Chapter 6

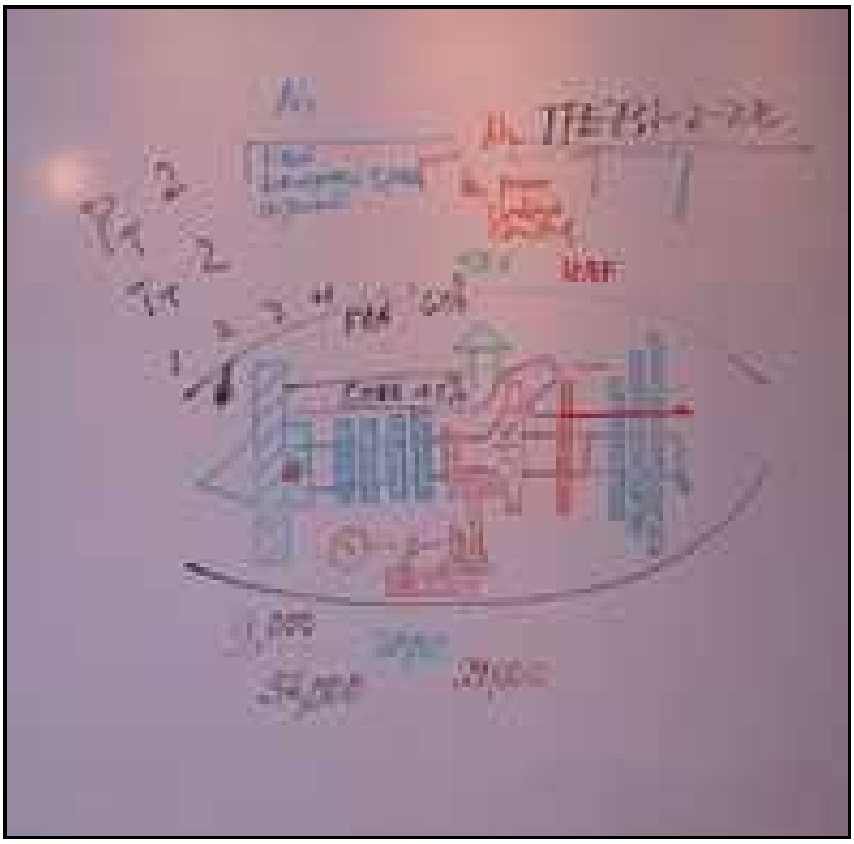
SYSTEMS – POWER PLANT

When I was working on my commercial ticket at Oklahoma A&M College my instructor was a WWII veteran pilot named Lowell C. Highfill. Having flown with the Flying Aggies during my first year at the SWO airport I chose Lowell as my instructor. In the summer of '57 we were walking out to an Aeronca 7AC Champ[1] to do some precision spins. He was asking me some questions and I was not really interested in answering them so I set myself up for a lesson I will never forget about knowing your airplane.

The question he was pressing me about was "How many holes are there on the end of the wooden prop?" My answer (you will love this) was "Aw hell, Lowell, how can we do spins worrying about holes in the propeller." We had just gotten to the tie down where the ship was and he said to me "You are not flying today. Put your parachute on the ground and sit on it. You are going get a lesson on how to pre-flight this crate."

In the Aviation Instructor's Handbook the six "Laws of Learning" are listed and the Law of Readiness is the first one: "Individuals learn best when they are ready to learn, and they do not learn much if they see no reason for learning" (p. 3). I promise you Mr. Lowell gave me the reason for learning that hot July day and I cannot only tell you about the holes in the prop but the reason they are there. Ask me about the wooden, fixed pitch, Sensenich propeller of a Continental four cylinder horizontally opposed 65 hp air cooled engine. As a matter of fact I own a propeller just like this - if you want to see it.

[1] This picture from my Web site under the same (almost) story in Part II of *Reminiscences* on page 74.



