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AVIATION SAFETY BULLETIN

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Inside this Issue:

GASES AND THE BODY

OZONE SICKNESS

Ozone sickness is another problem associated with flight at very high altitudes. Although it has been evident only with flights operating at altitudes of 30,000 feet or more, the advent of general aviation airplanes that operate at subsonic speeds at such levels makes this a problem of which even the private pilot should be aware.

Ozone is a bluish gas that exists in relatively high concentrations in the upper levels of the atmosphere, especially in the tropopause. Because the tropopause fluctuates in its average altitude from season to season, any flight operating above 35,000 feet is likely to come into, contact with ozone at some time.

Although ozone does have a distinctive colour and odour, passengers and flight crew who have experienced ozone sickness have been unaware of the apparently high concentrations of ozone prior to the onset of the symptoms.

The symptoms of ozone sickness are :

- hacking cough;
- poor night vision;
- shortness of breath;
- Headache;
- burning eyes, mouth and nose;
- mild chest pains;
- leg cramps;
- Fatigue;
- Drowsiness;
- nose bleed;
- Nausea; and
- vomiting.

The symptoms become more severe with continued exposure and with physical activity but do diminish rapidly when the airplane descends below 30,000 feet.

Some relief from the symptoms can be achieved by:

- breathing through a warm, moist towel.
- Limiting physical activity to a minimum, and
- breathing pure oxygen are also effective in alleviating the symptoms.

CARBON MONOXIDE

Oxygen is transported throughout the body by combining with the haemoglobin in the blood. However, this vital transportation agent, haemoglobin, has more than 200 times the affinity for carbon monoxide that it has for oxygen. Therefore, even the smallest amounts; of carbon monoxide can seriously interfere with the distribution of oxygen and produce a type of hypoxia, known as **anaemic hypoxia**..

Carbon monoxide is colourless, odourless and tasteless. It is a product of fuel combustion and is found in varying amounts in the exhaust from airplane engines. A defect, crack or hole in the cabin heating system may allow this gas to enter the cockpit of the airplane.

Susceptibility to carbon monoxide increases with altitude. At higher altitudes, the body has difficulty getting enough oxygen because of decreased pressure. The additional problem of carbon monoxide could make the situation critical.

Early symptoms of **CO** poisoning are :

- feelings of sluggishness , and warmness;
- Intense headache,
- throbbing in the temples,
- ringing in the ears,
- Dizziness, and
- dimming of vision follow as exposure increases;
- Eventually vomiting, convulsions, coma and death result.

Although CO poisoning is a type of hypoxia, it is unlike altitude hypoxia in that it is not immediately remedied by the use of oxygen or by descent to lower altitudes.

If a pilot notices exhaust fumes or experiences any of the symptoms associated with **CO** poisoning, he should immediately :

- shut off the cabin heater,
- open a fresh air source,
- avoid smoking, use 100% oxygen if it is available and
- land at the first opportunity and
- ensure that all effects of CO are gone before continuing the flight.
- It may take several days to rid the body of carbon monoxide. In some cases, it may be wise to consult a doctor.

CIGARETTES

Cigarette smoke contains a minute amount of carbon monoxide. It has been estimated that a heavy smoker will lower his ceiling by more than 4000 feet. Just 3 cigarettes smoked at sea level will raise the physiological altitude to 8000 feet. Because the carbon monoxide in the cigarette smoke is absorbed by the haemoglobin, its oxygen absorbing qualities are reduced to about the same degree as they would be reduced by the decrease in atmospheric pressure at 8000 feet ASL.

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GASES AND THE BODY cont...

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The carbon monoxide from cigarettes has detrimental effects not only on the smoker but on the non-smoker as well. After prolonged exposure to, an increased level of carbon monoxide such as that produced within a confined area such as a cockpit by people smoking, symptoms such as respiratory discomfort, headaches, eye irritation can affect the non-smoker.

Cigarette smoking has also been declared as hazardous to health, contributing to hypertension and chronic lung disorders such as bronchitis and emphysema. It has been linked to lung cancer and coronary heart disease.

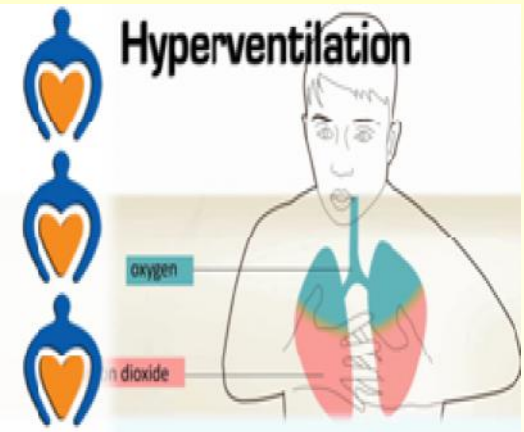
HYPERVENTILATION

Hyperventilation, or over-breathing, is an increase in respiration that upsets; the natural balance of oxygen and carbon dioxide in the system, usually as a result of emotional tension or anxiety.

Under conditions of emotional stress, fright or pain, a person may unconsciously increase his rate of breathing, thus expelling more carbon dioxide than is being produced by muscular activity. The result is a deficiency of carbon dioxide in the blood.

The most common symptoms are :

- dizziness,
- tingling of the toes and fingers,
- hot and cold sensations,
- nausea and
- sleepiness.
- Unconsciousness may result if the breathing rate is not corrected.



Remedy

- Slow down the rate of breathing and
- To hold the breath intermittently,
- To allow the carbon dioxide to build up to a normal level. Sometimes, the proper balance of carbon dioxide can be more quickly restored by breathing into a paper bag, that is, by re-breathing the expelled carbon dioxide.

DECOMPRESSION SICKNESS

TRAPPED GASES

During and descent, gases trapped in certain body cavities expand or contract. The inability to pass this gas may cause abdominal pain, toothache or pain in ears or sinuses.

Ear Block

The ear is composed of three sections. The outer ear is the auditory canal and ends at the eardrum. The middle ear is a cavity surrounded by bones of the skull and is filled with air. The Eustachian tube connects the middle ear to the throat. The inner ear is used for hearing and certain equilibrium senses.

As one ascends or descends, air must escape or be replenished through the Eustachian tube to equalize the pressure in the middle ear cavity with that of the atmosphere. If air is trapped in the middle ear, the eardrum stretches to absorb the higher pressure. The result is pain and sometimes temporary deafness.

During climbs, there is little problem since excess air escapes through the tube easily. However, during descents, when pressure in the middle ear must be increased. The Eustachian tubes do not open readily.

Remedy

- The pilot and his passengers must consciously make an effort to swallow or yawn to stimulate the muscular action of the tubes.
- Sometimes it is advisable to use the valsalva technique, that is, to close the mouth, hold the nose and blow gently. This action forces air up the Eustachian tubes.
- Children may suffer severe pain because of ear blocks during descents. They should be repeatedly reminded to swallow or yawn.
- Small babies are incapable of voluntarily adjusting the pressure in the middle ear and should be given a bottle to suck during descents.
- Painful ear block generally occurs; as a result of too rapid descent. If the pilot or his passengers are unable to relieve the pain of ear block by the methods described, it may be necessary to climb to altitude again and make the descent more gradually.
- After a flight in which 100 per cent oxygen has been used, the valsalva procedure should be used several times to ventilate the middle ear and thus reduce the possibility of pain occurring later in the day.



