

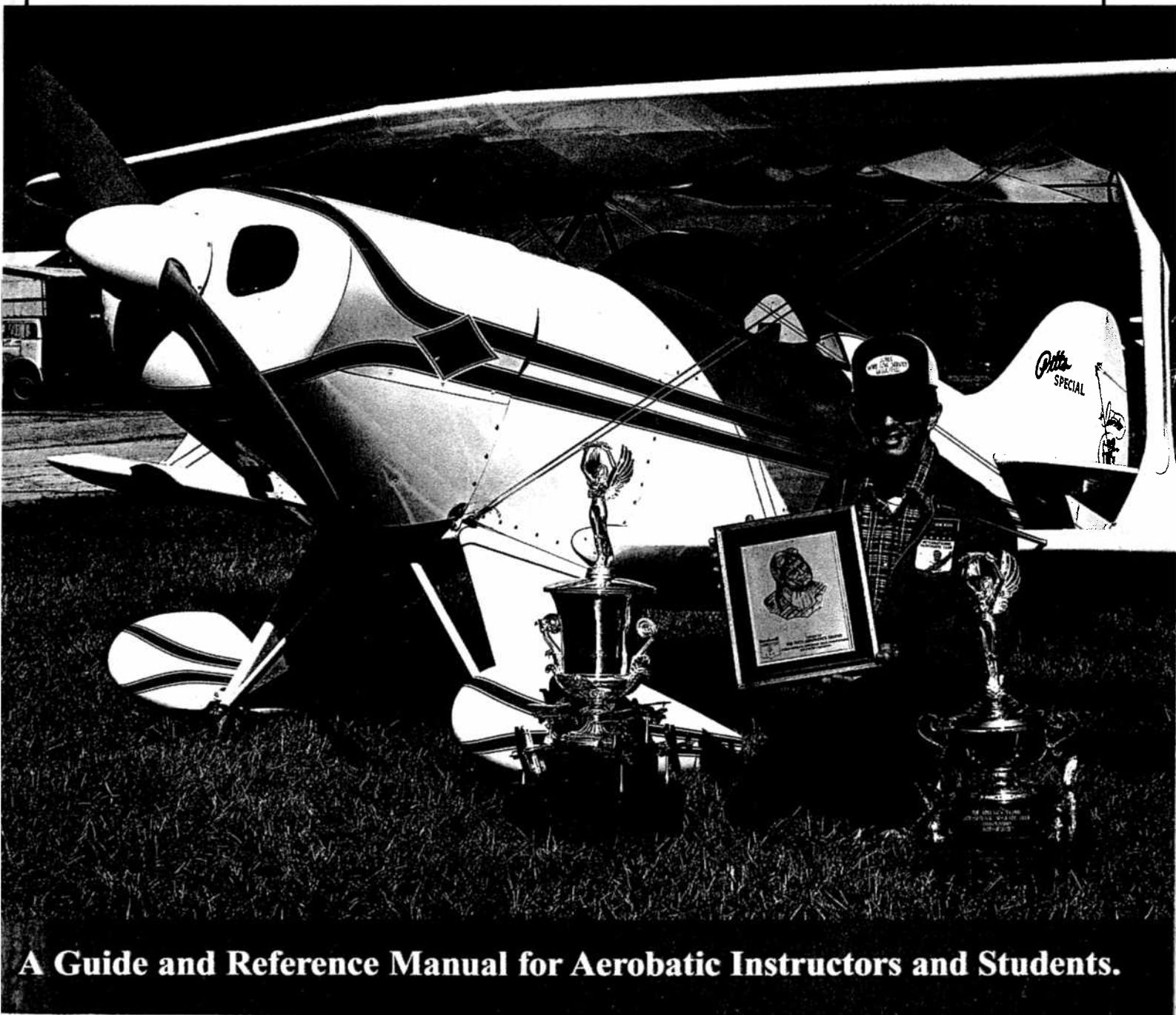
AEROBATICS WITH **BEGGS!**



SPINS

IN THE

PITTS SPECIAL



A Guide and Reference Manual for Aerobatic Instructors and Students.

SPINS

IN THE

PITTS SPECIAL

GENE BEGGS

Please memorize the EMERGENCY SPIN RECOVERY. It could save your life!

This is the most important part of the book; therefore, I will present it at the very beginning.

EMERGENCY SPIN RECOVERY IN THE PITTS

- 1. POWER OFF.**
- 2. REMOVE YOUR HAND FROM THE STICK.**
- 3. APPLY FULL OPPOSITE RUDDER UNTIL ROTATION STOPS.**
- 4. NEUTRALIZE RUDDER AND RECOVER TO LEVEL FLIGHT.**

Memorize and mentally practice this abbreviated version.

Power Off - Hands Off - Full Opposite Rudder

With this method you can quickly and easily recover from any spin in the Pitts Special. It is easy to remember and execute even if you are frightened or confused; furthermore, it is not necessary to know whether the spin is upright or inverted, the recovery is the same in either case.

Flight tests in the Pitts S-2B conducted by Bob Herendeen and myself have proven there is no compromise in altitude loss using the Emergency Spin Recovery compared to the hands-on method. Regardless of the method of recovery, at sea level it will require approximately eight hundred feet minimum to recover and pullout from an upright or inverted flat spin. Remember that this is with an expert at the controls who intentionally initiated the spin and knows exactly how to recover. Altitude loss during recovery and pullout is dependent upon density altitude and the skill of the pilot.

Once you are proficient with the Emergency Spin Recovery, you can perform the first three steps **simultaneously**. That is correct. You can cut the power, release the stick and apply full opposite rudder all at the same time; however, I would recommend that you perform the steps in order during the early stages of training.

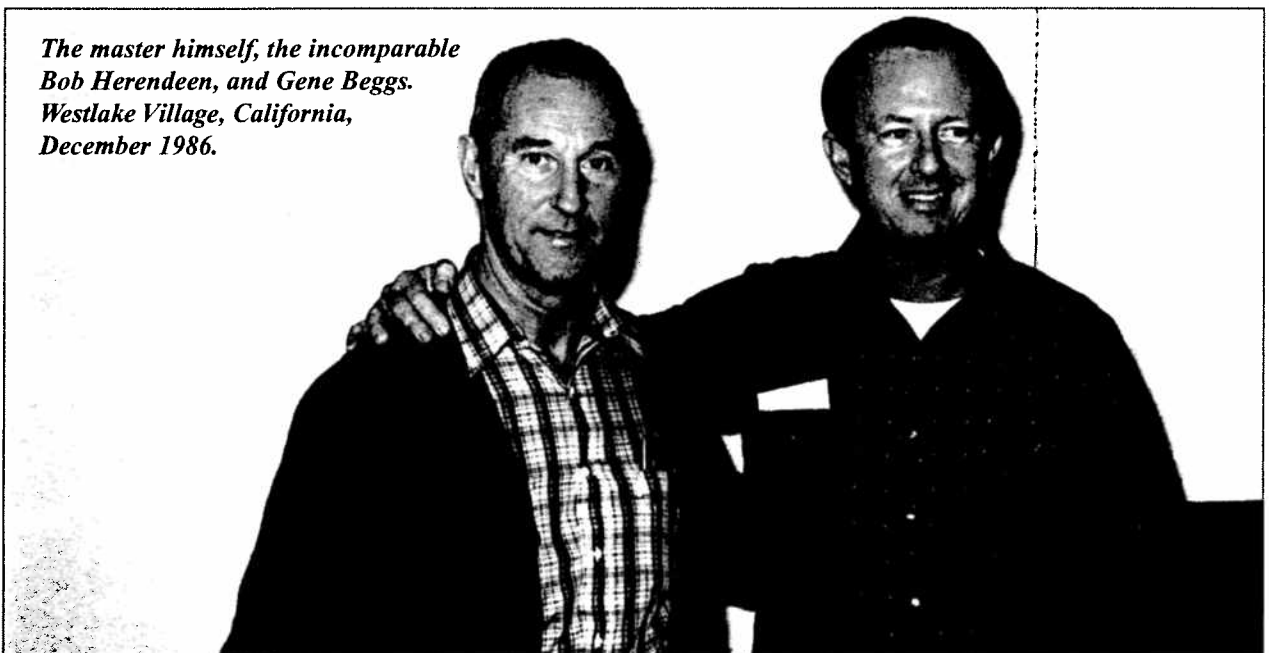
Please read the following two paragraphs very carefully. These are very important points.

- I am not suggesting that we eliminate the hands-on spin recovery. Normally we use this method, especially with the competition type spin. There are times; however, in which the Emergency Spin Recovery should be used. If you ever become confused and must recover from a spin as quickly as possible, revert immediately to the Emergency Spin Recovery.
- With the Emergency Spin Recovery, I am not suggesting that the pilot simply cut the power and turn everything loose, hoping the aircraft will recover on its own. Absolutely, not! The Emergency Spin Recovery definitely requires deliberate action and control input from the pilot.

The most common cause of spin accidents in Pitts Specials is pilot confusion; confusion about whether the spin is upright or inverted and confusion about direction of yaw. This results in erroneous control inputs, often delaying and in some cases preventing recovery. If the pilot is confused and in trouble, there are several significant advantages to using the Emergency Spin Recovery.

- After cutting the power and releasing the stick, the pilot has eliminated any concern about whether the spin is upright or inverted.
- With the hand completely removed from the stick, it is impossible to make an error in control input.
- It is impossible to reverse the spin with rudder.
- It is impossible to transition from upright to inverted or vice versa.
- The Emergency Spin Recovery involves no reference to flight instruments.
- The pilot must decide only whether to use full left rudder or full right rudder.

*The master himself, the incomparable
Bob Herendeen, and Gene Beggs.
Westlake Village, California,
December 1986.*



When trying to determine which rudder pedal to use, these are important points to remember.

- You must look straight ahead down the top of the engine cowling at the ground so you will always see yaw in the correct direction. You should see the fuel filler cap in your field of view.
- The recovery rudder pedal will be displaced closer to you when you take your feet off both pedals. When you push this pedal, it will travel farther and will be harder to push.
- The Pitts Special will not do an inverted flat spin using left rudder. That is correct. The power-on, inverted flat spin must be done with **right** rudder. This is due to gyroscopic forces of the engine and propeller. If you inadvertently wind up in an inverted flat spin, you can be certain it will require **left** rudder to recover.

