

The President's Corner

Hello to All,

This is my first report for the newsletter since I was elected as President of our Cessna 200 Series Association at our AGM at Mackay in October last year. I want to thank Garth Bartlett, as instigator of the group and as inaugural President, for his huge input to get our group up and running so successfully.

What a great write-up we had in the recent AOPA magazine Australian Pilot by Brian Bigg. His article is included in this newsletter as the report on the Mackay fly-in. Brian and his wife, Julianne, were with us for most of the fly-in but returned home on Sunday, while others flew to Brampton Island for the night. A fantastic time was had by all.

A little bit about me. I live on a 750 hectare farm in the lower southeast of South Australia and now concentrate on breeding prime lambs. I have scaled down my operation over the last few years, some call it semi-retirement, as I used to have a larger property nearby on which I had reasonable sized beef cattle breeding herd as well as sheep for meat and wool, plus some cropping of oats, lupins and sunflowers. In addition to that I had a pastoral grazing property about 80 nautical miles west of Broken Hill. Rainfall

in the Southeast is about 650mm while in the north the average is about 200mm.

Anyway, having two places that far apart was a good reason to have an aeroplane. I started learning to fly in 1964, and we bought our first aircraft, a Cessna 182, in 1965. That aircraft was followed by a Piper Seneca in 1974, and was held until 1980 when I went in partnership with a friend in a Beech 36. My current aircraft is a 1982 model Cessna 210N that I purchased in early 1985.

In addition to flying between my properties, I have travelled over most of Australia and have also flown once to Papua New Guinea.

I hope you have marked in your diaries the dates for the Albury fly-in which should be both interesting and fun. The registration form is included in this newsletter. The dates are 1st to 4th April, and that is for two nights in Albury and one night at Dinner Plain, near Mount Hotham. Make full use of your aircraft and invite friends to accompany you, even if they are not aviation enthusiasts, because there will be sightseeing and other things to see and do.

Once again, do not forget to purchase tickets for our great raffle that has been generously donated by John and Suzy Tilley – 7 nights accommodation in a penthouse

apartment at Clubb Coolum Beach Resort. The raffle will be drawn in Albury at the dinner on Saturday night. Information about Clubb Coolum is attached.








In the last few months we have seen some of the most bizarre weather across Australia. On one side of the country we have severe flooding while on the other we have had severe drought. I can only sympathize with any of our members who have been severely affected by one event or the other.

Cheers and happy flying.

DAVID CRAWFORD
President



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Cheers, **NEIL RICHARDSON** – Editor
C200news@njr.com.au

Mackay Fly-In, Brian Bigg - Guest Speaker See page 2



The Mackay Fly-in: A Flock of Wild Birds



The following Report on the Fly-In in Mackay was written for the AOPA Magazine by Brian Bigg who was our guest speaker.

Thanks to Brian for his attendance throughout the fly-in, his wonderful talk on TV production and his write-up for the newsletter.

Australian Pilot editor, Brian Bigg, a Piper person by preference, was invited to be guest speaker at the twice yearly fly in dinner of the Cessna 200 Series Association. He survived.

All things considered, they took it well. After all, you shouldn't really call your hosts crazy.

But during my speech to the Cessna 200 Series Association dinner in the Mackay Aero Club, I couldn't help noting that the group was not like other pilots groups of my experience.

Most often, gatherings of flyers involve clusters of crusty old men speaking with their hands, while patient wives loiter off to one side trying to make the whole event less crushingly boring by making new friends with each other.

But this lot was not like that.

Both partners obviously shared their passion for their aeroplanes, the weekend was jam packed with aviation and non aviation things to do and there was so much laughter, it was exhausting.

They had come from all over the country and from many walks of life. There was John and Suzy, a business couple from Adelaide; Neil and Robyn, real estate agents from the Gold Coast; Garth and Ceri, business owners in Sydney; John and Cilla, manufacturers from Victoria; and David and Annie, farmers from South Australia, among others. A total

of 20 people with a common love of Cessna 200 series aircraft.

Not a bad turnout either, for a group with only 31 members on a weekend when terrible weather blanketed most of the country.

The C200 Series Association was formed in 2008 with the goal "to promote safe flying and further the technical knowledge of members while facilitating an environment favourable to forming new and lasting friendships".

They get together twice a year, generally at the home base of a member who volunteers to be host.

Before Mackay they'd been to Naracoorte, SA; Mudgee, NSW and Longreach, QLD. And next April, they will be off to Albury.

The weekend was organised like a military assault. Not a second wasted, not a moment of uncertainty. The group knew where to go and what to do at every moment. Apparently it was because of Ceri's "how to organise a fly in" manual which she put together for the Association to make things easier for whoever makes the mistake of volunteering to be the next host.

Without that high level of organisation, my wife and I would never have got to learn that Mackay Sugar is Australia's second largest sugar company, with an annual turnover of more than \$300 million.

Or that clambering through an enormous sugar mill for two hours while wearing all the necessary safety gear involves body temperatures approaching boiling point.

