Private Pilot **(December 1968)**

"No-Fuel Engine"

By Bob Said

A Revolutionary Engine That Operates For 15 Cents per Hour Without Gasoline, Air, Combustion Or Exhaust May Be Near

Revolutionary developments have a way of creeping up on you in a technologically advanced society. This is the most technologically advanced society there ever was, and it may be that we have just been crept up on.

How would you like an airplane engine of, say, 300-hp, weighing half as much as existing ones? What if it used no consumable fuel, and therefore required no fuel tanks, lines, pumps, carburetor or injection pump, intake valves, spark plugs, or exhaust system? What if it did not use air, and could operate at 30,000 feet --- or 300 feet underwater --- as efficiently as it did at sea level? What if it generated no heat, and therefore needed neither a water-cooling jacket nor air-cooling fins?

Such an engine may exist. I have seen it, and talked to the people who are developing it. The unit is in the earliest stages of prototype test, but if it turns out to do all the things their patent application says it will, it is bound to join the Wright Brothers and the turbine as one of the three greatest things to happen to aviation.

Consider this: with such an engine, every Aeronca, Cherokee, and Skyhawk in the land would have the range to fly non-stop to Europe, Hawaii or Japan. Or anywhere else, for that matter. Military patrol planes could stay aloft as long as the crew could hold out. You could "gas up" the family light plane once every 4 or 5 years. On a Skyhawk, for example, your takeoff weight might be as much as 500 pounds less than it is now, because you'ld be lifting about half as much engine weight, no gasoline supply, no tanks, fuel accessories, etc. That would leave weight allowance for a couple of more passengers, and you'ld still have unlimited range. Nobody would ever "run out of gas" again. The astonishing possibilities go on and on.

Let's take a hard, skeptical look at this engine. It was designed by a Hungarian-born inventor name Joseph Papp. He and financial backer Don Rosen, who have set up a firm called Environetics, Inc., to develop the engine, are saying mighty little about the details of what makes it work until their patent applications have been granted. But this much they will say:

The engine operates on a charge of gas blends, hermetically sealed inside each cylinder above the piston. A charge of low-voltage electricity, which can come from either a 12-V or 24-V source common to light aircraft, is used to create an electrical field in or around the cylinder. This causes the gas to change from its original form to a new form which requires more space. As it expands it does two things: pushes the piston down and creates

--- they aren’t saying how --- the conditions for returning to its original form. The heat generated by its expansion is absorbed by its contraction. When it is contracted, another charge of electricity causes it to repeat the expansion-contraction cycle, and so on ad infinitum. When this sequence of events occurs in an orderly phase among 4, 6 or any convenient number of cylinders, suitably connected to a crankshaft, you get useful work.

How much work? It’s pretty much a paper solution at present, but the developers say any amount you want, from the amount necessary to drive a lawnmower on up through automobiles and airplanes to the amount needed to power a locomotive or a battleship.

Inventor Papp has been working on the concept for years when he immigrated to the US by way of Canada not long ago, and was hired by Rosen’s firm, which manufactures refrigeration equipment and store fixtures. A few days after he went on the payroll Rosen decided to put him to work on a "crash" basis to develop an engine that would actually run, to prove the concept. And he did, in six weeks.

A 4-cylinder, 90-hp Volvo automobile engine was chosen as the basis of the rig. Only the "short block" was used --- the cylinder head, intake and exhaust valve assembly and accessories were discarded. On top of the Volvo short block Papp set an aluminum block bored to match the Volvo cylinders. It contains the sleeved, hermetically sealed cylinders and pistons which are the heart of his engine. He bolted the bottom of his pistons to the top of the Volvo pistons, injected the charge of his mysterious gas, hooked up all manner of wires and gauges to his test board and fired her up. Under optimum conditions, incidentally, he says, no starter is required: just turn on the juice.

Among other things, he operated the engine for 35 minutes at 4000 rpm in a closed conference room full of interested potential customers. Any ordinary engine would have knocked them all out with monoxide poisoning. This one didn’t. What it did do, according to the test board, was generate "between 50 and 75 horsepower per cylinder" at 4000 rpm, which speaks well for the strength of the Volvo connecting rods and crankshaft. They were never intended to take this kind of knocking around. Rosen said the little 4-banger was generating "better than 300-hp", based on known displacement and measured pressure. Under normal operation, he said, an engine designed from the ground up on the Papp principle would generate about 800 pounds psi in each cylinder.

Rosen stressed that what Papp has done is design a fuel, not an engine. The secret blend of gases is the key. Using a power source to move pistons and a crankshaft is old hat to reciprocating engine technology. And Papp’s "key" can be applied to turbine technology as well.

One big market area Rosen is eyeing is the automotive field, in which a smog-free engine that exhausts nothing into the atmosphere would be bound to make many friends.

