Flying Safety

Flight Safety, Army Style

The Israeli Approach to Safety

Flying Safety the Marine Corps' Way

Germany's Flight Safety Program

SEPTEMBER 1992

Worldwide Safety Programs

Naval Aviation Safety . . . From Blue Water to Blue Skies

THERE I WAS

LCDR KEVIN B. LYNCH
Courtesy *Approach*, July 1992

■ So there I was, in the North Atlantic, loving life but hating my dry suit. The water temperature was 47 degrees F. No options, just curse and bear it.

We had just completed initial DLQs for my new copilot and were going for a Helo Inflight Refueling (HIFR) qual. My copilot had done HIFRs previously. The Aegis cruiser was making 28 knots steaming in formation with three other small boys. Though true winds were from behind us, relative winds were 10 degrees to port at 15 knots. After a smooth hookup, my copilot positioned the helo for the fuel transfer. As he flew formation with the ship's flight deck, salt spray began to build up on the windscreen.

Although the hose was charged, I was sure we weren't taking on fuel because the fuel indicators were not climbing. I had the crewmen doublecheck the connection and asked the ship to verify they were pumping. Both crewmen confirmed the HIFR system was connected and pumping. I heard a loud, dull thump come from the after station. I asked the crewmen if the hose had separated from the Wiggins fitting because it sounded as if something had banged on the cabin floor. When the first crewman said no, I got my first inkling that something bad was about to happen.

I checked the gauges; everything was normal. Since we didn't really need the fuel and it appeared as if we weren't getting any, I decided to call it quits. That's when *it* happened. *It* sounded like tree limbs going into a chipper. (It was most likely an engine failure due to FOD or fatigue. Ed.) Having heard that sound before, I called for full power while pushing both speed selectors forward. There was a big torque split — I mean really big — like no. 1 engine working and no. 2 engine resting. I stopped my scan when I saw Nr at 90 percent.

I heard the crewman call for an

continued, page 2

UNITED STATES AIR FORCE

Flying SAFETY

SEPTEMBER 1992

AIR FORCE SPECIAL PUBLICATION 127-2

VOLUME 48, NUMBER 9

page 3

page 15

page 21

SPECIAL FEATURES

REGULAR FEATURES

CONTRIBUTIONS

Contributions are welcome as are comments and criticism. No payments can be made for manuscripts submitted for publication. Address all correspondence to Editor, *Flying Safety* magazine, Air Force Safety Agency, Norton Air Force Base, California 92409-7001. The Editor reserves the right to make any editorial changes in manuscripts which he believes will improve the material without altering the intended meaning.

DEPARTMENT OF THE AIR FORCE • THE CHIEF OF SAFETY, USAF

PURPOSE —*Flying Safety* (ISSN 0279-9308) is published monthly by the USAF, Norton AFB CA 92409-7001, to promote aircraft mishap prevention. Use of funds for printing the publication has been approved by Headquarters, United States Air Force, Department of Defense, Washington, D.C. Facts, testimony, and conclusions of aircraft mishaps printed herein may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. All names used in mishap stories are fictitious. The contents of this magazine are non-directive and should not be construed as regulations, technical orders, or directives unless so stated. **SUBSCRIPTIONS** — For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Changes in subscription mailings should be sent to the above address. No back copies of the magazine can be furnished. **REPRINTS** — Air Force organizations may reprint articles from *Flying Safety* without further authorization. Non-Air Force organizations must advise the Editor of the intended use of the material prior to reprinting. Such action will ensure complete accuracy of material amended in light of most recent developments. **DISTRIBUTION** — One copy for each six aircrew members. One copy for each 12 aircrew support and maintenance personnel. Air Force units must contact their base PDO to establish or change requirements. AFSP 127-2 is entered as a publication at the Second-Class rate at San Bernardino Postal Service, 1900 W. Redlands Boulevard, Redlands, CA 92373 and additional entries. **POSTMASTER:** Send address changes to *Flying Safety*, AFSA/SEDP, Norton AFB CA 92409-7001.

THERE I WAS

continued

emergency breakaway and noticed we were entering forward flight. My copilot was maintaining the helo in ground effect as he increased airspeed. I declared an emergency to the ship and asked them to stand by. I jumped on the controls momentarily, more to make me feel better than as a result of my copilot's performance. Realizing how well he was doing, I released the controls and became the cheering section. When he called out 80 knots, I told him to start a climb.

As we passed through 100 feet, the popping stopped and no. 2 engine began to show signs of life again. The torque split had decreased to about 20 percent.

My copilot maintained single-engine airspeed and climbed to 500 feet. Since we were flying and the water was going in the right direction (away from us), the aviating and navigating were under control. It was time to communicate.

After quickly discussing our options with the crew, I told the ship of our intention to return to the CV. Feeling confident that we weren't going into the water, I decided to see if the engines could be matched up. I set them at 104 percent Nr and headed for mother.

Now some may think it unwise to make a 48-mile transit to a CV, passing up two small decks along the way, but losing an engine during a run-on landing to the CV seemed less dangerous than losing an engine on final to a small boy without a waveoff option. Both engines stayed on-line during the return trip, and we landed.

If the water is cold, wear your dry suit. Seeing the water 15 feet below me with 90 percent Nr was uncomfortable, but being in 47-degree water would have been more so.

Fly the brief. Everyone responded as we had briefed, making it easier to cope with the emergency.

Keep the entire crew involved in the decision process. We all agreed on the decision to return to the CV, discussing different "what if" scenarios throughout the transit. This kept everyone from breathing a sigh of relief prematurely.

Nothing beats experience. Having had a similar emergency earlier in my career, I didn't wait for any secondaries. Immediately going to full power kept us airborne and out of the water.

Aircrew Coordination Training (ACT) works. As a former ACT instructor and disciple, I'm convinced the program's pluses well outweigh its minuses. When responsibilities are assigned and understood in the brief, people will perform superbly in both their normal duties and during emergencies. ■

LCdr Lynch flies H-3s with HS-9.

FLIGHT SAFETY, ARMY STYLE

CMSGT ROBERT T. HOLRITZ
Technical Editor

■ It's hardly surprising the Army's safety program is geared toward ground operations. After all, unlike the Air Force, ground troops operating highly mobile tanks and equipment conduct the majority of Army operations. What is interesting is the Army's ground safety program is largely a spinoff from its highly effective flight safety program. In fact, the Army Safety Center, headquartered at Ft Rucker, Alabama, began as the Army *Aviation* Safety Center.

To understand how the Army's flight safety program works, I visited the National Training Center (NTC) at Fort Irwin, California. Located 20 miles south of Death Valley in the Mojave Desert, NTC provides Army units with some of the most realistic combat training possible. NTC was the place many of the ground forces who fought in Operation Desert Storm received their training.

At NTC, there are 12 deployments each year. During these deployments, units engage the "Opposing Force" — a unit permanently assigned to NTC and specially trained in the tactics expected to be used by potential enemies. The Opposing Force is out in the field for 20 days per month — 12 months a year.

Although realistic training is usually at the cost of increased risk, NTC has maintained an impressive safety record both on the ground and in the air. According to CW-4 Thomas P. Gadomski, the installation Air Safety Officer, "During the past 10 years, there has been a rapid increase in safety orientation toward the ground side of the house. Even during the Vietnam era, the Army had flight safety officers. But in the combat environment, the ground side was kind of ignored. This was unfortunate because, historically, except for Korea, we lost more people to accidents during combat than to enemy fire. Today, on the ground and in the air, safety receives the same emphasis during combat as in peacetime operations.

"We have taken lessons learned during Vietnam and Operation Desert Storm about safety in combat.

continued

The Army's flight safety program evolved from lessons learned during the Vietnam War.

FLIGHT SAFETY,

continued

During our training, each aircraft is monitored by a safety observer/controller either in the aircraft or in an accompanying aircraft. The Army has established guidelines where the observer/controller can give administrative kills for safety violations. This denies the commander the use of the aircraft for the duration of the exercise."

In addition, the Army places a high priority in preventing any friendly fire casualties. If an incident occurs during training, even during simulated combat, a thorough investigation is conducted by the safety officer.

Safety Officers

In the Army, the technical expertise for the safety program is with the warrant officers. As aviation warrant officers progress in rank, usually prior to reaching CW-3, they must choose one of three fields — flight instructor, maintenance, or safety. This specialization provides the Army with a corps of highly experienced safety officers. For example, CW-4 Gadomski has been a safety officer continuously for the past 13 years. While he still flies, he is a staff officer whose duties are strictly flight safety.

CW-3 Glenn F. Asbell is the safety officer for the 3/159 Aviation Battalion. Unlike CW-4 Gadomski, he has been a safety officer for less than a year. At the unit level, he is also responsible for running the unit's ground safety program. As with the Installation Safety Officer, the Unit Safety Officer spends a lot of time behind the desk.

