



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

crew coordination and communication, and other ADM techniques, the reader is directed to one or more of the manuals which may be obtained from National Technical Information Service.

a. **Published Documents.** (Price of individual documents is subject to change without notice.)

<u>Report Number</u>	<u>Title</u>
DOT/FAA/PM-86/41	Aeronautical Decision Making for Student and Private Pilots. NTIS identification number ADA182549, price \$23.00.
DOT/FAA/PM-86/42	Aeronautical Decision Making for Commercial Pilots. NTIS identification number ADA198772, price \$17.00.
DOT/FAA/PM-86/43	Aeronautical Decision Making for Instrument Pilots. NTIS identification number N8724880, price \$17.00.
DOT/FAA/PM-86/44	Aeronautical Decision Making for Instructor Pilots (how to teach ADM). NTIS identification number ADA182611, price \$17.00.
DOT/FAA/PM-86/45	Aeronautical Decision Making for Helicopter Pilots. NTIS identification number ADA180325, price \$23.00.

<u>Report Number</u>	<u>Title</u>
DOT/FAA/PM-86/46	Aeronautical Decision Making - Cockpit Resource Management. NTIS identification number ADA205115, price \$23.00.

b. **Any of the series** of ADM training manuals may be obtained by writing or calling:

Mailing Address: National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Telephone: (703) 487-4650 (orders)
(800) 336-4700 (rush orders only)
(703) 478-4780 (title identification branch)

5. DEFINITIONS.

a. **ADM** is a systematic approach to the mental process used by aircraft pilots to consistently determine the best course of action in response to a given set of circumstances.

b. **Attitude** is a personal motivational predisposition to respond to persons, situations, or events in a given manner that can, nevertheless, be changed or modified through training. A sort of *mental shortcut* to decision making.

c. **Attitude Management** is the ability to recognize hazardous attitudes in oneself and the willingness to modify them as necessary through the application of an appropriate antidote thought.

d. **Cockpit Resource Management, (CRM)**, in multiperson crew configurations, is the effective use of all personnel and material

assets available to a flight crew. CRM emphasizes good communication and other interpersonal relationship skills.

e. **Headwork** is required to accomplish a conscious, rational thought process when making decisions. Good decision making involves risk identification and assessment, information processing, and problem solving.

f. **Judgment** is the mental process of recognizing and analyzing all pertinent information in a particular situation, a rational evaluation of alternative actions in response to it, and a timely decision on which action to take.

g. **Personality** is the embodiment of personal traits and characteristics of an individual that are set at a very early age and extremely resistant to change.

h. **Poor Judgment (PJ) Chain** is a series of mistakes that may lead to an accident or incident. Two basic principles generally associated with the creation of a PJ chain are: (1) one bad decision often leads to another; and (2) as a string of bad decisions grows, it reduces the number of subsequent alternatives for continued safe flight. ADM is intended to break the PJ chain before it can cause an accident or incident.

i. **Risk Management** is the part of the decision making process which relies on situational awareness, problem recognition, and good judgment to reduce risks associated with each flight.

j. **Risk Elements** in ADM take into consideration the four fundamental risk elements: the pilot, the aircraft, the environment, and the

type of operation that comprise any given aviation situation.

k. **Situational Awareness** is the accurate perception and understanding of all the factors and conditions within the four fundamental risk elements that affect safety before, during, and after the flight.

l. **Skills and Procedures** are the procedural, psychomotor, and perceptual skills used to control a specific aircraft or its systems. They are the *stick and rudder* or *airmanship* abilities that are gained through conventional training, are perfected, and become almost automatic through experience.

m. **Stress Management** is the personal analysis of the kinds of stress experienced while flying, the application of appropriate stress assessment tools, and other coping mechanisms.

n. **VOR** is a very high frequency omnidirectional range station.

6. **COMMENTS INVITED.** Comments regarding this publication should be directed to:

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Flight Standards National Field Office,
AFS-500 (Advisory Circular Staff)
P.O. Box 20034, Gateway Building
Dulles International Airport
Washington, DC 20041-2034

Every comment will not necessarily generate a direct acknowledgement to the commenter. Comments received will be considered in the development of upcoming revisions to AC's or other related technical material.



Thomas C. Accardi
Director, Flight Standards Service

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CHAPTER 1. INTRODUCTION

1. **GENERAL.** Contrary to popular opinion, good judgment can be taught. Heretofore it was supposed to be gained only as a natural by-product of experience. As pilots continued to log accident-free flight hours, a corresponding increase of good judgment was also assumed.

2. ADM PROCESS.

a. *ADM builds upon the foundation of conventional decision making (figure 1), but enhances the process to decrease the probability of pilot error. ADM provides a structured, systematic approach to analyzing changes that occur during a flight and how these changes might affect a flight's safe outcome. The ADM process addresses all aspects of decision making in the cockpit and identifies the steps involved in good decision making.*

Steps for good decision making are:

- (1) Identifying personal attitudes hazardous to safe flight.
- (2) Learning behavior modification techniques.
- (3) Learning how to recognize and cope with stress.
- (4) Developing risk assessment skills.
- (5) Using all resources in a multicrew situation.
- (6) Evaluating the effectiveness of one's ADM skills.

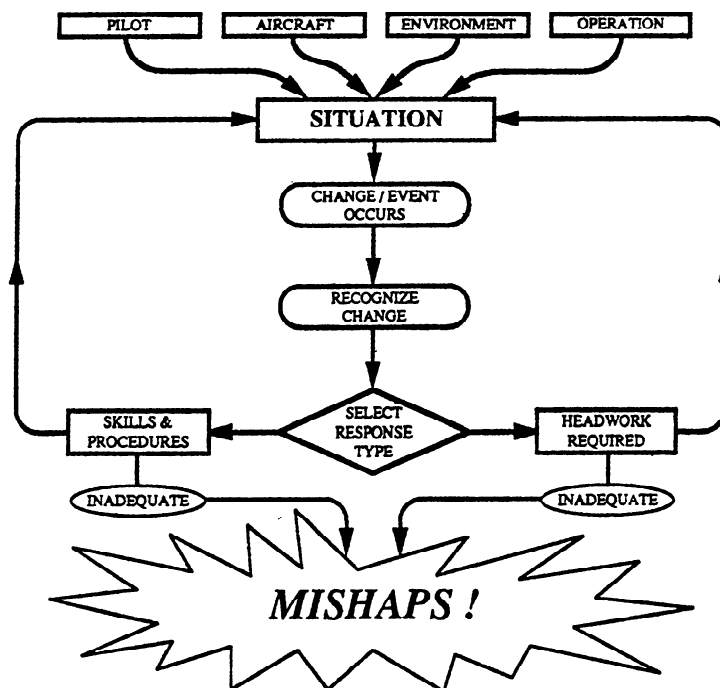


FIGURE 1. CONVENTIONAL DECISION MAKING PROCESS

3. CONVENTIONAL DECISION MAKING.

a. *In conventional decision making*, the need for a decision is triggered by recognition that something has changed or an expected change did not occur. Recognition of the change, or non-change, in the situation is a vital step in any decision making process. Not noticing the change in the situation can lead directly to a mishap (figure 1). The change indicates that an appropriate response or action is necessary in order to modify the situation (or, at least, one of the elements that comprise it) and bring about a desired new situation. Therefore, situational awareness is the key to successful and safe decision making. At

this point in the process, the pilot is faced with a need to evaluate the entire range of possible responses to the detected change and to determine the best course of action.

