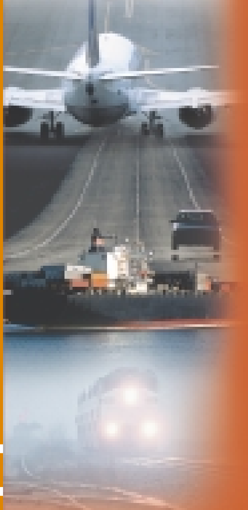


ATSB Australian Transport Safety Bureau

Air Safety Investigations

How does ATSB identify a safety problem in the aviation industry?

THE primary objective of any investigation into an air safety occurrence is the prevention of an accident.

Sometimes an investigation will uncover a safety deficiency in the aviation system and actions are taken to try to make sure the deficiency is fixed. At other times the details and circumstance of an accident or incident don't immediately uncover a safety deficiency or even provide immediate answers. However, the occurrence data is collected and stored in the ATSB database and may at some time in the future form part of a wider analysis of safety issues.

A safety deficiency is defined in the *Air Navigation Act 1920* Part 2A section 19AD as: *Any situation related to aviation that can reasonably be regarded as having the potential to affect adversely the safety of aviation.*

To first identify a deficiency the ATSB has to collect information. Then it analyses the data and works with the industry to develop safety recommendations and actions.

After an investigation the ATSB publishes a report which may be a short statement of the facts about the occurrence or a more detailed analysis which may include the operational and technical issues.

Aviation safety deficiencies may be found in many factors and could include one or more of the following:

- Aircraft or component design
- Manufacturing or quality control
- Maintenance or engineering procedures
- Regulatory standard, information and advisory documents
- Operational procedures
- Air Traffic Services procedures and documentation
- Corporate Management procedures.

If recommendations are made they go to the appropriate organisation or agency for further development, usually the Civil Aviation Safety Authority and Airservices Australia; and may include maintenance and aircraft operators and manufacturers.

ATSB has five categories of aviation incident/accident investigation. The most common type of occurrence requiring investigation falls into category four.

Category four occurrences are those where the facts do not indicate a serious safety deficiency but an investigation is required to substantiate the facts that were first reported. The circumstances are sufficiently complex to require detailed information from the pilot, operator and/or other involved parties.

In January 2001 there were 11 category four occurrences which are currently under investigation by the ATSB.

To notify ATSB of an incident or accident call 1800 011 034. You can follow this up with an online report at www.atsb.gov.au

Category four occurrences in January 2001

Date	*Occ. number*	*Location*	*Aircraft Reg.*	*Org/Type*	*Injury*	*Group*	*Type*
2-Jan-01	200100035	Gunnedah, NSW	VH-HVA	Embraer-820-C	Nil	Low Capacity	Incident
15-Jan-01	200100135	Honolulu, VOR	VH-OJT	Boeing 747-400	Nil	High Capacity	Incident
15-Jan-01	200100135	Honolulu, VOR	2001001352	McDonnell MD-11	Nil	High Capacity	Incident
18-Jan-01	200100213	Brisbane, QLD	VH-TJX	Boeing 737-476	Nil	High Capacity	Serious Incident
18-Jan-01	200100252	3km N Bencubbin WA	VH-PHG	Bell Helicopter 206B (111)	Fatal	Charter	Accident
22-Jan-01	200100421	111km N Bourke, NSW	VH-MOK	Cessna 210R	Nil	Other Aerial Wk	Incident
25-Jan-01	200100338	Sydney, NSW	VH-EEN	Fairchild SA227-AT	Nil	Charter	Incident
28-Jan-01	200100346	2km W Canberra, ACT	VH-BZO	Beech A23A	Fatal	Private	Accident
28-Jan-01	200100347	Logan Village, QLD	VH-SIS	Pitts S-1E	Fatal	Private	Accident
29-Jan-01	200100443	8km SSW Sarina, QLD	VH-WEB	Bell 206L-1	Fatal	Agriculture	Accident
30-Jan-01	200100445	Melbourne, Vic	A6-EMM	Boeing 777	Nil	High Capacity	Serious Incident

Training operations: know your fuel usage

You should always know how to work the fuel system in your aircraft (particularly when there are a variety of switches and selectors) and know how much fuel you have. Then check that you are right. It sounds simple. But it's better to avoid running out of fuel before you get to your destination! It has happened and accidents related to fuel exhaustion continue to be investigated by ATSB investigators. Flying instructor and transport safety investigator MIKE WATSON has looked at some of them, including the accident in which a Cessna 150 crashed on final approach at Canberra airport on 28 November 1999 after a training flight.

