experimental aircraft association

THE LEADING EDGE

NEWSLETTER OF MUROC EAA CHAPTER 1000

Voted to Top Ten Newsletters, 1997, 1998 McKillop Award Competition

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http://www.eaa1000.av.org *November 2004*

Chapter 1000 meets monthly on the third Tuesday of the month in the USAF Test Pilot School Scobee Auditorium, Edwards AFB, CA at 1700 or 5:00 PM, whichever you prefer. Any changes of meeting venue will be announced in the newsletter. Offer void where prohibited. Your mileage may vary. Open to military and civilian alike.

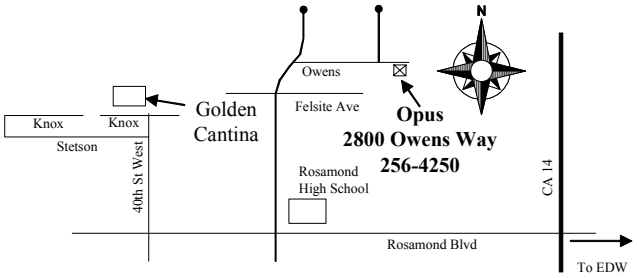
This Month's Meeting:

The Vice Kommandant Orders The *Project Police* on Maneuvers

Tuesday, 16 November 2004
1700 hrs (5:00 PM Civilian Time)
Vince Sei's Secret Rocket Factory
Rosamond, CA

Well, it's meeting time again sports fans. As you know your loyal **Vice Kommandant** usually has many program irons in the fire so as to draw on any of them for the current months meeting. As this month opened up, I was just returning from TDY to Dallas Texas and arrived back in the nick of time. I stoked the fires again and again and found that although the efforts were there, and the intentions were good, all of the irons had grown cold for this month except for one. So after a lot of head scratching and reviews of meetings past, I noticed that we have been remiss in one of our chief responsibilities, that being the mandatory ***Project Police*** Raid for November.

This month we are going to surprise **Vince Sei**. (*...yep, he'll be real surprised, assuming he forgets Knife's call and doesn't read this month's newsletter...hopefully he'll remember to go home that day...*) Vince has been diligently at work on a fast build Rocket and he's been making incredible progress. So it seems only fair that the ***Project Police*** show up and review his progress. Word has it that the Rocket is in the final stages of paint and electrical wiring. If you don't know where Vince lives see the handy dandy map attached. After the inspection the **Kommandant** will decide where the ranks will dine. It should be an interesting evening. We will see if **Vince** has the **coveted chocolate chip cookies** on hand for this, the last of this year's ***Project Police*** Raids.



As a special bonus, come to the meeting and try out the prototype **EUCLID**. Don't know what that is? Keep reading this newsletter...

- George "Knife" Gennuso
Vice Kommandant

News Non-Flash! Dave Vanhoy Wins At Copperstate!

Last month, you read in this space that **Dave Vanhoy** had won an award at the **Copperstate Regional Fly-In**. We have since found out the award was **1st Place, Custom Built Composite**. Yes, it wasn't Grand Champion, but still pretty impressive when you consider that **Dave** did **absolutely nothing** to prepare for judging! In the process, Dave found out some pointers about how to present the airplane better in the future.

As reported last month, Dave spent quite a bit of time talking with **Jack Cox**, presumably for an article to be published sometime in the future. That's Dave with Jack on the next page. After Dave and Jack came out of the

tent, several of us took that opportunity to talk with the man who has written so much of what we have read.

And for those of you keeping track, that's another award-winning **Mike Rosales** paint job.

Congratulations to **Dave** and **Hojo**!

Last Month's Meeting

EAA Chapter 1000
Scobee Auditorium
USAF Test Pilot School, Edwards AFB CA
19 October 2004
Gary Aldrich, Presiding

(*Note to the membership—Evil Editor Zurg was not pleased with Secretary "Cobra"'s performance this month. We received this pathetic plea for mercy here at* ***PPHQ*** *earlier this month:*

"Please note the time this is being sent (0433). I am literally walking out the door on my way to Maui. Through absolute negligence, I did not get the meeting report prepared in time for Zurg's call (anticipated next Friday). Perhaps one of you could write it? My sincere regrets and apologies. I was actually looking forward to doing this one. There's a fresh can of Macadamia nuts in this for the first guy to step forward.

Aloha.

KT"

We here at ***PPHQ*** *did some checking, and it appears that they actually do have computers and Internet access in Hawaii now. Therefore, we cannot understand the reason for this most weak of excuses. Therefore,* ***Evil Editor Zurg*** *has determined that Secretary "Cobra" will receive the standard punishment for such effrontery—public humiliation and retraining and retention in his position until he learns to do it correctly. At that point, he will not be released from his position, because we don't want to bother training someone else.*)

Once again this month, the assembled ***Project Police*** were enthralled by the tales of **Bill "Flaps" Flanagan**. Bill had been with us back in January when he told us more than we ever knew about Northrop flying wings. It was a huge success, and everybody enjoyed the presentation.

