The
Flightline

EAA Chapter 958 San Marcos, TX
Where every day is a good flying day!
October 2015 Issue

Experimental Aviation
The Success Continues...
EAA Chapter 958

October Chapter Meeting at Redbird Skyport

The October meeting will begin with coffee and Do-nuts around 9:30 am followed by the regular meeting at 10:00 am Saturday 10/17/15.

Program: Current Projects overview at Redbird

By: Nick Rizzo - Flight Training Technical Designer

Prez Sez

Greetings 958

It is hard to believe that we are quickly approaching the end of the year. We have speakers set for this month and November. Mr Nick Rizzo will be with us on Saturday to update us on the programs and technology coming from Ridbird. Mr. Rizzo is the flight trainer technology designer with Redbird. We will again have coffee and do-nuts starting around 0930 with the meeting getting under way at 1000 hrs.. Next month Hank Gibson will be discussing the right glass panel for your homebuilt. Finishing the year will be the Christmas party which tentatively will be held there in San Marcos. Should have the details on the facility in the next few weeks. there is a speaker for January Mr. Chis McCrank with a discussion on mountain flying. The Chapter will Be electing officers in January too, anyone interested in serving as and officer is asked to please let us know so we can include you or your nominee on the ballot. Chapter Dues will be due first of the year and please send an updated membership renewal form with your payment. This helps us make sure we have everyone's correct email address and we can get postings to you all.

We have made some great head way with the chapter over this last year. With having speakers just about every month and the fund raiser with Redbird at the spring fly-in. And not to forget the young eagles events held this year. We will certainly try to kept up the momentum with this next year and hope to include an activity for the chapter members to all meet somewhere, at a fly-in, or just some time or place to have a meal. There has been a number of folks asking about the pancake breakfast and if it will return. I've had some discussions about this and are looking to bring it back starting in January. So that where wher we are for the rest of this year and the beginning of next year. Please Come on out to the meetings and enjoy the chapter.

Phillip Steele Sr.

EAA Chapter 958 September Meeting Minutes

- Christmas party details should be finalized this month
- After the first of the year Phillip will not be interested in seeking another officer position
- Elections are coming up in January...please consider it
- List should be finalized in December
- EAA Leadership Academy
  If anybody is willing to go, the chapter will cover a portion of their expenses approx. 50%
- Will Hartsell is attending the weekend of September 27th
- The academy is free. Room/board free. You just have to get yourself there.
- A presentation on history of aviation fuel was given by Stephen Earl

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Editors Notes

WOW. Do we have things going here at Chapter 958. We've had a pretty successful year with the pancake breakfasts, the Redbird fly-in, the first Young Eagles program at San Marcos, and a super place to have our 958 meetings. The officers wish to thank everyone that has participated in the activities, and hope we can garner even more support and members in the upcoming year.

I'd like to thank Jon Sanders for sponsoring a subscription to "Contact! Magazine". It looks to have some great coverage of engines and some of the "grass roots" homebuilt activity. I'll bring a copy to the meeting. And thanks to Stan Timmerman and Steve Dixson for their contributions to the newsletter this month.

As an active aviation group we have an opportunity to let the local communities know what we're all about and and elicit their participation in the activities. If we begin advertising ourselves to the Chamber, the schools, the local professional groups and the rest of the local aviation community, growth and recognition will surely follow as long as we're always professional in our approach.

In addition to the EAA Young Eagles program, there is the Eagles program designed to bring interested and qualified individuals into flight training. The AOPA has their "Rusty Pilot" program, designed to bring former pilots back into the fold. There are a multitude of opportunities whereby the chapter can reach out the community and share the aviation experience.

And of course there are the chapter members who are building their own (flights of fancy) that may need a helping hand "literally", to get their project out of the garage and into the air. This is where an active membership can shine – providing the additional help and expertise to help fulfill the dream.