"LET'S take a simple aircraft, a two seat trainer. It has a 112HP engine and uses around 25 litres per hour. The fuel system is very easy, it's either "ON" or "OFF". The aircraft has big fuel tanks with several hours' supply. It normally does flights of one hour (or a bit more).

There will be times when you need to carry just enough fuel for a flight and reserves. This could well be the case if two large-ish occupants are in the aircraft and it will be overweight with full fuel. You might think, a one-hour flight: well, 45 litres should be plenty with a fixed reserve of 45 minutes on top of a one-hour flight.

What inaccuracies are there in this approach? The fuel gauges are not easy to read to within five litres or so per side (which is about half an hour's flying time) so a dipstick is used to verify what's there. Because the fuel tanks are in the wings they are flat and wide. If the aircraft isn't sitting level then the dip stick reading won't be accurate.

Dipsticks are often made of wood and fuel 'creeps' up the grain of the wood, giving a blurred reading. Ask yourself who made the dipstick, and how accurate is it? Is this the correct dipstick or a generic one for a fleet of the same aircraft type at a school?

Does the school or aircraft owner rigorously get fuel receipts from the fuel supplier and does the operator cross-check the fuel quantity indication when the fuel is loaded on the aircraft? How does an operator KNOW the accuracy of the fuel quantity indication systems on each aircraft, particularly if the aircraft is being used for several sorties between refuelling? It can be difficult to calculate when the aircraft can't carry lots of extra fuel for weight reasons.

This aircraft is said to use 'around 25 litres per hour'. It is important to realise that this is a general figure and there are other factors that will change this consumption.

The aircraft uses 50 litres on a two-hour navigation flight at 3,500 feet. This aircraft is also used for ab-initio training when it does anything but fly straight and level! When doing circuits the power setting never stays the same for more than a few minutes.

In the training area an 'effects of controls' lesson flight at 2,000 feet will have a different fuel usage from a practice forced landing exercise, when at different times the engine is at full power and at idle power.

A session of steep turns and incipient spins uses more fuel as the aircraft is climbing to get to around 4000 feet above ground level, and then uses higher power settings for the exercises. On a hot day with a heavy load, the aircraft will be running at full power all the time to get to that altitude.

How much fuel would be used? Engine manufacturers state that full power settings use around 40% more fuel than cruise power settings. These different fuel usages will average out with the different types of flight.

Obviously the situation can become critical if the inherent inaccuracies in fuel quantity measurement combine with a flight, or a series of flights that have used more fuel than the stated average, and an aircraft runs out of fuel just before it reaches its destination.

The engine of the Cessna 150 at Canberra lost power just before its destination after a flight on a hot day with a heavy payload from an airfield with an elevation of around 2000 feet. The flight included steep turns and other manoeuvres at between 5000 feet and 6000 feet altitude. The flight was planned to take an hour, but took just a little bit longer. The aircraft took off with more than 40 litres of useable fuel measured, but the engine lost power with hardly any useable fuel remaining after manoeuvring to join the circuit. ■

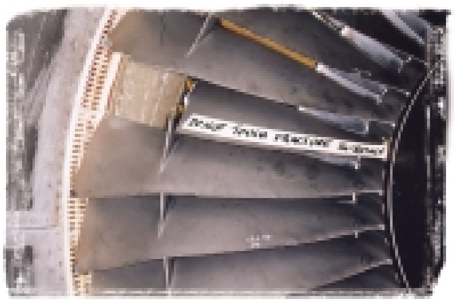
Safety briefs

767 broken turbine blade

Occurrence Brief 199901215

A Boeing 767 made an emergency landing at Sydney on 22 March 1999 after a portion of a fan blade in the right engine broke away.