Somewhere along the line, **Schmoozemeister Knife** found out that **Flaps** had another presentation in the can...er...on the hard drive and ready for presenting. It seems that besides being an authority on flying wings, he was also the Test RSO for the digital upgrades to the SR-71 back in the early '80s. So this month he was talking to us about what it's like to fly at Mach 3+.

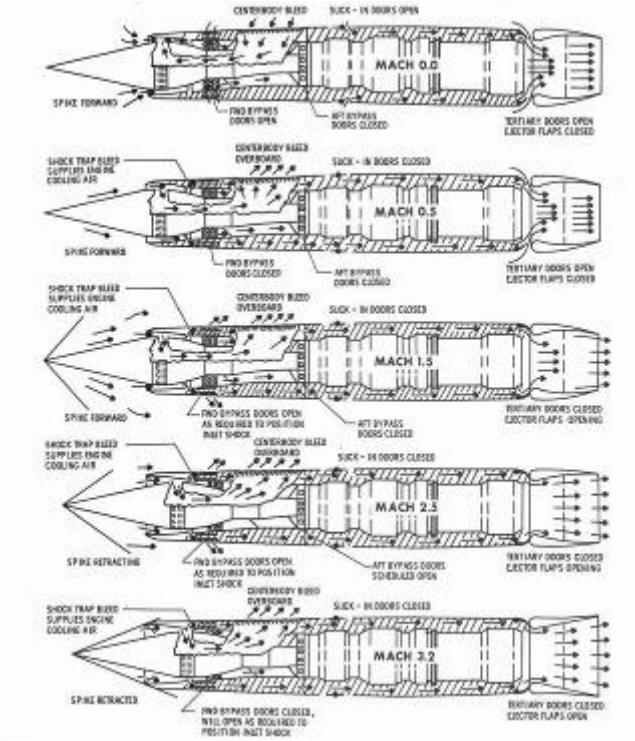
Yes, the SR-71 is one of those popular airplanes that you've seen in all of the books and on all of the TV shows, so you think you know a lot about it. But the ***Project Police*** quickly learned that you don't argue about what is right and what is not with the man who's actually flown the airplane. Once again, it turned out that many things we thought were true weren't.

To wit:

The performance capabilities of the aircraft were summed up by the quote on the first slide: "The faster you go, the faster you can go—IF you can stand the heat". It seems the limiting factor is not the thrust of the engines, but the temperature the skin could handle (typically 600 to 1000° F), the pressure at the compressor face, and the ability of the inlet to capture air. At Mach 3.2, the design point, everything is optimized. The inlet cone has the shock wave right on the lip of the inlet, and has the throat of the inlet choked down as much as possible (at the limit of its travel). Go much faster and the pressure at the compressor face grows to where it is greater than that coming in the inlet, and the air goes backwards through the inlet—it burps, or in the propulsion engineer's parlance, the inlet unstarts. This results in an immediate loss of thrust on that side, since the air is going out of the inlet instead of into the engine. In general, this is not a problem for directional stability, because the resulting sideslip (very large) screws up the flow into the other inlet and causes it to do a sympathetic unstart. At that point, you're a Mach 3.2 glider pilot. Flaps did confirm that the best way to figure out which engine unstarted first was to remember which side of the canopy your helmet schwacked first.

So you just restart the engine, right? Sure, assuming you have some TEB (TriEthylBorane) left. This is lovely stuff that ignites spontaneously upon contact with the air. The JP-7 fuel is so uninterested in burning that it can only be started by using a shot of TEB. The TEB tank for each engine holds enough TEB for 16 shots, and you need one each time you light the core burner or the afterburner.

Therefore, it doesn't matter how many times you can hit the tanker, when you're out of TEB, you'd better be looking for a place to land. The throttles are equipped with a counter of how many shots you've used (or was it have left), and Flaps said that he and his pilots had managed to confirm that it was just a counter, not a volume measurement. There was probably a story there too. He also told the story of a double unstart and flying in a supersonic glider while the pilot tried to restart the engine. Unfortunately, the pilot was trying to restart the left engine, which unbeknownst to him had a cracked, and thus empty, TEB tank. As Flaps was looking up at Mount Whitney and looking for the ejection handles, the pilot finally decided to try starting the right engine, which started immediately.



Engine start at the home 'drome (Beall AFB) was done with compressed air from a huge air delivery system built into the hangars. On the road, they would either use four -60 air carts manifolded together for start, or a start cart that used 2 Chevy 427 CID Racing Hemis to drive a shaft that mechanically spun the engine up to 1000 RPM.

Because of the high temperatures in the fuel tanks (the fuel was the primary heat sink), nitrogen was carried to fill the space that the fuel didn't (tank inerting). You may also have heard about the fuel tank leaks. No, Kelly Johnson didn't intend it that way. It seems (pun intended) that they never found a sealant that could stand up to the tank expansion in the presence of 300 degree fuel. Whenever the leaks got too bad, the bird went into the shop for resealing, which was a very labor intensive manual effort.