So give it some thought – "ask not what your chapter can do for you, but ask what can you do for the chapter." (sorry JFK)
Blue Skies and Tailwinds,
Russ

# Metal Saw from a Wood Bandsaw
By Stan Timmerman

Building a tube and fabric airplane requires simple tools. In a production setting, speed is more important than the price of the tool. I prefer to make use of what I have or can easily get. This article deals with my first attempt at cutting 4130 steel. I need to cut sheets and tubes. It is not hardened tools' steel but it is not far from it.

I purchased an old Sears band saw off craigslist for $50. Wood working equipment is common. I did not find it to be useful for cutting aluminum ribs or mdf form blocks. I decided to re-purpose it for metal. There are several problems with using wood equipment for metal.

The first problem is wood band saws typically have a blade speed in the area of 3000 ft/min. A metal band saw needs to have a blade speed closer to 300 ft/min. The second problem was I could not find a blade for cutting metal. Metal blades are typically called bi-metal. Wood blades are just carbon steel. Bi-metal blades are tool steel welded onto a flexible carbon steel backing.

My first project was modifying my band saw. I considered trying to get several counter shafts and pulleys to reduce the speed of the blade. However, a ten to one reduction requires several shafts and a million dollars in pulleys and bearings. I decided to take a different approach.
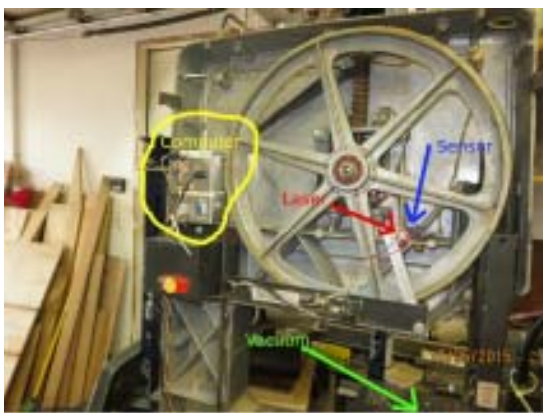
I broke open a cheap laser level and stole the laser. I then got a photo sensor and arranged the laser and photo sensor to count the spokes of the wheel. In the picture, just follow the wires to find the laser and the sensor. I then made a little computer. The computer is in the silver box above the original red switch. The software counts the rate of spokes flying by and turns the motor on and off. AC motors are not meant to be operated this way, and I hope to finish my airplane before something bad happens. Fortunately, I have a box of junk motors. The speed of cutting metal is manageable if not terribly fast.

I also added a vacuum to pick up metal chips.

The next problem was finding a blade. An 80 inch bi-metal fine tooth blade is not easy to come by. There was a local solution. The big box stores sell portable metal band saws. The saws are expensive, but the replacement blades are not. I was able to buy a box of replacement blades each 44 7/8 long. The cost was $15 for a package of two. The next problem was welding the two blades together.

From my days of running around a junk yard, I had salvaged a large chunk of aluminum. I had intended to be buried with it. After much thought, I decided this project was worthy of using it instead. There are many ways to make a jig. YouTube can be an excellent resource. I cut a ledge to hold the blade and added a couple of toggle clamps. The area in the center is where the weld will be made. The orange fan under the table is to keep the mosquitoes off of me. I lose more blood to them than cuts.

Before I took band saw apart I cut a slot in a piece of mdf. I tried to get about a twenty degree angle. I then used a sanding disk mounted in my table saw to "scarf" the end of the blade. Holding a blade in the slot the same way produces the correct scarf. It requires a little thought to join two unrelated blades since the final product has to have all teeth going in the same direction. The "scarf " can be seen on the blade laying on the box above.

I find dremel tools to be invaluable. Here I use a brush to clean up the edge near the scarf. Welding requires everything to be clean. The silver solder is also cleaned.

The picture to the left is a scarfed blade (top on one side bottom of the other side). There is also a tiny fleck of silver solder laying near the future joint.

After carefully overlapping the two opposite scarfs, I apply a flux made for silver solder. I then sneak the fleck of silver solder between the two blades at the scarf.

Then with a small flame I warm the area up. I am trying to drive off all liquid. The area will first bubble like caramelized sugar. Then when it is completely covered in crystal, the flame is brought close to reach silver solder melt temp. People that do silver solder call it flashing. The crystal material turns into a glass like material as the temp goes up. Then very suddenly the silver flashes and flows.

