

Tang Band speakers



Bob

Sep 2016 Sep '16

When installing a sound decoder we often must fit a loose speaker into a way-too-small sealed enclosure. Bass response always suffers. Standard speakers want to be in enclosures far larger than we can fit in our models.

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Sep 2016

A small Taiwanese company, Tang Band, has been producing a line of very high quality, small multimedia speakers, including some already in small sealed enclosures with passive radiators. In each the passive radiator, essentially a weighted speaker cone without a voice coil, is tuned to resonate at a frequency lower than the active driver. Set up this way, it extends bass response by about an octave.

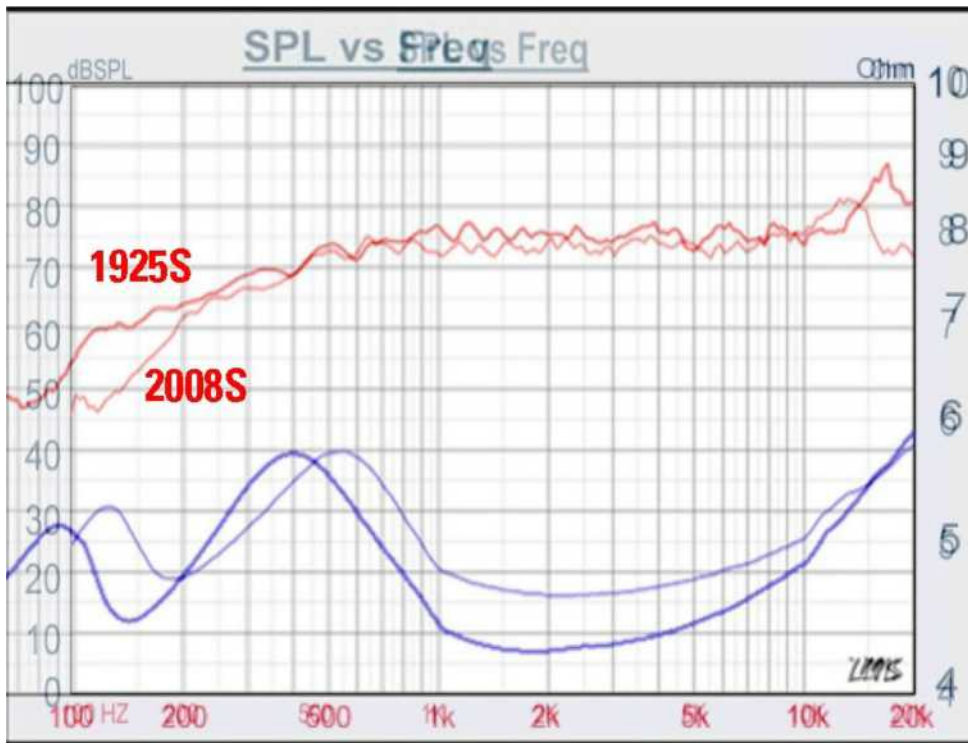
The 1925S and 2008S modules are more expensive than the typical model railroad speakers, but at the moment they are the best sounding I've installed, putting out much stronger bass and cleaner sound. The 2008S will distort at high volume, but is still plenty loud. It is rated at 1/2 watt, and the Loksound V4L decoder has a 3 watt amplifier. With this pair you do want to program the volume considerably lower than factory default.

Here's a recycled photo of the two modules side-by-side. The larger one easily fits in Alco and EMD hood units such as an RS11 or GP30. The smaller speaker is not as tall and fits inside Atlas SWs, under the radiator cutout.

Feb 26



I overlaid the data sheet frequency response curves of both modules for comparison purposes. The larger module has an extended bass response below 200 Hz.



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A good friend has speaker characterization equipment and measured a 1925 module. He confirmed the surprisingly-str response. ↩ W 🔔

These speakers are also available without an enclosure. Unfortunately, the passive radiators are not.

Do note that these are 4 ohm units. Some brands of sound decoders require 8 ohm speakers.

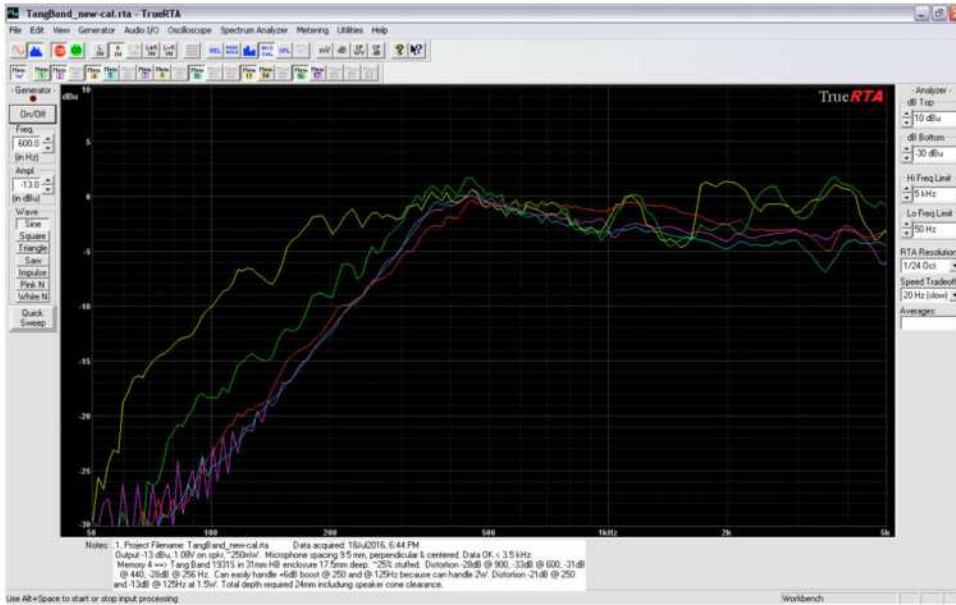
Sound samples can be heard in the Loksound Full Throttle thread.

Bob

Sep '16

I just received permission from friend Larry Hanlon to share some of his recent TB speaker measurements. To look at this graph you might want to click on it to enlarge.

Red: TangBand 1931S in 31mmx17mm deep commercial HB enclosure, ~25% stuffed. Aqua: TangBand 1815SA in 31mmx17mm deep commercial HB enclosure. Purple: TangBand 1925S in 28x28x12mm commercial enclosure, ~25% stuffed. Green: TangBand 1925SB module @ 2", shifted up 20dB to overlay. Yellow: TangBand 1931SB module @ 2", shifted up 20dB to overlay.



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These measurements were made in a room, not an anechoic chamber, so they have some extra ripples especially in the   

Green: TB 1925S speaker *module* shown in the previous post.

Purple: TB 1925 speaker mounted in a commercial 28mm x 28mm x 12mm commercial enclosure, filled about 25% with acoustic fill. It does remarkably well, losing only about 1/2 octave of bass.

Red: Larger TB 1931 speaker in a commercial 31mm x 17mm deep enclosure, filled about 25% with acoustic fill.

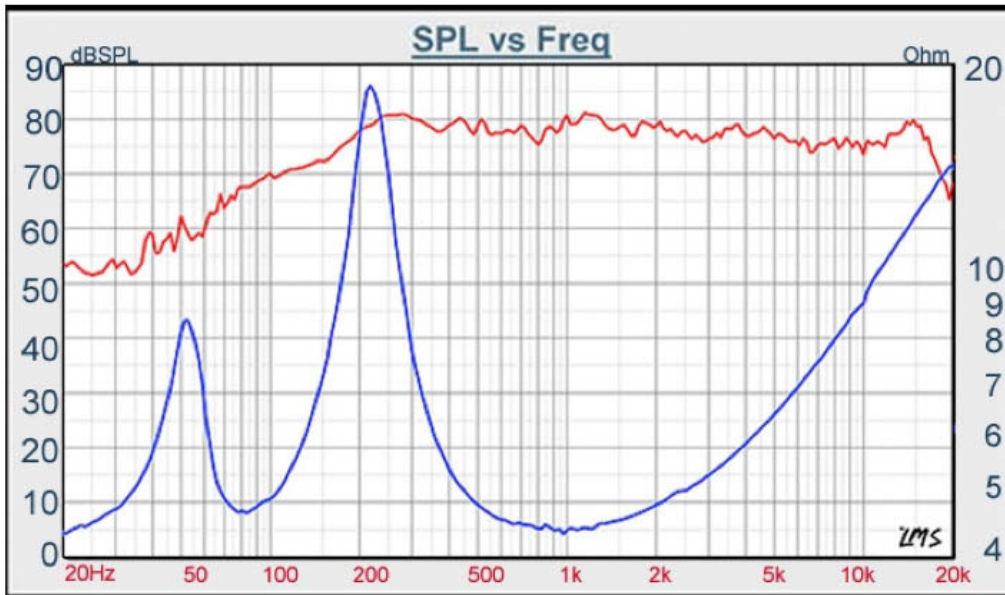
Aqua: TB 1815S speaker mounted in a 31mm x 17mm deep commercial "high bass" enclosure. This speaker is very similar to the 1931 except that the cone is concave instead of convex.

Yellow: The star of the set, TB 1931SB speaker *module*. This unit is too large to fit inside O-scale hood units, but can be shoehorned into many steam tenders. It is also too thick to fit in a P&D F-unit. Unfortunately, it is no longer available in quantities less than 200 pairs!

If you contact Parts Express, please lobby them to keep the 2008, 1925 and 1931 modules and speakers in open stock!

Another module I'm looking into is the 1828SD. This one has a cylindrical enclosure and a passive radiator on the bottom of the cylinder, if we mount it facing up in a locomotive. It is too tall to fit in an unmodified P&D F-unit, firing up into the dynamic brake fan exhaust. I would have to cut a 1.75" diameter hole in the brass locomotive frame and mount the passive radiator end below the frame, firing down to the track. It would require making a new motor mount. And it is quite expensive. But I'm listening to one right now, sitting on my mouse pad, driven by a V4 decoder and it sounds *awesome*. What to do?

Here's the rated 1828SD frequency response. Note that the left edge of the graph starts at 20 Hz. In the chart shown above in my previous post the graph starts at 100 Hz. The 1828 is down about 7.5 dB at 100 Hz, whereas the 1925S is down 20 dB at 100 Hz, and down about 7.5 dB at 250 Hz, almost 1 1/2 octaves deeper bass.



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CentralFan1976

Sep '16

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These speakers do a fantastic job, and with F0 (minimum frequency response) in the 75-80Hz range, they are well worthy of installing even in the lowest-fidelity sound systems. Personally, just swapping out the speakers, have seen a 2-decade drop in the low end response.



Here's the factory speaker:


And the Tang Band speaker:

Sorry, there is no sound of the speakers. Look for other videos that do show the difference.

Bob

Nov '16

CentralFan -

Checking the Parts Express web site today (Nov 1 2016) shows that they will be stocking the 2008S, 1925S and the 19.  speaker modules in single quantities instead of pairs. That's great news for model railroaders who work in larger scales, and you will be able to get more of the larger '31s with their extended bass response for your speaker upgrades.

Sep 2016

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Sep 2016

CentralFan1976

Nov '16

I saw this! And very excited...

Thanks!

