

The Crank Calls



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MEMBERSHIP \$25.00 US

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NEXT MEETING

**Saturday, June 18, 2022, at the
Golden Gate Live Steamers clubhouse site in
Tilden Park, Orinda, CA**

Gate opens at 9:00 am
Meeting starts at 10:00 am

Upcoming Events

- June 18: BAEM meeting at GGLS
- July 16: BAEM meeting at GGLS
- Aug 20: BAEM meeting at GGLS

See below for more details regarding events. Watch Crank Calls, BAEM emails and BAEM web page for updates. BAEM meetings are usually 3rd Saturday of the month except December.

MEETING NOTES

The monthly Bay Area Engine Modelers meeting was held at the Golden Gate Live Steamers site on May 21, 2022. Twenty-one members and one guest were present. Meeting was in conjunction with a GGLS weekend event. Saturday was a members day with lunch and Sunday was an open house. BAEM members were invited to show model engines at the open house.

NEW MEMBERS/VISITORS

BAEM members are reminded that visitors are welcome at our club meetings, and we're always looking for new members.

TREASURER'S REPORT

BAEM president Paul Denham reported that club is financially solvent.

Reminder: 2022 dues of \$25 are due. Give your check to Paul Denham at the next club meeting, or mail to Deirdre Denham at 1937 Merchant St, Crockett, CA 94525. Make checks payable to "BAEM".

CLUB BADGES

If you are a member in need a badge, contact Mike Rehmus (mrehmus@byvideo.com) who has offered to produce them.

Upcoming shows/events:

No upcoming events.

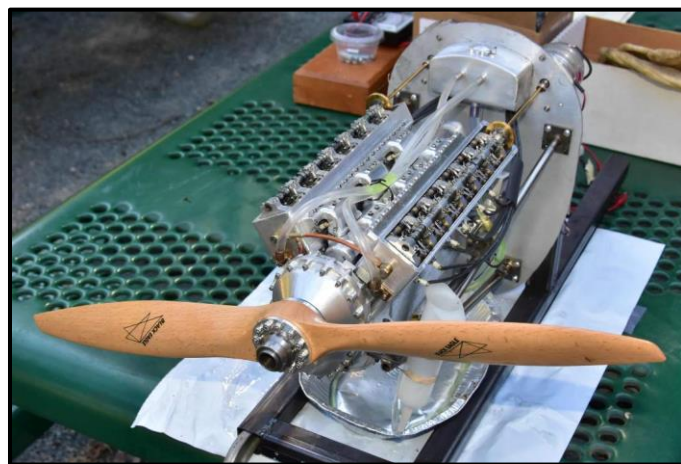
FIRST POPS



Peter Lawrence and his Merlin V-12 engine.

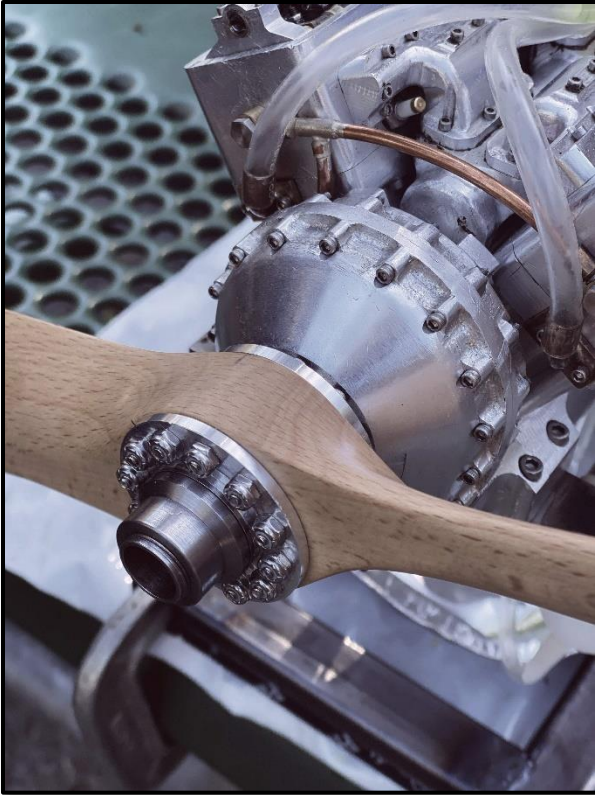
It's a special moment. Various pieces of aluminum, steel, cast iron, brass, and other materials have been carefully sawed, drilled, milled, turned and shaped, then fastened together by various means. A complex arrangement of moving parts has been imagined, then constructed. A rotating crankshaft moves pistons up and down within multiple cylinders. Lubrication is supplied, to make things move smoothly together without excessive wear. A coolant system transfers excess heat. An intake mixture of a precise fuel/air ratio must be created and delivered to each