Or that Mackay (and the rest of Australia for that matter) owes its wealth to the endless lines of black gold which snake towards the coast from the inland coal mines. It's quite an impressive sight.

The Sunday morning bus tour of the city, put on for the group, covered the history of just about every building in the city. I know more about Mackay than I ever thought I needed to.

And, of course without having invited such an entertaining after-dinner speaker along for the weekend, the group's members, along with a bunch of local Mackay pilots who attended, would not have been given the secrets of how to win \$1 million on the programme "Who wants to be a Millionaire?" (I am a television producer in my other life). You would be shocked if you knew how easy it is to win at Millionaire. C200 Association members should be able to make money from selling the information I gave them.

In a bid to overcome my Piper preference, Association president, Garth, presented me with a beautiful book on the history of Cessna. He said he hoped it would turn me from the dark side.

I do have a few hours in Cessna's. I flew one regularly as a member of the Canberra Aero Club a few years back. But I still prefer to see where I'm going when I turn (am I right, Piper pilots?).

On Sunday, most of the group headed off to Brampton Island for the night, before wending their way back to their far-flung homes the next day. They are justifiably quite proud of the fact that anywhere in Australia is just one fuel stop away for a Cessna 200 series aircraft.

We had been strangers to each other only two days before. Merely names on an e-mail.

But when my wife and I strapped ourselves in to fly home, we left behind friends who we hope to see again in some faraway part of Australia. They are a fun crowd.



Two of our Members Join the Jet Age

Steve Baxter and Steve Weber have recently purchased O&N Silver Eagle aircraft to replace their piston aircraft. Both aircraft were purchased through Propjet Aviation in Santa Rosa, California. Propjet is the West Coast sales agent for O&N aircraft. Bob Nicolas, President of Propjet told me that they only sell and maintain Cessna 210 and Cessna 340 aircraft. They presently look after sixteen Silver Eagles. Bob has 6,000 hours on the Silver Eagle and flies one home every night.

The Silver Eagle is a highly modified pressurized Cessna P210N. Myron Olsen (Ole) at O&N takes a piston P210N down to the last nut and bolt then builds the aircraft up again including various modifications such as strengthening and overbalancing all the control surfaces, installing a new air conditioning system and the latest glass cockpit avionics along with new leather interior. Last but not least is the installation of a brand new Rolls

Royce 250 B17F Turboprop rated at 450 shaft horse power on take off. Ole then adds a modern epoxy paint job and the aircraft is ready for the flight levels. At 20,000 feet, the aircraft TAS is around 215kts, sipping 80 litres per hour of Jet A1.

Steve Baxter will hangar his Silver Eagle at the Southport Flying Club not far from the southern suburbs of Brisbane, where he lives. Steve also owns a beautiful Cessna 182T with a Garmin G1000 avionics suite. Steve will use his Silver Eagle mainly to transport him and



his family from Brisbane to their home at Airlie Beach. Steve said that he also plans to do a bit of Australia-wide touring in the new bird. Keep a look out for Steve and VH-XXU at an airport near you.

In December 2010, Garth and Steve Weber went to Santa Rosa and did a pre-purchase inspection on N234SB and Steve did the deal. After flying the aircraft, Steve came back with a smile from ear to ear. Steve plans to go back to Santa Rosa in March to complete his training and supervise the disassembly and packing of his aircraft into the container.

Garth, whose company Bilyara Maintenance and Engineering in Sydney is the Australian factory authorized service centre for the O&N Silver Eagle, will reassemble the aircraft and place it on the Australian Register as VH-YLS. Steve will base his new Silver Eagle at Tyabb in Victoria, close to where he lives. The main mission for YLS will be to transport Steve and his family to and from his property just south of Merimbula in NSW. It is also highly likely Steve will be doing the odd sortie to other far away places like Darwin, where he has mates.

Steve presently owns a beautiful Cessna T210N, which will be on the market. Those members looking for a very nice T210N should contact Steve.

We are all looking forward to seeing the two Steves at our fantastic fly-ins around the country in their new speed machines.



Cessna 200 Series Website Updated

www.c200series.com.au Keep checking up on the website for upcoming events and other happenings of the club.



Spring Fly-in

Please stay tuned for details of our next Fly-In planned for the Spring of 2011.

Our many thanks to John Weston of Westonprint, Kiama for the final layout of this Newsletter and its superb reproduction.

Welcome to New Members

- Peter Clisdell
- Jock MacLachlan
- Kelvin Rogers
- Gordon Street
- Richard Treloar

ALBURY FLY-IN Fri 1st - Sun3rd April 2011

Following are the registration forms for the Albury Fly-In as well as some information about the sights of Albury and surrounds.

REGISTRATION FORM

Name	
Postal address	
Phone	Mobile
Email address	

Attendees	
Pilot	Passenger 3
Passenger 1	Passenger 4
Passenger 2	Passenger 5
Aircraft type	Aircraft registration

ETA Date:	Time:	Quality on Olive Hotel booked? <input type="checkbox"/> Other? _____
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Registration numbers (Please indicate the number of people from your party attending each event – even ones that are included in the registration – Thanks!)

