

TOWARD THE GOAL...

Reducing mishaps by 50%

Spatial **DISORIENT****ATION**

By Capt. Nicolas Webster, MC

Spatial disorientation (SD) is a normal response of a normal human to the abnormal environment of flight. Humans are terrestrial born and bred, and the systems that orient us to up and down are designed to work when we are attached firmly to the ground, or return us to the ground in an upright position. The body's spatial orientation systems were not designed for prolonged flight.

About 100 years ago, man entered the air in dynamic flying machines and quickly realized flight was a very hazardous environment. We soon learned that when we lost our peripheral-visual inputs of the horizon, very bad things start to happen, and the ground and sky are not where we think they are. For many years flight was a daytime visual activity until the development of instruments to assist in orientation. Even with modern instruments, aviators still manage to crash aircraft at a staggering rate because they continue to have difficulty adapting to the abnormal flight environment.

Researchers at the Naval Aerospace Medical Research Laboratory (NAMRL) in Pensacola, Fla., reviewed all naval Class A flight mishaps from 1997 through 2002, to identify the occurrence of SD. They used this definition to identify the mishaps: Spatial disorientation describes "a variety of incidents occurring in flight where the pilot fails to sense correctly the position, motion or attitude of the aircraft, or of himself within the fixed co-ordinate system provided by the surface of the earth and the gravitational verti-

cal.” SD also refers to “errors in perception by the pilot of his position, motion or attitude with respect to his aircraft, or of his own aircraft relative to other aircraft”

The study revealed the magnitude of lives and assets lost to the hazard of spatial disorientation in naval aviation.

FY97 to FY02 Rotary Wing Aircraft

- 47 Total mishaps – rate 1.94 per 100,000 flight hours
- 65 Total deaths
- 14 SD mishaps – rate 0.58 per 100,000 flight hours, cost \$118,251,279
- 35 SD deaths

FY97 to FY02 Fixed Wing Aircraft

- 120 Total mishaps – rate 1.81 per 100,000 flight hours
- 100 Total deaths
- 22 SD Mishaps – rate 0.33 per 100,000 flight hours, cost \$475,909,083
- 23 Deaths

The following series of articles provides additional information on the hazards associated with spatial orientation in flight, and some technological advancements being fielded or evaluated for future incorporation into aviation platforms. We’re also including a few “There I was” articles to show how dangerous SD can be. 

Capt. Webster is the aeromedical division head, Naval Safety Center.

HOW ARE WE DOING?

Here’s information on our safety status as we work toward the goal.

Aviation (Rates = Mishaps Per 100,000 Flight Hours)

Class-A Flight Mishaps (FY04 thru 8 Apr)

Service	Total/Rate	FY03 thru 8 Apr.	FY04 Goal*	FY05 Goal*	FY01-03 Avg	Fighter/Attack	Helo
USN:	8/1.51	14/2.35	14/1.24	10/0.88	20.3/1.77	6/4.93	1/89
USMC:	8/4.81	7/3.62	10/2.75	7/1.94	10.3/2.77	3/4.29	4/5.56

* Goals based on FY02 baseline.
 FY04/05 rate above goal.

For current information on aviation statistics visit:
www.safetycenter.navy.mil/statistics/aviation/default.htm

Mishap-Free Milestones

VP-10	31 years	197,000 hours	VT-27	12 years	300,000 hours
VAQ-139	12 years	19,430 hours	VAQ-138	22 years	37,422 hours
HS-8	23 years	73,500 hours	HMM-265	15 years	60,000 hours
HS-14	9 years	31,000 hours	HS-6	15 years	51,000 hours
VP-1	22 years	125,000 hours	VF-11	10 years	33,548.6 hours
HSL-41	21 years	120,000 hours	VP-1	22 years	125,000 hours
VP-40	37 years	241,000 hours	HC-11	12 years	100,000 hours
VFA-14	9 years	35,606.9 hours	VAQ-133	8 years	11,090 hours
VP-5	26 years	159,000 hours	VAQ-142	7 years	10,318 hours