

UNFORCED ERRORS:

A CASE STUDY OF FAILED DISCIPLINE

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*"Greater prudence is needed rather than greater skill."
Wilbur Wright (1901)*

Author's Preface

This case study is the second in a series written and designed to improve safety and operational effectiveness across the aviation spectrum. The first in the series "*Darker Shades of Blue: A Case Study of Failed Leadership*" is a study of the personal and organizational factors leading up to the crash of a B-52 at Fairchild Air Force Base in June of 1994. It has been adopted by several international aviation safety training programmes, as well as many professional military education and commander's courses offered in several branches of the United States military. Both of these case studies come entirely from public domain sources. However, the first of the two is copyrighted as noted in the author's preface, whereas this one is reproducible in whole or in part for any educational use. The content contained herein does not reflect any official position other than the personal and professional opinions of the author — who has made it his life's work to make flying safer and more enjoyable for all with whom he shares the skies.

The many faces of flight discipline

Flight discipline exists in many forms and at many levels. It is found in the study habits or checklist adherence of each individual flyer, as well as in the decisions made in "top brass" offices of large organizations such as the FAA, commercial airlines, or within the military. It is at once an attitude and a behavior. As an attitude, the disciplined mind harbors no room for complacency, failures of preparation or unnecessary risk-taking. As a behavior, this

zero-tolerance attitude manifests itself in our every day decisions and actions. In one form or another, flight discipline exists within nearly every organizational entity that deals with aviation.

Organizations are key in the development of flight discipline, as they establish a culture within which individual flight discipline can either flourish — or perish. The following case study illustrates the many faces of flight discipline at both the organizational and individual levels.

Unfortunately, most of the examples highlighted are negative. These failures include organizational compliance with governing directives, failing to train aircrews sufficiently, and putting mission accomplishment ahead of peacetime safety on the institutional priority list. On the individual level, we see both external and internal factors at work upon the minds and bodies of the aircrew members, resulting in a failure to perform the most basic in-flight tasks. There is evidence of failed flight discipline during planning as well as in the air. In short, the following case study is illustrative of breakdowns across the entire spectrum of flight discipline. These errors are identified and discussed through the analysis of a much-publicized accident in the mountains of Croatia that took the life of 35 people. The purpose of this example is not to cast blame or disparage individuals or organizations, but rather to show how single failures of discipline can lead to a deadly chain of events. The details that follow provide ample evidence of the critical importance of inculcating flight discipline at all levels of an organization.

Fifteen seconds to impact

Captain A.J. Davis must have felt something was wrong. Perhaps it was a glimpse of rising terrain through a break in the cloud cover. Maybe it was just a sense that the crew must have over flown the missed approach point by now, which they were having great difficulty identifying. Or perhaps it was a verbal prod from the copilot, Captain

Tim Shafer — something like “Hey pilot, something’s not right here, let’s go missed approach.” Although we will never know what actually occurred in that final fifteen seconds, we do know that for some reason, Captain Davis added power and began a shallow turn to the right. (Coolidge 19, 30) While this intuitive correction was indeed appropriate, it was far too late.

At 2:47 p.m. local time on the third of April 1996, a United States Air Force CT-43A (Boeing 737-200) callsign *IFO 21*, slammed into the rocky slope of a mountain nearly two miles north of the intended airport at Dubrovnik, Croatia. All aboard were killed, including six Air Force crewmembers and 29 passengers — among which was the United States Secretary of Commerce, the Honorable Ronald H. Brown.

The significance of this accident lies not in the fact that a high-ranking US cabinet member was killed, or that a critical error was made at the moment of truth, although there are lessons for us there as well, but rather in the series of unforced errors which put the crew in the position for the lethal mistake. Only the final error was of the split-second, time-constrained type we train for in our emergency procedure simulators. The remainder of the

errors — the ones that built the labyrinth with only one exit — were made out of inattention, complacency, or convenience. In short, they were failures of discipline.

To aid in the analysis of these failures, we must view the event through several lenses, both organizational as well as individual. Throughout the analysis, possibilities are explored that may or may not have actually had a direct bearing on the crash itself. More importantly for our learning purposes, is the fact that these events **could** have contributed to this mishap. We study all possibilities to gain the maximum learning potential from this tragedy, in hopes of preventing the next. Factual analysis of provable cause-and-effect relationships has already been expertly accomplished by a hand-picked team of investigators. While their task was to look for the absolutes — as learners our task is to look at the *maybes*, and analyze the *what-ifs*. As with all of the case study analyses I write, there is no intent here to focus blame — although there is clearly plenty to go around — but rather to learn from these errors to become **better airmen**.

Background

The story of IFO 21 actually begins with a tale of two wars. Following the fall of the Berlin Wall and the end of the Cold War, dozens of airfields formerly considered primarily as targets by American military aircraft, suddenly became open to western traffic. Since western aviation personnel had little or no access to these formerly hostile airdromes, there were no instrument approach procedures that had been officially “approved” by western aviation standards. This led to some confusion as to what requirements had to be met for US aircraft to fly into these newly opened countries and airfields. More on that later.

The flare-up in the former Yugoslavia only made matters worse. As the war raged on, certain pieces of critical terrain changed hands several times. One of these was the Cilipi airport in Dubrovnik, Croatia. Since the days of Alexander the Great, it has been common practice for a withdrawing force to take a few goodies — the “spoils of war” — with it as it occupies or retreats from enemy territories. Such was the case with the precision approach capability at the Cilipi airport — the primary aerodrome serving the coastal city of Dubrovnik, through which hundreds of would-be peacemakers and various negotiators made their entrance into the still relatively unstable region. During the period of conflict from 1992 to 1995, the Instrument Landing System (ILS) and Very High Frequency Omnidirectional Range (VOR), and a third NDB were all stolen. (Coolidge 41)

The end result of all of this, was that the critical crossroads in this hot region was only serviced by one non-directional beacon (NDB) approach — the least accurate of instrument approach systems currently in use at major airports. Furthermore, the approach that IFO 21 would be required to execute, used two different NDBs to complete the approach and missed approach procedure. The NDB to runway 12 at Cilipi approach is depicted at Figure 1. It can be seen from this depiction, an aircraft flying this approach would require two Automatic Direction Finding (ADF) receivers to complete both the approach and missed approach — since regulations prohibit “cross-tuning” a single receiver after the final approach fix. The CT-43A has only one. While not exceedingly difficult, NDBs require constant attention and good approach planning to fly effectively, and have a high potential and margin for both pilot and equipment error. (Kelly 1) Theoretically, adequate crew and staff planning should

