

Motorizing a Mediterranean Spitfire

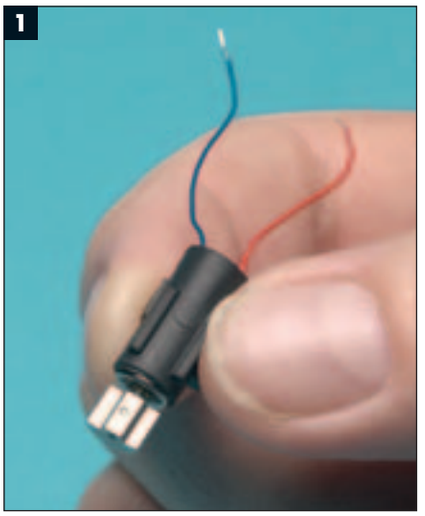
Animation in small scale

Story by Paul Boyer Photos by Jim Forbes and William Zuback

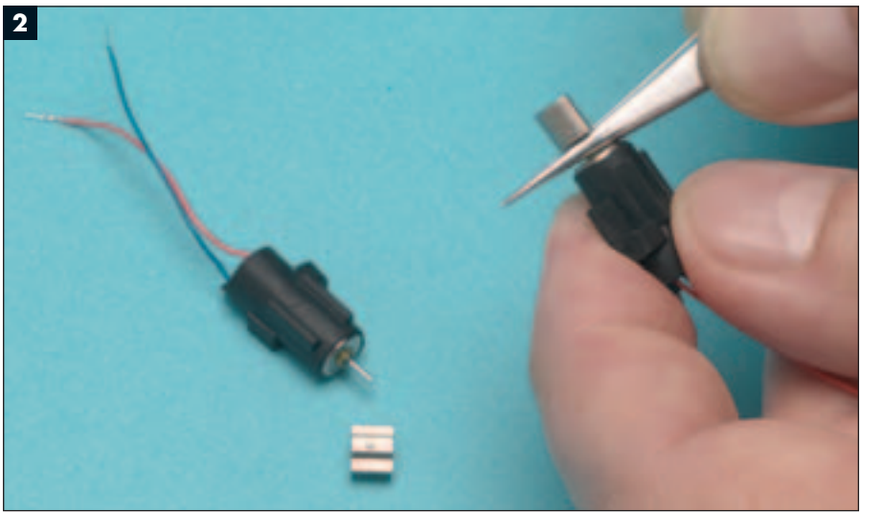
Recently, Hasegawa and Tamiya reissued a few of their 1/48 scale World War II fighter kits with spinning propellers – small electric motors buried inside the nose do the job. I thought, "hey, what about us 1/72 scale builders? Where are *our* motorized kits?"

Never one to wait around for anything, I looked for a way to motorize a 1/72 scale model. I had seen it done before. Two models in particular caught my attention at past IPMS/USA National Conventions: Raleigh Williams' beautiful Frog Vickers Vimy in Chicago in 2001 and Lynn Rowley's Hasegawa B-17 in his spectacular forced-perspective diorama of a midair collision with a Messerschmitt shown in Virginia Beach in 1996. These modeling masterpieces had one thing in common; spinning propellers, each powered by a pager buzzer motor, **1**.

A *what?* You know, those buzzing pagers? There's a tiny motor inside them



Pager buzzer motors are inexpensive and tiny – less than ¾" long!



The eccentric weight that makes the motor vibrate has to be removed. Paul pushed the weight from the axle with tweezers.

that has an off-center weight on the motor axle that creates vibration when it is activated. The motor takes 1.5 volts, is less than ¾" long, and less than ¼" in diameter – small enough to fit into almost any 1/72 scale model.

Challenge 1: Motor. Annoying as they may be, I didn't want to purchase pagers and smash them up just to get the little motors out, so I looked for a motor source. Science/surplus or electronic equipment stores are likely to have these motors, but you may have to ask the store managers. The motors are dirt cheap; I paid about $3 apiece for mine, but I've seen them in the All Electronics catalog for $1.75 (plus shipping).

The buzzer motors come with the weight on the tiny axle, and sometimes with a rubbery plastic jacket used to mount the motors in the pagers. Two wires (power leads) come out of the other end of the motor.

