prior to flight under these new limits, the operator must revise the Limitations Section of all FAA-approved AFM's and AFM Supplements, and the Limitations Section of all FAA-approved Airplane Weight and Balance Supplements, in accordance with a method approved by the Manager, Standardization Branch, ANM–113. Accomplishment of these revisions in accordance with the requirements of this paragraph constitutes terminating action for the requirements of this AD.

(g) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, Standardization Branch, ANM–113. Operators shall submit their requests through an appropriate FAA Principal Maintenance Inspector, who may add comments and then send it to the Manager, Los Angeles ACO, who will coordinate the approval with the Manager of the Standardization Branch, ANM–113.

Note 7: Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the Standardization Branch, ANM–113.

(h) Special flight permits may be issued in accordance with sections 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the airplane to a location where the requirements of this AD can be accomplished.

(i) This amendment becomes effective on February 16, 1999.

Issued in Renton, Washington, on December 16, 1998.

Ronald T. Wojnar,

Manager, Transport Airplane Directorate, Aircraft Certification Service.

[FR Doc. 99–446 Filed 1–11–99; 8:45 am]

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. 97–NM–81–AD; Amendment 39–10964; AD 98–26–21]

RIN 2120–AA64

Airworthiness Directives; Boeing Model 727 Series Airplanes Modified in Accordance With Supplemental Type Certificate SA1444SO, SA1509SO, SA1543SO, SA1896SO, SA1740SO, or SA1667SO

AGENCY: Federal Aviation Administration, DOT.

ACTION: Final rule; technical public meeting.

SUMMARY: This amendment adopts a new airworthiness directive (AD), applicable to certain Boeing Model 727 series airplanes that have been converted from a passenger to a cargo-carrying (''freighter'') configuration, that requires limiting the payload on the main cargo deck by revising the Limitations Sections of all Airplane Flight Manuals (AFM), AFM Supplements, and Airplane Weight and Balance Supplements for these airplanes. This amendment also provides for the submission of data and analyses that substantiate the strength of the main cargo deck, or modification of the main cargo deck, as optional terminating action for these payload restrictions. This amendment is prompted by the FAA's determination that under certain conditions unreinforced floor structure of the main cargo deck is not strong enough to enable the airplane to safely carry the maximum payload that is currently allowed in this area. The actions specified by this AD are intended to prevent failure of the floor structure, which could lead to loss of the airplane.

DATES: Effective February 16, 1999.

The public meeting will be held January 20, 1999, at 9:00 a.m., in Seattle, Washington. Registration will begin at 8:30 a.m. on the day of the meeting.

ADDRESSES: Information concerning this amendment may be obtained from or examined at the Federal Aviation Administration (FAA), Transport Airplane Directorate, Rules Docket, 1601 Lind Avenue, SW., Renton, Washington, by appointment only between the hours of 8:00 a.m. and 2:00 p.m.

The public meeting will be held at the following location: The Radisson Hotel, 17001 Pacific Highway South, Seattle, Washington 98188; telephone (206) 244–6000.

FOR FURTHER INFORMATION CONTACT: Questions concerning the airworthiness directive should be directed to Melissa Sandow, Aerospace Engineer, ANM–100D, FAA, Transport Airplane Directorate, Denver Aircraft Certification Office (ACO), 26805 E. 68th Avenue, Room 214, Denver, Colorado 80249; telephone (303) 342–1084; fax (303) 342–1084.

Requests to present a statement at the public meeting regarding the logistics of the meeting should be directed to Mike Zielinski, Federal Aviation Administration, Northwest Mountain Region, Transport Airplane Directorate, ANM–113, 1601 Lind Avenue, SW, Renton, Washington 98055–4056; telephone (425) 227–2279; fax (425) 227–1149.

SUPPLEMENTARY INFORMATION: A proposal to amend part 39 of the Federal Aviation Regulations (14 CFR part 39) to include an airworthiness directive (AD) that is applicable to certain Boeing Model 727 series airplanes that have been converted from a passenger to a cargo-carrying (''freighter'') configuration was published in the **Federal Register** on July 15, 1997 (62 FR 37778). At the same time, the FAA issued three other similar notices of proposed rulemaking (NPRM's) to address airplanes similarly converted in accordance with STC's held by FedEx, Aeronautical Engineers, Inc., and ATAZ (now held by Kitty Hawk Air Cargo). That action proposed to require limiting the payload on the main cargo deck by revising the Limitations Sections of all Airplane Flight Manuals (AFM), AFM Supplements, and Airplane Weight and Balance Supplements for these airplanes. That action also proposed to provide for the submission of data and analyses that substantiate the strength of the main cargo deck, or modification of the main cargo deck, as optional terminating action for these payload restrictions.

On February 4, 1998, in order to obtain additional public participation in these NPRM's, the FAA reopened the comment period for a period of 90 days and scheduled two sets of public meetings, which were held in Seattle, Washington, on February 18 and 19, 1998, and April 1 and 2, 1998. In addition to the comments submitted during the original comment period, the comments that were provided at the public meetings and submitted to the Rules Dockets during the reopened comment period also are discussed below.

Comments

Interested persons have been afforded an opportunity to participate in the making of this amendment. Due consideration has been given to the comments received.

The FAA has received comments in response to the four NPRM's discussed previously (i.e., Docket No.'s 97–NM–09–AD, 97–NM–79–AD, 97–NM–80–AD, and 97–NM–81–AD). Some of these comments addressed only one NPRM, while others addressed all four. For example, although the comments submitted by FedEx address only the NPRM applicable to its STC's (i.e., Docket No. 97–NM–09–AD), other commenters referenced FedEx's comments and requested that those comments be considered in the context of the other three NPRM's, as well. Because in most cases the issues raised by the commenters are generally relevant to all four NPRM's, each final rule includes a discussion of all comments received.

Existence of Unsafe Condition

Several commenters disagree with the FAA's finding of an unsafe condition and refer to the following statement in the NPRM's, ''[a] design which does not meet [certification] standards is presumed to be unsafe.'' The commenters contend that, while this statement is ''convenient,'' the FAA is still obliged to issue the AD in accordance with 14 CFR part 39. In accordance with part 39, prior to the issuance of an AD, the FAA must establish that an unsafe condition exists in a product and that this condition is likely to exist in other products of the same type design.

From this comment, the FAA infers that the commenters believe the proposed AD is merely a consequence of non-compliance with Civil Air Regulations (CAR) part 4b, which are the design standards to which the Model 727 was certificated, and that the unsafe condition has not been substantiated. The FAA does not concur. The context of the quoted statement in the NPRM's was an explanation of the FAA's method used in the design review that led to issuance of the NPRM's. Initially, the FAA had identified the potential non-compliance based on observation and review of original certification data. Since, in accordance with the Federal Aviation Act, CAR part 4b standards establish the minimum level of safety, the FAA considered that further evaluation was necessary and appropriate to determine whether this potential non-compliance created an unsafe condition warranting an AD. As explained in the NPRM's, the FAA determined not only that the design was non-compliant, but that the degree of non-compliance was highly significant, and resulted in substantial negative structural margins of safety. The FAA's analysis addressed the ''up'' load case, which was considered to be the most likely critical load case, in the sense that it was likely to be the load case that would present the most serious negative margins of safety. The analysis verified these negative margins and confirmed the FAA's concerns that serious negative margins may exist for other load cases, as well. The effect of these substantial negative margins is that the likelihood of catastrophic failure of the floor structure is unacceptably high. The FAA's finding of unsafe condition arises from this determination rather than from a finding of non-compliance with CAR part 4b.

Risk From Actual Operations

Several commenters state that the FAA's finding of an unsafe condition in the NPRM's is incorrect because, based on the way the airplanes are actually loaded and operated, the likelihood of encountering conditions specified in CAR part 4b that would exceed the strength of the floor structure is extremely improbable.

The FAA does not concur. The FAA's evaluation was based on the potential for a catastrophic event occurring as a result of an airplane encountering severe gust conditions while transporting containers loaded with maximum allowable payloads. (Unless otherwise stated, throughout the preamble of this AD the FAA uses the term ''container'' to refer to all unit load devices, including pallets.) The fact that operators may transport containers with maximum payloads only for a small percentage of their operations does not diminish the seriousness of the unsafe condition when they do transport such containers. (It should be noted that one commenter stated that its operations with even one container at maximum allowable payload are only a small percentage of its total operations, but also stated that it engages in such operations daily.)

In addition, the FAA disagrees with the commenters' conclusions regarding the probability of catastrophic events. The events that may cause a catastrophic failure occur randomly and, thus, cannot be reliably predicted and avoided for any particular operation. Although the probability of large gusts or excessive maneuvers (as specified in CAR part 4b) is low (approximately once in the lifetime of an airplane for a large gust), because of the large negative margins of safety associated with these unreinforced floor structure designs (discussed in the NPRM's), less severe events (i.e., lower gusts or milder maneuvers) also could result in catastrophic failure. Therefore, because the likelihood of encountering less severe events is significantly greater than the likelihood of encountering the events contemplated by CAR part 4b standards, and because the consequences of such encounters may be catastrophic, the FAA considers that the risk is unacceptable.

During the public meetings, several commenters suggested using analytical methods developed to show compliance with 14 CFR 25.1309 in assessing risks from gust loads. Their position was that if such analysis were performed, it would demonstrate that the unsafe condition addressed by the proposed AD is ''extremely improbable;'' therefore, an AD is unnecessary to address it.

The FAA does not concur. The purpose of section 25.1309 is to require that type certificate applicants demonstrate the robustness of the airplane systems and equipment. Therefore, it is not applicable to the assessment of the seriousness of an unsafe condition associated with identified structural deficiencies. Nevertheless, assuming that it is appropriate, section 25.1309(a) states that the airplane systems, equipment, and installations ''must be designed to ensure that they perform their intended functions under any foreseeable operating condition.'' This means that the airplane must function properly if it is being operated within its approved operating and environmental conditions. As discussed in the NPRM's, the FAA's analysis demonstrates that the affected airplanes, when operated with allowable payload weights and distributions (which is foreseeable), could experience catastrophic failure if they encounter gust conditions that are also foreseeable. Therefore, applying the analytical methods of section 25.1309(a), these STC designs would be found not to comply.

In addition, section 25.1309(b) requires that any system failure condition that would result in a catastrophic event be shown to be extremely improbable, even if the system failure occurred concurrently with environmental conditions that would reduce the capability of the airplane or the ability of the crew to cope with the system failure. Probabilistic analyses are used to demonstrate compliance with section 25.1309(b) by estimating the probability of random system and equipment failures occurring on the airplane. The consequences of failures that are more probable must be shown to be relatively minor; failures with more serious consequences must be shown to have lower probabilities. However, in providing guidance for compliance with this requirement, Advisory Circular (AC) No. 25.1309–1A advises: ''In any system or subsystem, the failure of any single element, component or connection during any one flight * * * should be assumed, regardless of probability. Such single failures should not prevent continued safe flight and landing * * *.''

Applying this analytical method to the circumstances of this AD, if the failure of the floor beam is assumed, the consequences are likely to be catastrophic, preventing continued safe flight and landing. Therefore, under the analytical approaches of either section 25.1309(a) or (b), the operations with understrength floors without limitations is unacceptable.

During the reopened comment period, FedEx submitted a risk assessment from which it concluded that, even assuming the NPRM identified a potential unsafe condition, the probability of occurrence was sufficiently small (i.e., once every 300 years) so that AD action should be postponed until additional testing and analysis has been completed. Other commenters referenced this analysis and supported FedEx's conclusion.

The FAA has evaluated the risk assessment submitted to Rules Docket No. 97–NM–09–AD, and does not concur with the commenters' conclusion. Regarding the general relevance of the kind of risk assessment submitted by the commenter, it should be noted that the probability of the limit gust event has already been considered when establishing the gust intensities specified in CAR section 4b.211(b). CAR part 4b requires that all airplanes be capable of structurally withstanding a gust of the intensities specified therein, as such a gust is expected to occur at some time in the airplane's operating life.

Regarding the specific data presented in the FedEx risk assessment, the FAA does not concur with the assumption that extreme gusts will be encountered by a cargo carrying Boeing Model 727 airplane only once in 5 million flight hours. As its basis for this assumption, the commenter states that ''FAA data indicate that, in approximately 50 million flight-hours of experience among US domestic 727s, there have been five pilot reports of extreme gusts that exceeded federal thresholds for danger.'' The commenter states that this equates to a rate of occurrence of approximately once every 10 million flights. The commenter also states that due to potential errors, it would be conservative to double this rate to 10 total events, and use an estimate of 1 occurrence per 5 million hours.

The FAA does not concur with the commenter's statement that FAA data show that only five cases of extreme gust have been encountered by the U.S. 727 fleet. Turbulence events must be reported only if they result in detected airplane damage or passenger injuries. During certain gust events, the gust loads encountered in the cockpit are substantially less severe than those encountered in the aft portion of the airplane. Therefore, some large gust encounters may not ''feel'' very severe to the flight crew. As a result, the FAA recognizes that not all severe turbulence events are reported. Further, in the NPRM's, the FAA provided five cases of turbulence as examples, to illustrate that turbulence is a real occurrence, and not merely theoretical. These five examples were obtained from data showing 87 reported severe turbulence events, which resulted in passenger injuries, on the Boeing 727 from 1966 to March 1997. The FAA selected the five reports because the airplane operators had reported the magnitude of the turbulence event after obtaining this information from the flight data recorder. Operators are not required to obtain data regarding the magnitude of the turbulence event, and therefore it is rarely reported.

During the public meeting held on Thursday, February 19, 1998, the FAA explained that these turbulence cases were just examples and had been selected because the reports included information regarding event magnitude. The FAA further explained at that meeting that it was inappropriate to use these data in a probabilistic analysis. The commenter's risk assessment provides no information to change the FAA's views.

A section of the commenter's report states, ''Detailed equations that combine empirical evidence and physical theory estimate how frequently gusts of different magnitudes arise at different altitudes.'' The commenter states that its calculations indicate that gusts with intensities that equal or exceed 50 feet per second are encountered once per 50 million flight hours at 35,000 feet. The report does not provide the equations themselves, does not describe the methodology used to determine the 1 in 50 million flight hours probability value, and does not specifically identify the referenced source data. Therefore, the FAA cannot assess the validity of the commenter's conclusions.

The commenter also refers to graphs contained in a 1988 American Institute of Aeronautics and Astronautics (AIAA) publication by Frederic M. Hoblit that the commenter states indicate even lower encounter rates for gusts during climb and descent. The FAA has examined this publication, and does not concur with the commenter's statements regarding these data. First, the commenter appears to be incorrectly referencing the graphs, which represent continuous turbulence, and not discrete gusts, as provided in CAR 4b. The two types of atmospheric disturbances are different, and to reference these graphs is inappropriate. Secondly, the commenter's risk assessment only addresses gusts ''that exceed the Federal threshold'' (which the FAA infers to mean limit load gusts) in combination with cargo loads with two adjacent containers having a total weight that equals or exceeds 9,600 lbs. This approach is unconservative. As discussed in the NPRM, the cargo floor has a high negative margin of safety, and the risk of structural collapse exists at gust intensities well below the limit gust load when carrying currently allowed payloads above 9,600 lbs. The greater the weight being carried in the container, the lower the gust needed to cause catastrophic failure of the floor. The lower the gust intensity, the more common the gust occurrence becomes.

Based on the foregoing, the FAA has determined that the risk assessment submitted by FedEx does not provide a basis for delaying the final rule.

One group of commenters, identifying themselves as airmen for one of the affected operators, supports issuance of the final rule, as proposed. The commenters state that they do not have procedures to avoid clear air turbulence, and based on their knowledge, if any of them had encountered a similar wind condition to that experienced by a Boeing 747 in January 1998, their airplane would ''come apart, in-flight.''

The FAA concurs that there is no reliable means to forecast or to avoid clear air turbulence. The flight conditions encountered by the referenced 747 could be very hazardous to one of the affected airplanes if encountered while critically loaded with heavy containers.