I try to move the flame away slowly, to help anneal the area of the weld. I then release one of the toggles as quickly as possible. I do not want the thermal contraction felt at the weld site. In truth when I first laid the scarf together I did not completely overlay them. My thinking is that when I heat them they will expand and be the correct distance. If that is so, when I weld them and let them cool I have to let go of one side so they can contract.

One last step, I use a dremel to clean up the glass like flux and make sure that no bumps from silver remain.

This is my life time supply of hard solder. Hard silver solder melts at a higher temp than medium silver solder. Medium silver solder melts at a higher temp than easy silver solder.

I first polish it with Scotch Brite then cut out a tiny sliver of silver. Keep it clean, no oxides, no finger prints.

Silver Sheet Solder, Hard Item #: 101702
http://www.riogrande.com/Product/Silver-Sheet-Solder,-Hard/101702

After a few years it drys up. I use a child's rock tumbler to turn some of it back into a paste.
Replacement belts for rock tumblers can be purchased from harbor freight. Tumblers are often found at GoodWill.

Handy Flux Paste Soldering and Annealing Item #: 504086

I use my tumbler for quart size paint. I like tools that you turn on and walk away.

http://www.riogrande.com/Product/Handy-Flux-for-Soldering-and-Annealing/504086?Pos=1

Live Weather and Traffic for Less Than $120

By Tom Charpentier

For decades, the homebuilt movement has allowed pilots affordable access to the latest in aircraft technology. One area where it hasn't always been so prominent is in the field of cockpit electronics. Now, however, several talented programmers have begun turning inexpensive, off-the-shelf parts into very useful gadgets that take the place of commercial devices costing many times more.

The device we are currently testing with a custom case and aftermarket antenna

One of these programmers is Christopher Young, EAA 1184340, who turned an inexpensive miniaturized Linux computer, a digital radio tuner, and a Wi-Fi adapter into an ADS-B receiver that interfaces with most tablet apps on the market today to bring live weather and traffic to the cockpit. We built and tested the unit for a total cost of under $120 (Avgas not included). The software is free and open-source, meaning it is open to community development. He calls his software "Stratux."

Young's instructions are found [here](#): Let's take a look at how it goes together:

Assembly and loading the software is very simple. We were able to get our unit working with no coding on our part or really any technical work at all. However, you will need to do a little shopping first.

Getting the parts

The "brain" of the unit is the Raspberry Pi 2, a small, simple computer about the size of a deck of cards that uses the operating system Linux. It was originally designed as an inexpensive computer to teach aspiring programmers how to code (you could hook up a keyboard, mouse, monitor, network cable, and speakers to it and use it as a fully functional desktop computer), and has since been used in robotics and other applications requiring a small computer that can be easily adapted to suit different roles. You can buy just the Raspberry Pi, but several companies sell an aftermarket kit that includes the peripherals you will need for this project. This is what we did, as per Young's instructions. The "Vilros" starter kit costs about $70 on Amazon.com.

Vilros starter kit – Excluding documentation and packaging, includes (clockwise from top left): AC power adapter, self adhesive heat sinks, microSD card and SD card port adapter, WiFi adapter, HDMI cable (not used for this project), Raspberry Pi 2, clear plastic case

With the Pi and starter kit, the only other peripheral that is required is a software defined radio (SDR) tuner. Young's software has been tested to work on a device from NooElec called the NESDR Mini 2. It is currently available on Amazon for less than $25 and also includes the antenna you will need.

The NESDR 2 comes with a telescopic antenna and a remote control (the latter not needed for this project)

The Raspberry Pi does not contain an internal battery, but is powered via a micro USB cable, the same type of cable used to charge most Android cellphones. You can either run the unit directly off your aircraft's power system using a car charger (if you have a cigarette lighter-style 12V outlet) or by using a USB external battery, which you can buy for a little over $10.

