

THE LEADING EDGE

NEWSLETTER OF MUROC EAA CHAPTER 1000

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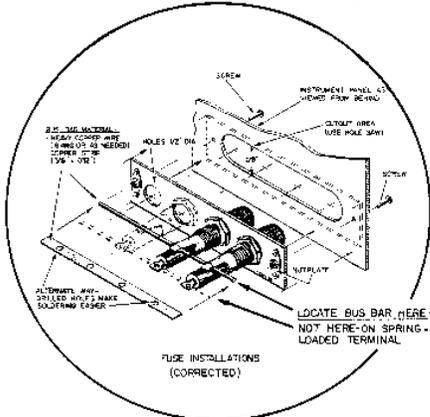
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December 1997

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:



Aircraft Wiring Techniques

Speaker: Charlie Wagner
 Tuesday, 16 December 1997
 1700 hrs (5:00 PM Civilian Time)
 USAF Test Pilot School Auditorium
 Edwards AFB, CA

This month Dipl. Eng.¹ Charles Wagner (aka "Mr. Wizard" or "Sparky") will continue his fascinating discussion of *Zen and the Art of Aircraft Wiring*. If you missed the first installment, study up on the program synopsis in this issue and ask Charlie for copies of his slides. With the proper treatment (punch 3 holes and insert in binder) they could become a valuable homebuilders' bible supplement. Charlie has promised pieces, parts, and assorted touchy-feelies for this meeting to keep the right brain folks amused. Whether your steed has quad-redundant digital flight controls with EFIS, or a beat-up old handheld duct-taped to the dash, you will doubtless benefit from Charlie's 40 years of experience with airborne electrons. See you there...and please come adequately grounded.

¹ Dipl. Eng.: An honored title bestowed on degreed engineers in Germany. A professional title, akin to putting "P.E." behind one's name (see--you even get culture in *The Leading Edge*--you don't get that even in *Pacific Flyer!*)

Chapter 49/1000 Annual EAA Awards Dinner

Now is the time to get your tickets for the first festive event of 1998--the Chapter 49/1000 Annual EAA Awards Dinner. It will be held at the Antelope Valley Inn on 31 January 1998. Come enjoy a buffet dinner, a no host bar, exciting EAA-style camaraderie, and lots of cool door prizes. All of this for just \$20 each! You'll definitely want to bring along your spousal unit or significant other. Social hour will begin at 1800, followed by dinner at 1900. **You won't want to miss it!** Look for tickets at the meeting.



Dues Due Dudes!

Hey you! Yea, you there!
 Reading the Chapter 1000
 Newsletter--Bringa you
 Checkabook to the
 meeting and pay up
 your \$15 for 1998 dues!
 If you can't make it
 to the meeting, then
 mail your \$15 check
 to:



EAA Chapter 1000 Treasurer
 Mike Meyer
 6809 Spaatz Dr
 Edwards CA 93523

Don't let your membership lapse in the best chapter in EAA, or risk missing a single issue of *The Leading Edge!* If you do, don't be surprised if some *Project Police* heavies show up at your door, or if your name is published here as a **DUES DELINQUENT!**

We know who you are!

Last Month's Meeting

EAA Chapter 1000

Scobee Auditorium, Test Pilot School, Edwards AFB
1700; 18 November, 1997

Gary Aldrich, presiding

After a rather low-key schmooze session, the meeting was called to order on or about 5:30.

Old Business

Jack Roth has been paid for the trailer he bought for the purpose of transporting the Chapter 1000 booth.

New Business

None.

Announcements

Name badges for recent new members are available. Contact **Gary Aldrich** if you haven't yet received yours.

The comment period is almost over for the NPRM which will allow the FCC to overrule local governments' zoning of tall structures.

The *Seventh Annual Scotty Horowitz Going Away Fly-In* is scheduled for May 16, 1998 at Rosamond Skypark.

Chapter 1000 is in need of **Technical Counselors**. If you are an A&P or AI, or have built your own aircraft, you qualify for this very important job of assisting your fellow **PPTAF** Officers in the construction of additional *Aerial Assault Vehicles*. (Besides that, you get a nifty shoulder patch.)

Chapter 1000 has been encouraged by **Bob Mackey** of EAA Headquarters to get a "Flying Start" program underway. The program is similar to the "Project Pilot" program sponsored by the AOPA.

A **Thank You** from **Claire Saxon** has been received in response to our donation to the Vern Saxon Memorial fund.

The manufacturer of the **PPTAF** T-shirts will produce new shirts only with the permission of the **PPUCO** (*Project Police Uniform Control Officer*), **Ron Applegate**.

Program:

The program on Aircraft Wiring was presented by the one and only, and our very own, **Charlie Wagner**. Although Charlie's RV-6A is his first total aircraft wiring project, Charlie is no amateur. Since age 13 he has rewired all of the automobiles he has ever owned; and for a great part of his working life as an electro-mechanical engineer at NASA-Dryden, was involved in the development of aircraft fly-by-wire controls.

Since this program broke all records for duration and complexity, space permits only covering the high points of Charlie's presentation. For more detailed information, or for tips and suggestions concerning your own wiring project, contact Charlie directly.

Charlie's objective was to design an electrical system for his aircraft to support a starter, alternator, and night VFR capability. Several good ideas put forth include:

1. Comm jacks **BEHIND** the seat to avoid the tangle of wires in the occupants' laps.
2. Push-to-talk switches on the control sticks so that communication and avigation may occur simultaneously.
3. Panel mount RCA-type jacks to provide ship's power to ANR headsets and hand-held avionics.
4. Jump-start connector in the panel to give the PIC complete control over the jump-start procedure.
5. Automatic avionics protection circuit to ensure avionics shutdown during engine start.
6. Battery, voltage regulator, and over-voltage protection circuitry mounted inside the cockpit to avoid the harsh environment forward of the firewall.
7. "Idiot Lights", including low oil pressure, over-voltage protection engaged, and engine overspeed.

Charlie next expounded upon several rules to keep in mind while laying out an aircraft electrical system. Following these rules to the extent practical will help to avoid noise and interference in the system.

1. Do not create magnetic fields to affect the compass.
2. Avoid ground current in the airframe.
3. Keep wiring for noisy stuff away from wiring for sensitive stuff to the extent practical.
4. Do not create power or ground noise in sensitive circuits.