Activity	No. of people	Price	Total
Registration		\$200 per person	
Friday night dinner		Included in registration	
Saturday morning			
Technical Session OR		Included in registration	
Gallery Tour		Included in registration	
Saturday afternoon tour and lunch		Included in registration	
Saturday evening dinner		Included in registration	
Sunday – optional visit to Dinner Plains		\$50 per person	
Purchase – Fantastic Raffle tickets		\$50 per ticket	

Payment by cheque (Cessna 200 Series Association) <input type="checkbox"/> or	TOTAL	
Payment by EFT (BSB 633 000Acc No 135455806) <input type="checkbox"/>		
Please quote member name on EFT or back of cheque		

(Concession rates available for children – please contact the secretary (0428 752 055))

Special requests – dietary requirements etc

<p>Indemnity</p> <p>I, the undersigned, do hereby indemnify the Cessna 200 Series Association and the members, officers and agents thereof associated with arranging functions and associated activities from all liability of any kind arising out of any function or activity arranged by or on behalf of any such person or body, or travel to and from same, and as agents for the persons or body named above, whose express permission I declare that I have obtained to do so. I do hereby indemnify each person or body arranging or associated with such functions, activity or travel from all liability.</p> <p>Signature: _____ Date: _____</p> <p>Name: _____</p>

Refund Policy:
Refunds can not be guaranteed for late cancellations

Please send/email completed forms to
 Mail Secretary, Cessna 200 Series Association, 24 Goolabah Dr, Tallebudgera QLD 4228
 Fax 07 5534 4125
 Email secretary@c200series.com.au

EVENT PROGRAM...

FRIDAY 1ST APRIL

- Welcome Registration at Albury Airport YMAY
- Transfers to the Quality on Olive Hotel
- Informal dinner at The Olive Restaurant at the hotel

SATURDAY 2ND APRIL

SATURDAY MORNING

- Gallery tour of Albury OR
- Technical Speaker (tbc)

SATURDAY AFTERNOON

- Bus to Beechworth historical town (see attached information)
- Lunch at Beechworth Brewery
- Tour of Beechworth Brewery
- Time to explore the historic town of Beechworth, including the Honey shop with an in-store hive, the Fromagerie with real French cheese and of course the famous Beechworth Bakery.
- Return bus to the Quality on Olive
- Dinner at Adamshurst Restaurant – ‘the Grandest Building in Albury’ with guest speaker Sussan Ley MP, Federal Member for Farrer, and whose favourite aircraft is a Cessna 206! (see attached information)

SUNDAY 3RD APRIL

Sunday is an optional extra overnight visit to Dinner Plain in the Snowy Mountains. We will fly from Albury to Mount Hotham and then a bus has been organised to take us to the Alpine village of Dinner Plain, where we can relax for the afternoon and all enjoy dinner together in the evening. We overnight at ‘Rundells Alpine Lodge’. The bus will return us to Mount Hotham where we depart in our own aircraft ... until the next fly-in!

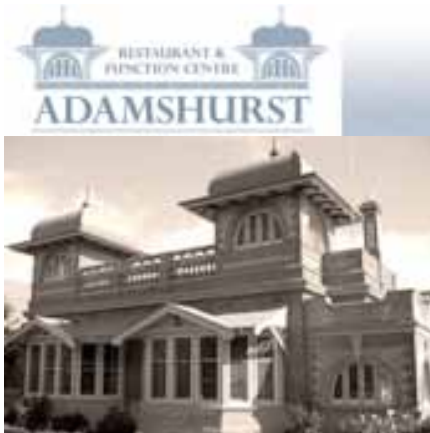
- \$50 contribution to bus from Mt Hotham to Dinner Plain on Sunday, and return on Monday morning.
- Fly in youR own aircraft
- All meals and accommodation at your own cost
- Accommodation: Rundells Alpine Lodge is offering bed, full breakfast and 2 course dinner \$279 per room.
- Please contact Fiona Battershill on 03 5159 6422 and mention the Cessna 200 Series Association for bookings



ALBURY EVENTS INFORMATION...

Welcome to Adamshurst

Built as a private residence in 1891 by Mr George Adams, proprietor of the Albury Banner and Wodonga Express, it has been described as one of the grandest buildings in Albury.



Beechworth Honey Experience

Take a walk through our new centre which focuses on education about bees, the environment, packing and distribution and

showcasing the sensational range of the Beechworth Honey products.

Experience our interpretative display and immerse yourself in the history of honey from stories told long ago. Accompany a beekeeper through the dramatic rural landscape and breathe...the pure fresh air whilst gathering honey from towering eucalyptus forests and valley grasses.

Watch how a modern day packing displayed and distribution system takes the liquid gold from the hives through to your breakfast toast or drizzle onto fresh fruit – 100% pure and natural as nature meant it to be.

Relax in the courtyard with a coffee, locally made honey biscuits and ice cream and then help the kids put together the monster jigsaw or find the queen Bee in the glass fronted live bee display.



