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Flightfax®

Online newsletter of Army aircraft mishap prevention information

Operating in degraded visual environment (DVE) flight conditions is incredibly challenging even for the best trained and most proficient aircrews. Since the initiation of combat operations in 2002, the loss of situational awareness (SA) or spatial disorientation (SD) within a degraded visual environment has accounted for 24% of our aviation Class A mishaps and 44% of our fatalities. Given the circumstances surrounding two of the Class A mishaps in early 2015, USACRC is highlighting the importance of properly executing an Inadvertent IMC transition when the aircrew loses visual reference with the ground. The improper transition into instrument meteorological conditions contributed to one mishap in FY15 and is suspected in the second with the end result of two aircraft destroyed and eleven fatalities.

The Aircrew Training Manuals outline the task, conditions, and standards to "Respond to Inadvertent Instrument Meteorological Conditions" in Task 1184 with the first step of this emergency being "Announce IMC, maintain proper aircraft control, immediately make the transition to instrument flight, and initiate immediate climb." The flight control sequence for this task that has been drilled into every pilot's head for this contingency is to level the wings, maintain heading and turn only to avoid known obstacles, adjust torque as necessary for a climb, trim the aircraft as necessary, and adjust the airspeed. There are two considerations for the execution of this emergency procedure (and, yes, we should treat this as an emergency).

The first consideration is are the pilots sufficiently trained in their basic instrument procedures so that they can "maintain proper aircraft control." The unplanned entry into IMC conditions rarely occurs in straight and level flight, and will require the pilot on the controls to adjust attitude, pitch, trim and power almost simultaneously to establish a level climb attitude. Without consistent practice in the aircraft or in the simulator, this skill is perishable and will make the recovery back to a level attitude more difficult. The longer it takes a pilot to recover the aircraft, the less of a chance the aircrew has to survive the transition into IMC.

The second consideration is are the pilots prepared to deal with the effects of spatial disorientation. The rapid loss of visual reference combined with the motion of the aircraft during the recovery will induce varying degrees of visual and vestibular disorientation. As stated in the ATM task, the pilot on the controls must transition to the instruments without delay, in order to use the attitude indicator and other flight instruments as the primary means for spatial orientation. Failure to execute this portion of the task quickly and accurately will result in the loss of aircraft control.

The real conversation isn't whether the pilot can properly execute the ATM task, but the decision making process and judgment of the aircrew that placed them into the dangerous circumstance of having to execute an inadvertent transition into IIMC in the first place. It fundamentally boils down to the pilot in command maintaining the flight visibility that is approved by the final mission authority. If the weather conditions deteriorate, the pilot in command must either terminate the mission (land the aircraft, transition to IIMC, or recover VFR back to the

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airfield) or they must seek the approval by the appropriate final mission approval to operate with a higher level of approved risk. It is this fundamental decision making concept that we as a profession are slow to learn.

The very first improper transition to IIMC mishap recorded in the USACRC occurred in 1972, and the findings stated that "THE ACCIDENT INVESTIGATION BOARD'S RECOMMENDATIONS ARE TO INSURE THAT ALL PILOTS KNOW AND ADHERE TO THE PROPER PROCEDURES FOR ENCOUNTERING INADVERTANT IMC AND TO BRIEF ALL PILOTS ON THE HAZARDS AND PECULARITIES OF FLYING MOUNTAINOUS TERRAIN. SPECIAL EMPHASIS MUST BE PUT ON ADHEREING TO PROPER PROCEDURES." Forty three years ago we identified that making good decisions necessary to comply with our minimum weather minimums would help prevent this type of mishap.

Let us not wait another 43 years to implement these lessons. Until next month, fly safe and manage your risk levels!

COL Mike Higginbotham
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Manned Aircraft Class A – C Mishap Table as of 30 Mar 15

	Month	FY 14 Class A Mishaps	FY 14 Class B Mishaps	FY 14 Class C Mishaps	FY 14 Fatalities		FY 15 Class A Mishaps	FY 15 Class B Mishaps	FY 15 Class C Mishaps	FY 15 Fatalities
1st Qtr	October	0	0	2	0		0	1	3	0
	November	3	0	5	0		2	0	1	2
	December	1	0	3	0		1	1	2	0
2nd Qtr	January	2	2	4	4		2	0	5	0
	February	1	0	3	0		0	0	0	0
	March	0	3	0	0		2	1	8	11
3rd Qtr	April	1	1	5	0					
	May	3	1	2	2					
	June	2	0	6	0					
4th Qtr	July	2	0	5	0					
	August	0	0	0	0					
	September		1	2						
	Total for Year	15	8	37	6	Year to Date	7	3	19	13
	Class A Flight Accident rate per 100,000 Flight Hours									
	5 Yr Avg: 1.31		3 Yr Avg: 1.25			FY 14: 1.42			Current FY: 1.81	

