FLIGHT SAFETY FOUNDATION

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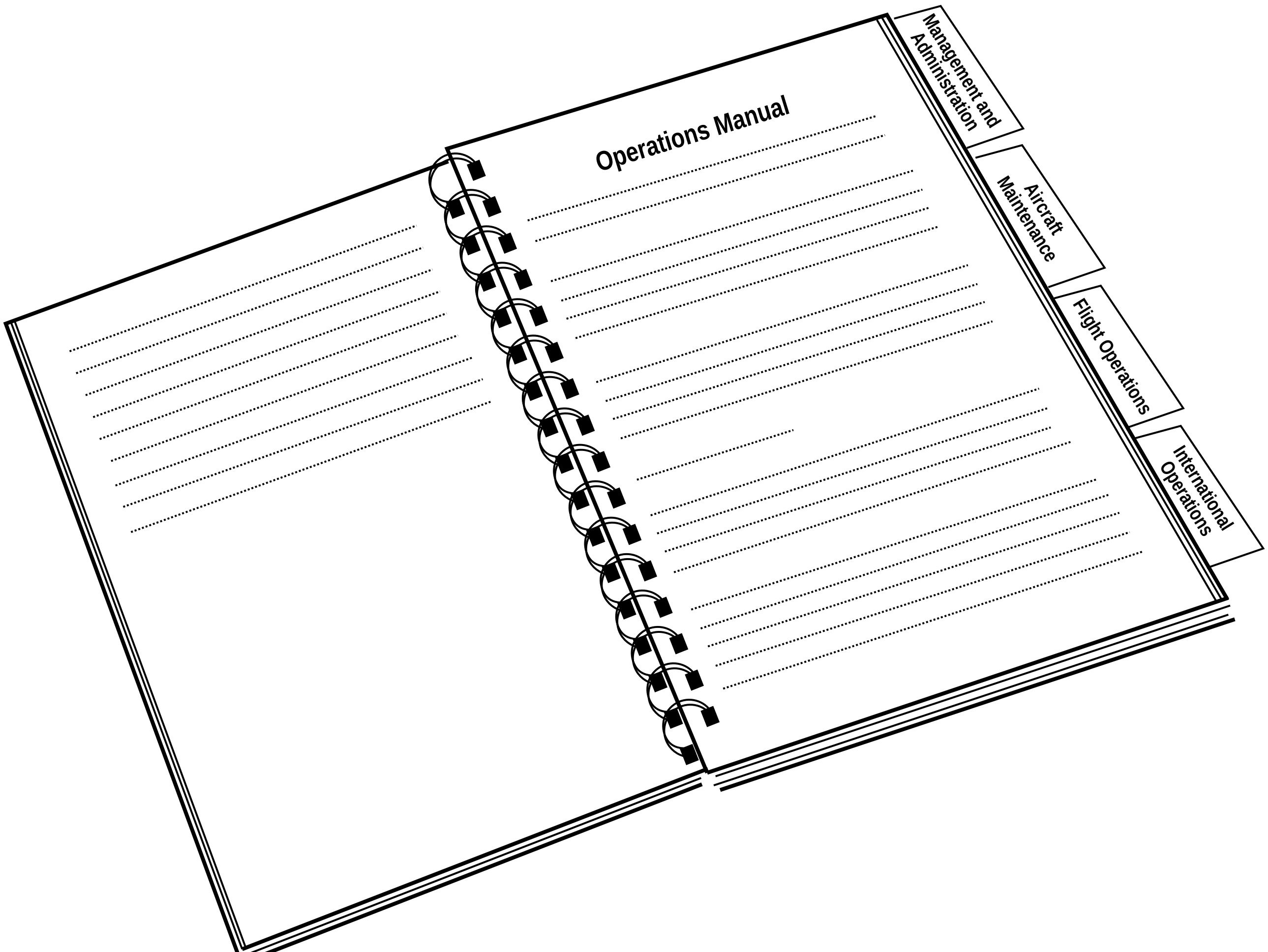
FLIGHT SAFETY DIGEST

Developing a Corporate Aviation Department Operations Manual Reinforces Standard — and Safe — Operating Procedures



Flight Safety Digest

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In This Issue

Flight Safety Foundation is an international membership organization dedicated to improving aviation safety. Nonprofit and independent, the Foundation was launched in 1945 in response to the aviation industry's need for a neutral clearinghouse to disseminate objective safety information, and for a credible and knowledgeable body that would identify threats to safety, analyze the problems and recommend practical solutions to them. Since its beginning, the Foundation has acted in the public interest to produce a positive influence on aviation safety. Today, the Foundation provides leadership to nearly 650 member organizations in 76 countries.

Developing a Corporate Aviation Department Operations Manual Reinforces Standard — and Safe — Operating Procedures

Creating an operations manual stimulates thought and discussion about optimum procedures, promotes standardization among flight crews and helps avoid ambiguity about responsibilities. The author offers general guidelines for a manual's content and organization.

John A. Pope
Aviation Consultant

In 1977, a corporate aircraft en route to a West Virginia, U.S., destination was making a nonstandard approach that concluded when the aircraft struck a mountain, killing all the occupants of the aircraft. At the time of the accident, the weather was reported to be ceiling of 100 feet (30.5 meters) and one-eighth mile (0.2 kilometer) visibility.

In its accident investigation findings, the U.S. National Transportation Safety Board (NTSB) said that the accident could have been prevented had there been written company procedures dictating when and how instrument approaches should be flown. In this particular accident, the NTSB said that diversion to an alternate airport with precision approach facilities and weather that was above minimums could have been a stated company policy, which might have prevented the accident.

As a follow-on to its accident investigation, the NTSB recommended that business aircraft operators develop an aviation department operations manual, because corporate aircraft operations involved sophisticated aircraft and systems in support of flexible and unpredictable mission requirements. In the NTSB's view, the nature of corporate flying dictated that the basic policies and procedures be documented and be well-known to pilots. The NTSB suggested that an operations manual would be the most practical means of establishing common administrative procedures and flight operations procedures to ensure that a strong measure of standardization would be conveyed to pilots. More specifically, the NTSB said that the manual should standardize pilot procedures and cockpit procedures during takeoff, while en route and during approach and landing phases.

Since that time, when the NTSB has investigated a corporate aircraft accident, the investigators have usually determined whether or not the aviation department had an operations manual, and if so, what the manual contained and how the manual was used by the pilots.

Some 14 years after the West Virginia accident, shortly after takeoff, on Dec. 11, 1991, a corporate Beechjet slammed into a mountain summit near Rome, Georgia, U.S. (*Accident Prevention*, October 1992) and killed all nine occupants after a flight that lasted less than five minutes.

The company that owned the aircraft did not have an aviation department operations manual. The circumstances surrounding the flight crew relationships in this accident caused the NTSB to recommend that the U.S. Federal Aviation Administration (FAA), in conjunction with professional aviation associations and manufacturers of turbine-powered aircraft, inform corporate aircraft operators of what happened in the Georgia accident and encourage them to examine their flight operations to verify that policies and procedures are established to prevent such accidents.

Short of making a survey of corporate aviation department operations, there is no accurate way to determine how many of them have comprehensive operations manuals. But it is likely that many aviation departments are without such documents and rely on notes, memos or unwritten policies and procedures that, presumably, are understood by their aircrews.

Why the lack of an operations manual? The most common answer is that a printed policy on how the aircrew operates will unnecessarily restrict the pilot in command (PIC) in how the airplane will be flown and limits the PIC's decision-making scope. A good manual does neither. The manual ensures compliance with pertinent aviation regulations, which are the basis for limitations. The PIC always retains the ultimate authority on how the airplane is to be flown safely.