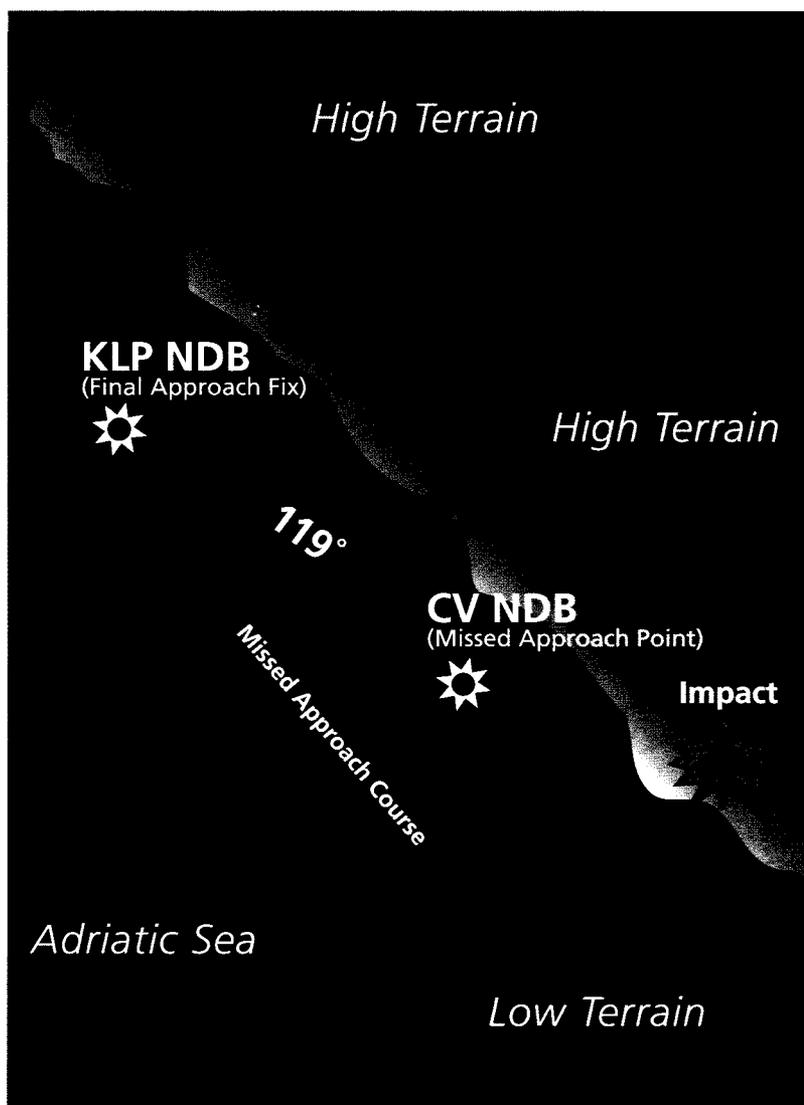


Figure 1. Approach and missed approach procedure

include a review of the equipment required to fly this approach, which would have quickly identified the CT-43 incompatibility. It did not. We will look into that failure more deeply in a moment.

So the composite backdrop of the accident reveals a relatively confusing and somewhat uncertain playing field, primarily due to the recent opening of the eastern block countries as well as the ongoing war in the Balkans. These circumstances presented unique challenges for all levels of command and supervision tasked with insuring safety while simultaneously completing the normal peace time military missions of the United States Air Forces in Europe (USAFE) as well as the peace-keeping operations in the former Yugoslavia. In order to properly analyse this scenario, we need to first understand the relationships between the major organizational players.

The players

The hierarchical command structure between the headquarters USAFE (HQ USAFE) and the 76th Airlift Squadron (76th AS) is fairly straightforward, although there are always several side players in any mission as complex as the one assigned to USAFE. Figure 2 shows the principle players in the decision process relating to airfield and instrument approach suitability for the newly opened countries which were not serviced by an approved Department of Defense (DOD) instrument approach procedure.

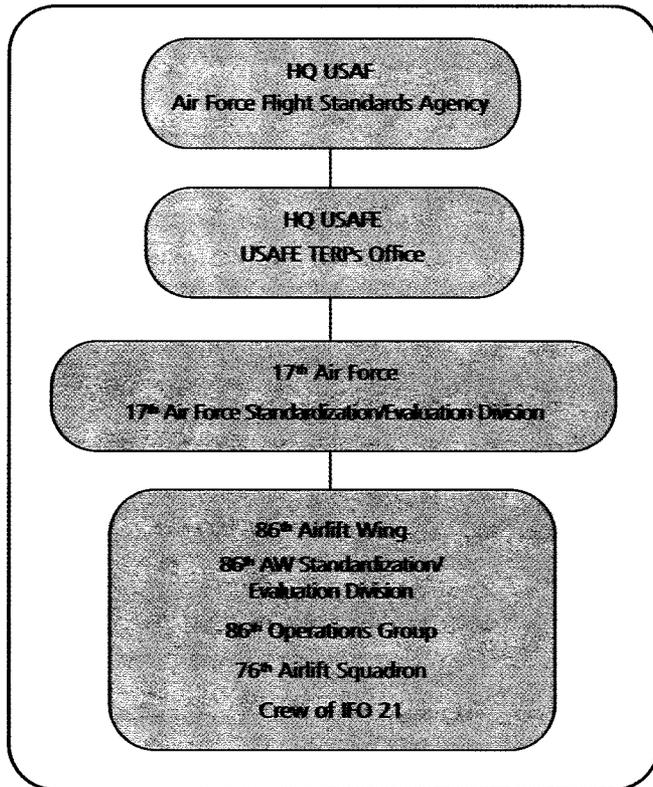


Figure 2. The organizational players in the crash of IFO 21

Organizational failures: A culture of non-compliance

There were several opportunities to break the chain of events which led to this tragedy at multiple levels of command and supervision. It is appropriate and illuminating to start at the upper echelons of command and work our way down to the aircrew level in this analysis. We will see that a willingness to accept less than full regulatory compliance occurs at all levels, and that an organizational culture of non-compliance may well have set the stage for the crash of IFO 21.

