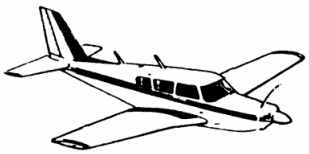


THE INTERNATIONAL COMANCHE SOCIETY
AUSTRALIAN TRIBE FLYER

Volume 13, Number 1 Jan 2007

TRIBE CHIEF'S REPORT

Well another year has gone and the older I get the quicker they seem to pass.
Jan and I would like to pass our best wishes on for a happy and prosperous 2007, I am sure that all our country members in particular would like to see a good break in the season from this ever increasing drought we have at the moment.

Our conference held in August in Hamilton Island turned out to be an excellent event. Our total number of participants was 151 made up of approximately 100 Australians and 50 International guests from 7 countries. We had a total of 33 aircraft assembled on the Hamilton Island airstrip which was the largest number of aircraft at one time on Hamilton Island Airport. Congratulations to the flagship winners. I would like to particularly thank the very hard working convention committee for their devotion and hard work over many months prior to and during the convention. also to our convention organiser Jodie Parker. Financially the convention showed a modest profit which has gone into our consolidated revenue of the Australian Society.

Since our last newsletter we have finally succeeded after a number of years in obtaining an STC for our trunnion legs, on the 31st October 2006. I believe this to be a very important step forward for our Australian Society as with a little bit of additional paper work from CASA we will be able to export these into the USA very shortly. Currently we are holding 14 new trunnions in stock with Roy Sneesby.

Last year we also saw CASA and various organisations discussing self regulation for all, or part of, the GA fleet within Australia. I think there is a lot of water to go under the bridge before any resolutions will come about in this regard. With this in mind the society has become a member of Australian General Aviation Administration inc. (This was formally Leisure Flight Australia) so that we can keep abreast of these developments.

Elsewhere in this Flyer you will see details of our next fly-in to be held at Khancoban in the upper Murray district on 9th & 10th March 2007. .
I encourage as many members as possible to come to this lovely location and town.

November saw our last proficiency programme which was held at Deniliquin, with 19 members participating in both the Module 1 and Module 2 courses, without doubt I think this was the best course we have held so far. I would like to thank all those members who attended and for the great work that the presenters and instructors do towards making these weekends so successful. At this stage our next course is scheduled for November 2007, however if there is sufficient interest shown we could put on an earlier course. During the conference at Hamilton Island, our American Members were very impressed with our course and as a consequence, one of their members Zach Grant has flown out to Australia and is spending a weekend with Lawrence Paratz and Ken Holdsworth in Melbourne to write a programme for American members similar to our proficiency course notes. My

wife Jan started to do a Pinch-hitter course with Rick Wedgewood and I believe there might be scope for other member's wives and/or partners to participate in this venture, if they wish to do so.

In the week prior to Christmas our tribe was extremely pleased to welcome Dr. Wojciech Mirski who successfully navigated his beautiful 260C HB-OFU from Switzerland, through Africa, Asia and on to Australia. HB-OFU will now be in Roy Sneesby's care for a few months until Wojciech comes back to continue his round the world flight across the South Pacific to South America and beyond. Many thanks to those members who hosted and helped Wojciech during his brief stay in Australia.

Safe flying.

John Macknight. Tribe Chief.

EDITOR'S REPORT

This is the first Flyer for a while and the first for 2007.

The International Convention in 2006 was a great success but pretty much took over the year. Back to normal for the flyer for 2007.

I have put all sorts of stuff in this Flyer including the picture below of Wojciech Mirski arriving at Moorabbin late December. An incredible feat of flying and endurance. Wojciech flew in his 260 from Switzerland to Australia visiting many countries (many of them in Africa) not for a race but for an adventure. He is a very interesting fellow and details of his trip can be found on Flying-doctor.ch

Thanks to John Moore, John Macknight, Don Dewar, Nigel Wettenhall, and Ian Thompson for material for the Flyer. Keep it coming.

Wojciech and Ed

Tony Read

== Coming Events ==

9th, 10th & 11th March 2007	Autumn Fly in	Khancoban
November 2007	Proficiency Course	Denniliquin

AUTUMN FLYIN 2007

Khancoban has been selected as the venue for our Autumn Fly In, on the weekend of 10 / 11 March 2007.

For those who missed our last visit to Khancoban in 1998, it is a perfect Autumn destination offering a delightful climate and superb Autumn colours. We have arranged accommodation at the Khancoban Alpine Inn for Friday and Saturday nights, and have organised a tour to the Murray 1 Power Station and surrounding areas on Saturday from 0900 till 1530. Dinner Friday and Saturday is at the Hotel and transport to and from the strip to the hotel is provided.

Socialising, boating, walking and swimming (for the brave) can fill in any spare time.

Total cost of accommodation, meals and tour is $220 per head. All bookings please ring John Macknight on 03 5881 6000 or Nigel Wettenhall on 0427 362428 by 28th February 2007. Please book accommodation through us rather than calling the hotel direct.

Strip details are in the AOPA guide, for any additional information call John or Nigel.

We hope to see as many as possible for great weekend.

REPORT ON RECENT FLYINS

Australian Convention a Great Success

Around 150 delegates and 33 aircraft assembled at Hamilton Island, just off the Queensland coast, in early August for the 2006 International Convention, the second such event hosted by the Australian Tribe.

The word "International" in the ICS name was underscored with seven countries represented – Australia, Canada, Germany, New Zealand, Switzerland, United Kingdom and the United States.

Hamilton Island proved to be an ideal location. The resort offered a very relaxed atmosphere, excellent facilities, easy access to the Great Barrier Reef, good accommodation and best of all, its own jet capable airport within walking distance. Flying in was easy whether on the airlines or by Comanche.