Note: This applies only to aircraft with engines that rotate clockwise.

Curtis Pitts had an interesting tip after reading the manuscript of this book. These are his exact words and I could not have said it better.

“Gene, I am not very good with words; however, I am sending something that you may use if you like. Here is something I have used for many years with people who have a problem knowing which way they are spinning. Look straight down over the nose and push on the rudder to catch up with the world. If the world is racing away to the left, push on the left rudder.”

Curtis Pitts

Well gang, that about does it for the most important part of the book. Now that we have that behind us, you can stop right here if you wish, but I hope you will continue reading. I would like to tell you in more detail about my experiences during the past thirty years that led to the publication of this book.

As I write this, I am fifty-seven years old. I have over thirty thousand hours in my logbook with twelve thousand six hundred of those hours logged as a flight instructor and pilot examiner. I cannot believe how quickly the last thirty years have passed. What I know I have learned mostly from others. I have learned more about flying from my students than they learned from me. Many of my closest friends are former students.

In this book, you will find no complicated formulas or advanced aeronautical theories. I am not an engineer; I am a pilot. During my years of instructing and flying aerobatics I have learned some things I think are worth passing on to others. So, grab your chute, climb aboard and buckle up! Let's go for a spin in the Pitts Special!

MY INTRODUCTION TO THE PITTS SPECIAL

My first glimpse of a Pitts Special was in June 1970 at the Ector County Airport in Odessa, Texas. I had no idea what an impact that little biplane would have on my life. At that time I was twenty-six years old with about three hundred fifty hours and had just started instructing for Vroman Aviation at the Midland Odessa Regional Air Terminal. The newly formed International Aerobatic Club (IAC) and local chapter of the Experimental Aircraft Association (EAA) were sponsoring an aerobatic contest in conjunction with an air show.

Aircraft entered in the contest included a Taylorcraft, a modified Chipmunk, a Citabria and a Cessna Aerobat, but the aircraft that absolutely mesmerized me was a beautiful red Pitts Special S-1S owned by Casey Kay. Fascinated by the looks, sound and performance, I knew immediately I had to have one.

There was no way I could afford a Pitts on my salary, but being a life long model airplane builder, I knew I could build one. I ordered the plans from Curtis Pitts and set out to build my first airplane. I attended many air shows, witnessing the performances of Bob Herendeen, Art Scholl, Charlie Hillard, Gene Soucy and Tom Poberezny, dreaming of the day when I would fly my own Pitts Special.

My work and pursuit of my pilot ratings occupied most of my time during the next two years. I had to content myself with studying the plans for the Pitts. I did not begin building until 1972 when I laid out the fuselage jig in my one-car garage. Construction of my aircraft took five years. The first flight was July 1, 1977.



Pitts Special S1-S, N63CK owned by Conrad M. "Casey" Kay. Ector County Airport, Odessa, Texas June 1970. This was the first Pitts Special I had ever seen. It was love at first sight. Curtis Pitts built this aircraft in Homestead, Florida. It is powered by a 180 Lycoming!



*L to R, Casey Kay and Charlie Freeman.
Hartlee Field, Texas, summer of 1978.
Now here are a couple of characters for you!*

The year I got serious about aerobatic competition was 1975. I bought a new Decathlon and flew it in the Sportsman Category in 1975 and 1976. After completing my Pitts, I began flying Intermediate Category in that aircraft.

From my earliest association with aerobatics, I had heard pilots talking about the danger of spins in Pitts Specials. Flat spins! Mysterious spins in which experienced pilots had spun in or bailed out after losing control.

There were many theories about the cause of these accidents. Some felt it was weight and center of gravity related. Others believed there were design flaws in the aircraft. Still others suggested there were spin modes that were unrecoverable. Everyone seemed to have a different opinion. One thing for sure, many very experienced pilots had trouble with spins in Pitts Specials. It seemed every time you picked up a magazine there was another tragedy reported.

Not wishing to become a statistic myself, I listened intently. I was not afraid of spins, but very respectful of them. I learned to fly in a Taylorcraft BC12D. Spins were introduced in the early stages of my training. Before solo, I was required to demonstrate one turn spins in each direction.



*Gene Beggs and 1970 Cessna Aerobat N8406M. Ector County Airport, Odessa, Texas, June 1970. First contest!
Finished fourth out of five entrants in Sportsman Category. Look out world! The next champion is on his way.*

FIRST SCARE IN THE PITTS

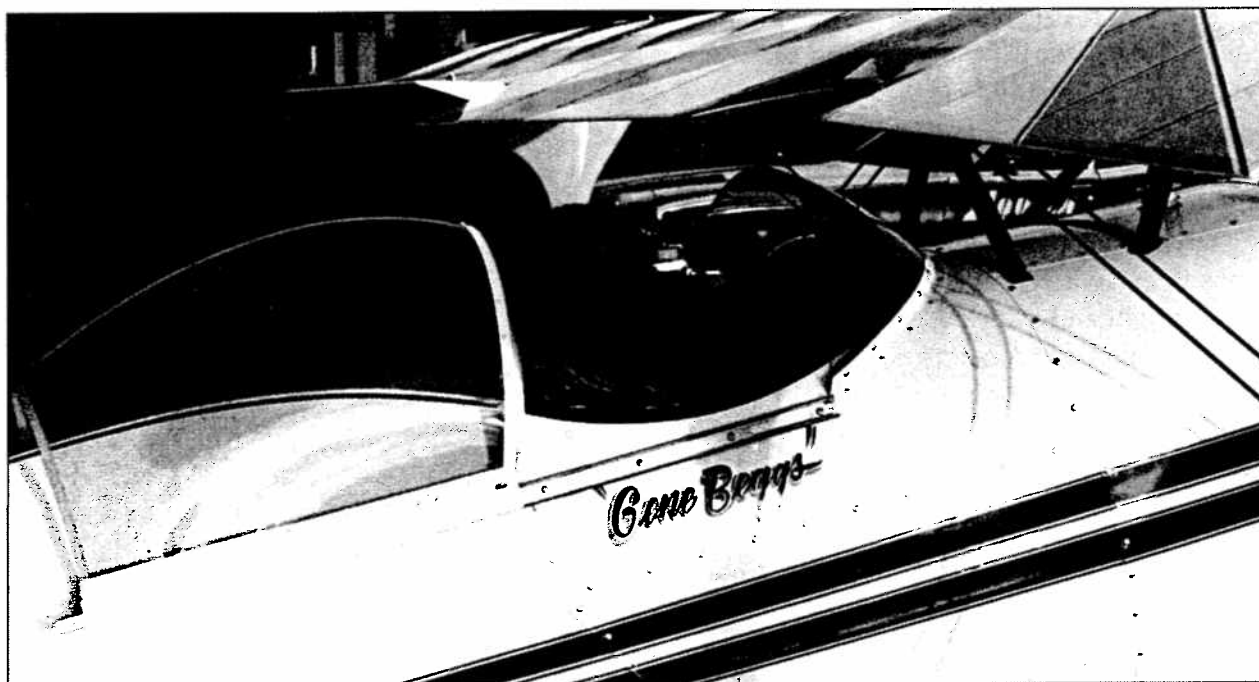
My aircraft, being experimental-amateur built, required fifty hours of test flights in a designated area. When the following incident occurred, I had completed about forty of those hours and was practicing one evening shortly before sundown. Having complete confidence in the aircraft and becoming more confident each day in my own skills I was sure I was well on my way to becoming the next National Aerobatic Champion.

Having performed all Advanced Category maneuvers including upright and inverted spins, I never encountered the slightest problem. I was beginning to wonder what all the fuss was about with the Pitts Special. The aircraft was so easy to fly and performed all maneuvers so effortlessly, the controls were light and responsive and it was a dream to fly.

It was getting late and I knew I had to return to the airport soon since I had no position lights; however, I just could not resist the urge to pull up for one last maneuver. I had been practicing torque rolls. Lowering the nose slightly, I increased airspeed to about 180 mph and pulled up to vertical.

Applying full left aileron and pressing lightly on the left rudder pedal, I climbed straight up, rolling rapidly to the left. As the airspeed dropped to zero, the engine torque took over and the aircraft began backing up, rolling slowly to the left. It was a good torque roll and I must have gotten two turns sliding backwards. The aircraft swapped ends rather violently and immediately entered a spin to the left. I thought, "Okay, that's cool. I'll let it spin a couple of turns before I recover."

When I initiated my recovery, the aircraft would not stop spinning! The harder I shoved the stick forward, the faster it spun. I felt the stick hit the forward stop and it still would not recover. My heart jumped into my throat as my adrenaline surged! I was out of control!



First flight of my homebuilt Pitts Special S1-S, N16GB. Midland Regional Airport Midland, Texas. July 1, 1977. "Sure I can fly it! No problem."

Thoughts began racing through my head, “What is wrong with this thing? Could I possibly be out of CG? Maybe the aircraft was damaged in the torque roll. Maybe I made an error in rigging. Have I simply encountered an unrecoverable spin? I have never had a problem before. I have spent five years building this terrific aircraft and now I may have to bail out of it!”

Regaining control of my thought processes, I said to myself, “Okay don’t panic. You still have twenty-five hundred feet of altitude. Make every effort to recover. If you cannot recover by fifteen hundred feet, bail out! Everyone has always agreed the most important thing is to **get the power off!**”

Reaching for the throttle, I yanked it back hard against the stop and was surprised to find I had not completely cut the power when I fell out of the torque roll. The throttle lever came back about an inch and the nose of the aircraft dropped slightly.

Completely releasing the controls, I said to myself, “Be absolutely certain which way you are spinning. Okay, I am sure I am spinning upright to the left, in which case, the proper recovery is to apply full right rudder, followed by nose down elevator.”

Shoving the right rudder pedal to the firewall, I followed with full nose down elevator. After one additional turn, which seemed like an eternity, the aircraft pitched nose down and stopped spinning. I neutralized the rudder and pulled out to level flight, surprised to find myself at a dangerously low altitude. Taking several deep breaths to calm myself I returned to the airport, touching down just as the sun slipped below the horizon.