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GASES AND THE BODY cont...

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Sinus Block

The sinuses are air filled, bony cavities connected with the nose by means of one or more small openings. If these openings are obstructed by swelling of the mucous membrane lining of the sinuses (as during a cold), equalization of the pressure is difficult. Pain in the cheek bones on either side of the nose, or in the upper jaw, or above the eyes, will result.

The valsalva procedure will relieve sinus pain for both ear and sinus block, the prudent use of nasal inhalants such as Benzedrex, Afrin, Neosynephrine may be helpful.

A nasal inhalant containing antihistamine, however, should not be used for the reasons stated in the section on drugs below.

Toothaches

Toothaches may occur at altitude due to abscesses, imperfect fillings, inadequately filled root canals. Anyone who suffers from toothache at altitude should see his dentist. However, the pain caused by a sinus block can be mistaken for toothache. If air is able to enter below a filling, the filling may well be blown out as the pilot reaches higher altitude.

Gastrointestinal Pain

Gas pains are caused by the expansion of gas within the digestive tract during ascent into the reduced pressure at altitude. Relief from pain may be accomplished by descent from altitude.

The Common Cold

Don't fly with a common cold. A cold that is a mere discomfort on the ground can become a serious menace to a pilot and his passengers in the air.

Tiredness, irritability, drowsiness and pain are ail symptoms of a cold and work together to make a pilot unsafe in the air. More insidious, however, is the effect a cold may have on the sinuses and on the middle and inner ear. Swollen lymph tissue and mucous membranes may block the sinuses causing disabling pain and pressure vertigo during descent from altitude.

Infection of the inner ear, that is a common symptom of a cold, can also produce severe vertigo. The tissue around the nasal end of the Eustachian tube will quite likely be swollen and middle ear problems associated, under normal conditions (see above), with descent from altitude will be severely aggravated. A perforated eardrum is a possible result. Although a perforated eardrum usually heals quickly, in some cases there is permanent hearing impairment or prolonged infection of the middle ear.

Cold remedies do not prevent symptoms. They usually only bring on other problems, drowsiness being the most common.

EVOLVED GASES

Nitrogen, always present in body fluids, comes out of solution and forms bubbles if the pressure on the body drops sufficiently as it does during ascent into the higher altitudes. Overweight persons are more susceptible to evolved gas decompression sickness as fatty tissue contains more nitrogen.

Bends is characterized by pain in and around the joints and can become progressively worse, during ascent to higher altitudes.

Chokes are pains in the chest caused by blocking of the smaller pulmonary blood vessels by innumerable small bubbles. In severe cases, there is a sensation of suffocation.

Paresthesia or Creeps is another decompression sickness with symptoms of tingling, itching, cold and warm sensations.

Central nervous system disturbances include visual disturbances, headache and, more rarely, paralysis and sensory disturbances.

Decompression sickness is unpredictable. One of the outcomes may be shock, characterized by faintness, dizziness, nausea, pallor, sweating and even loss of consciousness. Usually the symptoms disappear when a return to the ground is made. However, the symptoms may continue and special treatment (recompression) may be needed.

Decompression sickness, caused by evolved gas, is rare below 20,000 feet. The best defence against this painful problem is a pressurized cabin. Some protection against it can be achieved by breathing 100% oxygen for an hour before ascending to altitudes above 20,000 feet. This action washes the nitrogen out of the blood. Oxygen does not come out of solution or form bubbles. Refrain also from drinking carbonated beverages or eating gas producing foods.

Scuba Diving and Flying

A person that flies in an airplane immediately after engaging in the sport of scuba diving risks severe decompression sickness at much lower altitudes than this problem would normally be expected. The scuba diver uses compressed air in his breathing tanks to counteract the greater pressure of the water on his body. At a depth of 30 feet, his body absorbs twice as much nitrogen as it would on the ground. Ascending to 8000 feet ASL could bring on incapacitating bends. A good rule, if you have dived to a depth below 30 feet, is not to, fly for 24 hours to permit the nitrogen content of the body to return to, normal. ■

Article uplifted from pilotfriend.com

SAFETY CULTURE PART II

DIFFERENTIATING BETWEEN A POSITIVE AND NEGATIVE SAFETY CULTURE

The 1st issue of the 2015 CAAF Aviation Safety Bulletin published Part I of this Safety Culture article highlighting how the right Safety Culture is an asset in the Aviation Industry. In this 2nd article on Safety Culture the focus is on "Positive Safety Culture" and "Negative Safety Culture".

So, what is Positive or Negative Safety Culture and how can we differentiate between the two?

A positive Safety Culture would be one where everyone in the organisation knew the role they played with respect to safety, and believed that everyone else in the organisation was truly committed to safety because there was clear safety leadership, activity, and commitment in terms of resources. There would be a clear safety policy and strategy and anyone could raise a safety issue with freedom, in addition, safety would be discussed frequently at all levels in the organisation, and would be the first agenda item in weekly staff meetings.

At the other end of the spectrum is a negative Safety Culture, this is characterised by situations in which safety takes a back seat in decision making even though people are saying that safety comes first and where management and pilots/ controllers/engineers do not share the same beliefs about safety. Simple examples would be where employee concerns about certain safety aspects are not addressed, where there is no learning from past safety events, where safety cases state the system or procedure is safe but the operational staff at the coal face believe an incident or accident is imminent, or where safety is believed to be another person's responsibility. Such a pattern reflects negative Safety Culture because it means that safety will not be addressed coherently or effectively throughout the organisation.

In the following tables, uplifted from the EUROCONTROL/FAA White Paper published in 2008 on Safety Culture in Air Traffic Management, two different situations are depicted, one showing a Positive Safety Culture (Table 1) and the other a Negative Safety Culture (Table 2) and how they lead to different levels of safety performance.

	MANAGEMENT	OPERATIONAL STAFF
What was BELIEVED	▪ Both controllers and management believe they should submit reports of all occurrences. ▪ Both controllers and management believe human errors exist and reports are an important basis for learning and improving safety.	
What was DONE	▪ Management does not punish those who report; instead they are supported and the report is addressed.	▪ The controller reports the incident to the supervisor and they discuss the incident.
OUTCOME	▪ Controllers and management trust each other, and a just culture, where occurrences are freely reported, exists.	

Table 1 - Example of Positive Safety Culture

	MANAGEMENT	OPERATIONAL STAFF
What was BELIEVED	▪ Investigations of operational errors are necessary to determine problem areas and identify substandard controllers.	▪ Investigations are used to assign blame to lower-level employees and do not examine other problems.
What was DONE	▪ Designed investigation process without coordination with employees.	▪ Refused to cooperate fully with investigations.
OUTCOME	▪ Investigations of operational errors place blame on individual employees and fail to uncover underlying problems. ▪ Persistence of a blaming culture prevents implementation of an effective investigative process. ▪ Similar operational errors continue to recur.	

