

THE SENTINEL



OFFICIAL SAFETY NEWSLETTER OF CIVIL AIR PATROL

Loss of Situational Awareness Due to Ineffective Scan

The Civil Air Patrol is continuing to have mishaps in aircraft, vehicles and during cadet and senior ground activities that appear to be due to a loss of Situational Awareness (SA). This loss seems to be due to, for lack of a better term, ineffective scanning. We are landing our aircraft fast resulting in damaged firewalls, slow resulting in hard landings. Vehicles are backing into objects and running into other vehicles. On the ground we are stepping into holes, tripping over curbs, not keeping ourselves hydrated, cutting ourselves with knives and the list goes on. Are we really paying attention? Probably not since the reports of these mishaps make a rather large list. Thank goodness for on-line reporting.

This article is mainly directed toward our aviation group as that is where an enormous amount of CAP funds are directed in repairing mishap damaged. However, if you look at the areas of vehicles and ground missions, encampments and PT, you will see that this is a problem in each of these areas, too.

Please read this article and have a discussion with both your senior members and cadets in every arena to see how it is pertinent you and your mission.

At no time is an effective, timely cockpit-outside visual scan more critical than during the performance of maneuvers. When an inappropriate or ineffective scan pattern is used, the possibility of a loss of situation awareness (hereafter, LSA) onset is greatly increased. Indeed, the breakdown in scan is one of the leading contributors to mishaps where LSA was identified as a causal factor.

The development of a 'good' scan requires training and practice. However, initial and refresher scan training remain, for the most part, minimal at best. Further, where such training is provided, the means for assessing accurate scan performance lacks a firm empirical basis upon which to provide the pilot with constructive feedback.



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What is Situation Awareness (SA)? SA: An attention-based phenomenon reflecting the state of a pilot's awareness based on:

- The *perception & cognition of information* related to the 3-dimensional spatial world in and about the aircraft and the hazards associated with that environment.
- The *systems* (especially those that are automated) onboard the aircraft itself.
- The nature of the *tasks* at hand.

The extent and accuracy of this information is a function of what has been, or not been, attended to by the pilot over time. This information is then used, or not, to dictate pilot actions.

The types of SA associated with Visual Attention are – spatial; hazard; temporal; mode; task/procedural.

Causes for Visual SA Problems:

Pilot unable to perceive SA-critical elements –

- Obstructed from view.
- Not available on cockpit displays/other nav aids.

Illusions –

Data masked by other tasks/attention-catching stimuli –

- Information available, but a failure at data sampling due to distractions or fixation on other indicators.
- Common in high workload environments.
- Visual dominance may preclude pilot from hearing warning (gear up landing).

Inadequate/ineffective training –

- Created own strategies.
- Training failed to transfer.

Principles of scan and situational awareness:

Tactical visual scan: a sequential monitoring task where a pilot combines the data gained from each separate outside and cockpit instrument fixation into a full representation of aircraft state (*situation awareness*). Pilots quickly create scan and fixation patterns for each different required maneuver (i.e., transition through heading and altitude, takeoff, landing, etc.).

Scan characteristics (pattern, frequency and duration of fixations): determined by the intrinsic nature, complexity, and importance of the information provided by inside/outside visual targets, and pilot expertise.

Scan patterns and fixations may reflect a strategy based on what a pilot needs to know, or thinks he/she needs to know, at a given time.

The optimal pilot might balance the gains and costs in sampling certain data while neglecting others; the cost of which may be worth incurring to get the information needed.

Pilots employing non-optimal scan strategies may fixate or scan inappropriately, thereby missing important information that can result in a high cost both aircraft and crew.

What Causes scan to 'Breakdown'? Distractions, workload, automation, complacency, inadequate/inaccurate mental model, display design - "Glass Cockpit", lack of/poor scan training.

One possibility is that the use of ineffective scan begins early in flight training. How is cockpit scan taught? Cockpit scan is regarded as the most basic and important skill in instrument flight. However, a review of military, commercial and general aviation instrument training programs reveals a remarkable lack of standardized syllabi associated with teaching cockpit visual scan.

In some cases, scan is not taught at all, or is at best given short shrift. When scan is taught, instructors commonly employ a technique known as 'guided training', whereby students are told which instruments to scan and when to scan them. The instructor is normally unable to confirm whether or not the pilot is actually scanning effectively. Rather, the instructor assumes that if the aircraft is not where it should be at a given point in time, then the pilot has not correctly controlled the aircraft due, in part, to the use of ineffective scan and crosscheck techniques.

The best way to ensure that a pilot is scanning effectively is to provide a structured, standardized training scan training program; one which includes a means of ensuring that scans are indeed going where and when they should.

This previously stated, article was written primarily for the pilots; however, there is basically no difference in the scan vs. situational awareness whether driving a CAP vehicle or cadets and seniors performing activities such as encampments, PT or ES. Scan for the hazards (ORM) and use this information to keep yourself and others safe in the performance of your duties.

