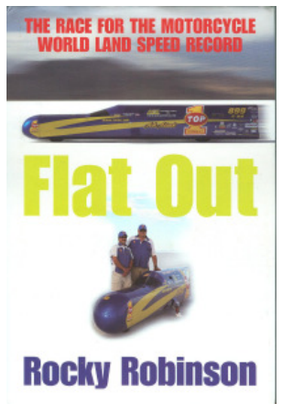
Reviews

Rocky Robinson (2007). *Flat Out: The Race For The Motorcycle World Land Speed Record.* 255 pages.

"You live more in five minutes flat-out on a bike like this than most people live in a lifetime." --- Burt Munro (1899-1978)

The "bike like this" was a 1920 Indian. Burt Munro was a motor head *and* madman from Invercargill, New Zealand, who came to the Bonneville Salt Flats late in life to set records with his equally aged machine. Two documentaries exist, both "must sees" available on one DVD, *The World's Fastest Indian* (2005) and an earlier (1971) *Offerings To The God of Speed*. I'll lend you my copy if necessary. The latter will give you chills.

Burt's been gone 30 years but there is no shortage of young fellows willing to take his place and get on (or in, as the case is now) a motorcycle and see how fast they can go. Rocky Robinson is a perfect example, and his book *Flat Out* is the story of how he set the world's record in 2008 at 360 miles per hour.



What I liked about Rocky's book is that it is written from the view in the cockpit, straight, as they used to say, from the horse's mouth, not a journalist covering the story or a professional biographer earning a living. Rocky Robinson is the man who sat 6" away from two hopped-up, screaming Suzuki Hayabusa engines while trying to keep his cigar-shaped machine going straight at over 300 miles per hour.

It is as much a story of failures as successes as any world record attempt has to be, but it is out of the failures and the team's reaction to them that the true character of a winning effort emerges. If you want to know what really goes on during the months leading up to a world record attempt and the emotions that surface during "speed week" at the Bonneville Salt Flats, get this book. Rocky has an entertaining style, the beer and girls are kept to the bare minimum, and there are lots of technical details for the motorheads.

If you're lucky, he may even sign one of his posters for you like he did for the Marshfield Pirate Shop, an item now proudly hung in our classroom.

Pioneers of Technology

Lionel M. Woolson
(1888-1930)

"I consider Captain Woolson as one of the great mechanical geniuses of this generation." --- Macauley, April 26, 1930

First, I need to thank Robert J. Neal for sending the Pirate Shop a copy of his (2008) book *Master Motor Builders*, the companion work to his earlier (1995) *Packards at Speed,* without which I would have remained ignorant of Lionel M. Woolson. Neal will probably be disappointed in my selection of Woolson for *Pioneers of Technology,* for of the four significant Packard engineers, Jesse G. Vincent probably deserves the most press. Woolson, however, was such a hardcore motorhead that I'm giving him the green light here.

Woolson was born in Los Angeles, but attended St. Paul's School in London for engineering. In contrast to modern engineers, he then went to work as a mechanic for Mercedes before returning to the United States in 1905 also as a wrench. From 1908 to 1912 he was superintendent of West End Garage in charge of automotive repair and "experimental work."

When the U.S. entered WWI in 1917, he enlisted and learned to fly airplanes and test aircraft engines. It was here he met the influential Packard engineer Jesse Vincent, who had also enlisted and was in heading up the engineering division.

After the war, Jesse Vincent hired Lionel Woolson to work for Packard. Woolson poured on the coal and during his 11 years at Packard was granted 175 patents, built and raced airplane and boat engines and was the first man to power an airplane with a diesel engine of his own design (a nine-cylinder radial known as the DR-980 Packard).

Woolson's life was cut short at 42 years old when, as a passenger, a small plane crashed. In those 42 years he spent no time spinning his tires as he fixed cars, made special carburetors, designed new engines and never veered from his passion to always have his hands on something mechanical, never leaving anything "stock." No resting on past laurels either.

This was a man who possessed rare cerebral/tactile balance ... the mind of an engineer with the hands of a mechanic.

Quarter Inch Drive

A quarterly newsletter for friends and graduates of Tom Hull's shop programs

Winter 2010 **Number 61**

Rat Fink, born out of iconoclast Ed "Big Daddy" Roth's dislike of Mickey Mouse, was Roth's most famous caricature. Known in the 1960's as Mr. Gasser, Roth was a counterculture artist and custom car builder, famous in my neighborhood for his *Mother's Worry* T-shirts and *Beatnick Bandit* hotwheels.