TFE 731-2-2B Whiteboard - GH

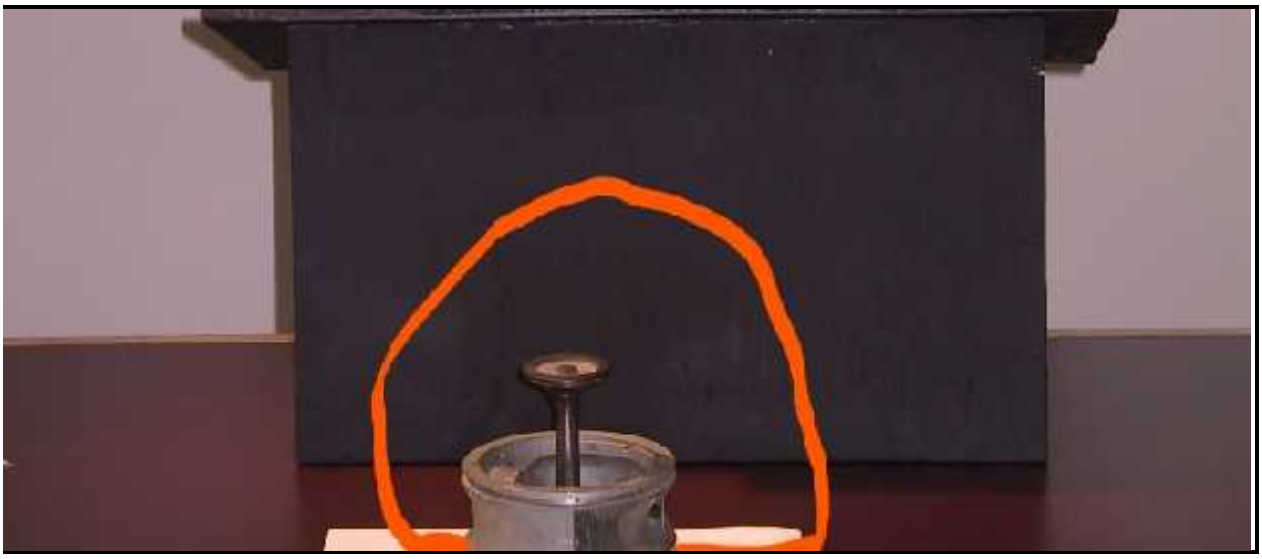
Of course the company provided complete Supplemental Information on the power plant, there is information in the Dash-1, the Approved Flight Manual (AFM), and even Garrett published a Pilot Tips to augment the operations, performance, and power management.

I like my drawing best…at least the spools show proper direction of rotation, course that and 50 cents will get you a cup of coffee. If you can draw your engine on the white board you probably can discuss how it works to your students. The more you know about your ship the better you will be able to fly it – someone said a long time ago. His first name was Orville but I forget the last.

You may recall in your training for IP Upgrade we went from the **rote** to **understanding** and then moved through **application** to **correlation**. You may recall a lot of credit was given on the first two in this class as most students have been to more than one class on the 731 and have heard more than one briefing from instructors on the same thing. There are two issues I want to quickly review and then show you a movie.

One, means going to application you must first have a handle on the understanding part and Two, means you almost have to have the experience in flying the jet to really have the appreciation of what correlation means. This is where the war stories and the debriefs are so important. Good instructors – Harry leads this list – are able to dance in any of the four arenas and have a story of each one of them. He can give you examples and then correlate with something that happen in the jet.

Will add, and we'll discuss it, but you need to determine the experience level of your student.



The center piece for Day I shows in orange above and right in front of my speech box, a piston turned upside down with a valve bored into it to make an ash tray. I am, of course, connecting the dots for engines, power plants, and 'motors' for just one of the classes.

You may remember the first movie we saw called *The Great Waldo Pepper*?[2]

"Hello, good people!"

We discussed his motivation for selling tickets for a plane ride noting we all have to sell flying – unless you get told to sit on your parachute. This movie just takes us back in time to the good ole days with no tail wheels, check lists, oxygen masks, or f'ing regulations.

[2] The Great Waldo Pepper 1:13 https://www.youtube.com/watch?v=H5Y9UCGYpl0

Would like to point out, in spite of saying the ship was a Curtiss Jenny or JN-4D, as shown below, the GW Pepper ship was a Standard J-1 Biplane and a picture of the exact one flown in the movie is shown just below the Jenny.

Curtiss JN-4 Jenny Notice the four ailerons (the models were all different...).[3]

Standard J-1 Biplane[4]

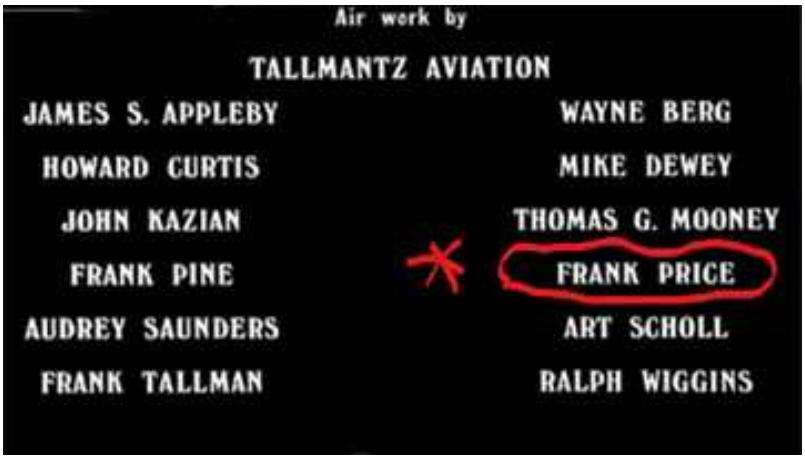
For what it is worth they look a lot alike. The J-1 has the top wing placed a little higher. The OX-5 engine in the Jenny is a larger engine than the one in the J-1.

