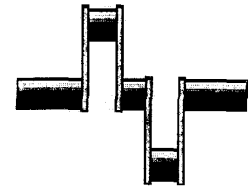


# The Crank Calls



March 2003

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**NEXT MEETING**  
**March 15, 2003, 10 AM AT**  
**Robert Schutz's Shop**  
**366 40th St. Oakland, CA**

Recommended by Pat O'Connor  
Check out the Torque Meter magazine at web site [www.enginehistory.org](http://www.enginehistory.org) for the quarterly magazine of the Aircraft Engine Historical Society.

## **BAEM Meeting Notes** **February 15, 2003** **Bob Kradjian, Secretary**

President Ken Hurst called the meeting to order at 10:10 am. There were no visitors or new members. No one had "first pops." Forty-five members were present.

Treasurer, Lew Throop, was out of the country and no report was forwarded.

### **Announcements:**

The organizers of the PRIME show initially announced that there will be no show this year. However, two days after our Feb. meeting it was re-announced that PRIME would go forward, "one last time", this year. If further shows are held, new organizers will have to found. In summary: There will be PRIME this year.

John Palmer announced the Antique Farm Equipment Show in Tulare, April 26 and 27 at the Agri-Center. Call (559) 688-1030 for details.

Our year's shows to date include Hillsborough, Palo Alto, and the GoodGuy's West Coast Nationals. If anyone is willing to work out a one-page piece for the two Concours programs, please contact me this month. Here's a chance

to immortalize a photo of your favorite engine. The Mare Island Open House and the Gotelli Speed Shop Open House are both possibilities to be confirmed later.

Gary and Jared Schoenly, of Cabin Fever, plan an autumn show in Visalia California. Exact dates and details for this first-time effort will be provided as available. Good luck to them, they do a terrific job at Cabin Fever. They also plan their first summer show at York, PA, on August 9 and 10.

Sincere thanks are offered to outgoing "Tech Topics" chief, Scott Overstreet and to past newsletter editor, Jim Piazza. Both gentlemen did a fine job. Of course, we extend our continuing gratitude to Robert Schutz for his fine hospitality.

### **"Bits and Pieces"**

Dwight Giles brought in just one of the several overhead valve V-8's that he, Ken



Hurst, and John Vlavianos are building. This engine is complete with a Roots type supercharger. It is amazing that nearly all the overhead valve Challenger-based V-8's have been produced by BAEM members, starting with Bob Haagensen and Roger Butzen in Southern California. These are truly advanced and ambitious projects.

John Vlavianos is working on an entirely new V-8 based on the small-block Chevy. He plans to show his progress at the next meeting. This is a much-needed development as the lower end of the three main-bearing Challenger is sorely challenged by the loads being placed on this venerable design.

Steve Meyers is also building one (or more) OHV V-8's. He showed the block assembly, which is only lacking sleeves, valve seats, and deck surfacing. He plans to use the oil pump design from Paul Knapp in Tempe, Arizona. A discussion followed in which several members spoke of developing too much pressure. A relief valve may be the solution.



Pat O'Connor is developing a turbocharger for his highly modified Wall Four (overhead camshaft) engine. He is scaling this down (1/4<sup>th</sup>) from a donated automobile unit. We know such



units are feasible as member Frank Kurz has one fitted to his Wall Four flathead. Pat plans to use bronze bearings, as ball bearings apparently don't hold up as well.



Gordon French showed a Caterpillar tread piece that was scaled down

from a full sized Cat D-8. This is a challenge as there are few, if any, flat surfaces. He also showed a nice start on a Sea Lion cylinder head using his CNC mill.

Tom Armstrong showed his design for a drip oiler with a sheet metal cover by Carl Wilson.



George Gravatt brought a very nicely done Bob Shores "Silver Bullet." It features ball bearings on both the crank and camshafts, Dwight Giles piston rings, Hall-effect ignition, and a Shores radiator.



Chris Leggo couldn't make the meeting but has had two articles published in Britain's venerable "Model Engineer". The first was on his Savery engine and the latest described a model

## ***THE CHALLENGER MYSTERY SOLVED AT LAST?***

We all have admired the wonderful Challenger V-8. There are probably more than a dozen of these complex and fine-running engines owned by members of the Bay Area Engine Modelers.

But, who designed Challenger? Who produced the first commercial casting set and plans? What is the real story?

Some of us had the impression that Elmer Wall had a hand in this engine. This was not possible, as Elmer died in 1948 and the engine was developed in the mid to late 1960's. But there is a surprise; the engine was loosely based on Elmer's venerable Wall Four! It even used some part designs directly from the Wall Four.