In This Issue

Serving the Psyche

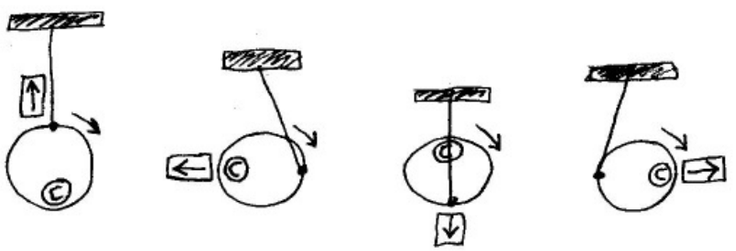
By its nature, open enrollment, the cornerstone of American education in general and the Pirate Shop in particular, serves a staggering breadth of learners. The mantra of high expectations for all students rings of cliche, but successful application means making students stretch to do things or understand concepts that they don't currently possess ... but there's the rub ...for numerous complicated reasons, one student may come to class cawing like a crow while another is "quicker on the uptake" than the teacher.

Primary and Secondary Harmonics

Setting aside the fowl inflicted and the creation of high expectations for him, let's shift to the other end of the spectrum. Last spring Shane Daly, athlete, scholar and aspiring engineer had one week left of his senior year. "What you need," I told him, "is to take a challenging mechanical concept and model it so that a third party can understand the theory." I jump started him by doing one myself as an example.

Primary Harmonics, or vibrations that occur at the same speed as an engine, are called primary harmonics. An interesting solution to this is the Synchro-balance shaft used by Briggs and Stratton to dampen one primary harmonic. The shaft runs opposite the direction of the crankshaft. Why? To start out, an engine's piston, as it moves up and down acts like a paint shaker. To dampen this effect, builders install counterweights which go down as the piston goes up, and vice-versa. However, placing a counterweight equal to the piston's effect would trade up and down vibration for side to side vibration. The lawn mower still numbs your hands.

So what the designers do is go for a happy medium. A counterweight say of, half the piston's effect, so it doesn't totally cancel out the up and down shake but then only produces half the side to side. But here's the key ---- *the resulting imbalance runs opposite the direction of the crankshaft.* Very few people would ever "see" this by reading words, so here is where the model comes in. Below, in pencil, is a circle which represents the crankshaft's circular rotation. The "C" with a circle is the main counterweight, the arrow in a box is the direction of the resulting force, or imbalance. The Synchro-balance places a weight opposite this new imbalance, but it needs to chase it around in the same direction, which is opposite the crankshaft rotation.



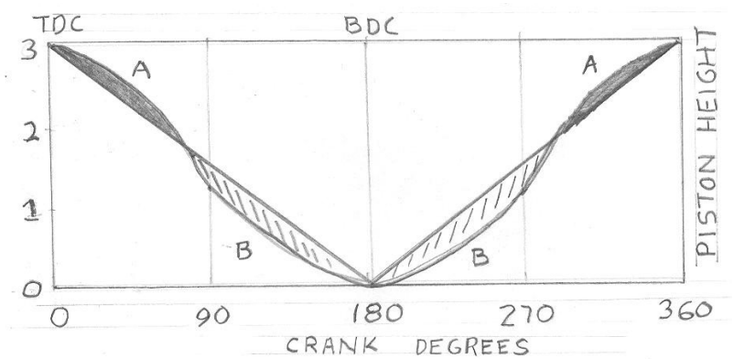
Watch the boxed arrow turning CCW while the engine spins CW.

Shane and Secondary Harmonics

Now it was Shane's turn. The concept to model is one manifestation of a secondary harmonic that is created by the speeding up and slowing down of the piston, which occurs at twice the engine speed. Now I know these engineer-types. Shane will go right to the internet and see what the answer is. Good news. I checked pretty carefully and there were no clear graphic models. Even better, some explanations were confusing and/or even faulty.

I would give you his final work done nicely in AutoCad but I lost the file over the summer, so I pencilled in one of his solutions below. If the piston and connecting rod rose and fell straight up and down (no circular motion) then the graph would be a solid line that looks like a "V." But from the middle of hump A to the middle of hump B the piston is falling faster than linear. (**Key:** When crank has turned 90 degrees the piston is **not** half way down the stroke). I like Shane's graph because I can see two flutters in one crank revolution, which helps me visualize the harmonic.

Think back to your front-end theory; its the same concept that allows a car to turn one front tire sharper than the other when going around corners. Toe-Out-On-Turns works because of where in the arc the steering arm is placed.



Sorry, I'm at home with no AutoCad so grabbed a crescent wrench instead of a Snap-On ratchet. Stripped the data off a 1936 Wisconsin with a degree wheel and a dial caliper instead of a spreadsheet. No high tech.

Kids like Shane are a blast to work with. They get a little frustrated but never lose their cool. When he couldn't get the graph he wanted I told him, "It's a concept problem, not an AutoCad problem." He kept at it and the epiphany finally hit. The paper he turned in the last day of school had several charts and graphs with his data arranged in various formats. Written under one was "This chart shows the irregularity during piston stroke. The beginning of the graph shows the first irregularity ... it slows down dramatically as the piston reaches BDC ... the next irregularity happens in the exact same order going up. This causes a vibration twice as fast as engine RPM."