The first task was to remove the weight from the axle. I removed mine by pushing a tapered tweezers between the weight and the body of the motor, fourcing the weight off the shaft, **2**. I cut through the side of the jacket with a blade and peeled it off the motor; you may not need to do this, depending on how much room you have inside the engine cowl of your model.

Challenge 2: Power source. I didn't want an unsightly external power source, so I needed to find a 1.5-volt battery that would fit inside a model. For a 1/72 scale fighter, even a AAA battery is too big. "Button" batteries, used to power camera electronics, watches, and so forth, come in several sizes and have sufficient voltage and capacity to run the pager motor for an hour or so of continuous operation. I chose a Duracell 76S 1.5-volt silver battery used in cameras and calculators. It's 7/16" in diameter and 3/16" thick.

I wanted a subject that would illustrate how small a motorized model could be, so I picked Tamiya's 1/72 scale Spitfire Mk.V. In keeping with this issue's Mediterranean/North Africa campaign theme, I chose Tally Ho's decals for a Spitfire Mk.Vb Trop. flown by American ace Lt. Sylvan "Sid" Feld in Tunisia in 1943. The tools and materials needed for this project are probably on your workbench, **3**.

Challenge 3: Installation. I had to find a way to connect the motor to the propeller. Tamiya's kit has a solid prop shaft that fits through a thick bushing and into a polyvinyl cap for easy post-assembly installation. That setup wasn't going to work with the motor, so I cut away some of the forward bulkhead and cut the bushing down to about 1/16" thick. I drilled a hole into the back end of the prop shaft.

At first I thought I would simply super glue the prop shaft onto the motor axle, but reconsidered. If I installed it off-center, the prop would wobble as it spun. Instead, I stripped some plastic insulation from a piece of wire and pushed it onto the motor axle and into the hole in the prop shaft. This soft connector added a little "fudge factor" into the motor installation.

The motor mount is simplicity itself. I thought about installing form-fitting bulkheads and all, but that looked like it would take a lot of trial and error.

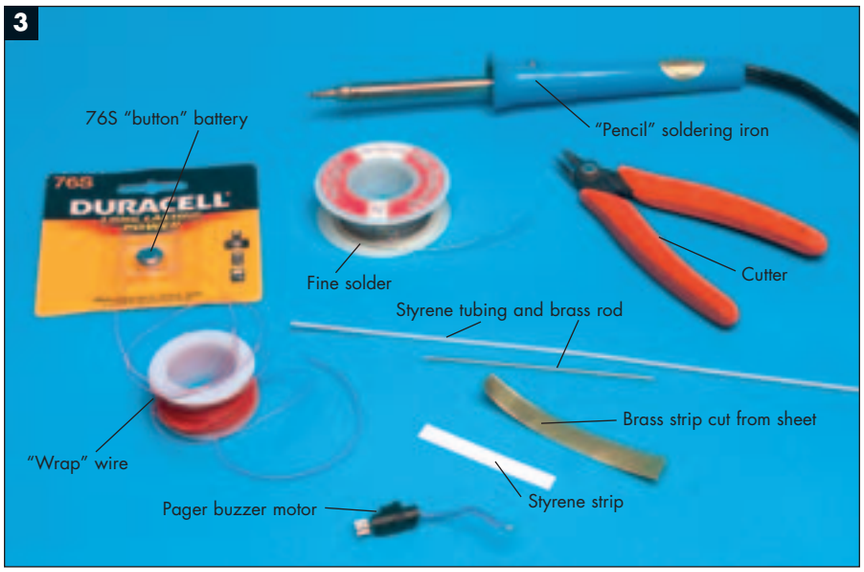
"Sid" Feld – Top American Spitfire ace

World War II buffs certainly know about top aces Richard Bong and Francis "Gabby" Gabreski, but there's little information on 1st Lt. Sylvan "Sid" Feld, the top American Spitfire ace. Sid was assigned to the 4th Fighter Squadron in Tunisia in 1943, and he shot down his first German aircraft, a Messerchmitt Bf 109, in January of that year. In April, he shot down six more enemy aircraft and eventually had nine victories painted on the side of his Spitfire.

