A101 SAFETY/ADM/ORM/CRM

References: Air Force Regulations
Federal Aviation Regulations
FAA-H-8083-25A, Pilot's Handbook of Aeronautical Knowledge, Chapter 17 (pgs 17-1 to 17-6)
IFS Local Flying Procedures, Chapter 1

INTRODUCTION
Aircraft are properly maintained in order for flights to be completed successfully with little risk. It is the aviator that most often forces the aircraft into an accident due to his/her attitudes and judgment. It is critically important, therefore, that the aviator understand that the crucial part of the flight process is their role as the decision-maker. The flight process begins with preflight planning and continues through to the post-flight debriefing. The aviator must make numerous decisions throughout this time and the best decisions are made with the best information. This information comes from many different sources.

The objectives of this unit are to increase knowledge of the various elements of flight safety to include ADM, ORM, and CRM. Aeronautical Decision-Making (ADM) is a systematic approach to risk assessment and stress management. Operational Risk Management (ORM) assesses the risks involved in the mission and how they can be mitigated. Cockpit Resource Management (CRM) utilizes team management concepts in the flight deck environment.

OBJECTIVES
- ADM - Mitigate the risk factors associated with flight
- ORM - Assess the degree of risk
- CRM - Effective use of all available resources to improve decision-making

STANDARDS
- ADM - Perform safe flight with acceptable risk levels
- ORM - Accurately perform risk assessments
- CRM - Utilize the available resources

AERONAUTICAL DECISION-MAKING (ADM)
ADM is a systematic approach to the mental process used by pilots to consistently determine the best course of action in response to a given set of circumstances.

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.
6. Evaluating the effectiveness of one's ADM skills.

Hazards are a real or perceived condition, event, or circumstance that a pilot encounters. Risk is an assessment of the single or cumulative hazards facing a pilot. Once the pilot identifies the hazard and assesses the risk, he/she utilizes ADM to decide the course of action to take.

Every pilot may possess one or more of the five hazardous attitudes when faced with a hazard.

Anti-Authority: "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.

Impulsivity: "Do it quickly." This 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.

Invulnerability: "It won't happen to me." Many people falsely believe that accidents happen to others, but never to them. They know accidents can happen, and they know that anyone can be affected. However, 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.

Macho: "I can do it." Pilots who are always trying to prove that they are better than anyone else think, "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.

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 it is 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."

Hazardous Attitude	Antidote
Anti-authority: Don't tell me.	Follow the rules. They are usually right.
Impulsivity: Do something quicky.	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.

Once a pilot identifies the hazardous attitude, he/she must apply the antidote in order to correctly handle the situation.

The pilot's attitude affects the quality of their decision.

OPERATIONAL RISK MANAGEMENT (ORM)

Every sortie has a certain amount of risk associated with it. This is true of every type of operation and not just aviation. There are many factors that affect the risk. It is very important that every sortie is evaluated for the risks involved and measures taken to mitigate as much risk as possible. Training in itself is a risky business, but training must be conducted. So, it will be conducted at the lowest amount of risk possible.

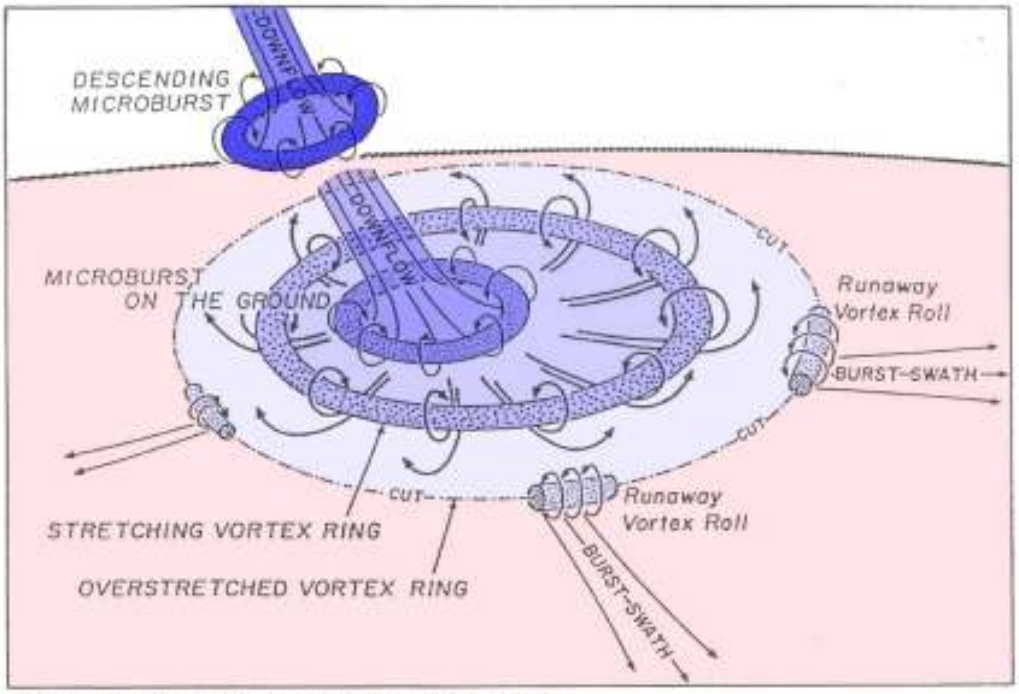
At IFS, ORM is conducted for every sortie by using the ORM Assessment Guide. This guide is broken down into separate areas in order to carefully determine the risk factors involved.

