Safety in the All-Cargo Air Carrier Industry

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When the American public pictures the airline industry in the United States, they invariably think of the "traditional" carriers transporting passengers on business trips and families on vacation. Until very recently, there was little public awareness of the growing segment of the industry that serves as the engine of the country's economic growth: the all-cargo carriers. Today, however, companies such as Federal Express and UPS have become household names, and a wide spectrum of other companies specialize in moving cargo to every address in the United States and virtually any place in the world. The airlines providing this service are generally less well-known than their passenger counterparts and every time an all-cargo carrier is involved in any accident (or "incident"), questions are raised with respect to the safety record of the industry. Any objective review of the history of the all-cargo industry, however, reveals that any such safety fears are unfounded.

The all-cargo airline industry as we know it today can be traced to

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** The Cargo Airline Association (formerly the Air Freight Association) is the nationwide industry organization representing the interests of the all-cargo air carrier industry. With offices in Washington, D.C., the Association is responsible for working with Congress, Administrative Agencies and State Governments on all issues of concern to the industry.

the autumn of 1977, where the United States Congress deregulated the air cargo segment of the air transportation marketplace, a full year before passenger transportation.[1] Before this dramatic change in regulatory philosophy, the United States Civil Aeronautics Board strictly regulated rates, routes and entry. This agency was established by Congress in 1938 and was phased out of existence in 1985. After the amendments to the Federal Aviation Act of 1958, companies were free to fly any and all domestic routes[2] and charge whatever rates they deemed appropriate. In addition, entry into the all-cargo business became substantially easier, prompting a number of companies to institute their first large aircraft cargo operations. Traditional air freight forwarders such as Airborne Express entered the airline business for the first time and small aircraft operators such as Federal Express[3] were allowed to phase into large aircraft service.

The results of cargo deregulation were dramatic almost immediately. Indeed, it is not an overstatement to note that deregulation spawned an entirely new industry — the overnight express carriers — and that the success of this industry is probably an example of deregulation at its best. In twenty short years, the all-cargo industry has grown to the point where annual industry revenues exceed $30 billion, over 500,000 full-time equivalent workers are employed worldwide and over 800 large jet aircraft operate daily. And, in spite of this rapid growth, the safety record of the industry is excellent.

At the outset, one of the major arguments against deregulation of any part of the airline industry was that safety would be degraded by underfinanced new entrants. The argument made was that new airlines would cut corners on maintenance, thereby decreasing overall system safety. With respect to the all-cargo industry, this fear was unfounded. Twenty years of operations have demonstrated that the all-cargo industry is dedicated to safe operations.[4] To some extent, safety was perhaps easier for cargo operations than for its passenger counterparts. This fact is a result of the way in which the cargo industry developed to meet the needs of its customers.

1. Federal Aviation Act of 1958, 91 Stat. 1278, 49 U.S.C. §40101 *et seq.* (1997).

2. "Air freight forwarders" or "indirect air carriers' are companies which collect freight from individual shippers, consolidate the cargo collected into large shipments and tender these shipments to the direct air carriers (airlines) for the physical transportation. 14 C.F.R. 296 (1997).

3. Prior to deregulation, Federal Express was forced to operate small Falcon Jet equipment. *See* 14 C.F.R. 298 (1997).

4. Recent accidents involving a Federal Express MD-I 1 aircraft at Newark International Airport and a Fine Air Services DC-8 at Miami International are still under investigation by the National Transportation Safety Board. However, initial indications are that neither of these incidents can be traced to any systemic problem in all-cargo industry safety.

Unlike passenger flights, which operate overwhelmingly during daytime hours, cargo flights are predominately at night. This operational fact is necessitated by the demands for overnight delivery. In order to meet this need, cargo hubs have been established throughout the Ohio Valley[5], flights from all over the country meet at these hubs in the hours around midnight, freight is off-loaded, sorted and reloaded for delivery the next morning. Actual aircraft operations from outlying areas into the cargo hubs originate from approximately 7:30 p.m. on the West Coast and from 10:00 p.m. to midnight in the eastern part of the country. In turn, morning delivery flights at destination airports generally land between 5:30 a.m. and 7:00 a.m., before most passenger flights are in the air. How do these operational necessities affect safety? First, members of the all-cargo industry fly at non-peak hours when air traffic is at its lowest. Therefore, the chance of any inflight incident is at its lowest. Second, all-cargo aircraft generally operate approximately four hours a day; passenger aircraft operate 10 to twelve hours each day. This schedule leaves more time to pay attention to each individual aircraft.