Back in my aerobatic tailwheel days I took some lessons one week from a man named Frank Price who was flying out of a small field in Waco Texas. His school was really "to keep you from busting your ass doing stunts at an airshow." Well, it didn't take me long to get out of airshow stuff as all the crowd wants to see and hear is noise, smoke, and get thrilled. They wouldn't buy you a tank full of gas to see

[3] The JN-4 Jenny http://www.aviation-history.com/curtiss/jn4.htm

[4] Same aircraft as shown in the movie: https://www.youtube.com/watch?v=4_TBFNdEeMk

you spin into the ground. Frank told me he was the one flying the scene in the beginning when he landed over Scooter to open the movie. Again the movie starts good and finishes rather poorly.



You can see below an exact model of what Frank Price used in his aerobatic school and I am demonstrating how to set up a lomcevak to do in my Pitts (I finally broke myself of doing them too).

We owe a lot to the instructors who helped us be all we can be and Frank was one of them! His history is colorful and his flying would water your eyes – he was one of the best pilots I have ever flown with.


This model built by Carl Brandborg

Convair B-36 Peacemaker[5]

In most classes we saw a movie clip of *Strategic Air Command*[6] mostly filmed at Carswell AFB in Ft. Worth, Texas back in 1954 starring the hero of aviation heroes Jimmy Stewart. For a training tool, as the movie was starting, I passed out a short quiz to half the class. The questions had to do with 'some more of the details' required in this class. Half the class could watch and maybe fill out the answers while it was being shown and the other half could take the quiz after it was over with. Course, the drill is to demonstrate another way of how discovery learning can be applied. We then discussed which method was more helpful and meaningful as the pilots who had the quiz did better than the ones who did not but the former missed a lot of detail on the screen while filling out the answers.

Strategic Air Command 5:32

https://www.airplanesofthepast.com/strategic-air-command-movie.htm

"Six turning four burning"

Pretty easy to see here how many engines it had, number of wheels on each bogie, number on the ship but do you remember the start sequence (and why)? Do you remember Sgt Bible the flight engineer (Col Potter of MASH, Harry Morgan) meeting him before they took off? General LeMay[7] kind of rode herd over the making of this movie and credit was given to upholding to SACs authenticity shown mostly at Carswell AFB.

---

[5] https://www.youtube.com/watch?v=9FJVxtTNjJk 6:30

[6] One of the Screenplay writers was Beirne Lay, Jr., who also wrote the book *Twelve O'Clock High*. Note: Test question: Who wrote the quote noted in "A Primer for Success: Getting Ready for C-21 Upgrade Academics"?

[7] After WWII my wife lived in Heidelberg Germany and played with a little neighbor girl named "Janie" LeMay.

Pratt & Whitney R-4360 Wasp Major

In our discussion we talked about being able to walk out into the wing to pump oil to the engines and saw the tunnel the crew used to slide back and forth to the rear of the bomber. The engines (from the picture above) has 28 cylinders, four rows of seven air-cooled cylinders in 'corncob' line with 56 spark plugs, and produced from 3,000 to 4,300 hp. They were notorious for in-flight fires.