In general, items 1, 2, and 4 can be accomplished by providing a return wire in close proximity to each supply wire and by isolating electrical devices from the airframe where possible. Especially make sure that comm jacks are isolated from the airframe and are grounded only at their respective device (radio, intercom, etc).

The "noisy stuff" referred to in item 3 includes ignition harness, P-leads, strobe power and high voltage cables, relay coils, and the alternator output. "Sensitive devices" include radios, EGT/CHT thermocouples, over-voltage protection circuit, and to some extent, the voltmeter.

Charlie also emphasized the importance of planning and designing the electrical system before jumping in and getting started with the actual wiring. The steps he uses are a follows:

1. List all devices in the system.
2. Make a map showing the approximate location of each device or group of devices in the airplane.
3. Sketch lines showing the interconnects. Group lines together where it makes sense.
4. Refine the interconnecting lines to make sure that the interference rules are being followed.
5. Sketch in the desired disconnect points. Done properly, this step allows most of the wiring work to be accomplished on the bench instead of while standing on your head in a small airplane. It also makes future service easier, enabling devices to be unplugged for maintenance instead of removing individual wired connections.

6. Make a list of the connectors and the required pins on each one. Assign names to each wire.

...to be continued.

Adjournment:

The meeting was adjourned about 8:30 to the *PPTAF Auxiliary Headquarters* (aka Burger King), where good times and good food were had by all.

- Miles Bowen, Secretary

The Prez Sez...

Happy Holidays! I hope everyone will be able to find time in this busy season to participate in at least some of our Chapter activities. These winter days of diminishing daylight and "iffy" weather make it more difficult to enjoy a pleasant flight or pound a few rivets; and...cram in a seemingly endless parade of holiday festivities. Nevertheless, your Board has endeavored to provide our regular fare of high-fructose snacks, "electrifying" guest presentations, and generally amiable camaraderie. As our thoughts naturally turn toward family this season, why not invite the significant others to share our meeting, or join the membership for that holiday value meal at the BK? Speaking of holiday values....don't forget to mark your calendars on January 31, 1998 with a large red notation to attend the annual Chapters' 49 and 1000 Awards Banquet and dinner at the AV Inn. Tickets for the sumptuous meal and world-class entertainment are a very reasonable \$20. Who says there aren't any bargains left? Check for further details elsewhere in this issue. Fly safe, enjoy this special season with family and friends....and, see you next year!

-Gary Aldrich



Young Eagles Update

The 6 December Young Eagles Rally was cancelled, as *Project Police* officers yielded to the forces of Mr. El Niño--a rare event here in the desert.

Chapters 1000 and 49 have been assisting with several other recent Young Eagles events as well. On 25-26 October 1997, 13 Young Eagles were flown up the road a piece at Inyokern with support from our chapters. Five Young Eagles were also flown on 2 August 1997 by Dean Vanderwall up at Lone Pine Airport.

At Air Force Plant 42 in Palmdale, CA, 23 October 1997 was "Take Your Son To Work Day," and part of the festivities were Young Eagles rides. A total of 58 Young Eagles were flown by **Ed McKinnon, Joe Biviano, George Prewitt, Ozzie Levi, Gary Trippensee, and George Heddy.**

The Palmdale Learning Center Kitfox finally lived up to its promise as **Bob Hoey** gave flights to 9 Young Eagles who had participated in the construction of the Kitfox.

That makes **85** more Young Eagles, for a total Year-To-Date of **484!**

The next Young Eagles Rally will be on **10 January 1998** at 0800 at the California City Airport.

- Russ Erb

Copperstate Fly-In

(This is the report that was bumped from last month's newsletter because of space limitations)

The forces of Air-Zona thought that they had come up with a fool-proof plan to protect themselves from the scourge of the *Project Police*. They arranged for high winds and low clouds in the Rosamond and Fox Field



areas, thinking that this would keep the *Project Police* on the ground with their tails between their legs. While this plan was generally successful, they did not account for three *Project Police* officers sneaking out early at different times and by different means of transportation to forward operating locations (FOL).

Jim Piavis, along with **Carolina Leonard**, had deployed into the target area via United Air Mobility Command. **P5 (Project Police and Previous President Pelletier)** had moved a few months earlier to Tucson under the cover story of an Air Force PCS. On Friday, 10 October, your newsletter editor deployed the *Project Police Paddywagon* to Tucson to the home operating base of **Harry Whiting**, a sworn confidant of the *Project Police*. At 0800 on 11 October, *Operation Copperstate* was launched, with the linkup of **P5, Erbman, and Hairy**. Taking a tactically disguised Ford pickup, we drove to Avra Valley Airport (E14), where the 1955 Cessna FC-180 Fighting Skywagon was stored. This airport was also reportedly the practice location of aerobatic superstar **Patty Wagstaff**, although we did not take the time to verify this. A quick trip through the local FBO to check out the plumbing facilities in little rooms with no windows verified their support of the *Project Police* as we sampled their excellent chocolate chip cookies. **Hairy** confirmed that these high-fructose snacks were available on a regular basis.

Infiltration plans were in hand, having been acquired by the intelligence network code-named World-Wide Web. These plans called for invasions from our sector to report an initial fix over Rittenhouse AF. We found Rittenhouse to have been closed for so long that it was essentially invisible. A golf course close by would have made a much better visual fix, even if it wasn't on the sectional. We landed on the center runway while listening to the results of buffoonery in a Beaver on the adjacent runway.

Our infiltration secured, the forces of Air-Zona made one last attempt to thwart us. Even though we displayed the appropriate "ACC" placard for the Antique/Classic

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parking area, they claimed it was full and directed us to the non-showplane general aviation parking area. We didn't feel too bad after we saw a Glasair II parked in the same area.

Realizing that we were there and there was nothing they could do about it, we were shuttled as heroes to the registration booth, where we willingly paid the small tribute to the organizers in appreciation of their making this operation possible. In our official black *PPTAF* uniform T-shirts, we then set out to scour the flight line.

