

AIRSHOW ACCIDENT REVIEW 2013

The tenets expressed in this review are those of the author and addresses a sample of significant accidents and incidents at aerial events worldwide in 2013, both during the actual events and during rehearsals and includes, airshows, air races, flypasts, and air capability demonstrations; in fact, any event at which an aircraft is displayed or rehearses for a public air event in which the flow of the event is jeopardised.

Des Barker

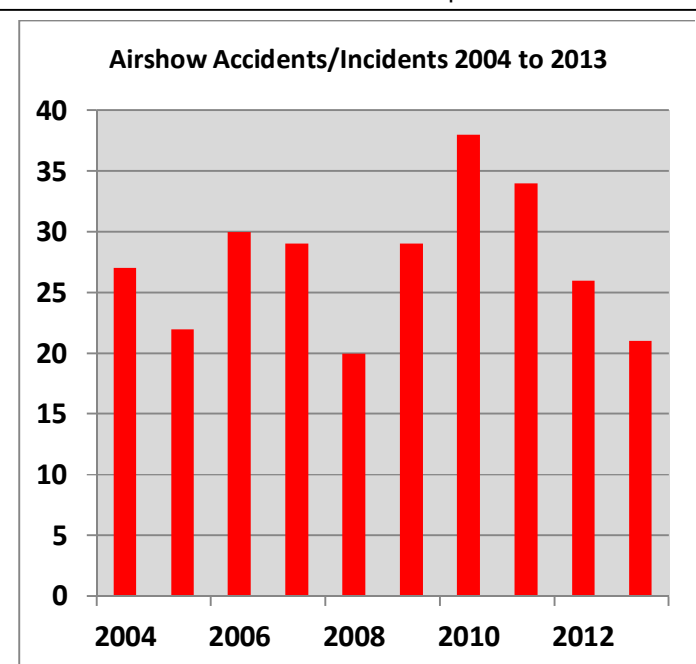
Introduction

Quoting from the concluding remarks from the *Airshow Accident Review 2010* published in *World Airnews* of February 2011 and reviewing the safety statistics of 2010 in which critical questions were asked: 'One is left with no other alternative but to reach the same conclusion as in 2009. As an international airshow community, we seem to have plateaued in our ability to reduce accidents and incidents at airshows. The question is: Can we afford then to just continue and accept an increasing average of 24 accidents/incidents per annum. Can we afford to just accept what the dice have dealt with the associated loss of life? Are we doing enough worldwide to reduce the number of airshow accidents/incidents? Based on the fickleness of human judgement in the low level display environment, is it realistic to even believe that zero accidents are possible in a given year? If not, what is an acceptable loss rate?'

'Should one even consider anything else but a target of zero accidents per annum? It is clear that regulatory oversight worldwide is in serious need of an overhaul and that airshow display pilots and airshow organisers will have to make a concerted effort to improve safety at airshows lest aviation legislation and insurance costs are brought to bear with dire consequences for this sport type. At the expense of melodrama, there is nothing new under the sun. Highly experienced pilots making the same errors in judgement over the past 101 years? Or is it the case as Earnest Gann implied in his book *Fate is the Hunter*. 'We can only do is our best. We either make it, or not? Maybe it's just time to revisit the marriage vows again with the realisation that low level display flying is for the professionals only!'

2013 Statistical Overview

These questions were put to the European Airshow Council (EAC), the International Council of Airshows (ICAS) and Airshow South Africa (ASSA) at their annual Safety Conventions in 2010. The year 2010 was acknowledged statistically as the worst in recent airshow history and the loss rate was unacceptable and as such, airshow safety oversight organisations were galvanized into taking a more aggressive approach to airshow safety and introduced improved oversight mechanisms and ongoing safety management systems that constantly questioned the environment with the view to identifying hazards and developing mitigating actions. It was pointless to introduce additional regulations, there were already enough in place; what was required, however, was to zero in on human factors across the entire airshow



Statistical analysis of airshow accidents and incidents over the past 10 years shows a year on year average of 27 accidents per annum but with a decreasing trend since 2011. Can this trend be maintained?

community, from first responders, through vendors, safety officers and display pilots alike, through a continuous in your face safety programme.

By 2011, there was the first indication of a reduction in airshow accidents which raised the question: %s this real or just random numerical scatter? By 2012, a further reduction was evident and the first indications of a trend towards improved airshow safety statistics was becoming evident which was followed up in 2013 with a further improvement, the lowest accident rate in many years verifying the downward trend. This begs the question, can we maintain this trend?

Is it possible to achieve a zero accident rate worldwide? What were the main contributory factors in 2013 that can be used as lessons learned? Reviewing some of the accidents in 2013 may provide some insight.

It bears mentioning that the 2013 airshow season worldwide, was adversely affected by US sequestration effects which saw many military organisations curtailing their participation in aerial events and the cancellation of several airshows.

