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महानिदेशक नागर विमानन का कार्यालय

सफदरजंग एयरपोर्ट के सामने

नई दिल्ली - ११० ००३

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Subject: **PILOT'S SPATIAL DISORIENTATION**

1. **PURPOSE:**

To acquaint pilots with the hazards of disorientation caused by loss of visual reference with the surface.

2. **INTRODUCTION.**

- a. The attitude of an aircraft is generally determined by reference to the natural horizon or other visual references with the surface. If neither horizon nor surface references exist, the attitude of an aircraft must be determined by artificial means from the flight instruments. Sight, supported by other senses, allows the pilot to maintain orientation. However, during periods of low visibility, the supporting senses sometimes conflict with what is seen. When this happens, a pilot is particularly vulnerable to disorientation. The degree of disorientation may vary considerably with individual pilots and their cumulative fatigue levels. Simply put, Spatial disorientation to a pilot means simply the inability to tell which way is "up".
- b. During a recent 5-year period, there were almost 500 spatial disorientation accidents in the United States. Tragically, such accidents resulted in fatalities over 90 percent of the time.
- c. Tests conducted with qualified instrument pilots indicate that it can take as much as 35 seconds to establish full control by instruments after the loss of

visual reference with the surface. When another large group of pilots were asked to identify what types of spatial disorientation incidents they had personally experienced, the five most common illusions reported were:

- 60 percent had a sensation that one wing was low although wings were level;
- 45 percent had, on levelling after banking, tended to bank in opposite direction;
- 39 percent had felt as if straight and level when in a turn;
- 34 percent had become confused in attempting to mix "Contact" and instrument cues; and
- 29 percent had, after recovery from steep climbing turn, felt to be turning in opposite direction,

3. ANALYSIS:

- a. Surface references and the natural horizon may at times become obscured, although visibility may be above visual flight rule minimums. Lack of natural horizon or surface reference is common on overwater flights, at night, and especially at night in extremely sparsely populated areas, or in low visibility conditions, A sloping cloud formation, an obscured horizon, a dark scene spread with ground lights and stars, and certain geometric patterns of ground lights can provide inaccurate visual information for aligning the aircraft correctly with the actual horizon. The disoriented pilot may place the aircraft in a dangerous attitude. Other factors which contribute to disorientation are reflections from outside lights, sunlight shining through clouds, and reflected light from the anti-collision rotating beacon.
- b. Another condition creating restrictions to both horizontal and vertical visibility is commonly called "white-out." "White-out" is generally caused by fog, haze, or falling snow blending with the snow-covered earth surface which may obscure all outside references. Therefore, the use of flight instruments is essential to maintain proper attitude when encountering any of the elements which may result in spatial disorientation.

4. CONCLUSION:

- a. The pilot, should understand the elements contributing to spatial disorientation so as to prevent loss of aircraft control if these conditions are inadvertently encountered.
- b. The following are certain basic steps which should assist materially in preventing spatial disorientation.
 - (1) Before flying with less than 5 kilometres visibility -obtain training and maintain proficiency in aircraft control by reference to instruments,
 - (2) When flying at night or in reduced visibility, use flight instruments, in conjunction with visual references.

- (3) Maintain night currency if flying at night. Include cross-country and local operations at different airports.
- (4) Study and become familiar with unique geographical conditions in areas proposing to operate.
- (5) Check weather forecasts before departure, en route, and at destination. Be alert for weather deterioration.
- (6) Do not attempt visual flight rule flight when there is a possibility of encountering deteriorating weather.
- (7) Rely on instrument indications unless the natural horizon or surface reference is clearly visible.

Sd/-
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