It might make many enemies, too, and this brings up an aspect of the story about the Papp engine which has troubled this reporter since he first heard about it. Clearly, an engine with these revolutionary characteristics, and with so many obvious military applications,

would confer an enormous technical advantage on the nation which possessed it. Not only militarily, but commercially as well: it would be mighty hard to compete in the world's marketplace against such an engine, if all you had to offer were conventional gasoline and diesel power plants. This being the case, why invite the attention of the bad guys before you have iron-clad patent protection and a going, proven product? If the Soviets don't already have such a fuel concept, they are likely to be mightily interested in this one. The world petroleum industry, and the financial community itself, might be a little uneasy about a concept which could conceivably put a permanent end to the use of petroleum fuels in all of the non-nuclear engines of the world. The auto and aircraft engine people ought to love the idea, because if it will do what its developers claim, the Papp power concept would result in better engines for these applications than any other in sight. But engine builders are as susceptible as anybody else to financial pressure, and the imminent end of gasoline sales throughout the world would be bound to generate a trifle more than a modest twinge on Wall Street.

Moreover, any reasonably sophisticated reader will wonder about safe, tidy little scientific ideas like entropy, conservation of energy and one or two others. Because they are unwilling to divulge hard details on the concept until patent protection is complete, Papp and his associates leave us nibbling at these annoying problems.

But then, the scientific community thought Edison, Marconi, the Wright Brothers and Robert Goddard were out of their minds, too. And look what they did for us. So don't scoff too soon. After more than two decades as reporter and editor for newspapers and magazines from coast to coast I have been exposed to more than my fair share of perpetual motion machines, miracle cancer cures, devices for communicating with poltergeists, methods of extracting gold from carrots and similar schemes. I do not recall one which caused my reporter's instinct for a good story to resonate more strongly than Papp's engine does. But then, I figured Dewey was a shoo-in over Truman, too, so it all comes out in the wash.

It must be stressed that, at the time of this writing, the Papp engine was an unproven engine. It had started some 50 times, run a total of "several" hours, and operated continuously for 35 minutes on its longest run. It had never been connected to a dynamometer to actually measure its power output. Rosen pointed out that there was little point in this because the block, connecting rods and crankshaft of the existing engine were Volvo components, not Papp components, and there was little point in testing them. The company's desire is to associate itself with a major engine manufacturer and allow it to do the development work and market the product under license. As Rosen notes, "A firm like that is equipped to so such work. We're not, and it isn't the business my company is in. But we have the product, and nobody else does".

Developed as inventor Papp envisions, it would be quite a product indeed. It would have a one-to-one horsepower to weight ratio. Only a quarter-inch of metal is needed to surround the cylinders --- no water jacket or cooling fins. They'ld be so much useless weight. The engine would be mounted inverted or vertically to power a rotor. In an auto application Papp says an rpm range comparable to those of diesels would be used, but the

optimum for the system is 2500-3000 rpm, which is right in the aircraft range. And Rosen says the acceleration and deceleration characteristics are "practically instantaneous --- much better than existing engines. We have instant rpm". At the time of manufacturing each cylinder would be charged with the special gas, and Papp's calculations indicate 60,000 automobile miles or 1000 operating hours for aircraft engines before a recharge would be needed. There is no abrupt fall-off in power output when a gas charge "gets old", so fuel exhaustion in flight becomes a thing of the past. When recharging time comes around, Papp says a supply of fresh gas would cost "about $25 per cylinder". Compare that with your current gas bill! Can you operate your 6-cylinder engine for roughly 15 cents per hour now, even in economy cruise?

Because the engine is not aspirated, it would retain full power up as high as the wing could lif tit. That would result in tremendous boosts in true airspeed for any lightplane on the market; better even than supercharging, without the expense or weight of a supercharger. In fact, the engine would continue to function perfectly in space, and Cal Tech's Jet Propulsion Lab is looking at it with that in mind. It would never suffer from carburetor ice, clogged fuel lines or spark plug failure --- no spark in introduced inside the cylinder. O-rings were used to achieve a hermetic seal in the Volvo prototype, and pressure lubrication was emplyed, but other techniques would be used on a production engine, according to Rosen.

The absence of gasoline removes all fire hazard, and the operating gas itself is not combustible, Rosen says. The closest he will come to identifying it is to say that "it is like, but is not, hydrogen, helium, etc. The components are readily available and not expensive".

All of this tends to make the mouth water, but it is predicated on two of the largest letters in the English language: I and F. Until Environetics --- or somebody else --- builds one of these engines and submits it to exhaustive performance tests, nobody will really know if it develops as much power for as long as Papp and Rosen say it will. IF somebody does, and IF the engine performs as advertised, a giant revolution is about to happen in engine technology and to light aircraft design as a spin-off. More space and weight allowance for people, less for hardware, and major improvements in performance and economy inevitably would follow for the fly-for-fun set. And IF all this comes about, Standard Oil had better consider a vigorous diversification program.

IF, on the other hand, there is a fly in the ointment and the Papp fuel concept craps out at the showdown, somebody else probably will take a new slant and keep on trying. After all, your heart just sits there expanding and contracting, and it, too, requires only periodic refueling. If somebody can figure out a way to make a couple of handfuls of gas behave the same way inside a cylinder, without suffering unpredictable coronary attacks, we'll get a simple, cheap, reliable engine some day...