Casualties

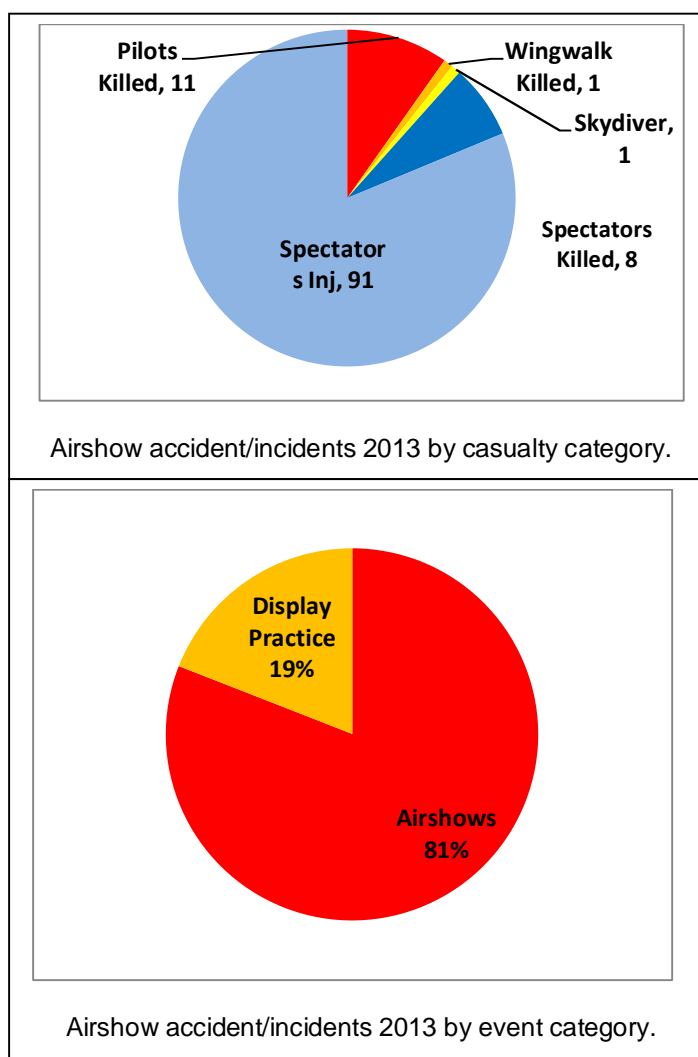
Although a total of 20 accidents and incidents were recorded although two were not directly aircraft related and despite the fact that the total number of accidents had decreased year on year, the accidents resulted in 112 casualties in which 11 pilots, one wing walker, one parachutist and 8 spectators lost their lives with a further 91 spectators injured, this in stark contrast to the zero spectator fatalities of 2012 which in itself, was a first in the history of airshows.

Unfortunately, the most significant contribution to the unnecessary spectator deaths and injuries was not aircraft related, but rather a rogue truck which was a sideshow at the Mexican *Extreme Aeroshow* where eight spectators were killed and eighty injured. Fatalities remain untenable and unsustainable if the airshow community is to continue to exist without additional regulatory and insurance interventions, both of which could impose additional constraints on the ability to host air events. Sponsors are not generally amenable to supporting events in which fatalities occur; not good for branding at all!

Event Categorisation

Historically, the ratio of airshow accidents during actual displays versus practice was 71%. In a significant regression in 2013, the percentage of accidents occurring at actual air events increased by 14%, to 85% with only 15% during practice. This phenomenon can possibly best be explained by the fact that the pressure to perform during the actual event watched by spectators and at times under hostile atmospheric conditions, places additional stress on the pilot to press the display to capability limits.

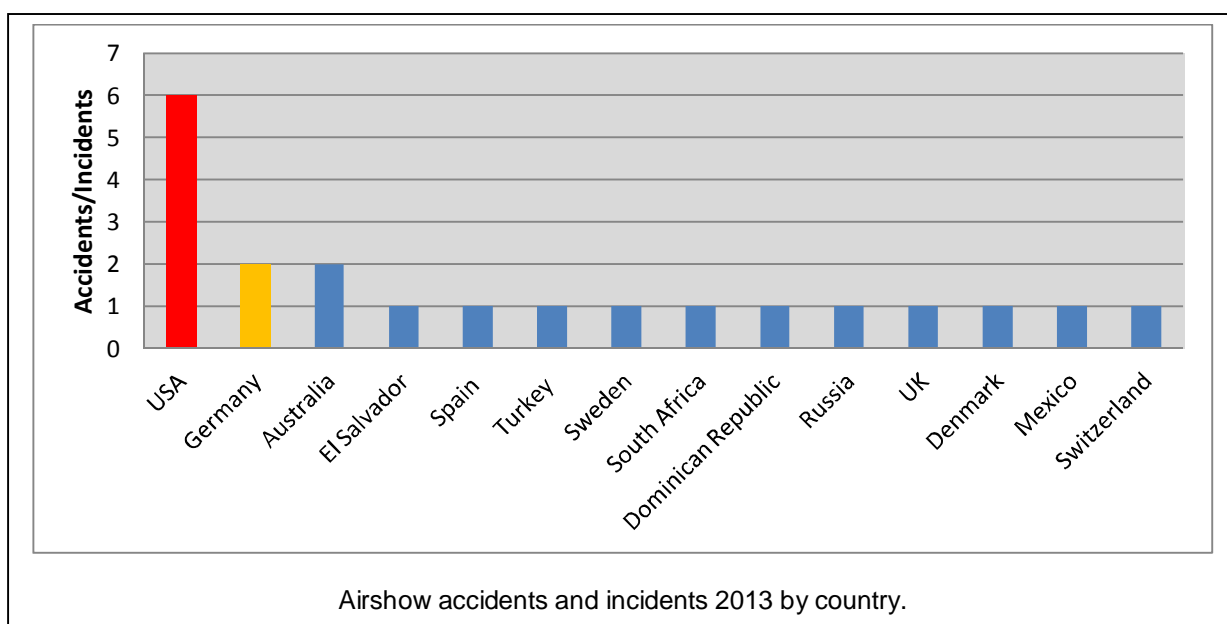
There are often cases in which the conditions during rehearsal are less than ideal and pilots then elect to postpone rehearsals until conditions improve. The problem is that on show day under less than ideal conditions, with the demands from the event organiser, and pilots wanting to meet their fee