While my original plan had been to spend the day looking at airplanes and engines, I ended up spending the day meeting many people face-to-face whom I had only heard of before. Our first target was the Poly-Fiber tent, which was cleverly located close to the registration booth. This seemed like a likely location to find **Jon Goldenbaum**, head dude at Poly-Fiber and recent new member of Chapter 1000. We quickly ferreted him out, finding him in a red Poly-Fiber shirt and a wide-brimmed black hat (apparently he was getting into the whole *Project Police* thing while still representing his fine company). We picked up a copy of his handout on the new water-borne composite finishing system, and he donated a copy of his book "*How to Cover An Aircraft*" to the Chapter 1000 Library. This is an outstanding book, with plain language instructions and humor worthy of the *Project Police*. He also stated that he would be happy to present a program for a Chapter 1000 meeting, and even put on a 2-day covering workshop for the chapter. All we need to do is supply a reasonable number of people willing to attend for both days. Contact **Russ Erb** if you think you would be interested.

Helping out in the Poly-Fiber booth was **Murle Williams**, who's award winning Kitfox (see June 1997 *Sport Aviation*) was parked in front of the booth. Noting that his airplane was equipped with the adjustable rudder pedals, I introduced myself, handed him a Chapter 1000 business card, and asked him to explain how the pedals were mechanized, which he then explained to me.

Eventually I decided to leave the comfortable confines of the Poly-Fiber booth and venture out to inspect the rest of the Fly-In. I stopped briefly by a tent where TIG welding was being demonstrated. I found it interesting that a 3-sided dark plastic (glass?) shield had been placed around the welding bench so that observers and passers-by could watch the demonstration without each having to don a set of welder's goggles. An excellent safety device.

I then wandered into a forum where a vendor (who's card I can't find right now) was discussing Temperfoam for aircraft seats. Temperfoam was developed for astronaut couches, and has the unique characteristic of conforming to your body shape without bottoming out like regular foam. Thus, instead of carving your seat to match your posterior, you can put in a flat 3" pad of Temperfoam (three laminated layers of 1" each soft, medium, and hard densities) and your seat will be wonderfully comfortable to anyone. As a demonstration, he threw a key ring on a pad and invited you to sit on them. Amazingly, you could barely tell the keys were there. This stuff is also recommended by none other than **Tony Bingelis**.

Wandering out onto the flight line, I finally saw a familiar face that didn't arrive with me, namely **Victoria**

and then **Paul Rosales**, known friends of the *Project Police*, builder of an RV-6A, and secretary of Chapter 49. They had come in via the heavy iron and were staying with friends in Phoenix. At that time they were perusing (big surprise) the RV row. Paul pointed me toward Rich and Karol Hansen of Pleasanton, CA, who had an RV-6A who were interested in flying in to the Edwards Open House (yea, sure...who isn't...). Then he mentioned that their airplane was a recipient of an Oshkosh Outstanding Workmanship award. NOW he had my attention...I talked to them, gave them my card, and told them how to contact **Chris Reeder**. It was a good move--their airplane was named **Copperstate Grand Champion** the next day! Read on to hear how we treated them when they arrived at Edwards...

I then moved on to inspect the Berkut on display, which had been painted to resemble the test support fleet at Edwards, namely white with orange tail flashes. **Norm Howell** has reportedly selected an N-number that will allow him to paint his aircraft similarly and the number will fit in seamlessly.

Proceeding on down and back the "left" side of the fly-in showed nothing else spectacular, other than running into our own **Jim Piavis**. I then returned to the center of the fly-in, intent on testing the acceptability of the Barbecue sandwiches being sold. However, I was greeted by a line long enough to make even *Project Police Officer Gary Aldrich* reconsider. As it was the prime lunch hour, I decided to continue on to the exhibit hangar, in hopes the line would recede with time.

On the way there, I found **Gerry Curtis**, the man behind the *Flight of the Eagles* trips to Sun-N-Fun and Oshkosh each year. He had been out to help us at the Fox Field National Air Races last year, and was so impressed with my stylish *PPTAF* uniform shirt that it finally convinced him to join us in Chapter 1000 (welcome, **Gerry!**). He also introduced me to the official EAA rep from Oshkosh, but I've since forgotten who it was. Oh, well.

In the exhibit hangar, I was able to confirm with a rep of Aircraft Spruce and Specialty that they have completed their move from Fullerton to the Corona airport. The correct address is shown on the 1997-1998 catalog. Take note of this if you happen to be headed down to Will Call to pick up that 25 foot 4130 steel tube.

Next I found **Richard Finch**, who had written a new book on welding called *Performance Welding*. You can pick up a copy from <http://www.amazon.com> for about \$16.50, plus shipping and handling. I was able to get it direct from him at an airshow special price of \$15. It was highly recommended by some of the guys on the Bearhawk e-mail list, and looks very interesting based on a cursory glance through it. Richard Finch recommends that you buy this book and not his *Welding Handbook*, which he claims was so heavily edited years ago so as not to upset any suppliers that it reads like you would expect a watered-down book to read. *Performance Welding* was edited for grammar and spelling, but the thoughts left intact, so you get the straight scoop from him on what he says works and what doesn't. Keep an eye out--he's also working on a design for a relatively low-cost four-place

low-wing aircraft. If it does well, maybe Van will finally design a four-place RV...

The Averys of Avery Tools were there selling their wares, so I took a moment to tell them how much I liked doing business with them (1-800-OK-AVERY).

Continuing on through the exhibit hangar I found a *Kitplanes* booth, where they were running an airshow special--two years for the price of one. I couldn't pass that up, so I added another two years onto my subscription.

Heading back out of the hangar, I stopped to look at the Hobbyair breathing apparatus. **Jon Goldenbaum** walked through and told me that I need the HVLP unit that was on display. I told him that I already had an air compressor (the Bearhawk has an aluminum wing) and spray gun. A gentleman standing next to me then read my name tag and realizing who I was, introduced himself. It was **Vance Jaqua**, an honorary chapter member and big wig engineer for Tri-R Composites. You may recall a couple of articles he submitted to *The Leading Edge* a few months back.

It was now a little after 2 pm, and since I was starting to get hungry, I went back to check on the Barbecue line. While it wasn't short, it wasn't nearly as long as before. I queued up, and soon had a very tasty BBQ pork sandwich in my hands. No sides, as the potato salad and the beans were sold out, and all that was left was cole slaw. The hazards of eating late...

After lunch, **P5** and I sashayed back onto the flight line, looking to investigate the "right" half of the show. Seeing the booth for *Contact!*, I stopped in and inquired if **Mick Myal**, honorary chapter member and *Contact!* Publisher, was around. He was pointed out to me and P5 and I introduced ourselves. As I was handing him one of our stylish Chapter 1000 business cards, two other gentleman of EAA Chapter 20, one of which was **George Mendonca**, walked up, so I handed them cards too. George saw that we were from Edwards, he quipped that he was coming down to our Open House the next weekend. Noting that he was with Chapter 20 (San Francisco area), I asked him if he knew **Ed Dutreaux**. "That's who I'm flying in with." I was taken aback for a moment, and then told him, standing there in the middle of Air-Zona, "You're staying at my house!"

