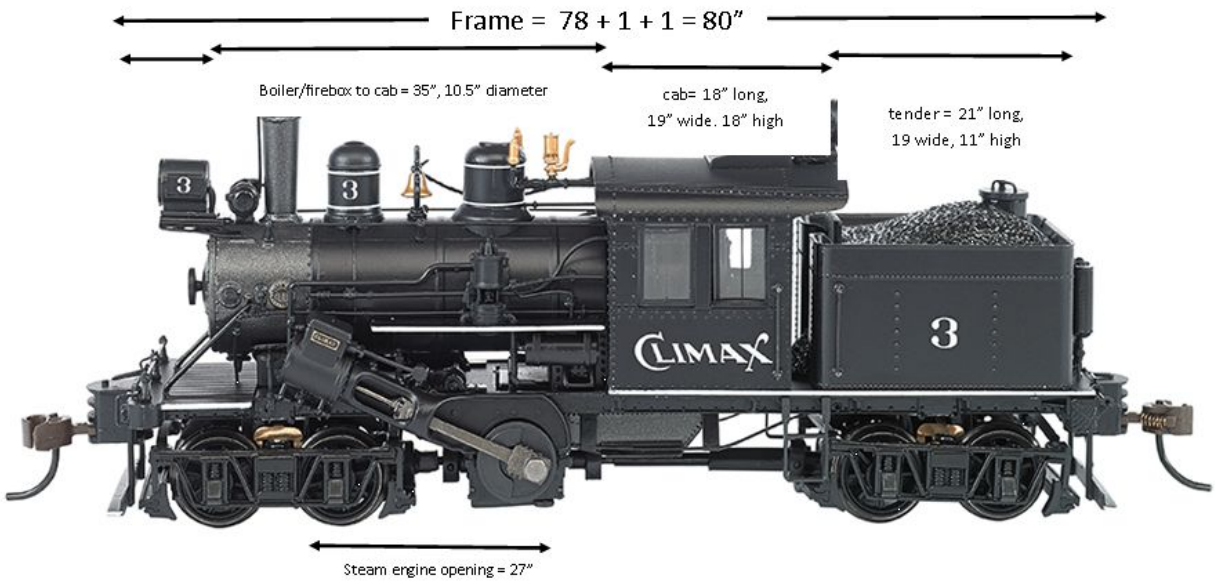
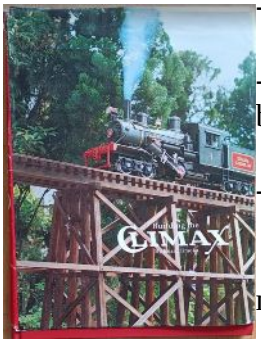
Building our Climax - Plan and Report

Paradise Valley Railroad, Powell River BC

As of Jan 15, 2026

Climax 2-truck locomotive. At 2.25” scale





- we are basing our model on several sources:

- - the above photo of a small scale Climax. E.g., We’ll likely use use the straight boiler rather than the tapered one in Kozo’s plan; and

- - the Kozo Hiraoka Climax book which describes a 3/4’ scale model.

Our nominal dimensions are 3x of the 3/4” Kozo plans to make ours a 2.25” = 12” model. On our 7.5” tracks it becomes a Narrow Gauge model.

- Dimensions will be adjusted to fit available material.
- We’re not doing the skew-bevel gearing and drive shaft; (ie, we’re after a Climax-like silhouette rather than an exact model). We’re simply using two arch bar trucks with 5.5” wheels (by Tom Artzberger). (Wheels on this actual Climax were 33”, or 6.2” at our scale. wheels (would be 29.3” actual, more like freight car sized).)

Follow-on Pages:
Trucks, Frame, Cab, Boiler, Engines, Coal/Water tender,
Follow-on Braked Operator/Passenger Car,
Controller, Batteries, Compressor, Sound Card

Figure 1: Geoff's G-Scale Climax

Trucks

note as of Jan 5: The Climax trucks, each with four motors, are currently under Little Toot; we need to get three new motors to restore Little Toot with its original trucks in order to have Little Toot as our third loco (for backup plus deployment on busy-passenger days)

