History of Model Engines

by Bill Mohrbacher

I WAS DELIGHTED when *MA* editor, Jay Smith, asked if I would submit an article about the history of model engines. As the Model Engine Collectors Association's (MECA) president, I feel it is important to keep this history alive. MECA does this through our publications, but through *MA* we can tell the story to a larger audience.

Model engines were developed worldwide, but I'll concentrate on the US-built engines. The design and manufacture of engines involved hundreds, and I can't mention them all.

If you go to the AMA website you can read much more about the engine pioneers in the Hall of Fame section. In AMA's National Model Aviation Museum are books and magazines full of engine history and displays of many of the engines mentioned.

In the beginning, there were huge, heavy engines, better suited to powering model boats than model airplanes. In 1896, Samuel Langley flew a large model airplane for 90 seconds, powered by a steam engine of his own design.

Full-size, internal-combustion engines were in their infancy and miniature engines were hand-built curiosities. A.D. Stanger flew a model airplane in England using a V4 of his own design; the engine weighed 5 pounds, 6 ounces!

In 1911, the Baby engine appeared in the US. A large engine with a 2.67 cu. in. displacement (cid), it weighed 3¾ pounds with its 18-inch-diameter, 13-inch-pitch aluminum propeller and gas tank. It was advertised at ½ hp, swinging that huge propeller at 2,300 rpm.

The Baby was available in inline two-, three-, and four-cylinder configurations. The Baby used a bronze, bushed, split-aluminum crankcase, a cast-iron cylinder bolted to the lower case, a three-ringed aluminum piston, a carburetor with a float, and side-port, piston-timed induction.

This was typical of smaller internal-combustion engines of the day. There were no glow plugs in 1911. The Baby used a spark ignition system with a 5/8-inch Rajah spark plug, a set of engine-mounted breaker points that were adjustable for advancing/retarding the timing, and a coil, condenser, and battery mounted in the airplane. The fuel was a mixture of gasoline and heavy motor oil.

Weiss Mfg. Co. produced the Baby through 1929. Other large engines such as the Knight and Gil Aero Midget were designed. The Gil was smaller, 1.18 cid, 0.4 hp at 2,500 rpm (information from an advertisement), and weighed 16 ounces. It had a two-piece aluminum crankcase with a removable front end, similar to some of today's engines.

In 1931, Weiss designed a much smaller .331 cid engine. Weiss sold only engine plans for the .331; Louis Loutrel sold the assembled engines as well as kits containing the plans and castings. Loutrel eventually took over the Weiss engine, redesigned it to eliminate the rear timer, upped the displacement from .331 to .517 cid, and sold them under his name.

A 1922 Gil Aero Midget 1.18 cid with its factory-installed 12-inch aluminum propeller.

This 1938 G.H.Q Aero .518 was a descendant of the Loutrel.

Photos by the author

The history and development of US model aircraft engines

It was a good engine, but the cast-iron cylinder and piston weighed 16 ounces. In 1936, Loutrel sold the design to G.H.Q. and the quality decreased. G.H.Q.s were sold from 1936 until roughly 1948 in preassembled or ready-to-assemble kits. They were widely advertised in model airplane magazines, and handyman magazines such as *Popular Mechanics*, but few modelers ever had any success with them.

In 1930 while still in high school, Bill Brown designed a compact, .29 cid model engine. It used a fabricated crankcase and poppet valve induction. Bill built his own spark plug and coil.

Bill's friend, Maxwell Bassett, designed an airplane for the engine, but the .29 was severely underpowered. Bill built another engine, this time with .60 cid (the prototype of the Brown Model A). They put this into Maxwell's airplane, the Miss Philadelphia, and it had sufficient power.

Bill and Maxwell placed fourth with the Miss Philadelphia in the 1932 Nats in Atlantic City, New Jersey. There was no separate class for gas engines and all other contestants were using rubber-powered FF models. CL and RC had not yet been invented.

In 1933, Bill and Maxwell went to the Nationals at Roosevelt Field in New York with several gas models and swept the field with first places in all three power classes. The modeling world was astounded by the performance of the Brown engine and everyone wanted one!

One other gas model was entered: the KG-1 built by Joe Kovel and designed by Charles Grant, editor of *Model Airplane News*. It was powered by the Gil aluminum engine, but neither Kovel/Grant nor Brown/Maxwell could get it to run.

Later in the year, Brown gave Grant his last hand-built Brown A. Installed in the KG-2 (a modified KG-1), the airplane and engine set many records. The following year there was a separate class for gas engine-powered models.

At this time, Bill had hand-built roughly 12 Brown As. Knowing he wouldn't be able to build enough engines for the demand, his dad arranged to have Walter Hurleman build a batch of Brown As and roughly 50 more were turned out.