P5 and I then wandered down the line to inspect the Thunder Mustang, which had the cowling open to show the engine. We werewhelmed. Looked just like it did in the magazines. It's just tough to get excited about an airplane that I could never even approach affording.

As we were on our way out, we saw **Don Thompson**, President and Newsletter Editor of Chapter 7. We discussed various matters of chapter business, and confirmed their allegiance to the *Project Police*.

We loaded back into the FC-180 Fighting Skywagon, having had a highly successful day, and had an uneventful trip back. The next day Harry and I went to the Pima Air Museum, where we determined that they have WAY too many airplanes. Highly recommended.

Want somebody else's impressions of Copperstate? Read the daily reports on http://www.primenet.com/~eaa_ariz/.

Corrosion Control--Material Selection

MIL-HNBK-5 has 25 different recognized aluminum alloys that may be used in aircraft. Each of these has four or more heat treatments or conditions. The selection of aluminum alloys is usually already made for the homebuilder. In general three alloys are specified: 2024-T3 (or -T4), 6061-T6, and 7075-T73. For homebuilts, I believe 6061-T6 alloy is the best all-around alloy for many reasons.

2024

2024-T3 (for sheet up to .249 thick) and 2024-T4 (for plate .250 and above) was well defined before WWII (known as 24ST) and is still a good choice in most cases. It has a good strength/weight ratio. The -T3 and -T4 have good toughness (tough: strong but pliant; that will bend, twist, etc. without tearing or breaking). Care should be taken because in certain stress orientations they can be susceptible to stress-corrosion cracking if the installation of bushings and fasteners are not well designed for the application.

The fact that 2024-T3 or -T4 can be susceptible to stress corrosion is not as much of a concern as it is with other alloys. This is because once a crack is formed, the toughness of the alloy makes for slow crack growth.

2024-T6 and -T8 tempers are high strength and are less susceptible to stress-corrosion cracking. Some aircraft manufacturers are requiring 2024-T851 instead of other tempers. I have been lead to believe that it is more expensive too.

2024 should not be welded because of the potential for future intergranular corrosion (believed to be because of the redistribution of the copper in the alloy).

6061

I like 6061-T6 for homebuilts. It has a reasonable strength/weight ratio. Homebuilts generally have low loads that can be handled well for sheet aluminum and extrusions with thickness dictated more by handling during assembly (and to lean on at the flightline).

(The first commercial Bell Jet Ranger delivered had to have the forward cowl redesigned and replaced because, although is was plenty strong for the loads, it dimpled when the new owner's wife leaned on it during the delivery picture taking session.)

6061 has good stress corrosion characteristics and has high toughness even at cryogenic temperatures.

6061 should never remain in the -O condition (true for any alloy) because of its low yield strength (soft and too easy to bend). It is good for welding. If fabricated in the -O condition or welded, it should be heat treated to the -T42 or -T62 condition. This heat treatment gets its stiffness and strength back. A homebuilder will have to go to a commercial heat treat company (which generally is not the way a homebuilder wants to "do business").

-T6 condition for 6061sheet is great but you must use correct bend radius (approximately 3 times or more the thickness).

7075

The airplane designer has many choices depending upon the requirements. "High Performance" aircraft usually use 7075 alloy because of the high strength/weight ratio. It also has other favorable characteristics by selecting the proper heat treat.

7075 does not have good weldability characteristics.

Do not select 7075-T6 for any critically stressed component. (I would not use it for any component.) It is susceptible to stress-corrosion cracking and low toughness characteristics (especially at cryogenic temperatures). The alloy was not well defined after WW II but it looked so good that a lot of people started using it. Allegedly the stress-corrosion cracking caused a few Martin 202 crashes (wing spars failing) before the alloy was well defined.

I specify 7075-T73 where ever high strength and low stress-corrosion cracking are paramount. It has the desirable stress-corrosion cracking and exfoliation characteristics in all stress directions. (The T-38 has been going through replacement of the upper forward longerons with 7075-T73 extrusions. Previous longerons suffered cracking due to notch sensitivity and stress corrosion that resulted in a few inflight breakups.)

5052

I was taught early in my career to not use any 5000 series aluminum except for ground equipment. At cryogenic temperatures 5052 does get stronger and is tough but above 150 degrees F it starts to lose strength rapidly.

Be extremely careful when using 5052 for structure on a airplane. (I will NOT use it for load carrying structure.) It work hardens and then cracks. I know it is used it for gas tanks because of its weldability. Also it does not need heat treatment (it being a non-heat-treatable alloy). This is okay if no airframe loads are introduced.

I'd rather see 6061 used when welding is required and then have it heat treated. (Work hardening in 5052 alloy has the same effect as metal fatigue but has an unpredictable time history.)

Tidbits

Strengthwise and corrosionwise 7075-T73 can be substituted for 2024-T3 (and -T4) and 6061-T6. Likewise 2024-T3 can be used for 6061-T6 on a strength basis.

Like 6061, 2024 and 7075 should not be used for load carrying in the -O heat treat condition. Some aircraft repair procedures (such as for the B-24) do call out the -O condition for use as fillers in repair splices.

If you cannot protect your material from surface corrosion before using, it might be a good idea to purchase alclad material. Remember that the alclad provides no strength and depending upon the thickness an alclad sheet is not as strong as a bare sheet (although the percentage loss is low).

I have been told by purchasing folk that 7075 is becoming less expensive than 2024 because it is becoming more generally used. 6061 is supposed to be even less expensive because of its wide use including machined parts.

I have seen specifications for new Navy aircraft where the minimum thickness of parts is .026. Apparently this is

due to thinner parts losing a high percentage of strength before corrosion is detected and repaired.

Selection of material is many times made on the availability of an alloy and the design altered to use what is available.

As far as I am concerned, the bible for material properties is MIL-HDBK-5. (It used to be known as ANC-5.) In general what has been published in Aircraft Spruce and Specialty Company catalogs on aluminum alloys is valid, but be careful if you use the catalog info to select an alloy for a new design.