b. *Figure 2 illustrates the ADM process*, how this process expands conventional decision making, and shows the interactions of the ADM steps and how these steps can produce a safe outcome. Starting with the recognition of change, and following with an assessment of alternatives, a decision to act or not act is made, and the results are monitored. ADM enhances the conventional decision making process with an awareness of the importance of attitudes in decision making, a

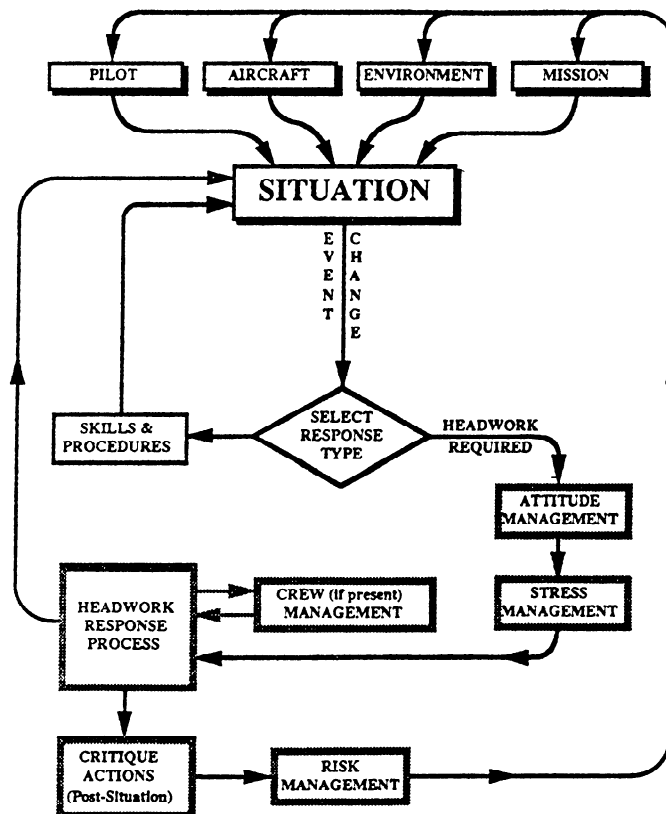


FIGURE 2. AERONAUTICAL DECISION MAKING PROCESS

learned ability to search for and establish the relevance of all information, and the motivation to choose and execute the actions which assure safety in a timeframe permitted by the situation. These elements of ADM are discussed in depth as they relate to the specific discipline in each of the training manuals.

4. OPERATIONAL PITFALLS. There are a number of classic behavioral traps into which pilots have been known to fall. Pilots, particularly those with considerable experience, as a rule always try to complete a flight as planned, please passengers, meet schedules, and generally demonstrate that they have the "right stuff." This much-talked-about "right stuff" is a fragile image. The basic drive to demonstrate the "right stuff" can have an adverse effect on safety and can impose an unrealistic assessment of piloting skills under stressful conditions. These tendencies ultimately may lead to practices that are dangerous and often illegal, and may lead to a mishap. All experienced pilots have fallen prey to, or have been tempted by, one or more of these tendencies in their flying careers. These dangerous tendencies or behavior patterns, which must be identified and eliminated, include:

a. **Peer Pressure.** Poor decision making based upon emotional response to peers rather than evaluating a situation objectively.

b. **Mind Set.** The inability to recognize and cope with changes in the situation different from those anticipated or planned.

c. **Get-There-Itis.** This tendency, common among pilots, clouds the vision and impairs judgment by causing a fixation on the original goal or destination combined with a total disregard for any alternative course of action.

d. **Duck-Under Syndrome.** The tendency to *sneak a peek* by descending below minimums during an approach. Based on a belief that there is always a built-in "fudge" factor that can be used or on an unwillingness to admit defeat and shoot a missed approach.

e. **Scud Running.** Pushing the capabilities of the pilot and the aircraft to the limits by trying to maintain visual contact with the terrain while trying to avoid physical contact with it. This attitude is characterized by the old pilot's joke: "If it's too bad to go IFR, we'll go VFR."

f. **Continuing visual flight rules (VFR)** into instrument conditions often leads to spatial disorientation or collision with ground/obstacles. It is even more dangerous if the pilot is not instrument qualified or current.

g. **Getting Behind the Aircraft.** Allowing events or the situation to control your actions rather than the other way around. Characterized by a constant state of surprise at what happens next.

h. **Loss of Positional or Situation Awareness.** Another case of getting behind the aircraft which results in not knowing where you are, an inability to recognize deteriorating circumstances, and/or the misjudgment of the rate of deterioration.

i. **Operating Without Adequate Fuel Reserves.** Ignoring minimum fuel reserve requirements, either VFR or Instrument Flight Rules (IFR), is generally the result of overconfidence, lack of flight planning, or ignoring the regulations.

j. **Descent Below the Minimum Enroute Altitude.** The duck-under syndrome (mentioned above) manifesting itself during the en route portion of an IFR flight.

k. **Flying Outside the Envelope.** Unjustified reliance on the (usually mistaken) belief that the aircraft's high performance capability meets the demands imposed by the pilot's (usually overestimated) flying skills.

l. **Neglect of Flight Planning, Preflight Inspections, Checklists, Etc.** Unjustified reliance on the pilot's short and long term memory, regular flying skills, repetitive and familiar routes, etc.

CHAPTER 2. HAZARDOUS ATTITUDE INVENTORY

5. ATTITUDE ASSESSMENT TEST. In each ADM manual, a chapter addresses five hazardous attitudes that can affect a pilot's judgment, and how these hazardous attitudes can have an impact on safe flying. Subsequent chapters in each of the ADM manuals provide methods of modifying these hazardous attitudes.

6. SELF-ASSESSMENT HAZARDOUS ATTITUDE INVENTORY TEST. Each ADM student should take the Self-Assessment Hazardous Attitude Inventory Test in order to gain a realistic perspective on his/her attitudes toward flying. The inventory test requires the pilot to provide a response which most accurately reflects the reasoning behind his/her decision. The pilot must choose one of the five given reasons for making that decision, even though the pilot may not consider any of the five choices acceptable. The inventory test presents extreme cases of incorrect pilot decision making in an effort to introduce the five types of hazardous attitudes described in Chapter 3 of this AC.

7. INSTRUCTIONS FOR TAKING THE SELF-ASSESSMENT HAZARDOUS ATTITUDE INVENTORY TEST.

a. *Read over each* of the six situations and the five choices contained in the inventory test. Keep in mind that there are no correct answers.

b. *Decide which one of the five choices* is the most likely reason for the decision made. Using a copy of the Attitude Inventory Answer Sheet (appendix 1), place the number 5 in the space provided.

c. *Continue by ranking in declining order* the remaining four probable reasons from 4 (next most likely) to 3, 2, and 1 (least likely) until all five blanks have been filled. (Figure 3 provides an example of how the alternatives might be ranked.)