cylinder at the proper time, then mechanically compressed via a precisely orchestrated piston movement while mechanically actuated valves open and close gas-tight, with proper timing, of course. An electronic system must sense the rotational position of the crankshaft, and, at the proper moment, deliver a hot spark to the compressed fuel/air mixture, causing it to ignite and explode, driving the piston downward, the crankshaft converting the force into rotational movement. Through this process, these marvelous engines convert the chemical energy stored in the fuel into useful mechanical power. These engines, even the simple ones, are complex mechanical devices. Building them and getting them to run is enormously challenging. As a group, we recognize the skill, talent and hard work required to make one of these engines "run." And we share in the celebratory moment when that finally happens. That moment is especially sweet when it arrives for a project as massively complex as the Merlin V-12.



Peter's Merlin V-12

Peter Lawrence ran his Merlin V-12 engine at the meeting. Peter started the project 12 years ago and has been reporting recent progress towards "first pops". He described a number of final assembly issues he encountered and overcame. These included crankshaft/bearing run-in, camshaft lobe regrinding, valve/rocker geometry interference, valve sealing problems (solved using toothpaste as lapping compound), slipping bevel gears on the camshafts, and carburation leaks. He also shared some of his jigs and fixtures as well as trouble shooting insights as he addressed the problems he encountered. Pete shared that he started the project in 2010 and was able to work in it almost full time for year while he was "between jobs".



Fine machining work throughout.



One of the 48 valves in the valve-head slotting jig

A video of the running of the engine can be viewed here: <https://youtu.be/mj72YxVFx7A>

To do justice to a technical description of the Merlin project Pete was asked to provide the attached summary for this CrankCalls issue.

Congratulations Pete for a marvelous accomplishment!



Peter Lawrence: Merlin V-12 Project Description

These are notes regarding the construction of my working model of a Rolls Royce Merlin 100 series V-12 engine, in 5.4:1 scale. The engine configuration consists of twelve cylinders in a 60-degree “Vee”, with four valves per cylinder, 48 valves total. The overhead valves are actuated via an overhead camshaft, one for each bank of six cylinders. The cams are driven by a vertical shaft with bevel gears and operate the valves via rocker arms.

I machined all the parts from bar stock, except screws, gears, ball bearings, and springs were purchased. Parts were machined on a manual mill and lathe. There were no castings and no CNC machining of parts.

Model dimensions were based on engineering cross section drawings on pages 10 and 11 of “The Merlin in Perspective” published by the Rolls Royce Heritage Trust. Drawings were photo enlarged to 1” bore and measurements taken from there.

Here is a comparison of key specifications for the full-size Merlin engine and my scale model:

	Merlin	Model
<i>Bore</i>	5.4 inches	1.0 inches
<i>Stroke</i>	6.0 inches	1.125 inches
<i>Displacement</i>	1648 cubic inches	9.3 cubic inches
<i>Compression</i>	6:1	6:1
<i>Propeller gear ratio</i>	0.4:1	0.4:1
<i>Supercharger gear ratio</i>	6~9:1	7:1
<i>Weight</i>	1700 pounds	13+ pounds
<i>Max RPM</i>	3000	9,000 (16,200 would be scale, but...)
<i>Peak HP</i>	1600	(9HP not possible w/out scale RPM, and still very improbable)
<i>Oil</i>	OM-270	10W30
<i>Coolant</i>	water/glycol	water/glycol
<i>Fuel</i>	100-octane	unleaded-regular with 2-stroke oil mix in 30:1 ratio
<i>Propeller length</i>	11 feet 2 inches	24 inches

External and internal dimensions are accurate for all parts except the “wheelcase” between the crankcase and the supercharger, which is custom designed to be machinable by a hobbyist. This model and Barry Hares’ are the only ones I’m aware of that use bevel gears to drive the cam shafts like the full size does (timing belts and pulleys just don’t do it for me) and have four-valves-per-cylinder like the full size does. Also, the full-size crank case suffers from lack of rigidity, so in the model every attempt was made to machine out the minimum amount of material and have the thickest possible walls. The full-size cam shafts also suffer from being undersized, but the model’s bevel gear drive allows for a larger cam shaft diameter, if desired. I didn’t, as I have no intention of running the engine at the speeds and powers required for this to be an issue.

Screw sizes are scale and range from 0-80 for the cam shaft bearing caps to 5-40 for the main bearing caps and the cylinder studs. This model required over 700 threading operations. I used hex socket head cap screws throughout, even though such fasteners didn’t exist at the time, they look great at this scale.

