Car & Locomotive Shop RS11 Sound Install

Bob

Mar 2016 **Mar '16**

It has been too quiet around here, so here is the start of a sound install in a brass Car & Locomotive Shop RS11. This is a “temporary” install as the locomotive has yet to be painted and re-detailed to eliminate its PRR heritage (a backwards horn.)

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May 2016

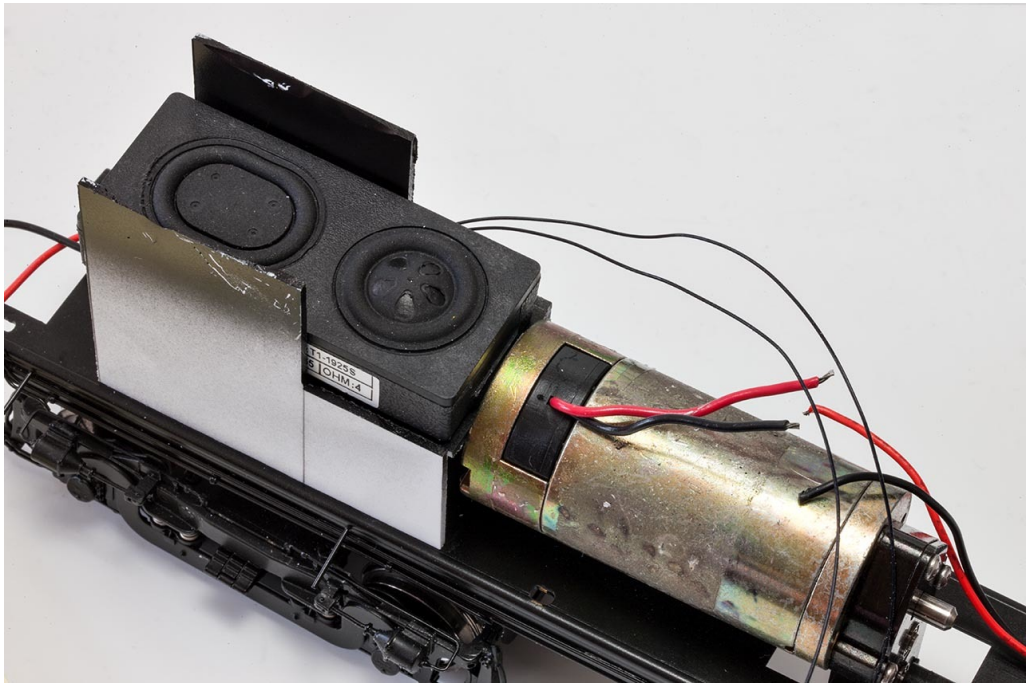
The C&LS engines that Henry Bultman imported some years ago have very smooth ball-bearing drives but very little starting torque, tending to jump like jack rabbits. This is due to a very low drive ratio and a custom-wound high voltage Pittman motor (not the typical 12 V 8-10A 8xxx.) The motor draws a locked-rotor stall current of only 1.2 Amps.

I gave up trying to get smooth operation with a Soundtraxx Tsunami. No manner of adjusting the back-EMF parameters would give smooth and powerful operation. Furthermore, the decoder kept corrupting its internal flash memory when a short circuit happened nearby, necessitating a factory reset and complete reprogramming.

This is an experiment with an HO-scale ESU LokSound V4 decoder. The V12 251 sound file is excellent.

The speaker used in this install is unconventional. Instead of a “hobby” speaker it is a Tang Band T1-1925S multimedia speaker. An oval passive radiator extends bass response a full octave, and it sounds great!