According to CW-3 Asbell, "I still fly, but not as much as I'd like. One of the important things for a unit safety officer is to be just one of the

ARMY STYLE

Realistic training provided at the Army's National Training Center, Ft Irwin, California, paid great dividends during Desert Storm.

guys when it comes to flying because you get a better feel for the way things actually are. You can spot all the trends starting to develop before they result in an accident. But there are a lot of administrative requirements, and the more time you spend at the keyboard and in the manuals, the less stick time you get. Hopefully, once I get more experienced and feel more comfortable with the job, I can fly more."

Risk Analysis

Risk analysis is a term familiar to most Air Force safety folks. At NTC and all Army training posts, a risk analysis is conducted before *every* combat exercise. The importance of risk analysis can easily be understood when one considers the involvement of thousands of troops, hundreds of pieces of equipment, and sometimes more than a hundred Army aircraft which are involved in these extremely realistic exercises. Then, add the participation of other services' aircraft to the equation.

According to CW-4 Gadomski, "In the Army, risk analysis is an important part of every mission. During the analysis, we evaluate many factors such as the type of aircraft, experience levels of the aircrews and ground personnel, night vision goggles, weather, number of personnel involved, and the type of mission. In addition, we look at the unit's endurance program. Unlike the Air Force, which has strict guidelines for crewmember endurance, in the Army, each unit has its own program which is largely dictated by its mission.

"We then present the analysis to the commanders of the deployed unit and the operational group (Opposing Force). At this time, we make recommendations to help lower the risk such as waiting for better weather, or using more experienced crews, or perhaps using better instrumented aircraft."

Mr Gadomski added, "In fact, unlike the other services, we do a risk analysis on every mission we fly at the training center. Low risk missions are approved by the operations officer, medium risk missions require the company commander's signature, while high risk operations must be approved by the battalion commander."

Investigation Boards

Unlike the Air Force mishap board members who are assigned temporarily, the Army uses centralized accident investigation boards. These boards are composed of only safety officers with many years of prior safety experience. There are two types of mishap teams — ground and flight. Headquartered at the Army Safety Center, Ft Rucker, Alabama, their main duty is to investigate accidents. While the Air Force has considered this concept, it seems to lend itself better to the Army because of its mission and relatively limited types of aircraft.

Serious Business

Just ask any soldier. The Army takes its safety programs seriously. What started as a flight safety program during the Vietnam war has emerged into a highly effective, integrated safety program. That is, flight safety and ground safety are molded together in an effort to make the battlefield, both in the air and on the ground, safer for the good guys and a deadly environment for the enemy. ■

Whether training or in actual combat, safety is paramount for the Army.

The Israeli Approach to Safety

COL L. OHAD NOY IAF CHIEF OF SAFETY
Air Force Safety Agency

■ The objective of all Israeli Air Force (IAF) flight safety activities is to preserve the airborne fighting force by reducing the number of mishaps in which aircraft and aircrews are lost. Safety is an integral part of operations — aircraft which do not return to base, or return damaged, interfere with operations, in both the long and short term.

Safety program management is based upon and emphasizes mishap *prevention*.

Data is a Cornerstone

The gathering of data and information is the cornerstone of the IAF safety program. Due to its size and, consequently, the small number of serious mishaps which occur in any given year, it is difficult for the IAF to gather and analyze valid and reliable statistical information.

The IAF has developed an important information-gathering tool which is based on a massive reporting of safety *incidents*. Incident reporting holds the following advantages when compared to mishap reporting:

■ The number of incidents is 10 times that of mishaps, if not more. These incidents provide a broad statistical base for the analysis of mishap causes and characteristics.

■ The cost of incidents is minimal — at most, a moment of fear, whereas the cost of mishaps can reach tens of millions of dollars, at best or, worst case scenario — result in the loss of human life.

■ All necessary information can be obtained following incidents — crewmembers are still alive and investigative equipment such as the VTR is readily available. This is in

Moreover, history has proven those squadrons which are careful to report incidents were those which also succeeded in reducing their mishap rates. Some of the more useful benefits of reporting incidents include:

- A daily review of the previous day's incidents, followed by the identification and immediate handling of safety problems, which includes activation of headquarters and command elements (technical malfunctions, ATC, command and management, etc.).
- The IAF Central data base is capable of issuing warnings regarding dangerous trends which may be developing. Information can be obtained according to any cross-section or topic. Information regarding incidents is reported via telegram addressed to the IAF Safety Center.

Mishaps are investigated by special investigation boards on either the base or branch levels.

Data Classification

The Paretto* method, based upon mishap/incident categories, is used to classify mishap/incident data. The main areas are midair collision, CWG, loss of control, etc. Initially, the Paretto method classifies information according to the quantity of incidents and, then, the Paretto method is applied according to financial cost or number of casualties.

* Paretto was a 19th century scholar who developed the 80/20 Rule, where 20 percent of the contributors are vital to the process while 80 percent have only a trivial impact.

The Paretto classification provides a clear safety picture and helps decision makers determine priorities in terms of command decisions and the allocation of resources and safety prevention programs.

Data Analysis and Remedial Actions

Once the major mishap or incident classifications have been determined using the Paretto method, an Air Force team is assigned to conduct an indepth analysis of the causes underlying and leading to mishaps and incidents.

These teams are composed of the commanders of different squadrons (combat, helicopter, and transport) and other IAF headquarters' officers representing the training or weapons departments. Once on a team, the IAF Safety Center, the IAF Logistics Division, etc., are led by various base commanders.

These teams are established to present to the commander of the IAF an analysis of the events, conclusions which can be derived, and recommendations to improve the current situation and to prevent similar incidents in the future. Recommendations can relate to training, exercises, procedures, weapons, maintenance, etc.

Coming Full Circle

The circle closes through continued reporting and followup of the mishaps and incidents and im-

continued

contrast to fatal mishaps where it is often difficult to reconstruct from the wreckage the exact sequence of events which produced the mishap and its causes.

- An environment which encourages reporting of even the most insignificant incident is also conducive to truthful investigation and mishap prevention methods. Here, too, this environment is in contrast to one in which incidents are not reported, and official policy is to establish fault and punish accordingly. Squadrons which have the highest reporting levels are respected.

The Israeli Approach to Safety

continued

plementing the elements of the safety program. In addition, the new situation is continually evaluated and analyzed for continual improvement (according to the TQM philosophy).

The IAF also dedicates efforts to relatively "small" items such as bird strike damage and FOD. In these areas, the IAF has succeeded in reducing its rate of damage by over 80 percent during a 5-year period only.

Base safety officers are appointed and are responsible for the handling of safety issues on the base level. Their areas of responsibility entail mishap investigations, training, control and supervision, and reporting and coordinating base safety efforts.

ISRAELI SAFETY MANAGEMENT AND TQM

"Safety management" is but a single instance of TQM (total quality management) which is based upon a number of common principles including:

- All levels of IAF manpower, processes, and outputs are guaranteed and secured.
- All IAF commanders and their staffs are required to adopt the management tools and methods stipulated by this approach.
- All levels of commanders, officers, and enlisted men are required to accept responsibility for the quality of their outputs and the processes or procedures in which they are involved. Consequently, quantitative criteria must be established to measure qualitative improvements, including safety.
- Major emphasis must be removed from a reliance on criticism and policing activities and placed on the formulation of quality and safety as essential elements of those processes which impact on the quality of results, operations, and safety.
- TQM, in general, and safety, in particular, constitute an ongoing and perpetual process of improvement, designed to reduce malfunctions and mishaps to an absolute minimum.
- Subordinates must overcome their fear, and openmindedness must be encouraged and promoted within the organization.
- The assimilation process involves a cultural change in the IAF. Resources required to achieve this change must be made available.
- The success of the process is dependent upon the commitment and involvement of senior IAF officers, in field and headquarter echelons alike.

The objective of Israeli Air Force flight safety is to preserve the airborne fighting force by reducing the number of mishaps.

Mishap Investigations

Inasmuch as the IAF places major emphasis on mishap prevention, it dedicates significant efforts to in-depth investigation of its mishaps. Special investigation boards (IB) are appointed for the purpose of compiling findings, determining the actual mishap causes, analyzing these findings, and presenting recommendations which will eliminate or reduce the possibility of similar mishaps occurring in the future. The IB is accompanied by a professional investigator from the IAF Safety Center who has been specially trained and has acquired a good deal of experience over the years in mishap investigation.

An interesting innovation introduced by the IAF Safety Center is the investigation of each severe (Class A) incident (an incident which could have produced a Class A mishap) as if it were, indeed, a mishap. By so doing, we have significantly increased the number of indepth investigations conducted.

Most mishaps/incidents which are not Class A are investigated by the base safety officer who receives professional assistance from the IAF Safety Center, as required.

Mishap reports are circulated among decision makers at IAF headquarters who comment upon the investigation and its recommendations. Finally, the commander of the IAF approves the recommendations which, following approval, become action items.

Additionally, the IAF is constantly trying to learn from the experience of other air forces. By so doing, it expands the scope of its data base.

Marketing and Publications

The IAF Safety Center devotes significant efforts and resources to safety marketing. Some methods used include:

■ **Video Cassettes** A bimonthly video cassette which documents and depicts the major incidents and mishaps which occurred in this period is sent to all squadrons. Mishap pilots are interviewed. This cassette has proven to be quite a "hit." It is viewed by entire squadrons and is an immediate and effective instructional tool.

