Pittsburgh-Butler Region Experimental Aircraft Association - Chapter 857

# EAA 857 NEWSLETTER

**From the EAA 857 Archives**

**Bob Santolla's Baby Ace, his first aircraft project.**

**See his article in this newsletter.**

**An update on project three: the Pitts Restoration**

# Presidents Message

EAA 857 Members,

A new year dawns for your EAA Chapter 857! We have reorganized, and we are now recognized by the Commonwealth of Pennsylvania as the Pittsburgh-Butler Region Experimental Aircraft Association - Chapter 857. We have our usual schedule of Fly-ins and Young Eagles events, so lets have a successful and safe program year for 2020.

The officers for 2020 have been elected as you will note in the minutes from the meeting on 11/11/2019. Most positions carried over from 2019, with Dan Hood newly elected to fill the open position on the Board of Directors.

Please remember that chapter dues, $25 per person, were due and payable on January 1, 2020. You must be a National EAA member to maintain your chapter membership. We renewed our charter in December with the national organization, and your dues in part pay for that charter and our yearly insurance.

I want to thank Phil Kriley, Don LaVoie, and Bob Santolla for their contributions to this month's newsletter. Your contributions such as these help immensely for me to provide this newsletter to you. Please everyone, send in your articles for publication to help is keep up with your projects, events, technical thoughts, and places visited this year! Thank you!

Remember, our next meeting is Tuesday 1/21/2020 at the normal time, 7pm, and place in the KBTP conference room. And closely following, there will be the post Super Bowl Chili Cook off on Sunday February 9 at 1 pm.

See you there!

Ted Merklin,

President EAA 857

# Minutes of November 19, 2019 Meeting

**Opening:** President Ted Merklin called the meeting to order at 19:00 and led the members in saying the Pledge of Allegiance.

**Attendance:** Ten members were in attendance.

**Secretary's Report:** Everyone was asked to be sure that they had signed the sign-in sheet. A motion to accept the Secretary's report of the October 15, 2019 Minutes was made by Frank Szczerba and Larry Schaefer seconded.

**Treasurer's Report**: A motion to accept the Treasurer's report was made by Larry Schaefer and Phil Kriley seconded.

**Newsletter Report:** Articles are always welcome from anyone. Notify Ted Merklin if you are not receiving the newsletter. The newsletter is also published to the chapter web site at: http://www.857.eaachapter.org/home.htm, which has been updated for 2019.

**Young Eagles Report**:

- Phil Kriley is taking over as Chapter Co-ordinator next year.
- We have a candidate for the Air Academy in 2020 with a position held for him pending payment of the deposit.
- National is still tabulating credits for Young Eagle flights.

**Technical Advisors: Chuck Potts and Bob Santolla, EAA 857 Advisors**

- *Report:* Reminder- ADSB will be required January 1st; There will be no extensions. This is pertinent to aircraft with engine driven electrical systems.

**Old Business:**

- *501c3 update:* The process is complete and we are recognized as a 501c3 entity.
- *Chapter Storage Room:* Improvements for storage and material movement are planned.

**New Business:**

*2020 Officer Nominations:* Nominations were closed and the candidates below elected to the positions noted.

- President: Ted Merklin
- Vice President: Phil Kriley
- Secretary: Richard Schubert
- Treasurer: Frank Szczerba
- Board Member (3 year term): Dan Hood

*Calendar:* (No January First event this year.)

- February 9 Chili Cook-Off
- June 13 International Young Eagle day
- August 9 Fly in breakfast with YE
- September 13 Fly in breakfast with YE