STACOM
STANDARDIZATION COMMUNICATION
U.S. ARMY
AVIATION
STANDARDIZATION
DIRECTORATE OF EVALUATION AND STANDARDIZATION, USAAVNC, FT. RUCKER, AL 36362

DES Flashback: STACOM 10 published 8 December 1976

THE REALITIES OF INADVERTENT IMC

"If inadvertent IMC is encountered climb to 2,000', contact range control on FM 30.8.“
“Descend immediately to regain VMC when IMC conditions are experienced."
“Inadvertent IMC flight is prohibited at all times."

The above are not excerpts from some inadvertent IMC plans currently in existence - they are the plans. They also represent the attitudes that cause inadvertent IMC to be Army aviation 's number-one killer. No matter how much we wish to ignore the possibility of encountering inadvertent IMC or rationalize that it really doesn't exist at all - "people shouldn't attempt VMC flight when the weather is marginal" - it still happens, generally with catastrophic results. The question is why? Why does an instrument-qualified aviator flying an instrumented aircraft lose control under these conditions when he has obviously demonstrated skill in instrument flight by obtaining the qualification? The answer to this lies primarily in one significant difference between deliberate and inadvertent IMC flight - PLANNING. The pilot undertaking a deliberate instrument flight has studied the weather, thoroughly charted the route, computed fuel requirements, has all the necessary navigation publications, and has a clearance from ATC to cap it off. He knows exactly where he's going and how to get there. Inadvertent IMC, on the other hand, is an unplanned event occurring generally at low airspeed and low altitude, with the crew totally unprepared for instrument flight. Psychologically, it's a nightmare.

The pilot fears the consequences of blundering into the ATC system without a clearance, is probably unsure of his position, and very likely does not have instrument navigation charts available. Add to this the utter lack of a preplanned course of action for a safe recovery and disaster is virtually assured. So to answer the question of why the pilot lost control-he didn't-he never attempted to control the aircraft, only tried to return to VMC - generally in a diving l80-degree turn, terminating in a high speed ground impact. What can be done about this? To begin with, the pilot has to be convinced that a system insuring his safe recovery has been established; therefore, each installation with aircraft assigned must develop a simple, *workable* IMC recovery plan. Keep in mind the pilot will have to memorize the altitude to which he is to climb, the facility to contact and the recovering

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airfield, so keep these immediate actions as straight forward as possible. Additional details such as frequencies, en route fixes, lost communication procedures, etc., must also be made available to the pilot in the form of a local publication permanently carried in the aircraft. All of which brings us to the next point-aircraft and aircrew suitability. Although both civilian and military aviators have tried unsuccessfully for years to disprove this - you still can't fly instruments without instruments nor can you fly instruments when you can't interpret them - so before trying to hack marginal VMC be absolutely certain that both you and the aircraft are prepared for and capable of instrument flight.

The final and most critical consideration - aircraft control. Any survivor of an inadvertent IMC situation will attest to the startling suddenness of the encounter. There is simply no time for an orderly transition to instruments - as in an ITO - which very probably accounts for the fact that in the majority of the inadvertent IMC accidents, the pilot had made no apparent attempt to go to the gauges. Since an attempted immediate return to VMC is virtually a suicidal act, and the pilot has no instrument scan established, the situation is certainly grim - but far from hopeless.

In recognition of this very critical transition period, HQDA directed USAAVNC to develop an immediate action procedure which would enable the pilot to rapidly transition to instrument reference. The procedure developed, which is now DA policy, is a simple step-by-step technique, bringing the instruments into the pilot's scan in order of criticality as follows:

#1. ATTITUDE INDICATOR - level the aircraft. Quite obviously, the most important first step, as no following control input will achieve the desired response if the aircraft is not in a level attitude.

#2. HEADING INDICATOR - maintain heading. Turn only to avoid *known* obstacles. Don't compound things by getting vertigo.

#3. TORQUEMETER - adjust to climb power. Let's get away from the hard ground as fast as possible.

#4. AIRSPEED - adjust to climb airspeed.

