MARCH/APRIL 2016

Vintage airplane

Dan Murray's Travel Air

- Cloudboy
- de Havilland Chipmunk
- Cessna 180

Straight & Level

GEOFF ROBISON
VAA PRESIDENT, EAA Lifetime 268346, VAA Lifetime 12606

Oshkosh 2016: "You gotta be there!"

I HOPE YOU ALL HAVE BEEN ENJOYING the brisk cool days of January and February. I for one am glad that it is now late winter, and I am hopeful that we will soon begin to experience some more seasonable flying weather here in the Midwest. For now anyway, we have little to complain about with the weather around home. We actually have experienced a minimal number of days with the temperatures in the teens or lower.

All of the news coming out of EAA/VAA about AirVenture Oshkosh 2016 has been nothing short of incredible. The lineup of featured aircraft and events for this year's AirVenture is again truly impressive. We will also be hosting a number of aircraft manufacturers' anniversary celebrations in the Vintage area this year. I am also confidant that we will have an impressive array of featured aircraft . You can stay updated on these featured aircraft and events at EAA Oshkosh through EAA's weekly e-blast e-mail. The lineup continues to grow, and it gets more exciting each week!

The *Vintage Airplane* magazine continues to grow in popularity. I continue to hear accolades from our membership about our starship publication. We are also experiencing a fair amount of outreach from the membership who would like to share their unique, personal vintage aviation related stories with the VAA. Keep it coming, folks. This is all good stuff, and I personally appreciate you reaching out to let us know what you think about the *Vintage Airplane* publication. We also continue to receive a lot of new and excellent material for the magazine, and I encourage anyone who has a great vintage aviation story to tell to share your story. Please submit your featured article and materials to our editor at *jbusha@eaa.org*.

You may have already heard that the VAA winter board meeting has now been officially reinstated and was held at the Candler Field Museum (GA2) in Williamson, Georgia, on February 27, 2016. Your board of directors planned a town hall style session that day that started at 1:00 p.m. Eastern time. All EAA and VAA members were invited to attend. We also had a membership table set up at the event for those who wanted to join. We were especially pleased to be joined that afternoon by the CEO of EAA, Mr. Jack Pelton. This event was a special opportunity for the membership to interact with the leadership. Immediately after the town hall event there was a special reception for the attendees, and they all had the opportunity to get to know us a little better. I hope that many of you were able to join us at the Candler Field Museum.

Please consider supporting the VAA's Friends of the Red Barn fund-

continued on page 63

Vintage Airplane
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Vintage AirMail

VINTAGE AIRCRAFT ASSOCIATION

Current EAA members may join the Vintage Aircraft Association and receive *VINTAGE AIRPLANE* magazine for an additional $45/year.

EAA Membership, *VINTAGE AIRPLANE* magazine and one-year membership in the EAA Vintage Aircraft Association are available for $55 per year (SPORT AVIATION magazine not included). (Add $7 for International Postage.)

FOREIGN MEMBERSHIPS

Please submit your remittance with a check or draft drawn on a United States bank payable in United States dollars. Add required Foreign Postage amount for each membership.

Membership Service
PO Box 3086
Oshkosh, WI 54903-3086
Monday–Friday, 8:00 AM–6:00 PM CST

Join/Renew 800-564-6322
membership@eaa.org

EAA AirVenture Oshkosh
www.eaa.org/airventure
888-322-4636

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FRONT COVER: Photo by Tyson Rininger
BACK COVER: Courtesy

For missing or replacement magazines, or any other membership-related questions, please call EAA Member Services at 800-JOIN-EAA (564-6322).

ANY COMMENTS?
Send your thoughts to the Vintage Editor at: *jbusha@eaa.org*

DARIN LACRONE

Friends of the RED BARN

VAA members like you are passionate about your affiliation with vintage aviation, and it shows. You're the most loyal of all EAA members, renewing your VAA membership each and every year at a rate higher than any other group within the EAA family. We appreciate your dedication! Each year we give you another opportunity to strengthen your bond with the VAA by inviting you to become a Friend of the Red Barn.

This special opportunity helps VAA put together all the components that make the Vintage area of EAA AirVenture a unique and exciting part of the World's Greatest Aviation Celebration. This special fund was established to cover a significant portion of the VAA's expenses related to serving VAA members during EAA AirVenture Oshkosh, so that no dues money is used to support the convention activities.

This is a great opportunity for Vintage members to join together as key financial supporters of the Vintage division. It's a rewarding experience for each of us as individuals to be a part of supporting the finest gathering of Antique, Classic, and Contemporary airplanes in the world.

At whatever level is comfortable for you, won't you please join those of us who recognize the tremendously valuable key role the Vintage Aircraft Association has played in preserving the irreplaceable grassroots and general aviation airplanes of the last 100 years? Your participation in EAA's Vintage Aircraft Association Friends of the Red Barn will help ensure the very finest in EAA AirVenture Oshkosh Vintage programs.

To participate in this year's campaign, fill out the donation form by visiting our website at *www.VintageAircraft.org/programs/redbarn.html* to make an online contribution. Or fill out the form on the right and mail to FAA FORB, PO Box 3086, Oshkosh, WI 54903-3086. And to each and every one of you who has already contributed, or is about to, a heartfelt "thank you" from the officers, directors, staff, and volunteers of the Vintage Aircraft Association!

CONTRIBUTION LEVELS ↓	Donor Appreciation Certificate	Special FORB Badge	Access to Air-Conditioned Volunteer Center	A "6-pack" of Cold Bottled Water!	Two Passes to VAA Volunteer Party	Breakfast at Tall Pines Café	Tri-Motor OR Helicopter Ride Certificate	Two Tickets to VAA Picnic	Close Auto Parking	Special Air Show Seating	Two Weekly Wristbands
DIAMOND PLUS $1,500 & higher	X	X	X	X	X	2 people, full week	2 tickets	X	Full week	2 people, full week	2 people, full week
DIAMOND $1,000 – $1,499	X	X	X	X	X	2 people, full week	2 tickets	X	Full week	2 people, 1 day	
PLATINUM $750 – $999	X	X	X	X	X	2 people, full week	1 ticket	X	2 days		
GOLD $500 – $749	X	X	X	X	X	1 person, full week	1 ticket				
SILVER $250 – $499	X	X	X	X	X						
BRONZE PLUS $150 – $249	X	X	X	X							
BRONZE $100 – $149	X	X	X								
LOYAL SUPPORTER $99 and under	X										

STEVE MOYER

Friends of the RED BARN 2016

Name: _____ EAA #: _____ VAA #: _____

Address: _____

City: _____ State: _____ ZIP: _____

Phone: _____ E-mail: _____

❑ **Payment enclosed** (Make checks payable to Vintage Aircraft Association)

❑ **Please charge my credit card for the amount of:** $_____

Credit Card Number: _____

Expiration Date: _____

Signature: _____

Choose your level of participation:

- ❑ Diamond Plus ($1,500 or more)
- ❑ Diamond ($1,000-$1,499)
- ❑ Platinum ($750-$999)
- ❑ Gold ($500-$749)
- ❑ Silver ($250-$499)
- ❑ Bronze Plus ($150-$249)
- ❑ Bronze ($100-$149)
- ❑ Loyal Supporter ($99 or less)

Badge Information
(for Bronze Level and above)

❑ Yes, prepare my name badge to read:

_____
(Please print name)

❑ No, I do not need a badge this year.

Certificates

❑ Yes, I would like a certificate.

❑ No, I do not need a certificate for this year.

Vintage Aircraft Association | 3000 Poberezny Rd., Oshkosh, WI 54902 | 920.426.6110 | EAAVintage.org

The Vintage Aircraft Association is a non-profit educational organization under IRS 501c3 rules. Under Federal Law, the deduction from Federal Income tax for charitable contributions is limited to the amount by which any money (and the value of any property other than money) contributed exceeds the value of the goods or services provided in exchange for the contribution. An appropriate receipt acknowledging your gift will be sent to you for IRS gift reporting reasons.

VA News

LYLE JANSMA–AEROCAPTURE IMAGES © 2015

Interstate Cadets Celebrate 75th Anniversary at EAA AirVenture

In January 1941 a new two-place aircraft was introduced to the public from a factory in El Segundo, California. The Interstate Cadet was a completely new design. It was a distinct departure from current trainers, and it quickly became a stalwart in the Civilian Pilot Training Program prior to World War II. Between January 1941 and June 1942 only 320 aircraft would be produced, but production of the military L-6 would keep Interstate busy through the war years, as would the very secret TDR program. Later the design would head north to Alaska where the Arctic Tern would become a successful bushplane.

Now 75 years later it is time to celebrate this venerable design, and AirVenture 2016 will be the site of this unique gathering of Interstate aircraft.

Events at Oshkosh include a group flight originating from our rendezvous site at East Troy, Wisconsin, into Wittman field, with a designated parking area for all Interstate aircraft. Daily forums will include sessions on Interstate history, maintenance, and restoration tips, a presentation on the target drone program headed up by Interstate, and a special program on the Pearl Harbor Cadet flown by Cornelia Fort on December 7, 1941—it is also the 75th anniversary of the Pearl Harbor attack and our entrance in World War II.

We invite all Interstate owners and enthusiasts to join with us for this historic event at EAA AirVenture Oshkosh 2016.

Contact information:

Tim Talen, 541-968-1273, *ragwood@televar.com*

Steve Dawson, 262-215-0022, *stevenldawson@centurytel.net*

Cessna 120/140 70th Anniversary

The Vintage Aircraft Association is celebrating the 70th anniversary of the Cessna C-120/C-140. As most of you know, showplane parking is limited. Please pre-register to help our volunteers plan for your arrival at AirVenture 2016.

If you are planning on attending the Cessna C-120/C-140 70th anniversary by flying in with any Cessna C-120/C-140 model, please complete the form located on the EAA website.

Vintage Bookstore

The Vintage Aircraft Association is seeking donated old and/or used books with an aviation theme for the AirVenture Vintage Book Store.

All proceeds from the sale of books will be used to enhance the Vintage experience during AirVenture and to provide a conduit for out-of-print aviation history books and technical manuals for our members and guests.

The Vintage Aircraft Association is a nonprofit educational organization under IRS Code 501(c)(3). All donations are tax-deductible.

Books can be sent to the following address: Vintage Aircraft Association, 3000 Poberezny Rd., PO Box 3086, Oshkosh, WI 54903-3086. Attn.: Erin Brueggen/Vintage Bookstore.

Boeing Stearman

The Vintage Aircraft Association is welcoming all Vintage Stearman aircraft to help celebrate the 100th anniversary of Boeing. As most of you know, showplane parking is limited. Please pre-register to help our volunteers plan for your arrival at AirVenture 2016.

Swift 70th Anniversary

The Swift Museum Foundation will be celebrating the 70th year of certification of the Globe/Temco Swift this year. The SMF is encouraging as many members as possible to fly their Swifts to Air Venture 2016.

For additional information please contact:

Jim Jones, President

Swift Museum Foundation

www.dixiefinishing.com

770-527-9036

jim@dixie-industrial.com

Navion 70th Anniversary

The Vintage Aircraft Association is celebrating the 70th anniversary of the Navion. As most of you know, showplane parking is limited. Please pre-register to help our volunteers plan for your arrival at AirVenture 2016.

Vintage Volunteer Work Weekends

April 22-24

May 20-22

June 24-26

Please feel free to attend all or what best fits your schedule. Housing and food provided.

Contact information:

Mike Blombach,Chairman

VAA Maintenance and Construction

Cell: 260-433-5101

E-mail: *michael846@aol.com*

Congratulations to VAA Member Bill Pancake

The newest inductee to the West Virginia Hall of Fame

When the 2014 inductees were announced, the nominating committee received more than 100 letters supporting Bill Pancake. Letters came from all over the world, including Austria, New Zealand, Panama, Iceland, the United Kingdom, Germany, South Africa Canada and most of the 50 United States. Bill's induction was held on August 10, 2015, at the Resort at Glade Springs in Daniels, West Virginia.

Bill Pancake

A forum presenter at EAA Oshkosh since 1981, Bill also holds seminars for the FSDO offices in Baltimore and Washington, D.C. He has had 12 award winners at Oshkosh, six of which were Grand Champions, including a recent Contemporary Gold Lindy—a 1970 7GCBC Citabria he restored for Paul Shank of Gaithersburg, Maryland, in 2009.

His other awards include a 2000 Keyser High School Legion of Honor, 2006 Wright Brothers Master Pilot Award and Charles Taylor Master Mechanic Award, 2008 Vintage Aircraft Association Hall of Fame, 2014 West Virginia Aviation Hall of Fame, and 2007 and 2014 Distinguished West Virginian Awards.

Bill has been married to his wife, Saundra, for 52 years. They are parents to a daughter, Dr. Stacey Boggs, and husband Mark, and grandparents to Michael Boggs and wife Jacki, Robert, Curtiss, and Hannah Boggs. In carrying on a family tradition, Bill soloed two of his grandsons on their 16th birthdays– from the same airport where he soloed on his 16th birthday in 1956, Miller Field in Keyser.

Jacki and Michael Boggs (grandson), Saundra and Bill Pancake, Jeanne Cochran (niece), Stacey (daughter) and Mark Boggs.

Ask the AME

JOHN PATTERSON, M.D., AME

Renal transplant

S.P. writes, "I am going to have a renal transplant. Will I be able to pass my medical?"

More than 100 airmen have received special issuance certificates for renal transplant. Seventy were third class, and there are more than 30 first class or airline medicals for renal transplant. In addition there have been more than 50 airmen with liver transplants and several heart and lung transplants approved as well.

Diabetes and hypertension constitute the majority of causes of renal failure.

Airmen who have had renal transplantation will be required to submit information regarding the cause of the renal failure, any history of hypertension and heart disease, other medical problems before and after transplant, a list of current medications used for immunosuppression with side effects, and recent laboratory tests.

Diabetes and hypertension constitute the majority of causes of renal failure. Hypertension leads to cardiac disease and large blood vessels, and diabetes causes problems with small blood vessels throughout the body, so in medicine one is rarely dealing with a single disease process. The primary function of the kidney is to filter toxins out of the blood stream, but the kidney does more than that. It regulates blood pressure through hormone production and fluid balance. It also keeps regulated the electrolytes (salts like sodium and potassium) in the blood stream. The kidney also produces a hormone that regulates red blood cell (oxygen-carrying cell) production in the bone marrow. That is why many patients with renal failure are anemic.

The filtering apparatus of the kidney is the glomerulus. Infections in the body can trigger an attack on the glomerulus as well, i.e., glomerulonephritis. If the filter of the kidney is damaged, it cannot rid the blood, and therefore the body, of toxins. Protein is a large molecule and normally filtered by the kidney. If albumin (a type of protein) is found in the urine, this is abnormal and may indicate kidney damage.

Hereditary conditions can lead to kidney failure, such as Alport syndrome. Polycystic kidney disease is a hereditary condition characterized by a kidney replaced with many small cysts. In the adult form, renal failure may occur in the 40- to 50-year-old age range, and typically the kidneys are two to three times their normal size. Renal transplant is most successful in the polycystic kidney patients, since they may not have the underlying systemic problems of diabetes and the ravages of hypertension on other organ systems.

After transplantation, the patient will be placed on immunosuppressant medications to prevent the body from rejecting the "foreign tissue." These medications are not without side effects themselves. Primarily the patients are more susceptible to infection and the development of cancers, most commonly skin cancers addressed in the previous column.

In summary, most airmen with renal transplants can be approved through the special issuance process. Yearly progress reports and laboratory tests are required. The National Kidney Foundation reports that 450,000 Americans are on dialysis, and 185,000 live with a functioning transplant. Approximately 100,000 Americans are on a waiting list for transplant, and less than 17,000 receive a kidney per year. So if you have not done so, consider signing your organ donor card when you renew your driver's license.

As I write this article, the Senate has passed the third-class airman medical reform. I hope I am able to write an article soon about what that will mean with successful passage in the House. Until then, blue skies and tailwinds in 2016.

CALL FOR VINTAGE AIRCRAFT ASSOCIATION

HALL OF FAME™ Nominations

Nominate your favorite vintage aviator for the EAA Vintage Aircraft Association Hall of Fame. A great honor could be bestowed upon that man or woman working next to you on your airplane, sitting next to you in the chapter meeting, or walking next to you at EAA AirVenture Oshkosh. Think about the people in your circle of aviation friends: the mechanic, historian, photographer, or pilot who has shared innumerable tips with you and with many others. They could be the next VAA Hall of Fame inductee—but only if they are nominated.