- Mario

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Bob

Dec '16

Mario - The 1931S pairs are showing back in stock on 13 Dec 2016. Parts Express are still waiting on single units.

PeteM

Jan '17

FYI single units of T1 1925S are now showing in stock at Parts Express. 4 or more for a discount. 😊

Bob

Jan '17

Woo hoo! Thanks, Pete. I'll be ordering more.

PeteM

Jan '17

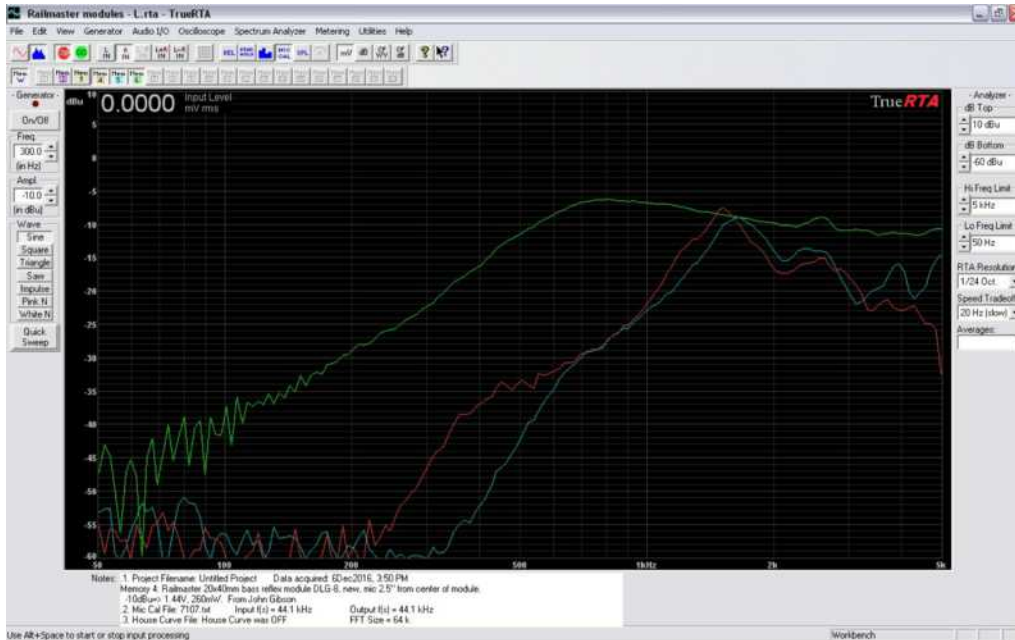
You're welcome! It's thanks to you that I found them. But I came in after the gold rush in the fall of last year. I think I got the last 4 at Parts Express and then found 2 more at Solen in Quebec (I'm in Ontario) and that was it for almost 4 months.

Bob

Jan '17

In the thread *Car & Locomotive Shop RS11 Sound Install* Frolin asked whether the Tang Band 1925S module was that much better than a Railmaster bass reflex speaker. Earlier in this thread there is a measurement by Larry Hanlon showing the 1925S module.

Larry recently sent his measurements of the Railmaster DSM-8 18x35 mm and DLG-8 20x40 mm modules, along with one of the new "sugar cube" or cell phone speakers, a CUI CDS-18138A. If this or the previous plot appears difficult to read, click on it to enlarge.



Larry's notes:

Railmaster DSM-8 and DLG-8 speaker modules. Neither module has any low end. Red: DLG-8 20x40mm speaker "bass reflex" module; Cyan: DSM-8 18x35mm speaker "bass reflex" module; Green: CUI CDS-18138A micro speaker in "minimum" 2.8mL enclosure. This enclosure is .030" styrene, .5" deep, built right around the speaker which forms the front face, and is about 50% filled with polyfiber. The moving plate of the micro speaker is facing out, and the enclosure is otherwise completely sealed.

These response curves were measured with 260mW driving the speaker, and the calibrated measurement microphone spaced 2.5" from the center of the modules in order to "see" the "bass reflex" port. Spacing from the CUI micro speaker was 1cm, which is why its output appears greater.

In my opinion this graph explains why HO and N scale enthusiasts are quickly switching to the new technology cell phone speakers.

That said, the Tang Band 1928S module puts out a **lot** more bass for O-scale than the sugar cube, usefully extending down to about 200 Hz, and can handle considerably more power.

ErikLindgren

Jan '17

Bob,

I am going to give these speakers a try in an upcoming project. Following your lead sir. Thank you for the data and research.

Erik

Bob

Jan '17

Erik -



If your secret project is steam, you might look into a 1931 module fitted in the tender, with the floor opened up with a lot more holes.

Sep 2016

This module really rocks in the bass department. Useful bass extends down to about 120 Hz. The Loksound L series decoders have two speaker outputs, so it might be possible to fit a second, smaller speaker in the smokebox at the cost of two more wires between the engine and tender.

2/9/17

Sep 2016

ErikLindgren

Jan '17

Bob,

You guessed it, I'm a sucker for steam. I want to start with my L-105 it's large and would really benefit from Loksound and your installation. I am planning on giving it a try!

Feb 26

Thank you for sharing this valuable information with the community.



Eternally grateful

Erik

ErikLindgren

Jan '17

I should add I will most likely be picking your mind on this as I go along.

Bob

Jan '17

A good external microphone arrived today for my iPhone, a Shure MV88 stereo unit. I had to give it a try.

This is a near-field recording, made about 3 inches away from a Tang Band 1925S module. The sound file is ESU's new 2000 HP 12-cylinder Alco 251 that I wanted to audition for an RS-32.

<https://photos.smugmug.com/photos/i-6bGBz4x/0/640/i-6bGBz4x-640.mp4>

The A&O is "O-scale in your face" so at times your ear can get up-close and personal with the equipment. I can't wait to railfan the RS-32! And hopefully this recording will give you an idea of what can be accomplished in O-scale.

The other option would be to try one of these tang band 1925S speakers and have it point up and out of the fans in the top of the long hood. The F0 of this speaker is actually higher than the TDS speaker and the power is the same, although it can get louder since its 4ohms.

I am worried that the sounds of the 1925S would be muffled quite a bit by trying to go through the small fan openings in the roof, but since the frame of the locomotive is already milled out for a speaker, perhaps thats the better option? Any opinions? Or maybe its worth trying it both ways and see which one is better...which is what I am trying to avoid.

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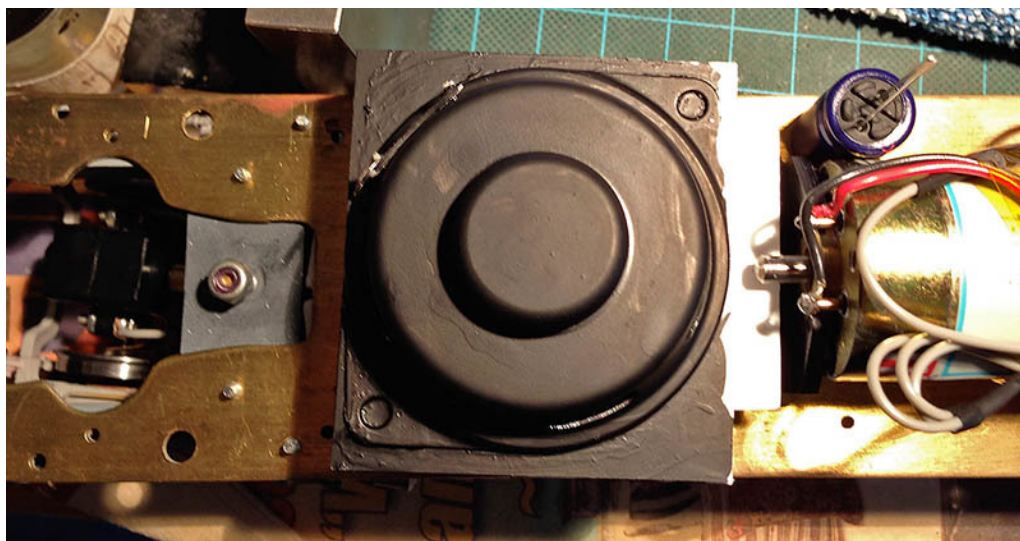
Bob

Jan '17

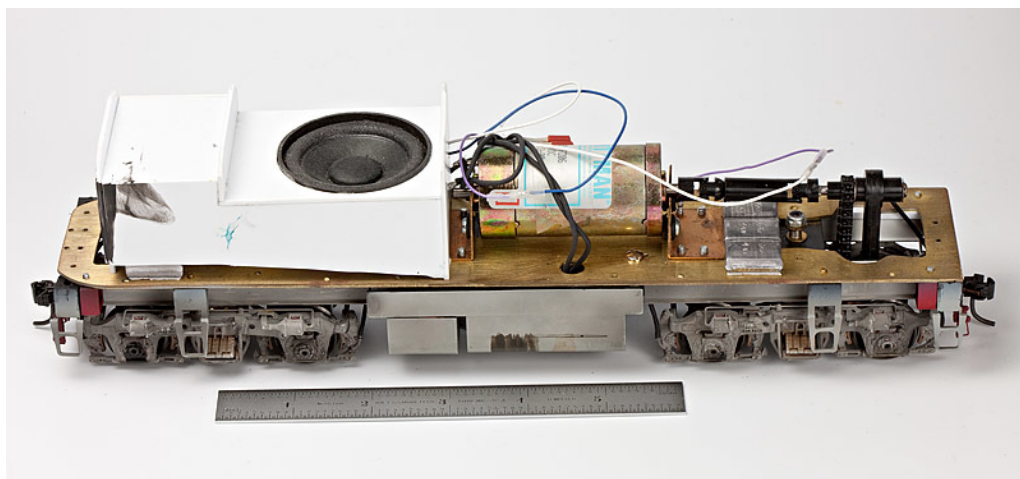
Dave -

We have no frequency response charts on the 1.77", but I can offer anecdotal evidence. In my ABA set of F3s, one has a 1.77" QSI (now TDS from Tony's Train Exchange) and the other two have the no-longer-available 2.07". Subjectively the 1.77 has a poorer bass response than the 2.07 during a run-by. The B unit has a much bigger enclosure and that helps bass response quite a bit, but it still isn't as deep as the 1925S module. Here's the only (lousy) photo I have of the 1.77" during its initial install 7 years ago.

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Here's the 2.07"going in the B unit.



The TB 1925S module has the same rated resonant frequency, 150 Hz, as the 1.77" in free air. The impedance chart shows two resonant peaks, one for the speaker and a much lower one caused by the heavily-weighted passive radiator. Once I installed the 1.77 in the biggest enclosure I could, f0 went way up. Comparing a speaker in free-air against another in a sealed enclosure is apples to oranges.

Although I didn't measure f_0 with the 1.77, I did measure the 2.07 once I put it in an enclosure. QSI stated that the 2.07 has a free-air f_0 of 150 Hz. For the sake of illustration let's assume that is correct. After putting it in a sealed enclosure for the F3A, roughly 2" x 2" x 1.5" deep and stuffed with fiberglass batting, f_0 went up more than an octave when driven by a 50 ohm function generator and measured with a digital oscilloscope. If I recall it was now somewhere around 350 Hz, but that memory could be faulty.