Table 2 - Example of Negative Safety Culture

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SAFETY CULTURE PART II cont….

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Being able to differentiate between a Positive Safety Culture and a Negative Safety Culture would enable employees and management alike to take stock of the organisations' Safety Culture and align their strategy to ensure they are on the right path towards a positive one.

Although it is recognised that the existence of an appropriate and robust Safety Management System (SMS) is necessary for maintaining and improving the safety of operations, it may not be sufficient to guarantee adequate safety performance. A SMS will not assure safety if it is not used properly, and thus all staff in the organisation need to be fully aware of its existence, understand its basis, and be motivated to use the SMS that is in place. A positive Safety Culture can be a strong enabler to ensure the SMS works in practice and vice versa; implementing a good SMS can be an enabler for Safety Culture.

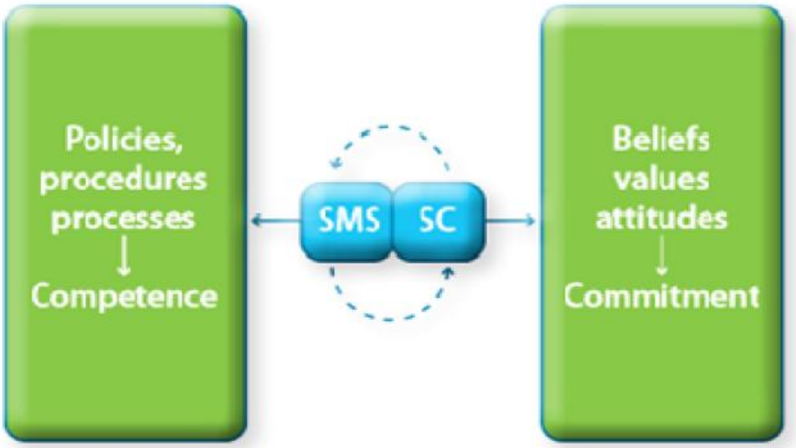
Organisations are managed by organisational practices, which affect both performance and reliability of safety systems. As James Reason put it, a well-developed SMS can serve as an accelerator of Safety Culture. Therefore SMS and Safety Culture are inter-dependent; SMS embodies the competence to achieve safety, whereas Safety Culture represents the commitment to achieving safety.

SMS and Safety Culture can be worked on together or independently, however, the strength of treating Safety Culture and safety management as one is that it can help focus Safety Culture improvement needs into noticeable improvements to the SMS. An alternative approach would be to have some distance retained between the two areas to enable feedback on where a SMS may not actually be working in practice, for example, a technical problem in the error reporting system that stops people from bothering to report incidents, while allowing a focus on deeper cultural issues that can be unearthed during Safety Culture surveys such as regional differences in safety attitudes, or problems of mistrust between different sections or levels in the organisation, an example being operational staff believing the SMS is just 'for show' or to 'protect' management.

Safety Culture takes time to grow and change whereas a SMS can be implemented. SMS can be explained clearly because it is a formalised system within the organisation that has been documented, i.e. policy and procedures, whereas Safety Culture is harder to explain as it is more difficult to identify Safety Culture features and characteristics such as group attitudes, perception and beliefs that can influence the effectiveness of safety management activities.

SMS and Safety Culture have the same objective, to maintain and improve safety and thus should be seen as inter-dependent and not as one being part of or a sub-set of the other. They are "like body and soul". ■

Article Compiled by GSD



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AIRCRAFT WAKE TURBULENCE CATEGORIES

The term "wake turbulence" is used in this context to describe the effect of the rotating air masses generated behind the wing tips of large jet aircraft, in preference to the term "wake vortex" which describes the nature of the air masses. (ICAO Doc 4444).

Wake turbulence separation minima are based on a grouping of aircraft types into three categories according to the maximum certificated take-off mass as follows:

a) **HEAVY (H);** all aircraft types of 136 000 kg or more (e.g. B747 and A330);

b) **MEDIUM (M);** aircraft types less than 136 000 kg but more than 7 000 kg (e.g. B737 and ATR72); and

c) **LIGHT (L)**; aircraft types of 7 000 kg or less (e.g. BN2A, C172, DHC6).

The ATC unit concerned shall not be required to apply wake turbulence separation:

a. for arriving VFR flights landing on the same runway as a preceding landing HEAVY or MEDIUM aircraft; and

b. between arriving IFR flights executing visual approach when the aircraft has reported the preceding aircraft insight and has been instructed to follow and maintain own separation from that aircraft.

The ATC unit shall, in respect of these flights as well as in other circumstances when deemed necessary, issue a caution of possible wake turbulence. The pilot-in-command of the aircraft concerned shall be responsible for ensuring that the spacing from a preceding aircraft of a heavier wake turbulence category is acceptable. Ifit is determined that additional spacing is required, the flight crew shall inform the ATC unit accordingly, stating their requirements.

Aerodrome controllers shall, when applicable, apply the wake turbulence separation minima specified in Table 3. Whenever the responsibility for wake turbulence avoidance rests with the pilot-in-command, the aerodrome controller shall, to the extent practicable, advise aircraft of the expected occurrence of hazards caused by turbulent wake.

WAKE TURBULENCE AND JET BLAST HAZARDS

Another hazard to bear in mind, particularly for light aircraft, is jet blast and propeller slipstream. Beware of passing close or landing directly behind aircraft with engines running, particularly large jets. Jet blast and propeller slipstream can produce localised wind velocities of sufficient strength to cause damage to other aircraft, vehicles, personnel and buildings. Some years ago a B727 on engine tests blew in a hangar door - clear testimony to the force which can be exerted.

Occurrence of turbulent wake hazards cannot be accurately predicted and aerodrome controllers cannot assume responsibility for the issuance of advice on such hazards at all times, nor for its accuracy.

When issuing clearances or instructions, air traffic controllers will take into account the hazards caused by jet blast and propeller slipstream to taxiing aircraft, to aircraft taking off or landing, particularly when intersecting runways are being used, and to vehicles and personnel operating on the aerodrome.

Jet blast and propeller slipstream can produce localized wind velocities of sufficient strength to cause damage to other aircraft, vehicles and personnel operating within the affected area.

WAKE TURBULENCE SEPARATION APPLIED BY ATC IN ACCORDANCE WITH ICAO STANDARDS IS AS FOLLOWS:-

Between		Arriving Aircraft		Departing Aircraft		
				Time Separation		
Following Aircraft	Preceding Aircraft	Time Separation	Distance Separation	Same Position	Inset Position	Distance Separation
Heavy	Heavy	N/A	4NM	N/A	N/A	4NM
Medium	Heavy	2mins	5NM	2mins	3mins	5NM
Light	Heavy	3mins	6NM	2mins	3mins	6NM
Light	Medium	3mins	5NM	2mins	3mins	5NM

Table 3

ADDITIONAL PILOT CONSIDERATIONS

Serious wake turbulence encounters during terminal operations are rare but nevertheless, pilots should be alert for possible wake turbulence encounters.

