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NEWSLETTER TEAM

Capt. Shawki Al-Ablani

Dr.M.S.Rajamurthy

Contact:

Flight Safety & Quality Assurance Division,
Operations Dept.
P.O.Box.394,
Safat 13004 Kuwait
Phone:+965- 4725475
Fax: +965- 4749823
E mail:
kwioeku@kuwaitairways.com

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EDITORIAL

Investigation of aircraft accidents reveal that in many cases, particularly CFIT, the accident is an outcome of the loss of situational awareness by the flying crew. This pilot centric parameter is addressed in some detail in this issue.

We have an article on conquering jet lag with a number of tips to handle jet lag during various phases of flight. Finally, there is a note on TCAS II operation on ground.

Your feedback is valuable. Suggestions and contributions can be sent to our office. Happy reading and many more safe landings.

SITUATIONAL AWARENESS (SA)

Dr.M.S.Rajamurthy

As you would have seen in the aircraft accident analysis covered in Flight Safety, in majority of the cases, we come across the phrase— "the crew lost situational awareness" or "crew did not maintain situational awareness".

Loss of SA is indeed the cause of many accidents. We can say that CFIT which accounts to nearly 50% of fatal accidents is mostly an outcome of the loss of SA. Korean Air B747-300 CFIT in Guam (Flight Safety July 2007) is one such example. Same is the case with MK airlines B747-244SF reduced power takeoff accident (Flight Safety June 2007). FedEx B727 collision with trees on final approach (Flight Safety May 2007) is yet another example of the deterioration in SA leading to the accident.

Let us understand this phrase, its impact on flight safety and how to mitigate it.

Simply said, SA is knowing where you are and what is happening around. It's the big picture, and one of the very foundations of pilot competence.

To focus on the present, a pilot/crew should monitor and evaluate current status- both the big picture and all the details. But it's important to remember that knowing and understanding the current state of affairs simply keeps you up with the aircraft. It doesn't put you ahead. For that, one must project into the future, anticipating what will happen. Consider what-ifs. What if you have to make a missed approach? What if the weather goes down at your destination?

The most established and popular definition of SA given by Mica Endsley:

"SA is the ***perception*** of elements in the environment within a volume of time and space, the ***comprehension*** of their meaning, and the ***projection*** of their status in the near future."

Perception, comprehension & projection are the three essential components of SA.

PHOTO OF THE MONTH

Airbus A-320s continue to have problem of nose landing gear. On October 21,2007, a Northwest Airlines Airbus A-320 made an emergency landing at Fargo, ND, with nose wheel at 90 degrees. The tires caught fire as the jet slid to stop. There have been many incidents involving nose-wheels at 90 degrees on Airbus A-320s(see March 2006 issue of Flight Safety for a detailed discussion).

The picture on the right shows a myair.com A320-214 taxiing at Paris Orly-LFPO, with nosewheel misaligned. The smoke from the tires is clearly visible.

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They support the active maintenance of an integrated mental model at three hierarchic levels:

- **Perception** involves monitoring, cue detection and simple recognition; it produces **Level 1 SA**, the most basic level of SA, which is an awareness of multiple situational elements (objects, events, people, systems, environmental factors) and their current states (locations, conditions, modes, actions).

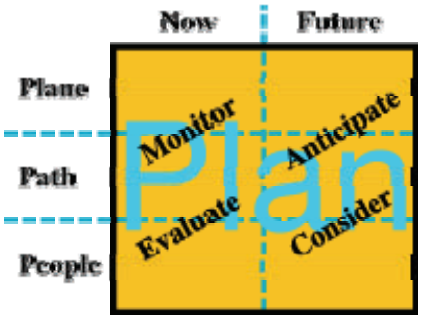
- **Comprehension** involves pattern recognition, interpretation and evaluation; it produces **Level 2 SA**, an understanding of the overall meaning of the perceived elements - how they fit together as a whole, what kind of situation it is, and what it means in terms of one's mission goals.

- **Projection** involves anticipation and mental simulation; it produces **Level 3 SA**, an awareness of the likely evolution of the situation, its possible/ probable future states and events. This is the highest level of SA.

The skills for projection are different than the skills for comprehension.

These can be put as monitor, evaluate and anticipate based on which pilot considers the actions and are shown in the matrix below.

Pilot's role is to 'aviate, navigate,



and communicate' in that order. To aviate, navigate and communicate, you must be aware of the **plane**, the **path**, and the **people** (crew, passengers, dispatchers, and air traffic controllers). Not only do you need to **monitor** and **evaluate** these three things now, but you need to **anticipate** what's going to happen in the future and also **consider** contingencies. The current and future state of the plane, the path, and the people are the components of the plan. So the pilot does the perception, comprehension and projection.