■ **Safety Quarterly** A safety quarterly is issued by the IAF Safety Center to each of the respective fleets — combat, helicopter, and transport.

Additionally, a one-page flier is distributed biweekly in which the major incidents/mishaps of the 2-week period are reviewed. Special emphasis is placed on one safety-related issue such as a particular incident, winter preparations, bird migrations, etc.

The Israeli Air Force has succeeded in reducing its Class A mishap rate by 80 percent over the past 20 years — by 60 percent over the last decade alone.

Conclusion

The IAF has succeeded in reducing its Class A mishap rate by 80 percent over the past 20 years — by 60 percent over the last decade alone!

The operational implications of this reduction are hundreds of aircraft and crews which have remained operational as part of a prepared fighting force. An additional byproduct is the saving of billions of dollars. This is an ongoing and systematic process leading to continuous improvement and increased safety and operability. ■

The Israeli Air Force is constantly trying to learn from the experience of other air forces. By doing so, it will continue to improve its mishap rate.

FLYING SAFETY . . .

THE MARINE CORPS' WAY

PEGGY E. HODGE
Assistant Editor

It can do what no other DOD attack aircraft can . . . stop motionless in air. It can lift straight up on takeoff, and it can stop *before landing*. This aircraft performed very well in Operation Desert Storm and today gives the Marine Corps greatly enhanced multi-role airpower from austere forward deployed sites. Coupled with its small size, unusual shape, and smokeless engine, the Harrier is a tough opponent in any dogfight.

■ The unique capabilities of the Harrier, along with the F-18, C-130, OV-10, CH-53, CH-46, UH-1, and AH-1 help make it possible for the Marine Corps mission to succeed. Along with the necessary aircraft, their mission requires its troops to deploy as a self-contained unit. This means a Marine Corps' squadron must be able to safely accomplish **all** operation and maintenance. Let's look at how this concept naturally affects their structure, operation, and philosophy.

The Safety Staff

The Navy and Marine Corps operate under the same Aviation Safety Program. The Marine Corps' safety staff begins right at the top in Washington D.C.

Within the Aviation Department at HQ Marine Corps in Washington, there is a section that monitors aviation safety. This office monitors all aircraft mishaps and any changes to aircraft procedures. They do not

"We are good" is ingrained in Marine Corps aviators from the onset and is a concept that follows them throughout their career. On a recent visit to the Marine Corps Air Station El Toro, Santa Ana, California, topnotch safety professionals, who exemplify this motto, described a very efficient approach to operating safely and how they make it work.

interfere with the daily operation of the wing, but do make suggestions when a safety item needs to be addressed.

The safety staff at the wing level (comparable to a numbered Air Force headquarters) is a consolidated department consisting of aviation safety, ground safety, industrial hygiene, and aeromedical safety. The group's safety staff (comparable to an Air Force wing) mirrors the wing level structure without the industrial hygiene specialist. "This facilitates our ability to keep a pulse on all aspects of safety and an ability to designate responsibility," explained Lt Col J. Farlee, Director of Safety and Standardization for the 3d Marine Aircraft Wing at El Toro.

A typical Marine Corps squadron is composed of the following safety functions:

- An aviation safety officer who is primarily concerned with the aviation safety program.
- A ground safety officer whose primary job is ensuring ground safety programs are being enforced and complied with — aircraft maintenance safety as well as off-duty ground safety.
- A Standardization Officer in charge of the NATOPS (Naval Aviation Training and Operating Procedures) Program whose job is ensuring each aircrew meets annual requirements for competency with aircraft systems, instrument flying, and that each aircrew has documented capabilities in their training record.
- A flight surgeon who provides continuity in the Aviation Medical Program and allows crewmembers to see the same doctor when the unit deploys.

"The real key to the whole safety program is command emphasis. You must have the commander's ears," explained Lt Col Farlee. "Without leadership from the top down, the program just won't be effective."

"We make sure the aircraft are safe and we're not pushing them too hard," said Capt Kennedy.

"There have been quantum leaps in the application of the safety program in the last 15 years," explained Major Wederbrook.

All Marine Corps safety professionals receive extensive training. Aviation safety training is conducted at the Naval Postgraduate School in Monterey, California. Two programs are offered — the Aviation Safety Officer and the Aviation Safety Command courses.

The Aviation Safety Officer Course is primarily targeted to captains and majors who will be squadron safety officers. The Aviation Safety Command Course is set up to work with commanding officers and those who may become senior members of aircraft mishap boards.

The Operators and Maintainers

Operators All Marine Corps pilots go through Navy flight school and are designated Naval aviators. Basic flight training is identical for both Navy and Marine Corps pilots. After completing primary flight training, pilots are assigned to a fleet replacement squadron (FRS) where they receive specialized training in the aircraft they will fly in the fleet, for example, the F/A-18 or CH-46E.

continued

The 3d Marine Aircraft Wing, Santa Ana, California, is probably the largest F-18 squadron in the Marine Corps. They have 44 F-18s in and out of rework. Their maintenance and operations people constantly coordinate to keep things moving.

FLYING SAFETY . . .

Pilots then move on to a tactical squadron.

A training and readiness manual provides the squadron a means of monitoring the pilot's proficiency. "This helps the operations people monitor what a pilot should be doing — it doesn't leave anything to chance. Pilots know exactly when they must refly a particular mission or they can't fly that mission profile in anything other than a training environment," explained Lt Col Farlee.

Maintainers "The Navy provides the basic training for all of our maintenance people," Lt Col Farlee said. "The program is set up so both Navy and Marine instructors are involved. They first attend basic maintenance training with follow-on training within the squadron. There is also structured OJT with syllabus-directed requirements that must be accomplished to remain current. As in operations, this training is closely monitored and documented.

"From a maintenance standpoint, you must provide a reliable product at the same time performing the maintenance in a safe manner — making sure all of the rules are adhered to," emphasized MSgt J.C.

THE MARINE CORPS' WAY

continued

Cole, Aircraft Maintenance Chief.

Marine Corps pilots are indoctrinated into maintenance early in their careers. They can be assigned to one of the squadron's maintenance sections as an OIC right out of the FRS and ultimately work up to being the aircraft maintenance officer of a tactical squadron.

"It's very difficult to accomplish both tasks of flying and overseeing the maintenance of your airplanes, but I think it contributes to aircrew safety when our troops know *exactly* what their airplanes are doing," added Captain Mike Kennedy, Assistant Aircraft Maintenance Officer.

Quality Assurance Instrumental to safe operations and successful maintenance is the Quality Assurance (QA) Department. QA is an independent department responsible for monitoring and auditing, as well as general oversight, of all work accomplished on the flightline and in the shops. Generally, people assigned to QA are the more experienced operators and maintainers.

"We have both operators and professional maintenance officers in QA working together. We have our own maintenance department within our flying squadron. We own our

continued

The AMSO — A New Dimension in Safety

■ A new dimension in Marine Corps safety is the Aeromedical Safety Officer (AMSO). During the timeframe when the Navy was having trouble recruiting flight surgeons into the service, they initiated a program to allow physiologists to bridge the gap between the shortage of medical officers and the needs of a squadron. The AMSO is filling the gap at the wing and group levels.

Lt Commander Chris Schuyler is the AMSO for the 3d Marine Aircraft Wing. "The primary mission of aircrew performance enhancement has evolved over the years," he explained. "The Marine Corps has made AMSOs an operational position — when Marines deploy, AMSOs deploy. We had seven AMSOs attached to the Marine Corps during the Gulf war.

"Today, the program consists of three areas. The first is the Aeromedical Brief Program which incorporates operational and safety presentations geared for a particular situation, a particular squadron, and a particular mission. These presentations range from G tolerance to vibration to noise to fatigue and all of the other areas that concern aircrew.

"Secondly, we are the coordinators for the FAILSAFE Program — Fleet Aviation Indoctrination Liaison for Survival Aviation Flight Equipment. We are the middleman between the engineers who develop the equipment and the pilots and aircrew who fly it. We're specifically trained in some of the engineering aspects and this fact, combined with our operational background, helps us effectively work with aircrew on modifications to their flight gear.

"The third phase of what we do is mishap investigation. We are school trained, and usually, we attend other professional schools during our career on mishap investigating. Most AMSOs are very experienced. We are involved with all Class A mishaps, particularly if human factors are involved." ■

"From a maintenance standpoint, you must provide a reliable product," explained MSgt J.C. Cole, Aircraft Maintenance Chief. "We make sure we adhere to all rules. We have specific guidelines to follow as the Navy and Army does."

airplanes — they don't belong to a maintenance squadron," explained Captain Kennedy.

The Mishap Board

A primary objective of any safety program is to prevent mishaps. When this objective fails, a good safety program must have an efficient investigative process. The intent is to find out what happened and then disseminate the finding(s) to prevent future mishaps. However, safety programs begin to vary when it comes to their method of board member selection and necessary training.