The person you nominate can be a citizen of any country and may be living or deceased; his or her involvement in vintage aviation must have occurred between 1950 and the present day. His or her contribution can be in the areas of flying, design, mechanical or aerodynamic developments, administration, writing, some other vital and relevant field, or any combination of fields that support aviation. **The person you nominate must be or have been a member of the Vintage Aircraft Association or the Antique/Classic Division of EAA, and preference is given to those whose actions have contributed to the VAA in some way, perhaps as a volunteer, a restorer who shares his expertise with others, a writer, a photographer, or a pilot sharing stories, preserving aviation history, and encouraging new pilots and enthusiasts.**

To nominate someone is easy. It just takes a little time and a little reminiscing on your part.

- Think of a person; think of his or her contributions to vintage aviation.
- Write those contributions in the various categories of the nomination form.
- Write a simple letter highlighting these attributes and contributions. Make copies of newspaper or magazine articles that may substantiate your view.
- If at all possible, have another individual (or more) complete a form or write a letter about this person, confirming why the person is a good candidate for induction.

We would like to take this opportunity to mention that if you have nominated someone for the VAA Hall of Fame; nominations for the honor are kept on file for 3 years, after which the nomination must be resubmitted.

Mail nominating materials to: VAA Hall of Fame, c/o Charles W. Harris, Transportation Leasing Corp.
PO Box 470350
Tulsa, OK 74147
E-mail: *cwh@hvsu.com*

Remember, your "contemporary" may be a candidate; nominate someone today!

Find the nomination form at *www.VintageAircraft.org*, or call the VAA office for a copy (920-426-6110), or on your own sheet of paper, simply include the following information:

- Date submitted.
- Name of person nominated.
- Address and phone number of nominee.
- E-mail address of nominee.
- Date of birth of nominee. If deceased, date of death.
- Name and relationship of nominee's closest living relative.
- Address and phone of nominee's closest living relative.
- VAA and EAA number, if known. (Nominee must have been or is a VAA member.)
- Time span (dates) of the nominee's contributions to vintage aviation. (Must be between 1950 to present day.)
- Area(s) of contributions to aviation.
- Describe the event(s) or nature of activities the nominee has undertaken in aviation to be worthy of induction into the VAA Hall of Fame.
- Describe achievements the nominee has made in other related fields in aviation.
- Has the nominee already been honored for his or her involvement in aviation and/or the contribution you are stating in this petition? If yes, please explain the nature of the honor and/or award the nominee has received.
- Any additional supporting information.
- Submitter's address and phone number, plus e-mail address.
- Include any supporting material with your petition.

How to?

ROBERT G. LOCK

Identify plywood ‘A’ and ‘B’ sides

Plywood is a veneer formed with an odd number of plies—three, five, seven, etc.—and with the grain direction of each layer at an angle of 90 degrees with the preceding layer or ply. Aircraft-grade plywood is manufactured to Military Specification MIL-P-6070. Common types are mahogany and birch, although basswood can be found. Aircraft plywood veneers are spread with waterproof adhesive and placed in a hot press to cure. Typical wood used in the cores are basswood and poplar. The outside plies are termed the “faces” or “face and back,” and the inner ply is termed the core. When there are five or seven plies, the center veneer is called the core, and the adjacent plies are called cross bands.

Plywood has a big advantage over solid wood in that it has strength in both directions along the length and width of the panel; solid wood has its strength only in the longitudinal direction. Plywood also has negligible change in width and length with changes in moisture content.

American mahogany or birch plywood comes in thicknesses of 1/16 inch, 3/32 inch, and 1/8 inch and will have three plies. Plywood of thicknesses of 1/4 inch, 5/16 inch, and 3/8 inch will have five plies. And thicknesses of 7/16 inch and 1/2 inch will have seven plies. When the veneers are glued and placed in a hot press to cure, one face will be very smooth and the opposite face will have some grain lines showing. The smooth side is called the “A” face, and the slightly rough side is called the “B” face. During fabrication and repairs it is always better to bond the B face when possible because the adhesive will penetrate better on that side. This is particularly true when using birch plywood.

Standard size for aircraft plywood is a 4-by-8-foot sheet. When the face grain runs parallel to the length, the plywood is called 90-degree grain. When the face grain runs at 45 degrees to the edges, the plywood is called 45-degree grain.

When forming of plywood is required, steaming is the best method; however, a steamer is not always handy. Soaking the plywood in hot water will aid in bending and forming the material. Figure 1 shows steaming 45-degree, 3/32-inch plywood around my Fairchild PT-19 center section leading edge back in 1958 when I was 19 years old. That is my late father, Leonard, to the left. He rented a wallpaper steamer, and it did a good job but was slow.

Figure 1

Figure 2 shows the center section with the new plywood glued in place. Nailing strips apply pressure until the synthetic resin adhesive cures, then the strips and nails were removed. In this early stage of my career I hope I knew about the A and B side rule. It was more than 55 years ago so I really don’t recall.

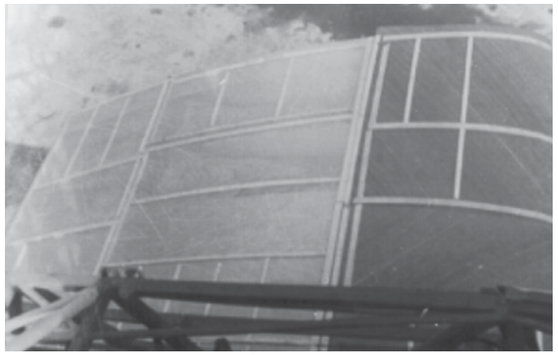


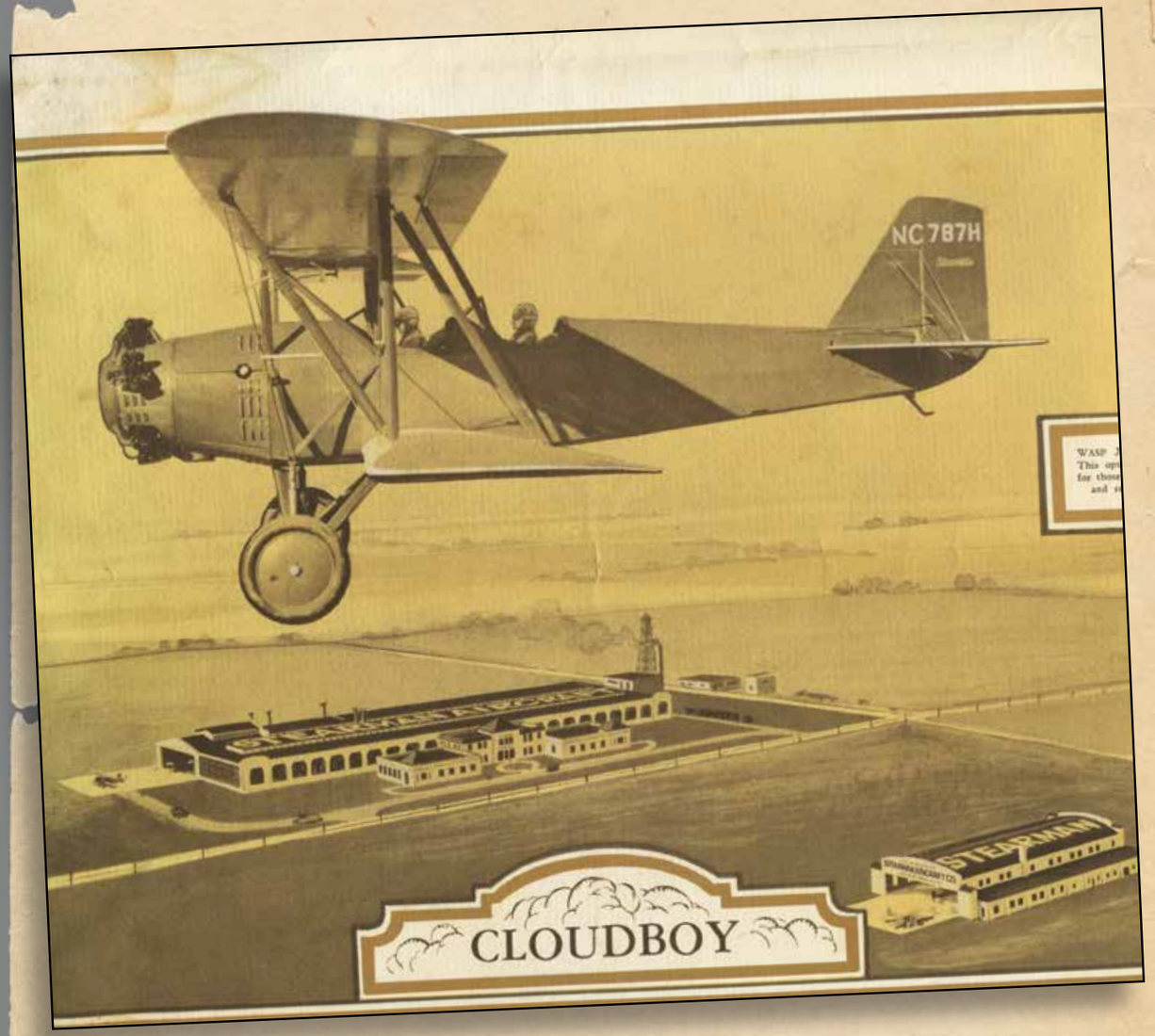
Figure 2

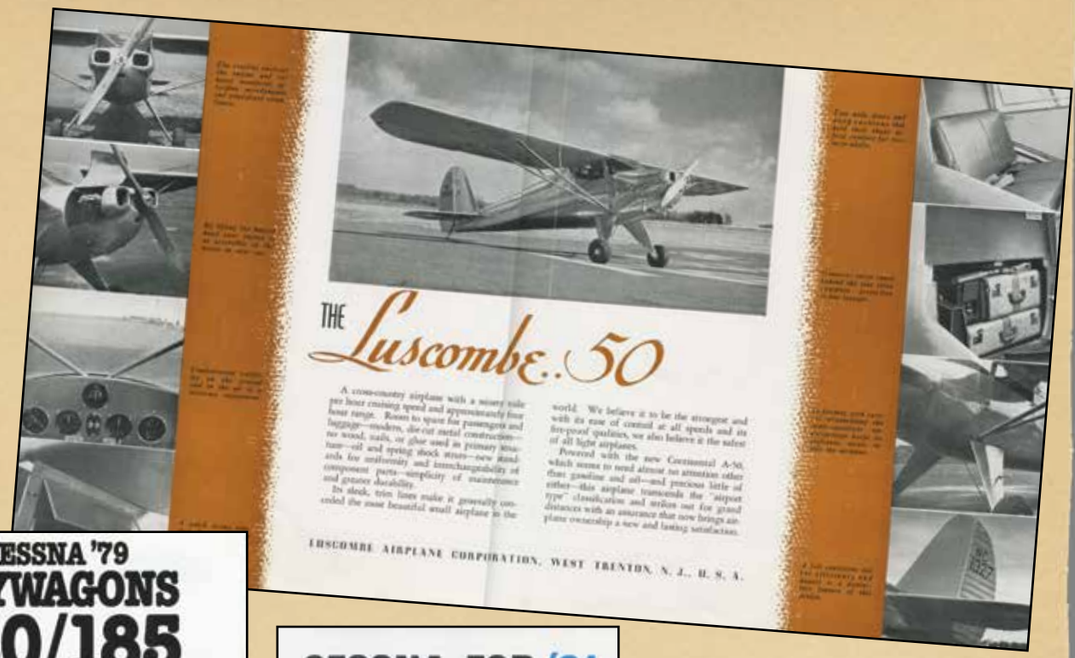
Good Old Days

SCRAP BOOK

From pages of what was . . .

Take a quick look through history by enjoying images pulled from publications past.





Classified Ads

Travel Air *5-Place Cabin* Monoplane [*With Wright J-5-C Whirlwind Engine*]

Carries pilot and four passengers, or equivalent in mail, express, or other cargo.

Balance and Stability It will fly itself, when once under way, so perfectly is it balanced. In an early test flight, this new ship maintained its direction and altitude for over 100 miles without the pilot once touching the stick, due to the remarkable stability built into the plane.

Comfort for Pilot and Passengers It has unusual flying comfort, both for pilot and passengers. Pilot's seat is in forward cockpit, which is completely enclosed, heated in winter, and which provides superior vision in all directions as well as protection from rain and snow. Passenger cabin is also comfortably heated and is roomy enough for four passengers without crowding, having approximately 118 cu. ft. of space. It, too, is heated in winter. Special flying togs are not necessary, either for pilot or passengers, and noise from the engine is reduced to a minimum, permitting conversation to be carried on with ease.

Self-Starter It is equipped with a self-starter, which does away with the necessity of a mechanic or helper.

Efficient Take-Off and Landing It has a quick take-off with full load (see results of tests, on back page) and because of its having individual wheel brakes it will land and come to a complete stop in small fields, as well as turn in a very short radius without outside assistance. This is a decided step forward, since it permits of absolute one-man operation.

Dependable Power Its motor insures a high degree of efficiency, speed and power — the Wright J-5 C Whirlwind Radial Air-cooled, 200 h.p. motor. There is no water radiator, with consequent elimination of leakage or freezing of water — a decided advantage in airplane operation. There is a cruising radius of approximately 450 miles.

Proper Body Construction Its body construction is according to the best practice, complying rigidly with the American Aeronautic Safety Code. This insures long and faithful service under exacting conditions, whether for transporting passengers or full loads of other cargo. Since the economic worth of any airplane is determined by its years of full productive value, this feature alone merits careful consideration.

Speed As will be noted by the result of the tests, (see back page) this model combines rapid climb with a high cruising speed. This means simply the ability to transport loads any given distance without the loss of precious time. In other words, the design of the plane is such as to glide through the air behind its engine with a minimum of resistance, effecting definite economies of operation for the owner.

Fills a Specific Need This plane was designed particularly to meet the needs of business firms requiring safe, speedy, comfortable transportation for people, baggage or merchandise. The seats are easily and quickly removed, when desired, providing a large space for cargo. Businesses seeking advanced methods of transportation, and whose requirements justify purchasing a plane of this class, will find it a time and money saver as well as a builder of prestige.

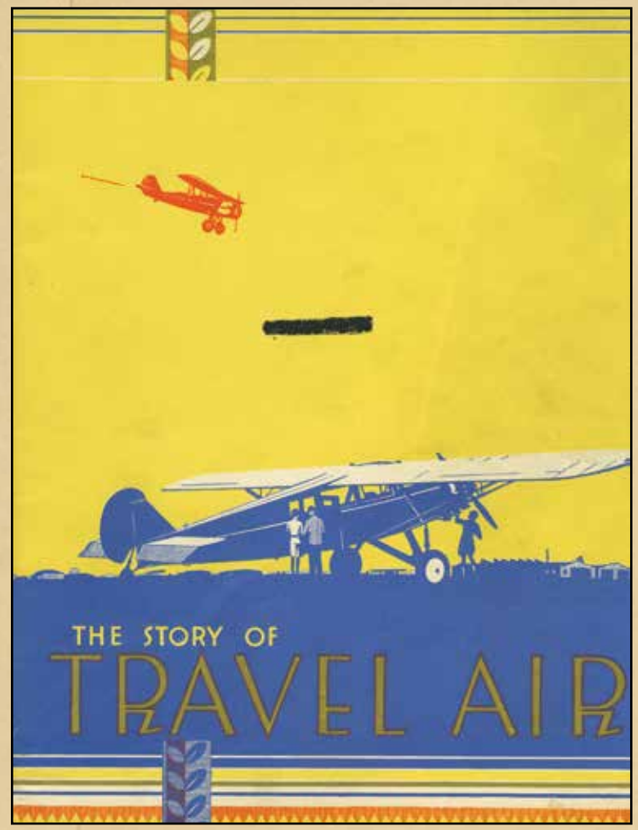
Further Particulars will be Gladly Given to any Interested Person, Firm or Flying Service.