Despite the recent upsurge in security measures at Australian RPT airports no problems were encountered by our visiting Comanche pilots. The YBHM staff went out of their way to help and all airside activities went off without a hitch.

Alan Breen contributed to the international flavour by flying his well maintained PA30 across the Tasman Sea from New Zealand via Norfolk Island to Brisbane, and then up the coast to Hamilton.

Unseasonal, blustery winds made conditions on the first couple of days slightly uncomfortable, especially on the 35 nautical mile catamaran journey out to the Reef. Three metre (10ft) waves challenged the seaworthiness of delegates but most came through unscathed.

Conditions at the Reef improved during the day providing the many snorkellers with a great view of the brilliant coral and abundant fish life.

Perfect conditions prevailed for the second boat trip to Whitehaven Beach on nearby Whitsunday Island where white, almost pure silica sand stretches for six kilometres. It was a wonderfully relaxing way to spend the last day.

A highlight amongst highlights was the Gala Dinner and Bush Dance held in the hangar with entertainment provided by the very popular Briagolong Bush Band. It was a major departure from the traditional formal dinner but greatly enjoyed by everybody. The mood was buoyant and the dance floor crowded.

Guest speaker for the night, Captain Glenn Todhunter, inspired all with his story of fighting back after a double leg amputation to again fly fixed and rotary wing aircraft for the Australian Army.

Speakers and seminar presenters were of an exceptional standard, making the formal sessions both interesting and entertaining.

We were greatly honoured to have the official opening performed by a former Deputy Prime Minister of Australia, Tim Fischer, thanks in no small part to the influence of our Tribe Chief, John Macknight. Mr Fischer is a speaker who both entertains and informs and his presentation at Hamilton Island was no exception.

Ferry pilot extraordinaire, Aminta Hennessy, gave us a revealing insight into the world of transoceanic light aircraft pilots. Did you know for example, that the fuel from the ferry tanks is fed into aircraft's tanks via a line running outside along the leading edge of the wing and through a modified cap? The reason? To avoid any disturbance of the aircraft's fuel system.

Australian Tribe member, Dr Tony Van der Spek, spoke about how pilots can take some simple measures to maintain their health and remain fit to fly into old age. Elements of his talk were based on recently published research. The information was welcomed by delegates as very useful.

Mike Gahan took us inside the world of air traffic control with special emphasis on planning for a future air space system. It was something of a revelation to understand the breadth of considerations required. The proliferation of unmanned aircraft is a major issue that most of us would not have thought about.

Australian Technical Director, Roy Sneesby, is a font of knowledge. He focused mainly on the Comanche landing gear system using many unassembled parts to demonstrate his points. Most Australian members have heard him speak frequently but we always find there is something to learn and understand. It's fair to say the reduction in landing gear incidents (touch wood!) in Australia over recent years is largely due to his work.

Thanks to now ICS President, Lawrence Paratz, we welcomed the attendance of Lycoming South Pacific and South-east Asia representative, Adrian McHardy. He spoke candidly of developments Lycoming has in store and in a nutshell it's good news. Most importantly, he assured us that all enhancements of their technology will be retrofitable.

Adrian was most generous with his time. It was a golden opportunity for Comanche owners to discuss engine issues.

Informal feedback from delegates was very positive. The island resort environment provided the perfect blend of space and proximity. It was a relaxing setting but delegates roamed around a relatively small and confined area which encouraged mixing.

On behalf of the organising committee I extend a big thank you to the delegates who made it such a successful the event. We know Australia is "at the bottom of the world" and appreciate the considerable effort made by our northern hemisphere friends to attend. And our Australian Comanche owners also deserve a special commendation – well over half the total membership attended.

We are also indebted to our Professional Conference Organiser, Jodie Parker of Iceberg Events, who worked on the project from early 2004. The smooth running both before and during the Convention was due in the main to her efforts and those of her staff. We recommend strongly to future Convention planning committees that they consider employing professional assistance.

When we started planning this Convention four years ago we set out to provide a uniquely Australian experience, something different. Monica and Friedrich Rehkopf from Germany sent a note to the committee after their return that suggests the goal was achieved: *"We enjoyed the Convention, the setup, the venue, the people, the weather, the food, the entertainment and just everything immensely. Your convention was so refreshingly different and exceptional"*.

We hope everyone enjoyed the Convention as much as we enjoyed hosting such a wonderful group.

FLYING ARTICLE

From John Moore

What art thou, O thunderstorm? A thunderstorm is a really big cloud that can ruin your day faster than you can change your mind! Often called nature's heat engine, thunderstorms are born from cumulus clouds that grow into towering cumulus to ultimately reach adulthood as cumulonimbus (CBs). The environment from which they grow must be warm, moist, and unstable. A lifting mechanism such as fronts, sea breezes, and mountains are needed to lift the blob of warm, moist air high enough to form thunderstorms. Also, the air aloft has to be cool enough so that even as the rising air cools, it stays warmer and therefore lighter than the surrounding air. This is what instability or an unstable air mass means. The humidity in the rising air condenses to form clouds, rain, ice crystals, and finally a thunderstorm is born. While thunderstorms occur anytime during the year, they most often occur in the late afternoon to early evening on a hot summer day. They can form by themselves (single-cell, ordinary, or air mass), or in clusters (frontal, squall lines, or mesoscale convective complexes, called MCC for short).

Thunderstorms harness energy that is equal to and often greater than the energy released by any atomic bomb dropped on Japan in WWII. Thunderstorms present the aviator with all known meteorological hazards, any of which can cause an aircraft to make an unscheduled reunion with planet earth, most likely with an undesirable outcome. While thunderstorms can wreak havoc through a variety of weaponry, I want to share with you the weather guy's point of view of how and why these hazards occur and what you as an aviator can do if you find yourself surrounded.