Recent conversations and correspondence with Chuck Kuhn of Peoria, Illinois and Paul Knapp of Tempe, Arizona have given us a great deal of authentic information on the origins of the Challenger.

The true originator of the Challenger was Alfred "Al" Bachtold of Forest, Illinois. He was a skilled machinist, a tinkerer, and an inventor. However, he was not a designer or a patternmaker. That is where Mr. Clayton Thoms entered along with a third partner, Mr. Dettrick of Morton, Illinois who was a designer, draftsman, and engineer.

Clayton Thoms lived in Pekin, Illinois (a suburb of Peoria). Chuck Kuhn kindly mailed me a reprint of an article in the Peoria Journal Star dating to October of 1967. The headline reads: "Pekin Mechanic Builds 18-Lb. Model V-8 Engine."

The account tells of a 15 month effort to build the "...world's smallest V-8." Mr. Thoms was a patternmaker for the Caterpillar Tractor Company, making patterns for "...cylinder blocks, heads, and pipes."

Quoting directly from the article: "The engine design and construction was a joint project between Thoms and Alfred Bachtold of Forest, who has an equipment manufacturing company there. Thoms said the idea of a small V-8 engine originated with Bachtold who hired an engineer to design such an engine for him. Before the engineer finished design plans, he quit because of some differences with Bachtold who then asked Thoms to finish the design and make the patterns for the castings. Thoms made the patterns of mahogany. The castings were poured at the Superior Foundry, Peoria, and Bachtold machined the parts at his factory. Thoms completed the assembly of the engine."

A detailed description of the engine follows and, without doubt, it is the same Challenger engine that we know. Notice that Mr. Thoms only identified the third partner, Mr. Dettrick, as "the engineer."

Both Mr. Thoms and Mr. Bachtold have died. The status of Mr. Dettrick is unknown.

The original, prototype Challenger (engine number one) was given to Clayton Thoms in payment for his development work. This was after a dispute about distribution of profits caused the original group of three to break up. Mr. Bachtold paid off the designer in cash and then headed up the project.

Thoms took the prototype engine to the Toledo model show where he sold it for \$1,000. It was later sold twice, and wound up in Los Angeles. I was offered the engine in 1997 and declined to buy it, but told Paul Knapp about this historic item. He bought it and it is now in his model museum in Mesa, Arizona! Go to [engine-museum.com](http://engine-museum.com) to see a photo of this historic engine with its original Wall downdraft brass carburetor and no fins on the head.

There is one more party in the Challenger story. He just may be the most important of the four, and is the only known survivor of that original group. His name is Emile Damotte and if you built a Challenger you will see his name on the lower right of the plans. Chuck Kuhn knows Emile (who is still working for Caterpillar) who lives in a town not far from Mr. Kuhn. Chuck is hoping to visit Mr. Damotte and learn more about Challenger's earliest days.

However, our good friend and new BAEM member--Paul Knapp--has been in contact with Emile "Skip" Damotte. Here is Mr. Damotte's part in the Challenger story.

Mr. Damotte purchased the entire Challenger project from "Alf" Bachtold in 1969. He then started Lancer Engineering which produced the Challenger castings and plans. (He also bought the entire Wall engine line from Elmer Wall's son, Robert.) The Lancer Engineering project was sold to Cole's Power Models in Ventura, California in 1980. As most of us now know, Coles was re-sold last year and is now located in Los Angeles. It is from Coles that most of us have purchased castings and plans.

Mr. Damotte gives us this direct history in a recent e-mail to Paul Knapp.

"The Challenger was not designed by Elmer

Wall, but it was designed to use several castings that were common to the Wall 4 cylinder, 50cc engine.

"...The designer began to design the V-8 using the Wall 50cc engine as a guide."

In later e-mails to Paul, Mr. Damotte tells of finishing the design for the heads, manifolds, a new front cover (the original one had "T/B" cast on the surface, signifying Thoms/Bachtold), the fly-wheel with the Lancer name cast on the back, distributor base, water pump bearing support, a redesigned timing-gear case, and the "camshaft layout". We see from this that Mr. Damotte was not a passive investor; he had a very great impact of the final appearance and performance of the engine. It also seems probable that if he had not purchased the project, there would have been no commercial offering of the Challenger. The very name "Challenger" originated with Mr. Damotte.

That is the story of Challenger. It was the joint work of four talented and industrious men. Well, maybe we should say five men. The "Father of Us All", Elmer Wall had a hand in it even though he died twenty years before Challenger was born!

My thanks to Paul Knapp, Chuck Kuhn, and Emile Damotte for the information!



