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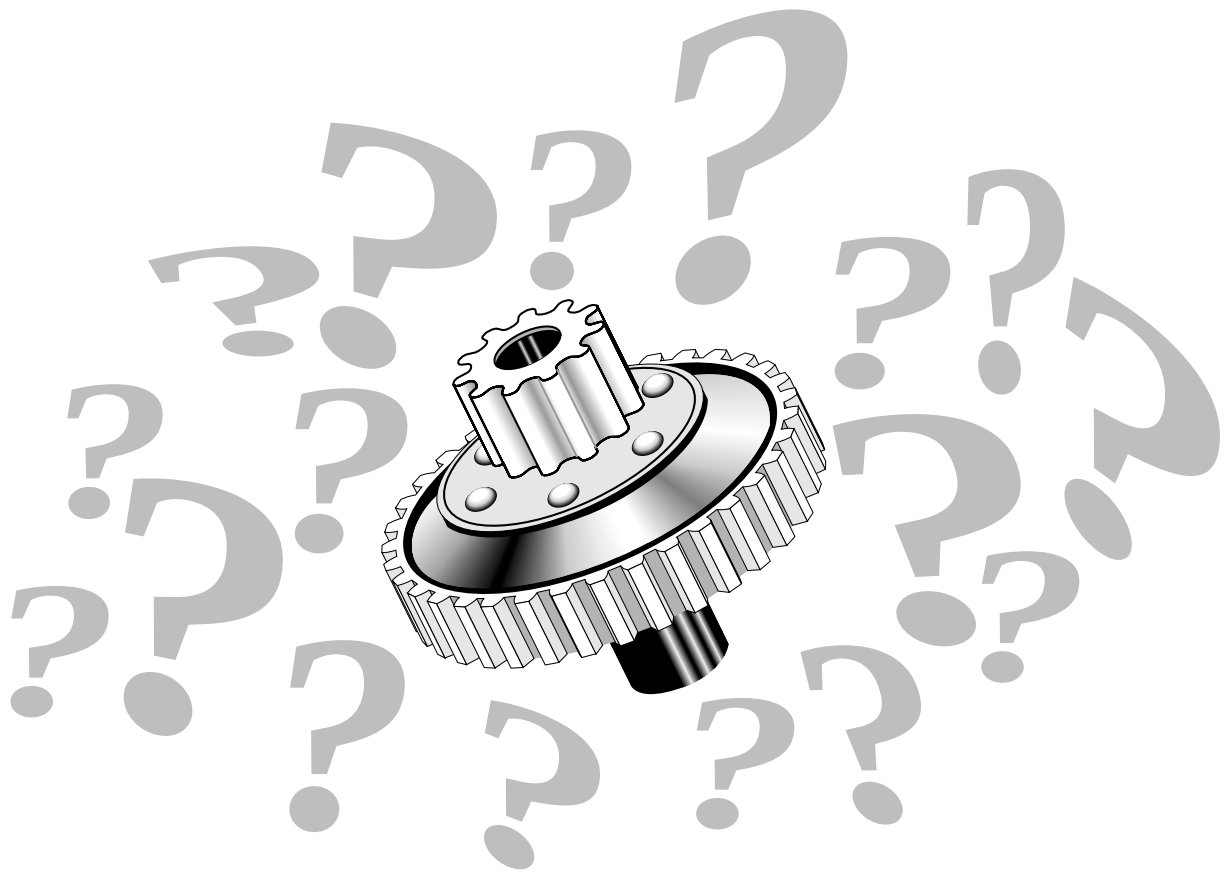
U.S. Audit Finds Some FAA-approved Repair Stations Using Bogus Parts



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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 600 member organizations in 75 countries.

U.S. Audit Finds Some FAA-approved Repair Stations Using Bogus Parts

Recommendations in a March 1994 audit report addressed three "areas of weakness": ensuring that replacement aircraft parts are FAA-approved; targeting repair stations for FAA surveillance; and improving surveillance.

Editorial Staff Report

An audit report of U.S. and non-U.S. aircraft repair stations concluded that the repair stations, which had been certified by the U.S. Federal Aviation Administration (FAA), regularly used unapproved aircraft parts. The audit report also said that counterfeit aircraft engine components had been installed at one repair station.

The audit report,[1] issued in March 1994 by the U.S. Department of Transportation's (DOT's) Office of the Inspector General (OIG), said that thousands of parts did not comply with federal regulations governing aircraft parts approval procedures and documentation, and that parts and maintenance guidelines were not followed.

The OIG audit focused on four repair stations in the United States, 10 FAA-approved non-U.S. repair stations, four FAA flight standards district offices and two international FAA field offices.

In addition to the suspect parts, the audit found "outdated repair manuals, substitute parts not approved by manufacturers and parts repaired by subcontractors not approved by the FAA." The audit report said that of parts sampled at 12 of the repair stations, "43 percent of all newly purchased parts and 95 percent of parts purchased from distributors or brokers did not have reasonable evidence of either FAA production approval status, production origin or conformance with established U.S. or industry specifications."

The report acknowledged that the FAA "has an adequate certification process for new repair stations." The OIG also found that "FAA aviation safety inspectors accomplished approximately 98 percent of the required domestic and 99 percent of required foreign repair station annual surveillance inspections ... ." But the report criticized as "inefficient and ineffective" the FAA policy of devoting the same level of inspection to all repair stations, regardless of the volume or criticality of repairs conducted at a facility.

The OIG recommended prioritizing inspections and suggested that the FAA develop a "statistically based management feedback system" that would build a picture of which

stations required more stringent surveillance because of the extent and risk of problems found at those stations.

Aircraft parts distributors and brokers, who now fall outside the FAA's purview, should be reviewed and regulated by the FAA, the report said.

The OIG's recommendations addressed what the report called "three areas of weakness." Six recommendations sought to "provide better assurance that replacement aircraft parts are FAA-approved"; four recommendations were designed to "provide better targeting of repair stations for FAA surveillance"; and five recommendations aimed at improving the quality of surveillance.

The OIG also recommended that the FAA report these areas as a "material internal control weakness" to the U.S. Secretary of Transportation for inclusion in the Secretary's report on management controls to the U.S. President and Congress, as required by the Federal Managers' Financial Integrity Act (FMFIA) of 1982.

Aircraft parts distributors and brokers, who now fall outside the FAA's purview, should be reviewed and regulated by the FAA, the report said.

FAA Administrator David R. Hinson dissented from the report's view that the weaknesses cited by the report were material enough to be reported to the Secretary and Congress. The Administrator also commented on the 15 substantive recommendations in the OIG report. He agreed with six recommendations, partially agreed with three, and disagreed with six.

The final audit report noted the FAA Administrator's response and announced that one OIG recommendation and parts of two others had been acceptably resolved. It continued to request consideration of some of the other recommendations, and for the remainder it asked for further information that it said would help evaluate the FAA's responses.

Report Calls for Improvements

The FAA certifies and regulates repair stations under Federal Aviation Regulations (FARs). Repair stations are legally required to conduct operations according to either an air carrier or commercial operator's FAA-approved maintenance manual under FARs Part 145, or according to rules contained in Part 43.

Part 21.305 requires materials, parts and processes to be approved under a Parts Manufacturer Approval (PMA), under a Technical Standard Order (TSO) issued by the FAA administrator, in conjunction with type certification procedures or in any other manner approved by the FAA Administrator. Manufacturers authorized under FAA procedures are known as Production Approval Holders (PAHs).

Part 43.13(b) mandates that technicians performing preventive maintenance "use materials of such a quality, that the condition of the aircraft, airframe, aircraft engine, propeller or appliance worked on will be at least equal to its original or properly altered condition (with regard to aerodynamic function, structural strength, resistance to vibration and deterioration, and other qualities affecting airworthiness)."

FAA repair station monitoring has two phases, certification and surveillance. Certification includes an inspection of the repair station's premises to ensure that the applicant's proposed procedures are effective and that the facilities and equipment meet regulatory requirements. In the surveillance phase, FAA guidelines require FAA aviation safety inspectors to perform an annual inspection of each repair station, whether located in the United States or outside the country.

