

COMMUNICATION

AN IMPORTANT ELEMENT OF MAINTENANCE AND REPAIR

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People from the airlines, the FAA, and the manufacturers have worked long hours in an effort to improve the Service Difficulty Reporting system. Their work to date is summarized as follows.

- **Goals were generalized into three broad work statements;**
 - (a) **Design a worldwide reporting system to provide safety alerts to aircraft operators, manufacturers, repair facilities and regulatory authorities.**
 - (b) **Design a companion system to provide worldwide reliability experience.**
 - (c) **Overhaul regulatory requirements to be consistent with (a) and (b) to provide information necessary and useful for public consumption.**

- **Focus soon narrowed to the specific need to improve the SDR system. Three subcommittees were formed;**
 - 1) **Data Collection Subcommittee**
 - 2) **Data Analysis Subcommittee**
 - 3) **Safety/Reliability Action Subcommittee**

- **Data Collection Subcommittee was assigned 3 (short-term) goals;**
 - 1) **Improve reporting by air carriers by achieving more consistent and complete reporting, giving consideration to aircraft age. Submit these reports electronically into the FAA database.**
 - 2) **Improve repair station reporting.**
 - 3) **Identify the information that should be reported, giving consideration to the current regulation and recommend changes as appropriate.**

Recent major accidents of US-registered aircraft have given rise to calls for improved systems to detect incipient problems before they become accidents. Pressure has been increased by the introduction of bill HR 3555 which formally calls for the setting up of a safety information system.

Both the FAA and the Air Transport Association recognized the need to improve airworthiness communications and initially separate activities led (in 1989) to the establishment of a joint FAA/Industry committee, the Improved Airworthiness Communications Steering Committee (IACSC), having the proposed objective of improving the reporting and analysis of safety-related operational data.

- Initially, the IACSC was a committee reporting to the Airworthiness Assurance Task Force.
- The Committee recognized the need to improve communication in the aircraft maintenance environment.
- To this end, Committee goals initially included:

Gather meaningful data.

Develop a common reporting format.

Ensure Foreign Air Carrier participation, a worldwide database.

Assure a worldwide alerting system.

Ensure consistent data collection/reporting.

Encourage electronic-based data handling, including electronic data submission and distribution.

Define consistent reporting requirements within ADs; corrosion findings; SSID findings.

- **PURPOSE OF THE S D R SYSTEM**

**121.703 MECHANICAL RELIABILITY REPORTS
(SERVICE DIFFICULTY REPORTS)**

Enhance air carrier safety by:

1. Gathering data that identifies mechanical failures, malfunctions, and defects that reasonably may be expected to cause a serious hazard to the operation of an aircraft.

AND

- 2. Developing and implementing corrective action to eliminate these failures, malfunctions, and defects once they have been identified as hazards to safe aircraft operations.**

The Government Accounting Office (GAO) reviewed the SDR system and identified a number of problem areas which include:

Problem:

- 1. SDR reporting from airline to airline is inconsistent. The database lacks credibility.**

From GAO Report:

"The chief reason that FAA engineers and airline personnel are dissatisfied with the SDR program is that its data are of low quality."

"....airline officials attribute reporting differences to vague reporting requirements, leading to varying interpretations of what should be reported and to airlines' concerns over the public's access to malfunction reports in accordance with the Freedom of Information Act. Concerned about public disclosure of SDR data, some airlines are reluctant to submit malfunction reports to FAA."

Recommendations:

- a. That 121.703 be amended to clarify existing regulation with the intent of reducing interpretation as to what is required to be reported. Clear and concise regulation reduces interpretation and enhances the consistency of the reporting required by this regulation.**
- b. That the aircraft structural reporting requirements of existing FAR 121.703, together with provisions for the reporting of factors relevant to aging aircraft and corrosion protection be gathered into a new regulation, FAR 121.704.**
- c. That airlines enter SDRs into the FAA's database electronically. A standardized data entry format with menus and built-in edits enhances consistency.**

- d. That certain exemptions from the Freedom of Information Act (FOIA) be made applicable to the air carrier information submitted per the requirements of these regulations. This protection (from FOIA) would encourage the willful reporting of safety related information into these databases.

