

BIG AND SMALL

Marvin Hedberg's scale and full-size Kansas City Hay Press engines

Story and photos by Bill Vossler

Marvin Hedberg grew up in the 1950s on a farm near Moose Lake, Minnesota. Now 72, Marvin's farm memories include the threshing circle of seven to eight families that moved from farm to farm with the threshing machines, and a neighbor who had a 6 hp International Harvester M engine on a rig to saw wood

for the stove. "On a real cold winter day, you could hear it sawing wood a mile away," Marvin says.

Marvin moved away from the farm, following a career as a machinist, but he never forgot threshing or the sound of that old IHC M. "Twenty years ago, I saw an ad for a threshing

Circa-1903 10 hp KC Lightning

Manufacturer	Kansas City Hay Press Co., Kansas City, MO
Serial no.	9 (added by Marvin Hedberg)
Horsepower	10 hp @ 250 rpm
Bore & stroke	7in x 6in x 2
Flywheel	3in x 42in
Ignition	Low-tension igniter
Governing	Flyball, hit-and-miss



The 10 hp Kansas City Hay Press Lightning Balanced Engine as it looked when Marvin Hedberg acquired it.



Marvin was also able to buy the hay press that was originally powered by the Lightning engine.

group and started attending," Marvin says. "I was also able to buy a 6 hp M engine at an estate sale. I mounted it on an F14 tractor chassis, making it an F6," he jokes. Marvin then found a 1-1/2 hp IHC M engine, which he installed in a half-size F12 chassis he built himself. "That way, I could

drive the engine and show it."

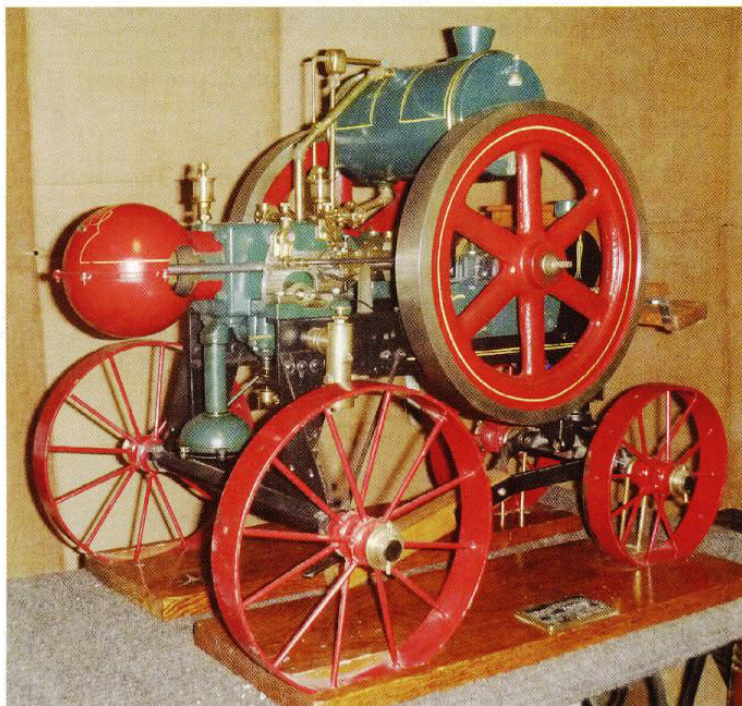
That was fun, but then he started noticing scale engines. "I figured they would be a lot easier to carry around and handle," Marvin says, "so I got interested in building those. Being a toolmaker with machinist equipment available, I could do that."

Starting small

Marvin's first kit scale engine was a Wyvern from England. "I wanted to build an engine based on how the English made them – a throttle-governed engine where the sideshaft operates both the intake and exhaust valves." Although Marvin was advised to start with something simpler for his first engine, with his machinist background he wasn't afraid to tackle the Wyvern. He finished the engine, even adding his own touches. "That engine didn't come with a governor, but I made a flyball governor for it that works just fine," Marvin says.

The next engine was a half-scale IHC M. The detail was very good on the kit, but it was missing a few parts. "I measured the breather, rear cover and thumb screw of a big one, and made scaled-down versions for the model," Marvin says. He corrected the muffler on the scale, made water fittings for the pump jack and did some detail work on the governor system. "I also made a hand crank and crank guard."