1. After initially descending, vortices can rebound. Test data have shown that vortices can rise with the air mass in which they are embedded. Wind shear, particularly, can cause vortex flow field "tilting," where the downwind vortex may rebound but with an enhanced decay rate. Also, ambient thermal lifting and orographic effects (rising terrain or tree lines) can cause a vortex flow field to rise.

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AIRCRAFT WAKE TURBULENCE CATEGORIES cont...

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2. In certain atmospheric conditions, primarily in en route operations, vortices from Heavy aircraft can descend more than 1,000 feet. Thus, in Reduced Vertical Separation Minimum (RVSM) operations, aircraft in oceanic airspace can offset from the centre-line of its track for wake turbulence avoidance for up to 2NM right of track.
3. When crossing behind a lead aircraft, try to cross above its flight path or, terrain permitting, at least 1,000 feet below.
4. When a lead aircraft climbs or descends through your projected flight track, vertical separation is no longer in place and a vortex encounter is possible. Similarly, use caution when climbing or descending behind other aircraft.

If a pilot considers the wake turbulence separation standards inadequate, an increased separation may be requested by specifying the spacing required. Conversely, if pilots indicate that they will take responsibility for their own wake turbulence separation then they may request exemption from these separations. This option should be treated with caution.

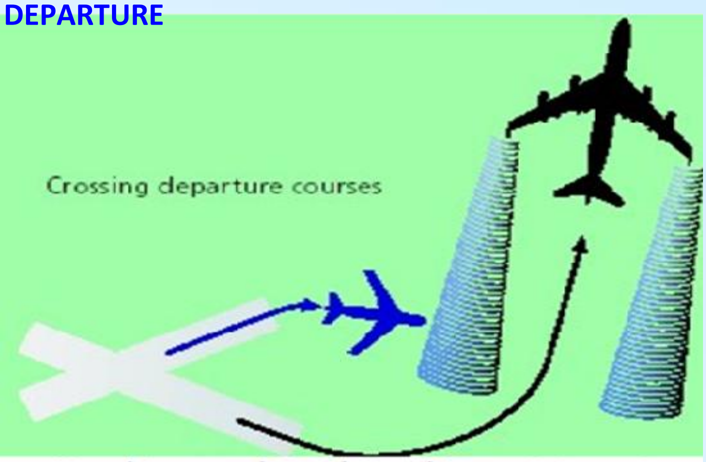
PILOT AWARENESS

Pilots should be alert at all times for possible wake turbulence encounters, particularly during take-off, approach and landing operations. The pilot has the ultimate responsibility for the safe operation of the aircraft. Although ATC provides appropriate wake turbulence separation to IFR aircraft, all pilots should be aware of wake behaviour and avoidance techniques and should follow the guidance and operating procedures contained in the Fiji AIP and Fiji AIC 10/98.

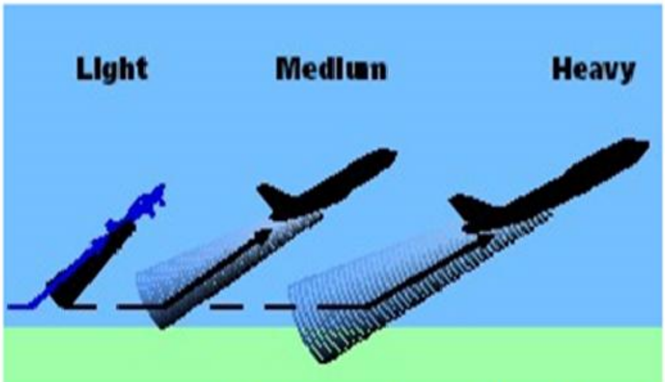
WINGLETS

Winglets have been developed as a means to reduce the induced drag of a wing, making it more efficient during cruise. There is a common misperception that winglets are a means to decrease the wake vortex hazard. Studies conducted during approach and landing show no discernible differences between aircraft with or without winglets.

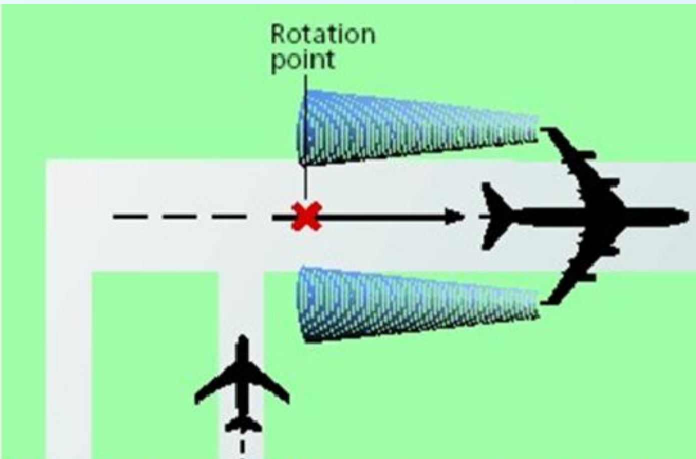
DEPARTURE



After airborne avoid headings which cross below and behind the path of larger aircrafts

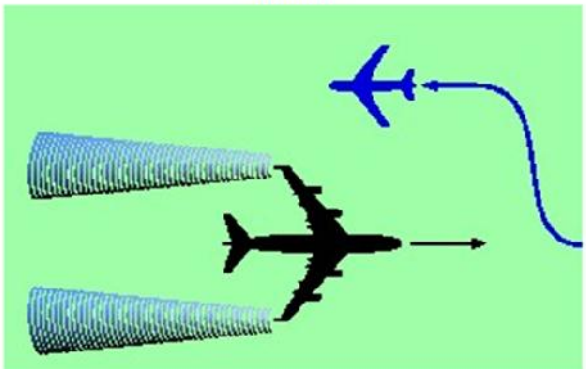


Ensure you can rotate before the preceding aircraft's rotation point. A climb above its flight path is also necessary, until you can turn clear. If this is not possible, delay your take off.



When planning to take off from an intermediate point behind an aircraft that has used full length, delay your take off.

En route



Avoid flight below and behind larger aircraft's flight paths.
If a larger aircraft is observed less than 1,000 feet above you on the same track (same or opposite direction) adjust your position laterally, preferably upwind.

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AIRCRAFT WAKE TURBULENCE CATEGORIES cont...