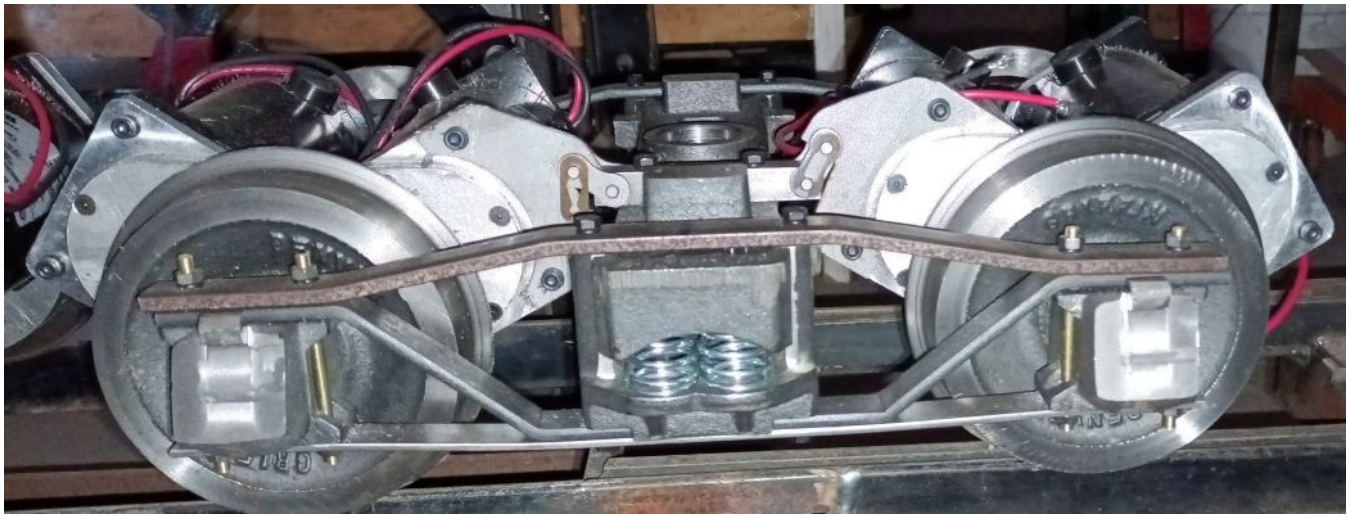
- Bought from Tom Artzberger.

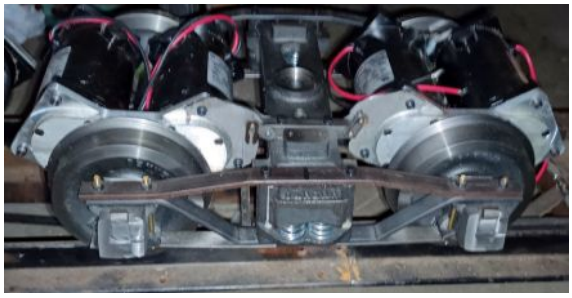
Dave Florence picked them up and returned to PR March 2024.

Trucks are 14.5 wide, 20” long and 6” high

Eight 24 volt Motors at 7.55 amps max = 0.18 hp each; = 1.5 hp total, torque for each =75 in. Oz

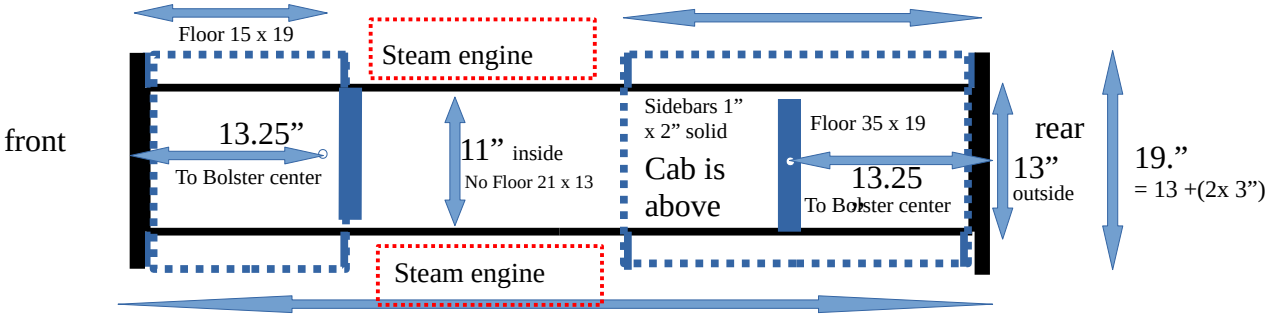
Dan spoke with Tom Artzberger and made the connector fitthe bolster.