It was only 21 minutes into the flight when a loud bang was heard and sparks and a flash were seen at the rear of the engine. There was an immediate drop in the engine pressure



ratio and a rise in the exhaust gas temperature (EGT) accompanied by a moderate vibration throughout the airframe. The EGT continued to rise and the engine was shut down. During the descent and approach the pilot reduced airspeed to 240 knots to reduce the vibration. The fractured fan blade and several 'liberated' portions of the blade (those that were found inside the engine bay) were examined by the ATSB and the engine manufacturer. The remaining 39 fan blades were returned to the engine manufacturer for review.

The blade had fractured about 470 mm above the blade platform just inboard of the mid-span shroud. About one-quarter of the blade had been liberated. The fan blade had fractured as a result of fatigue crack growth.

The failure had originated at a foreign object damage impact site 2.54 mm aft of the blade leading edge on the rear (concave) face of the blade. Traces of mineral debris were detected at the crack origin, indicating that the foreign object damage was the result of stone ingestion. Fatigue crack growth, from a crack depth of 1.5 mm, probably occurred during 35 flight cycles. The blade had no material abnormalities at the fracture site. ■

737 fuel contamination mystery

Occurrence Brief 200003034

An investigation into the contamination of a fuel sample taken from a Boeing 737 on 21 July 2000 has not found the source despite an intensive effort.

There was no indication of fungal species (cladisporium resinae). However, there was a heavy load of bacteria (pseudomonas) present in the water layer with a related film between the water and fuel layers.

The contamination was believed to be related to the fuel source following an inspection of the aircraft's fuel system, which showed no blockage of filters or other safety issue.

The contamination was found during routine fuel sampling before the first flight of the day. Maintenance personnel reported finding a red/ brown liquid present in the fuel sample removed from the Boeing 737 aircraft.

The aircraft operator met with fuel company representatives, the Civil Aviation Safety Authority and the ATSB in an attempt to determine the origin of the contamination. Fuel company representatives determined there had been no abnormal water drains at their refineries.

Research did however identify several past similar events in Australia. One in 1962 involved a Boeing 707 aircraft and was believed related to the sulphonates in the fuel combining with trace levels of transition metals (including iron).

Similar events, reported in 1996 and 1997, were believed to have resulted from the reaction of a complex of naphthenic/ sulphonic acids with transition metals (including iron).

Despite intensive investigation of this event, the source of the contamination could not be established and sporadic reports of contaminated fuel samples persist.

This incident was not related to the aviation gasoline (AVGAS) contamination reported in December 1999: analysis confirmed no presence of Ethylene Diamine. ■

Helicopter spraying ends in lake

Occurrence Brief 199904859

Two people survived serious injury when their helicopter impacted shallow water in Lake Joondalup in Perth on 19 October 1999 during a low-level turn in adverse wind conditions. The helicopter was being use to spray larvicide to control mosquitoes. During

a bank to right the helicopter unexpectedly lost height which the investigation concluded was consistent with it entering an area of strong turbulence.

The pilot conducted the runs from the east of the lake flying north/south tracks at about 30 feet, using the procedural turn technique and climbing to 50 feet to reposition the helicopter on each run.

Despite the turbulent conditions the pilot did not consider flying the helicopter higher above the water to provide a greater height margin. The pilot instead was concerned to position the helicopter to ensure spray coverage and to maintain a safe distance from the shoreline and trees.

The reported power margin should have been sufficient to recover the helicopter in benign conditions but the investigation could not determine if the power margin was adequate to overcome the conditions encountered at the time. By the time the pilot realised that the helicopter was descending at an excessively high rate there was insufficient height available for him to recover the helicopter. ■

Aural warnings to be fitted in aircraft

Occurrence Report 199902928

The Civil Aviation Safety Authority (CASA) has accepted an ATSB recommendation that it mandate the fitment of aural cabin altitude alert warnings systems to pressurised aircraft. This is one of the outcomes of the investigation and recommendations from an incident on 21 June 1999 in which the pilot-in-command of a King Air lost consciousness from hypoxia.

A number of factors contributed to the incident. The cabin altitude warning failed to indicate a problem with oxygen levels at 10,000 feet as required by CAO 108.26. The cockpit warning systems did not adequately alert the pilot to the cabin depressurisation. The oxygen mask deployment doors were incorrectly oriented during installation and the masks could not automatically deploy. As the aircraft climbed through 10,400 feet the pilot began the climb checklist actions. The passenger in the co-pilot seat saw the pilot reposition the engine bleed air switches from the top to the centre positions. At FL250 the air traffic controller contacted the pilot about being off track. A short time later the passenger noticed that the pilot was repeatedly performing a task and lost consciousness.

