



Spirit of Flight

Experimental Aircraft Association

Chapter 14: San Diego, CA

April 2021



T-34C seen at SDM. Photo by Jim MacKinnon. 4/3

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Gert Lundgren's RV-12 returns to Hangar 3 after getting painted. 3/10



UPCOMING EVENTS

April 14th—IMC Club Meeting 1830 on Zoom. Actual scenario involving an IFR currency flight in the Chicago Midway area. Registration info on faasafety.gov.

April 17th—Zoom Meeting 1000: Ron Berinstein from SCAUWG with Pat Carey and Mike Carson. Hidden dangers in the LAX and central LA Basin. Contact Kerry Powell or see faasafety.gov for details

Chapter Briefing

EAA Chapter 14
Members



Chapter Activities: Information provided by Chapter members.

Week ending March 6: Beautiful weather still – not too hot, not too cold. And the usual suspects were present busily working on their planes: Craig Cornford, Jimmy Kennedy, Gert Lundgren, Jim MacKinnon, and Ryan. See the article “EOS Reborn” on page 4 for a progress report on the EOS. Ron Shipley’s open-heart surgery went well – we hope to see him back down at the Chapter soon. In the meantime, Gary List has graciously agreed to take over the Treasurer duties temporarily. Those present at the Chapter enjoyed a sour lemon pie made by Richard West, our resident pieman.



Ryan works on his EOS

Week ending March 13: Ron Shipley is home and recuperating. He is a bit sore, but reports, “I am doing exceptionally well, thanks to my wife, Mary Ann. She’s been such a blessing. Not only is she a good nurse, but she keeps me in line. I can’t get away with anything!” Ryan took an initial taxi run with his EOS. While he identified some issues, it was great to see it moving. Weather was sunny – even the rain on Wednesday and Thursday only occurred at night and early morning, which meant some members could stop by and chat or work on their planes. Jim MacKinnon has installed his top wing on his Nieuport project and is working on his flight control cables. The usual gang was joined by Mark Albert and Gene Hubbard. Gene is working on installing a throttle linkage and has to make mounting brackets. Alan Sparkes stopped by to do some specialized work on Jimmy Kennedy’s car – as always, it took longer than they planned and it had to be continued the next day. Gary List attended the monthly AAC (Airports Advisory Committee) meeting as our representative; hot topic: proposed Navy Drop zone at Brown. See Gary to get more information; if you have concerns or additional questions, contact Brown Field Airport Manager Andy Swartz.



Jim MacKinnon poses with his Nieuport project, now with both wings attached.

Week ending March 20: Weather this week was all over the place – from heavy winds and rain, to beautiful, warm sunshine. Bad weather doesn’t affect our stalwart members though. Ryan and Gene Hubbard helped Gert Lundgren put the wings on his RV-12. First one went in fine – second one hung up a bit. It looks like Gert could make just a small bevel on one of the wing edges and that one wing would slide in smoothly with no structural issues at all. Dan McCarthy was out for a flight with his son and his flight instructor. Gene Hubbard and Ryan were both working with metal this week; Ryan had some leftover piano hinge from his Katana project that he shared with Gene. Gene made a beautiful metal combination air filter and carb air/heat box and Ryan constructed a prototype header tank. The Serendipity Club was busy going over Club matters (and flying was involved too). Craig Cornford, Gert Lundgren, Jimmy Kennedy, and Jim MacKinnon were all active as well. On Saturday, Mark Albert, John Collins, Kevin Roche and son David, Larry Rothrock, and Richard West all stopped by, as well as some Serendipity Club members. Al Sayder came down to use the Chapter tools to make some



Throttle linkage on Gene Hubbard’s Nieuport. It’s a stock VW carburetor, but needs an extension arm on the throttle to get the angle of the cable right.

replacement control linkage brackets for his experimental plane.

Week ending March 27: Some rain and sun, more rain and sun – typical March weather. Members kept their hangar doors closed as they worked on their projects as the wind was cold. But on sunny days, we had a variety of visitors and members stop by to look at the planes, shoot the breeze and help out where they could in keeping the Chapter looking presentable. Larry Rothrock, Gene Hubbard, and Ryan discussed a possible hangars donation. Hope we get some good news about that soon.



