



The Flying Wire

**Chapter 124
Experimental Aircraft Association**

**Volume 64 Number 1
January 8, 2025**

Board Meeting (Quarterly)- 5:30 pm

Dinner - 6:15 pm \$10

General Meeting - 7:00 pm

Table of Contents

January Program	.....1
Dinner Menu	.....1
We Need Guidance	.....1
New and Different	.....5
Dues are Due	.....6
Aviation Links	.....7
Notes from the Editor	.....7
Board Minutes	.....7
General Minutes	.....8
Contact Information	.....9

www.EAA124.org

www.CafeFoundation.org

www.EAA.org

EAA Chapter 124
5550 Windsor Road
Windsor, CA 95492

--- Mail ---
PO Box 6192
Santa Rosa, CA 95406

January 8, 2024 Program

“How to NOT be a Tailwheel accident statistic!”

Richard Craig, our December presenter who couldn't make it is back for our January New Year's meeting!! A great way to kick off 2025!

Please join us to welcome longtime CFI Richard Craig as tells tales of his adventures as a CFI in the Tailwheel trade... and spells out what it takes to stay off the Tailwheel accident statistic list.

Tailwheel flying is tricky business... but also some of the sweetest, skillful piloting available to us as aviators. The school of hard knocks in Tailwheel flyin' is long, hard, and littered with the detritus of accidents and hard-won experience. Richard's extensive career as a CFI in this field has given him some great advice to pass along. Richard got his license in 1987 and has over 3500 hours- 1000 in tailwheel! He got his private license in Timmerman, Milwaukee and has been immersed in aviation ever since. He's a commercial pilot, CFI, and an avid builder with two Cozy 4 aircraft builds under his belt! He has a special interest in aerodynamic design. He's got a lot to share.

We hope to see you there!

Dinner Menu:

Our January dinner is Lasagna, Grilled Garlic Bread, Super Salad, Chocolate Cake and Ice Cream! Only \$10

The VOR Project

(by Andy Werback)

January 2020

This project started many years after Jim Weir published a series of articles in Kit Planes, one of the experimental aircraft hands-on magazines. Seemed interesting, to a point. Basically, soldering together a bunch of electronic parts in such a way that they might make some interesting signals. Bread-boarding, in other words. Experimentation, too.

Weir's stated goal was to build an ILS ground radio - Localizer, Glideslope, Marker Beacons. Well, not exactly. What turned out was maybe a bit more interesting, consisting of a VOR simulator and a Marker Beacon generator. The Localizer and Glideslope are simply a couple of amplitude modulated signals with 2 tones - one tone says left or high, the other says right or low, based on amplitude comparison. The Localizer is in the VHF range (alternating frequencies with VOR stations), while the Glideslope is a UHF signal, around 340 MHz, paired with a specific Localizer frequency. The VOR, on the other hand, has a lot of stuff - a frequency modulated component, and an amplitude modulated component, and there is a rotating phase shift component. Here is a typical VOR station:



Santa Rosa used to have a VOR (it's still there, just turned off). I used it a couple of times for VOR approaches during my instrument pilot training, and it was nice to have a station located on-field as

compared to the other local approaches where the VOR is located off-field (SGD/Petaluma, for instance).

And, the article's schematics were none too good. Hardly readable. And no pin numbers, with one critical chip not even using the proper labels (the CD4046 PLL). So, it was a learning experience. I tried to contact Weir for better info but he blew me off, said contact the publisher. Not impressed.

Figures 1 and 2 are the top and bottom photos of the completed experiment. The upper 2/3s of the board are the VOR logic, the lower third is the 400 Hz pulsed marker beacon.