The pilot recovered during the descent and noticed that the PASS OXYGEN ON and both bleed air OFF green advisory annunciators were illuminated. He also noticed that the bleed air switches were selected to the ENVIR OFF position. An uneventful landing was made.

The safety actions taken after the incident included a re-evaluation of pilot training by the operator and more stringent currency requirements for single pilot operations by military pilots on the King Air.

A program has been put in place to conduct regular maintenance of the cabin altitude warning and the supplemental oxygen systems. The operator of the aircraft also installed an aural warning system in the aircraft and to other Super King Air aircraft in the fleet at a cost of around $1,000 each.

CASA has released a discussion paper seeking industry comment. It will prepare a regulatory amendment to mandate the fitment of aural warning systems to pressurised aircraft.

Multiple engine cowl accident factors

Occurrence Brief 200002648

Limited time on the aircraft type and lack of experience may have contributed to a Beechcraft Queen Air pancaking into a hillside shortly after takeoff at Leonora in June last year leaving the six occupants seriously injured.

Although the accident occurred after the inboard cowl of the right engine had cleanly broken away during the takeoff roll, the ATSB investigation found that this would not have adversely affected flying capability.

During the takeoff roll the pilot and passengers heard a loud bang followed by the engine cowl opening as the aircraft left the ground. The cowl fell away without damaging the aircraft. It was later found that two top hinges had failed.

According to the ATSB report, the pilot took off after last light when he was not rated for night flying. He elected to use a power setting of 45 inches of manifold pressure (maximum continuous power) "to avoid an overboost condition". He rotated the aircraft at 85kts when the cowl fell away.

Despite the pilot pulling back on the controls the aircraft would not climb and impacted the ground parallel to the slope of the tailings dump at low speed and high nose attitude. The impact forces acted perpendicular to the aircraft's attitude and probably contributed to the survival of the accident.

Despite recognising that the aircraft was not performing as expected the pilot did not apply full power. The investigation could not determine whether the use of full power would have resulted in a different outcome. The pilot may have been distracted by the engine cowl incident.

The Civil Aviation Safety Authority is conducting a separate investigation into the regulatory aspects of the accident circumstances.

UN Hercules damaged on landing

Occurrence Report 200000618

A Lockheed Hercules L382G was substantially damaged during its landing at Darwin on 18 February 2000. The aircraft had returned after a United Nations charter flight to Dili, East Timor. The right and front landing gear had extended normally but the left main gear had failed to extend.

An attempt to lower the left main gear using the manual hydraulic system was unsuccessful because the emergency engaging handle could not be moved. The flight engineer unsuccessfully attempted to manually move the lever on the forward grearbox of the left landing gear from "power" to "manual" and the loadmaster attempted to lower the gear by disconnecting the universal joints on the vertical torque shafts of the left landing gear.

The castellated nuts on the bolts of both wheel vertical torque shafts could not be undone without using a spanner. Even when a spanner was used, only two of the four nuts had been undone after about 30 minutes.

By this time the fuel was low with about 20 minutes endurance left. The pilot in command elected to land as there was no time to undo the remaining bolts. The aircraft came to rest in a straight line and there were no injuries.

The left main gear ball screw assembly was found to have excessive backlash and the grease on the ball screw was contaminated with accumulated debris. Several defects were also found which included excessively worn ball inserts and numerous chipped and distorted bearing balls in the ball nut assembly. The engineers concluded that the damage was consistent with the bearing balls not riding normally or freely along the sleeve with the greatest resistance probably occurring when the bearing balls rode across the gouges.

The previous day the aircraft had landed at Dili after the gear had been cycled up and down following an indication that the left main gear was not down and locked. It was found that the gear assembly had failed internally prior to this incident, and that reselecting the gear had led to the failure of the left main gear assembly at Darwin.

