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Editor's Spot

Hydraulic Lift

Mandatory disclaimer:
The idea for this article did not come from myself. I first over heard the ideas discussed in this article from BJ Weisman. Credit is due to him for developing the ideas.

Every now and then people come across certain things that puzzle them and they search for or make up answers to satisfy their need for understanding. When I first heard BJ talk about his theory of "hydraulic lift", I did not think much of it until a week or so later when I was watching him fly his V-Ultra at Smith's Hill in very minimal conditions. While watching him fly I noticed that the airplane was capable of staying up for sustained periods of time if and only if the airplane was flown very close to the hill. Whenever BJ would venture out away from the hill he would end up significantly lower when he returned to the face of the slope than he was previously. Yes, there was lift away from the hill but the airplane was not flying efficiently through it. Why was the airplane capable of flying very efficiently for long periods of time (in excess of ten minutes) in very close proximity to the face of the slope and was not able to maintain altitude away from the slope even when there was obvious lift out in front of the hill?

Well, I started to think about this and thought that the answer was obvious. The V-ultra could not maintain altitude away from the hill because that the lift that was generated away from the hill was not enough to sustain altitude. This all sounded good until I remembered a couple of other things that I had noticed on this particular day and days in the past where the lift had been marginal at best. One example was at the Cross in Ventura. On this particular day, the lift was very good for several hours before the wind slackened and the lift went away. Even though the wind was not blowing at any apparent speed, BJ and I flew his Renegade slope racer with ballast in these conditions and had flights in excess of five minutes without any noticeable loss of altitude. When I remembered this, the two pieces of information clicked and presto, the concept of hydraulic lift was defined.

Basically, the concept of hydraulic lift is pretty easy to put in a nutshell. The theory of hydraulic lift is the ability of a sailplane to produce enough lift to maintain level flight in conditions that were previously thought to be impossible. This is accomplished by utilizing two basic principles, the principle of ground effect and a take off of Bernoulli's principle. Becoming complicated yet? Now that the background and other information has been stated,

it is time to actually explain the concept of "hydraulic lift".

To start off, it would probably be necessary to explain the environmental conditions that help to create hydraulic lift. As most people know, when air moves it has to move around solid objects. In the case of a slope, the air most move up and over the slope in order to pass it. The rising air is what causes the normal lift band on a slope. At most slopes the lift band extends out in front of the hill sometimes up to 100 yards or more. The lift band of the slope is the region of space in front of the hill in which the air rises at a rate that is greater than the rate of sink of a sailplane. The angle at which the air is moving upwards is called the vertical component of the slope. In general, steeper slopes produce a greater vertical component.

Secondly, the velocity of the air also has a significant part to do with creating the conditions that are favorable to production of hydraulic lift. As the air approaches the hill, the air most either stop at the bottom, rise up and over the hill, or go around the side. Unfortunately for the air, and fortunately for us, the air can not stop at the bottom of the hill and is forced to go around the hill, either to the side or over the top. When air rises up the face of the hill it creates an area of high pressure that is caused by the compression of the mass of air as it tries to rise above the hill. The air in this area can be thought of as being in a system that is trying to stay at a state of equilibrium. Le Châtelier's principle, states that a system at equilibrium will counteract forces exerted on it in order to stay at equilibrium. In the case of our air/slope system, the system was at a relative state of equilibrium in terms of air pressure. When the air approached the slope, the rising air exerted a force on the system and caused the pressure of the system to increase. To counteract this the system tries to lower the pressure of the system back to its original state. This is accomplished by increasing the velocity of the air as it is rising. Bernoulli's principle states that the area of lowest pressure when a mass of air flows around a body is the area with the greatest velocity and vice versa. Thus, by increasing the velocity of the air, the pressure is lowered and the system remains in a relative state of equilibrium.

What does this mean to us? Well, the area where there is the greatest pressure increase is in the space closest to the face of the slope. Thus the velocity of the air in this area is the greatest because the system is forced to lower the pressure back down more in this area than in any other. This also means that in many cases the air also has the strongest vertical component in the area closest to the face of the slope.

There are three factors that combine to create hydraulic lift, first the environment which as already been explained, the aircraft, and how the aircraft is flown. It should be stated now that only certain types of aircraft can take advantage of hydraulic lift. What defines these aircraft is in the following explanation.