Did you hear the one about how the tanks seal themselves when they expand? Nope. Not true. They're still leakin' away at even at Mach 3.2. It's just that when your fuel flow is about 60,000 lb/hr, you're just not real interested in a 10 lb/hr leak.

The inlet system alone is probably worth a semester's study in propulsion class, with various doors opening and closing at various times to manage the air flow.

The J-58 has a similar history to the J-85 in the T-38. It seems both of them were originally developed to power cruise missiles. The J-85 powered the Quail decoy. The cruise missile that the J-58 was to power was cancelled. I'd hate to see how big of a mammoth moose that would have been!

Maybe you heard the one about how the J-58 being a turbo-ramjet. That is, at high speed the air is diverted around the engine core, the engine core is shut down, and the engine operates as a ramjet. Not exactly. The core always runs. Part of the confusion is that at high speed several large tubes duct air from the compressor around the burner and directly to the turbine for cooling, where "cooling" here means ducting hot air into really, really hot air to keep the temperature down to something less ridiculous.

The afterburner is unique in that it is built to run continuously. It will keep running as long as there is fuel to feed it. You probably don't realize that there is a limit on how long most afterburners can run, because if you ran them that long the F-16/F-15/F-18/T-38/whatever wouldn't have enough fuel left to accomplish any sort of mission. This required gold plating on oil coolers, lines, etc. because that was the only way to radiate the heat away fast

enough (gold has better thermal characteristics than just about anything, and is necessary regardless of the cost).

Cruise altitude was above 85,000 feet, and while the cabin was pressurized, it was only pressurized to 28,000 feet. Thus, pressure suit wear was mandatory. The pressure suit was supplied with pure oxygen at the pressure equal to 28,000 feet, which is a higher partial pressure of oxygen than sea level. Since the pressures match, the suit doesn't "inflate", which means it's just like flying an airplane in a hockey suit with hockey gloves instead of being in a balloon with hockey gloves. The worst part is that the humidity is 0% (qualitatively: dry). That means everything dries out—your throat, your eyes, your nose—and you can't rub your eyes or scratch your nose through the visor! There is a small hole that you can stuff a straw to drink water or eat "space food in a tube".

The aircraft is built extremely light, if you call 60,000 lb empty weight "light". But it is when you consider it carries 80,000 lbs of fuel and 2,000 lbs of sensors. Because it is so light, it is limited to about 30 degree banks and about 2.5 g load factor.

The tires were a bit of a design stretch, being inflated with nitrogen to 450 psi and having a 210 knot (242 mph) lift off speed. Then there was that cool silver coating to attempt to radiate excess heat. Unlike Concorde ops, it was standard procedure to sweep the runway for debris *before* takeoff, as a blowout was potentially catastrophic.

Flaps told the story of how since the SR-71 remained operational far longer than initially expected, the USAF used up its supply of tires. Of course, the old manufacturer was no longer available, so the USAF sent the specs to various tire manufacturers. Once the new tires were made, they had to be certified. This meant that Flaps and his pilot were doing takeoffs at max gross weight, much heavier than normal. The resulting takeoff from Palmdale put the SR-71 at about 100 feet over Sierra Highway in full blower at a decibel level that would be noticed in any car, no matter how big of a stereo you had. In fact, they had to have the Sheriff stop traffic on Sierra Highway so they wouldn't cause accidents. This soon lead to people congregating there for the specific purpose of watching/hearing/feeling the takeoffs.

The acceleration to Mach 3.2 in full A/B takes about 20 minutes and covers about 250 nautical miles. That makes the SR-71 capable of accelerating for longer than any other vehicle at max power—the Space Shuttle only accelerates for about 8 minutes. Even though you're at Mach 3.2, your calibrated airspeed is less than 350 knots. Your true airspeed is 1820 knots, which leads to turn radii that require "3/4 of the state of Colorado" to turn around.

Even with all of the cooling in the cabin (cabin air comes in at -40°, yes, that's 40 below), it still gets hot in there. The window glass is over 300 degrees. In the U-2, the pilot has a heater for his tube food. In the SR-71, the crew just holds the food against the window for a minute or two.

The cruise portion only lasts about 45-50 minutes, after which descent is required, either for landing or to refuel from a tanker. While refueling is difficult, sometimes requiring a single afterburner as the tanks fill and the plane gets heavy, the real challenge is just finding the tanker without being hundreds of miles in front of, behind, or to the side of the tanker.

The approach is at 175 KCAS, with landing at 155 KCAS. The lack of flaps leads to very high deck angles, just like with the Concorde or the F-102/106. Single engine approaches were exceptionally difficult, requiring full rudder and 5-10 degrees of bank just to maintain straight flight. The drag chute was critical for stopping—if it failed (melted due to door problems), you could pretty much count on having hot brakes. At some point the wizards at NASA saw the drag chute on the SR-71 and that led to the retrofit of a drag chute on the Space Shuttle.