Breaking new ground: one man's reflection

The investigation into the highly publicised Monarch Airlines accident in Young on 11 June 1993 in which seven people were fatally injured, broke new ground in aviation safety investigation in Australia. For the first time the focus of the investigation shifted away from the actions of the pilot. The investigation examined how organisational and task-related factors influenced the actions of individuals, and what defences were in place to protect against error. This set the scene for an entirely new approach to air safety investigation, not just here in Australia but world-wide. After a long career in the aviation industry, transport safety investigator Barry Sargeant reflects on this event and the changes it has brought. SARAH-JANE CROSBY **reports.**

THE Young accident investigation utilised an analytical model which recognised that organisational and task-related factors could impact on how people carried out their duties. Systemic failures in the airline's management of flight operations, and in the regulation and licensing of its operations by the former Civil Aviation Authority, were found to be some of the factors that adversely affected the environment within which the flight was being conducted.

"It really was a new way of looking at the information we received in the process of the investigation. This revealed the complex relationship between individuals associated with the occurrence, and the design and characteristics of the system within which those individuals operated," Barry said.

The new method involved the use of Professor James Reason's model of a systems-based approach to occurrence investigation.

Since 1993, the Bureau has conducted many of its investigations using techniques based on the Reason model, including in the rail industry.

"In 1997 there was a collision between two coal trains in the Hunter Valley causing about $15 million worth of damage. The NSW Transport Safety Bureau asked (we were the Bureau of Air Safety Investigation then) if we would be interested in sending a couple of investigators to carry out an investigation. I was selected along with Alan Hobbs, a Human Performance investigator. It was the first time we had done anything like that and the first time the rail industry had ever had air safety investigators look at a rail occurrence."

Traditionally rail investigations had apportioned blame and liability, focusing on individuals and the more immediate issues, not unlike many other types of investigations.

"They were interested in thinking outside the square. The sort of approach we were taking then, and we continue to do, is to look beyond the actions of individuals – the people at the sharp end. Everyone makes mistakes we all know that. But looking at the bigger picture means you can identify what other factors may have adversely affected the way train crews operated. So that's what we did – it was all very interesting."

Mr Sargeant acknowledges he did not suddenly become a rail expert, his only previous interest in rail had been getting a seat on the 7:10 to work. He knew his limitations and when to call upon other experts for advice. He was able to apply his air safety investigation skills as a manager of the investigation to achieve a successful result.

"I can get a phone call notifying me of an accident involving a company I have never heard of, and an aircraft type of which I know little about. Yet before you know it you realise that you have got sufficient knowledge to start identifying issues that were unseen by individuals in the company itself."

Barry also had management oversight of the investigation into the South-Pacific Seaplanes accident at Calabash Bay in 1998 and is currently in charge of the Whyalla Airlines investigation.

He began flying in 1965 after a first career as an electrician, working on big projects such as the Snowy Mountains Scheme. Keen to become a professional pilot from the outset, he ploughed the money he'd saved at the Snowy into his training. He learnt to fly at Bankstown, quickly gaining his commercial licence and in May 1966 started work as a flying instructor at Illawarra Flying School.

"Going into a site where there has been a fatality is a very sobering experience..."

After gaining further instructional experience he began training Qantas Cadets. This covered all phases from ab-initio to advanced multi-engine IFR training. He often comes across former cadets who now hold very senior airline positions, and looks back with fondness to those earlier times.

After the original cadet scheme was disbanded in 1972 he worked for various companies, including Jack Brabham Aviation as chief pilot, and Dalgety Australia, flying twin turbine King Air aircraft, later becoming chief pilot. His flying experience with Dalgety took him all around Australia and into Papua New Guinea, and was what he describes as "high quality flying".

In 1978 he joined Advance Airlines and became a Check and Training pilot, flying the Bandeirante and Super King Air aircraft, eventually becoming Chief Pilot for a short time.

After flying airline services to Lord Howe Island and regional centres for a year or so, "meeting some very nice people" and doing some "very enjoyable flying", he took up an offer to join the Department of Transport in 1979 as an Examiner of Airmen. He thought he already knew all about flying operations, but quickly realised he knew very little.

Not long after, at age 40, Barry's career took an unexpected turn. He suffered a stroke and lost his pilot licence on medical grounds. As luck would have it, he was able to transfer to the Bureau of Air Safety Investigation, and spent the next 16 years in Sydney as a senior air safety investigator, including 10 years as the Field Office Manager.

Professional life as an investigator was quite different. But Barry found that he could still remain close to the industry he was very much a part of. "The Sydney office was much more operationally focussed then. I spent a lot of time out of the office, undertaking field investigations ranging from 747s all the way though to parachutes, gliders and ultra-lights. I was even involved at one point in a Concorde investigation."