commitments, sometimes press the performances under conditions for which they have not practiced. The military adage of 'fight like you train' is especially relevant; display like you practice. anything else is pushing the error budget.

Accidents by Country

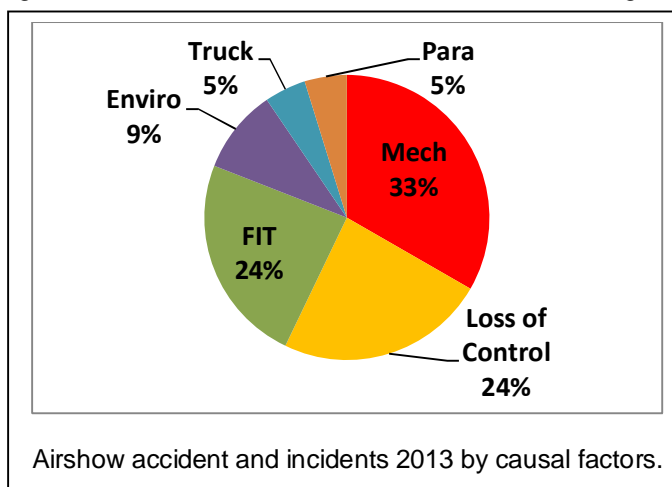
20 accidents occurred in fourteen different countries; a significant improvement on the 34 airshow accidents and incidents of 2011 and the 26 accidents of 2012. The USA, by virtue of its significantly greater number of airshows annually, experienced six, accidents and incidents. down from the nine in 2012. Sadly, there are no accurate statistics regarding flying hours flown in practice and during air events against which to make more statistical sense of the accident figures. Germany experienced two airshow accidents while El Salvador, Spain, Turkey, Sweden, Australia, South Africa, Dominican Republic, Russia, UK, Norway, Mexico and Switzerland all suffered one accident.



Causal Factors

For the third year in succession, Machine causes (30%) were the most significant contribution to airshow accidents and incidents, not the traditional Flight Into Terrain (25%) and Loss of Control (25%). In a way, that is good news. What is of concern is the number of mechanical failures within the vintage aircraft category, mainly engine failures. This contribution from MACHINE was thus inordinately high at 30% versus the historical average of 23%. Flight Into Terrain was down from the historical average of 28% at 25% and Loss of Control, up from 21% to 25%.

The question is why the mechanical contribution had increased so significantly? Not surprisingly, the primary contribution to Machine factors was closely tied into the increased number of vintage aircraft that were involved in airshow accidents; 50% of the accidents involved vintage aircraft, 83% of which were engine failures. Conclusion, mechanical failures on vintage category aircraft contributed inordinately as the primary causal factor of accident statistics in 2013, a similar trend was evident in the previous year and is certainly an indicator to monitor into the future.

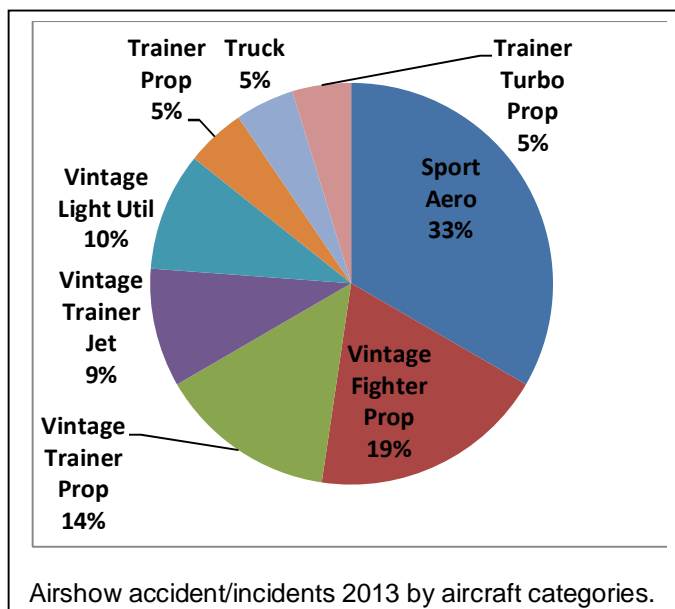


Very reassuring was the swing away from human judgement error, down from 86% in 2010 to 53% in 2011, 42% in 2012 and a slight increase to 52% in 2013. Does this mean that the airshow community have become more sensitive to the threats and challenges and that pilot judgement and fine motor skills have improved? Does this imply that maintenance efforts, particularly on vintage aircraft engines have now regressed below standard?