#5. RECOVERY PROCEDURES - initiate only after transition to instrument reference is complete and the aircraft has reached a safe altitude. Don't distract yourself from the primary job of regaining control of the aircraft. Save the yelling for later or let the copilot do it.

Remember this above all else - **WHEN INADVERTENT IMC IS ENCOUNTERED, YOU MUST GO ON INSTRUMENTS. THERE IS NO OTHER OPTION.** An immediate landing or a 180 away from the weather will work only when you are still VMC - and, unfortunately, we have the fatalities to prove it.

The 50-50-90 rule: Anytime you have a 50-50 chance of getting something right, there's a 90% probability you'll get it wrong.

IIMC Accident Findings: From the Archives

FINDING (Present and Contributing: Human Error – Individual Failure): After encountering instrument meteorological conditions (IMC) while attempting a visual meteorological conditions (VMC) approach in a UH-60A at approximately 100 feet above ground level (AGL) and 30 knots indicated airspeed (KIAS), the pilot in command (PC) in the left seat and on the controls, encountered inadvertent instrument meteorological conditions (IIMC). The PC failed to properly scan by not directing his attention within the aircraft. That is, the PC did not immediately initiate IIMC recovery procedures upon entering IMC conditions during the approach and transition to instruments. The PC continued a VMC approach for several critical moments after encountering IMC, descending to an altitude of 80 feet AGL before finally attempting IIMC recovery procedures. As a result, the PC failed to maintain control of the aircraft. This delay in implementing IIMC recovery procedures allowed the PC to encounter Type I (unrecognized) spatial disorientation and allowed the aircraft to descend and accelerate, instead of climb. The aircraft was destroyed, one Soldier was fatally injured, and 12 Soldiers were injured.

FINDING (Present and Contributing: Human Error - Training, Leader and Individual Failure) While performing a multi-ship, day out, night vision goggle (NVG) return, with a simulated troop insertion, the pilot failed to maintain orientation in flight environments known to restrict visibility. That is, once the aircraft inadvertently entered instrument meteorological conditions (IIMC), the pilot on the controls induced a spatially disorienting condition when he failed to cross-check instruments and arrest his bank angle after changing heading 20 degrees. This failure caused the aircraft to develop an unusual attitude which became unrecoverable. The aircraft crashed and the three crew members received fatal injuries.

FINDING (Present and Contributing: Human Error - Suspect Individual Failure and Training Failure): While conducting a daytime, two-aircraft general support mission, the crew of a CH-47D (Chalk 1) failed to maintain orientation and aircraft control. That is, after inadvertently encountering instrument meteorological conditions (IIMC), the crew lost control of the aircraft and crashed. The aircraft was consumed by the post-crash fire. The crew and all passengers received fatal injuries. The Board suspects the crew was overconfident in their ability to continue flying in the reduced visibility. They attempted to continue the mission even though visibility was less than the one mile approved for the mission. Previously that day they had successfully found areas of increased visibility and were able to continue the mission. The Board suspects these previous successes caused the crews to think they could find better visibility as they had done earlier in the mission.

FINDING (Present and Contributing: Human Error - Individual and Training Failure) While performing terrain flight during a night vision system (NVS) proficiency flight evaluation, the AH-64D pilot (PI) on the controls in the back seat failed to detect deteriorating weather conditions. That is, he did not recognize the adverse weather conditions until queried by the instructor pilot (IP). This delay reduced the time for the crew to react to the critical situation. As a result, the crew could not recover the aircraft prior to impact with trees. The aircraft was destroyed and consumed in a post-crash fire. Both crewmembers sustained minor injuries. The PI's actions were the result of overconfidence in his own abilities and inadequate hood and weather training. That is, his overconfidence in his own abilities to fly the aircraft using the NVS did not allow him to adequately diagnose and respond to the deteriorating weather conditions. His inadequate training is reflected by his having only 5.9 hours of hood and weather training in recent years. Additionally, the PI did not announce "IIMC," transition to the aircraft flight instruments, and begin instrument meteorological conditions (IMC) recovery procedures.

Mishap Review: UH-60 night unaided IIMC

During the conduct of a night unaided takeoff from a civilian airfield, the UH-60A encountered inadvertent IMC conditions. While attempting to return to the runway the aircraft descended and impacted the ground resulting in major damage to the aircraft and minor injuries to the crew.