"We have aircraft mishap boards set up within the squadrons to conduct mishap investigations," said Lt Col Farlee. "It's not a primary duty but a collateral one. There is a primary and an alternate board *always* formed. The senior member normally is the squadron's executive officer.

"In the case of an aircraft mishap where there is strike damage or fatality, a senior member is brought in from another command. When there is any doubt as to the cause factor(s), we get support from the Naval Safety Center at Norfolk, Virginia, who provide trained mishap investigators.

"The mishap board is an integral part of the squadron which I consider an advantage of our program," explained Lt Col Farlee. "Squadron members gain experience in mishap investigation, and they become much more attuned to the efforts necessary to manage that process and the difficulty in determining the cause factor(s) and recommendations to prevent us from having the same type of mishap."

The mishap investigation report is sent out by message and goes to all of the participants and everyone that has a common type of aircraft. In the report, investigators identify cause factor(s), draw conclusions, and make recommendations to eliminate the hazards that were discovered during that mishap. If they identify other hazards that were not associated with the mishap, those hazard reports are sent out also.

The Philosophy

"The real key to our safety program is command emphasis. No matter how hard safety officers work, they must have command involvement," emphasized Lt Col Farlee. "You will not be able to win the battle without it!

"It is the responsibility of officers and senior NCOs to watch their troops to make sure they're not pushing themselves to the edge. Without leadership from the top down, the program just won't be effective," Lt Col Farlee said.

Major Earl Wederbrook, Director of Safety and Standardization for Marine Fighter Attack Training Squadron 101 and a pilot for the last 15 years, also emphasized leadership. "Command involvement is obviously crucial in any program. It's now a requirement for commanding officers and executive officers to go to the Aviation Safety Command Course. This is a real positive step forward," he said.

They Are Good

The Marine Corps' safety program is a well-structured and efficient one. It has all the required elements: Command involvement, effective communication, efficient training programs, proper safety procedures, and a sound investigative process. And it has more! It has people who care!

As you leave El Toro, a sense of esprit de corps, a caring attitude, and a positive approach to duty is clear. The station is orderly, its people are professional, and there's just no mistake about it — they are good! ■

The Marine Corps operates a widely diverse group of aircraft.

CAPTAIN PETE J. STURZ
German Air Force
Flight Safety Publications

Directorate Federal Armed Forces Flight Safety

■ Located at Koeln-Wahn Air Base, surrounded by lilac bushes, oak, pine, maple, and chestnut trees, is an old villa — the heart and soul of the German military flight safety.

So much for the romantic part of the story. The rest is work, planning, work, prevention, work, investigation, work . . .

For the time being, Brigadier General Block and his deputy, Colonel Ruppert, are in charge of the Directorate of Flight Safety. Five sections, each with a lieutenant colonel as section leader, carry out different and multiple tasks toward one single goal worth every effort — MILITARY FLIGHTS WITHOUT ACCIDENTS.

Though all five sections aim for the same goal, **Section A** is responsible for aircraft mishap prevention. Its personnel assist the Director in supervising accident prevention policy and programs. Their activities include:

- Preparing and performing flight safety inspections together with the Directorate of Evaluation and Standardization. The inspection teams visit fighter wings every 2 years; all the other units, plus detachments (Air Force, Army, Navy), every 3 years.
- Reviewing regulations and directives, updating and checking amendments to publications concerning flying, recommending procedural changes and improvements.
- Planning, preparing, and coordinating courses for flight safety officers (and related personnel) at Fuerstenfeldbruck Air Base (training section).
- Preparation of annual programs and quarterly priority programs on accident prevention.
- Producing flight safety publications, such as *Flugsicherheit*, a bimonthly magazine; a monthly flight safety bulletin; accident prevention letters; posters; stickers; information brochures; and calendars.
- Production of flight safety video tapes, like the annual flight safety report; instruction tapes on various flight safety subjects; and videos recreating actual accidents for education and accident prevention.

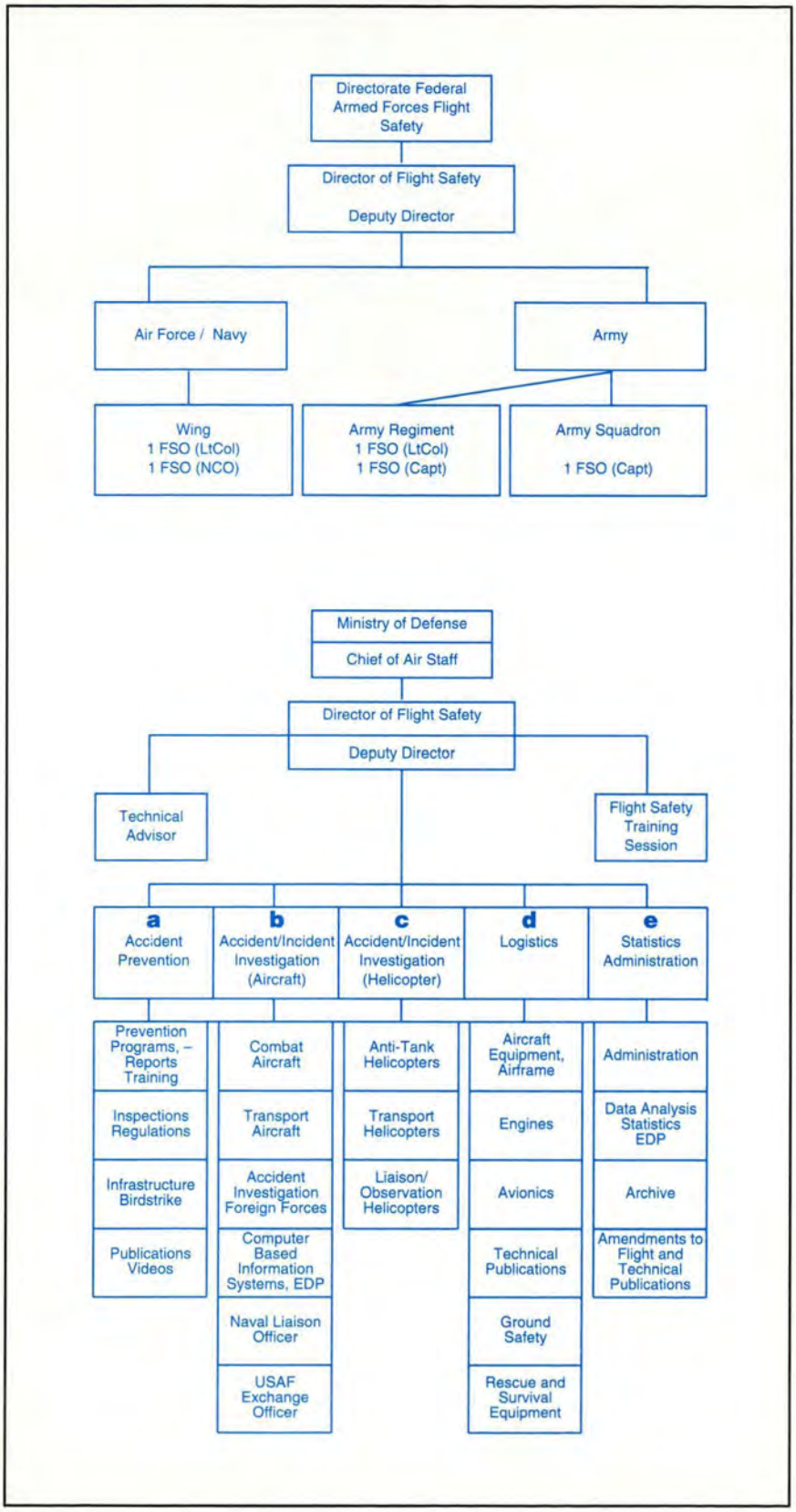
Section B is responsible for fixed-wing aircraft accident and incident investigation, which means:

- Selection and editing of incident/accident reports to be published in our magazines.
- Investigation and reporting of

continued

German Flight Safety

continued



accidents and incidents involving German military fixed-wing aircraft.

- Coordination and cooperation with other national investigation teams from NATO or other countries.
- Participation in standardization meetings and international flight safety conferences.

Section C is responsible for helicopter accident and incident investigation. In this section are the representatives of the German Army. Their activities parallel those of Section B.

Section D deals with aircraft engineering flight safety aspects which include:

- Airframe, engine, and aircraft equipment malfunctions and any improvements.
- Technical documentation.
- Aircraft ground safety (which includes fire protection, oxygen, fuel, lubricants, facilities, and equipment).
- Life support equipment, rescue systems, and survival training.

In addition, the specialists are members of the accident investigation teams, act on known and recognized deficiencies, participate in flight safety inspections, examine unsatisfactory reports (AFTO 29/22), and are involved in the processing of the documentation for all aircraft being flown in German Federal Armed Forces.

Last, but not least, we have the **Section E** with us, which provides all the necessary administration. EDP, data analysis, and storage of the essential data pertaining to incidents/accidents and statistics on almost every flight safety aspect are only some of the supporting actions of Section E.