**Adjournment:** A motion to adjourn at 19:55 was made by Phil Kriley, and seconded by Rick Schubert.

**Program:** The program was by Dale Soergel, who shared photos of KBTP and his family's aircraft back in the day.

Respectfully submitted,

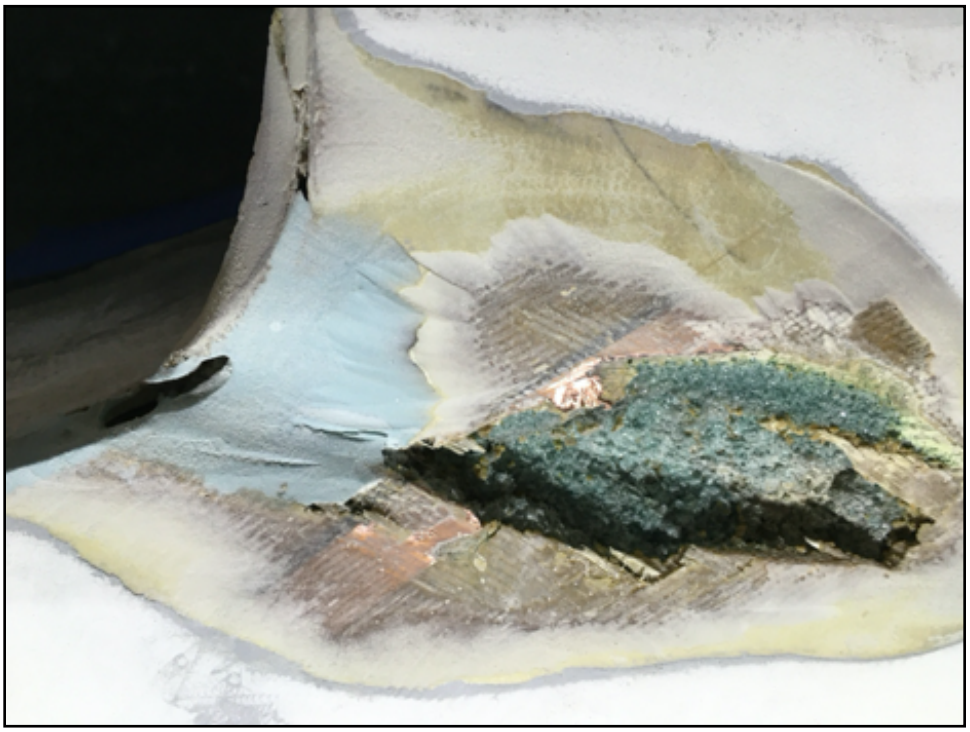
***Richard Schubert, Secretary***

# Foil Antenna Repair

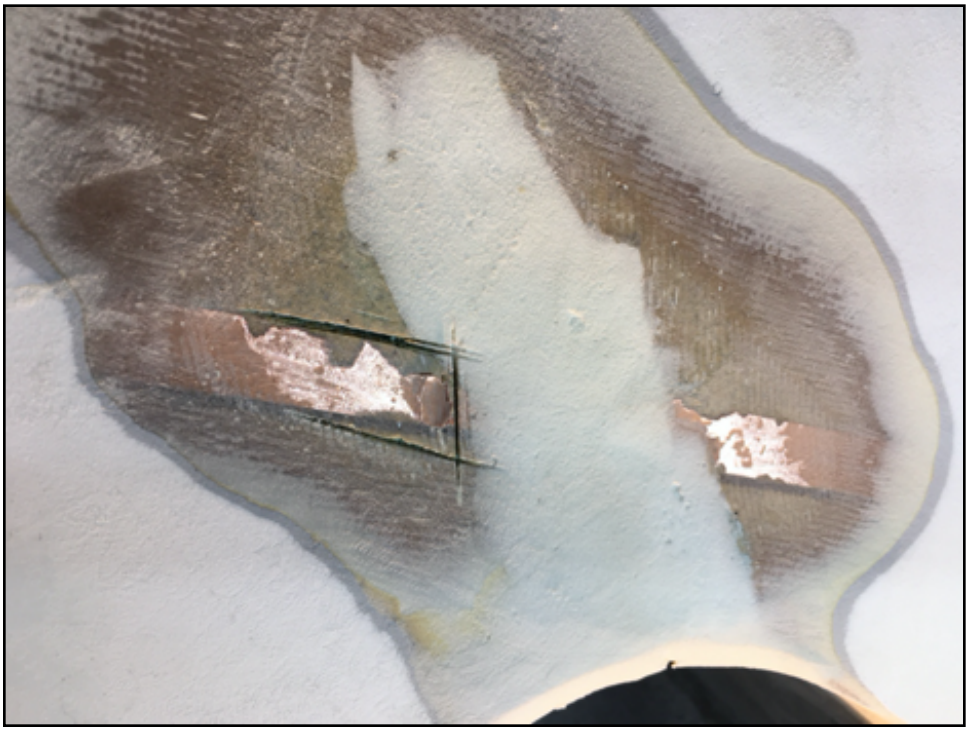
By Phil Kriley

In July of 2018, I had a very hard landing in my Cozy experimental. I was attempting to find a way to land slower and stop shorter. I succeeded, but had to spend a year and $$ repairing the damage!

One of the damaged areas was under the fuselage, just aft of the nose wheel well. As I was cleaning up the area I noticed something shiny and copper… and it wasn't a lucky penny… Upon closer examination I discovered that one of the embedded copper foil antennae was damaged.