In certifying and overseeing about 4,400 domestic and 344 non-U.S. repair stations, the FAA employs about 2,700 inspectors. The inspectors are assigned to 89 Flight Standards District Offices (FSDOs) and five International Field Offices (IFOs).

The OIG audit looked at FSDOs in the FAA's Southern Region and IFOs in the FAA's European Region. Repair stations audited were located in Florida, Georgia and North Carolina in the United States, and in the United Kingdom, Ireland, the Netherlands and Germany.

At each repair station examined, the audit team checked procedures in the following areas:

- *Sources of parts.* Documentation for 587 different part types (representing 31,508 individual parts) was examined. Repair stations obtain parts in various ways: by purchasing them new from the manufacturer, by subcontracting parts for reworking or repair and by obtaining salvaged parts from a distributor or broker.

  The audit used five criteria published by the FAA in Advisory Circular (AC) 20-62C to identify approved parts, as well as "common standards of good business practices." A part was suspect, the report said, "if the repair station could not provide reasonable proof, in the form of purchase documents and/or physical markings, to show the intended use of the part, its manufacturer, FAA approval status or evidence of conformance with established industry or U.S. specifications."

  Auditors paid particular attention to the 45 percent of the parts surveyed that came from a distributor or broker. Such parts were scrutinized more strictly because distributors or brokers are not regulated by the FAA and they have no standard record-keeping requirements,

making it more difficult to trace the pedigree of distributor- or broker-supplied components.

- *Maintenance manual revision dates.* The latest revision dates of manuals on hand at repair stations were checked against current revision dates supplied by manufacturers.

- *Parts.* Auditors compared parts used at repair stations with parts recommended by manufacturers' maintenance manuals. When parts were identified as substitutions, manufacturers were contacted to determine whether they approved of the substitute parts.

- *Internal controls.* The audit evaluated the FAA's internal controls for certification and repairs. The OIG inspectors audited work orders, logbook entries, invoices and employee records. They accompanied FAA maintenance inspectors on site visits and interviewed FAA management and repair station officials.

The report's findings were summarized under the heading "FAA surveillance and regulation of repair stations should be improved." The audit report said, "FAA-approved repair stations performed repairs for U.S.-registered aircraft using aircraft parts of unknown design, quality and origin and may not have fully complied with FAR Part 43 maintenance regulations." The audit report said that:

- "[Twelve] repair stations used 213 types of parts (14,232 individual parts) that lacked reasonable evidence" of validity;

- "[Five] repair stations used 11 outdated manufacturers' maintenance manuals to perform 47 repairs";

- "[Eight] repair stations used 27 types of parts (61 individual parts) not listed in the most current manufacturers' maintenance manuals";

- "[Three] repair stations subcontracted 16 types of parts (19 individual parts) to repair stations [that were] not regulated by [the] FAA";

- "[Ninety-five] percent (210 of 221) of the types of parts obtained from distributors or brokers lacked the necessary data, in our opinion, to determine positively that they met FAA approval requirements or met minimum industry or U.S. specifications";

- "[Eight] types of parts (50 individual parts) [were] purchased from suppliers not approved by [the] FAA to sell directly to end-users";

- "[Two] types of parts (60 individual parts) [were] produced by manufacturers not approved by [the] FAA to manufacture aircraft parts"; and,

- "[One] type of part (10 individual parts) ... had been counterfeited."

As an example of unacceptable parts documentation, the report described the case of three bearings purchased by a repair station from a distributor. "On the invoice was a generic certification from the distributor that stated, 'We certify that the parts listed above have been manufactured and inspected in accordance with applicable drawings and standards, and that these parts meet those drawings and standards requirements. Manufacturing and inspection documentation available on request.' The certification did not identify the bearing manufacturer or cite compliance with Federal regulations and no part certification document from the manufacturer was received with the part. The repair station used it without obtaining additional data."

The audit determined that repair stations had used outdated repair manuals to perform at least 47 repairs, in violation of Part 43 stipulations.

The one type of counterfeit part discovered came to light when auditors noted, among Pratt & Whitney JT8D engine parts at a non-U.S. repair station, seven suspect bushings. The bushings matched a counterfeit-part profile described in a notification letter that Pratt & Whitney had distributed in 1991. Ironically, the repair station where the counterfeit parts were discovered had bought those parts from one distributor in lieu of bushings that it had obtained earlier from another distributor after learning as a result of Pratt & Whitney's letter that they were bogus. Two of the new crop of counterfeit parts had already been installed in an engine that had been returned to the customer. The OIG report noted that when informed that it had again been victimized, the repair station took prompt corrective action, notifying the customer and quarantining the remaining counterfeit parts.

The audit determined that repair stations had used outdated repair manuals to perform at least 47 repairs, in violation of Part 43 stipulations. The report mentioned one case where analysis of a warranty return logbook at a repair station disclosed that when repairing an actuator on a Boeing 727, the repair station had used a maintenance manual that was seven years out of date.

The auditors could find only one example of an FAA inspector demanding corrective action by a repair station that had used obsolete manuals. In that instance, the FAA had accepted the repair station's letter assuring the agency that "overhaul manuals are being verified and updated on attrition basis as a manual is required. No unit will be released for service without a current manual."

The report observed that "surveillance inspections and the resulting follow-up action taken are not always detailed enough to detect potential FAR violations. Additionally, inspections are subjective in nature and FAR violations do not always result in enforcement action. Our audit disclosed that FAA inspectors seldom initiate an Enforcement Investigative Report (EIR) and prefer to handle violations through informal administrative action ... ."

The report said changes in the following areas are needed to improve the FAA internal control system for monitoring compliance with FAR Part 43 maintenance regulations:

- *Regulations and technical guidance.* "Clear and consistently interpretable regulations and technical guidance are needed to identify FAA approval status, production origin and the intended use of aircraft parts," the report said. "In AC 20-62C, the FAA places final responsibility for establishing the approval status of a part on the end-user and provides five acceptable methods for identifying approved parts. However, the FAA has not issued the necessary regulations whereby all of the required data would be made available to the end-user." The OIG recommended regulations to ensure that aircraft parts are marked in a systematic way, and that all sellers of aircraft parts be required to give the purchaser certified documentation attesting to a part's origin and approval status.

  The report also found "inconsistent interpretation of the regulations concerning part substitutions among FAA aviation safety inspectors, repair stations and manufacturers." It urged the agency to address this issue by providing guidance "explaining which part substitutions, if any, it [the FAA] allows and what type of prior approval repair stations must obtain." Regulations and guidance should also clarify what kind of work may be subcontracted to repair stations that are not regulated by the FAA, the report said.

- *FAA inspection requirements and quality of surveillance.* In the auditors' judgment, the FAA needs to make two basic changes in its oversight of repair stations. First, it should "prioritize its requirements for the number and content of repair station inspections through risk assessment considering repair station size, significance of repairs, levels of activity, and/or types of recurring problems found." The report included a table showing three repair stations inspected by the FAA during fiscal year (FY) 1991. Although the facilities ranged in size from 200 employees and annual sales of US$4 million to six employees and annual sales of $250,000, each received the same number of inspections — one.

  Second, the report recommended that FAA surveillance be reoriented toward performance or results. Currently, said the OIG, the FAA's surveillance is "based on a review of processes." The FAA, it said, "has not developed performance measures to evaluate the success of a repair station's operations (e.g., acceptable failure rates or acceptable number of warranty returns) nor does it analyze failure rate trends or number of warranty returns."

  The audit report said that the quality of surveillance could be improved if the FAA would establish standard performance measures; test components repaired by stations to evaluate the adequacy of the work; develop a "more statistically based approach" including quotas for aviation safety inspectors, who would be expected to review a certain number of work orders, manufacturers' maintenance manuals and parts used in repair; require inspectors to document tests performed during their investigations and the safety implications of any deficiencies; and develop standard procedures for follow-up actions when violations of the FARs are found.

"Our audit disclosed that FAA inspectors seldom initiate an Enforcement Investigative Report (EIR) and prefer to handle violations through informal administrative action ... ."

