

# **The Crank Calls**



October 2010

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**MEMBERSHIP**

**\$25.00 US**

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**Next Meeting**

October 16, 2010 at  
Chabot College, building 1500  
25555 Hesperian Blvd, Hayward 94545  
Doors open at 9:00 AM  
Meeting starts at 10:00 AM

**Upcoming Events**

Bunte Auction Services will sell at auction a large collection of model engines on Oct. 30 & 31, 2010. For more information see their website at [www.bunteauction.com](http://www.bunteauction.com) or call Greg Wilson at 847-214-8423.

**MEETING NOTES**

Bob Kradjian - September 18, 2010

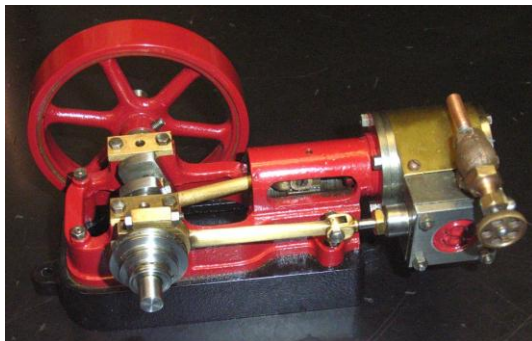
President Don Jones called the meeting together at 10:00 am.

**New visitors were:**

Richard Herrin who saw our display at the Good Guys Show. He has been a machinist for over 20 years and specializes in computerized machining.

Everett Good came with Dwight Giles from Napa.

Mike Martin, a tool designer, actually visited us years ago when we met at Paul Bennett's shop. His life-long interest has been with steam engines starting with a toy Wileco received as a child.



He showed us a Stuart 10 that he restored. It was in the estate of a friend and was neglected and rusty. It now is pristine. Unlike most of us, he actually uses steam instead of compressed air. Several nice boilers with spun caps were displayed. He also has a Carette "Storkleg" from 1903.

See: <http://www.tcawestern.org/carette.htm> for additional details.



Not a visitor, but it was good to see John Gilmore motor into the meeting on his brand-new titanium left knee. All this since the last BAEM meeting!

**Treasurer's Report:** Ken Hurst was at the Infineon facility for the drag races. We are solvent.



Mike Rehmus displayed two versions of the “wobbler” oscillating steam (or compressed air) engine initially developed for the WEME show. Dwight Giles made the prototypes. This engine will be featured in issue 23 of Model Engine Builder.

Mike also passed around detailed plans for Randall Cox’s upside-down two-cycle engine. Students at the University of Idaho drew up these very fine plans.

**Hillsborough Report:** This was the first show at the Crystal Springs Golf Course site. We had a fine reception and perfect weather. Members: Hurst, Gravatt, Jones, Hettinger, Kradjian, Aldrich, and O’Connor displayed engines and had a good time. The previous month we held our usual Good Guys West Coast National display. As always, as for more than a decade, we were well received and had large crowds of very savvy car guys to talk with.

*From a piece intended for last month’s letter:*



BAEM’s annual appearance at the West Coast National last month was a rollicking success. This is the largest car show on the Coast, and the crowds attending our

exhibit reflected that. Hot-rodders and Street-rodders remain our most knowledgeable audience. They understand the complexities of assembling an internal combustion engine. “Do you mean you have to make a camshaft?” is a common question. It’s now been over a decade that we have had a presence at Gary’s big show. Members: Jones, Hurst, Giles, Gravatt, Aldrich, Rehmus, Kradjian, O’Connor, and Gilmore participated.

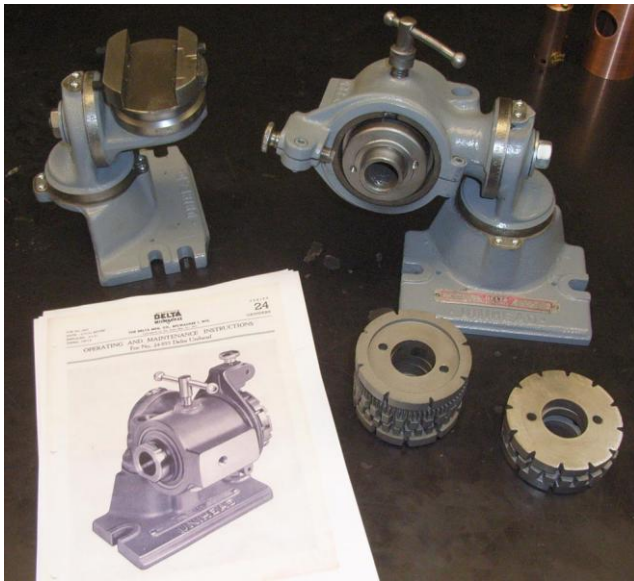
Speaking of the Good Guys, we floated the idea of combining our annual WEME Show with one of the Good Guys Pleasanton staff members. (There are four shows each year). This would relieve our tired WEME show crew of many responsibilities and cost us only the rental of a compressor. There are numerous pros and cons for such a major move and we will explore them at future meetings. Ken Hurst will be in touch with the Good Guys staff to see if this is feasible from their standpoint. It would be more difficult for some of the miniature engine fans to get there, but we would be exposed to thousands more visitors and potential new members.

