Bay Area Engine Modelers Club, Branch 57 of EDGE&TA

The Crank Calls

November 2014

President	Don Jones	(510) 566-3153	dj712@sbcglobal.net
Secretary	Bob Kradjian		bkradjian@aol.com
Treasurer	John Gilmore	(925) 228-8483	jgilmoreco@aol.com
Events	Ken Hurst	(707) 257-2481	icengine@comcast.net
Tech Topics	Carl Wilson		toolcarl@comcast.net
Editor/Printer	Larry Zurbrick	(408) 448-5752	baem_editor @pacbell.net

MEMBERSHIP $25.00 US
Contact John Gilmore at
jgilmoreco@aol.com

2015 Dues are now due!

NEXT MEETING
November 15, 2014 at
Chabot College, building 1500
25555 Hesperian Blvd, Hayward 94545
Doors open at **9:00 AM**
Meeting starts at **10:00 AM**

Upcoming Events

BAEM meetings: 3rd Saturday of the month

MEETING NOTES

October 18, 2014
Bob Kradjian

President, Don Jones called the meeting to order at 10:00 am.

VISITORS: There were no visitors, but we welcomed John Kennedy our new member.

FIRST POPS: There were none reported.

EVENTS: John Palmer reported that no EDGE & TA meetings are scheduled. While we are no longer using their insurance coverage, we will still be members of Branch 57, but only if we pay $4.00 per member per year. After discussing the matter, we decided (with a formal vote) to discontinue our association with EDGE & TA.

A report of the GEARS show was provided by Carl Wilson and Dwight Giles. Member Dave Palmer also attended the show with a large display of engines. The show was smaller than in the previous years.

The use of live steam at our WEME show was discussed at some length. There are many problems involved with certification of boilers, a number of insurance issues, and the safety of both members and visitors. The issue was tabled without a vote.

TREASURER'S REPORT:. We received $1,000 owed us to offset show expenses for the compressor and fuel at the WEME show. Treasurer, John Gilmore, discussed our storage situation with our show material. After discussion, it was decided to purchase an $1800 trailer to enclose and store this material. Al Aldrich has offered to store the trailer at no cost. A formal vote approved this plan with no dissenters.

CLUB BADGES: If you need a badge, contact Mike Rehmus (mrehmus@byvideo.com) who has offered to produce them.

BITS AND PIECES:

Paul Denham mentioned an Atkinson engine design by Jan Ridder that he found on the Internet. He is building two of these, one for his son. He used Gearotic to cut the spokes and hub for his flywheel. His first try was there for exhibit; it looks a bit like a Mercedes star. The Ridder site on You Tube is well worth a look. Start with: "Ridders 4 stroke IC engine with glass cylinder". This will give you a good look at the visible combustion chamber he has developed. Also on You Tube is a compilation of 40 of his engines if you have a half hour to spend. He is a remarkable inventive builder working in Holland.

Paul is also working on his own CDI ignition system with advance and retard features on a microchip. He will bring this for inspection at the next meeting. Paul described his starting problems with his Wall Wizard Twin. The problems were solved by a larger coil and greater plug gap. I had an identical problem with a Bob Shores "Silver Angel". Its balky starting and running was cured by fitting a large six-volt Volkswagen coil and a substantial gel-cell battery.

Paul Knapp wrote and gave us a link to some excellent photos of the WEME show. Please review these and catch up on museum news at: https://www.flickr.com/photos/15794235@N06/

Carl Wilson brought up the subject of measuring horsepower in our small engines. His suggestion was to use a double shaft electric motor as an absorber and a scale and tachometer for instrumentation. Pat O'Connor suggested the use of an automotive disc brake. This would speak to one of the most common questions we hear at the shows: "What's the horsepower?"

Jim Freel gave us a preview of a beautifully crafted distributor and rotor for his Black Widow V-8 project.

Mike Rehmus and John Palmer are still looking for help from members who can help with the preservation of the historical Wright brothers engine. A meticulous review of the drawing sets for the engine and a collection of all the redline corrections is needed. These will then be collected in one place so that the CAD files can be corrected. This will allow future use of the drawing set to make either models or full-sized engines. Check with Mike for details.

Carl Wilson then followed with a continuation of his detailed and erudite expositions of a complex subject, the balancing of rotating components. See Tech Topic for details.

To supplement Carl's presentation, there are a remarkable number of You Tube programs under "How to balance a crankshaft". "Engine Balancing Explained" is also on You Tube will give you an engineering approach by a nerdy, but interesting young man.

Steve Jasik discussed some of the advances in piston design and construction featured in a recent "Car and Driver" Magazine. See the following link: http://www.caranddriver.com/features/everything-you-ever-wanted-to-know-about-pistons-feature

He also developed a Schraeder valve fitting and tubing to decompress the injector fuel line when servicing his Corvette engine.

We had a raffle for an edge finder that was won by John Palmer.

THE HISTORY OF THE CARBURETOR

As promised, a few notes on the development of this critical device.

We think of the carburetor as a device to mix fuel with air and provide it to an internal combustion device. This usually refers to a liquid fuel. However, it seems the earliest carburetors developed in the 1800's did not use liquid petroleum; they used gas in vapor form, as in our present day heating gas. In the 1800's, these gasses were referred to as swamp gas, coal gas, natural gas, manufactured gas, wood gas, town gas, and other similar terms. A simple metering jet sufficed for most of these very early engines with little, or no, provision for wide variations in flow.