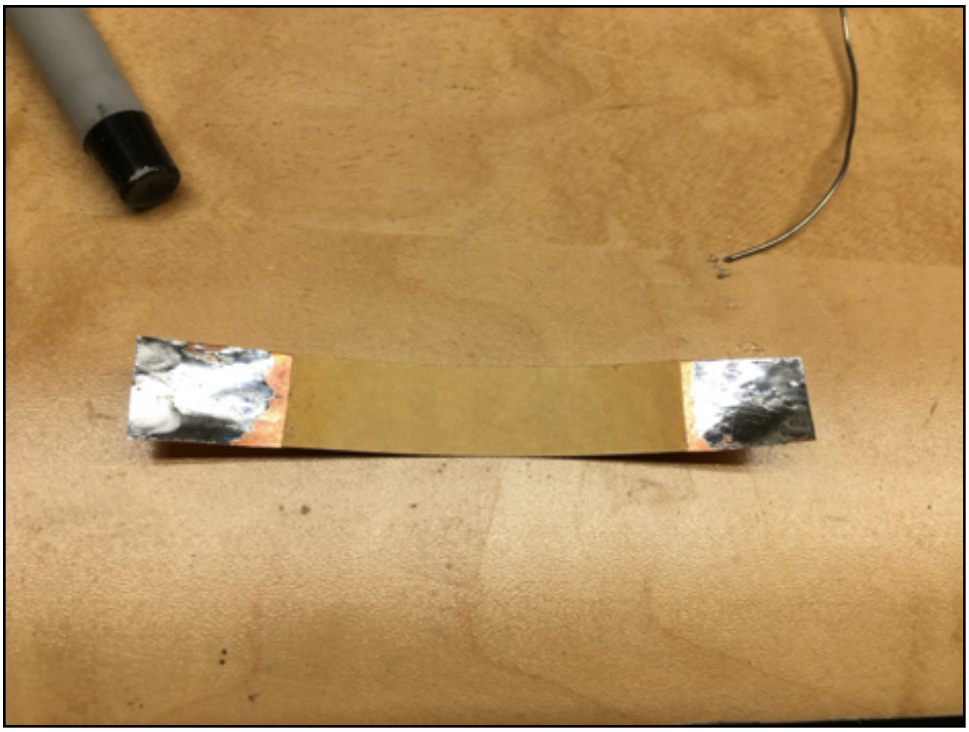
The Cozy has numerous copper foil antennae buried beneath the skin – some on the fuselage bottom, one on the underside of the canard, a couple under the wings and even a couple in the vertical stabilizers. They are several different lengths, depending on the radio they will be hooked to. This particular antenna was for my NAV 2 radio.



Repairing the antenna was not difficult but took some time over several steps to accomplish. I thought you might be interested in the process:

This photo shows the bash in the fuselage belly, just aft of the nose gear well, where I first noticed the copper.

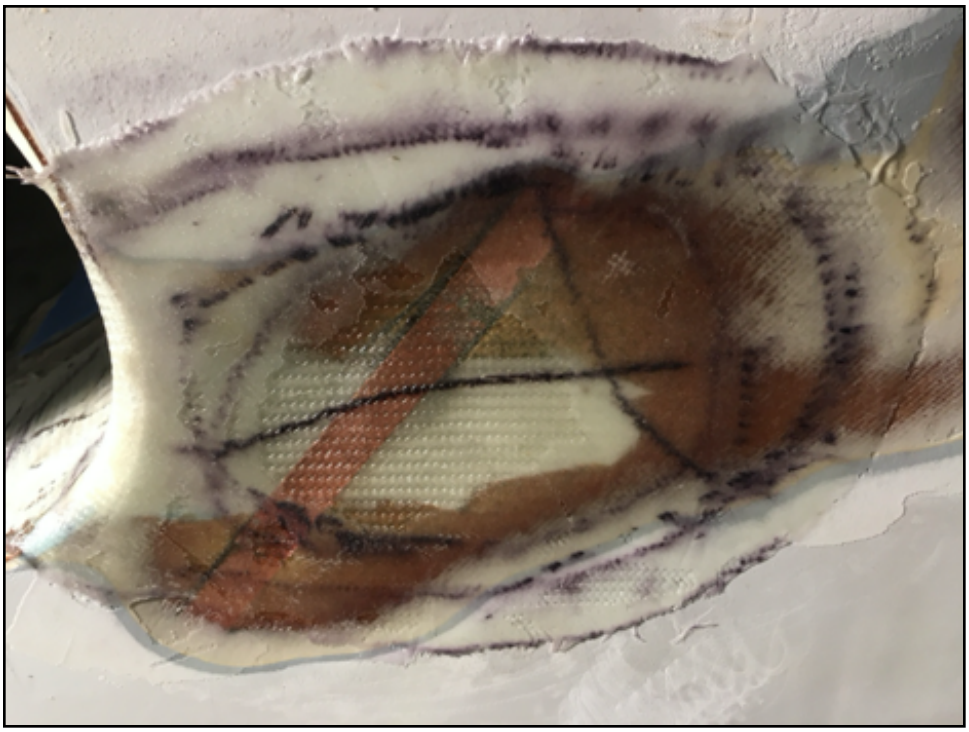
The first step was to fill in the "crater" with micro-balloons mixed with epoxy. Micro-balloons look like a VERY fine white powder, but are actually tiny hollow spheres. They are very light weight and when mixed with epoxy make a very nice filler that is also used during construction to join pieces of foam, such as in constructing the wings.