Frame, Bolsters and 3” Brackets

The frame is mainly completed –

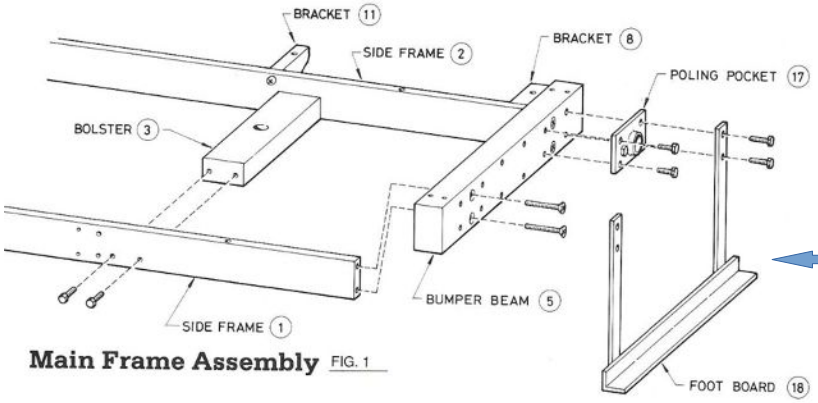


71” sidebar 1x2 solid, two 1” x 4” bumpers, 1.5” foot board at front and connector to pax car = 76” total

- *The 2 bolsters are 3/4”x2.5” steel donated by Dan*
- *The 8 Brackets to extend the flooring wider are 3/4 x 2 x 3” steel*

The frame is a simple rectangle 13” wide with 3” supports at eight places each side for the floor plates (dotted line) that hang over the edge under the coal bin, cab, boiler etc, making it 19” wide. Bolster centres are 13.25” in from each end. Bumper bar and other bits hang off the ends making total length 71 The bolt hole in the centre of the bolsters is 3/4”
”.

A floor is put on the frame under the water/coal bin, cab and part of the boiler, plus at the front, but omitted where the steam engine is outside the frame.



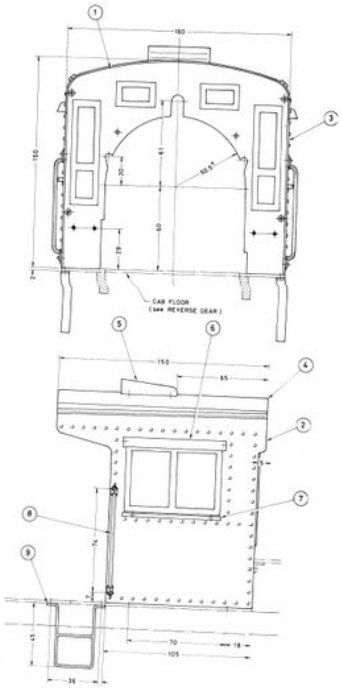
Bumper Beams and Bolsters are from a 1x4” steel piece that Dan is donating. Foot board are not yet designed

Bolster

CAB

Andre's plasma cutter was sold, so Dan will cut windows with his equipment ***note as of Jan 14, 2026***

Dan’s cab is 18 :wide, 22 high, 14 long



Rather than use the Kozo cab shown at the left, we are copying Dan’s cab (above)