Aircraft Categories

Bearing in mind the adverse effects of sequestration on military aircraft participation at airshows in 2013, the aircraft categorization essentially reflected the main participants worldwide with Sport Aero category involved in 35% of the accidents, followed by a total of 50% various vintage category aircraft. The single largest change to the historical trends was that for the first time in close on 100 years, no fighters were involved in airshow accidents worldwide.

What was of concern was the fact that vintage aircraft as a category, as was the case in 2011 and 2012, continued to make up 50% of the aircraft types involved in the accidents and incidents, this being 30% greater than the historical norm and is more than likely going to be the trend in the short to medium term. Since there has been a significant increase in vintage aircraft on airshow circuits worldwide, this is to be expected.



REVIEW OF AIRSHOW ACCIDENTS 2013

1. **JANUARY 23: ZIVKO EDGE 540 (SAN SALVADOR, EL SALVADOR)**
Mechanical failure has no respect for its victims, high time or low time, experienced or inexperienced as engine failure claimed Kirby Chambliss as its next victim. The five times US National Aerobatic Champion; 2004 and 2006 Red Bull Air Race World Champion was preparing for the *Ilopango Air Show* in formation with wingman Skip Stewart, when he lost the engine and was left with very few landing options in rough terrain. He was fortunately able to walk away, despite the aircraft being totalled.

The plane crashed into small trees and flipped over. The airplane was badly damaged, but Kirby extracted himself and walked to a clearing. I immediately called for the rescue helicopter and they were there very quickly; a testament to the readiness of the El Salvadorian military.¹



Despite inhospitable territory, the first responders were able to access the downed aircraft quickly. (El Salvador.com)

¹ EAA The Spirit of Aviation+, Chambliss Reportedly OK After Crash in El Salvador, 23 January 2013.



Investigators at the scene of replica Spitfire crash. (Simon Cross)



The barrel roll is often not given the necessary respect it deserves, particularly the coordination between roll and pitch rates versus closing velocity with the ground.

2. **MARCH 02: SUPERMARINE SPITFIRE MK 26 REPLICA (ADELAIDE, AUSTRALIA)** A replica 80% scale Supermarine Mk.26 Spitfire went down in an Adelaide parking lot resulting in a fatal injury to the pilot, owner and builder, Roger Stokes who was landing on conclusion of his show at the *Classic Fighters Airshow* at Parafield. About 30 privately owned vintage planes took part in the show which was raising funds to restore a World War II American Corsair fighter retrieved from Vanuatu and also to commemorate 103 years since the first powered flight in South Australia.

Prevailing weather conditions were extremely gusty and challenging; a number of pilots decided against flying their displays due to the conditions. Before the display, the pilot had apparently verbally expressed his concern about flying in such conditions but nevertheless continued, despite his concerns. A number of pilots, including a T-6 and Tigermoth pilot, decided against flying their displays due to the conditions.

This accident once again raises several questions; why do we put ourselves at risk under uncertain prevailing conditions, why do we press ahead under conditions in which we have uncertainty about our own ability to handle the elements? Ego? Our contribution to the show must go on? Responsibility to airshow organisers?

The bottom line is that if the display pilot, or any pilot for that matter, is not in the correct mental space, then there is no show, it doesn't get more straightforward than that. The 5000 spectators were informed that the remainder of the airshow had been cancelled."²

3. **APRIL 07: ENAER T-35 PILLAN: (SANTO DOMINGO, DOMINICAN REPUBLIC)** Two Pilots Killed After Plane Spirals Into Caribbean In Front Of Horrified Spectators At Airshow, was how this accident was described in the media. In the only military airshow accident recorded in 2013, 2nd Lt Carlos Manuel Guerrero and 1st Lt Rafael Sanchez, both Dominican military pilots, were taking part in the *Air Show of the Caribbean* when, flying a left hand barrel roll, had insufficient height available to complete a safe recovery; the aircraft crashed into the Caribbean waterfront 500 metres from thousands of spectators gathered on the Santo Domingo waterfront. After the aircraft hit the water, its wings crumpled and it sank within minutes. The remainder of the two-day festival was cancelled.³

4. **APRIL 27: REPLICA FOKKER EIII EINDEKKER (HAMPSHIRE, UK)** John Day, the *Great War Display Team's* most prolific aircraft builder and among the most experienced pilots of World War I

² Australian Transportation Safety Bureau: Investigation Number AO-2013-051, updated 23 July 2013.