Marvin's third scale engine was a hopper-cooled 4 hp IHC Mogul sideshaft: It was also his first scale engine built from scratch. "I had



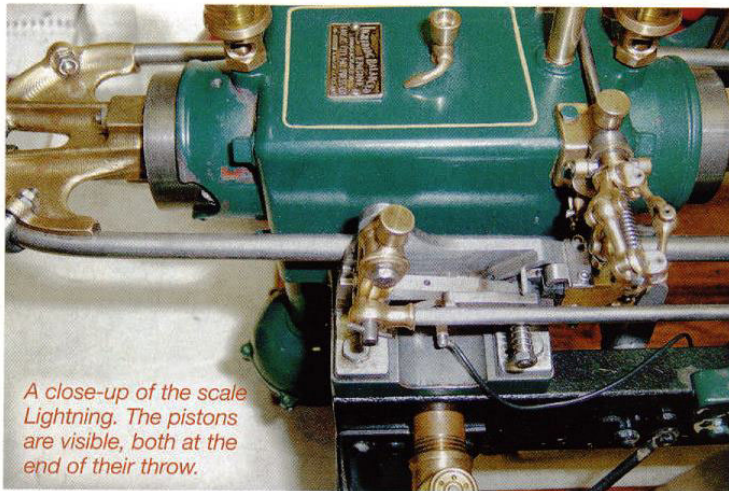
Marvin's quarter-scale Lightning is a faithful replica of the original.

the full-size Mogul engine on skids and I liked the way it ran," Marvin says by way of explaining his desire to build the Mogul. "After measuring the engine and drawing it in my computer, I scaled the engine down to quarter-size. I learned how to allow for shrinkage of iron, then made my own patterns and had castings made from them." The castings were then machined and assembled to make the finished engine.

The smaller parts he drew up and scaled down on the computer, then used a CNC (Computer Numerical Control) milling machine to cut the parts. "The way I build a model it takes \$50,000 worth of equipment," Marvin jokes. "Other people do it in their home shop, but I like to use the computer, where I can generate programs to cut the parts. That way I can control down to the detail that I show."

Back to big engines

Back in the 1980s, Marvin heard that engine collector Morris Blomgren had a very unique flywheel engine – a circa-1903 10 hp Kansas City Hay Press Lightning Balanced Engine. Morris only lived 30 miles from Marvin, in Falun, Wisconsin, and Marvin visited him often. "Morris was a talker," Marvin says. "When you decided to visit Morris, you knew it was going to last three hours because there was a lot of stuff to talk about. He was a good old Swede. We talked about his past acquisitions of engines and tractors, dealings with people, the sawmill he ran, farming,



A close-up of the scale Lightning. The pistons are visible, both at the end of their throw.

everything under the sun. When you needed to go home, you had to give Morris an hour's notice," Marvin laughs.

Modeling a rarity

As soon as Marvin saw the Lightning, he knew he wanted to model it. "I knew I couldn't afford to buy it, and he wasn't selling it anyway; Morris never sold anything. He enjoyed having company and had notebooks full of visitors' signatures from all over the U.S. and some foreign countries. I visited Morris quite a bit and measured that original engine. I drew the parts in the computer

in the shop, and went back and forth until I had all the information I needed to build a model of it. I machined all of the individual pieces from bar stock with the CNC equipment in my shop," Marvin explains.

At Morris' place, the big Lightning engine always sat outside. Morris had a significant collection, including steel-wheeled

A close-up of the real Lightning (right). Notice the valves under the cylinder. Serial number 9 on the replica build plate honors Marvin's friend Morris Blomgren (below).





The Lightning and the hay press running together after 75-plus years sitting outside.

tractors, steam engines, gas engines, Caterpillars, and other old iron, and Marvin took it upon himself to give the Lightning some attention. "I kept it oiled and

loose," he says.

As Morris grew older, Marvin helped take care of him so Morris could stay at home. After Morris passed away in 2009, Marvin



acquired the Lightning engine from Morris' estate, and later he bought the Kansas City Hay Press at the estate auction.

After getting the Lightning home, Marvin took it apart to assess its condition. "The major thing was to redo most of the linkage, and I had to hone the cylinder 0.03-inch over and have new pistons cast for it," he says. Even with that, however, Marvin didn't have many major problems with the Lightning. "I had a new water tank made, a new ball guard (using a borrowed pattern from Tommy Turner) and I had to figure out the exact timing. The engine doesn't have a camshaft, using a gearless mechanism. The timer is operated by a pushrod eccentric on the crankshaft. It is a ported exhaust, hit-and-miss 4-stroke engine," he says. The Lightning didn't have a serial number, but in honor of Morris, Marvin engraved a "9" (for Morris' 2009 passing) on a plate and affixed it to the Lightning.

The Kansas City Hay Press Lightning Balanced Engine has many unique features, including opposed pistons in a common cylinder that move toward each other, creating a common combustion chamber. On combustion, the rear piston pushes the crankshaft normally while the front, connected to the crankshaft via an exposed, U-shaped connecting linkage, pulls on the crankshaft.