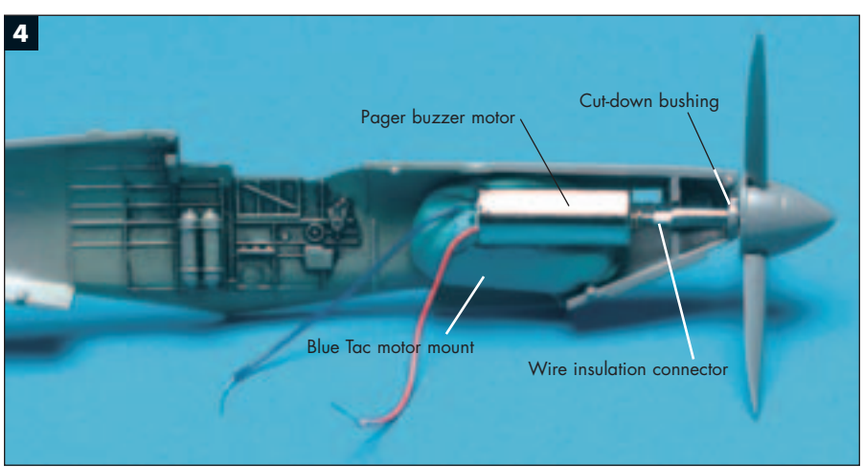
Later, Sid was assigned to the 410th Squadron, 370 Fighter Group, flying P-47s in Europe. Sid had bad luck there. He claimed no more aerial victories and was shot down and taken prisoner on Aug. 13, 1944. A week later, he died of injuries sustained during an Allied bombing attack.

For more information, read Paul Ludwig and Malcom Laird's *American Spitfire Camouflage and Markings Part II* (Ventura Publications).

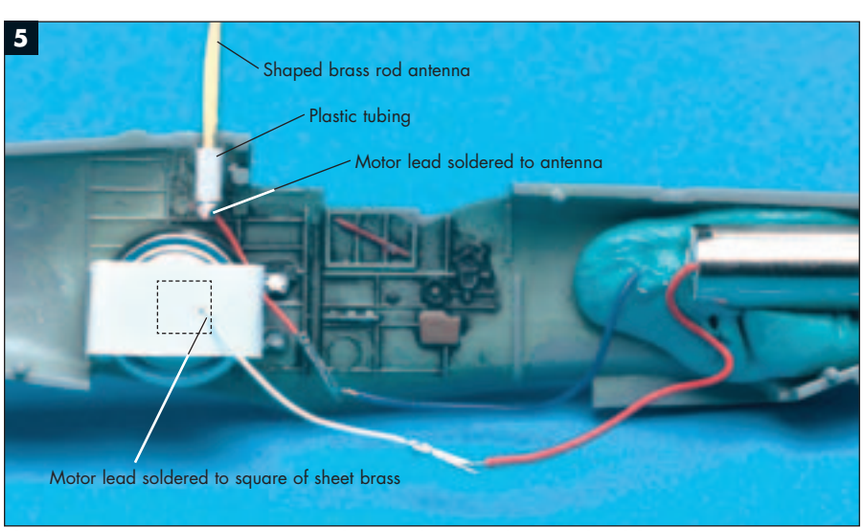
– Paul Boyer



No special tools were needed for this project. Except for the motor, all can be found in hobby shops and your nearby Radio Shack.



The pager motor (minus its vinyl jacket) is mounted in a blob of Blue Tac sticky putty.



The brass antenna mast serves as the switch. Note that one lead from the motor is soldered to the mast. When the mast is pushed down inside its tube, it touches the outside of the battery, completing the circuit.

Instead, I placed a blob of Blue Tac sticky putty into one side of the nose, pressed the motor into it, connected the propeller, and adjusted the motor's position, **4**. The motor has so little torque that it wouldn't spin the prop if the shaft was off center. Gradually moving the motor up and down, left and right, and in and out eventually got it aligned, and the prop spun freely.

Challenge 4: Battery placement and switch. Next I had to consider where to place the battery, how to connect it to the circuit, and how it could be replaced when it ran out of juice. The kit's wing fits tightly to the bottom of the fuselage without glue, so that was a big plus for this model. There was plenty of room for the battery behind the cockpit, and removing the wing opened the bottom of the fuselage for maintenance. If the model you choose can't be easily disassembled, you may have to create a removable hatch or power the motor from the outside.