Browse through the concept shop and make your selection from a wide range of premium Australian honeys. A fine array of quality gifts and souvenirs will suit the most discerning shopper.

Bridge Road Brewers

Conceived by Ben Kraus in 2004/05, in his dad's back shed, this Beechworth brewery is more than worth a visit. Bridge Road Brewers has countless awards under its belt and a beer list to quench even the most avid beer hunters thirst.

Experience unique hand crafted beers whilst they are being brewed under your nose. The brewery, the bar and its pizza kitchen are all located in a 150 year old Coach House and stables. The Coach House is located behind Tanswells Commercial Hotel, in the heart of picturesque Beechworth. The laneway entrance, leads into the breweries large beer garden and children's play area. The beer garden also doubles as Beechworth's outdoor

CONTINUED NEXT PAGE

cinema in the warmer months of the year.

The brewery offers at least 8 different ales for tasting, and each of those has at least one international beer award to its name. There's even a great list of local wines, recommended by the brewer, who was more intimately involved in their production before being turned away from the dark side.

Brewer/Founder, Ben Kraus, lives and breathes beer, he is constantly tweaking his huge range of ales, currently 12, or creating new ones to make sure they're up there with the best on offer. Be sure to plan at least an hour at the brewery to soak up the atmosphere, not to mention the booze.

Pizza is the obvious option to go with a decent beer, and the brewery kitchen has some of the best pizza around.

The Larder – Fromagerie and Provisions

Cheese lovers can taste some of the delicious varieties including French Roquefort, Rouzaire Brie aux truffles, La Mancha Manchego, Piano Hill Ironstone and sweet hand stretched, buffalo Mozzarella from Shaw River.



Davis also sells provisions for impromptu picnics or special occasions. Her store offers complimentary hire of wicker baskets packed with mouth-watering terrines, pates, locally

smoked trout and small goods as well as Lescure French butter to slather on Laurent Bakery baguettes.

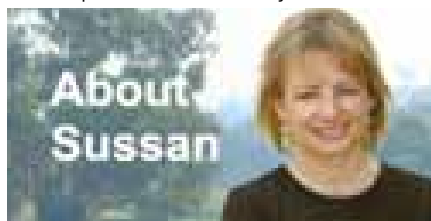
Guest Speaker—Sussan Ley MP

Federal Member for Farrer Shadow Minister for Employment Participation Shadow Minister for Childcare and Early Childhood Learning

Developing an early fascination with the skies and flying, a young Sussan worked a variety of odd jobs and hours to finance this passion, obtaining a Commercial Pilot's License which she still holds.

Prior to taking on married life on a family farm, Sussan worked as an air traffic controller at Sydney and Melbourne Airports, as an aerial stock-mustering pilot in outback New South Wales and Queensland and as a shed hand / shearers' cook across a large chunk of rural Australia.

During a livestock and dairy farming partnership of seventeen years Sussan



experienced the highs and lows that come routinely and test the resolve of those living on the land.

... The local election result was undecided for ten days with the new MP eventually installed by just 206 votes, a friend sending a congratulatory reminder that the 'Cessna 206'

- a popular bush utility plane - was also her favourite aircraft!

<http://www.sussanley.com/aboutsussan/biography.aspx>

Rundells at Dinner Plain

For over 100 years, Rundells Alpine Lodge has been renowned for alpine hospitality for leisure and business travellers alike. Set amongst the National heritage-listed Alpine National Park, in the picturesque village of Dinner Plain you can discover Australia's most unique alpine architecture.



Come and enjoy the comfort of the guest rooms and local produce at our in-house restaurant Graze. Relax in the spa and sauna after a day in the alpine park, savour a café latte in front of the open fire or enjoy a cold beer in Rundells paddock.

Rundells is surrounded by alpine walks, mountain bike tracks and cross country ski trails, a short walk to the Onsen Spa & Retreat and Cobungra Platter beginner ski run and only 10 minutes from Australia's leading ski resort, Mount Hotham and Mount Hotham Airport.

Cessna 200 Series Merchandise



A great range of merchandise has been arranged and photos and details are as follows:

- CAPS** \$15.00: Caps are available in off-white or black and one size fits all.
- POLO'S** \$30.00: Polo's are available in men's L, XL, XXL, XXL or women's 12,14,16 colours: black/white trim: white/black trim: or sky blue/navy trim.
- CHAMBRAYS** \$40.00: long and short sleeve, available in men's and women's in similar sizing as polos.

Email Neil or Robyn Shorrock - shorair@bigpond.com

Merchandise will also be available for purchase at Fly-Ins.



My Aircraft – VH-OAT By David Crawford



I mentioned in my President's report that I purchased my current aircraft in early 1985. I wanted to update the Beech 36 that I had in partnership with a friend, and Flip decided that he was not flying enough to warrant being an owner. It was a very early BE36 (s/no E50 manufactured in 1968) and it was sold.

