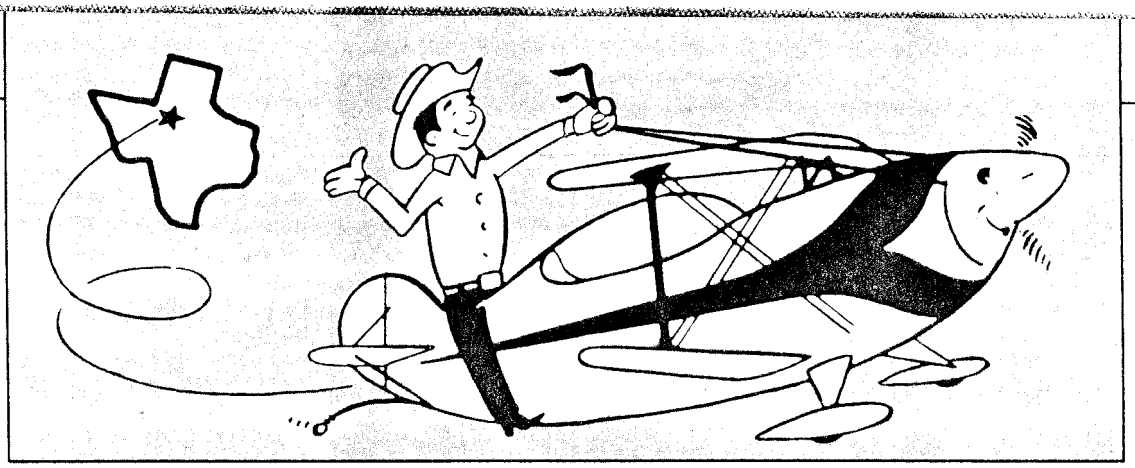


SPINOFFS

Herendeen & Beggs Add to Story

By Gene Beggs
Contributing Editor

Back near the first of the year, I spent a most interesting and enjoyable week in Santa Paula, California, as the guest of K.D. Johnson, the owner of Aerobatic Safety Unlimited, formerly known as the Pitts Stop. Ken is the Pitts dealer on the West Coast.

The purpose of my visit was to conduct my spin training course for the benefit of him and his instructors, Dave Byrne and Charlie Larkey. During the week, I also had the pleasure of flying with several other local aerobatic pilots among whom were Dan Rihn, Lee Manelski, Dale Donalson, Frank Gamble, Dan Wright, Dan Richland and Kathy Gray. But I was especially happy to have the opportunity to visit and fly with the one and only, Bob Herendeen!

I think I should tell you at this point that since my earliest involvement with the sport of aerobatics, Bob has always been my idol. He and his Pitts, N66Y, were my inspiration to build my own Pitts, N16GB, and to pursue the sport of competition aerobatics.

Shortly after completing my Pitts S1S, I had the pleasure of flying with Bob at Fond du Lac in August, 1978. It was during that brief session in Carl Bury's Pitts S2A that I observed a style of flying that has greatly influenced my own ever since. Bob's control technique and style of flying could best be described by one word — SMOOTH!! It is also quick, firm and precise, but, most especially, very, very smooth. Since that day at Fond du Lac 78, I have tried to pattern my flying after that technique.

Now, after these introductory statements, you can easily see why I was so pleased to be able to fly with Bob again. This time, instead of working to perfect my competition sequences, the primary purpose of our flight was to compare notes and techniques for performing and recovering from inverted and upright flat spins. We were flying the Pitts S2B owned by Johnson's dealership. What an interesting and enjoyable flight it was. Let me tell you about it!

Bob was the last "student" I flew with the evening of Friday, the 17th of January. After fueling and preflighting, we departed Santa Paula Airport and headed East, out over the citrus groves and climbed to 6,000 MSL. I was anxious to see Bob demonstrate the recovery technique that he had described to me earlier where he would leave the power full on while using the hands-on, standard recovery technique from the inverted and upright flat spins. I was very interested in comparing the altitude losses when using this recovery procedure versus the power-off, hands-off, opposite-rudder technique described in my series of spin articles, published in SPORT AEROBATICS and SPORT AVIATION.