After filling in the damaged area, I very carefully cut away the fiberglass over the antenna to expose some of the copper foil on both sides of the damaged area. This was tedious as there were 3 layers of fiberglass cloth over the copper. After a while I was able to get sufficient copper exposed to make the repair. I cut a piece of copper foil long enough to join the two pieces and then tinned the ends:

I removed the adhesive before tinning as it does not conduct electricity. I removed the rest of the backing paper when I was ready to solder the piece into place:

After checking the continuity of the repair with my meter, I laid up 4 layers of cloth, two small pieces over the immediate area, then two more, each larger than the previous so that there was a good transition:



After the layup cured I sanded the rough edges and made up another batch of micro that I smoothed over the entire area. When that cured I sanded it down, ready for primer and paint:

I have not tested the radio yet, but feel confident that the repaired antenna will be just as good as new!

# STROMBERG CARBURETORS-OVERVIEW
# MYSTERIES OF THE STROMBERG CARBURETOR

By Doug Combs, for the Luscombe Endowment
reprinted with permission
Thanks to Don LaVoie for this article.

The Stromberg Carburetor is often maligned, and sometimes questioned as 'inadequate' because it lacks an idle cut-off mixture control for engine shutdown, unlike most carburetors employed in aircraft. Because it was designed to be simple, and 'automatic', for use on primary small aircraft having low compression and very little "run-on"[1] tendency, it is somewhat unconventional. The Idle cut-off mixture feature was deemed to be un-necessary, and overly complex, so it was omitted in the design, favoring instead a leaning system referenced as a 'back-suction' mixture control used for high altitude leaning[2].

## Aircraft Carburetor Basics

ALL carburetors use two to four fuel circuits, or delivery methods to the engine. They are generally described as the Idle circuit, Mid range circuit, Accelerator circuit, and the Main jet circuit.

The Idle fuel circuit is simply a small hole at or near the throttle plate area that is regulated with a large brass needle valve adjusted from the outside of the throttle body. When the throttle is very nearly closed, the rapid movement of air past a small hole siphons fuel into the induction air stream (figure 3, item #2).

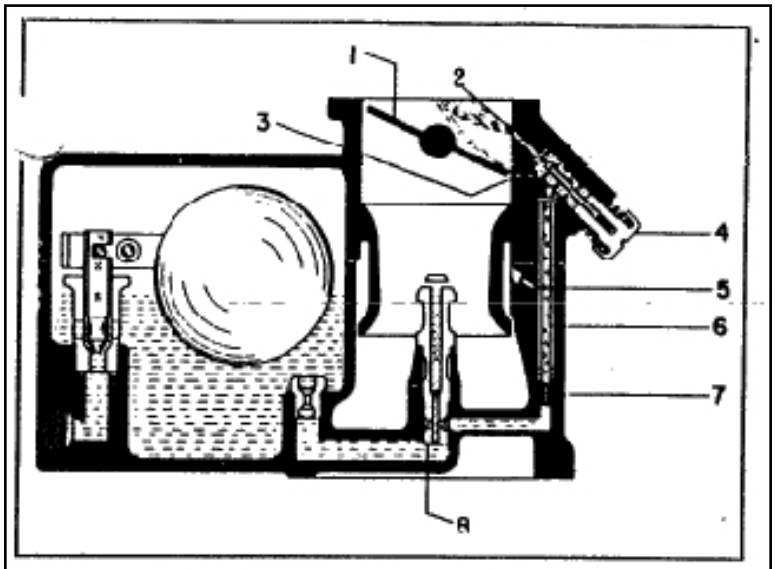


FIGURE 3.--SCHEMATIC DIAGRAM OF IDLE SYSTEM

*[1] Run-on is a non technical term for an engine that continues to fire the cylinder after ignition is removed from the spark plug. This is sometimes referred to as "dieseling". The irregular firing is caused by a high compression ignition of the fuel-air mixture, sometimes by carbon embers in the cylinder, or another heated imperfection within the compression chamber of the cylinder.*