History of flight

The scheduled training mission was an afternoon IFR flight to a regional airport with a scheduled stop for refuel, then an unaided VFR return to home base to pick up a crew chief and continue with a NVG training period. The crew reported for duty at 1000 hours local, conducting initial flight planning and preparation. Preflight was conducted at 1130L followed by final mission planning. The scheduled takeoff time was delayed one hour due to weather. The mission was briefed as moderate risk due to weather and approved at the appropriate level.

The aircraft departed home station at 1452L and flew to the regional airport without incident, arriving at 1554L. The aircraft and crew experienced no issues on the initial leg. The aircraft was shut down and refueled. At 1746L, following engine runup, the crew called for taxi for the VFR flight home. Weather at the time of departure was winds 310 degrees at 6 knots, visibility two and one-half statute miles with mist, few clouds at 1,400 feet, temperature 11, dew point 10 and altimeter 29.94. Sunset was 1708L with no illumination.

At 1752L the aircraft received takeoff clearance and departed for the night unaided return to home base. On departure, the aircraft inadvertently flew into a layer of fog while still over the runway. The pilot on the controls applied aft cyclic putting the aircraft into a 30 degree pitch up attitude while he reduced collective to slow the aircraft. Attempting to return to the airport, the pilot started a descending right hand turn. The aircraft struck the ground 22 seconds after takeoff with a 30 degrees nose high attitude, 30 degree right angle of bank and a right lateral drift coming to rest on its right side. The crew received minor injuries.

Crewmember experience

The PC, sitting in the left seat, 2,100 hours of total time, 1,000 in the UH-60, 109 hood/weather, and 44 night unaided. The PI, operating from the right seat, had over 800 hours of total time, nearly 750 hours in the UH-60, 64 hood/weather, and 15 night unaided. There were no additional crewmembers.

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Commentary

The accident board determined that after flying into a layer of fog with the landing light on, the pilot on the controls in the left seat lost orientation with outside visual references and failed to properly respond to inadvertent instrument meteorological conditions (IIMC). Additionally, there was a lack of positive communication between the pilots in that the PC failed to announce that he had entered IIMC, thus limiting the PI's awareness of the severity of the situation as they turned back toward the airfield.

What do the stats show

Human error is the leading cause factor in accident events.

Flight Mishap Rate FY05 – 14 (Ten years)

Total FY 2005 -2014 manned flight and flight-related mishaps

Hours flown: 11.6 million

CLASS A (202) Cause factor			**CLASS A - C (1003) Cause factor**		
Human Error :	165 (82%)	Rate/100K: 1.42	HE: 768 (77%)	Rate: 6.60	
Materiel Failure:	32 (16%)	Rate/100K: 0.27	M: 144 (14%)	Rate: 1.24	
Environmental:	1 (0.5%)	Rate/100K: 0.01	E: 54 (5%)	Rate: 0.46	
Unknown:	4 (2%)	Rate/100K: 0.03	U: 37 (4%)	Rate: 0.32	
Overall	202	Rate/100K: 1.74	1003	Rate: 8.62	

Flight Mishap Rate FY10 – 14 (Five years)

Total FY 2010 - 2014 manned flight and flight-related mishaps

Hours flown: 5.8 million

CLASS A (80) Cause factor			**CLASS A - C (442) Cause factor**		
Human Error :	61 (76%)	Rate/100K: 1.05	HE: 334 (76%)	Rate: 5.75	
Materiel Failure:	16 (20%)	Rate/100K: 0.28	M: 57 (13%)	Rate: 0.98	
Environmental:	0		E: 20 (5%)	Rate: 0.34	
Unknown:	3 (4%)	Rate/100K: 0.05	U: 31 (7%)	Rate: 0.53	
Overall	80	Rate/100K: 1.38	442	Rate: 7.61	

Flight Mishap Rate FY05 – 09 (Five years)

Total FY 2005 - 2009 manned flight and flight-related mishaps

Hours flown: 5.8 million

CLASS A (122) Cause factor			**CLASS A - C (561) Cause factor**		
Human Error :	104 (85%)	Rate/100K: 1.78	HE: 434 (77%)	Rate: 7.44	
Materiel Failure:	16 (13%)	Rate/100K: 0.27	M: 87 (16%)	Rate: 1.49	
Environmental:	1 (1%)	Rate/100K: 0.02	E: 34 (6%)	Rate: 0.58	
Unknown:	1 (1%)	Rate/100K: 0.02	U: 6 (1%)	Rate: 0.10	
Overall	122	Rate/100K: 2.09	561	Rate: 9.62	

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[Views expressed are to generate professional discussion and are not U.S. Army or USACR/SC policy]

Inadvertent IMC

Although both civilian and military aviators have tried unsuccessfully for years to disprove this - you still can't fly instruments without instruments nor can you fly instruments when you can't interpret them - so before trying to hack marginal VMC be absolutely certain that both you and the aircraft are prepared for and capable of instrument flight.