To many pilots these skills are second nature. They are continuously aware of the plane, the path, and the people and can project into the future and maintain this awareness. However, like all skills, these can be refined.

The following are events identified in accidents that lead to the loss of SA. Most accidents involving human error include at least four of these ten clues. These clues can warn of an "error chain" in progress - a series of events that may lead to an accident.

1. Ambiguous information- information from two or more sources that do not agree.

2. Fixation- focusing on any one task to the exclusion of everything else.

3. Confusion-uncertainty or bafflement about a situation (often accompanied by anxiety or psychological discomfort).

4. Primary duties- Failure to fly the plane, everyone is focused on non-flying activities.

5. See and avoid- Failure to look outside- everyone heads down.

6. Navigation- Failure to meet expected checkpoint on flight plan or profile-ETA, fuel burn, etc.

7. SOPs - Failure to adhere to standard operating procedures.

8. Compliance- Failure to comply with limitations, minimums, FARs, etc.

9. Contradictions- Failure to resolve discrepancies- contradictory data or personal conflicts.

10. Communications- Failure to communicate fully and effectively- vague or incomplete statements.

In addition to these, crew stress levels contributes to loss of SA.

a. When the stress level is low, the level of SA is also low. Low stress level is common on long flights as also in non-emergency situations. When we become bored or when we are fatigued there is lack of alertness resulting in a loss of recognition of warning signals and reduce our ability to react quickly and correctly in an emergency.

b. If the amount of information being processed is significantly above an individual's capacity, the stress level is very high and the crew will operate at low levels of SA.

A study of NASA's Aviation Safety Reporting System (ASRS) incident reports evaluates how flight crews manage malfunctions in the cockpit. Two types of malfunctions were identified.

Type A malfunctions were judged to be critical emergencies that triggered by the-book (skill or rule-based actions) responses by flight crews. Flight crew training and check rides concentrate on the flight crew's ability to handle major aircraft malfunctions.

Type B malfunctions are relatively minor or abnormal. The malfunction resolution procedure is less defined, requiring the flight crews to revert to knowledge-based actions and CRM principles to properly assess and resolve the situation. This may require time-consuming thought, discussion and trial-and-error procedures.

The danger of a Type B malfunction response is that too much of the crew's time and attention can be diverted from the normal duties involved in safe piloting and a loss of SA can occur.

This is where the evaluation of a flight crew's ability to manage the operational environment could take place during line-oriented flight training (LOFT) scenarios.

A paradox is introduced: the less serious malfunctions appear more likely to induce flight crew behavior leading to a loss of SA than do the serious malfunctions. Fixation, distraction, nobody flying the aircraft and work overload were found in a number of the Aviation Safety Reporting System reports (ASRS) and are of particular concern because they have been identified in many fatal aircraft accidents.

Flight crew training to prevent the loss of SA must be addressed to reduce the 70 percent of aviation accidents that occur as a result of a human failure.

Training to Prevent the Loss of SA

Resolving Type A malfunctions often occurs quickly, leaving less time for distraction from standard operating procedures (SOPs) and a loss of SA. When faced with a serious malfunction, the flight crew is likely to be in a state of all-round heightened awareness, referring to an emergency procedure checklist or memory items. The loss of SA is less likely to enter the error chain.

Resolution of Type B malfunctions poses a risk to flight crews who become

absorbed with resolving the malfunction, often at the expense of proper aircraft control. Pilots should always fly the aircraft, assess the situation, take appropriate action and evaluate the results. Flight crew training should emphasize that an aircraft malfunction can serve as an immediate red flag in warning against the loss of SA.

Analysis of the way flight crews handle Type A and Type B malfunctions has revealed significant differences in altitude and course/heading deviations, denoting a possible loss of SA. Of the Type A malfunctions, flight deviations were observed in 23 percent of the incidents. Of the Type B malfunctions, a loss of SA occurred in varying degrees in 100 percent of the incidents.

Further study of the ASRS reports provided evidence of crews using improper actions, such as not completing a checklist because of haste, using the wrong checklist or activating the wrong system control switches. *Training should stress crew co-ordination and emphasize that all crew members verify intended actions before initiating them.*

Managing Situational Awareness
Managing SA is about avoiding being caught off guard or being unprepared. It involves making effort to stay ahead of a situation.

Preparation is vital in crew cockpits and so is shared responsibility for collective SA. It must be noted that a situationally aware Captain and a situationally aware First Officer don't necessarily add up to a situationally aware crew. High-level crew SA can be thwarted by assumptions, inattention, inadequate communication, etc. by a rugged individualist in the left seat who subtly (or not so subtly) discourages input. Yet every crew member should augment the SA of the Pilot-In-Command (PIC). PIC's level of awareness will heighten or limit the combined SA level of the crew.