- *Regulation and surveillance of aircraft parts distributors or brokers.* The report said that the FAA should regulate and require periodic surveillance of aircraft parts distributors or brokers. Without such oversight, said the OIG, "the use of parts from these sources exposes the end-user to unknown and unwarranted risks."

- *Availability of information.* The report indicated that there is a need for better access to FAA data so that people can quickly and conveniently determine the approval status of parts, appliances and repair stations. It urged the FAA to refine its information maintenance capability to include data on repair stations' ratings and activity levels, and to specify what aircraft, engines or parts each repair station is qualified to accomplish. "In addition," the report said, "[the] FAA should analyze inspection results to identify recurring violations in order to identify high-risk areas. [The] FAA could then develop in-house training courses for aviation safety inspectors concerning areas most at risk and the most efficient and effective inspection techniques to use to resolve these areas."

FAA Has Taken Action To Eliminate Bogus Parts

The report recognized that the FAA had taken and planned a number of actions to detect and eliminate bogus parts:

- Since 1992, the FAA has held Approved Parts Seminars, open to all segments of the aviation industry, to aid in identification;

- In 1993, the FAA issued a 10-page color brochure, "Detecting and Reporting Suspected Unapproved Parts," and distributed it to the aviation industry;

- The FAA developed a 20-minute video tape to familiarize the aviation community with FAA regulations, policies and procedures concerting parts approval;

- To facilitate reporting of bogus parts and track corrective actions taken, the FAA launched a Suspected Unapproved Part (SUP) program. The agency created a national central reporting office to coordinate the resolution of all SUP reports, and FAA safety inspectors have been delegated to respond to them. SUP publicity has solicited reports to be made through the national aviation safety telephone "hotline." As of September 1993, the FAA had received 656 SUP reports, including 79 received via the hotline;

- The FAA issued AC 21-29A, *Detecting and Reporting Suspected Unapproved Parts,* offering information and guidance for detecting and reporting unapproved parts;

- Form 8120-11, *Suspected Unapproved Parts Notification,* was developed to facilitate the recording of suspected unapproved parts;

- To deal with the problem of parts manufactured by suppliers without FAA approval, the agency initiated a three-phase plan and formed a Parts Approval Action Team to accomplish each phase;

- In its FY 1993 management plan for the FAA's Flight Standards Service, the FAA identified safety objectives based on statistics from prior inspections and investigations;

- The FAA has issued draft AC 20-62D, *Eligibility, Quality and Identification of Approved Aeronautical Replacement Parts,* containing documentation guidance for sellers of aircraft parts that is expected to help make those parts more easily traceable; and,

- The FAA plans to consolidate and clarify the definition of a PAH and require part marking on all parts and subcomponents intended for installation on aircraft.

(As reported in *Air Safety Week,*[2] Anthony T. Broderick, FAA associate administrator for regulation and certification, suggested in testimony before a congressional subcommittee on March 9, 1994, that the report was influenced by "policy differences" between the FAA and the OIG. He said that the FAA considers the use of unapproved parts "a very serious matter," but added that "whether a part is technically unapproved or unsafe are two different questions." Broderick maintained that "there has never been an accident from [the use of] unapproved parts. We do not have a safety problem; we have a documentation problem ... .")

FAA Responds to OIG Recommendations

The OIG's recommendations were submitted to the FAA in a draft report dated December 17, 1993, and the FAA administrator's response was issued on February 17, 1994. The OIG's final audit report, dated March 7, 1994, responded in turn to the FAA's comments. The following lists each OIG recommendation, then summarizes the FAA's position and the OIG's reply for each.

OIG recommendation 1: "Continue plans to revise AC 20-62D and ensure the revision is published as planned and includes standard certification requirements for the aviation industry to use that clearly [identify] the part number, manufacturing source and compliance with the FARs for all replacement parts used to repair aircraft or aircraft components."

FAA position: The agency concurred. It said that draft AC 20-62D, *Eligibility, Quality and Identification of Approved Aeronautical Replacement Parts,* was distributed to all FAA Flight Standards and Aircraft Certification Offices for review. It said that the AC is expected to be issued in FY 1995.

OIG reply: The OIG accepted as adequate the corrective action reported.

OIG recommendation 2: "Continue plans to revise and reissue FAR 21 and ensure the revised regulations require the legible marking of replacement parts produced by all PAHs comparable to the marking requirements required for all PMA manufactured parts and require all PAHs to provide evidence of FAA production approval and certification of compliance with the FARs."

FAA position: The agency partially concurred. It said that the Aviation Regulatory Advisory Committee (ARAC) had a working group revising the production approval and marking requirements of Parts 21 and 45. "[The] FAA will consider this recommendation in the ARAC working group," it said. "However, [the] FAA cannot commit to incorporate this recommendation since it is subject to the ARAC rulemaking process."

OIG reply: The OIG said that the FAA's response did not provide sufficient data for it to fully evaluate the FAA's position. The OIG said that it needed more information about the ARAC rulemaking process, including whether ARAC or the FAA has final approval of the regulations.

OIG recommendation 3: "Revise Part 43 and provide technical guidance to clearly define acceptable part substitutions and allowable type of subcontracted repairs.

"a. Require repair stations to have authorized officials evaluate the safety impact of all part substitutions prior to installation and document the justification for using alternate parts.

"b. Clarify which repair functions are allowed to be subcontracted to repair stations not approved by the FAA."

FAA position: a. The agency did not concur. "The regulations already cover the methods by which parts substitution can take place," it said. "Additional guidance will be provided in AC 20-62D."

b. The agency concurred. It said that the regulations for what functions may be subcontracted to an uncertified repair station are contained in Part 145.57(c), in the preamble to Part 145, amendment 145-21, and Part 145 appendix A. It added, "We are currently rewriting FAA Order 8610.3, *Certification of Repair Station for Class and Limited Ratings, Including the Privileges of Those Ratings,* to clarify applications of contracting out."

OIG reply: a. The OIG requested that the FAA reconsider its response. It said, "Our results disclosed confusion by both repair station personnel and FAA personnel on part substitution requirements of FARs Part 43. The principal ambiguity is what constitutes a minor and major repair. ... [W]ithout current data on the planned changes for AC 20-62D we are unable to evaluate the merit of the changes. Further, FAA officials have on many occasions cautioned us that because an AC is only advisory, a repair station cannot be compelled to comply."

b. The OIG accepted as adequate the corrective action reported.

OIG recommendation 4: "Continue the development of a statistically based management feedback system. Ensure the system includes development of information on the volume, type, technical sophistication, safety sensitivity or criticality of repairs made by each repair station and the extent and significance of problems found at repair stations in order to target major or risk-sensitive stations for in-depth FAA surveillance. Specifically,

"a. Require domestic repair stations to report activity levels each year similar to the requirement for foreign repair stations.

"b. Redefine repair station ratings to more clearly identify what type repairs each repair station is approved to repair.

"c. Identify recurring problems and high-risk areas by analyzing inspection results.

"d. Develop in-house training course for aviation safety inspectors concerning areas most at risk and the most efficient and effective inspection techniques to use."

FAA position: a. The agency did not concur. "To require domestic repair stations to report activity levels would require a major change in FAA policy. Such a change [would be an] additional burden on the current available resources and would not enhance safety."

b. The agency concurred. It said that Part 145's current nine class ratings and 13 limited ratings were being revised to include 29 class ratings and nine limited ratings. "This should clarify what repairs each repair station is approved to conduct," it said.

c. The agency concurred. It said that certification, surveillance and inspection data were currently maintained in the Program Tracking and Reporting Subsystem (PTRS) data base, and that these data were reviewed to identify potential problem areas. In addition, it said, the FAA's Flight Standards Service was developing an analytical program called the Safety Performance Analysis Subsystem (SPAS). "The SPAS takes information from a variety of existing data bases, including PTRS and the Vital Information Subsystem [VIS]," the FAA said. "The SPAS correlates information and sets warning levels to alert inspectors [to] pending safety issue trends."

d. The agency concurred. It said, "the [FAA] academy is developing a 64-hour course that will be taught in a classroom setting over a two-week period. We intend to supplement this course with a computer-based instruction to be distributed to the field offices."

