Volume 37 Issue 9 September, 2020

Winds Aloft

EAA Chapter 790 Lake in the Hills, IL 790.eaachapter.org

Chapter Meeting Presentation

Building an Air Conditioner for your plane.

By Paul Ranieri

At our chapter meeting on Tuesday, August 25, Paul Ranieri gave a presentation on the Air Conditioning system he designed and built for his Plane.

Paul flies a Glasair Glastar he completed building in 2012 and his plane has a Lycoming O-320 mill from a Piper Cherokee with the same fixed pitch prop. He began developing his system about two years ago when several long flights on 90 degree plus days prompted the question 'how could I make this more comfortable without resorting to flying at higher altitudes?' The answer required research be conducted on what types of compressors, evaporators and condensers were available that could be modified for aircraft use i.e. light and small. Also, it was important to find out from the manufacturer, what the Lycoming could spare; in terms of powe- from the accessory pad, and how much the system would weigh per ton of cooling.

In this Issue

After building a test system and mocking-up several designs it became apparent that a feasible system could be installed in the airplane that weighed only 10 pounds per ton of cooling. To put that in real terms, one would need to carry 170 pounds of ice per hour of flight to equal the two tons of cooling available in Paul's system. After months of testing and taking data (remember in Chicago we only have three useful months for testing where temps exceed 90 degrees), it was time to install the system in the Glastar.

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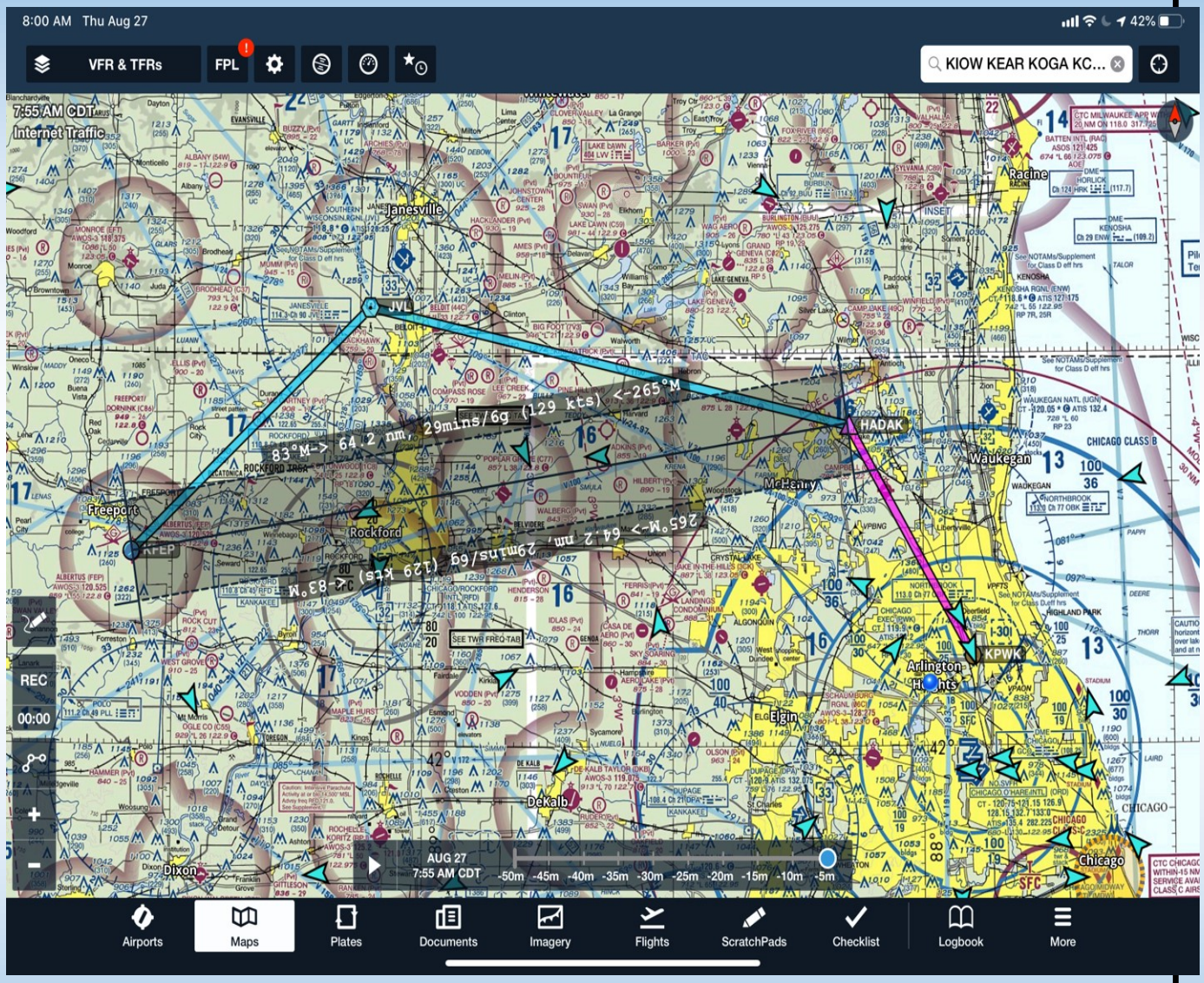
Foreflight Tip