Change in Applicable Standards

Several commenters state that the NPRM's reflect a radical change in the assumptions that certificate holders are permitted to use to substantiate the main deck floor structure. The FAA does not concur. As discussed below, the FAA's analysis is consistent with the applicable CAR part 4b standards, which became effective in 1953.

''Infinitesimal Probability''

One commenter states that the proposed AD would impose unnecessary costs which would then be passed to its customers, for what the FAA's Director of Aircraft Certification Service has stated is an ''infinitesimal probability of a safety related happening.'' The referenced comment is contained in an article in the April 15, 1997, issue of ''Commercial Aviation Report.''

From this comment, the FAA infers that the commenter believes the reference to ''infinitesimal probability'' belies the need for an AD. The commenter has taken the remark out of context. The actual quote is, ''What is the probability of it [catastrophe] happening in the next month? Infinitesimal.'' This remark was made in response to a question regarding why the FAA was issuing an NPRM rather than an emergency AD. The Director of the Aircraft Certification Service was explaining that, although the FAA had determined that the unsafe condition must be addressed by issuance of an AD, the urgency of the issue was not so great as to preclude the normal legally required process of providing public notice and opportunity to comment.

Accident Data

One commenter states that the fact that no crashes have occurred with the affected airplanes has nothing whatsoever to do with these airplanes being of a safe design. They merely have had the good fortune to have not yet encountered a critical condition. The FAA concurs.

''Erroneous Certification''

One commenter states that it counted on the competence of the FAA when obtaining the affected airplanes, as the cargo modifications were FAA-approved. The commenter further states that the FAA's error in issuing these approvals is going to severely hurt small operators of these airplanes, who are neither culpable nor negligent. While the FAA understands that the impact of this AD may be significant for some operators, the FAA cannot ignore the fact that an unsafe condition exists that requires action to ensure the continued operational safety of the fleet. If the FAA had been aware of these deficiencies at the time of the original STC issuance, the FAA would not have issued the STC's.

One commenter points out that the FAA design review team observed that the original passenger floor beams had not been structurally reinforced, and that this fact is immediately apparent from the technical drawings associated with the STC. The commenter questions why the FAA has not expressed any concern or noticed these facts earlier.

The applicant for any design approval is responsible for compliance with all applicable FAA regulations. The FAA has the discretion to review or otherwise evaluate the applicant's compliance to the degree the FAA considers appropriate in the interest of safety. The normal certification process allows for the review and approval of data by FAA designees. Consequently, the FAA office responsible for the certification of an airplane or modification to an airplane or an aeronautical appliance may not review all details regarding compliance with the appropriate regulations. Also, the fact that the cargo floor structure was unmodified does not necessarily lead to the conclusion that the floors are structurally deficient. As explained in the NPRM, the understrength floors on certain 747 airplanes converted to freighters caused the FAA to question the adequacy of all STC-converted passenger-to-freighter cargo floor structures. This AD arises from this evaluation.

An FAA/Industry Team

Several commenters request that the FAA establish an industry team comprised of the FAA, STC holders, and operators before issuing an AD to establish the requirements and a corrective action plan to resolve the problems with the STC's in a logical manner. One commenter states that ''too much time has been spent going in different directions to resolve common problems for all STC's,'' and that ''the FAA has not been sufficiently clear in their requirements for the re-design.''

The FAA does not concur that issuance of the AD should be delayed. An unsafe condition has been identified, and the FAA must take action to ensure an acceptable level of safety of the affected fleet of airplanes. The STC holders and operators are certainly free to form an industry team to find common solutions, and the FAA is willing to participate in such efforts. The FAA also does not concur that the requirements for re-design are unclear; as the FAA has stated repeatedly, the standards for evaluating proposed corrective actions are the original certification basis for the airplane, CAR part 4b. Any non-compliance with CAR part 4b would have to be shown to provide an acceptable level of long-term safety.

FAA/Industry Communication

One commenter states that there has been ''virtually no opportunity for technical exchange'' and, therefore, the FAA should delay issuance of the final rule until such an exchange has taken place. The FAA does not concur. Since as early as November 1996, the STC holders have been made aware of the FAA's concerns regarding the cargo floor structure. More specifically, meetings were held with each of the affected STC holders in January 1997 to discuss further details regarding FAA concerns.

On February 14, 1997, the FAA again discussed its concerns with the affected industry and again requested that industry provide the FAA with valid data to address those FAA concerns. Subsequently, over the course of the next four months as the FAA prepared the NPRM's, only one STC holder provided any data relative to the merits of the proposed AD's, and that data did not alleviate the FAA's concerns. In response to the NPRM's first comment period, three of the affected STC holders did not submit technical data and, for reasons discussed below, the data submitted by the fourth STC holder (FedEx) did not alleviate the FAA's concerns. During the reopened comment period, the FAA engaged in further extensive discussion with the affected industry and those discussions continue in the context of on-going efforts to identify necessary actions to address the unsafe condition. Based on this history, the FAA considers that sufficient opportunity for technical exchange has been provided and that further delay is unwarranted and unnecessarily jeopardizes public safety.

Delay Issuance

Two commenters state that additional time is necessary so that the airplanes would be removed from service only once to incorporate all needed corrective actions (i.e., not only for the floors, but also for other problems identified in the NPRM) due to the high cost of incorporating partial solutions to the overall problem. One commenter requests that all problems associated with the STC's be identified, solutions provided, and methods for accomplishment of the solutions be agreed upon prior to the issuance of any AD. The FAA does not concur. In light of the seriousness of the unsafe condition, the FAA has determined that it would first address the strength of the cargo floor structure. All of the remaining issues will be addressed in future rulemaking efforts. Even though this AD addresses only the cargo floor structure, it should not inhibit industry from taking corrective action with regard to the remaining issues. In fact, in order to minimize the inefficiencies identified by the commenter, the FAA is committed to working with industry to identify as expeditiously as possible necessary corrective actions for all of the problems discussed in the NPRM.

The Cargo Airline Association (CAA) requests that the FAA not adopt an AD imposing interim limits. Since the CAA believes that the risk of a catastrophic failure is ''virtually nonexistent,'' and since several potential STC holders with varying solutions to issues raised are in the process of working with FAA, scarce resources should be devoted to ensuring expeditious approval of these proposals.

Another commenter requests that the FAA delay issuance of the final rules until industry solutions are approved [estimating an additional 60 to 90 days for Israel Aircraft Industries (IAI) to complete its analysis, as it has only recently had access to Boeing drawings]. The commenter also states that the FAA rulemaking process has caused industry to make significant progress and aggressively pursue solutions that will likely meet with relatively prompt FAA approvals. The commenter also states that although these approvals will result in a 25 percent reduction in allowable payload, it is willing to operate with that limitation. This commenter, and several other commenters reference the FedEx risk assessment, which purports to demonstrate a low probability of catastrophic failure, as a basis for delaying the final rules.

Another commenter requests 4 to 6 months for completion of certain industry tests and risk analysis, as the 3-month timetable for the reopened comment period was not adequate, due to the highly complex and time-consuming nature of testing and evaluation procedures.

For the reasons discussed above under the heading ''Risk From Actual Operations,'' the FAA does not agree that the risk assessment submitted by FedEx warrants delaying this rulemaking. Furthermore, the FAA does not agree that correction of the unsafe condition can be assured within 60 to 90 days, or 4 to 6 months without this final rule. The STC holders and many operators have been aware of this issue since the fall of 1996. The FAA anticipates that, with the adoption of this AD, industry will continue recent significant progress in addressing these issues, which will result in timely implementation of appropriate corrective action.

Extension of Interim Operational Period

Several commenters state that the proposed 120-day interim allowances must have been determined to be safe by the FAA, with positive margins of safety. Therefore, the commenters request that the interim time limits be extended. Some of the commenters request that the extension coincide with regularly scheduled heavy maintenance. The CAA requests that the interim limits should be allowed to continue for however long it takes to modify the airplanes to bring them up to the original design limits. This commenter states that under normal operations, there is no risk of floor beam failure, and also states that the FedEx risk assessment shows that the likelihood of encountering conditions set forth in the NPRM are virtually nonexistent.

As discussed above under the heading ''Risk from Actual Operations,'' the FAA does not concur that the information provided in the FedEx risk assessment provides a basis for an extension of the interim period. However, for other reasons, the FAA concurs that the interim operational period can be extended.

In the NPRM, the FAA stated, ''because the determination of the effects of operational limitations on payload is based on approximations, the resulting payload limits may be unconservative.'' The 120-day interim limit was based on this potential unconservatism. Since issuance of the NPRM, the FAA has received data (Reports DFE–72701 and DFE–72702, submitted during the initial comment period as Appendices 5 and 6 to FedEx's comments to the NPRM) that partially confirm these approximations. In addition, although some progress has been made by industry in developing corrective actions, neither industry's proposal (as discussed in the NPRM) nor the FAA's expectations have been fulfilled. Based on current information regarding the status of various efforts to develop corrective actions, the FAA estimates that the entire affected fleet can incorporate corrective actions during scheduled heavy maintenance within 28 months after the effective date of this AD. In light of this new information, the FAA has reassessed the proposed interim period of 120 days and concluded that the period should be extended to 28 months. Therefore, the FAA has revised the final rule accordingly.

The FAA's decision to extend the interim limitations does not imply that the cargo floor structure has been determined by the FAA to be safe for an indefinite period, or in compliance with CAR part 4b requirements. As stated in the NPRM, the FAA's analysis considered only the most likely critical load case, and the proposed interim limitations were based on that analysis. The confirming data referenced above still does not address other potential critical load cases or all locations within the airplane. Nevertheless, in light of the balance of the safety and economic factors discussed above, the FAA considers that the level of safety provided by the interim limitations is adequate for the time period of 28 months. However, it is less than the level of safety provided by demonstrated compliance with CAR part 4b standards, and the FAA considers that compliance with those standards is a necessary objective to ensure the long term safety of the affected fleet. The balancing that the FAA has considered in establishing this interim compliance period is typical of the balancing that occurs in all AD's establishing interim requirements and is fully consistent with the FAA's obligation to consider economic impacts, such as those imposed by Executive Order 12866.

Increased Interim Payload Limits

Several commenters also request that, due to ''highly conservative'' methodologies used by FAA, the proposed interim weight limit should be expanded to allow an average maximum container weight of 6,000 lbs. The FAA does not concur that its methodologies are highly conservative. As discussed in the NPRM and in more detail below, the FAA's analytical methods are typical of industry practice, and the commenters have not demonstrated how these methods are highly conservative. The FAA has not been provided with any acceptable data to support the allowance for 6,000-lb. containers, except as discussed below under the heading ''Position-by-Position Limitations.''

A commenter requests that the FAA maximize the interim limits. The FAA concurs that the interim limits should be maximized to the extent that they are consistent with the necessity of addressing the unsafe condition. The FAA considers that the interim limits established in the final rule meet this objective; however, as discussed below, the FAA will continue to work to approve higher limitations, once their safety is substantiated.

Federal Express submitted report 98–026 ''Substantiation of Side Vertical Cargo Restraint Installation Using Static Test Results,'' Revision A, during the reopened comment period. FedEx states that this report ''proves conclusively that the side restraint installation is adequate to restrain the applied container loads due to vertical gust.'' The FAA concurs, and has changed the final rule (Rules Docket No. 97–NM–09–AD) applicable to the FedEx STC's to allow the higher interim limits with the FedEx side restraints installed.

Position-by-Position Limitations

The CAA requests that the FAA consider ''position-by-position'' limitations, which would establish individual weight limits for each container position on the airplane, based on the strength of the floor structure at that location. The CAA states that this would allow a higher total payload, while addressing the unsafe condition. The FAA concurs with the concept of position-by-position limitations, and will consider any such proposal when presented with supporting data.

For example, one commenter, Amerijet, has submitted a position-by-position proposal, which includes analysis providing for increased weights for certain container positions relative to those determined by the FAA for the interim period. This proposal also contained lower limits for other container positions and presupposes the installation of sidelocks. The commenter stated at the April 2 public meeting that it intends to install vertical side restraints [sidelocks], but has not submitted any data to the FAA on a sidelock installation. The FAA has determined that this proposal would provide an acceptable level of safety for the 28-month interim period, when the affected airplanes are equipped with approved sidelocks. The commenter's proposal would not be acceptable to the FAA for indefinite operations, however, as the analysis did not consider other issues such as CAR part 4b emergency landing loads. The FAA will continue to work with the commenter, or any other interested parties, to refine these proposals so that they may be approved under paragraph (f) or (g) of the final rule.

FedEx also submitted a position-by-position proposal, which also contained both higher and lower limits as compared to the FAA's proposed interim limits. FedEx's proposal also is promising, however, its analysis is based on assumptions which the FAA has determined to be inaccurate, given the limitations of the weight and balance manual. For example, FedEx's assumption for the percentage of the load distributed to the sidelocks (40 percent) was derived from its ''Inverted Container Test.'' As discussed below under the heading ''FedEx's Tests,'' the FAA considers this assumption to be unconservative. The FAA also will continue to work with FedEx to refine its proposal, so that it may be approved under paragraph (f) or (g) of the final rule.

The CAA also submitted a finite element analysis (FEA) and, based on this analysis, requested that the final rule allow interim container payload limitations (regardless of whether sidelocks are installed) of approximately 3,500 lbs. in the most forward and aft positions, and 8,000 lbs. over the wing and wheel well. All other positions would be limited to 4,800 lbs. per container position with no sidelocks installed, and 5,000 lbs. with sidelocks installed. The CAA also requested that, after unspecified frame modifications are incorporated and sidelocks installed, interim limitations of 6,000 lbs. per container be allowed. Three other commenters submitted similar proposals.

As stated previously, the FAA is willing to work with commenters to establish interim limits other than those established in the final rule. However, the data submitted with the comment do not establish that the model used in CAA's FEA accurately represents the airplane. The CAA states that the model was made using the Boeing Structural Repair Manual (SRM) and various unspecified measurements of the airplane, but without access to the type design data that define the airplane configuration. It is, therefore, based on numerous assumptions regarding the configuration, which have not been validated. Furthermore, the model purports only to represent a 120-inch long section of the fuselage. The model does not account for the numerous fuselage cutouts for cargo and passenger doors, which affect the way the floor structure reacts to loads. Also, the model does not address the different structural design of the wing box or wheel well areas.

Even if it were assumed that the model is accurate for some airplanes, it is based on the cargo container locations used by FedEx, which are different from those of the other affected airplanes. The positions of the containers and locks determine the loads introduced into the floor beams. Therefore, using the FedEx container layout produces a result which, even if valid, would be only applicable to the FedEx airplanes. Based on the foregoing, the FAA does not consider that the model provides a sufficient basis for revising the interim limits.

Several commenters state that the FAA's findings of negative margins of safety are too conservative over the wing box and wheel well, as these areas are capable of supporting higher container payloads due to their stronger design. The FAA concurs partially. The FAA has determined that an unsafe condition exists by analyzing the basic floor structure rather than the much more complex wheel well or wing box structure. These areas are capable of supporting greater loads, but the commenters have submitted insufficient data to determine what loads may be safe in these areas.

However, the FAA has issued STC's which substantiate the wing box and wheel well areas for payload capabilities equivalent to the carriage of 6,000- to 10,000-lb. containers, depending on the individual airplane's structural capability, which has increased as the 727's type design has evolved. The FAA notes that, although no structural reinforcement was added to the wing box and wheel well for these STC's, limitations were sometimes imposed in consideration of the individual airplane's structural capability.

The FAA has considered the greater strength of the wing box and wheel well and has determined that an acceptable level of safety will be achieved by allowing a total payload of 12,000 lbs. for any two adjacent containers in this area, without other limitations, for the 28-month interim period. To eliminate potential ambiguity as to the containers to which this limitation applies, the final rule specifies that this alternative limitation applies to containers located completely or partially between body stations (BS) 740 to 950. However, the FAA does not consider that it is acceptable to allow combined payloads above 12,000 lbs. for this interim period, or to allow 12,000-lb. combined payloads indefinitely, because the FAA does not have the detailed information or resources necessary to determine the appropriate payload and operational limitations for all configurations of the affected airplanes. Operators who desire further increased loading in this area are invited to submit their requests and supporting data to the FAA in accordance with paragraph (f) or (g) of this AD.

