

# EAA Smilin 'jack Chapter 866

## Newsletter July 2020



Kathy Anderson mounted a camera on top of the vertical stabilizer of her S19 pictured here on final for 04 at Dunn



*Greetings Members and Friends of EAA Chapter 866,*

The Phase-1 flight testing of our Experimental - Amateur Built (E-AB) aircraft is just one of the many enjoyable aspects of this aviation past time that we enjoy! There are many kinds of engineering and flight tests that we can perform to characterize the performance of our machines. For example, have you ever physically measured the actual take-off and landing distances of your airplane? I have not, but I *have* done it for another experimental flying machine!

This month marks the 9 year anniversary since the final landing and retirement of the Space Shuttle Space Transportation System (STS). It seemed fitting that former Shuttle commander and current EAA safety contributor Charlie Precourt, wrote an article in this month's *Sport Aviation* magazine about how he trained to land the Space Shuttle.

**As I read Precourt's article, I was reminded of one of my former NASA duties. One of my jobs (part of a small team of 4-5 folks really) was to measure the Shuttle's landing skid marks and the total roll-out distance, and any lateral excursions that we could measure. This was all done manually, and it was one of the most fun aspects of my job.**

**After the Shuttle landed on the 15,000' concrete runway, just across the river from EAA 866, the runway was flooded with support vehicles and ground crews. Most of them drove toward the Spacecraft, but our small team drove to the opposite end of the runway to locate the touchdown skids and then precisely measure their locations. Then we checked the length of the runway for lateral excursions and for the Nose wheel touchdown locations, and finally we measured the precise location of the final wheel-stop. Afterward, I tabulated it all in a report, along with other engineering observations about the landing gear, tires and brakes.**

**Our first biggest challenge was finding the fresh skid marks in the touchdown zone! It is a very big runway, and the Shuttle's skid marks were not the only ones on the runway. This was especially challenging at night. We even tried using a very expensive IR camera to help locate the warm skid marks at night, but the "leading edge" IR technology didn't help much. Any heat signature left by the skid marks was very rapidly wicked away by the large thermal mass of the concrete runway. The IR camera was useless, and we quickly learned that our old-fashioned sense of SMELL was our best detector. Just roll down the window and sniff for the smell of burnt rubber!**



## **STS-124 Left Main Landing Gear Skids; SLF RNWY-15**

The Shuttle skids had a characteristic look. After a few landings you quickly learned to differentiate the Shuttle marks from other types of aircraft tire marks. The tread pattern is different, the width is specific, the wheel spacing between adjacent tires was exactly 3 feet, and all of the new skids were very dark and distinct and had a sort of “feathering” of rubber dust around them. We measured the distance from threshold, distance from centerline, and length of skid for each tire. A landing with a slightly higher sink rate (firm arrival) had wider and shorter skids, while a “greaser” landing had longer ones as it took more time (in milliseconds) for the tires to spin up. We also looked for skips and bounces in the skids as some landings had a slight rebound in the oleo struts and one tire might lose contact with the runway for a short distance.

I soon realized that being a pilot myself was a big help in analyzing the skid marks, the wind sock told me if there was a cross wind component and we could often correlate that with skid marks that were slightly angled off in one direction to reflect the effects of wind drift. If there was a strong crosswind component, the Orbiter would land in a crab. An interesting feature of the skid marks was after the tires were fully spun up, they still shed a good bit of rubber & brake dust, and a discerning eye could make out a faint dual-tire trail of dust down the runway and pretty easily locate the area of maximum lateral excursion. This “ghost” trail as we called it didn’t last very long, as the normal weathering of the runway would erase the evidence. All of the astronauts were amazing pilots, but I always got some comfort in seeing how they had dealt with crosswinds or steering excursions, and had sometimes drifted well to the left or right of centerline while trying to correct. Like the rest of us, they were pilots, working their rudder pedals and trying to keep as close to centerline as possible.

## **STS-124 Right Main landing Gear Skids; KSC-RNWY-15**

The Shuttle would leave very nice skid marks as the tires spun up. Many of the skids were more than 150’ long, and we measured a few that were closer to 400’ long. When we had a new person on the landing measurement team, we always made sure they checked the fresh skid marks with their fingers . . . just to make sure we had the correct markings. The warm rubber residue was very “persistent” and it took a thorough hand washing to clean it off. There was something unique about having tire rubber on your fingers knowing that just an hour earlier, that same rubber was orbiting in space on the other side of the planet while traveling at 17,500 mph, but now it was stuck to your fingers! It somehow made the experience very personal.