Various aircraft manufacturers also have proprietary data they have developed over the years for a given alloy and application. With all the recent corporate mergers it is going to be real interesting to see what proprietary data will soon stir debates (contradictory data within a design group composed of individuals from formerly competitive companies). Hopefully much of the competitive data will become available in public domain.

Thanx

Thanks to Bob Urban and Stan Klein for trying to help me understand.

References

1. "Metallic Materials and Elements for Aerospace Vehicle Structures," Military Handbook, MIL-HDBK-5

- Lee H. Erb

EAA Chap 1000 Det 5, Arlington TX; EAA Chap 34
LeeErb@compuserve.com or (817) 275-8768

Corrosion Control--Electrical and Avionics Wire

Every airplane owner/builder should have a copy in reference of "WIRE, a nick in time," by Ed Maher. It was published in *Avionics News* in November, 1996. I got a copy from **Larry Cheatwood** when he was speaker at a Chapter 34 Monthly Maintenance Seminar in August.

Larry made a great presentation of what to look for in avionic installations. If you are near Cleburne, TX airport, stop and see him at Campus Avionics Service, (817) 556-2070. He is also into GPS (but I don't have his coordinates).

Back to the article. I knew that stripping wire was an art, but several tools are discussed. The author does not like my Scout knife method. I did not know that wire from an antenna may corrode under the insulation for FOUR FEET without proper seals in the connectors.

The 18-page article (which I have only 7 pages) covers a whole lot more and reminded me that electrical cable has a minimum bend radius just like sheet metal and hydraulic tubing.

Get a copy, at least for the Chapter 1000 library.

- Lee H. Erb

Chap 1000 Det 5, Arlington, TX, Chap 34

Boredom Fighter Update

Recently we reported that **Jim Piavis**, undercover somewhere deep in EAA Chapter 1 territory, was making good progress on his **Boredom Fighter**, but was having a severe aft cg problem. Jim has now informed us that he was able to fix the aft cg problem, but in the process of doing so, he created a large drag problem. He is now working on the drag problem, as shown in these photographs. You can see these pictures in full color on the **Project Police Picture Pages Phor Pilots** on the Chapter 1000 web site.



EAA Flight Advisors Help Make Homebuilt Flight Safer

EAA HEADQUARTERS, OSHKOSH, Wis.—(Sept. 8, 1997)—New figures show that the Experimental Aircraft Association's (EAA) Flight Advisor program is having a major positive impact on safety during the critical first hours of amateur-built aircraft flight testing.

According to newly released statistics from the Federal Aviation Administration (FAA), the accident rate is more than 93 percent lower for pilots who use Flight Advisors compared to the overall accident rate during initial homebuilt flight tests. Only 1.2 percent of all pilots who utilized the Flight Advisor program suffered accidents during the first 25 hours of flight in a new homebuilt. That compares very favorably with FAA figures of 19 percent of homebuilt accidents which occur during initial flight testing.

"The Flight Advisor program works," said EAA President Tom Poberezny. "The proof is in the numbers. Over the past three years, EAA Flight Advisors have made nearly 300 people safer pilots. These volunteer advisors throughout the country have improved the homebuilt accident rate significantly during the first few crucial hours of flight."

The program, which enables builder/pilots to evaluate their flying skills in their new aircraft, began in 1994. Each builder/pilot is matched with a volunteer Flight Advisor who has knowledge and experience in the "new" type of aircraft being flown. The Flight Advisor assists the builder/pilot with a thorough and objective evaluation of piloting skills and flight experience. An explanation of the particular flying characteristics of the new aircraft is also included. The advisor then helps establish checklists for flying the new aircraft. The builder/pilot can make an informed decision on whether additional training is needed before flying the completed project.

Any EAA member can request the assistance of a Flight Advisor. Many are already affiliated with local EAA Chapters. There is no charge for the service.

Builder/pilots who utilize Flight Advisors are also eligible for insurance coverage for the flight test period through AVEMCO Insurance, one of the world's largest aviation insurers. Such insurance for homebuilt flight testing is nearly impossible to obtain otherwise.

"Since more than 800 homebuilt aircraft have been added to the FAA register each year since 1994, we urge all pilots completing homebuilt aircraft to utilize the expertise of Flight Advisors," Poberezny said. "Fellow EAA members are volunteering to enhance the safety of homebuilt aircraft and the people who fly them. Builders who take advantage of this resource are wisely making their flight testing as safe as possible."

More information about the Flight Advisor program is available by calling EAA Government Programs at 920-426-6522.

EAA is an international aviation organization with 165,000 members and more than 930 local Chapters. For more information on EAA and its programs, call 1-800-JOIN-EAA (1-800564-6322) or explore EAA's World Wide Web site at <http://www.eaa.org>.

Workshop Wireless Noise Attenuating Headset System

If you're like me (a scary thought) then the TV or radio is an integral part of the workshop. However, there's a problem--it is very difficult, nee, even impossible, to hear anything on such shows as *Wings* (Discovery Channel) or *Victory At Sea* (History Channel) when you're drilling the 562nd hole in your spar or bandsawing that spar splice plate. This becomes even harder because you believe in protecting your hearing (*Whaaat? Say again?*) by wearing appropriate ear protectors or ear plugs while doing noisy things in your shop. (If you're not, then I would say either 1) you've already lost your hearing, or 2) you're being incredibly stupid, because once you lose your hearing, you can never get it back. You probably already wear ear protection in airplanes, so why not in the shop?)

So now we have two conflicting requirements. We want to hear the TV or radio, but we need to wear hearing protection. So I figured why not use those incredibly expensive ear protectors I bought several years ago? You know, the ones made by David Clark with the wire and two plugs hanging off of them. After all, since I don't have my own airplane right now, I'm not using my headsets to fly and they're just sitting in the closet (with Doug). The headset seemed like the perfect solution, since it was designed to allow you to hear stuff while attenuating all of the noise around you. After all, they quiet a drill just as well as engine noise...

The Perfect Solution, EXCEPT...

There are two problems with trying to use an aircraft headset with typical home electronics. Typical stereo headphones like you might pick up at Radio Shack® have an impedance of 8 ohms. Aircraft headsets have an impedance of 300 ohms or 150 ohms, depending on how they are wired. Now, as an airplane guy, I don't claim to understand what impedance is, other than it's some sort of "inductive resistance." The one thing I do know is that $300 \neq 8$. The result is that even if you buy the right size adapter at Radio Shack® to physically match the plugs, you still won't hear much of anything. I know--I tried it.