And so you'll be very impressed with how well I paid attention and how good my memory is, I won't tell you that I have Flaps' presentation open on the screen next to this one.

- Russ "Erbman" Erb
Psuedo-Secretary

Kommandant's Korner

Everybody thinks that flying in Southern California is easier and safer than almost anywhere. We've got mild weather, a plethora of airfields, lots of ATC help...Unfortunately, two accidents this past week point to the dangers of taking our flying environment for granted.

The first involves a beautifully maintained and equipped Cessna 182 based at Fox Airfield. Some of you reading this may know the pilot. He and three friends departed WJF for Harris Ranch (3O8), where they had lunch reservations. The weather was reported as VMC. However, in talking with Larry Barrett, owner of Mountain Valley Airport in Tehachapi, there were some "mountain obscurations" in the local mountains...a condition quite common in the fall and winter here. It's unknown whether these conditions existed on the Skylane's route of flight. At any rate, the pilot and his friends never made it back to Fox Airfield, coming to rest, instead, on the face of a mountain about 28 miles west of the airport. We'll probably never know the cause of this tragedy, except for the NTSB's cryptic "controlled-flight-into-terrain" categorization.

Those of us that have flown in and around our local mountains have all seen days when they presented an obstacle to our flight plans by trapping moisture or serving as a venturi to generate vicious turbulence. The weather on both sides of the range can be "CAVU", leading to strong pressures to attempt the flight. So, take a heavily loaded airplane, add in some maneuvers to stay out of the clouds, and put it all on the lee side of a mountain peak...well, you do the math. I'm not suggesting this was the scenario in this accident, but it's worth considering to illustrate how few "links" it really takes to complete the accident chain.

Personally, I give the mountain peaks a wide berth (vertically, laterally, or both) any time the wind is blowing, whether their tops are shrouded in mist or not. I've seen my VSI pegged against the bottom of the case with the airplane producing maximum power and flying at the best angle of climb. About the only way to fix that situation is, as the glider pilots know, to move your aircraft out of the sink. Experts in mountain flying always caution pilots to avoid places like the leeward side of mountains and to always have an "escape route" that doesn't involve the use of power to get away from the downdraft.

The other accident is so recent that the preliminary NTSB report has yet to hit the website. This accident involved a 1977 Cessna 210 and a CFI-rated pilot. The local media reported that the aircraft struck a house while on final approach to Zamperini Field in Torrance. Video shot from a news helicopter showed the Centurion lying, inverted, in the back yard of a house not 1/2 mile from the approach end of the runway. The media further reported that the pilot had told the tower, after receiving permission to land, that he was low on fuel. A small fire ensued after the aircraft struck the house, but was quickly extinguished. We won't know the cause for this accident for some time, though we have a better chance of getting the details as the pilot survived the crash and is currently fighting for his life in the hospital.

If this turns out to be another "fuel-starvation" accident it will illustrate the single, saddest link in the accident chain...poor pilot judgment. Certainly, it's too early to blame the injured pilot in this case; but the NTSB accident database is full of similar scenarios where pilots, for whatever reason, flew a perfectly good airplane to its destruction when a few gallons of fuel would have saved the day. Despite the fact that flight instructors have preached "there is no excuse for running out of fuel" to students for a hundred years, pilots continue to buffoon their fuel planning or simply the management of the available fuel on the airplane.

So, my message for this month? Treat our flying environment with respect...especially at this time of year when winter weather patterns can cause treacherous winds and decreased visibility. And...please, please, please do whatever it takes to ensure you land with reasonable (and legal) fuel reserves.

End of sermon....

Fly safe, check six, and the weather....and the fuel gauges....and...

- Gary Aldrich
Kommanding

Introducing The EUCLID (Erbman's Ultra-Cheap Lighted Inspection Device)

Recently the Bearhawk prop arrived, so it was finally time to pull the metal plug out of the crankshaft so that the prop governor could actually govern the prop (the crankshaft is plugged when using a fixed pitch prop to keep all of the oil from pumping out into the spinner). After doing this, I thought maybe I should inspect the inside of the crankshaft to see if any grunge was left there from the last time the engine was run many years ago (yep, there was).

While doing this, I ran into that age old problem—it's tough to see down a deep hole when the flashlight you're using is about three times bigger in diameter than the hole and blocks your vision. What would be good would be a small light bulb you could stuff down the hole, which wouldn't get in the way of what you're trying to see.

This made me think of my gooseneck LED lights that I had made earlier. Some of you saw those at our last ***Project Police*** show-and-tell. I tried one, and it worked great, except for having to drag the power supply and power cord all around.

Then I was struck with an inspiration. Fortunately, it didn't hurt too much. Why not make a similar device on a longer wire with a battery pack at the other end? It would only take two batteries to power the LED. Of course, like many great inspirations, this one came to me about 10 minutes before I had to leave to go somewhere, so I couldn't act on it right away.