Who is responsible for creating an operations manual and putting it to use? The job rests with the person in charge of the aviation department, no matter what that person's title might be. That person has to genuinely believe in the value of clearly stated administrative policies and standard operating procedures (SOPs). Just as flying "by the seat of one's pants" has given way to reliance on highly sophisticated aircraft instrumentation, so has the casual approach to policies and procedures given way to firm management that requires precise policies and procedures that will be practiced by all aviation department personnel.

A comprehensive manual may contain more than 60 pages of information, so considerable time and concentration are required to create and organize a manual.

Who creates the manual? That sometimes presents a problem. Department managers, who are expected to fly, are usually chosen because they are good pilots. Among the secondary considerations are managerial skills or aptitudes, predispositions for interpersonal relationships, an understanding of budgetary and accounting requirements, and, farther down on the list, an ability to communicate orally and in writing to satisfy basic company needs. Writing or editorial skills are hardly a primary prerequisite for the manager of an aviation department.

A comprehensive manual may contain more than 60 pages of information, so considerable time and concentration are required to create and organize a manual.

How can the task be approached? It is ideal if the aviation department includes someone who has the skills and the time to organize concepts and procedures and put them on paper in a logical order. A large aviation department may have such resources, but in small aviation departments, flying schedules have priority and resources may be limited.

If personnel, time and budget permit, an operations manual workshop might be a good start for creating an in-house operations manual. Such workshops provide an opportunity to exchange ideas with a peer group to determine how the document should be written. It will still be necessary to convert gathered knowledge into a manual that will fit the flight operation.

An internally produced manual will still generate workshop fees and travel, hotel and other expenses, such as the employee's salary during the project (and absence from his regular duties).

If in-house aviation department personnel and other resources are insufficient, determine if other personnel in the company can provide help. For example, if there is a public relations department in the company, a person in that department with writing skills and some familiarity with aviation may be able to translate "talk" into text for a manual.

If the aviation department elects to have an operations manual produced externally, then search the consultant market for someone who has created new manuals or updated older manuals for corporate flight departments. Before signing an agreement, be sure to check the consultant's references, and obtain estimates for cost and time to produce a complete manual.

How should the operations manual be structured? There is no single perfectly logical sequence, because an aviation department may give different weight to different subjects based on what value is placed on those subjects.

A practical start may be a section devoted to management and administration (M&A) topics that are not directly related to flight safety, followed by sections for aircraft maintenance, flight operation and international operations.

Top Management Signs Off on Manual

To begin the M&A section, there should be a statement signed by the company's chief executive that the manual is an official company document, that management has read and understood the manual's contents and that aviation department personnel will comply with the manual's policies and procedures.

There should be sections that define the purpose of the aviation department, identify department personnel and their specific duties and responsibilities, establish dress and behavior guidelines, set training requirements, determine security requirements for aircraft operations and outline procedures for a response to an aircraft accident.

Aircraft accident procedures are frequently given little attention because the company does not intend to have an accident. But accidents do occur, and being prepared for such a catastrophe is a company necessity.

Large corporations may have a master disaster plan for hurricanes, tornadoes, floods, fires, etc. These usually establish lines of communication and individual responsibilities. These plans should be examined to determine if a company airplane accident is included. If not, then the minimum requirements for the aviation department's aircraft accident plan should be determined and added to the company's master disaster plan.

Plan requirements for an aircraft accident begin with the aviation department. If it is a large aviation department, there may be sufficient staff to designate as primary contacts if an accident occurs. If the company has a one-airplane, one-aircrew operation, the responsibility for taking plan action has to rest with a designated executive in the corporate structure.

If an accident occurs, the authorities at the accident scene (such as civil aviation authority personnel and police) will likely call the registered owner of the aircraft with information about the accident and they will likely request flight plan information, passenger list, etc. That call will probably go to the corporate headquarters switchboard and whoever answers should know who should take the call. That person should be prepared to write down all the information that is available, such as what, where, when, survivors, etc. Because of press interest in aviation accidents, the company should be prepared to refer press inquiries to its public relations department or to a designated person prepared to respond to questions.

Aircraft accident procedures are frequently given little attention because the company does not intend to have an accident. But accidents do occur, and being prepared for such a catastrophe is a company necessity.

Initial internal responses may include notifying the company personnel department of injuries or of fatalities so that next of kin can be notified. Aviation department personnel should not be required to make notification calls but should, out of concern for crew's families, have the option to communicate with those next of kin.

At the accident scene, and if the crew is not incapacitated, the PIC should take charge and do what is possible to assist the injured until rescue personnel arrive. If possible, the PIC should note — without disturbing the aircraft — the control settings, instrumentation, ice on aircraft or runways, fuel quantity, hydraulic fuel level, etc. And, because many spectators, press representatives and various officials may gather at the scene, crews should not make any statements about the accident to anyone other than officially identified representatives of the NTSB and the FAA. Oral statements or written statements can likely be deferred until the crew has recovered from the immediate physical affects or emotional trauma of the accident.

There will be many requests for information from the NTSB, FAA and other government agencies, some with time limits, that will have to be fulfilled by the company. The accident plan should designate responsibility for responding to these requests.

Other subjects in the M&A section might include a discussion of what might take place should an FAA violation be filed against a crew member; the policies on divulging company information, public statements and authorship of articles; press relations; company policy on smoking; pilot qualifications; outside employment by aviation department personnel; and other subjects germane to the company operation.

'Flight Operations' Emphasizes Safety

The flight operations section should include any subject with a direct relationship to flight safety. Organizing a logical sequence is rather difficult, except for discussing the process of starting up the airplane, flying it to a destination and landing it.

One method is to present first the subject matter that occurs prior to flight. This may include physical examination requirements; use of alcoholic beverages or controlled substances; drugs and medication; blood donations; operating information and equipment; flight and duty-time limitations; aircraft loading; passenger briefings; PIC authority; flight preparation; flight plans; and aircraft preflight inspections.

The core of the flight operations section should be the cockpit SOPs. The airplane manufacturer's flight manual sets the mechanical steps that the crew must follow to operate the aircraft and to handle aircraft malfunctions. The company cockpit SOPs should direct how the crew will function as a team in every phase of flight. It is normal to assign individual functions to the pilot flying (PF) and the pilot not flying (PNF), to interrelate those functions as a part of cockpit resource management and to establish inviolate SOPs. In every situation, the challenge-and-response method and the use of approved checklists should be made mandatory.

Then the crew can be taken through the following steps in logical sequence: before starting engines, starting engines, taxi, takeoff, climb, cruise, descent, visual flight rules (VFR) and instrument approach (or missed approach) and landing. Writing in a narrative form works well for most procedures except takeoffs and approaches.

Takeoff and instrument approach procedures, and what each pilot does during each, are best understood if displayed in tabular form. A column can be set up under “Pilot Flying,” with another column alongside, designated as “Pilot Not Flying.” Normally, an action by one pilot initiates a response from the other pilot. For instance, a call by the PF for “Gear up” in that column should require a response in the “Pilot Not Flying” column as “Gear up, selected” and “up” (when indicated by instrumentation).

In most situations, the takeoff procedure and instrument approach procedures will closely match how the pilots are trained in the simulator with modifications based on company or pilot preferences. For example, some crews prefer a quiet cockpit during the final stage of an instrument approach and the PF might want to hear the PNF only call out, “Runway in sight, take over visually.” In other situations, the PF might prefer the PNF to call out, “1,000 feet [305 meters] above minimums,” and call out every 100 feet (30.5 meters) down to decision height. The preference should be stated clearly and all crews must be required to follow that specific procedure. This facilitates cross-monitoring and ensures that any deviation from the standard procedure can be perceived, discussed and corrected as necessary.

The U.S. Federal Aviation Regulations (FARs) Part 91, under which most corporate flight departments operate, allows options for making takeoffs and approaches in adverse weather. The company policy about takeoffs and approaches should be clearly stated and compliance made mandatory.

