



Airborne Law Enforcement Association
Safety Program
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IIMC TRAINING RECOMMENDATIONS (1.4)

I OVERVIEW

II SYLLABUS

III PERFORMANCE CRITERIA

IV CRM – TFO TRAINING

V INSTRUCTOR CHECKLISTS

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(CTRL + CLICK HEADING TO JUMP TO THAT SECTION)

I Overview

- 1.** The following document is a recommendation for safe and effective training to mitigate the risk of inadvertently entering instrument meteorological conditions (IIMC) in flight. The suggestions included here also cover training and emergency procedures that will help aircrews survive should they fail to avoid an encounter with IIMC. ALEA does not recommend flight training without properly rated and experienced flight instructors. It is also highly recommended that no new training effort take place without preplanning and risk assessment on the ground.

****The final decision on how to conduct any training lies with the Flight Instructor and Pilot in Command for that flight.**

- 2.** The recommendations included here are the result of consultation with numerous safety professionals and flight instructors with the aviation industry.
- 3.** IIMC training is different than planned IFR flight training in that:
 - a) IFR flight allows for pre-planning and set up of avionics and radios
 - b) Planned IFR flight is conducted in IFR certified aircraft

- c) Planned flight into instrument conditions does not carry the surprise or shock that IIMC flight does
 - d) Planned IFR flight is conducted within the IFR/ATC system based on minimum safe altitudes, radio communications, and IFR routing.
 - e) During planned IFR flight, entry into IMC conditions is usually done in a 'wings level' attitude and in a climb. IIMC entry in law enforcement often occurs during low level maneuvering.
 - f) While the 180 degree turn is still taught by some agencies, we need to recognize that no IIMC/CFIT accidents have resulted from a wings-level climb in IMC (outside of mountainous terrain).
- 4.** IIMC training should address the elements above.
 - 5.** **IIMC training should always involve a certified instrument instructor current in the aircraft being used. IIMC training can sometimes lead to vertigo and/or special disorientation. This can cause the pilot to make sudden and incorrect control movements. Depending on how powerful the misleading sensations in the pilot's head are, those control inputs can be forceful. This possibility requires a trained instrument flight instructor to maintain safe flight.**
 - 6.** The most important lesson to emphasize during IIMC training is the importance of anticipating and avoiding such an encounter in the first place. This avoidance effort starts on the ground.
 - 7.** Any procedures to be conducted after flying into IIMC should minimize the pilot's distraction from flying the aircraft and scanning the instruments. This includes minimizing inputting frequencies or setting avionics, retrieving charts or approach plates, and maneuvers that tend to draw the pilot's attention outside of the aircraft (i.e. clearing for turns). Movement of the head will not only shift the eyes from the instruments but increase the chances of vertigo/special disorientation.
 - 8.** A decision not to declare an emergency does not make IIMC any less of an emergency. (It is recommended that the pilot declare an emergency.)
 - 9.** A 180 degree turn is most appropriate before entering IIMC conditions, not after.
 - 10.** The difference between ¼ mile visibility and true 0/0 visibility in IIMC is significant. Wearing a view limiting device or 'foggles' in the daytime in most helicopters allows for continued visual contact with the ground through the chin bubble or lower

portion of the door. This is the rough equivalent of ¼ mile visibility and, unconsciously, significantly augments the pilot's ability to control the aircraft.

11. Every change in rate of climb/descent, bank, power and/or airspeed while flying in an IIMC encounter increases the chances of losing control of the aircraft. Panic driven desire to exit IMC or recover from an unusual attitude can lead to flight profiles that, while normal in VMC flight, are extremely dangerous in IIMC situations.