Oct 2019

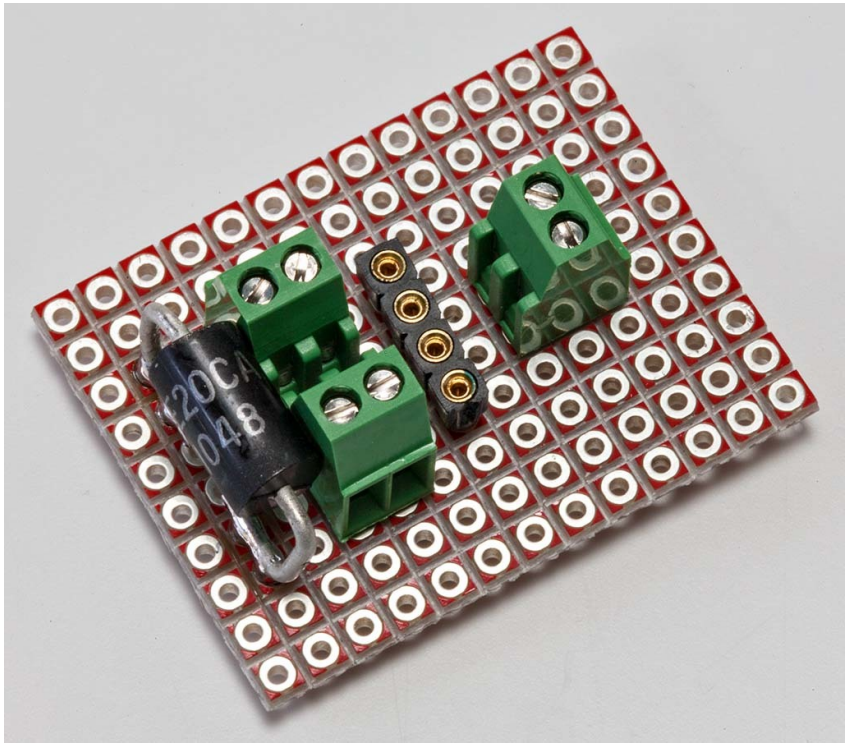


The module sits on a simple styrene frame that positions the passive radiator directly below the Alco’s radiator fan. The mounting tab on each end of the module has been cut off to save space.

Although the mount is shown resting on the frame, it will be installed in the car body and shimmed in place to prevent buzzing/rattling noises.

A small circuit board, to be mounted with double-stick tape after insulating the bottom side, provides screw terminals for the motor (upper right), left rail (top) and right rail (bottom.) A small 4 pin connector runs to the decoder mounted in the shell. A 1.5KE20 transient voltage suppression diode connects across the rails to protect the decoder from DCC bus ringing, particularly during short circuit episodes.

The circuit board facilitates dismantling the trucks from the chassis for painting, without having to unsolder anything.



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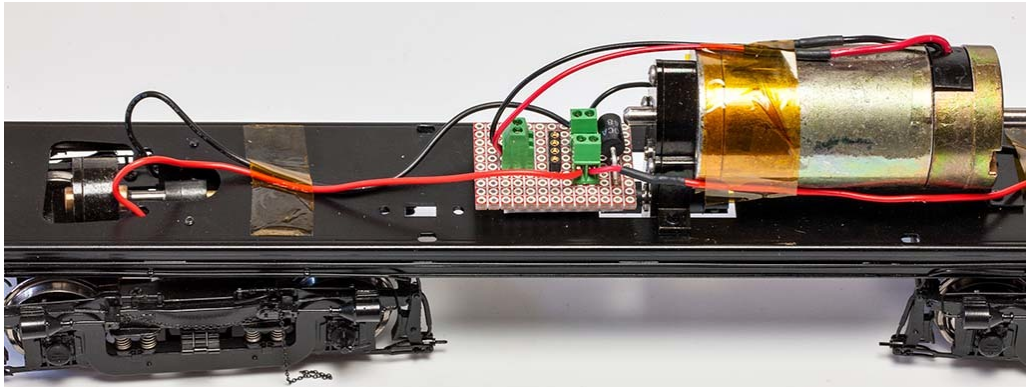
I've already done this install in a C&LS RS36. It runs like a champ, smoothly creeps about 1 tie per 2 seconds, and burb[illegible]h a surprising amount of bass. With quite a bit of momentum in the decoder, the V4 sound schedule comes into play. When switching the throttle can be slammed from stop to 1/2 or full throttle to drive the engine sound straight up to run 8, then the throttle can be quickly dropped once it gets to desired running speed. With a fast throttle reduction the sound will drop straight to idle but the motion continues, just as when a crew kicks cars while flat switching.