Situation 1 (Example)

- a. 1 (your least likely reason)
- b. 3
- c. 5 (your most likely reason)
- d. 2
- e. 4

FIGURE 3. SAMPLE SET OF RANK ORDERED ANSWERS

Situation 1. You are on a flight to an unfamiliar, rural airport. Flight service states that VFR flight is not recommended since heavy coastal fog is forecast to move into the destination airport area about the time you expect to land. You first consider returning to your home base where visibility is still good, but decide instead to continue as planned and land safely after some problems. Why did you reach this decision?

- a. You hate to admit that you cannot complete your original flight plan.
- b. You resent the suggestion by flight service that you should change your mind.
- c. You feel sure that things will turn out safely, and that there is no danger.
- d. You reason that since your actions would make no real difference, you might as well continue.
- e. You feel the need to decide quickly, so you take the simplest alternative.

Situation 2. While taxiing for takeoff, you notice that your right brake pedal is softer than the left. Once airborne, you are sufficiently concerned about the problem to radio for information. Since strong winds are reported at your destination, an experienced pilot who is a passenger recommends that you abandon the flight and return to your departure airport. You choose to continue the flight and experience no further difficulties. Why did you continue?

- a. You feel that suggestions made in this type of situation are usually overly cautious.
- b. Your brakes have never failed before, so you doubt that they will this time.
- c. You feel that you can leave the decision to the tower at your destination.
- d. You immediately decide that you want to continue.
- e. You are sure that if anyone could handle the landing, you can.

Situation 3. Your regular airplane has been grounded because of an airframe problem. You are scheduled in another airplane and discover it is a model you are not familiar with. After your preflight, you decide to take off on your business trip as planned. What was your reasoning?

- a. You feel that a difficult situation will not arise so there is no reason not to go.
- b. You tell yourself that if there were any danger, you would not have been offered the plane.
- c. You are in a hurry and do not want to take the time to think of alternate choices.
- d. You do not want to admit that you may have trouble flying an unfamiliar airplane.
- e. You are convinced that your flight instructor was much too conservative and pessimistic when he cautioned you to be thoroughly checked out in an unfamiliar aircraft.

Situation 4. You were briefed about possible icing conditions, but did not think there would be any problem since your departure airport temperature was 60 °F (15 °C). As you near your destination, you encounter freezing precipitation, which clings to your aircraft. Your passenger, who is a more experienced pilot, begins to panic. You consider turning back to the departure airport, but continue instead. Why did you not return?

- a. I have made it this far. What is the use in turning back now?
- b. The panic of the passenger makes you think it will not happen to me - I have encountered ice before and nothing happened.
- c. Why is he panicking? I can handle this situation just like I have done before.
- d. FAA regulations exaggerate the dangers of icing. I can handle this situation.
- e. I have got to do something. Descend! That will make everyone realize that I am in control.

Situation 5. You do not bother to check weather conditions at your destination. En route, you encounter headwinds. Your fuel supply is adequate to reach your destination, but there is almost no reserve for emergencies. You continue the flight and land with a nearly dry tank. What most influenced you to do this?

- a. Being unhappy with the pressure of having to choose what to do, you make a snap decision.
- b. You do not want your friends to hear that you had to turn back.
- c. You feel that flight manuals always understate the safety margin in fuel tank capacity.
- d. You believe that all things usually turn out well, and this will be no exception.

e. You reason that the situation has already been determined because the destination is closer than any other airport.

Situation 6. You are 40 minutes late for a trip in a small airplane. Since the aircraft handled well on the previous day's flight, you decide to skip most of the preflight check. What leads you to this decision?

a. You simply take the first approach to making up time that comes to mind.

b. You feel that your reputation for being on time demands that you cut corners when necessary.

c. You believe that some of the preflight inspection is just a waste of time.

d. You see no reason to think that something unfortunate will happen during this flight.

e. If any problems develop, the responsibility would not be yours. It is the maintenance of the airplane that really makes the difference.

8. SAMPLE SITUATIONS FOR ADVANCED RATED PILOTS.

a. *Paragraph 7 presented examples of six situations* from the student/private pilot ADM manual. For pilots with advanced ratings, the remaining ADM manuals provide similar situations and self-assessment tests. The following are example situations taken from these texts.

Situation 7. Instrument Pilot ADM Situation. You plan an important business flight under instrument conditions in an aircraft with no deicing equipment through an area in which light to moderate rime or mixed icing in clouds, and precipitation above the freezing level has been forecast. You decide to make the trip, thinking:

_____a. You believe your skills are good enough to handle ice accumulation on the aircraft.

_____b. You have been in this situation many times and nothing has happened.

_____c. You must get to the business meeting in 2 hours and cannot wait.

_____d. You don't allow an icing forecast to stop you; weather briefers are usually overly cautious.

_____e. There is nothing you can do about atmospheric conditions.

Situation 8. Commercial Pilot ADM Situation. Your passengers have shown up almost an hour late. You are going to an airport that requires a reservation. Which of the following alternatives best illustrates your reaction?

_____a. You think to yourself, if I hurry, maybe I can still make it.

_____b. Nothing will happen if I miss this reservation.

_____c. I'm smart enough to talk our way in when we arrive.

_____d. I can't help it if my passengers were late. I don't control them.

_____e. The Feds wouldn't dare keep me out.

Situation 9. Helicopter Pilot ADM Situation. You are to fly a helicopter which you know is old and has been poorly maintained. A higher than normal turbine outlet temperature on startup is indicated, and you suspect the fuel control. Two fellow company pilots, travelling as passengers, do not want to be delayed. After 5 minutes of debate, you agree to make the trip. Why did you permit yourself to be persuaded?

_____a. You feel that you must always prove your ability as a pilot, even under less than ideal circumstances.

_____b. You believe that regulations over-emphasize safety in this kind of situation.

_____c. You think that the fuel control will certainly last for just one more flight.

____d. You feel that your opinion may be wrong since the two other pilots are willing to take the risk.

____e. The thought of changing arrangements is annoying, so you jump at the suggestion of the other pilots.

Situation 10. Instructor Pilot ADM Situation.

You perform a slip demonstration during an approach to landing and fly the aircraft to the left of the runway centerline to a position which would make an attempted landing possible but dangerous. You return control of the aircraft to the student and instruct him to "execute proper landing procedures." Which of the following best characterizes your attitude about putting the student and yourself in this situation?

____a. I can always handle this even if he can't.

____b. Whatever happens, it's up to him now.

____c. I've never had a problem doing this in the past.

____d. The quicker we get through this, the better.

____e. These aircraft can take a lot worse landings than the manuals suggest.

9. SCORING INSTRUCTIONS. After completing the inventory test, transfer the responses for each alternative from the completed Attitude Inventory Answer Sheet (appendix 1) to the appropriate section of the Scoring Form (appendix 2). Total the ranking scores for each scale and enter the total in the space provided at the bottom of each column. The total score for each situation must be 15, while the total for situations 1 through 6 must be 90. If the totals are not 15 and 90, review for possible errors in the transfer of scores and check addition. These totals are then marked on the Attitude Profile (appendix 3) where indicated for situations 1 through 6.