Everything that is done in aviation (and, for that matter, life in general) is influenced by the weather. Go/No-Go, or selection of a route and altitude is based upon weather considerations. Runway selections are made to take advantage of favorable winds. Destination minimums, the approach flown, and the selection of an alternate is based on the prevailing and forecast weather conditions. Avoiding thunderstorms is critical for safe operations and a safe flight.

Thunderstorms come in all shapes and sizes, from cells only a few miles in diameter to clusters of storms that can stretch hundreds of miles across. A typical thunderstorm produces a brief period of heavy rain and lasts anywhere from 30 minutes to an hour. A thunderstorm will consists of one or more convection cells, these cells each progress through a life cycle which is divided into three stages:

1. Cumulus or developing stage

2. Mature
3. Dissipating

In limited detail, the cumulus or developing stage consists of an updraft. This causes the "puffy" cumulus to appear and grow. The diameter of the cell grows to typically between 3 and 5 kilometers. This early stage is characterized by turbulent air and--if above the freezing level--clear icing. Already flexing its young muscles, the thunderstorm moves into the mature stage. Both a warm updraft and a cool downdraft are present. The cell diameter typically grows to between 5 and 10 kilometers between the developing and mature stages. Lightning, severe turbulence and icing are now present. Depending on the severity, hail maybe present as well. In the dissipating stage, mid-to-low levels are dominated by downdrafts, which erodes the cloud base. The mid-to-upper levels of the thunderstorm are dominated by weakening updrafts while the outflow from the convective downdraft may generate enough lift to create a new thunderstorm, and just when you thought it was safe!

How Does This Affect an Aviator?

Where to begin? Turbulence, one of the most significant hazards in a thunderstorm, is encountered as a result of the tremendous updraft and downdraft winds that are associated within the thunderstorm. Studies of the structure of thunderstorms indicate that the most severe turbulence that an aircraft may encounter in a thunderstorm will be at approximately 8,000 to 15,000 feet above the terrain.

The strongest updraft winds are usually located at or above 10,000 feet, with updraft winds in excess of 65 feet per second producing extreme turbulence. Roller coaster intensity, but without the tracks! Downdraft winds can also produce turbulence, but they are generally less severe and occur in the lower altitudes below 10,000 feet. The hazard here is the downdraft can "push" a plane into the ground, and it doesn't care whether there's a runway nearby. The intensity of flight level turbulence seems to be directly related to the intensity of the precipitation in the thunderstorm, i.e., the heavier the precipitation, the more severe the turbulence.

Tail section of an Air Force C-141 after going through extreme turbulence.

The hazards of thunderstorms are not limited to the thunderstorm itself. Several miles surrounding the thunderstorm can present hazards equal to those found within the thunderstorm. Outside the cloud, shear turbulence can be encountered several thousand feet above and 20 miles laterally from a severe storm. Low-level turbulent areas can be found in the shear zone associated with the gust front, often indicated by the presence of a "roll cloud" on the leading edge of a storm. The roll cloud marks the top of the eddies in this shear and it signifies an extremely turbulent zone. Gust fronts often move far ahead (up to 15 miles) of associated precipitation. The gust front causes a rapid and sometimes drastic change in surface wind ahead of an approaching storm. This is called low-level wind shear and is the result of a phenomenon called microbursts.

Roll cloud. The dark leading edge of a thunderstorm indicates the presence of a gust front, which is caused my a microburst. This feature is a visual indicator of low-level wind shear.

Microbursts are small-scale intense downdrafts that on reaching the surface spread outward in all directions from the downdraft center. However, the greatest threat from downdraft often occurs in front or leading edge of a thunderstorm. This causes the presence of both vertical and horizontal wind shears that can be extremely hazardous to all types and categories of aircraft, especially at low altitudes. Due to their small size (less than one mile to 2.5 miles), short life span (generally less than 15 minutes), and the fact that they can occur over areas without surface precipitation, microbursts are hard to detect using conventional weather radar or wind shear alert systems. The intensity of the downdraft can be as strong as 100 feet per second. Horizontal winds near the surface can be as strong as 45 knots resulting in a 90-knot shear (headwind to tailwind change for a traversing aircraft) across the microburst. The parent clouds producing microburst activity can be any of the low or even middle layer convective cloud types. It doesn't have to be a thunderstorm that produces them, but that is the most common. A major consideration for pilots is the fact that a microburst will intensify for about 5 minutes *after* it strikes the ground.

An another dangerous weather phenomenon that thunderstorms produce is hail. Hail is regarded as one the worst hazards of thunderstorm flying, as if turbulence wasn't enough. Hail is generally found at about the 10,000 to 15,000 foot levels above the terrain, with the greatest frequency of hail occurring at the mature stage of the thunderstorm. Hail can produce serious structural damage to an aircraft in a few seconds, especially if the hail is large. In severe thunderstorms (hail greater than 3/4in and/or wind gusts 50kts or greater), hail may be encountered in *clear air* as much as five miles in advance of a thunderstorm! And just when you thought bird strikes were troublesome.

Hail damage to one of NOAA's P-3 "Hurricane Hunters." Click on image for a larger view.

Icing is another significant hazard of flying through thunderstorms. Icing generally occurs in the mature and dissipating stages in the middle levels of the thunderstorms where the temperatures are between 0 to -15 degrees Celsius. Due to the extreme nature of icing, an aircraft can lose its lift rapidly. Supercooled (water that exists in below freezing temperatures - its a thermodynamic thing) water freezes on impact with an aircraft. Clear icing can occur at any altitude above the freezing level; but at high levels, icing from smaller droplets may be rime or mixed rime and clear. The abundance of large, supercooled water droplets makes clear icing very rapid and encounters can be frequent in a cluster of convective cells. Clear icing can be extremely hazardous, extremely quickly.