The U.S. Federal Aviation Regulations (FARs) Part 91, under which most corporate flight departments operate, allows options for making takeoffs and approaches in adverse weather.

For example, under Part 91 zero-zero takeoffs may be permitted at the discretion of the PIC. Company policy might deprive the PIC of this option and, instead, require that weather be at least at landing minimums for the takeoff airport.

In an instrument approach, Part 91 permits the PIC to initiate an approach when the weather at the airport is reported to be below landing minimums (commonly called the “look-see” approach). The company policy might stipulate that the PF will automatically execute a missed approach procedure if the airport environment is not in sight at decision height. Companies that adhere to a different standard might not permit the PIC to initiate an approach when the weather is reported to be below minimums and might require that the pilot fly the aircraft to the designated alternate airport.

Supplementary subjects might include:

Deviation from prescribed procedures and pilot incapacitation. These two subjects are linked together because both will use the “two-way communication” system to verify what is happening. If the PF deviates from the standard flight profile in any way, the PNF should ask the PF why is he making a deviation. A response should be expected to the first inquiry (for example, “I am deviating 10 degrees to the right to go around that cloud buildup”) so that the PNF can monitor the deviation in relation to the flight plan. If there is no response, the PNF should again question the PF and, if there is no response to that inquiry, the PNF should immediately announce the intention to take control of the aircraft and then take control. Cockpit debates on what happened can take place after the aircraft is under control and on the proper flight path.

Pilots at the controls and admission to the cockpit. The usual policy is that only pilots employed by the company may manipulate the controls. Policies about admission to the cockpit may allow passengers to visit the cockpit area or put that area off limits during specific phases of flight.

Severe weather restrictions. Policies may vary depending on how the aircraft is equipped and what the airframe manufacturer recommends.

Emergency management. The airframe manufacturer’s flight manual should cover nearly all the possibilities and what visual, aural and physical signals are given by the airplane to the crew. The pilot training program should ensure the proper automatic responses by the crew.

Nevertheless, other procedures may be established for loss of engine power on takeoff or during cruise, ditching, fuel dumping, emergency landings, passenger evacuation, etc.

In-flight passenger illness. Commercial services are available that will dictate the procedures to follow if a passenger illness occurs while the aircraft is in flight; the means to contact those services should be in the manual. Flight departments that do not subscribe to such services should outline what the crew should do to respond to the passenger’s problem. Crews should be not expected to provide expert medical assistance, but they should be able to observe and describe the individual’s symptoms so that air traffic control and ground medical services can be alerted to offer assistance.

Transient maintenance. Maintenance problems can occur while the aircraft is away from its home base. A procedure should direct the crew about whom to notify, what to report and how to initiate maintenance services away from home base.

Postflight reports. Size and complexity of these reports depend on the size and nature of operations. The manual should direct what malfunctions should be reported and where the malfunctions should be noted in the aircraft records.

‘Maintenance’ Outlines Services Capabilities

The size and complexity of the maintenance section will depend on the company’s maintenance capability. Large maintenance departments may opt for a separate maintenance manual, which could provide considerable detail about responsibilities and functions. Nevertheless, many corporate aviation maintenance departments are limited in personnel and can provide only limited maintenance. In these situations, the manual should provide the crews with what they need to know about their company’s maintenance capabilities and how to relate to those capabilities.

The aviation department manager is responsible for aircraft maintenance. The maintenance department manager/chief of maintenance reports to the aviation department manager. The maintenance department manager should be consulted about what items to include in the maintenance section of the operations manual.

The maintenance department manager’s responsibilities should be outlined carefully, and of considerable importance are the procedures for how aircraft and equipment discrepancies are to be logged and how maintenance will respond to them. Whenever an aircraft has undergone maintenance, preventive maintenance or alterations, an airworthiness release will be required and this procedure should be noted.

The aircraft minimum equipment list (MEL) sheds a different light on defective or malfunctioning items that are basic to airworthiness. The procedures for both maintenance personnel and flight crews should be clear so that both groups understand if and when an aircraft may be flown.

If international flights are a part of the corporate flight schedule, another section should outline the basic considerations for embarking on an international flight. Because of the variety of geographical patterns, the frequency of operations to a given international area, the use of commercial firms for flight planning and ground handling and the capabilities of the crew, the operations manual may not include all situations. Nevertheless, broad guidelines are possible and the following subjects can be considered:

A tentative itinerary. Show the airports where landings are to be made and whether they are adequate for the aircraft in use; landing aids; airport services; the routes; fuel stops, etc.

Aircrew and passenger documentation. This section will include requirements to have passports, visas and tourist cards, and who is responsible for ensuring that these documents are on hand and complete.

Flight planning and ground handling services. This section will note who is responsible and how the services can be implemented.

Fuel buys. Ground handling agents, for instance, may be able to arrange fuel needs if they know where the airplane intends to land and how much of what type fuel is needed to refuel the aircraft. At some international airports, cash payments are required and the planning should consider the issues associated with large amounts of cash on the aircraft.

Aircraft documentation. A number of documents should be carried on the aircraft, including the airworthiness certificate, registration, radio licenses, insurance documents, etc.

Flight documents. These consist of any documentation that specifically pertains to a given flight as required by local authorities and civil aviation authorities. General declarations, landing permits, crew manifests and crew information, passenger manifests, passenger arrival cards and other papers may be required.

Uniforms and identification cards. Most corporate flight departments that operate internationally provide crews with uniforms. Official identification cards issued by ground handling agents or the International Business Aviation Council should be made mandatory for crew use.

No matter how many aircraft a company operates, an aviation department manual is necessary to set the policies and procedures under which the aviation department will function. The manual should clarify questionable situations, eliminate doubt, establish standardized operating procedures and improve safety.

The goal is to have a manual tailored to a particular corporate aviation department operation, covering every situation that can reasonably be expected as well as some (such as in-flight emergency or an accident) that at best will never occur. Accomplishing that mission requires open discussion, careful thought and hard work, but the product is worth the effort.

About the Author

John A. Pope established John A. Pope & Associates, an aviation consulting firm located in Arlington, Virginia, U.S., after retiring in 1984 as vice president of the U.S. National Business Aircraft Association. He has assisted more than 60 corporations in developing their operations manuals. He has also conducted more than 20 workshops dedicated to developing corporate operations manuals.

He served as a command pilot in the U.S. Air Force and the Air National Guard. He retired as a colonel from the U.S. Air Force Reserve after 33 years of service.

Aviation Statistics

Nonadherence to Rules, Airborne Spatial Deviations Most Commonly Reported to ASRS

Violations of air traffic control clearances represented more than half of "nonadherence" incidents reported.

Editorial Staff

Data compiled by the U.S. National Aeronautics and Space Administration (NASA) Aviation Safety Reporting System (ASRS) show that for 1993 as well as for the seven-year period 1987 through 1993, "nonadherence to rules and requirements" was the category of incident most frequently reported to the data base, followed by "airborne spatial deviations and conflicts" (Figure 1, page 7).

ASRS statistics are compiled according to safety-related incidents reported anonymously by pilots and air traffic controllers.

In 1993, "nonadherence to rules and requirements" represented 80 percent of the incident base, compared with 73 percent represented by that category for the seven-year period. For "airborne spatial deviations and conflicts," the category accounted for 62 percent of the 1993 incident reports and 65 percent of the incident reports for the more inclusive period. (Incident reports can fall into more than one category, so percentages of the incident base total more than 100 percent.)

"Nonadherence to rules and requirements" reports (Figure 2, page 7) were subdivided into nonadherence to air traffic control (ATC) clearances, representing 55 percent of the 1993 incident base and 52 percent of the seven-year incident base; U.S. Federal Aviation Regulations (23 percent and 20 percent, respectively); published procedures (17 percent and 12 percent, respectively); and company policy and other (2 percent and 1 percent, respectively).