Because of the success and demand for the Brown engines, Bill's dad and another investor formed Junior Motors in Philadelphia and in 1934 introduced the Brown Junior model B, selling more than 5,000 engines in the first two years. Gas models had come of age. The Brown used a one-piece cast-aluminum crankcase, a turned-steel cylinder/fin assembly with a brazed-on bypass, lapped-steel piston, and a simple tube venturi with a needle-valve assembly.

Gifted engine men across the country were also working on designs in 1935, and more engines began to appear including the Forster 99 (.99 cid) and Dan Calkin's diminutive Elf .138 cid.

Bill Atwood and Mel Anderson collaborated on the .364 cid Baby Cyclone. Instead of the side-port induction seen on most engines until that time, the Baby Cyclone used a crankshaft rotary valve similar to what we use today, but with the venturi on the bottom.

Atwood and Anderson designed successful engines well into the 1950s and 1960s. Anderson was responsible for the Cyclone, Super Cyclone, and Spitfire. Atwood designed the Phantom, Hi-Speed Torpedoes and Bullets, Champions, and Triumphs.

Mel Anderson entered the glow arena with the Baby Spitfire .045 and designed the Veco Series 100 engines. Bill Atwood entered the field with the Wasp .049 and designed the Cox Tee Dee series of engines.

Until 1934, only large automotive-type spark plugs such as the $^{5}/_{8}$-inch Rajah and the 12mm Bosch spark plug were available. These plugs were too large for the smaller model engines. Junior Motors and Hurleman produced their own

Bill Brown's first engine was built in 1931.

The 1937 Junior Motors Brown B .601 cid, was nearly identical to the 1934 model, with coil, condenser, and batteries. All had to be carried aloft!

This 1936 .364 cid Baby Cyclone C was made from machined aluminum.

Left: The 1936 Tlush .601 cid Super Ace, famous in South Africa and Australia, was almost unknown in the US.

Below left: A 1937 .56 cid Ohlsson Miniature.

Below: The 1937 .163 cid Chunn Chum had a huge .375 diameter Hurleman spark plug.

3/8-inch spark plugs, as did Blintliff and M&M.

In 1936, AC began producing 3/8-inch spark plugs strictly for model engines. At approximately the same time, Hugh Gunter started selling Clipper spark plugs. They were so good that Ohlsson and Bunch used them as their standard. Later Ohlsson spark plugs were actually made by Clipper.

These 3/8-inch spark plugs still weren't suitable for extremely small engines such as the .138 cid Elf. The cavity around the insulator added volume to the combustion chamber, lowering the compression, so Dan Calkin made his own ¼-inch spark plugs. He hired Champion to make insulators for him.

Then in 1938, Champion started making its own ¼-inch spark plug, suspiciously similar to Calkin's. By 1945 AC, Autolite, and Champion were all making spark plugs.

Back to the 1930s: In 1936 Irwin Ohlsson produced his first engine, a .56 cid. Teaming with Harry Rice, O&R produced a .049 cid engine through 1957. For years, Ohlssons and O&Rs were the engines to beat. Dan Bunch marketed his Gwin Aero .488 cid and kept his well-made, competitive, popular engines in production through 1945.

Four brothers, Charles, John, Vincent, and Frank Tlush, marketed the Tlush Super Ace .601 cid. This was the first model engine to employ a magnesium case. In 1934, the brothers shipped their first production runs to South Africa and Australia where modelers found they outperformed their Loutrels and Browns. Orders poured in from overseas leaving few available in the US.

In 1936, by the time the Tlushes could supply engines for the US market, the Baby Cyclones and Browns were established and Tlush couldn't break into the market. It is estimated that of the 5,000 engines produced, only 500 were sold in the US.

Engine production accelerated in subsequent years and engines were produced across the country. Names such as Herkimer Tool and Model Works and Orwick Engines joined Ohlsson, Atwood, and Anderson in longevity. Others engines, such as the Belmont, Dennymite, Syncro Ace, Madewell, and Perky came and went.

Right: This 1948 Fox .35 cid was the first Fox .35 and was built in Leroy Cox's mother's garage.

Below right: Ray Arden's exquisite 1941 Super Atom .099 had a Champion spark plug.

Below: The 1938 Cleveland .488 cid Tom Thumb was made by Bunch. It also had a large Hurleman spark plug.

With the desire for less-expensive, easy-to-transport airplanes and the advent of smaller spark plugs, engines such as the Elf, the 1937 Brat .139 cid, the Chunn Model Motors Chum .163 cid, the 1938 Dallaire Model Aircraft Pee Wee .11 cid, Madewell Manufacturing .147 cid, Condor Midget .162 cid, and Bantam .164 cid were produced.