Kerry Powell, Program Director

April 17—Ron Berinstein with Pat Carey and Mike Carson present installment #1 in a new series of safety presentations. This presentation, called “Hiding in Plain Sight – Avoiding Airspace Danger,” focuses on the area surrounding LAX and the central LA Basin. Ron, Pat, and Mike expose hidden dangers that exist daily but are sort of invisible. They also offer a free-to-use flight application that can be downloaded for use with Foreflight and/or Garmin Pilot, that will help pilots to safely navigate the area.

Ron, Pat, and Mike are all associated with the Southern California Airspace Users Working Group (SCAUWG). SCAUWG works to keep SoCal airspace safe and accessible for all users. Pat Carey is a co-founder of SCAUWG. Ron Berinstein acts as the SCAUWG Webmaster, produces monthly SCAUWG Zoom meetings, and has authored over 100 aviation seminar compilations.

This will be a Zoom meeting. We will e-mail invitations to members, otherwise contact Program Director Kerry Powell, or visit faasafety.gov and select Region WP09 for further information.

Ray Scholarship Update

Ryan Flores

After a brief hiatus on my flight training, Paul and I were able to start again, completing a stage check and some flight planning and navigation refresher lessons before flying a dual cross-country to KF70. Most recently I was able to complete the flight to KF70 solo, and we will continue to complete the cross-country flying before moving into checkride prep.

I'm looking forward to continuing my training and earning my private pilot certificate.

Thanks for your support and encouragement!



President's Message

Gene Hubbard



Several topics this month: scams, scholarships, and spread. Bad news first—the gift card scammers are after our members again. It generally starts with an ambiguous e-mail message like “Got a minute?” that claims to be from one or our members or directors. Usually a totally bogus e-mail account, but sometimes from a real account that’s been hacked. The conversation goes on that the sender can’t get to a telephone and has some sort of emergency—I think the latest was the need for some sort of surgery. Finally there’s a request to purchase gift cards and e-mail the identification numbers to the scammer. Bottom line is that we’re not going to ask you for money. Not that way, anyway.

Next topic is the 2021 Ray Scholarship. Ryan Flores, our 2020 Ray Scholar is finishing up his training and preparing for his checkride (see below), and Chapter 14 has been approved to sponsor another scholar for 2021. This is for \$10,000 toward private pilot training for a 15-19 year old. We’re taking nominations for this award until April 15th. Contact Trinidad Lopez, our Ray Scholarship Coordinator (bajassy@aol.com) for further information and an application form.

Finally, our “spread.” We’re working with the City to exercise options to expand our leasehold and we have a lead on some additional hangar donations. Exercising this option will extend our current lease until 2035 and let us expand our educational mission, including more space for members projects. But we’re a volunteer organization—more space means more work to do and we need more members volunteering. Contact me or any board member if you want to help us continue to grow and secure our spread until 2035.

Gene Hubbard



Ryan checks the stall warning system for insects during a pre-flight inspection.

EOS Reborn

By R. S. Ryan

Stop by my hangar at EAA Chapter 14 to see the EOS prototype, named after the Queen of Winds in Greek mythology.

Designed by Fred Smith, an engineer with an auto racing background, Sport Aviation carried several articles about this sleek, all-metal aircraft, which was being actively readied for kit sales back in the late 70s. The shape of the fiber glass engine cowling was originally sculpted in clay, resulting in accurate and smooth molds. The aluminum fuselage skin was all flat wrapped – no compound forming. An additional feature was a fully retractable tri-gear.

The information kit noted the following airframe and flight-tested capabilities:

- Empty weight, 670 lb
- Gross weight, 1000 lb
- Length, 16.7'
- Height, 6.5'
- Span, 26.0'
- Aspect ratio, 9/1
- Wing area, 75 ft²
- Flutter: Aileron, elevator and rudder tested to 190 T.A.S.
- Stalls, 55 mph I.A.S @ 4500' M.S.L.
- Cruise, 175 mph T.A.S. @ 70% power @5000' M.S.L.
- Cruise @75% power = 180 mph
- Max rate of climb S.L. 1100 fpm
- S.L. rate of climb tested 1000' fpm
- Glide ratio = 14.8/1
- Takeoff roll tested = 1000'
- Fuel consumption = 4.5 gallons/hr @70% power

The kit material further noted that “EOS/SFA is a single-seat aircraft that combines high performance, sophistication and efficiency. . EOS/SFA is not intended to be the simplest aircraft to construct. It is a balance of maximum design efficiency and minimum complexity. Superior L/D characteristics are offered by the use of custom wing spar extrusions, which provide the strength for one of the highest aspect ratios available on a normally powered aircraft.”