### Bits and Pieces



Peter Lawrence likes old electric motors and bought a neglected one on eBay. He is in the process of restoring it. The older engines were beautiful with lovely castings.





Anthony Rhodes is a knowledgeable tool collector. He showed the group a fine Delta Unihead UniVise (left) and UniHead (right). These work holding devices are commonly used for grinding tools at the various angles required for cutting metal. The vise is for lathe tools and the head for milling cutters. The division plates for the head are also shown. Anthony promptly received requests for a sale which he politely declined.

30 years. All this work was done on a Maximat 7. An early version of this engine can be seen on You Tube.



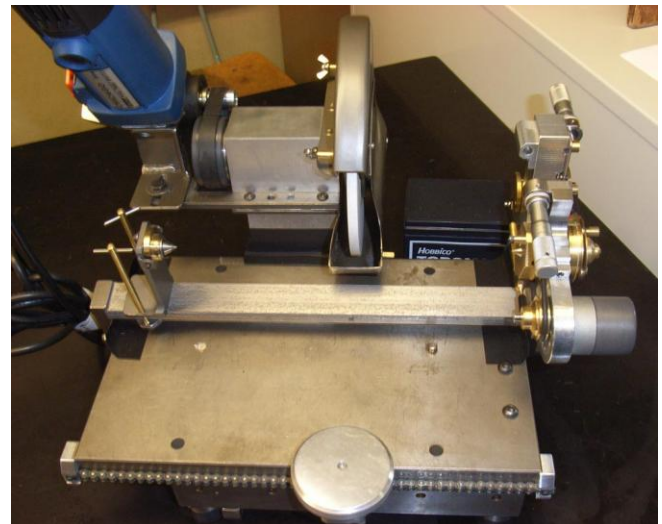
## Tech Topics:

### Cam Grinder by Bob Hettinger

Carl Wilson



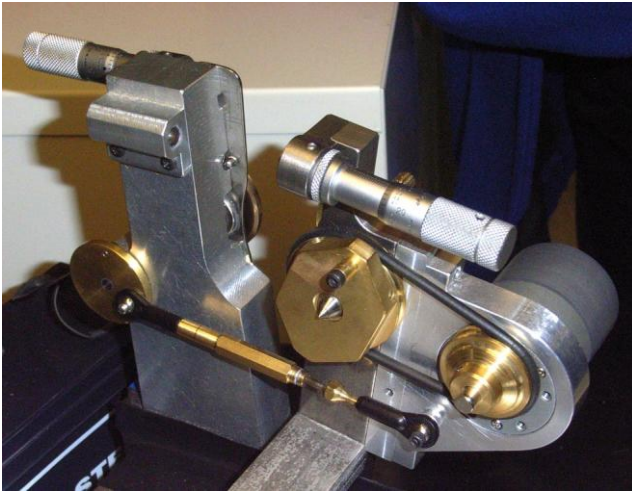
Joel Cohen impressed us with his rotary engines. It is a wonderfully complex engine with two rotors and that turn in chambers that have five blended radii. Gas and air (or just air) enters a small central chamber where it is compressed and moves centrally through to the back rotor. Joel has been working on this project for over



Bob showed his cam grinder at WEME 2010 and Ken Hurst persuaded him to bring it to the September meeting as the featured Tech Topic. Bob's rocking bar type is very neat design. Well thought out and detailed, I think it's the "cat's pajamas". And it's a crankshaft grinder as well as a cam grinder. Let's take a quick tour around the grinder starting with the blue bit at the top left: this is an angle grinder ingeniously adapted to drive the wheelhead spindle. This part began as an intended tool post grinder for Bob's lathe but when a friend donated the dovetail slide (large rectangular base for the machine) the tool post grinder became a

crankshaft grinder. The parts for cam grinding were added later.

The round knob seen at the front of the dovetail slide has a pinion at the other end which engages in a rack on the base of the slide unit. This mechanism is used to position the work with respect to the grinding wheel. The work is mounted on centers, one of which is visible at the left end of the long rectangular bar. The rocking bar also mounts a diamond when dressing the wheel is required.