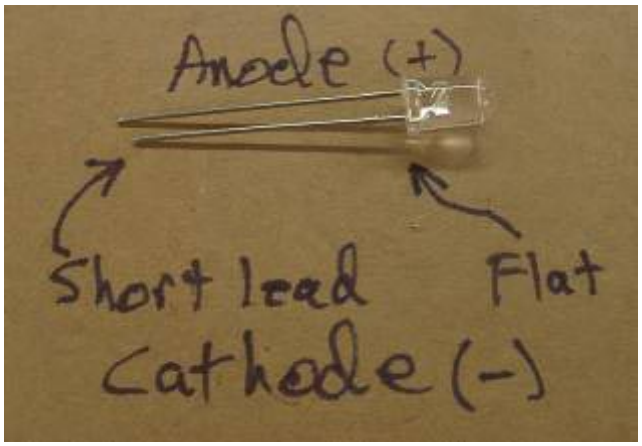
What I ended up with the next day was a really cool inspection flashlight at a dirt cheap price. It cost me less than a post-meeting dinner at BK. Then again, I already had most of the parts on hand. It took all of about an hour to assemble, not counting the epoxy cure time.

Even if you don't have parts on hand, it still isn't going to cost you very much, and certainly way less than the **Kommandant** spent on the last flashlight he put in the **Fightin' Skywagon II**.

Part	Source	Part Number	Price
Bright White LED	Mouser	604-L7114QWCD	1.96
SPST Toggle Switch	Radio Shack	275-0624	2.99
2 AAA Battery Holder	Radio Shack	270-0398	0.99
1/16" Heat Shrink Tubing	Mouser	5174-11165	0.63
1/8" Heat Shrink Tubing	Mouser	5174-1185	0.72
1/4" Heat Shrink Tubing	Mouser	5174-1145	1.09
3/8" Heat Shrink Tubing	Mouser	5174-1385	1.22
14 ga solid house wire (about 2 feet)	Stock pile or Home Depot	N/A	cheap
22 ga stranded wire (about 2 feet)	Stock pile or Home Depot	N/A	cheap
Solder	Stock pile or Radio Shack	N/A	cheap
5 min epoxy	Home Depot	N/A	cheap
2 AAA batteries	Lots of places	N/A	cheap
Total			**9.60+**

On the previous page is the parts list of what you'll need. You can get to Mouser at http://www.mouser.com . This is the list of what I used—as you will see, there is a lot of room for customization or modification to suit the parts you have laying around.

The construction process starts with the LED. Because the LED is a diode, the current will only flow through it one direction. You'll want to get it hooked up right or you'll be figuring out how to put the batteries in the battery holder backwards.



Shown above (before) is a picture that even I can understand. This is the LED listed in the parts list. The cathode is identified two ways. As it comes out of the bag, the cathode is shorter than the anode. Additionally, the cathode side of the plastic lens has a flat spot on it. If you're like me and can't remember what a cathode is, it's the side that connects to the negative (-) side of the power source. I guess it's a good thing I became an Aero Engineer instead of an EE.

Next, cut the cathode shorter as shown in the picture below. I've found the easiest way to hold the LED while soldering wires on is to slide it over the edge of a piece of corrugated cardboard as shown. Strip about 1/4" off of the 22 ga stranded wire. Slip a piece of 1/16" heat shrink tubing over the wire and lay the wire next to the LED lead. I used Tefzel wire, which is way more expensive than needed for this application, but I happened to have some on hand, so the price was right.

Solder the wire to the LED as shown below.

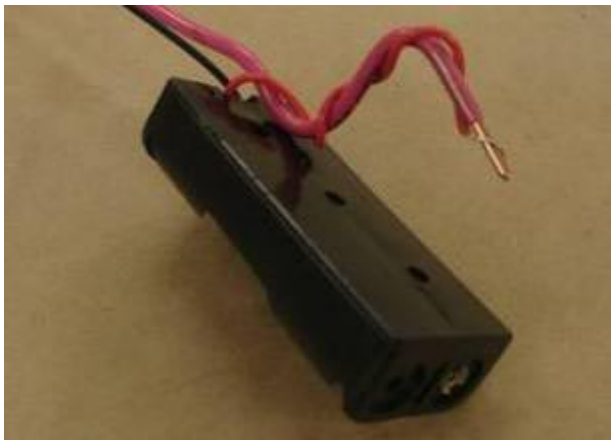
Slide the heat shrink tubing back up over the solder joint and shrink it with a hot air gun.

Take the piece of 14 ga solid house wire (the gauge is not critical—use what is available and sufficiently stiff) and cut it to the desired length, plus some extra to epoxy to the battery holder. Strip as shown below. Note the length and positioning of the stripped portion. This will be used to hold the LED in place. Wrap the anode (the terminal that you haven't used yet) of the LED around the 14 ga wire as shown below.