³ "Two Pilots Killed Plane Spirals Caribbean Horrified Spectators Air Show", Daily Mail dated 8 April 2013.

aircraft, died in a flying accident while participating in a pre-season air display practice at Middle Wallop airfield.

Flying his beautiful Fokker EIII Eindexer replica for its first appearance with the team as part of the mass formation of replica historic aircraft, a witness told the BBC: "I was returning home and saw a large number of replica aircraft doing circuits over the airfield. There were maybe a dozen or so in the air. It was unusual because they were so close together."⁴ No AAIB accident investigation report available.

5. MAY 02: ZIVKO EDGE 540 (NEW YORK, USA) The pilot of an Edge 540 single-seat aerobatic aircraft, David Windmiller, practicing for his performance in the 2013 *Bethpage AirShow* planned for the *Memorial Day* weekend, was forced to make an emergency landing on Route 231, a highway on Long Island, due to engine failure. The landing was hard; the Edge lost its propeller during the touchdown.⁵

6. MAY 05: HISPANO AVIACION HA-200 SAETA (MADRID, SPAIN) The accident occurred during an exhibition at the *Foundation Prince of Orleans Airshow*, which was repeated every first Sunday of each month. Some 3,000 spectators watched in horror as the vintage jet trainer failed to pull out safely from a left hand wingover, impact the National Police Force helicopter hangar at the Cuatro Vientos airfield and explode in a fireball.

The pilot, Ladislao Romero, an experienced jet display pilot and assistant to the Defence Minister, subsequently succumbed to serious burns while eight spectators were treated for injuries.

Rapidly responding to the crash scene, first responders heard him say: "I am alive but trapped," - it was the last thing they heard from him. The intense heat of the fire prevented fire-fighters from extinguishing the fires. Another group of fire fighters rapidly extinguished the fire on the side of the police hangar, which housed several helicopters, as well as fuel.⁶

Most display pilots do not really consider the myriad of challenges facing first responders and fire fighting crew and fly at airshows with the general understanding that first responders will arrive within the first few seconds of impact and be able to extract them safely. But sadly, most of the smaller airshows only have the minimum fire fighting facilities and even if they respond immediately, the intensity of the fire may not always allow close enough proximity to the burning aircraft to enable the pilot to be extracted . particularly if the fire-fighters are not wearing fire immersion suits to enable them to wade through the flames.

One lesson that can be learned from some of the accidents in 2013 is that fire fighting crews MUST be on cockpit standby at all times during a flying display since time is of absolute importance in preventing fires from starting or extinguishing existing fires. This of course implies that they are also all wearing the appropriate fire fighting suits. A critical consideration must also be the rate of fire



The rapid rate of post impact fire propagation implied that the aircraft had burnt out before emergency rescue teams could respond appropriately. (Nick Bayes)



Six vehicles which were parked in front of the hangars were destroyed by the Saeta. (Baciú Cristian / Demotix)

⁴ "Pilot Killed After First World War Replica Aircraft Crashes Near Airfield During Display Practice", MailOnline, Mark Deull, 28 April 2013.

⁵ NYDailyNews.com, "Pilot lands perfectly . on a Long Island Highway", 2 May 2013.

⁶ MailOnline, "Horror at Madrid airshow as thousands watch historic jet plunge to the ground and explode in huge fireball", dated 5 May 2013.

propagation during windy conditions which exacerbates the threat to pilot survival. Can there be an excuse for the death of a display pilot by fire after having survived the impact?

7. **MAY 19: PITTS SPECIAL (ADANA, TURKEY)** Turkey's Anadolu News Agency reported that Murat Ozturk, one of Turkey's most experienced display pilots, was killed during an airshow in southern Turkey. The airshow was part of public holiday festivities marking the *94th Anniversary of the War of Independence*. From the video, the Pitts recovered successfully from a two-turn left spin, but insufficient height was available to effect the recovery pullout safely. The Pitts crashed into an adjacent corn field; there were no other casualties.⁷

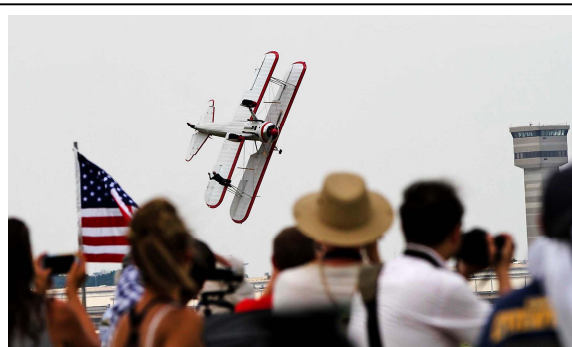
8. **JUNE 01: SAAB 91C SAFIR (SODERHAMN, SWEDEN)** The pilot died when a vintage Swedish Air Force SK50 trainer crashed shortly after takeoff at the local *EAA Airshow* in front of approximately 500 spectators. He reported engine trouble after takeoff for his demonstration flight, attempted a turn-around but was too low and too slow; the Safir stalled at about 300 ft agl and impacted the forest about 150 feet from the runway and was consumed by fire. The airshow was cancelled after the accident.⁸

9. **JUNE 02: EXTRA 330SC (MOSCOW, RUSSIA)** The pilot was killed when his Extra crashed near Bolshoye Gryzlovo airfield outside Moscow during an airshow after failing to recover from a spin. It appeared that he was doing a "Cravat", aka, "Nectie" (Xavier de Lapparent in "The Four Minute Freestyle").