I then enquired about a replacement aircraft and decided that getting a Cessna 210 was the way to go. The 210 has better range, better payload, and I do prefer high wing aircraft for several reasons – they are easier to enter and exit, they provide shelter from rain when loading, they provide a sunshade on northerly and southerly headings, and allow passengers an unobstructed view of the scenery. Another good point for me is the ability to taxi through gateways, as I have three to go through to get from my airstrip to my hanger. The downside of the 210 compared to the BE36 is it is harder for passengers #5 and #6 to get to their seats, and the cargo door is smaller. All that aside, I consider the Cessna 210 to be the best high performance single engine aircraft made, and what a pity it is that they are no longer produced. Hey, this is all knowledge that C200 owners already know!

Enquiries lead to purchasing, sight unseen, a 1982 model Cessna 210N in South Africa. It was then flown via India and Singapore to Darwin and then to Melbourne in late 1984 where it was put on the Australian register as VH-OAT. I took delivery in January 1985.

It has flown about 3,000 hours in the time that I have had it, all but a few of those flown by me. When the first life engine was time expired, I opted to have it rebuilt in Australia at a small engine overhaul business. It was OK, but in hindsight I think there were better engine shops around, or alternatively I could have chosen a factory remanufactured motor.

I have recently had another engine change, and this time I elected to replace the IO-520 engine with an Atlantic Aero conversion IO-550 with tuned induction. The original 4 mount engine mount was upgraded to the better 6 mount system.

So far I have only flown about 75 hours on the new engine, but it

is beautifully smooth and quiet and I have gained a small increase in airspeed. I had hoped that there may be a bigger speed increase but maybe it will improve with a few more hours of flying.

Aeroplanes have a happy knack of soaking up dollars to keep them in the air, and changing an engine is a good example of this. Just so I do not get out of the habit of spending money on OAT I will do a radio and instrument update within the next couple of years, because the radios, although still operating very well, they are ARC 400 Series, are original equipment and therefore nearly 30 years old, and the instruments are also the same age and classed these days as steam driven.

During my ownership of OAT, I have had one major problem whereby corrosion was discovered in the wing attach points. To me the pitting was negligible, and as a farmer I would have reassembled the wings and been very happy with it. Unfortunately, LAME's did not think in an agricultural way, and information was sent to engineers, who in turn sent information to Cessna, who in turn did not want to know anything about the problem and just suggested replacing everything, which meant the carry-through beam and the wing attach points.

Anyway, Aircraft Engineers Australia came to the rescue and developed a computer based analysis to be able to calculate if the corrosion could be treated and the final result be within design tolerances. Unfortunately, my problem was given very low priority and although the result was good, OAT was out of the air for over 12 months.

On the basis that this aircraft has been hungered for the majority of the time that I have had it, it worries me that other 210's that are left out in the weather for most of their life could have undetected corrosion that when eventually checked could make them unserviceable. I hope that I am wrong.

OAT is the best aircraft that I have owned and operated. It is fast, carries a good load and has great range. What more can you want in an aircraft. Viva Cessna 210.

David Crawford.



GROUP INSURANCE

Insurance Offer Benefit from a Group Scheme

Remember that the Cessna 200 Series Association Insurance Scheme is up and running.

Please try and support the insurance scheme if possible as the more we have under the scheme, the larger the benefits and savings for all participating members.

Members can access quotations by contacting Ralph Aikin at Kenney Aikin Aircraft Insurance Brokers.

Ralph will be the sole broker for the scheme and QBE Aviation have agreed to continue to support the scheme.



When it comes to aviation insurance expertise, we have earned a reputation for providing a specialised service second to none.

*For a quote or more information on how we can assist you, please contact:
Patricia Kenney or Ralph Aikin.*

Member of the National Insurance Brokers Association of Australia

Phone (07) 5448 8788
Facsimile (07) 5448 8588
Email: enquiry@kenneyaikin.com.au
PO BOX 29 BLI BLI QUEENSLAND 4560

TECHNICAL TALK

PAST PRESIDENT GARTH BARTLETT HAS SPOKEN WITH THE CPA WHO HAVE KINDLY ALLOWED US TO REPRODUCE PART TWO OF A TWO-PART SERIES ON VALVE FAILURES PREPARED BY MIKE BUSCH. THANKS TO ALL PARTIES INVOLVED FOR ALLOWING US TO INCLUDE THIS IN OUR NEWSLETTER.



by Mike Busch

EXHAUST VALVE FAILURES—PART 2

We have the technology to prevent these failures by detecting them in the incipient phase...

Last month we discussed how exhaust valves fail and why they sometimes fail prematurely. This month, we'll shift our focus to how we can monitor exhaust valve condition, detect incipient valve problems, and deal with them before in-flight failure occurs.

I started last month's column with a description and photos of an in-flight exhaust valve failure that occurred in my airplane nearly 20 years ago. That failure occurred "back in the bad old days" before we had the sophisticated engine monitoring tools that we have today—specifically spectrographic oil analysis, borescope inspections, and digital engine monitors.