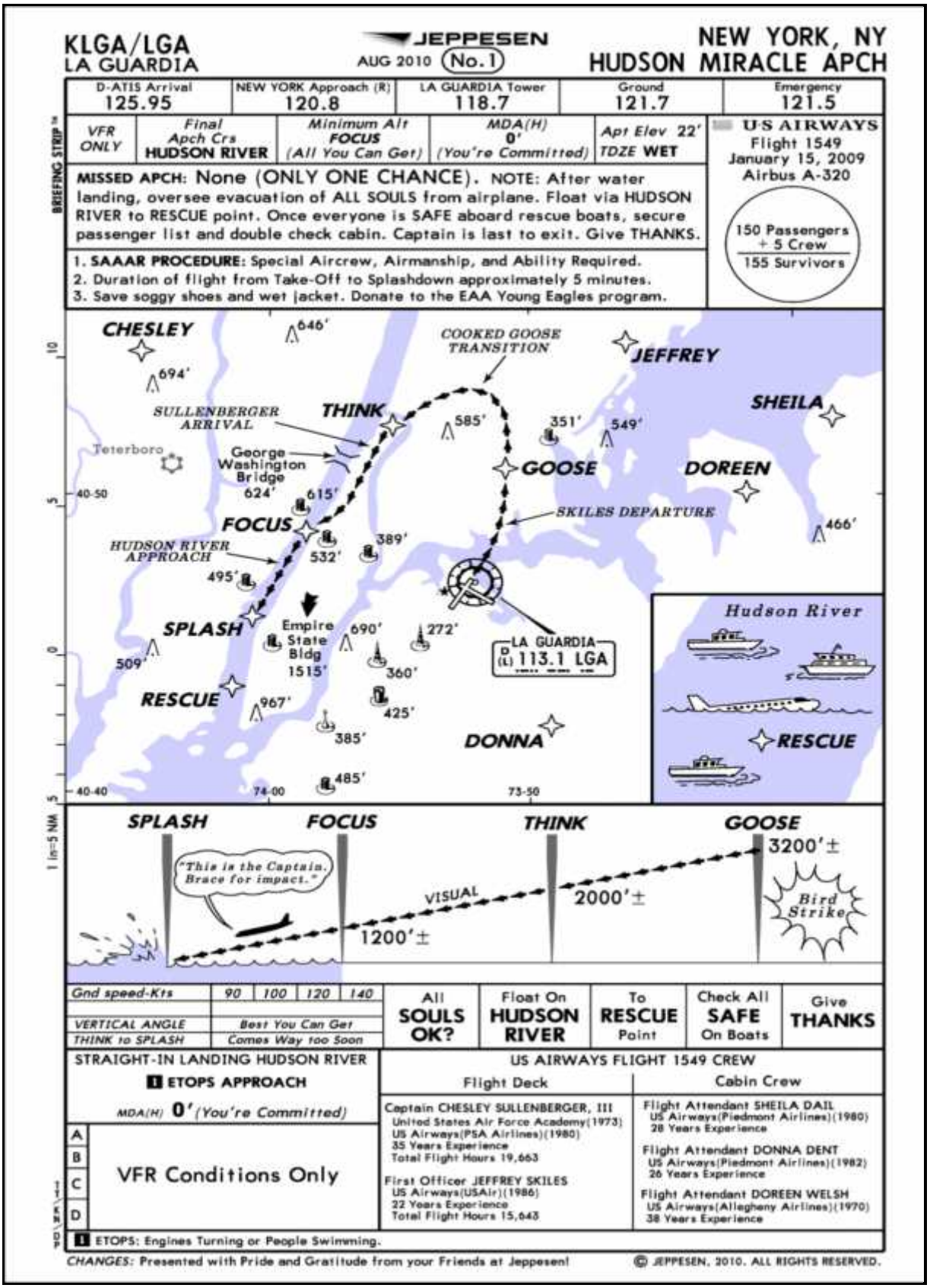
As a kid growing up in Ardmore during the time these 384 bombers were being built between 1946 and 1954 there was more than one that flew over southern Oklahoma making the unmistakable sound a B-36 makes. The bomber was the only bomber we had that could carry the atomic bomb for the few years till the B-47 came along. The B-36 could fly at about 250 knots for 40 hours (how far is that?) – some above 40,000 feet - and carry a 10,000 pound bomb load.

When your engine(s) gets cooked by a goose(s): Fly this approach

This is a perfect example to continue just like we were setting in the classroom. I would jump up and taxi over to my seven or so boxes on the table and dig out this approach called "**HUDSON MIRACLE APCH**" (2010). One should study the humor in whoever it was at Jeppesen that wrote it and they show the gratitude to Sully on the last line – and the crew members named in the way points.

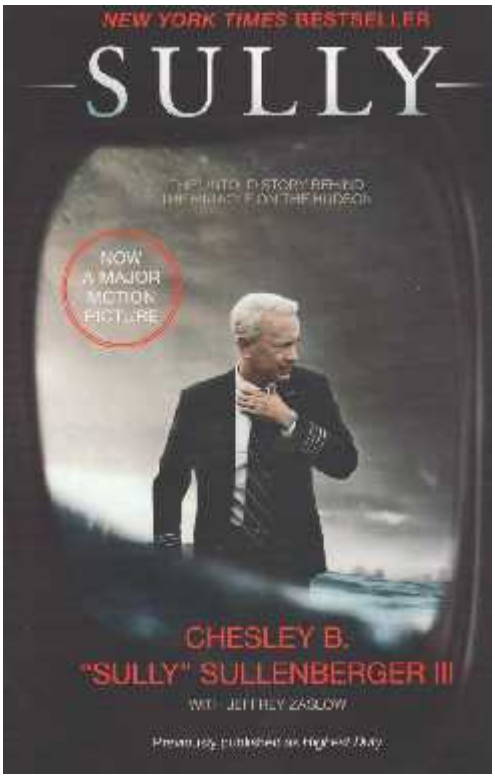
What is after the approach plate is a paper I wrote (and is on my Web site) about how Sully could have made it back to LGA. I discuss people landing in the water and how lucky – AND SKILLFUL – Sully was; however, given the training we are talking about in G. Heart Country and landing dead stick on every landing (damn near every time…) the punch line is on the last page.

Therefore, I decree this paper to add to the book. Just three words…we will hear them again.