There's a neat feature on the moving map of Foreflight. We all most likely have had ATC ask us "What's your on course heading to your destination?" while on an IFR flight plan or perhaps while you are under flight following. Or perhaps, you are requesting flight following and want to give the distance from the airport you had left. While there are many ways of doing this with or without Foreflight, I find that this tip comes in handy during these situations.



While you are in the map tab of Foreflight, simultaneously put two fingers down on the map and then drag those fingers from point a to point b a (i.e. where you are and your destination). Simultaneously lift both fingers away from the screen and you will see an overlay left on the map. This overlay shows you your on course heading, nautical miles of this segment, time and fuel burn. It's a quick and handy way of getting this information. It also could be used for "what if" type scenarios such as if you want to do a boondoggle from your plan but not sure what impact on time, fuel burn, etc. You can use this feature without mucking up the flight plan you have entered already. Happy Flying!

Article provided by Matt Van Bergen

Building an Air Conditioner for your Plane

(Continued from page 1)

Once fabricated and modified, the installation of the custom compressor and the fan/evaporator (the inside cold part) were straight-forward and mostly bolt-on. Custom line sets (hoses) and vent ducting had to be fabricated and installed. Paul designed a proprietary control system for the compressor that keeps the load on the engine as consistent as possible in-flight so there are no unwanted pitch trim changes. The pilot can vary the fan speed and cooling capacity/temperature in-flight and once set, there is no significant variation in engine load.

The last item to be installed was the condenser. The condenser is the exterior radiator-like coil that dissipates the heat transferred from the cabin and compressor to the atmosphere. Having learned from the test fixture how much airflow over the condenser was required, Paul decided to design and build a combination of up and down draft ducting that would take ram-air in from the lower cowling and some air from the scoop on the top cowling. In-flight at cruise speed there is always plenty of airflow, it is on the ground when problems can arise, and this design succeeded in preventing those problems.

Preliminary flight and ground tests have been very promising. With 93 degree OAT the vent air discharge temp is under 50 degrees with the fan on high and under 40 degrees with the fan low, this is comparable or better than an economy car's A/C. On the ground, the cooling capacity is about half which means vent temps in the 60's when it is 90+ outside which is still very comfortable. OAT's under 90 degrees and it's downright cold in the cabin and the system needs to be turned-down or it quickly becomes uncomfortably chilly.

The system uses anywhere from .25 to about 3hp depending on engine speed and pilot settings. Normal cruise settings would be under 2hp. Fully installed, the system weighs about 20 pounds and has about a 2 knot penalty in cruise which could be reduced with more refinements to the condenser air intake system. Paul is extremely pleased with the performance and outcome of the system and is in the process of building another with an environmental chamber for the test fixture so testing can be conducted during the cold months. The purpose of the second system is for life-cycle testing and failure analysis. The system in the plane has over 100 hours run-time on the test fixture and about 15 hours in-flight. If the system proves to be as reliable as it is functional, Paul intends to test the market for kits aimed at RVs and other EAB Lycoming/Continental powered aircraft.

For more information contact Paul Ranieri at *P.ranieri@comcast.net*

Editors note: It was very comfortable on a hot day

FLY OUTS

June - Clow Airport

July - Chuck Binzels

August - Waterman Airport

Photo's provided by Fran Logalbo

Calendar of Events

- No Young Eagles events through September
- Annual Pancake Breakfast Cancelled due to COVID concerns
- Sept– 22nd Chapter Meeting IMC, 6 pm social hour and food, LITH Airport
- October 27th Chapter Meeting -Nazis in Denmark
- November 24th, Chapter Meeting, Board Elections for 2021 and New Microsoft Sim information
- December 22nd Christmas Party at Paul's house Pick up your new Directory
- Check the Chapter Website “http://www.790.eaachapter.org/”

  for any additional details and a list of local chapter events in the area

“I fly because it releases my mind from the tyranny of petty things”. Antoine de Saint-Exupery

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