Problem:

2. SDR data is not timely. Weeks may elapse between an airline reporting a problem and the problem being data-based and distributed by the FAA.

From GAO Report:

"The SDR program's lack of timeliness is a critical flaw in its ability to effectively serve its users."

"The SDR program does not contribute to the timely correction of conditions affecting aircraft safety because, aside from storing data on a computer, it is a paper-based, manual process."

"From beginning to end, a single malfunction report will spend approximately 6 weeks in the SDR processing system before becoming available to analysts."

Recommendations:

- a. That FAA encourage airlines to enter SDRs into the FAA's database electronically. (FedEx and Northwest have been doing so in a test program.) The shift from paper to electronic submission of data to the FAA should provide a database that is almost real-time.
- b. That FAA make the SDR database available to the certificate holders, repair stations, and manufacturers for electronic data retrieval capability. The database would provide real-time history to participating parties and become an information resource. In other words, participation would be enhanced because the system would provide an information benefit to the user.

Problem:

3. The data is not analyzed. Problems are not identified, corrective actions are not developed or implemented.

From GAO Report:

"....FAA engineers....told us that poor data quality discouraged them from analyzing SDR data."

Recommendations:

- a. Same as problem 1. These recommendations, if implemented, should improve database accuracy and credibility.

NOTE: Industry and the FAA are participating in on-going activities (Improved Airworthiness Communications Committee's Data Analysis & Action Subcommittees - now known as the International Airworthiness Communications Working Group) to improve problem recognition and action implementation.

The subcommittee further recommended that;

- 121.703 be renamed Operational Difficulty Reports and focus on the reporting of operational difficulties.
- 121.704 be created to capture Structural Difficulty Reports.
- The word "flight" be eliminated from several areas of the regulation. Significant safety-related events occur while the aircraft is on the ground.
- Reports should focus on A/C serial number rather than registration number. Registration numbers can change rapidly in today's environment, serial numbers do not.
- Reports capture aircraft hours and cycles to address aging aircraft concerns. Also gather information that details the location of structural difficulties.
- The system be designed to code reports to the discrepancy. Focus on alerting to the discrepancy rather than on the corrective action (fix). Oftentimes, the fix isn't!
- Component problems be identified by sorting by the part number rather than coding the discrepancy to the part number level.

- SDR's incorporate a "turn-off" provision that curtails reporting once a problem is known, an AD or SB has been issued, and the repair can be affected without deviating from published instructions. This eliminates filling the database with reports of known problems.

AD or SB effectiveness can be captured by issuing reporting instructions within these documents. Don't use the SDR system to monitor these corrective actions.

- 121.705 (Mechanical Interruption Summary) reporting be eliminated. These reports are reliability, rather than safety related. 121.373 requires Surveillance and Analysis; therefore, the monitoring of these events can take place within the operators Reliability Program.
- Recently, the IACSC became a working group reporting to the Air Carrier/General Aviation Maintenance Subcommittee. This subcommittee, in turn, reports to the Aviation Rulemaking Advisory Committee.

These proposals are currently in the preliminary stages of the NPRM process.

- **Examples of 121.703 modification:**

- (1) Fires during flight and whether the related fire-warning system functioned properly;
- (2) Fires during flight not protected by a related fire-warning system;
- (3) False fire warning during flight;

Replaced by

- (1) All fires and, when monitored by a related fire-warning system, whether the fire-warning system functioned properly. All false fire or smoke warnings that require the use of emergency procedures;

- (6) Engine shutdown during flight because of flameout;
- (7) Engine shutdown during flight when external damage to the engine or airplane structure occurs;
- (8) Engine shutdown during flight due to foreign object ingestion or icing;
- (9) Engine shutdown during flight of more than one engine;

Replaced by

- (3) Any engine flameout during taxi or engine flameout or shutdown during flight. Intentional engine shutdowns for flight crew training or during test flights need not be reported;

Let me expand on 121.704 just a little.

