

# Ben Stone's



## Volksplane

Why (or why not) a Volksplane?

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*B.W. spent part of his youth touring the world as a US Naval aviator, debauching ashore and ruffling senior officers' feathers with his F-18 at sea. Most recently he served in the Reserves as an F-5 adversary pilot, where it was his job to teach fledgling jet jockeys the important lesson that old men in outdated fighters can still out-fight the unwary. Previously, his active duty included a tour as an F-18 instructor pilot, which imbued him with a regrettable habit for sharing his unsolicited opinions with other pilots. It is that penchant which convinced him that you might be interested in his thoughts on Bud Evans' Volksplane VP-1, one of which he recently completed. Here then, humbly submitted, is the first in a series of articles on the subject.*

With such a staggering array of kit aircraft available on the market today, the choices can be daunting for a prospective homebuilder. How is one to decide? In hangar bull-sessions, the newbie will be advised to decide what his "mission" will be, set a budget, and then focus only on designs that can do the mission on the budget.

So what sort of budget and mission might lead you to pick a Volksplane? To answer that question is to tell the story of the Volksplane. As was the case with other famous homebuilt designs, the very *raison d'être* for a Volksplane is to build an aircraft to get your feet off the ground at minimum expense, both in construction cost and hourly operating expense.

### HISTORY

Experimenters are familiar with several such designs. Bernie Pietenpol's Air Camper is arguably the most famous of them; designed in 1929, and popularized by a

series of how-to articles published shortly thereafter, the Air Camper could be easily built by the average handyman. Most importantly, it could be inexpensively powered by the ubiquitous Ford Model A engine, which was easily modified for aircraft use. Developing 40 horsepower at 1,600 RPM, the Model A was perfect for swinging a healthy-size prop to get the Air Camper (with a gross weight under 1,100 pounds) airborne off of the grass strips of that day. Over 80 years later,

the Air Camper is still "in production" in garages and hangars across the country.

With the passage of time, the Model A engine became harder to come by. So in the 1960's, Bernie chose another popular auto engine, the Corvair, to power an updated Air Camper. Although there are plenty of engines suitable for powering Pietenpols—they have, for instance, flown successfully behind all models of 4-cylinder Continentals and even a Rotec radial—the key criterion, from Bernie's standpoint, was affordability. No aircraft engine is ever mass-produced in anything approaching the quantities in which popular cars are built, so inexpensive homebuilt aircraft needed to be powered by inexpensive auto engines. GM built 1.7 million Corvairs in nine years of production; they were readily and cheaply available throughout the 1960s and even today there remain enough serviceable cores stored in barns across the nation to satisfy the homebuilders' market for decades.



The Pietenpol Air Camper was the first successful homebuilt to be built in large quantities and powered by a converted auto engine.

But I am preaching to the choir; no subscriber to *CONTACT! MAGAZINE* needs to be reminded of the virtues of automobile engine conversions.

Although Bernie made marginal modifications to the Corvair for use in his classic design, he did not make any substantive changes to the Air Camper itself. Granted, he designed a slightly longer fuselage which maintained the proper center of gravity with the Corvair engine, which was lighter than the Model A. But for all its ease of construction, the Air Camper remained rather *tedious* to build. Representative of standard practices when it was first designed, the Air Camper is stick-built and fabric-covered *everywhere*. The wing ribs - all 28 of them - take a couple of hours apiece to build, the eight wing struts and control horns require considerable welding skill, and the plans, which provide only the general overview, require the builder to puzzle out plenty of little details. What sort of hinges should be used on the control surfaces? How do you add a tail wheel when the plans call for a skid made out of Ford Model T leaf springs? How do you add brakes when the plans call for none?

So you can understand why Bud Evans, an aeronautical engineer who drove a Volkswagen, decided to design a new "airplane for the people" in the 1960s. Using materials and an engine that were not available in 1929, Bud set about designing the VP-1, the simplest possible aircraft, to be built inexpensively in the minimum possible time. The engine, of course, was the Volkswagen Type-1, which was then in production for the wildly popular Beetle, of which VW would ultimately build 21 million examples. The engine was readily available, with crate motors to be had from a dealer, and serviceable engines available even more cheaply when pulled from nearly-new vehicles that had suffered front-end body damage.