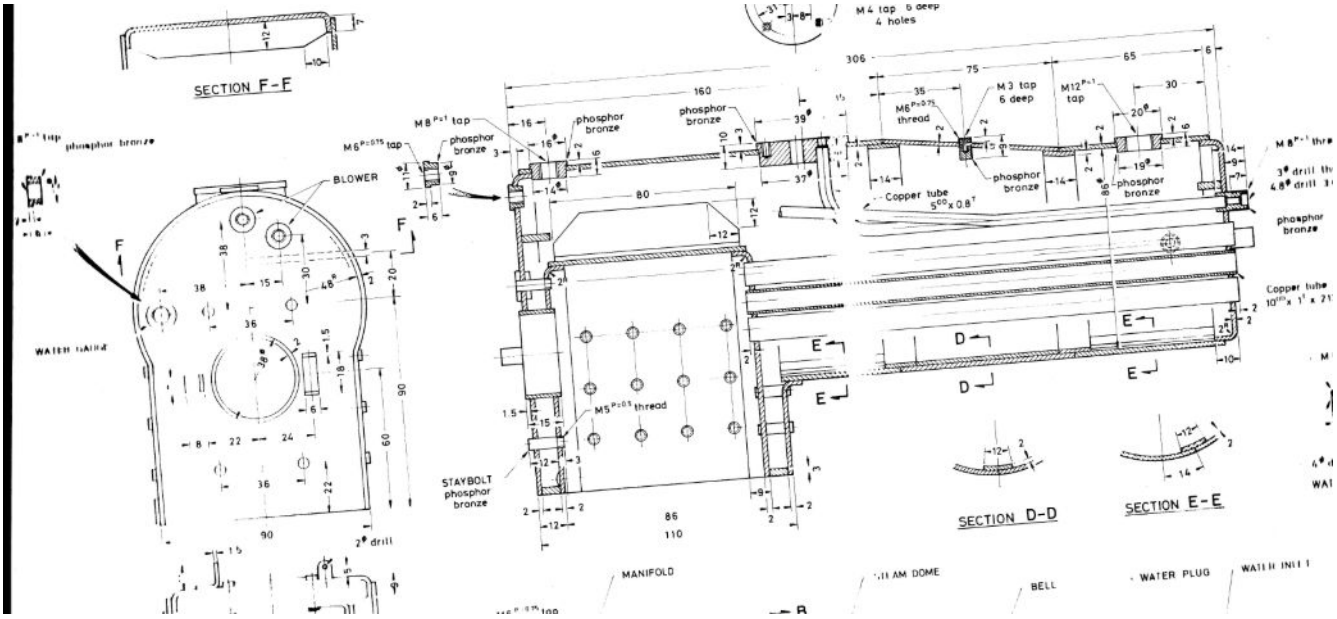
BOILER

Decorative screws replaced on the front piece; remainder of the boiler is cut to length and ready to go ***– note as of Jan 14:***

The Kozo boiler is tapered – 10.6” diameter cylinder at the narrow end to 11.8” at the firebox end next to the cab, and 36” long.

We’ve gone with our own design, a straiht pipe.

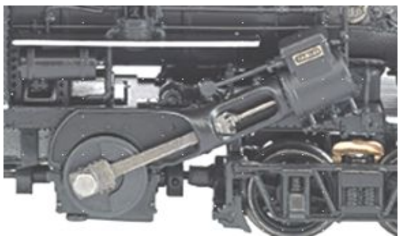
The Kozo Firebox is 10.5” wide, 12.5 long and about 14” useful space above for the compressor or tank (or one battery)



Engines

Dave took the prototype home to complete it so that making the build of two would be easier.
(Previous) The biggest sub-project not yet in hand is building the two engines for the Climax. We need to find a volunteer willing to take this on. The prototype is 80% complete and available for viewing.

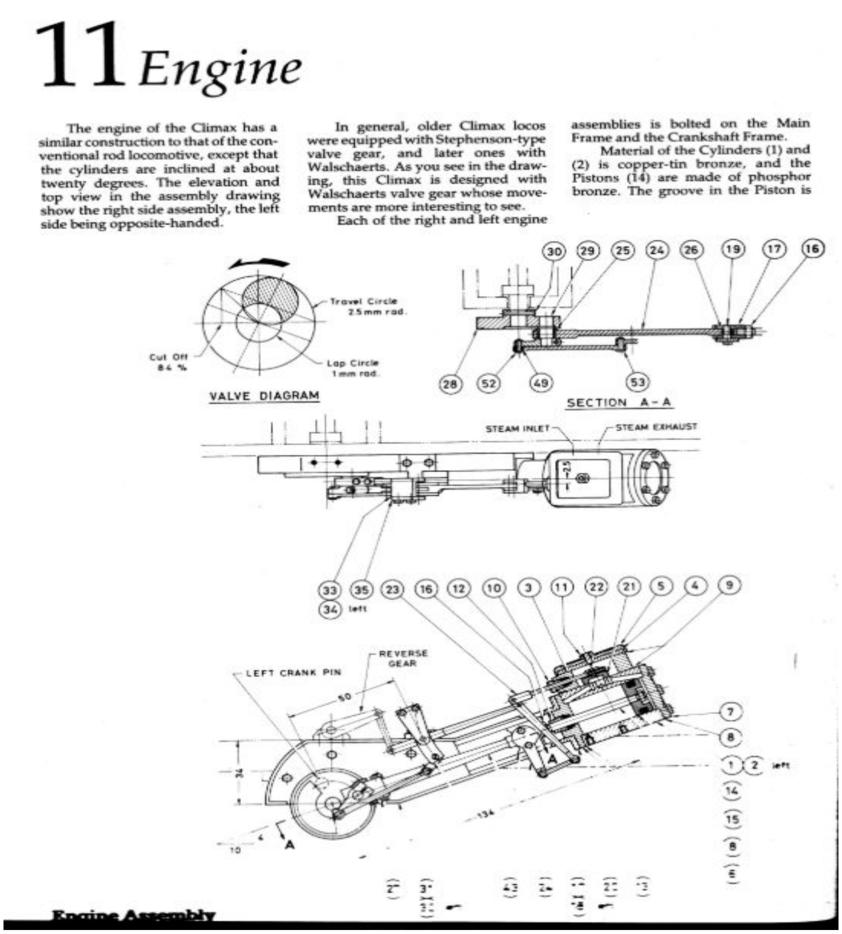
– note as of Jan 14:



The defining feature of a Climax is the slanted engines, 22 degrees.

The idea is to have one on each side on a trans axel and power them with a small motor synchronized to the drive motors.

Dave built a model from wood and stovepipe metal. We need to complete the model, duplicate the mirror image, attach them to a trans-axel, and motorize the axel.



11 *Engine*

The engine of the Climax has a similar construction to that of the conventional rod locomotive, except that the cylinders are inclined at about twenty degrees. The elevation and top view in the assembly drawing show the right side assembly, the left side being opposite-handed.

In general, older Climax locos were equipped with Stephenson-type valve gear, and later ones with Walschaerts. As you see in the drawing, this Climax is designed with Walschaerts valve gear whose movements are more interesting to see.

Each of the right and left engine assemblies is bolted on the Main Frame and the Crankshaft Frame.

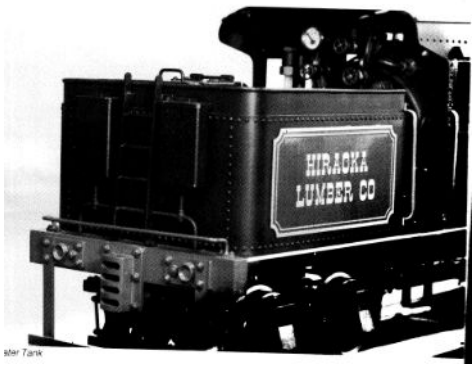
Material of the Cylinders (1) and (2) is copper-tin bronze, and the Pistons (14) are made of phosphor bronze. The groove in the Piston is

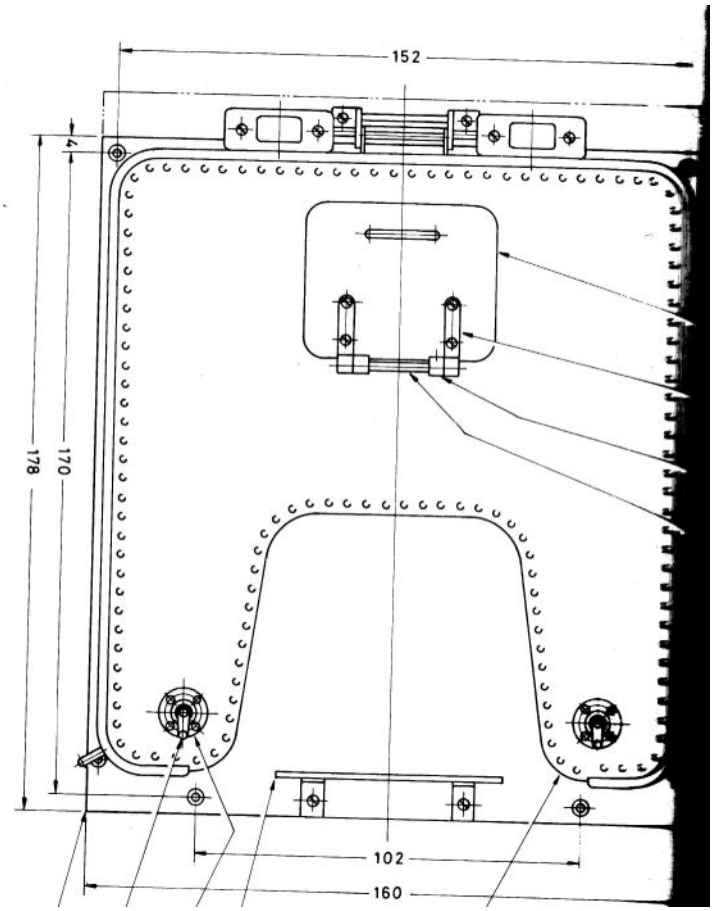
Coal/Water Tender

Built and in place, Detailing is underway . most screws installed; the task will continue next Wednesday – ***note as of Jan 14:***