Analysis of the video, he pulled up vertically, started rolling to the right and then, as it apexed out after three upward spiral turns, he put the aircraft into an upright left spin. The aircraft completed two turns of the spin and a significant nose down pitching moment indicated positive spin recovery followed by a positive recovery pullout, but with insufficient height available, the aircraft impacted in a flat attitude and came to a stop directly in front of the horrified spectators. Amazingly the aircraft remained essentially intact.

Energy management correlated with sight picture (attitude) management and constant cross referral to the decision making energy gate remains the most important survival consideration for a display pilot. Had he commenced recovery from the spin just a half turn sooner, he would most probably have been able to pull out safely.⁹ Once again, the proverbial fifty feet would have possibly been sufficient to complete the recovery safely.

10. **JUNE 22: BOEING STEARMAN IB75A (OHIO, USA)** The 2013 Vectren *Dayton International Airshow* was only in its third featured performance of the day when the popular wing-walker, Jane Wicker, and her pilot, Charlie



Could the underlying contributory cause be attributed to a line break which the pilot was unable to recover from given the roll response of the Stearman?

⁷ *Plane Crashes at Airshow*, Associated Press, 19 May 2013.

⁸ ASN Wikibase Occurrence # 156183, dated 2 July 2013.

⁹ Russia Herald, *Moscow Pilot Dies Near Moscow*, dated 2 June 2013.

Schwenker, were killed after impacting the ground during an inverted flypast.

"I don't do it for the money..." Jane told WDTN in an interview, "I do it for the fun." She mentioned that she was engaged and planned to be married on the wing of the plane. "I'm never nervous or scared because I know if I do everything as I usually do, everything's going to be just fine," she said.¹⁰

A review of the video footage showed the airplane complete a left ~~ear~~ drop turn, positioning to cross in front of the spectators from the left. The wing walker had positioned herself on the bottom side of the lower left wing and as the 450hp Stearman approached the crowd, it rolled left to the inverted position. While inverted, the aircraft's nose pitched up slightly above the horizon and then abruptly rolled to the right and impacted terrain in a descending left-wing-low attitude. A post impact fire ensued and consumed a majority of the right wing and forward portion of the fuselage. The Saturday show flying operations were cancelled and normal operations resumed on the next day.

Closer investigation of the half-roll entry at exactly knife edge indicated excessive elevator input causing a nose deflection. Then inverted, but with the heading offset toward the crowd line, the pilot would have HAD to then make an adjustment to regain the display axis and rolled right but with a significant nose down moment. This could very well have caused task saturation with her on the wing coupled with facing breaking the show line restriction. The inverted sink rate made a safe roll recovery roll from that height, impossible.

11. JUNE 23: MXS AIRCRAFT MXS (IOWA, USA) Like the airshow community needed any more negative excitement, but John Klatt was forced to land his MXS after it suffered an engine failure at the *Quad City Airshow* at the Davenport Municipal Airport.

This is one of those circumstances in which an airshow pilot had bare seconds to deal with a bad and deteriorating situation. Klatt was forced to jettison the aircraft's canopy which had become coated with oil in order to regain forward visibility to land. Klatt suffered some minor burns and bruises.

12. JUNE 29: ZLIN Z-526AFS AKROBAT SPECIAL (FINOWFURT, GERMANY) The pilot of the Zlin at the *Roadrunners Race 61* died when the airplane impacted the ground while transitioning from the inverted to the erect during a low level, inverted flyby. This was the second airshow accident in the previous two weeks in which a pilot appeared indecisive while inverted and in which the required attitudinal sight picture was not maintained. In both cases the pilots appeared to have had enough energy to push upwards before rolling upright, but did not, instead decided to complete the roll. Could this be a case of planned continuation bias?

Video footage showed the Zlin making the inverted fly-by and then during the left half-roll to erect, the nose scooped significantly and the right wing clipped the ground sending the aircraft somersaulting into a row of solar panels, killing the pilot instantly.

The "*Rock 'N' Race*" festival involved rockabilly music and drag racing. Organizers of the event cancelled the racing portion of the event following the accident.¹¹



John Klatt's canopy less MXS safely on the ground after the engine-out forced landing.



There seemed to be some misunderstanding about whether this Zlin display was part of the official programme or not.

¹⁰NTSB Identification: CEN13FA274 14, Boeing-Stearman IB75A, retrieved 9 December 2013.

¹¹ASN Wikibase Occurrence # 157335, dated 29 Jun 2013, retrieved 16 December 2013.