Not sure where I picked up that illuminating information but it remains as true today as 40 years ago. We've been stressing the degraded visual environment (DVE) and the effects of operating in those conditions, and yes, flying in marginal weather falls into that category. IIMC is not as insidious as operating in the low contrast - low illumination - no horizon situation because, for the most part, you see it coming. That wasn't always the case.

Because successful IIMC recovery events are not tracked, it is difficult to determine how often they occur. Accidents, on the other hand, are better documented. Looking back through the last four decades a couple of things stand out. In the 70's to mid-80's a typical case would involve a crew flying VFR at night in poor weather and entering IMC conditions. Spatial disorientation would occur and the aircraft would crash. These type of events were described as the most deadly killer in the aviation force. There could be a couple of catastrophic incidents a year. Remember folks, during that timeframe, they were flying night unaided.

Enter the aided night flying regime which continues to present day. In the 90's and first 10 years of this century the total number of Class A mishaps dropped by 50% but there was no drop in the number of marginal weather related mishaps with an average of over one a year. Early fears when operating under NVDs were that the crews would push the envelope in operating in bad weather because it would be easier to maintain visual contact with the environment (see through the obscurants) until suddenly the crew would be confronted with an abrupt end to visuals and have to transition to instruments. I'm sure to an extent that is true.

The last five years have shown a decrease in IMC related mishaps. Better aircraft, better weather forecasting and active mission risk mitigation has contributed greatly to this decline. But they still happen. Operating in marginal weather is more than inadvertently punching into the weather and making a recovery. Before the punching in, that same weather often pushes an aircrew into an operating environment that was not planned. Getting lower to stay below the clouds and to maintain visual contact with the ground brings new hazards into play – wires, towers, and other obstructions that would be less of a hazard with a few hundred feet of altitude.

IIMC is an emergency situation. Most emergencies will give you a caution light when it presents itself. A chip light comes on and you know what to do. But what's your caution light for IIMC? A good trigger point is the briefed ceiling and visibility. When it reduces to the minimum you are supposed to be operating at then your caution should illuminate. Start the plan for a safe landing area or turning around or your transition to IMC flight. Get the crew coordination going. Just like other emergency procedures, your training establishes how well you and your crew successfully respond to an event.

Speaking of training, what have you, your instructor pilots and unit overall done to optimize an aircrew's success when confronted with marginal weather? I'm sure once or twice a year each pilot

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has an instructor pilot evaluate an unusual attitude recovery by having the pilot bend over in the seat, close their eyes, then wiggles the sticks and announces “recover!” You may even get to follow that up with an instrument approach. How about throwing a little innovation into the training. Set up marginal weather scenarios in the simulators with conditions that deteriorate progressively so crews have to hit their trigger points and make decisions ahead of the curve. Or block some airspace in the training area, put a pilot under the hood and have them simulate encountering lowering conditions. When ready, make them land, turn around or do a smooth transition to a simulated IMC recovery. How about doing it with a flight of five or 10? There are many variations to the types of training that could be included.

Additionally, there is a new player in town for the Black Hawks and Chinooks with the new digital multi-functional display cockpits. An aviator transitioning from the old ‘steam’ gauges found on the UH-60A/L or the CH-47D may need a little more time and experience to make the adjustment to multi-functional displays. Your crosscheck with the old gauges will be different from the new. Just out of the UH-60M or CH-47F transition might not be the time to be flying in the worst of the VMC weather because a crew’s limited exposure to the MFDs may not be enough to comfortably operate in those circumstances, especially if an emergency type situation such as inadvertent IMC occurs. For your proficiency, add a few more unusual attitude recovery training events and practice using the new aircraft systems previously unavailable in older airframes.