I have 6 more F3 kits to build, with TB 1828SD modules waiting for them ($f_0 = 75$ Hz.) This ABA set will probably be left  because I have so many more engines of all kinds to prepare for operating sessions.

Sep 2016

As for the 1.77s, if they are an easy drop-in, that might be a compelling reason to try them. Switching to a 1925 would be a no-brainer if the SDs were produced with brass screened instead of solid plastic radiator intake grills. Locating the round driver directly under a pair of the fans might not be too bad. Bass will still find its way through the body shell and out the bottom, particularly through the now-empty speaker A-frames.

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For a quick test of a 1925S, without a decoder transplant, you could put one in series with a 4 ohm resistor and drive it from Scott's factory decoder. There won't be as much damping of the cone and that will have some influence over the frequency response.

All the best, Dave. Stay in touch as you proceed.

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DaveJfr0

Jan '17

Looks like I'd skip the QSI speaker, okay. Will probably try to see what the difference sounds like between 2 SD9's with different speaker setups.

That 1828SD is a beast. Good luck shoehorning that guy into even an F unit. I'd probably stick with 1931S for ease.

And speaking of uneasy, have you guys experimented with removing width from the side of a 1931S to make them fit?

Looking at some measurements, looks like if I could take another ~4mm or so off the width of the 1931S, I could make that speaker fit in anything I have...Weaver VO1000, AtlasO GP35, AtlasO RS1, etc.

Does anyone recommend any tools for easily removing material from the side of an enclosure? I'm pretty sure a file ain't gonna cut it, lol. The process would need to be easily replicated and consistent. I was thinking maybe a bench grinder or a standing band saw with very careful movements...thoughts? It's a shame they aren't just slightly narrower.

DaveJfr0

Jan '17

Oh and for those placing orders...\$100 gets you free shipping...they also have a 10 off 100 that expires in 3 days with code S16EVT.

Good deal if you're buying 7 1931's I suppose.

Then it appears there will be a new code for 10 off 125 that expires in March. Code PCJQ17

Either are a good deal if you want 8 1925's.

Bob



Jan '17

Dave -

Sep 2016

The tool for that job would be a vertical mill. However it is highly unlikely that there is 4mm that could be removed without cutting off the sides completely. The module needs to be sealed.

The 1931 module is 36mm wide but the active driver is 31mm across its rim. I don't know how wide the passive radiator is. Carefully shaving off 4mm would only leave at most 1/2mm of wall thickness on either side of the driver. That wouldn't work. I suspect the SD9's fuel tank is too short for a 1931 firing down.

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As for the 1828SD, it *can* be fitted inside a P&D F unit if I mill a hole in the brass frame for the passive radiator. Some of the front motor mount will have to go along with some of the simulated frame rails on the underside. I might need to make new porthole glass so the speaker can clear. With adequate ground and truck clearance the module has some room beneath the roof to breathe.

Being a coal road, the A&O uses dynamic brakes so sound can exit the fan slots and along the side DB air intakes.

A little speaker cabinet damping material glued under the DB hatch may dampen some of the inevitable cavity resonance. In the second photo I was listening to that resonance. It can be "tuned" by holding the speaker at various distances from the roof. Knowles did something like this with a cell phone speaker firing against a padded wall only a few mm above the cone. Sound came out sideways from the module, through a slot.

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The HO decoder is only for sound tests. The big Pittman motor would quickly let the magic blue smoke out.

Stick to the 1925s unless you think you can somehow make the SD9 carbody wider inside!

DaveJfr0

Jan '17

Recalculating my measurements would mean I need to remove roughly 2.5mm of material rather than 4. In either case, I think it will be too much effort to do that for every hood locomotive that needs it. Too bad...f0 of 105 is much nicer than f0 of 150.

And wow...that monster in every F unit? Gonna be interesting to see that consist in person.

Bob

Feb '17

Dave F-

I made a near-field recording of the 1828SD module playing the ESU 567B/C 76311 sound file. The speaker was open air, held so the passive radiator was about 1/2" above the table top, module facing up, as it will be mounted in an F-unit with the passive firing down at the track. I did not simulate car body sound apertures through the dynamic brake side and roof grills.

This recording begs for a good set of external computer speakers for playback. I will need a lot of restraint to keep the volume turned down during operating sessions. 😊 Anyway, it does show that much higher quality sound can be had in O-scale.

<https://photos.smugmug.com/Trains/Model/PandD-F3s/i-tPzkHn9/0/640/TB%201828SD%20Module%20ESU%20567B-C%2076311%20take%20two-640.mp4>

Enjoy

jonnyspeed

Feb '17

Thank you very much for the research and data. I just ordered several of the different sized modules to experiment with. I'm really looking forward to hearing the results.

Jonathan



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jonnyspeed




Feb '17

I've been doing a lot of research on sound in model railroading lately, since watching these Tang Band speaker videos. I've been measuring frequency responses of different speakers, models, and scales - including the prototypes. Obviously we know that it is very difficult to get true low bass frequencies due to the small relative size of our models, but what does "bass" really mean?

I've analyzed the low frequencies of several prototype diesels and steam engines. In general most diesel prime movers have a low rumble right around 40-50 Hz. This is true bass that you can feel as well as hear when you are standing near the engine. Steam engines also have many different sounds that drop below 80Hz.

So what does this mean for our models? In general terms I have found a large discrepancy between "average" and "best" in the different scales. Example, it seems that most casual listeners make comments about "good low end" when they hear tones ~500Hz.

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The interesting point about that is 1. 500Hz is obviously far off from what the prototypes are doing and 2. 500Hz is actually achievable from O all the way down to N. Factory speakers in O will get to ~400Hz pretty commonly. Factory HO speakers like Intermou    th LokSound decoders get to ~500Hz then roll off. Factory N scale cell phone type speakers, believe it or not, are not far off of HO in the 500-600Hz range.

What about "best" type install? I have been able to get down to and below ~100hz with Tang Band speaker modules in O scale, as have others. This is significantly better bass than many aftermarket installers are getting with "high bass" speakers. The best HO installs I've found have good response down to ~300Hz which is close to factory O installs. Those installs tend to use cell phone type speakers, which happens to be what the best N scale installs use as well. So I guess it shouldn't be a surprise that the best N scale installs I found use two cell speakers and get down to ~350-400 Hz.

So what does this all mean? I think it shows that there is a lot of room for improvement in bass response in all scales over the factory speakers. It also means that if you can basically "move up a scale" by upgrading. I was most impressed by O with Tang Band and N with cell speakers. N can really be made to sound about as good as HO. Of course if you want the best relative sound O scale wins. There is a big difference between sub 100Hz and 300Hz on the low end.

I'm working hard to see how close to 50 Hz I can get 😊

Bob

Feb '17

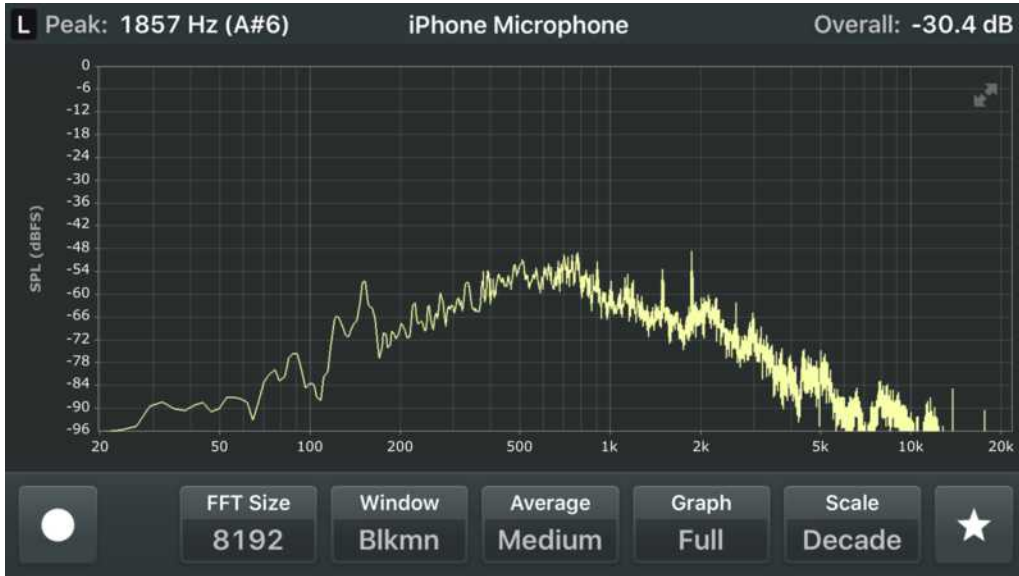
Care to share some of your frequency response plots?

jonnyspeed

Feb '17

Sure Bob. These aren't scientific results. They are taken with my iPhone 6 microphone, but they are useful for relative comparisons.

TB 2008:



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I don't have a chart for the larger TB module in the S4 yet. I will get one soon, but my ears tell me I'm on the right track 😊

Stock speaker:

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With TB:



Jonathan -

Thanks!

Just a clarification here for the readers. The frequency response plots from Tang Band and those measured by Larry are just that. The speaker sound level is measured while being driven by a sine wave of constantly-increasing frequency, using an individual calibrated measurement microphone.

Unless I missed something, the iPhone plot shows the sound pressure level while playing a decoder sound file. Because the sound file itself does not contain equal energy at each frequency (or is not a pink noise source) we see the product of the decoder's sound file and the speaker's frequency response. It is an apples-orange comparison.

Regardless, your measurement is quite interesting, and the sound comparison "speaks" for itself. I'm pretty sure you would enjoy the sound even more if you disconnected the pancake OEM speaker because its midrange resonance can still be heard.

Was that the 2008 or 1925 module?

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jonnyspeed

Hi Bob,

Here is my latest install of a 2008 into an S scale SW1:

Mar '17

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ErikLindgren

Fabulous 😊

Mar '17

ErikLindgren

I can't wait to start working this into my Santa Fe PA's of course with Alco appropriate audio files... Bob... as usual. Just incredible 😊

Mar '17

ErikLindgren

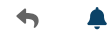
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CentralFan1976

Apr '17

Erik; ATS shoe on that PA?

ErikLindgren

Apr '17

This is a 1949-early 50's era detailed set #62L - A and #78L research by Gary Schrader and company imported in 2010 by Key Model Imports. They know Santa Fe. I weathered lightly and plan on following Bob's lead on DCC and sound also with my L-105 and M68. Thanks

for the reply.



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CentralFan1976

Apr '17

Really. Good to know.

I was surprised because the ATSF installed ATS on the line through Raton in 1947, and I know that these frequented there, thus limiting them to 79mph without them.

I'll still install them on my PAs!

Thanks!

Bob

Apr '17

Nice illustration/photos, Erik!

The PA should have plenty of room for a large speaker install unless the height from the rear drive shaft to the roof is limited. If it is a "tank drive" then no worries.

I haven't been inside many O scale steam engines. There should be plenty of room for a gutsy TB speaker in the tender, but in O scale our ears can easily home in on a single speaker location. Stack talk is just that, from the stack. Is there room in those engines in the front of the boiler? Are the stacks open to the boiler, or sealed? Post some photos of the guts with dimensions.