Our Flight Safety Policy

Flying under military conditions is dangerous. If we want to define (FLYING) SAFETY as a condition which excludes danger, it seems unrealistic. Therefore, concessions are made to cope with the danger involved in flying. To name only some of them:

- Development and use of parachutes
- Ejection seats
- Emergency exit doors
- Crashworthiness design
- Rescue and personal survival equipment

For all our efforts, flying is still and will be dangerous. The dominating problem in flight safety prevention remains unchanged — HOW TO RECOGNIZE HAZARDS IN TIME.

The little "bits and pieces," which could be avoided, are not very conspicuous, seldom obvious, and most of them do not even lead to an incident or accident when considered separately. The unfavorable combination, the fatal circumstance, the CHAIN OF EVENTS, as we call it, finally causes the mishap. That means we carefully have to watch every little piece in that big old puzzle.

Maximum Flight Safety or Maximum Mission Effectiveness?

These are conflicting demands, and both are of invaluable importance. With regard to the current political and strategic situation, there is no doubt at all that flight safety has to be given priority in peacetime operations!

We know that effective and realistic training must be conducted with an acceptable risk, but according to the statements and orders, there is no choice — flight safety has to be risk management. We have to redefine mission requirements and minimize the risk factor.

The Tornado fighter symbolizes the joint environment Germany's safety program is prepared to meet.

Many of these peacetime restrictions have been initiated by the combined effort of the standardization and flight safety officers in the field. These officers have an important and valuable advantage in preventing accidents in that they are close to the troops.

With every flying unit and every superior command (having flying units under its authority) is a Flight Safety Officer (FSO). On every air base exists a Flight Safety Committee, consisting of commanders of flying, maintenance, and supply groups, airfield manager, squadron commanders, and detachment leaders (ATC, weather, flight surgeon, chief of the fire brigade, etc.) to react to safety problems on the spot.

What else is to be said? Not much, but this — any flight safety organization today has to fight the same problems:

- Human factors
- Budget constraints
- Lack of personnel and material
- Discrepancies in flight safety-mission accomplishment
- Training deficiencies

This list could be extended because almost everything related to flight safety has been said, published, or commented on. All possible causes of incidents and accidents are well known — nevertheless, the same accidents happen again and again.

There must be a way, a real new, exciting, revolutionary way, to get the attention of all individuals in our business. It is probably our fault we didn't find it yet, but *you* sure should be curious about every article in flight safety publications. We'll find it! And in the meantime — be safe!

NO ACCIDENTS IS OUR GOAL. ■

Naval Aviation Safety ...

LT COL ROY A. POOLE
Editor

"We were halfway through an Indian Ocean cruise and had just completed our daytime war-at-sea exercise.

"My wingman had reported both engines had just flamed out. He managed to get one of them restarted before becoming an aluminum rock.

"As I joined on him, I coordinated a ready deck with the carrier so that our playmate could begin a single-engine straight-in approach immediately upon arrival.

"Cruising at 5,000 feet MSL, I noticed a glint of light flash straight back along their airplane. After about a millisecond, I realized the glint was sunlight reflected off their canopy as it was jettisoned.

"Now they're really up against it. To add insult to injury, they have a blown canopy. Those guys are going to get that airplane safely back onboard ship. What else could possibly go wrong?

"I didn't have to wonder for long. I watched both crewmembers go up the rails. Regrettably, I had a front row seat to the entire A-6 ejection sequence."

■ For an Air Force safety investigator, this scene would be a nightmare: Halfway around the world, no chance for technical assistance, the crew may not be picked up for hours, and the best piece of evidence is resting 3,000 feet below the surface of the ocean.

For the US Navy's Aviation Safety Program, however, this is normal operating procedure. When an aircraft carrier goes "blue water," a complete safety program goes with it. Like the Air Force, the Navy's safety program intends to keep the maximum number of aircraft and crews fully mission capable.

Naval Air Station Miramar in San Diego, California, is a good place for an Air Force safety officer to find out more about Naval Aviation Safety. NAS Miramar is the home of the Navy's "Top Gun" school and the COMFITAEWWINGPAC flying all E-2's and F-14's on the west coast. Nearly every pilot has spent years flying from aircraft carriers around the world.

Common Safety Goals

Lieutenant Commander Ed Carpenter is the safety officer for NAS Miramar. He invited *Flying Safety* down from Norton AFB to learn more about how Naval Aviation Safety shares the same goals as our USAF Safety Program.

Like the Air Force program, Naval Aviation Safety begins at the top.

Successful carrier operations depend upon a completely comprehensive and self-sustained safety program.

from blue water to blue skies

The Chief of Naval Operations, Admiral Frank Kelso, sets the standards for safe flight operations throughout the Navy. A safety staff headed by Rear Admiral A. A. Granuzzo, Commander of the Naval Safety Center, is located at NAS Norfolk, Virginia. The Safety Center monitors the programs, produces safety education materials like *Approach* magazine, and assists with mishap investigation.

The flying wing at the air station uses a Safety Department to carry out the goals of the program. It provides guidelines, conducts inspections, performs risk-management functions, and provides crosstell information up and down the chain of command. The actual management of the squadron safety programs, however, rests with each squadron. The Wing Safety Department sets minimum standards and then supports the efforts of the users.

The Heart of the Program

Each squadron uses a smaller Safety Department to carry out their individual programs. The department head supervises a NAVOSH officer (Navy occupational safety and health), a pilot safety officer, and a Naval flight officer. There is also an Aviation Safety Officer, who is not necessarily the department head.

The goal of the department is to prevent mishaps through planned actions, train people in correct safety practices, and to investigate mishaps to maintain combat readiness.

Like the Air Force, Navy squadrons have a hazard reporting program. It is run by the Aviation Safety Officer, and, according to Lt Cdr Carpenter, "Each Aviation Safety Officer should know the number one safety hazard in the squadron." The Safety Officer should be aware of all bird or animal hazards, monitor any physiological incidents, investigate near midair collision reports, and report all flight-related and embarked mishaps.

Lt Cdr Robert Young, of the AEW wing at Miramar, agrees with the importance of the hazard reporting program. "Hazard Reports are the number one means of preventing future mishaps. For example, after losing an aircraft, the investigators found a possible reason, submitted a hazard report, and within 1 day, all aircraft in the fleet were inspected and repaired as necessary."

On Their Own

The reasons for such responsiveness can be found in the unique nature of carrier operations. Once a carrier leaves port and reaches "blue water," it is almost entirely self-reliant. Technical experts and advanced analysis are often difficult to get in the middle of the ocean.

For these reasons, mishap inves-

continued

Where there's nothing but ocean on every horizon, carrier pilots begin "blue water" operations. Safety programs are prepared to meet any challenge without waiting for help from offices on the other side of the globe.

Naval Aviation Safety

continued

tigation is conducted by the squadrons on board the aircraft carrier. Each squadron identifies a permanently standing Aircraft Mishap Board. The board is composed of a maintenance member, an operations member, a flight surgeon, and an aviation safety officer who has completed schooling at the Naval Safety School located in Monterey, California.

Lt Cdr Young estimated as many as 50 percent of all aircraft mishaps may involve an aircraft lost at sea. Without a solid investigation program, commanders would be forever wondering if they could carry out their missions. The mishap boards finish their work within 30 days and provide not only "causal factors" but recommendations. And, of course, they will have provided hazard reports as soon as they discovered a possible problem.

Constant Improvements

The Navy's Safety Program continues to undergo improvements as they are needed. Back in the 1950's, the Navy developed NATOPS as a tool for improving flight safety. According to Ltd Cdr Young, NATOPS (Naval Aviation Training Operations Procedures and Standardization) were responsible for a dramatic 100-fold decrease in aviation-related mishaps immediately following their introduction.

"Following NATOPS," said Lt Cdr Carpenter, "the second biggest help for the aviation safety record was the angled carrier deck. We also saw further improvement in our accident rate with the creation of the Naval Safety Center located at Norfolk, Virginia."

Other changes have been made to safety programs as more and more escort and support ships have begun carrying their own aircraft. These helicopters and the crews who fly them have to maintain an aviation safety program just as critical as the squadron programs on the largest carriers.

Another change has been the incorporation of human factors issues into the safety program. Under the program name of "Check Scan," individuals are monitored to see if they are progressing satisfactorily through their skills development in a weapon system. If any of the various human factors are having a negative effect upon performance, commanders can take rapid steps to help the aviator overcome any particular problems.

Meeting the Challenge

The Navy's Aviation Safety Program has met, and will continue to meet, complex challenges. A floating wing must not only be self-sufficient, but also responsive. Air operations may involve the complete absence of standard training routes, the frequent interface with foreign controllers and forces, and an increased mission complexity. Despite the ever-changing nature of naval missions, the Navy has maintained a mishap rate nearly equal to that of USAF fighter aircraft.