Designed, Manufactured and Sold by Travel Air Mfg. Co., Inc., Factory and General Office, Wichita, Kans

A GUIDE TO COST OF OPERATION ..... COSTS ARE BASED ON NATIONAL AVERAGES

CESSNA MODEL 180 [redacted]

A Guide to Operational Costs Per Flight Year (owner operated)	USE THESE COLUMNS TO FIGURE YOUR EXACT LOCAL COST 300 Hrs.	500 Hrs.	700 Hrs.	GUIDE TO 300 Hrs. 48,600 Miles	GUIDE TO 500 Hrs. 81,000 Miles	GUIDE TO 700 Hrs. 113,400 Miles
Gasoline – 13.9 gallons per hour, 40¢ per gallon				$ 1668.00	$ 2780.00	$ 3892.00
Oil – 1 pint per hour plus oil change every 25 hrs. (12 qts. per change) at 50¢ per quart				$ 147.00	$ 245.00	$ 343.00
Airplane and Engine Maintenance at $1.50 per hour				$ 450.00	$ 750.00	$ 1050.00
Reserve for Engine Overhaul at $1.50 per hour				$ 450.00	$ 750.00	$ 1050.00
TOTAL DIRECT OPERATIONAL COST				$ 2715.00	$ 4525.00	$ 6335.00
A Guide to Fixed Charges Per Flight Year						
Storage – $40.00 per month				$ 480.00	$ 480.00	$ 480.00
TOTAL ANNUAL STORAGE COST				$ 480.00	$ 480.00	$ 480.00
A Guide to Insurance* Costs Per Flight Year						
All Risks (Ground and Flight) Deductibles: Fire and Theft – NONE; In Motion (Taxiing or Flight) – $250.00; Not in Motion – $50.00				$ 695.00	$ 695.00	$ 695.00
Public Liability						
Bodily injury excluding passengers, $50/100,000 limit				$ 25.00	$ 25.00	$ 25.00
Property Damage, $50,000 limit				$ 27.00	$ 27.00	$ 27.00
Passenger Liability, three passengers, $50,000 limit per seat. (Passenger liability slightly higher if "family-seat" coverage included.)				$ 110.00	$ 110.00	$ 110.00
* For private business and pleasure use by qualified pilot.						
TOTAL ANNUAL INSURANCE PREMIUMS				$ 857.00	$ 857.00	$ 857.00
TOTAL COST (Total operational, storage, and insurance per year)				$ 4052.00	$ 5862.00	$ 7672.00
A Breakdown by Mileage						
Miles (Cruise speed at 75% power) – 162 mph				48,600	81,000	113,400
COST PER AIRPLANE MILE				$ .083	$ .072	$ .068
COST PER SEAT MILE (4 Seats)				$ .021	$ .018	$ .017
For Depreciation – Consult Your Local Tax Authority To estimate depreciation on a per mile basis, take airplane cost (less residual value, if any) divided by years of life, divided by hours per year, divided by miles per hours, equals cost per airplane mile						



MONOCOUPE—2PCLM powered with 90 Lambert that has just been factory rebuilt. Ship has had little total time and is like new. Equipment includes wheel pants, flaps, tail wheel and many extra instruments ---$1750

ROBIN—3PCLM powered with Challenger 185 h. p. engine. Perfect ---$650

STEARMAN—C3R 3POLB powered with Wright J6-7 250 h. p. engine that was majored 55 hours ago. Ship relicensed last January and has had a total of 960 hours. Perfect condition, loaded with instruments in both cockpits, and a real buy at---$1650

STINSON, 1940—105 3POLM powered with Continental 80 h. p. engine. Total time about 300 hours, privately owned and an exceptionally clean ship---$2750

STINSON—Wasp Junior powered. Motor completely majored and has had no time since. All blind flying instruments including 2-way radio---$2750

TIMM TRAINER—2POLM powered with Challenger 185 h. p. engine that is practically new. Has had only 100 hours ---$950

TRAVEL AIR—E4000 3POLB powered with Wright J6-5 165 h. p. engine. Ship rebuilt last year---$1200

TRAVEL AIR Duster powered with Wright J-5-$1150

WACO RNF—3POLB powered with Warner 125 h. p. engine ---$1200

WACO GXE—3POLB powered with OX-5 engine. Clean ---$350

VEGA-VON HAKE—all metal. 7PCLM powered with Wasp engine. Has had airline care and is fully equipped with blind flying instruments including 2-way radio. A beautiful airplane---$5500

VEGA—wood fuselage, 7 PCLM powered with Wasp engine. Has had exceptional care and airline service. Fully equipped with blind flying instruments including 2-way radio.---$5000

LUSCOMBE PARTS, including 2 left wings, 1 right wing, 2 center sections, 2 sets doors, tail surfaces, controls, gas tank, seats, cowling parts and wrecked fuselage. Write for prices and particulars.

RYAN B1 Brougham fuselage—J-5 model—without engine—as is---$250

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SR10-C STINSON RELIANT 260 H. P. Lycoming—low amount of time—200 hours since major—1939 Gullwing—complete instruments including turn and bank, climb, sensitive altimeter—brand new RCA transmitter and receiver—complete with new $2500 pair of EDO floats—Sacrifice—at once for only $7500 cash—no trades.

WACO CUSTOM YOC 225 H. P. Jacobs L4MB. Completely modernized. Latest type Curtiss Reed metal propeller. Beautiful international orange with black gloss 24 coat hand rubbed finish, flaps, pants, radio receiver and transmitter—extra receiver for night and day monitoring of airline frequencies, heated pitot tube, reel type antennae, oversize tires and puncture proof tubes, 100 gallon tanks 1000-mile range, vacuum pump, large generator—both battery and magneto ignition—turn and bank, rate of climb, Kollsman sensitive altimeter, directional gyro-gyro horizon. Only 100 hours since complete United Air Lines major overhaul on engine airplane and all instruments. Cash or trade, $2995.00.

HOWARD—1940 DEMONSTRATOR—330 H. P. Jacobs—5 place Hamilton constant speed propeller. RCA receiver and transmitter, carburetor heater, Grimes landing lights, flares, manifold pressure gauges, turn and bank, rate of climb, Kollsman, Cambridge fuel analyzer, Waltham clock, outside air temperature, cabin heater, carburetor heater, 24 coat hand rubbed maroon finish—leather upholstery—plush trim—a de luxe airplane with 150 gallon tanks providing 1250 mile range . . . cruise 165. Total time 45 hours—cost new—less than five months ago $17,200. Selling for cash—no trades $13,500.

LOCKHEED 12-A: 2 Wasp Jrs. 400 H. P. each. Hamilton controllables. Hayes wheels, General tires, Goodyear tailwheel, Aerol shock absorbers, Grimes navigation and landing lights, Eclipse starter-generator and booster coils, Pesco fuel pumps, ventilating and heating systems, complete soundproofing. Full set of blind flying instruments, including Sperry group, all engine and airplane instruments. This airplane always privately owned and one that is now—in great demand. Ready for immediate delivery, $27,500.

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Grandfather to a Legend

The Stearman PT-912 Cloudboy

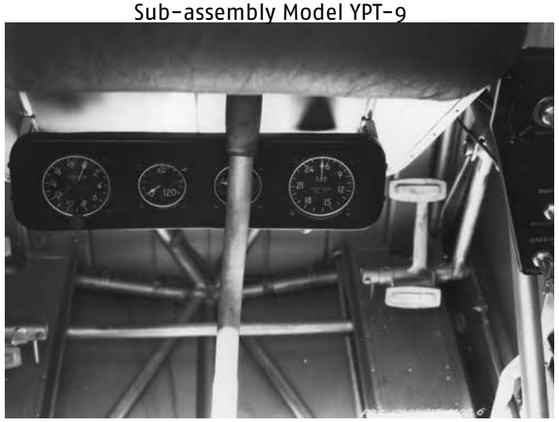
BY JIM BUSHA

"We pledge that the name Stearman shall stand for a quality of the highest order, for workmanship of the most exacting character, for a fairness in our dealings with you, of a kind that will make our business structure strong and enduring."

—The Stearman Aircraft Company, 1930

Sub-assembly Model YPT-9

Initial rigging assembly



787H Trainer Model 6A

The Lineage of the Legend Begins

At the very epicenter of "The Air Capital of the World," the Stearman Aircraft Company, which was under the umbrella of a larger aviation conglomerate known as United Aircraft and Transportation Corporation, knew it had a winner on its hands. Lloyd Stearman watched in silence as his latest design took to the sky. Excited anticipation spread across his face as the hangar doors of his company, which bore his namesake, slid open. It was the summer of 1930 in Wichita, Kansas, and he smiled, knowing he had a winner.

Lloyd, who had already secured a well-deserved seat among the nation's aviation icons with his previous aircraft designs, was banking on the fact that this new model, dubbed the Model 6 Cloudboy, would not only exceed the Army Air Corps' expecta-


Model YPT-9

Trainer Model 6A


Lycoming-powered YPT-9B and YPT-9C

tions and needs as a new trainer, but once accepted, orders for thousands of them would keep the factory running for years. The experimental Army designation was called the XPT-912.

The Cloudboy could be powered by a series of different powerplants that equaled different designations. Firewall forward, these included a variety of engine manufacturers such as Continental, Continental, Kinner, Lycoming, Wright, and Pratt & Whitney.

The Cloudboy was built for military specifications with a combination of metal, wood, and fabric components. As a trainer the landing gear was designed around a combination of springs and oil to absorb the landing and taxiing loads of fledgling cadets; 28-by-5 Bendix wheels with 30-by-5 tires supported the entire structure.

The fuselage was forged from steel tubing and, like the wings, was covered in cotton. The wings were built with conventional routed spruce spars with matching spruce ribs of Warren truss design. Internal bracing was accomplished with steel tubing and Macwhyte rods. Aluminum castings were attached to the rear spar that provided hinge points and ridged support for the ailerons on both top and lower wings.

The original Cloudboy delivered to the Air Corps, serial number 6001, was rejected because it was originally built to meet U.S. Navy requirements, which were not up to the same standard of those prescribed by the Army Air Corps. This ship was eventually returned to Stearman, with serial number 6002, modified to meet Army re-

Stearman Cloudboy Specs

N787H
Serial number 6002
Two-place open-cockpit trainer
Wingspan: 32 feet
Length: 24 feet, 8 inches
Weight: 1,733 empty, 2,400 gross
Engine: Lycoming R-685 225 hp
Prop: Hamilton Standard adjustable-pitch prop
Max speed: 110 mph at sea level
Cruising speed: 80 mph
Rate of climb: 710 feet per minute
Landing speed: 45 mph
Ceiling: 12,000 feet
Fuel capacity: 38 gallons
Cost per airplane (1930): $8,500

Ron Alexander

quirements, taking its place. The Cloudboy fuselage was painted in a dark blue, almost navy, with pale yellow wings and no military insignia markings. All that was displayed on the fuselage, in three separate lines, was: U.S. Army, Stearman 6L, XPT-912.

The Army put the Cloudboy through its paces in mid-September 1930 at Wright Field, Dayton, Ohio, to determine its suitability as a military trainer. Five different military pilots flew the Cloudboy for five hours each, alternating as instructor and student to simulate a training atmosphere.

Careful consideration was given to egress and accessibility, cockpit arrangement, equipment, location of instruments and controls, maneuverability, controllability, and stability.

After 25 hours under the Army flight test microscope, the general consensus of the pilots was that the Cloudboy was a good flying airplane. Minor tweaks and changes were requested that included downsizing of the windshield, changing the inadequate crash pad, fixing springs on the seat that were found to be too weak, adjusting safety belts that were attached too far forward, and installing a rearview mirror per Army specifications. All in all, the

Once I flew it I quickly realized that the Cloudboy, in my mind, is a much better flying airplane than the current Boeing Stearmans."

Army thought the Stearman had a neat and trim appearance, it was sturdy and well-constructed, and the cockpit layout was very good. The adjustable rudder pedals and adjustable seats provided quick and easy changes in position to suit individual students.

It was the Army's final recommendation that the Stearman Cloudboy be purchased for further flight tests at the training center. Unfortunately, with the country in a deep depression, even the Army Air Corps was operating on a shoestring budget and was only allowed to order six of the sleek new biplanes for evaluation. The Army designation was changed to YPT-9.

By December 1930 Lloyd had had enough of answering to a large conglomerate organization and packed up his things, leaving the aircraft company that bore his name and headed west, where he eventually became president of the Lockheed Aircraft Company.

Four other Cloudboys were released to the civilian market and sold as the models 6A and 6F with a color combination of either red or Skyways green for the fuselage with orange-colored wings. With no further orders by the military or civilian pilots, the Cloudboy could have easily slipped into obscurity had it not been for the several Stearman engineers, now working for Boeing, who used the geneses of the Cloudboy for its next design called the Model 70.

Eventually, with more fine-tuning, the final product to emerge in 1935 was known as the Model 75. This "steppingstone to fighters" was more affectionately known as the Kaydet to military cadets in all branches of the service. More than 8,400 Stearmans were produced from 1935 through February of 1945, with enough spare parts lying around to build another 2,000 of them. Today only three of the original Cloudboys remain, and the oldest of the bunch, serial 6002, the original military guinea pig, is now lovingly cared for and regularly flown over the skies of Georgia.

Caretaker of History

Ron Alexander, caretaker of the Peach State Airport just a stone's throw south of Atlanta, became the custodian of the Stearman Cloudboy in 2005. But Ron's affliction to the old stuff came about in a nontraditional way.

"I soloed in an Aeronca Champ

back in 1960," said Ron. "I eventually climbed the ratings ladder and wound up instructing in college to ROTC cadets."

Ron entered the Air Force in 1964 with more than 800 hours of flying time under his belt and eventually became a C-130 pilot with MATS (Military Air Transport Service).

"We kept going to this little country at the end of the world called Vietnam as it was cranking up at the time. I remember one flight where we landed at Cam Ranh Bay, and I saw this brown, ugly-looking twin-engine airplane with this big tail and awkward stance sitting in the corner of the field next to the dirt strip. I thought, 'Good god! I feel bad for the poor sucker who has to fly that monster.'

"About six months later I was back home on leave when I got a call from my squadron commander, who said, 'You're going to Vietnam, and you have a choice. You can either go as a forward air controller or as a Caribou pilot.' I asked what the hell a Caribou was. And my CO tried to explain to me what it was so I decided to take that. I was sent to Fort Benning and met the Caribou face to face. It was the very same ugly dirty brown bird I had seen in Vietnam."

Ron flew the Caribou in 1966 and flew out of Da Nang on a majority of missions, supplying Special Forces troops as his main focus.

By the end of his tour he had been promoted to captain and parted company with the Air Force in May 1969.

"I was hired by Delta in June of 1969 and flew an assortment of jets as a captain until I retired in 2002. It was while I was working for Delta that I had decided that I wanted a Stearman, even though I had never flown one before. I found an old duster in Louisiana and trucked it back to my home in Georgia. I was proud of that project, and when I unloaded it off the truck all my neighbors gathered around, looked at the pile of pieces and parts, and walked off shaking their heads saying, 'What are you going to do with that pile of junk?'"

Being the driven person Ron is, he had that Stearman flying in less than two years and won best PT at Galesburg in the early 1980s.

"And of course I had my neighbor's line up for biplane rides! Deep down inside I always had this intrigue for old biplanes, and although I had never flown one, having laid my hands on it for two solid years when I wasn't in the front office of a Delta jet, I would work on the Stearman 12 to 14 hours a day alongside my wife and children.

"So the big day came to fly it, and there were no other Stearmans around to get checked out in. I decided I would be the test pilot, and I flew it and did fine with it for the first two or three days I logged in it. But boy, oh boy, it humbled me big time right after that! The 'honeymoon' was over, and I gained an immediate respect for the old airplanes and haven't had any issues ever since."

Ron lost count of how many rides he ended up giving to all who wanted one in his Stearman.

"I owned that airplane for almost 15 years until a tornado decided to tear my hangar apart and the Stearman within. To say I had a soft spot in my heart for Stearmans is an understatement."

Enter the Cloudboy

In 2005 Ron was searching for a replacement to his beloved PT-17 when he found the Cloudboy listed for sale. Gordon Plaskett from King City, California, restored the Stearman from 1986 until 1995 and was willing to hand the baton to the next caretaker. After its military test flight role, the airplane spent a majority of its time in both the Midwest and West, especially in California.

"At one time it was converted as a crop duster," said Ron. "In 1952 it was converted to a Stearman 6L with the installation of a Lycoming 680 engine at 225 hp. Once I flew it I quickly realized that the Cloudboy, in my mind, is a much better flying airplane than the current Boeing Stearmans."

The Cloudboy has four ailerons, which makes it more maneuverable than the two found on the Boeing models. The visibility out front is much better as well, as are the flying characteristics.

Much of the design and technological features of the Cloudboy were transferred to the Boeing models. This old boy handed down a lot of its DNA to the later Boeing-built models. The basic design lineage between the models includes the fuselage and tail structure. The Cloudboy was built lighter and less beefy than the Boeing product—it's not quite as sturdy or strong, as the tubing inside the Cloudboy is not quite as large as that found inside supporting the Boeing models.

When you set the two biplanes side by side, the similarities jump right out at you.

Sweetheart of the Skies

Ron has flown a variety of other biplanes, including various Stearman models, Wacos, New Standards, and so on, but he says emphatically with much pride that the Cloudboy is at the very top of his list for a just plain all-around nice flying airplane.

"Most of the others are heavy on the controls; some have a lot of adverse yaw and are 'hogs' in the air. But not so with the Cloudboy. It is very simple to start, and once in the air is very maneuverable and easy and light on the controls. There are very little in the way of instruments, just the necessities: airspeed, altimeter, turn and bank, tachometer, and oil pressure and temperature gauges."