The first area is **Weather/Environment**. The separate factors include the wind, visibility, clouds, turbulence, temperatures and virga. As expected, whenever the conditions deteriorate, the risk increases.

Virga needs some explanation. Virga is defined as wisps or streaks of water or ice particles falling out of a cloud but evaporating before reaching the earth's surface as precipitation. After the falling water evaporates, the downdraft continues to the surface. Blowing dust and dust rings at the surface are indications of the downdraft's contact with the surface. This is actually a microburst.

A microburst is a localized, intense downdraft. It is caused by friction between the air and the heavy rain pulling the air with it. The evaporation of the rain cools the air and makes it heavier. Microbursts can cause a lot of damage, blowing down trees, structure damage and airline crashes.

Microburst: A small downburst with its outburst, damaging winds extending only 4 km (2.5 miles) or less with maximum wind speeds of up to 75 m/s (168 mph) (Fujita 1985). Duration is typically less than 15 minutes. Downward velocity can exceed 6000 ft/min.



The microburst can easily exceed the performance capability of the aircraft and force the aircraft into the ground.

A pilot flying into a microburst must anticipate sudden and strong changes in wind direction and speed.

(a) A headwind is encountered that lifts the plane.
(b) This is followed by a strong downdraft.
(c) When leaving the storm a tailwind causes a loss of altitude.

The **Mission** section of the ORM deals with the currency and training status of the SP and IP for the sortie.

The last section is **Human Factors**. It is very important that you are physically and mentally prepared for the sortie. The amount of sleep and the condition of your mind and body are evaluated.

Once points have been assigned in each area of the guide, tally the points in each section and get a total for the assessment. Refer to the bottom of the page for the approving authority. Consider ways of mitigating the risks.

ORM ASSESSMENT GUIDE

WEATHER/ENVIRONMENT

*** Consider current *and* forecasted conditions.**

		Risk
Crosswind	>15 kts	2
	>10 kts	1
Wind Shear		2
Visibility	<5 SM	1
Ceiling	<2000 Ft	2
	<4000 Ft	1
Wind Gusts	>30 kts	2
	>20 kts	1

		Risk
Turbulence	>Light	1
CBs in the vicinity		2
Surface OAT	>30° C	2
	>25° C	1
	<10° C	1
	<0° C	2
Temp/Dew Spread	>30° C	2
	>22° C	1
Virga		1

Subtotal:

MISSION

		Risk
AC in Pattern	>6	2
	>4	1
Last Flight (Student)	>30 days	3
	>15 days	2
	>7 days	1
Last Flight (IP)	>30 days	3
	>15 days	2
	>7 days	1
Student's 1st Lesson		1

		Risk
Showtime	< 0700	1
Duty Day	> 10 hrs	2
	> 8 hrs	1
IP 4th sortie today		2
IP 3rd sortie today		1
Solo 1st sortie today		1
Solo 2nd sortie today		2
VNAV		1

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Subtotal:

HUMAN FACTORS

	Risk
IP sleep (0 = fully rested)	0 - 4
IP mind/body (0 = no personal factors)	0 - 4

	Risk
Student sleep (0 = fully rested)	0 - 4
Student mind/body (0 = no personal factors)	0 - 4

Subtotal:

Total Risk Factor	0-12	13-20
Approval Authority	IP	SOF

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The ORM six-step process is a continuous cycle and only works if all six steps are followed in sequence as each is a building block for the next step.

SPECIAL INTEREST ITEMS (SII)
SII are safety topics that need added emphasis for a period of time. These change as necessary. These are briefed by the IP during the Mission Briefing. By following these items, the safety of every sortie is increased and the risk reduced.

RUNWAY SAFETY
"The airport surface environment is a complex and dynamic place, the dimensions of which are bounded, not only by the physical pavement and its attendant marking, lighting and signage, but also by the capabilities of the many people who must carry out their separate roles on its surface and the equipment and procedures they use to coordinate their actions."
-National Blueprint for Runway Safety

RUNWAY INCURSION AVOIDANCE
Runway safety is one of the FAA's highest priorities – specifically the problem of runway incursions. A runway incursion is defined as: Any occurrence at an airport involving an aircraft, vehicle, or person on the ground that creates a collision hazard or results in a loss of separation with an aircraft taking off, intending to take off, landing, or intending to land.