So if you are in or near a thunderstorm, there must be lightning present. Lightning can be a deadly hazard to the aircraft flying through a thunderstorm. It is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt." Most of the lightning people see takes place between a cloud and the ground. But lightning also occurs within a cloud, between a cloud and the air, and between two clouds. When lightning occurs in the atmosphere its electrical energy scatters in the

air and can cause damage to passing airplanes. Lightning discharges occur most frequently near the freezing level in the thunderstorms. Lightning can do considerable damage to an aircraft. It can destroy radio equipment and cause onboard fires. The probability of lightning strikes occurring to aircraft is greatest when operating at altitudes where temperatures are between minus 8 degrees Celsius and plus 8 degrees Celsius. (Area where the separation is greatest between positive and negative charged ions) Lightning can strike aircraft flying in clear air in the vicinity of thunderstorms. A bolt of lightning can discharge about 100 million volts of electricity and heat the air to over 60,000 degrees Fahrenheit in a split second. It can literally light up your life!

- At any given time there are an estimated 2000 thunderstorms in progress, mostly in tropical and subtropical latitudes.
- About 45,000 thunderstorms takes place each day.
- Annually, The U.S. experiences about 100,000 thunderstorms.
- About 16 million thunderstorms occur annually around the world!
- The lightning from these storms strikes Earth about 100 times each

Lesser-known affects of thunderstorms include, effect on Altimeters. Pressure usually falls rapidly with the approach of a thunderstorm, then rises sharply with the onset of the first gust and arrival of the cold downdraft and heavy rain showers, falling back to normal as the storm moves on. The pressure changes are the result of large temperature fluctuations. This cycle of pressure change may occur in 15 minutes. Altimeters may be more than 100 feet in error in a very short distance. Not a good thing in IMC during an IFR approach.

Engine Water Ingestion. Turbine engines have a limit on the amo unt of water they can ingest. Updrafts, as mentioned earlier, are present in thunderstorms, particularly those in the developing stages. If the updraft velocity in the thunderstorm approaches or exceeds the terminal velocity of the falling raindrops, very high concentrations of water may occur. In English, the upward vertical wind is able to suspend water droplets in a particular area of the cloud allowing for a buildup of water. It is possible that concentrations of water can be in excess of the quantity of water that turbine engines are designed or are able to ingest. Therefore, severe thunderstorms may contain areas of high water concentration, which could result in flameout and/or structural failure of one or more engines, probably not a good thing.

What's a pilot to do?

If thunderstorms are forecasted, take note (read the great article in Approach, April 2002, page 8) If you have to deal with thunderstorms during any part of the flight, here are some recommendations.

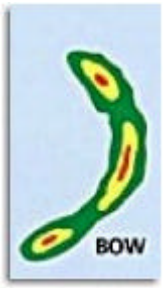
Most military aircraft are equipped with weather radars. Learning how to interpret those wicked little storms can be a lifesaver. But please remember that radar will not sense the following features due to very small diameter of the droplet or crystal:

Small cloud droplets-- Fog
Ice crystals-- Small dry hail or graupel (granular snow pellets)

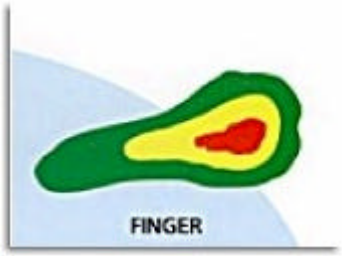
If in IMC, the radar becomes primary method of "seeing" thunderstorms. It is therefore important to know how each type of precipitation affects what the radar is showing. Depending on the precipitation type and its movement, there are recognizable thunderstorm patterns that will show where the hazards are. Knowing what your radar is showing would allow the pilot to recognize and avoid the hazards. Again, saves soiling a perfectly good flight suit.

Avoid the following radar echo shapes. All of which indicate a severe hazard to aviation.

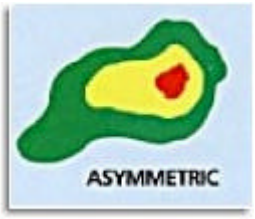
1. **Any echo with a dry intrusion (dryer air being sucked into the thunderstorm). The echo will be a "U" or "V" shape.** There are several reasons for this. Severe thunderstorms have dry air mixing in the middle altitudes, which can create an intrusion of dry air (turbulence). Hail rising and descending in a thunderstorm would also appear as a missing area cutout from the storm.



2. **Any echo with a hook or bow shape.** Hook shapes are indicative of rotations taking place within severe thunderstorms. This is a strong clue to ground weather observers that hail and tornadoes are possible. Damn, forgot to mention the possibility of tornadoes. Well you get the idea.

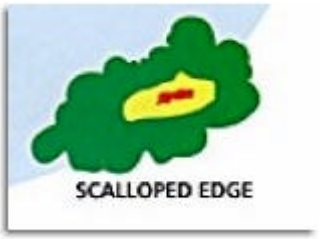


3. **Any echo with protruding "fingers"**. Like a hook, a finger shows strong possibilities for tornadoes and hail.



4. **Any echo with an asymmetric coloring and shapes.** Severe storms created by windshear aloft will tilt to one side. This gives shapes and colorings that are not even or concentric.

5. **Any echo with an "arrow shape."** Again, this is indicative of a storm with tilt and the possibility of severe weather.



6. **Any echo with scalloped edges.** Scalloped edges show turbulent motions taking place in and near the cloud. There is a good chance for hail here also.