Paragraph (a) of the NPRM did include a limited position-by-position proposal, in that it specified a reduced payload limitation in the area of the cargo door (BS 440 to BS 660). As with the wing box and wheel well area, to eliminate potential ambiguity as to the containers to which this limitation applies, the final rule specifies that this limitation applies to containers located completely or partially between BS 440 and BS 660.

Extension of Initial Compliance Time

One commenter states that the NPRM's will ''wreak havoc'' on the express industry and shipping public. The commenter states that it has no way of knowing when the effective date of the AD will be. The 48-hour implementation of the load limits will inevitably result in serious disruption to cargo already booked or in transit when the final AD's are issued. Several other commenters requested 120 days after AD issuance for interim limits to become effective, as this time was necessary to alter manuals, provide personnel training, and generally prepare for a significantly different loading procedure. The FAA concurs partially. The FAA has changed the final rule to extend the compliance time from 48 hours to 90 days. The AD becomes effective 35 days after the date of publication in the **Federal Register**. As requested by the commenters, this allows a total of 125 days for operators to make necessary changes to the FAA-approved Airplane Flight Manual and cargo loading procedures.

All Container Types

Several commenters state that the proposed AD should address the use of all possible containers, pallets, and the intermixing of pallets and containers. Other commenters followed with similar statements about pallets, bulk loading, oversized cargo, and combi configurations (i.e., configurations with provisions for passenger seating and cargo on the main deck). One of the commenters requests that the wording of the proposed AD be changed to contain generalized wording that would address all container sizes, using a ratio of the length and width of other containers to the 88- by 125-inch container specified in the proposed AD as a means to determine the container payload limit. The commenter further states that this could help the implementation of the rule. The commenters request these changes to avoid the disruption that might result from having to obtain individual approvals for each of the types of containers.

The FAA concurs partially. In light of the administrative burden of approving individual container types, the FAA has reassessed this proposed requirement. The FAA recognizes that, except for half-size containers (discussed below), the FAA analysis used to establish the payload limits for containers measuring 88 by 125 inches also is applicable to any container within the same floor area. The reasons are that the analysis considered the effect of the container weight on the floor structure supporting the container, and that the differences in the stresses in the floor structure associated with the different container types are not sufficient to warrant different limits. Therefore, the FAA has revised the final rule to specify the same limitations for container size codes ''A,'' ''B,'' and ''C,'' as defined in National Aerospace Standard (NAS) 3610, which is the specification referenced in FAA's Technical Standard Order (TSO) C90c for cargo unit load devices (containers).

For half-size containers (i.e., size code ''D'' or ''E'' of NAS 3610, or the FedEx ''Demi'' container), the final rule specifies payload limits that are one-half those for other containers. Since these half-size containers are designed to be placed side-by-side across the fuselage, this separate limit is necessary to ensure proper load distribution within the area. It should be noted that paragraph (g) of the final rule allows operators to establish different container payload limits from those specified in the rule by substantiating that those limits provide an acceptable level of safety.

For oversize cargo, operators may apply for approval of alternative methods of compliance in accordance with paragraph (f) or (g) of the AD by proposing appropriate limitations for such cargo.

Service History

One commenter claims that, for the converted 727 freighters, ''successful flight history is direct evidence which supports [the commenter's] analysis showing the airplanes to be safe.'' The commenter references CAR sections 4b.202, 4b.270, and 4b.300 to show that service history is a reliable indicator ''to support or define a substantiation methodology.''

The FAA does not concur. The requirements of CAR part 4b that the commenter references are related to the determination of the fatigue strength of structure, where it is acceptable to utilize the service history of airplanes of similar structural design. However, the unsafe condition addressed in this AD is not related to fatigue, but is the result of the existing floor structure being significantly understrength. The only conclusion that can be drawn analytically from the accumulated flight history of the converted 727 freighters is that these airplanes have yet to encounter a sufficiently severe gust condition when critically loaded with an allowable payload configuration to cause failure of the floor structure.

Deflection of Floor Beams

One commenter states that the FAA did not provide a reasoned explanation of the NPRM claim that ''even if the floor beams of the main cargo deck only become deformed, the results could be catastrophic.'' The commenter compares this statement to McDonnell Douglas Report MDC–J5568, applicable to Model DC–10 series airplanes, which was approved by the FAA and showed significant and permanent deformation of the wing.

From this comment, the FAA infers that the commenter believes that, if the wing can bend safely and even deform permanently when it has cables/fuel lines, etc., passing through the structure, then the floor beams also must be capable of safely deforming or bending.

The FAA does not concur. The NPRM states why deformation of the floor beams could be catastrophic. For the ''up'' load case analyzed by the FAA, which consisted of ''up'' loads applied to the containers due to a down gust on the airplane, the floor beams common to the forward and aft locks of a container bend upward due to the applied upward load. The adjacent floor beams underneath the containers that are not attached to the container do not bend. If this deflection relative to the adjacent floor beams is excessive, this could result in the bending and stretching of all control cables and fuel lines passing through the floor beams. Such bending and stretching could result in uncommanded flight control inputs at a critical time when the airplane is subject to severe gust conditions. In addition, the fuel lines located in the floor beams are not designed to flex in the same manner as fuel lines located in the wing structure of an airplane and, therefore, may crack, bend, or rupture.

The occurrence of either an uncommanded flight control input during critical flight conditions or the rupture of a fuel line can be catastrophic. The McDonnell Douglas report referenced by the commenter is not applicable to the floor beam deflections of a 727 converted freighter since the fuel lines and control cables located in the wing of Model DC–10 series airplanes are specifically designed to accommodate large wing deflections and are in compliance with the applicable regulations.

Safety Factor

One commenter states that the use of a safety factor as small as 1.5 presupposes very accurate analysis, knowledge of loads and material properties, and sound engineering practices. Structure with negative margins of safety of -0.63 clearly indicates that some or all of these suppositions have not been achieved. In addition, some operating conditions, such as gusts, are beyond human control. The safety factor of 1.5, as required by CAR part 4b, is necessary to maintain the safety of the airplanes. The FAA concurs with the commenter, but notes that the finding of unsafe condition in this AD is based on the FAA's determination that the risk of catastrophic failure of the understrength floor structure is unacceptably high, rather than on a simple finding of non-compliance with CAR part 4b.

Fore and Aft Center of Gravity Shifts

Several commenters objected to the FAA's analytical use of the trapezoidal method for evaluating shifts in the center of gravity (cg) within a container. One commenter, FedEx, states that the FAA's use of the trapezoidal shift results in impracticable—if not impossible—circumstances that exceed the requirements of CAR section 4b.210.

In order to gain a better understanding of this and other FedEx comments, the FAA met with FedEx on September 19, 1997, having first provided FedEx with a series of questions to be discussed at the meeting. (The minutes of this meeting are included in Rules Docket No. 97–NM–09–AD.) At this meeting, FedEx reported that it had only recently obtained a scale that would allow it, for the first time, to determine the actual locations of the cg's inside its containers. FedEx stated that it had weighed and determined the cg location on a sampling of 1,500 containers, but did not provide any data to the FAA at the meeting. In any case, the FAA does not consider it appropriate to evaluate only an operator's average container payload when establishing the safety of the affected airplanes. The unsafe condition determined by the FAA's analysis is based on the payload weight and distribution with which these airplanes are currently allowed to operate.

In addition, in a letter dated November 4, 1997, to the FAA (a copy of which has been placed in Rules Docket No. 97–NM–09–AD), FedEx states that ''A review of container weights, quadrant weights, and cg's for the 'SAA' (88- by 125-inch) container finds no containers in the 4,000 to 8,000 lb. range with a cg offset greater than 8.67%.'' However, FedEx did not provide data (e.g., the numbers and types of containers reviewed; the percentage of cg shift for different container weights) to substantiate the value of 8.67 percent. Therefore, the FAA is unable to determine the significance of this comment.

FedEx states that it chose to use a ''stair step'' or ''box'' method to evaluate the effects of cg shifts within a container. FedEx also states that the FAA rejected this method for use on the 727 converted freighters without a reasoned explanation.

The FAA does not concur with the comments regarding the FAA's methodology. As stated in the NPRM, the large negative margins of safety calculated using the FAA's analysis included consideration of the effect of a horizontal cg shift of 10 percent within the container (e.g., 8.8 inches from the geometric center of the base of the container for the forward and aft direction). Shifts in cg are particularly important in considering the ''up'' load case because the container loads are applied primarily to the floor beams at the forward and aft edges of the container where the container locks are located. The effect of the cg shift is to increase the loading on the beam in the direction of the cg shift. For example, if the cg is shifted aft, the applied loads will be increased on the floor beam located at the aft edge of the container.

In analyzing the effects of forward or aft cg shifts, the FAA employed a ''trapezoidal method.'' The trapezoidal method is well accepted and used by both Type Certificate (TC) and STC holders. The trapezoidal method is analogous to shifting sand in a box. With no cg shift, the weight of the cargo is uniformly distributed across the base of the container. As the cg is shifted, the load or ''sand'' is taken from one side and applied to the other side. This results in a sloping load distribution, with a load ''peak'' on one end of the container, and a load ''valley'' on the other end. Another acceptable method for considering forward or aft cg shifts is the ''box'' or ''stair step'' method. In this method, rather than sloping, the load ''steps'' up from a low level on one end, to a high level on the other.

The FAA does not concur that the trapezoidal shift used in the FAA's analysis exceeds the requirements of CAR section 4b.210. For ''up'' loads on the container, and a forward or aft cg shift (which the FAA has identified as the most likely critical case), if the airplane is not equipped with side vertical restraints (sidelocks), the results of the loads analysis are the same regardless of whether the stair step or trapezoidal method is used. Since all loads are carried by the floor beams that support the forward and aft container locks, the loads on the beams will be identical for any method that shifts the cg a particular percentage within the container. It is the percentage of cg shift that is important, not how that cg shift was achieved. This represents the majority of the airplanes affected by these four AD's. For those airplanes equipped with sidelocks, there is a maximum difference of 14 percent in the two methods for ''up'' loads, at the ''peak'' of the trapezoid. In consideration of the varying locations of sidelocks and the manner in which loads are actually distributed among all locks, this difference does not significantly affect the FAA's analysis or alter the finding of the unsafe condition.

The FAA considered 10 percent as the appropriate amount to shift the cg within the container, as it is realistic and typical of cg shift limitations contained in operator weight and balance manuals. Consideration of a 10 percent cg shift also represents an industry standard as evidenced by NAS 3610 (contained in the Rules Dockets). The vast majority of containers used by operators comply with this standard. FedEx has not provided any data that indicate that a 10 percent cg shift is unreasonable, or that show that the FAA's use of a trapezoidal shift is unrealistic. The data that FedEx provided (average container densities ranging from 7 to 18 lb./cubic foot) concern only the average weight of a container used in its operations and assumes the weight to be equally distributed throughout the container.

FedEx also states that the trapezoidal method results in load distributions that greatly exceed the 90 lb./inch ''running load'' (freight payload per inch of airplane floor length) limitation specified in the FedEx weight and balance manual. FedEx states that the trapezoidal shift method will result in possible freight densities of 40 lb./cubic foot in approximately 1/4 of the container volume. FedEx states that this equates to an average value of over 200 lb./inch running load in this area of the container. FedEx reports that its daily average operational load density is approximately 7 to 7.5 lb./cubic foot, and on rare occasions may have reached the 18 lb./cubic foot range; therefore, the FAA's analysis bears no relationship to operational reality. (An average density of 18 lb./cubic foot over the entire volume for the full-size FedEx container equates approximately to a 7,920-lb. container, or about 90 lb./inch running load.)

The FAA acknowledges that, in its analysis described in the NPRM, it was not constrained by the 90 lb./running inch limitation specified in the FedEx weight and balance manual. However, the FAA does not concur that this results in inaccurate weight limits. The FAA notes that, for a FedEx container at the maximum permitted payload of 8,000 lbs., the running load limit is exceeded even with no shift in the container cg (88-inch container width times 90 lbs. per inch equals 7,920 lbs.). For any forward/aft cg shift within the container, using either the trapezoidal or ''box'' method, the degree to which the limit is exceeded increases in direct relation to the magnitude of the cg shift.

In addition, the FAA reviewed FedEx's loading procedures during a visit to its flight line at Sea-Tac International Airport, Seattle, Washington, on February 5, 1997. During this review, the FAA became aware that FedEx neither determines the actual cg location of the cargo within each container nor has the necessary equipment at all of its loading facilities to determine that it is operating within the cg and running load limitations of its weight and balance manual.

Based on other comments received in response to the NPRM, it appears that FedEx's practice is not unusual even though it is inconsistent with its weight and balance manuals. In light of the fact that, to the FAA's knowledge, no operators are measuring the cg's for all containers, and that a recent sampling accomplished by FedEx shows cg shifts as high as 8.67 percent, the FAA concludes that use of 10 percent cg shift in its analysis is not only an appropriate reflection of industry cargo loading practice, but may actually be unconservative.

Finally, the FAA does not concur that it has rejected the use of the ''box'' method proposed by FedEx. FedEx did not consider a cg shift effect in the original substantiation documentation for its original STC design, but later proposed to employ a ''box'' method used by McDonnell Douglas for the certification of a DC–10 freighter (submitted by FedEx as a comment during the first comment period in Appendix 2, Report 97–028, Revision I/R, dated April 1, 1997). After review of this method, the FAA accepted it in a meeting with FedEx on April 29, 1997. The basis for this acceptance is that it provides an acceptable level of conservatism in the absence of more rational data to predict the cg within a container. As discussed above, the use of the ''box'' method does not significantly affect the FAA's analysis or alter its finding of an unsafe condition.

FAA's Methodology

Boeing states that the FAA's analysis is similar to that used by Boeing for initial certification of Model 727 series airplanes. However, Boeing also states that while the analysis is conventional, some of the assumptions made are not typical of industry practice for the floor beam analysis and are conservative relative to the original certification practice of Boeing, with respect to trapezoidal loading and credit for pressurization. Boeing states that, when it evaluates cg offsets in containers, it uses the stepped rectangular or ''box'' method to determine cg shifts.

The FAA concurs partially. As explained previously, the trapezoidal loading assumption is nominally more conservative than the stepped rectangular or ''box method.'' For the ''up'' load case, this nominal difference only affects those airplanes with sidelocks. In any case, this difference does not significantly affect the FAA's analysis or alter its finding of an unsafe condition.

The FAA does not concur that its analysis is inappropriately conservative because it considered zero fuselage pressurization. Fuselage pressurization tends to provide an increase in floor beam load carrying capability because the pressurized fuselage, to which the ends of the floor beams are attached, pulls outward on the ends of the floor beams, which makes the floor beams act stiffer. Severe gust conditions, such as microbursts, may be encountered at low altitudes when the fuselage is not pressurized; therefore, it is realistic to consider those conditions. Even with credit for fuselage pressurization, the FAA's conclusion would be unchanged because the pressurization effects do not significantly affect the substantial negative margins of safety found as a result of the analysis. Furthermore, CAR section 4b.216(c)(1) requires that ''The airplane structure shall have sufficient strength to withstand the flight loads combined with pressure differential loads from zero up to the maximum relief valve setting.''

Another commenter, FedEx, states that the FAA's analytical techniques are too conservative and, therefore, result in artificially low payload numbers (container weights) for the 727 converted freighters. The FAA does not concur. The FAA reviewed the substantiating data submitted for the original certification of FedEx's 727 freighter conversion STC and found that this data package lacked any stress analysis substantiating the floor structure. Lacking this data, the FAA reviewed the analytical methods used by others in industry. The FAA determined that other industry analytical methods for cargo systems used conservative overlapping assumptions to ensure that the design resulted in a safe product that complied with CAR part 4b. The FAA's decision to use these methods to perform an analysis of the floor structure of the affected 727 converted freighters is consistent with industry standard practices.