Assembly

Assembly really couldn't be easier. Our starter kit came with self-adhesive heat sinks to prevent certain chips from overheating on the Raspberry Pi. These are on top of the unit and it is easy to pick out which to attach.

As with any project working with delicate electronics, be sure to ground yourself for static before touching the Pi

To install the necessary peripheral devices, simply plug the radio tuner and the Wi-Fi adapter into the Pi's USB ports.


*The USB ports used do not matter, but we liked the form factor of this arrangement*

You can enclose the Pi in the case your starter kit provides.

Loading the Software

The hard drive of the unit is a microSD card, the same data storage device used in many small cameras such as the GoPro. For this step you will need to connect the card to your computer. Many modern computers have either an SD or microSD port, and our starter kit includes an adapter that allows you to go between the two. If your computer does not have a built-in port, USB card readers are available inexpensively at any office supply, electronics, or photography store. Christopher has preconfigured everything you need to load onto the card to make it work the first time you plug it in. Download the latest release from here and load it onto the card using Win32DiskImager for Windows or Pi Filler for Mac. Both programs are simple and fairly straightforward.
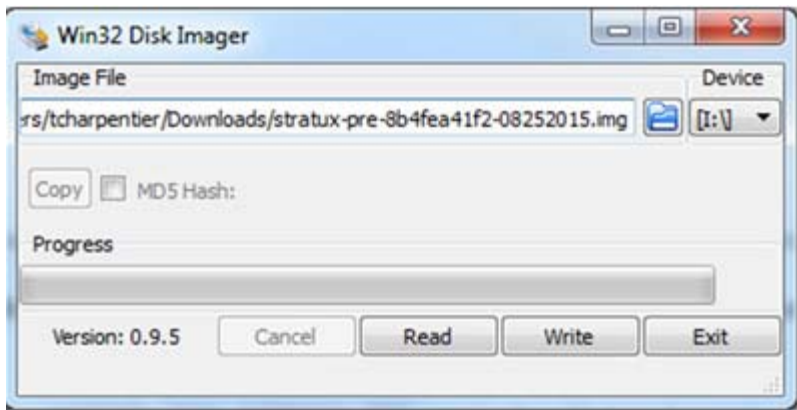
Win32DiskImager; "Image File" is the file inside the zipped folder you downloaded from Young's website, "Device" is your card port
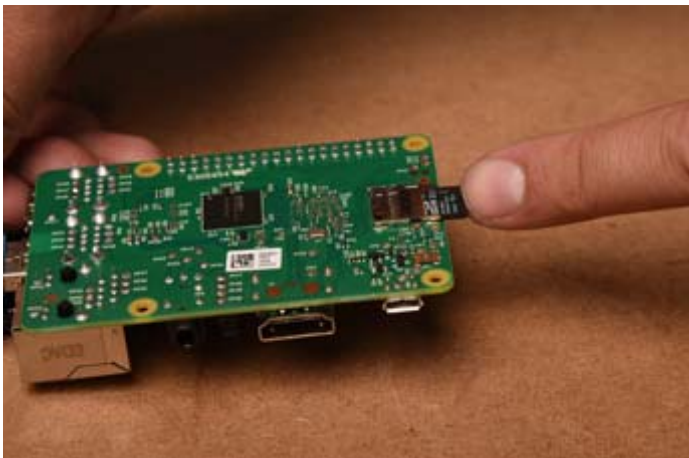
Once you are done loading the software, simply slide the microSD card into the slot on the underside of the Raspberry Pi.

Pairing to Your App

Stratux works over Wi-Fi using the "GDL90 Protocol," a standard data format for ADS-B in used by many receivers and most apps. For our iPad running ForeFlight, it was as simple as logging onto the Wi-Fi network broadcast by the unit, and ForeFlight automatically began using its data. Most apps other than Garmin Pilot, which exclusively uses a proprietary Garmin device, have been reported to be compatible with Stratux.

Bench testing the device – you should be able to pair with your app at this point but it is unlikely you will receive any data unless you are in close proximity of an ADS-B ground station

A brief flight test will confirm that the device is working. If you are using the telescopic antenna that comes with the tuner, it actually works best when retracted for this particular wavelength. We mounted ours on the glareshield pointed vertically, but depending on the construction of your aircraft this is not always necessary.