For a biplane it's got tremendous visibility, along with great flying characteristics for its age and era. It has a wonderful roll rate with great response of the four ailerons. All four of the ailerons, by the way, are all metal.

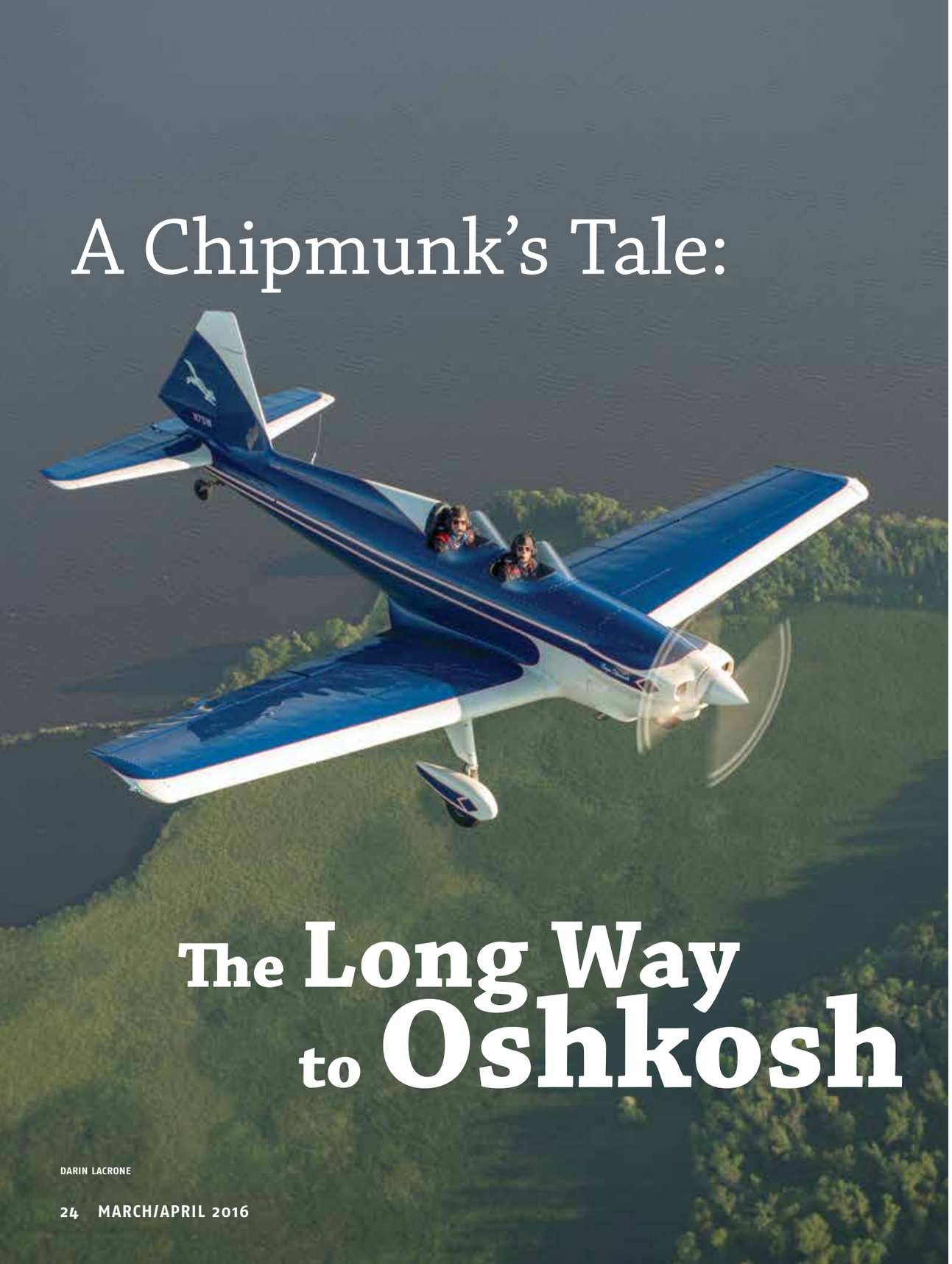
This airplane is lighter than its grandson the Kaydet and weighs around 1,850 pounds empty, compared to the 2,100-plus pounds of the Boeing models.

"If I had one complaint it's the fact that the Cloudboy only carries 38 gallons of fuel. It burns roughly 13 gallons an hour at a cruise speed of 100 mph. So its legs are quite short. But remember it wasn't designed as a cross-country machine. As for maneuvering and flight situations the Cloudboy is heads and shoulders above the PT-17. But for hard-core aerobatics the PT takes the crown due to its structural beefy stature. The stalls are very unassuming, and it breaks from a stall very clean and straightforward. The Cloudboy will spin easy as well, and because of its lightweight attributes I can take off from the end of a 3,000-foot grass runway and literally be climbing through 400 feet before I reach the end of the strip. In a flat-out run the Cloudboy will leave the PT-17 with its tongue hanging out trying to catch up. It's a pretty fast airplane.

"I have been told by others who used to operate the Cloudboys that you can loop it from level flight. I haven't and won't try that, as it's an old airplane and I have nothing to prove by doing it. But it just shows the maneuverability of this early biplane, which has a short takeoff roll and good climb rate. Its roll axis is excellent, along with its pilot-friendly visibility on landing. It is not very squirrelly on pavement, due in part to its fairly wide gear and the 30-by-5 wheels. I never say or claim that a tailwheel airplane is docile on pavement because they are not, but the Cloudboy is more docile than most. Trust me, it can still bite you just as hard if your head is not out in front of it.

"But I get the most joy out of early morning or late afternoon flights in the Stearman as I enjoy just watching the world go by beneath the wings of the Cloudboy. It's a very relaxing biplane, one in which I hope to admire for a very long time before the next custodian takes the reins of this historic treasure."

A Chipmunk's Tale:



The Long Way to Oshkosh

DARIN LACRONE

Mark Meredith's de Havilland DHC-1's arduous journey

BY BUDD DAVISSON

The de Havilland Chipmunk is one of those airplanes that you *never* hear anyone who's flown it bad-mouth. It's just a delightful little airplane. However, that's not what attracted Mark Meredith of Rockville, Maryland, to it. In fact, from an early age he saw the Chipmunk in an entirely different light, and it was almost pre-ordained that he would eventually own one of those "different" Chipmunks. One that breathed fire and had fangs!

In the Beginning There Was the Navy

Mark's aviation career began with the Navy at Annapolis; then, after 25 years, first as an A-6 bombardier, then as a maintenance/logistics type on "…nine or 10 different carriers," he retired as a captain in 2004. But the Chipmunk had hooked its little claws into him long before that.

He says, "I built the usual airplane models with my dad starting at about 8 years old. Among many other airplanes, I got hooked early on the Ryan STA and Art Scholl's Super Chipmunk. My taste has *always* been in vintage, with some WWII fascination thrown in. Always loved the golden age airplanes, the racers, the biplanes. It has never been nostalgia but beauty that drove my love of certain airplanes. That perfect blend of form and function that brings tears to the eyes as only 1930s-'40s airplanes can. The Hughes H-1, Lockheed Sirius, Ryan STA, P-40, and many others. Modern jets and most lightplanes are functional but do not have the same grace… though many come close, especially some homebuilts. Few achieve the same beauty as the old ones. That's what I saw in the Chipmunk."

Even though airplanes had been his professional life for a quarter of a century, Mark says, "Life kept getting in the way, so I didn't get my pilot license until I was 47 after I retired from the Navy and suddenly had some cash and time to

The front windshield is easily removed and the cockpit covered over for a true "racer" look.

TYSON RININGER

spare. I trained in 172s at Freeway Airport outside D.C. while we lived in Annapolis and I was on a Navy project. All the time I was training, I kept thinking back to Art Scholl in the Super Chipmunk. Right from the beginning, I wanted to do aerobatics. Not as a hard-core performer but at some beginning

The big rudder is a common 'munk mod.

TYSON RININGER PHOTOS

Every thing in the cockpit was removed and rehabbed.

Every thing in the cockpit was removed and rehabbed.

Cooling is always a chore.

TYSON RININGER PHOTOS

Mark fabricated the gear fairings.

The nose bowl, a Meredith design, is for max cooling and looks.

competition level. So, I was totally primed to buy when N7DW showed up in *Trade-A-Plane*."

Enter *Chippy*: A Tired World Traveler

Sometimes wonderful things happen to those who deserve them, and for Mark, the timing was right.

He says, "In 2009 I had a really nice 1973 A36 Bonanza with tip tanks...but it needed an engine overhaul, and I wanted to put the money into something else instead! I wanted to learn to fly aerobatics and thought maybe a restoration or kit was in my future. I've been interested in building—or designing!—an airplane since I was about 10 years old. Then, while perusing *Trade-A-Plane* for Decathlons, I saw the airplane I now call *Chippy*. A Chipmunk: It was red and evoked a 1930s charm I couldn't resist! It was all about pure looks—airplane porn—not personality, because I knew little about Chipmunks but I knew I liked this one. So, I sold the Bonanza and with the proceeds bought *Chippy*. At the same time I bought my wife a Prius (smart move!) and bought a half-share in an Archer so I could still fly."

Chippy might have been an apropos name for the airplane at the beginning, if the name refers to paint and an airframe that had seen better days and was badly chipped.

Mark says, "It was flyable, but it sure was in ugly condition. The beautiful lines couldn't cover that up. It had been ridden hard its entire life! Among other things, it still wore all seven coats of paint it had received since 1974, and much of it was flaking off in sheets. Worse, the cockpit fabric was in tatters and the mechanical condition was unknown to me. This was scary. Its long history had caught up with it."

The trail the airplane had followed was torturous and covered half the globe.

1951-55: Produced in England for the RAF, SN BF-370.

1956: Exported to Australia.

1956-65: Flown by Tasmanian Aero Club.

1965: Converted to a sprayer: "SA-29 Spraymaster." Rear cockpit with a tall bubble canopy installed and a hopper in the front. Still had stock engine.

1966: Sold, worked as a glider tug.

April 1971: New Aussie owner began to convert it to Scholl-type Super Chipmunk. Work stalled, and it was sold again.

May 1972: Imported to the United States, sold to Odessa, Texas, owner.

June 1974: Wings modified. Clipped 19 inches; ailerons extended. Installed O-435, engine number two.

June 1978: Sold to another Texas aerobat. Engine changed to GO-540,engine number three, geared.

March 1979 to February 1980: Owner couldn't afford to replace a trashed engine so sold it back to a previous owner, who put an O-540 in it, engine number four.

September 1987: Sold to Aeronautique Enterprises in Texas. Hopper removed; modified to two-place open cockpit.

1988: Rudder enlarged; beefed up the spar (steel carry-through in-

The soul of the original Chipmunk is hidden by the well done and tasteful redesign.

DARIN LACRONE

The aft part of the wings was originally fabric but is now aluminum.

TYSON RININGER

stead of stock bushings).

From 1974 to 1988: Removed many Spraymaster mods that still remained. Tail modified again. Its shape was changed in 1965, 1974, 1988, and 2012.

November 2000: Sold to Atlanta pilot. Flown very little.

September 2003: Sold to Bruce Moore of H-D Flying Service (and EAA photo ship pilot!). Bruce put an overhauled IO-540 on it, engine number five.

Summer 2009: Sold to current owner, Mark Meredith.

That's at least 12 owners and five engines split between the RAF, flying clubs, crop dusters, and aerobatic types spanning three continents. How's that for a spread of owners? In talking about becoming the latest owner, Mark says, "I bought it, flew it home from Florida to Maryland, and put about 30 hours on it before losing the right cowl cheek in flight over the eastern shore. That really got my attention and forced the rebuild to begin in earnest. It was an embarrassing moment!"

Mark actually started to rebuild it and got it into the air after the cowling and some other major units were finished. But, then the engine began scaring him. At that point he lost patience with doing things piecemeal and made the decision he knew he should have made at the beginning. He decided to take it completely apart, strip everything, and start from scratch. It hadn't been entirely gone through for nearly 40 years, and it was time.

Doin' the Wings First

The wings had already been modified for aerobatics, including clipping 19 inches from each tip. Also, the fabric on the back half of the wings was replaced with 0.020 aluminum, the spar was beefed up, and the flaps were chopped in half, with the outboard piece being married to the ailerons.

Mark says, "I didn't do any additional mods to them other than rebuild the ailerons, which were coming apart. I did replace a piece of trailing edge along with all the flap bearings, and I replaced a big piece of the right, leading edge skin."

Renewing the Fuselage?

"Many Super Chippies have been re-skinned," Mark says, "because the original fuselage skin is very thin, especially at the tail. I should have re-skinned mine—it may have been less work than stripping inside all the crevices, and patching all the holes and dented skin.

"Some things you can't save, and the firewall was one of them. It was so full of holes, it looked like it had been hit with buckshot. It was too ugly to save so I replaced it with a heavy gauge polished stainless firewall. I think it is 0.050 or 0.060. I also had to completely disassemble the top longerons and rebuild them from the firewall to the rear cockpit."

Because of the overwhelming filth at the bottom of the fuselage and the multilayers of control system mods, Mark decided to strip the control system out entirely and start over. He says, "At the same time I built new structure under the floors to support the controls, smoke tank, and battery. I-beams run between the main and LE spars (I used all the old spar holes—no new ones) and back to the rear cockpit main bulkhead. An elephant could stand on those floors. I also removed the remaining sprayer doublers (corrosion underneath) and patched the holes where spray controls had jutted through the side of the fuselage."

As is always the case like this, once the fuselage is stripped bare, it was the opportune time to replace all of the systems, including fuel, brake, and electrical. Mark also built new panels with overhauled gauges and some electrical wizardry. He says, "I used Bob Nuckolls' book [*AeroElectric Connection*] to design and implement the electrical system. That was really enjoyable."

He reused the IO-540 that was in it when he bought it but rebuilt and remounted it using the mount that was in the airplane ("...a beauty courtesy of Bruce Moore") and the Christen inverted system. Everything else from the firewall forward is new or freshly fabricated.

"When I did the right cowling, I didn't do the traditional method using foam to make the male mold because I wanted it to exactly match the existing left side. The cheek cowling fits *very tightly* over the cylinders, so there would have been no room or structure to support foam. So, I cut the old left cowl into strips to define the form and literally built a thin plywood 'boat' covered with drywall spackling compound over the engine. When that was shaped and sanded, I had John Hogansen come in and pull a female mold off it. Then he made the final parts in his own shop. It came out perfect! I loaned his superb molds to two other Super Chipmunk rebuilders—these may be the only ones around."

The nose bowl is pretty much a Meredith original in that, after a lot of design work and investigation, he reshaped everything and managed to lower both the drag and the temperatures. Much of this was via optimizing the internal cooling and induction airflow, but he says there is still room for improvement.

DARIN LACRONE

Sleek from any angle, "Chippy" has teeth, courtesy of an IO-540 Lycoming.

It's All About Beauty

Mark doesn't hide the fact that, although he wants an airplane that really performs, he was initially drawn to airplanes by their looks, and that hasn't changed. So, when laying out the fuselage lines during the rebuild, he still had teenage images of 1930s racers and such floating around inside his head. This resulted in the large, flowing turtledeck/headrest that caused an Oshkosh controller to flag him out onto the runway as "the blue racer." The 0.024 aluminum structure is quite stiff, courtesy of the stressed skin and hides both a roll bar and baggage compartment.

The new gear fairings and pants contribute to the racer lines that flow all the way back to the sleek DIY tail cone.

"There were a lot of areas in the tail that forced me to make friends with the English wheel, shot bags, and hammers. This included the fairings and strakes, but is most noticeable on the tail cone. I formed that in two clamshell pieces and flush riveted them down the middle. I got to where I really like forming aluminum."

Paint Isn't as Easy as It Looks

It's often easier to name babies than it is to decide upon a paint scheme, and this was doubly true with Mark Meredith. He had an image in his mind that he had to match, but it wasn't specific enough to guide him.

He says, "Painting the fuselage interior with an airbrush was enough to convince me I needed a pro to do the final paint and help with a scheme. I worked with Kevin Burns at Scheme Designers, Cresskill, New Jersey, on the scheme over a period of four years. They often partner with painter Ken Reese at KD Aviation in Trenton-Robbinsville, New Jersey. Together they have done several recent AOPA giveaway planes, so that's where I heard about them. They were *all* terrific to work with, and I can't recommend them enough.

"The scheme evolved quite a bit. The scheme it wore when I bought it was a knockoff of the Travel Air Mystery Ship. I loved the red and black but not the lines. I wanted a golden age looking scheme with graceful lines. Some ideas came from a beautiful blue and yellow Skybolt (the transition from the nose color to the fuselage via the stripes). The layout for the top of the wing is a tribute to Bob Odegaard's Super Corsair. It seemed simple and elegant.