The other problem is that nasty cord. While you could try a long extension cord to reach anywhere in the shop, it really gets in the way and can even become a safety hazard. I found that clecos were made with a material that is especially attractive to audio cords, as the cord was constantly getting caught on clecos as I tried to move around the shop. Any acceptable solution would have to do away with that cord. Of course, it would be nice if it didn't cost as much as the headsets, much less the airplane.

Adapting the Headset

If we first look at trying to adapt the headset to a radio, we can solve the first part of the problem. As far as the radio receiver goes, the good folks across the pond at Sony solved that problem about 15 years ago. I picked up a Sony AM/FM/Cassette Walkman at Best Buy for 16.99 plus tax (on sale). (*This doesn't address the problem that radio reception of my favorite stations in my workshop borders on non-existent, but that's another issue*)

That's great, but there's still that impedance issue. To solve that, I turned to my brother Robert Erb (currently located at EAA Chapter 1000 Det 5, Arlington, TX). He provided me with the simple adapter circuit shown in Figure 1. Again, I don't claim to understand how it works, but it does. Some of you may notice that a 1/4" stereo jack is specified, even though the headset plug is a mono plug, and you'd be right. My only defense is that it works. Modify at your own risk.

I mounted the Walkman and adapter on a belt I had laying around, and secured them in place with a high quality unidirectional bonding strip (i.e. duct tape). I strap it around my waist with the equipment in the back. The microphone jack of the headset is wire-tied to the earphone jack. With this, I can move freely around the workshop, hearing what I want to hear and not hearing (much of) the noise that I don't want to here.

But What About The TV?

So now I have a hands-off, noise-attenuating headset equipped FM radio (also AM and cassette), but I still can't hear the *Modern Marvels* show about the B-25 crashing into the Empire State Building while I'm drilling my spar. Again, I turned to my brother, tasking him to design an FM transmitter that would plug into the earphone jack on my workshop TV. In response, he created the circuit shown in Figure 2. The portion inside the dotted outline is most of a kit available at Radio Shack®. I built it, plugged it into the TV, and it worked great. Not only does it work in the garage, but I can receive the signal over about 70% of the yard when it's time to mow (no change in reception when it's not time to mow).

So if you think this system is way-cool and you've just got to have one, then just follow this procedure. First, get thee to your local Radio Shack® ho, and procure the following items...

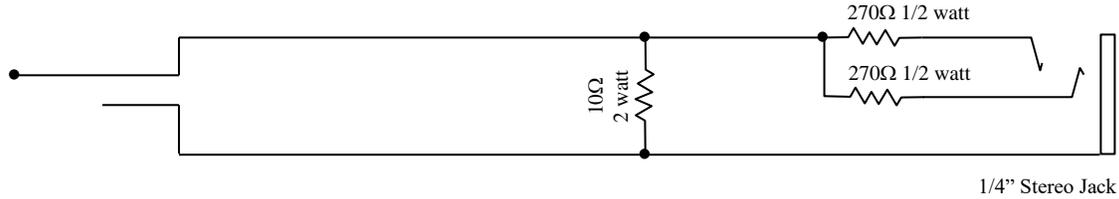


Figure 1. Headset Adapter Schematic

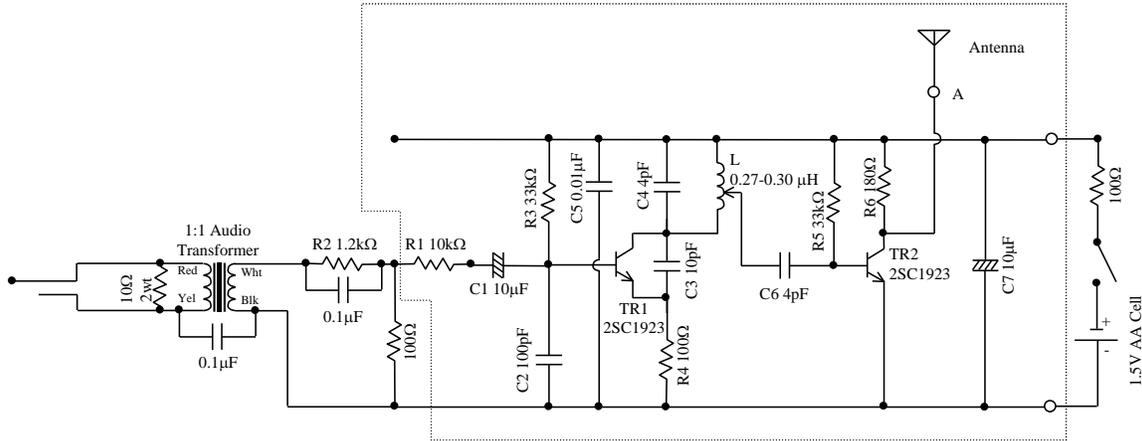


Figure 2. FM Transmitter Schematic

Transmitter Materials List

FM Wireless Mike Module Kit	28-4030	\$11.99
AA Plastic Battery holder	270-401	\$0.79
Resistor 10 ohms 2 watts	271-080	2/\$0.99
0.1 μ F 50 wvdc PC mount capacitor	272-1069	2/\$0.79
Resistors 100 ohms 1/4 watt	271-1311	5/\$0.49
1:1 Audio Isolation Transformer	273-1374	\$3.99
Submini SPST Switch (optional)	275-612	\$2.89
6 ft patch cord	as required	~\$2.49
Plastic box (optional)	as required	~\$2.59

Building the Transmitter

Start off by building the FM wireless mike module kit per the directions that came with it, with the following exceptions:

- 1) Do not install the microphone element. You won't be using it.
- 2) Do not install resistor R2 per the instructions with the kit. You will use it in a slightly different location as per Figure 2.

Build the remainder of the transmitter according to the schematic in Figure 2. When you are done soldering to the circuit board, clean the bottom (solder side) with an old toothbrush and isopropyl alcohol.

Adjust the frequency of the transmitter to an empty frequency by turning the core of the coil. DO NOT use a metal screwdriver as suggested in the kit instructions. Use the end of a flat toothpick to turn it (you may need to trim the toothpick).

Locate the transmitter at least 6 feet from the TV or other input source to avoid possible interference.