Hydraulic lift is only created when the sailplane is flown in a certain area. This area is basically one wingspan's height or less above the face of the slope. It is necessary to fly the aircraft in this area because this is roughly the area in which the plane is flying in what is called 'ground

effect'. Ground effect is the phenomenon that occurs when a plane flies in close proximity to the ground. When the aircraft flies close to the ground, the air underneath the wing is compressed forming an area of higher than normal pressure. This higher pressure creates more lift than is normally developed in normal flight. The aircraft also produces less drag in ground effect because the vortices that are generated in normal flight are not able to develop in ground effect. Unfortunately this condition only occurs when the aircraft is within roughly one wingspan's height or less of the ground. This is why only certain planes can truly take advantage of hydraulic lift. Since the glider must be flown in ground effect, it must be flown very close to the face of the slope. If you are flying a foamie with a forty-two inch wingspan, it is not really practical to fly the airplane in ground effect for extended periods of time, unless you like flying through the weeds! Thus, a plane with a wingspan of at least sixty inches is preferable. Secondly, the cleaner the airplane is, the better. A big old draggy floater will not gain much from trying this technique, while a full F3B ship will make considerable gains.

Once the plane is flying in ground effect, the question of "How should I fly the plane," comes into play. To start off, you want to fly through as much air as possible. Thus you want to fly at or slightly above the best L over D speed for your plane. By doing this you will allow the plane to cover as much ground as possible at a relatively efficient speed. The art of keeping the plane on step is one that must be mastered as well. The exact speed that you should fly the plane is highly dependent on the conditions and one must learn to fly the airplane at the correct speed to take advantage of the lift that you are creating. Flying smooth and efficient is important. Fly the airplane straight. Try to avoid crabbing into the wind and do not do any erratic moves.

When all of the above mentioned items come together, hydraulic lift is created. By flying the airplane in its most efficient state on an area of slope where the lift being generated is the greatest, amazing things can be done. Imagine sloping in no wind or flying your slope racer when all of the big floaters can barely stay up. Its all possible when you learn to take advantage of what BJ Weisman has affectionately deemed 'Hydraulic Lift'. Oh, In case you are wondering how he came up with the name, I will let you ask him.

Think about it

Thomas

In the News

Unfortunately, I was not present at the last meeting and do not have the minutes from the meeting. Thus, there is not that much to talk about. So, look through the news will have to do.

World Events

- It is official, F3J is going to have a world championship. The first Championship will be in 1998 in England and will alternate years with the F3B world championship. For those of you who are unfamiliar with F3J, it is basically the same thing that we fly at the field all of the time but it has a few twists.
  1. No winches- F3J is hand tow. The planes are towed up using a runner or runners who run like mad and try to rip the wings off your plane in order to give you the best launches possible.
  2. F3J is all man on man. This means that you are only scored against the people in your flight group. The contestant in each flight group who gets the best score in the flight group gets a thousand points and everybody else's' score is normalized to it.
  3. No landing skegs. Oh no!!!
- That's the basics of F3J. Later in the issue are the rules and regs for the new Southern California Soaring Clubs F3J league. The first contest is in September and there is one in October and November as well.

National Events

- The 1996 nationals are history. This year's nationals were held at the National Flying site in Muncie, Indiana. The took place from July 26- August 3. The events that were run were: F3B, F3J, Handlaunch, Two-Meter, Open, Nostalgia, and Scale. This year TOSS was represented at the Nationals by BJ Weisman, Edgar Weisman, and Thomas Akers. The flyers from California proved to be the majority of the dominant pilots. Not only did California's pilots fly well, but they took home the most trophies. Yeah!!. Joe Wurts was the overall champion with wins in Handlaunch and Two-Meter. Aarron Valdez won Unlimited for the second year in a row. In terms of actual flying, the conditions varied constantly and the weather was always a factor. Just about everybody had to fly in the rain at one time or another. Ask Edgar about what happens when your Vision gets a little bit too wet. Although some people(BJ) might disagree with following statement, I feel that this year's Nationals were an expertly run set of contests and I had a blast.