"The mean, vicious *Chippy* on the tail is a re-imagining of the leaping panther on the tails of my old A-6 squadron, the VA-35 Black Panthers.

"I dragged Scheme Designers through about 30 iterations until I had something nice, but it was still red and black with gold pinstripes. But everyone has those colors these days! About that time a wise 10-year-old kid walked in my hangar with his grandfather, looked at my scheme ideas taped to the wall,

Documenting the Life of Geoffrey de Havilland

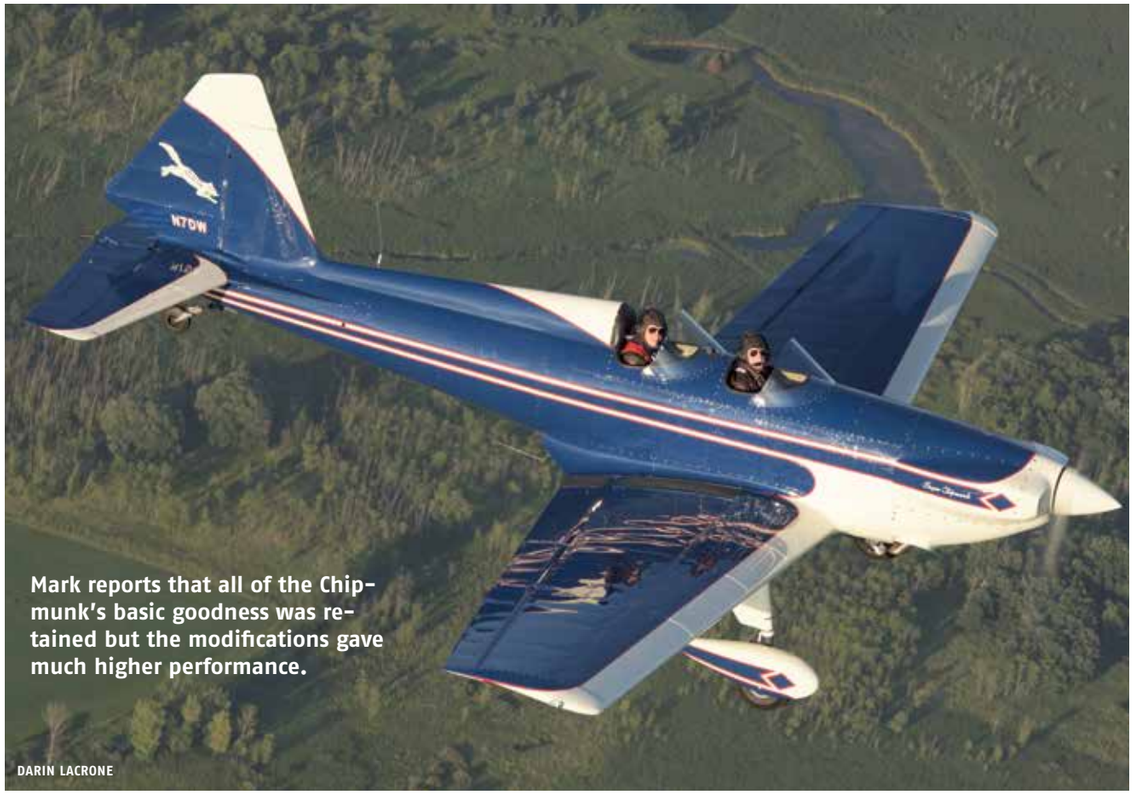
In the world of aviation, few designers have been more prolific and, certainly, inspired more affection than the United Kingdom's Sir Geoffrey de Havilland. From the DH2 and Be2 biplanes of World War I and the interwar Moth and Rapide series to the fabulous DH98 Mosquito in World War II, de Havilland Canada's Chipmunk and Beaver, and the DH106 Comet and DH121 Trident jetliners, the companies that bear Sir Geoffrey's name have produced some of the most important aircraft in British—and Canadian—aviation history.

For all these successes, however, de Havilland's personal story is not terribly well-known. Director Ashley Rowe and veteran de Havilland display pilot Stephen Bohill-Smith hope to change that with *The Geoffrey de Havilland Story*, a new documentary released by Flying Horse Films. Five years in the making, the film follows de Havilland's story from his childhood in Nuneaton and Crux Easton, to his pioneering flying attempts in 1909 and his subsequent storied career. The film makes modest use of contemporary dramatic re-enactments, alongside archival imagery and interviews with pilots, family members, and other de Havilland notables. Stuart McKay, MBE, founder and secretary of the DH Moth Club, is a key contributor, and his considerable expertise is welcomed and nicely showcased in the film.

With a run time of just more than two hours, the film is long by traditional documentary standards, but it doesn't drag. On the contrary, by taking a more languid pace, it sets a relaxed tone that makes the interviews feel more personal, more teatime chat than lecture. The film is beautifully shot and well-polished, and provides a deep and engaging look at a richly deserving subject. Fans of de Havilland types will find it informative, educational, and inspiring.

The film is available on all-region DVD in NTSC or PAL formats, and it may be purchased directly from Flying Horse Films for £15, approximately $21.50 U.S., plus shipping. For more information, visit *www.FlyingHorseFilms.co.uk*.

DARIN LACRONE



Mark reports that all of the Chipmunk's basic goodness was retained but the modifications gave much higher performance.

DARIN LACRONE

and said, 'All aerobatic airplanes are red. You should paint it blue.' I said, 'You're right!' And the final scheme was born that day.

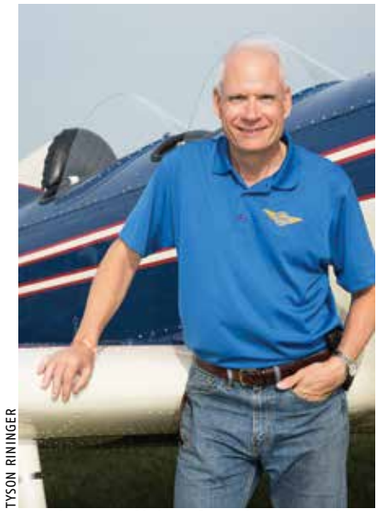
"I stripped, cleaned, and etched/Alodined it, but KD Aviation did the final prep, laid the tape for the tapered checkerboards and stripes, masks for the art, and blew the paint, and it's amazingly perfect! Paint lines actually cross right over hundreds of round head rivets but have no tape bleed-under. Not on a single rivet!"

And Speaking of Tough Jobs

"Hands down, the worse part of the project was stripping the paint," he says. "It took a year for the exterior, with help from a sweet woman and her grandson, whom I hired. Seven coats came off, one at a time. It was like archeology, slowly revealing history one color at a time.

"While they worked outside, I mostly worked inside the fuselage. It took close to 500 hours to strip, prime, and paint the inside of the fuselage. I started out with nasty chemicals (25-plus gallons at something like $60 per gallon for the inside and outside). I breathed through a fresh-air mask fed by my HVLP unit, wielding scrapers and toothbrushes to get in the cracks. Halfway through, a Chippy rebuilder friend in Tulsa (Jesse Schneider) tipped me off to water-based stripper. It worked great! Lay it down, wait a day, then blast the cracks with a garden nozzle. I kept the Shop-Vac going, to suck the water and sludge out of the bilge. It still took another few months of that, but life was sweet again.

"Unfortunately, I paid a price. I fought various kinds of damage from repetitive moves and weird positions while lying on my belly and knees across the spar. It took a year to get all of the feeling back in my right leg and recover full hand function. The human body wasn't meant to be treated that way. I could have skipped all that by doing the re-skinning it really needed.



TYSON RININGER

Mark Meredith's face betrays the "Whew, it's finished" thought that has to be in his mind.

"Once I was in that far with an airplane in pieces, what could I do but finish? There was no exit so I bulldozed through it a day at time. I was still doing paid Navy work full time during this period, so much of the stripping was done between 7:00 and 10:00 p.m. in a dark hangar a few evenings a week. Once the stripping was finally done, rebuilding and fabrication began, which was more fun than I may ever have again in this life. . .unless I do another airplane, and if I do, someone else is going to strip it!"

No One Works Alone

Mark has a long list of those he wants to thanks, including:

My local A&P/IA Larry Donaldson and Brian Tuscher of Chesapeake Aviation Services at Lee Airport, Annapolis.

My local EAA Chapter 571 friends.

Jesse Schneider, a three-time Chipmunk restorer based in Tulsa. He's a huge source of Chippy expertise!

John Michelli of the Baltimore FSDO.

Welding by Aerospace Welding in Minnesota. Terrific folks.

Oregon Aero covered the seats, did the stitching, and made the headrest. David Esterline and David Shelton went above and beyond!

Will and Sam James of James Aircraft, who taught me much about cooling and induction systems.

Josie DeRodio and Thorn Britton, who spent long hours stripping paint.

John Hogansen, who built the female cowling molds and cowling.

Ken Reese and his crew at KD Aviation in Trenton-Robbinsville, New Jersey, who did the perfect paint job.

The Miracle of Airplanes and Marriage

"From the beginning, anyone who hears me talking about this airplane should know that it wouldn't have happened had I not had Martha as my wife and partner. When I came out of the Navy and started consulting, I was making good money but wasn't happy. My release was banging on the airplane at night and on weekends, which Martha encouraged. More important, she let me quit my regular job and spend a year and a half finishing this airplane and now spend my days flight instructing for the Navy Annapolis Flight Center, which I dearly love. Life is definitely good!"

So, now he's as happy as a Chipmunk. Or something like that.

What Our Members Are Restoring

Are you nearing completion of a restoration? Or is it done and you're busy flying and showing it off? If so, we'd like to hear from you. Send us a 4-by-6-inch print from a commercial source or a 4-by-6-inch, 300-dpi digital photo. A JPG from your 2.5-megapixel (or higher) digital camera is fine. You can burn photos to a CD, or if you're on a high-speed Internet connection, you can e-mail them along with a text-only or Word document describing your airplane. (If your e-mail program asks if you'd like to make the photos smaller, say no.)

For more information, you can also e-mail *jbusha@eaa.org*.

‘Well…We Had These 11

Travel Airs’

The second time around for Dan Murray’s Travel Air

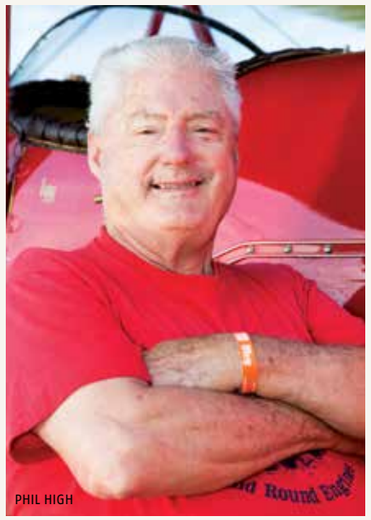
BY BUDD DAVISSON

The logbooks say NC6464 had 30,000 hours of ag-flying behind it, when Dan Murray, of Longmont, CO, restored it then flew another 3,000 hours before restoring it for a second time last year.

TYSON RININGER

Almost all of the sheet metal on the fuselage was there, but could only be used as patterns.

TYSON RININGER



PHIL HIGH

Dan Murray has spent a good portion of his life restoring Travel Airs.

To say that Dan Murray likes old airplanes would be a gross understatement. He loves flying them and busting knuckles while deep inside their bowels. In fact, considering that between its first and second restoration he put in well more than 3,000 hours on Travel Air NC6464, the bird he had at AirVenture 2015, it's hard to imagine that he had time to do anything other than fly. But, obviously, he did.

Born and raised in Montana, he now calls Longmont, Colorado, home. His résumé says he has done everything from working as a mechanic to doing quality control on Minuteman missiles to restoring airplanes (obviously), and now he *claims* he's retired. This last résumé entry is doubtful because his name keeps popping up in connection with other Travel Air restorations throughout the Western United States. Once the airplane bug bites and the infection sets in, it is seldom cured as long as the host animal is still breathing.

He says, "As a kid I lived near the Army base in Great Falls and built models constantly. I even won a scholarship to college that was based on my model-flying ability.

"I got my first flight in 1946 with my cousin in a brand-new Stinson Station Wagon, and he let me fly it. Then, many years later, when he was in his 80s, I took him for his last airplane ride."

Dan actually started his flight training with no training involved: "I flew with as many friends as possible and actually learned to fly both an Ercoupe and a Taylorcraft, but none of it was formal training. Then we moved to Rapid City, South Dakota, for the Minuteman missile projects, and I got a lot of stick time with the company pilots in the company airplanes. When I finally took flying lessons in Lewiston, before the first flight the instructor asked if I'd ever flown before, and I said no, but after a few minutes he knew better. He soloed me in a couple of hours in a C-172.

"The vintage/antique airplane thing started for me in Lewiston,"

Dan says the big old airplane is good for a 115 mph cruise at 12 gallons/hour.

TYSON RININGER

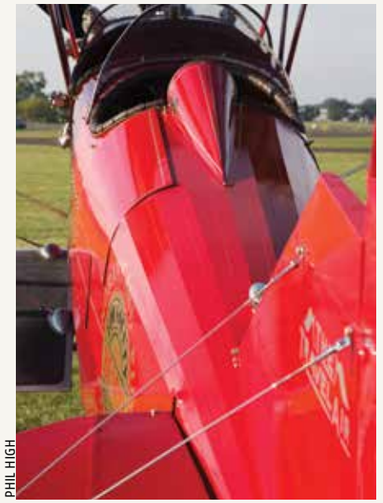
he says. "Frank Bass had a flying service there, and he was into antique airplanes. We became good friends, and I helped him restore and fly them. This included a Travel Air B-4000 and his Kari-Keen. With only two or three hours on the Travel Air after restoration, we flew it to Blakesburg for the AAA show, and I was totally hooked. I was about 34 years old at the time. He soloed me in his Travel Air, my first, and that airplane is now in Kermit Weeks' museum."

What Dan Murray didn't know, as he was growing up and becoming more and more infatuated with older airplanes, was that his future airplane, N6464, was at that time working its tail off as a crop duster in Texas.

"The airplane had left the factory in September of 1928," he says. "Originally it was built as a mail plane with an unbelievable 108 gallons of fuel in four tanks. However, the extra tanks were capped off when the factory delivered it as a standard airplane. Then, in 1931, when it was only 3 years old, a storm blew a hangar onto it. The damage was extensive and the rebuild was not completed until 1936, when it was registered as NR6464 and restricted for crop dusting. It flew as a crop duster un-

PHIL HIGH

The Wright R-760 is a later version of the original J-6.



PHIL HIGH

til it was replaced by an Ag Cat in 1968, an amazing 32 years! The logbook for the airplane shows more than 30,000 hours of ag work!"

NR6464 bounced from owner to owner, all of them crop dusters. However, one owner, Floyd K. (Slats) Rodgers of Mission, Texas, did more than kill bugs with the airplane. Eventually, he wrote *Old Soggy No. 1* about his days as a booze runner: He used the heavy-lift capabilities of his Travel Air dusters to run illegal alcohol

Sometimes referred to as the "Wichita Fokker" the elephant ear aileron and rudder balances give the airplane a distinct Fokker flavor.

PHIL HIGH PHOTOS

around the Texas/Oklahoma area.

Dan says, "Somewhere along the way the gas tanks were removed from the wings, and the tail surfaces and fuselage were covered with aluminum. This was done to keep the fabric from burning off, if the sulfur dust caught fire from static electricity before the pilot would see the fire and close the dust chute.

"It came out of the factory with a J-5 Wright engine but had a Lycoming R-680 when it was dusting, and that's what it had when I got it."

When 6464 was retired, she was part of an 11-plane fleet of dusters—all Travel Airs—owned by one crop duster. They were simply disassembled and crowded into a barn and its lean-tos in Pharr, Texas, and ignored. Technology, in the form of Ag Cats and other more modern ag-planes, had rendered the old birds, which had already been obsolete for decades, useless. There's a chance that, had they been retired 10 years earlier, the owner would have simply scrapped them. However, by 1968 the antique airplane movement was gaining momentum and their value as historical artifacts (avifacts?) was recognized, so they were spared and simply left to deteriorate.

"The existence of the 'pile of biplanes in the barn' was no secret," says Dan. They were common knowledge in the antique airplane community, but everyone said they had been underwater and only a fool would buy them. Frank and I looked at the airplanes, and there were piles and piles of wings, tail feathers, and fuselages along with 11 newly overhauled R-680 Lycomings.

"The tales about them having been underwater looked to be true: All the wood was white and looked like badly dried driftwood. However, on a hunch I took some soap and water to one and found that everything was coated in sulfur dust and good old Texas dirt, but under that layer was what looked like new, freshly varnished wood. The dust had really protected them."