Sliding the canopy back, I taxied toward the open doors of the hangar and pulled the mixture to idle cutoff. I sat there in silence for several minutes, thankful to be alive, thankful my aircraft was still in one piece. Questions raced through my mind, “What happened? Could it possibly be that the power I inadvertently left on was responsible?”

After an almost sleepless night, I was back at the airport early next morning, determined to find the cause of the incident. Weight and balance figures showed I was well within limits. All control surface deflections were normal. Wing rigging was correct. I could find absolutely nothing wrong with the aircraft.

Continuing with the test flights, I climbed to a higher altitude, performing spins in each direction, both upright and inverted. I experienced no problems and assumed the entire incident was caused by my failure to completely cut the power when I fell out of the torque roll. If only I had known that day what I learned about spins during the next five years. The recovery would have been so simple.



“Okay, I got it off the ground, now how do I land this thing?”

WHAT HAPPENED?

WHAT WAS THE REAL EXPLANATION?

First, let me assure you, the Pitts was behaving in a perfectly normal manner. There was nothing wrong with the aircraft. It would be several years before I would completely understand what happened that day. What I had encountered accidentally was an upright flat spin to the left. Gyroscopic forces of the engine and propeller were raising the nose, increasing the angle of attack and keeping the aircraft in the spin.

At that time, I mistakenly believed, like so many others, that the most important thing in spin recovery was nose down elevator to break the stall. I did not understand the importance of first applying full opposite rudder. I had also stumbled into my first experience with the accelerated spin. When I tried to recover from the spin described above, I failed to apply full opposite rudder before pushing the stick forward. When I applied nose down elevator, I accelerated the rotation.

The remaining test flights were uneventful and I received my endorsement from the FAA, releasing the aircraft from the test area.

INTERMEDIATE COMPETITION IN THE PITTS

Competing in the Intermediate Category, I flew two contests in 1977. I did not finish well. The Pitts was way ahead of me. After several months of practice, I was much better prepared and in 1978, I redeemed myself nicely by winning the Aerobatic Club of America (ACA) title, becoming the Intermediate National Champion. I had no problems in 1978. The scare I experienced earlier had faded from memory and I was looking forward to moving up to the Advanced Category in 1979.

ADVANCED COMPETITION

One of my most successful years in competition was 1979. Competing in the Advanced Category, I won both the IAC Championship at Fond du Lac, Wisconsin and the ACA Championship at Sherman, Texas. I was looking forward to moving up to the Unlimited Category in 1980, the year in which I experienced my second narrow escape with a potentially deadly inadvertent spin!

SECOND CLOSE CALL IN THE PITTS

The Advanced and Unlimited Categories are flown at relatively low altitudes. The floor of the Unlimited box is only one hundred meters above ground level. Practicing for the upcoming season, I was working much lower than in the past. I had a maneuver that began inverted with a push-up to vertical, a roll on the up-line, followed by a hammerhead turn.

Pushing up to vertical from what proved to be a little too low an airspeed, I attempted the vertical roll. I knew immediately the aircraft was not going to make it through the maneuver. I abandoned the roll on the up-line and tried to recover; however, I had waited a little too long. The Pitts swapped ends and immediately began spinning to the left. At first, I thought I had entered an upright spin to the left. Wrong! It was an inverted, right rudder spin, in which the roll was to the left.

Looking down at the ground, I observed a left rotation. I instinctively applied right rudder and shoved the stick forward and much to my surprise, the aircraft kept right on spinning! There was no altitude to spare. I could not afford to make a mistake. I had to make the right decision and take corrective action immediately or I was dead! I am very thankful I had two years experience in the aircraft when this incident occurred. If it had happened during my first year, I shudder to think what could have happened.

At that time, I had some experience with outside snap rolls. I knew that with a negative angle of attack, yaw and roll are in opposite directions. If you push the stick forward and apply full right rudder, you will snap roll to the left. I had not intentionally initiated this spin. I had already tried to recover with right rudder and forward stick. Since that had not worked, it could only mean I had entered an inverted right rudder spin. If this were the case, the proper recovery would be to apply full left rudder and pull the stick back!

Although it was completely contrary to what my instincts were telling me to do, I gritted my teeth, applied full left rudder and pulled the stick back! The aircraft stopped spinning almost immediately. Beginning the pullout, I applied full power, hoping and praying I had enough altitude to recover. Obviously, I made it. How low was I? Well, let's just say I got a good look at the cross members on the utility poles!

That was my first encounter with mistaking an inverted spin for an upright spin and getting caught in the dangerous trap of looking up through the canopy at the ground instead of straight ahead over the nose. Later, you will understand why this is the deadliest of traps for the novice!

FIRST YEAR UNLIMITED COMPETITION

When I began flying aerobatics back in 1970, I had no idea I would ever compete in the Unlimited Category. I knew I could fly Sportsman and thought I might fly Intermediate someday, but the Advanced and Unlimited Categories were far beyond my wildest dreams. My first year in Unlimited was rather uneventful with the exception of the previously described spin incident. My stock 180 horsepower aircraft had plenty of performance and I came to appreciate what a fine machine it was.

Progressing through the IAC categories, I found the transitions quite manageable; however, when I began flying Unlimited, I felt as if I had skipped a category, advancing two steps in one year! Though I did not place well in 1980, I was not discouraged. I had proven to myself that I could fly Unlimited. With a few more months of training, I felt I could qualify for the United States Aerobatic Team in 1981.

1981 A BREAKTHROUGH YEAR FOR SPIN RECOVERY

Throughout my flying career, I have always taken a special interest in anything involving spins and spin recoveries. I guess you could say it has been a passion. During my years of competition, spin accidents continued at an alarming rate. The aircraft involved were often Pitts Specials. The accidents were not the stall-spin-turning-base-to-final type; they were spins entered accidentally while performing aerobatic maneuvers. Many very experienced pilots were losing control and spinning in from altitudes in which there was plenty of room to recover. What was happening? Why were they unable to recover?

- Were they simply disoriented, trying desperately to recover from what they thought was an upright spin when in fact they had transitioned to an inverted spin?
- Did they forget to reduce power to idle?
- Maybe the pilot was cross-controlling with opposite aileron, thereby flattening the spin or looking up through the canopy behind the spin axis and misinterpreting the direction of yaw.
- Maybe a rudder pedal became jammed behind a cross-member or other structure preventing the pilot from obtaining opposite rudder.
- Maybe the pilot failed to release backpressure, reversing the spin with rudder.
- Maybe a seat belt or parachute locked up the stick in the unoccupied cockpit.
- Maybe a tool or other loose object blocked a flight control in the wing or fuselage.
- Is it possible the throttle linkage failed, leaving the engine at full power?
- Perhaps the pilot was applying the correct control inputs, but not holding them long enough before trying something else.
- Could it be the passenger in the second cockpit froze on the stick or rudder making it impossible for the pilot in command to recover?

Surely, all of these things have caused accidents. It is sometimes impossible to determine exactly what happened. Some form of pilot error causes most spin accidents. Some unexplained accidents involving very experienced pilots were likely caused by control blockages. If the rudder pedal, with which you initiate a snap or spin, jams in the fully deflected position, it will be impossible to recover! It will also be impossible to recover if the elevator locks in the full up or down position. The pilot in command cannot be too careful to insure that the aircraft is free of loose objects and that there is no way a flight control could become jammed.

A PRICELESS BIT OF INFORMATION IS DISCOVERED

Swiss Aerobatic Champion, Eric Mueller, published a short article in *Sport Aerobatics* in November 1981 entitled, *The Spin-Myth and Reality*. In the article he described an unusual method of spin recovery in which he closed the throttle, removed his hand from the stick, letting it find its own position, recovering only with full opposite rudder.

He went on to say, "I have found this to be the most reliable method of recovery if I am the least bit confused." He further stated, "The pilot need not know whether the spin is upright or inverted, the recovery is the same in either case."

These words immediately commanded my full attention, but I was very skeptical. I thought, "Hey, I don't think he has tried that in an inverted flat spin in a Pitts. There is no way that will work!"

The suggestion to let go of the stick seemed absurd! I was thinking, "If I let go of the stick, will it not be held forward or aft, preventing recovery? How can the stall be broken if I do not apply nose down elevator?" It just did not make any sense at all. I could not see how the stick could move by itself. Although very skeptical, I thought, "Hey Beggs, remember, this man is a very experienced world class competitor, several times Swiss National Champion. Although he does not mention the Pitts specifically, he does state that he has included a variety of aircraft in his testing. Maybe I better look into this a little further."

Before I continue, let me remind you that at that time I was not a beginner. I had logged over twelve thousand hours, primarily as a flight instructor flying small airplanes on a daily basis. I was an experienced aerobatic competitor who had just completed his seventh year of competition, including two years in the Unlimited Category. I had logged about five hundred hours in various aerobatic aircraft such as the Aerobat, Citabria, Decathlon and Taylorcraft and I had over six hundred hours in the Pitts S-1S. I figured there was not much I did not know about aerobatics and spins. Wrong! I had never heard of this method of spin recovery. It proved to be one of the most important things I would ever learn.

FLIGHT TESTING ERIC MUELLER'S THEORIES

Many experienced pilots will casually dismiss an article about spins, thinking they already know it all. That is probably the reason most readers overlooked Eric Mueller's article. He did not have a good command of the English language in those days and he communicated with the help of his friend, Annette Carson, who translated the article from German.

Evidently, I was the only reader that took Eric Mueller's article seriously. If you ask, "Why did you take such notice when others dismissed it as trivia?" the only explanation I can offer is, "I was looking for it!" Unaware of exactly **what** I was looking for or **where** I would find it, I was looking for answers. I was determined to find a solution to the spin problem that had plagued our sport for years. Realizing that if this would work in the Pitts, it just might be that I had found the final piece of the puzzle and the answer to my prayers, but it just seemed too good to be true. I had some investigating to do immediately! I began by calling upon some of the most respected names in the sport, asking if they had heard of this hands-off spin recovery. I could find no one who had heard of it or read the article.

Determined to prove for myself whether the hands-off spin recovery would work in the Pitts, I rolled out my S-1S, checked my parachute and departed for the practice area. I had performed flat spins many times before and was confident that if the hands-off recovery failed to work, I could still recover, but just to be on the safe side, I climbed a little higher than usual before beginning.