21” long, 18.5” wide and 11” high

Space in side can be used for a child seat
(not big enough for an operator seat (see Kozo drawing below))





Follow on car page 1 *- see more current notes on the next page*

Follow-on car. Essential that it be completed before or at the same time as the Climax
- - - Why? it provides the brakes for the Climax/Pax car, and storage for most of the four batteries and the compressor
- To get the Climax/Pax car pair done this year, it may be best to build it off-site.
- Rick offered to look at the design and may volunteer to build it
- Dave will update the design document for group approval

We bought two new air-braked trucks from Tom Artzberger so the Climax can have a brake-equipped car immediately behind.

The front of the car where the engneer sits could use a leather tractor seat identical to the two we installed on the gas loco – Jan 5, 2026

The four batteries will be located under the driver and the toboggan seats, or on the loco. The centre of the car would have storage for batteries or compressor, like Dan's bench-eloco we used to use. The frame would be identical to the easy access car shown below one.

Dan's eLoco right

Climax Follow-on Car notes *note as of Jan 5:*

The car is to be a toboggan-style seat with a compartment in the centre to hold batteries and compressor, much like the 4' bench that holds Little Toot, except bigger: **84" x 20".**

The trucks underneath are new (currently sitting under the Climax frame). They have air-brakes, and connect on the bolster. (TBA the connection spec)

The frame has
- the metal rectangular **frame** 84x20– perhaps 1"x2" tubing, suitable for supporting a plywood sheet
- two **bolsters** centred about **13 inches from the end**s to hold the trucks
- perhaps metal cross piece(s) if needed to further support the plywood sheet

A good model for the plywood additions can be seen in our easy access car (or the 4' Little Toot, but plywood there is quite light)

the frame and bolsters (84x20, bolsters at 13")
Can add metal struts to better support the plywood

See above how the entire plywood superstructure is held in place on the frame by pocket connectors as shown in the sketch above.

The frame has connector parts at both ends to the cars in front and behind, spec to be provided later by Dan

Sitting on the plywood sheet is a plywood **box 84" x 8" wide x 12" high.**

The roof of the box is a padded plywood seat 12" wide, removable to service the batteries. (examples are the one on Little Toot and on the car we made, #11)

Typical box contents Four batteries 12.5, 6.5, 8.5 high, Compressor.. 13 x 6 x 8 high, Tank 19 x 8 x 11 high, P360 controller (as in the 4' Little Toot)
(some of these contents may be put onto the Climax, e.g., in the coal/water tender)

An option under discussion is to have the engineer sit at the front of the follow-on car (alternative is to have him sit on the coal/water tender)

So the padded top of the box should be delayed until this is resolved.

Controller:

We may need to get a new controller for Little Toot suitable for 4 motors (the Climax will need the P360 that we are now using on Little Toot) ... Jan 5, 2026

It's arrived, under $1000 with pst/gst collected

installation
https://www.youtube.com/watch?v=5ruKug_VU10

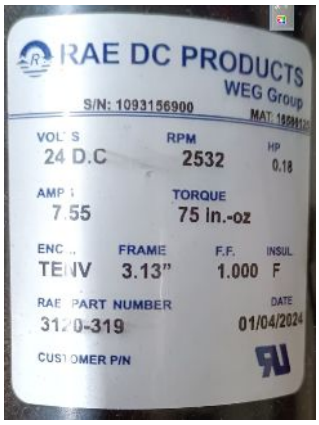
menus
https://www.youtube.com/watch?v=hu2BQqau_MU

Manual
https://www.4qd.co.uk/wp-content/uploads/Pro-360-controller-manual-v3_9.pdf

Contact Name Dave Florence

Item	Description	Quantity	Unit Price	Sub-Total
PRO-360-S	Pro-360 controller - standard [12-48V / 360A]	1	396.00	396.00
ISP-001	Interference suppression pack - extra motor	9	2.40	21.60
RBT-24V	Bell throttle, Reversing, 24v.	1	57.75	57.75
SEN-SPD	Speed sensor for Pro-160 / 360	1	26.95	26.95