Following ten steps will ensure that SA is not lost.

1. **Plan ahead and predetermine crew roles** for high-workload phases of flight.
2. **Develop a plan & assign responsibilities** for handling problems and distractions.
3. **Solicit input from all crew members** including cabin, ATC, maintenance, dispatch, etc. CRM is the key.
4. **Rotate attention from the airplane to flight path to people around you** - don't fixate.
5. **Monitor and evaluate current status** relative to your plan.
6. **Project ahead** and consider contingencies.
7. **Focus on the details** and scan the big picture.
8. **Create visual and/or aural** reminders of interrupted tasks.
9. **Watch for clues** of degraded SA.
10. **Peak up when you** see SA breaking down.

Long-haul pilots "force" themselves to maintain SA by relentlessly scanning through things to do, checking all systems and checking all relevant information is collected and thought through. This keeps them alert over hours of unchallenging routine flying. Every pilot can do the same.

References:

1. Managing Situation Awareness on the Flight Deck, or The Next Best Thing to a Crystal Ball, Sheryl L. Chappell, NASA Aviation Safety Reporting System.
2. Situational Awareness, Key Component of Safe Flight, Constance Bovier. FLYING CAREERS Magazine, January 1997.
3. Situational Awareness, Doug Edwards, John Douglas & Greame Edkins, Flight Safety Australia, November 1998.

How to conquer Jet Lag

Capt. Yacoub Al-Najjar, Asst. Director – Training & Dev., Flight Crew Ground Training, KAC

There is nothing worse than the sleepless nights, light headedness and general upset that follow a long flight with large time zone difference. Jet lag can be one of the major downside of traveling, especially if you waste rest time period battling fatigue. Below are few suggestions that could make all the difference when it comes to avoiding the return flight drag. Drag through jet lag.

What is Jet Lag?

The Medical term for Jet Lag is Circadian Dischronism. Circadian meaning something occurring in approximately 24 hours, and Dischronism meaning a lack of order in an arrangement of events in their occurrence.

The body responds to a number of environmental prompts including feeling sleepy when it is dark or night time., wakeful at daylight and hungry at breakfast, lunch and dinner. Jet Lag is caused by the disruption of this body clock.

The body is designed to maintain a regular rhythm of daylight and darkness. When these rhythms are disrupted a small cluster of brain cells, which control the time of the biological functions (Circadian Rhythms) are thrown out of sync. The body then responds with various symptoms, such as rest lessens, disorientation, aching joints, insomnia and exhaustion during the day.

There is much debate about whether it is better to fly East sectors or West sectors. It may be a matter of personal preference but it has been proven medically that jet lag is much more of an issue for those flying East bound sectors with large time zone difference as time is lost. While flying West sectors often result in arriving at about the same time as you have left or almost the same time.

There are many things we can do in order to reduce the level of discomfort brought about by jet lag.

1. Before the flight

Always get a good night sleep: Plenty of rest will ensure that you have the energy to beat off the initial effects of Jet Lag.

Try to eat well: As research has shown that a breakfast and lunch of high protein food, followed by a high carb evening meal can help to prepare your body clock for a rest.

2. During Flight

Drink a lot of fluids: The dryness of the aircraft environment can cause dehydration. Drinking plenty or fluids can help to offset this. Water is your best friend as it is far better than coffee and fizzy drinks at combating dehydration.

Change your clocks: As soon as you are on board the aircraft, it is

extremely important to change your personal watch to the time at your destination. This little psychological trick will help you to adjust to your new time zone. However, you may ignore this for short sectors and stick to your normal schedule.

Get as much exercise as you can: Walking up and down the aisle standing for spells in the cockpit and doing twisting and stretching exercises while you are in your seat all help to reduce discomfort, especially the swelling of legs and feet.

3. After the Flight

Take a shower after an extended flight: A hot shower not only refreshes you up but also gets the muscles and circulations flowing.

Spend time outside: It is important to spend time in daylight because this can help to reset your circadian rhythm.

Be disciplined at meal times: Despite craving for mid-morning lunch or breakfast at 4am, do not give in. Try to eat light meals and snacks for the first day. Until you can have your first full dinner at the right time.

Avoid sleeping pills: You may feel like you're going mad with your inability to sleep, but do not take sleeping tablets in an effort to alleviate Jet Lag. This is dangerous approach as sleeping pills induce a comatose state with little or no natural body movement.

If you do decide to take them make sure you consult an aviation doctor for advice prior to doing so.