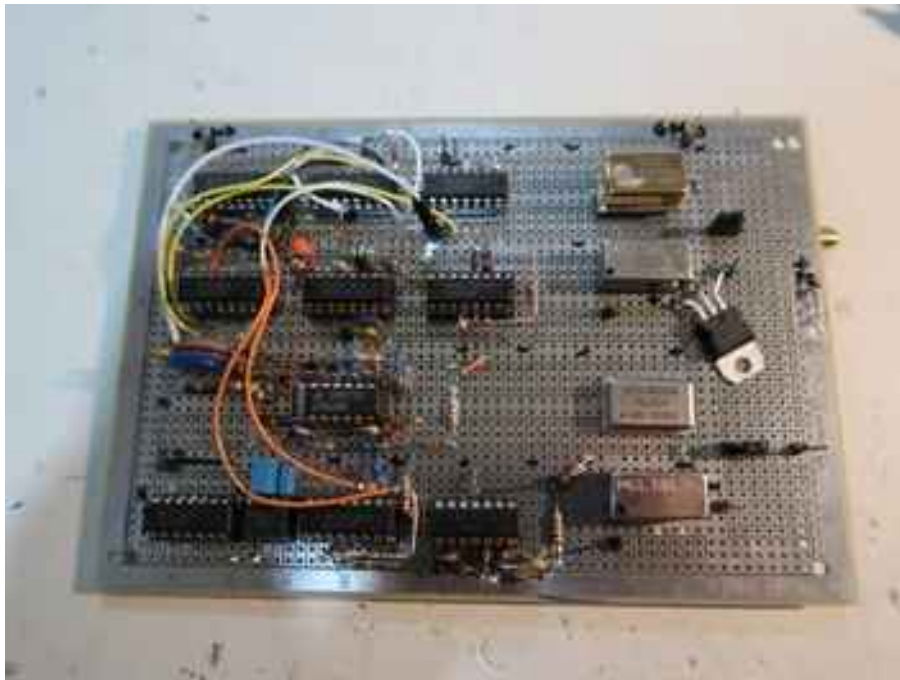


Figure 1 - Top of Breadboard VOR Simulator

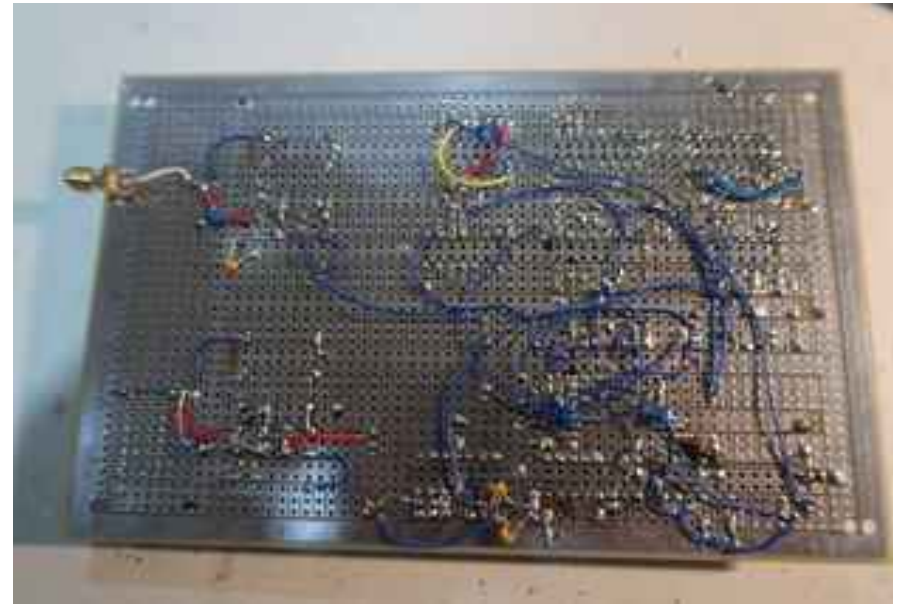


Figure 2 - Bottom view of hand wiring - pretty exciting for sure

There were a couple of major glitches in Weir's design. He used a set of diodes as an "And" gate to control the count limit for the CD4040 counters. That didn't work worth beans. Latching a reset pulse with a D flip flop (CD4013) was a simple answer, worked like a charm. For the marker beacons, he did the tone, but not the pulse gate (400 Hz for .4 sec, .1 sec quiet). The other problem I had was the oscillators for 75 MHz and 110 MHz - could not get a frequency doubler to work enough to drive the SBL-1 mixer. Probably just too much capacitance or who knows. Anyway, wound up using some oscillator modules from eBay - simple and sweet. Save the VHF experimenting for another time.

Details -

U1 is a hex inverter that generates a 32 KHz square wave. U2 is a 12-bit counter that divides the 32 KHz by 273 to get 120 Hz. U4 (CD4013) is a D flip flop that does a proper reset. U3 takes the 120 Hz and divides by 4 to get 4 signals, each 90 degrees phase shifted, at 30 Hz. 30 Hz is then the basic driving signal for the rest of the VOR signal. (Figure 3).