7. **Any storm with a few VIP Level 1 dots (weak) showing nearby.** Hail falls many times outside of the thunderstorm, often in advance. Checking the winds at altitude and correlating it to the leading edge of the storm that hail will fall should help identify that potential hazard. Additionally, your radar may be attenuating and not "seeing" the true intensity of a nearby storm.

8. **Any target with changing shapes.** Rapidly growing shapes show rapid motions taking place within the cloud. Turbulence will almost always take place under these conditions.

We'll end this article with some do's and don'ts of thunderstorm flying. I hope that it has been an eye opener and/or a refresher. Please respect Mother Nature. As I have indicated, the thunderstorm represents one of the most dangerous and formidable weather hazards that the pilot must face. While the effects of a thunderstorm tend to be fairly localized, the severe weather hazards that accompany it are a definite threat to the aviation community, flight, and field operations. The ability of the AG to forecast the when and where of thunderstorm activity is of vital importance. Please take heed when the forecaster mentions the possibility of thunderstorms. Remember also, the TAF code only covers five miles around the air station. Always have an alternate plan, an escape route, because there is no true all-weather aircraft when severe weather is considered. Every pilot and aircraft has weather limitations. Nah, so it isn't so!

Do's

- Never regard any thunderstorm lightly, even when radar observers report the echoes are of light intensity.
- Do avoid by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo. This is especially true under the anvil of a large CB where hail damage and lightning can occur.
- Do circumnavigate the entire area if the area has 6/10 thunderstorm coverage.
- Do remember that vivid and frequent lightning indicates the probability of a severe thunderstorm.
- Do regard as extremely hazardous any thunderstorm with tops 35,000 feet or higher whether the top is visually sighted or determined by radar.

Don'ts

- Don't land or take off in the face of an approaching thunderstorm. A sudden gust front of low level turbulence could cause loss of control.
- Don't attempt to fly under a thunderstorm even if you can see through to the other side. Turbulence and windshear under the storm could be disastrous.
- Don't fly without airborne radar into a cloud mass containing scattered embedded thunderstorms. Scattered thunderstorms not embedded usually can be visually circumnavigated.
- Don't trust the visual appearance to be a reliable indicator of the turbulence inside a thunderstorm.
- Don't fly into virga (falling rain that does not reach the ground) where turbulence is likely.

If you cannot avoid penetrating a thunderstorm, the following are some suggestions prior to entering the storm:

1. Tighten your belt(s), put on your shoulder harness if you have one, and secure all loose objects.
2. Plan and hold your course to take you through the storm in a minimum time.
3. To avoid the most critical icing, establish a penetration altitude below the freezing level or above the level of -15 °C.
4. Turn on anti-icing devices. Icing can be rapid at any altitude and cause almost instantaneous power failure and/or loss of airspeed indication.
5. Establish power settings for turbulence penetration airspeed recommended in your aircraft manual.
6. Turn up cockpit lights to highest intensity to lessen temporary blindness from lightning.

7. If using automatic pilot, disengage altitude hold mode and speed hold mode. The automatic altitude and speed controls will increase maneuvers of the aircraft thus increasing structural stress.
8. If using airborne radar, tilt the antenna up and down occasionally. This will permit you to detect other thunderstorm activity at altitudes other than the one being flown

The following are some do's and don'ts if in the rare event that find yourself inside a thunderstorm:

Do's

- Do keep your eyes on your instruments. Looking outside the cockpit can increase danger of temporary blindness from lightning.
- Do maintain constant attitude; let the aircraft "ride the waves." Maneuvers in trying to maintain constant altitude increase stress on the aircraft.
- Avoid the altitudes with temperatures of plus/minus 8 degrees Celsius. (Highest probability of lightning strikes)

Don'ts

- Don't change power settings; maintain settings for the recommended turbulence penetration airspeed.
- Don't turn back once you are in the thunderstorm. A straight course through the storm most likely will get you out of the hazards most quickly. Besides, turning maneuvers increase stress on the aircraft.

LCdr. Ireton is the Officer in Charge at the Naval Training Meteorology and Oceanography Detachment in Corpus Christi, Texas

Note: This article in its entirety is taken from the US Naval Safety Centre Site.

TECHNICAL ARTICLE

Fuel Tank Puzzle

From John Moore

Systems knowledge is of fundamental importance to safe flying. It provides you with the ability to work out what's going on when presented with abnormal indications during flight, and to make better decisions. It can enable you to make accurate diagnoses and point your mechanic in the right direction instead of having him wandering up blind alleys at your expense.

Our Proficiency Programs are a fantastic source of this knowledge. I can't recommend them strongly enough – they have been a major source of my Comanche knowledge.

But as this story shows there is always more to learn. That's one of the great things about flying.

It really started just before the Hamilton Island Convention when EDS (PA 30 C model) went in for a 100 hourly. The main tanks were full. Ray Goulding from Goulding Airmotive in Bendigo noted some fuel staining near the right hand wing root. I hadn't seen any evidence of a failing fuel cell

previously but figured out what was happening. The aircraft had been placed on jacks in a nose down position bringing the top front of the cell in contact with fuel. In normal ground and flight attitudes the front of the cell is higher and therefore fairly dry. That's why it's often an initial failure point.

I kept watching over the next few months and saw no further evidence of staining but decided that new cells were on the agenda. I hadn't been able to smell any fuel in the cabin either but that wasn't unusual – my sense of smell has diminished in recent years.

In late November I took our 18 year old daughter, Stephanie, down to George and Maree Mills' property in Tasmania for four weeks work experience required as part of her university degree. As she climbed into the aircraft she said "what's that fuel smell, Dad?"

New cells

I decided to order two new main cells straight away. The auxes had been done before I bought the plane in about 2002 but I could find no record of the mains having ever been changed. It turned out the log books were accurate – they were the original 1969 cells with evidence of repairs on the left-hand side, but nothing on the right.