*[2] The back suction mixture is generally pretty automatic at all altitudes less than 7-8,000 feet IF the float level is accurately set on the bench. This means that manual manipulation of the mixture control should NOT be required until the aircraft is well above that altitude. When very high, the mixture manipulation should only be undertaken very judiciously, and only when monitored by an EGT gauge, because a small deflection of the mixture wafers can cause a rapid leaning of the fuel supply which will allow the engine to save fuel at the expense of more expensive burnt metal.*

As the throttle is opened, the Idle circuit becomes less effective, so often a Mid-range circuit is activated to deliver fuel until the Main jet becomes active. The Mid range circuit generally consists of another hole, or a series of holes in the carburetor wall slightly upstream from the idle orifice. These work similar to the Idle circuit, where the rushing air creates a low pressure that feeds more fuel into the air stream as the throttle is advanced (figure 3, Item #3). During rapid throttle advancement these Idle and Mid range fuel sources can be inadequate, so they are sometimes supplemented by an Accelerator system, consisting of a small well (figure3 item #6), or a reserve depression where fuel is more easily siphoned during power increases, or some manufacturers use an accelerator pump that physically sprays fuel into the carburetor air stream. (The Stromberg uses an accelerator 'well' system, which is more fuel efficient by being stingy on acceleration fuel, especially on cool mornings immediately after start. Carburetor air will assist in these situations.)

**How is the Stromberg different?**

Other carburetors use a small hand operated valve in series[1] with the main float and inlet needle valve. When the pilot moves the mixture knob in the cockpit, the valve closes a fuel metering orifice, restricting the fuel available to mix with air in the fuel air mixture in ALL of the above fuel circuits. Closing the metering orifice completely results in a fuel starvation at the carburetor jets, resulting in engine shutdown, or cut-off due to a lack of fuel.

The Stromberg mixture system has no manual metering orifice in the fuel inlet system; Instead, the Stromberg mixture operates by exerting a vacuum, or less than atmospheric pressure on to the fuel in the float chamber. This is done by diverting low pressure air from behind the carburetor venturi through a wafer system, and into the fuel float bowl figure 4.

*[1] "Series" in this instance means that the fuel must pass each restriction one at a time, as opposed to a parallel route, where fuel might feed from two different locations.*

I can do no better than copying the Stromberg explanation of this system which reads as follows:

**Manual Mixture Control System** (See figure 4.)

(Not incorporated in the NA-S2, NA-S3 and NA-S3B models –*those equipped with cover plates, ed.*)

The manual mixture control system of the back suction type, consists of a manually operated valve (1) having a stationery lower plate (3) and a movable upper plate (2); a

(a) suction channel (4) and vent channels (5 and 6). When the manual mixture control lever is moved, the upper plate is rotated varying the size of the orifice through the valve.

(b) Briefly, the function of the manual mixture control system is to vary and regulate the pressure applied on the fuel in the float chamber, leaning or enriching the mixture as required.

(c) When the manual mixture control is in the "FULL RICH" position, the large holes in the upper and lower plates are aligned so that the fuel in the float chamber is subjected to the full pressure behind the venturi tube (approximately atmospheric), through vent channels (5 and 6.)

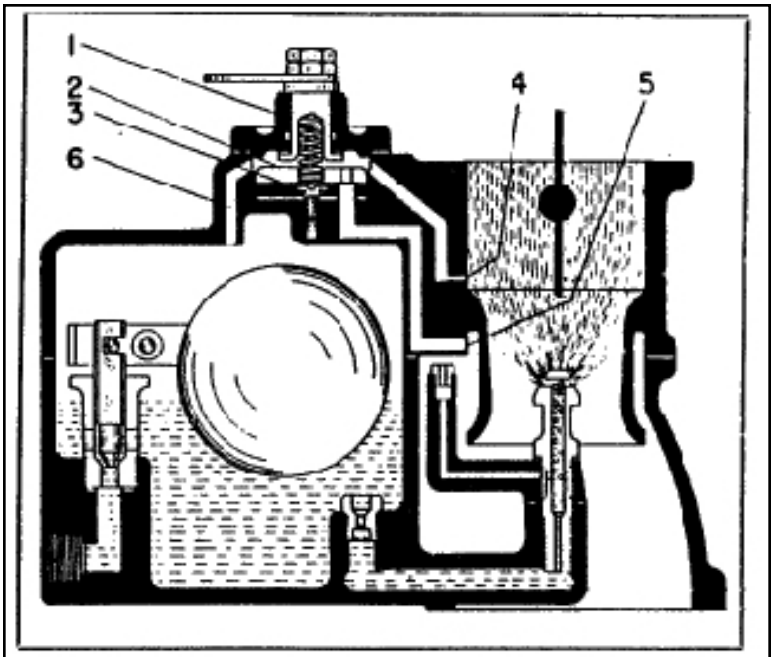



FIGURE 4 –SCHEMATIC DIAGRAM OF MANUAL MIXTURE CONTROL SYSTEM

(d) Then, as the manual mixture control is moved toward the "LEAN" position, the large hole starts to close and a series of progressively smaller holes in the upper (movable) plate start to open over the hole in the lower plate. This action restricts the air flow through vent channels (5 and 6) to the float chamber. This subjects the fuel in the float chamber to a suction through channels (4 and 6) reducing the air pressure forcing the fuel through the Main metering jet, resulting in a leaner mixture.

