

This Month's Old Timer



The Arrow Sport V-8



By Bob Whittier

A man can take a bundle of steel tubing, a pile of spruce lumber and a roll of cloth, and through the use of common saws, files, planes and drills, build an airplane of very presentable appearance. But to transform some pigs of iron and aluminum into an engine is something else again. . . you need a foundry, a forge, a milling machine, a drill press and gosh knows what else. Thus it is that the engine for his airplane has always been the stumbling block for the amateur aircraft builder.

Back in the early 1930's the engine situation was really tough. The supply of Curtiss OX-5 wartime engines was just about gone, and the depression had kept production of lightplane engines such as the Aeronca, Continental A-40 and Szekely to such a low figure that their cost was fairly high. The need was for a light, inexpensive airplane to stimulate private flying, everybody

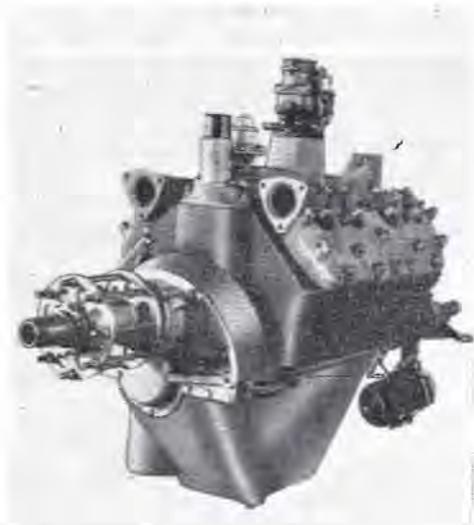
agreed, but there could be no such airplane unless there was a cheap, reliable engine.

From 1935 to 1937, a lot of experimenting was done with automobile engines and airplanes designed around them. There was the Plymouth-powered Fahlin Plymoucoupe, the McGaffey Aviate with a Ford V-8 engine — and the Arrow Sport. Of the several which appeared, only the latter managed to get into limited production, so let us take it as an example to study the general idea of using auto engines in planes.

The Arrow Aircraft Corp. of Lincoln, Neb., under the guidance of Mark Woods who had had many years of experience in light airplane construction, became interested in the Ford V-8 engine. With the assistance of David E. Anderson of Detroit, who had supervised the engineering of the V-8, Arrow went to work to see what could be done.

In modifying any auto engine for flight, the biggest problem is weight. To cut it to a bare minimum, you can take the crankshaft, connecting rods, pistons and valve gear of some car engine and design a new crankcase and cylinder assembly using aluminum and air cooling as in normal aviation practice. This requires so much pattern-making and machining that the price is high. The alternative is to retain the car's basic cast iron cylinder block and accept the weight penalty for the sake of keeping cost low.

Arrow chose the latter course. An aluminum oil pan was designed, aluminum pistons installed, and a lighter generator provided. In addition, a 2:1 reduction



The Arrow F V-8 that was factory installed on the Arrow Sport. Advertising literature issued at the time offers a simple economical solution to the usually costly overhaul problem . . . "at the end of 500 hours, turn in the old engine for a factory rebuilt one at an average cost of \$55.00".

gear was fitted as the Ford's 3000-plus rpm's were too high for propeller efficiency. The basic engine was retained. It developed 82 hp at 3075 crankshaft rpm, and the weight was 402 lbs. dry. By contrast, the modern Continental C85 airplane engine produces 85 hp at 2575 rpm and weighs only 182 lbs! In other words, the Arrow V-8 weighed some 220 lbs. more than the engine we would choose today to power an 85 hp airplane, and this does not include the radiator and water!

Since passengers, gasoline, instruments, wheels and what-not all come to about the same weight, if your engine weighs a couple of hundred pounds more, the airplane will have to be stronger to take it and must have more wing area to carry it with about the same performance. A bigger airplane weighs more and requires more labor to build. The Arrow V-8 grossed 1675 lbs., as compared to the 1200-1300 lb. average for two-place lightplanes of the past dozen years.

You may save money on the engine, but you have to buy more material and make it into a bigger airplane to carry it. Arrow quoted some interesting 1937 prices in its catalog:

	Arrow V-8	Competitive Engine*
Rebuilt engine block	\$55.00	\$540.00
Cylinder heads	\$ 9.00 for two	\$ 69.50 for five
Carburetor	\$ 4.65	\$150.00
Connecting rod	\$ 2.35	\$ 35.20
Oil pump	\$ 5.50	\$ 60.50
Ignition system	\$12.25	\$126.00

*Probably the 85 hp LeBlond or Lambert

As for the airplane, it sold for \$1500, which was good for an 82 hp craft but still higher than the \$1200 average being asked for 40 and 50 hp aircraft-engine powered lightplanes of the same period. Arrow plugged their ship's greater weight and "big-plane feel" in their literature.

The ship was a rather neat appearing two-seater of strictly conventional wood, steel-tube and fabric construction. It had a fairly high wing loading of 9.3 lbs./ft., a somewhat poor power loading of 20.4 lbs. per hp, and was supposed to cruise at 90, top 100, climb at 800 fpm., and do 300 miles on a 20 gal. gas capacity.

Everyone who flew it remarked about its brick-like glide. The geared-down propeller ticked over very slowly in a glide and as it was of rather healthy diameter, created quite a disk in the air as it rotated. It chopped up the air in big hunks and reduced lift at the center section of the wing noticeably. In addition there was a sizeable radiator between the landing gear vees, adding cost,

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weight and drag. You shut the throttle and took an "elevator ride" down onto the airport. Arrow said this was glide control, just like flaps, and a fine thing for dropping into small fields. Aeronca and E-2 Cub pilots who tried the Arrow said "Yikes, it scares me!"

I remember seeing quite a few of these ships around 1937 and 1938 and we all thought it was going to become popular. But what happened? Well, I'm sure I have not seen one since at least 1938, and I haven't seen one mentioned in Trade-a-Plane for just about as long. I guess they have all gone the way of the passenger pigeon.

What happened? Just this. You have no good small airplane engine at a low price, so you develop one by rebuilding an automobile powerplant into an airplane engine, and start building and selling airplanes powered by it. If you're lucky, you might sell quite a lot of airplanes. All those airplanes flying around with rock-heavy engines are bound to start some engineer to thinking, "Boy, if I built a real airplane engine at half the weight of that clunker, I'll bet those ships would fly so much better the owners would gladly pay something extra for my engine!" And so somebody markets a real light airplane engine which costs a few hundred dollars more, but gives you an appreciably faster, lighter smaller airplane. So you go out of business while others start selling lighter, faster planes powered by the new airplane engines now available in quantity at a reasonable price!

We're rapidly getting to another one of those periods when no good small airplane engines are available at a reasonable price. Franklin and Lycoming long ago gave up 50 and 65 hp engines and Continental is turning them out at a trickle because nobody is manufacturing new airplanes to take 65 hp. We're wearing out what we've got; we all recognize that a light, inexpensive sport plane is badly needed, and I'll be darned if fellows aren't fiddling with auto engines again! Let's hope Lycoming, Franklin and Continental have enough sense to hold onto their 65 hp patterns and dies!