That's all there is to it! Give it a try, and you'll never have to miss *Home Improvement* just because you're making noise in the shop!

- Russ Erb

Buck Rivetz' Web Page Review

Project Police Det <DATAMASKED>



"We're here to help!"

Target for the Month:

Aircraft Spruce & Specialty

URL: <http://www.aircraft-spruce.com>

Date of Review: 15-16 Nov 97

This is the first of a new column to acquaint my fellow *Project Police* members with the various Web sites out there in cyber space. Since the Internet started its megaton-size explosion in '94, the number of aviation related sites has grown immensely. It's my job to familiarize you with some of the better sites available on your desktop. I will be searching out the nooks, crannies, and basements of the Internet to bring the latest on the really way-cool sites. No need to spend time on the fluff.

For standardization, the computer used for this effort is a 133 Pentium machine with 32MB RAM using a Rockwell 26.6 modem to access the Web through an

THE LEADING EDGE

Internet Service Provider, so performance is basically typical of the average user.

Now the review of the month:

The first target was chosen for the applicability to many of the users in the So Cal area. Many of you use Aircraft Spruce and Specialty because (1) it's close, relatively, and (2) there's no other supplier in the area. This review will give you some information on what A/S has done to improve their visibility to the Customer.

The A/S Web site opens with a standard home page, nice graphic and opening screen, from which the surfer can launch into the table of contents. After a short down load, the user will see the following areas of interest:

Aircraft Spruce News: The news section reflects the basic information that was published in their newsletters with information on events and a short letter from the President. This particular page advertised the move to the new location and was posted on 27 Sep. Unfortunately I viewed the site on November 16. A little updating could help.

Aircraft Spruce Around the World: Locations from around the world, but the picture of the old Fullerton warehouse is still included. I would hate to travel from Bakersfield and find the building empty. I'd be TICKED! This section reflects the points of contacts and photos for their locations worldwide. Not included on this page was the new building in Corona (however, this is located under the News section).

On-Line Catalog: This is the key to the whole enchilada! When this is full-up FMC, this electronic catalog will rock. At the time of the review, the catalog had several sections in very good shape and others that were in need of fleshing out. The basic premise is to allow the user to electronically select items and place them in the "electronic shopping cart". You then total the selections, provide payment method, and sometime in the future receive your order. All done *automagically*.

Composites: Has a very good selection of materials and supplies. Most of the common composite materials were covered to include Kevlar, Graphite Carbon and the usual assortment of fiberglass, foams, fillers, epoxies, tapes, special tools and even pre-fab fiberglass E-Z parts were included. Items contain the standard catalog number, which if highlighted, may be placed into the electronic shopping cart. And loaded on the electronic order form.

Spruce: This section outlines the general info pertaining to their spruce products. If you are familiar with their printed catalog, the A/S web provides the same type of general information on the products, specifications, handling techniques, etc. For spruce items, they advertise that shipment can "usually" be made with in 3 weeks. Other items available are nails/ balsa, plywood, and glues.

Metals: Only the overview to steel making was available which gave the standard info on steel production, much like the printed catalog.

Now, if you're into **fabric**, there is a great selection of products available for selection. The Poly Fiber Process seems to be complete and well represented with all the materials and tools one needs to cover an aircraft. Both Polytone and Aerothane coatings are loaded in the catalog as well as Randolph. For those preferring Ceconite, these products are also represented.

Lastly, **Avionics:** This first items are the avionics packages available through the avionics shop at Chino airport. Apparently, most brands and models are available for selection. Graphics on the avionics are lacking so unless you know what you're looking at, you may want to find a picture in the printed catalog.

Functionality: The catalog uses a search engine to allow the user to search on a text string for a product. It would be nice if they had a pull down list (such as the one Microsoft uses to select products through their site). I tried to select the Garmin GPS Pilot III and after several tries, resorted to "Garmin", which produced several pages of the Garmin Products.

Electronic Order Form: The Electronic Order Form provides the listing of all parts selected through the catalog and also provides a method to manually input selections. You can specify method of shipment and have an estimated shipping charge calculated. All the important information stuff is required, name, address, telephone, e-mail address, and of course, credit card number. Some folk may be skittish about trading on the web, but it's no less secure than giving your credit card to the waitress at the local watering hole. Think about it. Some sites such as banking and stock trading employ various encryption devises such as Secure Socket Layering, (SSL) but A/S does not appear to employ additional electronic encryption.

Customer Service: This is the crux of the Web site. Customer Service. Hangar-Talk around the local airports seem to reflect a customer service issue with A/S; in general, the status of orders. This web function should improve Customer Service 100%. The first thing you need to do is register, a one time good deal. Allow 24 hours for their server to update your customer number for on-line status and you're there! The next day just input your customer number and the database will give you the status of outstanding orders. Unfortunately, I did not have any orders to status, but I did register without a problem.

Sportair Builders Workshops: This page provides hyperlinks to the Sportair Builders Workshops as well as schedules.

Sport Aircraft and General Aviation Directory: Good selection of other sites, for manufacturers, unofficial builder-sponsored sites, aviation publications, and organizations. This is a pretty conventional listing of "Other Links" that are found on many aviation Web sites.

Aviation Events Calendar: The events calendar was in need of some work. The last event listed was 23-25 October 97 and was last updated on January 31 1997. Seems the calendar of events should have a continuously updated one-year calendar.

Mailing List: Finally, the mailing list provides a the customer a method to get on the A/S mailing list. 'Nuff said.

Overall, this is a very good site with functionality, not just a static site for information. Graphics are kept to a minimum to allow for quicker downloads and faster transactions. Text is easy to read with colors that don't distract.

Electronic Commerce is just becoming a major player in the economy and will rapidly expand. Many organizations are attempting to find uses for the new

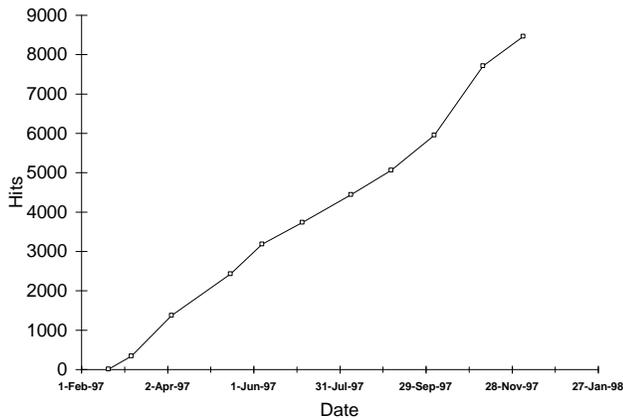
technology that the Web offers, with some companies having little success. However, Aircraft Spruce seems to have found a method to advertise their presence, and improve that all-important customer relation rating.