Although there was a lot of positive buzz about the plane at Oshkosh, only 2 other planes were made and mine was the only one that flew. It is a beautiful plane with an interesting past and hopefully an interesting future.

Originally designed to use a 2 stroke engine, it later had an 1834cc RevMaster VW installed; later still the engine grew in size to a 2276cc Great Plains engine, with Ellison throttle body carburetor and a Prince P-tip 52 by 50 two-bladed prop. According to the seller, it had 140 out of the 154 hours TT successfully flying in this configuration.

I hadn't known anything about this plane, but looking through our EAA Chapter 14 Library, I found an information packet about it. I liked the look of the plane and did some research on the Internet. By chance, I stumbled onto a photo of the finished prototype, along with an e-mail



Ryan's EOS, all assembled on the EAA ramp.

address for the photographer/owner. Eventually we arranged a time and place for me to drive and tow back the plane from Dayton, Ohio several years ago.

Once I got it back to EAA Chapter 14, I had to get to work and see what I actually had. I knew it had flown, but what was its condition after sitting for a long time, sometimes out in a field? I got rid of the water in the two wing fuel tanks (since they are aluminum I was concerned about corrosion). But I knew the tanks needed further research to see what shape they were actually in.

Next, I needed to know the current weight and balance—both the empty weight and with the pilot on board. A number of members helped me with this—it was definitely not a one-man operation. We started by putting the wings on the airplane and then the airplane on the scales in order to find the actual empty weight for the aircraft and the static CG. Next we measured the empty weight with pilot on board to determine the pilot CG. Then we put it back on the ground and measured the different fuselage stations. Because of all the help, I now had the information I needed to do an initial W&B.

Next we put it on saw horses to get the main gear off the ground in order to check the retractable gear mechanism, both to see how it would work and how it would feel from the pilot seat. At first all controls were stiff and difficult to move; I even thought that the Johnson bar was bending (it turned out it wasn't). On our first try, we couldn't get the main gear up without someone helping it up by hand. So we lubricated all the hinge points we could find and finally got the gear so it would fully retract. But it still took way too



Preparation for gear retract test. With the plane on jackstands, Ryan cycles the landing gear

much pressure on the control bar for a small pilot using his left hand. After that we cycled it several times, but I was still disappointed at the amount of force it took to cycle the gear. In fact, it seemed it would be impossible to both fly the plane and retract the gear in the air. However, the next day I found some more areas to lubricate; after another liberal application of WD-40, I was able to retract the gear in one smooth movement of the retract bar.

I was concerned that the engine cylinders might have rust in them as the plane had been sitting for 12 years, 6 inside and 6 outside. So, a friend and I got right to work to find out. We removed all the spark plugs, blew air through the cylinders to clear them out and then lubricated the cylinders with fogging oil through the spark plug holes. With the spark plugs out, we turned the prop by hand and didn't find any resistance by rust or anything else. At this point we hooked up a battery to the starter and turned the engine over so that the oil pump would lubricate the lifters and the internal engine parts. Then we ran a compression test -- all the cylinders were very high. Next we checked to see if we had a spark. No luck—we couldn't get the original electronic ignition to fire the plugs. So we removed that ignition and installed a distributor which we knew worked. At this point we had both compression and ignition—now all we needed was fuel to make the engine run. We hot-wired the distributor, hooked the jumper cables to the starter, sprayed starting fluid in the intake manifold, and backed away. Suddenly, the engine was running. What a relief – the engine appeared to be OK.

Things looked really positive – but then life got in the way and it looked like I wouldn't be able to work on the project anymore. I even sold the plane to a man in Canada who had great plans to use it for work. But he never came to pick up the plane and when the business went bust, he finally asked me to put it up for sale for him. I really hadn't wanted to see it go in the first place, so I just bought it back. Finally I decided to start working on it again when new member Patrick Cooley wanted to help work on a project and I thought that the EOS would be just the ticket.