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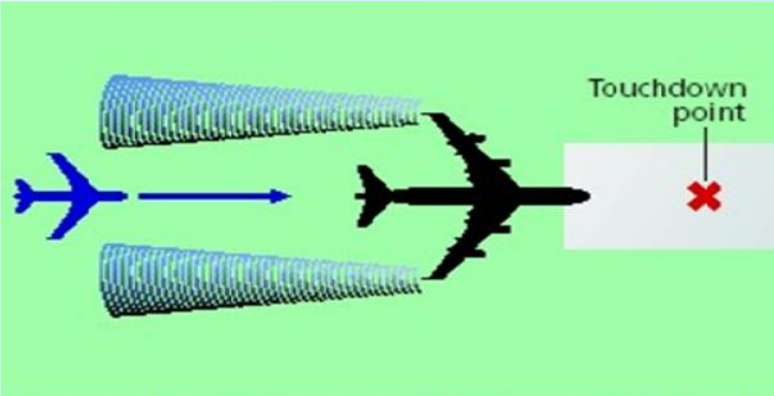
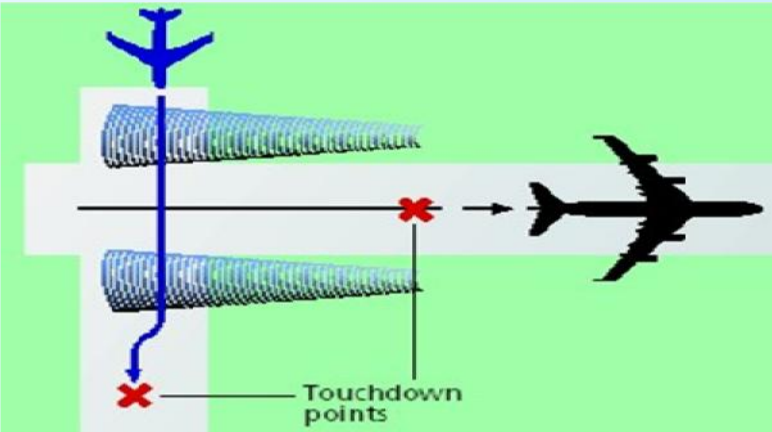
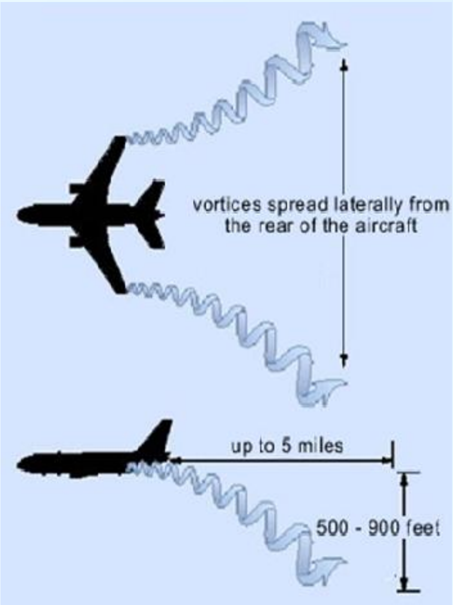
LANDING



Stay at or above the larger aircraft's final approach flight path. Note its touchdown point and land beyond it.



Cross above the larger aircraft's flight path.



Remember wake turbulence separation is not provided to landing VFR arrivals, nor to IFR on visual approach. In these cases it is up to the pilot to provide adequate spacing from preceding arriving or departing aircraft.

How to Avoid Wake Turbulence

Pilots should remember three basic warnings concerning wake turbulence:

* **Do not get too close to the lead aircraft.**
* **Do not get below the lead aircraft's flight path.**
* **Be particularly wary when light wind conditions exist.**

Source: ICAO Doc 444)

EMERGENCY HAND SIGNALS

In the event of a fire emergency and radio communications (on the discrete frequency) cannot be maintained between the On Scene Commander and the flight crew, standard emergency hand signals as depicted in **Fig 1** shall be used. These hand signals should be known and understood by all cockpit, cabin crew and Airport Rescue Fire Fighters.

At night, lit wands will improve the chances of the signal being seen, however, some degree of ambient light may be necessary for the message to be understood.

Fire Signal

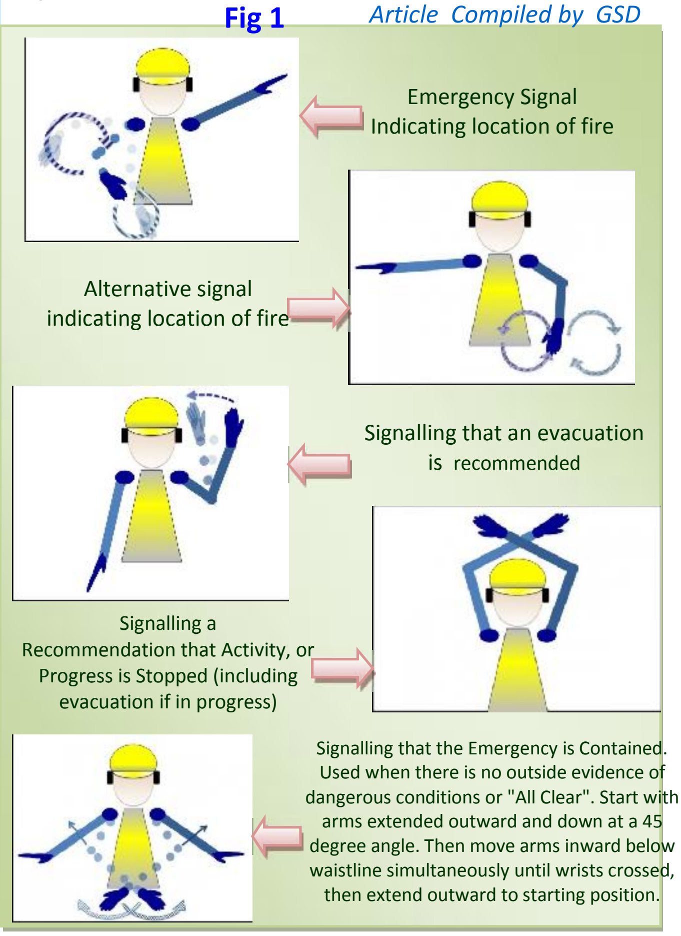
ICAO describes this signal as moving the right-hand wand in a "fanning" motion from shoulder to knee, while at the same time pointing with the left-hand wand to area of fire (which might be an engine, APU, brake, or elsewhere). The signal could be made with a rapid horizontal figure-of-eight motion at waist level with either arm, pointing at the source of fire with the other arm.

Confusion

It is possible to be confused between which emergency signal is being issued, especially in conditions of poor light and visibility and when the signals are conducted imprecisely or carelessly. In most cases the context of the event should help with clarity; however, for example, the signal to indicate a fire is dissimilar from both the engine start and aircraft turn signals.

Article Compiled by GSD

Fig 1



DANGEROUS GOODS CARRIED BY PASSENGERS AND CREW

INCIDENTS RELATED TO ELECTRONIC CIGARETTES

1. Electronic cigarettes are being carried by passengers in increasing numbers. Several incidents have been reported involving electronic cigarettes overheating through the accidental activation of their heating elements resulting in fires in checked baggage. The Dangerous Goods Panel (DGP) will be addressing this safety risk at its next panel meeting which will likely result in an amendment to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284). Until such time, States are encouraged to inform operators of this safety risk and to recommend that they require passengers to carry such devices in the cabin, where an incident can be immediately mitigated, and not in checked baggage.