Parts were designed to be machinable by us mere mortals (compare to Barry Hares’ model Merlin, of the same scale but unimaginably accurate) and my intention is to make plans and construction notes available. While there is some debate as to whether I achieved this design goal I’ll just say it is not a beginner model, the builder should have experience with

multi-cylinder engines, making rings and valves that seat and seal, be competent with a rotary table, and not be intimidated by geometry and trigonometry.

I built my own cam grinding machine (inspired by Bob Hettinger's, which uses the rocking shaft design), and will probably make finished cam shafts available if/when plans are. If there's enough interest, I might even make CNC superchargers available, that's the hardest rotary table part to make manually.

I gave up trying to make working scale magnetos/distributors, my distributors are sized to be reliable and mounted behind the firewall, along with electronic ignition and ignition coils. Empty scale magneto/distributor shells are mounted on the engine for appearance.

I spent 12 years on this model, but most of that was weekend machining that was split between this and several other model engines. I'm guessing 4~5,000 hours but that includes all the design and drawing time, as well as many throw away mis-designed and/or mis-machined parts.

It is still not finished. I achieved "first pop" by cutting a lot of corners and by taking a vow over the past year to not work on any other project until this milestone.

Frequently Asked Questions:

When are you going to make rocker covers? "Probably never, since I really like being able to watch the cam/rocker/valve movement."

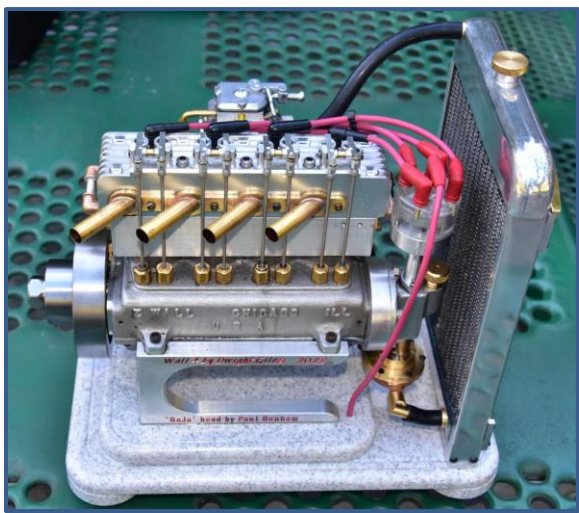
Are you going to make a scale Mustang for it to go in? "Probably not, since at this scale it would be 6 feet long with a 7-foot span and wouldn't fit on any bookshelf."

And finally, a great thanks to all the BAEM Club members whose tips and suggestions were invaluable to this project, and who all suffered through my many long-winded club meeting progress reports.

-Pete

May 22, 2022

BITS AND PIECES



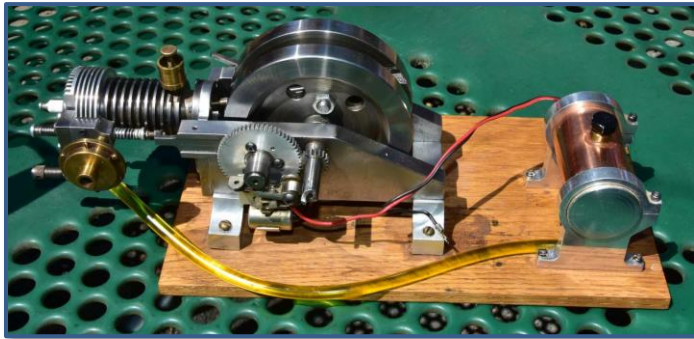
Paul's Wall 4, with new radiator.

Paul Dunham brought in the Wall 4 he and Dwight Giles collaborated on. He had it running as the April meeting and added the radiator.

Stuart Spain brought in a shop made drive shaft disconnect that he made for towing his pickup behind his recreational vehicle. Purpose of the device was not apparent to some as it was sitting on the table. Reportedly it worked well for a number of years. It was available for meeting since the pickup was retired.

Ray Fontaine was showing engines at the Rio Vista Early Days Engine meet and was approached by someone that said he had a model engine with a stuck piston. Ray agreed to look at it and was able to un-stick the piston and was working on the timing when he noticed the crank to cam gear ratio was 1 to 3 (20 teeth

to 60 teeth). After some research, he realized the engine was a 6 -cycle Philip Duclos designed “Oddball Engine”. The build article was published by Home Shop Machinist. Paul Denham loaned Ray his copy of Duclo’s Shop Wisdom to help Ray finish the cleanup and get it running.



Ray Fontaine's Oddball engine.

John David, a Golden Gate Live Steamers member, acquired a complete Stuart S50 Steam Plant via EBay. Plant apparently came from Stuart fully machined and included horizontal steam engine, burner, disposable gas can regulator, feed pump, reservoir, boiler check valve, pipework, and lubricator. John did some rework to get it running. He brought it to the BAEM meeting in hopes of recruiting someone to run it at the GGLS open house on Sunday while he was busy running locomotives.