The extended cord on the antenna also allows for remote mounting


In most areas an ADS-B in signal can be had at or just above pattern altitude. You will begin receiving NEXRAD radar, METARs, TAFs, NOTAMs, TFRs, and other Flight Information Service – Broadcast (FIS-B) products. Some apps will explicitly note that these products are being received via ADS-B. With one radio tuner the unit will pick up traffic squawking ADS-B out on 978 MHz. If you are ADS-B out equipped, you will also receive TIS-B traffic. TIS-B is datalinked to FAA radar, meaning you get Mode C and primary targets. EAA is working with the FAA to expand TIS-B availability to all aircraft, not just those equipped with ADS-B out.

Screenshot from a recent flight to Iola, WI showing precipitation on NEXRAD radar over the U.P. (ForeFlight recognizes the unit under "FreeFlight" because that system also uses the GDL90 Protocol)

Important Note

This is not an ADS-B out solution. It can quickly become confusing anytime we talk about ADS-B, but Stratux takes advantage of the in component of the system, which can be used to bring live weather and traffic to the cockpit. To be compliant under the ADS-B 2020 mandate, you will need a transponder compliant with FARs 91.225 and 91.227.
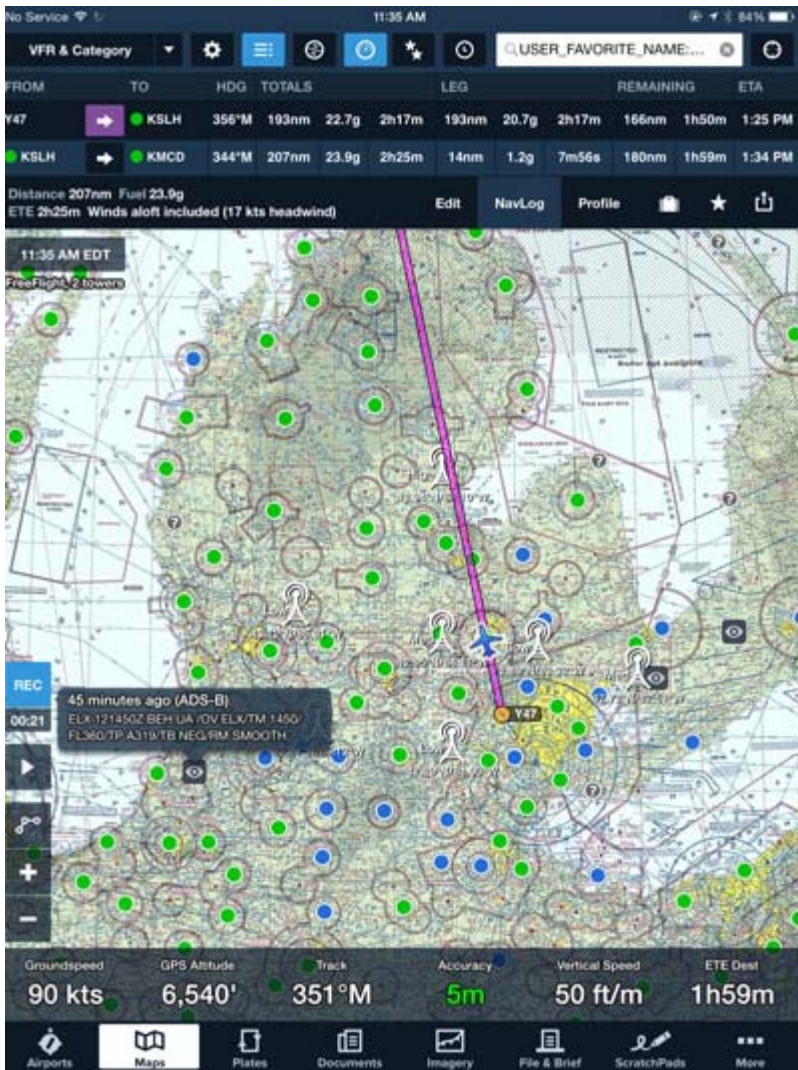
Chris sent us this screenshot showing a pilot report loaded through ADS-B

Extensions

There are a number of modifications and add-ons for this device. We used a 3-D printed case specifically designed for this project and an aftermarket antenna to fit everything into a compact package (we are still testing the antenna to determine whether it is as effective as the one packaged with the tuner).