10. ATTITUDE PROFILE. Using the total scores for each Scale I-V from appendix 2, place an "X" on the corresponding scale profile in appendix 3. Notice that the score values run from bottom to top, so that the highest value should be at the highest point on the profile sheet. Straight lines should be drawn from the score in each scale to the score in the next scale (connect the "X's") so that the profile resembles a graph. Note the hazardous attitude shown at the bottom of each scale on appendix 3.

11. PROFILE EXPLANATION. The profile graph indicates the comparative tendency for each of the five hazardous attitudes. The higher the relative rank (first, second, third, etc.), the greater the propensity to respond with that hazardous attitude. The pilot should keep in mind his/her results while reviewing the explanation. An explanation of the pilot's profile starts with the description of an all-too-common flight situation.

a. *A pilot of a single-engine aircraft* checks the weather and notes that there is a possibility of a thunderstorm at the destination airport. The pilot has never operated an aircraft in bad weather and knows that a flight instructor would advise against flying. Despite this knowledge, the pilot takes off, crashes in poor weather, and is seriously injured.

b. *Why does this occur so often?* Because many accidents involve pilots who allow themselves to be influenced by one or more of the five basic hazardous attitudes. These attitudes get pilots into trouble by causing them to take chances that invite an accident. (The five hazardous attitudes are the ones recorded on the assessment inventory just completed.)

12. SUMMARY.

a. *The pilot should use the profile* to determine which hazardous attitudes dominated his/her responses. The profile will illustrate which hazardous thought patterns have a greater tendency to influence a pilot's judgment. The inventory test may indicate the actual tendency of the pilot; however, exhibiting attitudes similar to those described are common and normal. As a pilot's flying career

progresses, the ability to identify these hazardous attitudes will help the pilot counteract his/her hazardous thoughts. The goal of this exercise is to balance all thoughts against possible outcomes so that actions are nonhazardous. A critical part of ADM training is learning to examine the thinking process and control hazardous attitudes. Flying will become safer if a pilot is able to identify and act upon hazardous attitudes.

b. *In reviewing* the five hazardous attitudes in Chapter 3, a pilot should pay particular attention to hazardous attitudes that may characterize his/her own tendencies. Hazardous attitudes occur to every pilot to some degree at some time. Problems arise when these hazardous attitudes occur regularly and/or to an extreme. Therefore, a pilot should learn to recognize these hazardous attitudes in order to take corrective action.

CHAPTER 3. DEALING WITH HAZARDOUS ATTITUDES

13. HAZARDOUS ATTITUDES. ADM addresses the following five hazardous attitudes.

a. *Antiauthority (don't tell me!).* This attitude is found in people who do not like anyone telling them what to do. In a sense they are saying no one can tell me what to do. They may be resentful of having someone tell them what to do or may regard rules, regulations, and procedures as silly or unnecessary. However, it is always your prerogative to question authority if you feel it is in error.

b. *Impulsivity (do something quickly!)* is the attitude of people who frequently feel the need to do something-anything-immediately. They do not stop to think about what they are about to do, they do not select the best alternative, and they do the first thing that comes to mind.

c. *Invulnerability (it won't happen to me).* Many people feel that accidents happen to others, but never to them. They know accidents can happen, and they know that anyone can be affected. They never really feel or believe that they will be personally involved. Pilots who think this way are more likely to take chances and increase risk.

d. *Macho (I can do it).* Pilots who are always trying to prove that they are better than anyone else are thinking I can do it - I'll show them. Pilots with this type of attitude will try to prove themselves by taking risks in order to impress others. While this pattern is thought to be a male characteristic, women are equally susceptible.

e. *Resignation (what's the use?).* Pilots who think what's the use? do not see themselves

as being able to make a great deal of difference in what happens to them. When things go well, the pilot is apt to think that's good luck. When things go badly, the pilot may feel that someone is out to get me, or attribute it to bad luck. The pilot will leave the action to others, for better or worse. Sometimes, such pilots will even go along with unreasonable requests just to be a "nice guy."

14. ANTIDOTES FOR HAZARDOUS ATTITUDES.

a. *Hazardous attitudes which contribute* to poor pilot judgment can be effectively counteracted by redirecting that hazardous attitude so that appropriate action can be taken. Recognition of hazardous thoughts is the first step in neutralizing them in the ADM process. This chapter is designed to familiarize the pilot with a means of counteracting hazardous attitudes with an appropriate *antidote thought*.

b. *When a pilot recognizes* a thought as hazardous, the pilot should label that thought as hazardous, then correct that thought by stating the corresponding antidote. Antidotes should be memorized for each of the hazardous attitudes so that they automatically come to mind when needed.

15. ANTIDOTE RECALL EXERCISE. The hazardous attitude antidotes (figure 4) should be learned thoroughly and practiced. Make a copy of the Antidote Recall Exercise form (appendix 4) and, without referring to the text, write the characteristic thought for each hazardous attitude and its appropriate antidote. Check the statements and continue if they are correct. If not, continued study of the antidotes is recommended until they are memorized.

16. THE IMPORTANCE OF REINFORCEMENT EXERCISES. The basic definitions, the self-assessment test, the hazardous attitudes, and the antidotes represent the foundation for understanding the factors of good ADM. However, they represent only about 10 percent of the important process of learning and putting ADM into practice. The other 90 percent can be achieved only through completion of all of the situation exercises in the appropriate manual (i.e., Student/Private, Instrument, Commercial, etc.) and applying the principles learned to each and every flight. Some examples of the reinforcement exercises from each of the manuals follow. These are presented as examples of the types of decision errors which have contributed to accidents in the past.

HAZARDOUS ATTITUDE	ANTIDOTE
Antiauthority: Don't tell me.	Follow the rules. They are usually right.
Impulsivity: Do something quickly.	Not so fast. Think first.
Invulnerability: It won't happen to me.	It could happen to me.
Macho: I can do it.	Taking chances is foolish.
Resignation: What's the use?	I'm not helpless. I can make a difference.

FIGURE 4. THE FIVE ANTIDOTES

17. INSTRUCTIONS FOR USING REINFORCEMENT EXERCISES. Read each of the following situations. At the end of each situation, an alternative should be selected which best illustrates the reactions of a pilot who is thinking a particular hazardous attitude. After the most appropriate alternative is selected, refer to the explanation of alternatives page for the proper response. This page will provide the correct answer. If the selection is accurate, proceed to the next situation. If an incorrect alternative was selected, the reader should review the situation again and select another alternative. Repeat the exercise until the correct alternative is selected.

a. *The Impulsivity Hazardous Attitude.*

(1) *Situation:* As you enter the landing pattern, you normally lower the flaps. The tower suddenly changes the active runway. Distracted, you forget to use the before-landing checklist. On short final you find yourself dangerously low with a high sink rate. Glancing down, you realize that you forgot to extend the flaps. Which of the following alternatives best illustrates the **impulsivity** reaction?

(i) You feel that nothing is going to happen because you have made intentional no-flap landings before.

(ii) You laugh and think, "Boy, this low approach will impress people on the ground."

(iii) You think that using a checklist is a stupid requirement.

(iv) You immediately grab the flap handle and add full flaps.

(v) You think that it all depends on whether you get an updraft or downdraft now.

(2) *Explanation of Alternatives:*

(i) Feeling that nothing bad can happen suggests the invulnerability hazardous attitude (it won't happen to me). Go back to the situation and select another alternative.