One more thing. If you find yourself inadvertent at low or no airspeed and you’ve leveled the wings but still have a rotating course indicator – neutralize your pedals. It’s difficult to maintain a heading with a pedal input causing a turn. **Jon Dickinson, Aviation Directorate**

UAS Class A – C Mishap Table as of 30 Mar 15

	FY 14					FY 15			
	Class A Mishaps	Class B Mishaps	Class C Mishaps	Total		Class A Mishaps	Class B Mishaps	Class C Mishaps	Total
MQ-1	6		3	9	W/GE				
MQ-5	1	1		2	Hunter	1		1	2
RQ-7		12	11	23	Shadow		2	3	5
RQ-11			1	1	Raven			1	1
RQ-20			1	1	Puma				
YMQ-18									
SUAV					SUAV				
UAS	7	13	16	36	UAS	1	2	5	8
Aerostat	3	2	3	8	Aerostat	0	1	0	1
Total for Year	10	15	19	44	Year to Date	1	3	5	9

Unplanned doesn't have to be unprepared

The Army is still losing personnel and equipment because of unplanned flight into instrument meteorological conditions (IMC). While the number of mishaps from this cause has decreased substantially over the past few years, we can still expect at least two or three a year.

These mishaps are almost always catastrophic, resulting in fatalities, injuries, and destroyed aircraft. All six aircraft involved in IMC mishaps over the past 2 years were destroyed. Eight people were killed and 12 injured. Only one of the pilots and copilots had more than 600 flight hours. This was a UH-60 pilot with approximately 1,000 hours. **Four of the six** mishaps involved **supervision.**

In two separate incidents, OH-58 pilots were the only crewmembers on board when their aircraft entered IMC. One of the OH-58 pilots took off from a field site at night to fly to the airfield because weather conditions were rapidly deteriorating. A field training exercise was just about over, and the unit commander wanted to avoid another night in the field. **This was the first time the pilot had flown at night without a copilot.**

Weather conditions at the time of departure were within the guidelines for VFR flight, and the airfield was only a few miles away. Shortly after the OH-58 pilot took off, the aircraft entered a fog layer and was then seen emerging from the top of the fog layer in a climbing turn, as required by vertical helicopter IFR recovery procedures. While following this procedure, the pilot apparently decided to try to return to low-level visual flight conditions. The OH-58 was seen at a low altitude in a right descending turn just before it crashed. The pilot was killed.

The other OH-58 pilot who was flying without a copilot was also on a night VFR flight. En route to the unit field site, he had to go through an airfield control zone. Unable to find the field site because of an overcast condition and lack of ground reference lights, the pilot began flying in left orbits, searching for the site. About 2 minutes later, the pilot entered instrument meteorological conditions. **The tower operator did not tell the pilot that the weather had deteriorated to IMC.** The pilot tried to maintain control of the aircraft and started to climb to a higher altitude. He was unable to maintain or establish control as the aircraft banked left and right several times. The OH-58 hit the top of a tree and crashed. **The pilot had no documented Instrument training In the OH-58 and no actual Instrument flight in IMC anytime in his aviation career.**

A UH-1 pilot, also flying without a copilot, was on a medevac mission. After overflying the pickup point, the pilot began a right descending turn to land. During the approach, a heavy rainstorm severely reduced his visibility and he became spatially disoriented. The aircraft continued to descend, and the main rotor blades hit a large tree. The UH-1 crashed through the trees and came to rest on its left side. **The detachment commander authorized the mission to be flown with only one pilot on board.**

Another UH-1 crashed as it was being moved from a field site to an airstrip. The ceiling was estimated to be below 100 feet, and visibility was limited due to darkness and clouds. **The air mission commander had directed that five aircraft be repositioned to the airstrip in weather conditions less than those prescribed for VFR flight.** When the UH-1 pilot picked his aircraft up above the trees, it entered clouds. The low-time pilot became disoriented, and the aircraft was seen in a left turn which continued until impact on a ridgeline. The pilot, copilot, and crew chief were killed.

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Four people were killed and six seriously injured when a UH-60 crashed while flying through fog. Two UH-60s were transporting troops. The weather began to deteriorate about 20 minutes after takeoff. The aircraft were flying low level through valleys and over rising terrain. The flight leader told the No.2 pilot to drop back and **he would try to find a route through the fog.** When radio contact could not be made with the flight leader, the No.2 pilot reversed course, crossed over into a parallel valley, and proceeded to destination.

The crew of the No.1 aircraft lost visual reference because of the fog and tried to transition to instrument flight. Before they could do so, the main rotor blades hit a large tree and the aircraft crashed almost inverted.