Installation was during the week before Christmas and the first flight was the retrieval trip to Tasmania on the Saturday.

All six tanks were filled for the 656 nautical mile round trip and I took off about 8.30am and climbed to the planned 9000. ATC vectored me to the east of track past Arbey to keep clear of jet arrivals for 16 at Melbourne. About 20 miles north of ML they cleared me direct ML and then as planned to CWS, and across the strait to Devonport.

At this point I selected the tips. You know the story – access fuel in the tips first because it won't be available if a solenoid or the electrics fail. I had used 33 litres since start-up. Isn't the Shadin a wonderful tool?

The trip proceeded smoothly. I was in the clear well above cloud, the air was like a millpond and the aircraft was running sweetly. It was just the antidote I needed after the usual chaotic lead up to Christmas.

Stuck gauge?

The only discrepancy I noted was that the RH tip gauge wasn't moving. Nothing terribly alarming initially because we all know how unreliable gauges are, don't we? But as Benzo passed and the cloud disappeared to reveal the best visibility I have ever seen crossing the Strait, the gauge stayed there firmly fixed to the full mark. Perhaps the float had stuck in the fully up position? After all it had been an incredibly smooth trip – nothing to shake anything loose.

Naturally, I had thought about solenoid failure but incorrectly assumed this would lead to the gauge indicating a reducing fuel level in the aux. I now know better.

Approaching the coast I advised Centre I would be tracking from Devonport direct to Longdown. But as I turned on to the new track it was clear a visual descent wouldn't be possible and I asked Launceston tower for descent on the planned track DPO - LT.

Obliging as always, they amended the clearance and advised a cloud base of 3500 with a comment that it looked good out towards Longdown. A Chieftain pilot departing in my direction said the cloud base was closer to 4500.

Things got busy as I switched from the tips to the mains for the descent (the Shadin was telling me the switch was due anyway), amended the track in the GPS, kicked out the autopilot and started down.

As the autopilot let go I noticed the right wing was heavy – the solenoid had failed after all, I thought, and there really was a full tank on the end of the wing! But then I glanced across again at the fuel gauges and noticed the RH main was well down. So the RH engine had, in fact, been drawing from the main even though the selector was in the aux position. There was an explanation if it had drawing from the aux instead of the tip, but not from the main. What had Ray and his mechanics done?

Confusion

Confusion reigned momentarily. Had the lines from the main and aux been transposed somehow? I couldn't see how this was possible and indeed it wasn't in the circumstances.

Of course, about now many of you will be saying, "he simply turned on the switch for the tip tank but left the selector on the main". Not so, on several counts. I had checked the fuel selection a number of times, as is my habit. Secondly, mis-selection would have been blatantly obvious when switching from the tips back to the mains. Most importantly however, had the selector been left on the RH main the gauge would have indicated a reducing fuel level in that tank.
But back to the descent. The first thing always is to fly the aeroplane – it was performing normally and there was no need for any immediate action. But approaching 8000 I thought it would be useful to reduce the imbalance if possible before landing. So I re-selected the RH tip. There was only about 15 minutes to go and to make any appreciable difference it would be necessary to have both engines drawing from that tank. So on with crossfeed and continue descent, not knowing with any certainty where the fuel was coming from, except that it was somewhere on the RH side. But the smoothness of the morning's flight continued with both engines purring beautifully.

I know you are supposed to use mains for climb and descent but I have never encountered any problems with either auxes or tips. However, I always use mains until the top of climb.

As predicted I became visual at 4500 and tracked for the circuit at Longdown. By the time I landed the imbalance had virtually disappeared.

Stephanie had asked what time I would be landing because she wanted to be at the strip to see the touchdown. This from a daughter who had previously been very disinterested in flying! Sure enough, she and George were strategically located for the landing – I would have to make this a good one!

Searching for fuel

Greetings out of the way, I started working my way across the six tanks. The RH tip was down about 15 litres indicating the second attempt to get at it during descent had indeed been successful. The RH aux was full – no solenoid failure - and the RH main showed it had supplied nearly all the fuel for the 120 mins trip.

The LH side was as it should have been – near empty tip, full aux and nearly full main. But what had happened? There was probably a connection with the cell change, but what? The line to the main

tank had to be open even though the selector was in the aux position. This could have happened if some grit had lodged between the ball and seat that seals the line to the main tank. The activity of the cell change provided an explanation for the introduction of debris, and reselecting the main top of descent could have cleared it.

This all made sense and eased my mind. But what if the problem hadn't resolved itself? If what remained in the RH main was the only fuel available on that side for the return trip, I would have to resort to crossfeeding from the LH main and aux to ensure there would still be fuel in both mains for the landing.

I calculated there was at least 160litres available on the LH side and an absolute minimum of 30 on the right. Quite comfortable given the forecast and I could always land at Moorabbin if necessary.

At top of climb approaching the northern Tasmanian coast I selected the RH tip again
and crossfeed on the LH side. This time the RH tip gauge showed the expected decline consistent with both engines drawing on it. Approaching Fliki in mid-Strait I gingerly went to both auxes and then carefully watched the gauges. Within a few minutes there was a flicker of movement and then they both started going down in normal fashion. The fuel system was back in business! Whatever had stopped the ball from sealing had disappeared. The rest of the flight was easy.

Plenty left

The Shadin showed there were 130 litres on board when we landed at home. Refuelling the mains and tips proved there were 46 litres left on the RH side (32 in the main and 14 in the tip) and 70 on the left (63 main and 7 tip). The auxes weren't refuelled but the calculated 14 litres remaining was consistent with the time they were selected.

After Christmas a test flight with full tips showed normal operation. There have been no problems since with either the auxes or tips.