Solder the anode to the 14 ga wire.

At the other end of the 14 ga wire, strip the end and bend it to a nominal "Z" shape. This shape will increase the torsional strength when it is epoxied to the battery box later. Wrap the red (positive) wire from the battery box around the 14 ga wire. Cut to length and strip the end as shown.

I used a 2-AAA battery holder because two batteries would give me 3 volts, sufficient to drive the LED, even though the LED could take half a volt more. The AAA size batteries have sufficient life since the current drain of the LED is extremely small, only 20 milliamps. This also minimized the weight while still using a readily available battery size. One other possible factor in my decision was that Radio Shack didn't have the 2-AA battery holder I was looking for when I went in there.



Solder the red battery holder wire to the 14 ga wire.

Optionally you can shrink a piece of 1/8" heat shrink over the joint, or just cover it with epoxy later. If you use heat shrink, be careful heating it, as the cheap insulation on the battery holder wire is not very tolerant of heat.

Cut the black wire from the battery holder as shown. Slip a piece of 1/16" heat shrink over the wire. Strip, attach, and solder the black wire to one of the terminals on the SPST switch. Be careful you don't shrink the heat shrink by accident while soldering the joint.

Slip another piece of 1/16" heat shrink over the 22 ga wire. Twist the 22 ga wire lightly around the 14 ga wire. Cut to length, strip, attach, and solder the 22 ga wire to the other terminal of the SPST switch as shown. Slide both pieces of heat shrink over their respective solder joints and shrink into place.

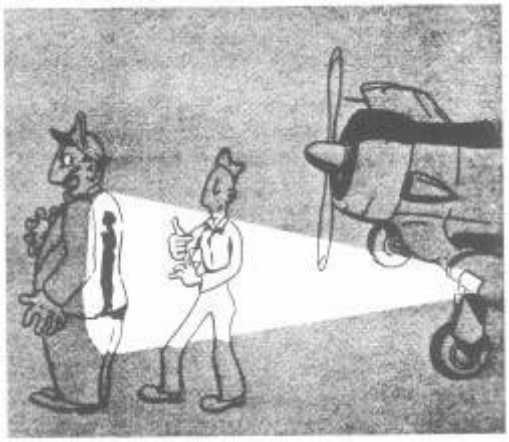
Of course, you can use any switch you want. I chose this one because it was very small.

Slip a piece of 3/8" heat shrink over the wires and over the switch assembly as shown below.

Shrink the heat shrink over the switch to hold the switch in place.

Slip several pieces of 1/4" heat shrink over the wire assembly. The last piece is shrunk over the LED as shown to hold the LED in place. The other pieces are shrunk to hold the 22 ga wire in place on the 14 ga wire.

If necessary, trim the end of the heat shrink tube with a razor knife to expose the end of the LED.



Prep the back of the battery holder by roughing it up with sandpaper. This will give the epoxy something to hold on to, and will impress the epoxy guru **Knife** with your building prowess. Mix the 5 minute epoxy to a nice gorilla-snot consistency and apply to hold the 14 ga wire in place on the back of the battery holder.

When the epoxy cures, you should have a nice EUCLID as shown below.

Insert the appropriate batteries, flip the switch, and hopefully the LED will light up. You shouldn't have to worry about letting the smoke out.

Now you can use your EUCLID to look inside those dark inspection holes. You can bend the wire to put the light wherever you need it. Use it with an inspection mirror to see around the corner into those inspection holes.

I built the prototype EUCLID with a white LED. You can use any color you can find. Here are my recommended choices for high brightness LEDs in red or green. Note that if you use the red LED, you'll want to put a 33Ω resistor in series with the LED, since the red LED has a lower forward voltage. Simply attach one end of the resistor to the switch and the other end of the resistor to the 22 ga wire.

Part	Source	Part Number	Price
Bright Red LED	Mouser	604-L7113SECH	0.82
Bright Green LED	Mouser	604-L7143VGC/H	2.87

If you want to use a DC power source of a higher voltage than 3 volts, you can calculate the size of the dropping resistor required by

$$\text{Resistance} = \frac{\text{Input Voltage} - \text{Forward Voltage}}{\text{Forward Current}}$$

Remember that 20 milliamps goes into the equation as 0.020 amps. Of course, you'll get a resistance value that isn't available in a common resistor. Just use the closest one, preferably one with slightly higher resistance. Here are the resistor values for the recommended LEDs for input voltages of 9 and 12 volts.

Color	Forward Voltage	Forward Current	Resistor for 9V input	Resistor for 12V input
White	3.5 V	20 mA	270 Ω	470 Ω
Red	2.4 V	20 mA	330 Ω	510 Ω
Green	3.7 V	20 mA	270 Ω	470 Ω

Of course, you can also use a low voltage AC power source as well. The LED is self rectifying, lighting on half of every cycle.