One commenter expresses concern over the methods utilized in the structural substantiation of floor beam loads in the documentation contained in these Rule Dockets, although the commenter did not identify a basis for the concern. The commenter states that over the course of the last two decades it has developed stringent methods for accurately predicting cargo induced loads in airplane structure. The commenter requests that the FAA consider these methods in performing its evaluations. The commenter submitted data regarding its analytical methodology used in development of numerous STC approvals of cargo handling systems.

The FAA has reviewed the commenter's methods and considers that this methodology utilized conservative, overlapping assumptions to ''bracket'' unknown variables and utilized a trapezoidal distribution of cargo in defining its cg offsets. The FAA agrees that these are appropriate methods for determining loads for cargo floor structure and are consistent with those employed by the FAA. These methods result in conclusions that are consistent with the FAA's findings that the floor structure addressed by these AD's presents an unsafe condition. Further, the FAA notes that these conclusions are consistent with those derived from other methods commonly used in industry.

Boeing addresses the statement in the FAA's analysis of the floor beam allowables (contained in the Rules Dockets) that the analysis is ''partial'' and ''unconservative.'' Boeing states that, for the ''down'' load case (i.e., ''down'' loads applied to the container), the FAA's analysis is sufficiently conservative for the following reasons: (1) The critical section selected for analysis reflects the worst case hole-out situation; (2) all significant [down] load cases were dealt with; (3) the critical section analyzed would have no degradation of [safety] margins because of secondary bending effects; and (4) the critical section analyzed has no shear on it by first principles and, therefore, any shear interaction effects should be small.

The FAA concurs with the commenter's statement; however, the FAA notes that this statement was carefully limited to apply to ''the down load case being considered'' and does not address all load cases, the actual strength of the floor, or the floor beam as a whole.

The FAA does not concur that the commenter's statement is valid for all load cases and all floor beam structure. The FAA's statement that the analysis is ''partial'' and ''unconservative'' relates to the fact that there are many floor beams, several with differing applied loads, load carrying capabilities, and critical cross-sections. As a result, the FAA's analysis could not be considered complete (therefore partial), nor could the FAA state that it had accounted for all effects, which may result in yet higher stress levels and larger negative margins of safety (therefore unconservative).

One commenter states that the standard being pursued by the FAA for the converted 727 freighter includes all known theoretical possibilities, plus an additional safety factor of indeterminate size. The commenter refers to a statement in the NPRM that ''* * * airplanes may encounter severe turbulence that exerts wind gust forces beyond the critical case forces of CAR part 4b * * *'' as implying that the FAA is imposing standards beyond that of CAR part 4b.

The FAA does not concur. The FAA's analysis of the converted 727 freighter floor beams was accomplished using the standards identified in CAR part 4b. No new standard is being applied to these airplanes. The commenter has taken the NPRM statement out of context. The FAA's reference to gusts that exceed CAR part 4b critical load cases is in a portion of the NPRM that addresses the basis for the retention of the 1.5 factor of safety, which is required by CAR section 4b.200(a). This factor is used to protect the airplane from failure when experiencing limit load, the highest expected actual in-flight loading, and other unknown situations.

As stated in the NPRM, interested parties had requested that the FAA eliminate the safety factor during preparation of the NPRM, which would allow higher payloads. The statement that the commenter characterizes as implying ''new standards,'' and a safety factor of ''indeterminate size,'' was simply a discussion of the existing level of safety established by the CAR part 4b standards (this airplane was originally certificated to those standards over 30 years ago).

One commenter quotes from CAR section 4b.210 that the analysis must be conducted using ''any practicable distribution of disposable loads.'' The commenter states that the loading scenarios the FAA uses are much higher than the maximum [loading] experienced in actual service. Several other commenters characterize the FAA's assumptions and analysis as ''ultra conservative.''

The commenters appear to have misinterpreted the referenced CAR section 4b.210. The word ''practicable,'' which means possible to put into practice, appears to be read as ''practical.'' Subpart C of CAR part 4b requires that analysis be conducted for conditions (e.g., critical altitude, critical load, or maximum/minimum weight) that are possible; Subpart C is not restricted to normal, average, or practical conditions. Designing airplanes to withstand only average loads would result in a greater potential for catastrophic failures whenever those loads are exceeded.

Boeing Data

FedEx states that none of Boeing's analysis for the affected 727 airplanes provides any baseline for comparison of the unit load device (ULD) cg shifts, container load distribution, or other key methodologies. The FAA does not concur. As a check to verify that its analysis was generally correct, the FAA examined some of the type certification data that Boeing had submitted prior to certification of 727 passenger and freighter airplanes. The Boeing data verified the FAA's analysis in the following two significant respects:

1. Boeing's stress analysis that established allowable floor beam strength for the passenger version was entirely consistent with the FAA's stress analysis; and
2. Boeing's loads analysis for the freighter version, while using a different methodology from that used by the FAA, would result in substantial negative margins of safety for passenger floor structure when carrying 8,000-lb. containers.

In accordance with CAR part 4b, Boeing's analysis of the 727 freighter considered all aspects of cargo loading, including cg offsets, load distribution, and multiple other facets. It should be noted that Boeing found it necessary to substantially strengthen the floor structure for its freighter version in order to carry the same payloads currently allowed by the subject STC's and remain in full compliance with CAR part 4b.

FedEx's Analysis

In support of its position that there is no unsafe condition, FedEx states that it has used a rational, conservative analytical approach for determining that the cargo floor structure is safe, which has not been accepted by the FAA. Specifically, FedEx references individual floor beam analysis and tests conducted with combinations of loads, offsets, container positioning, airplane weight, and flight maneuvers that create conditions exceeding any that statistically will occur.

The FAA does not concur. Except for the lateral floor beams over the 80-inch long wheel well area, which is discussed below under the heading ''Data Showing Floors to be Safe,'' FedEx has not yet submitted a complete analysis of the floor structure, or of a single floor beam. The tests that have been run to date are of limited relevance as discussed under the heading ''FedEx's Tests.'' Further, as discussed previously, the FAA also does not concur that the unsafe condition is so improbable that it should not be addressed.

FedEx states that the statement in the NPRM that the FAA used commonly accepted analytical methods in its structural analysis is misleading because it fails to address other ''commonly accepted analytical methods.'' In particular, FedEx references the FAA's use of a pinned end column fixity coefficient (''c'') of 1.0, and in contrast points out that a ''c'' of 2.58 is used in an example problem contained in ''Analysis and Design of Flight Vehicle Structures'' by E.F. Bruhn. FedEx considers this example problem to be analogous to a floor beam lower cap analysis. FedEx states that other alternative analytical methods (such as Bruhn) result in a significant increase in allowable loads for the floor beams (therefore potentially higher allowable container weights), but these methods have been rejected by the FAA as inapplicable to the converted 727 freighters, even though they have been accepted previously by the FAA on other certification efforts.

The FAA does not concur. The selection of this coefficient can have a significant effect on the determination of the allowable payloads. A low column fixity coefficient of 1.0 means that the ends of the beam are ''pinned'' (i.e., free to rotate or move like a hinge). A column fixity coefficient of 4.0 means that the ends of the beam are fully ''fixed'' (i.e., unable to rotate or move for any applied load). The FAA's analysis uses a ''pin end coefficient'' because it represents the airplane structure. As stated previously, the FAA's analysis considered the ''up'' load case to be the most likely critical case. For this load case, the lower horizontal member or ''chord'' of the ''I'' shaped floor beam will be in compression and, therefore, will behave in the same manner as a column under compression. It will be free to rotate or move like a hinge, not fixed as a higher fixity coefficient would suggest.

FedEx's proposed ''c'' coefficient of 2.58 does not appear in any of its analysis in support of its comments to the NPRM. At the September 19 meeting, FedEx stated that it did not use the 2.58 value in any of its analyses submitted in its comments. FedEx also stated at the meeting that the 2.58 value was merely an illustration of a fixity coefficient that could be found in the Bruhn handbook for a similar problem. Nevertheless, FedEx maintained at that meeting that it estimates the true value of ''c'' is in excess of 1.2, and may be as high as 2.58, although FedEx did not provide any data to the FAA to show that a ''c'' of 2.58 would be representative of the structure.

In addition, in FedEx's analysis submitted to the NPRM, FedEx used a ''c'' value of 1.2. (Document 97–021, initial release, dated February 28, 1997, submitted to the NPRM (Rules Docket No. 97–NM–09–AD) as Appendix 1 during the first comment period). However, in a later version of the same document, FedEx also used a ''c'' coefficient of 1.01 (Document 97–021, dated March 24, 1997, but designated as the initial release of the document, as well), submitted to the FAA for review on April 7, 1997. The FAA has determined that there is essentially no difference between 1.00 and 1.01 for a column end fixity coefficient. Therefore, the FAA concludes that the more recent data submitted by FedEx is consistent with the value of 1.0 for the column fixity coefficient used in the FAA's analysis.

FedEx states that it has submitted reports to the Seattle Aircraft Certification Office (ACO) that employ assumptions that were used by Douglas Aircraft Company and were accepted by the Los Angeles ACO for the original certification of the Model DC–10 airplane. FedEx also states that the Los Angeles ACO's earlier approval of the assumptions used in the Model DC–10 analysis affirms that it is using an appropriate method to substantiate the integrity of its converted 727 freighters. FedEx states that the FAA has not explained how the methodology can be accepted by the Los Angeles ACO and not accepted by the Seattle ACO.

The FAA acknowledges that use of the particular assumption(s) referenced in the DC–10 analysis, if applicable to FedEx's 727 analysis, may allow higher container weights than those specified in the proposed AD.

The FAA does not concur with the commenter's statements. For many certification projects, it has been acceptable to use a particular assumption which may not be conservative, provided that there are other quantifiable assumptions used which account for the lack of conservatism and result in the overall design being conservative and in compliance with CAR part 4b. Therefore, an unconservative assumption used as part of a particular approved methodology is not equally acceptable for another methodology without ensuring that the lack of conservatism is accounted for elsewhere in the methodology and that the overall design is conservative.

At the July 24, 1997, meeting with FedEx, an FAA representative from the Los Angeles ACO stated that it was the responsibility of FedEx to demonstrate that the analytical assumptions and methodologies used on the DC–10 were conservative for the Boeing 727. To date, FedEx has not made that demonstration. During the September 19 meeting with FedEx, the FAA asked FedEx if it had used the entire analytical methodology that was used for the DC–10. FedEx replied that it had not. Therefore, the FAA does not agree that the two ACO's have been inconsistent.

FedEx states that neither it nor the FAA has a complete, accurate model which objectively demonstrates the actual performance of the vast array of the TSO and STC ULD's in any one of the hundreds of individual airplane cargo positions and latch configurations of in-service airplanes. The FAA concurs that there is no accurate model which demonstrates the actual loads input into the structure of the 727 converted freighters for the myriad of possible configurations. However, an analysis using conservative overlapping (or enveloping) assumptions can be performed to show the design is safe for the proposed usage and is in compliance with CAR section 4b.200(c). This approach has been successfully used by aerospace companies for many years and is acceptable to the FAA.

FedEx's Tests

FedEx states that three tests (descriptions follow) indicate that the floor structure of the existing main cargo deck is in compliance with CAR part 4b when supporting existing weight limits of the weight and balance manual.

1. *Inverted Container Test.* FedEx states that it has conducted an inverted container test that demonstrates that its existing sidelocks are effective in carrying 35 to 40 percent of the container load. The test report is contained in Appendix 9 (Report 97–048, Revision I/R, dated May 5, 1997) of FedEx's comments to the NPRM (Rules Docket No. 97–NM–09–AD) during the initial comment period. FedEx also states that these results show that the FAA's estimation that the sidelocks carry 20 percent of the container load is far too conservative.

The FAA infers that FedEx considers that the FAA's estimation that 20 percent of the total container load is carried by all sidelocks (10 percent per side) is conservatively low since this results in 80 percent of the total load being carried by the locks attached to the main deck floor beams. Because FedEx's inverted container test showed that 35 to 40 percent of the container load was carried by the sidelocks (approximately 20 percent per side), 60 to 65 percent of the total load would be carried by the locks attached to the main deck floor beams.

FedEx states that this test indicates that the floor structure of the existing main cargo deck is in compliance with CAR part 4b when supporting existing weight limits. The FAA does not concur that FedEx's testing has shown that sidelocks are 35 to 40 percent effective because the testing does not address all container types, cg shifts, and all container positions on the airplane. The FAA estimated that the sidelocks are 20 percent effective based on current industry methods, as used in TC and STC programs. To date, industry, with the exception of this test by FedEx, has little or no data showing the exact distributions of actual sidelock load percentages. Therefore, enveloping assumptions and/or conservative analytical methodologies have been consistently used by various manufacturers to show compliance with CAR sections 4b.200(c), 4b.210, and 4b.359, to which these STC's also were certified. This approach has previously obviated the need to determine the exact load distributions to each lock for the various container types used by operators.

Several commenters point out that there is a vast array of different types of containers and other ULD's used by the affected operators. This includes a wide range of construction, shapes, and materials. Some ULD's look like boxes; others look like flat pallets or ''cookie sheets.'' These differences significantly affect the distribution of loads to all locks when subjected to ''up'' loads on the container. Although FedEx's airplanes that have been modified in accordance with the affected STC's predominantly haul the full-size or ''SAA'' container, and the half-size or ''Demi'' container, FedEx reported at the September 19 meeting with the FAA that its modified 727's haul other kinds of containers, such as flat pallets, when necessary.

For these reasons, the FAA's analysis used to determine the maximum safe payload limits for operations must conservatively account for any of the currently permitted container types.

CAR section 4b.359 requires that ''each cargo and baggage compartment be designed for the placarded maximum weight of contents and the critical load at the appropriate maximum load factors corresponding to all specified flight * * * conditions * * *.'' CAR section 4b.210 requires that ''flight load requirements shall be complied with * * * at all weights from the design minimum weight to the maximum weight appropriate to each particular flight condition, with any practicable distribution of disposable load (mass load) within the prescribed operating limitations stated in the Airplane Flight Manual.'' CAR section 4b.200(c) requires that ''all loads [force loads] shall be distributed in a manner closely approximating, or conservatively representing actual conditions.''

Therefore, in order to show compliance with the applicable regulations, either the distribution of the container loads to latches used to analyze the floor beam structure must be accurately determined for all container types used, or conservative assumptions must be used considering all practicable distribution of cargo loads. Finally, the floor structure must be strong enough to carry the maximum weight at the critical cargo load distribution at the appropriate maximum applied loads.

As stated previously, the FAA's analysis in the NPRM's identifies one of several possible critical load cases—that of a large gust pushing the airplane down, which causes ''up'' loads on two adjacent containers. On all of the affected STC's, adjacent containers share the same set of container locks at the forward and aft edges, and these locks are attached to the floor structure. This condition results in the loads for both containers being concentrated on isolated floor beam(s) at the location of the locks.

A ''typical'' full-size (88- by 125-inch) container is an enclosed box with two sides curved to match the rounded contour of the airplane fuselage, a fully or partially removable front side (i.e., a door), and a fixed or rigid back wall. Because of the design of a typical container, the back wall tends to carry the majority of the load (the curved sides and removable front are not as effective in supporting an ''up'' load as the rigid back wall). A different type of ULD, a flat pallet, with netting to restrain the cargo, distributes the loads to the container locks very differently than the 88- by 125-inch container. The net tends to distribute the load more uniformly around the pallet edges.

The rational basis for the FAA's analysis is illustrated by the following two examples of container/ULD arrangements that result in load distributions to the floor beams which approach or exceed the 80 percent estimate used by the FAA (i.e., the converse of the estimate that 20 percent of the load is carried by the sidelocks). These two examples assume maximum allowable ULD payloads of 8,000 lbs. using configurations that are permitted for all of these STC's.

Example 1: Back-to-Back Containers. Based on the data from FedEx's inverted container test with an ''SAA'' container facing (door side) forward, 43 percent of the total load was carried by the locks on the back side of the container. If two containers of equal weight are placed back to back, the equivalent of 86 percent of the total load of one container would be placed on the floor beam(s) at the interface (43 percent plus 43 percent).