In spite of the undeniable safety record of the all-cargo industry, questions continue to be raised. For example, because of the fact that members of the all-cargo industry have traditionally utilized their equipment only approximately four hours each day, the aircraft of choice have been those with relatively low capital costs, *i.e.* used aircraft purchased from passenger carriers and converted to cargo configurations.[6] In turn, this fact has led to two safety-related questions: first, are the relatively older aircraft safe to fly as they approach 20 and 30 years of age? And second, were the conversions from passenger to cargo configurations, as approved by the Federal Aviation Administration in the early-to-mid 1980s, adequate to provide sufficient safety margins at the higher loads carried on freighter aircraft? Initially, it should be noted that companies operating all-cargo aircraft are fully monitored by both the Federal Aviation Administration and the Department of Transportation. DOT oversight insures that certificate holders are financially fit and the FAA performs safety oversight functions. These rules under which the all-cargo industry operates are therefore substantially the same as the corresponding rules for the more well-known passenger carriers.

5. For example, Federal Express established its national hub in Memphis, Tennessee; United Parcel Service operates out of Louisville, Kentucky; Airborne Express is located at Wilmington, Ohio; Burlington Air Express is at Toledo, Ohio; Emery Worldwide is located in Dayton, Ohio; and Southern Air Transport has recently moved to Columbus, Ohio from Miami, Florida.

6. Over the years, as the industry has increased its average daily utilization, some larger companies have opted for new equipment initially delivered as freighter aircraft. Nevertheless, the backbone of the all-cargo fleet is still equipment, which began its life in the passenger business.

More specifically, with respect to the so-called "aging aircraft" issue, while it is clear that older equipment needs close monitoring and increased maintenance costs, it is equally clear that aircraft can operate, and are being operated, safely well beyond their originally-calculated economic lives. The all-cargo industry is committed to maintaining such aircraft to the highest safety standards, and no accidents or incidents have been uncovered which are traceable to the age of the aircraft. Moreover, since the FAA issued Supplemental Type Certificates (STCs) for the conversion of passenger aircraft to cargo configurations in the 1980s, these aircraft have operated safely with absolutely no structural failures or any evidence of potential structural problems. At the same time, the FAA is currently in the midst of a major investigation to determine whether or not structural changes should be made to either the floor supports or the cargo door mechanisms. Although approximately fourteen years of operation have revealed no problems, the FAA has alleged that recent advanced computer modeling has apparently revealed that more can be done to increase the structural integrity of the cargo conversions. The FAA has released a Notice of Proposed Rulemaking on this issue and final action is expected within the next several months. The industry is working with the agency on both an engineering and policy level to insure that necessary changes are made and that unnecessary proposals are not adopted.

All-cargo industry members are also heavily involved in the safety-related area of airline security. As the political climate around the world has rendered the United States and its institutions more vulnerable to terrorist activity, the airline industry has been forced to increase its vigilance — both in the passenger and the cargo arenas. Accordingly, the Aviation Security Advisory Committee (ASAC), a broad-based group of industry experts, continually monitors security issues and provides advice to FAA security personnel. And a subcommittee of cargo experts (the Cargo Working Group) is specifically charged with reviewing procedures relating to the transportation of cargo on passenger-carrying aircraft.[7] The result of this activity has been, and will continue to be, an increased level of awareness of security issues by airline personnel and a continuing significant enhancement of security requirements.[8] Although detailed explanations of enhancements contravenes the fear of the information fall-

7. The focus of the Cargo Working Group has been on passenger-carrying aircraft since these aircraft appear to be more vulnerable to terrorist activity than all-cargo aircraft.

8. It should be noted that the Federal Aviation Regulations specifically require that airports, 14 C.F.R. Pt. 107 (1997), passenger airlines, 14 C.F.R. 108 (1997), and indirect air carriers, 14 C.F.R. 109 (1997), all have in place FAA-approved security programs. In addition, individual members of the all-cargo community have voluntarily opted to file security programs under the provisions of 14 C.F.R. §108.5(b) (1997).

ing into the wrong hands, FAA and industry oversight in this area will be focused on the relationship between the air carriers and their shipper customers.