OIG reply: a. The OIG requested that the FAA reconsider its response. "By tailoring surveillance inspections to repair stations with high-volume repairs of flight critical components coupled with data on known deficiencies, [the] FAA could better prioritize its limited surveillance resources," it said.

b. The OIG said that the FAA's response did not provide sufficient data for evaluating the FAA's position. The OIG said that it would need to review the proposed rating system. It requested that the FAA provide a copy of the proposed changes to the Part 43 rating system.

c. The OIG said that the FAA's response did not provide sufficient data for evaluating the FAA's position. The OIG said that it would need more information about SPAS. "We would like to know how SPAS works and [the] FAA's expected outcome of the analysis," the OIG said. "We would like to know how often this analytical tool will be used and to what extent." Citing reported inaccuracies in PTRS and VIS data bases, the OIG also wanted to know how information would be verified before being introduced into the SPAS.

d. The OIG accepted as adequate the corrective action reported.

OIG recommendation 5: "Develop standard performance measures that represent the success or failure of a repair station's operation."

FAA position: The agency did not concur. It said that repair stations were already held to a minimum standard, outlined in Part 43 and Part 145, and that guidance was published in FAA Order 8300.10, *Airworthiness Inspector's Handbook*.

OIG reply: The OIG requested that the FAA reconsider its response. It said that "because the FAA surveillance function is process driven, the quality of a repair station's work product is not directly monitored by [the] FAA. By developing and implementing performance standards or benchmarks for repair stations' work products, more reasonable assurance of consistent quality repairs would be provided. Rather than short observation of repair processes during an annual inspection, such standards would provide additional confidence in a repair station's work product."

OIG recommendation 6: "Require independent testing, on a statistical basis, of components and products repaired by repair stations to evaluate the adequacy of the work performed."

FAA position: The agency did not concur. "This recommendation will require a rather involved change to the existing regulations and policies and the impact on resources is something that must be taken into consideration," the FAA said. "At the present time, there are reliability programs used by the air carriers. ... Inadequacies in work performed are detected by analysis of data from these systems."

OIG reply: The OIG requested that the FAA reconsider its response. It said that "statistically based testing would send a clear signal to repair stations that their work products are subject to independent analysis with test results made available to [the] FAA." The system of air carrier reliability reports, the OIG said, "doesn't provide reliable independent monitoring of work products of repair stations worldwide. The purpose of [the] FAA's Service Difficulty Reporting program is to collect mechanical reliability reports, analyze the reports, and disseminate trends, problems and safety alert information to the aviation industry and FAA personnel. However, a prior U.S. GAO [General Accounting Office] report concluded the program was of little value because of ... [the] FAA's management inattention."

OIG recommendation 7: "Develop a statistical approach to the surveillance process such as standard requirements for aviation safety inspectors to review a certain number of work orders, manufacturers' maintenance manuals and the traceability of parts used in repair."

FAA position: The agency did not concur. It said that "the FAA inspection program continues to be an effective and efficient means of assuring compliance with the FAR. The program has evolved by our own experience and through the recommendations of others. To adopt statistical sampling procedures ... represents a very significant departure from our established effort without any demonstrated improvement in safety."

OIG reply: The OIG requested that the FAA reconsider its response. "As evidenced by the results of OIG audits and investigations, [the] FAA's surveillance is not effectively ensuring [that] repair stations comply with the FAR. The surveillance procedures focus on the repair process and do not require minimum testing of data that could quickly confirm the existence of problems."

OIG recommendation 8: "Require aviation safety inspectors to document tests performed during each surveillance inspection and the safety implications of any deficiencies found."

FAA position: The agency concurred. It said that it required its inspectors to "document tests performed during each surveillance inspection and the safety implications of any deficiencies found. The level of detail recorded during surveillance inspections has recently been increased and presently meets our programmatic needs."

OIG reply: The OIG said that the FAA's response did not provide sufficient data to fully evaluate the FAA's position. It requested further explanation of how the information recorded during surveillance had been increased and when this change had occurred. The OIG asked for an example of an actual inspection report prepared according to the new criteria.

OIG recommendation 9: "Develop standard procedures for follow-up actions that inspectors should take when they find FAR violations and require standard documentation including the preparation of a SUP notification for safety-impacted parts repaired using outdated manuals, incorrect part substitutions or unauthorized repair stations."

FAA position: The agency did not concur. It said that its inspectors had guidance and procedures for follow-up action in FAA Orders 2150.3A, *Compliance and Enforcement Program*, and 8300.10, *Airworthiness Inspector's Handbook*. It also said that a work group had been formed to create a process by which the FAA would refer violations to the OIG.

OIG reply: The OIG requested that the FAA reconsider its response. "We are aware that standard guidance procedures are contained in the cited publications," the OIG said. "However, our audit results disclosed FAA inspectors are not following up and assessing the impact of FAR violations. We

have revised and clarified our recommendation to state that standard procedures are needed to ensure that inspectors perform required follow-up assessments for such violations as [the] use of parts and subcontractors not known to be FAA-approved."

OIG recommendation 10: "Expand regulatory authority to require FAA surveillance of aircraft parts distributors or brokers and to require distributors or brokers to maintain documentation for the traceability of all parts sold or traded and provide to purchasers documentation supporting the FAA approval status and the manufacturing origin of all such aircraft parts."

FAA position: The agency partially concurred, saying that it did "not believe that these changes would necessarily improve safety. We do know that a major increase in resources and industry burden would be brought about by such regulations. Instead, [the] FAA and industry working groups are developing an alternative approach using the concept of voluntary accreditation of suppliers by FAA-sanctioned third parties."

OIG reply: The OIG requested that the FAA reconsider its response. "Because distributors and brokers are unregulated," the OIG said, "once aircraft parts pass through distributors or brokers, the regulatory chain of custody of aircraft parts is broken and the risk of unapproved or counterfeit parts entering the supply system increases. ... [P]arts brokers and distributors need to be included in the FAA regulatory chain."

OIG recommendation 11: "Provide guidance to the aircraft repair industry on the PAH and repair station data available from [the] FAA including instruction on how to access current data on PAHs, drop-ship authorization holders and repair station authorizations for all aircraft parts."

FAA position: The agency partially concurred. It said that it did not have the requested information "readily available" for the aircraft repair industry, but that it would contact the repair station industry to determine its need for such information and appropriate delivery methods.

OIG reply: The OIG said that the FAA's response did not provide sufficient data for it to fully evaluate the FAA's position. "We need an explanation [of] how the development of a comprehensive PMA data base as a commercial activity would be accomplished," the OIG said. "We need to know how a commercial entity would track new FAA approvals and certificate revocations and who would be held accountable for the accuracy of the information."

OIG recommendation 12: "Report the material internal control weaknesses disclosed in this report to the Secretary [of Transportation] for inclusion in the Secretary's annual report to the President and Congress as required by the FMFIA."

FAA position: The agency did not concur. It disputed that any internal control weakness existed. "The SUP program is done in concert with OIG and we have developed standardized procedures and local coordinators to address these specific unapproved parts issues. Since this high level of oversight is provided in the SUP program, we feel this recommendation is unnecessary."

OIG reply: The OIG requested that the FAA reconsider its response. "Our conclusion that [the] FAA should report a material internal weakness is based upon our evaluation of both foreign and domestic repair stations," the OIG said. "The corrective actions needed to improve the three areas of weakness complement, but are not replaced by, the SUP program. The SUP program is designed to detect SUPs while the focus of our recommendations is to improve the quality of [the] FAA's surveillance and regulatory structure to prevent the introduction of SUPs into the aviation community. We view the SUP program as a detection and measurement tool to provide FAA management data on the number of SUPs that are entering the repair stream because surveillance and regulatory controls are weak."

