So how do we flip the prop? Just spin it counterclockwise, right? Well, maybe. I find that with a great many engines, it's the type of bump we are experiencing that tells us how to flip the prop.

With a cold engine, if I feel a good, very strong bump, I will not flip the prop the normal way. I will rotate the prop gently counterclockwise until it is stopped by compression, then wind up and slap it backwards, *away* from compression. This is a reliable way of starting well-primed engines, and you'll see it used by many racing and combat pit crews.

Now, if the bump is a little weaker, flipping through compression (counterclockwise) the regular way is probably called for. If the bump begins to go away altogether, it's probably time for another prime or choke.

However, let's say the engine is flooded and neither method is working (you may be getting snapped at by the engine if you are trying to flip it normally). Now you may want to flip it backwards *through* compression a few times to clear the flood. As the flood goes away, the engine should start to snort a little and begin to demonstrate willingness to start pretty soon.

As the feedback from the engine changes, you may want to try different flipping styles to find out what works. The key point here is to realize that there is more than one way to crank an engine, and if one isn't working, it's probably time to try another. It's also helpful to remember that some engines may not give much of a bump at all, particularly if the engine is a bit old and worn. However, it may respond to one or more of the types of flips described here anyway. Experiment.

Use a glove or a leather finger protector so that you can hit the prop as hard as you want. No sticks or other hard objects—they break props and create a safety hazard.

HOT STARTS

Here's another nightmare that seems to recur to your columnist. It's a racing contest. A relatively new flier asks me to pilot his entry. Glad to help, I hang on for the first tank, grease the plane into the pits and watch the pit stop. The pitman fuels the plane, flips the prop, and after a couple of flips, the engine still hasn't started. Then the nightmare begins. Like the dream in which a person is falling, falling and can't do anything about it, I see the pitman reach for the prime bottle. "No, no!" I try to shout, but nothing comes out over the noise of the engines. He sticks the prime bottle in the exhaust and *("No!")* squeezes! Arrrghhhhhh. The race is lost. It may be another 30 seconds of prop flipping before I awake and take off for the rest of the heat.

The one thing a hot engine almost never needs is a prime! A little charge in the crankcase while fueling (this can be accomplished by opening the shutoff a second before you stop squeezing the fuel bulb, for example) may be good, but never an exhaust prime unless the engine just plain cools down completely. A hot engine will flood easily and drown in a prime.

It's much more important to learn to fuel the engine with just the right amount of pressure, to cool it off with fuel on the head if necessary, and to flip the prop correctly, than it is to prime. You wont feel the bump with a hot engine, but that doesn't mean there's no fuel in the cylinder.

Fuel up and give it that smart backwards (away from compression) slap. If that doesn't work, try flipping smartly and quickly forward. You should feel something soon—or be able to tell whether the engine is flooded or dry. It may not start instantly but if you prime it you can practically guarantee it won't start. If the engine is in fact dry, a couple of rotations of choking probably will be enough of a prime. If it takes a long time—20 or 30 seconds—then a prime may in fact be called for as a last resort. Remember, hit the prop smartly.

It's important to practice with your equipment and begin to develop a sequence of functions that starts the engine reliably. Virtually all competitive fliers work out a predictable sequence for handling each engine.

Here's a sample hot start sequence that would not necessarily work for all engines and situations, but it gives a sense of the kind of sequence that can be developed with practice. The point is not to copy this to start your engine, but to develop your own sequence that works and practice it. This is the pit stop sequence used by my racing team for its Northwest Sport Race plane. This is a simple setup with no shutoff, fastfill or hot glove. The task is simple—just fill the tank and start—but the way we go about it is very deliberate and has been practiced literally hundreds of times:

The pilot brings the plane in to the pit at a good clip, wasting as little time as possible in the glide. Because shutoffs are not allowed in this event, the glide can vary from about a quarter lap to about 1-1/4 lap. The pitman catches the plane and follows this sequence exactly: 1. Pour fuel on the head of the engine for cooling. 2. Put filler bulb on tank and push button that opens uniflow vent. 3. Squeeze until fuel overflows. 4. Release uniflow button a split second before stopping the fuel squeeze, to allow some fuel through the line. 5. Remove bulb. 6. Connect battery. 7. Lift nose of plane, push prop up against compression and hit the prop a tremendous smash backwards. 8. Release plane.

If the engine doesn't fire in the first couple of flips, we'll switch to fast forward flipping and it will go in a few seconds. Normal ground time for this pit stop, assuming the engine starts on the first flip, is 6-10 seconds. It would be in the range of 4-6 seconds if fastfills were allowed.

To illustrate that not every engine is the same, here's another sequence for hot re-

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