However, one thing has still puzzled me. If both lines were open and capable of feeding fuel into the selector, why he did the engine draw from the main tank and not both the main and tip especially as the tip has a higher head?

I rang Roy Sneesby to check the technical details of this story – it's one thing to be ignorant but quite another to put that ignorance into print! At the end of our discussion I raised the issue of why did it feed from the main and not both? And as I was talking about the fuel level in the tip being higher the answer hit me like a bolt from the blue.

Comanche tanks are not vented through the cap but via separate vent lines. The line to the main tank is large and cut off at an angle to better capture pressure from the air flow while the tip tank vent line is considerably smaller and at right angles to the airflow.

Pressure above the fuel in the main tank is higher than the pressure in the tip. The problem was finally solved!

And the final comment. How often have we been told about the importance of regularly draining the crossfeed lines? You really don't know when they will be needed. Fortunately, I had done mine only a couple of flights beforehand.

MEMBERS ARTICLE

From Don Dewar

Comanche History

Testing the Comanche 400

In May 1984, the 400 Tribe held a special Flyin at Tucson, Az. to celebrate the twentieth birthday of the Comanche 400. Twentyeight 400S were in attendance and at the memorial banquet speeches from Piper old hands were read.

One was from Jay Myers who worked at the Loch Haven plant for 29 years, 21 of them as a test pilot and the rest as a mechanic. He was 75 in 1984 and taped this story of the 400 testing, which for the interest of current members I have reproduced below.

"When I first saw the 10-720 I thought, "What a hunk of iron!" We took a regular Comanche 250 and put the 400 HP engine in it. There were no structural revisions - it was strictly an experimental plane. The first propeller was a two bladed prop. Later we went to three blades because of vibration, but the plane was faster with the two blades.

One of the problems we had was the high elevator forces. I had to put both hands on the wheel to land the airplane. We finally solved that problem by installing an electric trim. The first one we tried would help the pilot when the control forces got up to 20 pounds; then later we put in the ones you have now where you just use the trim switch to give yourself the trim you want.

Another problem was a noise in the engine. We got so we called it "machine gun clatter". I'll tell you we spent a lot of time and effort trying to solve that problem. The noise was unpredictable; you'd be flying along at cruise speed and for no apparent reason the noise would start. If I closed the throttle the noise would stop. We checked for cross firing of the mags. We changed to different type mags. We changed spark plugs. We changed the counterweights on the crankshaft. We measured stresses on the propeller and cut off some of the propeller tips. I can't remember what the outcome was but it seemed to solve the problem. (No it didn't)

Then there was a starting problem. When the engine was cold it would start fine. Even when other airplanes wouldn't start on a cold morning the 400 would usually start right off. But when it was hot, I figured out that there was no way to start the engine unless you flooded it. I'd make sure the engine was really flooded, then I'd pull the mixture control out, open the throttle and start cranking. In about 30 seconds it would start and just run OK. They tried a heavier starter and a higher cranking speed but that didn't help. You still had to flood the engine to get it started.

After I had flown the first airplane for about a year I got a newer aircraft. This one had the wings beefed up, the fuselage was different and the landing gear was different. There was a new motor mount, a new engine and a new propeller. I had my electric trim now and was about to get an autopilot for testing. This was N8400P, the first production 400. Now every time I walked out to the ramp and looked at this aircraft - it really was a beautiful looking aircraft - I figured that this was probably the nicest looking aircraft we had ever developed. Everything was just in proportion. Like the wings and the fuselage and the tail; nothing was oversized or like brute force or stood out like a sore thumb. The three bladed prop really set the thing off. It just set and looked like it said. "Come

on, come on, let's go flying." Kind of invite you, "Let's fly!"

One day I was flying N8400P and I thought I saw the engine moving the cowling. It wasn't what I would call a large movement but I could see it. When I'd put the nose down this movement was from right to left. The problem turned out to be in the engine mount. As I recall they had to change some of the rubber biscuits in the mount. I think they made one of them stiffer than the original and one of them a little softer.

For flutter test, we brought in a man from Canada. He put devices on the tail, ailerons, wing tips, cowling and propeller. They start vibrations in the airplane, varying the frequency and the amplitude, trying to get the aircraft to flutter. He tried but he couldn't produce any flutter. The 400 is one of the very few aircraft that I have not been able, myself, to get into some kind of flutter or vibration.

I did stability tests. I'd go up and trim for 75% cruise, then push the wheel forward and see how it came back, then pull it back and release it. Then I'd do the whole thing again at different cruise speeds. No matter what way I departed from trim speeds, the plane would always come back to trim speed and at very near the same altitude.

The stabilator on the 400 is exactly the same as the one we have on the Aztec. That may be one reason why the control wheel forces are heavy but it is also the reason why the airplane is so stable. This is probably the most stable aircraft that Piper ever manufactured.

Then I would conduct power-on stalls and I'd trim to 1.3 times the stall speed. For power, you can choose 75% or maximum power. I chose maximum power to give me my first condition. When I was approximately off my trim speed, I would reduce my airspeed at one mile per second so that when the airplane stalled, we'd have heavy buffet and this is a true stall. The nose would pitch up 10 degrees and the roll was not over 3 to 5 degrees with the loss of about 50 feet and not over 100 which I consider very good.

Then I'd do the same type of stall with gear down, full flap and again trim 1.3 times stall speed. I'd reduce airspeed at one mile per second same as I did the other time with the same result. I'd get heavy buffet, the nose would pitch up 10 degrees and the loss of altitude would be less than 50 feet. Then I'd go to gross weight: RSG, this is the worst condition. I'd trim to 75% power in level flight and bank left 30 degrees and very slowly reduce airspeed. I'd probably gain 1000 feet before the airplane stalled. I would stall the airplane at 30 degrees strictly by tightening the wheel. At the stall I'd have the wheel almost against the stop and the airplane would roll to the right - it may go under – but most generally it went over the top. I'd release the control and it would stop immediately. There was no spinning tendency whatever.