Though relatively few in number when compared to the massive amount of traffic that moves safely through our nation's airports every day, runway incursions present a special problem. Not only do they have the potential to put more lives at risk due to the number and proximity of aircraft operating on the airport surface, they also take place in a complex and dynamic environment where root causes are difficult to isolate.

At the simplest level, incursions occur because people make mistakes. Humans are superbly skilled at making decisions under a wide range of circumstances but, for a variety of reasons, they are also fallible. It is not just a pilot, controller, or vehicle operator problem, it is a problem that all of us in the aviation community share.

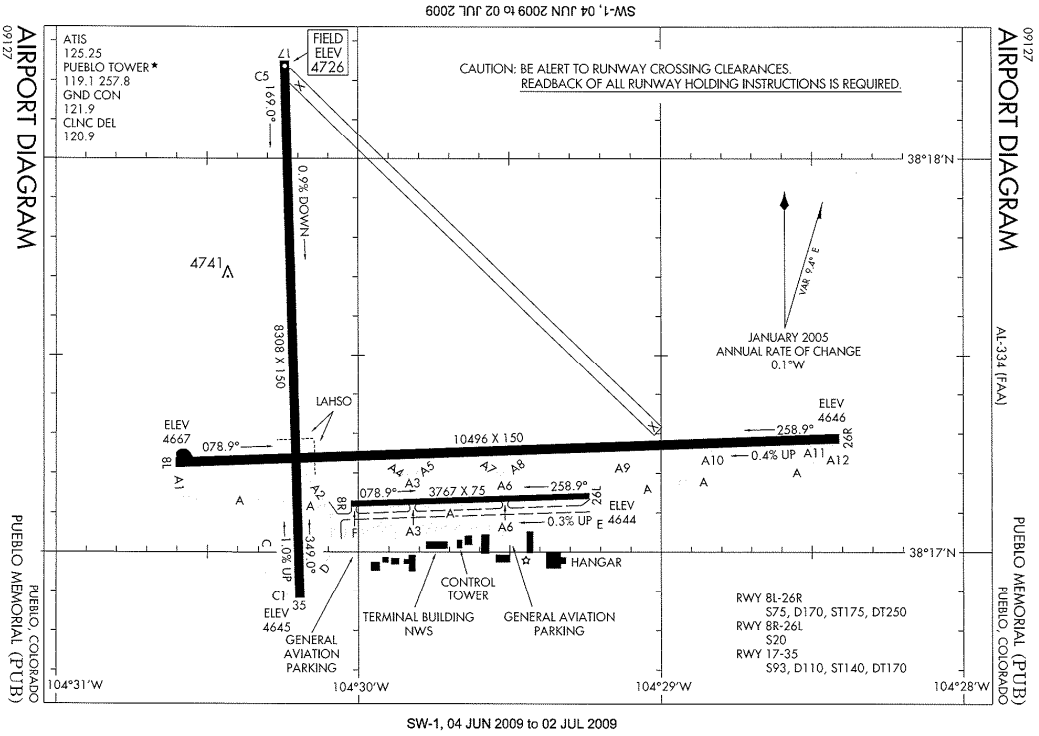
You are required to read-back all hold-short instructions, takeoff and landing clearances while at IFS. You would be well advised to do so for the rest of your piloting career. When in doubt as to your location or clearance, ASK!

Here are a few ways of preventing runway incursions.
Have a current airport diagram and use it!
Review diagram prior to taxi.
Review diagram after receiving taxi clearance.
READ BACK ALL HOLD SHORT INSTRUCTIONS!!!
If there ever is a question, *STOP and ASK!*

Airports Diagrams are readily available at www.naco.faa.gov

Problems arise when pilots do not consider "Taxiing" a critical phase of flight and thus fail to give it the time and attention it demands. It is usually thought of as the "calm before the storm," or at the opposite end of the flight, the spool-down reflection period. But, in reality, it is one of the highest risk phases of flight!

RUNWAY INCURSIONS DO NOT DISCRIMINATE –
They can happen at any airport at any time to anybody!



CREW RESOURCE MANAGEMENT (CRM)
Definition- The effective use of all available resources—people, weapon systems, facilities, equipment and environment—by individuals or crews to safely and efficiently accomplish an assigned mission or task. CRM is a tremendously important tool to use in safely completing a flight.

There are many influences that can lead to crew error. Among them are ATC, weather, maintenance, distractions, unfamiliar airport, time pressures, system malfunctions, diversions, call signs, etc. Either alone or in combination, these influences can be disastrous.