Bob Mar '16

The chassis is fully wired.

Extensions had to be added to the motor and a few other leads. Boo Rim used a corrosive acid flux which rotted quite a bit of wire beneath the insulation that rendered the wire ends un-solderable. Any flux can and will creep down between wire strands and beneath the insulation during soldering. A flux that becomes inert at room temperature, such as rosin (RMA), will not cause long-term damage. All acid fluxes can and will rot the wires even beneath the insulation!

Not visible, but very important, is a sheet of styrene mounted underneath the circuit board. This prevents connections on the board from punching through double-stick tape and shorting to the frame. One layer of Loctite double-stick tape holds the board to the styrene, and a second layer holds the styrene to the chassis.



The empty 4 pin gold connector is wired with power on the outside two pins and motor on the inner two. Plugging the mating connector in backwards can cause no harm and only result in swapping the locomotive's running directions.

A test plug can be made to confirm operation on DC power, should the need arise in the future.

Bob **Apr '16**

Here we see the car body portion of the temporary install. The speaker module fits well and wires manage easily without tangling with the motor shaft or getting pinched.

Lights will be installed after painting.

The 4 pin plug is the only connection between the shell and the chassis. Eventually the decoder will be held in place with a phosphor bronze strap attached to the cab floor via two existing M2 screws.

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This weekend we played with the RS11 then Vince switched Havens Yard with the RS36, which has a very similar install. David set up a switch list of work that lasted about an hour. Here is a quick snap of the 36 at the north end of the yard.

Oct 2019

Edited to add RS36 photo.

Bob **Apr '16**

Here's a link to a short video of an identical install in an RS36 as Vince starts a switch job in Havens Yard. The momentum CVs are perhaps a little bit too high, but the sound profile works best with considerable momentum.

Turn up the sound.
Link to video on Smugmug

Frolin **May '16**

Wondering about the use of the Tang Band T1-1925S speaker, in comparison to common model RR bass spkr options, like a Rail Master Bass Reflex speaker. Is it that much more noticeable in sound, or warrant the cost from $12 to $40 (compared to the Reflex brand or others)

?

Also when you mentioned the Tsunami, was this last year's model or a newer Econami model ?
Any concerns with the LokSound only being 1.5 amp draw ?

Thanks for any details. I am looking at a similar conversion with an OMI RS-11, plus have two Atlas GP-9s to do. Was lo at a new Tsunami 200 for 2amp and a Bass Reflex, in these when found your post. Happy when found this posting on what you are doing similar. Thanks in advance!

Mar 2016

Bob May '16

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May 2016

Frolin -

I've *never* heard such a gutsy decoder bass response as from that Tang Band module. The passive radiator extends bass an extra octave, and the sound is *very* clean. The $40 price is for TWO modules, not just one, so it is actually 67% more expensive than a Rail Master.

I plan to install these wherever I can fit them. Note that the TB is a 4 ohm speaker, and I believe the Econami is rated for 8 ohm speakers. I tested one with a Tsunami but distortion set in at fairly low volumes.

Henry Bultmann used a custom-wound Pittman motor in his C&LS locomotives. I measured 1.2A at stall (i.e., locked rotor) and 12V DC. Henry removed the labels from his motors so there is no way to look it up (and Henry passed on a while ago.) That's why I installed the less-expensive HO Loksound decoder in this particular engine.

I would not recommend a 2A decoder in any OMI O-scale locomotive unless the 12V Pittman motor has been replaced. The stall current is just too high and a 2A Econami may fail. It has been a while but if I recall my OMI RS11 uses an 8514 motor which has a rated stall current of 7.9A. The smaller 8x23 motor used in later OMI chassis is rated at 5.54A.

Oct 2019

At present I plan to use the Loksound V4 L decoder for future sound installs.

As for Atlas GP9s, Dan at O Scale Resource (a free e-magazine) recommends wiring the dual "China drive" motors in series. This lowers both an excessive top speed and the stall current.

For your larger-than-O-scale equipment, you might look into the Tang Band T1-1942SB driver. It is pretty amazing. I bought one hoping to fit it into a steam tender, but things were too tight.

