U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: **AERONAUTICAL DECISION MAKING**

Date: 12/13/91 AC No: **60-22**
Initiated by: **AFS-820**

1. PURPOSE. This Advisory Circular (AC) provides introductory material, background information, and reference material on Aeronautical Decision Making (ADM). The material in this AC provides a systematic approach to risk assessment and stress management in aviation, illustrates how personal attitudes can influence decision making and how those attitudes can be modified to enhance safety in the cockpit. This AC also provides instructors with methods for teaching ADM techniques and skills in conjunction with conventional flight instruction. However, this AC is not intended to replace the complete body of knowledge contained in the ADM related reference materials listed in paragraph 4, but rather to support them and to serve as a catalyst for further study.

2. APPLICATION. The material contained in this AC is applicable to pilots who operate airplanes or helicopters under Federal Aviation Regulations (FAR) Parts 61, 91, 121, 125, 133, 135, and 141.

3. FOCUS. This AC is designed to explain the risks associated with aviation activities to pilots. Underlying behavioral causes of typical accidents and the effects of stress on ADM are emphasized. These materials provide a means for an individual to develop an "Attitude Profile" through a self-assessment inventory and provide detailed explanations of preflight and in-flight stress management techniques. The assumption is that persons exposed to these behavioral techniques will develop a positive attitude toward safety and learn ways to manage stress while recognizing and avoiding unnecessary risk. This AC is a learning tool that will help enable a person to make an intelligent determination as to the risk involved before beginning a flight. It is intended that the reader recognize risk factors such as weather, weight and balance, recency of experience, environment, and cockpit stress management so as to deal effectively with them.

4. RELATED REFERENCE MATERIAL. Twelve years of ADM research, development, and testing culminated in 1987 with the publication of six manuals oriented to the decision making needs of variously rated pilots. These manuals provide multifaceted materials designed to reduce the number of decision related accidents (the type of accidents which account for 52 percent of fatal general aviation pilot error accidents). The effectiveness of these materials has been validated in six independent studies where student pilots received such training in conjunction with the standard flying curriculum. When tested, the pilots who had received ADM training made fewer in-flight errors than those who had not received ADM training. The differences were statistically significant and ranged from about 10 to 50 percent fewer judgment errors. In the operational environment, an operator flying about 400,000 hours annually demonstrated a 54 percent reduction in accident rate after using these materials for recurrency training. For detailed information regarding exposure to risk assessment, stress management, interpersonal

CHAPTER 4. STRESS AND FLYING

18. WHAT IS STRESS? Stress is a term used to describe the body's nonspecific response to demands placed on it, whether these demands are pleasant or unpleasant in nature. The demands on a pilot can range from unexpected windshear encountered on a landing to a lost wallet. Piloting the aircraft is the pilot's responsibility. Therefore, a healthy pilot should perform at his/her optimum level and make decisions to the best of his/her ability. Numerous physical and physiological conditions in a pilot's personal and professional life, as well as the nature of flight itself, can hamper this ability. Even though a pilot holds a medical certificate stating that the pilot meets the health requirements for a particular type of flight operation, the decision whether the pilot is fit to fly is strictly the pilot's.

19. HOW MUCH STRESS IS IN YOUR LIFE?

a. ***If you hope to succeed*** at reducing stress associated with crisis management in the air or with your job, it is essential to begin by making a personal assessment of stress in all areas of your life. You may face major stressors such as a loss of income, serious illness, death of a family member, change in residence, or birth of a baby, plus a multitude of comparatively minor positive and negative stressors. These major and minor stressors have a cumulative effect which constitutes your total stress-adaption capability which can vary from year to year. To enhance your awareness about the sources of stress in your life, the life change profile questionnaire (appendix 5) is presented. Place a check in the **Happened** column if you have experienced the event described in the last 12 months. Total your score at the end of the questionnaire.

b. ***The more change you have,*** the more likely you are to suffer a decline in health. As a rule of thumb, if you score over 20 checks, mostly in the top half of the checklist, you have an 80 percent chance of a serious health change. If you have about 20 checks distributed over the checklist, you have about a 50 percent chance of illness in the near future. Each of us has personal stress-adaption limitations. When we exceed this level, stress overload may lead to poor health or illness.

20. IS STRESS BAD? Stress is a response to a set of circumstances that induces a change in a pilot's current physiological and/or psychological patterns of functioning forcing the pilot to adapt to these changes. Stress is an inevitable and necessary part of life that adds motivation to life and heightens a pilot's response to meet any challenge. In fact, performance of a task will generally improve with the onset of stress, but will peak and then begin to degrade rapidly as stress levels exceed a pilot's adaptive abilities to handle the situation.