Local News

- Joe Wurts has done it again. At a recent F3B practice at SULA, Mr. Wurts pulled off one of the fastest if not the fastest speed run in history. Joe completed the six hundred meter course in 14.38 seconds for an average speed of just over ninety-three miles an hour. Way to go Joe.
- Everyone in the club should wish BJ Weisman the best of luck when he goes to Albuquerque in a few days to compete at the U.S. F3B National Team Selections. If all goes well, BJ could very likely come home a member of the U.S. National Soaring Team.
- TOSS is getting bigger. The club's membership is increasing just about every weekend. We now have the full spectrum of flyers, ranging from stone aged experts, to twelve years old beginners. All Right!

• *Southern California Soaring Clubs - $(SC)^2$ - F3J Rules - 1996*

1. Safety is paramount in all $(SC)^2$ -F3J contests. It is the responsibility of the Contest Director and the host club to take any and all steps necessary to insure the safety of participants, spectators, and property at the contest.
2. The entry fee will be $6.00; $2.00 of this will remain with the host club. $4.00 will go to $(SC)^2$ -F3J. $(SC)^2$ - F3J shall run the contest and supply the awards.
3. Rules in the FAI Rule book shall apply except as revised below.
   - 5.6.1.3 F) two different transmitter frequencies is not required
   - 5.6.1.3. ADD H) for 1996, landing aids will be allowed as per $(SC)^2$ rules.
   - 5.6.4. A)reflight is not to occur because a contestant's model collides in flight with another model, they are to continue the flight. The competitor may use rule 5.6.3.1. b) competitor is allowed 2 attempts in each flight group.
   - 5.6.8.3 Only one (1) tow-person is allowed.
   - 5.5.7.6 Add D) Two-lines will be of one component and max. dia. of 3 mm.
   - 5.6.11. There will be no fly-off rounds. The contest shall have as many rounds as possible for all flyers. All rounds will count.

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Handlaunch Golf

Recently, I had the opportunity to participate in one of the up and coming aspects of soaring, handlaunch golf. Basically, imagine yourself at the tee on the 18th hole at Pebble Beach, standing there with your golf cart parked off to the side, your caddie/driver is waiting patiently for you to proceed. You take one last look down the fairway and start your swing. Oh yeah, I forgot to tell you, you are not playing with a golf ball, you are using your handlaunch glider. This is where I hope handlaunch golf will be in a couple of years although it is pretty far off, it is getting there.

Handlaunch golf is run basically the same way as regular golf. You start from the tee and your first throw counts as a drive, except most golfers cannot drive 450 yards. Once you throw you hop in your golf cart and take off after the plane which is rapidly getting farther away... When your plane finally comes to a rest, you simple pick it up and throw from where ever you are. Once you get to the green you have two choices, you can either try to put and get the plane to come to rest within one wingspan of the hole, or you can take a two stroke penalty and not half to put. Pretty simple? In essence yes, but in practice it is anything but it.

There are some problems that occur while playing handlaunch golf. First, the art of the drive is definitely an art. Basically, it comes down to this. Most handlaunchs fly faster than the fastest speed that a golf cart can attain. This means that when you throw, you are not able to keep up with the plane. So, you have to fly in a much different environment. It becomes very difficult to judge speed as well as depth perception, because you are moving. If that is not enough, imagine trying to do this while trying to fly through a column of trees. Tricky.

However, despite all of this, handlaunch golf is a blast. Even though it might be difficult, everyone is in the same boat and its fun watching other people try to do the same thing.

One thing is for sure though, we need to find a way to get on a local golf course.

Monthly Contest Results

July Paragon Only Contest

Pilot	Score
Mike Reagan	1000.00
Don McNamee	1000.00
Don Nothern	1000.00
Thomas Akers	995.85
Jim Buck	995.18
Ed Slobod	995.02
Edgar Weisman	992.36
Larry Jimenez	0.00
Bob Swet	0.00

Contest Directors

September- BJ Weisman
October- Thomas Akers
November- Myles Moran
December- Devin Holzer and Charles Babcock

August Open Scores

Pilot	Score
BJ Weisman	1000
Thomas Akers	924
Hank Schorz	903
Mike Reagan	887
Don McNamee	860
Edgar Weisman	856
Bill Karp	855
Art McNamee	846
John Johnson	812
Bob Swet	775
Greg Nikola	545

Two Meter Scores

Pilot	Score
BJ Weisman	1000
Art McNamee	959
Don McNamee	900

Up Coming Events

August 28- TOSS Club Meeting
August 30,September 1- F3B Team Selections

September 8- TOSS Monthly Contest
September 25- TOSS Monthly Meeting
September 28- SULA F3J
September 29- HSS SC^2