As important as his choice of engine was Bud's ruthless pursuit of simplicity. Where contemporary designs commonly featured fabric-covered fuselages that had to be laboriously welded out of steel tube, Bud used a fuselage of stressed plywood skins, easily and quickly built over a simple framework of spruce longerons. In lieu of the Piety's tedious stick-built wing ribs, Bud substituted 1/4" plywood ribs, stack-sawn and belt-sanded to final size. There was no welded-tube motor mount, merely four aluminum spools to provide an inch of standoff where the VW engine, using the same attach points by which it bolted to the bell housing in a car, was bolted directly to the 3/4" plywood firewall.

Best of all, Bud did his best to use materials that were readily available in a 1960s lumber yard, and therefore cheap and easy to come by. The fuselage skins are marine plywood and assemble to three bulkheads made primarily out of Douglas fir sandwiched between more pieces of marine plywood. Aileron horns can be built from 1020 mild steel (hardware-store angle iron) and the plans call for stock Cessna axles, wheels, and brakes. The ease and simplicity of building a VP-1, according to Bud's website, resulted in the sale of 7,000 sets of plans.

Thousands were built, putting the VP-1 in the same league with the Sonex, the Kitfox, or even the RV series— in quantity if not in performance.

Why was the Volksplane so popular? And does it deserve to be so still?

### **THE MISSION**

Bud described the VP-1 as "the simplest-to-build basic aircraft for the novice homebuilder." Design considerations made safety paramount, of course, "but beyond that all other performance goals and even appearance gave way to simplicity for homebuilding." Bud explained his obsession with simplicity by noting that he "always felt that the reason more of our members do not build aircraft is— because the job is considered too complex."

Bud's minimalism is evident in the advertised specs for the VP-1. With a 1500-cc Type 1 VW engine, it is designed for an empty weight of 440 pounds and a gross weight of 650 pounds with eight gallons of fuel onboard. The load limit at that weight corresponding to FAR Part 23 requirements for utility-category aircraft is 4.4-g. Performance as advertised includes a cruise speed of 75 mph, maximum speed of 95 mph, a sea-level rate of climb of 600 feet per minute, and an absolute range of 200 statute miles.

The VP-1 is a fun aircraft to help get your feet off the ground. It's an inexpensive tool for boring holes in the blue sky on a VFR day. And if this is your mission, a VP-1 is a proven design well worth considering. If you're in a hurry to get somewhere though, you should probably look elsewhere.

### **THE "GOTCHAS"**

Sharp-eyed readers may have noted some numbers in the specs above that don't quite add up. An empty weight of 440 pounds and a gross of 650 leave a useful load of 210 pounds. With eight gallons (48 pounds) of gas, there is not enough payload left for an FAA-standard 170-pound pilot, let alone anyone bigger. For this reason, Bud also lists a "maximum gross" weight of 750 pounds. At this weight, the airframe is still stressed for the 3.8-g limits of the normal category.

This is important for another reason: the advertised 440-pound empty weight is a pipe dream. This empty weight was that of the prototype. This is a point not clearly evident in the plans, although it is admitted in the "VP Pilot's Handbook" that accompanies them. Based on the initial flight tests of the prototype, Bud made several modifications which he then incorporated into the published plans. The modifications, which included such basic items as wheel brakes and a steerable tail wheel, increased the empty weight by 37 pounds. So the best you could expect of an aircraft built to the plans is an empty weight of 477 pounds, which effectively forces you into the higher gross and lower load limit. But as the VP-1 is most decidedly **not** an aerobat, the 3.8-g limit should pose no real consequence.