Now in level flight, I'd have the power off in a glide trimmed to 1.3 again to do an accelerated stall. I would pull the wheel back fast, the airspeed would drop off about 5 miles per second and I'd have a very steep angle, very close to 30 -35 degree angle. It looks almost vertical - it is not vertical - but it's a very high angle. This was to find out if the aircraft was going to tuck under. It didn't tuck under, the nose dropped about 30 degrees and it came out at a speed less than that I had trimmed for.

Then I would conduct a stall with power off, gear and flaps down and 30 degrees of bank. I'd tighten up the controls strictly by just using the wheel force, bring it near to the stop and hold 30 degrees until the airplane stalled. The aircraft stalled at these speeds with a high buffet and would roll right - it may go over the top – but generally it stopped right on the level flight position.

For a spin test, I'd trim for 75% level flight and pull off the power for your spin checks. As I'd reduce to stall speed at one mile per second, the nose would be approximately 10 degrees high off the horizon

and I'd get heavy buffet so I'd pull the wheel full aft and go to left rudder. The airplane would pitch over momentarily inverted and come around to a one turn spin. It would stop in a half turn by using the controls. I'd do the same thing to the right and at heavy buffet, pull the stick right back and kick right rudder and hold her. In about half a turn I'd be inverted and when she came out to the full turn the nose would be down 20 - 25 degrees and she'd snap right out. If you use the controls to recover, you are recovered in half a turn. When I say you are at a half torn, the airplane is inverted but she comes around then at the final torn of the one turn spin. The airplane is not inverted when you recover.

Now these spins were conducted also with gear and flap down. This airplane has no tendency to keep on spinning. So as soon as you release the control and take a positive recovery, a half turn is the maximum you will go to for a recovery. I have had a couple of flat spins in a 250 Comanche and I advise you, don't try any spins of any type.

If you treat this airplane like it should be treated it will return the same respect to you. So much for stalls and spins - it is a very solid airplane. We had no problem with this airplane during our stability runs, stalls, whatsoever."

FUN BIT

"SAY THAT AGAIN"

"This 'telephone' has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us."
Western Union internal memo, 1876.

"I think there is a world market for maybe five computers."
Thomas Watson, chairman of IBM, 1943.

Computers in the future may weigh as little as 1.5 tons."
Popular Mechanics, forecasting the relentless march of science, 1944

"640K ought to be enough for anybody."
Bill Gates, 1981.

"But what good is it for"
Engineer at the Advanced Computing Systems Division of IBM, 1968, commenting on the microchip.

"There is no reason anyone would want a computer in their home."
Ken Olson, president, chairman and founder of Digital Equipment Corp, 1977.,

The concept is interesting and well-formed, but in order to earn better than a 'C,' the idea must be feasible."
Yale University Management professor in response to Fred Smith's paper proposing reliable overnight delivery service. (Smith went on to found Federal Express Corp.) !

"Who the hell wants to hear actors talk?"
H.M. Warner, Warner Brothers, 1927.,

"l'm just glad it'll be Clark Gable who's falling on his face and not Gary Cooper." :
Gary Cooper on his decision not to take the leading role in "Gone With The Wind."

We don't like their sound, and guitar music is on the way out."
Decca Recording Co. rejecting the Beatles,1962.

"Heavier-than-air flying machines are impossible."
Lord Kelvin, president, The Royal Society,1895.

"Airplanes are interesting toys but of no military value."
Marechal Ferdinand Foch, Professor of Strategy, Ecole Superieure de Guerre.

"Drill for oil? You mean drill into the ground to try and find oil? You're crazy."
Well-drillers who Edwin L. Drake tried to enlist to his project to drill for oil in 1859.

"Louis Pasteur's theory of germs is ridiculous fiction."
Pierre Pachet, Professor of Physiology at Toulouse, 1872.

PLACES TO GO

Bass Strait Stopover – Great Place to Stay

Lawrence Paratz

Kerrie and I (with Leon and Rebecca) have just had a couple of days on King Island (in Bass Strait). We stayed at some delightful new accommodation at Grassie Harbour, which is the port on the east of the Island. We thought it might be of interest to others.

Ken and Marilyn Chapman purchased the Grassy Golf Course a few years ago, and have tastefully redeveloped the club-house, which has spectacular views, as their own home, and as a B&B. The property is known as Portside Links and is well described on their website, www.portsidelinks.com.au.

They have also built two great self contained units on a ridge in the golf course, again with excellent sea and coastal views. We stayed in one of the units (they only finished them in January), and they are something special. A cot and an extra bed were no trouble.

Everything you could want down to the utensils, games and some DVDs is there. Lots of space, tasteful décor, and a weather-protecting car park for each unit. Each has its own private indoor BBQ area (plumbed gas), and we did much of the cooking there.

The two units would be ideal for two couples travelling together. If you don't want to cook, you'll need a car to get to Grassy, Currie or Naracoopa for a meal, so it's better suited to a couple of days away than an overnight stop.

We hired a car to explore the island, but I suspect if you worked it with Ken or Marilyn, they might be able to get you across from the King Island airport if necessary.

Penguins come ashore each night onto the breakwater, and you can readily view and walk amongst them. Best display of penguins I've seen.

MEMBER'S PANEL

Ian Thomson's PA39 MMN

2006 FLAGSHIP

Ian Thomson's PA39 MMN

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We / I understand both the Australian and American International Comanche Societies are Incorporated bodies.

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