Dan says, "This was in 1980, and Frank Bass, who passed this last year at 90 years old, and myself bought all 11 planes. My son, John,

The massive tail gives excellent control down to almost zero airspeed.

and I then spent two solid weeks disassembling and stuffing them in two tractor-trailer trucks and taking them to Moore, Montana. There we stored them at Frank's place in the hayloft of his old barn. We tossed a coin to see who got what airplane, and that's how I came to own NC6464. Frank sold his half off as basket cases. I sold one as a basket case but, over the years, rebuilt the rest and sold them."

30 x 4 tires are correct, but, while crop dusting, many Travel Airs ran on truck tires.

PHIL HIGH PHOTOS

It's doubtful if any original Travel Air cockpits were this nice.

Dan says the fictional owners are Iggy Norant and Stu Pid.

Entrance to the front pit is made easier by a small door.

At that point, Dan and Frank had the aeronautical equivalent of King Tut's treasure. Think what your workshop, backyard, or hangar would look like with 11 disassembled biplanes sitting in it. There is something magical about discovering even one ancient airplane that has been sleeping for decades. Sometimes it's difficult to describe the thought process involved at the moment of discovery, but it has to do with seeing the potential and imagining the airplane coming back to life. Now multiply that 11 times over! Very few of us will ever see anything like that in our lifetimes.

"Although the storage was pretty dry, don't get the idea that these were all pristine airframes," Dan says. "They were actually fairly rough. They'd been ridden hard and put away wet many times in their lives and showed it. Plus, all of them sat on International truck wheels and tires. True working birds. There were a fair number of airframe spare parts but no engine spares. The good news was that they saved most of the original parts, as they took them off to do the duster mods, so when I did N6464 I didn't have to do too much scrounging for original parts.

"On the first rebuild, it was surprising that so much wood was reusable," Dan continues. "Most airplanes like this require new spars and ribs, but not 6464. However, while the wood was okay, the glue in a lot of places wasn't. So glue joints all had to be checked,


N6464 back in her glory days as a duster.

PHOTOS COURTESY AUTHOR


It took two tractor trailers to get all 11 airframes back to Montana.

and if necessary, pried apart, cleaned, and reglued. All of the wood was sanded and varnished. The fittings all came off and were sandblasted and painted, and the trailing edges were replaced.

"On the second restoration, it was mostly refinishing, checking everything, and repairing a few fittings. Although I had flown the airplane a lot, it had held up really well.

"When it comes to ag fuselages," he says, "it's not unusual to find lots of modifications done during their dusting days. We probably removed close to 200 pounds of steel parts. So the first time there was a fair amount of surgery involved and some welding. However, second time around we just took it all the way back down to the tubing, sandblasted everything, and powder coated it. We also replaced three or four brace wires that had stretched.

"The first time around," Dan remembers, "we were dealing with nearly four decades of continual abuse. Besides the typical deterioration from age and moisture, the aluminum on the tail and fuselage had to be removed and lots of the crud it had trapped in place cleaned off. So everything was cleaned and painted. For that reason, the second time around it was a simple case of refinishing and powder coating, as required. It's hard to believe that even though I flew it 3,000 hours after rebuilding it, the structure was actually in good shape. There's a big difference between hauling passengers at air shows and dusting fields day after day."

Although the R-680 Lycoming is a powerhouse and a number of them came with the Travel Air treasure trove, it wasn't the "right" engine, and Dan decided to make that right by going with a Wright. (Follow all of that?)

In overhauling the Wright R-760, Dan says, "Parts are available from Harmon Dickerson, Columbia, Missouri, but the engine I bought was rough and took a lot of parts and time. The good news, however, was that most of the internal parts were usable. The engine runs well, is not hard to overhaul, and is easy to keep running. In fact, the first time it was overhauled, it had gone 1,800 hours and, when I tore it down, all it needed was one valve spring and to replace a broken cylinder stud."

Everything about late-'20s biplanes is big, and this is especially seen in the landing gear and wheels. Today, where 6-by-6s are the typical footwear of almost everything we fly, the 30-by-5 wheels, which were used on a large number of the big biplanes at the time, look absolutely huge because they are. Dan has the original wheels on 6464. They mount 12-inch Bendix mechanical brakes. "This means the brakes alone are the size of the tires on most of our airplanes."

If one thing can be said about old-time dusters, it's that they were machines built to do a job, and the job wasn't easy on them. In effect, they were hammers and were expected to complete the mission. Looks didn't really count. Plus, when an airplane is flown eight to 10 hours a day in an effort to cover as many acres as possible in the shortest amount of time, that means maintenance cycles can be only days apart. Even when doing oil changes at 50 hours, this kind of schedule could mean doing one a week or more. So the sheet metal is continually going on and off. Airplanes like the Travel Air didn't have hinged sheet metal panels, so screws came and went until holes were egged out, and edges got dinged from being manhandled and carelessly laid around. Looks don't count, so Travel Air dusters eventually got to the point that they were normally ratty looking. So when N6464 came to the end of its working life, almost anything made of sheet metal had to be replaced. Which was no big problem.

Dan says, "Most of the sheet metal was still there, so I had good patterns to use in making the new pieces. I saved very little of the sheet metal because it was easier to fabricate new ones than try to repair and save the old ones. However, even though I had put a lot of flying hours on the airplane between restorations, the second time all the metal needed was cleaning and painting."

In the postwar period, the flood of cheap Stearmans didn't really threaten to put the few Travel Airs still flying out of work: The Travel Airs could carry more so they were still viable as dusters. However, Travel Air parts were wearing out and there was a pile of surplus Stearman parts everywhere a duster pilot looked. So, as with N6464, many Travel Airs were seen using lots of Stearman parts.

"When I got the airplane," Dan says, "a lot of the cockpit stuff was Stearman. This includes the entire throttle assembly; the rudder pedals, which hung from a cross member; and the seat was Stearman. The entire tail-wheel assembly was also Stearman. All of these changes worked and some were actually improvements, but they weren't Travel Air so they had to go. In some cases parts were just missing, but I had original blueprints so I could make what I couldn't find."

Dan reports that some of the hardest tasks centered on removing the add-ons left over from its days as a duster. There was the hopper, which required some tubing work to correct, and lots of things that were welded here and there. Also, a lot of unneeded fittings were removed while doing the duster mods and had to be reinstalled. Dusters, especially old-school dusters, were essentially flying tractors. There were no rules about what the operators could or couldn't do to the airframes, and there was little or no oversight. To survive financially, the aircraft had to be kept flying during the short time frames each crop demanded. So finesse didn't count. Utility did. Make it work and get it off the ground making money.

N6464 is covered in Poly-Fiber using Aerothane paint, and the scheme is typical Travel Air with a few personal touches. Dan points out, "My wife, Linda, did most of the covering and all of the interior. It's done in leather and is as comfortable as any airplane you'll ever fly. If you're an airplane guy, you can't have a better wife than one like mine, and I couldn't do any of the stuff I do if it wasn't for her."

Regarding the paint, Dan explains, "In Montana we had a company called Norant and Pid Construction. We used that name with the Bendix logo on the Travel Air and it became Norant and Pid Flying Service. Notice that the names on the cockpit are Iggy and Stu. If you combine those with the name of the company, you get 'IggyNorant' and 'StuPid.' I'm not sure which one I am. Maybe both!"

Although the Travel Air obviously has the drag of a tumbleweed, when Dan is at his home base in Longmont he's at 5,000 feet MSL. Even at that altitude, he says he still gets 1,000-feet-per-minute climb.

"Just for grins," he says, "I took it into Leadville, Colorado, which is the highest public airport in the U.S. and just a few feet short of 10,000 feet MSL, and I still had 500-fpm climb. Those big wings really work!"

Travel Airs are legendary for their good flying characteristics, which Dan confirms.

"It's super docile and easy to control. On takeoff, the tail comes up at about 10 mph, and it flies off at about 45 mph, with little or no help from me.

"When landing, most of the pattern is flown at 70 mph—with 60 on short final—and it's slipped as needed. Then, when I can see both sides up the runway, you bring the nose up just a little and hold it until it settles at about 45 mph. I'm comfortable flying it in and out of 300 feet of runway, if the approaches are good. That's with max load and zero wind. It really wants to fly! All of this and it still cruises at 115 mph at 12 gallons per hour. Its top speed is about 130 mph, but that's when going straight down with full power! It's really a joy to fly!"

It took Dan six years, working part time, to finish it the first time but only 18 months the second time, and now that it's finished, he's again taking N6464 to as many fly-ins and air shows as he can reach. Now that he's "retired" (yeah, right!), maybe he'll put another 3,000 hours on it.

Spirit of Columbus

A flying tribute to Mock's moxie

BY SPARKY BARNES SARGENT

DARIN LACRONE

DARIN LACRONE

COURTESY DICK MERRILL

View of the *Spirit of Columbus* paint scheme at home in Tennessee.

COURTESY DICK MERRILL

This is the way N2961A appeared prior to being painted like the *Spirit of Columbus*.

Quick, how many American women have flown around the world solo in a single-engine airplane? Still thinking? The answer is two. Now, can you name either one of these intrepid women?

If you're stumped, we'll make it easy for you: In 1964, Geraldine "Jerrie" Fredritz Mock was the first to do so, in a 1953 Cessna 180. Thirty-nine years later, CarolAnn Garratt became the second, flying a 1993 Mooney MSE.

Jerrie's interest in aviation was sparked when she went for a Ford Tri-Motor flight as a child. Later, she studied aeronautical engineering at Ohio State University, but in 1945 she married pilot Russell Mock and started a family. Though her life was, in some ways, typical for that era, it was also atypical due to her lingering love for aviation. She started learning to fly at age 32 in a Piper Tri-Pacer and earned her private certificate in 1958. By the time she began the meticulous preparations for her world flight, this petite pilot had logged more than 700 hours. Described by some at the time as the "flying housewife," Jerrie was 38 and a mother of three. An instrument-rated private pilot, she embodied a humble, quiet confidence combined with a spirited determination born of curiosity and inner fortitude.

In her book *Three-Eight Charlie* (1970), Jerrie wrote: "I discovered that there was a certain unknown factor, excitement maybe, that made it possible for me to do things that otherwise I couldn't have done." (A commemorative 50th anniversary edition was published in 2013.)

The Cessna 180 in which Jerrie Mock made her world flight is suspended from the ceiling in the Boeing Aviation Hangar at the Steven F. Udvar-Hazy Center in Chantilly, Virginia.

Dick and Ginger Merrill

There have been only a few women of other nationalities who have also flown solo around the world in a single-engine plane: Sheila Scott in a Comanche 260 in 1966 (United Kingdom), Judith Chisholm in a Cessna Centurion T210 in 1980 (United Kingdom), Gaby Kennard in a Piper Saratoga in 1989 (Australia), and Polly Vacher in a Piper Dakota in 2001 (United Kingdom).

50 Years Later...

Husband-and-wife pilots Dick and Ginger Merrill of Chuckey, Tennessee, enjoy promoting aviation history. Through the years, Dick has developed a special feeling for Jerrie's achievement—partially because he was a teenager living in Ohio when he heard the local news about the housewife who was flying around the world. He also read about Jerrie Mock in aviation magazines at the time, but hardly imagined that in 1980 he would purchase the very same make and model of the airplane that Jerrie had flown.

So when Dick's 1953 Cessna 180 (N2961A) needed a new paint job, Ginger encouraged him to have it painted just like Jerrie Mock's *Spirit of Columbus*. He agreed; they both felt it would be a great way to pay tribute to the first woman pilot to circle the globe solo in a single-engine airplane. It would also be a handy means to educate the current generation of pilots about Jerrie's record-setting flight. Essentially, the Merrills didn't want her flight to fade into forgotten history.

But first, Dick wanted to request permission from Jerrie to copy her paint scheme. "I talked to Wendy Hollinger and Dale Ratcliff at Oshkosh—they had published the 50th anniversary edition of *Three-Eight Charlie* and had been in contact with her," recalls Dick, "I told them what I wanted to do, and they gave me Jerrie's phone number. So I called her a few days later and told her I wanted to paint my airplane like hers. She said, 'That's a wonderful idea. Come show it to me if you get it done.'"

Before we highlight more of the Merrills' story, let's take a closer look at Jerrie's flight.

Spirit of Columbus

Jerrie's husband, Russell Mock, co-owned N1538C with Al Baumeister. Voicing a sentiment that may be familiar to other 180 owners, Jerrie wrote, "One of the reasons we had bought the plane was because his engine roared so dramatically at takeoff." She apparently surprised her husband by wanting to make the world flight, and the co-owner didn't think she'd really do it. When Jerrie first began planning the flight in 1962, she imagined it as a pleasurable journey around the world. Then it was

brought to her attention that she could be the first woman to make a solo round-the-world flight, and that opened the door for corporate sponsors including Champion, Textron, and Bendix. Lofty hopes and expectations from numerous supporters propelled Jerrie forward.

Christened *Spirit of Columbus*, the plane featured a red-and-white paint scheme that was finished barely a week prior to takeoff. Changes to the airplane included the installation of a new 225-hp Continental and large fuel tanks in the cabin where the passenger seats had been. With 178 gallons of fuel on board, the 180 had a range of 2,400 nm. Navigation equipment included a new compass, twin radio direction finders, dual short-range radios, and one long-range radio system with a trailing antenna. An autopilot system was also installed.

Then, shortly before Jerrie was to depart from Port Columbus International Airport on March 19, 1964, she learned that Joan Merriam Smith had made plans to be the first woman to fly solo around the world

COURTESY DICK MERRILL

Dick and Ginger Merrill flew their Cessna 180 to the First Flight Society's celebration of the 112th anniversary of the Wrights' flight at the Wright Brothers National Memorial this past December. During the ceremonies, Jerrie Mock was inducted in the Paul E. Garber First Flight Shrine.

(in a twin-engine Piper Apache). That upped the ante, and Jerrie's flight became anything but leisurely.

Solo World Flight

For many pilots today, it's difficult to truly imagine flying around the world in a single-engine tailwheel airplane without the benefit of a copilot, GPS, and satellite weather radar. Jerrie battled a swirling cauldron of challenges, including thunderstorms, sandstorms, icing conditions, starless-night navigation, radio problems, carburetor troubles over a shark-infested sea, gale-force winds during landings, brake failure, foreign regulations, and red tape…and then, exhausted from flying, she tried to comply with her husband's demands for up-to-the-minute reports following virtually every leg of her flight. She carried a manual typewriter so she could type these reports for *The Columbus Dispatch*.

Russell persuaded Jerrie to stay ahead of commercial pilot Joan Merriam Smith. Ultimately, it was Jerrie who triumphed. But the competitive pressures during the world flight mounted to the point where Jerrie was reluctant to talk with her husband on the phone to give him progress reports, and at times she was even embarrassed by his zeal for her to claim a place in history.

Jerrie wrote, "I decided that going around the world the way I was doing it wasn't much better than staying home." But she also wrote about numerous occasions when her flight was filled with times of serenity, excitement, and the joy of beholding awe-inspiring scenery and skyscapes. After flying more than 23,000 miles in approximately 29 and a half days, Jerrie completed her eastbound flight on April 17.

During her flight, she set two records, which were sanctioned and accepted by the National Aeronautic Association and the Fédération Aéronautique Internationale: speed around the world, Class C1-c, and speed around the world, feminine. President Lyndon B. Johnson awarded her the FAA Gold Medal for Exceptional Service in May 1964. In addition to establishing many "firsts" for women, Jerrie received numerous honors and awards, including the FAI Louis Blériot Silver Medal, the American Institute of Aeronautics and Astronautics Special Award, the EAA Special Award, and the Amelia Earhart Memorial Award. She went on to set a number of speed records in a Cessna P206.

1953 Cessna 180—Take Two!

Dick Merrill learned to fly in a 1957 Cessna 172 when he was in high school, and he soloed in the spring of 1959 after he turned 16. But time and money for flying were scarce during his college career, so most of his aviation activity was limited to hanging out at the Ohio State airport and taking ground courses in the university's aviation program. He also visited Port Columbus, where Jerrie had begun and ended her flight.

By the time Dick was well-established in his career as a geologist for oil companies, he had earned his commercial certificate and instrument rating. He also had his flight instructor certificate and was living in Houston when he decided it was time to quit renting airplanes and own one. At first he thought he'd like to have a Decathlon for aerobatic flying, and then considered a Cessna 170 so he could carry more passengers. At that point, someone suggested that he could haul a lot more weight with a Cessna 180.

So his quest began, and when he found one listed in *Trade-A-Plane* in 1980, he contacted the seller in Illinois. "He offered to fly it down at his cost, and I agreed that if I didn't buy it, I'd pay his fuel down and back," Dick recollects, adding, "I took it to a local shop, and they did a pre-buy inspection. I've owned it for 35 years, and now the 180 is like a family member; it's

sort of become part of me."