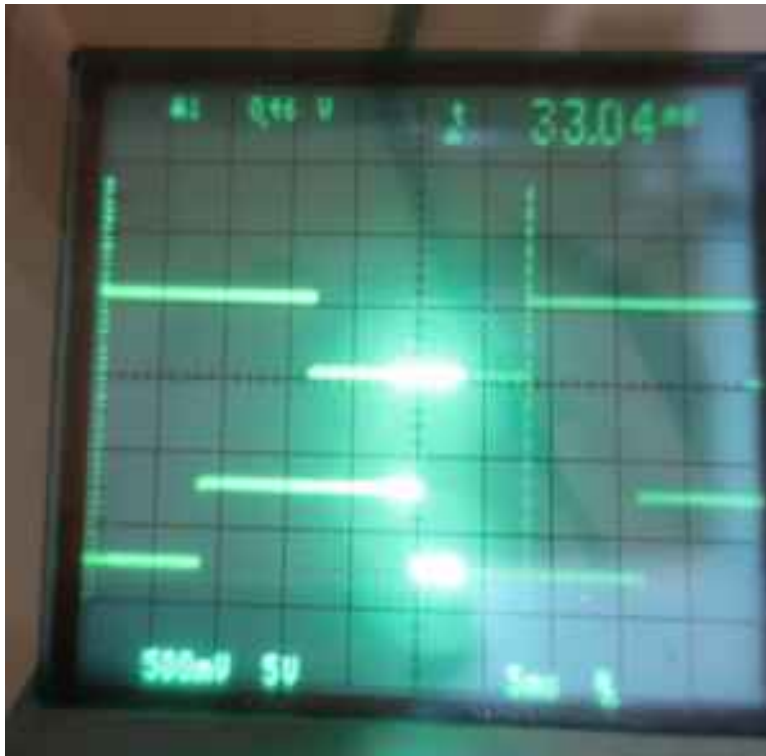
U5 is a Phase Lock Loop - phase detector and FM generator. Pretty

cute, it multiplies the 30 Hz reference by 332 to get 9960 Hz. It is a VFO, using the phase detector's output to control the voltage-controlled oscillator. The output is divided by U7 to get back to 30 Hz - when the VCO signal matches the reference signal, you have 9960 Hz. (U7 is a 12 bit binary counter - it resets when its output counts up to 332. The schematic is probably in error as it shows a divide by 340. 332 in binary is 0101001100). (Figure 4).

From there, the signals are filtered (30Hz active filters) and combined to get a complete signal to modulate the RF signal. This is crystal oscillator at 116 MHz and an SBL-1 double balanced mixer. The modulated signal is shifted by a 1N4148 diode to get a DC offset, so the SBL-1 is really an amplitude modulator (another cute Weir item).

If you're into math, the technical approach is as follows (extract credit from a very helpful article in Wikipedia, VHF_omnidirectional_range, discussion of "Conventional VOR"):

The conventional signal encodes the station identifier, $i(t)$, optional voice $a(t)$, navigation reference signal in $c(t)$, and the isotropic (i.e. omnidirectional) component. The reference signal is encoded on an F3 subcarrier (colour). The navigation variable signal is encoded by mechanically or electrically rotating a directional, $g(A,t)$, antenna to



produce A3 modulation (grey-scale). Receivers (paired colour and grey-scale trace) in different directions from the station paint a different alignment of F3 and A3 demodulated signal.

$$\begin{aligned}
 e(A, t) &= \cos(2\pi F_c t)(1 + c(t) + g(A, t)) \\
 c(t) &= M_i \cos(2\pi F_i t) i(t) \\
 &+ M_a a(t) \\
 &+ M_d \cos(2\pi \int_0^t (F_s + F_d \cos(2\pi F_n t)) dt) \\
 g(A, t) &= M_n \cos(2\pi F_n t - A)
 \end{aligned}$$