(ii) When you are thinking about impressing people on the ground, watch out for the macho hazardous attitude (I can do it). This can cost you dearly. Go back to the situation and select another alternative.

(iii) Thinking that checklists are stupid suggests that you feel that aircraft designers, the Government, and your instructor, all of whom urge the use of checklists, are wrong. This suggests the antiauthority hazardous attitude (don't tell me). Go back to the situation and select another alternative.

(iv) Right! Immediately adding full flaps without thinking is an example of the impulsivity hazardous attitude (do something quickly). Unfortunately, in this situation, full flaps will probably only increase the sink rate. Go on to the next situation.

(v) If you are convinced that it is up to the wind, this implies the hazardous attitude of resignation (what's the use). Go back to the situation and select another alternative.

(3) *A Good Attitude.* Distractions can be dangerous--always use your checklist.

b. *The Antiauthority Hazardous Attitude.*

(1) *Situation:* You approach the VOR and the controller asks if you want to execute the entire VOR procedure or will you accept a right turn of more than 90° to intercept the final approach course. You state that you will make the turn directly onto final at 2,000 feet although this will press you to get properly established on final. Which of the following alternatives best illustrates the antiauthority reaction?

(i) It was not your idea to make the approach like this.

(ii) A controller is not going to influence the way I fly.

(iii) You do not need the full approach; you know you are a good instrument pilot.

(iv) You are in a hurry and do not wish to bother with the full approach.

(v) You know the controllers will be impressed with this approach.

(2) *Explanation of Alternatives.*

(i) By assuming someone else has responsibility for your approach, you exhibit the resignation attitude (what's the use?). Go back to the situation and select another alternative.

(ii) Right! The regulations are for someone else attitude assumes controllers are interfering with your business. You are thinking in an antiauthority manner. Go on to the next situation.

(iii) Here you are taking the invulnerability stand (it won't happen to me). You think of yourself as invulnerable. Go back to the situation and select another alternative.

(iv) This is the impulsivity hazardous attitude (I must act now, there's no time). Go back to the situation and select another alternative.

(v) The desire to impress another influences your decision. This is the macho attitude (I'll show you - I can do it). Go back to the situation and select another alternative.

(3) *A Good Attitude.* Make as much time available on an approach as possible. You may need it.

c. *The Macho Hazardous Attitude.*

(1) *Situation:* On a trip to the west coast, you make an en route refueling stop at an airport in the Rockies. After refueling, the density altitude prior to your departure is reported as 10,500 feet. You are at maximum takeoff weight when you depart. At the present rate of climb, you will just barely clear the minimum crossing altitude (MCA) at the next intersection on your flight route. Which of the following alternatives best illustrates the macho reaction?

(i) There is really nothing you can do about it; it is up to air traffic control (ATC) to make sure you clear.

(ii) The MCA's have plenty of leeway for clearance. So what if you are a little low.

(iii) You are a good pilot and will make it.

(iv) When you see that you cannot climb enough, you immediately inform ATC of your situation without determining your intentions.

(v) Mountain flying is not any different from any other flying and you have never run into any problems before. Nothing will happen.

(2) *Explanation of Alternatives.*

(i) Assuming someone else is responsible for you is the resignation hazardous attitude. Go back to the situation and select another alternative.

(ii) This is the antiauthority hazardous attitude (don't tell me). Go back to the situation and select another alternative.

(iii) Right! Thinking I'll show you - I can do it, is the macho hazardous attitude.

(iv) Acting before thinking, this is the impulsivity hazardous attitude (do something quickly). Go back to the situation and select another alternative.

(v) This is the invulnerability hazardous attitude (it won't happen to me). Go back to the situation and select another alternative.

(3) *A Good Attitude.* Be aware of your limitations and don't exceed them.

d. *The Invulnerability Hazardous Attitude.*

(1) *Situation:* While preflighting the pressurization system, you discover that the rate adjustment control is inoperative. Knowing that you can manually control the cabin pressure, you opt to disregard this discrepancy and depart on your trip. You will have to handle the system yourself. Which of the following alternatives best illustrates the **invulnerability** reaction?

(i) It's too late to fix it now.

(ii) You can handle a little problem like this.

(iii) What's the worst that could happen?

(iv) I certainly didn't break it. It's not my fault.

(v) You barely need the pressurization at the filed altitude anyway.

(2) *Explanation of Alternatives.*

(i) This is the impulsivity hazardous attitude (there's no time - I must do something quickly). Go back to the situation and select another alternative.

(ii) This is the macho hazardous attitude showing through (I can do it). Go back to the situation and select another alternative.

(iii) Right! Nothing bad is going to happen to you because of your invulnerability. Go on to the next situation.

(iv) This is the resignation hazardous attitude - what's the use? - where someone else is responsible. Go back to the situation and select another alternative.

(v) This type of thinking is characteristic of the antiauthority attitude (rules and regulations are made to be broken). Go back to the situation and select another alternative.

(3) *A Good Attitude.* Settle for nothing less than full operating systems.

e. *The Resignation Hazardous Attitude.*

(1) *Situation:* Your copilot shows up for duty and you notice that the copilot's behavior is

somewhat out of the ordinary. You know your copilot has had a cold. When questioned, the copilot said maybe it was the antihistamine that he/she took the night before. Although your aircraft requires a crew of two, you decide to ignore your copilot's drowsiness and inattention. Which of the following alternatives best illustrates the **resignation** reaction?

(i) You could fly this jet by yourself anyway.

(ii) You two have flown together many times, and everything has always worked out fine.

(iii) What else can you do? He was assigned this flight too.

(iv) He/she might not be within the regulations, but he/she says he/she's okay and that's what counts.

(v) There is really no time to call another copilot now.

(2) *Explanation of Alternatives.*

(i) This is a trait of the macho hazardous attitude (I can do it). Go back to the situation and select another alternative.

(ii) This is the invulnerability attitude (it won't happen to me). Go back to the situation and select another alternative.

(iii) Right! When you feel as if it is out of your control, you are exhibiting the resignation hazardous attitude.

(iv) This is the antiauthority hazardous attitude (the rules and regulations don't apply to me). Go back to the situation and select another alternative.

(v) This is the impulsivity hazardous attitude (do something quickly). Go back to the situation and select another alternative.

(3) *A Good Attitude.* Don't let others do your thinking for you.

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.

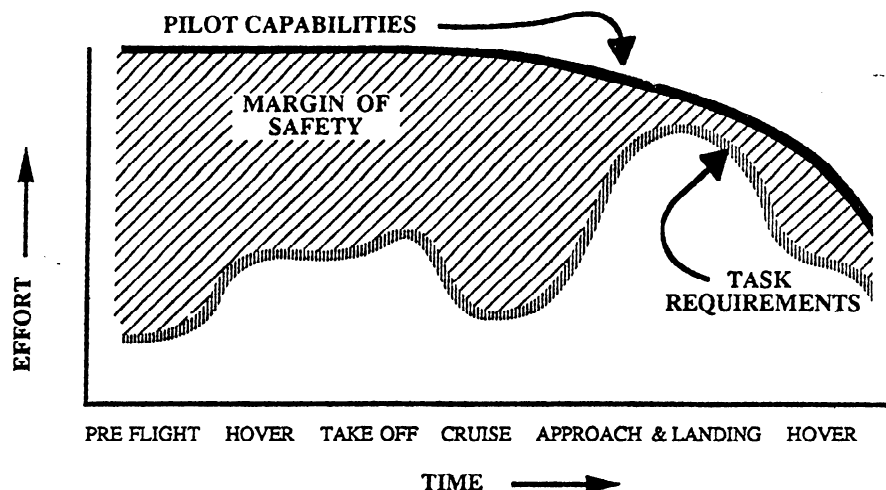


FIGURE 5. THE MARGIN OF SAFETY

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?