Although the formal investigation of the mishap focused a great deal of attention on the fact that the crew flew an instrument approach that did not meet U.S. Department of Defense standards, there were other factors that may

have been equally — if not more significant. A myopic or single-focus analysis does not tell the entire story. Accidents are seldom this simple, and this one is no exception. An organizational efficiency expert could probably find dozens of areas for improvement which were identified by the intense scrutiny brought on by this accident, but here we will limit our analysis to two organizational failures at echelons above the 86th Airlift Wing. The first was the failure to implement an effective Cockpit/Crew Resource Management (CRM) programme as required by a regulation nearly two years old at the time of the accident — as this was surely a CRM mishap if ever there was one. The second breakdown was one of enforcement, the inability of the command and supervisory positions at HQ USAFE and 17th Air Force to enforce their orders which told the 86th AW to stop flying to unapproved airfields. It is clear from the investigation that the intent of all echelons above the wing was for the 86th AW to stop flying to unapproved fields immediately upon notification, yet several months of non-compliance were allowed to occur before the cows came home on April third.

The final element of discussion revolves around the communication channels used — or not used — to enforce the directives. Some weak attempts at answering the “why didn’t you stop” question seemed to hint at e-mail as the culprit — and not people.

The remaining organizational and individual breakdowns of discipline will be discussed relative to elements internal to the 86th AW, concluding with the crew of IFO 21. Throughout the process there were opportunities to fix the problems and break the accident chain. Critical decisions were made at each of these junctures, and these decisions turned out to have life and death consequences.

Organizational failure 1: Failing to implement CRM training mandate

Cockpit/Crew Resource Management is the flight crew’s insurance policy against multiple failures within the hostile flight environment. It teaches aircrew members to identify, access, and utilize all available resources to safely and effectively complete mission objectives, and has been credited with documented and significant accident reduction wherever it has been thoroughly and systematically implemented. Although Air Force Instruction 36-2243, Cockpit/Crew Resource Management required aircraft and mission-specific CRM training for all Air Force crewmembers and had been in force for nearly two years, there was no USAFE CRM programme in place at the time of the crash of IFO 21. (Coolidge 61) This failure to provide the required training resulted in the 76th Airlift Squadron attempting to develop CRM training on its own. Even though this was a noble effort by hard working visionaries at the squadron level, this program clearly did not meet the requirements set forth by the existing regulatory guidance (AFI 36-2243, p. 6).

Because little of the official investigation focused on the lack of CRM training for the IFO 21 crew, and because of the documented effectiveness of the training, let's briefly review the content and history of CRM to demonstrate how important this decision — or non-decision — really was.

Analysis

Cockpit Resource Management is nothing more than a name given to a concept. The concept is simply to *maximize mission effectiveness and safety through effective utilization of all available resources*. What makes CRM unique as a training programme — and why its absence was so critical to this mishap — is the environment and target audience for which the training is designed. CRM is designed to train team members how achieve baseline measures of safety and maximum mission effectiveness in a time-constrained environment under stress. This was precisely the environment that Captain Davis and his crew found themselves in on 3 April 1996.

Organization	Accident Rates
Bell Helicopters Inc. (US Only Jetranger Pilots)	48% decrease
Petroleum Helicopters Inc.	54% decrease
US Navy	28 % decrease
US Navy, A-6 Intruder crews	81% decrease
US Air Force, Military Airlift Command crews	51% decrease

source: (Diehl 1992)

Figure 3. Accident Rates following CRM or Aircrew Decision Making Training

By *all available resources*, we mean just that, including hardware, software, printed materials such as regulations and flight manuals, people power (your own and others), the environment (sun, terrain, etc.), time, fuel, etc.. Research has demonstrated that many crew members cannot **identify** all of the resources at their command, let alone access them in a time-stressed or emergency situation. The multiple aircrew failures that occurred within the cockpit of IFO 21 are identified later in this case study, but exemplify a failure to effectively manage resources across this spectrum. *CRM training is designed to produce team members who consistently use sound judgment, make quality decisions, and access all required resources, under stressful conditions in a time-constrained*

environment. Aircrew members who are trained and practice good CRM can — and often do — overcome serious challenges in flight. Unfortunately, those that do not, often fail to respond effectively to the same challenges.

Aviators have been making poor judgments since the day Icarus decided to check out the maximum service ceiling of his new wings. In an Inspector General (IG) report from 1951, *Poor Teamwork as a Cause of Air Craft Accidents*, data from 7,518 major accidents taken between 1948 and 1951 (now that's a database!) determined "poor organization, personnel errors, and poor teamwork" resulted in the majority of aircraft accidents. The study further reported that "the human element...and effective teamwork is essential to reducing the accident rate." The IG report even went as far as recommending, a "teamwork training programme," but unfortunately for the crew of IFO 21, neglected to add a suspense date to the requirement for training. The aviation community re-focused on the need for some type of human factors training following the much publicized crash of a United Airlines DC-8 in Portland, Oregon, in December 1978. Attempting to ascertain the nature of a possible landing gear problem, the aircrew allowed the aircraft to completely run out of fuel while circling near the landing field on a clear night in good weather. The result of this re-focused attention was the amendment of Part 121 of the FARs allowing airlines to train what is now called CRM.

Following CRM implementation, air carriers began to notice dramatic decreases in their accident rates. Military application of these principles lagged behind our civilian counterparts, but in the mid-1980s, the Naval Safety Center and old Military Airlift Command (MAC) began to implement airline-style programmes — with **outstanding** results. The popularity of these programmes grew throughout the 1980's and early 1990s to the point where nearly everyone had some version of CRM. AFI 36-2243 sought to close the loop in MAJCOMs — such as USAFE — that had not yet gotten on the bandwagon by establishing a regulatory requirement for multi-level CRM training. For reasons unknown, USAFE did not recognize the potential benefits of CRM and were unable to follow clear guidance.

An analysis by a former NTSB accident investigator and senior official with the U.S. Air Force Safety Agency, examined accident data from several military and civilian examples. Each organization achieved a thirty to eighty percent improvement in accident rate from pre- to post-CRM training. Figure 3 illustrates these dramatic results. In spite of the mountains of evidence which suggests that organizations should embrace CRM — and the regulatory mandate of AFI 36-2243 — USAFE chose to ignore it or to put the requirement on the "back burner."