Figure 3 - 120 Hz Reference and 90 Deg Phase Signals

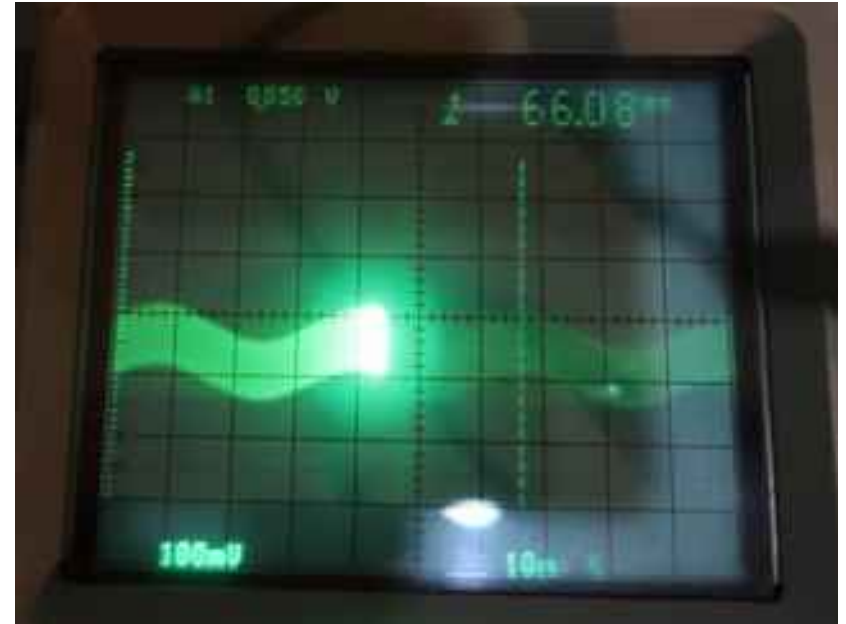


Figure 4 - The FM/AM modulating signal

The board is built with the option for external RF inputs - for the VOR, that would enable different VOR channels, not just 116.0 MHz.

The Marker Beacon is just the Outer Marker - 400 Hz, burst .4 sec

on, .1 sec off. A 555 timer is used to generate the burst gate. An "And" Gate controls the 32 KHz to a divide by 81 chip, followed by a 400 Hz active filter. The op-amp filters must be carefully tuned as they have a fairly narrow bandwidth. Figure 5 shows the gating signal (missing from Weir's design).



Figure 5 - NE555 .4/.1 sec gate signal

These signals are fairly low frequency, so the camera and oscilloscope don't get along too well.

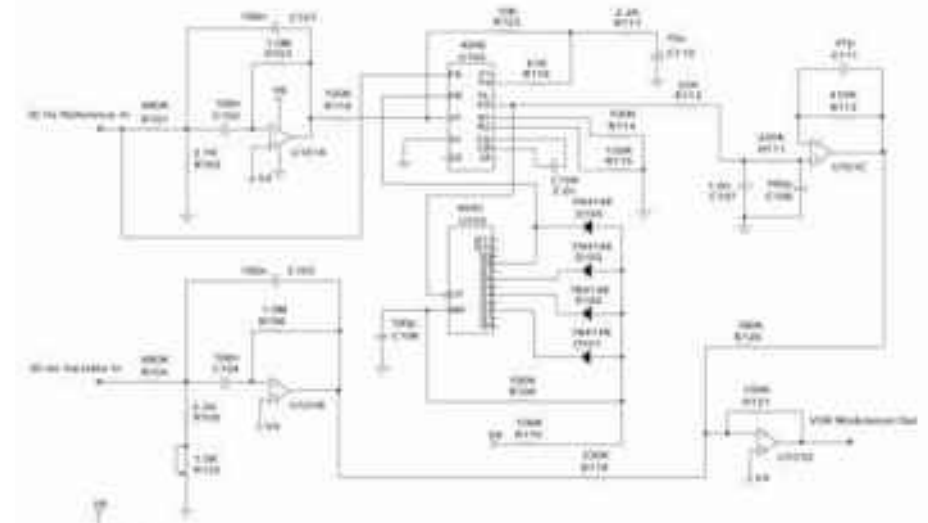
All of the logic/circuitry on the board is 5V. Power comes from a 7805 3-terminal regulator, so 12v is used from an external power supply. (Most of these projects start at 12v. Saves guessing about whether one is 5v or 12v and possibly blowing something up).

Anyway, looks like it all works. The output of the modulators is pretty low, but using a 14.2 MHz signal instead of the 75 MHz module, could hear the marker beacon on the Elecraft K2 Ham radio receiver. Another test would be to take the board to the airplane and see if anything would show up on the VOR indicator.

Bottom Line

What is really cool, about all this, is that this is all 1950's technology. It's very accurate (better than 1 degree) and the airborne radios can be very small. For example, the Narco Mk 12 is a shoebox with a VHF transmitter, and 2 VHF receivers (voice and VOR/ILS Localizer) and 1 UHF receiver (glide slope). All done using vacuum tubes. The VOR receiver decodes the signal, compares it to the Omni Bearing Selector and generates a left/right needle deflection and a To/From indication. Pretty darn cool. Some really smart guys must have worked on this.