Nowadays, there's no excuse for such an in-flight failure because we have the technology to detect these problems early. Anyone who experiences an in-flight exhaust valve failure today just wasn't paying attention.

BORESCOPE INSPECTIONS



Figure 4—Using a borescope to inspect exhaust valves.

In my opinion, regular borescope inspections should be our first line of defense against exhaust valve failure. The borescope is an optical probe (see Fig. 4) or a subminiature digital camera (depending on which model is used) that can be inserted through a spark plug boss (usually the top one). It is used to perform a direct visual inspection of the combustion chamber, including the valves, cylinder head, cylinder barrel and piston crown. The borescope permits a quick, inexpensive, unambiguous determination of whether the exhaust valve is operating normally, or whether it is starting to burn or stick.

Figure 5 shows the appearance of normal valves in a TCM cylinder. The smaller valve on the left is the exhaust valve. Note the reddish pattern of exhaust deposits on the face of the valve. The deposits are quite minimal, indicating that this cylinder has been running a nice, lean, clean-burning mixture that produces relatively few deposits. More

importantly, the deposit pattern is almost perfectly symmetrical—similar to a bullseye—showing that this valve is operating at the same temperature all the way around the circumference of its face, with no hot spots. That's exactly the way a healthy exhaust valve should look.



Figure 5—Note the symmetrical appearance of the exhaust valve (left), showing the valve is operating normally

Compare that with the exhaust valve in Figure 6. Look at the highly asymmetrical pattern of exhaust deposits on the face of this valve. The cylinder has been running rather rich, causing thick deposits to form around most of the circumference of the valve face. But the valve



Figure 6—This exhaust valve is in serious trouble, and doesn't have much longer to live. There's an obvious hot spot in the 8 to 10 o'clock position.

has an extreme hot spot in the 8 to 10 o'clock position, so hot that it has burned off almost all the exhaust deposits in this area. This valve is in very serious shape, and wouldn't have survived very many more hours without failing. The borescope inspection is the gold standard for evaluating exhaust valve condition. Unlike the differential compression test (which has proven to be inconsistent and unreliable), the borescope provides a clear, unambiguous indication of whether or not the exhaust valve is healthy. If the valve has a symmetrical appearance under the borescope, it's fine. If the appearance is asymmetrical (lopsided), the valve is in distress and needs to be replaced. Simple as that.

The only problem with borescope inspections is that they need to be done regularly, and often enough to ensure that a distressed valve is detected before it fails in flight. How often is that? My research indicates that a well-trained inspector can generally detect a hot spot on an exhaust valve 100 to 200 hours before the valve fails in flight. If you have your cylinders borescoped at intervals of 100 hours or less, you can be fairly confident that a burned exhaust valve will be detected before it fails in flight.

By happy coincidence, 100 hours is just about the right interval for cleaning, gapping and rotating spark plugs. If the top cowling and the top spark plugs are removed, then doing a borescope inspection is a no-brainer, and shouldn't take more than an extra 30 minutes. In fact, any time a spark plug is removed from a cylinder for any reason, it would be crazy not to stick a borescope in the hole and look around.

ENGINE MONITOR ANALYSIS

These days, an increasing proportion of the piston aircraft fleet—including the majority of high-performance aircraft—are equipped with digital engine monitors that display and record per-cylinder EGT and CHT data and often numerous other parameters as well. The digital engine monitor should be our second line of defense against exhaust valve failures.

Although it can't give nearly as much advanced warning of valve distress as the borescope, the engine monitor's compelling advantage is that it monitors the engine continuously, and doesn't need to be scheduled. Look at the engine monitor data dump in Figure 7, and focus on the anomalous appearance of the EGT trace for cylinder #3 (light gray trace). At first glance, this might seem like it's coming from a failing probe or a loose connection. But closer examination reveals that the EGT oscillations are not rapid and random (as one would expect from a bad probe or connection), but rather very slow and almost perfectly rhythmic.

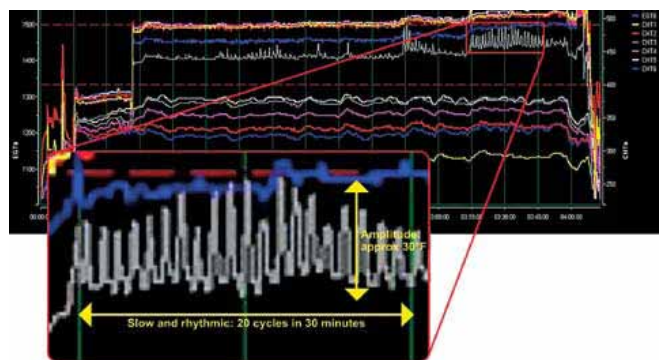


Figure 7—A very slow, rhythmic EGT oscillation (often on the order of one cycle per minute) is the unique signature of a failing exhaust valve.

As the inset shows, the EGT oscillated exactly 10 times in each 15-minute period, and for a total of exactly 20 cycles in 30 minutes—a bit less than one cycle per minute. A failing probe or connection can't do that. In fact, there's only one thing that can do that: a failing exhaust valve.