- Russ Erb

An Ed Heineman Test

The picture shows me doing "an Ed Heineman test" on an engine inlet screen on a Navy Douglas A-3 as the crew chief looks on. I did the aerodynamic design and Joe ---- at DynCorp did the layout and most of the detail design. (I wish I could remember his last name. He was an excellent designer.) (*was it Joe Bagodonuts? He's very popular around here...*)

The objective was to design an engine inlet FOD screen that was less that 65 pounds and could be installed by one person. Also the screen could not restrict the engine airflow during ground runs at maximum thrust.

The previous inlet screen design was over 100 pounds and required 2 persons to lift and install. It also blocked the engine inlet airflow so that the engine could not attain flight idle, let alone be able to do a maximum engine thrust test.

The screen in the picture weighed 63 pounds and could be lifted and installed by one man (6-foot 5). The height of the engine off the ground and the bulk of the screen made it very difficult for one man to install it. With practice and in an emergency one man could probably do it.

When the ground run was made by the crew chief, the engine gave no drop in maximum thrust at maximum settings. The engine never "saw" the screen.

The "Ed Heineman test" is described in his autobiography. Ed Heineman was the Chief Engineer of Douglas Aircraft Military Division and is probably best known for his A-4 "Heineman's Hot Rod." Ed was also

chief designer of the A-3, the U.S. Navy's first nuclear bomber. (He worked for Donald Douglas, Sr, for 29 years. When Donald, Jr, took over the company, he fired Ed.)

Ed described a designer who was very proud of his design for a light-weight ladder for a pilot to climb into the cockpit. Ed asked if it would work and then proceeded to attempt to climb on the ladder. The ladder crumpled.

The test on the screen was to determine if the screen would stay on the nacelle during engine run up. After I pulled myself up, the crew chief did likewise.

We had 30 screens built and delivered. Within a year all Navy A-3's were retired from service. I doubt if any of the screens were used operationally.

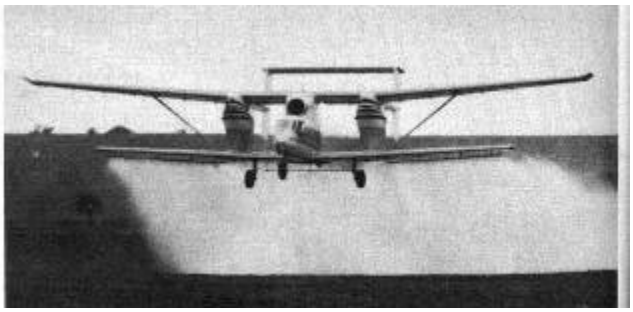
- Lee H. Erb
EAA Chapter 1000 Det. 5, Arlington, TX

But What Else Happened At Copperstate?

Well, we were going to tell you, but we ran out of room and time this month. Keep watching...er...reading and maybe we'll get it in next month.

Project Police Aircraft Spotters Quiz

So **Evil Editor Zurg** had you stumped this time, eh? He likes it when that happens. To review, here are the pictures you couldn't figure out:



Amazingly, two ***PPOs*** were able to come up with the correct answer:

"The aircraft pictured is the **PZL-Mielec M-15** (Ref Janes 77-78). It is a Polish turbofan engined agricultural aircraft. The two outboard structures between the wings are the hoppers. It first flew on 30 May 1973. It can carry about 5000 lb of chemical and normally operates at a blistering jet powered 89 knots! When it initially was developed there was some concern in the US over its true intent (could it be a chemical or biological weapon delivery aircraft). – **Lathan Collins**"

"Page 143 of Darrol Stinton's "The Design of The Aeroplane" has a photograph of the Polish PZL M-15 Belphegor Agricultural Jet Biplane. On page 594 an analysis of agricultural designs explains the desire to put the pesticide tanks in the center of lift and away from the cabin in a vertical layout, thus the biplane and the use of the lower plane as a streamlined spraybar.—**Francis X. Gentile**, wasting valuable time knowing obscure things about airplanes"

Randy Kelly was "close but no cigar" with his response "Excellent question as to the "airplane of the month". I've seen that picture before, but I don't remember where (Av Leak? Popular Mechanics?)and ain't got a clue what it is. (But looks like something either the Russians or the Czechs fabricated?)I am wondering if it's the only jet I've ever seen with an engine on it's back where power changes are neither stabilizing or destabilizing. Looking forward to the answer."

These pictures were submitted by **Zurg's** Researcher of Odd Things **Robert Erb**. He found them in the February 1979 issue of Popular Mechanics, where the story read "You knew all along that it was a Polish crop-duster, right? Why else would anyone build a jet-propelled biplane with a twin boom tail. But seriously, folks, the Poles have high hopes for the M-15 jet crop-duster, with reportedly 3000 of them being built on order for the U.S.S.R. It's powered by a small, Soviet-built AI-25 turbofan engine that develops 3300 pounds of thrust. The two hoppers outside the fuselage between the wings can carry up to 70 percent of the aircraft's empty weight of 6812 pounds in liquid, powder or granules. this high load-carrying advantage, plus benefits in short-field takeoff/landing performance, an almost 200-foot swath of chemical distribution per pass and low operating speed (stalls at 67 mph) add up to no joke for U.S.-built agricultural aircraft competing for a world market."

