

# Getting **Gassed**

## G100UL Nearly Ready to Power GA

By Jim Cavanagh

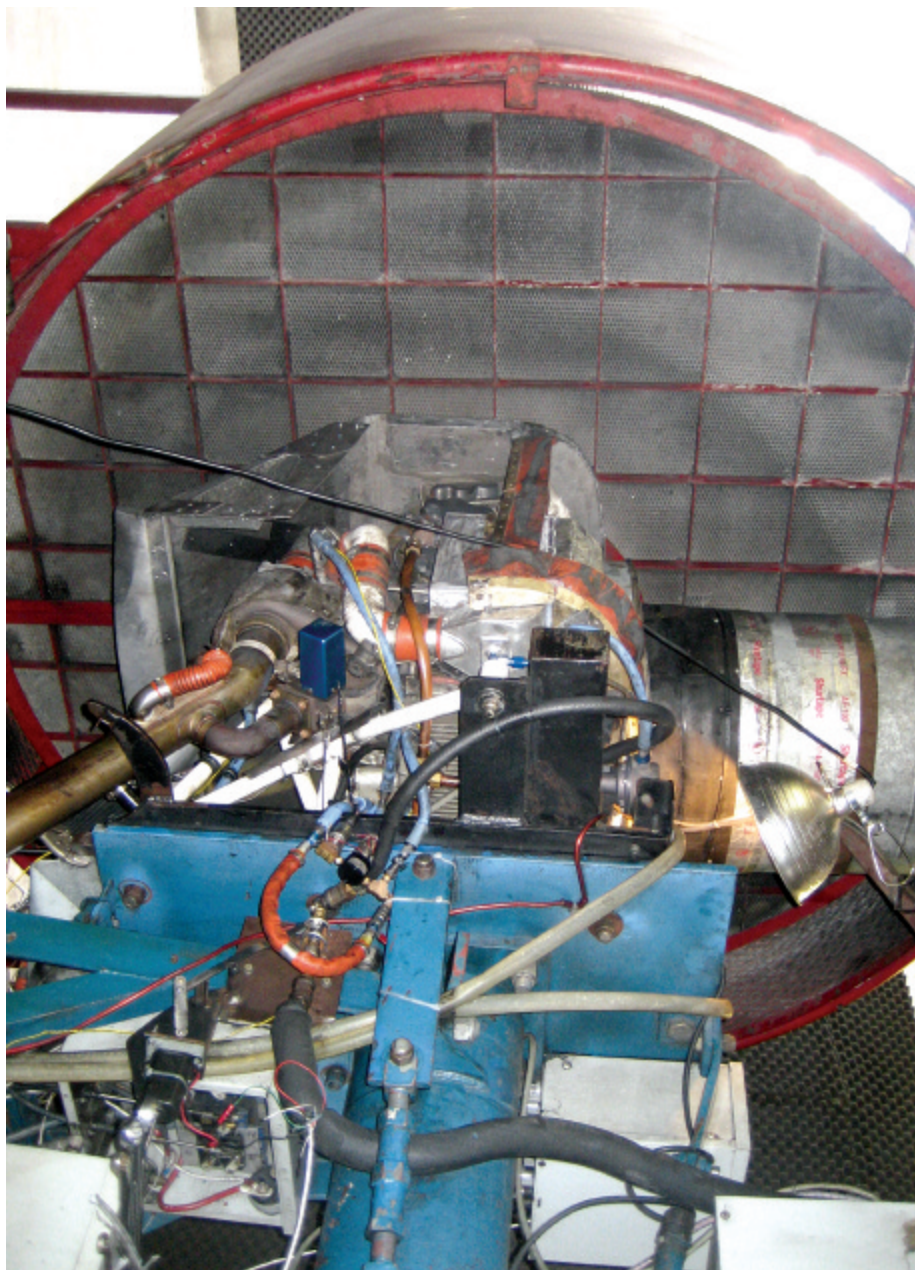
Photos provided by General Aviation Modifications, Inc.

**T**here's a strong possibility that the lead in our fuel will be outlawed by 2014. With this looming date and situation, you would think that there would be a concerted push to develop a high-octane fuel that would keep our airplanes flying. So far, just three companies are giving this the big "heave ho;" they include Swift Fuel, General Aviation Modifications, Inc. (GAMI), and Hjelmsco, a Swedish company that has been selling unleaded aviation fuel since 1981.

Of these, GAMI seems to have the most viable contender. The company has announced success in blending a 100 motor octane number (MON), unleaded, petroleum-based fuel that, for all intents and purposes, will successfully power all aircraft gas-combustion engines. GAMI's G100UL fuel has been submitted to the FAA for certification. However, it has hit that bureaucratic wall that seems to pop up whenever a new idea arrives in aviation.