This curious disregard for an existing training requirement is only the first verse in a sad song of an organization who was incapable of fully implementing and enforcing governing regulations and policy. Should it have been a great surprise that subordinate organizations took the same cavalier attitude towards regulatory guidance? Oh, and one further question — Who was responsible for insuring that USAFE was implementing Air Force directives? Was there a failure of oversight here as well?

Organizational failure 2: Failing to enforce AM 206-11

Pilots do not question the reliability of printed instrument approaches — at least not until recently. They rely implicitly on the accuracy of the depicted approach plate to provide the required margin of safety above obstacles and terrain. But as discussed earlier, the opening of new airports in previously hostile areas caused the military to question the reliability of these new published approaches and to require a comprehensive safety review. “Air Force Instruction 11-206, paragraph 8.4.1 requires any instrument approach procedure not published in a Department of Defense or National Oceanic Atmospheric Administration flight information publication be reviewed by the major command Terminal Instrument Procedures (TERPS) specialist before it can be flown by Air Force crews” (Coolidge 51) — unless the weather is good enough for a visual approach. These distinctions are made to insure that approaches developed by sources unfamiliar to the US aircrews, meet or surpass our safety requirements. To say that this new restriction would negatively impact on the mission of the 86th Airlift Wing — who serviced the entire European region — would be a huge understatement.

Before we go any further into this discussion, the reader needs to know that if this process had been accomplished for the NDB Rwy 12 approach at Cilipi airport in Dubrovnik, Croatia, the TERPs specialist would have found an error of *at least 400 feet* on the minimum descent altitude (MDA) for the approach. (Coolidge 45) If the directives had been followed, either the crew would not have flown the approach at all, or they would have flown it with correct attitudes that guaranteed adequate terrain clearance. In either case, they would be alive today.

The new approach guidance went into effect in November of 1995, and the 86th AW Operations Group Commander immediately recognized its adverse effect on his units' ability to perform their mission. The 86th AW lands at many airfields where the only published approach is a “Jeppesen.” Jeppesen refers to a company which merely publishes approaches given to them by host nations, and they are

exceedingly clear on this point. In fact, Jeppesen publishes a disclaimer specifically stating that they “do not review or approve the adequacy, reliability, accuracy or safety of the approach procedures they publish.” (Coolidge 53) Yet there seemed to be some confusion on this point by several senior officers both at the USAFE headquarters and at the 86th AW, as the following email from the USAFE Director of Operations clearly points out.

the implications (\$\$ + manpower) of this 'new' guidance is significant... especially with all the... countries opening up!! What's the matter with Jeppesens... we've used them for years... don't our airline bro's use them all the time? (Coolidge 58)

Obviously, he did not understand — or choose to accept — the concept that Jeppesen was merely a reproducer of approach plates of dubious reliability. Somehow he equated the term “Jeppesen” with “safe” or “reliable” — a point the company itself goes to great lengths to avoid.

In spite of the impact and confusion surrounding the new regulation, the staff at USAFE headquarters had little choice but to notify their subordinate commands, including the 86th AW of the new requirements. As soon as he received and reviewed the new regulation, the 86th AW Operations Group Commander (OG) requested a blanket waiver to allow 86th AW crews to fly Jeppesen approaches to minimum weather criteria without the required TERPS review. Upon being advised of this request, the 17th Air Force commander “attempted to intervene” via e-mail to the 86th AW commander, indicating his disapproval of the waiver request.

Analysis

We begin to see the decision process revolving around and between three commanders. The lowest echelon (86th OG) seeing the impact on the mission as paramount, the upper echelon (17 AF commander) clearly concerned about safety (or the appearance of a less than proactive stance towards safety), and the “middle man,” the 86th Wing commander, curiously absent from this initial exchange. But what was really going on here? How can a Major General “attempt” to intervene in a subordinate's decision without being effective? The evidence indicates that the waiver request from the 86th OG went forward, in spite of the 17 AF commander's disapproval. It is clear that the 17 AF commander did not weigh-in with the full weight of his two stars, or the situation would have been over right then and there, and the 86th wing would have fell into compliance. For some reason, he did not, but it wasn't long before someone would get another chance to remedy the 86th AW's non-compliance.

Organizational failure 3: Failing to take "no" for an answer

On 2 January 96, the request to fly Jeppesen approaches without a TERPs review was denied by headquarters Air Force after a review by the Flight Standards Agency, and the rationale for the denial provided as follows:

The MAJCOM TERPS review of non-DOD/NOAA FLIP products before they are authorized for USAF aircrew use provides a reasonable and prudent balance between operational flexibility and instrument approach development requirements... Some country/regions have approach design/flight check procedures similar to those used by the USAF and probably require little in the way of "hands on" review. Other parts of the world use less reliable practices when applying their approach building procedures and would warrant a closer look... Proper approach development is one factor aircrews take for granted every time they fly an instrument approach. When planning all approach, our aviators assume that if they fly the approach as depicted, they will have adequate obstacle/terrain clearance. The requirements outlined in 11-206 will help us maintain that high level of confidence — we should keep them as they are. (Coolidge 53)

On 23 Jan 96, a Major from the USAFE Operations training division delivered the news directly to the 86th OG (via e-mail).

HQ AFFSA (Flight Standards Agency) has denied the... waiver request to AR 11-206, submitted to authorize use of Jeppesen approaches without MAJCOM review. The result of this is two-fold. 86th AW FCIF (flight crew information file) 95-20, as presently written, which authorizes the continued use of Jeppesen approaches, will have to be rescinded... Presently, with the waiver being denied and upon rescinding the FCIF, 86th AW aircrews will have no authorized Jeppesen approaches to fly.

Case closed? Not quite. About two hours after receiving the e-mail, the 86th OG crafted his own message to subordinate squadron commanders' as well as information copies to both 17 AF and USAFE operations offices, stating in part

This is a start — will await further guidance ... on fields we've never flown into. My view on this: Safety is not compromised if we continue flying ops normal until approaches are reviewed — then we rescind the FCIF. (Coolidge 55)

Although the 86th AW commander initially expressed some reservations about the response, he did not countermand his OG's order. In fact, the Accident Investigation Board Report determined that "credible testimony shows that the 86th OG commander's action to not rescind the

FCIF was taken with the concurrence of 86th commander." (Coolidge 55) Later, at an Operations Group staff meeting "the consensus from the squadron commanders and the chief of standardization and evaluation as that safety was not compromised, and Jeppesen approaches could continue to be flown pending... review." (Coolidge 55) In relatively short order, the 86th AW had thumbed its nose at higher headquarters. The FCIF that was directed to be rescinded on 23 January, was still in use on 3 April — the day of the mishap. It was rescinded on 4 April.