Example 2: Container and Flat Pallet. Using the test data for the inverted container test, 43 percent of the load would be carried by the back wall. A flat pallet (''cookie sheet'') placed just aft of this container in a cargo position, which has four sidelocks on each side, will place approximately 28 percent of the total load on the front side of the ''cookie sheet'' [as discussed previously, the net on the flat pallet tends to distribute the load equally to all sides of the sheet, and since there are five locks each on the floor beam(s) supporting the front and back side of the sheet, and four on each side, 5/18 (or 28 percent of the total load) will be on the front side]. This results in a total of 71 percent (43 percent plus 28 percent) of the maximum ULD payload, being placed on the floor beam(s) between these two ULD's.

These two examples of the many possible loading configurations illustrate the reasonableness of the FAA's estimation that 80 percent of the maximum allowable container payload could be concentrated on the floor beam(s) at the interface between two adjacent containers.

In addition, the FAA has other concerns with FedEx's inverted container test. First, the effects of a critical cg shift within the container were not tested. As tested by FedEx, the back wall of the container carried 43 percent of the load with a zero percent cg shift (i.e., the cg of the container was at its geometric center). As discussed previously, this is impractical to achieve in actual operations. If the cg had been shifted towards the back wall of the container, the load at the back wall of the container would have been higher than the 43 percent noted previously.

It should be noted that the FedEx test plan submitted to the FAA in May 1997 (Appendix 4 of FedEx's comment to Rules Docket No. 97–NM–09–AD submitted during the initial comment period; Document 97–034, dated May 6, 1997) listed aft cg shift load cases on page 9 of that plan. However, these critical load cases were not tested because the actual test (described in Appendix 9) had taken place in accordance with an earlier test plan, Document 97–023 (which is referenced in Appendix 9). This was confirmed by FedEx at the September 19 meeting.

A second concern with the FedEx inverted container test is that the container was tested in a fixture in which the lock locations were representative of only one cargo position on the airplane. There are typically a maximum of 8 to 12 containers that may be carried on the main deck, depending on the configuration of the airplane. Sidelocks are evenly spaced along the fuselage, and different cargo container positions result in either four or five sidelocks along the container side edges. For these reasons, a variety of locations should be tested to determine the critical load case for the floor beams.

A third concern is that FedEx tested cargo position 5 on the 727–200 with the door of the container on the aft side of the cargo position. This orientation is opposite of how FedEx reports that the ''SAA'' containers are usually placed in its airplanes. This orientation of the container in the test fixture resulted in a sidelock being within 4 inches of the back wall of the container. The distance from the front wall of the container to the nearest sidelock was 23.5 inches. Due to this large distance, or ''overhang,'' and the flexibility of the ''SAA'' container, the nearest sidelock to the front wall on each side of the container together carried 32 percent of the total test load. If the container had been placed in the fixture with the door on the front side of the cargo position, such that the back wall of the container had a 23.5-inch ''overhang,'' or was in one of the several other cargo positions possible which have greater than a 4-inch ''overhang'' to the backwall of the container, the loads on the container back wall (which are carried by the floor beams) would have been significantly higher.

Finally, it is important to note that FedEx has provided no analysis of the floor beam structure showing that the large negative margins of safety are resolved based on its assertion that 35 to 40 percent of the container load is distributed to the sidelocks. The load distribution is only part of the answer; the load distribution must be used in a stress analysis to develop data identifying stresses in the structural members.

The FAA concurs that, in principal, testing of containers using a fixture such as that used by FedEx, if it represents the most adverse case of ''overhang'' for the back wall for all applicable cargo positions, and if it shifts the container cg to the most adverse position, will produce conservative results for the latches common to the floor beams, for the container type tested. The results will be conservative because of the flexibility of the floor beams, relative to the stiff behavior of the test fixture. The degree of conservatism is unknown to the FAA and has not been demonstrated by FedEx.

FedEx, in its test, did not consider all practicable load distributions nor establish the critical case considering an adverse aft cg shift and sidelock location. FedEx tested only those containers or ULD's that it predominantly uses, but not all the types that it actually uses in service; therefore, it is impossible to draw broad conclusions about the behavior of many different container types, applicable to all cargo positions, or the degree of conservatism introduced by floor beam flexibility from its limited testing.

Therefore, the FAA concludes that the 35 to 40 percent distribution of the ''up'' load to the sidelocks used by FedEx is artificially high. The FAA does not concur that the data ''Container Test,'' documented in Appendix 9, demonstrate that the commenter's existing sidelocks, in general, are effective in reacting 35 to 40 percent of the container load, or that the tests ''indicate that the floor structure of the existing main cargo deck is in compliance with the requirements of CAR part 4b when supporting existing weight limits.'' The test also does not demonstrate that the FAA's finding of unsafe condition is incorrect.

2. *Single ''I'' Beam Test.* FedEx states that it performed a floor beam test on a conservative representation of an unmodified passenger floor beam. This test is documented in Appendix 8 of FedEx's submittal to Rules Docket No. 97–NM–09–AD (FedEx Engineering Report 97–049, Revision I/R, dated August 15, 1997), and the additional data is contained in Appendices 10 (FedEx Floor Beam Test, Wyle Lab) and 11 (FedEx Floor Beam Test Videotapes).

FedEx also states that this test showed a lower floor beam chord compression allowable in excess of 60 ksi (60,000 lbs. per square inch) just prior to failure of the floor beam. FedEx states that this value controverts the FAA's calculation of 40.6 ksi in the FAA's analysis. In addition, FedEx states that the floor beam was tested in a fixture designed to replicate the airplane floor support structure, and that the test results are conservative due to the interaction of other floor beams, seat tracks, and floor panels in the airplane; the benefits of which were not addressed during this test. FedEx states that this test indicates that the floor structure of the existing main cargo deck is in compliance with CAR part 4b when supporting existing weight limits.

The FAA does not concur that FedEx's measurement of 60 ksi compressive stress is relevant to the actual strength of the floor beam. In the FedEx test, the 60 ksi measurement was taken just before the floor beam fractured in tension (i.e., stretching of the floor beam to the point of failure). The FAA considers that the critical failure mode (i.e., the failure mode that would cause collapse of the floor structure in actual operation) is buckling of the floor beam. Buckling occurs when the floor beam warps or twists under applied loads. As discussed below, the test data indicate that the actual compressive stress at which the floor beam buckled was approximately 18 ksi.

Although the floor beam buckled during the test, the floor beam did not collapse, in part because the test fixture substantially and artificially limited the amount of warping of the beam. The test fixture used a rigid ''I'' beam to support the ends of the floor beam. This kept the ends of the floor beam from moving inward during the test. In contrast, on an actual airplane, the ends of the floor beam can move inward because they are attached to the fuselage frames, which are much more flexible than the rigid ''I'' beam used in the test fixture. The result of this artificial restraint was that the floor beam buckled and began to deflect. Instead of collapsing, as would be expected on an airplane, the floor beam behaved more like a cable, suspended from two rigid ends, with very little bending strength, but significant axial strength. This behavior was ultimately demonstrated by the catastrophic failure of the beam in tension, similar to a cable failure. If the beam had been supported as it is in the airplane, it is likely that the floor beam would have collapsed at the onset of buckling.

For example, if a horizontal beam is supported at each end, and vertical loads are placed on the beam, as the beam deflects the ends will pull inward. Restraining the beam ends will limit the bending deflection and stiffen the beam, preventing collapse of the beam as it buckles. This artificial restraint does not affect the buckling capability of the beam, but it causes the beam to appear to have higher load carrying capability than it actually has. FedEx acknowledged the effect of this axial restraint in a November 4, 1997, letter to the FAA. FedEx stated that ''It is conceivable that the bending deformation of the beam * * * would be influenced by restraining the ends of the floor beam from translating * * *.''

As stated previously, the critical compression buckling stress of the floor beam tested was approximately 18 ksi. (This occurred at the load step entitled ''0.6g.'') At this point the beam buckled as a column in the forward/aft direction. Beyond this load factor, at the spanwise location left buttock line (LBL) 11, the beam began bending in the forward and aft direction, as evidenced by the detailed test data for load case number 5, 2.8 g (2.8 times the force exerted by gravity at sea level) ''up'' load in Appendix 8. Forward and aft bending of the beam clearly indicates that the beam has buckled, and can be seen by observing the FedEx videotapes contained in Appendix 11. This buckling failure occurred prior to 40.6 ksi as predicted by the FAA, and before the 49.1 ksi value predicted analytically by FedEx in Appendix 1.

The occurrence of buckling at 18 ksi rather than approximately 40 ksi can be explained by the ineffectiveness of the stability straps in the test fixture. Over most of the airplane, the floor beams extend from one side of the airplane to the other. A stability strap is a long, thin strip of metal, running perpendicular to the floor beam, and attached to the lower surface of several beams, at intervals ranging from 17 to 24.75 inches along the lower surface of the floor beam. The purpose of the stability straps is to support or stabilize the lower chord to strengthen the floor beam. This is accomplished by reducing the ''effective length'' of the lower chord of the beam from one long column (the entire length) by splitting it into a series of shorter, stiffer columns that are equal in length to the distance between the stability straps. The stability straps in the test model were ineffective because the portion of the test fixture to which the straps were attached was not stiff enough to allow the straps to fully stabilize the floor beam. (This is exactly the opposite problem from that described above with respect to the excessive rigidity of the test fixture where the floor beam ends were attached.)

By graphing the results obtained from the test, the FAA determined that the stability straps were not fully effective at the location where the beam buckled. This graphing demonstrated that the ''effective length'' of the floor beam lower chord at the point of buckling was 40.4 inches [between LBL 32.6 and right buttock line (RBL) 7.8], rather than the ''effective length'' of 24.75 inches used in the analyses conducted by FedEx and the FAA. Since the ''effective length'' was longer for the tested beam due to the ineffectiveness of the stability straps, the resulting column was weaker and buckled at a lower stress than would occur on the affected airplanes.

The FAA subsequently used the same analytical techniques used in its previous analysis to confirm that the buckling strength of the beam is approximately 20 ksi based on the effective column length of 40.4 inches demonstrated by the FedEx tests. This correlates well with the stress at buckling of 18 ksi measured in the tests and confirms the validity of the FAA's analysis.

During the September 19, 1997, meeting, and at the February 18, 1998, public meeting, FedEx concurred with the FAA that the stability straps buckled during the test, and were largely ineffective, as the straps could not provide stability to the lower chord.

At the public meeting on February 18, 1998, two FedEx consultants made presentations regarding this test. Both consultants agreed that, although the test was properly performed in accordance with the test protocol, the test fixture was not representative of the airplane. As a result, one of the consultants (Dr. Foster of Auburn University) stated that it would be inappropriate to draw conclusions from this test for the airplane floor beam.

Based on the discussion above, the FAA concludes that FedEx's ''Single I Beam Test'' does not demonstrate a lower chord stress capability greater than that calculated by the FAA, or that the existing main cargo deck is in compliance with the requirements of CAR part 4b when supporting existing weight limits. The test also does not demonstrate that the FAA's finding of unsafe condition is incorrect.

3. *''On-Aircraft'' Test.* FedEx states that an ''on-aircraft'' test was conducted (Appendix 12, Report 97–052, Revision I/R, dated August 27, 1997), and that this test demonstrated that the container/airplane combination withstood an applied ''up'' load of approximately 20,000 lbs. FedEx states that this test indicates that the floor structure of the existing main cargo deck is in compliance with the requirements of CAR part 4b when supporting existing weight limits. FedEx also states in Section 6 of Report 97–051, also in Appendix 12, that a margin of safety of 2.1 was demonstrated with a 10,700-lb. container.

The FAA does not concur that this test demonstrates that the airplane is safe and in compliance with CAR part 4b. The test also does not demonstrate that the FAA's finding of unsafe condition is incorrect. The ''on-aircraft'' test consisted of FedEx's ''SAA'' or full-size container, situated on the main cargo deck of a 727, restrained vertically by the forward and aft pallet locks (attached to the floor beams), and side vertical restraints (sidelocks). The container was modified to place four ''I'' shaped beams running lengthwise through the container. Four hydraulic jacks were positioned underneath the ''I'' beams on either side of the container and attached to jacking platforms on the main deck floor. The jacks were used to apply ''up'' loads to the container, as is shown in Figure 2.1 of FedEx's Report 97–051 (Appendix 12 of FedEx's submittal to Rules Docket No. 97–NM–09–AD). To transmit the loads applied to the ''I'' beams to the container, a rigid structure made of seventy-two 4- by 4-inch thick wood beam spacers, and thirty-eight 3/4-inch thick plywood sheet formers curved at the edges to match the contour of the container, were fastened with screws to the 0.063-inch thick aluminum skin of the container. This structure, weighing approximately 1,400 lbs., provided a rigid platform for the ''I'' beams to lift the container (details of the plywood structure and its estimated weight are provided in Figure 2.3 of Report 97–051, Appendix 12).

The FAA has determined that the ''I'' beams and rigid structure used to introduce ''up'' load into the container artificially limited the distortion of the container under load and forced most of the applied load to the sidelocks and away from the floor beams. This is unconservative for the floor beams because it results in the test not representing how an actual loaded container or other ULD would affect the loads on the floor beams.

During the September 19 meeting, FedEx agreed that in the ''up'' load case, if the container is loaded and not restrained by the rigid structure, it attempts to deform to a catenary (arched) shape at the front of the container where the door is located. This effect is demonstrated by FedEx's inverted container test described in Appendix 9. FedEx also stated, however, that this would have no effect on the test results, although it was considering the use of airbags or hydraulic bags instead of the rigid structure to allow the ''SAA'' container to behave as it did in the test documented in Appendix 9. FedEx also stated in the meeting that it believed that testing to 2.5 g's, or 20,000 lbs. of ''up'' load, helps to account for the load being ''beamed'' or forced to the sidelocks.

The test results indicated that over 80 percent of the load was directed to the sidewalls of the container and, therefore, to the sidelocks rather than the floor beams. The FAA finds that this effect results from the rigid structure used to introduce the load into the container, and that this renders the test unrepresentative of the actual loading of the floor beam and significantly unconservative.

Even though the FAA determined that the results of the inverted container test (Appendix 9 of FedEx's comment) were unconservative, it showed that the percentage of the load carried by the back wall of the container was approximately three times greater than that determined by the ''on-aircraft'' test. The loads carried by the rigid back wall are largely carried by floor beam(s) locks, not the sidelocks. These results also contradict FedEx's conclusion that the ''on-aircraft'' test demonstrates that the floor structure is safe. The ''on-aircraft'' test provides confidence in the strength of FedEx's sidelocks. However, because of the artificial shifting of the loads from the floor beams to the sidelocks, the test fails to demonstrate that the floor structure is safe. Further, the ''on-aircraft'' testing to 2.5 g's did not result in the application of significant loading to the floor beams. Therefore, the results of the testing to 2.5 g's is of little significance when addressing the unsafe condition of the floor beams.

In Appendix 1 of FedEx's April 30, 1998, submission to Rules Docket No. 97–NM–09–AD during the reopened comment period, FedEx appears to now recognize the effect of the rigid plywood formers in forcing the load to the sidelocks and away from the floor beams. In this Appendix, on page 2 of the FedEx Engineering Report 98–026, Revision A, FedEx states ''Measured loads for the container perimeter latch locations indicate that 40% of the applied load was reacted on each side by the side latches (see Reference 3). This is due to the fact that the rigid formers did not allow the top of the container to deform as it would during actual conditions and thereby forced more load outboard than what would be typically encountered during flight.''

In summary, based on the previous discussion, the FAA does not concur that this test demonstrates that the airplane is safe and in compliance with CAR part 4b. The test also does not demonstrate that the FAA's finding of unsafe condition is incorrect. One commenter states that he participated in FedEx's ''on-aircraft'' test. He states that the data from the latch load cells were inconclusive for the tests, and although he considered the test to be a reasonable representation of airplane conditions, he suggests that FedEx improve the latch load cell installation and data acquisition system and investigate whether the plywood formers used to apply the test load to the container roof could influence the latch load distribution. As discussed previously, the FAA does not concur that the ''on-aircraft'' test was representative of the airplane, but concurs that the plywood formers influenced the load distribution.