APPROVED!

- Buck Rivetz

Web Site Update

Well, I guess the honeymoon is over. As of 6 December 1997, we have **8482** hits on our Web Site, which is back down to 27 hits a day, which is in keeping with what we've been seeing in previous months. See the graph of the activity below.



Usage History on <http://www.eaa1000.av.org>

Web site updating has slowed down a bit, due to an increase in production rate on the Bearhawk, but the July and August newsletters were finally posted.

Here are three e-mails received by your webmaster:

"Your web site is a treasure and a beauty to behold. I have told all the others in my chapter about it and Lancaster's. One guy is buying a computer just to get on the net after I showed him your site. The net is only embryonic now, so what's for the future? Fantastic explorations. Your site is on the leading edge. Yours truly, Larry Smith EAA305040"

"I'm friends with Paul [Rosales] and he said to check out your homepage! Too Cool! Christina"

"Awesome web site!!! I'll have to meet some of y'all someday; you seem to have a humorous and addictive attitude in your chapter. Jim Ivey, Pres. Ch125 -- El Paso, TX"

There I Was, At Oshkosh...

(Now how many of you would actually have admitted to this?...)

As all of you who have been to Oshkosh know, finding the time to see and do all the "MUST SEES" and "MUST DO'S" on your list is really quite impossible. This includes making sure you are properly dressed for the weather of the day, and, of course, you need to make sure

you are wearing that very, very important EAA Chapter membership badge! So much to do, so little time, right?

Well, I made sure to pin on my favorite chapter badge one day, but then something tragic happened...I lost my badge! I missed the old badge terribly, but somehow I knew...

...several weeks later, I received the following letter in the mail.

"Dear Charleen,

I bet you thought this badge was gone forever. I was taking care of business in the #3 PORTAJOHNS just south of the flymarket at Oshkosh when I looked on the floor and found your badge and thought you might like to have it back. Since it was on the floor, God knows what is on it, so I bagged it for you (badge was enclosed in a plastic, ziplock bag). Maybe you should wash it before you wear it.

The badge has covered a lot of ground since you saw it--Oshkosh to Columbus, Ohio to California, about 2000 miles.

Well, I and my dad (85 years old) hope you will again wear it with pride at Oshkosh 1998. Please say hello to your chapter from Chapter 443--"the Wrong Brothers Air Force."

Your fellow EAAer,
Col Tiny Snider
Columbus, Ohio"

Now, isn't this what being an EAA member is all about?

- Charleen Beam

American Affordable Aircraft "Vision"

The Vision is a plans-built, 2 place (side-by-side), composite aircraft using a Stratus Subaru engine of 100 HP. It is designed for first time builders with a very complete instruction manual. Check out their web site at <http://members.aol.com/VisionFlyr>. We also have an info pack in the chapter library.

Chapter 1000 Calendar

Dec 16: EAA Chapter 1000 Monthly Meeting, 5:00 p.m., Edwards AFB. USAF Test Pilot School, Scobee Auditorium. (805) 490-1476

Jan 7: EAA Chapter 49 Monthly Meeting, 7:30 p.m., Sunnydale School. 1233 S. Ave. J-8, Lancaster, CA. (805) 942-7149.

Jan 13: EAA Chapter 1000 Board of Directors Meeting, 5:00 p.m., Edwards AFB. Test Pilot School, MOL Room (805) 490-1476

Jan 20: EAA Chapter 1000 Monthly Meeting, 5:00 p.m., Edwards AFB. USAF Test Pilot School, Scobee Auditorium. (805) 490-1476

Feb 4: EAA Chapter 49 Monthly Meeting, 7:30 p.m., Sunnydale School. 1233 S. Ave. J-8, Lancaster, CA. (805) 942-7149.

Feb 10: EAA Chapter 1000 Board of Directors Meeting, 5:00 p.m., Edwards AFB. Test Pilot School, MOL Room (805) 490-1476

Feb 17: EAA Chapter 1000 Monthly Meeting, 5:00 p.m., Edwards AFB. USAF Test Pilot School, Scobee Auditorium. (805) 490-1476

Feb 21-22: EAA Chapter 1 Open House, Flabob International Airport, Riverside CA.

Feb 21: Operation Rubidoux Sundown VI. (805) 258-6335

May 16: Seventh Annual Scotty Horowitz Going Away Fly-In, Rosamond Skypark (L00), Rosamond CA.

For Sale:

Sonerai III project. Fuselage and wings 95% complete. Modified for A65 engine. Engine torn down for overhaul but complete with a great many spare engine parts. Includes instruments. Hydraulic brakes. All excellent work. Call Fletch Burns 760-373-3779

Glasair III, production #3090. Professionally built, IO-540, Engine/Airframe 190 hrs, Full IFR panel, 3 Axes Trim, 2 Nav-Coms, Trnspr, Intercom, Fire System. Super Class Act \$125,000 OBO Serious buyers only. Dr. Gerry Curtis, Ph.D. 1-800-606-1626, FAX 213-722-6355

To join Chapter 1000, send your name, address, EAA number, and \$15 dues to: EAA Chapter 1000 Treasurer, Mike Meyer, 6809 Spaatz Dr, Edwards CA 93523. Membership in National EAA (\$35, 1-800-843-3612) is required.

Contact our officers by e-mail:

Gary Aldrich: gary_aldrich@pobox.com

Miles Bowen: miles_bowen@ple.af.mil

Mike Meyer: aerosong@ptw.com

Inputs for the newsletter or any comments can be sent to Russ Erb, 805-258-6335, by e-mail to erbman@compuserve.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

6708 Doolittle Dr

Edwards CA 93523-2106

<http://www.eaa1000.av.org>

THIS MONTH'S HIGHLIGHTS:

REGULAR MEETING 16 DECEMBER AT TPS

CORROSION CONTROL--MATERIAL SELECTION

WORKSHOP WIRELESS HEADSET SYSTEM

BUCK RIVETZ' WEB PAGE REVIEW



DUES (\$15) DUE FOR EVERYONE IN JANUARY!