Analysis

To quote country singer Lorry Morgan, "What part of no don't you understand?" The clear and timely dissemination of the waiver denial was categorically dismissed with the concurrence of all relevant commander's in the 86th AW. Although it is highly likely that the lower echelon squadron commanders and chief of standardization/evaluation felt considerable pressure to go along with the boss's recommendation to ignore the waiver denial and continue "ops normal." What would prompt professional military officers — especially ones who had shown the mettle to climb through the ranks to command — to ignore clear directives from both headquarters Air Force and USAFE?

During the investigation for the mishap, two mitigating factors were surfaced to help explain the actions of the 86th AW leadership. First, it was stated that the initial e-mail from the USAFE training branch was an "informal notification" and therefore, did not need to be interpreted as a strictly enforceable order. This legalistic mumbo-jumbo doesn't wash — especially in light of the fact that the 86th AW was already operating in violation of a printed Air Force Instruction — as clear a piece of guidance as exists in the military. It was also pointed out that the e-mail did not contain three important pieces of information that may have changed their interpretation of the waiver denial. The e-mail did not include the information of who actually denied the waiver, it did not mention that safety was a factor in the decision, and third, that the same guidance had been given to all other commands. This excuse also rings hollow. In a military organization, a directive from higher headquarters is to be followed, even if it does not go into detail as to the decision process or include background information. Simply put, when a soldier is told to march, the feet should start moving — not wait for further persuasion or argue with the logic behind the order. This weak rationale for non-compliance sounds like a simply attempt to divert attention (and blame?) away from the responsible parties.

There were several other organizational issues that could be discussed, such as the failure of 17 AF to insure compliance in February 96 after their representative directly informed the 86th AW chief of standardization and evaluation to rescind the FCIF which allowed the aircrews to continue

flying unapproved approaches. However, in the final analysis none of these officers flew the aircraft into the ground, and no number of organizational failures can adequately explain the breakdowns of discipline at the aircrew and individual levels. Yet the multiple break-downs of the organization surely had some impact on the individual aviators who flew within them, and perhaps begins to explain the apparent disregard of directives which occurred at the aircrew level.

Aircrew failures

From the aircrew perspective, the portrait of the final flight of IFO 21 can be viewed as a collage of external pressures, busted crew rest, poor planning, mismanaged resources, violations of regulations, ignored or misapplied checklists and tech order procedures, distractions, lost situational awareness, and extremely poor judgment. For professional pilots, these guys had a *real bad day*. The accident investigation calls this collection of errors “uncharacteristic mistakes” which included “misplanning the flight... flying outside of a protected corridor... excessive speed and not having the aircraft configured by the final approach fix... beginning the approach without approval (clearance) and without a way to identify the missed approach point.” (Coolidge 60)

When you add to these errors the fact that the copilot willingly broke crew rest on two occasions, that the crew was apparently unaware of the active airspace restrictions contained in the special mission instructions (SPINS), that they did not have the required equipment to fly the approach into Dubrovnik, that they had scheduled less than the regulation minimum ground time at Dubrovnik, and that they did not properly manifest the passengers on board the aircraft — it seems that the accident investigation report may have understated the issue when it found “behaviors indicative of a reduced capacity to cope with the normal demands of the mission” were present in the crew of IFO 21. (Coolidge 60, 61) In documenting the crew failures, it is not enough to make a laundry list of errors, or to wag a condescending finger of blame at the dead pilots — who were certainly trying to do their best. We must look into the potential causes of these multiple failures.

External pressures and organizational influences

The flight to Dubrovnik was clearly not a “normal” mission for a crew from the 76th AS. The accident-investigation states “external pressures to successfully fly the mission were present, but testimony revealed a crew that would have been resistant to this pressure and would not have allowed it to push them beyond what they believed to be safe limits.” (Coolidge 59) What external pressures could have been responsible for such deviations from normal performance?

External factor 1: High operations tempo and culture of non-compliance

The 76th AS, and in fact all of USAFE, had been operating at a fever pitch for months, if not years prior to the mishap. The demands of the mission coupled with the military drawdown that has impacted negatively on all branches of the service, simply left too few people to do too many things. Like all good soldiers, each echelon from the senior commanders to the lowest ranking, of the enlisted forces, leaned forward to get the job done. This operations tempo may well have been partially responsible for other accidents and mishaps as well. As we have seen, this combination of high ops tempo and mission-oriented commanders began to create an atmosphere of “can-do at all costs” and caused some to blatantly ignore regulatory guidance in the sacred name of *the mission*.

It is impossible to isolate aircrews from this command atmosphere. In fact, the 76th AS squadron commander had been recently relieved from command by the 86 AW commander for “a loss of faith in his leadership abilities.” The relieved commander felt that he was relieved because “of his concern about flying General Officers and on allowing... missions to fly into potentially hostile fire areas.” (Coolidge 59) At least one aircrew member was clear in his opinion that the firing of his squadron commander did have an impact on how he approached the mission. “It does force you to find... more ways to get a mission done, I don’t know if that is good or bad, but it will get you to thinking of how — to preclude those problems as quickly as you can.” (Coolidge Tab EE1/12) The views of the former squadron commander stressed safety over mission accomplishment.

The wing commander may have felt that such views were interfering too strongly with the ability to accomplish the wing mission. The human factors representative on the accident investigation stated:

“there were indirect messages from the 86 Wing that even though safety was properly acknowledged and advocated in the formal sense, mission accomplishment... was foremost. Examples include (1) that when there was a safety stand-down day in October 1995, the 75th and 76th AS continued to fly scheduled missions, (2) the day following the mishap, the 76th did not stand down because missions had to be flown, (3) testimony that there was a constant struggle (with the wing) to lessen the flying per day so that the crews could train or obtain rest for the crews; and (4) they could not have a safety down day because there were too many missions to fly. (Coolidge Tab EE-1110)

Although the accident investigation report stated that “the replacement of the squadron commander and its timing (four days prior to the mishap) were coincidental

to this accident,” (Coolidge 59) it seems difficult to believe that squadron crewmembers would not perceive the firing of their boss for stressing safety over mission accomplishment as anything but a clear message to get the job done.