CHAPTER 5. RISK MANAGEMENT

22. ASSESSING RISK. Risk management is the responsibility of everyone involved in aviation. The flight operations manager, for example, who is faced with the decision as to just how hard to push a pilot to go, becomes a party to the risk management process. It is understandable from an economic point of view that the mail, checks, boss, passenger, whatever, must get through. This question "Is the success of the task worth the risk?" must always be kept in mind during decision making. Risk management in ADM is discussed in detail in DOT/FAA/PM-86/43, Aeronautical Decision Making for Instrument Pilots.

23. THE DECIDE MODEL.

a. *A good tool* to use in making good aeronautical decisions is the Decide Model (figure 6).

The Decide Model, comprised of a six step process, is intended to provide the pilot with a logical way of approaching decision making. The Decide Model is described in greater detail in DOT/FAA/PM-86/43, Aeronautical Decision Making for Instrument Pilots.

b. *The six elements* of the Decide Model represent a continuous loop decision process which can be used to assist a pilot in the decision making process when he/she is faced with a change in a situation that requires a judgment. This Decide Model is primarily focused on the intellectual component, but can have an impact on the motivational component of judgment as well. If a pilot practices the Decide Model in all decision making, its use can become very natural and could result in better decisions being made under all types of situations.

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1. **Detect.** The decision maker detects the fact that change has occurred.
 2. **Estimate.** The decision maker estimates the need to counter or react to the change.
 3. **Choose.** The decision maker chooses a desirable outcome (in terms of success) for the flight.
 4. **Identify.** The decision maker identifies actions which could successfully control the change.
 5. **Do.** The decision maker takes the necessary action.
 6. **Evaluate.** The decision maker evaluates the effect(s) of his action countering the change.

FIGURE 6. The DECIDE MODEL

CHAPTER 6. IDENTIFYING THE ENEMY

24. GENERAL.

a. *Most preventable accidents* have one common factor: human error, rather than a mechanical malfunction. Pilots who are involved in accidents generally know what went wrong. Very often, the pilot was aware of the possible hazards when the decision the pilot made led to the wrong course of action. In the interest of expediency, cost savings, self-gratification, or other often irrelevant factors, the incorrect course of action was chosen. This cycle of decisions began at the flight planning desk with decisions made on how much fuel to carry, the route, the alternate route, and adequate weather conditions. This cycle continues throughout the flight with decisions made on speed, altitude, and when to descend. Each flight is a sequence of choices with certain milestones in the sequence that require particular determination and discretion.

b. *Flying is rapidly changing* from a physical to a mental task. Initial instruction to manipulate and control an aircraft requires approximately 1 to 2 years. However, training to command an aircraft intelligently involves a decade or two of experience and periodic recurrent training. ADM is designed to reduce the extremely long and sometimes painful process of learning how to make good judgment decisions based upon experience alone. While it is true that simple errors of equipment operation are seldom serious, mistakes in judgment can be fatal.

25. **PERSONAL CHECKLIST.** One essential decision point before a flight is the checklist of basic principles that cannot be compromised. This personal checklist should include the fundamental tenets applicable to every flight. Once a pilot decides what not to do, the decision on what needs to be done becomes clear. Consider the following **never's** as factors that contribute significantly to unsafe flight:

a. *Flight while under* the influence of alcohol or drugs, including applicable prescription drugs, is a **never**. Several drinks of an alcoholic beverage will influence thought and reaction for

approximately 24 hours, while heavy drinking will have lingering effects for up to 36 hours or longer. Effects from the use of marijuana remain in the system for at least a week. The concept should be obvious that flight safety is measurably compromised within those time periods. The side effects and duration of all prescription drugs are well documented and available from a local pharmacist, the family physician, a drug addiction agency, or the Surgeon General.

b. *Flight with a known* medical deficiency is never expedient or legal (FAR § 61.53).

c. *Flight outside* the certified flight envelope is never safe. Weight, balance, speed, maneuvers, G-loading, and flight in known icing should be limited to flight manual parameters. Beyond that, you are in the wilderness and all discoveries could be unhappy experiences.

d. *Flight with less* than the required minimum fuel is never reasonable. The applicable FAR's are sufficiently liberal. Twenty or 30 minutes fuel in VFR conditions (depending on aircraft category) and acceptable IFR reserves should be adequate to provide for contingencies.

e. *VFR flight* into instrument meteorological conditions is never justified.

f. *Descent below* the applicable minimum enroute altitude anywhere is never justified.

g. *Casual neglect* of any applicable checklist is never justified. A checklist may be larger or smaller; however, certain standards should be established for all flights so that the first decision point is whether or not to begin the flight. This can be the toughest decision.

h. *Aircraft accident statistics* show that pilots should be conducting preflight checklists on themselves as well as their aircraft. Pilot impairment contributes to many more accidents than failures of aircraft systems. The following version of the "I'M SAFE" personal checklist (figure 7) contains all of the most common categories of pilot

impairment and can easily be committed to memory.

smoking, speeding, overeating, etc.), the pilot is, nonetheless, driven by his or her own emotions.

26. HOW TO BE A SAFE PILOT.

a. *A pilot does not have* to be a genius to be a safe pilot. However, a pilot should be an emo-

d. *Existing rules would go* a long way to remedy the accident rate; however, personality traits that cause irrational behavior also make pilots prone to disregard the rules that would assure safe operations.

1. Illness.	Do I have any symptoms?
2. Medication.	Have I been taking prescription or over-the-counter drugs?
3. Stress.	Am I under psychological pressure from the job? Do I have money, health, or family problems?
4. Alcohol.	Have I been drinking within 8 hours? Within 24 hours?
5. Fatigue.	Am I tired and not adequately rested?
6. Eating.	Have I eaten enough of the proper foods to keep adequately nourished during the entire flight?

FIGURE 7. The "I'M SAFE" Checklist

tionally stable person who can accept the fact that he/she is not in possession of all facts or skills for all situations and be willing to accept the recommendations of those who specialize in evaluating, assessing, and administering aviation procedures.

b. *Reaching a consensus* on all matters within the aviation community can prove difficult, if not impossible. Even though the rules and procedures are designed to serve most of the people most of the time, a pilot can always argue for different ways of doing things. An experienced, mature pilot will accept and follow the rules and procedures which will benefit the aviation community. The immature, emotionally unbalanced pilot has strong tendencies to satisfy a personal need regardless of the consequences.

c. *Some pilots break rules* simply for the immediate gratification of some emotional need. Even though the pilot may know that this emotional need is not considered a healthy habit (e.g.,

e. *When a pilot exhibits* one or more of the five hazardous attitudes or irrational behavior, that pilot may also be exposing any emotional weaknesses in his/her personality.