The intake and exhaust valves are on the bottom side of the cylinder at its midpoint and the igniter is on the side. "There's no cylinder head, and combustion takes place between the two pistons," Marvin notes, adding that "the double pistons balance the engine. There's no pressure against the frame, which holds the cylinder in place, and there's no stress at all. It runs smoothly because there are no opposing forces that push or pull on the rest of the engine." On this 10 hp, the engine frame is also the

Marvin with the Lightning at the 2015 Butterfield (Minnesota) Steam and Gas Engine Show.

cart frame, made from U-shaped 8-inch channel iron.

"Everybody had their own idea on how to make an engine work, Marvin says, noting the Lightning's odd layout. "They also wanted to avoid patent infringements and lawsuits by other companies if they made engines similar to others. Engineers would go from company to company and take their ideas with them," which could cause problems, as well. Marvin says all Lightning Balanced Engines were built with opposed pistons. "There are seven complete Lightning Balanced Engines that we know of, plus two partial engines, 4 hp through 12 hp."

More old iron

Marvin has other gas engines, including a 1911 5 hp Frisco Standard made in San Francisco, California, a 2 hp vertical Otto and a 2 hp Sendling H-1 engine made in Germany. "I like unique engines, and I like learning about different methods of producing power," Marvin says. "I enjoy learning about the details and trying to figure out how people designed and built these old engines before modern technology kicked in."

Besides gas engines and model engines, Marvin also collects toy tractors, garden-sized crawlers ("anything with tracks") and horse equipment. "My grandfather ran logging camps in the early 1900s, so my dad grew up in the logging camps and passed the interest down to me cutting pulpwood and firewood on the farm."

But out of all of Marvin's old iron, the Lightning is his favorite because of the history he had visiting with Morris and building the model. "The Internet is a modern way to share information and keep in touch," Marvin says, reflecting on his long interest in old iron, "but the older I get, I think the reason we go to shows is as an excuse to get together, meet new people, talk with old friends, and keep track of each other." ☺

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Morrison & Marvin

Marvin Hedberg enjoys building scale engines because he gets to learn how they function, "Every engine has a different way of doing things," Marvin notes. "I measure the engine, and then generate the parts so they'll do exactly the same thing in the same style and motion as the original. The more unique and special an engine is, the more intriguing it is to me." Making sure intake and exhaust valves don't leak, and getting engine timing right are important on scale engines. "The timing is the most critical," Marvin says. "When you make a model, you're also scaling down the tolerance area on timing, parts fit and the way things work together.

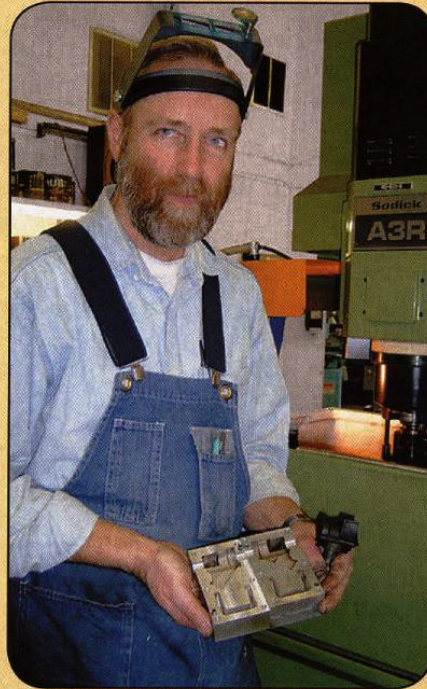
It is much more critical on a model than on the big ones."

Marvin's fascination with scale engines eventually led to him teaming up with noted scale engine builder Roland Morrison, famous for his scale Mery Explosive engine, among others, to craft casting kits of unique engines, including the Lightning.

Crafting scale engines from scratch is an intensive process. To make the detailed castings, Marvin machines a cavity into an aluminum block. He has to account for the metal shrinkage plus the wax shrinkage, so the cavity must be precisely oversized to end up with the correctly sized part. This cavity is then injected with hot wax.

The molded wax is then sent to a foundry where it is dipped repeatedly into a ceramic slurry, building a shell around the wax piece. Then, the whole thing is baked in an oven until red hot. This vaporizes the wax, leaving a hollow cavity inside the ceramic. While the ceramic is still red hot, molten iron or bronze is poured into the cavity. After cooling, the ceramic is broken away, leaving a perfect part. A wax part is needed for each metal part, so it's a time-intensive process.

The aluminum molds themselves are difficult to design and sometimes take days to draw and machine, so they represent a sizable investment. Marvin's first Lightning was made from bar stock, but he and Roland later made castings of the Lightning and have sold a few sets through their company, Morrison & Marvin Engine Works (www.MorrisonandMarvin.com).



Marvin holding molds he made for the scale Lightning Balanced Engine.