External factor 2: VIP passengers

Although this unit regularly carried distinguished and high-ranking passengers, the combination of a Presidential cabinet member and the flight into a recent combat zone carried certain pressures that were sure to effect the crew. On one previous documented occasion, the Commerce party had attempted to pressure a C-20 pilot to take a potentially unsafe course of action when scheduling difficulties were encountered. (Coolidge 59) The pilot of IFO 21 had demonstrated his capacity to stand up to pressures such as these on previous occasions, including a recent flight where he had transported the Presidents of Croatia, Bosnia-Herzegovina, and Serbia and had to divert from the intended destination of Sarajevo. It is unknown what pressures — if any — might have been generated by the Commerce party on this flight, but it is unlikely that it would have been enough to convince the crew to forsake safety for mission accomplishment by itself. As a contributor to the overall stress level on the crew, however, it could well have been a factor.

External factor 3: Multiple mission changes

A third external stress or that may have been more contributory was the multiple and late arriving mission changes to which the aircrew had to respond. Aviators are controllers by nature, and as such they abhor feelings of unpreparedness. It can be stated with some degree of certainty, that the crew was agitated — more likely damned mad — about the last minute changes to the high-profile mission. The accident investigation states “frequent changes to the mission itinerary contributed to the possibility of inadequate mission planning.” (Coolidge 59) Once again, this may be a significant understatement, and the mission changes may have had implications that go beyond mere planning factors. The multiple changes may have effected the basic physiological capabilities of the crew, by contributing to broken crew rest by the copilot — for certain — and perhaps other crew members as well. We will discuss the implications of that in a moment.

Although many, if not most, military missions experience changes prior to and even during, the mission, this flight experienced four separate major changes to the original itinerary, the last of which occurred on 2 April, the day after the crew had “completed” their official mission planning at Ramstein AFB. This may well have created a situation where the crew had to make difficult planning choices related to adequacy, thoroughness, and even regulatory

compliance. In fact, it is quite clear that these multiple changes forced the crew to do some mission planning well into the night prior to a 0330 (3:30 a.m.) mission show time on April 3rd.

Apparently, busting crew rest was almost commonplace in the 76th AS. The accident investigation revealed multiple cases of crews who felt the need to violate crew rest minimums to get the mission accomplished. Although the former squadron commander had tried to discourage this practice, he stated “every now and then I hear a trip report come back in and the crew — the aircraft commander will write how they made it happen, four hours away from crew rest. I know some of the guys are still doing that.” (Coolidge Tab EE I/ 11 1996)

Internal factors

While many of the factors that effected the crew of IFO 21 were beyond their control, such as the organizational climate of non-compliance, the potential pressure of flying a presidential cabinet member, and the multiple mission changes, there were also internal factors at play. The internal drive for success often found in high achievers like Captain Davis can often manifests itself in negative ways. A hesitancy — or even inability — to say “no” to a tasking from above is one such hazard. Another phenomenon that may have been occurring, was the fact that the pilot was on a rapid career upswing after a less than spectacular start in the 76th airlift squadron. He may have viewed this “second chance” as something he wasn’t about to mess up by failing to get this high profile mission accomplished. Although each of these internal factors may have played a small role in the crew’s sudden inability to cope with the mission demands, the most serious, and likely internal contributory factor was self-induced fatigue by the copilot, Captain Tim Shafer.

Internal factor 1: Fatigue

Fatigue can severely impair an individual’s performance, and in the cockpit of an aircraft, it can have lethal implications. Something caused multiple breakdowns on the crew of IFO 21, and based on the analysis of the copilot’s sleep pattern the night before the accident, fatigue must be considered as a likely contributory — if not outright causal-factor.

A former Air Force wing safety officer who specialized in training for the night environment points out the seriousness of fatigue to military pilots.

Fatigue is potentially the most serious human factor problem associated with...flying. Fatigue, fatigue recognition, quality sleep and fatigue management techniques should be a priority concern for everyone involved with ...flying operations. (Hoey 1992)

Hoey goes on to list several typical aircrew errors caused by fatigued pilots including despair, short temper, reduction in the will to work, loss of appetite (which can lead to hypoglycemia), **loss of the desire to interact with others** (emphasis added), mental depression, a defeatist attitude, and loss of memory. (Hoey 1992) This list of symptoms identifies several areas critical to successful and safe air operations, and may reflect possible causes behind the “uncharacteristic mistakes” aboard IFO 21 cited by the accident investigation report. Perhaps the most significant, is the finding of a reduced desire to interact with others, which could have been critical during those last few minutes.

Beyond the seriousness of impaired performance lies a more insidious effect of fatigue. Curt Graeber (1990) of the NASA-Ames Research Center states that fatigue not only contributes to serious performance errors, but that crew members can often not accurately assess their own fatigue levels, thereby rendering them less capable of self regulation. Graeber and Hoey’s conclusions demonstrate that fatigue may well have a serious impact on the interaction required for effective Crew Resource Management, exactly what was missing on the flight deck of IFO 21. Let’s take a moment to review Captain Shafer’s actions the evening of April 2, the night before the fateful mission.

At 2200L (10:00 p.m.) the night before the mission, Captain Shafer made a call to the European Operations Center — a controlling agency for the flight — and requested “the latest mission change.” He was verbally briefed on the change, which to his surprise added a whole new segment to the pre-planned mission. After his phone call, he was faxed a copy of Change 4, but only the cover sheet survived transmission. (Coolidge 11) This indicates that the copilot did not even begin to plan this added segment of the flight until less than six hours before show time for the mission — a clear violation of minimum crew rest periods. Pilot crew rest requires 12 hours off duty and eight hours of uninterrupted rest prior to showing for a mission. Anyone who has ever waited on technology to deliver a critical piece of information can just imagine Captain Shafer’s attitude as he watched the FAX stop after single cover sheet rolled off the hotel machine. Should he call back for a re-transmission? Should he wake the pilot and tell him they were being pushed too far, too late and recommend a safety of flight delay in the mission? Or did he say to himself, “The hell with it. I’ll suck it up and get the job done. I’ll hack the mission.”? There is no information available to indicate what the copilot did with the information after he received it, but a likely scenario would be that he proceeded to plan out the new segment of the mission. After all, why would he not have waited until morning to make the call if he did not plan on using the information at that time. If he did begin to plan the new mission segment, it would have taken a minimum of 45 minutes to an hour to put the new information together, meaning that he would

have hit the sack sometime around 2300 hours (11:00 p.m.). Assuming he went to sleep immediately, which is doubtful with the worries of the changed flight fresh on his mind, he would have had the opportunity for about four hours of sleep. But even this short period would not pass without interruption.