KLGA/LGA
LA GUARDIA
JEPPESEN
AUG 2010 (No.1)
NEW YORK, NY
HUDSON MIRACLE APCH
D-ATIS Arrival 125.95
NEW YORK Approach (R) 120.8
LA GUARDIA Tower 118.7
Ground 121.7
Emergency 121.5
VFR ONLY
Final Apch Crs HUDSON RIVER
Minimum Alt FOCUS (All You Can Get)
MDA(H) 0' (You're Committed)
Apt Elev 22'
TDZE WET
US AIRWAYS
Flight 1549
January 15, 2009
Airbus A-320
150 Passengers + 5 Crew
155 Survivors
MISSED APCH: None (ONLY ONE CHANCE). NOTE: After water landing, oversee evacuation of ALL SOULS from airplane. Float via HUDSON RIVER to RESCUE point. Once everyone is SAFE aboard rescue boats, secure passenger list and double check cabin. Captain is last to exit. Give THANKS.
1. SAAAR PROCEDURE: Special Aircrew, Airmanship, and Ability Required.
2. Duration of flight from Take-Off to Splashdown approximately 5 minutes.
3. Save soggy shoes and wet jacket. Donate to the EAA Young Eagles program.
CHESLEY
646'
694'
COOKED GOOSE TRANSITION
JEFFREY
SHEILA
SULLENBERGER ARRIVAL
THINK
585'
351'
549'
Teterboro
George Washington Bridge
624'
615'
GOOSE
DOREEN
40-50
SKILES DEPARTURE
FOCUS
466'
HUDSON RIVER APPROACH
389'
532'
495'
SPLASH
Empire State Bldg 1515'
690'
272'
LA GUARDIA
D (L) 113.1 LGA
509'
360'
RESCUE
967'
425'
385'
DONNA
485'
40-40
74-00
73-50
Hudson River
RESCUE
1 in=5 NM
SPLASH
FOCUS
THINK
GOOSE
"This is the Captain. Brace for impact."
VISUAL
1200'±
2000'±
3200'±
Bird Strike
Gnd speed-Kts 90 100 120 140
VERTICAL ANGLE Best You Can Get
THINK to SPLASH Comes Way too Soon
All SOULS OK?
Float On HUDSON RIVER
To RESCUE Point
Check All SAFE On Boats
Give THANKS
STRAIGHT-IN LANDING HUDSON RIVER
E ETOPS APPROACH
MDA(H) 0' (You're Committed)
A
B
C
D
VFR Conditions Only
US AIRWAYS FLIGHT 1549 CREW
Flight Deck
Cabin Crew
Captain CHESLEY SULLENBERGER, III
United States Air Force Academy(1973)
US Airways(PSA Airlines)(1980)
35 Years Experience
Total Flight Hours 19,663
First Officer JEFFREY SKILES
US Airways(USAir)(1986)
22 Years Experience
Total Flight Hours 15,643
Flight Attendant SHEILA DAIL
US Airways(Piedmont Airlines)(1980)
28 Years Experience
Flight Attendant DONNA DENT
US Airways(Piedmont Airlines)(1982)
26 Years Experience
Flight Attendant DOREEN WELSH
US Airways(Allegheny Airlines)(1970)
38 Years Experience
E ETOPS: Engines Turning or People Swimming.
CHANGES: Presented with Pride and Gratitude from your Friends at Jeppesen!
© JEPPESEN, 2010. ALL RIGHTS RESERVED.

Sully - the movie: Three Words

Gary Heartsill



8/22/2016

Abstract

This paper points out the success of Captain Sullenberger's crash landing of an Airbus A320 in the Hudson River on January 15, 2009, suggests seeing the movie will probably depict some of the more remarkable events during this 'Miracle on the Hudson' and will point out the issues of not making it back to the airport and why he landed with the left engine still running while touting in the Appendix more information than is needed to see the Hanks/Eastwood movie.

Key words: movie, airplane accident, investigation, 'Miracle on the Hudson,' Airbus, Sully

Introduction

The TV commercial was just released for the *"Sully"* movie due out in September. Perhaps anything Tom Hanks and Clint Eastwood put together is worth watching; however, I was struck rather forcibly with two items some of us have been pondering since January of 2009. In the commercial you hear an investigator and then a news person say "Simulations show you could make it back to the airport" and "The left engine was still operating…" I said to myself "Goodness gracious these two items are in the movie trailer? I wonder what else they will ask."

The attached information maybe more than you need to get ready for the movie but here are some issues to consider before we see how Hollywood deals with it. The crash was a big deal.

What this paper promotes:

1. Supports the success of Captain Sullenberger's water landing on the Hudson in an Airbus 320.
2. Suggests some information about the investigation of the crash not every movie goer will want to see, read, or review.
3. At the end, questions the ditching decision with three simple words.

What this paper does not promote:

4. Does not take on Hollywood, Sullenberger, Airbus, NTSB, or US Airways.
5. Does not provide serious answers to the serious questions about the crash.

Have wondered, and will still wonder why Sully about one minute after they took off made the statement "…***what a view of the Hudson today***." This was made climbing through 2200 feet. He then retracted the flaps, completed the after takeoff checklist, and four seconds later they collided with the birds…Maybe this was some sort of cosmic foreboding or premonition?