His interest in meeting people and experiencing life continued in his new role but it wasn't without its down side.

"There are pressures. You're often dealing with families and friends of people who have died in aircraft accidents. That requires sensitivity, total honesty, understanding of what its like for them, and being open to listen.

"Going into a site where there has been a fatality is a very sobering experience I can assure you. But its something you just have to do – its part of the job. You cannot afford to let your emotions overcome your professional duties. There are others on the site trying to do a job, often depending on you."

Those experiences have made him more passionate about the safety message. "When I see a needless loss of life, particularly when it is similar to previous accidents we have investigated, I feel particularly disappointed that the safety message does not seem to be getting through to some people. I value getting out to the industry, making safety presentations, and generally talking with people about safety. I feel sorry I don't get to do it so much these days."

When the "new way" of doing things came in with the Young accident was it hard for an old hand to embrace it?

"It seemed obvious to me. The former Director of the Bureau, Dr Rob Lee, had shown us the way forward, I just happened to be the first to put theory into practice. I could clearly see that the Reason model really made a lot of sense, and had very wide implications for safety well beyond the transport industry.

"I also could never really understand why everyone was so keen to single someone out for blame and to make an example of them. It fixes nothing. Take a maintenance engineer who makes a mistake and reports it to the boss and gets the sack. What signal does that send to the other engineers? Will the next one come forward when there is a mistake made? I don't think so. By sacking 'the guilty', management thinks they have solved the problem but in fact they have created a new one."

It is clear that the no blame approach taken by BASI, and continued by the Australian Transport Safety Bureau, encourages the industry to report safety problems. It has been widely recognised that if the reports were used against an individual then safety reporting would soon stop.

It has been acknowledged in the industry world-wide that a good reporting culture is essential for problems to be uncovered so that remedies can be implemented. In the past few years the number of occurrences reported to the ATSB has increased. That might suggest a decline in safety, but according to Barry, what it really means is that the safety culture has continued to improve, encouraging better reporting.

"Most people know that here in the ATSB we are not police. We are not here to determine blame or apportion liability. In fact the legislation we work to, the Air Navigation Act, prevents us from doing so. This is a message we are constantly reinforcing. Yet every now and again you meet someone who thinks we are trying to find blame, but it's not true. Then there are others in the industry who want to take a hard line by fining or punishing individuals.

"We are far better off by looking beyond blaming someone to ask, what were the underlying factors that contributed to this person making that error? How can we change things, and what defences can we put in place to make sure that if someone does make an error it is detected and prevented from progressing to a safety breakdown?"

The Hunter Valley train collision identified issues not normally addressed in previous rail investigations, including driver fatigue inadequate or missing system safety defences, train crew pairing, reporting of occurrences and situational awareness. Certainly there is now evidence to suggest a shift towards more systems-based investigations in the rail industry as a result of work by the ATSB.

In early 1999 Barry was promoted to Deputy Director Air Safety Investigation, based in Canberra, and became part of a new organisation when the ATSB was formed.

As he contemplates retirement from full time work and hopes to take things a little easier (but still keeping his hand in) he insists that Australian aviation safety really is in good hands. ■

Confidential Aviation Incident Reporting

THE Confidential Aviation Incident Reporting (CAIR) system helps to identify and rectify aviation safety deficiencies. It also performs a safety education function so that people can learn from the experiences of others. The reporter's identity always remains confidential. To make a report, or discuss an issue you think is relevant, please call me on 1800 020 505 or complete a CAIR form, which is available from the Internet at www.atsb.gov.au

Chris Sullivan
Manager CAIR

CAIR reports

Unsafe practices in flying operation (CAIR 200002561)

I wish to submit a confidential report on the flying operations of an aviation company trading as [company name] *in* [regional NSW location]. *The company is an air charter operator that conducts bank run type operations.*

My concern is as follows. Young pilots (looking for work and flying hours) are expected to not complain when duty times are exceeded and must accept maintenance irregularities, such as inoperative autopilots. Entries are not supposed to be put in the maintenance release that could prevent an aircraft from flying. Pilots that do not comply are told to look elsewhere for work. I believe the owner (who should know better) imposes these dangerous practices rather than the chief pilot, who is merely the "pawn" in this operation.