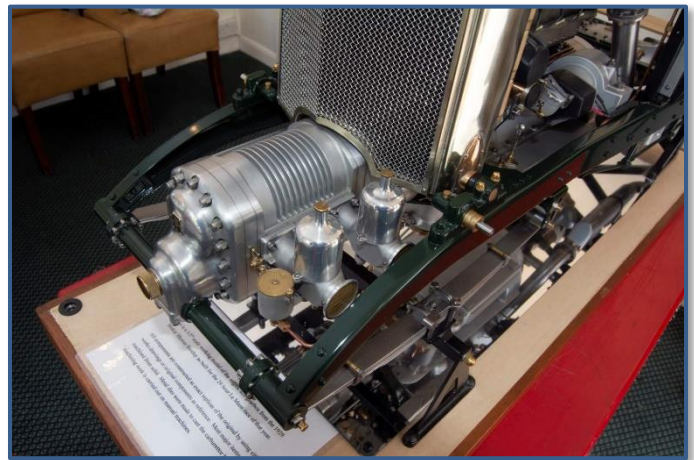
Stuart S50 Steam Plant

RAMBLINGS

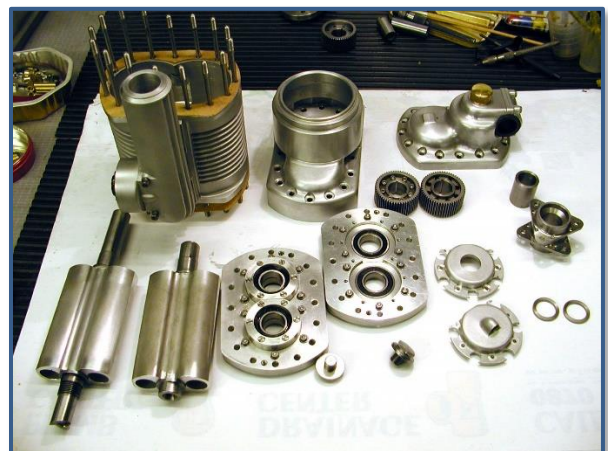
Mike Rehms reports:

Thought you would like to see the supercharger details on the 4.5 Liter Bentley engine built by Mike Sayers (UK) whom I visited last month. All the work is manual, no CNC. He had the rotors wire EDM'd and they work quite well. He asked me if I could do a build article on superchargers. Any volunteers for help on this?

Mike also rebuilds automobiles. His first was a Bentley works ‘mule’. Someone dropped off a frame in his garage and he built the entire car which has been recognized by the Bentley Club of the UK as a ‘true’ Bentley. He’s had that car all over the world. He let me drive it about an hour after we met at the Harrogate show in the UK many years ago.



The engine from the front. The SU carburetors work very well over the entire RPM range. Each one just fits in the palm of one's hand.



Supercharger parts.



Complete engine



Mike Sayers and his Delahaye engine model.

Now he is working on a 1927 Delahaye that won the first British Grand Prix in 1927. Straight 8 with double-overhead cams. Like all his models, this one will run and run well. This model is destined for the Brookland's museum in the UK who have the original car.

Best,
Mike

Sad news. Dick Pretel reports that longtime BAEM member Roger Slocum passed away last month.

Working on an interesting project? Got a great BAEM story? Share it with us here. Send us pics and project details, and your hard work will be shared with the entire club.

WANTED

BAEM member Larry Bunch wants to purchase a Logan 11 x 36 Lathe and asks that anyone who knows of one for sale please contact him.

Larry Bunch 209-404-6700
wendyrocky2@gmail.com

FOR SALE

Dick Pretel has a number of model engine connecting rods available for sale. Rods are for Wall 4 and Challenger V8. Wrist pins are included. Price is \$12 per rod. Contact Dick via email (rpm11K@att.net) with questions or orders. Drawings at <http://www.damgood.com/product-model.html>

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Dwight Giles has a vintage motor he is offering:
-1.5 hp electric motor. 1750 rpm. 110/220v AC single phase. Heavy! Price: Free!
Contact Dwight at jig313@aol.com
or phone: 707-648-1481

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Got something you'd like to sell? Your ad is free and will be seen by likely customers.

NEWSLETTER CONTRIBUTIONS

Your contributions to this newsletter are appreciated: workshop reports, tech articles, reviews, historical pieces, whatever. You contribute, we'll figure out how to post it. Send your contributions to either or both of us. Thanks!

-Mike Byrne at mgbyrne3@comcast.net
-Wes Wagon at weswag@ix.netcom.com