A related area is the subject of the carriage of hazardous materials. This issue was brought into sharp focus by the tragic crash of Valulet Flight 592 in May 1996. Although no final report on this accident has yet been published, all indications are that improperly transported oxygen canisters caused the onboard fire. In turn, this fact has resulted in a reassessment of hazardous materials procedures.[9] Initially, it should be noted that the carriage of hazardous materials by air is an everyday occurrence — and one that is necessary for shippers throughout the United States. Indeed, for the medical community alone, the U.S. air transportation system is a lifeline in supplying needed medicines, blood supplies and equipment. The issue, therefore, is not whether hazardous materials should be carried on aircraft, but rather what safeguards should be put in place to protect public safety.

Faced with this issue, the Department of Transportation's, Research and Special Programs Administration (RSPA), has enacted a comprehensive set of rules governing the carriage of dangerous cargo.[10] The regulations contain specific packaging, labeling, marking and shipping requirements, depending on the material being shipped and the mode utilized. All segments of the air transportation marketplace, including carriers, shippers, and freight forwarders are governed by the Hazardous Materials Regulations.

Finally, another area of "debate" within the aviation community is the subject of collision avoidance systems. In today's regulatory environment, the Traffic Alert and Collision Avoidance System (TCAS) is mandatory for large passenger carrying aircraft. All-cargo aircraft, although carrying transponders and "visible" to the collision avoidance systems of passenger aircraft, are not themselves required to have this equipment. The primary reasons that the Congressional mandate did not include members of the all-cargo industry to install TCAS were that the legislation focused on the aircraft carrying the mostly passengers. The threat to cargo aircraft was minimal since the industry operates mostly during nighttime hours when there is relatively little traffic with which to collide. While these considerations are still generally applicable today, the all-cargo industry has recognized that increasing nighttime operations by other members of the industry and increasing daytime operations by

9. As a result of the ValuJet crash, the carriage of oxygen canisters on passenger aircraft is now banned. 61 *Fed. Reg* 26418 (May 24, 1996); 61 *Fed Reg 68952* (December 30, 1996). They may still be transported on all-cargo aircraft, but this policy is currently under review by the FAA. *See* 62 *Fed Reg* 30767 (June 5, 1997); 62 *Fed Reg* 34667 (June 27, 1997).

10. Hazardous Materials Regulations, 49 C.F.R. § 171-175 (1997).

members of the cargo industry necessitated a review of the entire collision avoidance issue. Begun over two years ago, this review indicated that new generation technology already in existence could be used to create a more effective collision avoidance system at significantly lower costs to potential users.

Why not simply install existing TCAS technology on cargo planes? Because TCAS has significant limitations which can be overcome by new generation technology. These limitations can be summarized as follows:

- TCAS is a reactive rather than A PROACTIVE system. Pilots only learn of the potential problem when they are warned of an impending collision. The new system will enable pilots to avoid ever being placed in such a position.
- TCAS has a limited range which decreases in the high density airspace where it is needed most.
- TCAS is not effective on the ground or below 1000 feet where the majority of collisions have occurred.
- TCAS has a higher than desirable false alarm rate, causing pilots to mistrust the alarms. Indeed, the Air Line Pilots Association has reported that its pilots simply ignore TCAS warnings approximately *50%* of the time.[11]
- TCAS is too expensive for deployment by the overwhelming majority of general aviation (small) aircraft.

The collision avoidance system being developed by the all-cargo industry is based on Global Positioning System (OPS) and the Automatic Dependent Surveillance-Broadcast (ADS-B) system. It will provide pilots with both more data upon which to base decisions and more accurate data than is now being provided. In addition, the new system will work on the ground as well as in the air and will be a cost-effective measure for most general aviation aircraft. The basic technology necessary for development and implementation of the all-cargo alternative collision avoidance system is not merely in the mind of some mad scientist. Rather, it is technology that is available today and simply needs to be applied to the system envisioned. The drafting of standards for ADS-B are well underway both domestically and internationally[12], and successful flight demonstrations have been completed both in Boston and at the 1996 Atlanta (ICAO). Olympic Games. In addition, successful ADS-B simulations have been completed by both NASA Langley and NASA Ames. In Europe, the technology to be employed is already being flight tested in Sweden.[13] And most recently, the FAA announced its Flight 2000

11. AIRLINE PILOT MAG., Sept 1996, at 5.

12. In the United States, tbe RTCA is responsible for establishing standards upon which production must be based, while internationally such standards are established by the International Civil Aviation Organization.