Aside from its new paint job and a few enhancements, Dick's 180 still has a fairly stock appearance. He's proud of the instrument panel, saying, "It had nothing that lit up until about 10 years ago, when I installed an engine analyzer. But I've kept it pretty much original for two reasons. One, I didn't need more instruments—you know, the boys flew Berlin every day in the weather with this panel! Two, I didn't want to butcher the panel by putting anything modern in it."

N2961A hasn't been restored per se, but Dick has performed continual maintenance on it. Some of the work accomplished in recent years includes re-skinning the horizontal stabilizer and installing a True-Lock wheel-retention system, a Whelen LED beacon, Door Steward gas spring door assist on both cabin doors, folding seats, a shoulder harness system, and a P. Ponk Landing Gear Beef-Up Kit.

"Being an A&P and IA, I've slowly gone through the airplane and cleaned things up," explains Dick, adding, "I'm on my third engine—a Continental O-470-J—and second prop. I have logged just under 5,000 hours now, and half of that time is in my 180."

Flying the 180

The Cessna 180 has a long-standing reputation as a real workhorse, and those who own or fly them are staunch devotees of the breed. The 1953 model has a wingspan of 36 feet and measures slightly more than 26 feet from nose to tail. It stands 7 feet 9 inches tall on its slender spring steel gear and has a tread of 92 inches.

Dick's 180 has Cleveland wheels and brakes, carries 55 gallons of fuel, and burns about 12 gallons per hour. "My groundspeed is 130 knots. I'm a geologist, so I don't mind going slow and looking at the ground! I land about 60 mph, and I make every landing as if it's a short-field landing, so if I really have to make one, I'll be in practice," shares Dick, adding, "I wheel-land it almost all the time because I can land almost as short with wheel landings and can put it down more precisely. The key is airspeed control. It's a challenging airplane, and every time you fly it, it figures out a way to remind you that you need to pay attention to it all the time!"

The Paint Scheme

Dick joined the International Cessna 180/185 Club right after he bought N2961A and recalls that "there was some talk about Jerrie among the members. One flew to Florida and brought her to a meeting in the early 1980s. She wouldn't fly the airlines to our meeting, but she'd ride in a 180!"

In the mid-1980s, Dick flew his son to D.C. and toured the restoration facility (now known as the Garber facility), where he saw Jerrie's 180. "I recognized her airplane, which was stored in one of the hangars there. Then a few years ago," says Dick, "I saw it again, when I was in the Udvar-Hazy Museum at Dulles with a group from the Aircraft Engine Historical Society. Jerrie's airplane was hanging from the ceiling, and I took photos of it."

Based on glowing recommendations from friends, he took his 180 to Dial Eastern States Aircraft Painting in Cadiz, Ohio, in 2014. "I showed them about 30 pictures of Jerrie's airplane as it hung in the Smithsonian, and they duplicated the script and paint scheme almost exactly. At first they had a little challenge when it came to matching the colors," says Dick, adding, "they used Imron polyurethane and did a great job! As it turned out, I paid $1,000 less for the airplane than I did for this paint job!"

Flying Farewell

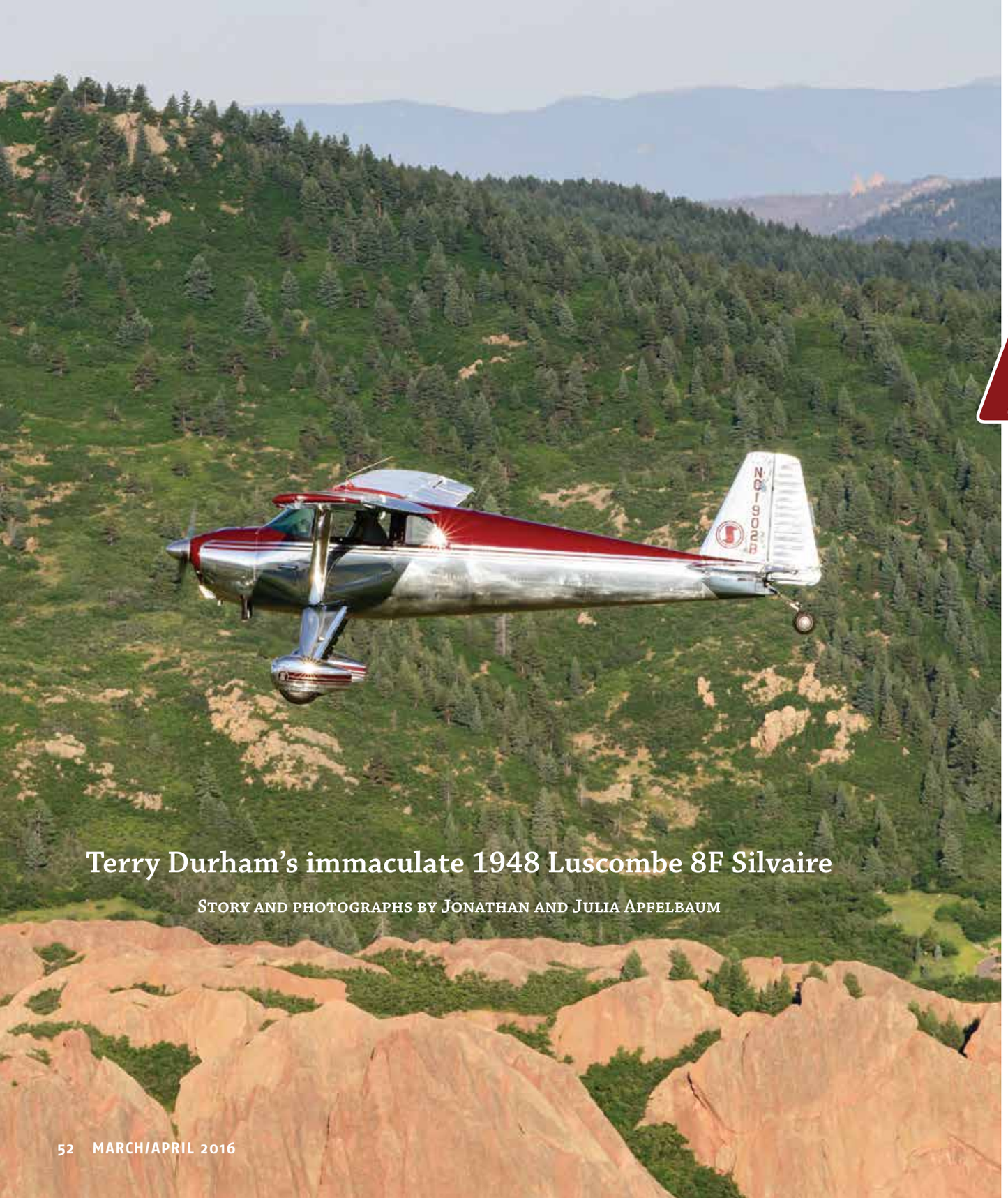
Sadly, Jerrie passed away before Dick had the chance to show her his freshly painted 180. She died at 88, at home in Quincy, Florida, on September 30, 2014.

"The family asked us to participate in scattering Jerrie's ashes," recalls Dick. "Tom Navar, a physician from El Paso, also has a 180, and he had visited with Jerrie one time. He had invented a device to spread ashes, which hangs on the strut of a 180 where the strut attaches to the wing. It has a radio-controlled flapper door in the back to release the ashes. Ginger and I led the formation over the Gulf of Mexico. Tom scattered her ashes from his 180." (One other plane was in the formation—Dale Ratcliff flew a Cherokee 180, and Wendy Hollinger accompanied him.)

Mock's Inspiring Legacy Lives On

Applying the *Spirit of Columbus* paint scheme to his 180 has presented Dick with some other interesting and unexpected opportunities. For one, he was asked if his airplane could be used in a movie about Jerrie. "When I fly to places now where people recognize the *Spirit of Columbus* paint scheme, they have their pictures taken with the airplane," Dick shares, adding, "the First Flight Society has a meeting at Kitty Hawk on December 17, and they invited me to attend since Jerrie is the 2015 inductee in the Paul E. Garber First Flight Shrine."

Remember the old song "Don't Fence Me In," which conveys a wide-ranging love of freedom and exploration? Just as that lyrical cowboy didn't want to be fenced in, neither did Jerrie wish to be corralled within her cultural confines. She wanted to see the world from her own aerial perspective, and so she did, perhaps exceeding her own expectations. Today, her legacy continues to inspire others, thanks to the enthusiastic efforts of Dick and Ginger Merrill, whose airplane is a flying tribute to Jerrie's soaring spirit and remarkable achievements.



Miss Ruby

Terry Durham's immaculate 1948 Luscombe 8F Silvaire

Story and photographs by Jonathan and Julia Apfelbaum

Terry Durham

Terry Durham grew up in an aviation family, where getting your pilot certificate was as expected as learning to drive. With a loan from their stepfather, Terry and his brother Larry bought a Luscombe 8A in 1972 for $2,050. He majored the engine as a shop project while working on his A&P, and they flew the wings off of it, traveling all around the Midwest. It had no radio, no electrical system, and nothing even close to today's navigational systems. Just a map and looking out the window. It was flying, pure and simple. And absolutely perfect for a young man with flying in his blood.

In 1975, they sold the 8A for $3,500 and repaid the loan, but Terry always had a thought that he wanted another Luscombe someday. He tried to pursue a career in commercial aviation, but with the large number of pilots coming out of the military after Vietnam, the odds were against him. He wound up pursuing a different career and went into radiology, later moving from Chicago to Colorado. As happens to many of us, life got in the way and flying fell by the wayside. That was until the 1990s when Terry started working for a radiology equipment company and eventually covered a 10-state sales region. Driving was too time-consuming, and the airlines didn't always mesh with his schedule. He approached his company about a third alternative and soon was back flying. For years he flew a Cessna T210 and then later a Mooney 20F, covering his territory. But he never forgot his old Luscombe.

He tracked down his original 8A, only to find it disassembled in a barn, where its current owner is saving it for a someday restoration project. Since reacquiring it seemed unlikely, his dreams of another Luscombe once again went on the back burner. That was until last fall when, on a whim, he called an aircraft broker friend to ask if he knew of any Luscombes that might be available. Serendipitously, his friend *did* know of a Luscombe that hadn't even hit the market yet. He was planning on listing it the following week. It was a museum-quality restoration that had been carefully pampered and loved. A few e-mails later, Terry was on his way to Oklahoma with his checkbook in his hands. What he found exceeded all of his expectations: a low-time 1948 Luscombe 8F that had undergone a ground-up restoration and couldn't have been any more perfect if it had just come off the assembly line brand new. It had less than 900 hours on the airframe total, as well as a Continental O-200 STC (remember, Terry lives in Denver, where density altitude is significant),

original interior, and cleverly hidden radio and transponder to not distract from the original appearance. Since its total rebuild, it had been stored in a climate-controlled hangar and meticulously maintained.

After five hours of dual and a thorough checkout, Terry was on his way back to Denver with his new Luscombe.

So what was the story behind Luscombe NC1902B? Well that involved a number of well-known and respected people in the aviation world. Starting with Charlie Harris. Charlie Harris has been a driving force in the vintage aviation world for many years. He was named after Charles A. Lindbergh, who flew over his hometown on the date of his birth. Growing up in an aviation family, he soloed at 16 and went on to a long distinguished career, including induction into the Vintage Aircraft Association Hall of Fame in 2006. Mr. Harris began the process of acquiring NC1902B in 1984 from Alfred G. "Fritz" King in DeLand, Florida. Mr. King was the foreman and head of the Luscombe manufacturing plant in West Trenton, New Jersey, in the late 1930s before he became a pilot for Delta Air Lines. He test-flew the majority of all the Luscombes built during the prewar era. Mr. King had originally advertised it for sale in 1984; however, given his personal history, and after having owned it for 14 years, he felt it would be the last Luscombe he would ever own and had difficulty parting with it. After several years of negotiations, eventually he sold NC1902B to Mr. Harris in 1986. The purchase included a disassembled Continental O-200 engine.

The original plan had been for it to be completely restored; however, it languished for several years at one facility without any progress. In 1989 it was moved to Bartlesville, Oklahoma, and placed in the exceptional hands of Francis "Frannie" Rourke and his son, Pat. From 1989 until 1992 it underwent an extensive restoration. It was taken down to the bare bones and rebuilt. The Continental O-200 was rebuilt as well, giving NC1902B a zero-time engine, as well as an added boost of performance. The restoration was for the airframe and engine, and after it was complete, attention was turned to the interior and paint.

In the 1970s and '80s, one of the finest detail restoration and "finish" Luscombe masters was T.R. Boyd of Lake Jackson, Texas. Mr. Harris commissioned him to complete the restoration of NC1902B. It underwent a complete rebuild of the exterior, interior, engine compartment, instrument panel, seats, side panels, carpets, luggage area, headline, and paint trim in 1949 Luscombe 8F Deluxe maroon trim, as well as polishing the plane to perfection.

All of the work was completed in 1997, and the results are stunning!

As Terry describes his pride and joy, "I love how original it is." It is a straight, true low-time airframe. The finish and interior are as close as possible to how it was back in 1948. "I was a bit concerned about the engine. The O-200 was overhauled 20 years ago and only has 80 hours on it since then. However, it was carefully maintained in a climate-controlled environment, and the compressions are good, and all indicators are that it is staying healthy. I do keep a close eye on it. With the density altitude in Colorado, I am glad to have the extra horsepower.

"While you can get up over 'the hills' (you know, those 14,000-foot Rocky Mountains) on the original Luscombe engines, I'll leave that to those with more experience and practice."

As you approach *Miss Ruby*, you cannot help but admire the gleam of the perfect polish.

"That has been a challenge," admits Terry. "Being in a climate-controlled hangar in Oklahoma had kept about 80 percent of the original polish. After moving it to the low-humidity environment of Colorado, and lots of elbow grease, I was able to get it to about 90 percent of how I wanted it. However, I couldn't get the last 5 to 10 percent

of the perfect polish despite a lot of effort."

After spending more than five hours one Saturday working on a single panel and failing to get the desired finish, Terry finally metaphorically and literally threw in the towel. "I talked with Joe Banks at Top Flight Aircraft Detailing. He had never done an entire airplane before but was eager to try. I was surprised at how much of an art form polishing can be." With Joe's help, Terry was able to get *Miss Ruby* to the desired mirror finish. When Terry took delivery of the airplane and went to push it out of the hangar, Charlie Harris stopped him. "Never, ever, touch it with your bare hands," Charlie warned him. "Now I see why," Terry says and laughs. "Keeping the finish maintained is a full-time job."

"I love how the Luscombe is an honest flying plane. With the O-200, cruise is about 110 mph, burning about 6 gallons of fuel an hour. With 24 gallons in the wing tanks, it has a comfortable range." With the original Siflex (or Silflex, Luscombe spelled it both ways) landing gear, he has never found any of the ground-handling issues, even though Luscombes are alleged to be a problem. "It is just a delight."

Terry tries to make it out to the airport early in the morning and go fly a little before work. It starts the day off on the right foot.

So why *Miss Ruby*? That is a tale in and of itself, so bear with me. The Heath Company, which many of us grew up with, making radios and other electronic devices in our home workshops, had an aviation beginning. Edward Bayard Heath built his first airplane in 1909 and acquired the Bates Aeroplane Company in 1912, changing it into the E.B. Heath Aerial Vehicle Company. He died in 1931 in an airplane crash. The company continued to weather various changes, has survived, and still bears his name. In 1954, then CEO Howard Anthony was about to buy a de Havilland Dove to add to their fleet of business aircraft. On a trial flight from Michigan down to Florida, the aircraft flew into a violent storm and came apart, killing all on board. Terry's father was copilot on this trip in his capacity as the chief pilot for Heath Company.

Fast-forward 40 years, and Terry and his two brothers made a long-delayed journey to rural Tennessee to visit the site of the accident. Times and landscape had changed, and despite local guides, they had no luck finding the location. A chance encounter led them to Miss Ruby, a longtime local matriarch, who had actually seen the accident from her kitchen window, while canning vegetables, back in 1954. From that same kitchen window, Ruby, now well into her 80s, was able to describe the events of that day. With her help they were able to find the wreckage from the crash and pay their long-awaited respects. In her honor, Terry named his Luscombe after her.

As he describes: "I am very fortunate that everything came together for this Luscombe. But I don't really own her; I'm just the caretaker."

The Vintage Mechanic

ROBERT G. LOCK

Evolution of aircraft instruments
Part 5—Tracing the history of the airspeed indicator

Tracing the development history of aircraft pressure airspeed indicators is challenging because there is no data showing exactly when it was invented and who invented it. This subject is something I have wanted to pursue for some time but never have devoted the effort, but now with the Internet, it is amazing what one can find without having to leave the office.