I chose to start on the fuel tanks as I knew I had some dirt in them. Patrick took out the left fuel tank so we could take a better look at it (took over 100 rivets to do that!). It didn't look too bad. But since fuel starvation is one of the biggest problems on a new project, I knew I would need to have fuel filters to make sure no contaminants were getting through and into the engine.

I next took a look at the brakes. Back when the plane was first built, the designer used Harley-Davidson rear brakes which were a great choice for the time. But by now they were 50 years old. The piston on the first brake cylinder was frozen and it took almost an hour to get the piston out and cleaned up. The metal main discs were also rusty and the rust had to be ground off. However, once everything was cleaned, and put back in, the brakes seemed to be mechanically fine. But I had used aviation brake fluid on them – and Harley Davidson brake seals do not like aviation fluid – the O rings swelled up and deteriorated in about a week.



Don't do this!

Harley Davidson O-rings and MIL-PRF-5606 don't mix. Ryan had to go to eBay to get new ones.

It seemed like no one in San Diego had the O rings I needed to start over. Finally some Harley-Davidson rings I ordered on eBay came in. This time I used automotive brake fluid and all went as expected.

Next up, I had to get the retractable nose gear and main gear working again. I had fixed them when I originally got the plane, but they needed work once more after sitting for a while. At least I knew the secret for smooth operation this time.

I then hooked up the starter, battery, distributor, and ignition and replaced the oil cooler. The next step involved installing the carburetor and intake system. I had used the original carburetor on a different plane, but I found another one that would work. However, this required making a new manifold as I needed to put the carburetor in a different position. I bought VW parts, but had to go from a large size pipe to a small pipe and I bought silicon intake boots. Now I only have two connections on each side as the pipes are welded. I also replaced the old rubber connections. I then hooked up the manifold runners from the carburetors to the heads.

Once that was done, I sprayed ether into the carburetor and the engine started. Jimmy Kennedy had a spare gas can and we filled it up and hung it up like an IV. With this fix, the



IV for airplanes. Jimmy Kennedy's spare gas can hangs from the hangar roof and supplies fuel for Ryan's first EOS engine start.



Ryan runs up the EOS engine. You can tell that the prop is spinning because it looks warped on the image.

engine actually turned over and kept running. I realize I may need a fuel regulator, but so far I was OK.

Finally, the EOS was ready for an initial taxi run with a temporary fuel tank. The engine seemed rough – but that was to be expected as I hadn't had an opportunity to set the timing. However, the plane wouldn't move, even when applying more throttle. Finally the brakes released and it started moving. The delay may have been caused because the brakes hadn't been seated and they finally worked themselves into place. However the delay highlighted another problem. At one point I thought the brakes weren't working, but then discovered I had my feet in the wrong position on the rudder pedal. This showed me I would have to redesign the pedal to fit me.

While I was working on the plane, I realized I needed to do something about the instrument panel. The EOS has a really nice instrument panel, but I knew I needed to remove all of the old wiring and rewire everything that I would keep. I decided to make up a temporary simple aluminum instrument bracket that could standalone and that would be easy to move forward when I was working on the plane. I prepared the basic panel and cut a hole in it for the quad instrument. Then member Nigel Worrell came down to help me wire it up. It was a frustrating process as much of the wiring needed upgrading or replacing – and the Quad itself seemed to have issues. Nigel took it home to check it out. Good news: Nigel repaired my 4 in 1 Quad instrument saving me \$400, the price for a new one. He told me what he had to do to get the job done. "The quad is all working. The oil pressure sender also works. I was able to test oil temp using a resistor. I had to make mechanical repairs to the oil pressure and oil temp gauges. The oil pressure needle was binding on the case; it had been bent. The oil temp had a spring coil deformed. I identified the wiring. I had to draw the circuit out. BTW, you may know this, but this oil pressure sensor has to go with the quad." I replied that the reason I took the gauge apart was because the glass cover was loose and moving around so the needles probably were bent for sometime. He also stated, "I had an interesting chat with Westach today. I know a bit more than I did a few days ago. He confirmed my circuit drawing, told me some history of the part. He was very pleasant." I

decided to reuse the Kop-flex couplers I had as the ones I saw on eBay had not been modified so they would be different.