As you might know, engineers love to collect data for analysis and trending, and to correlate real world data against analytical engineering predictions and math models. The Orbiter’s onboard Inertial Measure Units (IMUs) were used for Guidance, Navigation, & Control (GNC). Our landing measurements allowed the GNC engineers to compare the landing data from their onboard instrumentation systems against the real world data to see how far off their systems were. Occasionally they used our skid mark measurements to correct calibration errors. On one occasion, they asked us to remeasure the skid marks, and we realized we had made a measurement or data recording error. For that reason, we always painted markings on the runway where the skid marks began and where the orbiter tires rolled to a stop. That way we could find the spot again if we had to remeasure anything.

Recording the actual measurements was a very simple process of locating the runway edge markers to get the relative position to the threshold, and then counting the expansion joints in the concrete runway to



reach the spot where the skid marks were. The expansion joints were exactly 20 feet apart. The last bit of measurement was done with a tape measure, and it was all recorded to the nearest +/- 6 inches. I recall that the STS-95 landing with Senator John Glenn aboard was the only time I saw the vehicle touchdown exactly on centerline, (to within less than 1 inch). The Commander for that mission was Curt Brown, and I imagine he got a lot of mileage around the astronaut office for that bit of skill & luck!!

After recording the skid marks, and the nose wheel touchdown spot (several thousand feet down the runway), we would approach the spacecraft and record the exact final wheel stop locations. Using this data, we could calculate to within 1 foot or less the exact rollout distance. As you might imagine, many factors influenced the roll-out distance, including surface winds, air density, approach speeds, landing weights, braking effectiveness, the timing of the drag chute deployment and release, the use of the rudder/speed brake, plus any general piloting dispersions. We also performed quick-look inspections of the wheels, tires, brakes, and landing gear struts, and made sure they were all OK for towing back to the hangar.



**STS-133, last landing of Discovery, and my final time on the Runway Measurement Team**

**This vehicle now resides in the Smithsonian NASM, at Udvar-Hazy.**

**A typical Shuttle landing targeted a touchdown spot about 2,500 feet from the threshold, and a typical rollout was around 9,000 feet long. The shortest rollout distance ever recorded was 6,015 feet and the longest ever recorded was 13,732 feet.**

**In truth, the Space Shuttle was an experimental flight vehicle, and it was effectively always in a “Phase-1” testing program. All shuttle landings were hyper analyzed to find ways to improve landing techniques and crew training, and to look for any adverse trends. After all, when you have a billion dollar vehicle and only one shot to land it right, you can’t leave anything to chance.**

**Measuring skid marks was one of the most fun jobs I had working on the Shuttle program. I still miss the excitement and camaraderie of “Landing Day”. Most of my Space Shuttle knowledge is now obsolete, but the experience gained was priceless.**

**And by the way, we had no need to measure runway take-off distances, it was always ZERO!**

**Keep on Building, Flying, and Flippin those *Smilin’-Flap-Jacks!***

**Les Boatright**

**EAA Lifetime #563003**

**President, EAA Chapter 866**

**The *Smilin’ Jack* Chapter**

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**Some reminders about upcoming events:**

Date	Calendar Event	Place/Info
July 1 <sup>st</sup>	Regular Chapter 866 Monthly Meeting	Building 10 / 7 pm
July 4 <sup>th</sup>	OUR Chapter 866 Monthly Pancake Breakfast <b>To Be Determined . . . at July 1<sup>st</sup> Meeting</b>	Building 10 / 8-10 am

July 20 <sup>th</sup> - 26 <sup>th</sup>	AirVenture 2020 – Oshkosh, WI –  <b>CANCELLED Due to COVID</b>	Oshkosh, WI (KOSH)  <b>CANCELLED</b>
July 21st - 25 <sup>th</sup>	<b><u>EAA Spirit of Aviation Week</u></b>  A Virtual Celebration of our favorite pastime!!  <a href="http://www.EAAtogether.org">www.EAAtogether.org</a>	<b>ONLINE ONLY</b>
Aug. 1 <sup>st</sup>	OUR Chapter 866 Monthly Pancake Breakfast  <b>To Be Determined . . .</b>	Building 10 / 8-10 am
Aug. 5 <sup>th</sup>	Regular Chapter 866 Monthly Meeting	Building 10 / 7 pm
Sept. 2 <sup>nd</sup>	Regular Chapter 866 Monthly Meeting	Building 10 / 7 pm
Sept. 5 <sup>th</sup>	OUR Chapter 866 Monthly Pancake Breakfast	Building 10 / 8-10 am
Oct. 3 <sup>rd</sup>	OUR Chapter 866 Monthly Pancake Breakfast	Building 10 / 8-10 am
Oct. 7 <sup>th</sup>	Regular Chapter 866 Monthly Meeting	Building 10 / 7 pm
Nov. 4 <sup>th</sup>	Regular Chapter 866 Monthly Meeting	Building 10 / 7 pm
Nov. 7 <sup>th</sup>	OUR Chapter 866 Monthly Pancake Breakfast	Building 10 / 8-10 am
Nov. 12- 14 <sup>th</sup>	DeLand Sport Aviation Showcase ( <i>Fingers Crossed</i> )  <a href="https://www.sportaviationshowcase.com/">https://www.sportaviationshowcase.com/</a>	DeLand Municipal Airport (KDED)