After clearing the area, Bob placed the S2B into an inverted flat spin, using full right rudder, full right aileron and full power. The spin was started at 6,000 MSL and was allowed to continue through an unknown number of turns until the altimeter read 5,000 MSL. At this altitude, Bob initiated his previously described power-on, hands-on recovery, stopped the spin and pushed out to level flight. Upon level out, the altimeter read exactly 4,000 MSL — a net loss in altitude of exactly 1,000 feet from the point where recovery was initiated.

Now we went on to compare this technique with the power-off, hands-off, opposite-rudder method. We climbed back up to 6,000 MSL, cleared the area and again placed the Pitts into an inverted flat spin as previously described, using right rudder. The aircraft was allowed to spin, flat, until the altimeter read exactly 5,000 MSL. At this point, I quickly cut the power, released the stick and applied full left rudder. When the spin stopped, I neutralized the rudders and placed my hand back on the stick and pushed out to level flight.

A quick glance at the altimeter showed it to be reading 4,100 MSL! This was a net loss in altitude of 900 feet from the point at which recovery was initiated, representing 100 feet difference between the two methods of recovery from the inverted flat spin.

Bob and I both performed several more inverted flat spins and the results were always in favor of the power-off, hands-off, opposite-rudder method of recovery insofar as altitude loss during recovery was concerned. In every case, the power-off recovery resulted in a net savings in altitude of 100 feet.

After these two experiments, we decided to try something else. We thought, "Hey, wonder what would happen if you tried the hands-off, opposite-rudder technique, but left the power full on?" Well, we found out! It won't recover! This really didn't surprise me because I had tried it before and found that the Pitts, and the Eagle as well, will recover from the

upright flat spin if you release the stick and leave full power on and apply full opposite rudder, but this is not the case with the INVERTED flat spin!

When using the hands-off, opposite-rudder method to recover from an INVERTED flat spin in either a Pitts or an Eagle, you must cut the power! By reducing the power to idle, you minimize the gyroscopic forces acting to raise the nose and hold the aircraft in the stalled condition. I believe the difference lies in the distribution of the weight of the aircraft with respect to a line drawn from the spinner, horizontally down the fuselage and parallel with the wing chord line, to the tail post, when viewing the aircraft from the side.

If you could somehow run a string right down this imaginary line and suspend the aircraft from this axis while the aircraft was supported by this string in the knife edge position, you would find that when the aircraft was released, it would roll upright. I believe this is due to the weight of the landing gear and the overall center of gravity of the pilot's body being below this line. This weight distribution vertically relative to the aircraft's center line is what I believe accounts for the fact that the Pitts and Eagles will spin much flatter, inverted than upright.

In either a Pitts or an Eagle, the nose will come right up to the horizon in the INVERTED flat spin; however, in the UPRIGHT flat spin, the nose will only come up and stabilize at approximately twenty to twenty-five degrees below the horizon. Again, I think that this difference in pitch attitude from inverted to upright is due to the "pendulum" effect described earlier.

Incidentally, you should remember that when performing either upright or inverted flat spins in the Pitts and Eagle aircraft using full power, you must be spinning AGAINST the engine rotation in order for the gyroscopic forces produced by the engine and propeller combination to be able to raise the nose. To further simplify that statement, you could say that you can only do an INVERTED flat spin in these two aircraft with RIGHT RUDDER and you can do an upright flat spin only with LEFT RUDDER! It simply won't work the other way around! If you try to do it the other way, you will find that the gyroscopic forces produced when you increase the power will force the nose down.

OK! Enough details and technicalities for right now. Let's get back to our flight with Bob Herendeen!

By this time Bob and I had really gotten into the flight and were having a great time. The air was smooth and the visibility was great. So, we decided to move on to the upright flat spins. Hey, you know what? We found a little surprise there. Let me tell you about it!

I asked Bob to demonstrate his power-on, hands-on spin recovery from the upright flat spin to the left. After allowing the Pitts to spin upright flat for about a thousand feet, Bob left full power on, applied full right rudder and began to apply a little forward pressure on the stick — sort of "finessing" the aircraft out of the stalled condition. He recovered from the spin, pulled out to level flight and had the aircraft leveled off with a total altitude loss of only 700 feet from the point at which he initiated his recovery. Terrific!