I kept running through my list of tasks: troubleshoot and replace EGT, change spark plugs to iridium to troubleshoot rough idle, and adjust distributor timing. Nothing ever goes as smoothly as one would wish, and I found out that I had advanced the timing too much, so the aircraft wouldn't even start. I readjusted the timing and it now runs smoothly.

I decided I wanted to make a larger header tank. It was extremely difficult to make a template with the bulkhead in the way, so I took it out.

This necessitated moving wires and hooking them back up (never ending process). But now I have plenty of room to work. In front you can see the temporary panel that holds the Quad and switches.



Before and After. The cockpit front bulkhead, shown in place on the left, made it impossible for Ryan to make a template for his new header tank. Removing the bulkhead (right) gives room to fit the new header tank. The quad engine instrument is visible on its temporary mount in the center of both photos.

I made a cardboard box mockup for the header tank. It provided a 4-gallon tank (instead of 1 gallon), which means, when combined with the wing tanks, it should be good for 400 miles as a conservative estimate.



Cardboard mockup for Ryan's new four-gallon header tank. Cardboard is easy to work and cheap—Make your mistakes here.

Actually fabricating the tank was difficult as the .050 aluminum metal I used to form the header tank was thick. But I used the Chapter metal brake to bend the metal and the shear and hand tools to cut, modify, and trim the metal and I ended up being pleased with the fit of the prototype.

However, I had to go through a learning curve with the fuel tank sealant. It was difficult to measure the two components accurately and I didn't have the ratio correct for the small amount of sealant I needed. I also didn't realize how long it

Partially fabricated header tank in the EOS fuselage.



took to set up (72 hours, not overnight). I ended up making a new tank, but it had a silver lining. I was much more careful with the fabrication this time around and it looked better.

I then had to prep and install the various fittings for the header tank.

Fuel Tank Fittings.

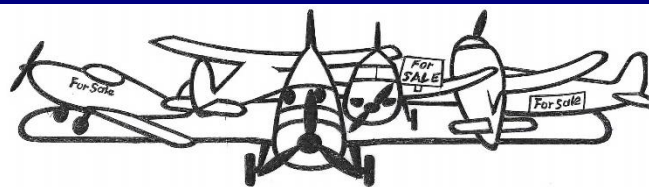


I finally was ready to start doing the final riveting. Mark Albert suggested trying Ababa in El Cajon to get the rivets I'll need for both the header tank and replacing the wing tanks. It was a good suggestion – got a good price by buying in bulk. Here's the final riveted tank – all fittings in place, including the fuel sight gauge. With the finished permanent tank installed, I was able to do more taxi testing – and everything worked well. I'm happy with the results.



Finished header tank, riveted and with a filler and sight gauge.

Though lots more needs to be done before the EOS can fly, I'm really satisfied with the recent progress and I've really appreciated the support and encouragement given by Chapter members.



Marketplace

SONEX-A KIT. Firewall aft with empennage. Has VW engine mount and assembly manuals; no wings. Asking \$2,500 or make offer. Text Ryan at 858-229-4875 for more information and additional pictures. (3/21)



HANGAR AVAILABLE AT RIVERSIDE AIRPORT. Port a Port Exec 1, 42' wide. For sale for \$16,500. Ground rent is \$256/mo. Includes elec/trash/porta-loo/security-lighting. Available March 1, 2021. Excellent condition. Contact mikerox2500@gmail.com (2/21)



Aircoupe in the SDM pattern. From the bubble canopy, it seems to be an Alon. 3/30

April 2021

Facebook

<http://www.facebook.com/pages/EAA-Chapter-14-San-Diego-CA/134162329986593>

Chapter Website

<http://www.eaa14.org>

EAA Chapter 14 Memberships

Applications are available at our Brown Field hangars and on our website.

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Chapter Events

Open House at the Brown Field hangars:
every Saturday from 9:00 am to 2:00 p. Lunch at 11:30

Young Eagles Flights:
9:00-1:00 am, second Saturday of the month

Pancake Breakfast:
7:30-9:30 am, third Saturday of each month

General Meeting: 10:00 am, third Saturday of each month

Directors Meeting: after lunch in the library. 3rd Saturday

Hangar Phone:

619-661-6520

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