The Airbus A320 has some features designed into it that are different than most aeroplanes. The Airbus has flight envelope protections. A 'protection' that overrides the pilot – it is sort of like a cocoon built around the pilot. There are 'laws' built into the machine controlled by the computer. A Boeing for instance has a button that can be pressed so the pilot can take complete control of the airplane. A Boeing airplane can stall. "An Airbus cannot be stalled in normal law."[8] Airbus is different. (The details are beyond the scope of this paper.) However, we will have to give Sully his due for flying the Airbus and landing in the Hudson given the 'protection' built into the ship. He did good (well). He walked away from it and nobody got hurt.

Doing some "Monday morning quarter backing" a few years after the crash and looking at the 'laws' and 'protection' in the A320, the question of turning back to LaGuardia (LGA) is still a question some of us talk about. I don't know about an Airbus but a Boeing 727 or a Learjet 35

[8] See The NTSB PDF file # 13 in the Appendix for a more detailed explanation noting this is for a "really interested person" as the fly-by-wire airplane is sometimes confusing as to who is in control and it may depend on what 'law' the plane is flying in. Lot's of luck, by the way…

could, nominally speaking (an engineless but glide-able airframe) make it back to the airport – or make it to Teterboro (TEB) which would be a stretch lining up with the south 7,000 foot runway.

What Sully initially asked for was clearance back to LaGuardia as he began a slight turn to the west. He did not maintain an exact gliding air speed. He asked for the Quick Reference Checklist (QRC) to get the engines restarted and then was having to deal with ATC and what was available for him to land while flying his crippled jet. However, we know the rest of the story. He successfully landed the A320 in the Hudson River. Again, he gets the credit. Tip of the hat to him for making the 'miracle' landing[9].

Sully Track (orientation)

Observing the Sully Track on the next page the first focus is bottom right corner where LaGuardia is located or at the blue LGA. The yellow/pencil highlight going north up to the "May Day" call, west/southwest across the green top of the pie, and down the river to the red zero.

Notice the blue clock times all the way around from take off at 25:00 (start of roll) to the 30:43 time of crash landing.

Notice the red numbers reflect the altitude, first at 700' to the top at 3200,' 1500' at the bridge and on around to 200', 360', 200', and zero.

Have shown the callouts of "switching to departure," "view of Hudson," "Bird Strike," "TEB?" "Brace," and "Hudson." There are mile markers (statute) 1 thru 12 miles for his track.

There is shown one minute to 1500' – second minute to just before the 4 mile marker at 2900' and then the last three minutes 2700'-1500'; 1500'-500'; and 500' to 0'.

Note the green pie. This is the area of successful return with a turn back to LGA from about 27:33/27:45 at 2700' to about 28:27 at 1500' (G. W. Bridge) would allow enough time to glide back to LGA. Notice the distance from the Bridge to LGA is the same as to 0' in the Hudson.

Teterboro airport (TEB) is the red dot to the west is within a half mile of being the same distance from the bridge as to LGA.

---

[9] All accidents have to be investigated by the NTSB. See the Accident Report AAR-10/03 file, # 13 in the Appendix. Let me say the investigation is quite (was quite) detailed. They don't miss much. As a matter of fact the key witness at one of these hearings would almost be better off to drop his trousers, bend over and spread his cheeks so everyone can see because he will get bore sighted before it is over with...I promise you.
Please Review for your benefit these items as it will explain better than I can some of the Airbus/Accident details:
Executive Summary – xv.
Flight Track – 4.
Airspeed Displays – 10-12.
Dual-Engine Failure Training – 59-61.
Conclusions – 119-121.
Probable Cause – 123.

There is a ‘shady’ area south of the bridge down to 1200’ that would make LGA but is close…

Sully Track

Looking forward to see the movie

I will be looking to see if they show some landings at LGA in the Airbus A320 simulator. It shouldn't be that difficult but I only had one ride in an Airbus so I would not know; however, let's talk about this for a minute. Remember we are Monday morning quarter backing and we are not going to get into Sully's success with comments like "Well, I could have made it."

For drill, same numbers as accident aeroplane: max weight takeoff, runway 4, cleared to five, 3700 feet broken, winds 290 at 8 kts variable 310 at 9 kts. We know what we are going to do so watch this! At 2800 feet the flocking birds hit the ship and we lose both motors. "I got the jet" Pitch for best lift over drag speed and maybe the ***Green*** dot will show something like (my guess) 200 KIAS – maybe 180... The pitch is done at the same time as a left turn is started.

Loss of two engines is an immediate response:

Pitch for best Lift over Drag, Turn for the nearest airport, Set up a pattern to land half way down the runway and when that point is made or you can see you can land half way down, extend the landing gear and move the point half way to the approach end. Maintain the speed all the way to touchdown. Next extend the flaps to move the landing point to one quarter of the way down.[10] Note: The radio call is to tell ATC you are going to land on runway 13 at LGA and run the trucks because you have lost both engines…period. You should own the airport and the airspace getting there at this time.[11] (These are my comments. ATC won't buy being told…)

[The other issues of what checklists to call for, and appropriate behavior to keep the feds and chief pilot off your case is, or should be, written in the Operation Specifications of the airline.]