Bob May '16

Frolin -

In hind sight it appears that I may not have clearly responded to your question regarding Tsunami or Econami. The decoder I tried was an original Tsunami. It constantly lost its internal EEPROM programming in the areas that hold CV values and some "derived" values from those CVs. This would happen any time a short circuit occurred nearby, most commonly from the front pilot as it attempted to pass over a high point on a 3-way switch. The only cure was a *complete factory reset,* followed by reprogramming everything I wanted to change. One of the major symptoms was a gross imbalance between low speed steps forward and reverse, even though I programmed the public CVs that got scrambled back to the values I desired.

Furthermore, I was never able to get a really smooth start and great low-end torque out of the Tsunami back-EMF (an all-too common complaint.)

Subsequently I've only tested the same locomotive, over the same short, with the Loksound HO decoder protected by a 20 volt TVS diode shown in a previous photo. It still shorts, but there is a perfect recovery.

If anything the Loksound decoder has *too much* regulation in speed steps 1 and 2. In a control systems class I had in college, it appears to have a fixed I or Integral feedback term that ramps up before the locomotive moves and then overshoots when running in consist with a C&LS companion using the same decoder. No CV tuning has so far addressed the overshoot issue. Perhaps ultra-tuning one of the speed tables, and CV2, can match both locomotives so that they don't fight like siblings for alpha male child status.

Back to the Tang Band module, when I ran the chassis without the shell attached on a test track, the 1 inch driver had an *amazing* cone excursion, jumping several millimeters up and down at a normal volume. Keep in mind that Loksound decoders do not have adjustable equalizers, so this was the normal bass Matt Hermon put into the sound file. And at that large excursion, the sound was *perfectly clean*.

As my friend David explained, the C&LS brass locomotives are high end, and now there is high end sound appropriate for their operation.

I'm not affiliated with Loksound in any way. I don't get a discount (wish I did!) And I *really* wish they would release a Mac version of their software.

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Mar 2016

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Jun 2016

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Oct 2019

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Frolin Jun '16

Bob, thanks for the replies and details. Has taken two readings and weeks to digest and get back to the trains. Not found the issues with the Tsunami you mention, but most of my installs have been in the larger 22.5 scale, as my main railroad in an indoor narrow gauge line.

Last week my OMI Alco RS-11 arrived. It’s a pur’dy brass engine. My test run found it makes noise and does not run so well. I gather this is a combination of being a 30 year old brass model, an old motor that should be replaced, and some gears and drives that need fresh grease.

So I am looking for a O scale shop to re-motor and install DCC and lights, and paint it. As yours is a C&LS engine, have you had to do this with any OMI models? Any suggestions?

Frolin

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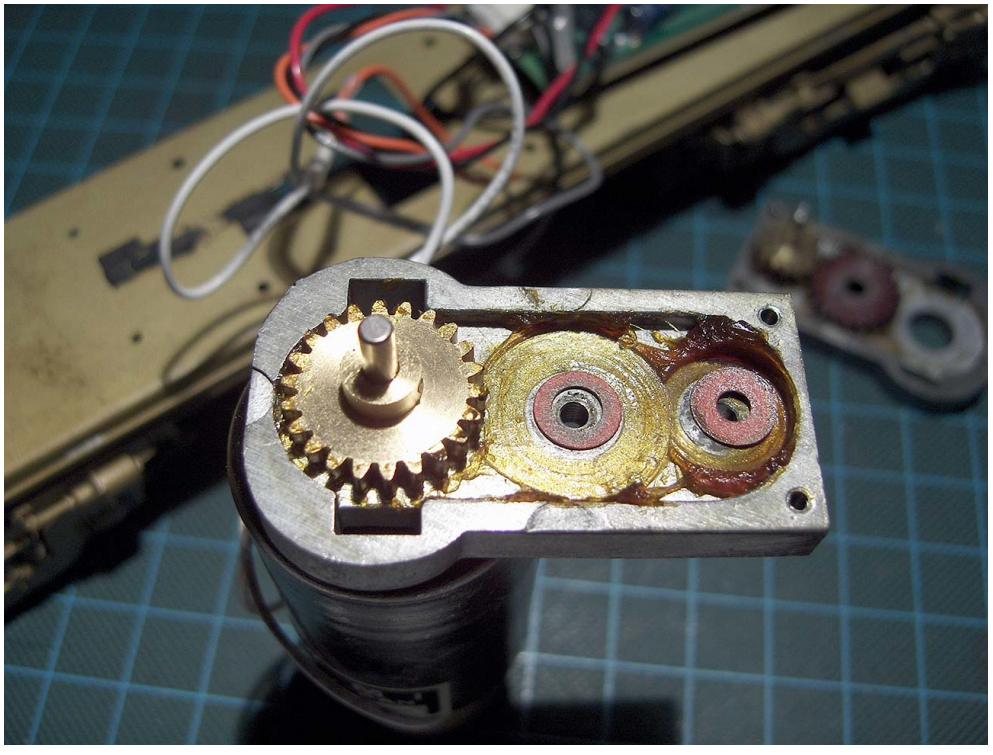
Bob Jun '16