12. The recommended solutions to this issue are:

- a) Conduct IIMC training **at night**
- b) Perform IIMC training in a simulator.
- c) Use of view limiting devices in the cockpit (i.e. blocking out the canopy or cockpit windows, curtains, etc.). While this is a fine method used by many professional organizations, the safety considerations and procedures needed to perform this type of training are specific to individual aircraft and operations, so it will not be covered here.
- d) Divide IIMC training into the follow three tasks:
 - (i) **IIMC Avoidance**
 - (ii) **IIMC Entry Initial Response**
 - (iii) **IIMC Recovery Procedures** (*only to be conducted after the initial response procedures have been completed and the aircraft is stable*)

IIMC TRAINING RECOMMENDATIONS (1.4)

II Syllabus

1. LESSON BRIEFING

- a) Pre-mission risk assessment form complete
- b) Route of flight
- c) Establishment of 'transfer of control' protocol
- d) Emergency procedure protocol
 - 1. Who will fly the aircraft in an emergency
 - 2. Response to vertigo and spatial disorientation

- (a) Recognition – Confession – Response
- (b) Pilot and Instructor responses to Spatial Disorientation/Vertigo
- 3. What the other pilot will do
- 4. Alternate landing sites
- 5. One pilot eyes-inside, the other pilot responsible for looking outside aircraft for collision avoidance.
- e) Review of avionics, charts, procedures as required

2. LESSON OBJECTIVES

- a) Establish if the flight is a training flight or an evaluation
 - 1. Cover performance criteria for evaluation OR
 - 2. Cover training goals – Performance Based Objectives (start with Rote – aim for Correlation. Include Description, Conditions and Criteria for each goal.)
 - 3. Establish required airspeed and allowed deviation range, maximum rate of climb/descent and maximum bank angle
- b) Suggestions included in **Section III Performance Criteria**

3. PREFLIGHT PREP

- a) Charts and GPS database up to date and accessible. [For IIMC training, emphasize that any data or charts needed for the training scenario should be things normally kept in the aircraft and within reach of the pilot.]
- b) Battery check and backup for NVG's if required
- c) Other equipment (foggles, etc.)

4. LESSON EXERCISES AND MANUVERS

- a) Normal take off and climb to altitude (on NVGs if available)
- b) Preferably at night and within a dimly lit practice area

IIMC Avoidance

- c) Present the pilot with a scenario that they are in deteriorating weather conditions. Continually give the pilot simulated ceilings and/or visibility that are lowering. Monitor if the pilot decides to perform 180 degree turn, land (rotorcraft) or divert to the nearest airport with VMC conditions before entering simulated IIMC conditions.
 - 1. *Instructor's note. Consider using EDPs (Enroute Decision Points) that trigger a decision from the pilot to divert or land. An examples would be: having to lower altitude two times due to changing weather.*
- d) Resume flight towards selected practice area.

IIMC Initial Response Procedures

- e) Once over dark area have pilot look down into lap and turn off goggles (if available). Leave goggles in down position to limit view outside of windshield or put on view limiting device.
- f) Put aircraft into unusual attitude and return controls to pilot. Instruct pilot to return to wings-level flight and a slight climb (500fpm). Repeat at least three times.
 - 1. Suggestions for instructors:
 - (a) Vary how you begin the procedure. One time, announce the start of the procedure with no warning and quickly return the controls to the pilot after establishing a usual attitude (*while still maintaining positive transfer of controls*). This will help simulate a sudden onset of IIMC and hopefully the discomfort that it brings.
 - (b) Also try having the pilot close their eyes and look down for several minutes. Make slow, easy control input changes back and forth until finally putting the aircraft in an unusual attitude. This will hopefully more closely simulate the sensation of a loss of situational awareness that must be dealt with by the pilot, which again more accurately simulates IIMC.
 - (c) Optional: on one of the three attempts, have the pilot begin a 180 degree turn from the usual attitude to address the challenges in the maneuver. CFII must maintain close monitoring of pilot control inputs.
 - (d) Optional: Initiate the maneuver from a normal law enforcement orbit
- g) On the final evolution have the pilot initiate the agency's IIMC response procedure:

1. Zero degrees roll and 500 fpm climb or 5 degrees nose up (away from terrain if applicable)
2. Airspeed +/- 5 knots of the predetermined IMC flight speed for your aircraft.
3. Verbal notification to crew that they are in IIMC
4. Verbal verification of location, altitude and heading