The net result was that, although the FAA had indicated concurrence with six of the recommendations, the OIG accepted the corrective actions taken and planned for only three of the recommendations. "After careful analysis of the FAA Administrator's response," the report said, "we have concluded that the actions proposed are not sufficient to provide reasonable assurance [that] aircraft maintenance and repair will conform to FAA aircraft certificate requirements. In each of three areas of identified weakness, the [FAA] Administrator declined to implement action essential to correction." ♦

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1. U.S. Department of Transportation, Office of the Inspector General. *Report on Audit of the Certification and Surveillance of Domestic and Foreign Repair Stations, U.S. Federal Aviation Administration.* U.S. Department of Transportation Report No. R4-FA-4-009, March 1994.

2. "DOT: FAA-approved Stations Used Parts of Unknown Origin, Quality." *Air Safety Week* Volume 8 (March 14, 1994): 1.

Decrease in Airmisses for U.K. Commercial Air Transports Less Positive When Other Aircraft Categories Included

The U.K. Civil Aviation Authority says that the safety trend deteriorates when general aviation, recreational and military aircraft are included in the data.

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Editorial Staff Report

For commercial air transports, the annual rate of airmisses involving some degree of risk has declined during the last decade in United Kingdom (U.K.) airspace, according to a report by the U.K. Civil Aviation Authority (CAA). But when the focus is expanded to include all types of air traffic, including military, the picture is considerably less encouraging.

Figures published in *UK Airmisses Involving Commercial Air Transport* show that "risk-bearing" incidents involving air carriers have trended downward from 21 in 1983 to three in 1992, although the figure rose to seven in 1993 (Table 1, page 11). The total number of commercial transport aircraft involved in airmisses found to have included some risk declined from 26 in 1983 to four in 1992, although that rate also bounced up to nine in 1993 (Table 2, page 11).

Such figures are not directly comparable, because of the growth of aviation activity during the 1983–1993 period, but an analysis of airmisses based on hours flown also shows a decreasing frequency during the period. From a high of 4.3 airmisses per 100,000 flying hours in 1983, it reached a low of 0.3 in the last four months of both 1992 and 1993 (Table 3, page 12).

All of those airmisses involved at least one civil air transport aircraft. The report also offered, by way of comparison, a look at figures for airmisses involving "both civil aircraft of all types (including general aviation and recreational) and military aircraft of all nationalities." With these additional types of aircraft included, the improved-safety trend deteriorates; the numbers of incidents involving risk showed no pronounced trend during the study period, and were actually higher (77) for 1993 than for 1983 (75) (Table 4, page 12).

The CAA defines an airmiss as an occasion "when a pilot considers that his aircraft may have been endangered by the proximity of another aircraft." Airmiss reports are thus subjective, being based on the pilot's own definition and

perhaps influenced by the pilot's concern about possible repercussions. When an airmiss occurs while a flight is subject to air traffic control (ATC), the pilot normally reports it to the controller. According to the report, there is a parallel (but separate) procedure by which ATC personnel can report what they consider an airmiss even if neither pilot involved in the incident comments on it. It is not clear whether these ATC-reported incidents were included in the figures.

Airmisses are categorized according to a system of guidelines formulated by the International Civil Aviation Organization (ICAO). The incidents are rated "A," "B" or "C" depending on whether they are accounted to have created a definite risk, a possible risk or no risk of collision, respectively.

According to the CAA, airmisses are reported and investigated under its system "to ensure that lessons are learned and that corrective action is taken." Investigations may reveal "possible weaknesses in rules or procedures; they may draw attention to potential problem areas in the airspace; or they may highlight shortcomings in individual or equipment performances." The reports first go to the Joint Airmiss Section of the National Air Traffic Services, to be examined by the Joint Airmiss Working Group (JAWG). The JAWG is an independent committee drawn from a cross-section of civil and military aviation bodies; represented on the panel are British Airways, the British Airline Pilots Association, the Guild of Air Traffic Control Officers, the Ministry of Defence Inspectorate of Flight Safety and others.

All reports are presented to the JAWG in an anonymous format, and the emphasis is on analyzing the causes of each incident in search of procedures that may reduce future possibilities for a similar incident. According to the CAA, "JAWG reports are circulated to the aviation community for briefing and training purposes; statistical trends are analyzed and in some cases the JAWG makes immediate recommendations for remedial action." ♦

Table 1
Commercial Air Transport Airmisses — Number of Incidents, U.K. Airspace, 1983–1993

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1992			1993		
											Jan.–April	*May–Aug.*	*Sept.–Dec.*	*Jan.–April*	*May–Aug.*	*Sept.–Dec.*
Definite risk (A)	4	0	1	4	2	4	2	6	0	1	1	0	0	0	0	1
Possible risk (B)	17	11	11	8	9	11	9	6	5	2	0	1	1	2	4	0
Total risk-bearing (A+B)	**21**	**11**	**12**	**12**	**11**	**15**	**11**	**12**	**5**	**3**	**1**	**1**	**1**	**2**	**4**	**1**
No risk (C)	38	51	37	49	44	58	51	51	26	35	11	20	4	7	13	9
Total (A+B+C)	59	62	49	61	55	73	62	63	31	38	12	21	5	9	17	10

Source: U.K. Civil Aviation Authority

Table 2
Commercial Air Transport Aircraft Involved in Airmisses, U.K. Airspace, 1983–1993

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1992			1993		
											Jan.–April	*May–Aug.*	*Sept.–Dec.*	*Jan.–April*	*May–Aug.*	*Sept.–Dec.*
Definite risk (A)	5	0	1	7	2	7	2	9	0	2	2	0	0	0	0	1
Possible risk (B)	21	14	15	9	11	13	10	9	6	2	0	1	1	2	6	0
Total risk-bearing (A+B)	**26**	**14**	**16**	**16**	**13**	**20**	**12**	**18**	**6**	**4**	**2**	**1**	**1**	**2**	**6**	**1**
No risk (C)	48	60	44	59	57	75	60	58	36	39	11	22	6	9	15	13
Total commercial transport aircraft in airmisses (A+B+C)	74	74	60	75	70	95	72	76	42	43	13	23	7	11	21	14

Source: U.K. Civil Aviation Authority

Table 3
Commercial Air Transport Airmisses Related to Flying Hours, U.K. Airspace, 1983–1993

	83	84	85	86	87	88	89	90	91	92	92			93		
											Jan.–April	*May–Aug.*	*Sept.–Dec.*	*Jan.–April*	*May–Aug.*	*Sept.–Dec.*
Commercial air transport aircraft in risk-bearing airmisses	26	14	16	16	13	20	12	18	6	4	2	1	1	2	6	1
Commercial air transport hours flown in U.K. airspace (× 1,000)	595	641	658	681	731	797	863	893	873	946	283	353	310	287	360	321
Commercial air transport aircraft in risk-bearing airmisses per 100,000 hours flown	**4.3**	**2.2**	**2.4**	**2.3**	**1.8**	**2.5**	**1.4**	**2.0**	**0.7**	**0.4**	**0.7**	**0.3**	**0.3**	**0.7**	**1.7**	**0.3**

Source: U.K. Civil Aviation Authority

Table 4
Total Airmisses — Civil and Military, U.K. Airspace, 1983–1993

	83	84	85	86	87	88	89	90	91	92	92			93		
											Jan.–April	*May–Aug.*	*Sept.–Dec.*	*Jan.–April*	*May–Aug.*	*Sept.–Dec.*
Definite risk (A)	13	21	14	21	20	33	30	25	21	22	9	10	3	2	5	5
Possible risk (B)	62	57	52	50	58	59	55	51	53	39	15	14	10	15	38	12
Total risk-bearing (A+B)	**75**	**78**	**66**	**71**	**78**	**92**	**85**	**76**	**74**	**61**	**24**	**24**	**13**	**17**	**43**	**17**
No risk (C)	92	93	77	104	113	120	118	119	68	95	25	50	20	16	38	35
Total (A+B+C)	167	171	143	175	191	212	203	195	142	156	49	74	33	33	81	52

Source: U.K. Civil Aviation Authority

Publications Received at FSF Jerry Lederer Aviation Safety Library

U.S. Report Focuses on Reducing Equipment Failure and Downtime in Airways Facilities

The report also aims to refine a system to collect and analyze the contributing factors behind facility outages.