My next task was connecting the wires from the motor to the battery. You can't just solder wires onto a battery – the heat may make the little dynamo explode! First, I made a sheet styrene box to hold the battery, but that didn't fit into the fuselage. All I needed was something to tightly hold one power lead against the front face (negative pole) of the battery.

My solution was a strap from .010" sheet styrene. I wrapped it tightly around the battery and glued the overlap with liquid cement. When it was dry, I pushed the battery out and drilled a small hole in the center of one side of the strap. I threaded a piece of wrap wire through the hole and soldered it to a small square of shim brass, then glued this inside the strap.

The other lead from the motor had to touch the outside of the battery. I could have installed a contact on the other side of the strap, but I wanted to have an inconspicuous switch to complete the connection. After several days of cogitation, including dreams of switches in a sliding canopy or hinged rudder, I came up with a simple solution. The antenna mast behind the cockpit could serve as the switch and double as a battery ejector!

I replaced the kit's plastic mast with a longer one shaped from brass wire. I soldered the power lead from the motor to the bottom end of the mast and placed it in a short section of plastic tubing that

was super glued inside the spine of the fuselage. To make the prop spin in the right direction, just play with wires going to the positive (outside) or negative (front) sides of the battery. If it turns the wrong way, swap the wires.

By super gluing the back side of the battery strap into the fuselage, I was able to anchor the battery where the brass antenna would contact its outer rim, **5**. Pushing the mast down completes the circuit and starts the motor. Pulling it up a millimeter or so breaks the connection. For changing the battery, pushing the mast down even farther neatly shoves the battery out of the strap.

With all the equipment installed, it was just a matter of running the power leads underneath the cockpit tub, finding a suitable pilot figure, and closing the fuselage, **6**.

So, it *is* possible to motorize even one of the smallest 1/72 scale models. The tiny pager buzzer motor would even fit into the nacelles of World War I pursuits. It turns propellers at what appears to be an engine's full speed. The truly inventive may want to try varying the voltage or installing resistors to slow down the revs.

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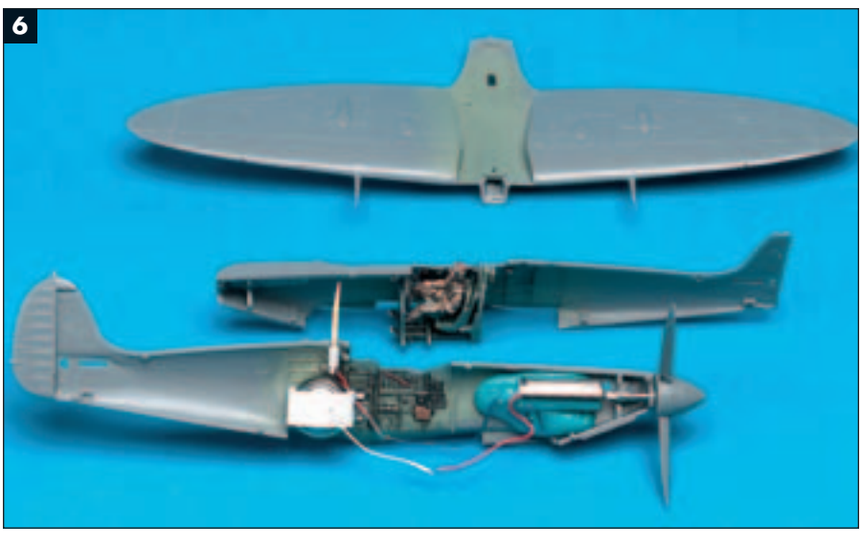
[Thanks to Matt Usher, Raleigh Williams, and Lynn Rowley for their helpful ideas. – *P.B.*]

SOURCES

Electronic supplies and tools available from electronic equipment stores such as Radio Shack

Pager vibrator motors All Electronics Corp., P.O. Box 567, Van Nuys, CA 91408-0567, 800-826-5432, www.allelectronics.com

Tally Ho Decals available from Meteor Productions, P.O. Box 3956, Merrifield, VA 22116, 703-971-0500, www.meteorprod.com



The Spitfire fuselage shown with the motor, battery, cockpit, and a spares-box pilot installed. (You can't run up your Spitfire without someone inside standing on the brakes!)



American Spitfires were obtained from the RAF. Roundels and fin flashes were painted over or covered with U.S. insignias.