Bingo. That's all I can do for you Shane. Go get the world.

190 Duration

Motorheads and Madmen

"He's the most capricious ... He's the Salvador Dali of the movement -- a surrealist in his designs, a showman by temperament, a prankster."
-- Tom Wolfe speaking of Ed Roth in
The Kandy-Kolored Tangerine-Flake Streamline Baby (1963)

As well as a crazy cartoonist*, Big Daddy Roth was a legitimate car customizer, who along with George Barris were celebrities in post-WWII southern California hot rod circles. From Leonardo Da Vinci in Italy to Jesse James at West Coast Choppers the design and structure of the mechanical world has always attracted a montage of both people and ideas in quest of tools to use as an extension of man's tactile creative energies.

One thing is certain, these people are driven, sometimes to the point of questionable stability, but always strangely amped-up and energized. You see this while reading their life stories. Like musicians, they don't retire; it's too ingrained in who they are to stop. Pick up a biography of any true motorhead; Kettering, Yunick, Ricardo, Porsche, Miller, Offenhauser, Fuller, Jano, Chapman, Britten, Manly, Cummins, .. you will see what I mean.

Engines especially, that thudding, pulsing epitome of mechanical motion, seem not only to fascinate the motorhead, but by symbiosis fuel the fascination which compounds the motivation to keep going. In the groove, late at night, lying under a car turning the last bolts in on your engine swap ..James McMurtry feels it as he powers along in *Choctaw Bingo*: "Got a biker bar next to the lingerie store that's got them Rolling Stones lips up there in bright pink neon and they're right downtown where everyone can see 'em and they burn all night, you know, they burn all night, they burn all night."

For a mind-altering experience, see* **Crumb, *a 1994 documentary film about the life of underground but now world famous cartoonist R. Crumb and his truly mad family.*

Until next issue,

Tom Hull

Tom Hull

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Two heads are better than one. Me and my Moto Guzzi V-Twin.

Success Story

Steve Westbrooks

- Graduated SU: 1987
- Umpqua Community College: 1991
- Rogue Community College: 1993
- Current Employer: VA Roseburg Healthcare

Why does this man look so happy? Maybe it's the company of his wife Kristy (Mills) to the right, ex-cheerleader, current mother and future English teacher ... and it could be the thought of their two great kids (Alexis at 11 and Riley who is 9). Steve says for him success is "where you are at in your life, is your family happy and stable and are you satisfied with your accomplishments?" And the only way to be truly successful, he says, is to be happy with yourself.

Well, the eyes never lie and the exuberance that I saw in him 24 years ago is still there as evidenced above.

For the last 16 years Steve has been serving as a registered respiratory therapist and cardiopulmonary services manager in Roseburg, Oregon. Although the management part of the job can be demanding, he very much likes the clinical aspect of the job ... the hands-on work; and because of his educational background he is well compensated for his skills.

I clearly remember Steve as always busy in my mechanics class, and he agreed recently when he said, "I loved the shop class. What I learned in class got me my first job at James Graf Trucking doing brakes, tires, rear ends and welding. That job is what got me through school and put me where I am today."

For me, I get a great kick out of watching these kids grow up. One student I had long ago (not Steve) asked me recently if I was still as funny as I thought I was. Ha. That's a good one. That's funny. All I can say is that, Steve, I'm going for a little color this issue; it should help that gray goatee show up a little better in your picture.

Here's How: Tips from the Field

Torque Turning

Almost everyone I know uses the click-type torque wrench because of the convenience of hearing and feeling the value instead of having to look (can't see the face of a torque wrench when it's between the water pump and the radiator).

However, there are still good uses for the old "beam" style torque wrench designed by Walter Percy Chrysler in the late 20's. Installing crankshafts and pistons for instance. Drop the crank in, torque the mains and then place the beam-type torque wrench on the crank and see how easy it spins. *Nice-easy-smooth?* No? Plastigage every bearing? Checked end-play? Put main caps on with arrow pointing to go? Now the pistons. Of course there's drag here. The key is that the torque values get stacked in even increments as each piston is installed. Problem children stand out, awaiting your mechanical solution.

Indestro: just one of many who scooped up Chrysler's idea.

Another similar use for ole' Mr. Beam is installing cam bearings. When knocking new cam bearings in the classic American V-8 with the cam under the valley, it's not uncommon for one or two of these bearings to be tight and put drag on the cam. How tight is tight? What drag is acceptable? Well, with enough experience, the torque-o-meter is in your wrist and the 600 wet-dry in your hands.

Until then, pull out a 1/4" drive beam torque wrench that measures in inch-pounds, paying close attention to the "starting" as well as the "running" torque values. You're still in charge of the wet-dry.