GAMI has been around for a long time, and it is best known for its GAMIjectors, a matched set of fuel injectors that balances the fuel input to cylinders. In an interesting chicken-before-the-egg scenario, GAMI, in developing these injectors, has found itself to be the leading gas-combustion authority in the known universe, highly touting the "lean of peak" philosophy for running our engines.

To obtain combustion and fuel-flow data, GAMI created, almost entirely in house, the world's most sophisticated test cell and software and began studying combustion



Developing a new fuel requires endless hours of research, experimentation, and testing. To obtain desirable results, this engine was put through demanding operating periods inside GAMI's engine-testing facility.



Engineers man the control console, which features computers, monitors, and instruments that process and display every aspect of the engine's performance during testing.

at a nearly molecular level. Its research has proven a number of combustion theories, debunked others, and has dissected the combustion-event timeline to the millisec-

ond. Rather than go into all of this, I highly recommend any interested pilot to take his or her advanced pilot course, offered a couple of times a year.

Through the work of its test cell and software, GAMI has been able to develop its injectors and prove their effectiveness, and with this knowledge developed the Pressure Reactive Intelligent Spark Management (PRISM) electronic ignition system that can control the combustion process. While not necessarily needed for smaller engines, PRISM can manage the combustion event in all aircraft engines, enabling the entire fleet to continue operations without suffering performance reduction.

Many of our engines can run on lower-octane fuel, so long as the spark occurs at the correct time. Unfortunately, with magnetos, the timing is typically fixed somewhere between 20 and 25 degrees before top dead center (BTDC). As power, mixture, RPM, altitude, and barometric pressures change, the optimal spark event changes location. A magneto's fixed timing creates an incomplete burn or detonation that can destroy a cylinder in minutes. GAMI has had PRISM functional for nearly six years, but the industry didn't know where it was headed, fuel-wise. When the EPA began pushing the FAA for a timeline on eradicating leaded fuel,

GAMI, rather than waiting on the refineries, began testing fuel and additive packages on its own.

Obtaining a quantity of basic unleaded gas, GAMI developed four or five additive packages and tested all of them extensively. It ultimately settled on one it has named G100UL.

GAMI has approached the FAA with a test program scenario, using an STC test plan. It would apply for an STC to use the fuel in Cirrus turbo-normalized engines of 310 hp and compile data for verification. GAMI's test cells have run these engines with high-compression (8.5:1) cylinders at more than 350 hp without detonation. Like most FAA projects, the path to certification can be very challenging. GAMI is hopeful that the FAA will not impose unreasonable requirements on this critical STC process. Time will tell.

G100UL is just short of meeting all of the requirements of ASTM D-910, the current specification criteria for aviation fuels, but its testing shows that the discrepancies are operationally insignificant.

I spoke with Timothy Roehl, vice president of GAMI, who has been on the ASTM/CRC Unleaded Avgas Committee



This unique label on the experimental aircraft's wing calls attention to GAMI's special G100UL fuel.

for nine years; he and George Braly are the point people on this project. Roehl reports that, under testing, the performance of the new fuel is at least as good as 100LL, and

that horsepower is unchanged and has the potential of higher performance when using PRISM. Further, the fuel is cleaner, does not affect lubrication, and, without lead, offers



A service technician fills the airplane with GAMI's new aviation fuel. The fuel is clean, does not affect lubrication, and, because it has no lead, offers reduced maintenance.

reduced maintenance. G100UL is heavier than 100LL, but contains more energy per gallon, so you might lose a few pounds of ramp weight but gain significant range.

Transitioning to a new aviation fuel has problems associated with it. Infrastructure, distribution, contamination with other fuels, and the costs of the additive packages and handling are considerations. GAMI's fuel is considered transparent. GAMI has proven that, even when contaminated (mixed) with 100UL, the fuel maintains its octane rating. Without the need for lead, G100UL can be blended much more efficiently.

GAMI does not intend to be the new Shell Oil or BP. Rather, its intentions are to patent the formula and process and franchise its fuel so that it can be blended by any state-of-the-art refinery, regardless of location.

Cost-wise, considering everything, GAMI anticipates the new fuel being available to pilots at the same price as, or maybe less than, 100LL. The really good news is that all of this has the potential to come together in a relatively short period of time, provided the FAA doesn't drag its feet, although, realistically, this probably won't happen. Some industries are hesitant to change. Aviation is probably one of the worst to embrace new technologies, both for the cost of certification and the overall conservative mindset. The underground scuttlebutt of self-appointed gurus is a large part of this. Some governing bodies, likewise, are bothered by change; you know who I mean. But, there is a bit of light shining on our fuel situation, and 2014 doesn't look that ominous any longer.

But you never know! <sup>CO</sup>