Dwight Giles, Ken Hurst, and John Vlavianos proj-

# TECH TOPICS

BY  
PAT O'CONNOR

## Recorded by Carl Wilson.

Bay Area Engine Modelers, home of the Twofer Tech Topics! Yes sir! folks, right here at BAEM we got two Tech Topics for the trouble of attending only one meeting. What a deal. Pat O'Connor started his tenure by featuring Dwight Giles presenting his techniques for making the beautiful finger-jointed wooden boxes that are to be found beneath his engines, and then Pat hosted a discussion of materials, techniques, and tips for making gaskets. While we had a great time, this only increased Pat's problems because we used up two of his good ideas for Tech Topics. Suggestions are always welcome.

Dwight Giles gave us a lucid and well-documented tour through the intricacies of making finger jointed boxes for engine bases. He



uses a jig that was featured in Wood magazine, Feb. 1989. This device is based upon a 3/8-16 all-thread rod that will move the workpieces exactly 1/16" for each turn of a crank. All four pieces of the box are clamped together and to

the jig. They are indexed to the saw blade edge. For the first cut the jig is advanced 2 turns for the first finger and 2 turns for each additional finger. When done the box pieces are flipped over, indexed again and the jig advanced 1 turn for the first slot and 2 turns for each additional slot. All of Dwight's boxes are made with 1/16" wide fingers. He makes special 6" diameter saw blades that will cut a 1/16" kerf. Dwight emphasized that a slitting saw without a set to its teeth will not work. If you rough out a blank, Dwight will make you a saw blade. See him for details.

The glue-up is easy: smear glue over the joints and fit the fingers together. But the clamping method is a neat trick. Dwight uses a long piece of rubber cut from an inner tube (about 5/8" wide and about 10' long.) This is simply wrapped around the box in all directions and tied off. No need for a dozen long clamps here! When the box is clamped, he checks for squareness. Another strip of inner tube can be wound around the box in such a direction as to pull the box into square as necessary. The top of the box is glued on and its edges are routed. The inside of the box has some important details. The "vertical" corners (between the ends and sides) are reinforced with a 45 deg. glue block. The block not only reinforces the joint, but also provides a place to attach the rubber feet that prevents the box from walking around the table when the engine is running. The "horizontal" corners (between the top and sides) are also reinforced if the box is for a V-8 engine.

Thank you, Dwight.

## GASKETS:

Ken Hurst brought a sample of a Kevlar-nitrile gasket material available from McMaster-Carr. He cuts the gaskets to rough size in a paper shear and then clamps them between two 1/8"



aluminum plates that have the same shape as the desired gasket. Ken said that you can cut a bunch simultaneously, so make spares. Just cut around the plates with a hobby knife and drill the holes in the drill press. If the template plates are made to the same dimensions as the pieces to be sealed, all will be well. Ken recommended Copper-Kote for a sealant.

Carl Wilson uses gasket punches over a wooden block. Both shop-made and commercially available punches were shown. The gaskets can be drawn with a CAD program and printed on paper. Kraft paper (shopping bag) and drafting

vellum are useful for low temperatures and pressures. His final demonstration was cutting a gasket with a ball-pein hammer by tapping against the metal piece to be gasketed. Nothing fancy here.

Pat O'Connor uses a wooden table on his mill and the digital readout to locate the position of the cutter. The gasket is cut to the same dimensions as the parts to be sealed. The material is a cork/paper blend (see below,) which is taped to the wooden table. For small holes, Pat uses the thin-wall brass tube available from hardware and hobby stores.

Dick Pretel recommends "Flange-Seal FST-3" available from McMaster-Carr for metal to metal sealing. One advantage of this material over RTV adhesives is ease of disassembly. Dick also seals threaded fasteners with this material. For head gaskets he uses a cork-paper material (CN 705) made by Interface Solutions, Inc. He will frequently coat both sides of the gasket with hi-temperature wheel bearing grease.

Note: The gasket material recommended by Pat and Dick is sold in large quantities only. Dick is willing to be our purchasing agent if there are enough buyers. The minimum quantity to each buyer will be 1 yard and should cost about \$5. Please contact Dick if you are interested.

## President Notes:

Hi club members, well we started the New Year off with a excellent tech topic which was on wooden box making by Dwight Giles and gasket making by Carl Wilson. If any you have a special talent and you would like to share it with the club, please contact Pat O'Connor Tech Coordinator.

March meeting is our annual swap meet/ bring those items that you have two & clean out those cabinets. Don't bring your junk. Maybe we can plan a potluck in the future.

Too all safe machining.

**Ken Hurst**

Photos by Jim Piazza and Bill Nickels