Ben Shereshaw's Bantam quickly became a .19 cid and Ben produced it through 1946. It was a popular, well-made engine, but the little 1939 Mighty Atom .097 cid, designed by Ray Arden, was the tiniest and best small engine of the time.

The Mighty Atom used a "piston valve" bypass where the fuel/air charge flowed through the center of the piston instead of around it. Ray's design talents and the manufacturer's precision made the engine easy to use and popular for eight years. Many airplanes were designed specifically for it.

A 1941, *Model Airplane News* engine directory lists 50 manufacturers and 62 different engines ranging in size from .097 cid through 1.53 cid.

Before World War II, engines were using a side port, crankshaft rotary valve, rear disc, rear drum, and piston-valve induction in many displacements. Most engine production stopped during the war. Afterward, many manufacturers did not resume production. Of the engines produced in 1941, only eight of the 50 manufacturers survived: Atwood, Anderson, Avion, Bantam, Bunch, Elf, Herkimer, and Ohlsson.

A huge number of small shops had turned to engine production. Tether car racing was popular and was responsible for a great deal of engine development. Legendary names such as Ball, Bungay, Hassad, McCoy, and Dooling showed up and McCoy and Dooling ventured into model airplane engines. Names such as Delong, Drone, Fox, K&B, and Vivell were added. Most were spark ignition except for a few diesel engines.

In 1947, Ray Arden commercialized the glow plug we know today. Modelers were quick to see the advantage of not carrying all the heavy ignition components and eliminating the points.

In the June 1949 *Model Airplane News*, E.G. Ingrams' "Present Day Motors" article called 1948 the "Glow Plug Year" and had a list analyzing engines available in 1949. There

were 79 engines and 30 manufacturers listed, eight of which were glow engines and six were diesels (compression-ignition). American modelers found the diesels didn't match the performance of glow engines and diesels never became popular, although Leon Shulman's1948 Drone diesel saw a fair amount of use.

Eliminating the spark-ignition components allowed much smaller, practical engines to be produced. Lud Kading, the "K" of K&B, used a glow head to enable him to produce the marvelous K&B Infant .020 cid in 1948. Soon after, Mel Anderson introduced the Baby Spitfire .045 cid and Herkimer's Charles Brebeck introduced the OK Cub, the first mass-produced .049 cid.

These pioneers introduced a new genre of model aviation. Kids who couldn't afford a sparker and a 6-foot airplane could get a Cub .049 and a smaller 2- or 3-foot aircraft!

CL flying became popular in the late 1940s and grew in the 1950s. Airplanes were designed for Speed, Aerobatics, Scale, sport flying, and Navy Carrier.

RC bloomed with the establishment of the citizens band, and FF was still popular. Most of these flight forms required their own type of engine and had classes for up to four different size engines.

Navy Carrier and RC needed engines with speed control so throttle development began, spawning hundreds of engines. Companies marketed plastic RTF CL airplanes as a way to sell engines.

Leroy Cox designed the Thimble Drome line of reed valve .049s (Space Bug, Space Bug Jr., Thermal Hopper, Babe Bee, etc.), which set the performance standard. They were used in Cox's line of RTFs and kits designed for their engines, making the .049 the most popular engine in the world.

Fox designed a lightweight and powerful .35 cid engine in 1949 that is still in production. It became the standard engine size for CL Aerobatics and a workhorse for CL sport flying, Combat, and for larger throttled RC airplanes.

Early throttles were two-speed setups using two separate needle-valve assemblies; one was set to run rich and the other to run lean. Either could be turned on or off. Other systems choked off the exhaust, such as the Fox 1958 RC specials or the aftermarket Roto-Valve. Late in 1958, Veco marketed its HI/LO engines in .19 and .35 displacements, which coupled an exhaust valve with a simple rotary choke carburetor.

Multichannel RC airplanes, using reed relayless RC systems, became popular, especially when Fred Dunn's low-wing, aileron-equipped Astro Hog won the first four places in the 1958 Nationals.

Fliers wanted stronger engines and K&B answered in 1959 with a .45 RC engine that coupled the exhaust valve with a rotary choke carburetor. The K&B .45 dominated multichannel aircraft and were used by Ed Kazmirski in his 1960 Nats- and Internationals-winning Orion.

In 1962, the Clarence Lee-designed Veco .45 RC engine appeared and Ed used it in his 1962 Nats-winning Taurus. In a *Model Airplane News* construction article in January 1963, Ed stated that he choked down the Veco 45s .280-inch diameter throttle bore to .250 to cut down its power! Fox brought an RC version of the .59 out of retirement, but the Veco .45 ruled.