27. DEVELOPMENT OF GOOD DECISION MAKING SKILLS.

a. *The development of* good decision making skills is far more difficult than developing good flying skills, but it can be done. Good judgment may mean not flying while under the influence of any medication, when it is too windy, or refusing a revenue flight when it would require flying in marginal weather.

b. *Many pilots fail* to make proper decisions; sometimes due to a lack of knowledge, but too often the result of a human tendency to rationalize a situation until it appears justifiable. When a pilot really wants to do something (such as loading that one last passenger when close to maximum gross

weight, or performing a high speed, low altitude pass), the pilot can generally make himself/herself believe that it was all right to do it. A pilot can be his/her own worst enemy.

c. *In addition to* the FAR, AC's, articles in magazines, books written by expert pilots and instructors, Pilot Proficiency Programs, Airman's Information Manual, NOTAM's, Airworthiness Directives, and Biennial Flight Reviews, there are some do's and do not's that can ensure the prevention of most accidents. All of this information is safety-oriented. Not following this safety-oriented information is similar to not following the advice of a doctor or lawyer.

d. *The most important decision* a pilot will make is to learn and adhere to published rules, procedures, and recommendations. Pilots, by learning and adhering to these published rules and procedures, can take most hazards out of flying.

When a pilot operates an aircraft, human lives are held in the balance. Therefore, a pilot has a moral responsibility to operate in the safest possible manner.

e. *Aviation has reached a new plateau.* Acquiring aeronautical knowledge, airmanship skills, and proficiency are relatively easy. Navigation has been reduced to calculator simplicity. Modern autopilots and electronic displays have significantly reduced a pilot's workload. Today's technology requires administrative management and aeronautical decision making skills as prerequisites for safety and efficiency.

28. SUCCESSFUL DECISION MAKING.

Successful decision making is measured by a pilot's consistent ability to keep himself/herself, any passengers, and the aircraft in good condition regardless of the conditions of any given flight.

CHAPTER 7. TEACHING ADM

29. PURPOSE. The ADM manual for Instructor Pilots (DOT/FAA/PM-86/44) contains all of the necessary background material to teach effectively the subject material of the companion publication entitled "Aeronautical Decision Making for Student and Private Pilots" (DOT/FAA/PM-86/41). This chapter provides a brief introduction and overview on the process of teaching ADM.

30. BACKGROUND. The instructor's ADM training manual is a result of 10 years of research, development, testing, and evaluation of the effectiveness of judgment and decision making. It is a revision of the prototype publication "Judgment Training Manual for Instructor Pilots," which was developed jointly by the Federal Aviation Administration, General Aviation Manufacturers Association, and Transport Canada in an effort to improve general aviation safety.

31. THE FLIGHT INSTRUCTOR'S ROLE IN ADM TRAINING.

a. *Although the information* in this chapter is designed to help pilots overcome a variety of circumstances which may result in poor pilot judgment, the flight instructor is the key element of this program. The flight instructor's attitude and approach to flying may often influence students more than any specific lesson. By always setting a good example and by giving students support and encouragement throughout this program, a flight instructor helps students develop good judgment and sound flying practices.

b. *To help prepare for this role*, thought should be given to the differences between the instructor as an evaluator and the instructor as coach. The evaluator sees his/her role as one of telling the student what to do, then monitoring the student's performance. In contrast, think of the instructor in a slightly different perspective; someone who actively stimulates learning, such as a "coach." The instructor not only makes assignments and observes the results, he/she also helps the student learn through demonstration and personalized instruction.

32. PRINCIPLES OF ADM TRAINING.

a. *The ADM manual* for student and private pilots is simple and repetitive for two reasons:

(1) The simplicity provides frequent positive reinforcement; and

(2) The repetition builds good judgment habits and refreshes memory so that information can be readily recalled in a variety of circumstances, even when under stress.

b. *The scenarios* in the student and private pilot ADM manual should stimulate the student's interest and appreciation of the need for good pilot judgment and ADM.

c. *The instructor* has a profound effect on a student as a role model and as an opinion shaper.

(1) Use of the ADM concepts to guide conversations with the student focuses the instruction on judgment-related training and increases the student's ability to provide self-generated feedback.

(2) Knowing how to recognize and respond to hazardous attitudes and high stress is very important to exercising good pilot judgment. The instructor should encourage the student to develop these skills but, in doing so, should never attempt to analyze or modify the student's personality.

(3) The student learns concepts and behavioral techniques and repeatedly applies this learning to relevant flight situations during ground and flight training.

d. *The basic instructional principles* which follow are simple, but application does take some practice. When you first try to apply them you may feel somewhat awkward, but you will become more comfortable with them eventually. After a few months, the use of these principles will become automatic.

(1) Behavior positively reinforced will continue.

(2) Behavior followed by punishment may decrease.

(3) Be very specific about learning objectives.

(4) Reinforce generously in the early stages of learning.

(5) Shift slowly from continuous to occasional reinforcement.

(6) Shape existing behavior into desired behavior.

33. TEACHING THE BEHAVIORAL ASPECTS OF ADM.

a. *General.* Students must be exposed to this material early in their pilot training, ideally during the first quarter of the student standard private pilot training course.

b. *Description of Material in the Student and Private Manual (DOT/FAA/PM-86/41).* Three approaches are presented in this manual to improve the pilot's judgment and decision making skills. The first approach presents an analytical method for making decisions and evaluating risk (Chapters 2 and 3). The second approach (Chapters 4, 5 and 6) addresses the pilot's hazardous attitudes and substitutes ones which promote good judgment. The third approach (Chapter 7) deals with overcoming high stress which reduces judgment and decision making abilities.

34. TEACHING THE APPLICATION EXERCISES.

a. *General.* The following material, contained in Chapter 8 of DOT/FAA/PM-86/41, Aeronautical Decision Making for Student and Private Pilots, should be integrated, where appropriate, into the topics of the conventional ground training syllabus.

(1) "Preflight and Aircraft Systems" after aircraft and aircraft systems.

(2) "Weight/Balance and Performance" after performance and weight and balance.

(3) "Official Procedures and Communications" after airports and communications, aviation regulations, and the Airman's Information Manual in Canada - the AIP.

(4) "Cross-Country Flying" after basic navigation and radio navigation.

(5) "Physiological Factors and Night Flying" after medical factors and cross-country flying.

b. *Description of Material.* Each section of Chapter 8 of the Aeronautical Decision Making for Student and Private Pilots document presents exercises which test the student's judgment and decision making knowledge in the previously mentioned topic areas. These exercises require the student to use the terms and concepts learned in all previous lessons. Encourage the students to review earlier material as necessary. After the student has completed each section, discuss the answers. No answer key is provided, but bear in mind that, although responses to most of the questions may be relatively obvious, there are no absolutely right or wrong answers.

35. IN-FLIGHT INSTRUCTION: THE LESSON PLANS.

a. *General.* How does a flight instructor combine educational principles with the concepts in this manual to improve a student's judgment and decision making? By giving the student a series of practical, "hands-on" lessons in which you observe performance and response to specific behavior. Do not comment on intentions or motivations. Use rewards (praise) frequently and avoid criticism (punishment) as much as possible. Errors or misjudgments by the student should be viewed as opportunities for learning, not as occasions for criticism.

b. *The Lessons.*

(1) In this unit, while on routine training flights, you will give your students "activities" designed to further develop their appreciation for the decision making concepts based upon an actual preflight or in-flight "hands-on" experience.