Credit for the earliest carburetor that used a petroleum-based, liquid fuel is disputed. A strong possibility for that honor is Jean Lenoir (France) and the date was 1863. He had previously constructed an engine that ran on coal gas and he fitted it with a carburetor using petroleum. By the next year, Siegfried Marcus (Germany) produced a single cylinder, two-cycle engine with a "crude carburetor". In 1886 Marcus filed a patent for a "vaporisater". As space permits, this story will continue with a brief history of early carburetor design.

TECH TOPIC:

Carl Wilson

Let's go back to last month's Tech Topic and review the basic ideas of balance and unbalance. Picture a rotor mounted on two bearings – it has to rotate around the centerline defined by the centers of the bearings. That is the geometric axis.

The demonstration model showed that a rotor "wants" to rotate around an axis defined by the center of mass of the rotor. If this axis does not coincide with the geometric axis a rotating force will appear – the rotor is "forced" to rotate around the geometric axis.

This rotating force will cause the rotor to vibrate and in many cases this is unwanted. Balancing is the art of detecting and correcting unbalanced forces to reduce vibration to an acceptable level. There is no such thing as perfect balance – that can only be approached to a degree determined by the time and money available.

There are many ways of detecting and quantifying the location and size of light or heavy spots on a rotor. Now that statement is not quite right, for we usually cannot find exactly where those spots are but we are able to determine exactly where to correct for their effects. I designed and built this balancing machine and its amplifier to do that job:

Two bearing pedestals are mounted on a base plate and carry an open (180º) bearing in which the part is driven by an electric motor. The bearings are suspended from the pedestals by two small leaf springs which allow the rotor to move (vibrate) slightly toward and away from the operator. This motion is detected by a pickup – in this case a velocity transducer – a magnet and coil.

The generated signal is sent to the balancing amplifier which does several things: it shows the amount of vibration of the rotor at the location of the pickups, and flashes a strobe light at some point on the rotor. At this time not much is known: just a number on the meter and a spot on the rotor.

There are several ways of proceeding from here. This type of amplifier relies upon adding a trial weight and running the rotor again. The amount and location shown by the amplifier will change. Several trials may be made at known angles from each other and the final correction may be calculated by equations or by a graphical vector solution from the values of the trial runs. Alternatively, the trials may be continued by a specific method until the desired state of balance is achieved.

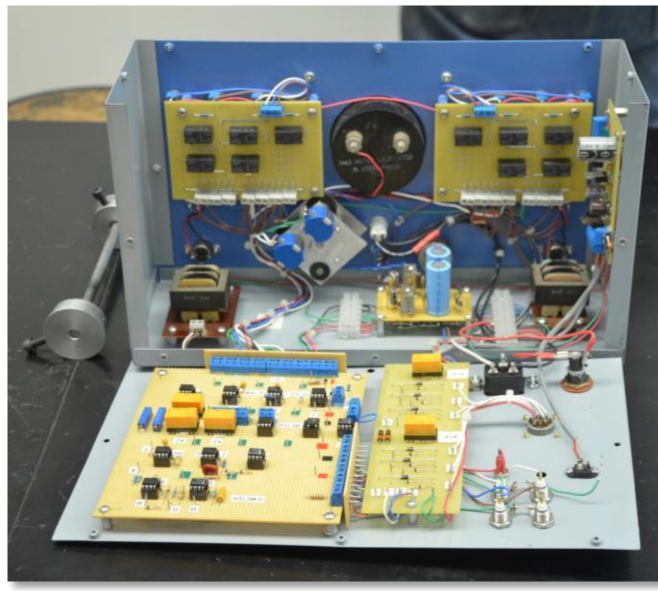
There are two more features built into this amplifier. These are the complex network consisting of the six switches and four potentiometers in the top 2/3rds of the front panel. This is the separation and calibration network and is used primarily in production balancing. To understand its function let's go back to last month's Tech Topic.

Some of the demonstrations showed that a change in one end of the rotor affects the amounts and angles at the other end. This is called "cross-effect." The separation portion of the network cancels the cross-effect from the "other end" so that the readings of the amplifier are those for the end being read. The cross-effect is a function of the geometry of the rotor and is the same for all identical rotors. This allows the operator to balance a rotor by the methods given above, set the amplifier controls to cancel the cross-effect and then balance all the rotors in the same batch directly without any further trial and error.

This process is aided by the calibration network. This circuit makes it possible to directly read on the meter a number which corresponds to some particular correction. That is, the meter could be set to read the depth of a given size of a drill or the number of washers to add.

Finally the network, together with the fifth potentiometer labeled Phase Shift, may be set to flash the strobe at the correction location of either the heavy or light side. This method of balancing is known as the Gisholt method, after the company which sponsored the development of the circuit.

An interior view of the balancing amplifier shows the electronics bit and pieces. In many ways this is an analog computer which solves complex vector calculations. Anno Domini 2014, this is, of course, old school. Balancing machines are now digital and require less operator expertise. That being said, this combination of balancing machine and amplifier is capable of very accurate work.



To return to the topics introduced in the September Tech Topic: balancing is the art of correcting any unequal distribution of mass around the geometric axis by adding or removing weight at specific locations in one or more correction planes. The axis of mass distribution is brought closer to the geometric axis thus reducing unbalanced forces acting in the rotor and reducing vibration.

John Palmer told us about his method of balancing full-size hit-n-miss engines. The engine and its skid is placed upon two pieces of round bar stock or pipe. If the engine is not well balanced it will roll back and forth on the floor. John clamps weights on the inside of the flywheel and does a series of trial runs to determine the best location and weight. A very low tech but effective balancing machine.