2. Electronic cigarettes, also called personal vaporizers or electronic nicotine delivery systems, are battery-powered devices that simulate tobacco smoking by producing a heated vapour which resembles smoke. The devices have a heating element to vaporize a liquid solution. Passengers are normally permitted to carry these devices under the provisions for dangerous goods carried by passengers and crew contained in Part 8 of Doc 9284.

3. Background information on this subject can be found in the report of the DGP Meeting that was held from 20 to 24 October 2014 in Rio de Janeiro, Brazil (DGP-WG/14). The report is available on the DGP website at http://www.icao.int/safety/DangerousGoods/Pages/DGP.aspx.

On 8th April 2015 CAAF issued an advise to industry to that recommended that operators require passengers to carry e-cigarettes in the aircraft cabin, where any incident can be immediately mitigated, and not in their checked baggage. As per EASA Safety Information Bulletin 2015-06 issued on 7th April 2015.

<u>Fiji Air Navigation Regulations</u> 73 *Smoking in aircraft.*

Smoking is prohibited in all aircraft registered in Fiji or any foreign registered aircraft operating under an Air Operator Certificate issued under these Regulations.

<u>Definition of Smoke</u>

Noun – a visible suspension of carbon or other particles in air, typically one emitted from a burning substance.

Verb - emit smoke or visible vapour.

SMOKING (BE IT A CIGARETTE, CIGAR, PIPE OR E-CIGARETTE IS PROHIBITED ON ALL AIRCRAFT REGISTERED IN FIJI OR ANY FOREIGN REGISTERED AIRCRAFT OPERATING UNDER AN AOC ISSUED UNDER THE FIJI ANRS ■

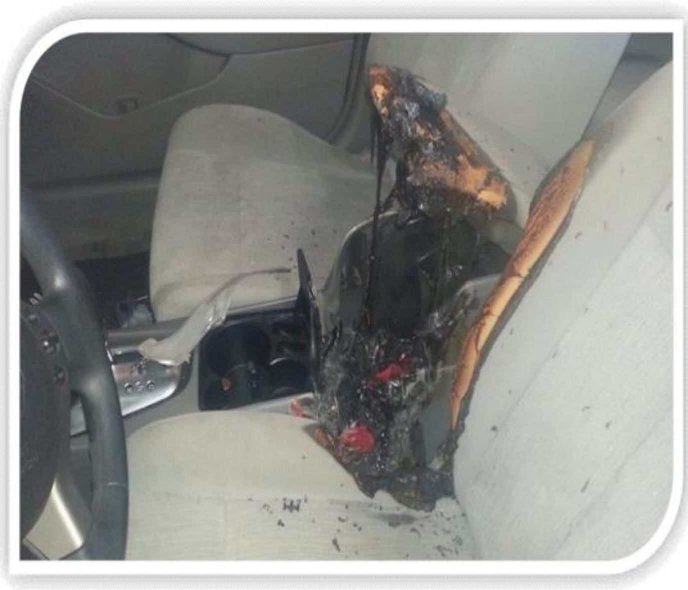


IMAGE OF THE AFTERMATH OF AN E-CIG FIRE IN

(Article by Air Safety Department)

LITHIUM BATTERIES

Lithium batteries have much advantages-long life, high storage capacity for their weight, no memory effect, and long shelf life. They can be found in just about anything requiring batteries, including laptops, phones, just about every other electronic device, and kids toys. These little bundles of energy can light up your life in ways you weren't expecting if they are misused or abused.

There are two main types in widespread use – lithium metal (disposable) and 'lithium-ion' (rechargeable).

The lithium metal types are mostly either 1.5 V lithium-iron disulphide ($Li\text{-}FeS_2$) cells, a direct substitute for carbon-zinc and alkaline types; or 3 V lithium-manganese dioxide cells, usually in 'button' or 'coin' configurations. Note – 'cell' refers to a single unit; a 'battery' is multiple cells connected in (usually) series.

A typical $Li\text{-}FeS_2$ cell comprises a steel case; a lithium metal anode, insulated from the iron disulphide cathode by a microporous membrane; a lithium salt electrolyte in an organic solvent; and a top cap/positive terminal. The negative terminal is the case bottom. The anode, separator, and cathode are long thin layers rolled in a spiral configuration. Two safety devices are incorporated – a vent valve provides overpressure relief; and a thermistor-type layer beneath the cap limits or interrupts current flow in the event of an external short circuit. It is conductive at normal temperatures, but becomes increasingly resistive when heated.

Lithium-ion cells are structurally similar, including the safety devices, but use a lithium-cobalt oxide anode and carbon cathode, and organic solvent electrolyte. Nominal voltage is 3.6. Several cells make up the familiar battery packs used on many electronic devices, and these batteries have additional safety devices – temperature sensor, voltage regulator circuit, and charge state monitor (a computer chip controlling the charging process). There are literally millions of these batteries in use in New Zealand alone.

Some Basic Precautions

Lithium (particularly Li-ion) batteries are known to have occasionally caused fires, with associated minor explosions. The biggest enemy of a lithium battery is heat, and this can be external, or caused by excess current, as in a short circuit. Heating can cause venting of the flammable electrolyte, and if an ignition source is present, a potential fire situation exists. In extreme events, the case can rupture, releasing the electrolyte and possibly small quantities of highly reactive lithium metal. Overheating of one cell can have a 'cascade' effect.

Lithium batteries are classified 'dangerous goods', and there are restrictions on their carriage in both carry-on and checked baggage, and as freight. Spare batteries and electrical devices with batteries installed should be carried in hand baggage rather than in checked baggage. In the event of overheating or fire, crew can take direct action. Protect spares from short-circuit by using their original packing or a plastic bag, and keep them separate from metal objects.

If a battery-powered device must be carried in checked baggage, pack it to prevent accidental activation, for example, by locking a power tool's trigger. Crush or puncture damage to a battery must be avoided, because this can cause an internal short in addition to releasing the contents.

Shippers, freight forwarders and air-lines should be familiar with the packaging and carriage requirements, which are detailed in the ICAO *Technical Instructions for the Safe Transport of Dangerous Goods by Air* and the IATA *Dangerous Goods Regulations.*

A wealth of technical and safety information on this topic is available – a web search using the keywords "lithium batteries" will provide any additional information you may need. ■

(Story uplifted from Vector January/February 2012 .)

WHY LITHIUM BATTERIES KEEP CATCHING FIRE

In the past year rechargeable batteries containing the element lithium have been in the headlines for all the wrong reasons. Investigators in Japan are investigating why a lithium-ion battery overheated on a Boeing 787 Dreamliner at Narita airport. Last year Boeing grounded its entire fleet of the next-generation plane after the lithium batteries on two of the aircraft caught fire. (The 787s returned to the air after being fitted with a modified system to protect the aircraft against battery fires.) Tesla, a maker of electric cars, performed a remote software update to its Model S luxury cars after two fires, which were blamed on road debris damaging the under tray containing the vehicles' lithium batteries. Lithium batteries are widely used because of their high energy density: in other words, their ability to store a lot of energy in a lightweight, compact form. But they have a tendency to cause expensive machinery to go up in smoke.