Frolin -

I'm somewhat familiar with that OMI locomotive. In 2004 I lightly rebuilt one of them, a high-hood version, to run on the previous A&O. It appeared to be a fairly early OMI import, and it initially ran poorly, making a lot of noise.

Inside I found that grease in the center cast white metal gearbox had gummed. It was not high-quality construction, using the soft white metal as shaft bearings. I cleaned and lubed the gearbox. There were some shim washers installed which didn't fully remove axial play. It has been so long ago I'm not quite sure exactly what I did to tighten it up.

First photo: Inside the original gearbox.



The unit came with an old Sagami motor, probably 5 pole. It had a lot of cogging and the input gear set screw made a nasty burr on the shaft. Cogging primarily happens when the field magnet attracts pole pieces of the armature and causes uneven torque. Skew-wound

motors, such as the later Pittman can motors, largely eliminated that problem. It appears that I left the old Sagami in the unit and just milled a flat on the motor shaft for the set screw to rest.

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There was a dried piece of tubing connecting the rear shaft of the motor to a small gearbox that drove a radiator fan. The fan turned *very* slowly, and changed directions with the locomotive (which a prototype fan would not do.)

Anyway, no doubt you could get smoother operation if someone rebuilt the drive train. I've never looked into that so I can offer no meaningful advice.

There should have been a parts bag with the locomotive containing extra small springs, air hose glad hands, and the like. Also if I recall there were originally two fuel tanks, one larger than the other.

All the best!

Frolin **Jun '16**

Bob, I have not yet opened up the shell and looked at the motor or drives. My guess is being 30 years old, it may need a complete replacement. Or at least the motor, but from other readings, the drives and mechanisms as well. Been looking around for a shop to do a paint job, but also now maybe a remotor. Gosh, I may end up spending more to paint and get it to run, than I did on the model itself! ha ha

Next fun is to start looking for LED options, for the lights. Thought why not go ahead and add the lower nose hood headlights, and since the holes are there, the Marker lights, and if going a variation of the SP, the red emergency light on top. Debating on rocket launchers as well (ha). Any suggestions for LEDs to use?

So what radius is your C&LS RS handling, think it will handle 32-25 inch? How about motor and drive noise, as is, is it a quieter drive now or can you still hear it coming (without a sound decoder)?
What's the current progress?

Frolin

Bob **Jun '16**

Frolin -

I haven't tried to measure the minimum radius of my Overland RS11s. But I am not at all optimistic that you could run one around even a 32 inch radius curve.

By design they won't take as sharp of a radius as the C&LS drive. That's because the short drive shaft from the gear tower universal to the same universal on the truck is a lot shorter than on a C&LS drive. The Overland shaft powers the axle closest to the fuel tank. The C&LS drive shaft powers the axle farthest from the drive shaft, so the shaft angle is far less on the C&LS drive than on the Ove land on the same radius curve.

I'm sorry if this news is disappointing. However, if you only plan to have very sharp curves on industrial tracks, then you might consider having a "handle" or cut of short cars on the locomotive that can negotiate the sharp curves, keeping the locomotive's trucks well outside of the danger zone. The use of a handle was at one time a common prototype practice.