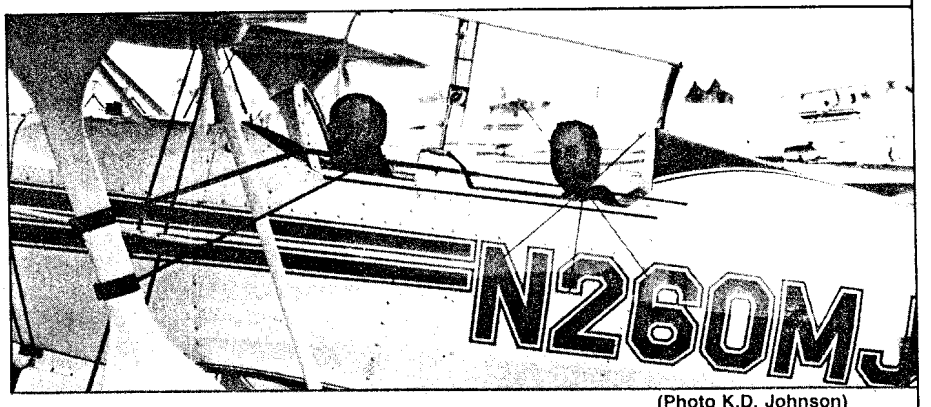
Now, to compare these results with those of the power-off, hands-off, opposite-rudder technique that I usually use, I climbed the Pitts back up to 6,000 feet, initiated an upright flat spin to the left and let it spin for about a thousand feet. OK. Start the recovery about right there, now! Power off, release the stick, full right rudder. The spin slowed and abruptly stopped as the stick snapped to neutral. Now, neutralize the rudders and smoothly pull out of the dive. A glance at the altimeter revealed a 900-foot altitude loss from the point where I initiated recovery. "Son of a gun!" Let's try that again.

We ran through the same scenario several times and, in every case, Bob was able to recover with a 700-foot loss of altitude and I with 900. Now bear in mind that this was only with the UPRIGHT FLAT spins. In the inverted flat spins, I was always able to recover with a 100-foot less altitude loss. Not much difference, huh?

I believe that the reason we were able to recover from the upright flat spin with the power on in 200 feet less, than when using the power-off, hands-off, opposite-rudder method, is due to the "spool up" time of the engine — time it takes for the engine to develop full power about two or three seconds from the time you advance the throttle. Remember that "pendulum" effect I described earlier? Well, that is the reason that you can recover easily from an upright flat spin with the power on, but not so with the inverted flat spin!

Yes, in the hands of an expert such as Bob Herendeen, the Pitts will recover from the UPRIGHT flat spin with the power full on in about 200 feet less altitude than when using the power-off, hands-off, opposite-rudder method of "emergency spin recovery" that I advocate. However, the Pitts will recover from the INVERTED flat spin with less altitude loss using the "emergency" method.

So, what is the point I'm trying to make? Well, first of all, we have found there is no appreciable difference using the new, "emergency" spin recovery in the Pitts or Eagle insofar as altitude loss is concerned. Secondly, everything seems to point to the fact that you just can't beat this new, power-off, hands-off, opposite-rudder method of "emergency" spin recovery if you ever find yourself in trouble with a spin in a Pitts or Eagle aircraft.



(Photo K.D. Johnson)

Who is teaching whom? Gene Beggs, left, and Bob Herendeen get ready to test and re-test their spin theories and techniques.

At a contest, I watched with my heart in my throat as a good friend recovered at a dangerously low altitude from an inadvertent, inverted flat spin, using this method. Thank God, he was knowledgeable and proficient with its use, for had he allowed the aircraft to spin for even another half turn, he would have very possibly struck the ground during the pullout. There was no time for indecision or to try to sort out whether the spin was upright or inverted, flat, normal or whatever.

When you cut the power and release the stick, that eliminates the need to know any of that. And it also prevents the possibility of aggravating the spin with the elevator, ailerons or power. All you need to do at that point is to look straight down the cowling — past

the gas cap, so that you can't possibly be looking behind the spin axis — and apply absolutely FULL rudder against the spin rotation. The spin will slow and then abruptly stop, and you are out of the spin. Neutralize the rudders, take hold of the stick and pull out of the dive.

Some of you are probably getting tired of hearing me talk about spins, but be patient. The whole story hasn't been told yet. The subject is just so deep that it cannot be adequately covered in the space available here. I hope to be able to put it all together in a book soon. We have sure learned a lot about the subject in the past few years.

Anyway, sorry for digressing so far. Now, back to the conclusion of my flight with Bob Herendeen.