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Editorial Staff

Reports

Human Factors in Airway Facilities Maintenance: Development of a Prototype Outage Assessment Inventory. Blanchard, Robert E.; Vardaman, Jennifer J. Report No. DOT/FAA/AM-94/5. February 1994. 26 p.; table, appendices. Available through the U.S. National Technical Information Service (NTIS)*.

Keywords

1. Airway Facilities
2. Data Bases
3. Corrective Maintenance
4. Human Factors
5. Quantification
6. Maintenance Reporting

Summary: The airways facilities (AF) maintenance community is concerned with identifying ways of reducing equipment failure and the time required to restore equipment to operational status following a failure. It is vitally important to identify the many components of downtime and contributors to a particular outage (equipment failure). The primary objective of this study was to develop a technique to identify and map within a "systems" structure all potentially significant contributors to AF maintenance downtime.

The secondary objective was to use past outage data to build a data base to determine whether overall outage time can be apportioned among the contributors. Subject matter experts (SME) involved in restoring outages from the Oklahoma City (OKC) General National Airspace System (GNAS) Airways Facility Sector (AFS) and the Memphis GNAS AFS assisted in the iterative design and review process that produced the Airway Facilities Outage Assessment Inventory — Form A (AFOAI). Ten previous OKC GNAS outages and four previous Memphis GNAS outages were analyzed using the AFOAI — Form A, confirming that the inventory is a useful tool in identifying specific contributors to AF maintenance downtime. Recommendations are to continue to refine the format of the AFOAI to test its usefulness in collecting and analyzing data on factors and conditions contributing to facility outages. [from abstract]

Aviation Safety: FAA and the State Department Can Better Manage Foreign Enforcement Cases. U.S. General Accounting Office (GAO). Report to the Chairman, Subcommittee

on Investigations and Oversight, Committee on Public Works and Transportation, U.S. House of Representatives. Report No. GAO/RCED-94-87. March 1994. 18 p. Available through GAO**.

Keywords

1. United States — Federal Aviation Administration — Rules and Practice — Evaluation

2. Aeronautics, Commercial — Law and Legislation — United States

3. Business Enterprises, Foreign — Law and Legislation — United States

4. Law Enforcement — United States — Evaluation

Summary: This review was instigated as a result of the crash off the coast of Miami, Florida, U.S., of an overweight and uninsured non-U.S.-operated aircraft. The aircraft narrowly missed high-rise buildings in a heavily populated area before it crashed, jeopardizing the lives of U.S. residents.

The review addressed the issues of whether (1) foreign governments acted on enforcement cases that the U.S. Federal Aviation Administration (FAA) referred to them, and, conversely, whether the FAA acted on enforcement cases that foreign governments referred to it; (2) whether the FAA had identified enforcement system weaknesses in its assessments of foreign countries' compliance with international safety standards; and (3) whether the U.S. Department of Transportation (DOT) acted against foreign air carriers that violated departmental aviation regulations.

The results indicated that the FAA has not effectively managed its enforcement workload, and as a result, foreign governments and the FAA did not act on about one-third of the referred safety violations between 1990 and 1992, primarily because the referral occurred after statutory time limits or too close to them to investigate. When conducting foreign country assessments between 1991 and 1993, the FAA found deficiencies that weakened foreign countries' enforcement capabilities. Overall, 16 of the 26 countries that the FAA assessed did not meet international safety standards.

DOT assessed 28 civil penalties against foreign carriers between 1989 and 1992. Violators in 26 of these actions paid their fines. Two carriers failed to pay and committed additional violations. DOT officials subsequently revoked both carriers' operating authority. [from report]

Rotorcraft Low Altitude IFR Benefit/Cost Analysis: Conclusions and Recommendations. Anoll, Robert K.; et al. Report No. DOT/FAA/DS-89/11 and DOT/FAA/RD-93-22. October 1993. 98 p.; tables, graphs, appendices. Includes bibliographical references. Available through the U.S. National Technical Information Service (NTIS)*.

Keywords

1. Aids to Air Navigation — United States

2. Helicopters — United States

3. Air Traffic Control — United States

Summary: This report is the last of a series of three that addressed rotorcraft low-altitude benefit/cost analysis. The report reviews operational requirements and constraints for specific rotorcraft missions identified in the previous reports. It also reviews all of the alternatives identified for improving rotorcraft operations. The alternatives included additional communications and surveillance equipment, both existing equipment and future systems identified in the Aviation Systems Capital Investment Plan (CIP), and air traffic control procedural changes. A benefit/cost (B/C) analysis was conducted for each communication, surveillance and procedural improvement identified. When site-specific data were available, they were used to calculate actual B/C ratios. When no data existed, a break-even analysis is provided. [from abstract]

Ground Deicing and Anti-icing Program. U.S. Federal Aviation Administration. Advisory Circular No. 120-60. May 1994. 30 p.; ill.; appendix.

Summary: Safety information received in 1992 by the U.S. Federal Aviation Administration (FAA) indicated that 15 accidents during the last 23 years have involved inadequate anti-icing or deicing. The March 1992 crash of an airplane taking off from LaGuardia Airport in New York, New York, U.S., during a snowstorm at night, was blamed on failure of the airline industry and the FAA to provide flight crews with procedures, requirements and criteria compatible with departure delays in conditions conducive to aircraft icing, and the flight crew's decision to take off without assurance that the airplane's wings were free of ice despite prolonged exposure to precipitation following deicing.

The advisory circular (AC) said that the FAA has determined that Federal Aviation Regulations (FARs) Part 121 certificate holders must provide pilots in command (PCs) with pertinent information and operator-developed procedures and criteria for deciding whether to take off in icing conditions. Nevertheless, the AC also said that the FAA believes that ultimately, the decision whether to take off is the PC's responsibility.

This AC provides one method of obtaining approval of a ground deicing and anti-icing program and to ensure compliance with FARs. [from background & purpose]

The Influence of Hatch Weight and Seating Configuration on the Operation of a Type III Hatch. Fennell, P.J.; Muir,

H.C. A paper prepared by Cranfield Institute of Technology Applied Psychology Unit. CAA Paper 93015. U.K. Civil Aviation Authority, London, England. August 1993. 66 p.; ill., graphs, tables. Includes appendices.

Summary: The U.K. Civil Aviation Authority (CAA) commissioned the Applied Psychology Unit at Cranfield Institute of Technology to conduct an investigation in two separate phases, assessing the influence of hatch weight and seating configuration on the ability of members of the public to operate a Type III hatch. The research was part of a wider European program of Type III hatch testing that included tests conducted at Fokker facilities in the Netherlands. Phase 1a assessed the influence of three alternative weights of hatch (12.5-kilogram, 15-kilogram and 25-kilogram) on the ease of operation of the Type III exit in a pre-Airworthiness Notice (AN) No. 79 seating configuration. Phase 1b assessed the influence of the same three hatch weights with the seats arranged in accordance with AN79, Ref. 1, to enable the effect of the increased seat space available from the AN79 seating configuration to be evaluated. In accordance with CAA testing criteria, 50 percent of all the tests in Phase 1a and 1b were conducted with a 50th percentile male dummy, simulating a passenger unable to operate the exit. An assessment of the potential benefits of training members of the public to operate a Type III hatch was also included in Phase 1b.

The results indicated that it was necessary to have a 50 percent reduction in hatch weight from 25 kilograms in addition to increasing the available seat space from the pre-AN79 to the AN79 seating configuration, to significantly reduce the time taken to operate the hatch with or without a dummy obstruction of the exit. The combined benefits of reduction in hatch weight and increased seat space were significantly greater for females than males. The results indicated that both a reduction in hatch weight and an increase in seat space are necessary for significant improvement in the time taken by passengers to operate the Type III exit. [from summary]

Books

Federal Aviation Regulations Explained: Parts 1 and 135. Jackson, Kent S. and Brennan, Joseph T. Englewood, Colorado, U.S.: Jeppesen Sanderson Inc., 1994. 230 p.

Summary: To help pilots understand U.S. Federal Aviation Regulations (FARs) Part 135, the authors have consulted U.S. Federal Aviation Administration (FAA) advisory circulars (ACs), the *Airman's Information Manual (AIM)*, U.S. National Transportation Safety Board (NTSB) decisions, FAA Chief Counsel opinions and regulatory background.