Rolling inverted, I reduced power to idle and applied forward pressure on the stick to hold altitude. As the stall broke, I pushed the stick full forward and applied full right rudder. The aircraft entered an inverted, right rudder spin. After approximately one turn, I applied full right aileron and full throttle. The Pitts quickly wrapped up into a full-blown, inverted flat spin. Once the spin stabilized, I did exactly as Eric Mueller suggested. I cut the power to idle, removed my hand from the stick and applied full left rudder. What happened next could only be described as incredible!

After one additional turn, the nose of the aircraft pitched down, the spin stopped abruptly and the stick snapped to neutral. Surprised by the sudden recovery, I released the rudder and pulled out to level flight, shouting with excitement! It was the most amazing discovery of my flying career! I had never recovered from a spin in this manner. Why did it take thirteen years to discover this? Why was this not common knowledge long ago? It was so simple! The reaction of my students when they first experience this method of spin recovery has always fascinated me. Peter Garrison described the experience as “electrifying.”

Climbing back to altitude, I could not wait to try it again! I was thinking, “That is the most amazing thing I have ever seen!” I must have performed a dozen flat spins that afternoon, both upright and inverted. The Pitts always recovered beautifully. Since that day, I have referred to the procedure as THE EMERGENCY SPIN RECOVERY.

At the time, I regarded the discovery as something new; however, I later learned it was not new at all. The hands-off opposite rudder method of spin recovery was first used back in 1912 by Lt. Wilfred Parke, of the British Royal Navy who made history by recording the first recovery from an accidental spin in an Avro biplane. The incident became known as “Parke’s Dive” and is included in Annette Carson’s book, *Flight Fantastic*, published by J. H. Haynes & Co. Ltd. ISBN 0 85429 490 2.

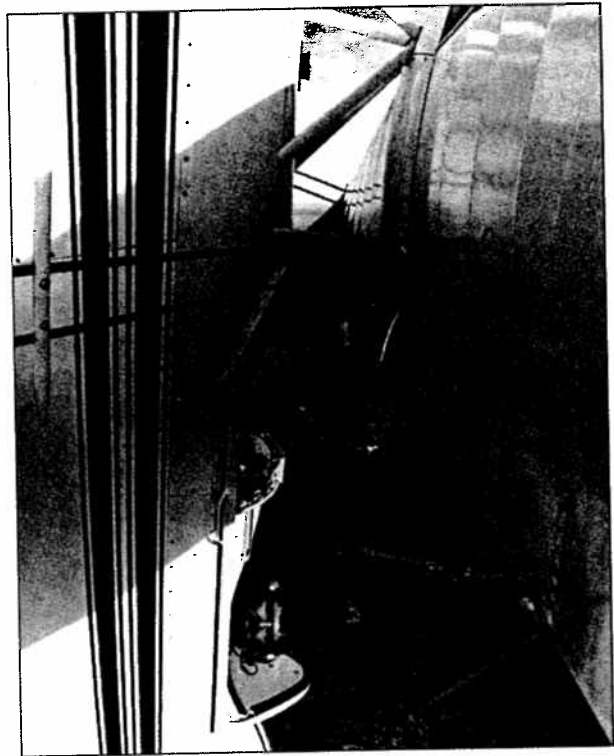


My new Model “T”, N49307. October 1981.

DEVELOPMENT OF THE ADVANCED SPIN TRAINING COURSE

After discovering the Emergency Spin Recovery, I continued testing other aircraft. I had recently taken delivery of a new Pitts S-1T. My friend and former student, Kirk Fulton volunteered the use of his Pitts S-2S. I conducted a very thorough series of spin tests in the Pitts models S-1S, S-1T and S-2S. The Emergency Spin Recovery worked beautifully in all three aircraft.

After purchasing a new Pitts S-2A, I began teaching aerobatics and developing the syllabus for my Advanced Spin Training course. Among my students were pilots with experience levels ranging from complete beginner to Advanced and Unlimited competitors. If the course had any shortcomings, this test period would certainly reveal them. After more than a year of refinement, I was certain it was time to go public with my work and write my first article for the IAC magazine, *Sport Aerobatics*.



Gene Beggs and Kirk Fulton, "going vertical" over the oil fields of West Texas.

My first spin article, *Out Spinning with Gene Beggs* appeared in the February 1984 issue. To say, the article stirred up a hornet's nest would be an understatement. All Hell broke loose! Letters to the editor began arriving in great numbers. Many thought I was crazy. Most comments went something like this.

- "That won't work! That's not the way to recover from a flat spin!"
- "The last thing a pilot wants to do is turn loose of the stick!"
- "That guy is over-simplifying things and is going to get a lot of people killed!"
- "That might work in those little things he flies, but it won't work in my _____!"
- "Boy, that guy has really got his neck stuck out with what he is saying!"
- "Have you really tested all of this out or is it mostly theory?"
- "Have you checked your weight and balance? Have you tried that with two people onboard?"
- "Have you really tried that in an inverted flat spin?"
- "Okay, let's assume this works like you say, but how much more altitude does it take versus the hands-on recovery?"
- "Are you just saying, 'Cut the power and turn everything loose?' Hey, I have known that for years."

The controversy raged on. The aerobatic community was divided into two camps: those who thought I was crazy and those who thought I was a hero. Writing several follow-up articles to answer questions, I patiently continued teaching my course, one student at a time, trying to be as understanding as possible with my critics. I expected criticism. Sure enough, I got it! What I was teaching went against several decades of accepted wisdom and established tradition.

The years 1982 through 1986 were the most interesting and rewarding of my flying career. At last count, I had graduated 129 pilots from my Advanced Spin Training Course. Among my graduates are some very accomplished and famous individuals. I will not publish their names here, but I think you would be impressed by those who took the time to fly with me.

QUALIFICATION FOR THE U.S. AEROBATIC TEAM

The U.S. Aerobatic Championships were held at Falcon Field, Mesa, Arizona, in September 1983. I qualified for my first position on the United States Aerobatic Team. It was a dream come true. My aircraft was a stock Pitts S-1T. I will always be grateful for the privilege of serving on that team. The World Aerobatic Championships were held in Bekescaba, Hungary in 1984.

Qualifying again for the U.S. Team in September 1985 at Sherman, Texas, I flew in the 1986 World Championships at South Cerney, England. The credibility earned in these events helped promote my spin-training program and brought many students from around the world.



Two of my dearest friends and teammates, Julie Pfile, and Bill McIntyre, center. Falcon Field, Mesa, Arizona. September 1983.

We had just learned, moments before this photo that Julie and I had both qualified for the United States Aerobatic team. Hurray! We made it!

Bill McIntyre is the best aerobatic coach in the World, and played a big part in my success as an aerobatic competitor.

My family and I regard Julie Pfile as one of our own.

TRANSITION TO THE AIRLINES

For sixteen years, I earned my living as a flight instructor, flying small aircraft on a daily basis. I operated my own flight school and aircraft dealership for thirteen years at Midland International Airport, Midland, Texas. Throughout the seventies, the small aircraft industry was prosperous; however, the eighties ushered in a new era. Product liability lawsuits were bringing the industry to its knees. Prices were escalating at unprecedented rates and I did not see a bright future for General Aviation. My concerns proved valid and if not for my aerobatic and spin training work, I would have had difficulty making a living during the early eighties.

Fortunately, for my family and me, as General Aviation was declining, deregulation was bringing new opportunities in the airline industry. Southwest Airlines at Love Field in Dallas, Texas, was hiring pilots to fly their Boeing 737's. Among my students were several Southwest pilots who encouraged me to obtain a type rating and go to work for the airline. The more I thought about it, the better it looked and I started class at Southwest in January 1986. I am presently in my sixteenth year with the company.

Southwest took a favorable view of my aerobatic activities and granted me a leave of absence to compete in the World Aerobatic Championships in South Cerney, England.

After returning from England, I was somewhat depressed. At the time, I did not understand exactly what was wrong. Of course, now I understand perfectly. Subconsciously I knew my days of aerobatic competition were over. It was obvious the two hundred horsepower biplane could no longer compete at the world level against three hundred horsepower monoplanes. The super performance of the powerful monoplanes



Captain Leon Boyd, Southwest Airlines, Dallas, Texas



Gene Beggs and Leon Boyd strapping into the Pitts for another acro session. The Erdmann's chipmunk, "Chippy" in the background.



One of our loveliest students, U.S. Airways Captain Jill Butterworth. "Yes Jill, the wind does blow in West Texas."

had outclassed my stock Pitts S-1T. I knew I could not afford the type of aircraft necessary to compete in the future. I also had a new career that demanded my attention, so I walked away from aerobatics after 1986 and seldom looked back.

Returning home to Odessa, Texas, I pushed the Pitts into the hangar and locked the door. There it remains today. I have always said, "I ran out of time, money and enthusiasm simultaneously." Weary of world class competition and the demands of my flight school and spin-training program, I was simply burned out. During the years that followed, I occasionally heard from friends about what was going on in the world of aerobatics, but for the most part, I was completely out of touch.

Turning all of my attention to family and career, I thought I was finished with aerobatics and spin work. Through test flying, teaching and writing for *Sport Aerobatics*, I felt I had put something back into the organization and sport that had given so much to me. I could devote no more time to spin work. I knew I should assemble my experiences and writings into a book, but I put it out of mind thinking, "If anyone is interested, they can obtain copies of my articles from EAA headquarters in Oshkosh. I have done my duty and passed on to others what I have learned." I let my EAA and IAC memberships expire and settled down to life as an airline pilot.

NEW FACES IN AEROBATICS

As time passed, new people came into the sport. Most of those that I knew had moved on to other interests. I recognized few names when I glanced at a copy of *Sport Aerobatics*.

Arriving home from an airline trip one day, I was pleased to find a message from my friend, K. D. Johnson. We have known each other since meeting at Fond du Lac, Wisconsin in 1977. At that time, K. D. was a Pitts dealer. He operated a flying service at Santa Paula, California called, "The Pitts Stop." He was very active in aerobatics during the years in which I competed and accompanied the U.S. Aerobatic Team to Hungary in 1984 as a member of the ground support team.