13. A description of the Swedish prototype can be found in FLIGHT INT'L MAG., Jan.28, 1997.

demonstration project, a program that will incorporate ADS-B technology in an operational demonstration with aircraft operating in Hawaii and Alaska during 1999. This is the exact same technology that forms the basis of the all-cargo industry's new collision avoidance system.

The first phase of the industry's project is the installation of the new FAA-sponsored Traffic Information Service (TIS). TIS is a new system of data transmission based upon a relatively slight software modification of existing FAA ground-based radar sites. This modification will provide an uplink of proximate traffic by a Mode S transponder and will include a visual warning of any threatening traffic. This system will enable all-cargo aircraft to see anyone equipped with a transponder and to evaluate any traffic for potential threats. Installation of this system will begin in the first quarter of 1998 in conjunction with the nationwide FAA deployment of the system.[14]

In addition, the installation of ADS-B at approximately the same time as TIS will provide additional operational and safety benefits. Aircraft equipped with ADS-B will be able to share information more detailed and accurate than TIS alone (for example, call sign, speed, altitude, aircraft type, etc.) which in turn permits more informed pilot safety judgments and the operational ability to utilize airspace more efficiently. Once this ADS-BITIS equipment is installed within the next year, cargo aircraft will, for the first time, be able to "see" each other.

The second phase of the industry project will be the development of software to permit conflict detection and resolution. This technological leap will eliminate dependence on ground-based radar centers (the TIS system) and will permit aircraft-to-aircraft data communication. In turn, this system will enable the pilot to be in control of the conflict detection and resolution process, with controllers monitoring activity and acting as a final "referee", if necessary.[15] Present estimates are that such software certification can be accomplished by the I st Quarter of 1999 and quickly installed on ADS-B-equipped aircraft. Although this phase of the project does not include Resolution Advisories, as a practical matter it provides a level of safety surpassing existing TCAS II systems. Rather than merely reacting to a warning system that a mid-air collision may be imminent, (a wholly reactive system), Phase II of the all-cargo industry collision avoidance project is a proactive system permitting the pilot to obtain, and react

14. On April 2, 1997, the RTCA Technical Management Committee approved Minimum Operational Performance Standards for the TIS Data Link Communications. In addition, at the same meeting, the FAA announced that the TIS project is fully funded, approved for inclusion in the National Airspace System and undergoing final operational testing.

15. In order to retain the highest level of safety possible, the TIS system should be retained to provide information for non~ADS-B equipped aircraft.

to, a wide variety of extremely accurate aircraft information, thereby virtually eliminating any near collisions.

The final phase of the all-cargo industry project will be the addition of Resolution Advisories to the Conflict Detection and Resolution system described above. The accuracy in this system will far surpass any present or envisioned TCAS technology, thereby taking the aviation community to a level of safety, which exceeds even the originally-planned TCAS IV. It is estimated that the software development and certification for this element of the system will be possible in approximately 2001.

These initiatives, coupled with the already excellent safety record of the all-cargo carriers, insure that the all-cargo industry will continue to provide a safe system designed to meet the needs of shippers around the world. The challenge as we approach the turn of the century will be to integrate emerging technology into a bureaucratic system which has often resisted change. In turn, this challenge will require the industry to work closely with federal regulators in the development of new systems and certification procedures for these systems. This needed "reinvention" of the FAA bureaucracy will require that the functions performed by the agency be analyzed and redefined, where necessary. In addition, Congress must insure that the FAA receives the funding necessary to accomplish these objectives. The precise way in which this funding is apportioned among the representatives of the user community will be one of the major debates of 1997 (and perhaps 1998). While the all-cargo carriers have always pledged to pay their fair share of the costs of FAA activities, Congress must insure that one segment of the air transportation marketplace is not required unfairly to subsidize another AND that the funds collected are in fact used to pay for aviation infrastructure and NOT to reduce the federal debt.

In summary, the all-cargo industry, from its inception, has demonstrated a high level of safety while, at the same time, experiencing explosive growth. The industry is committed to maintaining this record and on its own is taking the actions necessary to insure that safety and security remain the highest operational priority.