Response from CASA: On 22 June 2000 the above noted CAIR report was referred to CASA for action. The report identified concerns within [regional location] based operator [company name], including allegations of excessive flight and duty times and maintenance irregularities.

In response to these allegations, an unscheduled audit of the company's flying operations was conducted by CASA officers on 17-18 August 2000. Based on the findings of the ensuing audit report, regulatory action was instigated against the company's Air Operator's Certificate, the chief pilot's Chief Pilot Approval and several of the company pilot's Air Transport and Commercial Pilot Licences.

Subsequently, in December 2000, CASA issued a notice to [company name] indicating its decision not to renew the company's AOC when it expired on 31 December 2000. The decision was based on the fact that the company had a safety history indicating a systemic tendency for unsafe conditions to become established, and that the company could not demonstrate that its conscious level of safety awareness, staffing capacity and implementation of safety systems was at an appropriate level. As such CASA could not be satisfied under section 28 of the Civil Aviation Act, and thus could not support the reissue of [company name] AOC. At the time of writing, the company is inoperative.

Model aircraft display (CAIR 200001485)

A model aircraft event was held at [ABC Racecourse] *on 30 April 2000. At 1535 a model aircraft was observed doing aerobatics and trailing smoke up to 1000 feet (approximately). This could have been a problem for* [XYZ airport] *operations when the duty runways were 17, as the racecourse is a common reporting point when 17 is used. I do not believe a NOTAM was issued to cover this activity.*

The organisers should be informed of the proximity of [XYZ airport] *operations and the need to at least advise the tower of the time of such activity.*

CAIR Note: This occurrence was discussed with the CASA District Office. CASA was aware of the display but understood that the display would not exceed 300 feet. Without permission in writing by the Authority, CAO 95.21 paragraph 4.2.(e) prohibits flight at a height exceeding 300 feet above terrain except when in the confines of a model aircraft flying area.

Danger Area anomaly (CAIR 20010020)

The local flying training areas to the northwest of Parafield are detailed in the Designated Airspace Handbook as D291, D292, D293 and D294. Danger Areas D291 and D292 are below the control area steps and are in Class G airspace, whereas D293 and D294 overlay these areas and are in Class C airspace.

Local flying clubs are aware that D293 and D294, although in Class C airspace, are considered as Class G for flying training purposes.

There is an entry in ERSA (under PRD Areas) which states "When active, Class C airspace within this Danger Area is reclassified Class G". This entry is directly beneath the entry for D293. There is no such statement pertaining to D294.

Also, the reporter stated that when aircraft transit D294 to the north from Parafield at 4000 feet and below, the air crew do not seek a clearance to enter and leave a small portion of Class C airspace. This portion of airspace is situated between the northern boundary of D294 and the 36 DME control area step.

Response from Airservices Australia: I am writing in response to the above report, which relates to flying training areas associated with Parafield Airport.

The ERSA entries for D293 and D294 should both have notes reading 'When active, Class C airspace within this Danger Area is reclassified Class G'. Unfortunately in the printing of the latest issue of ERSA the note for D294 has been omitted. NOTAM CO 265/01 has been issued correcting the omission and ERSA will be amended at the next opportunity.

The northern boundary of D294 and the 36NM Adelaide Class C step do not exactly

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coincide leaving a section of Class C airspace with a base of A025 between 1 and 2 miles wide. An aircraft wishing to exit D294 to the northwest between A025 and A040 would require a clearance to do so. Whilst D294 is established for flying training it is possible that transiting aircraft may use the airspace.

The latest Airspace Audit of South Australia has identified this situation and made a number of recommendations regarding Control Area and Restricted Area boundaries. These recommendations will be acted on once the final report is received.

No radio calls in MBZ (CAIR 200100046)

Aircraft [registration] *taxied, then backtracked on runway 27 and departed circuit area with no audible radio calls. Wynyard has ARFU and no beepbacks were heard.*

I was listening on radio and could clearly hear other traffic in MBZ. Other pilot in attendance listening was a PPL holder.

Aircraft then returned and conducted circuits, still with no radio calls.

CAIR note: The CAIR office contacted the aircraft owner. The owner advised that the aircraft had recently undergone significant maintenance to the radios and that they should have been working. The owner believed that the problem might have been "finger trouble" by the pilot. The owner would ensure that the pilot was fully briefed on the operation of the radio before any future flight.