The work of the IACSC has led to the formulation of recommendations for a proposal of a new FAR, FAR 121.704, which specifically addresses defects in aircraft structures and the problems of aging aircraft. Based on this recognized need to insure the continued airworthiness of aging aircraft, this rule will capture structural defects that could have safety-of-flight implications. The reporting requirements of 121.703 (a) 14 & 15 have been revised and incorporated in this proposed FAR. The required reporting focuses on discrepancies discovered in primary structure and principle structural elements. Furthermore, it will capture discrepancies discovered in composite materials when they comprise primary structure or principle structural elements. This proposal also incorporates a provision that provides relief from additional reporting once a structural problem has been recognized (by the issuance of an A. D. or a manufacturer's service bulletin) and a published corrective action can be followed to affect a repair. This provision reduces the economic burden to air carriers in that it eliminates the requirement to continue reporting known problems. The continued reporting of known problems that have resulted in the issuance of an A. D. can be accomplished by placing reporting requirements within the A. D.

The final goal of the Data Collection Subcommittee....Address Repair Station reporting.

The subcommittee's recommendation to improve repair station reporting is to clarify 145.63. 145.63 should be modified to state that any item discovered on a Part 121 Air Carrier's aircraft that must be reported per the requirements of 121.703 or 121.704 will be submitted by the repair station to the FAA and a copy of the report forwarded to the 121 certificate holder. The certificate holder's responsibility for reporting these occurrences as required per 121.703 or 121.704 will be delegated to the repair station. Since the items that are reportable under these sections can have safety implications, timely reporting is most likely to occur when the repair station submits the discrepancies it discovers. Additional rationale for this recommendation is the realization that duplicate reporting occurs because of duplicate requirements. The repair station currently submits a report to the FAA as required per 145.63 and the air carrier submits the same report to the FAA as required per 121.703/121.704. These changes are recommended to insure more timely reporting and to eliminate duplicate reporting.

- **What remains to be done?**

Industry and government need to continue working together (International Airworthiness Communications Working Group) to determine best methods of analysis, alerting, and action implementation.

Determine who should be responsible for gathering and analyzing the data, the FAA or the OEM.

There are problems and benefits associated with both alternatives.

At the OEM; (Problem) corporate liability concerns (Benefits) solves Foreign Air carrier participation & FOIA Concerns.

At the FAA; (Problem) Foreign Air carrier participation, FOIA Concerns.

Determine the best SDR data distribution alternatives; Intelligent Service Network, On-line access, CD-ROM distribution.

We need to bring together the various structural data gathering and reporting activities.

What follows is a proposal of a method to implement structural data collection and analysis in a databased mapping environment. This system has been developed by one European Air Carrier. In addition to databasing the relevant defect and repair information, it displays that information in a 3-D format. Repairs can then be recalled and displayed as a picture. This Computer Aided Design (CAD) software enables the user to visualize repairs as they occur on an aircraft or a fleet of aircraft. Its implementation could be a tremendous aid in structural defect detection and analysis.

Present and Future Aircraft Structural Condition Data Collection and Analysis Activities

- **121.703 Mechanical Reliability Reports (contain structural reports)**
- **121.704 Structural Difficulty Reports ?**
- **Repair Assessment Reporting ?**
- **S. I. D. Reporting**
- **Corrosion Prevention Reporting**
- **Aging A/C Service Bulletin Inspection Findings Reporting**



TODAY

**Different Reports - Different Forms
Different Databases - Different Destinations**



A PROPOSAL FOR TOMORROW

**Begin Work To Develop A Common Reporting
System That Combines These Activities**



GOAL

One Form - One Report - One Destination - One Database

RESULTING IN

A TOTAL PICTURE OF A/C STRUCTURAL CONDITION