IIMC Recovery Procedure

h) Communication (actual or simulated) with air traffic control

1. Declare an emergency (highly recommended that this is put into policy and training)
2. Ask ATC for frequencies and/or headings. This depends on the local area, ATC capabilities and the instructor's discretion. (To evaluate the dependence on ATC for help in IIMC, review the Maryland State Police accident in 2008)
3. Pilot directs the Instructor acting as APPROPRIATELY TRAINED TFO (or second pilot) to enter the required frequencies, headings and/ or selected instrument approach into avionics system unaided*
4. If options 2 and 3 are not available to the pilot, enter the approach into the avionics system unaided. *It is recommended that this is a last resort when dealing with an IIMC encounter.*
5. Begin navigation back to entry point for instrument approach or VMC conditions using instrument, not visual, navigation and flight.

i) Brief approach:

- This briefing again must minimize pilot distraction from instrument scanning and flying the aircraft. It will be more abbreviated than a normal IFR briefing. Developing an acronym is suggested. It is also highly recommended that the flight crew (i.e. TFO) be trained on how to do this for the pilot so the pilot can focus on flying – see section IV CRM – TFO Training
- Information does not need to come from a chart, it may be obtained from ATC in order to avoid diverting attention to locating or reading a chart. Suggested items to consider:

1. Type and location of approach
 2. Radio frequencies
 3. Navaid frequencies
 4. Approach course heading
 5. GPS signal status (terminal, approach, RAIM, etc.)
 6. Altitudes (initial, intercept, minimums, etc)
 7. Missed approach procedure
 8. Landing configuration (flaps, lights, gear, etc.)
- j) Perform at least two different types of approaches in the manner described above.
- k) Optional: Practice an ASR or other similar ATC assisted approach.
NOTE: only practice this if the controllers in your area are **trained** to do such an approach and are **willing** to do so in an actual IIMC emergency. Reliance on such approaches has contributed to fatal accidents in the past when the controllers were not able to conduct the procedure.

IIMC TRAINING RECOMMENDATIONS (1.4)

III Performance Criteria

1. Training flights and proficiency checks can follow the same outline as listed above. However, these should be separate flights, or at minimum separate phases of the flight. Pilots should know when it is okay to ask questions and admit to needing assistance from the instructor, and when they are being tested and expected to display their ability to meet the proficiency criteria. If this program is new at your agency, always conduct training that describes how to do each task before evaluations. Do not assume everyone has a clear understanding of how to perform the task.
2. Proficiency Requirement Suggestions:
 - a) IIMC Avoidance –
 1. Pilot makes decision to perform 180 degree turn, land (rotorcraft) or divert to the nearest airport with VMC conditions before entering simulated IIMC conditions.
 - b) IIMC Initial Response Procedure –
 1. Pilot is able to recover to zero degrees roll and 500fpm climb within 5 seconds and without assistance from the instructor.

2. Maintains stable flight while only referencing instruments.
 3. Minimum power changes
 4. Pilot does not exceed 10 degrees of bank or 500fpm once stabilized.
 5. Airspeed +/- 5 knots of the predetermined IMC flight speed for your aircraft.
 6. Conducts IIMC entry procedure from memory
 7. No assistance required from the instructor *
- c) IMC Recovery Procedure –
1. Pilot is able to set up the approach and perform the approach briefing without error.
 2. The pilot utilizes all resources, including ATC and TFO as applicable, to complete these tasks *
 3. No assistance required from the instructor.
- d) Approach –
1. Approach is flown with less than ½ scale needle deflection (if applicable).
 2. Pilot does not descend below approach minimums as determined by the instructor, charts or unit procedure.
 3. Pilot does not exceed 10 degrees of bank or 500fpm during approach,
 4. Minimum power changes
 5. Airspeed +/- 5 knots of the predetermined IMC flight speed for your aircraft.
 6. No assistance required from the instructor *
- e) Missed Approach –
1. Pilot performs missed approach procedure at appropriate time
 2. Pilot does not exceed 10 degrees of bank or 500fpm
 3. Airspeed +/- 5 knots of the predetermined IMC flight speed for your aircraft.
 4. Minimum power changes
 5. No assistance required from the instructor *

3. Currency Requirements:

Whereas:

- IMC flight skills and avionics familiarity are perishable skills.
 - IIMC/CFIT accidents are a leading cause of fatal accidents in public safety aviation
- a) The above pilot flight training syllabus should be performed quarterly

- b) Pilots should perform at least three practice instrument approaches with their TFO or co-pilot every month in VMC conditions.
- c) If the agency has their own simulator, IIMC training flights can be conducted more regularly between pilot and TFO if the CFII is not available.