Supervision played a part in the crash of an AH-1 whose pilot flew into IMC. As a flight of four Cobras started through a mountain pass, a low cloud cover caused visibility to decrease substantially. The flight leader thought they should turn back, **but the platoon leader, who was in one of the other aircraft, urged him to go a little further.** The flight leader continued on, became disoriented, and lost his composure. The aircraft hit the side of a hill, injuring both occupants.

Although unplanned entry into IMC can occur at any altitude, the most critical is close to the ground or obstacles such as mountains, trees, or buildings. The difference between planned and unplanned entry into IMC is usually dramatic because of several factors. Unplanned entry into IMC is unexpected, requires immediate transition to instrument flight, and usually causes the pilot to become extremely anxious about the possibility of a collision with the terrain or some other object. Unplanned entry can result in poor cockpit coordination, jerkiness on the controls, and poor instrument scan.

The briefing before the flight usually focuses on who will do what in the event of an emergency, such as an engine failure. The crew should also discuss what each will do in case of unplanned entry into IMC. During the flight, the crew should be mentally prepared for the possibility of entering IMC and know exactly the steps they will take if this should happen.

The 5 Cs

Successful transition from visual meteorological conditions to instrument meteorological conditions requires the logical application of a step-by-step procedure to avoid loss of control, confusion, and a catastrophic mishap. An inadvertent IMC procedure was developed several years ago. Labeled the 5 Cs - control, coordination, clearance, course, and call-this procedure gives the pilot something to follow when confronted with inadvertent IMC.

The 5 C procedure Is a fast acting antidote to confusion and anxiety during the first 10 to 15 seconds after IMC penetration. It is during the first few seconds that the battle with inadvertent IMC is won or lost. If aircraft control can be maintained during this initial crucial period, the chances of surviving an IMC experience are greatly enhanced. Whether or not all 5 Cs will apply in each IMC circumstance will depend on existing conditions, e.g., terrain, obstacles, etc. The procedure is to be carried out in conjunction with and as a part of the unit vertical helicopter IFR recovery procedure plan.

1. Control of the aircraft is the most important factor in recovering from unplanned flight into IMC, so that is the first C. You must convince yourself ahead of time that should you enter IMC and lose ground reference, your only option is to immediately transition to instrument flight. Level the wings in the attitude indicator, maintain heading, adjust to climb power, and adjust to climb airspeed. Once you make the transition, control is established by crosschecking the flight instruments. If you fail to make this transition, you're in serious trouble. The four subsequent Cs depend on the successful accomplishment of the first C.

2. The second C is Coordination. As we said earlier, before a crew begins a flight, they should discuss what each will do in case of unplanned entry into IMC. It should be understood that the pilot at the controls will concentrate on the instruments and the copilot will look outside.

3. Next comes Clearance. To insure that the highest terrain feature along the route of flight will be cleared, gain altitude with a straight controlled climb.