21. HANDLING STRESS IN FLYING. Accidents often occur when flying task requirements exceed a pilot's capabilities. A superior pilot uses superior judgment to avoid stressful situations which might call for use of superior skills. The difference between pilot capabilities and task requirements is the margin of safety (figure 5). In this example, the margin of safety is minimal during the approach under ideal conditions. For this pilot, a cold and fatigue may reduce the minimal margin of safety as well as the overall margin of safety throughout the flight.

a. ***Stress is insidious.*** Stress has a gradual and cumulative effect that develops slowly, so slowly that stress can be well established before becoming apparent. A pilot may think that he/she is handling everything quite well, when in fact there are subtle signs that the pilot is beyond his/her ability to respond appropriately.

b. ***Stress is cumulative.*** A generalized stress reaction can develop as a result of accumulated stress. There is a limit to a pilot's adaptive nature. This limit, the stress tolerance level, is based on a pilot's ability to cope with the situation. If the number or intensity of the stressors becomes too great, the pilot is susceptible to an environmental overload. At this point, a pilot's performance begins to decline and judgment deteriorates.

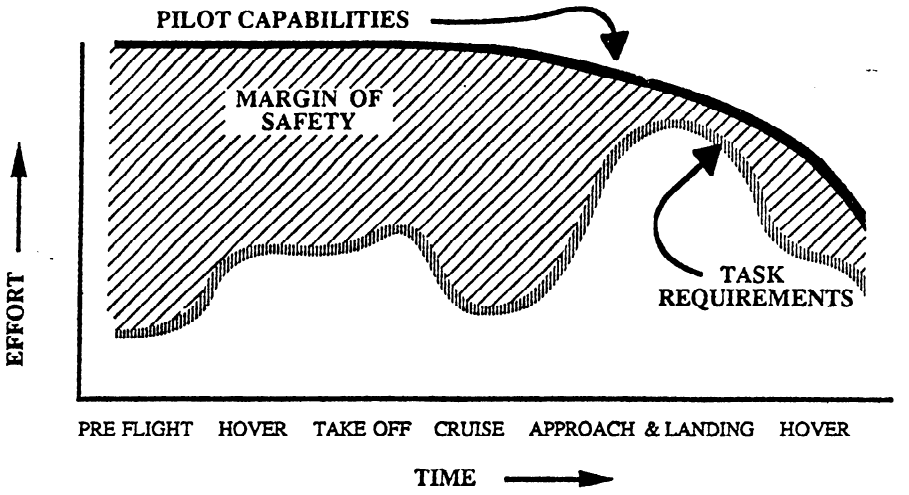


FIGURE 5. THE MARGIN OF SAFETY

c. ***Signs of inadequate coping.*** The indicators of excessive stress often show as three types of symptoms: (1) emotional, (2) physical, and (3) behavioral. These symptoms differ depending upon whether aggression is focused inward or outward. Those individuals who typically turn their aggressive feelings inward often demonstrate the emotional symptoms of depression, preoccupation, sadness, and withdrawal. The individual who typically takes out frustration on other people or objects exhibits few physical symptoms. On the other hand, emotional symptoms may show up as overcompensation, denial, suspicion, paranoia, agitation, restlessness, defensiveness, excess sensitivity to criticism, argumentativeness, arrogance, and hostility.

d. ***Life Stress Management.*** There are many techniques available that can help reduce the stress in your life or help you cope with it better. Not all of the following ideas may be the solution, but some of them should be effective for you.

(1) Become knowledgeable about stress.

(2) Take a realistic assessment of yourself.

(3) Take a systematic approach to problem solving.

(4) Develop a life style that will buffer against the effects of stress.

(5) Practice behavioral management techniques.

(6) Establish and maintain a strong support network.

e. ***Cockpit Stress Management.*** Good cockpit stress management begins with good life stress management. Many of the stress coping techniques practiced for life stress management are not usually practical in flight. Rather, you must condition yourself to relax and think rationally

when stress appears. The following checklist outlines some thoughts on cockpit stress management.

(1) Avoid situations that distract you from flying the aircraft.

(2) Reduce your workload to reduce stress levels. This will create a proper environment in which to make good decisions.

(3) If an emergency does occur, be calm. Think for a moment, weigh the alternatives, then act.

(4) Maintain proficiency in your aircraft; proficiency builds confidence. Familiarize yourself thoroughly with your aircraft, its systems, and emergency procedures.

(5) Know and respect your own personal limits.

(6) Do not let little mistakes bother you until they build into a big thing. Wait until after you land, then "debrief" and analyze past actions.

(7) If flying is adding to your stress, either stop flying or seek professional help to manage your stress within acceptable limits.

f. ***Flight Fitness.*** A "Go/No-Go" decision is made before each flight. The pilot should not only preflight check the aircraft, but also his/herself on each and every flight. A pilot should ask, "Could I pass my medical examination right now?" If the pilot cannot answer with an absolute "yes," then the pilot should not fly. The following checklist is intended for a pilot's personal preflight use. A pilot may elect to carry a copy in his/her flight bag and onboard the aircraft.

(1) Do I feel well? Is there anything wrong with me at all?

(2) Have I taken any medication in the last 12 hours?

(3) Have I had as little as one ounce of alcohol in the last 12 hours?

(4) Am I tired? Did I get a good night's sleep last night?

(5) Am I under undue stress? Am I emotional right now?

(6) Have I eaten a sensible meal and taken in a good load of protein? Do I have a protein snack, such as cheese, meat or nuts, aboard?

(7) Am I dehydrated? Do I need to take noncarbonated liquids such as water or fruit juices?

(8) Am I equipped with sunglasses, ear protectors, appropriate clothing?