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CentralFan1976 **Aug '16**

I want to say that you use of Tang Band speakers has inspired me, and I just had to see what they could do… I used an iPhone spectrum analyzer to check the difference and it's amazing. You can see it all here: **http://ogrforum.ogaugerr.com/topic/upgrading-equipment-why-not-speakers-too?reply=63232381186473628**

Of course, I had to pair the speakers with either a resistor or another speaker to get the 8 ohms needed, but I think the frequency range mix of the two speakers sounds pretty darn good. And since the highs come out of the smaller speaker, I can place that towards the front because most of the horn comes from the laptop speaker, in this case.

Here's the best sounding version.

It's going to go in this:

It's going to go in this:

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durang0 Jul '19

Any chance of persuading someone to sell a C&LS RS36? Can make a offer hard to refuse 🙂

Bob Jul '19

I have one. Wait for my estate sale! 😀

Not a snowball's chance before…

Bob

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durang0 Jul '19

It could be arranged 🙂 I guess I knew that would be the answer 🙂
My estate sale might beat yours…lol

Maurice

durang0 Jul '19

Mar 2016

I would also like a C&LS C420 if anyone is not using theirs ???

cwebster Jul '19

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I don't think C&LS did a C420, but Oriental Limited produced at least four different versions of it - Phase I and II with low hoods, plus at least two high nose versions (AAR and HiAd trucks.)

Oct 2019

Bob Jul '19

Henry Butman, the C&LS importer *never* commissioned a C420 nor a C430, but in the 1980s *Overland* did a C430 and that's where David got his. It is/was a NYC prototype with high-adhesion trucks. Oriental did at least one version of a C420.

Bob

PeteM Aug '19

Hi Bob,

I figured I'd post the highlights of my "cram a TB1931 into a C&LS RS11" project here in case there's anything of use.

Firstly I want to thank you and this great group's ideas and work that gives me the confidence to try this kind of stuff! 😃

I was going to use a TB1925 in my RS11s but I noticed that the 1931 will fit between the hood sides, just not quite between the radiator vent panel castings at the rear. So I figured I could shave 1mm off each side of the 1931 based on what I'd seen you guys doing.

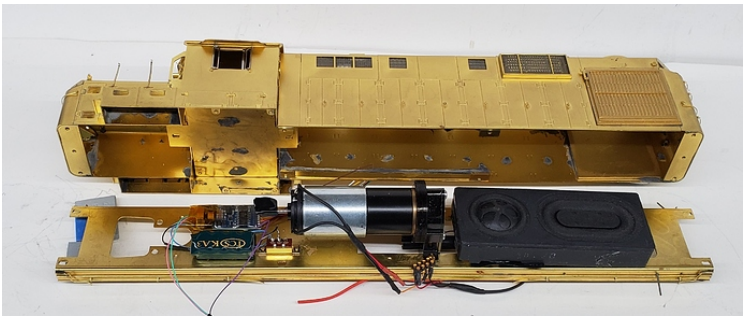
But now the motor was in the way. It needed to be moved forward. But then the cab interior would be affected. 😬 Then it hit me: turn the drive tower around 180 deg and move it backwards instead, until the motor just fit behind the cab bulkhead. Now a TB 1931 speaker can lay flat on its back just above floor to give the bass the best chance.

I also had to lengthen one drive shaft and shorten the other by the same 22mm I moved the tower and move the cutout in the tank weight by the same amount.

I had already decided to swap out the Pittman 24V even though it can run on an HO decoder as I learned from you. But I wasn't able to get the starting and very slow running I wanted. So I had a Maxon RE24 with a 22gp gearhead that gives about 4.5:1 ratio. Robin Talukdar designed and 3D-printed an adapter to install the Maxon using the C&LS gear I pulled off the Pittman. I made a quick testbed with Robin's adapter to see how it ran and sounded with a LS 5DCC HO before I hacked into the chassis:

No way could I go back to the 1925 after hearing that! 😄

Here's a pic of where eevrything fits once I moved the tower:



Mar 2016

In this pic I still needed to cut off the shaft at the cab end of the motor and shave 1mm off the rear half of the speaker sides… As well I then cut off the rear cab floor mounting tab from the rear bulkhead, and bent the rear floor tab up 90 deg and 3M tape it to the back of the bulkhead.