First Container Facing Aft

Two commenters state that positioning the first container aft of the 9g cargo barrier with the door facing forward is not optimum from a crashworthiness perspective and request that the AD specify that this container be facing aft instead. The FAA concurs. Paragraphs (a) and (b) of the final rule have been revised to allow the first container aft of the bulkhead to face aft, with all other containers facing forward.

Increased Running Load

One commenter states that the following statement in the NPRM is factually inaccurate: ''This running load of 90 pounds per inch is a safety concern, as it is approximately 2.6 times higher than the maximum running load of 34.5 pounds per inch allowed on these same floor beams when the airplane was in a passenger configuration.'' The commenter states that in a negative gust (''up'' load) situation the passenger floor beams must act to restrain upper deck loads and lower deck cargo loads simultaneously and, as a result, must react 81.0-lbs. per inch, not just the 34.5 figure as the NPRM indicates. The commenter maintains that if reduced loads are necessary to maintain the safety of cargo airplanes, then passenger airplanes should be similarly restricted.

The FAA does not concur that the passenger and cargo airplanes present similar safety concerns. The NPRM statement quoted by the commenter appeared in the section of the NPRM that described the FAA's reasons for undertaking the detailed design review which led to the conclusion that there is an unsafe condition. The statement in the NPRM is factually accurate for the running loads and the ''down'' load case and contributed to the FAA's concern with the strength of an unreinforced cargo floor.

The FAA subsequently determined that the ''up'' load case is the most likely critical case. The FAA agrees that, for the ''up'' load case, the running load figures identified in the comment are accurate. However, the passenger compartment is designed to uniformly distribute passenger loads such that every floor beam is active in carrying these loads. In contrast, the freighter floor loads are applied differently. Instead of the main deck loads being applied uniformly, each 88-inch deep container spans several floor beams. As discussed previously, the result of this is that only floor beams located at the edges of containers are active in carrying the ''up'' loads. Hence, as the FAA determined in its detailed design review, the effect on the airplane is that the 90 lbs. per inch cargo container loading is much more critical than the uniformly applied upper and lower deck loads of the passenger configuration and is, in fact, a safety concern.

One commenter states that the interim weight reduction is too restrictive considering that the passenger 727 can carry in excess of 6,800 lbs. in the same zone. The 3,000-lb. limitation imposed in the NPRM is unjustified. The FAA does not concur. As discussed previously, the loading on the floor is significantly different depending on whether it is loaded by the carriage of passengers or containers. The 3,000-lb. limitation specified for the carriage of cargo in the NPRM is justified by the FAA's analysis provided in the Rules Dockets.

Netted Lower Lobe Cargo

One commenter states that if the lower lobe cargo is assumed to be netted (restrained), it would not have any relevance in a down gust situation. The FAA infers that the commenter believes that, as the cargo would be restrained to the belly of the airplane, it would not load the underside of the floor beams in a negative ''g'' environment due to a down gust.

Another commenter states that the NPRM should be changed to allow lower lobe weights to be subtracted from the main deck limits if the load is properly tied down. The FAA concurs partially. If the lower lobe cargo is properly tied down, it will be restrained by the structure differently than represented in the FAA analysis. While the FAA is not currently aware of configurations that restrain lower lobe cargo, paragraphs (f) and (g) of this AD allow for approval of this type of configuration as an alternative method of compliance with the final rule.

Airplane Weight Increases

One commenter states that the FAA should reconsider the present policy of withholding approval of maximum take-off weight (MTOW) and maximum landing weight (MLW) increases for 727 freighter modified airplanes. The rationale for this is that the resulting higher weights would allow greater fuel loads for remote region operators, and also would increase the safety margin of the airplane's modified fuselage structure, which is the FAA's prime concern addressed by the NPRM's. The FAA infers that the commenter believes that the proposed AD should be changed to reflect this.

The FAA concurs partially. The FAA concurs that maintaining a minimum in-flight weight reduces the loads resulting from vertical gusts, unless this additional weight is carried in body fuel tanks that are suspended from floor beams. Additional loads to the floor beams exacerbate the unsafe condition. This issue is addressed appropriately in the context of type certification and is not addressed in this AD. Therefore, the FAA has determined that no change to the final rule is necessary.

Operators' Ability To Determine Container CG's

One commenter states that there is no means to measure or comply with the requirement that the container cg's be within +/−10 percent of the geometric center of the container. Two commenters state that the wording in the proposed AD should be changed to allow those operators having a loading procedure that maintains the container cg within +/−10 percent to be considered compliant with this requirement. The FAA does not concur that the cg of the container cannot be determined, or that the requirement to maintain the cg within 10 percent of the horizontal cg cannot be complied with. For example, FedEx has recently acquired equipment for this purpose. Because the cg location within the container has a major effect on the loads imposed on the floor beams, the FAA considers that this limitation is necessary to address the unsafe condition. It should be noted that the vast majority of cargo containers are certificated to TSO C90c, which specifies a maximum cg shift of 10 percent. Therefore, operators should always have been ensuring that the cg shift did not exceed this limitation in the TSO.

One commenter submitted data to the Rules Dockets that the commenter states will allow an operator with a properly designed or modified scale to accurately determine, display, and record the container cg. The FAA did not evaluate the technical accuracy of the submission, as no change to the proposed AD was requested by the commenter.

Airplanes With Apparent Increased Floor Capability

One commenter states that one of its 727–200 airplanes has a greater running load allowable than its other two airplanes (37.5 lbs. per running inch versus 34 lbs. per running inch) and asks why this airplane is limited by the same restriction.

The FAA infers that the commenter believes that its airplane should have higher allowable container loads, based on this apparent increased capability, and that the AD should be changed to reflect this. The FAA does not concur. From its analysis, the design review team determined that the 727 main cargo decks are capable of supporting a maximum payload of approximately 3,000 lbs. per container. Paragraphs (f) and (g) of the AD allow for an applicant to propose new payloads along with substantiating data and analysis. No change to the final rule is necessary.

Inconsistent Limitations

One commenter states that the FAA's determination that these airplanes are capable of supporting only 3,000 lbs. per container is entirely inconsistent with the FAA's interim proposal, which would allow an 8,000-lb. pallet in any position where the entire load would be carried by one set of container locks. The commenter does not see any rational or consistent approach in the NPRM's. The FAA does not concur. The analysis that resulted in the 3,000 lb. per container limit was based on the current operational limits of the airplane. As discussed in the NPRM, the FAA determined that, if more restrictive operational limits are imposed, a higher payload could be allowed on an interim basis. The FAA has estimated that the airplane gust loads will be reduced with limitations on in-flight weight and maximum operating airspeed to the extent that the 3,000 lbs. limit per container can be raised to 4,000 lbs. for the interim period.

For the ''up'' load case, two 4,000-lb. containers placed back-to-back, without side vertical restraints, impose approximately the same amount of load on the floor structure as a single 8,000-lb. container with the adjacent cargo positions carrying no payload. Because of this, for the interim period, the operator would have the flexibility to carry an 8,000-lb. container, provided the containers on either side are empty.

If side vertical restraints acceptable to the FAA are installed, then the interim payload is not to exceed a total weight of 9,600 lbs. for any two adjacent containers. In this case, as stated in paragraph (b) of the AD, the 8,000-lb. limit per container would still apply. Many of the different containers and flat pallets or ''cookie sheets'' used by operators require side vertical restraints, as specified in TSO C90c.

Irrelevancy of Model 747 Problems

One commenter states that the FAA only proposed payload reduction because of the incidents occurring on 747's, but the FAA has no reason to believe the problems found on the 747's will occur on the 727's. The FAA does not concur. The FAA did, in fact, look into the 727 conversions because those conversions had been performed by some of the same companies and with similar procedures and design methods as some 747's which had been found to be unsafe. The unsafe condition that is the subject of this AD, however, is specific to the 727 and has been documented in the Rules Dockets.

Applicability of 14 CFR 25.1529

One commenter states that the NPRM statement indicating that STC holders are required to issue Instructions for Continued Airworthiness in accordance with 14 CFR 25.1529 does not apply to its STC's because the applicable airworthiness standards for the 727 are CAR part 4b, rather than 14 CFR part 25. The FAA does not concur. Since January 28, 1981, 14 CFR 21.50(b) has required that the holder of an STC for which application was made after that date shall furnish the Instructions for Continued Airworthiness prepared in accordance with 14 CFR 25.1529. This requirement is effective regardless of the specific certification basis of the airplane.

Fatigue Cracks as Evidence of Unsafe Condition

FedEx states that, if the FAA's report of huge negative margins of safety at ultimate load are true, then the ''typical daily operating conditions would still impose substantial loads on the structure,'' and result in wear and cracking of the floor structure. FedEx's review of the FAA service difficulty report data generated only two reports of cracks on the converted 727 freighters, and no other damage was found that could be attributed to the 727 cargo conversion modification.

The FAA does not concur that a low number of in-service difficulty reports indicates that the FAA's finding of unsafe condition is unfounded. FedEx has reported that its average cargo load density is approximately 7.5 lbs. per cubic foot, which equates to an average cargo payload of approximately 3,300 lbs. per container. This results in stress levels that on average would be similar to those of a passenger 727. Therefore, it is not expected that fatigue cracks would develop in only 11,008 total flight cycles, which is the highest number of cycles accumulated (as of August 27, 1998) by any FedEx 727 airplane since conversion to a freighter configuration. As discussed previously, the unsafe condition addressed in these AD's is not a result of fatigue, but is the result of the existing floor structure not being able to support the allowable payloads and distributions for the critical gust conditions.

Data Showing Floors To Be Safe

FedEx states that the NPRM is inaccurate in stating that the FAA design review team was unable to find any data which showed that the floors were safe for the heavier (than passenger loading) freight payloads. FedEx states that the FAA has received and accepted data verifying the safety of the floor structure. FedEx also states that the FAA has failed to provide ''reasoned explanation'' for not approving various documents.

The FAA does not concur. In performing its own analysis, the FAA was careful to use only methodologies that were commonly employed in industry. One of the ways that the reasonableness of the FAA analysis contained in the Rules Dockets was checked was to compare the results with results of the STC holders' analyses, where possible. In this case, several analysis documents (Dee Howard Reports R90–2, R90–4, and R90–6) were used by FedEx to analyze the main deck floor beams in support of its STC for half-size containers (SA7447SW). However, these documents do not ''verify that the unreinforced floor structure of the main cargo deck can safely support the heavier freighter payloads.'' Also, they do not address all of the critical load cases or configurations, nor do they address the effect of cg shifts.

Recognizing these limitations, the FAA used FedEx's methodology to verify that the FAA analysis yielded similar results for a similar load case. In doing this, the FAA used the load case which placed ''down'' loads on the containers, as provided in FedEx's analysis, as its analysis did not contain an ''up'' load case (as required by CAR part 4b standards). Using the applied loads from FedEx's ''down'' load case, the FAA calculated the margins of safety for the floor beams using the FAA's documented methodology. The results for the mid-span of the floor beam matched very closely to those documented in FedEx's STC analysis for the half-size containers, which verifies that the FAA's and FedEx's analytical methodologies were quite similar for the same load case.

However, because FedEx's (Dee Howard) documents do not address all the critical load cases, locations on the floor beam, or configurations, nor do they address the effects of cg shifts, they do not ''verify the safety of the floor structure.''

In addition, of the ten documents related to the floor beam analysis testing that FedEx submitted in its comments, three documents (Appendices 1, 2, and 3) describe analytical methodologies and do not (and are not intended to) ''show the floor structure can safely support the heavier payloads.'' Regarding the decompression methodology document submitted in Appendix 3, FedEx acknowledged at the September 19, 1997, meeting that it had not yet revised the document following comments received from the FAA at a meeting held between FedEx and the FAA on July 24, 1997.

Three other documents (Appendices 4, 8, and 9) are test plans or results that have been discussed previously and also do not ''show the floor structure can safely support the heavier payloads.''

The two external loads documents (Appendices 5 and 6) have been approved by the FAA prior to FedEx's comment submittal (FAA letter 97–120S–534, dated August 21, 1997) and are considered appropriate as a starting point for an analysis of the floor structure. However, these documents by themselves do not ''verify the safety of the floor structure.''

Appendix 12 includes a document containing an incomplete analysis of one floor beam, a test report which was discussed previously, and two videotapes of that test, none of which ''verify the safety of the floor structure.'' Finally, FedEx's Document ER 97–035 I/R, dated July 20, 1997 (Appendix 7), which was approved by FedEx on August 13, 1997, had not been submitted to the FAA prior to its inclusion in FedEx's comment submittal. In reviewing this document, the FAA has determined that because the area addressed is shorter than an 88-inch container, this document alone does not substantiate higher container loads. The floor under the rest of the container also would need to be substantiated to warrant a change to the AD limits.

The FAA does not concur that it has received and accepted data verifying the safety of the floor structure, or that the FAA design review team was in possession of any data which showed that the floors were safe for the heavier (than passenger loading) freight payloads. Finally, the FAA does not concur that it has failed to provide FedEx with a ''reasoned explanation'' for not approving various documents. FedEx is aware of the current status of all the above mentioned documents.

FedEx also states that a Boeing letter (Appendix 41) indicated that the floor beams were safe for a passenger to freighter airplane conversion at (container) weights of 8,000 lbs. The FAA does not concur. The referenced letter was part of an initial budget quote for a zero fuel weight increase that estimated potential weight increases that might be applicable to airplanes converted from passenger to freighter configurations. Simplifying assumptions were used by Boeing in order to allow FedEx to quickly establish, as a rough approximation, the financial feasibility of converting an airplane. Any necessary changes to the floor beams in estimating the weight of the airplane following conversion were not addressed.

FedEx's Finite Element Model

FedEx states that the FAA misused FedEx's finite element model (contained in Engineering Report 8504), which identifies negative margins of safety in the fuselage monocoque, to substantiate its finding of unsafe condition. FedEx also states that the NPRM was inaccurate in stating that the report was used for certification. The FAA does not concur. The FAA did not use FedEx's Engineering Report 8504 to validate its analysis. Rather, as discussed previously, the FAA used the floor beam analysis documents submitted as part of the substantiation for FedEx's STC for half-size containers (SA7447SW) to validate its analysis. The NPRM did state that the original STC certification data contained documented negative margins of safety. The FAA does not concur that this statement is incorrect. At the meeting held September 19, 1997, FedEx stated that the document was used to support original STC issuance, and that no other document was submitted.

Critical Loading on Floor Beams

FedEx states that, contrary to a statement in the NPRM, the FAA has not established that floor beams at the forward and aft edges of the container are more critically loaded. In its August 28, 1997, submittal to Rules Docket No. 97–NM–09–AD, FedEx cited its ''on-aircraft'' test as proof that the sidelocks are more critically loaded. FedEx appears to have mistakenly inferred that this statement addresses the effectiveness of FedEx's sidelocks. This inference is incorrect. In context, this statement simply points out that, for the ''up'' load case, ''the floor beams at the forward or aft edges of the containers would be more critically loaded'' than the floor beams under the center of the container. The reason for this is that a full-size container is restrained against vertical movement by the container locks attached to the floor beams at container edges and there are no container locks in the center of the container.

Communications With FAA

FedEx's comments included a number of disagreements with documentation of various communications prepared by the FAA and placed in Rules Docket No. 97–NM–09–AD. Because these comments do not relate to the merits of this AD, they are not addressed in this final rule. However, the FAA has provided a response to these comments in that Rules Docket.

Interim Limitations Already Observed

One commenter states that the interim operating limitations are not necessary because the commenter does not know of a 727 freighter STC that allows operation higher than 350 knots indicated airspeed (KIAS) and, for practical reasons, 727–200 airplanes almost never operate at weights below 100,000 lbs. The FAA does not concur. While many of the affected airplanes are subject to a maximum operational speed limitation of approximately 350 KIAS, other affected airplanes are not subject to such limitations and do operate at higher speeds. In addition, while operation at weights below 100,000 lbs. is not likely for most 727–200 converted freighters, such operation is permitted and may occur. Such operation is even more likely for the lighter weight 727–100, which also is subject to this AD.