At the 1963 World Championships, the most popular combination was a Taurus with a Veco .45 and Orbit reed radio. Jim Kirkland won the 1963 US Nationals with his Veco .45-powered Beachcomber.

Proportional radio sets hit the market in November 1961 with the Space Control System, followed by the Dee Bee Quadruplex, Sampey's 404, and Orbit in 1964. The 1964 Nationals were won by a Supertigre .56 and started a trend to larger RC engines.

In 1965, Bill Wisniewski astonished the racing fraternity with his tuned-pipe engines, blowing away conventional engines. Cliff Weirick won the 1965 Nats and second place in the Internats with a preproduction Veco .61. The Veco .61 enjoyed success, but foreign engines such as Supertigre, Enya, O.S. Max, and Webra, started showing up.

Soon, proportional radios ruled and the reed sets died away. K&B and Veco continued to enjoy success in CL and RC Pylon Racing; eventually K&B bought out Veco. Fox and Johnson remained successful in CL Stunt and Combat, but the foreign engines pushed in there, too.

In 1968, the Schnuerle-ported engines showed up from Austria and soon this porting became common. Cox had enjoyed domination of the small-engine field, especially when the company hired Bill Atwood, who designed the Tee Dee series.

Above: L-R are the 1949 K&B .020, a 1949 Baby Spitfire .045, and a 1949 OK Cub .049 cid engines.

Right: The 1954 Fox .59 cid two-speed with two needle-valve assemblies for high and low speed control.

Far right: The 1958 Fox .35 RC Special had an exhaust valve throttle.

With the foreign competition, the old engine makers gradually died off. Although popular through the 60s, McCoy never had a successful RC engine and eventually faded away. Several makers jumped headlong into the slot car boom and its sudden, precipitous decline ruined Cox, Dynamic, and K&B.

Better radios, far better throttles, mufflers, new engine metallurgies, fuel pumps, and more showed up. Today Fox is the only one of the original engine makers remaining in business. Randy Linsalato at MECOA picked up the K&B line and several others.

The huge inventory of Cox engine parts has found a new home at Xenalook, and part of that company's line is assembled from these parts. Doug Martin is assembling several small Fox engines, including the .049 FAI power plant, from original factory parts. Nelson, PA, and Jett build some of the finest competition engines in the world.

Later on the engine field advanced to four-strokes, jet turbines, and the large two- and four-stroke engines to power the ¼-and 1/3-scale models.

We in MECA treasure these engines and their history and are committed to preserving them and their stories. MECA was formed by Bruce Underwood and Joe Foster in the late 1950s. By 1961 there were roughly 25 members.

Joe had other commitments and the organization became stagnant. In August 1963, Tim and Betty Dannels published the first issue of the *Engine Collectors Journal*. *ECJ* was the glue that held MECA together.

Allan Shively rejuvenated MECA and published the first *Bulletin* in 1964. *ECJ* has continued as the premier source of engine-collecting knowledge, publishing issue 200 in August 2010.

As MECA grew, a Swap Sheet for engines and parts exchanges was instituted. "Collectos" (engine collectogethers) began and national Collectos, now called EXPOs, started. Membership peaked at more than 1,200 members, declined somewhat, and presently is roughly 850 and increasing as Web tools introduce us to younger and international collectors.

eBay has become a major source of engine transactions, but MECA has a "15-day" rule where a transaction between members can be canceled for any reason within 15 days. Visit the MECA website and learn more.

There are many fine sources of engine history. Frank and Vickie Anderson have been publishing *Anderson's Bluebook* for many years. It is the source of approximate American engine values, as well as an excellent source for identifying engines.

Tim and Betty Dannels also publish the *American Model Engine Encyclopedia* (*AMEEI*), a fine source of identifying engines with sharp photos and descriptions. Ron Chernich's Model Engine News website has wonderful information about American and foreign engine history.

The AMA's National Model Aviation Museum has hundreds of publications related to model engines in its library, including collections of *Air Trails*, *Flying Models*, and *Model Airplane News*, as well as displays of the engines mentioned in this article.

I am indebted to many for the information in this article: Reed Martin and Darrel Peugh for some of the photos of very early engines; *Anderson's Bluebook* and *AMEE*; numerous articles in *ECJ* and *MAN*; Dave Gierke's excellent publications and his December 1999 "Engines" article in *MAN*; myriad MECA buddies; and personal experience since 1949. *MA*

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K&B's ground-breaking 1959 .45 cid was developed for RC models.

Clarence Lee's legendary 1962 Veco .45 was built for RC as well.

The 1968 Austrian HP .61 cid was the first Schnuerle engine imported into the US.