Back in 1986, K. D. invited me to Santa Paula to train him and his instructors in my Advanced Spin Course. It proved to be a most interesting and memorable experience. An article about the trip appeared in the December 1986



The United States Aerobatic Team 1984. Falcon Field. Mesa, Arizona. L to R standing: Gene Beggs, Harold Chappell, Henry Haigh, Kermit Weeks and Alan Bush. L to R kneeling: Debby Rihn, Brigitte de Saint Phalle, Julie Pfile and Linda Myers.

issue of *Sport Aerobics*. It was during that week that Bob Herendeen and I conducted the altitude tests comparing the hands-on spin recovery to the Emergency Spin Recovery.

When I returned K. D.'s call, he asked, "Gene, are you aware of what is happening recently in the world of aerobics?" I responded, "No, I have been completely out of touch." He continued, "Well, we have a new group of people in aerobics today who seem to be repeating history with all the spin accidents that are occurring. These newcomers have not had the benefit of reading your spin articles. Let me send you some writing that has appeared recently in *Sport Aerobics*. See what you think."

After reading the articles and speaking with several people involved with IAC, I agreed there were some alarming trends developing. My work was obviously far from finished. It was time to get involved again and begin writing this book. I hope you find it helpful and enjoy reading it.



*The 1986 United States Aerobic Team. Sherman, Texas.
L to R, Harold Chappell, Clint McHenry, Kermit Weeks, Henry Haigh and Gene Beggs.*



*United States Aerobic
Team 1986.
Sherman, Texas.
L to R, Linda Myers,
Debby Rihn,
Patty Wagstaff and
Julie Pfile.*

GENE BEGGS'

ADVANCED SPIN TRAINING COURSE

WARNING

The following course syllabus was developed and used for several years in teaching advanced spins in the Pitts S-2A and S-2B. It is not a basic spin course! It contains advanced maneuvers that can be very dangerous if attempted by the novice. Dual instruction from a qualified aerobatic instructor should be considered mandatory!

This book and course syllabus is provided for reference only. I do not franchise, endorse or recommend any aerobatic school or instructor, as I have no control over what they teach.

For a listing of aerobatic schools and instructors, contact the

International Aerobatic Club

P. O. Box 3086

Oshkosh, WI 54903-3086

920/426-6574

FAX 920/426-6560

OBJECTIVES

This course will familiarize you with all spin characteristics of the Pitts Special. Upon completion, you will be able to recover from any spin including upright and inverted flat spins using the Emergency Spin Recovery. If you have not received basic aerobatics and basic spin training, you should do so before beginning this course.

CONTENT

- Normal spins upright and inverted.
- Emergency spin recovery.
- Accelerated spins upright and inverted.
- Flat spins upright and inverted.
- Spin reversal.
- Transition spins.
- Spin prevention.
- Visual references.

AIRCRAFT USED IN THE COURSE

We will use either the Pitts S-2A or S-2B. Both aircraft have identical spin characteristics. If you will be flying a single place Pitts model S-1S, S-1T or S-2S upon completion, I assure you, everything will work the same in those aircraft.

TIME REQUIRED TO COMPLETE COURSE

Each of the five lessons is a block of learning. There is no specific time requirement. Most pilots will complete each lesson in approximately one hour. Pre and post flight briefings take approximately thirty minutes per lesson.

WEIGHT AND BALANCE

Considering the emphasis placed on this subject by some, my comments will probably surprise you. Many pilots have blamed all sorts of problems on weight and center of gravity when in fact those problems were caused by misunderstanding and pilot error. I am not saying you can disregard weight and balance, if you are flying a FAA certificated aircraft with a standard airworthiness certificate, you must adhere to the limitations in the operating handbook.

Using experimental aircraft, I have done inverted and upright flat spins with centers of gravity that were considerably aft of the recommended limit, never having a problem with recovery. If you inadvertently exceed weight and balance limits slightly in your Pitts Special, I assure you, it will not suddenly become uncontrollable. If you and your passenger can comfortably get into the aircraft and move all controls to the stops without difficulty, you need not worry about spin recovery.

PREFLIGHT PREPARATION

Before each flight, we will discuss the content of the lesson. You will always know what to expect. It is perfectly normal to feel some apprehension and discomfort at first, so we will take it slow and easy, progressing at a pace that is comfortable for you.

Before each flight, remove all loose objects from your pockets, such as coins, knives, pens, etc. Anything that gets loose in the aircraft is very dangerous! It will inevitably find its way into the tail-cone and could jam the elevator controls. Inspect the aircraft carefully, paying particular attention to the tail-cone. You cannot be too careful about keeping the aircraft free of loose objects!

If you are flying solo in a two place aircraft, be very careful to secure the seatbelts and parachute in the unoccupied cockpit. Before stepping into the cockpit, brush off the bottom of your shoes. You would be amazed at the dirt and gravel that is kept out with this habit.

Inspect the area around the rudder pedals carefully. Many pilots pay little or no attention to this critical and dangerous area. Move both pedals to the stop. Make certain there is no chance of a pedal becoming jammed in the fully deflected position behind a structural member or other obstruction. Rudder cables stretch and tubes bend. Consider what could happen if the pedal moved an inch farther, falling out of a tail-slide. If you do a snap roll or spin and the rudder pedal locks in the fully deflected position, it will be impossible to recover!

Be sure your parachute fits properly and that you are familiar with the location and operation of the ripcord handle. Know how to jettison the canopy and exit the aircraft should an emergency arise. Be sure, you can reach the rudder pedals and that you are seated in the aircraft in such a way that your visibility is unrestricted. If necessary, use firm seat cushions to adjust seating position. It is very important to be as comfortable as possible.

Seat cushions should be firm and must not compress or your lap belt will loosen. The main lap belt and crotch strap should be as tight as you can get them. The shoulder harness should only be snug. The secondary belt should cover the main belt in such a way that you cannot accidentally release your main harness. Position the buckle of the secondary belt to the left side, off center, with the latch opening in the opposite direction from the main harness. In this way, you are unlikely to release your main belt with your sleeve or the stick. Never wear a loose fitting watchband or bracelet.

As you taxi for takeoff, remember that forward visibility is limited. Taxi slowly and S-turn constantly. Stay alert for anything that might be in your path. Just before taking the runway for takeoff, make one last check to be certain the **canopy is locked!**

After takeoff, climb to approximately five thousand feet above ground level. Make climbing turns as you depart the airport traffic area. Level off and adjust pitch trim. Lean the mixture, making certain it is on the rich side and adjust cowl flaps to keep cylinder head temperature within limits. Make one last check of your harness and engine instruments and clear the area for traffic.

LESSON ONE

Before moving on to advanced spins, we will review the four normal spins to insure there are no problems with your entries and recoveries. This lesson will also include an upright flat spin, recovering with the Emergency Spin Recovery.

NORMAL SPINS

The normal spin is the only type required in competition. To enter, reduce power to idle. Apply nose-up elevator as airspeed decreases. Steadily increase the rate of stick movement to prevent altitude loss. When the stall breaks, apply full nose-up elevator, followed by full rudder. Leave the power off, use no aileron and hold the stick full aft or full forward.

To recover, apply full opposite rudder followed by nose down elevator and establish the down line. The recovery from a normal spin requires slightly less than a quarter turn. The point at which you apply full opposite rudder determines the heading on recovery. Use **full** rudder to initiate the spin and **full** opposite rudder to recover. This insures the same control deflection each time, making entries and recoveries more consistent.

COMMON ERRORS WITH SPIN ENTRY

- Failure to completely reduce power to idle.
- Climbing and forcing entry.
- Losing altitude before spin is initiated.
- Failure to hold **full** in-spin rudder and/or **full** nose-up elevator.
- Applying aileron during entry.

COMMON ERRORS WITH SPIN RECOVERY

- Recovering off heading.
- Failure to use **full** opposite rudder for recovery.
- Failure to apply nose-down elevator **after** applying **full** opposite rudder.
- Failure to establish vertical down-line. The down-line is not part of the recovery, but it is graded in competition.

LESSON ONE (Continued)

UPRIGHT FLAT SPIN WITH EMERGENCY SPIN RECOVERY

The best way to experience the Emergency Spin Recovery the first time is from an upright flat spin to the left.

First, enter a normal upright spin with left rudder. After approximately one turn, apply full right aileron, keeping the stick full back, continuing to hold full left rudder. This will immediately increase the rate of rotation. Now apply power. It is not necessary to use full power, only enough to bring the rpm up to the lower limits of the governor. Gyroscopic forces of the engine and propeller will further raise the nose and the aircraft will spin as flat as possible in the upright mode. The rate of rotation, pitch attitude and bank angle will stabilize within two to three turns.

To recover, cut power to idle, remove your hand from the stick and apply full right rudder. After approximately one turn from the point at which you apply full right rudder, the nose will pitch down, the rotation will stop quite abruptly and the stick will snap to neutral. When rotation stops, release the right rudder and recover to level flight, adding power as you begin the pullout. If you are like most pilots, you will be amazed at how well this recovery works and how simple it is!

LESSON TWO

This lesson consists of a brief review and introduction of the accelerated spin. We will also examine the effects of all control inputs once the spin is established.

EFFECTS OF CONTROL INPUTS

There are really only four spins, upright left and right and inverted left and right. Flat and accelerated spins are only variations of these four basic spins. Once a spin is established and the in-spin rudder remains fully deflected, spin rotation continues no matter what we do with the other controls! The following control inputs will not result in recovery, but they will change the nature of the spin.

1. Nose-down elevator.
2. In-spin aileron.
3. Out-spin aileron.
4. Adding power.

We will examine each of these control inputs and see how they produce flat spins and accelerated spins. We have already seen the effects of opposite aileron and power in lesson one with the upright flat spin to the left. When we apply opposite aileron to the developed spin, we get an immediate flattening effect. The rate of rotation increases, the bank angle decreases and the nose rises. This increases angle of attack and produces more rotational energy.

If we are spinning against the engine rotation, as in the case of the upright spin to the left, the nose will rise even further when we add power. If we are spinning with the engine rotation, as in the upright spin to the right, adding power will lower the nose. This is due to gyroscopic forces, not thrust.

The recovery from a flattened spin will always take longer, at least one full turn from the point at which we apply full opposite rudder. In contrast, the recovery from a normal spin requires less than a quarter turn.

UPRIGHT ACCELERATED SPINS

Let us now examine the effects of nose-down elevator and in-spin aileron and see how they produce accelerated spins.