Most Lycoming and TCM engines employ a "rotator cap" mounted at the tip of the exhaust valve stem that causes the valve to rotate a fraction of a degree every time the valve cycles open and closed. The

purpose of this valve rotation is to prolong valve life by equalizing the heat load around the circumference of the valve face, and helping to keep the valve and seat clean and free of deposits. The rate of valve rotation varies with engine RPM and rotator cap construction. For most TCM engines it's about one revolution per minute at typical cruise RPMs, a bit faster for most Lycoming engines.

Consequently, if you notice a slow, rhythmic variation of EGT with a frequency on the general order of once cycle per minute, there's only one phenomenon that can possibly account for that EGT variation: exhaust valve leakage. Your response to such an observation should be to schedule a borescope inspection of the offending cylinder as soon as possible. In all likelihood, the borescope will reveal that the exhaust valve has an obvious hot spot, and the cylinder will need to come off for replacement of the exhaust valve and guide and dressing of the valve seat.

Figure 8 shows the progressive deterioration of the #2 exhaust valve (top red trace) in a Bonanza's TCM IO-520 engine over a period of five months. Note how the EGT variation becomes increasingly obvious, regular and rhythmic as the exhaust valve deteriorates. Also note the frequency: almost precisely one cycle per minute. The valve was literally crying out for attention. Ultimately the owner noticed the problem and pulled the cylinder before the valve failed in-flight.

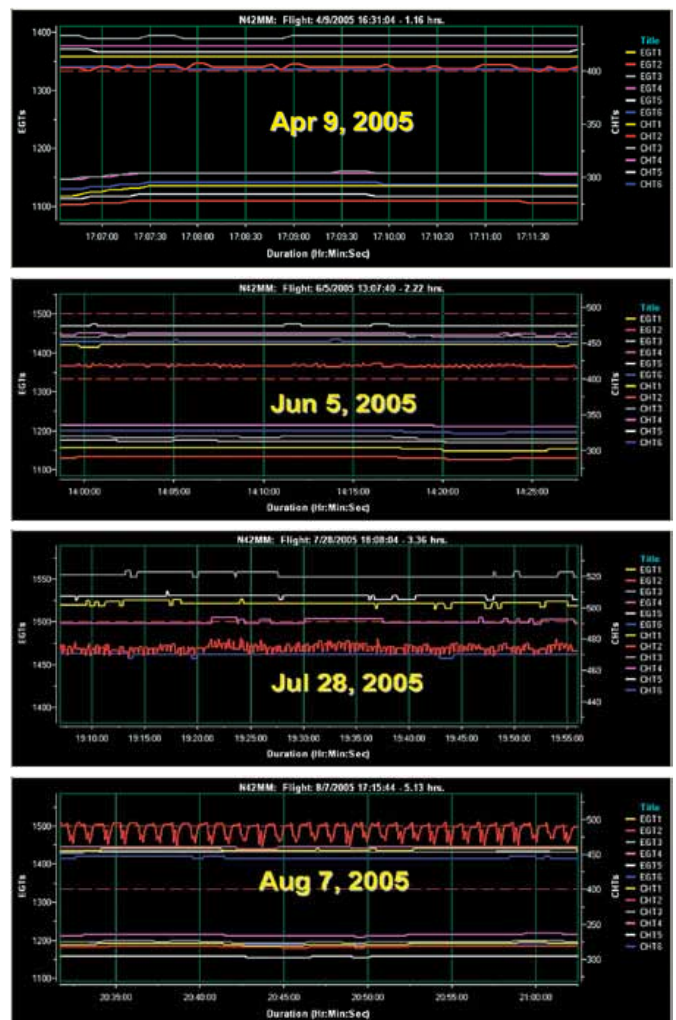


Figure 8—Successive data dumps show progressive deterioration of #2 exhaust valve (top red trace) over a five-month period. Note the precisely rhythmic EGT variation at almost exactly one cycle per minute.

The engine monitor will not give nearly as much advance warning of a failing exhaust valve as the borescope, but my research suggests that it will give something on the order of 25 hours lead time before

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failure—provided the pilot is paying attention and knows what to look for (and now you do).

Note that this EGT signature depends on the fact that the exhaust valve is rotating during engine operation. A few engines don't use rotator caps (notably Lycomings with solid- Figure 8—Successive data dumps show progressive deterioration of #2 exhaust valve (top red trace) over a five-month period. Note the precisely rhythmic EGT variation at almost exactly one cycle per minute. stem exhaust valves), and certain failure modes (e.g., stuck valves) may prevent the valve from rotating. Therefore, the slow rhythmic EGT variation may not be present in every failing exhaust valve scenario, but it will be present in most of them.

OIL ANALYSIS

A third line of defense against exhaust valve failure is spectrographic oil analysis. We've seen that exhaust valve failure is usually caused by accelerated valve guide wear. Exhaust valve guides are made of a high-nickel alloy, so accelerated guide wear usually shows up in oil analysis as increased nickel.