Included most prominently among "airborne spatial deviations and conflicts" (Figure 3, page 8) were overshoot altitude deviations during climb or descent (17 percent of the 1993 incident base, 21 percent of the 1987–1993 incident base) and "track or heading deviations" (16 percent in both periods). These same reported incidents also contributed to the "nonadherence" category.

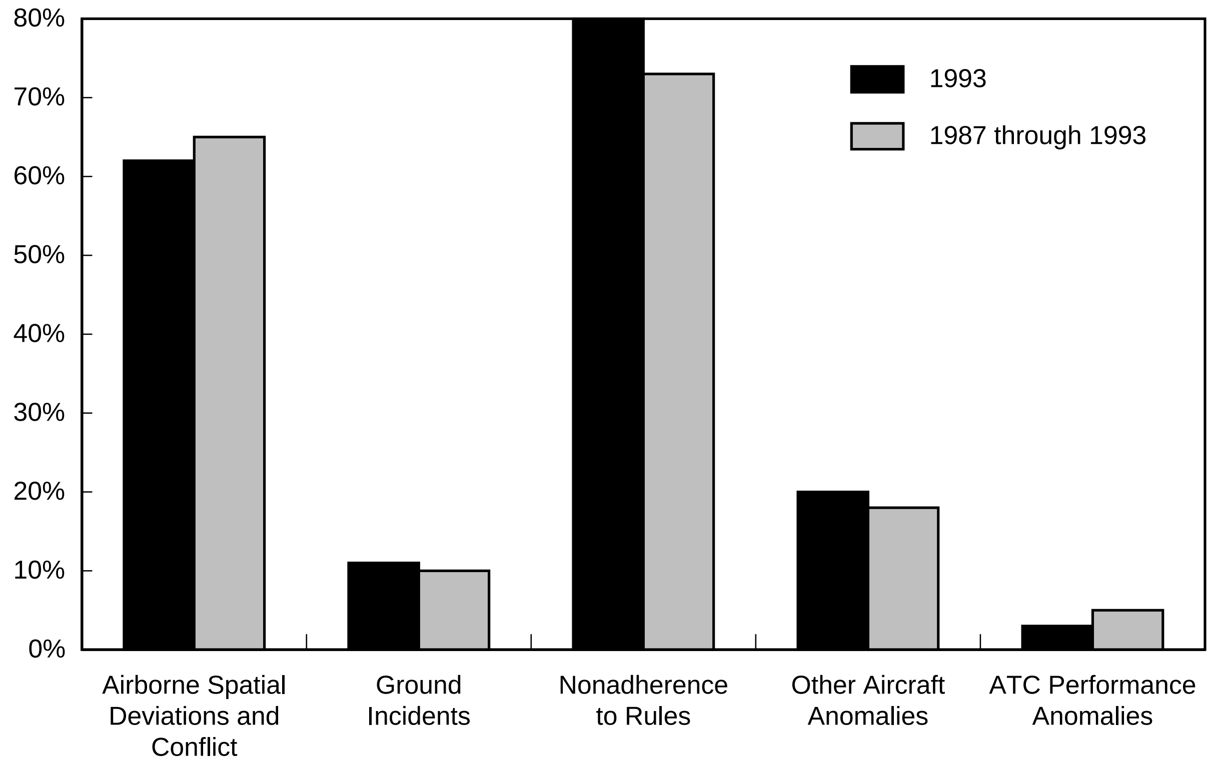
Among reported anomalies characterized as "top level" by ASRS, none closely approached the frequency of the "nonadherence" and "airborne spatial deviations" categories. "Ground incidents" accounted for 11 percent of the 1993 reports and 10 percent of the inclusive-period reports. "ATC performance anomalies" represented 3 percent and 5 percent, respectively.

Comprising 20 percent of the 1993 incident base and 18 percent of the seven-year incident base, "other aircraft anomalies" (Figure 4, page 9) included incidents such as equipment problems, weather encounters, airborne loss of control and visual flight rules (VFR) operations in instrument meteorological conditions (IMC). None represented more than 7 percent of the one-year or seven-year data bases.

For the entire incident base and every subdivision within it, no significant *pro rata* differences were noted between the 1993 statistics and the 1987–1993 figures.

ASRS statisticians caution that the data base's statistics are not a reliable guide to actual numbers of various types of incidents, or to the relative frequencies of different types of incidents. Nevertheless, the incidents reported do indicate accurately the minimum number of incidents that occurred in each category, and can reveal the existence of a problem that requires attention.♦

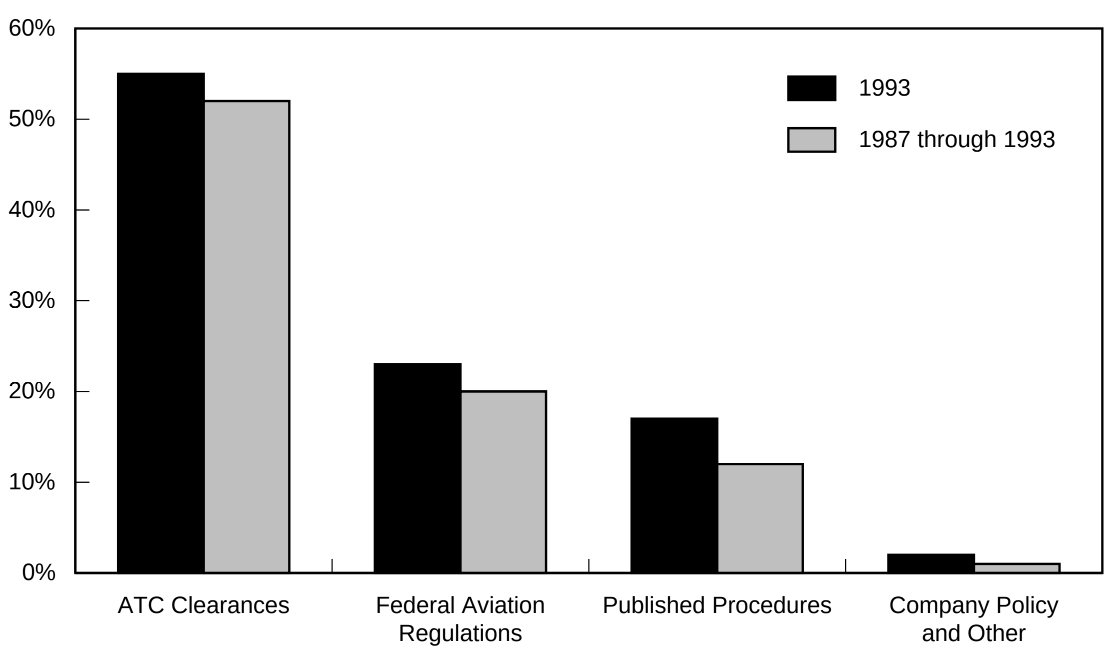
Incidents Reported to ASRS: Anomalies (Top-level Categorization)



Source: U.S. National Aeronautics and Space Administration, Aviation Safety Reporting System