ESU L V4 decoders have two 4 ohm speaker outputs, which could be used for a smaller driver in the smokebox and a larger one for bass in the tender.

Craig

Apr '17

Now Bob...we just have to figure out how to blow smoke at someone if they look down the stack for the speaker 😊

Frolin

Apr '17

Craig, a one-time-only option for smoke is possible, but requires a new decoder every time you want to use it again! har har

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Bob

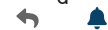
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Craig -

Or something! For some reason my mind wanders to an old 3 Stooges movie in which Curly orders clam chowder and finds out that the clams are "really fresh!" 😊 Sometimes steam engines would burp and send a jet of water up the stack. Evidence of that could be seen on the UP steam shop drop-ceiling until new management removed the building's insulation.

I haven't opened up the N&W Mollie boilers just yet, but there may be a chance to install a second speaker in the smokebox to fire up the stack. The V4L decoder has two amplifier outputs (a stereo class D amplifier chip) so driving a second could be possible. Or the sound could fire rearward from the smokebox and exit around the gear tower. This would still move the sound stage a little bit forward

Feb 26



ESU is one of the last decoder brands to support a cam, but their version uses tiny magnets and a Hall-effect sensor (no cam bounce!) I can forgive mis-quartering in HO because everything is small but in O scale the chuffs need to start at 0 degrees, not 45 degrees, and stay in perfect sync.

Frolin -

Been there, did that...

CentralFan1976

Apr '17

Hi, guys!

I wanted to share with you first that work is progressing on the Tang Band install in one of my F-units. Here's the fuel tank that had been machined to accept the T1-1931S.



Thanks!



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Bob

Apr '17

Nice! Please share more photos as the install progresses. I'm sure you will love the sound.

ErikLindgren

Thank you Bob! 😊



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CentralFan1976

And ladies and gentlemen, the crowd pleaser! Tang Band T1-1828S.



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Thanks!
-Mario

Bob

Jun '17

Mario -

Thanks for calling out this new TB module. 👍

That speaker is a brute! It has a bit lower bass response than the 1828SD module I'm installing in P&D F units. Because it is 5mm narrower, I might be able to fit one in an N&W 4-8-0 tender. Must make a wood mockup for space planning.

CentralFan1976

Jun '17

I did the same thing!



Thanks!

- Mario



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CentralFan1976

Jun '17

It's alive!

Bob

Jun '17

Bwaaaaahaaaaahaaa!

Sorry dear readers, I'll try to recompose myself. It is just that I'm still looking for my lower jaw somewhere on the floor. 😊

Well done, Mario! Those are *awesomely gutsy* chuff sounds. 👍 Crowd pleaser, indeed!

Watch out near maximum volume because the Lionel sound board may not have been designed to drive a 4 ohm speaker at full volume without distortion (some distortion was audible after you cranked up the volume potentiometer.) If Lionel designed the sound board for 8 ohm speakers it might ruin your day over time. Take an ohm meter to the Lionel OEM speaker and see if it is about 4 ohms or 8. That huge TB speaker module can take pretty much whatever an in-form-factor decoder can throw at it without complaint. The decoder may not. If that is the case, add a 4 ohm 1 W resistor in series with the TB module and you should be good to go.

Anyway, that is *seriously delicious* steam sound!

O-scale. There is no substitute!

Not even Porsche.

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David

← 🔔 Jun '17

Amazing sound, Mario. Makes me wish I was in the steam era. Good work.
Thanks for sharing your journey with us.
David

CentralFan1976

Jun '17

Thanks!

What you don't see is the 4ohm neodymium laptop speaker tucked in under the electronics and on top of the gear box (which I rebuilt to eliminate slack) that points down and out of the bathtub shell. This small speaker adds what the Tang band cant; high end nuances to the whistle and chuff, which now sound like their coming from the steam chest. The human ear really can't tell directionality of low frequency sounds, like the chest-thumping speaker in the tender.

Even with an iPhone 7+ and 4K camera, you really can't tell how low it goes.

Thanks!
-Mario



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Bob

Jun '17

Spectacular sound, Mario! I imagine folks in the club were wowed when they heard it run on the layout.

Alas, I measured my N&W 4-8-0 tender and the T1-1828 won't fit due to the way the bottom of the brass tender shell is reinforced. Looks like I'll have to drop back in size to a 1931 module.

The Loksound V4L decoder has two speaker outputs (presumably it uses a class-D stereo amplifier chip) and I'll see if I can install a second speaker, possibly a 1925SB loose driver, if room in the smokebox permits.

When you get the 1931 module in the F-unit fuel tank running, please let us know.

Bob

Mar '18

Jonathan -

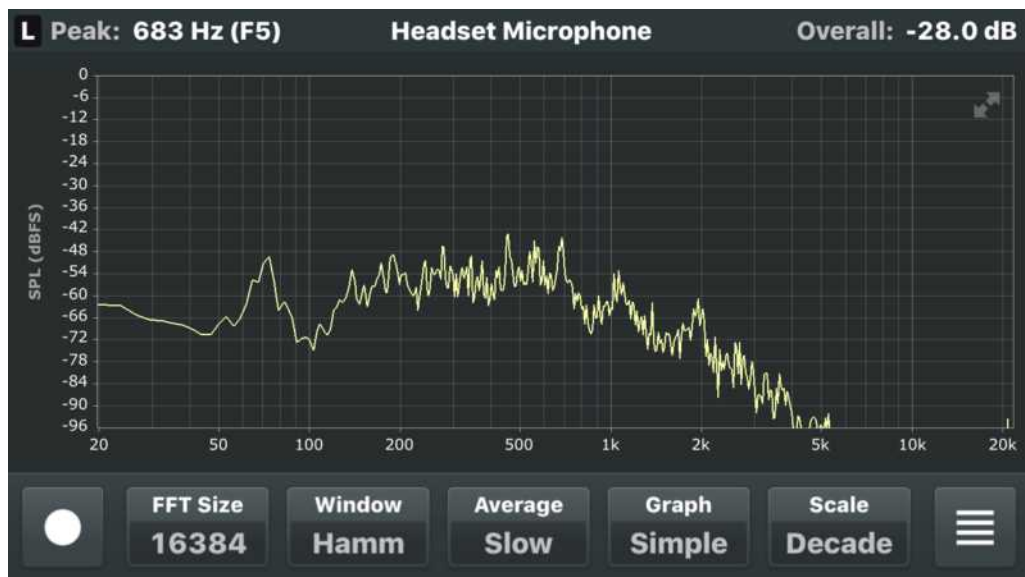
I recently bought an inexpensive but individually-calibrated external iPhone microphone for sound measurements from Parts Express, a Dayton Audio iMM-6. Currently I have the same analyzer app that you have.

Now I haven't *yet* set up an amplifier to drive a TB speaker with pink noise, to measure the *speaker* frequency response in an install, but like you I did measure the SPL of a TB speaker driven by a Loksound decoder.

In this case the speaker is the huge 1828SD module, which I can fit firing up, behind the cab, in P&D F3 units after milling a hole through the brass frame, with a V4L decoder loaded with the 76311 EMD 567-16 BC (FT) file. So this is a measurement of the ESU file + speaker + install Sound Pressure Level (SPL.) It is not a system frequency response plot.

It is known that ESU adds some bass boost to many of their diesel files. But I didn't expect to get this much bass down at 70 Hz. The TB data sheet says the speaker response alone drops about -8 dB at 70 Hz.

Here is an SPL plot of the decoder+speaker+shell running at idle, measured from 1 foot away, a common viewing distance on the A&O.



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In LokProgrammer one can assign a throttle function to "Fade out sound." By assigning it to a "Not function key" I can set a low, default operating session volume and a separate "bring down the house" loud volume for demos during clinics.

By the way, a bass peak at about 70 Hz corresponds to a 2-stroke V16 engine idling at about 260 RPM.

bigtrainjames

Jun '18

I was digging around the Tang Band site tonight, looking for some specs. I stumbled onto a speaker module that I have not seen before. It may be applicable to carbody style locomotives.

New Tang Band speaker

The module isn't all that much shorter in height (about 8mm), but it is significantly narrower than the 1828SD module (about 17mm). The trade-off of course is in the bass response. 95 hz in the new speaker, 75 hz in the 1828SD.

I really need to send them an email requesting the rectangular modules with a max width of 1.25" or possibly even 1.375".

Jim

Bob

Jun '18

Jim -

Parts Express has been selling the T1-2025SC for a while. Both in width and height it *might* just fit vertically in a single-tower P&D F-unit, although the front motor mount may require modification if the cab detail kit is installed.

That said, there would be little clearance between the bottom passive radiator and the brass frame. The P&D shell is 1.65" from frame to outside edge of the roof while the 2025 is 1.47" tall. The roof has an arch shape so it might be possible to take advantage of that for a little more vertical clearance.

Since you mention a max width, TB has a T1-1925S module that is only 29mm / 1.14" wide. That's my go-to speaker for scale narrow hoods like GPs. They have a smaller module, the T0-2008S at only 24mm / 0.95" wide that I use in Atlas SWs. Both of them are in stock.

Sep 2016

bigtrainjames

Bob,
I've got both the 1925 and 1931 on hand. I'll be using one or the other in my sw1500 project and other hood units (the sw1500 style radiator isn't as deep as the early sw's like you model).

I thought the 2025 might be new as I hadn't noticed it before and I only recalled you talking about the 1828, which would require frame milling and several other mods to fit into an F unit. It sounds like you already have it covered.

Jim

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Bob

Jun '18

Jim -
Thanks for the heads-up about the 2025. Frankly if the 2025 had been stocked some years ago, I might have initially purchased them. But because I already have in stock 1828s, I'll intend to follow through with planned chassis/frame/underframe modifications.
All the best!

jonnyspeed

Aug '18

Wow Bob. That is telling isn't it. It isn't overly boosted so I imagine it would sound really good. Thanks for sharing! This is getting good 😊

bigtrainjames

Aug '18

There was discussion earlier in the thread about the viability of the Tang Band 1931S module for use with hood type locomotive shells. I had been hoping to use the 1931 in my switcher project based on an Atlas mp15dc, but there was definitely going to be some grinding or cutting needed to make the speaker fit without causing displacement of the shell. I finally bit the bullet and started modifying parts, knowing that I might mess up the speaker module or breach the enclosure while removing material. Here are the results.

My goal was to remove some material from the sides of the speaker module and also from the inside of the Atlas shell, making the speaker narrower and the shell wider. The speaker enclosure began at about 1.420" width at the top face. The sides are generally slightly narrower than the top, but there are ribs spaced along the sides that match the width of the top face. The Atlas hood began with a width of about

1.372", with a wall thickness of about .085", but there is a problem where the recess for the hand brake on the left side protrudes into the cavity behind. The back side of the hand brake recess can not be thinned, so most of the material was removed from the right side of the shell.