October 5,6- CVRC Fall Soaring Festival
October 12- ISS F3J
October 13 TOSS Monthly Contest
October 27 SWSA SC^2
October 30 TOSS Monthly Meeting

LASTNAME	FIRSTNAME	AMA	PHONE	ADDRESS	CITY	ST	ZIP
Akers	Thomas	385783	805-496-6655	1583 Wakefield Ave.	Thousand Oaks	CA	91360
Ames	Peter		805-658-6121	821 Via Arroyo	Ventura	CA	93003
Babcock	Charles	497854	805-495-3093	1807 Hendrix	Thousand Oaks	CA	91360
Bass	Simon		805-379-4819	174 Hunt Circle	Thousand Oaks	CA	91360
Deboer	Charles	409751	805-492-1868	775 Brightstar	Thousand Oaks	CA	91360
Feeney	James and Orion		805-432-3455	2526 Young Ave	Thousand Oaks	CA	91360
Fenney	Christopher	432321	805-482-2428	2759 McCulloch Avenue	Camarillo	CA	93010
Filice	Gary	478997	805-529-7534	11502 Northdale Dr.	Moorpark	CA	93021
Gulden	Brittain			13110 East Annette Street	Moorpark	CA	93021
Herbison	Roger	427678	805-649-1392	320 Grande Vista	Oak View	CA	93022
Holzer	Devin	508941	805-496-3555	1462 Feather Avenue	Thousand Oaks	CA	91360
Jimenez	Larry	378742	805-652-1937	1943 Channel Drive	Ventura	CA	93001
Karp	Bill	122971	818-878-1846	5446 Amber Circle	Calabasas	CA	91302
Keightley	Chase	484427	805-987-6443	542 San Clemente Way	Camarillo	CA	93010
Kelley	Jason		805-491-2052	12108 Alison Dr	Camarillo	CA	93012
Kluss	Bill	15036	805-437-2120	1368 Morrow Cir	Thousand Oaks	CA	91362
McCallum	Paul	266169	818-597-9374	P.O. Box 6247	Thousand Oaks	CA	91359
McNamee	Art	7417	805-526-6292	2645 Placerville Court	Simi Valley	CA	93063
McNamee	Don	48996	805-531-9442	133666 Bear Valley Road	Moorpark	CA	93021
Moran	Myles	18426	818-882-4687	10428 Oso Ave.	Chatsworth	CA	91311
Northern	Don	28279	805-523-1018	3977 Willow Creek Lane	Moorpark	CA	93021
Oldenburg	Ed	106776	805-499-6354	261 El Gallardo	Newbury Park	CA	91320
Reagan	Mike	93756	805-529-5513	14705 Loyola Street	Moorpark	CA	93021
Schmidt	Ed		805-642-5591	1412 Glacier Ave	Ventura	CA	93003
Skow	Ed	529910	805-646-6544	315 North La Luna	Ojai	CA	93023
Spoer	Jonathan	393152	818-889-2788	30811 Main Mast	Agoura Hills	CA	91301
St.Lawrence	Don	409441	805-437-9681	207 Sommerset Circle	Thousand Oaks	CA	91360
Stafford	Jack		805-654-0308	748 Via Arroyo	Ventura	CA	93003
Stern	Michael	131478	805-492-8452	745 Lynnmere Drive	Thousand Oaks	CA	91360
Swet	Bob	83283	805-388-9619	2600 Ponderosa Drive Apt. 15	Camarillo	CA	93010
Thomas	Laurence		805- 497-1371	1467 Oberlin Ave	Thousand Oaks	CA	91360
Tiffin	Richard	555063	805-449-9113	2070 Rodeo Ct	Thousand Oaks	Ca	91362
Trist Jr.	Paul	28643	818-545-7551	1101 Melrose #1	Glendale	CA	91202
Usher	Martin	550138	805-492-1176	3081 Roundup Cir	Thousand Oaks	CA	91360
Weisman	BJ		805-375-3175	3350 William	Newbury Park	CA	91362
Weisman	Edgar	67651	805-371-4171	752 Camino Valles	Thousand Oaks	CA	91360
Wolfe	Burton		525-7758	745 Foothill Rd	Santa Paula	CA	93060