Flight number callsigns *(three reports)*

First report (CAIR 200004359)

Two [aircraft type] *departed Hobart and Launceston for Sydney close together. Their callsigns were* [operator] *966 and* [operator] *996 respectively. After Flinders Island they were on the same route at the same level, 55 NM in trail. The potential for confusion of like sounding flight number callsigns in such a situation is very high. In fact, the next controller did transpose the callsigns when reading back the coordination. When I corrected the error, he made a comment about the wisdom of operating two flights close together with such similar callsigns.*

This incident illustrates the problems inherent in flight number callsigns. If the aircraft had been using their registrations, their callsigns would still have been similar, yet much more distinctive. This is because the spoken phonetic alphabet is much easier to differentiate than spoken groups of numbers.

Response from operator: (Abridged response) This is the first CAIR report I have seen on flight number callsigns since we started using them some years ago. In this case, one of the aircraft must have been running late.

The commercial division of [overarching affiliate operator] does the allocation of flight numbers and we don't have that much control, but we have changed some in the past where this potential problem has occurred. The problem is that they are running out of numbers.

Certainly, we have been aware of the problems caused by like or similar callsigns, but overall, to us (the operator) the use of flight number callsigns has been accepted by the crews, with very little adverse comment. From a flight planning position it is good. Unlike [regional operator] where they had a very 'anti' flight number callsign group in the pilot ranks, we have operated with flight number callsigns with very few problems.

Certainly in the case of OCTA operations, the use of flight number callsigns is good as it very clearly tells the GA pilot that he is dealing with an RPT aircraft. Our company position is that we prefer to use flight number callsigns.

Second report (CAIR 200006136)

National Instruction 29/2000 allowed [operator] *to use flight number callsigns. The callsign is the operator name followed by the flight number. In one burst around* [location] *there was "*[operator] *1344" departing, and "*[operator] *1341 and 1351" arriving. This leads to a great deal of radio traffic on a busy frequency and makes it difficult for other aircraft to keep situational awareness on DTI and on* [location] *MBZ.*

So far, the operator's use of flight number callsigns has been for night operations. This is not good for safety.

I suggest that pilots resume using aircraft registrations as callsigns immediately, to avoid confusion.

CAIR note: In discussion, the reporter stated that he did not know the rationale for the operator's change to flight number callsigns. He added that the flight number callsigns required more time to say than did the registration callsigns. He perceived the new callsigns were an additional factor for controllers to consider during periods when only one controller was working and traffic flows were complicated by noise abatement requirements. The situation could be further complicated if traffic was operating in IMC.

Response from Airservices Australia: I am in receipt of the subject correspondence from you regarding a CAIR report concerning flight number callsigns. The reporter's comments are noted and in response I can advise that the expansion of the use of flight numbers as callsigns has been approved by Airservices following representation from a number of domestic operators. All operators are required to seek specific approval to use such callsigns provided they meet specific conditions regarding for example, the number of digits and combinations of digits in the callsign suffix. These requirements are detailed in AIC H1/01 dated 25 January 2001.

In addition, prior to permitting the expanded use of flight number callsigns, Airservices undertook a detailed hazard analysis and published a safety case, which contained significant operational input. I would suggest the concerns raised by your reporter are adequately covered in that document.

Third report (CAIR 200100291)

From 12 February 2001, [regional airline] *will start using flight number callsigns. This will further confuse/congest the airwaves. Registration callsigns are less confusing and less likely to be transposed. An example of this is on Sundays in the late afternoon,* [international air carrier] *has flight numbers 121, 153, 193, 173 arriving at Melbourne. From an ATC point of view there is no gain in using flight number callsigns, to the contrary it increases the possibility for error.*

This is another example of a non-operational person wishing to implement change for no benefit to the end user. Numbers are used in altitude, headings etc. Why add them to callsigns?

CAIR note: A check of data from NASA's ASRS (Aviation Safety Reporting System) and UK CHIRP (Confidential Human Factors Incident Reporting Program) reveals international concern with "callsign confusion". *Similar numbers + human error = callsign confusion.*

Note: The CAIR office would appreciate feedback on your experiences with regard to this particular topic.

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