I started out on the speaker module with a bastard file applied to the sides. Whatever type of plastic is used is pretty tough. I wasn't making much progress, so I switched to a Dremel with a cutting tool. I was hesitant to do this as I was worried about controlling the shell and the Dremel, and not slipping up and cutting a big hole in the speaker module. A mill would be ideal for this operation, but I don't have one, so the Dremel would have to do. Taking light cuts and being as firm as possible, I was able to remove material from both sides of the enclosure to the point where it now measures about +/- 1.395" along it's length. I was even able to remove additional material in the area of the hand brake recess, which falls between the primary driver and the radiator section, so that the width is about 1.375". I didn't try to remove any more material anywhere else as it wasn't required for my use and I didn't want to risk an error. But further experimentation might reveal that the enclosure could be narrowed to 1.375" along it's entire length. I'll cross that bridge when I need to. I cut the end mounting tabs off with a compound miter saw. This might not be necessary in a larger locomotive, but my switcher will be a tight fit so the tabs came off and I will use double sided tape for attachment.

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Aug 2018

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On the shell, I cut to the chase and went straight to the Dremel. It was easier to be confident as I knew the wall thickness of the shell, where on the speaker I would only know if I had gone too far after it was too late. Taking light cuts and checking often, I removed about .028" of material from the engineer's side of the shell. The open width inside the shell is now +/- 1.400" in the area where the speaker will reside. With the speaker installed, I put a straightedge along the sides of the shell to check for any bowing, and was pleased to see that the edge lay flat along the length of the shell.



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My only concern now is whether there will be vibration issues if the speaker enclosure is touching the shell. I won't be a  to  if I get everything wired up and tested. Fingers are crossed. The other issue is that even with the mounting tabs removed, the 1931S eats up a lot of space inside the shell. Coupled with the Loksound L motherboard and decoder, it makes things pretty tight in there. I'll deal with it for what I hope will be awesome sound.

I would like to think that based on the results here that the 1931S module could be made to work with other hood type locomotives. I will certainly be trying the same installation on another Atlas loco in the future. I would like to be able to modify the speaker with more precision, ideally with a mill. I'd like to have cleaner looking results, only because I'm compulsive, even though nothing will be visible... And I may discover that the sound isn't satisfying or there are other issues once everything is tested. But for now I'm pretty stoked with how things turned out.

Jim

[wmry1401](#)

Sep '18

I thought there was plenty of room inside my P&D Fs to put it in above the motor, wrong! So I made up 3 mounts tonight. I replaced the step screw with 1" long ones and slipped 1/8" tubing over them high enough to clear the drive. Various other styrene shapes leftover from other

projects completed them. Used canopy cement to hold in place and just a dab where the rod touches the chassis. Canopy cement is great



stuff if you have never tried it before.



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Bob

Sep '18

Kenneth -

Very interesting, and a nice clean install. I didn't expect that a 31 would fit there; obviously I was wrong. If you have not yet assembled the shells, may I ask how much vertical clearance there is from the peak of the round speaker cone to the bottom of the roof?

I haven't used canopy cement. Can the 1" screws can be backed-out to remove the speaker mounts for drive train access and repair?

Bob

Sep '18

Disclaimer: I'm not an audio engineer, nor do I play one on TV.

So... I ordered a calibrated USB microphone from Parts Express and purchased trueRTA software. I don't have access to an anechoic chamber like those used audio experts, but I do have a glass desk top, which might substitute for the track and roadbed.

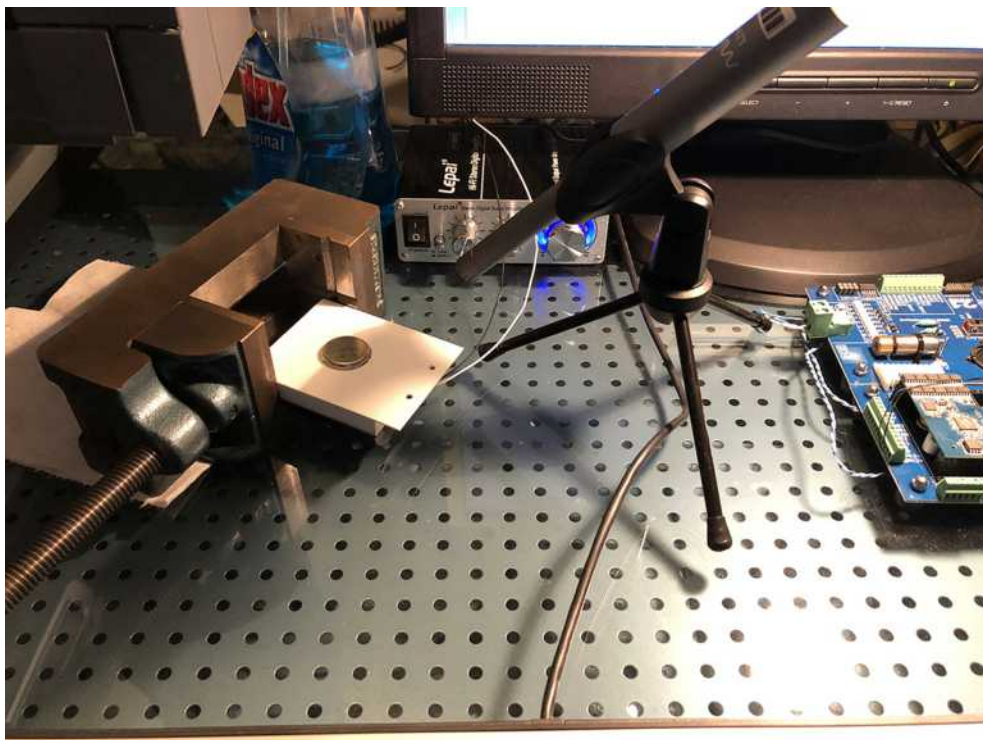
My first victims are a Tang Band 1931S module and a QSI 2.077" "High Bass" speaker I built into a Red Caboose GP9 fuel tank. Both were held above the desktop at proper heights they would be sit above the rails.

Subjectively, to my ears the TB module had more bass, but was not as loud. It sounded better being driven by a LokSound V4 decoder. Confirmation arrived in the frequency response plots.



The green trace shows the TB 1931, and yellow, the QSI. Note that the QSI is louder, but the TB has a flatter bass response. One can click on the plot to enlarge it.

Here are photos of the measurement conditions.

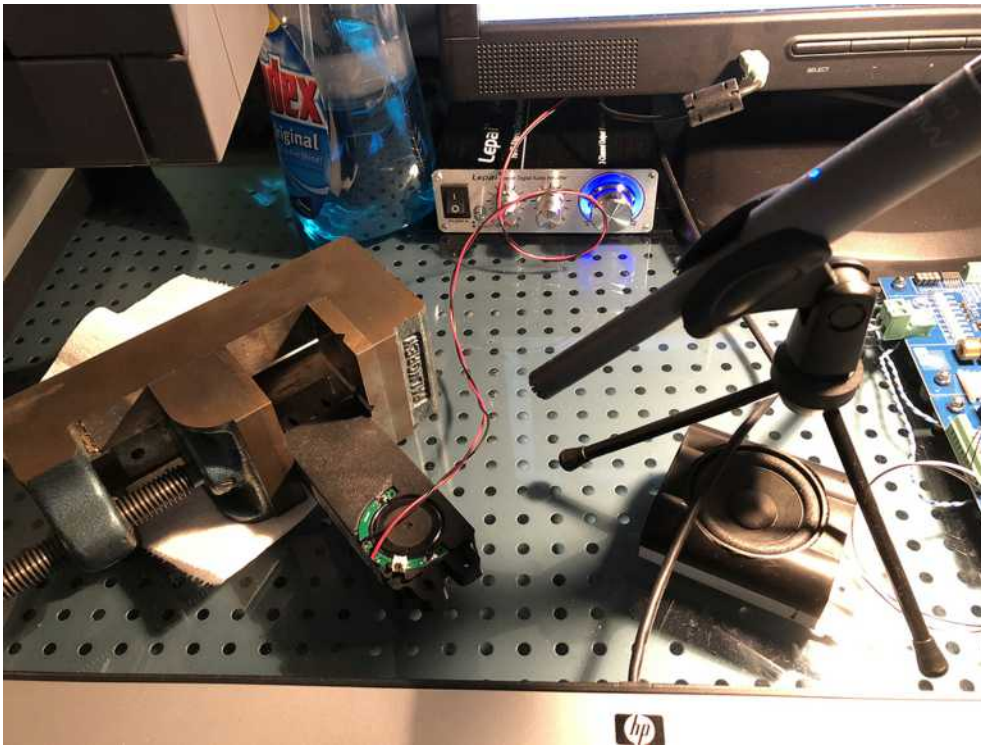


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bigtrainjames

Oct '18

I'm curious about the performance of the Tang Band facing upward. Not in comparison to the QSI speaker, but just in general. Is it worthwhile to test it in that orientation, without something like the desktop to bounce the sound off of? The Tang Band install in my sw1500 will be upward facing, firing out of the radiator core, and I am inclined to think that most of my future installs will also be upward facing.

Bob

Oct '18

Jim -

Here's a plot of the 1931 module facing down and up. Generally I'm finding that downward-firing introduces an audible change in sound, with up-firing my preference. The yellow trace is firing up, magenta firing down.

This down firing measurement looks a bit different from the previous plot. It may have been held at a different height above the desktop.



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Oct '18

Interesting, and good, if you think the upward facing speakers produce better sound. I don't know that I have much choice in speaker orientation except in models with larger fuel tanks. So it may be a moot point. But it's always better when the moot points go your way.

Looking at the graph, I have some questions. Remember that I don't know too much about the technical aspect of sound yet. It looks like the bass rolls off more quickly with the upward facing speaker, below 75Hz? Is that relevant, especially at the 30-35 decibel level? I'm trying to get some context here. Do we even hear the bass at the lowest end of the spectrum at that volume? Can we discern the 5-7 decibel difference in volume? Or are we more concerned with the better volume in the range from 75Hz through 1kHz?

Lastly, I'm curious what constitutes an "audible change in sound"? Is it volume at a given frequency, or does it relate to factors like distortion or clarity?

Bob

Oct '18

James -

By the time we get 12 dB down relative to the response at about 1KHz, the bass is pretty much gone. I wouldn't be too concerned about differences below 70 Hz. Except...

By an audible change, I'm not implying a change in clarity or distortion. It is the relative emphasis of certain frequency ranges over others. It is a bit like holding an empty glass a few inches from your ear. You can hear the air cavity in the glass emphasize certain notes over others.

Don't get too wrapped up in peaks and dips. They were far worse before I applied 1/3 octave smoothing. A lot of them come from sound bouncing off surfaces in the "room", which means the physical room and *everything* close to the speaker, such as an old scanner, ALPS printer, computer monitor, myself, you get the idea. They are walls in a sound measurement cavern, not a proper anechoic chamber (spooky if you've ever been inside one, as I have.)

What's measured *does* change quite a bit when the microphone or speaker is moved. Speaker manufacturers often make their measurements near-field, with the microphone fairly close to a single speaker driver mounted in an "infinite baffle" (a large flat non-resonant wall.) In my earlier measurements the capsule was aimed at a spot between the speaker and passive radiator from about 1" away.

Bass response of the 1931 module *definitely increases* 😊 when I move the mic above the passive. That begs the question of which element should be directly under the radiator grill, the passive or the speaker? *The passive?*

bigtrainjames

Oct '18

Sep 2016

Well, that's even more interesting. I guess I should consider turning the speaker around on my sw1500.