The book contains the regulations that comprise FAR Part 135. FAR Part 1 is included as a reference for the other regulations. Each regulation is listed with an explanation (unless it is self-explanatory); cross-references to other regulations; related ACs; the regulation's location in *AIM*; excerpts from NTSB cases associated with the regulation; and excerpts from appropriate FAA chief counsel opinions. [adapted from preface]

Takeoffs Are Optional, Landings Are Mandatory: Airline Pilots Talk About Deregulation, Safety and the Future of Commercial Aviation. O'Malley, Penelope Grenoble. Ames, Iowa, U.S.: Iowa State University Press, 1993. 227 p. Includes bibliographical references, index. ISBN 0-8138-2414-1.

Keywords

1. Aeronautics, Commercial — United States — Accidents
2. Aeronautics, Commercial — United States — Safety Measures
3. Aeronautics, Commercial — United States — Deregulation
4. Airlines — United States — Deregulation

Summary: Through a series of interviews with experienced pilots and flight crew members, the author seeks answers to the question, "How has deregulation affected cockpit crews?" The author says that the answers are disturbing. The book contends that results of deregulation, from the loss of command autonomy to the lack of proper maintenance to the reduction in good flight training, have put flight crews and their passengers at increasing risk.

These aviation professionals illustrate the flying hazards with stories of fatal accidents, near misses, tarmac-tower-management confrontations and equipment failure. They also address the drastic changes in the industry itself — the mergers and takeovers that have reduced the number of major airlines by more than 75 percent since deregulation's inception — and provide insights into the human factors of flight safety, discussing crew life-styles, interrelationships and job satisfaction.

Black Wings: The American Black in Aviation. Hardesty, Von; Pisano, Dominick. Washington, D.C., U.S.: National Air and Space Museum, 1983. 80 p.; ill. Includes bibliographical references.

Keywords

1. Afro-Americans in Aeronautics — United States

Summary: This book is the outgrowth of an exhibit that opened at the U.S. National Air and Space Museum in 1982. Both the exhibit and the book were designed to call attention to the historic role that blacks have played in shaping the growth of modern aviation.

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

** U.S. General Accounting Office
P.O. Box 6015
Gaithersburg, MD 20877 U.S.
Telephone: 202-512-6000
Fax: 301-258-4066

Updated U.S. Federal Aviation Administration Reference Materials

Advisory Circulars (ACs)

AC Number	Date	Subject
AC 183-35E	4/25/94	*FAA DAR, DAS, DOA and SFAR Part 36 Directory* (cancels AC 183-35D, *FAA DAR, DAS, DOA and SFAR Directory*, dated December 30, 1991).
AC 150/5000-12	7/15/94	*Announcement of Availability — Passenger Facility Charge (PFC) Application (FAA Form 5500-1)*
AC 65-27	5/11/94	*Announcement of Availability: FAA-T-8080-10E, FAA-T-8080-11E and FAA-T-8080-12E*
AC No. 43-16	Sept. 1994	*General Aviation Airworthiness Alerts, Alert No. 194*

U.S. Federal Aviation Regulations (FARs)

Part	Date	Subject
Part 232	5/24/94–6/21/94	Certification and Operations: Domestic, Flag and Supplemental Air Carriers and Commercial Operators of Large Aircraft (change 5, incorporating Amendment 121-238, Extension of Compliance Date for Installation of Digital Flight Data Recorders on Stage 2 Airplanes, adopted May 17, 1994, and Amendment 121-239, Emergency Locator Transmitters, adopted June 10, 1994).
Part 121	3/17/94	Certification and Operations: Domestic, Flag and Supplemental Air Carriers and Commercial Operators of Large Aircraft (change 4, incorporating Amendment 121-237, Alcohol Misuse Prevention Program for Personnel Engaged in Specified Aviation Activities, adopted January 23, 1994. This final rule adds 121.458 and 121.459 and Appendix J).
Part 135	1/23/94–3/17/94	Air Taxi Operators and Commercial Operators (change 2, incorporating Special FAR [SFAR] No. 36-6, Development of Major Repair Data, adopted January 21, 1994, and Amendment 135-48, Alcohol Misuse Program for Personnel Engaged in Specified Aviation Activities, adopted January 25, 1994. SFAR No. 36-6 changes the termination date of SFAR 36 to January 23, 1999, and Amendment 135-48 revises 135.1(c) and 135.1(d) and adds 135.253 and 135.255. This change reprints subpart because material was missing in some of the basic parts published in January 1993, and because 135.129(a)(1) was printed incorrectly).

U.S. Federal Aviation Administration Orders

Order	Date	Subject
7210K CHG 3	6/9/94	*Facility Operation and Administration*
7110.65H CHG 3	8/18/94	*Air Traffic Control* (This change transmits pages omitted from Order 7110.65H, Change 3, Air Traffic Control.)
7110.10K CHG 3	6/9/94	*Flight Services*

Aircraft Jolted by Turbulence, Minor Injuries Result

The pilot flew across the top of a cloud that showed no indication of precipitation on weather radar.

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.

Minor Injuries After Turbulence Jolts Aircraft

Hawker Siddeley HS 748. No damage. Minor injuries.

The flight had passed through weather with minor turbulence into clear air without turbulence. A cloud top ahead of the aircraft showed no indication of precipitation on weather radar. Although the pilot felt a course deviation was unnecessary, the seat belt sign was activated.

As the aircraft flew across the cloud, the aircraft received a single severe jolt of turbulence. Substantial negative g forces were followed by positive g forces. Three occupants received minor injuries and loose items were thrown about the cabin.

The crew determined that the aircraft was undamaged and the flight was continued to the destination airport. A maintenance inspection confirmed that the aircraft was undamaged.

Crew Ignores Procedures, Picks Icy Taxiway

Boeing 767. No damage. No injuries.

When the controller requested that the aircraft exit the runway at the next available taxiway, the crew assumed that there was landing traffic close behind its aircraft. The crew identified the next taxiway, which was restricted from use on that runway and was so identified in the flight operations manual. Nevertheless, the crew turned the aircraft onto the taxiway. The nose gear and right main gear moved off the pavement into the muddy grass beside the taxiway.

An investigation determined that the taxiway, which had been covered with clear ice, was normally prohibited from use during winter operations and it was a nonstandard procedure to ask an aircraft to exit at that location.

Windows Replaced After Brush with Wingtip

Boeing 757 and McDonnell Douglas DC-10. Minor damage. No injuries.

The Boeing 757 was holding in a penalty box while waiting for its gate to clear when the flight crew saw a DC-10 taxiing

toward them. The Boeing 757 crew believed that there would be insufficient clearance between the Boeing 757's nose and the DC-10's wing. The Boeing 757 crew attempted to warn the approaching DC-10 by flashing their aircraft's lights, waving their arms and calling on the ground frequency; the DC-10 crew was listening on a different frequency.

The DC-10's wingtip struck four windows in the cockpit area of the Boeing 757. The windows were replaced because of abrasion damage, but there was no structural damage to either aircraft.

An investigation found that the Boeing 757's nose had extended forward of the holding bay clearance limit line. The DC-10 was on the taxiway centerline and would have cleared the Boeing 757 if it had been properly positioned.

Crew Ignores Fire Warning, Assumes Malfunction

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

The aircraft was at 39,000 feet (11,895 meters), and after a fire warning the crew discharged one fire bottle in an aft cargo compartment. The fire warning light extinguished, but then flickered.

The cargo-fire checklist called for a landing at the nearest suitable airport. After discussing the situation, the crew decided that the warning was the result of a malfunction not a fire. The crew elected to continue to the original destination — another hour of flight.

Crew Uses Ax to Exit Aircraft

Piper Navajo Chieftain PA-31. Substantial damage. No injuries.

The night charter flight departed the airport with two crew members and cargo 260 pounds (118 kilograms) above the aircraft's maximum allowable take-off weight of 7,000 pounds (3,175 kilograms). When the pilot selected the landing gear lever to retract the gear, the lever did not return to the neutral position. The pilot decided to recycle the gear and moved the lever to extend the gear. The landing gear failed to extend and the lever became loose.