There are core CRM components that help us maintain good CRM:

- Situational Awareness (SA)
- Crew Coordination/Flight Integrity (Leadership and Assertiveness)
- Communication
- Risk Management/Decision Making

- Task Management (Adaptability/Flexibility)
- Mission Planning/Debrief (Mission Analysis)

SITUATIONAL AWARENESS (SA)
Situational Awareness (SA) is the primary focus of CRM training. The loss of SA is the number one cause reported on all human performance related mishaps.

USAF/XO defines SA as "a continuous perception of self and aircraft (traffic) to the dynamic environment of flight, threats, and mission, and the ability to forecast and then execute tasks based on that perception."

It is the accurate perception of current operations, controllers, other aircraft, and the surrounding world, both now and in the near future. Referring to the phrase "the big picture" best describes Situational Awareness. When perception matches reality, a person is situationally aware.

Some of the clues that show that you have lost SA are:
- Feeling of being "behind the aircraft"
- Poor performance on basic maneuvers
- Missed tasks and checklist steps
- Switch errors
- Erratic aircraft control
- Missed radio calls
- Misprioritization of tasks

To recover from a loss of SA:
- Reprioritize Tasks
  - Terrain Clearance Tasks (TCT)
  - Mission Critical Tasks (MCT)
  - Non-critical Tasks (NCT)
- Talk to other flight members/agencies to help build SA or communicate concerns
- Call knock-it-off, regroup, rebrief (if necessary), try again
- Decide whether to continue mission or terminate - "knock it off"

VISUAL SCANNING (CLEARING)
Maintaining safety of flight is your number one priority. As you progress in flying, your eyes will become trained to pick out other air traffic. You should spend approximately 80% of your piloting time looking for other aircraft. This technique, called "scanning" (clearing) involves dividing your viewing into segmented areas of about 10º each. If something does catch your attention, you should identify the object before moving on to the next segment. Be sure to include the entire visual area in your scan since conflicting traffic can come from any direction. Blind spots caused by the design of the airplane can block your field of vision.

These blind spots will vary from one airplane to another, depending on the location of the windshield and cockpit. In the DA20-C1, the fuselage blocks your view under the airplane as well as some of the area above and behind. The wings further restrict the view downward. When you make a turn in a low wing airplane, the view in the direction away from the turn is blocked.

Therefore, before making a turn in either a high or low wing airplane, you must always scan the entire area for possible traffic. This is especially true when you are near an airport.

Clearing turns involve at least a 180º change in direction. This is the first thing you do when you enter a training area at IFS. The most common way to clear an area is to make two turns in opposite directions, with each turn being 90º of heading change. You are looking outside, so how do you know you went 90 degrees? Look for a landmark directly left or right of your position, and turn to that point.

If you do spot another aircraft, its relative position will help you to determine if it presents a potential hazard to you. If the other airplane appears to be at or near the horizon, it is near your altitude. Even if the other traffic is not near the horizon, you should keep the traffic in sight until it has passed by since the other pilot may change altitude.

When an aircraft is on a frontal collision course with you, its position in the windshield will barely move as it approaches. This is called 'Constant bearing/Decreasing Range'. Because the airplane does not appear to be moving, it probably will not catch your eye as easily. For this reason, it is important that you develop and use the proper scanning technique at all times.

Note: Effective clearing at IFS is accomplished in three ways: scanning, standardized radio terminology / monitoring, and proper use of the Traffic Advisory System (TAS).

POSITIVE EXCHANGE OF THE FLIGHT CONTROLS

Positive exchange of the flight controls is an integral part of flight training. It is especially critical during the telling-and-doing technique of flight instruction. Incident/accident statistics indicate a need to place additional emphasis on the exchange of control of an aircraft by pilots. Numerous accidents have occurred due to a lack of communication or misunderstanding as to who actually had control of the aircraft, particularly between students and flight instructors. Establishing the following procedure during the initial training of students will ensure the formation of a habit pattern that should stay with them throughout their flying careers. They will be more likely to relinquish control willingly and promptly when instructed to do so during flight training.

Prior to flight, a briefing should be conducted that includes the procedure for the exchange of flight controls. A positive three-step process in the exchange of flight controls between pilots is a proven procedure and one that is strongly recommended by the FAA, NASA, and the AOPA.

Although CFR 61.47 states that the student will be acting as PIC during a checkride, in some accident cases neither the student nor the IP was sure of who had control of the throttle. A positive transfer of throttle control did not take place, so no one was in command, resulting in accidents. During every flight -- whether it is a personal flight with another pilot or a checkride -- always know who the Pilot in Command (PIC) is before takeoff. While at IFS, the IP will always be the PIC, unless you are solo! On all student sorties, the student is to 'act' as the PIC unless the instructor takes the aircraft or verbally overrides a student decision.

If the IP in any way indicates he/she is taking control of the aircraft, immediately relinquish the control of the aircraft and state that you have done so aloud.