AUXILIARY TURBO-JET ENGINES FOR SAILPLANES

by MAX DREHER

Since the existence of sailplanes, it has been always a dream of their pilots to have some kind of self-launching system. The reasons for this are well-known, because the soaring pilot would have a chance to launch himself, where and when he wants, independent from any of today's usual towing methods. Sometimes it is really heart-breaking for a pilot who has to wait long hours in line for a tow on a booming day. Your own power also will permit the pilot to ferry his ship back to the starting point after a cross-country flight. Also, take-off with your own power should be safer than towed flight, although some would argue that point.

There are two types of propellant in use today as auxiliary power in sailplanes. One is the propeller, driven by a small four- or two-cycle piston engine, in the 4- to 50-H.P. class. The other is the pure jet engine, which seems to be more and more on the up-come.

All over the world, the gasoline engine driven propeller has so far been the most used auxiliary power source for sailplanes. These engines are, in general, heavy, take a lot of space and do not run too smoothly. Also, they are mechanically very complex because it is a must to have them retractable, in order to reduce drag. To do this simply with low weight is not an easy job for the designer and gives him a lot of headaches. In most cases, auxiliary systems like this force the builder to design special ships for this purpose. Consequently, sailplanes like this are very expensive. Could this be the reason why they are not seen too often?

On the other hand, the jet engine is a small, light-weight, compact unit and has a big thrust output. The only disadvantage of jets is the high fuel consumption, which is not too bad since the engine is used mostly for short running times in this application.

There are four different basic principles of jet engines, all of which have been tested on sailplanes, but not all are suitable for this purpose. They are the following: A, the rocket engine; B, the ram-jet engine; C, the pulse-jet engine; and D, the turbo-jet engine. I assume that most of the readers of this article are familiar with the working principles of the just-mentioned jet engines; however, I will point out briefly why most of them are not suitable for sailplane use.

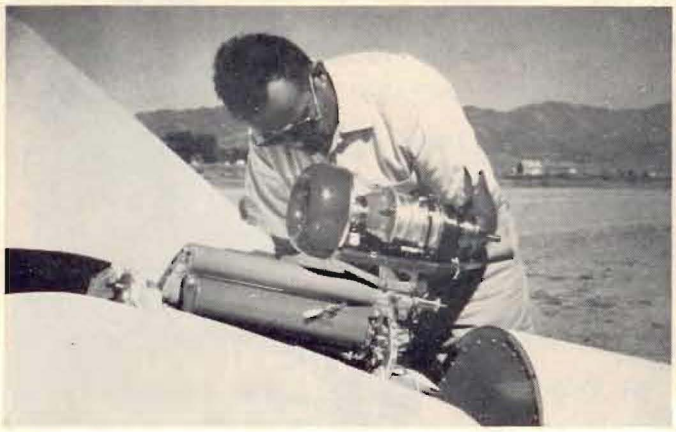
A. The rocket engine was used by Fritz Opel, a German car industrialist, to power a glider over a quarter century ago. This power plant, small and light in weight, is usually powered with solid fuel. It has a large thrust output, but the running time is very short, normally 10 to 15 seconds. Also, the operation is not the cheapest because an Aero-Jet emergency rocket, a standing size to boost light planes, costs about $300 each shot. Once the engine is fired up it cannot be stopped, nor can its thrust be regulated, which is not too good from a safety standpoint.

B. The ram-jet engine, since it has no compressor, is strictly a supersonic jet. It has to be used at a high speed so the ram air will build up enough pressure to make it efficient. It has no rotating components and is mechanically very simple. Fuel can be of either liquid or gas-type. The thrust can be regulated. But sailplanes fly at a low mach number so are not suitable for this type of a jet engine.

C. The pulse-jet engine, also called the two-cycle jet, had its first practical use during the second World War to power the German V-1 winged bomb. But today, this type of a jet is popular only as a model jet engine to power model airplanes. It can be run statically and is mechanically simple. The thrust cannot be regulated. This system is not very efficient, it generates more noise than thrust.

D. The turbo-jet engine, in use all over the world today on many modern airplanes, has proven itself as a very reliable and good power source. It has its own compressor, driven by a gas turbine, which gives statically, or at full flying speed, the pilot a chance to control the engine from idle to maximum thrust. It has a good weight-to-thrust ratio and is by far the most efficient member of the jet family. In the 100-lb. thrust class, the fuel consumption will be about 1.5 lb. fuel/hour. Also this engine swallows almost any type of fuel and is, even with its high-rpm rotor, a very safe machine. Turbo-jets, built as baby machines, could be adapted easily to most sailplanes built today, and would permit a few restarts in the air, also.

Baby turbo-jet engines have been in use very successfully in France,



Left, Max Dreher with the turbo-jet engine described in this article. Below, the Prue 215 sailplane with the turbo-jet engine mounted above the wings.