Figure 1

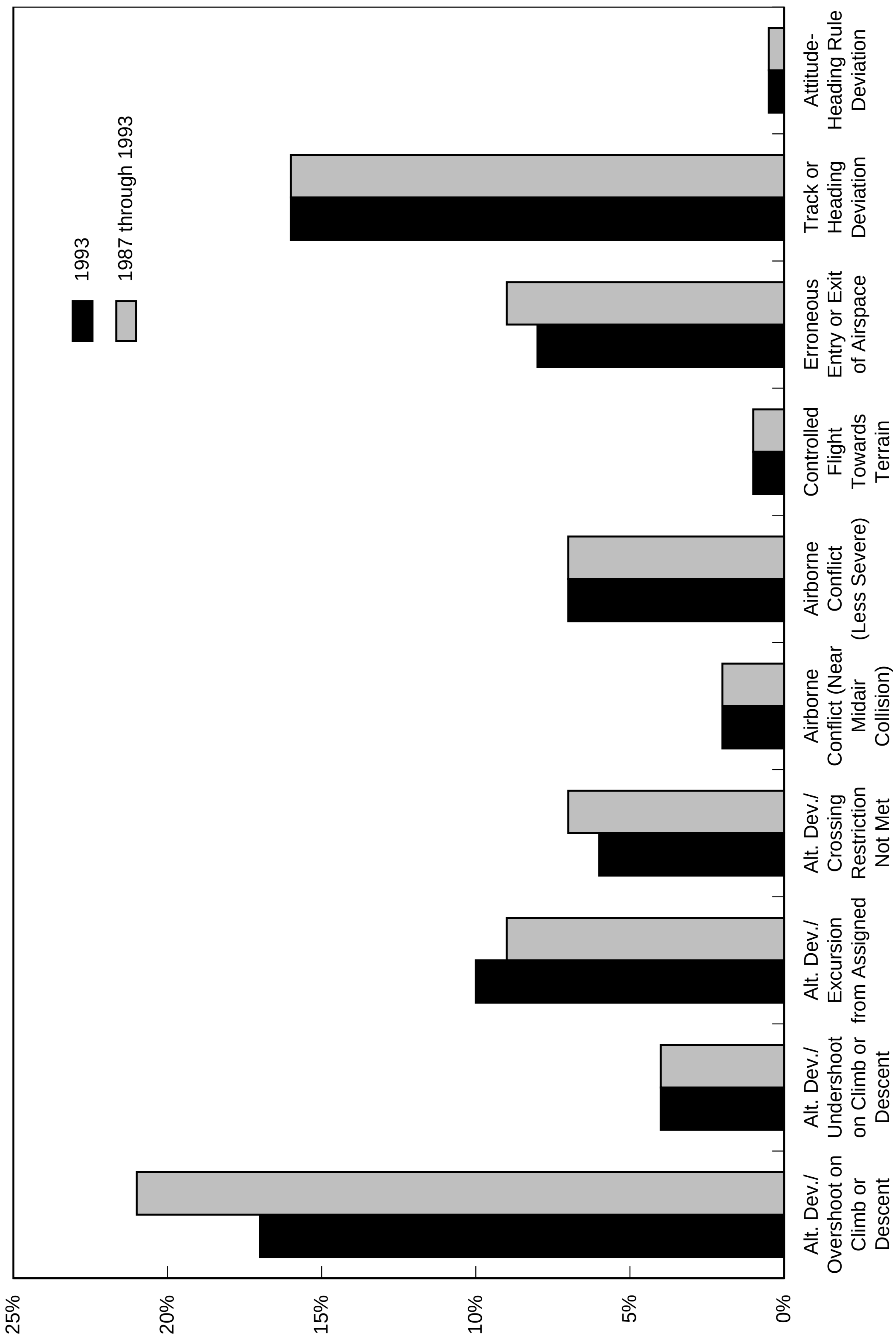
Incidents Reported to ASRS: Nonadherence to Rules and Requirements



Source: U.S. National Aeronautics and Space Administration, Aviation Safety Reporting System

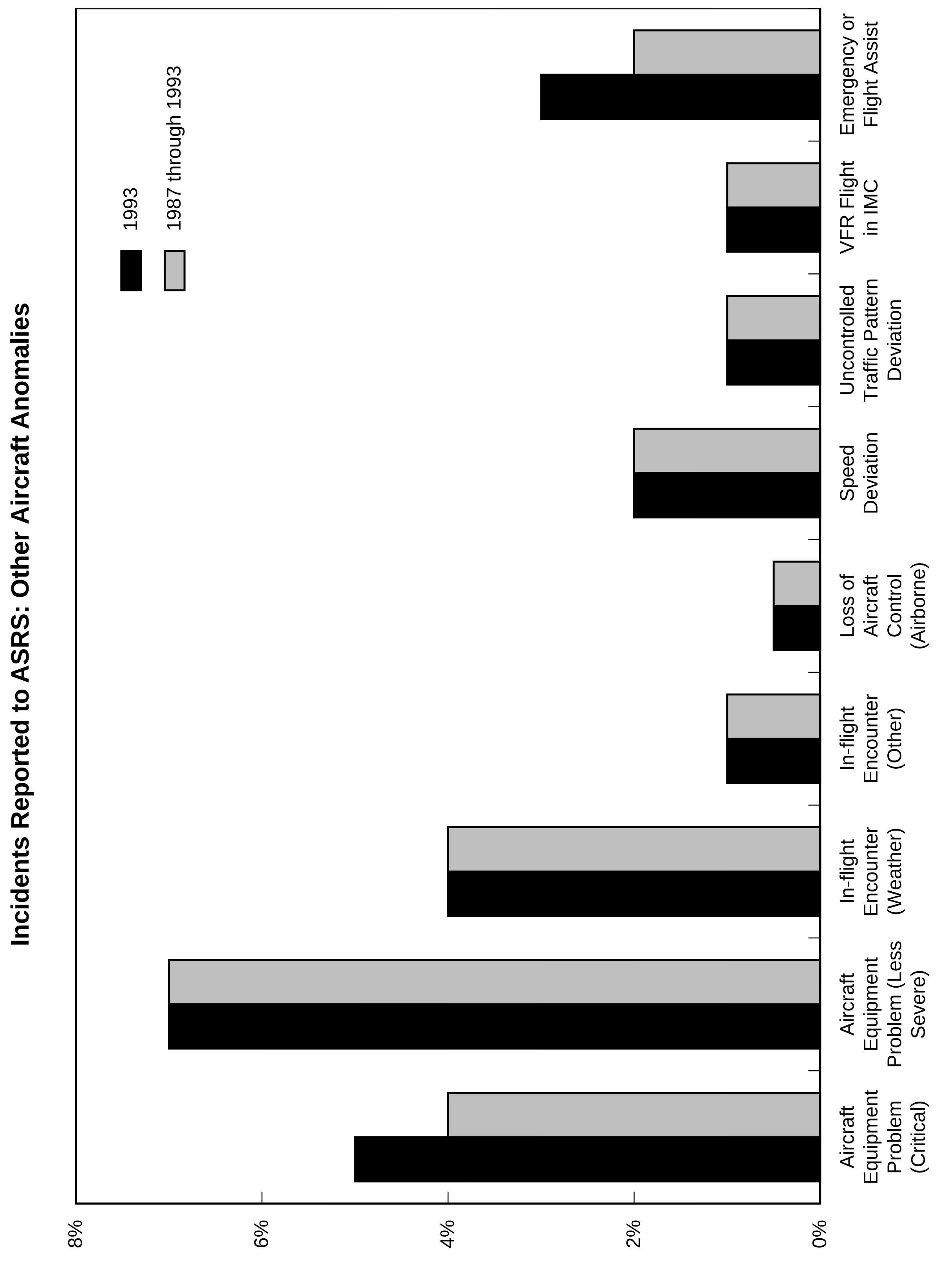
Figure 2

Incidents Reported to ASRS: Airborne Spatial Deviations and Conflict



Source: U.S. National Aeronautics and Space Administration, Aviation Safety Reporting System

Figure 3



Source: U.S. National Aeronautics and Space Administration, Aviation Safety Reporting System

Figure 4

Publications Received at FSF
Jerry Lederer Aviation Safety Library

Report Contains General Accounting Office (GAO) Official's Testimony on Government-corporation ATC System

***Jerry Lederer reviews Robert N. Buck's* The Pilot's Burden.**

Editorial Staff

Advisory Circulars (ACs)

Weld Repair of Aluminum Crankcases and Cylinders of Piston Engines. U.S. Federal Aviation Administration (FAA). Advisory Circular (AC) No. 33-6. December 1994. 11 p.