Batteries – Lead-acid or gel batteries @24 volt will be stored in the follow-on car that has the tractor seat for the operator and toboggan seat for a few passengers behind. Lead acid or gel batteries provide lots of weight for the follow-on car, which has air brakes, so we will have good braking with or without passengers. *May want to use four @ 6-volt batteries Jan 5, 2026*



Load is 8 @ .18 hp motors (1.44 hp) , plus perhaps a ninth small motor for the drive shaft of the simulated Climax engines, plus soundcard, headight and compressor for the air brakes

We looked at LiFePo4 batteries, but Facebook advisors and 4QD recommend 4x 12 volt lead acid unless space is the driving criteria. To accommodate space, we can put the batteries in the follow-on car, with the toboggan seat much like Dan's eLoco that we use to pull the wheelchair car.

https://www.facebook.com/groups/220852414703712/posts/7135279186594299

Compressor

Maybe the model we just put into the gas loco is the best one to use – df, Jan 5, 2026

VEVOR make a 120 psi compressor; comes with a horn we could use to alert emergencies.
16.3 x 6.0 x 11.2 inch $123 canadian
https://www.vevor.ca/train-horn-kit-c_11496/vevor-12v-air-compressor-with-tank-1-6-gallon-6-l-train-horn-air-compressor-120-psi-working-pressure-onboard-air-compressor-system-for-train-air-horns-inflating-tires-air-mattresses-p_010247980894

About this item

•Air Compressor 1.6-Gal Tank Kit: Our 12 volt air compressor with tank kit includes an air tank, compressor, and pipe set, reaching an efficient speed of 5000r/min. Provides stable air pressure quickly, ideal for air horns, tire inflation, air mattresses, and more, with minimal noise and damage risk.
•90-120 psi Air Compressor: The train horn air compressor operates within a 90-120 psi range, with a sensitive gauge for real-time pressure monitoring. It automatically inflates at below 90 psi and stops at over 120 psi to prevent overpressure. The tank maintains optimal air pressure, enhanced with fuses for compressor protection and a drainage plug for easy water release.
•Strong Air Tightness: The air horn compressor is made from heavy-duty steel with anti-rust coating, which is corrosion-resistant, impact-resistant, and wear-resistant. The air compressor features a non-leakage structure and a tightly welded air tank to minimize leakage risks.
•Shock Absorption and High-Temperature Resistance: The onboard air compressor kit includes a thick rubber cushion for noise reduction and enhanced stability when installed between the tank and vehicle bottom. The PA gas pipe withstands temperatures up to 120℃, and the motor is equipped with a 100℃ temperature control overload protection, ensuring safe operation in various weather and road conditions.
•Universal 12V Compatibility: Our air compressor kit is designed for any vehicle with a 12V battery system, making it suitable for trucks, SUVs, cruise ships, and more. Its universal compatibility ensures ease of use without concerns about incompatibility

Sound System

Many sound card suppliers have gone out of business; there is no obvious supplier for logging railroad sound systems .. and perhaps even a smoke system! . Perhaps Wes Turnbull at PVRC could help find a source jan 5, 2026

Dan and 4QD recommend the Phoenix PB 17 sound card. $US price 295.

the PB11 design to create the **BigSound™ PB17.**

It has the Climax steam engine as one of its sounds

http://www.phoenixsound.com/products/pb17.html

BigSound™ PB17	Released in January 2018, the BigSound™ PB17 is our standard does-it-all sound board. Perfect for DC, DCC, Remote Control and Ride On applications.	$295.00 - Complete Kit

We'd need a 3 watt speaker too; two 8-ohm speakers recommended, or one 4 ohm.

e.g.

The Handbook http://www.phoenixsound.com/pdf/PB17_Handbook.pdf

Image shown is a representation only. Exact specifications should be obtained from the product data sheet.

SP-7140

DigiKey Part Number	433-1164-ND
Manufacturer	Soberton Inc.
Manufacturer Product Number	SP-7140
Description	SPEAKER 4OHM 3W TOP PORT 85DB
Manufacturer Standard Lead Time	9 Weeks
Customer Reference	
Detailed Description	4 Ohms General Purpose Speaker 3 W 300 Hz ~ 20 kHz Top Rectangular
Datasheet	Datasheet
EDA/CAD Models	SP-7140 Models

Example speaker 4 cm x 7 cm $11 + shipping