What might be a limiting factor is the aircraft's range. The advertised fuel burn, at 75 mph economy cruise, is 2.7 gallons per hour (GPH), measured with the 1500-cc engine. At this rate, eight gallons of gas yield an absolute endurance of just under three hours. The advertised cruise range at this speed is 200 statute miles. Again, sharp-eyed readers will note that the numbers don't add up. With under three hours of absolute endurance and VFR reserves, the longest legal flight plan is two hours twenty-five minutes, yielding a range at 75 mph of 181 miles. The smallest engine readily available is the 1600-cc model which was introduced in 1972, and larger displacements are available at little extra cost. On an airplane as underpowered as the VP-1 it makes little sense *not* to avail yourself of the additional power (i.e., additional safety) cheaply available in the larger engines. But of course those engines will burn more fuel; my 1835-cc engine burns 3.9 GPH. That lowers your realistic endurance to 1.5 hours, and your no-wind range to 112 miles.

Headwinds? At 75 mph, even the mildest zephyr will lower your ground speed by a significant fraction. And of course all your navigation will be in nautical, not statute, miles, so the range we just calculated is under 100 nautical miles. Suddenly the \$100 hamburger that's within easy reach in a rented Traumahawk becomes a multiple-stop proposition in a VP-1. In the Midwest or on either coast, where municipal airports are to be found every 10 or 15 miles, cross-country flights are a realistic possibility. But out west, where landing strips with fuel pumps are few and far between, you will likely find that the Volksplane's range is, as a practical matter, short enough to confine you to local flights only.

### THE DECISION

So, let's think back to the advice we offered the newbie in our hangar bull session: what's your mission? Do you need to carry a lot of baggage? If so, a VP-1 is not for you. Do you need to carry any bags at all? Again, the answer should really be "no," although you could potentially provide room for, say, a large ditty bag in the optional turtledeck fairing.

Can a Volksplane cruise fast enough to melt the paint off your leading edges? Absolutely not! Can you take a friend for a ride in it? Can you wow your friends with 9-G stunts? Can you use it as reliable transportation in any weather, shooting ILS or GPS-WAAS approaches to minima? Are you kidding me? No, no, and no. If any of those criteria are important for your prospective homebuilt, you need to be looking at a Comp Air 7, a Lancair Propjet, a Zenith Zodiac, a RANS S-10 Sakota, or an RV-8, and potentially a second mortgage.

But if you want an airplane that's inexpensive and simple to build, that gets your feet off the ground on a Saturday morning and won't break the bank in so doing, if you do all of your flying solo and don't need to carry a passenger, if you have no particular place to go and live within a few miles of some fun little airports, the venerable Volksplane might still be a good fit for you.

### EXPECTATION MANAGEMENT

Like the Air Camper before it, the Volksplane was hot news when plans first became available. *Mechanix Illustrated* put the VP-1 on the cover of its September 1969 issue. As you would expect, *Sport Aviation* covered the airplane, as did the flagship magazines of homebuilding associations in Japan, England, and Australia. A "Volksplaning" craze spread worldwide, with examples being built in Germany, Italy, France, England, Scotland, Ireland, South Africa, Canada—you get the idea. Its popularity was due, in part, to the ease of building a homebuilt whose "...construction time, even for someone with little aircraft or boat-building experience, has been simplified to the point where this project can be completed in a few months."

But before you believe the hype, it's important to realize that the VP's design is nearly 50 years old. "Simplicity" is, in some measure, in the eye of the beholder. The 1960s homebuilder had different expectations than we do today. It is worth asking whether "simple," as it was understood then, means what we think it means today.

### SIMPLICITY

When the VP-1 was first introduced, the models it was competing against were all horribly tedious to build. Back then, EAAers were building Fly Babies, or Wittman Tailwinds, or Heath Parasols, or Air Campers. Their fuselages were either wire-braced and stick-built, or even more laboriously cobbled together out of steel tubes that had to be hand-fitted, notched, filed to size, and welded in place. The Volksplane's fuselage was incredibly quick and easy to build in comparison.