This AC provides guidelines for developing repair procedures for weld repairs on crankcases and cylinders of piston engines, particularly weld repairs that are not contained in the engine manufacturer's maintenance manual. It also includes information on critical areas of welding, welders' qualifications, inspection techniques, thermal processes and required technical data.

Guidelines for Using Global Positioning System Equipment for IFR En Route and Terminal Operations and for Nonprecision Instrument Approaches in the U.S. National Airspace System. U.S. Federal Aviation Administration (FAA). Advisory Circular (AC) No. 90-94. December 1994. 25 p.

This AC provides pilots guidance to use global positioning system (GPS) equipment during instrument flight rules (IFR) navigation in the U.S. National Airspace System and in oceanic areas. It includes operating en route and in the terminal environment during nonprecision instrument approach procedures. The guidelines provided are not mandatory.

Announcement of Availability: FAA-S-8081-4B, Instrument Rating Practical Test Standards. U.S. Federal Aviation Administration (FAA). Advisory Circular (AC) No. 61-111. November 1994. 1 p.

The U.S. Federal Aviation Administration (FAA) has published the Instrument Rating Practical Test Standards for all airplanes, helicopters and airships. FAA inspectors and designated pilot examiners will use these standards when conducting practical tests for the instrument rating. This AC announces the standard's availability and provides ordering information.

Announcement of Availability: FAA-S-8081-12, Commercial Pilot Practical Test Standards (Airplane). U.S. Federal Aviation Administration (FAA). Advisory Circular (AC) No. 61-110. October 1994. 6 p.

The U.S. Federal Aviation Administration (FAA) has separated the Commercial Pilot Practical Test Standards (Airplane) from other practical test standards because it was not cost-effective for FAA inspectors and pilot examiners to purchase a book incorporating all aircraft categories if they were only administering a test in one category. The rotorcraft, glider and lighter-than-air practical test standards will be incorporated in a separate volume to be published later.

Seaplane Bases. U.S. Federal Aviation Administration (FAA). Advisory Circular (AC) No. 150/5395-1. June 1994. 48 p. Illustrations, appendices.

A seaplane base is to aviation what a marina is to boating: It provides a community with access to the airways, and it provides employment opportunities for charter and concession operators, members of the tourist industry, commercial pilots, flight instructors, aircraft mechanics and flight activity support staff. This advisory circular provides guidance in planning, designing and constructing seaplane base facilities.

Guidelines for Evaluation of Military Aviation Training Courses. U.S. Federal Aviation Administration (FAA). Advisory Circular (AC) No. 147-4. May 1994. 3 p.

The guidelines in this AC will help U.S. Federal Aviation Administration (FAA)-certificated aviation maintenance technician schools (AMTSs) to evaluate training courses received by members of the U.S. military services while on active duty. A joint U.S. government/industry working group was formed in 1992 to develop common guidelines to evaluate military aviation maintenance training courses. Representatives from the Aviation Technician Education Council, U.S. Department of Defense and the FAA served on the working group.

Reports

Air Traffic Control: Issues Presented by Proposal to Create a Government Corporation. Mead, Kenneth M. Testimony before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, United States House of Representatives. Report No. GAO/T-RCED-95-114. February 1995. 17 p. Available through GAO.**

Kenneth M. Mead, director, Transportation Issues, Resources, Community and Economic Development Division, General Accounting Office (GAO), testified before the U.S. House of Representatives on the Clinton Administration's plan to create a wholly owned, not-for-profit, self-sufficient government corporation to operate, manage and modernize the U.S. air traffic control (ATC) system. This corporation would not receive any federal subsidies after receipt of prior commitments form the Airport and Airway Trust Fund.

Mead testified that GAO found that the corporation could be financially viable if the proposal's budgetary, cost and revenue assumptions are realized, and most importantly: exemption from the spending cuts outlined in the Budget Enforcement Act; efficiencies that would allow the corporation to hold down operating costs; and exclusion of certain pension and postretirement health-care costs. GAO also found that the FAA would face new challenges when establishing its safety oversight function, and in his testimony, Mead expressed concerns about how the proposed division of safety responsibilities would work in practice and how regulatory disputes between the corporation and the FAA will be resolved. He also said that Congress, when establishing the corporation, will need to consider how the needs of those users (e.g., general aviation and small airports) who do not contribute as much financially to the system as others will be met.

Aviation Security: FAA Can Help Ensure that Airports' Access Control Systems are Cost-effective. U.S. General Accounting Office (GAO). Report No. GAO/RCED-95-25. March 1995. 26 p. Appendices. Available through GAO. **

<u>Keywords:</u>
1. Airports — United States — Security Measures — Finance

Since 1989, the U.S. Federal Aviation Administration (FAA) has required that major airports in the United States have systems installed for controlling access to high-security areas where large passenger aircraft are located. (The systems are eligible for funding under the FAA's Airport Improvement Program [AIP].) This report to the U.S. House of Representatives Committee on Appropriations, Subcommittee on Transportation and Related Agencies addresses the subcommittee's concern about complaints by airports and airlines that the FAA substantially underestimated the cost of these systems. In its report, the GAO discusses how much access control systems will cost and have cost, and identifies actions that the FAA could take to determine that such systems are cost-effective in the future.

Aircraft Fires, Smoke Toxicity and Survival: An Overview. Chaturvedi, Arvind K.; Sanders, Donald C. A special report prepared for the U.S. Federal Aviation Administration (FAA) Office of Aviation Medicine. Report No. DOT/FAA/AM-95/8. February 1995. 6 p. References. Available through NTIS.*

<u>Keywords:</u>
1. Aircraft Fires
2. Fire Complexity
3. Smoke Toxicity
4. Combustion Gas Toxicity
5. Fire Research Issues and Directions
6. Fire Survival

Although in-flight fires are rare, postcrash fires do occur in modern aircraft; passengers may survive the force of the crash, but be incapacitated by smoke inhalation. This study, examining the 26-year period 1967–1993, found that there were 95 fire-related civil passenger aircraft accidents worldwide that claimed about 2,400 lives. From 1985 through 1991, about 16 percent of all U.S. transport aircraft accidents involved fire; 22 percent of the deaths in these accidents involved fire/smoke toxicity. The authors found that "combustion toxicology" is moving from a descriptive phase to a mechanistic one, in which models and methods for gas analyses have been developed.

Some Performance Effects of Age and Low Blood Alcohol Levels on a Computerized Neuropsychological Test. Schroeder, David J.; Harris, Howard C. Jr.; Collins, William E.; Nesthus, Thomas E. A special report prepared for the U.S. Federal Aviation Administration (FAA) Office of Aviation Medicine. Report No. DOT/FAA/AM-95/7. February 1995. 38 p. Figures, tables, references, appendices.

<u>Keywords:</u>
1. Alcohol
2. Age
3. Performance
4. Memory
5. Neuropsychological Test
6. Computerized Test Battery

COGSCREEN is a computerized test battery that the U.S. Federal Aviation Administration (FAA) uses as a screening instrument for cognitive functioning. For this study, nine of 11 basic COGSCREEN tests were used with 60 subjects who fell into three age categories: 27–32, 42–47 and 57–62. Subjects were given four 30-minute training sessions on the tasks; the following afternoon they participated in the experimental sessions. For the experiment, there was a predrinking session, which provided a baseline, and three postdrinking sessions targeted to breath alcohol levels of 0.04 percent, 0.027 percent and 0.014 percent. The data gathered indicated that the COGSCREEN test battery is sensitive to decreases in information processing time and cognitive reductions associated with aging, but they did not support a typical alcohol effect.