Figure 9 shows 550 hours worth of history of nickel readings in the left engine of my Cessna T310R. This engine had traditionally "made" about 14 parts per million (ppm) of nickel during the first 1500 hours since major overhaul, which is about normal for a six-cylinder TCM engine. Then the nickel readings started acting strange, rising into the low 20s, then the high 20s, giving warning of accelerated exhaust valve guide wear.

Unfortunately, oil analysis cannot identify which cylinder is the culprit. But the increasing nickel readings put me on notice that there was likely to be a failing exhaust valve in my future. Consequently, I started watching the engine monitor carefully, and started doing more frequent borescope inspections. Eventually, the #3 exhaust valve was found to be developing a hot spot.

At 2,148 hours SMOH, the #3 cylinder came off and the exhaust valve and guide were replaced. Nickel then started to decline as the

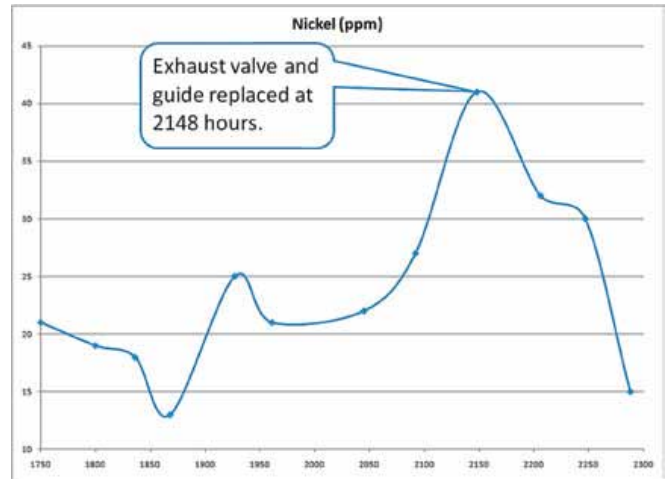


Figure 9—Oil analysis started showing elevated nickel (exhaust valve guide material) long before the failing exhaust valve was detectable by other means.

new valve and guide broke in, and after a few oil changes it dropped back to a healthy 15 ppm.

By using oil analysis, engine monitor data, and regular borescope inspections, exhaust valve distress can be detected reliably long before the valve reaches the point where it will fail. Nowadays there's really no excuse for suffering the kind of swallowed valve episode that I experienced two decades ago. We have the technology to eliminate these failures.

See you next month.

Tech Topics is a monthly column written by Mike Busch of CPA's technical staff. Mike is a longtime CPA Magazine columnist, co-founder of AVweb and teaches Savvy Seminars, www.savvyaviator.com, for aircraft owners and mechanics. Mike is the National AMT of the year for 2008. Mike owns, flies and maintains a 1979 Cessna T310R based in Santa Maria, California.

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Membership Application Form

On behalf of the committee of the Cessna 200 Series Association Incorporated, I extend an invitation to you to join this exciting new Association.

The purpose of the formation of the C200 Series Association is for likeminded aviation enthusiasts to meet several times a

year in different locations within Australia to promote and enjoy safe flying and to further their technical knowledge in an enthusiastic atmosphere.

The committee anticipates 2 fly-ins per year to a chosen destination within Australia plus 2 extra committee meetings to be held at a destination agreed by those on the committee.

Membership has been set for the first year @ \$100.00 per member and is open

to anyone with an interest in things aviation and particularly if they are an owner and or operator of a Cessna 200 series.

Please find attached the Application for Membership New & Renewal forms.

We look forward to meeting you soon and to many happy fly-ins.

Cheers,
Secretary C200 Series Association



Application for Membership

Name:	
Address: (For Mailing)	
Home Phone No:	()
Business Phone No:	()
Mobile No:	
Fax No	()
Email Address:	
Aircraft Call Sign:	
Aircraft Type: Model, mods, etc)	
Signature:	

Initial Subscription: **\$100.00**

Cheque (Payable to C200 Series Association)

Cash Direct Deposit

BSB 633 000 A/C 135455806
Name OR call sign as description

Completed forms should be mailed to: **24 Goolabah Dr., Tallebudgera 4228**

Emailed to: shorair@bigpond.com or secretary@c200series.com.au

ADMIN ONLY:

Date received		Receipt No:		Member No:	
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Membership Renewal \$100 DUE NOW

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Address: (For Mailing)	<i>(If details same as last year please tick, note changes below if any)</i>
Home Phone No:	()
Business Phone No:	()
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Fax No	()
Email Address:	
Aircraft Call Sign:	
Aircraft Type: Model, mods, etc)	
Signature:	

Initial Subscription: **\$100.00**

Cheque (Payable to C200 Series Association)

Cash Direct Deposit

BSB 633 000 A/C 135455806
Name OR call sign as description

Completed forms should be mailed to: **24 Goolabah Dr., Tallebudgera 4228**

Emailed to: shorair@bigpond.com or secretary@c200series.com.au

ADMIN ONLY:

Date received		Receipt No:		Member No:	
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