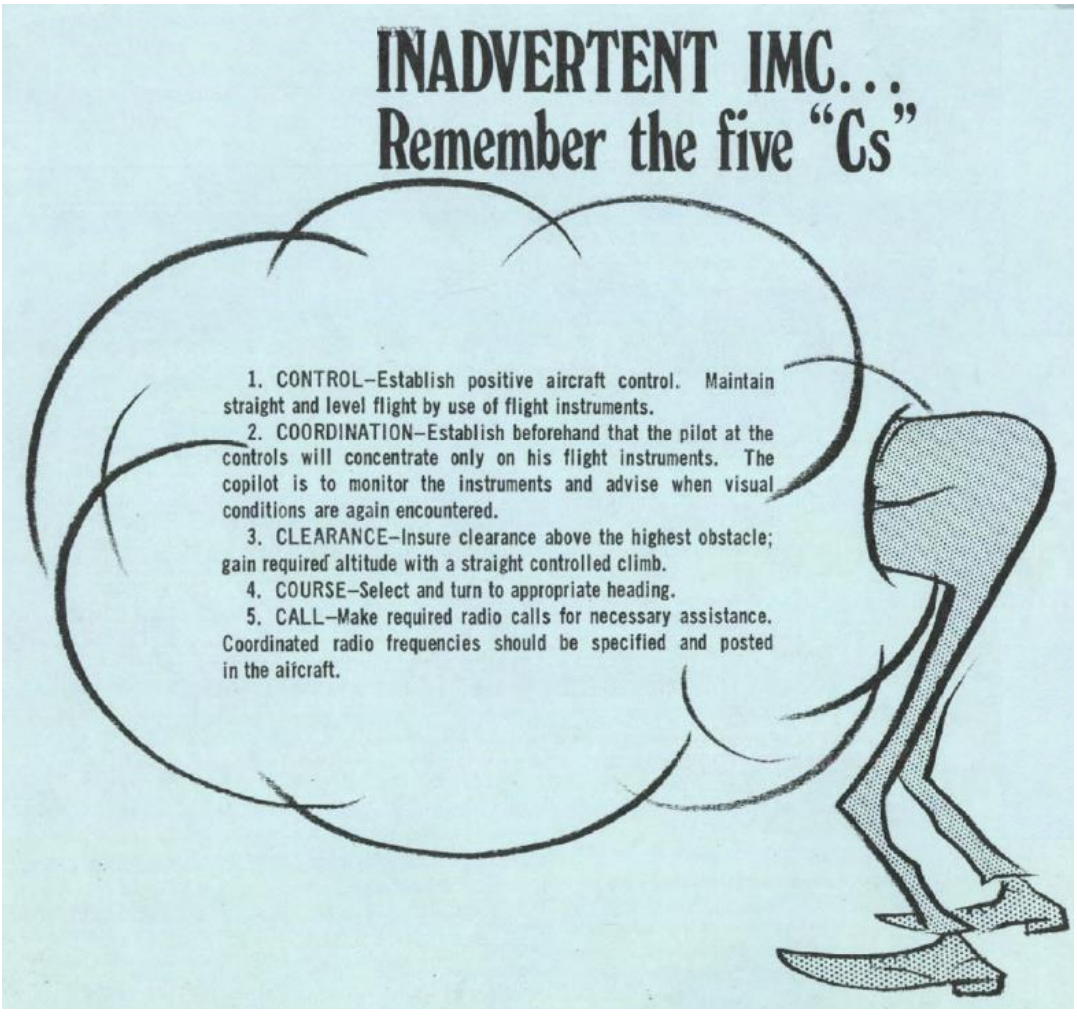
4. The fourth C is Course. Select and turn to the appropriate heading.

5. The last C is Call. Make required radio calls for assistance. Coordinated radio frequencies should be specified and posted in the aircraft.

FM 1-202, Environmental Flight, gives slightly different procedures to follow if enemy weapons are active and the terrain along the route rises rapidly.

Why have inadvertent IMC recovery plans when regulations specify certain weather minimums for VFR flight? We're certainly not advocating entry into IMC, and we know that the best approach is to land before entering IMC. But, as you can see from the mishaps for the past 2 years, pilots are sometimes forced to cope with instrument meteorological conditions.

Practice of the 5 Cs under visual meteorological conditions will boost your confidence in your ability to control the aircraft in IMC. Remembering the 5 Cs and being able to make them work may someday get you out of a bad situation.



Selected Aircraft Mishap Briefs

Information based on Preliminary reports of aircraft mishaps reported in February/March 2015.

Attack helicopters

AH-64D 

-After landing, crew heard a 'squealing' sound, followed by low hydraulic fluid indicators and a burning odor. Post-flight maintenance inspection revealed that the hydraulic pump had seized, resulting in transmission damage. (Class C)

-Aircraft experienced inadvertent BUCS-activation and a left yaw and spin during ground taxi for take-off. Crew/IP performed an emergency engine shutdown and arrested the spin. Post-flight inspection revealed damage to the aircraft as a result of 'rapid' spin action. (Class C)

Utility helicopters

UH-60 

-M series. Flight of two aircraft reportedly experienced deteriorating weather conditions shortly after take-off for a night training mission. One aircraft impacted the water resulting in 11 fatalities. (Class A)

-A series. Aircraft stabilator made contact with the ground during an executed autorotation. (Class C)

Cargo helicopters

CH-47D 

-Aircraft experienced a # 1 engine TGT exceedence (1100°C/12 SEC) during shutdown. (Class C)

Unmanned Aircraft Systems

RQ-7B 

-Crew experienced multiple computer malfunction indications during flight and engaged the flight termination system. Recovery chute was deployed and the system was recovered with damage. (Class C)

-Normal take-off was aborted and aircraft was flown to the point of fuel starvation, at which point, emergency landing procedures were initiated and recovery chute deployed. Damage was sustained by the aircraft and payload during landing. (Class C)

-Crew experienced an engine-temperature spike during training flight and initiated the landing sequence. The recovery chute was deployed but the system contacted the ground nose first and sustained significant damage. (Class B)

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