A good alternative is an aromatherapy kit. Stimulating essential oils such as grape fruit, Cardamom and rosemary help to keep you alert and refreshed and calming sedative oils, such as lavender and mandarin aid relaxation.

The Jet Lag Workout:

Another way to alleviate Jet Lag is to have a workout after the flight. It may seem like the last thing on earth you feel like doing, but working up a swept will boost circulation. Lift your mood and re-energize you. Exercise also helps to eliminate the build-up of toxins in muscles that may cause minor aches and pains. There are various exercises you can do, such as walking or running at a moderate pace for 20 minutes. Additionally you can swim or cycle for the same amount of time with equal effect. If you were feeling slightly more alive you can attempt 30 minutes of circuit training with weight machines. You should do two sets of12 to 15 repetitions per exercise using a medium weight.

SHOULD TCAS BE OPERATED ON THE GROUND?

EUROCONTROL ACAS II bulletin no. 9, July 2007

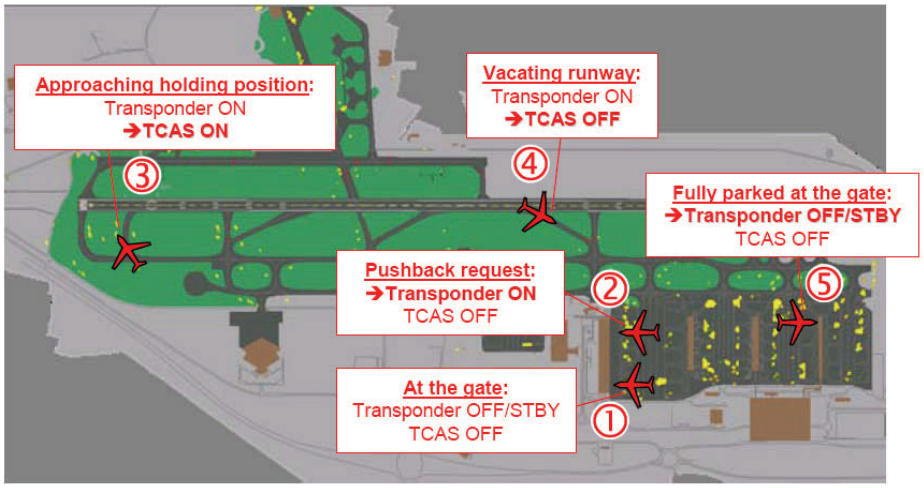
The Advanced Surface Movement Guidance & Control System (A-SMGCS) is to be introduced at a number of European airports. To enable A-SMGCS detection, aircraft must be operating their Mode S transponders, at least from the pushback and until reaching the stand on arrival. TCAS also relies on Mode S technology and for this reason TCAS and Mode S control panels are usually combined in a single unit on the flight deck. Experience shows that TCAS is sometimes turned 'on' and turned 'off' at the same time as the Mode S transponder. Except for turning TCAS on for a short period of time before crossing an active runway to double-check for the presence of any aircraft on approach, this should not be done for the following reasons:

• **TCAS II is not designed to provide any safety benefits for aircraft on the ground:** the collision avoidance function is not active before being airborne and the TCAS traffic display does not depict intruders detected on the ground (Note: due to erroneous transponder data, some aircraft on the ground may be displayed).

•**TCAS II routine operation on the ground degrades safety**:

Performances of the ground surveillance equipment (e.g. SSR, A-SMGCS) and of the surveillance by airborne TCAS II units can be compromised if there are significant numbers of TCAS II units operated on the ground. As a result, ATC and the operation of airborne TCAS II could be adversely affected.

To address these issues, ***ICAO recommends in PANS-OPS (Doc 8168) and the ACAS manual (Doc 9863) not to operate TCAS II while taxiing.***



WEB WATCH

http://www.crm-devel.org/resources/crmtopic.htm *Neil Krey's CRM developers site-a good resource for situational awareness and various CRM topics—lists a number of references*

The Confidential Aviation Hazard Reporting System (CAHRS) provides a means of reporting hazards and risks in the aviation system before there is loss of life, injury or damage. It is open to anyone who wishes to submit a hazard report or safety deficiencies confidentially and non-punitively. Reports help to identify deficiencies and provide safety enhancement in areas of aviation. CAHRS forms can be collected at different location of KAC (i.e. Flight Dispatch) Premises. Completed forms can be dropped in FS&QA allocated box at Flight Dispatch or e-mailed to kwioeku@kuwaitairways.com or faxed to 00965-4749823 or mail to Flight Safety and Quality Assurance office, Operations Department, P.O. Box 394, Safat 13004, Kuwait Airways –Kuwait.