Certainly the major countries that invented flying machines around the time of the Wright brothers were committed to also inventing instruments, particularly around the time frame of World War I. The English, French, German, and American inventors were applying their expertise to determine how fast, how slow, and how high these flying machines could go. Most of the inventors were originally watch- or clockmakers, and many had brought their knowledge to the field of maritime (ships) and motor vehicles (motorcycles and automobiles).

The oldest reference I can locate is that of Alec Ogilvie, who patented an airspeed indicator for an airplane on November 3, 1909. He used a case with a rubber, airtight diaphragm separating the inside into two chambers. Just how accurate this instrument was would be pure conjecture; since rubber stretches and deteriorates, the instrument probably was not very accurate.

The instrument shown in Figure 1 is an early Ogilvie airspeed indicator that was removed from the Fokker trimotor *Southern Cross*. The wording on instrument face reads: "Non luminous, Ogilvie Indicator, MK 1Va."

Figure 1

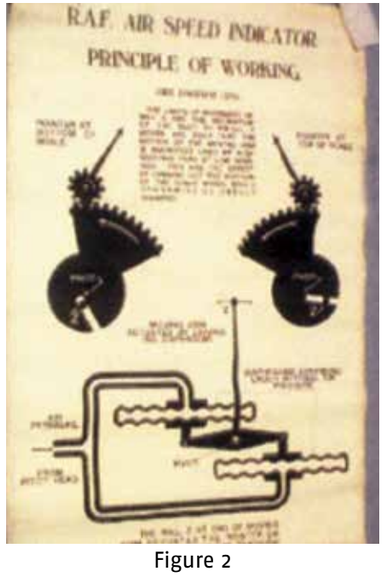


Figure 2

The fabrication date seems to be around 1925. The instrument is currently in the possession of the Powerhouse Museum in Sydney, Australia.

Figure 2 is a poster titled "RAF airspeed indicator, principles of working," designed by Air Ministry, England, in 1918. Part of the Powerhouse Museum collection, the poster is also viewable on the museum's website. From the poster it is evident that the English invented a metallic diaphragm to replace the previous doped fabric or rubber pieces. This seems to indicate that metallic diaphragms were invented around the end of World War I, particularly when airplane performance had increased dramatically in airspeed, altitude, and maneuverability.

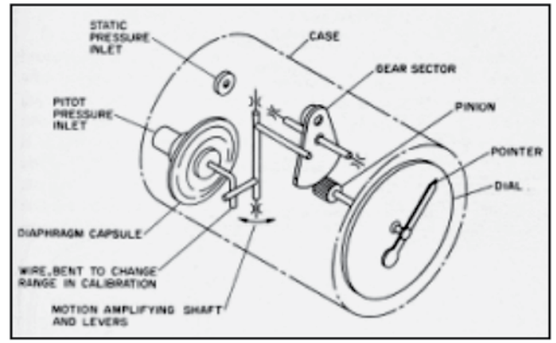
Also in England, in 1851, Samuel Smith founded his London-based family clock- and watchmaking business. By 1904, Smith & Sons Limited had pioneered the first British speedometer, which became a core product for the next 80 years in the emerging motor industry.

In 1917 during World War I, the product range was extended considerably, most significantly with the purchase of an airspeed indicator invention. Just who invented this airspeed indicator is unknown. By 1929 the Smiths Aircraft Instruments Division was formed, and an aircraft instrumentation facility constructed. In the 1930s the first electrical fuel gauge, electrical thermometers, oil pressure gauges, and the Smith system of remote indication, standard equipment on most British-built aircraft, added to the range of products.

In the United States, airspeed instruments were also being invented. Perhaps the father of the airspeed indicator was Elmer Sperry. In the 1923 National Advisory Committee for Aeronautics 9th Annual Report, Technical Report No. 165 details "Diaphragms for Aeronautic Instruments," authored by Mayo D. Hersey.

Mr. Hersey writes, "This report was prepared by the Bureau of Standards at the request of the National Advisory Committee for Aeronautics on the subject of diaphragms for aeronautic instruments. Flexible diaphragms actuated by hydrostatic pressure form an essential element of a great variety of instruments for aeronautic and other technical purposes. The various physical data needed as a foundation for rational methods of diaphragm design have not, however, been available hitherto except in the most fragmentary form."

Perhaps, at this time, an explanation of just why a diaphragm is used in airspeed indicators is in order. In the schematic diagram are the internal workings



Schematic diagram of internal airspeed indicator.

of a modern airspeed indicator. The diaphragm capsule receives pitot (ram) air and expands accordingly to positive pressure. The case is filled with ambient (static) air pressure, and the difference between ram air and ambient air pressures gives a reading on the dial of the instrument.

Therefore, the diaphragm is a most important ingredient of the indicator. In the early days of instrument design, diaphragms that could withstand temperature change and constant expansion changes were not available, thus the use of doped fabric and rubber diaphragms, which were inaccurate. The doped fabric or rubber diaphragms separated the indicator into two chambers, ram air pressure and static ambient pressure. If the diaphragm was connected to a needle on the face of the indicator via sectors and gears similar to a watch or clock, an airspeed reading could be achieved. Thus the early airspeed indicator was born.

Now, back to more early history of the airspeed indicator. In the early 1920s, experiments were being made to produce diaphragms from a better material; something that would not change with temperature fluctuation or aging. In the NACA Report No. 165, Table 1 shows the types of diaphragms used in aeronautic instruments in 1923.

From the same report comes Table 2, which shows the specific instruments tested in 1923 and who manufactured the unit.

Note that the airspeed indicators shown were invented by Bristol (British), Atmos (German), Sperry (American), Foxboro (American), and Ogilvie (British), and that the Ogilvie unit has a rubber diaphragm. All indicators have a range of airspeed from 0 to 160 miles per hour. These then are the earliest of airspeed indicators installed in aircraft of the 1920s.

From NACA Report No. 127 one can find data on the pitot and static nozzles that were current at the time. Figure 3 is a fuzzy photograph of these sensors.

Each nozzle is described on the next page.

TABLE I.

TYPES OF DIAPHRAGMS IN AERONAUTIC INSTRUMENTS.

Instrument.	Diaphragm element.		
	Action.	Form.	Material.
Altimeter	Elastic with control spring	Corrugated capsule	Nickel-brass; rarely brass or steel.
Barograph	do	Same in multiple	Nickel-brass.
Venturi air-speed indicator	do	do	Do.
Oxygen regulator	do	do	Do.
Water ballast gauge	do	do	Do.
Statoscope	Elastic, self-acting	Single corrugated diaphragm	Nickel-brass, and steel.
Rate-of-climb indicator	do	do	Nickel-brass; phosphor bronze.
Pitot air-speed indicator	do	Corrugated capsule	Nickel-brass, also silver.
Gasoline depth gauge	do	do	Nickel-brass.
Gas bag manometer	do	do	Do.
Pitot air-speed indicator	do	Same in multiple	Do.
Statoscope	do	Flat disk	Rubber.
N. A. C. A. air-speed recorder	do	do	Steel.
Pitot air-speed indicator	do	do	Rubber.
Pitot air-speed indicator	Slack with spring control	Flat, annular	Doped fabric.
Toussaint-Lepère air-speed recorder.	do	Multiple flex bellows	Rubberized silk.
N. A. C. A. yawmeter	Slack, balanced	Flat, annular	Fabric.

[1] General Report on Aeronautic Instruments by the Bureau of Standards, comprising Reports Nos. 125-132, inclusive, National Advisory Committee for Aeronautics. See in particular Reports Nos. 126, Parts I, II, and III; 127, Part I; 129, Parts III, IV, and V; and 130.

TABLE II.

DIAPHRAGM DATA FOR PARTICULAR INSTRUMENTS.

Elastic action.	Name and range.	Number of diaphragms.	Diaphragm diameter, cm.	Deflection, per cent diameter.	Stiffness, kg./cm.
2	Bristol water ballast indicator, 50 inches	4	5.1	2.2	235.0
1	Tycos altimeter, 20,000 feet	2	5.0	1.4	196.0
2	Bristol air-speed indicator, 160 m. p. h.	4	5.1	1.4	59.0
1	de Giglio barograph, 6,000 meters	4	4.5	9.1	28.0
2	B. S. rate-of-climb indicator, ±3,000 ft./min	1	14.0	.57	19.0
3	Atmos air-speed indicator (fabric), 300 km/hr.	1	7.0	3.0	12.0
1	Dreyer oxygen regulator, 25,000 feet	14	5.0	23.4	10.0
2	Sperry air-speed indicator, 160 m. p. h.	2	7.0	3.0	5.9
1	Foxboro air-speed indicator, 160 m. p. h.	14	2.54	9.1	4.5
2	Statoscope, 200 feet	1	9.4	2.1	2.8
3	Smith gas bag manometer (fabric), 80 mm. water.	1	11.4	2.6	2.7
2	Ogilvie air-speed indicator (rubber), 160 m. p. h.	1	8.4	13.8	1.5
4	N. A. C. A. yawmeter	1	.....	.....	0

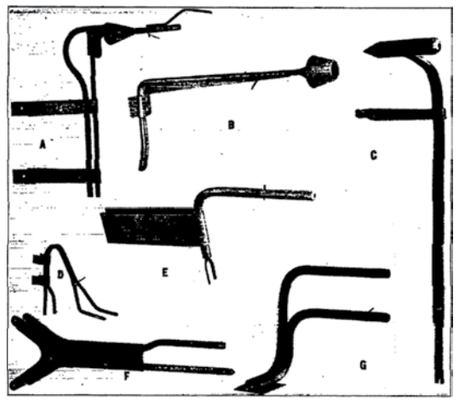


Figure 3

A—An early British design.

B—An early American design.

C—An early German Pitot tube about 7/8-inch diameter and 5 inches long.

D—An American nozzle in which the dynamic and static heads are separate tubes about 1/4 inch in diameter. They are bent upward at a sharp angle to prevent water from forming in the tubes.

E—A British design in which the dynamic and static tubes are concentric.

F—A standard British design. The static head in this case has four concentric rings of holes about 1/4 inch apart along the side of the tube.

G—A dynamic and static tube in which an annular series of slots are provided in the static head instead of the small round holes that are usually used. Experiments indicate that small round holes are in general a more reliable means of determining the static pressure.

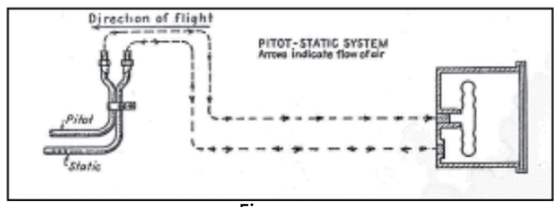


Figure 4

The schematic in Figure 4 is a pitot/static installation for an early airspeed indicator. In the discussion of the history of the airspeed indicator I have tried to point out how the instrument was developed in the early years of aviation. And to accompany the invention of the indicator was the invention of a pitot and static nozzle that was mounted to a wing strut or wing leading edge. These two inventions produced this system above as we know it today.

When Elmer Sperry was inventing one of the first airspeed indicators in the United States he developed a business association with Dr. Leo Baekeland, which proved to be an interesting side note to aircraft instrumentation. Baekeland was born in Ghent, Belgium, in 1863 and immigrated to the United States in 1889. His first major invention was Velox, a photographic printing paper that could be developed under artificial light. Baekeland sold the rights to George Eastman and Kodak for $1 million in 1889.

He then started his own laboratory in Yonkers, New York, where he invented Bakelite in 1907. Bakelite is made by mixing carbolic acid with formaldehyde, which forms a gooey substance that hardens over time. Bakelite is considered to be the first plastic introduced to the general public at a chemical conference in 1909.

Baekeland founded the General Bakelite Corporation. Bakelite was used to manufacture everything from telephone handsets to costume jewelry, as well as engine parts and insulation for electronics. It was also used for making fishing reels, but it was used by Elmer Sperry to manufacture aircraft instrument cases. Bakelite allowed him to make his airspeed indicator invention airtight. Dr. Baekeland died in 1944 at the age of 80 in Beacon, New York.

In 1915 Elmer Sperry's son, Lawrence, was put in charge of the Sperry Gyroscope Company's aviation department. Two years later, Lawrence founded his own company, the Lawrence Sperry Aircraft Company, to develop and market the airplane stabilizer, aerial torpedo, and automatic pilot. Early records show that during the early 1920s Elmer Sperry signed over all rights to the drift indicator, air distance recorder, airspeed indicator, and air compass to his son's company.

Lawrence Sperry was a daring test pilot, and his exploits, particularly at the 1916 Paris Air Show, provided both his company and Sperry Gyroscope with valuable publicity. In 1924 Lawrence Sperry died in an airplane accident, and Sperry Gyroscope acquired the assets of the Lawrence Sperry Aircraft Company.

As the airspeed indicator was developed, other aids to flight were being invented and tested. Early pilots looked out of their open cockpits for roads, rail lines, and airports to find their way in daytime flight. Pilots watched the horizon to make sure they were flying with the aircraft's nose and wings in the proper position relative to the ground, called attitude.

As airmail pilots began flying at night and in all kinds of weather in the early 1920s, new equipment helped pilots navigate and maintain aircraft attitude when they could not see the ground. Navigation aids were developed for use inside the aircraft and also to guide the pilots from the ground. These devices included such ideas as a bubble of liquid to help keep wings level and a device that measured pressure at different heights, called an altimeter, which told a pilot his altitude above ground level.

A simple magnetic compass for direction was installed either in the cockpit panel or held in the pilot's hand. The "primary panel" was developed that included compass, airspeed, altimeter, tachometer, and oil pressure and temperature indicators. Additionally, as the gyroscope invention of Elmer and Lawrence Sperry became available, other information could be displayed on the instrument board. Navigation information was displayed on a group of instruments called the basic or primary six, which included the attitude indicator, a vertical speed indicator showing the rate of climb and descent, airspeed indicator, turn-and-bank coordinator, a heading indicator showing the magnetic compass course, and the altimeter. These instruments are still used.

Shown in Figure 5 is an advanced instrument board of primary instruments plus gyroscopic instruments for "blind flight."

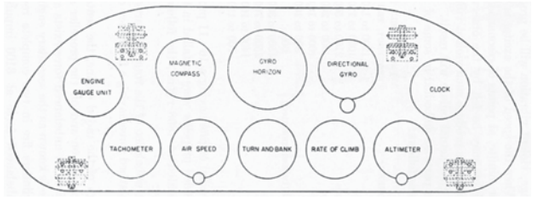
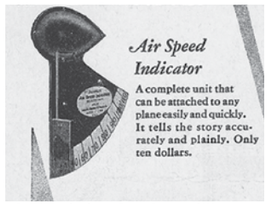


Figure 5

Although the pitot/static airspeed indicator with a metallic diaphragm made great progress, one airspeed indicator was to "hang around" until the 1920s. It was cheap and easy to install but not especially accurate. It was the flat plate/resistance indicator that appeared on interplane wing struts of biplanes. Perhaps the most famous in the United States was the Johnson airspeed indicator, marketed by the Johnson Airplane and Supply Company of Dayton, Ohio.

Figure 6



The original advertisement for Johnson's airspeed indicator. Note the price of just $10!

Shown in Figure 6 is an original Johnson airspeed indicator, unfortunately missing its flat plate pointer.

Straight & Level

continued from page 1

raising program, as it is in full swing again this year. I can never properly thank the many dozens of VAA members who have long been actively involved in this program. Your extremely generous support of the VAA is the backbone of our efforts to bring the membership solid programming and events to the Vintage area during Oshkosh! The Red Barn fund has eight different levels of giving, and there are many levels of perks available to our supporters. Check us out at *www.EAAVintage.org*, and click on the "Friends of the Red Barn" tab. Please join and be a part of the excitement of EAA/VAA Oshkosh by mailing your contribution to VAA FORB, P.O. Box 3086, Oshkosh, WI 54903-3086. Keep in mind as well that if you own an aviation-related business and you are looking to get your name out to vintage aircraft owners, we always have different programs during Oshkosh that are sponsorship events and you can easily attach your business name and logo to these events or programming. As a reminder, we are also continuing to solicit donated funds to assist with the expenses of the Tall Pines Café pavilion construction at Oshkosh.

As always, your thoughts and comments regarding the business of your association is very much welcome! And if you have some words of wisdom to share with your president, please contact me at *grobison@eaa.org*. We would also like to continue to hear your thoughts, positive or otherwise, regarding AirVenture Oshkosh in the Vintage area.

As always, please do us all the favor of inviting a friend to join the VAA, and help keep us the strong association we have all enjoyed for so many years.

VAA is about participation: Be a member! Be a volunteer! Be there!

Let's all pull in the same direction for the overall good of aviation.

Remember, we are better together. Join us and have it all.

New Members

New Members List March/April 2016 Issue

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Jeff Apple . . . . . Sheridan, IN
Paul Bendigo . . . . . Reading, PA
Allen Benzing . . . . . Flower Mound, TX
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