13. **AUGUST 17: INTERSTATE S-1B1 CADET (PENNSYLVANIA, USA)** An Interstate L-6 Cadet (Grasshopper) was in the *Parade of Planes* at the *Lancaster Community Days Airshow*, an annual aircraft showcase at the Lancaster Airport, when it crashed on the runway during takeoff, approximately 100 yds in front of the 1,000 spectators. Although the aircraft was significantly damaged, the pilot, Ricardo Argente, was not injured.

According to Argente, he was No.5 in a formation takeoff of six, all of which were vintage military spotter aircraft. He was about 75 feet behind the preceding aircraft during the initial climb after takeoff when at about 10 ft agl, he noticed the airplane had drifted to the right of the runway centreline, which he immediately corrected and at approximately 35 ft agl, he encountered severe turbulence and the aircraft abruptly rolled to the left. Unable to regain control, the airplane impacted the runway with the left main undercarriage and came to a quick stop.

The aircraft hit the ground hard and came to rest on the paved portion of the runway about 30 feet past the initial impact point; the left wing leading edge spar was cracked, the left main undercarriage had collapsed, the right main landing gear strut was bent and the propeller was damaged."¹² The airshow was temporarily shut down until the wreckage had been cleared from the main runway intersection. Speculation was that the wake turbulence from the preceding four aircraft may have led to the crash.



Wake turbulence from the preceding four aircraft in the formation takeoff was most probably the primary cause of the loss of control.

14. **AUGUST 17: MESSERSCHMIDT BF-109: (ROSKILDE, DENMARK)** A vintage BF-109 experienced engine problems during a display at an airshow in Roskilde and with little height available for positioning, carried out the inevitable off field emergency belly landing in a field adjacent to the Roskilde Airport. The pilot was not injured.

15. **AUGUST 24: UDET FLAMINGO REPLICA (TANKOSH, GERMANY)** The Udet U-12 Flamingo replica of the Deutsches Museum, fitted with an authentic Siemens-Halske engine, came to grief at Tankosh, injuring three, one seriously; it also took out a tail of a motorised glider parked alongside the runway. The close proximity of the participants and spectators was a recipe for disaster but by the grace of God, there was no loss of life.



Mechanical failure remains an ongoing threat to the replica/vintage category of aircraft.

16. **AUGUST 31: BLERIOT XI (DITTINGER, SWITZERLAND)** Demonstrating early historical aircraft remains a challenge for two reasons; the first, the antiquated aerodynamics with concomitant low stability margins and control power and then secondly, the low power to weight ratios which make the aircraft susceptible to strong winds, downdraughts, turbulence, density altitude, etc.

¹² NTSB Identification: ERA13LA366, August 17, 2013: Interstate S-1B1 retrieved 16 December 2013.



Directional control on tail draggers, particularly the vintage aircraft in which stability and control is at best marginal, will continue to challenge display pilots.



The fickleness of vintage aircraft performance and handling poses an insidious threat to the display pilot under adverse atmospheric conditions.



Inadequate safety margins between the spectator enclosure and the performing truck contributed to the deaths as the rogue truck ploughed into the spectator enclosure at a Mexican airshow. (Reuters)

Another world renowned early vintage aircraft pilot, Mikael Carlson's skills were tested to the limit when the Bleriot XI entered a downdraught from surrounding valley during his display; the low excess power was inadequate to develop a countering climb. There was no other alternative but a landing in the adjacent corn field, damaging only the propeller and undercarriage.

Carlson egressed from the overturned Bleriot and waved to the crowd to indicate that he was not injured. The early Anzani-powered Bleriot's suffered from a problem in that they did not have sufficient power to get the air flowing across the wings fast enough to give good control authority. Carlson's aeroplane had a 50 hp Gnome, which being a rotary, had sufficient torque, much more so than the 24-30 hp Anzani-powered examples.

17. SEPTEMBER 07: FLEET 7 BIPLANE (VIRGINIA, USA) A 1929 Fleet Model 7 biplane skidded off the runway and overturned when one of its main landing gear brakes locked after landing upon arrival at the *Louisa Airshow*, Freeman Field. Both the pilot, Bryon Stewart, and his passenger walked away with no injuries and the airshow continued as scheduled.

The pilot reported that following a normal crosswind landing on runway 27, the airplane began to veer to the left. Following an application of right rudder the airplane continued to the left and departed the left side of the runway into the grass, struck an embankment, nosed over, and came to rest inverted causing substantial damage to the vertical stabilizer.¹³

18. OCTOBER 05: MONSTER TRUCK (CHIHUAHUA, MEXICO) An out-of-control monster truck shot into a crowd of spectators at a Mexican airshow, killing at least eight people and injuring eighty others, dozens of them seriously. The driver was detained on charges of manslaughter after having appeared to have lost control of the truck after leaping over cars it was crushing during a demonstration at the "*Extreme Aeroshow*".