The sub-mini slide switch is to disconnect the KA for programming. Henry gave us a cut-out for that at least!

Pete

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PeteM **Oct '19**

So I finally got my first RS11 running with the Maxon coreless gearhead, LS5 DCC HO and Tang Band 1931s as mentioned in my above post.

Excuse the state of this RS11, I bought it used at March Meet and it's a bit of a dog. The front pilot, steps and handrails fell off in several pieces when I took it out of the box. The paint and number are incorrect also. It still needs a lot of work.

But I was keen to see how it ran and sounded. I also wanted to see if it's possible to get an Atlas O China Drive loco to work any better with LS5 than with LS4/Select. I feel there's a decent improvement but I guess one decoder will always struggle to manage two truck-mounted motors in series even if they and the drivelines were exactly identical.

The Atlas C424 has a TB1931s in the fuel tank but facing up. I cut away the chassis so both the driver and passive radiator are exposed. Although the shell doesn't have a lot of openings, it sounds less bad this way than facing down in the tank as you'd expect.

But I really wanted to run my CP Atlas C424! Again, lots of work still needed.

Here are the results:
"Virtual consist"

Startup

Coasting and feathering the brake

I am going to live with this Atlas drive for now. Next up finishing the other C&LS RSs.

As always, thanks to Bob and others here for the inspiration to try new things! 😀

Pete

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Bob Oct '19

Pete -

The 1931 module sounds awesome! And the speed matching is amazing.

PeteM **Oct '19**

Thanks Bob, means a lot coming from you! 😀

I've been thinking about the coreless gearhead upgrade in the C&LS RSs. I'm not sure it'll be needed now I have seen the LS5's improved motor control. And as you said, the 24V Pittman is OK with a LS HO-sized decoder which still leaves room for the TB1931s on the rear floor if the motor/tower can be moved back about 25mm and the tower turned 180 deg.

I think I'm going to try the next one that way and see how the starting, slow running and consisting works out vs. the Maxon upgraded one. That way I won't have to pull the C&LS gear off the Pittman and press it onto the Maxon which filled me with fear and loathing. 😉

As for the Atlas C424, I just dropped the body shell on and I was surprised that it didn't sound much different. There are no open grilles in the Atlas plastic shell except the small exhaust stack, so I was expecting it to sound pretty muffled. But I guess there's enough holes around the trucks for the air to move through.

Pete

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Bob **Oct '19**

I'd also guess that some sound is coming out through the typical Atlas perforations in the fuel tank, although I have never seen their C424 in person. I have one Overland C424 torn apart and two more to start. Those will get the more humble 1925S modules.

If I get a chance I'll shoot a quick iPhone video of my C425 during tomorrow's Oct 26 open house.

You have a *lot* more courage than I do for cobbling now-unobtanium C&LS engines! I recently found a Trainmaster in factory Reading paint that I don't have the heart to strip much less weather.

Keep up the great work!

PeteM **Oct '19**

Well the speaker in the C424 ended up on its back on the bottom of the tank, which pretty much covers up the holes. It won't fit in the hood even with some shaving down as the plastic shell is way too thick.

Yeah, once you take a Dremel to your first C&LS chassis and drive shafts, the second one hurts less. Or so they say… Gulp.

That's great you found a C&LS Trainmaster! With the new LS5 "ventilator" function output setting, you can have each fan motor start, speed up and slow down separately. 😀

Pete

Bob **Oct '19**

Pete -

Please elaborate about the “ventilator” function output setting. A search through the V5 manual comes up with no results for the term.