IIMC TRAINING RECOMMENDATIONS (1.4)

IV CRM – TFO Training

1. It is recommended that TFO's and other regular aircrew members be regularly trained in IIMC procedures by a unit instrument flight instructor.
2. It IS NOT recommended that pilots conduct IIMC training in flight with crewmembers who are not certified instrument flight instructors, including non-rated TFO's. TFO's may practice using avionics or other IIMC procedures in flight if in VMC conditions and the pilot remains 'heads-up' looking outside of the cockpit.
3. Agency policy should specifically list tasks that the TFO is expected to perform in an IIMC encounter. Possible tasks to consider:
 - a) Tuning radios to required ATC frequencies
 - b) Tuning approach frequencies in
 - c) Setting up approaches
 - d) Retrieving charts, checklists, etc.
 - e) Briefing approaches
 - f) Monitoring instruments for approach deviations or aircraft orientation
 - g) Staying heads-up on final to search for runway/airport
4. Proficiency Requirements (example):
 - a) IIMC Avoidance –
 1. TFO used CRM to convince pilot to perform 180 degree turn, land (rotorcraft) or divert to the nearest airport with VMC conditions before entering simulated IIMC conditions.
 - b) IIMC Initial Response –
 1. TFO conducts IIMC entry procedure from memory.
 - (a) Assist pilot monitoring aircraft orientation
 - (b) Frequency for ATC entered if needed
 2. No assistance required from the instructor/pilot.
 - c) IIMC Recovery Procedure

1. TFO is able to set up the approach
2. TFO able to give approach briefing without error.
 - Type and location of approach
 - Radio frequencies
 - Navaid frequencies
 - Approach course heading
 - GPS signal status (terminal, approach, RAIM, etc.)
 - Altitudes (initial, intercept, minimums, etc)
 - Missed approach procedure
 - Landing configuration checklist (flaps, lights, gear, etc.)
3. TFO calls out bank angle in excess of 5 degrees or vertical speed in excess of 500fpm.
4. Airspeed +/- 5 knots of the predetermined IMC flight speed for your aircraft.
5. No assistance required from the instructor.

d) Approach –

1. TFO is able to call out crossing approach fixes
2. TFO calls out intercept altitude and/or every 100 feet within 800 feet of the ground.
3. TFO calls out bank angle in excess of 5 degrees or vertical speed in excess of 500fpm.
4. Airspeed +/- 5 knots of the predetermined IMC flight speed for your aircraft.
5. No assistance required from the instructor/pilot.

e) Missed Approach -

1. TFO calls out when at minimums
2. TFO changes radio or navaid frequencies as needed for missed approach
3. TFO activates missed approach function of GPS or sets heading in avionics as needed
4. TFO calls out bank angle in excess of 5 degrees or vertical speed in excess of 500fpm.
5. Airspeed +/- 5 knots of the predetermined IMC flight speed for your aircraft.
6. No assistance required from the instructor/pilot.

5. Currency Requirements:

- a) TFO's should be given proficiency flights based on established agency procedure at least once every three months. This should be with a CFII.

- b) Trained TFO's should be given the opportunity to practice their tasks at least once a month in flight or in a simulator. This may be conducted with any unit pilot as long as the pilot remains 'heads-up'.