Col Lyle E. Letteer, CAP
National Safety Officer

Lightning Safety

The National Weather Service (NWS) reports a 30-year average of 58 deaths per year in the United States, including Puerto Rico, due to lightning strikes. So far this year 28 fatalities have occurred with four happening in Florida.

At a wing encampment this year, lightning struck a communications antenna mounted on a trailer parked adjacent to the building being used as the encampment headquarters. The strike damaged several pieces of equipment. A cadet was using a laptop at the encampment headquarters and experienced an electrical shock. Luckily the cadet suffered no lasting side effects, complications or restrictions to duty.

The investigation revealed neither the antenna nor the trailer was grounded. According to CAPR 100-1, *Communications*, paragraph 7-1b, *Equipment Grounding*: "All communications equipment not in motion will be adequately grounded at all times." Paragraph 7-1e states, "Lightning arrestors or grounding switches should be installed on all antennas."

The above incident represents two unsafe actions: communications equipment not being grounded and using a computer during an electrical storm.

The National Weather Service has a lightning safety website (<http://www.lightningsafety.noaa.gov/overview.htm>) that provides these tips to avoid injury during thunderstorms:

- Thunderstorms happen year round.
- Lightning can strike as far 10 miles from the area of rain as it can travel horizontally many miles away from the thunderstorm and then strike the ground. These types of lightning flashes seem to come out of a clear blue sky. While blue sky may exist overhead, a thunderstorm is always located 5 miles, 10 miles or farther away.
- Remember: If you can hear thunder, you are close enough to be struck by lightning.
- *There is little you can do to substantially reduce your risk if you are outside in a thunderstorm.*
- Move to a safe shelter like a fully enclosed building with a roof, walls and floor, and with has plumbing and/or wiring. **Unsafe buildings** include car ports, open garages, covered patios, picnic shelters, beach pavilions, golf shelters, tents of any kinds, baseball dugouts, sheds and greenhouses.
- If lightning should directly strike a building with electricity and/or plumbing, the current will typically travel through the wiring and/or

plumbing, and then into the ground. Stay away from showers, sinks, hot tubs, and electronic equipment such as TVs, radios, corded telephones and computers.

- If you are unable to take shelter in a safe building, seek a safe vehicle. One that is fully enclosed, metal topped such as a hard topped car, minivan, bus, truck, etc. **Unsafe vehicles** include convertibles, golf carts, riding mowers, open cab construction equipment and boats without cabins.
- Do NOT leave the vehicle during a thunderstorm.
- While inside a safe vehicle, do not use electronic devices such as radio communications during a thunderstorm. Lightning striking the vehicle, especially the antenna(s), could cause serious injury if you are talking on the radio or holding the microphone at the time of the flash.
- Remain inside the safe building or vehicle 30 minutes after you hear the last clap of thunder.

If you are outside and away from a safe building or vehicle, these tips will *not* prevent you from being struck by lightning, but may *slightly* lessen the odds.

- If camping, hiking, etc., far from a safe vehicle or building, avoid open fields, the top of a hill or a ridge top. Keep away from tall, isolated trees or other tall objects. If you are in a forest, stay near a lower stand of trees. If you are camping in an open area, set up camp in a valley, ravine or other low area (although possible flash flooding should also be considered). Remember, a tent offers NO protection from lightning.
- Stay away from water, wet items such as ropes, and metal objects such as fences and poles. Water and metal are excellent conductors of electricity. The current from a lightning flash will easily travel for long distances.
- The vast majority of lightning injuries and deaths on boats occur on small boats with no cabin. If you are caught in a thunderstorm on a small boat, drop anchor and get as low as possible.
- Boats with cabins offer a safer, but not perfect environment. Safety is increased further if the boat has a properly installed lightning protection system. If you are inside the cabin, stay away from metal and all electrical components. Stay off the radio unless it is an emergency.

Following the above NWS lightning safety tips will lessen the risk of injury to yourself, your personal property and CAP's property.

Lt Col Brenda Allison, CAP
Asst National Safety Officer

Summary of Form 78 Accidents and Incidents for June 2009

Aircraft

- Aircraft wingtip struck hangar while taxiing
- Tow hook damaged during glider tow operation
- Dent found on leading edge of right wing
- Aircraft wing tip grazed a light pole while taxiing
- Tail tie down ring sheared off during soft field takeoff
- Nose wheel tire flat on landing rollout
- Found small dent and paint missing on wing tip
- Aircraft hit runway light while taxiing in grass to tie down area

Vehicle

- Van damaged by private trailer being pulled by a POV

Bodily Injury

- Wind blew AVGAS into a cadet face after removing nozzle from aircraft
- Cadet suffered allergic reaction during refueling
- SM lacerated foot getting off bunk bed
- Cadet lacerated face hitting headboard on bunk bed
- Cadet had allergic reaction to 8 insect bites
- Cadet fell on obstacle course and broke wrist