I already have plans to wow my HO-centric local modeling associates once I get the decoder and speaker wired up. The layout I currently run on has several sound equipped locos, which I enjoy running more than I thought I would. More so the steamers, as I think that HO sound is more successful for them versus diesels. I'm planning to take my chassis and a test track over there and jumper to the rails for initial testing. I don't expect anybody to change scales, but I would like for them to have second thoughts.

By the way, since you mention the smaller speakers, I had a nice chat with Bryan Vianco two weeks ago at the Indy 2-rail show. We talked about the Tang Band modules, and a lot of other stuff too. He's a big fan of the sugar cube speakers, but then he also specializes in N scale dcc installs, so it makes sense.

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Oct 2018

Thanks for all the effort testing different scenarios. All this info should lead to some convincing sound performance.

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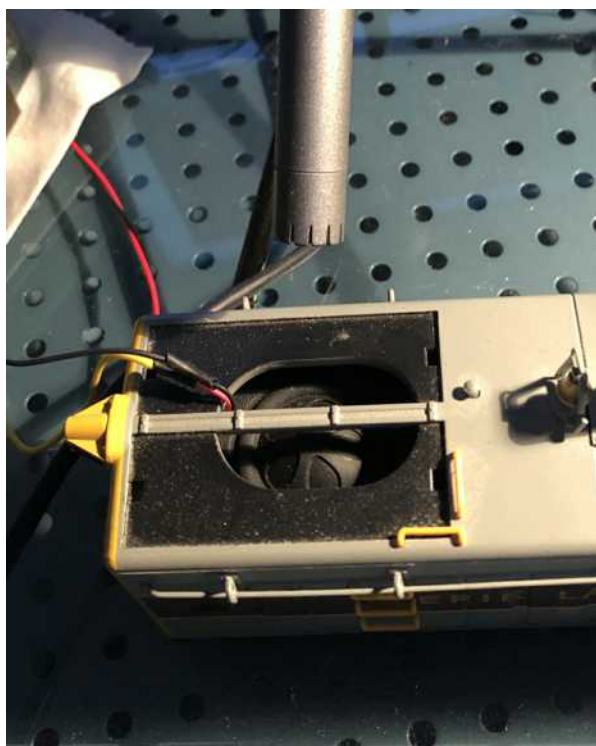


Bob

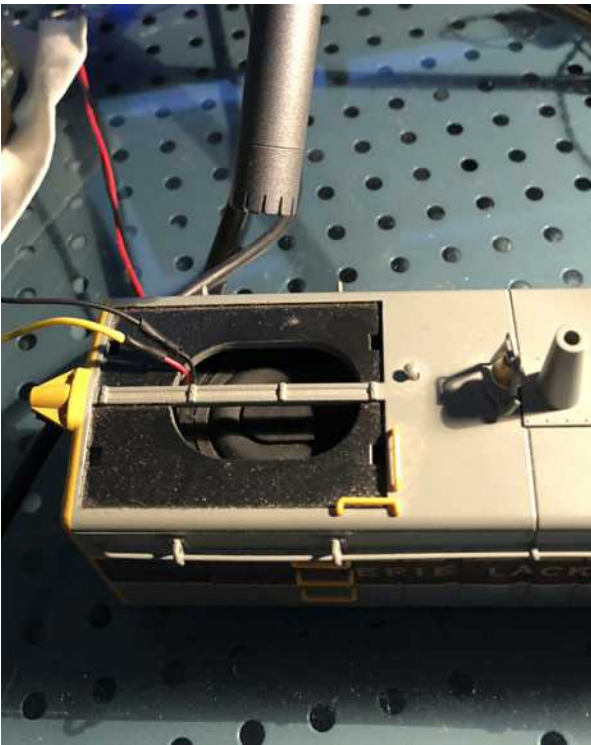
Oct '18

Turning around the speaker in an SW so the passive gets more grill exposure isn't intuitive but it might just work. For a quick and not all that scientific test, I set an Atlas O SW8/9 shell on top of the module, which sat on spacers to better approximate the final mounting height. Since I haven't yet milled off the posts sticking down from the roof, the speaker had to sit a bit low. I also plan to mill out most of the black painted area for a better appearance through new etched grills. Note that this shell is from an early Atlas production run. Later runs relocated the speaker to the fuel tank and improved attachment strength of truck side frames.

First photo: Measuring the speaker itself.



Second photo: Measuring the passive.



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Overall the setup was about 4 dB louder with the speaker firing out the hole, so in the measurement software I shifted the radiator response curve up by 4 dB for an easier comparison with the yellow speaker curve.



The extra 5 to 9 dB of bass below 100 Hz might be most welcome. My objective is better bass at a quieter overall volume. We will need a pair of SWs to switch the north end of Havens Yard because the switch lead runs downhill as it ducks out of sight. They should sound pretty nice shoving a long cut of cars.

Must build faster!

bigtrainjames

Oct '18

Bob:

Must build faster!



Preach, Brother!!!

Sep 2016

I'm going to turn my speaker around. The added benefit is that it puts the speaker connections at the end closer to the decoder. Less wire

**PeteM**

Oct '18

Very interesting results. I have all my Tang Band speakers mounted facing up, with as much air space and opened grilles, vents, fans and exhausts as possible above them. I found out by accident that they sound better and seem to my ears to have more bass. This proves it! 😊

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Oct 2018

Another advantage of this setup is that I can usually get the driver under or somewhat close to the bell which seems to make the bell more convincing. I think it's because the bell sound has the most directional treble content. The placing of the passive radiator end of the TB enclosure doesn't seem to matter much as the sound from that end isn't so directional. It just needs to have the most open areas above it to let the bass out.

Feb 26

Also I have used thin speaker cloth to cover any big holes under grilles and fans to hide the speaker and it doesn't seem to affect the sound.



Thanks for all the great testing, design and engineering ideas that you guys come up with. I'm continually learning from you! 😊

Pete

Bob

Oct '18

Jim -

As we contemplate turning the speakers around in our SWs, let's verify that there is sufficient vertical clearance above the speaker. That's the end that has the greatest cone excursion and stands taller due to the domed shape. There's enough bass boost in many of the ESU sound files to make that puppy really move. The frequency response *will* change with a shorter distance between the module and roof.

Pete -

Thanks for your report! Your experience confirms that we may be on to something useful.

Could a similar improvement in bass response occur with a smaller 1925S module installed in a Car & Locomotive Shop Alco? In an RS-36 I *might* have accidentally located the passive directly under the fan grill. I say *might* because the photo was taken before the install was finished.

PeteM

Oct '18

Good points Bob. As I've got more into sound quality after learning of Tang Band from you, I find I'm putting speaker loc for best sound performance right up there with smooth starting and slow running as priority 1. So now I'm looking more at the fuel tank use the decoder and keep-alive, leaving as much as possible of the space inside the loco hood for acoustic optimization. With brass locos there's usually plenty of air outlets, with Atlas and other plastic locos I'm opening up fans and grilles where practical.

Fun times!

Sep 2016

Bob

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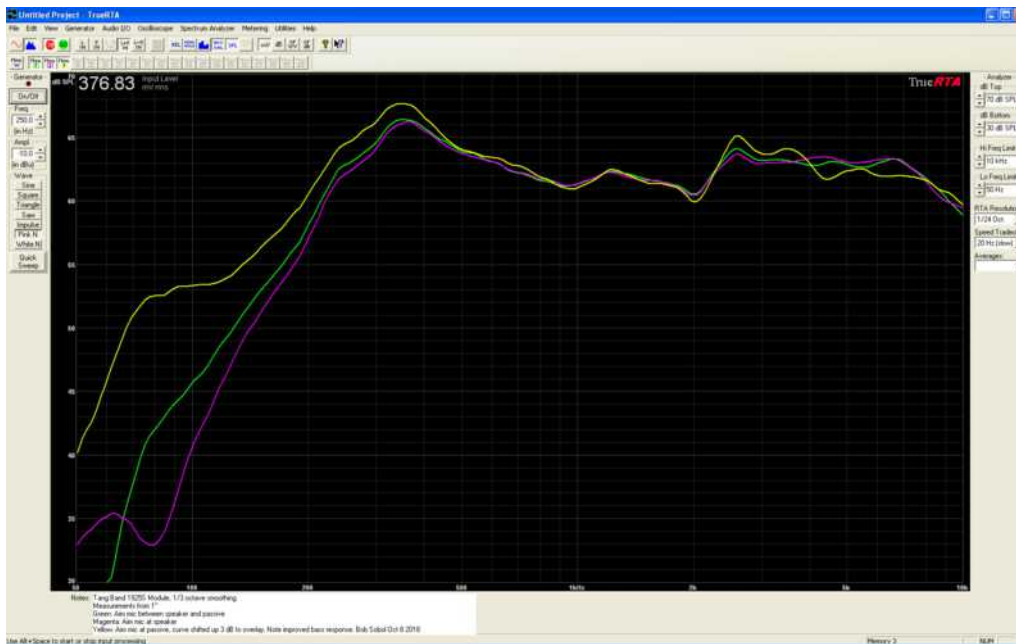
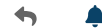
Just did a quick measurement of the 1925S module. In the following plot, which was 1/3 octave smoothed, all measurements were made from 1" away with speaker held in a vise.

Green: aim the mic between the round speaker and passive radiator.

Magenta: aim the mic at the center of the speaker.

Yellow: aim the mic at the center of the passive radiator.

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The yellow curve was shifted up 3 dB to overlay it with the other two curves. A "speed tradeoff" in the software was set to a slower rate, 20 Hz, and that produced smoother curves than the earlier 1931 measurements.

So it appears that installing it with the passive radiator directly under a screen or grill would offer slightly less volume but better bass response, about 3 dB at 200 Hz and 7 dB at 100 Hz. As always, things will change after installing in a locomotive.

PeteM

Dec '18

I thought I should show you my latest effort inspired by the great work I see on this forum! Basically a Tang Band 1942s with a motorized truck mounted on each end! 😊 Actually it's a P&D F7B with drive upgrade kit from Jay Criswell at Right-O'-Way.

I don't run it quite this loud for ops sessions, but it does get people's attention. Turn up the video volume and enjoy! 😊

<https://youtu.be/TEHlqudbWJw>



Pete M

Sep 2016

Bob

Dec '18

Hey, Pete!

I'm envious of both the sound install and the drive that Jay built for you. I wish I could afford only Jay's drives in my O-scale locomotives, much less one! Both are top quality.

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Dec 2018

That's some great rumble machine. What is your thinking to mate that awesome sound quality with a narrow hood diesel?

How do you like the Photo Throttle? I'd love to run a train with one, but it seems about 2x too big in every dimension, especially the depth. BTW I've run a GP9 and an SD9e, the latter with a train. Not to brag, but I loved the throttle response of the old cylindrical air throttle stands. Especially with 14 cars in tow.

Feb 26



PeteM

Dec '18

Hi Bob,

Glad you like it and thanks for leading me to Tang Band in the first place. So much fun!

Regarding drives, I decided on fewer locos but better running. So I'm culling the herd, mainly of Atlas China drives and putting the proceeds into Jay's drives. I sell off the Pittman motors and Weaver/P&D drives (some Finescale360 chassis and towers as well) plus I save about \$50 per decoder as I can use HO. I've dropped the power consumption of my layout overall by over 75%, so selling off 2 x 8A boosters as well. Ends up not far out of pocket.