As Operations Desert Shield and Desert Storm demonstrated, the future of United States Military power rests with the joint use of all our forces. Navy and Air Force operators can safely rely upon the aviation safety program of either service to ensure the most effective completion of our assigned missions. ■

Canadian Armed Forces Flight Safety Program

MAJOR GRAHAM LARKE
Canadian Forces Exchange Officer
AFSA/SEFF

■ In the Canadian Armed Forces (CAF), the Director of Flight Safety is responsible for all flight safety policy. This policy is implemented by Air Command through groups, bases, and units. Supervisors at all levels are responsible for establishing their own flight safety programs.

Mishap prevention is the responsibility of commanders at all levels and involves monitoring the control, conduct, and support of air operations. Commanders are assisted by flight safety officers (FSO), who provide specialized advice on flight safety programs.

In many ways, the CAF Flight Safety Program is very similar to that of the USAF. There is an AFR 127-4, *Investigating and Reporting U.S. Air Force Mishaps*, equivalent. There are squadron, wing, group, and higher headquarter levels of flight safety officers. Occurrence (like USAF mishaps and incidents) reporting and the followup reporting system are also quite similar. The program includes the usual statistical data banks, flight safety surveys, a flying safety magazine (*Flight Comment/Propos de vol*), BASH programs, flying safety training courses, etc. However, there are some differences, and some of the more interesting approaches follow.

In 1991, the Class A mishap rate in the Canadian Armed Forces was 3.38 per 100,000 hours. The Class A destroyed rate was 2.25. This included 9 flight mishaps in 226,000 flying hours.

Heart of Program

The heart of the CAF Flight Safety Program is the reporting system. This system makes everyone aware of those circumstances which could lead to, or have resulted in, aircraft accidents or injuries to personnel. It is only by identifying hazards that appropriate preventive measures can be implemented. All air occurrences are reportable and are categorized, depending on the level of damage.

Flight Safety Occurrence

In the CAF, an occurrence is any event involving an aircraft in which damage, injury, or hazards occur to CF resources or from CF involvement. Occurrences are classified as "A," "B," "C" mishaps or "D" or "E" incidents.

A — Written off the inventory, beyond economic repair, or missing.

B — Taken to contractor (not flown under its own power) for necessary repair.

C — Requires "third level" repair to a major aircraft component.

D — Repairable at the unit level.

continued

CAF Safety

continued

E — No damage, but still has the potential for accident or injury.

Note: In this system, there can be the case where there is little or no damage, only a "D" or "E", but the occurrence is classified a mishap because someone was fatally injured.

Flight Safety Philosophy

In a briefing to a flight safety officer course, Colonel John David, Director of Flight Safety for the CAF, stated that in his opinion, "The most important contributing factor to the conduct of safe flying operations is how the unit flight safety officer and unit noncommissioned flight safety officer see their role within the flight safety system." That is, how they think, see, and practice flight safety; how they convey their ideas; and, of prime importance, the way they get others to cooperate in the implementation of safety initiatives. This will determine their effectiveness and the effectiveness of the unit's flight safety program.

Mishap Investigation

In most mishaps, a specially trained mishap investigator is assigned to the mishap investigation. He is normally a pilot (Major) who is assigned to the Director of Flight Safety's staff (equivalent to the Air Force Safety Agency). He will initially be concerned with making an early determination of cause, if possible. This is done so there will be no delay in taking appropriate actions to correct a technical fault in the fleet or to change an unsafe procedure. The safety investigator will report directly back to the Director who, in turn, will advise the appropriate authorities of the immediate actions recommended.

Flight Safety Video Presentations

After a mishap has been thoroughly analyzed, it is reenacted in a VHS™ video tape presentation. Here, amateur actors play the parts of key personnel in the mishap sequence. The purpose of this video is ultimately for mishap prevention. The videotapes are shown on a regular basis so old mishaps aren't repeated by new aviators or crews.

McDonnell Douglas CF-18 Hornet

Channels of Communication

The CAF safety organization is unique in that it is advisory in nature and exists at all levels of command. Mishap prevention, to be effective, relies on the rapid flow of accurate information. With these, preventive measures can be devised and implemented. Consequently, to operate effectively, the flight safety organization must maintain constant communication between all levels of command.

In addition, flight safety personnel at higher headquarters must maintain personal contact with the operational levels to be most effective. The reason is not to bypass the people in between, but to get the needed information out as quickly as possible. Then preventive measures can be implemented or cause factors can be resolved at the lowest possible level. Also, with proper communication, the flight safety organization can provide valid, accurate, and timely advice to operational commanders.


CC109 Cosmopolitan


CH124 Sea King


CC115 Buffalo


CH113 Labrador

Human Factors

Like the USAF, the CAF is concentrating a lot of effort on the human factors side of mishap prevention. This is especially important since approximately 80 percent of CAF mishaps involve human factors in one way or another. For example, spatial disorientation has been a problem in many of our CF-18 mishaps, and the CAF is looking at purchasing or leasing a new type of spatial disorientation trainer (one of which is the next generation beyond the current US Navy disorientation trainer).

The CF Defence and Civil Institute of Environmental Medicine has recently completed an indepth study on human factors problems with fighter pilots in the CF-18 community. It is anticipated senior management will be addressing these issues soon.

Conclusion

The CAF Flight Safety Program is very similar to that of the USAF. Although there are subtle differences, the aim is the same: "Preservation of aviation resources" so the nation has a war-fighting capability. The overall effectiveness of any flight safety program requires active participation on the part of commanders at all levels. It requires a sound investigation process, constant communication at all levels of command, and dedicated flight safety officers at all levels. In most air forces, effective programs have driven mishap rates down. However, with the cost of our aircraft today, even a few mishaps are very costly. We just have to get smarter.

The challenge for the future lies in developing and improving mishap prevention methods and programs. CAF preventive activities must keep abreast of developments and advances in aviation technology if success is to be achieved in reducing its mishap rate further. ■

CANADIAN ARMED FORCES

The Royal Canadian Navy, Air Force, and Army were integrated in 1968 to become the Canadian Armed Forces. With unification, all air resources were amalgamated under the Commander of Air Command with operational control of specific resources being given to the land and maritime commands through designated Air Groups.

Aircraft in the Canadian Forces inventory are as follows:

Transport/SAR
- CC130 Lockheed Hercules
- CC137 Boeing 707
- CC144 Canadair Challenger
- CC138 DeHavilland Twin Otter
- CC115 DeHavilland Buffalo
- CC109 Cosmopolitan
- CC142 DeHavilland Dash 8
- CH113 Sikorsky Labrador

Maritime
- CP140 Aurora (Lockheed P3C Orion)
- CH124 Sikorsky Sea King

Land
- CH135 Bell-Vertol Twin Huey
- CH136 Bell-Vertol Kiowa

Fighter/Trainer
- CF-18 McDonnell Douglas Hornet
- CF5 Northrop Freedom Fighter
- CT114 Canadair Tutor
- CT133 Lockheed T-Bird
- CH136 Bell Helicopter Jet Ranger

LT COL ROY A. POOLE
Editor

All Airplanes are

■ I learned to fly more than 25 years ago in a 100-horsepower Cessna 150 at El Monte Airport, 40 miles east of Los Angeles. Other than those rare times when I had to fly with the company's 250-pound chief pilot, I never thought the little airplane's performance was at all inadequate.

Oh, sure. A couple of times I had to circle to gain altitude before crossing the mountains on the way to Bakersfield, but it all seemed normal enough. Over the next 2 ½ decades, I discovered the venerable "Dollar-fifty," like lots of civilian aircraft, was only marginally powered.