Once the spin is established and we keep the in-spin rudder fully deflected the spin will continue, even if we apply full nose down elevator. When we apply nose down elevator, the pitch attitude becomes nearly vertical. The angle of attack decreases and the rate of rotation, increases dramatically. The pitch attitude is so steep and rate of rotation is so fast, it is difficult to tell whether the spin is upright or inverted. Recovery from an accelerated spin is almost instantaneous when opposite rudder is applied. The inner ear is very affected by the accelerated spin. As we begin the pullout, you will be quite dizzy. It will take several seconds of straight and level flight for the equilibrium to return to normal.

Now we will examine the effects of in-spin aileron. This control input lowers the nose slightly, decreases angle of attack and increases rate of rotation; however, it will not produce the dramatic results of opposite aileron or nose down elevator. Opposite aileron flattens the spin and in-spin aileron lowers the nose and accelerates the rate of rotation.

LESSON THREE

This lesson includes a brief review followed by introduction of the inverted flat spin and inverted accelerated spin. Visual cues and direction of yaw in inverted spins are covered in detail.

VISUAL REFERENCES RELATIVE TO SPIN AXIS

With spins, as in all other maneuvers, the first and most important thing is, you must know where to look. Regardless of aircraft attitude, one thing always remains constant; when you view the ground straight ahead through the windshield, down the top of the engine cowling, you always see yaw in the correct direction.

Open cockpit aircraft and those with large canopies that provide unrestricted visibility are advantageous to the experienced air-show and competition pilot. This visibility aids in orientation to runways, crowd-lines and competition box markers; however, it can be a deadly trap for the novice if he winds up inadvertently in an inverted spin.

In inverted spins, g-forces tend to tilt the head back. More often than not, the novice will be looking up through the canopy at the ground or perhaps viewing the ground behind the spin axis. In this situation, he is likely to mistake roll for yaw or see yaw in the wrong direction and is almost certain to go for the wrong rudder! Again, may I strongly emphasize how important it is in an out-of-control spin to look straight ahead through the windshield down the top of the engine cowling!

Refer to the illustration on the following page. It will help you understand visual cues relative to the spin axis.

VISUAL CUES RELATIVE TO SPIN AXIS

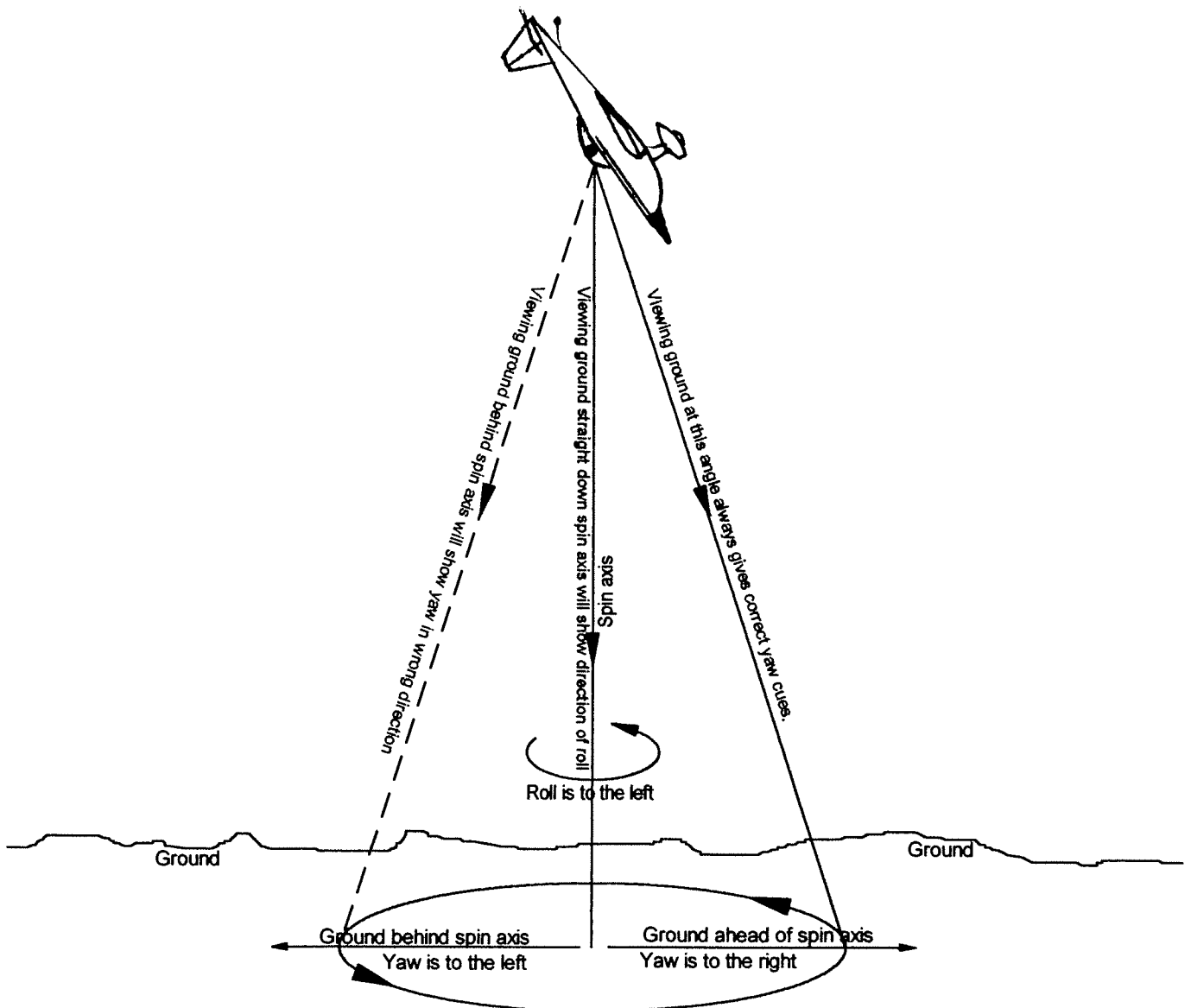
As the aircraft spins, the nose draws a circle about the spin axis. In an upright spin, the structure of the aircraft prevents the pilot from viewing the ground straight down the spin axis. The pilot will naturally look straight down the nose and is unlikely to become confused about the direction of yaw. This is not the case with the inverted spin.

LESSON THREE (Continued)

In the inverted spin, the pilot can view the ground at any of three angles:

1. He can look straight ahead along the top of the engine cowling in which case he will always see yaw in the correct direction.
2. He can look straight down the spin axis and will always see roll in the correct direction.
3. He can tilt his head back and view the ground behind the spin axis and will see yaw in the wrong direction.

Study the diagram below. It will help you understand visual cues. For illustration purposes, assume the aircraft is in an inverted **right rudder** spin. The pilot is holding full forward stick and full right rudder.



LESSON THREE (Continued)

Once you fully understand visual references relative to the spin axis, there is another important thing to remember. Most pilots, inexperienced in inverted flight, tend to brace themselves very hard against both rudder pedals. This makes it impossible to obtain full rudder in either direction until they relax the other leg. It takes experience to be able to relax and let the seat belt support the body.

During the years in which I taught this course, I found that when students were unable to recover, using the Emergency Spin Recovery, they were invariably making one or both of the following mistakes:

1. Misinterpreting the direction of yaw and applying the wrong rudder.
2. Bracing themselves so hard against both rudder pedals they were unable to obtain full opposite rudder.

Many pilots are reluctant to accept the Emergency Spin Recovery. They refuse to believe the answer to such a longstanding problem could be so simple and are strongly opposed to letting go of the stick. Maybe in their mind they think of this as “giving up.” I have often heard the statement “Real pilots do not let go of their aircraft!”

When a student was reluctant to remove his hand from the stick, I would suggest using a handhold during Emergency Spin Recovery. I often recommended the cockpit combing because I could then see both hands. Structural tubes at each side of the cockpit also make convenient handholds. Grasping these tubes may make it easier to obtain full opposite rudder. It is very important to apply absolutely **full** opposite rudder during spin recovery.

INVERTED FLAT SPINS

The inverted flat spin must surely be the most feared and misunderstood maneuver of all time. Many experienced pilots have died in inadvertent inverted flat spins or bailed out after they were unable to recover. This has created a myth that has grown to enormous proportions. The truth is, the inverted flat spin is just another maneuver. No more dangerous than a steep banked turn once you understand it. The entry is not difficult and the recovery is amazingly simple. A Pitts Special is as happy doing an inverted flat spin as a simple aileron roll. When you complete this lesson, I think you will agree.

Due to gyroscopic forces of the engine and propeller, the inverted flat spin can be done only with **right** rudder in the Pitts Special. As stated earlier, if you find yourself inadvertently in an inverted flat spin, you can be certain it will require **left** rudder to recover. This assumes the engine rotates clockwise from where the pilot sits.

To enter an inverted flat spin, roll inverted and reduce power to idle. Apply forward pressure to hold altitude as the aircraft slows to stall speed. As the stall breaks, apply full forward stick and full right rudder. After approximately one turn, apply full right aileron, keeping the stick full forward then apply power. It is not necessary to use full power, just enough to bring the rpm up to the lower limits of the governor. Hold these control inputs and the aircraft will stabilize into a full-blown inverted flat spin within two to three turns. When ready to recover, use your Emergency Spin Recovery, power off, hands off, full opposite rudder.

Well, what do you think? It is hard to believe, but that is all there is to it!

LESSON THREE (Continued)

INVERTED ACCELERATED SPINS

In lesson two we learned that after entering a normal upright spin and keeping the in-spin rudder fully deflected, the spin rotation continues. We also learned that when we apply nose down elevator while spinning, we get an immediate and dramatic increase in rate of rotation and the pitch attitude becomes nearly vertical. Of course, the same thing happens in an inverted spin. We will now introduce what I believe is the most awesome of spins, the inverted accelerated spin! This spin can be very disorienting. I do not introduce it early in the course. The rate of rotation and negative g-forces can pull a headset off your head if you do not use a chinstrap.

By now, you should have complete confidence in three things:

1. Pitts Special biplanes.
2. The Emergency Spin Recovery.
3. Your ability to recover from any spin in the Pitts Special.

If you have any doubt about any of these things, do not continue flying aerobatics until you get some dual instruction from someone who understands everything I have said so far!