One cannot dilly-dally about pitching and turning. This is makeable, but you must fly the biggest piece to the ground giving yourself and the airplane the best approach possible keeping the best airspeed and the most altitude. Note: Given the ambiguity, stress, and not much time to turn back to the field and thread the needle to land at LGA, one could decide down at about 1000 or 500 feet if the field can be made or landing a tad to the north in the East River. This would be a backup or Plan B. (Maybe the East River is not as deep as the Hudson.)

Back to Sully. One reason he did not go to LGA[12] is because he is in an Airbus. It is my opinion with the protection, laws (normal, alternate, and direct), and the fly-by-wire issues (side stick

[10] This sounds a lot easier than it is because there are some training issues that take time to see, feel, and accomplish. The training experience will show how to decide to not extend the gear or flaps if the approach is going to be short. Questions of using ground effect to help nurse the last few knots of speed may help and to hold off on the flaps to selectively extend "to get you over the fence."

[11] Sully spends some time talking in his book about Patrick the controller who was a source of help by not asking the fed questions of how many souls on board, fuel remaining, and other (at this time) superfluous questions but realizing the nature of the problem and the severity of not having all day to figure things out.

[12] In his book Sully justifies his reasons for not turning to LGA. He says not being certain he could make the runway would have "catastrophic consequences" and among other things, he said "we didn't know if we'd be able to lower the landing gear and lock it into position" (pp. 221-225).

and all) he was better off with a two or three mile long runway. Then he could focus on the best angle to let the ship contact the water. This is where he gets the credit because it didn't break into, break into parts, or sink. He got the ship down and floated the 75 million dollar airplane down the river. Again, it doesn't matter to him as he did his job. He did it splendidly and, again, no one was hurt. You can cover up a lot of errors in the system for using ditching procedures dated in 1968. You can talk about one engine still running, hull breach in the rear bulkhead, and the silliness of the third Probable Cause "(3) The captain's resulting difficulty maintaining his intended airspeed on final approach due to the task saturation resulting from the emergency situation." If the guy who wrote that had been in the back when it landed he would not have come up with such a riveting [bleeping] remark about as good an aviator as there is…

Back to the simulator. Same song, second verse. This time plug in the weather to something like 500 and 2 and see how well your crew can make a right descending turn to intercept the ILS to runway 22 at LGA. The challenge will be to stay at Green dot speed until you can decide to put the gear down and make the landing, or maybe land on the flaps, or if short when breaking out, turn a bit to the left to miss the ILS and ditch in the water, gear up, and full flaps.

I wonder if the training folks, due to Sully's successful landing are doing much of this in the simulators?

<u>Relevant Issues – Just a note…</u>

The question has come up about the cabin floor being breached during the ditching. The argument is that the Airbus A320 was not certified by our rules and regulations and President Carter accepted the French certification in this area. The crash results show the three areas of the main cabin floor. A flight attendant was injured near the aft, center, aisle, jump seat. See the NTSB report pages 30-33 for the impact information. Note the pictures of how the rear bottom of the airplane was destroyed…part of the reason it filled up with water.

The question about the engines, especially the left or number one engine still running, as was commented on in the movie trailer question to Sully. The reports, especially the Airbus (p. 32), NTSB (pp. 33-35), and (see my # 14) *2011 – Air Crash Investigation* video spend time explaining how destroyed the engines were and unable to supply power to get the jet back to LGA. Note they say the engines were not tested, or were required to have been tested, with birds the size of the 10 pound Canadian birds that went through both engines. Some say the engines should have provided thrust from the core even if the fans were damaged. The last problem is about the computer auto-throttle protection under the French engine warranty that will not allow the pilot to over ride; hence, the argument for having an engine (or part of one) – as they had with number one – but couldn't control it.

<u>Finally</u>

I have a little heart burn about all this. Aeroplanes are not supposed to be landed in the water and have said, before Sully doing so well, that there were not one in 10,000 airline pilots that

would chose to ditch in a river. Just shows how long in tooth this ole round gauge pilot is. So be it. However, let me tell you a story.

Was working with a crew of two flying a two-engine aeroplane working the front course of runway 28 in Portland (has the Columbia River running by the north bank of the aerodrome). In spite of what Sully says in the commercial about no one getting training in loss of all engines low to the ground "…no one has ever trained for an incident like that," well, that's not really true.

This crew, just like everyone else that was in this training, was told they could not land the jet in my simulator with any engines running. All were to be 'dead stick." One would fail somewhere in the scenario, and the other would fail before the landing. This crew had lost their second engine out on final and were gliding in to land. They also were having trouble extending the landing gear and at about 400 feet, distracted by the gear not coming down, they passed up the perfect approach to land on concrete and announced "we are going to land in the water."