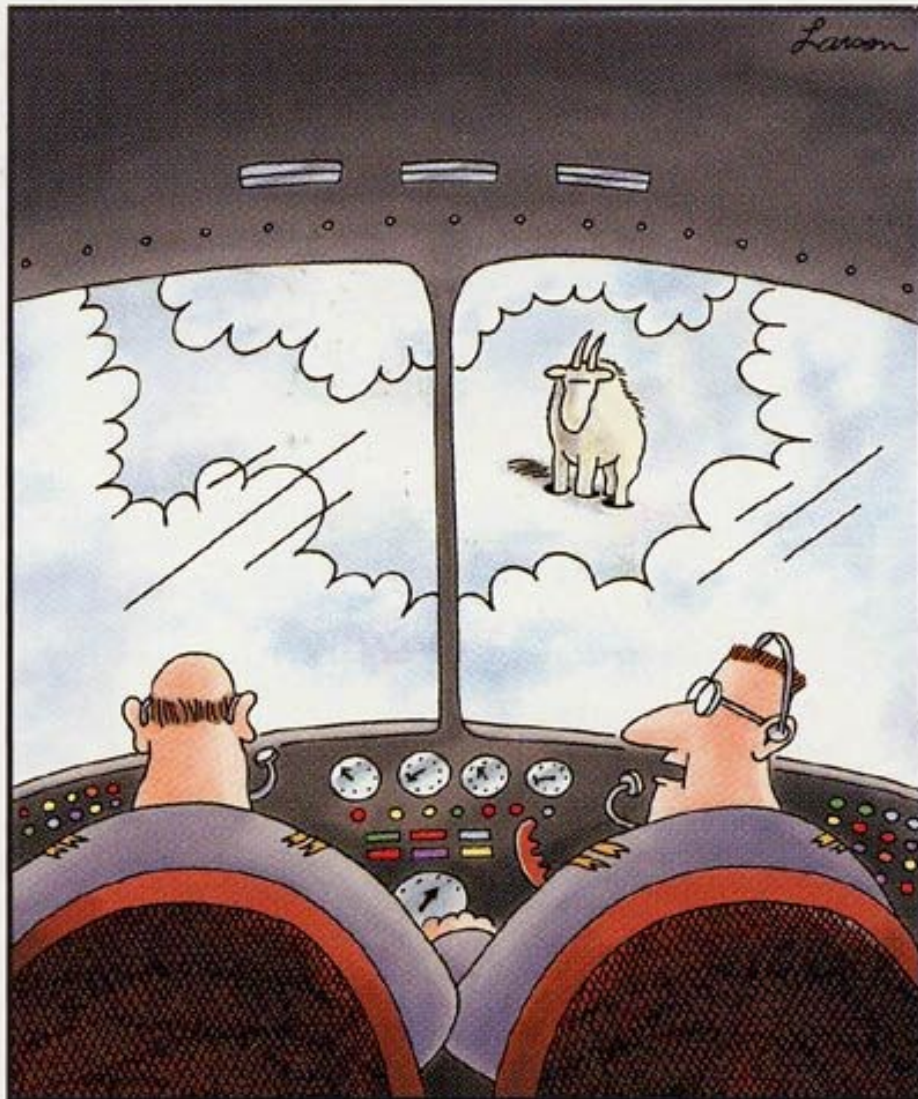
**PLEASE SEND IN in any additions / updates to the Calendar of Events.**

**We'd like to keep this current and accurate!**

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Humor of the Month Club:



"Say ... what's a mountain goat doing  
way up here in a cloud bank?"



Thousands of feet in the air new spark plugs were needed if the *City of Chicago* was to set new refueling record. So one of the Hunter brothers, defying death, changed them.

Some Mechanics Are Just Better Than Others . . .

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CHAPTER MEETING:

We WILL be holding our Regular JULY Monthly Chapter meeting at Arthur Dunn Airpark, Building 10.