*If the agency has an established TFO/aircrew IIMC training program and the TFOs stay both current and proficient the instructor may incorporate this into the training and proficiency flights outlined above. The instructor may simulate a trained TFO by performing some of the tasks that are assigned to aircrew. It is still recommended that at least one evolution of the IIMC entry or approach segments be conducted as if the TFO is not trained (or possibly incapacitated physically or psychologically)

IIMC TRAINING RECOMMENDATIONS (1.4)

Section V 'Instructor Checklists' on next page



V Instructor Checklists

1. LESSON BRIEFING

- Pre-mission risk assessment form complete
- Route of flight
- Establishment of 'transfer of control' protocol
- Emergency procedure protocol
- Review of avionics, charts, procedures

2. LESSON OBJECTIVES

- Training Objectives
 - IIMC Avoidance
 - IIMC Initial Response Procedures
 - Returning to safe environment
- Establish if the flight is a training flight or an evaluation
- Review Completion or Evaluation Standards

3. PREFLIGHT PREP

- Charts and GPS database up to date and accessible.
- Battery check and backup for NVG's if required
- Other equipment:

- | | |
|-------------------------------|-----------------------------|
| <input type="radio"/> Foggles | <input type="radio"/> _____ |
| <input type="radio"/> Charts | <input type="radio"/> _____ |
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4. LESSON EXERCISES AND MANUVERS – Pilot

- Normal take off and climb to altitude (on NVGs if available)
- IIMC Avoidance Exercise
- IIMC Entry Simulation (unusual attitudes) x 3
- IIMC Initial Response Procedure
 - **Zero degrees roll**
 - **500 fpm climb or 5 degrees nose up**
 - **Airspeed +/- 5 knots**
 - Verbal notification to crew that they are in IIMC
 - Verbal verification of location, altitude and heading
- ATC Communication (actual or simulated)
 - Declare an emergency
 - Ask ATC for frequencies and/or headings. (*if applicable*)
- IIMC Recovery Plan (Utilization of CRM is recommended)
 - Set up approach (*if applicable*)
 - TFO duties (*only as trained*)
 - Type and location of approach
 - Radio frequencies
 - Navaid frequencies
 - Altitudes (initial, intercept, minimums, etc)
 - Begin navigation back to entry point for instrument approach or VMC conditions
 - **<10 deg bank** **<500fpm** **Airspeed +/- 5 knots**
 - Missed approach procedure brief
 - Final approach course heading
 - GPS signal status (terminal, approach, RAIM, etc.)
 - Landing configuration (flaps, lights, gear, etc.)
- Complete approach to airport (or VMC conditions as applicable)
 - Two approaches (or applicable IIMC recovery procedures)
 - Perform at least one 'go-around'
 - **<10 deg bank** **<500fpm** **Airspeed +/- 5 knots**
 - Minimum power changes
 - Less than ½ scale deflection on instrument approach indicators

1. LESSON EXERCISES AND MANUVERS – TFO/Second Pilot

- IIMC Avoidance Exercise
 - TFO used CRM to convince pilot to perform 180 degree turn, land (rotorcraft) or divert to the nearest airport with VMC conditions before entering simulated IIMC conditions.

- IIMC Initial Response Procedure
 - IIMC entry procedure from memory.
 - Inputs radio frequencies as requested by pilot
 - Assist pilot monitoring aircraft orientation
 - (a) **Zero degrees roll**
 - (b) **500 fpm climb or 5 degrees nose up**
 - (c) **Airspeed +/- 5 knots**

- IIMC Recovery Plan (Utilization of CRM is recommended)
 - Set up approach
 - Type and location of approach
 - Radio frequencies
 - Navaid frequencies
 - Altitudes (initial, intercept, minimums, etc)
 - Confirms course to entry point for instrument approach or VMC conditions
 - Assist pilot monitoring aircraft orientation
 - 10 deg bank <500fpm Airspeed +/- 5 knots**
 - Missed approach procedure brief
 - Final approach course heading
 - GPS signal status (terminal, approach, RAIM, etc.)
 - Confirm landing configuration

- Complete approach to airport (or VMC conditions as applicable)
 - Two approaches (or applicable IIMC recovery procedures)
 - Perform at least one ‘go-around’
 - TFO is able to call out crossing approach fixes
 - TFO calls out intercept altitude and/or every 100 feet within 800 feet of the ground.
 - Assist pilot monitoring aircraft orientation
 - 10 deg bank <500fpm Airspeed +/- 5 knots**
 - Calls out deflection on instrument approach indicators in excess of ½ scale

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