PS - Here is a sample of one of the schematics (no more readable now than some years ago):





And if you have a certified radio repair station, you might have one of these nice little boxes on your bench for about \$6000 -

Thank You and Welcome!

By Andy Werback

OK, so here is some real Chapter News. Please Read.

A lot happens at EAA Chapter 124 that isn't really noticed or appreciated. Things by and large are pretty routine - As Volunteers and Members, we sort of keep rolling along. But a lot does happen behind the scenes that keep the motor of 124 humming along! Taking care of facilities, organizing monthly speakers and meetings, preparing and serving the monthly chapter dinner menu, organizing and executing events such as Young Eagles and Fly Outs... not to mention what the Board does, along with the Chapter Treasurer, and the Chapter Secretary... it's a LOT! A position that rarely gets enough accolades or applause is our Newsletter Editor.

After nine (plus) years as Editor of our chapter newsletter, "The Flying Wire", Stuart Deal is stepping down and moving on. 9 years! That's a lot of issues. A lot of hoping that someone will send in an article or photos... that the minutes will show up on time... that the

annual list of Chapter Leaders will be updated... that the current Chapter News will be passed along... that all the myriad of details will be submitted- and that there will be enough time to put it together in an engaging format before the deadline. It's a lot to do - and a lot to think about. And when there are no articles!! Time to get creative!

We would like to take a moment to say Thank You Stuart! Thank you for all your service- all your time and efforts - and for a job well done! We appreciate everything you've put into the newsletter- and everything you've contributed to this chapter! Maybe you'll have time now to sit back and enjoy! (somewhat similar to what I'm doing helping Sam with the dinners!).

While Stuart basks in his retirement from this herculean task, I'd like to Welcome our new Chapter 124 Newsletter Editor, Jenny Hollingworth. She has graciously volunteered to take on this responsibility. Most of you should know Jenny by now. She has been helping out at all the Young Eagle events and her husband Paul, our resident Gyrocopter expert, has been a Chapter presenter and a very active Young Eagle pilot volunteer. Jenny has many interests in theatre, communications and writing, and is currently the Board President of the California Theatre of Santa Rosa. We're very glad to have both Paul and Jenny as part of this Chapter.

My understanding of "editor" is someone who edits (corrects, completes, builds a more complete product). That in itself is a lot of work, as is keeping everything going together in a timely fashion. The reason I mention this, is that it's much easier to "edit" than it is to "create", but doing both is really asking for a lot. Therefore, I would encourage everyone to please submit articles for the newsletter! Aviation or related things you find interesting along the way, things you may write, photos and captions of aviation adventure and interesting tid bits! These submissions make the Editor's job as easy and reasonable as possible - Submit timely articles, with a modicum of proof-reading, and appropriate to the audience (we're pretty easy to please!). Let's help to make this another vibrant aspect of our Chapter!

So - Thank you Stuart, and Thank you Jenny and we wish you both the best in your exciting futures.

Please NOTE:

For submissions, Jenny can be reached at jennyhollingworth14@gmail.com. Also NOTE: The preferred format for Newsletter submissions is documents in “.doc” format (Microsoft Word), and separately attached pictures in “.jpg” format. The cutoff date remains the 20th of the month.

A Message from Our Treasurer

Dues are due!

A reminder to all chapter members that dues to the chapter are due on 1/1/25.

Dues are \$50.

To remain an active member, and to be sure to be included in next year’s roster, dues must be paid by the February meeting.

A full member requires that they be current with EAA National, and is required to have voting rights, be a board member, or to have an airplane parked on site.

And just to support our chapter, and the efforts of EAA.

Thanks!

John Whitehouse

Chapter Treasurer



(Reprinted with permission of John L Hart FLP)

Interesting Aviation Links

(thanks to David Heal)

Pricey Toys [Click Here](#)

Bhutan! [Click Here](#)

[e](#)

Newsletter Editor Notes:

from Stuart Deal

Looking forward to a little time to work on my upcoming book. If you have a chance, please submit an article to [Jenny Hollingworth](#).

EAA Chapter 124 Board Meeting Minutes December 4, 2024

Meeting convened 5:30 pm

Board Meeting Members in attendance- Dominic Cerniglio (President) Marlon Young (Vice President) John Whitehouse (Treasurer) David Franco (Secretary) Larry Rengstorf (Facilities)

Director) Michael Cingari, John Swanstrom, Jeremiah James, George Marshall and John Fluno.