The inverted accelerated spin is quite a ride and when you master this one, you can handle any spin in the Pitts Special.

To enter the inverted accelerated spin, roll inverted and reduce power to idle. Enter a normal spin with full forward stick and full right rudder. We will do the one with right rudder first because the rate of rotation is a little slower. After one turn, begin pulling the stick back while holding full right rudder. As you pull the stick back, you will see an immediate increase in rate of rotation. Even with the stick full aft, the aircraft continues spinning in an inverted right rudder spin. Yaw is to the right but roll is to the left. Recovery is almost instantaneous when you apply full opposite rudder.

Now we will do the left rudder inverted accelerated spin. Enter a normal inverted spin with left rudder. After one turn, pull the stick back while holding full left rudder. The rate of rotation in this spin is truly awesome!

LESSON FOUR

This lesson provides an opportunity for you to demonstrate and practice all of the things you have learned so far. You will also learn about transition spins and spin reversals.

TRANSITION SPINS (Some call these cross-over spins.)

The normal hands-on spin recovery works great in most situations, but if you hold the anti-spin controls too long, it can really get you into trouble!

The Pitts Special has controls that are light and very effective. It will do exactly as you say, right now. If you are heavy-handed, there is extreme danger in over-controlling in a normal spin recovery. For example, assume you are spinning upright with left rudder. The normal recovery is, apply full right rudder followed by nose-down elevator. When rotation stops, neutralize rudder, establish the down-line, then pull or push to level flight. Now, assume that you get quite rough with the aircraft, hold the right rudder too long and continue holding full down elevator. What do you think will happen? I will tell you what will happen.

Instead of recovering, the aircraft will hesitate slightly as it transitions from upright to inverted and yaw will reverse from left to right. Roll will continue to the left and the aircraft will then be in an inverted, right-rudder spin. From an observer's standpoint, the spin will still be to the left. If the pilot is not educated to this, he may think he is still in the upright spin to the left and cannot recover. He will continue holding what he thinks are anti-spin control inputs when in fact, he has transitioned to an inverted spin. These control inputs are then holding the aircraft in an inverted right rudder spin.

The same thing happens; transitioning from inverted to upright. This is one of the reasons the Emergency Spin Recovery is so important. With the hand removed from the stick, it is impossible for the aircraft to transition. Let me talk you through a transition from inverted to upright.

Roll inverted and enter a normal, inverted spin with right rudder. Once the spin is established, apply full left rudder and quickly pull the stick full back. Hold these inputs and you will see the aircraft smoothly transition from inverted to upright. Roll continues to the left and yaw reverses from right to left.

SPIN REVERSAL

If the pilot fails to release backpressure and attempts to recover with only opposite rudder, the aircraft will not recover. The rotation will slow, the aircraft will hesitate briefly and then literally snap in the other direction. Of course, this applies to both upright and inverted spins. The possibility of spin reversal is another good reason to use the Emergency Spin Recovery if you get into trouble. It is impossible to reverse a spin with your hand off the stick. Let's do a spin reversal from left to right.

Enter an upright spin with left rudder. After about two turns, continue holding the stick full back, and apply and hold full right rudder. The direction of rotation will reverse and the aircraft will snap into a spin to the right.

LESSON FIVE

This lesson will serve as a final review. I will put the aircraft into unusual situations and ask you to recover. This will insure that you can recover from any inadvertent spin. We will also do an elevator trim demonstration and introduce a spin prevention technique.

INADVERTENT SPINS

Intentional spins are entered from a fully stalled condition, but inadvertent spins can be entered from any attitude and with surprisingly low angles of attack. Spins and snaps are actually the same thing. They are both autorotations and are accomplished by "loading" the wing with the stick and "triggering" the autorotation with full rudder in the desired direction. Contrary to what many believe, the aircraft does not have to stall before a spin or snap can be initiated. Angle of attack must only be sufficient for the down-going wing to stall when full rudder is applied.

EFFECTS OF ELEVATOR TRIM

Many have asked, "How does elevator trim effect spins and spin recoveries? Will the Emergency Spin Recovery work if the aircraft is out of trim?"

Surprisingly, I have found elevator trim has no effect on spins or recoveries. The Emergency Spin Recovery works even when the trim is full up or down. Stick forces are heavy during entry and pullout, but spins and recoveries are unaffected.

SPIN PREVENTION

There will be times in which you will fall out of a maneuver and the aircraft will be on the ragged edge of spinning. If you fight it, there is a good chance it will spin. You can prevent an inadvertent spin with the following technique.

Reduce power to about half throttle, look into the cockpit and visually center the stick and rudder pedals. Hold the controls tight and wait for the aircraft to pitch nose down. With power reduced and controls neutral, the aircraft will not spin. After the nose falls through the horizon, add power and recover to level flight. It is important to center the controls visually. If you are tensed up, hanging on the belts, you may think you have the controls in neutral when in fact they are displaced enough to cause a spin.

Well, my friend, congratulations! If you have successfully completed each of the five lessons, you have completed Gene Beggs' Advanced Spin Training Course.

FREQUENTLY ASKED QUESTIONS

WILL IT WORK IN ALL AIRCRAFT?

The question I hear most often is, “Will the Emergency Spin Recovery work in all aircraft?” No, not exactly! Although I have found it works beautifully in the vast majority of cases, there are rare exceptions. You may occasionally encounter a spin mode in some aircraft in which you must physically apply nose-down elevator. This is extremely rare and I assure you it will **never** happen in the Pitts Special.

The Emergency Spin Recovery can **always** be used, even in those aircraft that require nose-down elevator. Once you cut the power, remove your hand from the stick and apply full opposite rudder, the Emergency Spin Recovery has served its purpose. It has eliminated the need to know whether the spin is upright or inverted and it has prevented erroneous control inputs with the stick. If the aircraft has not recovered within two turns, either you are on the wrong rudder pedal or you have encountered the rare aircraft in which you must physically apply nose-down elevator. First, be certain you are on the correct rudder pedal. Once you are sure you are applying **full** rudder against the yaw, grasp the stick and apply full nose-down elevator. If the stick remains forward, the spin is inverted and you must pull it back. If the stick remains aft, the spin is upright and you must push it forward.

My critics have often said, “Have some doubt about Gene Beggs’ hands-off spin recovery. It is not one hundred percent in all aircraft.”

Let me assure you, the Emergency Spin Recovery is one hundred percent reliable in the Pitts Special and in the vast majority of other aircraft.

In those rare cases in which an aircraft will not recover using the Emergency Spin Recovery, does it indicate a shortcoming of the method of recovery or does it reveal a problem with the aircraft? You may draw your own conclusions.

Since my first spin article appeared in *Sport Aerobatics* in 1984, the hands-off opposite rudder method of recovery has become widely known as the “Beggs/Mueller” method. Eric Mueller is now deceased, but I personally feel we are given too much credit. Neither of us invented the recovery. As far as we know, Lt. Wilfred Parke of “Parke’s Dive” fame was the first to use the method. Rather than “Beggs/Mueller” or “hands-off”, I suggest we simply use the term Emergency Spin Recovery.

HOW DOES THE EMERGENCY SPIN RECOVERY WORK AND WHY DOES THE STICK MOVE TO NEUTRAL WHEN ROTATION STOPS?

The Pitts Special, like any conventional aircraft, is designed so that center of gravity is forward of center of pressure. If we stall the aircraft and release the stick, it will pitch nose down. With this in mind, assume that we are in an upright spin to the left, the stick is full aft and we are holding full left rudder. When we release the stick, it does not go to the true neutral position. It remains somewhat aft and deflected to the left. As long as the in-spin rudder remains fully deflected, spin rotation continues. This brings to mind four questions:

1. With the hand removed from the stick, why does the aircraft remain stalled?
2. Why does the stick remain aft?
3. Why is the stick deflected slightly to the left?
4. What causes the stick to snap to the true neutral position all on its own when spin rotation stops?

The nose does not pitch down due to centrifugal forces. As the aircraft spins, there are two centers of mass rotating about the center of gravity, one forward of the spin axis and one aft. These two rotating masses produce centrifugal forces that raise the nose and lower the tail. These forces are sufficient to keep the aircraft stalled. The stick remains aft because the elevator is “floated” upward by the vertical component of the relative wind. As the aircraft spins, it is both yawing and rolling and the ailerons trail in the direction of roll, deflecting the stick slightly to the left.

In a spin the aircraft is not flying, it is falling. Flight path is straight down. This creates a strong vertical, relative wind component. The tail is also describing an arc about the spin axis. This creates a strong relative wind from the side for the rudder. The true relative wind to the tail is a combination of the two. The pilot can feel these forces through the controls. When we apply nose-down elevator, it takes considerable force to overcome the vertical component of the relative wind. When we apply opposite rudder, the recovery rudder pedal is harder to push and travels farther.

When we apply full opposite rudder to recover, the rudder provides tail damping force to slow the spin rotation, much like that of a drag chute. As rotation slows, centrifugal forces in the fuselage decrease. When these forces decrease sufficiently, the nose heavy tendency of the aircraft takes over, the nose pitches down, breaking the stall and the spin rotation stops abruptly. The elevator streamlines itself with the horizontal stabilizer and the ailerons streamline themselves with the wing. This causes the stick to snap to the true neutral position. The pilot then releases the rudder, takes hold of the stick and recovers to level flight.

SHOULD SPIN TRAINING BE MANDATORY?

This debate has gone on for decades and will probably never be resolved. There is much disagreement about spins and spin recoveries. The truth is, many pilots are apprehensive about stalls and they are scared to death of spins! If you are afraid of something, most likely you do not understand it and have doubts about your ability to deal with it. Most flight instructors do not spend nearly enough time with their students practicing slow-flight and stalls.

Personally, I am grateful that spins were included in my pre-solo training. My primary flight instructor, Doug Stelter, was comfortable with spins and taught them in a calm, professional manner; consequently, I was never alarmed when an aircraft dropped a wing during stall practice. Doug Stelter is now a Boeing 737 Captain for America West Airlines and lives in Lubbock, Texas. We remain friends today. Thank you Doug, for all that you taught me in that old Taylorcraft. I owe you, my friend.

WHAT HAPPENS IF THE ENGINE QUILTS IN A SPIN?