Development of Qualification Guidelines for Personal Computer–based Aviation Training Devices. Williams, Kevin W.; Blanchard, Robert E. A special report prepared for the U.S. Federal Aviation Administration (FAA) Office of Aviation Medicine. Report No. DOT/FAA/AM-95/6. February 1995. 30 p. Figures, references, appendices. Available through NTIS.*

Keywords:
1. Personal Computer–based Aviation
2. Training Devices
3. Flight Training
4. Instrument Flight Psychology
5. Applied Psychology

As the capabilities of personal computers have advanced, the number of flight simulation programs available as personal computer–based aviation training devices (PCATDs) has increased. This report presents a conceptual approach to develop and to evaluate PCATDs. It also provides a technical plan for developing and testing guidelines to assess PCATDs as part of the training curriculum of a flight school operated under U.S. Federal Aviation Regulations (FARs) Part 141.

Books

Buck, Robert N. *The Pilot's Burden: Flight Safety and the Roots of Pilot Error.* Ames, Iowa, U. S.: Iowa State University Press, 1994. 237 p. Illustrations, bibliographical references.

A commentator on a recent TV program referred to pilots as nothing more than "chauffeurs." Both occupations call for professional integrity, but they defy comparison. An airline pilot operates in three dimensions under instrument conditions with no visible natural horizon, like driving a car in dense fog at high speed and without a road. There is the possibility of collision from any direction. The aircraft, unless it is a helicopter, cannot be stopped to fix a mechanical problem or to off-load a sick passenger.

Aircraft in flight continuously fight the unrelenting force of gravity, which instantaneously takes advantage of any failure or weakness in the control of the aircraft. Human errors, carelessness and complacency are more likely to be catastrophic than in any other means of transportation. Piloting is also subject to problems in the infrastructure such as airways, airports and air traffic control; to complicated FAA regulations; and to the necessity for maintaining fitness for duty.

Buck's book describes how an excellent safety record has been achieved, despite the hazards that had to be overcome, since the time that a pilot's life expectancy was only three years to the present when his life expectancy is that of the general population's.

But Buck goes on to describe how the pilot has had to deal with increasing cockpit burdens introduced by growing cockpit complexity. He compares this with a juggler tossing and catching an increasing number of balls. There must come a point when the juggler will fail to catch one ball.

Aside from explaining this growing burden, the book reflects the dignity of the piloting profession. It is an epic of majestic proportions, reminding me of Homer's *Odyssey*. The book contains lessons for aircraft designers, dispatchers, maintenance supervisors, traffic controllers, top management and all concerned with the desire to make the aircraft operations "user friendly." [Reviewed by Jerry Lederer, Flight Safety Foundation president emeritus]

Commuter Airlines of the United States. Davies, R.E.G. and Quastler, I.E. Washington, D.C., U.S.: Smithsonian Institution Press, 1995. 504 p. Illustrations, appendices, bibliography, index.

Keywords:
1. Local Service Airlines — United States — History
2. Local Service Airlines — Government Policy — United States

This book provides a history of the commuter airline industry in the United States, from its inception in the 1920s through the present, but focusing on its growth since the 1960s. Twenty-two commuter aviation "pioneers" are profiled, and the authors identify the personalities who contributed to commuter aviation in each of 13 geographical regions. The authors examine the effect of government on the industry, discussing changes in regulation and the impact of deregulation in the 1970s. The book's two appendices provide tables and graphs describing commuter aircraft characteristics and commuter airline industry statistics.

Applications of Psychology to the Aviation System: Proceedings of the 21st Conference of the European Association for Aviation Psychology (EAAP). Fuller, Ray; Johnston, Neil; McDonald, Nick, eds. Brookfield, Vermont, U.S.: Ashgate Publishing Co., 1995. 328 p. References.

Aviation Psychology: Training and Selection — Proceedings of the 21st Conference of the European Association for Aviation Psychology (EAAP). Fuller, Ray; Johnston, Neil; McDonald, Nick, eds. Brookfield, Vermont, U.S.: Ashgate Publishing Co., 1995. 363 p. References.

Human Factors in Aviation Operations: Proceedings of the 21st Conference of the European Association for Aviation Psychology (EAAP). Fuller, Ray; Johnston, Neil; McDonald, Nick, eds. Brookfield, Vermont, U.S.: Ashgate Publishing Co., 1995. 324 p. References.

Keywords:
1. Aeronautics — Psychology — Conferences

Together, the three volumes in this series comprise the proceedings of the 1994 21st conference of the European Association for Aviation Psychology (formerly the Western European Association for Aviation Psychology).

Applications of Psychology to the Aviation System (volume 1) looks at psychology's role in aviation, starting with governments' and aviation authorities' policies for human factors research and its application in the aviation industry. The volume is divided into eight sections: "Policy for Human Factors in Aviation," "Systems and Organization," "Accidents/Incidents and Their Aftermath," "Cross-cultural Factors," "Theory and History," "Perspectives on Crew Resource Management [CRM]," "Automation" and "Individual Factors."

Aviation Psychology: Training and Selection (volume 2) examines the role that training and selection play in aviation psychology and aviation safety. The volume's sections cover CRM, air traffic control, selection, instruction, training delivery and skill maintenance.

Human Factors in Aviation Operations (volume 3) discusses a wide range of human factors issues in aviation, including the effects and implications of new technology on human operators. Section titles include: "Aeronautical Decision Making," "ATC: Automated Systems," "ATC: Human Factors," "Critical Incident Stress Management," "Error Analysis," "Fear of Flying," "Hardware and Software Interface Design," "Aircraft Maintenance," "Physiological Factors," "Pilot Competence," "Situational Awareness" and "Workload."

Jane's All the World's Aircraft 1994-1995. Lambert, Mark, ed. Alexandria, Virginia, U.S.: Jane's Information Group Inc., 1994. 807 p. Illustrations, index.

This edition marks the 85th year that *Jane's All the World's Aircraft* has been issued. Categories included are Aircraft, Lighter than Air and Aero Engines. A foreword describes changes in the aerospace industry. The editors have incorporated three changes to make the book easier to read: First flights are listed by country, rather than date, first; forecasts of important dates are also listed by country, rather than date, first; the index is split into two sections, one for types in the present edition and one for types in past editions.♦

* U.S. Department of Commerce
National Technical Information Service (NTIS)
Springfield, VA 22161 U.S.
Telephone: (703) 487-4780

** U.S. General Accounting Office (GAO)
P.O. Box 6015
Gaithersburg, MD 20884-6015
(202) 512-6000
(301) 258-4066 (fax)

Updated U.S. Federal Aviation Administration (FAA) Reference Materials

U.S. Federal Aviation Regulations (FARs)

Part	**Date**	**Subject**
Part 135	12/29/94	*Air Taxi Operators and Commercial Operators* (incorporates Amendment 135–54, "Traffic Alert and Collision Avoidance System" adopted December 23, 1994, which affects §135.180).

Advisory Circulars (ACs)

AC No.	**Date**	**Title**
20-126E	1/17/95	*Aircraft Certification Service Field Office Listing* (cancels AC No. 20-126D, *Aircraft Certification Service Field Office Directory*, dated 4/14/93).
21-15J	1/20/95	*Announcement of Availability: Type Certificate Data Sheets and Specifications for Aircraft, Aircraft Engines and Propellers* (cancels AC No. 21-15I, dated 2/11/93).
60-24	1/24/95	*Announcement of Availability; New Flight Standards Service Electronic Bulletin Board System*

Accident/Incident Briefs

In-flight Smoke Causes Diversion and Emergency Evacuation of B-737

Failure of the cabin crew to prepare for evacuation was blamed on miscommunication with the captain.