(2) Take 15 minutes or so for your own preparation the first few times you work with each lesson.

(3) Start the lessons when the student has the ability to control the aircraft confidently during the most basic maneuvers. Use your own judgment, but a suggested starting point is about three flight lessons before you expect the student to solo.

(4) At least three lessons each are needed to teach risk assessment in decision making, hazardous attitude recognition, and stress management, for a total of nine lessons. Each lesson should take no more than 5 minutes and should be integrated into the normal 1-to-2 hour flight training period.

(5) The instructor's ADM manual provides 18 lesson plans for in-flight teaching of these mental processes.

36. IN-FLIGHT INSTRUCTION: THE TRAINING SCENARIO.

a. *Purpose.* The purpose of this chapter of the instructor's manual is to further encourage the student to use judgment and decision making skills. Your duties are two-fold; (1) you must set up situations to stimulate the student's decision making process, and (2) you must respond to student behavior in a manner that encourages safe judgments and decisions.

b. *The Scenarios.* Practice situations, provided in this section of the manual, create circumstances that may actually encourage the

student to make an unsafe judgment or decision. Why? Because it is important for the student to become skilled at recognizing and replacing hazardous attitudes and unsafe tendencies with good judgment behavior.

37. TYPICAL TRAINING SCENARIOS. This section of the instructor's manual provides a narrative of a typical judgment training session. You might find it useful in formulating your own ideas for conducting your own judgment training flights. As mentioned earlier, all necessary preparation should be completed before the student's expected arrival time.

38. MANAGEMENT OF ADM TRAINING.

a. *This training program* is more than just a collection of related facts and ideas for students to learn. It is a carefully designed educational system. Using this integrated system produces an overall result greater than that attainable by random presentation of the individual parts. To achieve the maximum benefits of this system, you must manage the instruction carefully.

b. *The materials presented* in this chapter of the instructor's manual are listed below. They are designed to aid both the individual instructor and the training supervisor for a group of flight instructors; i.e., the chief pilot engaged in decision making training activities. The aeronautical decision making training materials are:

(1) *Schedule of Student Work.* A master plan for scheduling training activities for students.

(2) *Set of Master Copies.* Original documents of all the instructional materials and forms required to teach this training curriculum.

(3) *Answer Keys for the Postcheck Exercises.*

APPENDIX 1. SAMPLE ATTITUDE INVENTORY ANSWER SHEET**Situation 1**

- a. ____
- b. ____
- c. ____
- d. ____
- e. ____

Situation 6

- a. ____
- b. ____
- c. ____
- d. ____
- e. ____

Situation 2

- a. ____
- b. ____
- c. ____
- d. ____
- e. ____

Situation 7

- a. ____
- b. ____
- c. ____
- d. ____
- e. ____

Situation 3

- a. ____
- b. ____
- c. ____
- d. ____
- e. ____

Situation 8

- a. ____
- b. ____
- c. ____
- d. ____
- e. ____

Situation 4

- a. ____
- b. ____
- c. ____
- d. ____
- e. ____

Situation 9

- a. ____
- b. ____
- c. ____
- d. ____
- e. ____

Situation 5

- a. ____
- b. ____
- c. ____
- d. ____
- e. ____

Situation 10

- a. ____
- b. ____
- c. ____
- d. ____
- e. ____

APPENDIX 2. SCORING FORM

SITUATION	SCALE I	SCALE II	SCALE III	SCALE IV	SCALE V	Total
1.	b____	e____	c____	a____	d____	15
2.	a____	d____	b____	e____	c____	15
3.	e____	c____	a____	d____	b____	15
4.	d____	e____	b____	c____	a____	15
5.	c____	a____	d____	b____	e____	15
6.	c____	a____	d____	b____	e____	15
Items 1-6 Subtotal	____	____	____	____	____	<u>90</u>
7.	d____	c____	b____	a____	e____	15
8.	e____	a____	b____	c____	d____	15
9.	b____	e____	c____	a____	d____	15
10.	e____	d____	c____	a____	b____	15
Items 7-10 Subtotal	____	____	____	____	____	<u>60</u>
Items 1-10 Grand Total	____	____	____	____	____	<u>150</u>

APPENDIX 3. ATTITUDE PROFILE

SCALE I	SCALE II	SCALE III	SCALE IV	SCALE V
_____ 50	_____ 50	_____ 50	_____ 50	_____ 50 ← Mark X's below this line if you answered all ten situations
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____ 40	_____ 40	_____ 40	_____ 40	_____ 40
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____ 30	_____ 30	_____ 30	_____ 30	_____ 30 ← Mark X's below this line if you only answered situations one thru six
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____ 20	_____ 20	_____ 20	_____ 20	_____ 20 ← Mark X's below this line if you only answered situation seven thru ten
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____ 10	_____ 10	_____ 10	_____ 10	_____ 10
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
Antiauthority	Impulsivity	Invulnerability	Macho	Resignation

APPENDIX 4. ANTIDOTE RECALL EXERCISE

HAZARDOUS THOUGHT	ANTIDOTE
ANTIAUTHORITY:	
IMPULSIVITY:	
INVULNERABILITY:	
MACHO:	
RESIGNATION:	

APPENDIX 5. LIFE EVENTS STRESS TEST

<u>Item No.</u>	<u>Happened (X)</u>	<u>Life Event</u>
1.	_____	Death of a spouse
2.	_____	Divorce
3.	_____	Marital Separation
4.	_____	Jail term
5.	_____	Death of close family member
6.	_____	Personal injury
7.	_____	Marriage
8.	_____	Lost your job
9.	_____	Marital reconciliation
10.	_____	Retirement
11.	_____	Change in health of family member
12.	_____	Pregnancy
13.	_____	Sex difficulties
14.	_____	Gain of new family member
15.	_____	Business - budgets, schedules, deadlines
16.	_____	Change in financial state
17.	_____	Family member on drugs or alcohol
18.	_____	Death of close friend
19.	_____	Change to different line of work
20.	_____	Change in number of arguments with spouse or partner
21.	_____	Mortgage or loan over \$10,000
22.	_____	Foreclosure of mortgage or loan
23.	_____	Change in responsibilities at work
24.	_____	Son or daughter leaving home
25.	_____	Trouble with in-laws or partner's family
26.	_____	Outstanding personal achievement
27.	_____	Spouse or partner begins or stops work
28.	_____	You begin or end work
29.	_____	Change in living conditions
30.	_____	Revision of personal habits
31.	_____	Trouble with boss or instructor
32.	_____	Change in work hours or conditions
33.	_____	Change in residence
34.	_____	Change in school or teaching institution
35.	_____	Change in recreational activities
36.	_____	Change in church activities
37.	_____	Change in social activities
38.	_____	Mortgage or loan less than \$10,000
39.	_____	Change in sleeping habits
40.	_____	Change in number of family social events
41.	_____	Change in eating habits
42.	_____	Vacation
43.	_____	Christmas
44.	_____	Minor violations of the law

Total number of checks for the past 12 months _____.

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**Federal Aviation
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