Many have asked, "Will the Emergency Spin Recovery work with the engine stopped?" Yes, it will! Spin recovery is unaffected by engine failure. If anything, the Pitts recovers better with the engine stopped because there is no gyroscopic force.

HOW DO I KEEP THE ENGINE FROM QUITTING IN A SPIN?

To prevent engine failure in spins and tail-slides, engine idle rpm and mixture settings must be correct. During my years of instructing, I frequently found idle settings that were excessively rich. Many pilots mistakenly believe engine damage will result from idle settings that are too lean. This will not happen. If the engine is idling at all, it is not too lean. The pilot can best determine if idle settings are correct. Here is how to do it.

After landing, taxi to a safe area, turn the aircraft directly into the wind and stop. Be sure the mixture control is full rich. Pull the throttle back against the stop and note the idle rpm. It should be about eight hundred. Slowly pull the mixture control to idle-cut-off and watch the tachometer closely. Before the engine falters and quits, you should see only a slight rise in rpm. If you get more than one hundred rpm rise, your idle mixture is too rich. If you are careful and quick about it, you can push the mixture back in and prevent the engine from quitting during this test. Unless you are sure of what you are doing, I suggest you get a licensed mechanic to make the adjustments. Remember, idle mixture and off-idle mixture are two different things. With the mixture control in the cockpit, you can adjust only the off-idle mixture. A mechanic must adjust the idle mixture and rpm.

SPINS IN OTHER AIRCRAFT

It was never my intention to include all aircraft in my tests. My main concern was for pilots flying aerobatics in Pitts Specials. When this book was in the planning stages, I thought it best to confine it to only that aircraft. After careful consideration, I decided that I should tell you about some of my experiences in other aircraft.

CHRISTEN EAGLE II

During the years in which I taught aerobatics full time, I had many students who took their training in their own Christen Eagle II. The flight and spin characteristics of the Eagle are virtually identical to those of the Pitts S-2A. The Christen Eagle II recovers beautifully from all spins using the Emergency Spin Recovery.

SPIN TESTS IN THE MOONEY

During the eighties, I did a tremendous amount of spin work including two FAA certification programs for Mooney Aircraft in Kerrville, Texas. I was the spin test pilot for the certification of the Mooney Porsche and TLS models. This was the first time FAA representatives monitored my spin work. All flights were conducted in a controlled environment and video taped from a chase plane. Each program involved over four hundred spin entries and recoveries. There were no surprises. Both aircraft recovered beautifully using the hands-on recovery and the Emergency Spin Recovery.

PIPER TOMAHAWK

In 1985, my friend, Ken Doshier, owner of West Tex Aircraft in Lubbock, Texas, asked me to spin test the Piper Tomahawk. It had developed a bad reputation in stalls and spins. I put the Tomahawk through a series of upright spins including normal, flat and accelerated. The Tomahawk is an excellent spinning aircraft that recovers beautifully using either the normal or the Emergency Spin Recovery. It spins so well that I can see how it would be intimidating to a pilot who is apprehensive about stalls and spins. There is a persistent rumor about the Tomahawk. It goes something like this. "Have you looked at the tail of a Tomahawk in a spin? It bends over as if it were going to break off!" Hey, give me a break, an aircraft so weak would have never made it through FAA certification. Spins do not "bend the tail over."

After completing the spin tests in the Tomahawk, I had an amusing experience with a young instructor who had kept his distance from me all day. As I walked across the ramp, parachute over my shoulder, he followed and gave me a dirty look as he turned and walked over to the Tomahawk. He began examining the upper surfaces of the tail cone. I suppose he thought I had abused his little steed and was sure the tail was about ready to fall off. Do you suppose fear and uncertainty may have been responsible for the rumors about the Tomahawk?



L to R, Gene Beggs and Jim Patton. January 1985. Jim Patton headed up the General Aviation Spin Test Program at the Langley Research Center in Hampton, Virginia.

BEECHCRAFT T-34C

In January 1985, NASA evaluated my Advanced Spin Training Course. Jim Patton, a former Navy test pilot, headed up the General Aviation Spin Test Program at the Langley Research Center in Hampton, Virginia. Jim spent a week at my facility and completed the entire Advanced Spin Training Course in the Pitts S-2A. We also flew the T-34C. This was the first aircraft I encountered that would not recover using the Emergency Spin Recovery. At that time, I had such faith in the method, I believed it would work in all aircraft. Jim Patton knew otherwise and I am sure that is why he came to Midland in the T-34C. I enjoyed flying with Jim and will always count him among my friends. He is a fine gentleman and a terrific pilot.

This brings us to the second aircraft that would not recover using the Emergency Spin Recovery. You will probably be surprised to learn it is the Cessna 150!

CESSNA 150/152 AEROBAT AND COMMUTER

In 1985, I received a call from fellow IACer, Charlie Wells. He asked, "Gene, do you know Bill Kershner?" "Sure!" I responded. Charlie continued, "I attended a flight instructor refresher course recently and Bill Kershner said he had a problem with your hands-off spin recovery. Why don't you give him a call."

Bill Kershner said "I have read your spin articles in *Sport Aerobatics* and find them very interesting. I do not fly the Pitts Special, but I am trying that hands-off recovery in my Cessna Aerobat and I am not coming out of the spin." I asked, "How long are you waiting after you apply full opposite rudder?" He responded, "Oh, five or six turns!"

Bill said that during the certification of the Aerobat, he encountered a spin mode that would lock-in and continue spinning all on its own. He described the spin as follows. "When you spin the Aerobat to the left, two turns or more with full in-spin aileron and/or power on, it will lock-in and will not recover using only opposite rudder."

He said that this occurred in every Aerobat he had flown. It was a characteristic of the design and not a quirk of one individual aircraft. I asked if this also applied to the standard Cessna 150 and he said that he did not know. This news really surprised me because I instructed for years in the Cessna 150 and had several hundred hours in a 1970 Cessna Aerobat.

My flight school owned a little 1975 Cessna 150 Commuter that we called "Daisy" because of its bright yellow color. I topped off the tanks and departed for the practice area to see for myself the spin mode Bill Kershner had described.

Reaching a safe altitude, I did exactly as he suggested. I entered a spin to the left adding full left aileron and about half throttle. After two turns, I cut the power, released the controls and put my feet flat on the floor. I could not believe my eyes! Daisy continued spinning, all on her own, showing no sign of recovery even after six turns. I applied the recommended hands-on recovery and the spin stopped within one additional turn. The aircraft would not lock-in to the right, only to the left. Once the locked-in spin was established, the aircraft would not respond to full opposite rudder. In one case, I counted twenty turns with my arms folded and feet flat on the floor.

NORTH AMERICAN T-6/SNJ

The third aircraft I encountered that would not recover with the Emergency Spin Recovery was the North American T-6/SNJ. Members of the Confederate Air Force questioned whether the Emergency Spin Recovery would work in the T-6. After a thorough check out in two different aircraft, I conducted a series of spin tests.

The T-6 was nice to fly, with controls that were surprisingly light. The stall was crisp with little or no warning and it took a lot of altitude to recover from a full stall. The aircraft exhibited no tendency to drop a wing in the clean configuration, but with flaps extended, both aircraft had a tendency to drop the right wing. The T-6 recovered beautifully from all spin modes to the left using the Emergency Spin Recovery. Not so to the right!

When I spun the aircraft two turns or more to the right with full in-spin aileron and/or power on, it would lock-in and would not recover using the hands-off Emergency Spin Recovery. After cutting the power, releasing the stick and applying full left rudder, the stick remained almost full aft and to the right. It required both hands and a lot of force to shove the stick forward and recover.

180 DECATHLON

Another aircraft that will not always recover with the Emergency Spin Recovery is the 180 Decathlon. This occurs in the inverted left rudder spin. I have not flown the 180 Decathlon extensively. I do not know if the 150 Decathlon also exhibits the same behavior. If we could spin-test every aircraft, I am sure we would find others that will lock-in and continue spinning on their own.

AN OLD MYTH THAT REFUSES TO DIE

GIVE HER A BURST OF POWER!

Throughout the history of spins, many myths have persisted. The most prevalent of these is the one that says, "Yeah son, if you can't get the nose down, give her a burst of power. That will make the elevator more effective and help you get the nose down."

Folks, let me assure you, that is complete nonsense! "Giving her a burst of power" is one of the worst things you can do when trying to recover from a spin! Power will not help you get the nose down and gyroscopic forces will make it **more** difficult if you are spinning against the engine rotation. There are pilots, who firmly believe that "Giving her a burst of power" helped them recover. The truth is, they recovered in spite of that action, not because of it.

OTHER METHODS OF SPIN RECOVERY

Most aircraft will eventually recover from any spin if the pilot cuts the power and completely lets go of all controls, but this may take several turns. There are many documented cases of this happening after the pilot quit fighting the controls and turned his attention to exiting the aircraft.

The panic-stricken pilot who somehow manages to recover from an out-of-control spin will likely credit the last thing he did, regardless of what that action may have been. I have heard all sorts of recommendations. Here are some examples:

- **PULL THE STICK FULL AFT, APPLY FULL LEFT RUDDER AND WAIT UNTIL YOU RECOGNIZE AN UPRIGHT SPIN TO THE LEFT, THEN MAKE A NORMAL RECOVERY**

If a pilot is in trouble and out of control, I see no reason to waste time and altitude with this procedure. If by some chance, you are in an inverted left-rudder spin and try this, you will be in for the wildest ride of your life! You will be sitting there with the stick full aft, spinning like crazy, waiting for the aircraft to transition to an upright spin to the left, when you hit the ground! (See lesson three. Inverted accelerated spins.)

If the requirement is to recover as quickly as possible with a minimum loss of altitude, the Emergency Spin Recovery is the way to go. If you have any doubt about this, go up, compare the two procedures and see which one results in the least loss of altitude.

- **UNFASTEN YOUR SEAT BELT AND LUNGE FORWARD AND GRAB THE CABANE STRUTS.**

Yes! It has been done and I am sure the pilot still believes that action was responsible for the recovery.

- **CUT THE POWER AND APPLY FULL DOWN TRIM.**

Refer to lesson five.

- **CUT THE POWER AND PREPARE TO BAIL OUT.**

Well, don't laugh! It worked, didn't it?