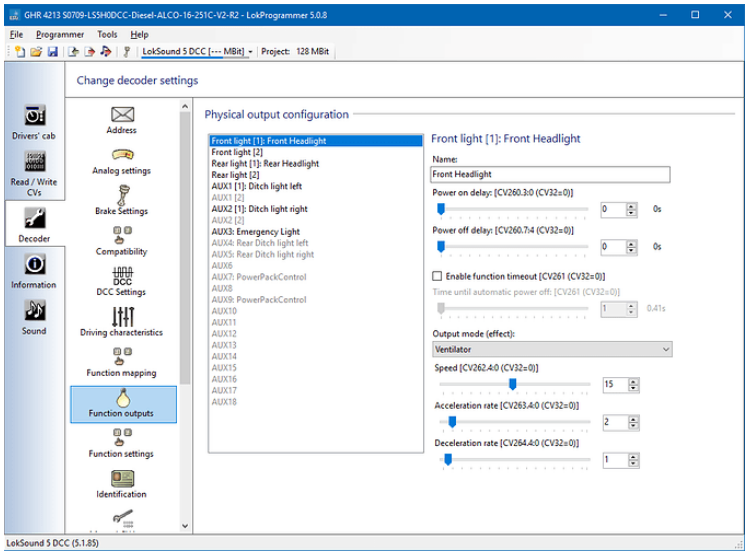
Mar 2016

PeteM Oct '19

Hi Bob,

It’s one of the choices in the Function Output settings drop-down. It seems to enable speed and kind of “CV3” and “CV4” momentum settings for function-driven small fan motors and such. I actually use it to get a nicer fade-in and fade-out on my LED headlights and ditchlights, as the LS5 regular fade settings didn’t seem as nice to me as V4/Select.

So I asked about the fade effect on the ESU site forum and got this tip from user Wolfgang (WH) to use “Ventilator”. In my case, Speed sets the brightness, Accel rate sets the fade-in and Decel rate the fade-out. No way I ever would have thought to use it without that tip!



Pete

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Bob Oct '19

Pete -

Thanks for the tip! In my research I found a FM Trainmaster operator’s manual. The fans came on full-blast one-at-a-time as a function of water temperature. Still the Ventilator is a great tip to improve the turn on and off of various lamps on the engine, but not so much for the TM fans.

That said, if I can get access to variables that describe throttle notch step and timers, it should be possible to create a reasonable sound slot to drive 4 independent radiator fans. It seems likely that a custom circuit will need to be etched, since if I recall, the C&LS internal electronics start up fans in pairs instead of sequentially. I just wish I could find out which ones were fan #1, #2, #3 and #4!

Back to ventilator, a slowly-rising PWM output might be very useful to slowly spin-up each fan as it turns on.

Mar 2016

PeteM Oct '19

No worries Bob!

I've noticed that the fan sounds in my LS Select and 5 equipped locos seem to come on after so much time spent above Notch 3 or 4. They go off again a bit after the throttle is closed. So I bet you could also turn on and off "ventilator" as a condition.

As well there's that sequential class lights code in the Bowser and ScaleTrains OEM files that lets you switch class lights from off through white, green, red and back to off with consecutive presses of say F5. Maybe that could be a basis for turning on more fans as the "heat" builds up?

Plus maybe what you need might be in the new "SoundCVs" in LS5 that set the speed-steps-per-notch among other things.

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But all this is way above my pay grade. 😟 I look forward to seeing what you come up with!

You've probably seen this but jst in case: MMW are offering a similar setup in their models for cooling and dynamic brake fans, but it's not controlled by DCC. I bet it could be though.
http://midwesternmodelworks.com/operational-fans/

Oct 2019

Pete

Bob Oct '19

Pete -

Thanks for the clarification! Ventilator does seem very useful to adjust the headlight turn on and dim speeds. That said, I don't see how it could be used to sequentially turn on fans.

I wrote my own sound schedule to sequentially turn on lighting in my latest Overland C425. Multiple presses of F5 does the following:

num boards on, # boards+white class, # boards+red class, off.

I passed on driving green class lights since indicating a second section would be used with Train Orders. Walkway safety lights and ground lights (under the cab, given root canals for 0402 LEDs with a die grinder) come on when the engine runs.

If I can find a shared variable that gives me the current engine notch, or equivalent, then with a timer I should be able to sequence fans. I have no clue what's on the PC board that currently controls the 4 fan motors but it shouldn't be *too* difficult to figure out. I'm guessing they are pager vibration motors without the counterweights. If so, they are high current low voltage, so may need a custom driver circuit.

Again, thanks.

PeteM Oct '19

Bob,