Sometime between midnight and one o’clock, a pilot who had recently arrived from Cairo called upon the co-pilot to return some personal items he had brought back from his trip. They talked for a few moments and the visiting pilot also gave Captain Shafer some mission planning materials the crew had prepared, trying to help out because they knew the crew IFO 21 was receiving late changes to the mission. If Captain Shafer went to sleep immediately, he would now be able to add perhaps 2 hours of sleep to the less than one hour he had already gotten. Although the accident report states that “it could not be determined if the copilot had sufficient sleep” it is clear from the testimony that he did not — at least in terms of Air Force regulations. How significant was this? After all, it was only a single crewmember and it was just one night.

Wilkinson (1965), a noted sleep researcher who studied human performance degradation following periods of sleep debt, noted that effects of sleep loss vary widely between individuals from essentially no effect to an almost complete breakdown of performance. In short, Capt. Davis, the aircraft commander of EFO 21, might well have been flying solo and not known it. On a normal mission, he might have hacked it, but the pressure was on and the numbers of distractions present on this approach would have challenged a well-rested and fully functional crew.

Internal factor 2: Pressing

If Captain Davis may have been flying with an impaired copilot, he may also have been competing with himself. He had recently seen a rapid upturn in his flying career progression, and may well have been trying to demonstrate that he deserved it. It hadn’t always been so. After his arrival at Ramstein in 1994, the squadron commander of the 76th had noted that Captain Davis “did not display adequate procedural knowledge — for upgrade to aircraft commander.” (Coolidge 35) In fact, the commander did not approve his upgrade during his entire eight months in command. However, about five months later, in October of 1995, Captain Davis did upgrade to aircraft commander. Less than three months following this upgrade, he was granted a waiver by the Operations Group Commander (for insufficient flying hours as an aircraft commander) and was upgraded to instructor pilot (IP). He completed his instructor checkout on 15 February 1996, *and less than one week later* the Operations Group Commander approved another waiver of requirements to upgrade Captain Davis to evaluator status — the military equivalent

of a check airman. So while Captain Davis had labored in obscurity for nearly 13 months as a copilot, his fortunes had changed dramatically recently. In less than four months, he had upgraded sequentially to aircraft commander, instructor pilot, and evaluator pilot. Although Captain Davis may have been a late bloomer, he was on his way now. As the lone evaluator pilot in the 76th AS, he knew he was viewed as the guy who could get things done. He had come along way in a short time, perhaps too short. This scenario of rapid advancement, may well have set the stage for a hazardous attitude known as "pressing."

Pressing is defined as an unwarranted — and occasionally obsessive — drive to accomplish flight objectives. It has also been called *get-home-itis*, *get-there-itis*, or *mission-itis*. By any name, it can lead to unsafe conditions associated with poor risk management. When a pilot presses, he or she places more emphasis on mission accomplishment, and less on safety. The implications are obvious. But would this scenario drive a normally good pilot into a region of bad judgment, one that could lead to the incredible series of "uncharacteristic mistakes?" Perhaps not on its own, but when coupled with a fatigued copilot, and a few unexpected distractions...

Internal factor 3: Distraction

One of the greatest enemies of the aviator is channelized attention, or the inability to rapidly scan and process multiple inputs, commonly referred to by pilots as *crosscheck*. There can be many reasons for channelized attention and lost situational awareness, but the most common is simple distraction — a phenomenon which the crew of IFO 21 was about to deal with in abundance. The accident investigation report explains the source of these distractions. "During the flight from Tuzla to Dubrovnik, the mishap crews misplanning of the route caused a fifteen minute delay in the planned arrival time (an unpardonable sin when transporting VIPs). Pressure may have begun to mount for the crew to make the scheduled arrival time, especially because responsibility for the delay now rested with the crew. As IFO 21 neared the final approach fix, there were two additional distractions: a delay in clearance to descend from 10,000 feet and external communication with a Croatian aircraft, 9A CRO." (Coolidge 60) Testimony indicates that as IFO 21 approached the final approach fix, the pilot of 9A CRO asked them to switch frequencies and proceeded to explain an "unpublished circling procedure" that he had used to get the US Ambassador to Croatia and the Prime Minister to Croatia on the ground only an hour earlier. It appears that the aircraft commander was hand flying (autopilot off) the aircraft and simultaneously talking to the Croatian pilot. The copilot was talking on the tower frequency and most likely running the checklists. Neither was adequately preparing to fly an NDB approach to Cilipi airport.

Final approach

The post accident analysis of radar tapes and aircraft wreckage indicates the following sequence of events took place as IFO 21 passed the final approach fix. The aircraft crossed the final approach fix without clearance and approximately 80 knots above the flight manual final approach airspeed of 133 knots. In addition to being hot, they began tracking approximately nine degrees left of the final approach ground track. The copilot was not backing up the aircraft commander with his navigation instrument settings, and neither pilot had any way of identifying, the missed approach point. At this point, still four minutes from mountain impact, the crew was clearly well behind the aircraft. In addition, their high airspeed was limiting their time to fix the problems and salvage the approach. A well disciplined and normally functioning aircrew should have realized the danger and executed some version of a missed approach at this time — but the crew of IFO 21 pressed on. The crew eventually slowed the aircraft to 150 knots, and descended to the minimum descent altitude (MDA) of 2150 feet. But these actions were being taken at the expense of accurate course guidance. The aircraft was still tracking nine degrees left of course, the weather was poor, and Murphy was waiting patiently on a 2300 foot peak less than 4 miles away at their twelve o'clock position. Simply stated, the crew had broken down as a team entity, and the pilot's individual crosscheck was failing.