But today, most homebuilders prefer kits, and those who can afford the extra expense typically choose any available quick-build options. If your idea of simplicity is to assemble pre-formed and pre-drilled sheet-metal with pop rivets, an aircraft like the Zenith CH650 is probably more your style. If you would like a single-place wooden airplane with performance specs very similar to the VP-1, the Loehle Sport Parasol comes as a completely prefabricated kit that glues together like a model airplane in as little as 400 hours. The VP-1 will look unnecessarily tedious in comparison.

This doesn't mean that the VP-1 is *not* simple; it is. It was especially so when it was first designed. But in the half-century since, the march of progress—and some talented kit designers—have made even simpler options commonplace.

### ACQUISITION COST

Here's one category in which the Volksplane remains tough to beat. Because it's plans-built almost exclusively from raw materials, with few pre-fabricated components available, a builder saves money by doing all of the work himself. In essence, he first "manufactures" a kit, then assembles it. The downside, of course, is the additional time spent fabricating Volksplane components. The upside is an inexpensive homebuilt.

That said, the Volksplane is not quite as inexpensive as it once was. Bud Evans reported that it cost him less than \$1000 to build the prototype, including the cost of a used engine. In today's dollars that would be roughly \$6500—a colossal bargain if indeed it could be achieved. But a Volksplane will realistically cost double that figure, for a couple of reasons:

- The marine plywood out of which it's made is no longer commonly available in lumber yards. You will likely have to order it, and the cost is comparable to aircraft plywood. Since you'll need to send away for certified aircraft spruce for the wing spars and longe- rons anyway, you might just as well order aircraft plywood at the same time. The total for these materials is roughly \$1500 plus freight. This leaves only a few pieces of Douglas fir to be obtained locally, at minimal savings.
- Airworthy Volkswagen engines are no longer available off the street. Complete engines are no longer officially in production, and the wise homebuilder would cast a wary eye on any engine he finds in a car. When was it last overhauled? Was the engine case replaced at the last overhaul, or is it the same case that came with the car 40 years ago? Does that odometer *really* read 28,000 miles, or has it rolled over a couple of times? Factory-new Volkswagen parts and high-performance hot-rod parts are readily available, and can be easily assembled into a high-quality brand-new engine. And while it won't be a particularly expensive engine—you can buy all of the necessary parts, brand new, for about \$6000—it's not quite as cheap as it was in Bud Evans' day.

That said, a \$13,000 Volksplane is not unrealistic, and is cheaper than many simpler, faster-to-build options. Aircraft Spruce offers comprehensive VP-1 materials kits for under \$5,500. In contrast, the Loehle Sport Parasol kit that I mentioned earlier, easily one of the most inexpensive options and one that is readily comparable to the VP, costs \$7,995. When you add in a \$5,941 Rotax 503 engine, a \$785 engine mount, a propeller, the finishing kits...you get the idea. The simpler, quicker-build options come at a price. Even a Sport Parasol will cost \$3,000 to \$5,000 more than a VP, and other competitors are considerably pricier:

- For you Walter Mitty types, a Loehle P-40 kit runs \$13,995 and requires a \$10,841 engine, a \$2,009 engine mount, and a \$610 propeller.
- A Onex, which is similar in size and power to a Volksplane, albeit of much higher performance, comes in a \$12,995 kit that requires a minimum \$6,995 engine. Kit manufacturer Sonex Aircraft LLC estimates a flyaway cost of \$25,299.
- Fisher Flying Products' Avenger V is a kit with performance specs very similar to a VP-1 on the same VW engine. The quick-build kit advertises a 300-hour build time for \$9,225, with the same engine cost as for the Volksplane.

So while there are many competitors out there who offer comparable (or better) performance than a VP-1 and a

faster, simpler building experience, you will be hard-pressed to beat a plans-built aircraft for sheer inexpensive construction. The VP-1 still maintains its edge.