The narrow hood locos are still a challenge speaker-wise. The TB 1931 just fits in the C&LS RS11/36, and the trick seems to be setting it as low down as possible and firing up, to get as much free air space and vents in the shell above it, just as you found in your recent testing.

As you know, the 1931 doesn't quite fit in RC GP9 hoods which is a shame. Perhaps it could be machined narrower, but beyond my capabilities. If we had budget, maybe we could get TB to make us a longer, narrower 1931, perhaps with 2 x passive radiators and the longest-throw/highest efficiency driver that could fit.

Or... I did like the look of where you were going with the custom enclosure idea, and with the passive radiator you don't need a lot of air volume inside the enclosure because you want max air pressure to drive the radiator. Maybe you could devise an enclosure for the 1931 driver and radiator that does fit in a narrow hood? 😊

Otherwise I'm limited to TB 1925s mounted as low as I can, firing up through as many open vents, fans and exhausts as available.

As for ProtoThrottle, I have to say it's the most fun and engaging item I've ever added to my layout. It makes the engineer's role and experience as realistic as everything else I'm trying to achieve operations-wise. It is a bit larger than most throttles but I find it easy to get used to. My hands are about 1.25:1 scale and you. But everyone who operates here seems to love it so far. I've had an operator who was an engineer tell me it's the most realistic experience he'd ever had operating on a layout. 😊

I highly recommend getting some hands on with it if you can.

That's neat you drove the real thing. I would love to try that. The closest I ever got was driving Flying Scotsman at Tyseley back in the early '90s. Nothing at all like an SD9!

A couple of pics of the PT in hand:



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Pete



Sep 2016

Bob

Jan '19

Pete -

Glad to hear you're having fun with the PT. There are mixed reviews at a large local layout, mostly centering around the bulk of the device. Driving the Scotsman must have been a real hoot, man!

As for selling off boosters, one important question to ask is "If I eliminate this booster, what will that do to the length of the DCC bus to the track?" The extra wire inductance can be an important consideration.

I recently did temporary installs of 1931 modules in a pair of Alco FA-1s. They sound great, currently a bit too loud. The rectangular 1828s *almost* fit. I had to fuss with one of the gear towers that wanted to lock up and bind. Ugh. Jay's drives would have been most welcome and I fully appreciate his disdain for that drive. But there is an FB-1 waiting to join the consist, so I would be in for 3 conversions, and that would be the tip of the iceberg. The A&O has been running out of motive power.

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**PeteM**

Jan '19

Thanks for the booster point Bob. I have my booster power districts separated through existing PSXs, just more PSXs per booster now. I only have one buss run over 30 ft' and I added a NCE snubber to the far end of that one. So far so good... :

Yeah, how come Tang Band doesn't take the width of O scale cowl- and hood- unit Diesels into account when they design their speaker enclosures - don't they realize the huge market potential? 😊

Those chain drives can be frustrating for sure. The best I got was to steal all your great tuning ideas, and add the FineScale360 tower kits. That at least gets you a top shaft that's parallel to the bottom shaft and has ball bearings, plus adjustable shaft centres.

Next up I was thinking about swapping the chains and sprockets for pulleys and belts but then I saw Jay's concept of a gearhead motor. Having the entire drive-train after the motor run 1:1 with the wheel revs eliminates a lot of noise and vibration. Fortunately for my wallet, my roster is probably 1/10th of the A&O if that!

Pete

Bob

Jan '19

I just measured the system frequency response of a Tang Band 1925S module installed inside my C425. Sound exits through the radiator intake vents at the end of the long hood, just below the number 475... Here's the measurement setup. That's the measurement microphone in the right of the photo.



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Next we have the frequency response. It was measured using pink noise and TrueRTA software. The locomotive's speaker is driven by a Lepai class D amplifier. The original measurement was an average of 10 1/12 octave measurements, then smoothed to 1/3 octave. Bass response is down about 14 dB at 100 Hz relative to 500 Hz.

ESU puts some fixed bass boost in many of their sound files. If we drive the speaker from LokProgrammer and progressively increase the throttle notch, we can measure SPL or Sound Pressure Level plots that give us an idea of what frequencies we will actually hear. First up, a plot from idle = green, run 1 = magenta, run 2 = yellow, run 3 = orange, and run4 = cyan.



Finally run 4 = cyan, run 5 = green, run 6 = magenta, run 7 = yellow, run 8 = orange.



So although the system frequency response is down 14 dB from 500 Hz to 100 Hz, we are still getting significant bass down to 100 Hz. That's a bit better than Larry's free-air measurement would predict. In this case, I installed the speaker so that the passive radiator was directly above the radiator louvers.

Of course your mileage may vary.

PeteM

Apr '19

I figured I'd show you my latest attempt at using TBs in Alcos. I gotta tell somebody! 😊 I "rescued" this somewhat dog-eared C&LS RS11 from March Meet. Starting over with all new innards except I'll keep the 24V Pittman for now. The TB 1931s *just* fits inside the C&LS RS11 shell. I'm going to try a Loksound V5 as soon as my order arrives, but for now it's an HO Select.

The challenge will be how to get enough air moving out through the grilles and exhaust to maintain at least some of the bass.

Pete

Sep 2016

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Apr 2019

Feb 26



Sep 2016

Bob

Pete -

Have you perchance checked to see if you can slip the shell + walkway assembly over the speaker? The walkway is narrower than the speaker. Plans?

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**PeteM**

Apr '19

Yes! First thing I did was to see if a 1931 instead of a 1925 would fit in the shell and it does. But only mid-ships, the big grill castings at the back make the shell just too narrow back there.

So then I just blue-tacked everything onto the chassis to see how the slow-running and sound would be with the 24V motor and Loksound HO. I've done one previously but I put a coreless Maxon gearhead in there to try and get smoother starting. Now I'm thinking that's not necessary which is good.

The 1931 will have to be mounted in the shell and will have to go near the top, or I will have to sacrifice some of the cab interior. Or maybe I can mill the outside of the 1931 enclosure by 1 or 2mm and put it at the back with the driver forwards. I will experiment with facing up and facing down installs to see which retains more bass.

I think I'll end up trading off between best sound, see-through grilles, and cab interior. First world problems I guess... 🙄

Bob

Apr '19

Pete -

When the round speaker gets too close to the top of the shell, a very strong resonance sets in causing frequencies ~1KHz and a bit lower to suddenly become a lot louder. It is possible that you might get a better balanced frequency response with a 1925 mounted much lower.

Here's a quick and easy experiment to do. Enable drive hold, and fire it up. Now take the flat palm of your hand and hold it horizontally over the speaker. This simulates the top of the shell. Now slowly bring your hand down and towards the speaker. At some point, probably around 1/2 inch or so, you will hear an abrupt increase in high frequencies. I just tried this on my LokProgrammer with a 1931 connected. The emphasized frequencies sound almost like a steam hiss, perhaps accompanied by a loss of bass.

You might also try this with a 1925.

All the best.

[Link to example video](#)



Sep 2016

PeteM

Apr '19

Thanks for the suggestions. I've found the same symptoms you describe with TBs from 2008 up to 1942. The only way it seems to work is if you have almost all-grille above the driver, or at least 1.5" clearance in front of the driver. I've also had issues when I got the driver too close to the motor magnets.

One of my other C&LS RS 11s has the 1925, as do all my other locos. I do find the sound more open and relaxed with the 1925s but it just feels light on bass after hearing the 1931 and 1942. I do seem to be obsessed with trying to get more bass. Maybe it's a fool's errand. 😞

I've got a 1942 in that P&D F7B where the speaker can lay on its back in the middle of the floor thanks to the truck-mounted coreless gearhead motors. TBH that's the only one where the bass still works pretty good with the shell on.

82 / 93

Apr 2019

I did cut away the plastic under my MP15DC grilles and replace with black loudspeaker fabric which got rid of the hiss of the 1925s in them.



Feb 26



I think I'll make this RS11 the last one I try to improve before I go back to the trusty 1925...

bigtrainjames

Apr '19

Hey Pete,

Bob and I had discussions previously about removing material from the sides of the 1931 modules. Bob then preceded to cut one open, which he chronicles [in this linked thread](#). You'll see that wall thickness runs about .078", so I would think that you could remove 1mm from each side and be safe.

I do have a question about the install you showed that night. I'm curious why you didn't turn the truck mounted motors around and hang them off the mounting bracket cantilevered over the truck kingpin, instead of toward the middle of the loco? This would seem to address the truck swing issue you mentioned, and alleviate the need to frame mount the motors. Although now that I think about it, maybe there was an issue with the cab interior? Just something I thought of after the show.

Jim



Sep 2016

PeteM

Apr '19

Hi Jim,

Thanks for the update on removing material from the 1931. I'll take another look at those posts.

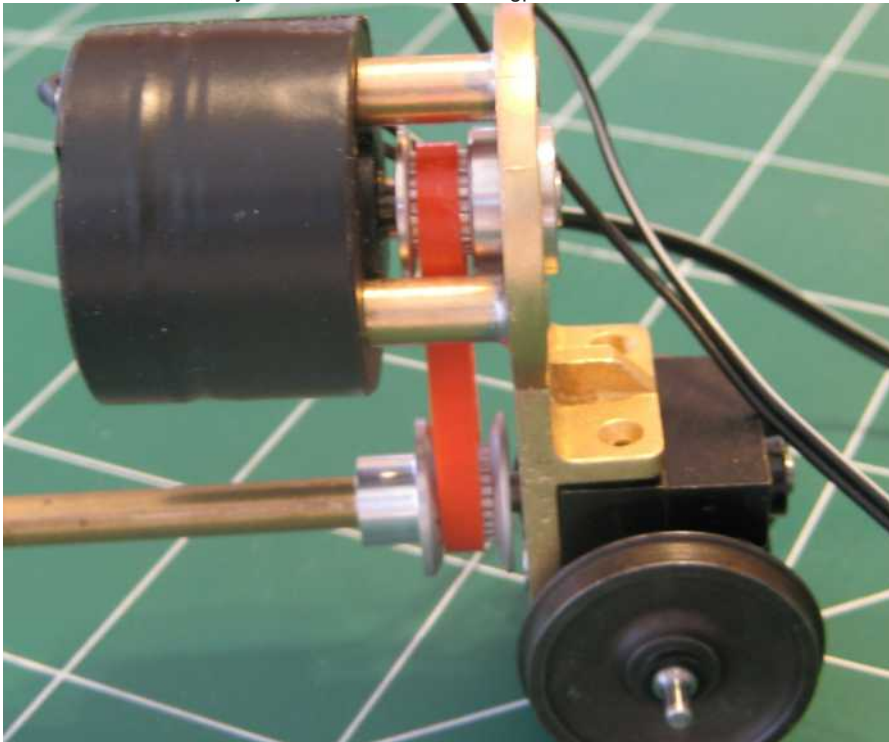
It would have been great to meet you at March Meet. Maybe next time!

Re the motor mount, Jay does offer an "over the kingpin" version.