This is not a new phenomenon, and fortunately it is also a rare one. In 2006 millions of lithium-ion battery packs made by Sony were replaced after several hundred overheated and a few caught fire. These batteries were used in laptop computers produced by a number of manufactures. Since then, production processes have improved and fires remain relatively rare. As Elon Musk, Tesla's founder, has pointed out that with some 30,000 Tesla cars now on the road, fires have affected one in 10,000 vehicles—which sounds bad, but the equivalent statistic for petrol-powered cars is one in 1,300. And it is not just lithium batteries that cause fires. Old-fashioned lead-acid batteries can explode too. Nevertheless, lithium batteries, now almost ubiquitous in any portable electronic device, need to be treated with caution.

The attraction of a lithium-ion battery is that lithium is the least dense metallic element, which means that weight-for-weight it can pack more power than other types of battery. But lithium is also a highly reactive substance; it belongs to the alkali metal group, which contains sodium and potassium, the high reactivity of which will be familiar from school chemistry classes. Like all batteries, lithium ones consist of two electrodes separated by an electrolyte. Typically for a lithium cell the electrolyte is a solution of lithium salts and organic solvents. When the battery is charged, lithium ions are driven from the electrolyte into a carbon anode. When the battery is discharged they flow back, creating a balancing flow of electrons in a circuit that powers the device. The trouble comes about if there is a small fault or damage is caused to the extremely thin separators that keep the elements of the battery apart. This can lead to an internal short-circuit and a subsequent build-up of heat. This can trigger what is known as a "thermal runaway" in which the battery overheats and can burst into flame. That can cause adjacent battery cells to overheat, which is why groups of cells in some battery packs (such as those used in Tesla cars) are kept in separate protective compartments. Lithium batteries can also be damaged by using them in hot environments, and by excessive discharging and charging—which is why most lithium batteries contain special circuits to prevent this. Catching fire if something goes wrong, then, is in their nature.

The two things that will keep lithium-ion batteries relatively safe are continuous improvements in manufacturing techniques and the use of smart control systems to monitor their temperature and regulate their charging and discharging. Besides a high energy density, another advantage of lithium batteries is that they do not suffer from any "memory effect", which means they can be partially charged and discharged many times without loss of capacity. Running down a lithium battery completely, however, can destroy it. So this too has to be guarded against by the power electronics. Researchers are working on alternative chemistries to the lithium-ion battery which could have even greater energy densities, though they will have quirks of their own and will also require careful handling. But for the time being, lithium is king. ∎

Source: Article uplifted by AVSEC from CJ Security Consulting Group Singapore

SECURITY—THE GREATEST CHALLENGE FOR THE AIR CARGO INDUSTRY

Total screening of all air cargo is a daunting task, and one which is neither attainable nor necessary. The reasons reflect the challenges of the air cargo supply chain itself, the diverse customers it serves, and the diverse models of how they are served.

Certainly, it has been proven that "100%" can be attained in limited circumstances. Specifically, the US mandate for 100% screening of cargo on passenger aircraft within, out of and into the US was a legislative requirement that had to be met. Within the US, the ability to allow forwarders and even some shippers to screen cargo was attained at a significant cost, one which was borne by industry itself. But it was also accomplished and enabled by an increase of over 400% in the number of TSA cargo inspectors to ensure compliance. The ability to fund that level of oversight does not exist in too many markets. For inbound US cargo, the mandate was met through the adoption of acceptance of a "certified" validation that the non-US measures were deemed commensurate (by TSA) with US programs.

Of course, this only takes into account the cargo transported on passenger aircraft. The overall volume carried on freighters (shipments) far surpasses that which is transported in passenger bellies. Thus, while it might be relatively easy screen a large shipment through the certified cargo program (supply chain screening) as is allowed in the US, it would be difficult, if not impossible, to physically screen the millions of small packages transported daily by express carriers. The speed with which they move also makes effective screening difficult. It certainly can be done, but only at the cost of lowering the speed with which such packages move. This is not something which is appealing to consumers, who demand instant gratification in today's "e-commerce" world. The latter is further complicated by the dramatic increase in packages moving via the postal stream, which still ends up on passenger or freighter aircraft.

However, 100% may not be necessary, and regulators are beginning to take an even more serious look at this. In essence, with the addition of more shipment information, (such as shipper, consignee and other information), tendered earlier in the transport process, regulators can use a risk-analysis format to determine which individual shipments may need a higher level of screening, while others may not need as close a look. Think in terms of automated passport analysis enabling "no fly" (or other) measures, or even TSA's "Pre-Check" in the US. The concept behind pre-check is that a great deal of information is known already about the passenger (submitted earlier for vetting), and thus they are subjected to less stringent measures, while other passengers get the full inspection. Ultimately, this should enable the vast majority of passengers to move via pre-check, and the same equation would apply for cargo. The full impact of this is still to be determined, as these Advance Data regimes (ACAS in the US, PRECISE in the EU, and PACT in Canada), are still only in the pilot phase. What is certain, however, is that shipment data will need to be more accurate, timelier, and more complete, and the IT programming to connect all of this may well also lead to additional costs for industry.

There is no doubt that the air cargo supply chain has invested millions of dollars into an already high priced avenue of transport. The infrastructural requirements to support increasing (and evolving) regulatory procedures, as well as the support requirements to physically manage the flow of cargo to satisfy various regulatory bodies, have expanded.

These costs include not only the expensive equipment, but also extensive and on-going management oversight, as well as significant and on-going training/re-training of employees. This applies not only to the screening process and equipment, but also toward managing the ever complex security programs issued by regulators (in some cases several inches thick!).

As an example, in the IT arena, industry must now also worry about providing things such as advance data for regulatory targeting analysis. Additionally, in many cases, we must spend valuable IT time compiling statistical reports for regulators' compliance use. The challenge for industry is that in both cases, much of this still operates the way it did "back then", using data sets and programs created in IT silos at each company. We must continue to look at how this can be managed more efficiently. Newer concepts such as shared cloud environments may be at least part of the answer, but at whose cost? And in many companies, it is probably still difficult to find IT managers who come out in favor of outsourcing their own jobs. The tendency to "program it internally" still survives, and as a result, connecting all of these proprietary systems 1:1 to numerous government IT systems adds cost to both sides of the equation. Global regulatory bodies have the same challenge finding common data requirements and channels that might make it easier for the industry to operate on a shared platform.