### PERFORMANCE SPECS AND OPERATING COST

When Bud began designing his "simplest-to-build basic aircraft," FAR Part 103 lay 20 years in the future, as did cheap, reliable, and plentiful Rotax engines in the 28-50 HP range. The VP-1 exemplified the state of the minimalist art when it was first built. But since then, Part 103 ultralights have made even simpler aircraft readily available. The performance specs are admittedly not directly comparable:

- The VP-1 has an advertised cruise speed of 75 mph, and a top speed in level flight of 95 mph, against a limit of 63 mph for a 103 legal ultralight.
- The VP-1's 8-gallon fuel tank is 3 gallons larger than that permitted in ultralights. Combined with the higher speeds, of course, you have a somewhat longer range in the Volksplane.

But if a Volksplane fulfills your mission requirements—which, as we discussed, can basically only be to get your feet off the ground for an hour or so—a Part 103 ultralight might suffice, and might provide some advantages of its own:

- A Part 103 ultralight requires neither registration with nor inspection by the FAA, which eliminates a few distasteful headaches at what should be the triumphant moment of completion.
- Because ultralights don't have to meet the "51% rule" for amateur-built kits, manufacturers can offer kits that are nearly ready to fly. Quicksilver advertises a 40-hour build time for its MX Sport ultralight, the Quad City Challenger 103 is advertised to require 100 hours, and Belite offers brand-spanking-new aircraft ready to fly off the lot.
- Although you will pay a premium for the nearly-finished aircraft, being able to fly right now may well be worth the additional expense. [See, for instance, my story in the sidebar.] Belite's ready-to-fly Cub clone only costs \$15,995. Is the year or two it might take you to build the VP-1 worth saving \$3,000 or less? For many builders it might not be.



Belite Aircraft offers a 28-HP Part 103 ultralight ready-to-fly (albeit unpainted) for \$15,995.

The *direct* operating cost (i.e., the cost of consumables like fuel and oil that are expended only when the aircraft

flies) is comparable between ultralights and Volksplanes. Even the tiniest Rotax will sip over 2 GPH, while my "big" VW burns only 3.9 GPH. Burning comparatively cheap auto gas, the difference in cost is negligible. My Volksplane now has 120 hours on it, at a direct cost of \$13.13 per hour.

### SUMMARY

So, who's the ideal Volksplaner? He or she should be someone who wants a project that is simple enough to be realistically completed, but complicated enough to pose some challenge. He is, after all, building an airplane entirely from scratch. He should be someone who needs no real utility from his airplane, and will find all the satisfaction he needs in a local hop with the Saturday morning *Dawn Patrol*. He should be someone for whom the pay-as-you-go approach allowed by plans-built airplanes is a material advantage over the hefty up-front costs of kits. A half-century after Bud Evans put pencil to paper, such builders probably still exist. In fact, continued economic recession likely makes such builders more numerous than they would be in good times. For those builders, the Volksplane VP-1 remains a proven and credible option. But it is, admittedly, a great option only within a very small niche.



**Ben, enjoying the fruits of his labor, boring holes in the sky with his Evans Volksplane VP-1, NX903BB**

Well, friends, let's call it a day. We've discussed why one might want to build a VP-1, and in the accompanying sidebars I've explained why I myself chose to build one. In future issues, I'll discuss the construction process and offer some hints that I flatter myself to think might prove useful to some of you. And this being a magazine about engines rather than airplanes, I promise you some engine talk next time.

But until then: chock 'em, chain 'em, and all loose tales to the catwalk.

For more info on the Evans Volksplane VP-1, visit: [www.evansair.com](http://www.evansair.com)

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# Why The Volksplane?



### B. W.'s Volksplane story

So, why did I pick a Volksplane? As builders are often enthusiastic cheerleaders for the planes they built, you may be surprised by my indifferent attitude towards it. I am certainly proud of my project, and I get a huge kick out of flying it. For that matter, I even get a huge kick out of just seeing the engine cough to life with one swing of the prop! But I'm realistic enough about the VP's design to understand its limited utility, and as a pilot who enjoys putting his airplanes to work, I definitely wish I could do more with the Volksplane.