After finishing with our spin experiments, I just could not let this golden opportunity go by without asking Bob to demonstrate how he does those beautiful Lomcevaks with which he has thrilled airshow crowds the world over. What a thrill it was to be able to ride through those wild, wonderful gyrations and tumbles with such a master as Bob at the controls.

Upon completion of our flight together and after debriefing on the ground, Bob and I came to the conclusion that we were in complete agreement on every point concerning spins and that we had both arrived at the same conclusions regarding such things as the application of opposite aileron and the application of power and their effects on the spin when attempting to execute inverted flat spins with left rudder etc., etc.

Before closing, I just have to tell you of something that I know will warm your heart. It sure did mine, anyway. While we were all relaxing in the office after the completion of our debriefing, Bob pulls out his pilot logbook and begins making an entry for our flight. He paused, looked up and politely asked, "May I enter this flight as dual instruction? Will you sign my logbook?"

Can you imagine? A pilot of such vast experience, skill and accomplishments asking ANYONE to sign off a session of dual in his pilot logbook? After recovering from the shock and regaining my composure, I proudly entered my signature and CFI number in Bob's logbook. Thank you, Bob. I'm not so sure who the instructor really was up there, but it was indeed a pleasure and an honor to fly with you again.

Perhaps we should all follow the example of aerobatic great Bob Herendeen and remember that we can all learn from each other if we will just ask, watch and listen. Happy landings.

FABRIC PROBLEMS

By Ray Stits
IAC #8284

Until the development and availability of suitable man-made filaments in the '50s, the short service life of organic fibers, cotton and linen, was a major expense in maintaining fabric covered aircraft, especially when stored outside.

With the adaption of polyester to cover aircraft, it is now theoretically possible for the covering to last longer than the metal or wood structure underneath because there is no deterioration with ultraviolet protected polyester fabric. However, many aircraft are still being recovered in three to seven years due to four major problems or mistakes:

#1 is fabric deterioration due to inadequate ultraviolet (UV) protection. Blocking all visible light is the best assurance that all UV radiation is blocked. I have inspected many aircraft just recovered and could count my fingers on the topside of the wing when viewing through an inspection hole from the bottom.

If no UV absorbing additives are included in the finish, transparent coatings allow the fabric to deteriorate to below minimum strength in about five years when stored outside in the Southwestern states.

#2 is cracks and ringworms in a brittle and incompatible coating system which will not stretch with the fabric. Unfortunately, many owners and mechanics try to experiment with a wide variety and combination of automotive and off-the-shelf coatings on the aircraft instead of doing their experimenting on small test panels which are then placed on a 45-degree, south-facing weathering fence or in a laboratory weatherometer.

According to reports I receive from unhappy second and third owners, very seldom do the logbooks indicate the true combination of coatings on the aircraft, and selling the aircraft seems to be the usual method for the experimenters to solve their fabric problems.

Any coating system which will not stretch with the fabric under impact, or flex with bending loads, will crack and sometimes shatter like plaster off a wall.

#3 is poor coating adhesion to the fabric. There have been many cases of poor bonding nitrate dope first coats on polyester, regardless of the trade name or color tint, peeling off and leaving the wing leading edge fabric bare, when flying in a heavy rain storm, and peeling and exposing the fabric, when just sitting tied down in the weather as tension develops with age. There also have been many cases of butyrate dope being mistakenly used as a first coat which peeled off in the slip stream with very little peel resistance after a break in the coating.

#4 is improper fabric tension. Loose fabric, which stretches and balloons between the ribs and expands and wrinkles in cold weather, is the result of improper heat tauting. It is considered to be a workmanship problem. The peak of the tension curve with polyester fabric is 350°F. However, many mechanics try to buck the laws of physics and use an uncalibrated clothing iron, applying an unknown temperature, or use a hot air gun which applies unknown temperature at a wide range throughout the swing. Temperatures above 350°F will start to thermo-soften the filaments and release the tension. There seems to be a very strong aversion for many mechanics with a little fabric covering experience to read a manual and learn new techniques.

Excess fabric tension, which distorts and warps the airframe, can only be caused by many coats of cellulose dope in combination with full heat tauting. It is also a workmanship problem and again indicates a lack of technical knowledge and skill.

And with that statement, I want to clear up any confusion there may be between various types of covering methods. Up to now, I have been writing only about polyester, which is the only aircraft fabric that may be tauted