A motion was made to approve the October 2, 2024 minutes. The board convened executive session to discuss a pending matter.

Open agenda items: Donation acceptance mechanism. At present no action is anticipated which would ease the processing of donated monies.

Website updates- A person needs to be recruited to make changes to the website and keep it updated in a more user friendly fashion.

Flyouts- The chapter is going to make a concerted effort to organize more breakfasts and fly-outs.

Scholarship efforts- The president and board member Jeremiah James filed out the scholarship application for the EAA sponsored national Ray Aviation Scholarship program.

Roof Leak Repair- Professional consultation was obtained to determine which technique is best to repair the roof. Repair costs are estimated to be \$2,200 max. A motion was made to allocate funds to repair the roof. The motion was seconded. The motion carried unanimously.

A motion was made to reward Rick Dabney with a year's free chapter membership and \$150 gift card for his help with the automated hangar door. The motion was carried unanimously.

Bathroom repairs and updates- Lighting and fixtures need to be updated. Efforts will be coordinated in coming months.

Simulator Donation- Member Scott Holder has arranged to get a simulator donated to the chapter. A motion was made to accept the FAA certified simulator. The motion carried unanimously.

A motion was made to dispose of the the surplus glass cabinets in the meeting room. The motion carried, 9 in favor 1 opposed.

Meeting adjourned 6:19 pm

EAA Chapter 124 General Meeting Minutes

December 4, 2024

Meeting Convened 6:10 pm

The president called the meeting to order. His first order of business was to thank the Sam Werback for her excellent efforts. The president then asked any new attendees to introduce themselves and their interests. Several came forward to share their particular stories and interests.

The chapter president then apologized that the promised speaker unexpectedly re-scheduled his tailwheel instructional presentation. The chapter president then encouraged the attendees to socialize and share their experiences fellow members.

Meeting adjourned 8:45 pm



Chapter 124 Contact Information

President: Dominic Cerniglio (24/25) (310) 628-9008
Vice President: Marlon Young (24) (707) 479-9994
Secretary: Dave Franco (23/24) (707) 494-4259
Treasurer: John Whitehouse (24/25) (707) 217-2687

Board:

Mike Cingari (24/25) 707 280 0159
George Marshall (23/24) 707 293 4583
John Swanstrom (24/25) 707 758 9017
John Fluno (23/24) 707 315 5524
Jeremiah James (24) 707 291 8445

Membership: Dave Franco (707) 494-4259

Facilities Chairman: Larry Rengstorf (707) 570-5267

Facilities Committee:

Dwayne Green (707) 544-4539
Mike Fenn (707) 481-5791
Mike Tovani (707) 838-1891
Dominic Cerniglio (310) 628-9008

Newsletter Editor and Webmaster pro tem:

Jenny Hollingworth

jennyhollingworth14@gmail.com

Technical Counselors:

Bob Gutteridge (707) 539-5188
David Heal (707) 953-5021
Jerry Rice (707) 431-0206
Kevin Quirk (707) 539-8589
Doug Dugger (530) 526-4997
Rolf Unternaehrer (707) 364-7935

Flight Advisers: CJ Stephens cell: (707) 799-2878
David Heal home: (707) 838-0261
cell: (707) 953-5021

Young Eagles: Josh Hochberg (415) 999-0949

Librarian: Open

EAA Chapter 124 5550 Windsor Road Windsor, CA 95492

Chapter meetings are held on the first Wednesday of each month at 7:00 pm. FOOD (\$10) AND SOCIALIZING (free) from 6:15 to 7:00 pm. EVERYONE IS WELCOME!

Directions: The site is located on the west side of Sonoma County Airport. Take the Shiloh Road exit from Highway 101 in northern Santa Rosa. Turn left at the stop light (west) and continue to a "T" intersection. Turn left again and follow the road to the EAA sign on the left.

Members are invited to submit articles of interest. You will be notified whether or not an article will appear in the current issue.

Please email articles to: eea124newsletter@sonic.net

Deadline for newsletter submissions is the 20th of each month. Articles submitted after that date will be included in the newsletter at the discretion of the editor. All articles are copyrighted. To reproduce any article, please contact the editor.

EAA CHAPTER 124 is not responsible for any modification or maintenance items appearing in the newsletter or in any other correspondence. It is the responsibility of the reader to get approval for such items from the appropriate A&P, FAA or other government official.