So you're probably wondering why didn't I follow my own advice, and ask myself what was my mission? Well, here's the story...

When I decided to build, I was a lieutenant on active duty with the United States Navy. I was privileged to have my Uncle Sam footing the bill for 300 hours a year in F-18s and T-34s, so I didn't *need* an airplane to get my fix. But I wanted something I could call my own. I wanted something cheap that could get my feet off the ground on the weekends. Having wanted to build an airplane from scratch since I was seven years old, I decided the time was ripe. I was stationed on the Left Coast, where airports are plentiful and an aircraft's range was of little consequence. And, since I could never be sure I'd finish the airplane before I was sent to sea again, I wanted an airplane with a minimal initial investment, one that I could pay for as I built it.

My performance requirements were virtually nonexistent. Just about anything that flew would be fine by me. Range was of little consequence; I could get a \$100 hamburger at any number of fields within easy reach. And the desire to pay-as-I-went ruled out complete kits. Certainly I could buy partial kits (like the empennage kits commonly offered as starters) but I was put off by the long lead times required for the remainder. Plans-building allowed me to buy inexpensive plans, buy my materials as I needed them, and

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The author's Volksplane, enjoying a moment in the sun under New Mexico's big sky.

**Continued from page 13** (if necessary) shelve the project when I was ordered to sea again; I could always pick up again where I left off.

A lifelong gearhead, I had no concerns about building my own engine. And in all other parameters the Volksplane seemed ideal. The plans are still available, for under \$65, from both Aircraft Spruce and Bud Evans' heirs, who maintain his website [www.evansair.com](http://www.evansair.com). The VP-1 promised low construction cost, simple construction (perhaps not the simplest available, but the simplest available *at modest cost*), and easy-to-follow plans. I could simply build what the drawing on one page showed, put it away while I built the next page, and assemble all the pieces when the time came.

Well, as happens to far too many homebuilders, life intervened— I was ordered to sea. I had managed to get the airplane roughly two-thirds complete in about 600 hours of nights and weekends, spread out over 18 months. But there the project languished. Upon my return I was ordered to overseas shore duty for five months, to await my release from active duty. Then came a new job in a new city, a divorce, a layoff, the whole nine yards.

And then six years later, the ideal opportunity to finish the airplane ironically came when I, as a US Navy Reservist (you won't believe this...) was ordered back to active duty for a year! It sounds ridiculous, but it was shore duty with gentlemanly hours that afforded me the time to complete my project. Haunted by my unfinished business, I resolved to complete and *FLY* the completed Volksplane back home, rather than trailer home a project. But by then, times had changed. I finished an

airplane with no appreciable cross-country range, 700 miles from my home— and I needed to deliver it. When I began the project, home was at sea level in California, within 30 minutes' flight time of a dozen good airport cafes. By the time I finished I lived a mile high in Albuquerque. With only two exceptions, the airports within range of my home base are either towered airports (which somewhat dull the enjoyment of flying an open-cockpit airplane with no radio) or dirt strips devoid of any reasons for wanting to fly there. My mission now, whether I like it or not, is merely to bore holes in the sky within range of my home base.

The Volksplane was the perfect project for the parameters I wanted— *when I chose to build it*. That my mission changed in the nine years it took me to finish it makes me somewhat less than enthusiastic about owning a Volksplane— hence my ambivalent, pros-and-cons attitude towards it. But you should not mistake that coolness as a critique of the airframe itself, which still is *perfect* for the mission I originally chose it for. Within an admittedly small niche, the Volksplane, half a century after Bud Evans broke out his slide rule, remains the best choice.

The moral of my story, if indeed such an obvious lesson could be considered a "moral," is to make the best possible choice with the information you have at hand. But the art of homebuilding an experimental aircraft takes a long time for most practitioners, so your design parameters may change during the time it takes you to build your craft. If it's at all possible to guess at what you will need or want several years down the road, use those parameters when choosing a design. Then tell all of the rest of us your secret!