Editorial Staff

The following information provides an awareness of problems through which such occurrences may be prevented in the future. Accident/incident briefs are based on preliminary information from government agencies, aviation organizations, press information and other sources. This information may not be entirely accurate.

Air Carrier

Smoke in Cockpit Forces Diversion, Evacuation

Boeing 737-200. Minor damage. No injuries.

The Boeing 737 had begun its descent when the flight crew smelled smoke in the cockpit while passing through 28,000 feet (8,540 meters). The first officer reported substantial smoke coming from the circuit-breaker panel behind the captain's left shoulder. The flight crew immediately donned smoke goggles and oxygen masks and asked air traffic control (ATC) for a diversion to the nearest suitable airport.

The first flight attendant, at the captain's request, looked for the source of the smoke, but was not successful. Although the captain asked the flight attendants to prepare the cabin for an immediate landing, it was later determined that no evacuation preparation was carried out. It was determined that no announcements were made to the cabin crew or the passengers about the problem or the diversion.

The captain declared an in-flight emergency and diverted to an airport about 20 miles (32.2 kilometers) away. The smoke in the cockpit subsided during the diversion and, after landing and clearing the runway, the captain asked the flight attendants if they still smelled smoke.

When the flight attendants answered in the affirmative, the captain commanded an evacuation.

An investigation determined that no evacuation preparation had been undertaken by the flight attendants because they did not interpret the captain's instruction to "prepare the cabin" as an evacuation preparation order. The source of the smoke was found to be an overheated lighting ballast in the forward lavatory. Air circulation directed the smoke into the cockpit.

Aircraft Strikes Tug Parked in Gate Area

McDonnell Douglas DC-10. Substantial damage. No injuries.

As the aircraft turned into the gate area, the No. 3 engine struck an unattended ground tug, which had been left parked inside the aircraft operating envelope for that gate. The tug became wedged beneath the engine.

An investigation determined that as the aircraft approached the gate area, the pilots did not observe any intrusion into the parking space and that there were no visual impairments. The tug was parked with its engine running, in neutral gear, with the parking brake set. The driver was not at the scene.

While the aircraft was found to be more "angled in" to the gate than normal, it was determined that it was within the confines of the parking space. The investigation also determined that the pilots did not completely clear the parking area before entering the area. The incident is being used by the airline in training about clearing parking spaces before taxiing into congested gate areas.

Gear Malfunction Results In Emergency Landing

Fokker F-27. Substantial damage. No injuries.

The twin-turboprop F-27 was on daylight approach to a European airport when the right main-gear indicator showed red on final. The left main-gear and nose-gear indicators were green.

The pilot recycled the gear but there was no change in the indication. A missed approach was executed and emergency procedures were completed while holding. The pilot then declared an emergency and requested foam on the runway. On touchdown, the aircraft turned to the right and left the runway into the grass. The aircraft received substantial damage. No one on board the aircraft was injured. An investigation determined that a right main-gear retraction cylinder had malfunctioned.

Jet Blast Jolts Commuter

Cessna 208 Caravan. Substantial damage. No injuries.

The single-engine turboprop Caravan was cleared to cross a runway at night behind a McDonnell Douglas MD-11 that was lined up on the runway for takeoff.

As the Caravan passed directly behind the MD-11, the aircraft's engine's were advanced for takeoff. The jet blast from the MD-11 jolted the Caravan, causing a loss of control, and a wing spar was substantially damaged. No one on board the Cessna was injured.

Hard Landing Follows Power Loss

Cessna 421. Substantial damage. No injuries.

Just after rotation, the right engine lost power during a daylight takeoff. The aircraft then drifted to the right and landed hard on the taxiway.

The left main gear collapsed first and the right main gear sheared off as the aircraft skidded down the taxiway. The Cessna received substantial damage. There were no injuries.

Twin Crashes Short of Runway in Fog

Beech 58 Baron. Aircraft destroyed. Three fatalities.

The twin-engine Baron impacted terrain 3,609 feet (1,100 meters) south and 2,100 feet (640 meters) west of the runway, killing the pilot and two passengers.

An investigation determined that the pilot had canceled his instrument flight rules (IFR) flight plan en route to his destination. Weather at the time of the daylight crash was reported as instrument meteorological conditions (IMC) with fog and light drizzle.

Twin Stalls Attempting Return to Airport

Piper PA-31. Aircraft destroyed. One fatality.

Shortly after takeoff, the pilot of the twin-engine Piper advised air traffic controllers that he was returning to the airport because of an unspecified problem. The aircraft was seen at an altitude of 200 feet (61 meters) in a steep left bank before it descended nose and left-wing low into terrain.

The aircraft came to rest next to a residence and both the aircraft and the house were destroyed in a postcrash fire. Witnesses told accident investigators that they heard "sputtering sounds" from the aircraft before the in-flight loss of control.

Box Canyon Snares Single

Cessna 150. Aircraft destroyed. Two fatalities.

The single-engine Cessna was on a daylight cross-country pleasure flight in Canada when it was flown into a box canyon that was surrounded by 9,000-foot (2,745-meter) mountains.

Search aircraft located the wreckage at 6,300 feet (1,922 meters) the following day. The pilot and a passenger were killed and the aircraft was destroyed. Accident investigators concluded that weather was not a factor in the accident.

Rotorcraft

Long Line Snags Helicopter from Hover

Bell 206B. Substantial damage. One minor injury.

The helicopter was engaged in an external load operation when it collided with terrain.

The aircraft was in high hover while a ground crew filled a bucket suspended with a long line. The bucket began to swing and caught on a truck parked nearby. The pilot then lost control of the aircraft and the main rotor blades struck terrain. The helicopter impacted the ground and rolled down a hill before the long line caught in trees and stopped the aircraft from sliding.

The pilot suffered minor injuries in the accident and the helicopter received substantial damage. Weather at the time of the accident was reported as visual meteorological conditions (VMC).

Sightseeing Flight Ends in Tragedy

Hiller FH-1100. Aircraft destroyed. Four fatalities.

The aircraft was on a sightseeing trip over the ocean when it struck the water and sank.

The pilot told accident investigators that he was hovering at about 100 feet (30.5 meters) above sea level near the shoreline when he lost pedal control and the aircraft began to spin. The pilot said he executed an autorotation into the water and that the helicopter sank. The helicopter was not equipped with floats and none of the passengers were wearing a life vest. The four passengers on board were killed. The pilot was not injured. Weather at the time of the accident was reported as visual meteorological conditions (VMC), visibility 15 miles (24.1 kilometers) and winds at four knots.

Pilot-induced Oscillation Leads to Rollover

Bell 47-D1. Substantial damage. No injuries.

The helicopter was hovering over a helipad in preparation for takeoff when a pilot-induced oscillation began.

The pilot reported that overcontrolling the aircraft led to a rollover. No mechanical or system malfunctions were found. The helicopter received substantial damage. The pilot was not injured in the crash. Weather at the time of the accident was reported as visual meteorological conditions (VMC) with partial obscuration, visibility six miles (9.7 kilometers) and winds at five knots.♦

FLIGHT SAFETY DIGEST

Staff: Roger Rozelle, director of publications; Girard Steichen, assistant director of publications; Kate Achelpohl, editorial assistant; Rick Darby, editorial consultant; and Karen K. Bostick, production coordinator.

Subscriptions: US$95 (U.S.-Canada-Mexico), US$100 Air Mail (all other countries), twelve issues yearly. • Include old and new addresses when requesting address change. • Flight Safety Foundation, 2200 Wilson Boulevard, Suite 500, Arlington, VA 22201-3306 U.S. • Telephone: (703) 522-8300 • Fax: (703) 525-6047