The work drive mechanism is mounted at the right hand side of the grinder. Starting at the right: the workhead drive motor and sheave; then a belt drive to the workhead spindle. The right hand center and dog drive pin are mounted on the workhead spindle. The masters are mounted at the right hand end of this spindle and are not visible.

Bob explained that the two micrometer heads resulted from the grinder being first configured for crankshafts and then modified for cam grinding. He said that he later realized that he could have done a bit of redesign to eliminate one of the micrometers. Anyway, two micrometers looks really serious!

The bell crank, reach rod, and rod end are typical of Bob's careful attention to detail. That mechanism rotates the work into and out of contact with the grinding wheel. Less visible, but also worthy of attention is the grinding wheel guard fabricated from 16ga steel. The complexity of its contours is not visible in the photos – you will have to take my word for it.



Bob displayed some of his camshafts and two of the masters. The masters (intake and exhaust) are soldered together at the lobe centerline angle and the pair of pins also operates as part of the indexing mechanism to phase the lobes for each cylinder. This is a simple and compact arrangement and works well.

Bob is currently building a Sealion (in-line 4 cylinder with overhead cam on top of a 30cc displacement.) He spent some time researching the cam timings for various engines and had a handout with his results and is reprinted in the Crank Calls with his permission.

Bob notes that making the master is the key to cam grinding. He used the method of calculating the lift of the cam follower at 3 degree intervals and milling the master to the resulting table. This is, in effect, placing the desired lift curve upon a larger base circle.

Bob's cam are made in O1 oil hardening steel, heat treated before grinding, finish ground with a 120 grit wheel and buffed with fine steel wool to deburr the edges of the lobes.

Thanks, Bob, for your presentation.

### In Memoriam

One of our most beloved members, Carmin Adams, passed away on October 4 after a long illness. Carmin was a World War II veteran who saw extensive combat duty in Germany and later served in the occupation of Japan. He was a wizard automobile tuner who was a winner in national fuel economy championships. He was a wonderful family man and patriot. But to all of us in the club he was our true friend. His skills with miniature engines were remarkable. His interests were mainly older IC engines, and his last project was a beautiful Stirling. We treasure his memory as a skillful, kind, gentle, and generous man and offer our sympathy to his family.

## Model Gas engine - CAM PROFILES (DEGREES)

	Exhaust			Ext/Int	Intake			Lift
	open	nose	close	Split	open	nose	close	
<b>Sealion 30cc</b> (modified)	<b>55*</b> (55*)	125* (124*)	<b>195*</b> (193*)	110* (117*)	<b>170*</b> (175*)	235* (241*)	<b>300*</b> (307*)	<b>.080"</b>
<b>Seal 15cc</b>	<b>60*</b>	125*	<b>190*</b>	118*	<b>175*</b>	243*	<b>310*</b>	—
<b>Dalphin 10cc</b>	<b>60*</b>	128*	<b>195*</b>	111*	<b>172*</b>	239*	<b>305*</b>	—
<b>Centaur</b>	<b>65*</b>	128*	<b>190*</b>	116*	<b>172*</b>	244*	<b>315*</b>	—
<b>kiwi 15cc</b>	<b>60*</b>	123*	<b>185*</b>	112*	<b>170*</b>	235*	<b>300*</b>	<b>.094"</b>
<b>SB Chev. V8</b> (full size)	<b>50*</b>	124*	<b>197*</b>	116*	<b>171*</b>	240*	<b>310*</b>	—

### Create Master Cam for the Sealion engine: (see cam profile)

Tools used: Milling machine, rotary table with degrees, and 3/8 mill. cutter.

- 1.) Cam blank = 2.0" Dia., Drill alignment pins (matching grinder mount) at 0° and 180°.
- 2.) On the rotary table, Center and align the cam blank to 0° at the X axis.
- 3.) Rotate cam blank to 55° (for exhaust) on the X axis to begin the cut
- 4.) Cut to a depth of .080" to begin the "step" cut. (see attached 'degree' table)
- 5.) Continue clockwise rotation and 'step' cut to 193° to complete the nose of the cam.
- 6.) machine the remainder of the 'base circle' to complete exhaust cam
- 7.) Repeat steps 2-6 to machine the 'intake' cam (nose 175°- 307°)
- 8.) Block sand the nose to a smooth rounded finish. Note: Any errors or excess metal removal will be directly transferred to errors in the cam lobes.

### References:

- 1.) Model four cycle gasoline engines - by L. C. Mason
- 2.) Strictly I. C. #18 January, 1991

Bob Hettinger marbo1000@netscape.net