Please Join Us on Wednesday July 1<sup>st</sup> at 7PM



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HAPPY LANDINGS

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**Ben and Ray goin flyin in their J3 Cub**

**Ben and Ray flew the cub again the other day and the hardest part of this otherwise very pleasant endeavor is shoe horning Ray into that front seat and then, after they have flown get him out of that front seat. I sometimes help Ben get him in and out of that and sometimes we twist and bend his legs, knees, and ankles till I think we're going to break something! Ray is 93 yrs old and can still fly an airplane! FUN!!**





*Dick has left us!*

*By Larry Gilbert*

Dick House was a an Army Air Corps advanced flight instructor with BT 13s during the second world war and after the war and discharged he flew an Aeronca Champ for a while until life got in the way and he got married and had a family. After the family was raised and he got to retirement age plus a few years he decided to fly again and asked me if we could do some flying in the Citabria. We made the arrangement and he flew with me most every Monday morning for a few years until he could no longer climb in and out of the plane. What an experience it was! When he had the controls the plane was always on the edge of snapping over or stalling in some uncoordinated manner, and the older he got the more feeling was going away in his feet and the ball was always hanging in the corner, opposite direction of the turns. He loved doing very steep turns and when we rolled out he was always pulling up into a stall. Towards the end of his flying with me when the ball was in the corners in this maneuver I was holding the stick from coming all the way back so when it did start to break I'd add the rudder needed to avoid the spin and get us out of that quickly! He wanted to fly the Citabria like he flew the BT 13s!



In 2013 he was talking a lot about going over to Kissimmee and flying the P51 Mustang and was willing to pay as much as \$2,000.00 for a ½ hr flight in one of these. When he found out the price was \$3,250.00 for that flight he dropped that idea from his bucket list. So, Loretta and I got this idea about providing a simulated P51 flight in the Citabria. He was 90 yrs old at the time. The picture below is a copy of one that is displayed in our hangar, if you've ever been there you may have seen it.



We did a flight that day and Dick really wrung it out that time!

Then one day Dick said that his nephew had bought him a gift certificate for the P51 flight at Kissimmee. Loretta and I volunteered to take him to Kissimmee and in a few days we headed over there. At the Stallion 51 hangar we climbed the stairs to the main office and were met there by a receptionist, two pilots and a doctor. They were expecting us! The Dr. interviewed Dick and was evaluating him to be sure he was up to this flight. While Dick was talking to one of the pilots and the Dr. Loretta and I were a few feet away just listening and the other pilot said to me, "are you ready to go flying?" I said the guy who is flying is at the other end of the counter talking to those folks. He repeated, "are you ready to go flying?" I told him that I'm always ready to go flying but that's your customer over there. He said, yes and you'll be flying in formation with them in a T6 and it's already paid for! Dick had bought the ride for me in the T6! Lucky ain't I?

What a ride it was! "Homer" was my instructors' call sign. Dick's flight was "Dog". I took off first and we climbed out to the West and while at cruise, the P51 with Dick flying pulled up along the right side of us. What a majestic sight, the 14' dia. Prop on the P51 reminded me of a giant buzz saw and they seemed a little too close for comfort! Then, the Mustang dropped some and slid under us and up on the left side wingtip to

wingtip! We then broke away and my instructor talked me through a loop, barrel roll and maybe a split S. I grayed a little bit pulling 4Gs coming out of the loop! The horizon was just out of focus for a fraction of a second!

Homer talked me through the landing and it was a nice wheelie! Dick showed up a little later with Dog and landed. We watched the video when we got back to their office and Dick was doing aileron rolls and his instructor was holding his hands in the air to prove that Dick was doing the flying, all of this at 90 yrs old!

A very fond memory! I took Dick up for the last time on his 96<sup>th</sup> birthday and once he was in the plane and on the stick he went right back to his old tricks.

Dick died Monday June 29, 2020 at 97 yrs.



Dick is in the back seat of "Crazy Horse" I'm in the front seat of the T6. We were about this close in formation flight!

*Kathy Anderson's RANS S19*

Kathy gave me a ride a couple of weeks ago in her RANS S19 that she built a couple of years ago. What a nice airplane! It flies beautifully and is well equipped and smooth as silk. It is powered by a Viking engine and that's probably one of the reasons it seems so smooth, I think. That, plus the fact that Kathy is a very smooth and deliberate pilot makes for a good ride!

*Larry*

She mounted an action camera on top of the vertical stab – see youTube link

[https://www.youtube.com/watch?time\\_continue=18&v=RZmDd9HUDGc&feature=emb\\_title](https://www.youtube.com/watch?time_continue=18&v=RZmDd9HUDGc&feature=emb_title)

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**Meeting Weds. 7 pm  
Bldg. 10 Dunn Airpark  
Titusville, Fl**

**Monthly Breakfast MAYBE!!  
TO BE DETERMINED AT CHAPTER MEETING!!**