Several attempts were made to lower the landing gear with the emergency system, which failed to function. After discussions with technicians on the ground, it was decided that a cable had been disconnected or broken from the hydraulic power pack, which was located forward of the cockpit front bulkhead, where it was inaccessible to the crew.

The crew elected to make a gear-up landing. After the aircraft came to a stop, the crew exited the aircraft through a cockpit side window, which the crew broke with an ax.

After the accident, regulatory authorities found that the aircraft was not suitably equipped for freight operations and noted that the normal and emergency exits were blocked by cargo. They also found that the cargo had not been secured and there was no structure or netting separating the cargo from the cockpit.

Unqualified Crew Pushes Landing Minima

Embraer EMB-110 Bandeirante. Minor damage. No injuries.

The pilot crew was not qualified to land its aircraft, a nonscheduled cargo flight, in the daylight Category III weather conditions at the airport, but the approach was continued. The aircraft struck approach lights 196.85 feet (60 meters) from the approach end of the runway.

The two crew members, the only occupants of the aircraft, were not injured. A main-gear tire on the aircraft and the approach lights were damaged.

Cargo Flight Receives Unwanted Lift

Cessna 208 Caravan. Substantial damage. No injuries.

The time was nearly midnight when the McDonnell Douglas MD-11 was on the runway and lined up for takeoff. The Caravan, a nonscheduled cargo flight, was cleared to taxi across the runway and behind the MD-11.

The Caravan was directly behind the MD-11 when its engines were advanced for takeoff. The resulting jet blast lifted the Caravan from the pavement and caused a loss of control that resulted in a damaged wing spar.

Pilot Loses Control Of Aircraft in Flight

Rockwell Commander 690. Substantial damage. No injuries.

The pilot reported autopilot was disengaged during a descent through 16,000 feet (4,880 meters) with turbulence reported as light to moderate when the aircraft entered an uncommanded right roll. The pilot regained control and landed the aircraft.

The two crew members aboard the air ambulance were not injured, but the aircraft was substantially damaged during the daylight flight. The outboard 30 inches (76 centimeters) of the right horizontal stabilizer and elevator was bent up and aft 180 degrees onto the upper surface of the stabilizer.

Fuel Starvation Leads to Accident

Cessna 340. Substantial damage. No injuries.

The aircraft made an emergency descent with both engines inoperative. The daylight off-airport landing substantially damaged the aircraft, but the pilot and three passengers were not injured.

An investigation determined that both engines were selected to the left main tank, which was found to be dry after the accident. The auxiliary tanks and the right main tank contained a substantial quantity of fuel. The fuel-low warning light was found to be intermittently nonfunctional.

Investigators believed that the pilot's familiarity with the aircraft led him to select and check the position of the fuel selector by feel rather than by visual confirmation. The shape of the selector prevented a positive confirmation of its position by touch only, but the position of the selector, partially obscured by the pilot's seat and between the seat's rails, encouraged a touch check rather than a visual check.

Crew Unprepared for Flight

Gates Learjet 25. Destroyed. Two fatalities.

The final radio message from the crew was that they were descending in daylight instrument meteorological conditions from Flight Level 310 to 9,000 feet (2,745 meters) en route to Greenland for a positioning flight to the United States.

The wreckage of the aircraft was found 24 days later at 8,650 feet (2,638 meters) mean sea level on the ice cap 70 nautical miles (129 kilometers) north northeast of the destination. The aircraft was destroyed and the two crew members were killed.

Accident investigators believed that the aircraft drifted northward because of wind and was descending at the time of impact. The crew, navigating only with an automatic direction finder, may have mistaken a very strong signal from the navigation aid as an indication that it was closer to the destination than it really was. The crew may have made a descent based on a standard altimeter setting rather than an actual setting. Conditions at the time of the accident would have resulted in an altitude that was lower than that indicated. Minimum safe altitude in the area was 11,000 feet (3,355 meters).

Loose Baggage Might Have Trapped Pilot

Cessna 182 Skylane. Substantial damage. One fatality.

Turning to final approach in daylight under visual flight rules, the pilot radioed that his aircraft was having engine problems, and that he was going to ditch the aircraft in a nearby lake.

After striking the water in a landing attitude, it remained afloat and upright for several minutes. The pilot did not exit the aircraft and the plane sank in 100 feet (30 meters) of water. The ditching was controlled and survivable, but the pilot drowned.

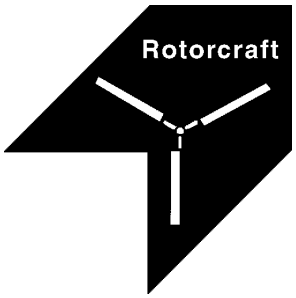
The pilot, who had more than 23,000 flight hours, was found wearing an inflatable life jacket. His seatbelt was unfastened, but his seat was nearly full forward. This position would have made it difficult for the pilot to open the door. Investigators said that unsecured baggage stowed behind his seat might have prevented the pilot from moving his seat rearward. They also suggested that he might have delayed attempting to exit the aircraft while he donned the life jacket.

Annual Inspection Adjustments Overload Engine

Mooney M20-J. Substantial damage. No injuries.

After an annual inspection, the pilot was making a test flight in daylight under visual flight rules. During descent, the engine began to vibrate and lost power, and the pilot made a forced off-airport landing with the landing gear and flaps retracted.

An investigation determined that during the inspection, the propeller pitch control had been overhauled and adjusted to a normal 2,700 (rpm). Nevertheless, after installation, the tachometer indicated 400 rpm lower than the actual rpm. The resulting high rpm and high fuel pressure contributed to the overloading of the engine's moving parts and resulted in engine failure.



Snow Snags Scenic Flight's Skid

Aerospatiale AS 350B. Substantial damage. No injuries.

The glacier scenic flight in daylight under visual flight rules included a snow landing at the top of a ridge in the mountain range above the glacier. Weather conditions had been good and marked by some clouds during earlier flights that day, but after the snow landing, the pilot observed that weather conditions had changed and a rapid build-up of clouds was taking place around the edge of the basin below the ridge. By the time the pilot recalled the six passengers, boarded them and executed a takeoff, he determined that the clouds were "pouring over the basin" and prevented a safe exit by that route.

He elected to return to the landing area to wait for conditions to improve. As the pilot hover-taxied, a white-out was created as clouds engulfed the helicopter. The pilot attempted to land immediately, but the loss of visual references and a tailwind combined to create a drift condition that resulted in a skid digging into the snow. The helicopter rolled 270 degrees, the tailboom was severed by the main rotor blades and the cabin came to rest on its side.

The occupants of the helicopter were not injured and they exited the cabin safely. The helicopter's radio was not damaged and the pilot summoned help. He and the passengers were rescued by helicopter about two hours after the accident, which was blamed on the touchdown with drift in white-out conditions.

Mechanical Problem Reduces Power, Leads to Accident

Aerospatiale AS 350B. Substantial damage. No injuries.

Several skiers were aboard the helicopter as it lifted off the mountain in daylight under visual flight rules and began a vertical climb to clear nearby trees. Main rotor rpm began to decay rapidly when the helicopter was about 25 feet (8 meters) above ground level. The helicopter began to rotate to the left. The pilot attempted to regain control and increase main rotor rpm, but he was unsuccessful.

The helicopter's tail struck the ground first and the tail rotor was broken, but no occupants were injured.

An investigation determined that an electro-pneumatic bleed-air valve had stuck in the open position, which would have reduced take-off power by more than 10 percent. Some 2 percent additional power was lost because bleed air heat had been selected to keep the windows clear of moisture. The valve had been repaired after the pilot had first reported that it had been sticking, but the pilot reported that the repaired valve had also been sticking intermittently. ♦

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For more information contact J. Edward Peery, FSF.

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Staff: Roger Rozelle, director of publications; Girard Steichen, assistant director of publications; Kate Achelpohl, editorial assistant; Rick Darby, editorial consultant; and Dwyane D. Feaster, production consultant.

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 • telex: 901176 FSF INC AGTN • fax: (703) 525-6047