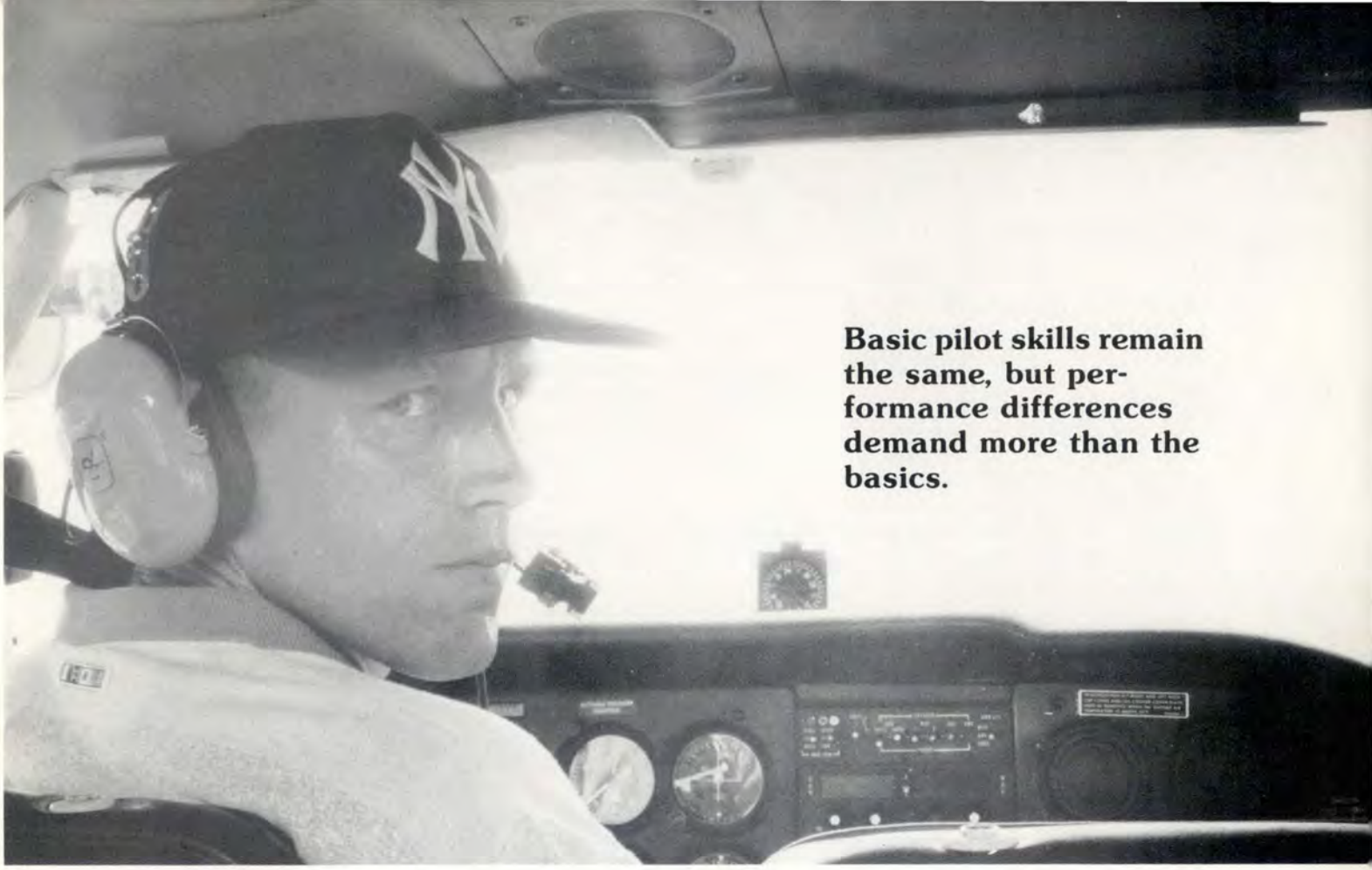
Power is Relative

Today, many other Air Force pilots are flying general aviation, or civilian, aircraft and discovering the same thing. The Air Force is about global power, and our planes have lots of it when compared to general aviation. However, when we can't fly Air Force planes and turn to the civilian variety, there is a big potential to underestimate the significant differences between types.

For example, the first Cessna 172s were sold as four-place, family airplanes. They held around 36 gallons, or 230 pounds, of gas. Yet, they were powered by an anemic 145-horsepower engine. Later models would see the power boosted to 180 horsepower. If you read the owner's manual carefully on the 1957 Cessna 172, you would have seen it was impossible to take off with full fuel and four adult passengers onboard.

In contrast, Piper sold a similar airplane, the Cherokee 140, as a two-place trainer. They eventually called it a 2 + 2, meaning you could carry two adults and two smaller people if you off-loaded some fuel first. The Cherokee was delivered with a 150-horsepower engine. The point is, if you believed the advertising photographs for the Cessna and didn't check out the books, you would discover for yourself what the test pilots at Piper had already discovered: Little airplanes with little motors don't carry big payloads.

Let's continue a comparison of these two classic airplanes for a moment. After all, there is a good chance one is still flying as a rental at your local airfield. As mentioned earlier, they were delivered with 145- or 150-horsepower engines . . . more than 30 years ago. The chances are, neither engine is still producing all of the power it had when new. For the sake of argument, let's say they've lost 5 percent of their output. They are now 138- and 143-



Basic pilot skills remain the same, but performance differences demand more than the basics.

not the same

horsepower airplanes.

Although the list of performance robbers could go on, an important one needs to be addressed. Underinflated tires may rob as much as 15 percent of the horsepower from a takeoff roll. Loading up a bunch of passengers on a hot day with low air pressure in the tires could find you trying to make it skyward with about 120 horsepower. There are *two-seat* training planes which have more horsepower than that!

The performance of most light airplanes falls off considerably as altitude is reached — a situation we don't seem to notice in today's high efficiency jet engines. Many conventional piston engines are operating at only 65 percent power at 10,000 above sea level. Our tired 138- or 143-horsepower engines may now only be producing about 90 horsepower at full throttle.

A short time ago, three officers climbed into a light airplane for a trip from the valley airport to a mountain landing strip. They rented an older Cessna 172 with a 145-horsepower engine. Their departure airport was 1,300 feet MSL. Fifteen miles away lay their mountain airfield situated in a valley at 6,700 feet MSL. In between lay some good-sized real estate to climb over.

After takeoff, the pilot, a banked Air Force UPT graduate, turned directly for the mountains. Although the airplane was not climbing rapidly, it appeared to be able to make it over a ridge if the pilot continued up a narrow valley.

Appearances, especially when flying in the mountains, can be deceiving. The old airplane was unable to climb fast enough or to turn around in the valley and made a stalled, forced landing (looking at the airplane, most people would call it a "crash") on the mountainside at an altitude of nearly 5,000 feet MSL. Since they filed no flightplan, one person hiked for 6 hours to summon a rescue team for his injured buddies. (For a passenger's view, see "Two Long Hours" on page 27.) When listening to the pilot, and keeping the poor aircraft performance in mind, you find it easy to believe the pilot overestimated the capabilities of this airplane.

This was not an isolated incident. Over the years, Air Force pilots flying general aviation aircraft have managed to overestimate the performance of their airplanes on a number of occasions. One pilot was flying below the rim of a narrow canyon. He crashed into the sides after turning up a "dead end" and finding out there wasn't enough power to climb out of the canyon. Another pilot rented a passenger airplane and then flew over a near-

continued

by lake where friends were boating. After a series of wingovers and hammerhead stalls, the pilot misjudged the airplane's ability to pull out of the dive and crashed into the lakeside cliffs.

Experience is Limited

Less obvious, but just as deadly, were those accidents in light airplanes caused by pilots flying into bad weather in general aviation aircraft. Air Force pilots are highly qualified to fly in instrument conditions in military airplanes. This experience keeps them "current" to fly light airplanes in the weather as well. But unlike the modern displays of military aircraft, general aviation airplanes often have instruments which give only raw data and are prone to inaccurate readings.

If you practice with the general aviation instruments, they will safely get the job done. However, too many pilots have attempted to use what to them are somewhat "primitive" instruments for getting through some serious weather problems.

As if the instruments were not a big enough limitation, the procedures for flying light aircraft in the weather are either confusing or nonexistent. Unlike the military Dash-1, with its detailed section on how to fly on instruments under all conditions, most owner's manuals barely touch on what to do. This is particularly a problem with the older aircraft.

The commonly accepted answer to this lack of guidance is to find yourself an instrument instructor. Instructors teach you what they were taught by somebody who taught them the same techniques they learned from still another instructor. Although most instrument flying is based upon technique rather than procedure, quality instruction has ensured flight safety. Remember, although your license and your military experience may *say* you're qualified to fly Cessnas in instrument conditions, that's no guarantee you *should* fly or could fly safely.

I once met a friend in Las Vegas who was part owner of an instrument-certified Cessna 182. He needed to fly to Los Angeles this night, but the weather was too bad. He suggested I do a couple of landings in the 182, and then, using my instrument license, we would both fly to L.A. It was tempting. Here was a chance to fly a different airplane for free. Fortunately, common sense returned, and I declined the invitation. I was used to flying jets with HSIs and TACAN. How safe would I be with an ADF and no DME?

Responsibility is One-Sided

Finally, we come to supervision. Although it's always needed, we don't always appreciate the role supervision plays in keeping Air Force missions safe. When you start flying general aviation airplanes, you learn quickly.

Typically, military pilots rent an aircraft from a local fixed base operator at a nearby civilian airfield. They are given a quick checkout (my most recent checkout in a Piper Archer lasted 35 minutes). It is not uncommon to clear a pilot to fly all airplanes with less performance than the one used for checkout, but without actually having to fly them. I was cleared for the 180-horsepower Archer, the 160-horsepower Warrior, and the 112-horsepower Cessna 152.

Once you are cleared to rent an airplane, preflight planning is simple. Just call the operator and reserve the plane for the time you need it. Then, show up a minute or two before takeoff and get the keys and the logbook. Finally, untie it, crank, and go.

Before you all start writing letters telling us about the FARs and other rules which should be followed, please be patient. While we exaggerated a little, almost everyone who rents an airplane will recognize some of these lax procedures (when compared to military policies) are present at *your* fixed base operator.

A passenger in the ill-fated Cessna 172 which crashed into the mountain had this to say. "I had never before flown privately until after my UPT experience, and the one aspect about civilian flying that

By the time Air Force crews board their aircraft, a lot of support has ensured a safer mission.

sticks out in my mind is how it differs from military flying in that it is much less structured. UPT is a very controlled environment. The program follows a strict syllabus and is governed by many rules and regulations. In contrast, once an individual obtains a private pilot's license, it becomes the individual's responsibility to adhere to all of the rules and regulations set forth by the FAA."