Similarly, the costs and requirements for labor and valuable personnel resources have changed dramatically. To remain vigilant (and compliant) now, companies globally have had to invest in additional personnel to support audit, paperwork and reporting requirements from multiple regulatory bodies – often covering the same types of information but in differing formats. The updated EU ACC3 requirements are but one example of the collateral costs this process entails. Simplifying and standardizing processes would go a long way toward cost reduction in these areas .To remain competitive and viable, industry must continue to explore ways to streamline and reduce these costs. The fact we have done so much already to add mandated security programs at our own cost, yet remain competitive, speaks well of the flexibility and adaptability of our industry. ■

Source: Article uplifted by AVSEC from Security On Guard ; CJ Security Consulting Group .Up PTE Ltd, Singapore

CONGRATS FIJI AIRWAYS—ARRIVAL OF B737-800

SIDS PROGRAM FINDS DANGEROUS DEFECTS

Cessna owners are getting a safety dividend from the SIDS (supplemental inspection documents) inspections that are now mandatory on propeller-driven Cessna aircraft. It has been reported that there are reports of serious problems discovered during SIDS inspections. They include cracked wing struts and horizontal stabiliser spars, cracked fuselage bulkheads, corroded wing spars and several cases of cracks in nose landing gear. Authorities around the world have mandated the compliance with SIDS and other manufacturer's supplemental or structural inspection documents. Fiji will soon follow suit, thus making all of Cessna's 100, 200, 300 and 400 series aircraft to complete a series of structural inspections developed by the manufacturer. However, Fiji Operators are already taking necessary steps to include the SIDS inspections into the Aircraft maintenance Schedules of the affected aircraft, taking advantage of the extended deadlines for the inspections.

SIDS were developed by Cessna and the United States Federal Aviation Administration due to concerns that critical principal structural elements of aircraft are susceptible to fatigue or corrosion damage. In many cases these components have not been inspected since the aircraft were manufactured, decades ago. The structural inspection program, which complements existing scheduled maintenance, requires a detailed inspection of a range of structural areas such as wing spars, wing attachment points, strut attachments, rudder bars and attachment points and horizontal stabiliser attachment points.

SIDS inspections are mandatory for all types of maintenance systems – whether an aircraft is maintained according to the SMP 9 or SMP 19 schedule of maintenance. ∎

*(Source/Reference: **flightsafetyaustralia.com, retrieved from** http://www.flightsafetyaustralia.com/2014/12/sids- program-finds-dangerous-defects/)*

AVSEC CARGO AND MAIL SECURITY COURSE

The Civil Aviation Authority of Fiji (CAAF) Aviation Security and Facilitation Department conducted the Aviation Security Cargo and Mail Security Course from 16th – 20th March 2015 at CAAF Training Room.

This AVSEC Cargo and Mail Security course has been developed to provide aviation security personnel with the knowledge and skills to enable them to coordinate and supervise implementation of Security measures within their airports utilising Approved Regulated Agents Security Programmes and Standard Operating Procedures based on Annex 17 – Security and ICAO Doc 8973 (Security Manual).

The course was attended by 11 participant from Williams and Gosling Limited, Carpenters Airfreight Limited, DHL Gobal Forwarding, Air Terminal Services Limited and DHL Express Fiji Airways Airfreight. Limited.

The objective of the course have been designed to enable participants to;

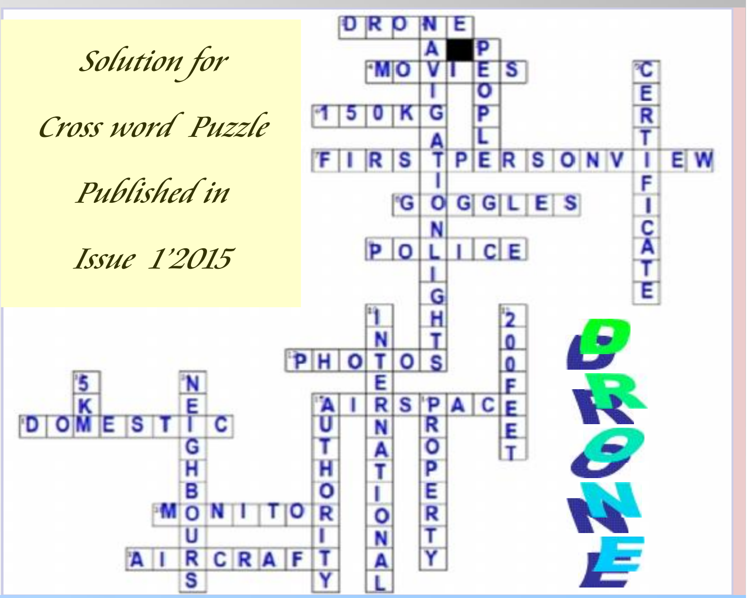
- Appreciate the purpose of security measures for the protection of cargo and mail
- Understand the nature of threat to civil aviation
- Understand the air cargo secure supply chain
- Understand the role of the appropriate authority and operators,
- Apply appropriate security control to cargo and mail
- Apply appropriate security control to cargo facilities, vehicles and transport, containers and equipments.
- Respond appropriately to a security incident.

In recent years the global aviation industry has continued to see terrorist threats to the security of the travelling public, airlines and aircrafts. Acts of unlawful interference have also occurred at airports and airlines and cargo facilities at off-locations.

The counter measures against these act can be effective only as long as the people responsible for protecting the industry carry out their jobs diligently

This course trained the personnel to assist in the implementation of aviation security preventive measures in accordance with appropriate aviation security programmes and international aviation security standards and recommended practices. ■

(This course was conducted by AVSEC Department.)



Disclaimer

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HEALTH TIPS—KNOWING SOMEONE HAVING STROKE ? THINK .... F.A.S.T.

F.A.S.T. test as an easy way to remember the most common signs of stroke.

Using the F.A.S.T. test involves asking these simple questions:

Face	Check their face. Has their mouth drooped?
Arms	Can they lift both arms?
Speech	Is their speech slurred? Do they understand you?
Time	Is critical. If you see any of these signs call 000 straight away.

A Stroke is always a medical emergency. Recognise the signs of stroke and seek medical assistance immediately.

A stroke is not a heart attack. A stroke happens when the supply of blood to the brain is suddenly interrupted. Some strokes are fatal while others cause permanent or temporary disability.

The longer a stroke remains untreated, the greater the chance of stroke related brain damage. Emergency medical treatment soon after symptoms begin improves the chance of survival and successful rehabilitation.

Facial weakness, arm weakness and difficulty with speech are the most common symptoms or signs of stroke, but they are not the only signs. Other signs of stroke may include one, or a combination of:

- Weakness or numbness or paralysis of the face, arm or leg on either or both sides of the body
- Difficulty speaking or understanding
- Dizziness, loss of balance or an unexplained fall
- Loss of vision, sudden blurring or decreased vision in one or both eyes
- Headache, usually severe and abrupt onset or unexplained change in the pattern of headaches
- Difficulty swallowing

The signs of stroke may occur alone or in combination and they can last a few seconds or up to 24 hours and then disappear.

When symptoms disappear within 24 hours, this episode may be a mini stroke or Transient Ischaemic Attack (TIA).

SOME THINGS WERE NEVER MEANT TO FLY