The truck made an initial pass over two cars, then making a second pass at higher speed, coming down sharply nose-first and bounced violently before piling straight into the crowd, which stood directly in the path of the monster truck, unprotected by any wall or barrier. Some witnesses said the driver appeared to have hit his head on the interior of

¹³ NTSB Identification: ERA13LA418, Fleet 7, N9433, retrieved 17 December 2013.

the truck, which is nicknamed "Big Show," as he drove over the old cars.

The airshow was cancelled after the accident. The prudent question: %s it necessary to provide such alternative acts at an airshow? Are the offerings of an airshow so low that alternative sources of adrenaline generation are required to get fare paying spectators through the gates? Are the appropriate safety mechanisms and oversight in place to protect the spectators and other aircraft from such unrelated activities? Sadly, the reputation of airshows can only suffer following this type of accident.

19. OCTOBER 12: EXTRA EA300 (SECUNDA, SOUTH AFRICA) In a remarkably similar accident to the Extra 330 accident in Moscow in April 2013 in which the aircraft 'pancackedqin after not having sufficient height for the pullout from an erect spin, world renowned display pilot, Glen Dell, perished in the post impact fire of an accident.



The burnt out wreck of the Extra 300 at the Secunda Airshow was all that remained after impact. (YouTube)



The two parachutists taxi out on the Stearman for the display at Tampa Airport.

Pulling into 45° upline and apexing with a 3-tumble Lomcevak, the aircraft, for a reason as yet not established, transitioned into a four turn inverted spin. Dell was able to recover from the inverted spin but with insufficient height to effect a recovery, the Extra 300 impacted adjacent to the runway. A post impact fire started and by the time the fire-fighters were in position to extinguish the fire, Dell had sustained major burns and died a few hours later after having been uplifted by helicopter to hospital. No CAA accident investigation report available.¹⁴

20. OCTOBER 19: PARACHUTIST (FLORIDA, USA) A parachutist, Marc Curto, fell to his death when his parachute failed to deploy during an airshow north of Tampa. The accident occurred near the Topp of Tampa Airport. A witness told ABC Action News he saw two wing walkers on the biplane as the plane made a manoeuvre around 1,000 feet in the air. The victim fell from the plane and his parachute never deployed.

The Stearman, with two wingwalkers onboard, had been airborne for five to ten minutes. An eye witness reported: "I looked off in the distance and I saw something fall from the plane. I had no idea it was a body." The yellow and blue Stearman biplane circled the area where the wingwalker fell, in an apparent attempt to see the precise location of where the parachutist fell.¹⁵

21. 09 NOVEMBER 2013: AVRO 504K (MASTERTON, NEW ZEALAND) It was during

the afternoon event at Hood Aerodrome, the opening weekend of the *Vintage Aviator Fighter Collection* showcase while practising for the 15 November display when the 1917 vintage Avro 504K, an original Avro 504, powered by a 100HP Gnome rotary engine and New Zealand's oldest aircraft, suffered a power loss after takeoff in the climb at about 200 ft agl. The engine began to run roughly and fade due to over-richness leaving the pilot with no other alternative but an emergency landing. The pilot turned onto a longer grass vector and landed in the distance remaining, however, the landing was heavy causing some damage but fortunately without injury to the pilot.¹⁶

¹⁴ New24, %Aerobatic Pilot Dies After Airshow+, 12 October 2013.

¹⁵ Abc7News, %FAA: Wingwalker falls to death from biplane during airshow+, dated 19/10/2013.

¹⁶ %Pilot escapes crash of unique WWI fighter+, Wairarapa Times-Age, Nathan Crombie, 3 November 2013.

Conclusion

2013, a year of mixed fortunes, of significant reduction in the number of accidents but this was offset by the inordinate number of engine mechanical failures. It was a year in which despite the adverse effects of sequestration reduced military participation, a high level of safety oversight was applied by airshow organisers, air bosses and safety officers, however, the issue of first responder response to the fire fighting challenges imposed by burning aircraft MUST be addressed as a matter of urgency, including fire fighting equipment, personal protection suits and cockpit readiness in anticipation of immediate response.

Of the twelve fatal accidents, 25% of them (#s 7, 9 & 19) resulted from intentional spin/tumble/gyroscopic manoeuvres which went wrong and from which there was insufficient height to recover; it would be prudent for display pilots to remember the hazards of performing spin/tumble/gyroscopic manoeuvres with little margin for small variations that could lead to extra height loss during recovery. The energy loss in a tumble/spin is a variable that must be investigated scientifically in an effort to provide quantitative planning information to the display pilot.

In addition, the introduction of peripheral adrenaline generating events such as monster cars, racing events, skydiving, etc, must receive the same amount of oversight and regulation as for display flying in an effort to protect the spectators from injury. The Udet's loss of control during takeoff at Tankosh (Ser # 15) once again raised the issue of spectator proximity to the aircraft dispersal area and the display line, particularly at the smaller rural airshows in which regulatory oversight is somewhat less strictly policed.

Dealing with such issues holds the potential for quick wins well within the capabilities of airshow organisers, safety officers and display pilots which can ultimately contribute to driving an agenda for zero airshow accidents per annum.

Safe airshows 2014!