The missed approach procedure for Dubrovnik requires a right turn and a climb to 4000 feet, and is identified and executed at the "CV" NDB locator. Post accident analysis found the single ADF receiver on board IFO 21 was tuned to the KLP beacon — which was required for course guidance. In the absence of a second ADF receiver, the crew was unable to identify the missed approach point, and as a result overflew it without executing the required procedure. Although there are several unauthorized procedures that the crew might have been attempting to use to identify the missed approach point, including timing, inertial navigation system coordinates, cross-tuning the single ADF receiver, and visual identification — whatever procedure they used, if any — failed them. The final failure of discipline had occurred, and the crew impacted the rocky mountainside more than one nautical mile past the published missed approach point, killing all aboard.

An analysis of the crews actions and failures

The crew of IFO 21 got behind the aircraft and never caught up. The lack of a complete crosscheck at regular intervals has been responsible for a multitude of pilot-error accidents (Nance, 1986). Fatigue and distraction appears to exacerbate this tendency. Alluisi (1967; 1972) found weighted tasks, those with high priority, caused the fatigued operator to attempt to maintain his performance

on the task deemed most important at the expense of secondary, or less important tasks. This is especially dangerous in aviation where “less important” tasks are just as potentially lethal as those considered “primary.” In this case, the need to get the Secretary on the ground by a certain time, may well have been deemed the most important task. By focusing on it, the crew — quite probably degraded by the copilot’s fatigued state — was unable to function up to normal standards. More significantly, they did not realize the danger of their degraded performance in time to save their passengers or themselves. A combination of a late descent, poor planning which added the pressure of a late arrival, and a relatively difficult approach set the stage for a breakdown of the basic crosscheck and checklist discipline required to fly a safe instrument approach. All of this could have been solved with a single trip around the holding pattern.

An analogy might help in understanding what happened to IFO 21 in those last few minutes. Aviators have been compared to jugglers who are required to simultaneously juggle several different colored balls (tasks). Red balls are primary tasks, require constant attention, and are potentially lethal within seconds. An example of a red ball on this mission was executing the missed approach at the CV locator. Yellow balls are secondary tasks and require frequent but not constant attention — but they will turn red if disregarded. Accomplishing the descent and before landing checklists in a timely manner, and getting clearance for the approach were examples of yellow ball tasks. White balls sit next to the juggler, to pick up *if and when* there is time and attention available. They are external demands or pressures and influences, such as the concern for getting Secretary Brown down on time. They must *never* be allowed to interfere with the real show — the red and yellow balls that are in motion. As the juggler gets tired or distracted, a ball drops. In this case the first balls to drop were the yellow ones — the normal procedures for reviewing an approach, obtaining clearance, and the normal procedures checklists. These yellow balls eventually get picked up — but at the expense of attention needed to keep track of the one truly red ball on this approach — the missed approach point.

The deadly chain of failed discipline

From the moment that USAFE decided they could not find the time to implement the mandated CRM training, they were in effect making a decision to operate at a higher than necessary risk level. When the 86th Airlift Wing decided not to comply with the directive to stop flying Jeppesen approaches that had not been reviewed by DOD instrument specialists, they too made a decision which put all of their aircrews in a region of increased risk. The failure of several levels of oversight to insure compliance on both of these decisions; demonstrate that adequate checks were not in place.

On an individual level, the aircraft commander of IFO 21 allowed his crew to be pushed into a very small corner by accepting mission changes that they did not have time to adequately plan. This resulted in a failure to identify the fact that the CT-43 did not have the required equipment (two ADF receivers) to fly an instrument approach into Dubrovnik. There may have been considerable external and internal pressures at play, but as always in aviation, the buck stops with the pilot in command.

The copilot failed as a team member by not pointing these items out to his aircraft commander, and by violating clearly established crew rest criteria. As a result, he was not as sharp as he needed to be to at the moment of truth. He did not adequately back up the aircraft commander on the approach, failed to accomplish required checklists in a timely manner, and failed to advise the aircraft commander to go missed approach as the situation deteriorated and the crew lost situational awareness.

Good Intentions

All of these decisions were made with good intentions. At the MAJCOM level, CRM training was just not a high priority. Manning was down, operations tempo was up, there were just too few resources to go around. At the wing level, the mission came first. Each tasking was important, and the new restrictions got in the way of priority one — getting the job done. The pilots of LFO 21 were clearly aware of the heavy emphasis on the mission, especially in the wake of their squadron commander being relieved of command. They knew the importance of the Commerce Secretary’s mission, and were just trying their best to be “can-do” team players. But good intentions are not sufficient rationale for poor discipline, and that is why this case study is so effective for our learning purposes. As aviators — or those responsible for aviation policy — we must clearly understand and follow established guidance. We must practice sound flight discipline. The road to hell is paved with good intentions.

A final perspective: The tough questions

If Secretary Brown had been delivered in one piece, would we still view this event as a case of misplaced priorities — or as a positive demonstration of a “can-do” attitude? Would Captains Davis and Shafer have professionally benefited from a couple of letters of appreciation from the Secretary’s office, or gotten a wink and a pat on the back from the senior staff if they had successfully flown the “special circling procedure” given them by the pilot of 9A CRO? Would all be forgiven and forgotten if they had hacked the mission? Simply put, does the result of a decision — or string of decisions — determine the legitimacy of the process used to get there? Have we reached the point in our decision making processes where the end truly justifies any means of achievement? Has the unwritten motto in aviation at all levels of command become

“don’t get caught?” Before you trivialize these questions, ask yourself how many “small infractions” you have witnessed — or perhaps been a part of — during your career that were necessary to “get the job done.” Then ask yourself how you would sleep at night if the result had turned out like the one described in this case study.

One final point that should be made is that this case study (as well as my last one) represent *caricatures* of poor judgment. That is to say, the failures in this case were obvious, large and easy to recognize — they stood

out like a cartoonist’s rendering of W.C. Field’s nose. But most failures of discipline are much more difficult to analyze — or even to identify, and it *these* failures which are the most prevalent and dangerous to our day to day operations. Sometimes just acquiescing to a bad idea can be a fatal link. The British novelist and philosopher C.S. Lewis makes this point clearly when he states in *The Screwtape Letters*, “indeed the safest road to Hell is the gradual one — the gentle slope, soft underfoot, without sudden turnings, without milestones, without signposts.”

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*One of the tests of leadership
is the ability to recognize a
problem before it becomes
an emergency.*

—Arnold Glasow