(e) The farther the manual mixture control is moved toward the "LEAN" position, the leaner the mixture becomes due to less air pressure on the fuel in the float chamber.

*ED note: The 'automatic leaning' feature inherent to the carburetor is due to the reduced ambient pressure changes with altitude being transmitted to the fuel chamber as altitude increases resulting in an appropriate reduction of fuel throughout most of the common operating altitudes. This feature effectively eliminates any need for" manual leaning" of the Stromberg carburetor as described above, except in extreme situations, and very high altitudes. Stromberg Mixture control Operation and Faults.*

**Stromberg Mixture Control Operation and Faults**

As noted previously, the Stromberg mixture control has no idle cut-off, and it is very sensitive to movement of the mixture wafers in the mixture chamber. For operations at less than 7-8000 feet, the Stromberg mixture is best left full rich because the inherent design of the carburetor leans the mixture "automatically" with little pilot input. Because of this "auto" feature, the manual mixture is rarely needed until cruising above 10,000 feet.

Many of these mixture wafers have been removed, or the mixture arm wired to full rich to prevent operational errors by un-informed pilots. The back suction mixture control is only effective above about 1600 RPM. If a pilot attempts to stop the engine using this control, the engine will simply continue to idle until either the ignition or fuel valve is turned OFF.

HOWEVER, if the mixture is left in the full lean position, it will usually not become apparent until the next high power run-up, or until the initial takeoff roll, when the engine will lean out and bang, pop, or backfire, at about 1800 RPM. This is because the carburetor then creates an over-lean fuel condition, preventing the engine from accelerating smoothly. After the second or third trip to the hangar with such (pilot induced), symptoms, many operators chose to disable the mixture, or to wire the Stromberg mixture controls to the full "rich" position. Instructions to flight school operators on methods that might be used to disable the mixture control systems so as to prevent 'student error' and damage to engines from improper mixture use.

**Summary Tidbits**

The Stromberg carburetor, NAS 3-… , is a very reliable and simple unit used on many vintage engines. The size of the fuel jets and venturi size varies, based upon the engine installation, so it is important to ascertain which dash number carburetor is installed, and to confirm that the carburetor dash number is correct for your engine type, horsepower, and application.

Your mechanic or carburetor shop should have all of the proper information available to select the materials, parts and process available to you for your installation and overhaul. If they do not have access to all the manuals and manufacturer data- go elsewhere for service. A Stromberg for an A-65 will physically fit on an 85 or 90, (and vice versa), but it will not perform properly because the jets and other settings internally are DIFFERENT.

**Stromberg Needle Valves**

When the Stromberg carb first appeared in the 1930s, they had stainless steel needles. A service bulletin in 1943 suggested the change to the neoprene tipped stainless needles for better sealing, and to prevent seepage. The seats were also changed with the neoprene needle install. Then in the early1960's, there was another Service Bulletin that suggested the change to the Delrin needle because the neoprene unit was age limited, and had begun to wear, or take a 'set' in service.

The stainless steel needles are still available and remain an acceptable and legal installation. It is an old, tried, and true part. I have used the steel unit to replace the neoprene tips because it is inert and long lived. The steel needle and brass seat do have a tendency to seep when parked, if installed right out of the box, but that can be fixed with some lapping into the seat, or averted by turning off the fuel at the tank valve. Obviously the neoprene tip was engineered to prevent this seepage problem.

Most Strombergs have the steel/brass setup which isn't affected by any kind of fuel. Occasionally it is necessary to rap on the carb to seal it up when the engine is stopped and the fuel is on (I.E. just before startup). When the engine is running the vibration does the same job.

The manufacturer now recommends the Delrin needle. Delrin is a plastic which wears over time and has some poor reactions alleged with alcohol in some auto fuels that should not be introduced, but often are. The biggest problem is that the installation of Delrin requires the shop to modify the float by soldering on weights to offset the much lighter weight of the Delrin needle. This modification takes time and is not easily reversed if you later change your mind to use the steel needle. There is a service bulletin (ACSB-84) that discusses the change from neoprene tipped stainless steel needles to the Delrin needles. A copy of the SB is in the Bendix - Stromberg Overhaul manuals section and the Delrin needle (pn 2523047) is available from CAS. Delrin has similar sealing advantages to the neoprene, but these needles are produced by the current manufacturer, whereas the Stainless steel units are typically Old stock, surplus, or bogus parts produced to replicate the old units. Obviously there is no profit incentive for the current manufacturer to recommend old stock parts or surplus.