Well, I will tell you I did keep my mouth shut until they crashed in the water and then in my tertiary language asked why. He responded in a very calm and confident manner and said ***"Sully did it."***

Epilogue

A note found during the investigation from one of the passengers:

gh

Appendix

1. The Warner Brothers “Sully” movie trailer - 2:03 minutes

   https://www.youtube.com/watch?v=mjKEXxO2KNE

2. Flight 1549 Reconstruction…Ditching Jan 15, 2009 - 7:21 minutes (3D animation, multiple screens)

   https://www.youtube.com/embed/tE_5eiYn0D0#t=109

3. Captain Sullenberger’s Moment 6:14 mins. TV interview with Harry Smith and Maggie Rodriquez.

   https://www.youtube.com/watch?v=7pn5alsFbL8

4. Cockpit Voice Recorder (CVR) Transcript (excerpt below) http://www.tailstrike.com/150109.htm

15:24:54 TWR Cactus fifteen forty nine runway four clear for takeoff.
15:24:56.7 RDO-1 Cactus fifteen forty nine clear for takeoff.
15:25:06 CAM [sound similar to increase in engine noise/speed]
15:25:09 CAM-2 TOGA.
15:25:10 HOT-1 TOGA set.
15:25:20 HOT-1 eighty.
15:25:21 HOT-2 checked.
15:25:33 HOT-1 V one, rotate.
15:25:38 HOT-1 positive rate.
15:25:39 HOT-2 gear up please.
15:25:39 HOT-1 gear up.
15:25:45 TWR Cactus fifteen forty nine contact New York departure, good day.
15:25:48 RDO-1 good day.
15:25:49 HOT-2 heading select please.
15:25:51.2 RDO-1 Cactus fifteen forty nine, seven hundred, climbing five thousand.
15:26:00 DEP Cactus fifteen forty nine New York departure radar contact, climb and maintain one five thousand.
15:26:02 CAM [sound similar to decrease in engine noise/speed]
15:26:03.9 RDO-1 maintain one five thousand Cactus fifteen forty nine.
15:26:07 HOT-1 fifteen.
15:26:08 HOT-2 fifteen. climb.
15:26:10 HOT-1 climb set.
15:26:16 HOT-2 and flaps one please.
15:26:17 HOT-1 flaps one.
15:26:37 HOT-1 uh what a view of the Hudson today.
15:26:42 HOT-2 yeah.
15:26:52 HOT-2 flaps up please, after takeoff checklist.
15:26:54 HOT-1 flaps up.
15:27:07 HOT-1 after takeoff checklist complete.

15:27:10.4 HOT-1 birds.
15:27:11 HOT-2 whoa.

5. MOVING ON OCTOBER 14, 2009 What We Can Learn From Sully's Journey

The Wall Street Journal By JEFFREY ZASLOW (note: Co-author of Sully)

http://www.wsj.com/articles/SB10001424052748703790404574469160016077646

6. US_Airways_Flight_1549_Sully_Skiles_Hudson_River_Miracle_Apch_Chart.pdf

This is sort of a spoof of what the approach and landing looks using Jeppesen as a model. Note the names of all the crew members.

7. Raw footage of the water landing – 1.25 minutes.

https://www.youtube.com/watch?v=IC7gBV_jUR0

8. Miracle of the Hudson Plane Crash ("what really happened") – 48:26 minutes

https://www.youtube.com/watch?v=5SL1A2d2e7M

9. Hudson Crash…Reconstruction from inside the plane – 5:19 minutes (animated view from cockpit)

https://www.youtube.com/watch?v=BQRuQJoa5IE

10. US Airways Flight 1549…[Original ATC] - 4:30 minutes (animated view of aircraft)

https://www.youtube.com/watch?v=E8itHvXd0oM

11. An EXO Sphere 3D of the airplane being brought up out of the water. There are some other films in this site. - 7:21 minutes. This is a repeat from the EXO site and not the YouTube 2 above.

http://www.exosphere3d.com/pubwww/pages/project_gallery/cactus_1549_hudson_river.html

12. **PDF file** – Submission of Airbus to the NTSB for US Airways Flight 1549 – Accident Investigation

http://www.exosphere3d.com/pubwww/pdf/flight_1549/ntsb_docket/441039.pdf

13. **PDF file** – NTSB AAR1003 Accident Report – 213 pages

http://www.ntsb.gov/investigations/AccidentReports/Reports/AAR1003.pdf

14. 2011 – Air Crash Investigation – Hudson Splash Flight 1549 – A National Geographic video Published or shown on Jun 27, 2012. Good review of feds looking at the crew, engines, and 10 pound bird strikes.

https://www.youtube.com/watch?v=RuxCBYAaZ9M

15. Recovery of US Airways Flight 1549 from the Hudson – 4:48 minutes, being put on a barge.

https://www.youtube.com/watch?v=IC7gBV_jUR0

See Amazon.com for his book noting the newer edition is titled *Sully: My Search for What Really Matters.* A nice easy read. His stories are similar to some people I know. He is a nice guy.