

Spending much of my time around Rapides, Doves, Chipmunks, Prentices and Proctors, I'm pretty accustomed to seeing assorted Gipsy engines in varying stages of undress. But a works note on a Gipsy Queen in CFS Aero's classic engine bay brings me up short. The Great War is a time of particular interest to me, and the words "EXPERIMENTAL BRISTOL F2B" flash in my eyes like neon.

As every aviation enthusiast will know, the Bristol F2B was one of the most successful aircraft of WW1. Armed with a single fixed forward gun and one or two movable Vickers 303s in the rear cockpit, it was fast and surprisingly manoeuvrable, making it a formidable weapon in the closing stages of the Great War.

The Brisfit was powered by a water-cooled V12 Rolls-Royce Falcon engine that developed an impressive 275hp. Those twelve cylinders were arranged in a 60 degree "V" above the crankcase, putting the crankshaft at the bottom. This was coupled through an epicyclic gearbox to the propeller, which therefore emerged from the lower quarter of the radiator, giving the Bristol one of its most recognisable identification characteristics.

Nearly a century after the F2B's birth, flyable Falcon engines are now close to extinct. Tony saw an appeal on the Internet that asked if anyone in the world could fit an alternative engine in a Bristol Fighter.



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# THINKING INVERTED

"I can't resist a challenge, so I said I could put an engine in anything, and then found myself explaining to the directors that I'd legged us into a project that was going to keep boredom at bay for the best part of a year."

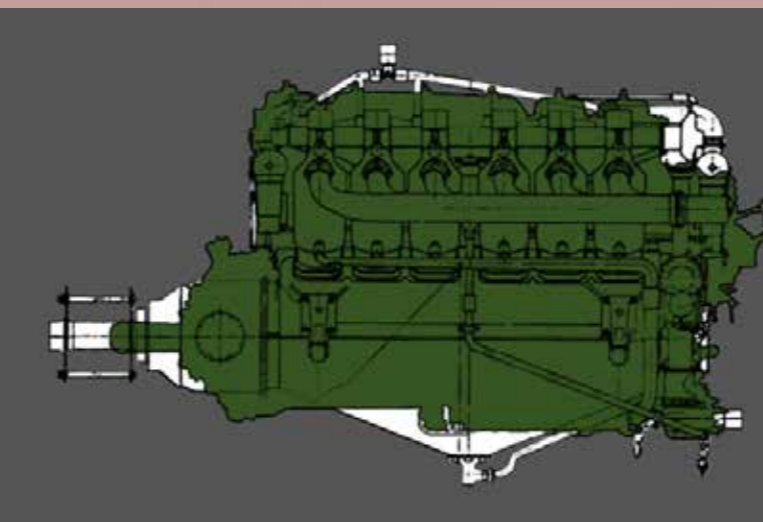
Now, of course, you've already spotted a key factor that makes the Gipsy a less than obvious choice. It's an inverted straight six, with the crank at the top and the pistons at the bottom. It's not going to please the purists when they see a "Biff" with the prop at the top.

Then my brain processes what my eyes have been trying to tell it: this Dripsy has the cylinders at the top. Now that's not a trivial modification; turning an engine the wrong way up puts everything in the wrong place. The crankcase was never intended to hold oil, and if the crank keeps splashing in and out of the sump then you'll be trying to lubricate things with froth. Add to that the fact that the Gipsy is an air-cooled engine, meaning that the oil plays a crucial part in keeping the head temperature down. Tony explains the various modifications, all beautifully crafted in magnesium and connected by chain mailed Aeroquip, that he's devised to get the oil from where it's unwelcome to where it's needed.

"There's a lot of maths gone into this project," he explains. "We're potentially adding more than 100hp, so the engine bearers will need to be redesigned to avoid turning the fuselage into a corkscrew."

That's a huge power upgrade. What effect will it have on handling and performance?

"It'll need to be restricted - we can't subject the airframe to that amount of power. We're working on how to do that at the moment; the obvious solution would be



to put in an intake restrictor, but we've got to ensure that we don't increase the risk of carb icing."

One outcome of Tony's calculations (I suspect he uses a slide rule) was a slightly worrying figure for prop speed. "When it's turning at 2400rpm, the tips are travelling at around Mach 0.96. That's uncomfortably close to the big number - faster than I feel we should be spinning a wooden airscrew." Tony's recommendation is to reduce propeller diameter by two inches, bringing the tips to a more ideal Mach 0.8. "I realise it's a big ask - any owner of a historic aircraft wants it to be as near original as possible - but hopefully the visual difference will be unnoticeable, and safety is always the main consideration."

This is a project that few engineers would even contemplate. There are plenty of Continental-engined replica SE5s or Rotec-powered Sopwith Camels around, but installing a vintage engine in an even more vintage airframe is a step into the unknown. That said, CFS knows its way around Gipsies better than almost anyone else on the planet - there are over a dozen examples of their expertise snoring happily away on the other side of the airport at CAF.

"Once it's in place and running it'll look authentic and sound fabulous," says Tony. "One of the exhaust stacks will be a dummy because we're replacing a V8 with a straight six, but the sound will be true vintage. This replacement may have been built in 1946, but the Gipsy series started in 1927, when the F2B was still being built. It's sad that there aren't any genuine Falcons left, but this conversion is close enough to please all but the strictest purist. It will allow the few Brisfits left to keep flying, and that's the most important thing."



Clockwise from top right:

A pair of C-47/DC-3 propellers under refurbishment. These are from G-AMSV, the C-47 currently resting in CAF's Hangar 7.

A Continental R-975 from a Sherman tank under overhaul. Tank engine overhauls have recently become a regular feature of CFS's CV.

The test rig that will be used for static trials of the upside-down Gipsy Queen on completion.

Close match: A Gipsy Queen (without supercharger) laid over a Rolls Royce Falcon V8. Notice how the thrust lines coincide.