Because this problem is more prevalent in a multiple operator training environment, Stromberg developed and sold several models without the mixture components. They also issued the seats need to be matched to the type of needle. The overhaul shop or mechanic making inspection and modifications will/should check that.

Cost of the steel/brass kit for valve replacement is about $130. The Delrin kit is similarly priced. My vote is for the old stainless steel with some lapping compound, then the type of fuel is never a question, and wear is not going to occur until two generations down the road.

**Auto Gas**

We assume that you have installed one of the auto gas STC's before using that fuel in the airplane. If so, then the mechanic making the modification and certifications was required to insure that all of the rubber (neoprene & Delrin), and other components NOT compatible with auto fuel were removed from the system as this is one operating limit to the STC installations. Leaving the neoprene tip in place can be very dangerous because it can swell and even come loose from the needle valve, causing the needle valve to stick closed, or even to free flow fuel. Either condition can cause an unscheduled landing, thus the reason for the operating limitation for auto fuel requiring the removal of such components. Use of the Neoprene tip is therefore a very dangerous proposition if you plan to use, or are fueled with anything other than aviation fuel.

*NOTE: Auto fuel left for several months without operating the aircraft tends to varnish, gum, and cake in the system and may swell O rings or clog some small ports in the Carburetor over time.*

**Conclusion**

The Stromberg Carb is a great unit with outstanding efficiency and a very good service history so long as you do not need an idle cutoff feature, and you understand its operation and leaning limitations.

**Sources for Stromberg parts or overhaul manuals**

The Luscombe Endowment or Classic Aero Support (your hosts to this information at www.luscombe.org) 480-650-0883 or Email dlosey@Luscombesilvaire.info The Luscombe Endowment grants print permission to the Luscombe Association while retaining rights to the original content for further reproduction.

# Pitts Update

by Bob Santolla

Happy New Year EAA Chapter 857 members. Now that we are in a new year, those of you that are building, restoring, and improving your airplanes, continue the good work. For those not building, how about working on another pilot rating such as an instrument, commercial, multi-engine, or maybe a CFI rating! Set a goal and make it happen!

I've been working hard putting in many hours since I last updated my Pitts project. I have the Pitts in my Florida garage to keep the project moving along, and I can report to you that much work has been accomplished.

The lower wings, ailerons, elevators, stabilizer, and rudder are covered and painted. As I mentioned earlier, I have been using the Stewart Covering system and it is easy to use and most importantly, it is low odor due to the low VOL formulas. The learning curve for using this new system was only a couple of hours. I made a few mistakes covering the ailerons so I removed the fabric and started over. The rest of the covering went as predicted and the more I worked on the parts, the better I became with the system.

I found that after applying the EkoFil (UV coating) and spraying the EkoPrime that it produced a great sand-able surface to fill imperfections and make the surface ready for the top color. I spray using my DeVilbiss FineLine HVLP gun which works really well with the Stewart System liquids.