Alternatives to Limitations in the AD

Several commenters asked about alternatives to the proposed rule and suggested increased inspections, such as those in other AD's. The FAA does not concur. The unsafe condition identified in the AD is not based on loads imposed on the floor structure on an average flight (i.e., fatigue-type loading). The unsafe condition is caused by loads experienced on the airplane due to a large gust while carrying certain cargo payloads and distributions. In this case, a floor beam failure or excessive deflection would likely result in the loss of the airplane. Because such a failure would not necessarily be preceded by cracking, inspections of the airplane would not prevent the failure. The only means for preventing a catastrophic event is to limit the flight operation of the airplane and/or the container payloads.

One commenter proposes a statistical approach to study the unsafe condition by requiring certain inspections over the next year while imposing certain operational limitations. The FAA does not concur. Because the unsafe condition is a collapse of the floor caused by large gusts, increased inspections in the areas of concern will not serve to lessen the likelihood of loss of the airplane.

One commenter proposes that the FAA revise the proposed AD to further limit the maximum operational speed to 280 KIAS as an alternative to payload limitations. The FAA does not concur with the commenter's proposal to reduce the maximum operational speed to 280 KIAS. Reducing the maximum operational speed levels below 350

KIAS does reduce the gust loads on the airplane. However, speed restrictions below 350 KIAS that permit safe operation of the airplane do not affect the maneuver loads, which at these speeds become more critical than the gust loads.

''Mode B''

One commenter requests that, for the interim limitations, the FAA also allows operation at ''Mode B'' [350 knots equivalent airspeed (KEAS)] for the maximum operating airspeed (Vmo). The commenter states that operations at ''Mode B'' would be more convenient than the 350 KIAS limitation specified in the proposed AD. The FAA concurs. The FAA has revised the interim limitations of the final rule accordingly.

Release of Proprietary Data

Several commenters state that the FAA must divulge all data used to make its finding of an unsafe condition and cited various legal cases.

The FAA infers that commenters are insisting that the FAA release relevant proprietary data that was considered by the FAA during this rulemaking. The FAA does not concur for two reasons. First, the Trade Secret Act (18 U.S.C. 1905) prohibits the disclosure of such data, and this prohibition is not overridden by the requirements of the Administrative Procedure Act (APA). The cases cited by the commenters, while generally stating that agencies must release all information on which they rely during rulemaking, do not address the prohibition against the release of trade secret data.

Because AD's address unsafe conditions associated with aeronautical products, the FAA routinely evaluates proprietary design data in determining whether AD's are necessary. In determining whether such material should be placed in the Rules Docket, the FAA applies the standards developed under the Freedom of Information Act (FOIA; 5 U.S.C. 552) in the application of Exemption 4 [§ 552(B)(4)], which protects ''trade secrets and commercial or financial information obtained from a person and privileged or confidential.'' If data are determined to meet those standards, they are not placed in the Rules Docket, but are retained in separate files that are not released to the public. Apart from violation of the Trade Secret Act, if the FAA were to release such data, it would be much more difficult for the FAA to obtain the data on which its findings of unsafe conditions are necessarily based.

Second, the APA generally has been interpreted as requiring that agencies provide the public with a meaningful opportunity to comment on proposed rules. In this rulemaking, the FAA has fully complied with this requirement, even without releasing trade secret data. In developing the NPRM, the FAA used proprietary Boeing loads data in its analysis, from which the FAA identified the existence of the unsafe condition. Although Boeing has not consented to releasing these data, FedEx has submitted comparable loads data (discussed previously under the heading, ''Extension of Interim Operational Period'') which, when used in the FAA analysis (which has been placed in the Rules Dockets), also demonstrate the existence of the unsafe condition. FedEx did consent to the release of these data. In fact, at the first public meeting on February 18, 1998, the FAA used these data in its presentation explaining its analysis. The analysis and the presentation are fully documented in the Rules Dockets, and have been available for review by commenters. The FAA also has referenced other proprietary data, which have been submitted by applicants seeking approval for modifications to correct the unsafe condition, as confirming the FAA's analysis. Although these data are relevant to the rulemaking, they do not provide the basis for the FAA's action, and their release would not significantly increase the meaningfulness of the public's opportunity to comment on the FAA's proposal.

One commenter requests copies of three recently updated Boeing computer programs which it believes were utilized by the FAA in determining the container payload limits specified in the NPRM. The commenter states that those programs are entitled: (1) ''Vertical Gust Load Factors 'Gs;'' (2) ''727 Movement (sic) of Inertia Model;'' and (3) ''Operating Empty Weight Plus Payload Distribution.'' The FAA is not aware of the referenced programs, does not have them, and did not use them in its analysis.

Economic Analysis

Several commenters state that the FAA underestimated the cost to modify the airplane floor structure into compliance to CAR part 4b, citing a Pemco estimate of $400,000, as opposed to the $100,000 estimate contained in the NPRM. Several commenters also state that the FAA had underestimated (1) the loss in revenue due to the reduced allowable payloads, and (2) the amount of time necessary to get all airplanes modified due to the short 120-day interim period, a lack of FAA-approved fixes, and the limited availability of facilities to install the modifications within the 120-day period proposed by the NPRM.

The FAA concurs. The FAA used data supplied by industry to conduct its cost and regulatory flexibility analysis used in the NPRM and has considered the data supplied by commenters during the comment period to conduct the cost and regulatory flexibility analysis used for the final rule.

Cost-Benefit Analysis

One commenter states that the FAA must undertake a thorough cost-benefit analysis and economic impact assessment in conjunction with its consideration of the remedial actions at issue in this rulemaking. The commenter states that the FAA has thus far failed to conduct an adequate cost-benefit analysis. The commenter states that a cost-benefit analysis and economic impact assessment are required by the provisions of the Regulatory Flexibility Act.

The FAA does not concur. As discussed below under the heading ''Regulatory Evaluation Summary,'' the FAA has performed an extensive analysis of the costs and benefits of this AD and has fulfilled the requirements of the Regulatory Flexibility Act.

Combi Airplanes

One commenter states that the NPRM has not considered those operators that operate airplanes in a combi mode (a combi airplane has provisions for passengers and cargo on the main deck in separate compartments). The commenter also states that it assumes that the load restrictions would not apply to the floor structure which is used to carry passengers and that the original manufacturer's limitations are applicable. The FAA concurs. Although the commenter is correct with respect to floor structure carrying passengers, combi airplanes transporting containers on the main deck must be in compliance with the limitations specified in this AD.

Applicability of Proposal

FedEx points out that the wording of the applicability in the AD could easily be misconstrued as also applying to airplanes manufactured as freighters by the original equipment manufacturer. The FAA concurs and has revised the applicability of the final rule to read ''Model 727 series airplanes that have been converted from a passenger to a cargo-carrying (''freighter'') configuration in accordance with Supplemental Type Certificate SA1444SO, SA1509SO, SA1543SO, SA1896SO, SA1740SO, or SA1667SO; certificated in any category.''

Other Cargo Lock Devices

One commenter requests that the proposed AD be revised to add a paragraph discussing a ''special load-alleviating cargo container lock'' for which the commenter has applied for an STC at the FAA, Los Angeles ACO. The commenter reports that this lock will allow for the carriage of 16,000 lbs. rather than 8,000 lbs. in two adjacent containers, as specified in the proposed AD, but to be conservative, the commenter requests that the rule allow 12,000 lbs. for two adjacent containers for the interim period. During the reopened comment period, this commenter submitted additional information in support of its original comment.

The FAA does not concur. The information submitted is not sufficient to substantiate the safety of the airplane with the locks installed. This lock is the subject of an STC application and is not currently FAA-approved. Paragraphs (f) and (g) of the AD provide for approval of alternative methods of compliance to address potentially alleviating devices for the unsafe condition. The commenter may obtain such an approval upon submission of data substantiating that the referenced device provides an acceptable level of safety. Therefore, no change to the final rule is necessary.

''Fine Tune'' the AD

The CAA and others request that the AD should be ''fine tuned'' after issuance, as new data become available. The FAA does not concur that ''fine tuning'' of the AD is necessary. Paragraphs (f) and (g) of the AD allow for approval of alternative methods of addressing the unsafe condition when substantiated properly. As with any AD, if new information indicates that changes to the AD itself are needed, the FAA has the authority to revise or supersede this AD.

Request for Clarification

One commenter requests clarification of the procedures that will be used to obtain future FAA approvals with respect to this rulemaking and to inform the public of those approvals.

As stated in the final rule, all submissions should be made to the Atlanta ACO. The Transport Airplane Directorate has established a team consisting of members from several ACO's to review all requests in accordance with paragraphs (f) and (g) of this AD. In all other respects, the process for approvals under this AD will be similar to that followed for all AD's. For example, in order to protect applicants' proprietary data, the FAA will notify only the applicant for an approval of the FAA's decision; while the FAA will disclose whether approvals have been granted, requests for approved data would be handled under normal FOIA procedures.

Other Safety Improvements

One commenter states that, because this AD will necessitate large expenditures and does not address an unsafe condition, requiring compliance with it will prevent the affected airlines from adopting other less costly and more effective safety enhancements, such as updating flight deck equipment. The FAA does not concur. As discussed previously, this AD addresses a serious unsafe condition. Although correcting this condition may be expensive, the FAA has determined that it must be corrected to ensure an acceptable level of safety.

Petitions for Reconsideration

In addition to their comments, several commenters also filed ''Petitions for Reconsideration'' in accordance with 14 CFR 11.93. Because these petitions were filed prematurely, the FAA considered them as comments to the Rules Docket. However, because the substance of the petitions is repetitious of the more extensive comments submitted by FedEx and others discussed above, the petitions are not discussed separately in this final rule.

Explanation of Change of Aircraft Certification Office Contact

The FAA has changed the point of contact for obtaining further information, for obtaining FAA approval of certain actions, and for submitting substantiating data and analyses in accordance with the provisions of this AD, due to relocation of certain STC holders.

Conclusion

After careful review of the available data, including the comments noted above, the FAA has determined that air safety and the public interest require the adoption of the rule with the changes previously described. The FAA has determined that these changes will neither increase the economic burden on any operator nor increase the scope of the AD.

Participation at the Public Meeting on the Final Rule

Requests from persons who wish to present oral statements at the public meeting should be received by the FAA no later than 5 days prior to the meeting. Such requests should be submitted to Mike Zielinski as listed in the section titled FOR FURTHER INFORMATION CONTACT above, and should include a written summary of oral remarks to be presented, and an estimate of time needed for the presentation. Requests received after the date specified above will be scheduled if there is time available during the meeting; however, the names of those individuals may not appear on the written agenda. The FAA will prepare an agenda of speakers that will be available at the meeting. To accommodate as many speakers as possible, the amount of time allocated to each speaker may be less than the amount of time requested. Those persons desiring to have available audiovisual equipment should notify the FAA when requesting to be placed on the agenda.

Purpose of Public Meeting

Because of the high degree of public interest in this AD, the FAA has scheduled a public meeting to discuss its content and issues relating to compliance. The FAA's objective is to ensure that all affected operators and design approval holders have a full understanding of the issues addressed in the AD and of the actions necessary to comply with it. The FAA anticipates that, following this meeting, there will continue to be extensive discussions between the affected parties and the FAA for the purpose of identifying and implementing the most timely and cost-effective means to eliminate the unsafe condition addressed in this AD.

Public Meeting Procedures

Persons who plan to attend the public meeting should be aware of the following procedures that have been established for this meeting:

1. There will be no admission fee or other charge to attend or to participate in the public meeting. The meeting will be open to all persons who have requested in advance to present statements, or who register on the day of the meeting (between 8:30 a.m. and 9:00 a.m.) subject to availability of space in the meeting room.

2. Representatives from the FAA will conduct the public meeting. A technical panel of FAA experts will be established to discuss information presented by participants.

3. The FAA will try to accommodate all speakers; therefore, it may be necessary to limit the time available for an individual or group. If necessary, the public meeting may be extended to evenings or additional days. If practicable, the meeting may be

accelerated to enable adjournment in less than the time scheduled.

4. Sign and oral interpretation can be made available at the public meeting, as well assistive listening device, if requested 5 calendar days before the meeting.

5. The public meeting will be recorded by a court reporter. Any person who is interested in purchasing a copy of the transcript should contact the court reporter directly. This information will be available at the meeting.

6. The FAA requests that persons participating in the public meeting provide 10 copies of all materials to be presented for distribution to the panel members; other copies may be provided to the audience at the discretion of the participant.

Regulatory Evaluation Summary

The regulations adopted herein will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this final rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

The FAA conducted a Cost Analysis and Final Regulatory Flexibility Analysis to determine the regulatory impacts of this and three other AD's to operators of all 244 U.S.-registered Boeing Model 727 passenger airplanes that have been converted to cargo-carrying configurations under 10 STC's held by four companies. This analysis is included in the Rules Docket for each AD. The FAA has determined that approximately 6 727–100's and 45 727–200's operated by 10 carriers were converted under Pemco STC's. (There were 15 727's for which the FAA could not identify the STC holder. It is possible that these airplanes were also converted under a Pemco STC. Their costs are not included here.)

Assuming that the operators of affected airplanes converted under Pemco STC's will comply with the restricted interim operating conditions set forth in the AD, the FAA estimates that operators will not lose revenues during the 28-month interim period after the effective date of the AD. During the interim period, these airplanes will be limited to a total of 8,000 lbs. per pair of adjacent containers (a total of 36,000 to 48,000 lbs., depending on the number of pallets) because none of the Pemco-converted 727's have approved side restraints. Assuming typical payloads ranging from 34,835 lbs. for a 727–100 with nine pallets to 47,820 lbs. for a 727–200 with 12 pallets, none of the operators of Pemco-converted airplanes will lose revenues during this interim period.

The Cost Analysis and Final Regulatory Flexibility Analysis, completed by the FAA and included in the Rules Dockets, estimates that affected airplanes can be modified at a cost of $385,000 per airplane to carry the maximum payloads currently allowed, or a total of $19.6 million for the 51 Pemco 727's. The FAA expects that operators will modify their airplanes during the 28-month interim period, scheduling the modifications to coincide with periodic maintenance. A modification will require that the airplane be removed from service for a period of 17 days; the FAA conservatively estimates that scheduling a modification during periodic maintenance will reduce the net time out of service by two days. The FAA estimates the lost revenue during this 15-day period will be $14,829 per 727–100 and $23,405 per 727–200. The total down-time lost revenue for the 10 operators will be $17.1 million. This estimate conservatively assumes that cargo is not shifted from airplanes being modified to other airplanes. Such cargo shifting is typical industry practice and would reduce the costs attributable to lost revenues. Incremental fuel costs to carry the additional weight of the floor modification will be $211,000 over the 28-month period, as airplanes are modified. When all Pemco 727's are modified, additional fuel costs will be about $15,000 per month.

The total cost, therefore, to modify the fleet of affected 727's that were originally modified to the Pemco STC's, including lost revenues while the airplanes are out of service plus the modification cost, is $37.0 million, or $33.8 million discounted at seven percent.

The Regulatory Flexibility Act of 1980 (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), was enacted by Congress to ensure that small entities are not unnecessarily or disproportionately burdened by government regulations. The RFA requires a Regulatory Flexibility Analysis if a rule would have a significant economic impact, either detrimental or beneficial, on a substantial number of small entities. The purpose of this analysis is to ensure that the agency has considered all reasonable regulatory alternatives that will minimize the rule's economic burdens for affected small entities, while achieving its safety objectives. Under section 63(b) of the RFA, the analysis must address:

1. Reasons why the agency is promulgating the rule;

2. The objectives and legal basis for the rule;

3. The kind and number of small entities to which the rule will apply;

4. The projected reporting, recordkeeping, and other compliance requirements of the rule; and

5. All federal rules that may duplicate, overlap, or conflict with the rule. These elements of the RFA are addressed below:

A. Reasons Why the Agency is Promulgating the Rule

The FAA has determined that unreinforced floor structure of the main cargo deck of converted 727's is not strong enough to enable the airplane to safely carry the maximum payload that is currently allowed in this area. The actions specified in this AD are intended to prevent failure of the floor structure, which could lead to loss of the airplane.