Think of the number of things we do to enhance our safety before a military flight. We get a weather briefing, talk to a supervisor about the big picture, coordinate for airspace or routing, review the weight and balance, calculate our takeoff and landing data, brief everyone about the mission and emergency procedures, and fly IFR to the maximum extent possible.

It is entirely possible for a pilot of a light airplane on a local flight to get the weather by listening to the car radio while driving to the airport. The "big picture" is what you can see in the pattern. Routing will be over familiar visual landmarks like the K-Mart™ store. Weight and balance or takeoff and landing data are accomplished using the "We've done this before, so we'll do it again," technique. Briefing emergency procedures will only scare the passengers and delay engine

When you walk out to general aviation planes, you do it alone. There's no SOF or crew chief to back you up. *You* are your own safety program.

start. Finally, IFR frequently means "I Follow Roads."

Not too long ago, an active duty officer prepared to fly a rented airplane using a computerized flight plan. The plan calculated over 5 hours of fuel on board the Piper Warrior. For some reason, the Warrior was not available when the pilot arrived at the airport, so a Cessna 172 was chosen instead. They both are supposed to carry four people, and both have approximately the same size engine. Except . . . the 172 has only 4 hours of fuel available.

Because of headwinds, it took longer en route to the destination. At the 3-hour point, the right wing tank gauge showed empty. Since the fuel line was set to "both," and the pilot was sure there was over 5 hours of fuel, there was only one conclusion — the tank gauge was malfunctioning.

At this point, the pilot checked the owner's manual and discovered there was only 36 gallons of usable fuel in a Cessna 172. However, based on in-flight calculations, there should still be a good, safe 1 hour of fuel remaining. Convinced the gauge was in error, the pilot turned the selector valve to "right" to prove the empty indication was erroneous. The engine quit, proving the gauge was right.

Despite a return to the left tank and repeated starting attempts, the engine would not restart. The emergency landing in a field was successful other than minor damage to the wingtips. This is a classic example of how the supervision we are so accustomed to as military pilots simply doesn't exist in much of the civilian world. The responsibility is entirely upon the pilot. There are no steely-eyed ops officers watching as you go out the door!

TWO LONG HOURS

1530 Just prior to leaving the base gym, I met Lt Jones and Lt Brown and was invited to fly with them later that day.

1615 Jones, Brown, and I met at the municipal airport and signed out a Cessna 172 for an intended local sortie with a duration of approximately 90 minutes.

1640 We taxied to the active runway and took off. Nothing unusual had occurred during preflight or runup.

1700 After completing three uneventful touch-and-go's, we departed the pattern from the downwind leg and continued climbing. We all agreed to do some sightseeing over the mountains north of the field before heading for the practice area.

1720 While climbing up a narrow canyon, we became aware the 172 was not performing "normally." The pilot began taking steps in an effort to rectify the situation.

1725 We realized the aircraft was not capable of sustaining level flight and prepared ourselves for a forced landing.

1726 Unable to turn out of the canyon, we crashed onto an upsloping canyon wall in a nearly stalled flight attitude.

1730 Lt Brown was hurt pretty badly, but we all finally crawled out of the wrecked airplane. In the growing darkness, I started down the mountain by myself to get help.

Two long hours, from when I received an invitation to go fly, had passed until the moment when we almost died. ■

All Airplanes are Not the Same

A 30-year-old, 145-horsepower airplane is not the same as a T-38. Airplanes with the nosewheel moved to the tail (conventional gear) require unique skills not normally found in Air Force training. Aerobatic maneuvers in an F-16 can hardly be compared to performing a loop in a glider. Despite its size, a C-5 may find it easier to fly an ILS approach than a four-passenger, twin-engine airplane equipped with a single receiver and a three-light marker beacon.

To be sure, aerodynamics don't change. At least the flight controls seem to have the same purposes. However, the speed, performance, and ability of all airplanes are very different.

Whenever pilots move from one type of aircraft to another, there is always something to learn and often something to "unlearn." This is especially true when moving from the sophistication of modern jet aircraft to the simplicity of general aviation airplanes. The failure to respect and to learn the limitations of these smaller airplanes can result in fatal consequences. ■

Look Back To See

Everything they said back in '45 is just as true today. Flying a light plane is not something to take for granted.

Remember the Big Step Up?

The step Down is the same size

DON'T NEGLECT THESE SENSIBLE PRECAUTIONS

ASK FOR A CHECK RIDE.

REVIEW CIVIL AIR REGULATIONS.

REMEMBER THAT THIS AIRPLANE WAS DESIGNED FOR PEACETIME FLYING.

AERO INSURANCE UNDERWRITERS

2

To All Military and Naval Pilots Home From the Wars:

Frankly, gentlemen, you have us worried. The situation is so complicated with our respect for what you have accomplished, our friendship for you personally and your accident record here at home that we can not even be subtle. Here are the facts:

You have been doing flying most of us couldn't touch.

You are rightfully proud and you don't relish any stay-at-home suggesting you need advice.

Your accident record since you came home is rotten—an abnormal accident rate for every hour of flying, case after case of exhibitionism, buzzitis, and poor technique in airplanes that don't perform like the equipment you are used to.

Everyone is reluctant to place restrictions on you, which puts us exactly in the middle with our neck out. Well, we are not going to place restrictions on you either, but we *are* going to ask you to remember three things.

1. C.A.R. has been changed since you went away.

2. Under the new rules *any* flying that endangers the life and property of another is *RECKLESS* flying, and it may affect the whole future of the pilot involved.

3. There is nothing wrong with a civil aircraft, *but it is different.* You are used to structures that will take a 9 G pullout with never a shudder. You are used to lots of horses out in front. Even more important, *you have come to expect things will happen—NOW—when you move a control.* The airplane you will rent or borrow won't be like that.

You know these things, of course, and you know they can add up to a rugged situation for us all. There isn't much we can do to help. Here are the revised sections of C.A.R. and here is our final bit of advice: *Ask for a Check Ride.*

Roger.

The Engineering Department
Aero Insurance Underwriters.

3

U.S. GOVERNMENT PRINTING OFFICE: 1992-679-016/60001

Ahead

MAJOR GARY R. MORPHEW
Directorate of Aerospace Safety
Flying Safety, September 1984

■ The two pages shown on the left were reproduced from a handbook given to returning aviators from World War II. After some pretty hairy mishaps, the insurance underwriters decided a review and caution were in order. It is obvious they didn't pull any punches!

Many things have changed since then. The Civil Aviation Regulations have become the Federal Aviation Regulations. The requirements for civil flying became more stringent, and the aircraft became more efficient. How much concerning military aviators taking a flight in light civilian aircraft has changed? Looking at statistics, very little.

Speaking as a military pilot who has flown the F-105, the F-4, and the OV-10, and being a light plane owner as well, I know the warning shown on the second page: "Remember the Big Step Up? . . . the step Down is the same size," is accurate. (We all do remember the big step up, don't we?)

When we step into a light plane after hours and hours of wrestling those fast, heavy, and maneuverable jets around the sky, everything appears to move at quarter-time. Talk to anyone who has made this transition after an extended stay in the fast movers and they are likely to tell you the crosscheck was like lightning — it didn't vary from desired altitude more than 10 feet, and airspeed was right on the money (except for the climbout where the airspeed dropped unexpectedly every time they pulled on the pole). They also might tell you the lack of dials, gauges, and switches made the flight a bit more boring.

General aviation mishaps are predominantly a result of human error. Pilots overextend their ability or capability and get into a situation from which neither they nor their aircraft can recover. Unfortunately, they all too frequently involve someone who was "along for the ride." This sometimes plays an even greater role in the military pilot flying light aircraft. After all, if all you talk about is the thrill of flying, the "there I was . . . ," and so on, pretty soon those ground huggers are going to ask you to show them what it's like.

After a thorough preflight inspection (more thorough than normal to impress the uninformed), the intrepid aviator and companion climb in, strap in, and leap into the air. Just cruising along is usually enough for the unsuspecting passenger, but the mighty fighter pilot can't take straight and level for more than a nanosecond. His turns peg out the turn needle, the coordination is a bit off (use rudder?), and the — — aircraft just doesn't perform! He stretches the maneuver a bit too far and — OOPS! Hopefully, there is room to recover.

Federal Aviation Regulations (FAR) may not seem very restrictive to the standard military pilot. After all, with so many rules to dictate how to fly our jets, the broad general terms used in the FARs may appear to be a license to disregard everything about flying safety. Most military regulations and directives are much more restrictive than their civilian counterparts. However, a few procedures and rules which normally don't affect the fast mover are critical to safe operations in lighter, slower aircraft.

Everything they said back in '45 is just as true today. Flying a light plane is not something to take for granted. Follow the three simple rules illustrated anytime you step from your MiG-chaser into the bug smasher. ■

Safety Crosstalk

IT'S EVERY-WHERE

Share the good ideas we're given; give good ideas to share.