This month, **Evil Editor Zurg** is throwing you another loop. Instead of identifying an aircraft from a picture, your task is to answer the question submitted by ***PPO* Lee Erb**:

"Who was the first person to receive a Masters Degree in aviation and aerodynamics in the United States?"

Submit your answer the usual way by sending that information to erbman@pobox.com or to the editor's address seen on the last page of this newsletter. Include any other information you know. Links to web sites with more info are a plus. Next month we'll tell you who (if anyone) was correct.

Web Site Update

As of 7 November 2004, the hit counter stood at **94226**, for a hit rate of about 21 hits/day for the last two months.

Just a reminder that the EAA Chapter 1000 Web Site is hosted courtesy of Quantum Networking Solutions, Inc. You can find out more about Qnet at http://www.qnet.com or at 661-538-2028.

Chapter 1000 Calendar

Nov 16: EAA Chapter 1000 Monthly Meeting, 5:00 p.m., Vince Sei's Secret Rocket Factory, Rosamond CA. (661) 609-0942

Dec 7: EAA Chapter 49 Monthly Meeting (? – check first), 7:30 p.m., General William J. Fox Field, Lancaster, CA. (661) 948-0646

Dec 14: EAA Chapter 1000 Board of Directors Meeting, 5:00 p.m., High Cay, 4431 Knox Ave, Rosamond CA. (661) 609-0942

Dec 21: EAA Chapter 1000 Monthly Meeting (? – check first), 5:00 p.m., Edwards AFB. USAF Test Pilot School, Scobee Auditorium. (661) 609-0942

Jan 4: EAA Chapter 49 Monthly Meeting, 7:30 p.m., General William J. Fox Field, Lancaster, CA. (661) 948-0646

Jan 11: EAA Chapter 1000 Board of Directors Meeting, 5:00 p.m., High Cay, 4431 Knox Ave, Rosamond CA. (661) 609-0942

Jan 18: EAA Chapter 1000 Monthly Meeting, 5:00 p.m., Edwards AFB. USAF Test Pilot School, Scobee Auditorium. (661) 609-0942

Jan 29: EAA Chapter 49 Annual Awards Banquet, AV Inn, Lancaster CA. (661) 948-0646

Feb 1: **NO** EAA Chapter 49 Monthly Meeting

Feb 8: EAA Chapter 1000 Board of Directors Meeting, 5:00 p.m., High Cay, 4431 Knox Ave, Rosamond CA. (661) 609-0942

Feb 15: EAA Chapter 1000 Monthly Meeting, 5:00 p.m., Edwards AFB. USAF Test Pilot School, Scobee Auditorium. (661) 609-0942

Mar 8: EAA Chapter 1000 Board of Directors Meeting, 5:00 p.m., High Cay, 4431 Knox Ave, Rosamond CA. (661) 609-0942

Mar 15: EAA Chapter 1000 Monthly Meeting, 5:00 p.m., Edwards AFB. USAF Test Pilot School, Scobee Auditorium. (661) 609-0942

Apr 19: EAA Chapter 1000 Monthly Meeting, 5:00 p.m., Edwards AFB. USAF Test Pilot School, Scobee Auditorium. (661) 609-0942

May 21: Fourteenth Annual Scotty Horowitz Going Away Fly-In, Rosamond Skypark (L00), Rosamond CA. (661) 256-3806

To join Chapter 1000, send your name, address, EAA number, and $20 dues to: EAA Chapter 1000, Doug Dodson, 4431 Knox Ave, Rosamond CA 93560-6428. Membership in National EAA ($40, 1-800-843-3612) is required.

Contact our officers by e-mail:
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Inputs for the newsletter or any comments can be sent to Russ Erb, 661-256-3806, by e-mail to erbman@pobox.com

*From the **Project Police** legal section: As you probably suspected, contents of The Leading Edge are the viewpoints of the authors. No claim is made and no liability is assumed, expressed or implied as to the technical accuracy or safety of the material presented. The viewpoints expressed are not necessarily those of Chapter 1000 or the Experimental Aircraft Association. **Project Police** reports are printed as they are received, with no attempt made to determine if they contain the minimum daily allowance of truth. So there!*

THE LEADING EDGE
MUROC EAA CHAPTER 1000 NEWSLETTER
C/O Russ Erb
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http://www.eaa1000.av.org

ADDRESS CORRECTION REQUESTED

THIS MONTH'S HIGHLIGHTS:
REGULAR MEETING 16 NOV AT VINCE'S
SR-71: WHAT YOU DIDN'T KNOW
EUCLID INSPECTION DEVICE
AN ED HEINEMAN (STYLE) TEST

EAA™
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