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But in the end my combo of chop-nosed RC GP9s, the need to go round 36" radius, and have a cab interior made the chassis-mount version a better compromise. We did shorten the drive shafts quite a bit so the TB1925 can sit low down between the motors and facing up. I took the backing off all the long hood fans and the sound is decent at least.

Pete

Bob

Apr '19

Here is a short iPhone video (poor microphone instead of my Shure MV88, which I forgot) during the April 20 op session. The Alco C425 served at times as a helper engine up the grade from Union Gap to Linnwood. I was glad I endured the pain of installing 24 LEDs in this locomotive, including the white and red class lights. The engine still needs air hoses.

An EMD 567 Roots blower whine heard at the start of the clip came from Craig Linn's beautifully-weathered C&NW chop-nose GP9 running on the point of this train.

[Link to short video](#)



Sep 2016

coaltrain

May '19

I am new to O scale, I am wondering where you got that motor and drive parts (belt and cogs). I am trying to repower a few O scale Shay locomotives and I was considering using timing belts like that orange one, however mine will have to be about 2.5mm wide.

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May '19

PeteM

Welcome to O scale! The motors and drive parts in my locos came from Jay Criswell at Right-O'-Way.

<https://right-o-way.us>

Feb 26



Pete

Bob

Jan 5

A heads-up for users of Tang Band speakers. A friend and fellow O-scaler received a brand new 1931S module with a factory short circuit. That resulted in the destruction of the audio amplifier in a new V5L decoder.

The defect was a solder bridge between the two pins of the little white connector. I was able to remove it by passing a #5 blade between the two pins.

Moral: I suggest checking each speaker with an ohm meter prior to installation.

rnb3

Feb 4

Hey Bob, can you help make me smart...? I'm checking for continuity across the pins on the back of the speaker. I'm getting zero ohms or the continuity ringer depending on setting. I scored a gap between the pins to make sure there is no solder bridge. Still zero ohms! Any suggestions on how to save this speaker?

Bob

Feb 4

Wow, Rick! I'm glad I sounded a warning. That may have saved you the cost of a decoder.

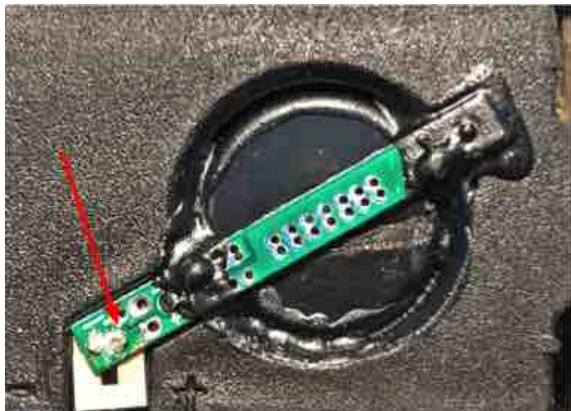
The previous shorted speaker was a 1931. If I recall you are installing a 1925. Some thoughts:

You could send it back as defective, and request a new one. If you proceed to modify the speaker, which *might* work, Parts Express won't likely swap for a replacement.

I also assume you are using a meter better than a \$3 one from Horrible Freight. If it *is* a cheapie, double-check your results using a meter at your place of work. Since you mentioned a continuity beeper, presumably the meter is digital. I have a bunch of Triplet analog VOMs I inherited from my dad and those have to be zero adjusted before using the Ohms ranges. But you already know that (making this for the readers.)

Sep 2016

First, let's examine the back side of the module. Double click on the photo below to enlarge it. There's a red arrow pointing to the general location of the connector pins. First examine it under some serious magnification to see if you can identify any sort of solder or hairline copper trace bridge. It's worth a look, but I doubt it will prove fruitful. Try running your knife blade along the dark green area between the upper and lower PC board traces to make sure there isn't a solder bridge near the red arrow.



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Short still there? I'm not surprised. Discounting the resistance of the meter leads, a sample 1925S I examined measured 3.8 Ohms. Some continuity buzzers may beep, some may not. My \$\$\$ Fluke 289 beeps.

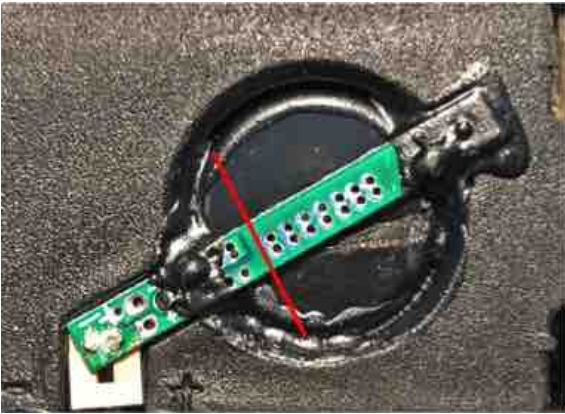
Notice that there are a lot of extraneous holes drilled through the PCB. These are plated vias, indicating that this is a double-sided board. We can't just cut a trace on the top side to clear a short because there are probably mirror-image traces on the bottom side.

The next step might be destructive!

1. Support for the PC board depends upon both ends being attached to the back of the speaker with glue.
2. To clear the short, which is most likely somewhere under the lefthand black blob, we're going to carefully use a Dremel cutoff disc to saw the PC board in two. But first...
3. To make sure we have adequate support, we first epoxy the connector and that end of the PC board for extra strength. Likewise, we epoxy the right end of the board to the magnet. The speaker cone wires are extremely delicate and any twisting of the PC board when cutting will most likely sever one or both wires. See step 4 to consider where you don't want to have a thick blob of epoxy. That's where the PCB will be cut. Also don't heap it up so that it creates a burr under the saddle when the speaker is mounted in your SW9.



4. Next we use the cutoff wheel and saw here. This separates the PC board in two and severs both the topside copper trace and that on the bottom.



5. Finally we attach wires in these two locations.



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I don't guarantee that this will work, but if you don't want to send the unit back it is worth a try. If this fails, the speaker was *already* destined for the circular file.

This recording will self-destruct in 5 seconds. Good luck, Rick.

Bob

Bob

Feb 6

Rick replied by email that 3 other (high quality) meters read between 3.6 and 3.8 ohms, so his speaker is OK.

Bob

Feb 12

I heard through the grapevine, from friend Larry Hanlon, that ESU added two new Tang Band speakers to their product line. Unlike the 4 ohm ones available through Parts Express, these are 8 ohm. and so compatible with a wider range of decoders from various manufacturers.

They appear to be 8 ohm variants of the 2008 and 1925 modules. Information available today on the ESU US web site is only in German, but the given dimensions appear to match the enclosure after the mounting tabs have been removed.

I'm glad to see that TB has received a (an other?) OEM contract for these small but amazing speakers.



PeteM

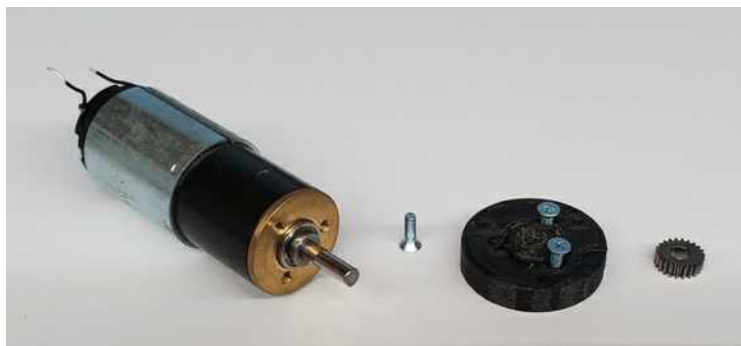
Sep 2016

Feb 26

Bob,

Thanks for the tip about the shorted TB1931s! I've never thought of checking that before but I guess I was lucky. I'm checking them all prior to install now.

My latest project with TB1931s are two C&LS ex-SP RS-32s. To make room for the 1931s in the long hood and improve starting and slow running, I swapped the Pittman for Maxon coreless gearhead. Robin Talukdar 3D printed adapters for me to mount the gearhead to the tower. The drive gear was pulled off the Pittman and pressed onto the Maxon. I also rotated the tower 180 deg.



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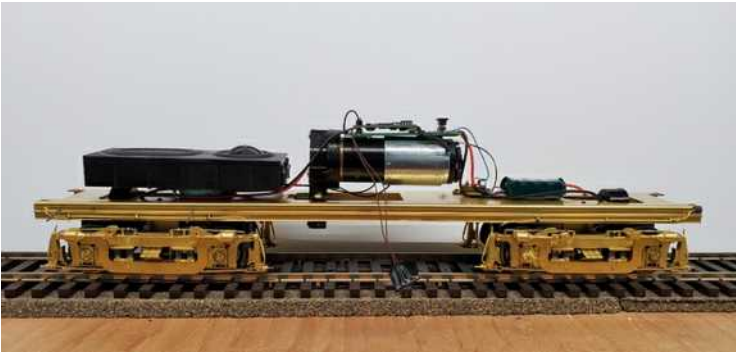
Then I cut a larger opening in the chassis (gulp) and moved the tower 25mm to the rear so the motor fit behind the rear cab bulkhead. That leaves ample room for the TB1931s behind it facing up on the floor. One drive shaft was shortened by 25mm and the offcut used to lengthen the other by 25mm.



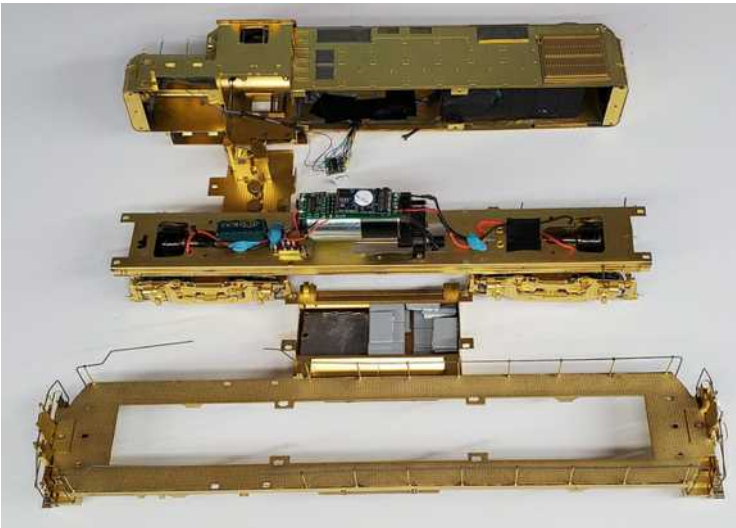
I used a Nix Trains Decoder Buddy V5 to install the Loksound 5 DCC 21-pin HO decoder on top of the gearhead to keep the space behind the motor free. This helped keep the wires out of sight through all those lovely grilles. 😊

The TB 1931s is just siliconed into the shell after 1mm was removed from the passive radiator end of each side.

Here's the basic layout from right (front) to left. TCS KA3, SPDT switch to take KA out of circuit when using the LokProgrammer, Maxon gearhead with adapter, Decoder Buddy with LS5DCC and the the 1931s.



As well the gap in the fuel tank weight had to be moved to align with the new tower location.



I loaded different RS-32 sound files inot each loco and here's the result after a bit of fine tuning to work with ProtoThrottle:

Thanks again for the inspiration to tackle this kind of project! 😊

Pete



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