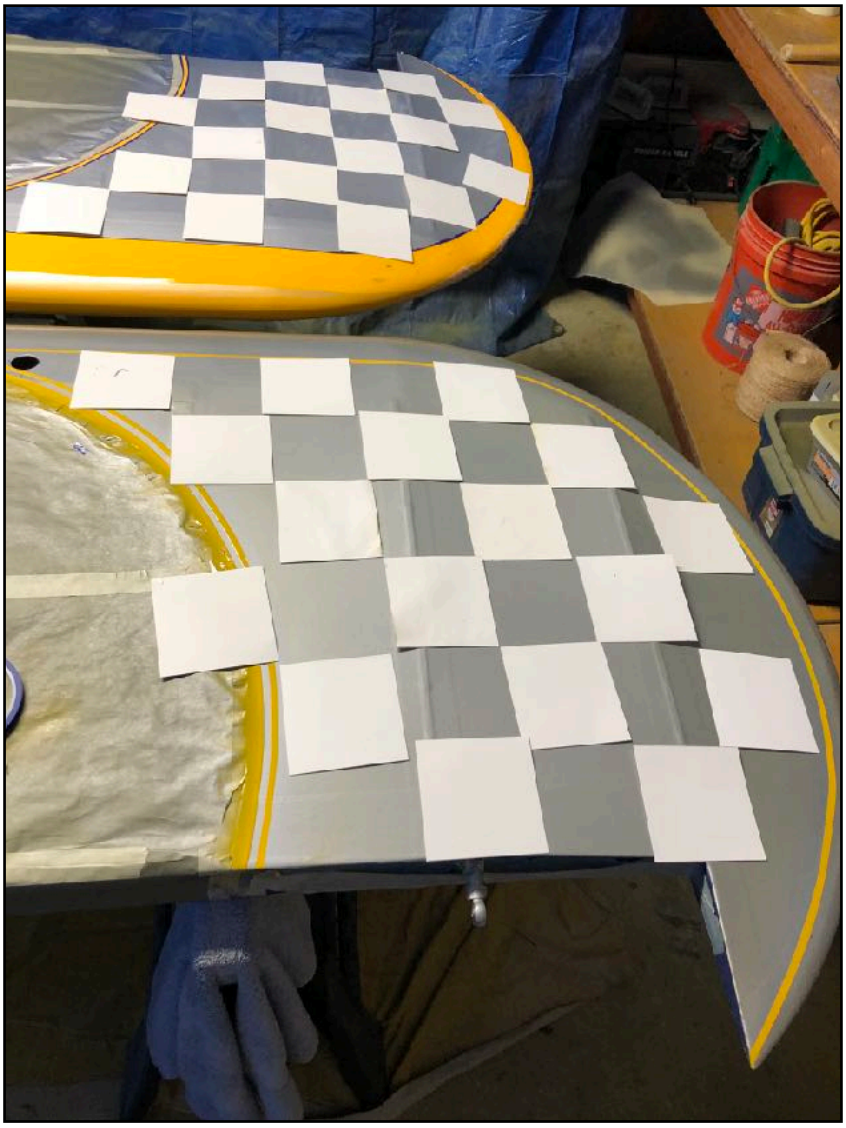
The airplane is painted with Federal Yellow and will be trimmed in Midnight Black and Metallic Silver. Yes, I will now have two yellow airplanes, but every Pitts I've seen is painted red with white trim and I wanted something more original.

The most time consuming job is masking the trim using 1/4 and 1/2 inch fine line tape. The vinyl tape makes the curves easy to apply and when the tape is removed it makes a sharp crisp line. I am laying

out a checkerboard pattern on the wings and empennage and this is the first time I've attempted this. I am finding it to be more tedious than I imagined, so things are a bit slower with the trim design.

Building airplanes is a learning and educational process and I'm learning new ways to do the work and I seek help when needed for parts I don't understand. I hope to have my project completed in the next 12 months.

Back to work!




## Chapter 857 Members

See your chapter's Website at:

http://eaa857.org

Take a look today!

Newly Updated with **This Newsletter!**

Prior Issues for 2019 will appear in our newsletter archive.

Please submit your project updates, photos, articles, thoughts, technical tips

to contact@eaa857.org

ALSO, Monitor our Facebook Group Page:

Search for "EAA Chapter 857"

## Websites of Interest to EAA 857 Members

http://www.butlercountyairport.org

http://www.eaa.org/

http://www.airventure.org/

http://www.aopa.org/

http://www.faa.gov/

http://faasafety.gov

http://www.condoraero.com

www.draggintailpilots.weebly.com

# EAA 857 Chapter Officers for 2019

| | |
|---|---|
| **President** | **Ted Merklin** |
| **Vice President** | **Phil Kriley** |
| **Treasurer** | **Frank Szczerba** |
| **Secretary** | **Rick Schubert** |
| **Newsletter / Web Page** | **Ted Merklin, Ed.** |
| **Young Eagles** | **Phil Kriley** |
| **Technical Advisors** | **Chuck Potts Bob Santolla** |
| **Board Members** | **Dan Hood 2020-2022**<br>**Bob Santolla 2020-2021**<br>**Gary Marsico 2020** |

Use contact@eaa857.org to email the Chapter President. Your request will be forwarded to the appropriate individual.

# EAA 857 - Calendar for 2020

## Chapter Meetings

Meetings are held on the third Tuesday of the month at 7:00 PM in the Conference Room at the Pittsburgh-Butler Regional Airport.

January 21
February 18
March 17
April 21
May 19
June 16
July 21
August 18
September 15
October 20
November 17

## Chapter Events

| | | |
|---|---|---|
| EAA 857 Chili Cook Off - | Sunday, | February 9 |
| International Young Eagles Day - | Saturday, | June 13 |
| EAA 857 Fly-In and YE - | Sunday, | August 9 |
| EAA 857 Fly-In and YE - | Saturday, | September 13 |

## 2019 National Events

| | |
|---|---|
| Sun 'n Fun - | March 31 - April 5 |
| Sentimental Journey - | June 16 - 20 |
| AirVenture Oshkosh 2020 - | July 20 - 26 |