For the enterprising amateur builder, a more streamlined antenna option might be to permanently mount a standard transponder antenna to the bottom of the aircraft and wire it to the unit. The tuner accepts a male MCX connector.

With a second digital radio tuner Young's software will support traffic information from aircraft squawking on 1090 MHz, which most commercial aircraft do. He is also working on adapting a standardized gyroscope and GPS chipset to provide position and AHRS data to apps that support it.

If you want a complete, well-packaged, off-the-shelf, and, perhaps most importantly, fully supported, device, then you'll want to check out the Stratus from our good friends at Sporty's, not to mention the Garmin GDL-39, the Dual XGPS170, the Levil Tech iLevil, PowerFLARM, and many others. But if you want to tinker a bit, consider building your own. Just as in other aspects of homebuilding, the only limit is the builder's imagination. The software and hardware are made to be modified and improved. We're excited to see what you'll come up with!

Pictured is a 978 mHZ antenna we found online; Others have reported success with the antenna off a Garmin GDL-39

ELM CREEK FLY-IN

Elm Creek Airpark, Seguin, TX

19th Annual Fly-In

Saturday, October 31, 2015

10am to 3pm
Lasagna Lunch starting at 11:30
$9.00 per person – Halloween attire encouraged
Raffle at 12 pm

Randolph AFB is having an airshow the same day from 9am – 4pm with 5 mile radius TFR. Check NOTAMS before heading to Elm Creek.

AIRCRAFT PARKING
Multi-com Frequency 122.9
2280 x 80 ft. turf
Elevation 550 ft MSL
4 mi. SSW of Seguin

FAA Identifier: 0TX6
Monitor 122.9
Look for "Follow Me" golf carts
WX ASPS at BAZ
119.325 (830)629-7979

TRAFFIC PATTERN
RUNWAY 14 LEFT
RUNWAY 32 RIGHT
LAT/LONG: 29-30-18N/097-59-49W

Fuel @ New Braunfels 12 nm N
Aviation related questions?
Call Steve Sewell – 210-844-2156 or
email: sjsewell@gmail.com

Sponsored by Elm Creek Homeowner's Assoc. Social Committee
For prior fly-in photos see www.elmcreekairpark.com
Carol Sewell – Publicity – 210-844-2155 or casewelltx@gmail.com

Driving Directions
Fly-In is at 201 Tailwind Drive, Seguin, TX 78155
(Approx. 1 1/2 -2 miles West of the intersection of State Hwy 46 and FM 467 south of Seguin)
Please follow and obey all sign. Aircraft have right-of-way on streets.
Yield toaircraft taking off, landing and taxiing.

Aviation Safety Programs and Webinars
EAA Sponsored webinars (free)

Upcoming webinars include the following topics and presenters:

October 14 - 7 p.m. CDT
Designing the Perfect Paint Scheme
FAA AMT Credit
Presenter: Craig Barnett

October 21 - 7 p.m. CDT
Prepare for Your Checkride and Pass
FAA Wings Credit
Presenter: Larry Bothe

October 28 - 7 p.m. CDT
Flying the Tailwheel Airplane: Key Points for Becoming a Great Stick and Rudder Pilot
FAA Wings Credit
Presenter: Jim Alsip

November 4 - 8 p.m. CDT
Carbon Monoxide - Silent Killer
FAA AMT & Wings Credit
Presenter: Mike Busch

November 11 - 7 p.m. CDT
Precession Precision: Taming Turning Tendency
FAA Wings Credit
Presenter: Prof. H. Paul Shuch

November 24 - 7 p.m. CDT
Drones: The New Frontier?
Presenter: Scott "Sky" Smith