B. Statement of Objective and Legal Basis

Under the United States Code (U.S.C.), the FAA Administrator is required to consider the following matter, among others, as being in the public interest: assigning, maintaining, and enhancing safety and security as the highest priorities in air commerce. [See 49 U.S.C. § 44101(d).] Accordingly, this AD amends Title 14 of the CFR's to require operators of Boeing 727 airplanes that have been converted from a passenger to a cargo-carrying (''freighter'') configuration to comply with certain payload limitations, substantiate data showing other acceptable limits, or show an alternative method of compliance (AMOC).

C. Regulatory Flexibility Determination

Under the RFA, the FAA must determine whether or not a rule significantly affects a substantial number of small entities. This determination is typically based on small entity size and cost thresholds that vary depending on the affected industry. The entities affected by this rule are those 10 carriers operating the 51 U.S.-registered converted Boeing 727 airplanes that have been converted under Pemco's STC's. Many of these carriers may be small. Therefore, the FAA has prepared an analysis of cost impacts and has examined possible regulatory alternatives.

D. Projected Reporting, Recordkeeping, and Other Compliance Requirements

With two minor exceptions, the rule will not mandate additional reporting or recordkeeping. First, there will be a negligible one-time cost to operators to revise their AFM's and Supplements. Second, operators will be required to keep records of the modifications to their airplanes. This requirement is common to all maintenance, preventive maintenance, and alterations under § 91.417, Maintenance records.

E. Overlapping, Duplicative, or Conflicting Federal Rules

The rule will not overlap, duplicate, or conflict with existing Federal rules.

F. Analysis of Alternatives

This AD will impose a financial requirement on small entities that operate 727's that were converted under Pemco STC's. The FAA examined potential alternatives to the AD's requirements to minimize the rule's economic burden for small entities while achieving its safety objectives. The alternatives are:

- Exclude small entities;
- Extend the compliance deadline for small entities; and
- Establish higher payload limits for small entities.

The FAA has determined that the option to exclude small entities from the requirements of the rule is not justified. The unsafe condition that exists on an affected 727 operated by a small entity is as potentially catastrophic as that on an affected 727 operated by a large entity. In fact, the average payloads carried by small entities may exceed the average payloads carried by large operators, resulting in a higher probability of a catastrophic event.

The FAA also considered options to extend the compliance period for small operators. The proposed rule established a final compliance date of 120 days after the effective date of the rule. During this 120-day period, operators could comply with interim operating conditions that would enable them to carry higher payloads than those permitted after that interim period. When the proposed rule was published, the FAA had information that indicated that a portion of the engineering data from an FAA-approved STC for a floor modification that could be used as an AMOC would be available within a few months of the proposed rule's publication. In addition, the FAA estimated that operators would be able to modify their airplanes within the 120-day interim period.

Hamilton Aviation has received letters of approval for work towards obtaining an STC for strengthening the floor beams aft of Station 700 and expects to be able to submit additional data in the Fall of 1998 that will provide the basis for an STC for the entire floor. Pemco World Air Services expects to be able to use Hamilton's engineering tools to modify the floors of the 727's it has converted. The FAA is confident, therefore, that there will be AMOC's for operators of all affected airplanes when this final rule is published.

Several commenters to the Rules Dockets for the proposed AD's rejected the FAA's claim that their airplanes could be modified within the 120-day interim period. Their arguments were based on the unavailability of an approved STC that could be used as an AMOC (or, at that time, even letters of approval toward an STC). Operators also stated that modification of all 244 U.S.-registered airplanes would be impossible within a 120-day time frame.

The FAA agrees 120 days is unrealistic and would have severe economic consequences because operators would be required to reduce their payloads substantially at the end of the interim period. In the final rule, therefore, the FAA extends the interim period to 28 months. This will permit operators time to modify their airplanes during regularly scheduled maintenance, minimizing down time and associated lost revenues. This change will be especially beneficial to small entities that may find it difficult to find alternative means of carrying cargo.

Finally, the FAA rejects the compliance alternative that would reduce payloads from those currently required but would establish higher payload limits than those for larger entities. This alternative is unacceptable because the unsafe condition is dependent on the size of the payload, not the size of the entity. The FAA cannot permit a small entity to operate under an unsafe condition.

Title II of the Unfunded Mandates Reform Act of 1995 (the Act), enacted as Pub. L. 104–4 on March 22, 1995, requires each Federal agency, to the extent permitted by law, to prepare a written assessment of the effects of any Federal mandate in a proposed or final agency rule that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more (adjusted annually for inflation) in any one year. Section 204(a) of the Act, 2 U.S.C. 1534(a), requires the Federal agency to develop an effective process to permit timely input by elected officers (or their designees) of State, local, and tribal governments on a proposed "significant intergovernmental mandate." A "significant intergovernmental mandate" under the Act is any provision in a Federal agency regulation that would impose an enforceable duty upon State, local, and tribal governments, in the aggregate, of $100 million (adjusted annually for inflation) in any one year. Section 203 of the Act, 2 U.S.C. 1533, which supplements section 204(a), provides that before establishing any regulatory requirements that might significantly or uniquely affect small governments, the agency shall have developed a plan that, among other things, provides for notice to potentially affected small governments, if any, and for a meaningful and timely opportunity to provide input in the development of regulatory proposals.

This AD does not contain any Federal intergovernmental or private sector mandate. Therefore, the requirements of Title II of the Unfunded Mandates Reform Act of 1995 do not apply.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Safety.

Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me by the Administrator, the Federal Aviation Administration amends part 39 of the Federal Aviation Regulations (14 CFR part 39) as follows:

PART 39—AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

2. Section 39.13 is amended by adding the following new airworthiness directive:

98–26–21 Boeing: Amendment 39–10964. Docket 97–NM–81–AD.

Applicability: Model 727 series airplanes that have been converted from a passenger to a cargo-carrying ("freighter") configuration in accordance with Supplemental Type Certificate SA1444SO, SA1509SO, SA1543SO, SA1896SO, SA1740SO, or SA1667SO; certificated in any category.

Note 1: This AD applies to each airplane identified in the preceding applicability provision, regardless of whether it has been otherwise modified, altered, or repaired in the area subject to the requirements of this AD. For airplanes that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must request approval for an alternative method of compliance in accordance with paragraph (g) of this AD. The request should include an assessment of the effect of the modification, alteration, or repair on the unsafe condition addressed by this AD; and, if the unsafe condition has not been eliminated, the request should include specific proposed actions to address it.

Compliance: Required as indicated, unless accomplished previously.

Note 2: The payload limitations specified in this AD are in addition to payload limitations that are otherwise applicable and do not allow for increases in payloads beyond those specified in such limitations.

To prevent structural failure of the floor beams of the main cargo deck, which could lead to loss of the airplane, accomplish the following:

(a) Except as provided in paragraphs (b) and (c) of this AD, within 90 days after the effective date of this AD, accomplish the requirements of paragraph (a)(1) or (a)(2) of this AD, as applicable.

(1) For airplanes that transport containers or pallets that have been manufactured in accordance with National Aerospace Standard (NAS) 3610 Size Codes ''A,'' ''B,'' ''C,'' ''D,'' or ''E,'' containers: Revise the Limitations Section of all FAA-approved Airplane Flight Manuals (AFM) and AFM Supplements, and the Limitations Section of all FAA-approved Airplane Weight and Balance Supplements to include the following information. This may be accomplished by inserting a copy of this AD in all AFM's, AFM Supplements, and Weight and Balance Supplements.

''LIMITATIONS

All containers with one door must be oriented with the door side of the container facing forward, except the door of the first container aft of the cargo barrier may face aft.

The location of the horizontal center of gravity for the total payload within each container or pallet shall not vary more than 10 percent (8.8 inches) from the geometric center of the base of the container or pallet for the forward and aft direction, and 10 percent of the width from the geometric center of the base of the container or pallet for the left or right direction.''

''PAYLOAD LIMITATIONS

For containers or pallets that have been manufactured in accordance with National Aerospace Standard (NAS) 3610 Size Code ''A'' (88 by 125 inches), ''B'' (88 by 108 inches), or ''C'' (88 by 118 inches):

Do not exceed a total weight of 3,000 pounds per container or pallet on the main cargo deck, except in the area adjacent to the side cargo door. In the side cargo door area, for all containers or pallets completely or partially located between Body Station 440 and Body Station 660, those containers or pallets are restricted to a maximum payload of 2,700 pounds per container or pallet. The 3,000 and 2,700 pound payload limits include the payload in the lower lobe cargo compartments and any other load applied to the bottom of the floor beams of the main cargo deck for the same body station location as the container or pallet on the main cargo deck.

For containers or pallets that have been manufactured in accordance with NAS 3610 Size Code ''D'' (88 by 54 inches) or ''E'' (88 by 53 inches) containers:

Do not exceed a total weight of 1,500 pounds per container or pallet on the main cargo deck, except in the area adjacent to the side cargo door. In the side cargo door area, for all containers or pallets completely or partially located between Body Station 440 and Body Station 660, those containers or pallets are restricted to a maximum payload of 1,350 pounds per container or pallet. The 1,500 and 1,350 pound payload limits include the payload in the lower lobe cargo compartments and any other load applied to the bottom of the floor beams of the main cargo deck for the same body station location as the container or pallet on the main cargo deck.''

(2) For airplanes on which any other containers or pallets are transported: Revise the Limitations Section of all FAA-approved AFM's and AFM Supplements, and the Limitations Section of all FAA-approved Airplane Weight and Balance Supplements, in accordance with a method approved by the Manager, Standardization Branch, ANM–113, FAA, Transport Airplane Directorate.

Note 3: The weight restrictions to be approved under paragraph (a)(2) will be consistent with the limitations specified in paragraph (a)(1) of this AD.

(b) For airplanes that ARE equipped with side vertical cargo container restraints that have been approved by the Manager, Standardization Branch, ANM–113: As an optional alternative to compliance with paragraph (a) of this AD, within 90 days after the effective date of this AD, accomplish the requirements of paragraph (b)(1) or (b)(2) of this AD, as applicable. This alternative may be used only during the period ending 28 months after the effective date of this AD.

Note 4: To be eligible for compliance with this paragraph, the side vertical cargo container restraints must be approved by the Manager, Standardization Branch, ANM–113, regardless of whether they have been previously FAA approved.

(1) For airplanes on which containers complying with NAS 3610 Size Codes ''A,'' ''B,'' ''C,'' ''D,'' or ''E,'' are transported: Revise the Limitations Section of all FAA-approved AFM's and AFM Supplements, and the Limitations Section of all FAA-approved Airplane Weight and Balance Supplements to include the following limitations. This may be accomplished by inserting a copy of this AD in all AFM's, AFM Supplements, and Weight and Balance Supplements.

''LIMITATIONS

Maximum Operating Airspeed of Vmo equals 350 knots indicated airspeed (KIAS), or Mode ''B'' [350 knots equivalent airspeed (KEAS)].

Minimum operating weight: 100,000 pounds.

All containers with one door must be oriented with the door side of the container facing forward, except the door of the first container aft of the cargo barrier may face aft.

The location of the horizontal center of gravity for the total payload within each container shall not vary more than 10 percent (8.8 inches) from the geometric center of the base of the container for the forward and aft direction and 10 percent of the width from the geometric center of the base of the container for the left or right direction.''

''PAYLOAD LIMITATIONS

For airplanes that transport containers or pallets that have been manufactured in accordance with National Aerospace Standard (NAS) 3610 Size Code ''A'' (88 by 125 inches), ''B'' (88 by 108 inches), or ''C'' (88 by 118 inches):

Except as provided below for Body Station 740 to Body Station 950, do not exceed a total weight of 9,600 pounds for any two adjacent containers or pallets and a total weight of 8,000 pounds for any single container or pallet.

For those containers or pallets which are completely or partially located within Body Station 740 to Body Station 950 (the region of the wing box and main landing gear wheel well): Do not exceed a total weight of 12,000 pounds for any two adjacent containers or pallets and a total weight of 8,000 pounds for any single container or pallet.

These container payload limits include the payload in the lower lobe cargo compartments and any other load applied to the bottom of the floor beams of the main cargo deck for the same body station location as the container or pallet on the main cargo deck; and

For containers or pallets that have been manufactured in accordance with NAS 3610

Size Code ''D'' (88 by 54 inches) or ''E'' (88 by 53 inches) containers:

Except as provided below for Body Station 740 to Body Station 950, do not exceed a total weight of 4,800 pounds for any two adjacent (in the forward and aft direction) containers or pallets and a total weight of 4,000 pounds for any single container or pallet.

For those containers or pallets which are completely or partially contained within Body Station 740 to Body Station 950 (the region of the wing box and main landing gear wheel well): Do not exceed a total weight of 6,000 pounds for any two adjacent (in the forward and aft direction) containers or pallets and a total weight of 4,000 pounds for any single container or pallet.

These payload limits include the payload in the lower lobe cargo compartments and any other load applied to the bottom of the floor beams of the main cargo deck for the same body station location as the container or pallet on the main cargo deck.''

(2) For airplanes on which pallets or containers other than those specified in paragraph (b)(1) of this AD, are transported: Revise the Limitations Section of all FAA-approved AFM's and AFM Supplements, and the Limitations Section of all FAA-approved Airplane Weight and Balance Supplements, in accordance with a method approved by the Manager, Standardization Branch, ANM–113.

Note 5: The weight restrictions to be approved under paragraph (b)(2) will be consistent with the limitations specified in paragraph (b)(1) of this AD.

(c) For airplanes that are NOT equipped with side vertical cargo container restraints that have been approved by the Manager, Standardization Branch, ANM–113: As an optional alternative to compliance with paragraph (a) of this AD, within 90 days after the effective date of this AD, accomplish the requirements of paragraph (c)(1) or (c)(2) of this AD, as applicable. This alternative may be used only during the period ending 28 months after the effective date of this AD.

(1) For airplanes on which containers complying with NAS 3610 Size Codes ''A,'' ''B,'' ''C,'' ''D,'' or ''E,'' are transported: Revise the Limitations Section of all FAA-approved AFM's and AFM Supplements, and the Limitations Section of all FAA-approved Airplane Weight and Balance Supplements to include the following limitations. This may be accomplished by inserting a copy of this AD in all AFM's, AFM Supplements, and Weight and Balance Supplements.

''LIMITATIONS

Maximum Operating Airspeed of Vmo equals 350 knots indicated airspeed (KIAS), or Mode ''B'' [350 knots equivalent airspeed (KEAS)].

Minimum operating weight: 100,000 pounds.

All containers with one door must be oriented with the door side of the container facing forward, except the door of the first container aft of the cargo barrier may face aft.

The location of the horizontal center of gravity for the total payload within each container shall not vary more than 10 percent (8.8 inches) from the geometric center of the base of the container for the forward and aft direction and 10 percent of the width from the geometric center of the base of the container for the left or right direction.''

''PAYLOAD LIMITATIONS

For airplanes that transport containers or pallets that have been manufactured in accordance with National Aerospace Standard (NAS) 3610 Size Code ''A'' (88 by 125 inches), ''B'' (88 by 108 inches), or ''C'' (88 by 118 inches):

Except as provided below for Body Station 740 to Body Station 950, do not exceed a total weight of 8,000 pounds for any two adjacent containers or pallets and a total weight of 8,000 pounds for any single container or pallet.

For those cargo pallets which are completely or partially contained within Body Station 740 to Body Station 950 (the region of the wing box and main landing gear wheel well): Do not exceed a total weight of 12,000 pounds for any two adjacent containers or pallets and a total weight of 8,000 pounds for any single container or pallet.

These payload limits include the payload in the lower lobe cargo compartments and any other load applied to the bottom of the floor beams of the main cargo deck for the same body station location as the container or pallet on the main cargo deck.

For containers or pallets that have been manufactured in accordance with NAS 3610 Size Code ''D'' (88 by 54 inches) or ''E'' (88 by 53 inches) containers:

Except as provided below for Body Station 740 to Body Station 950, do not exceed a total weight of 4,000 pounds for any two adjacent (in the forward and aft direction) containers or pallets and a total weight of 4,000 pounds for any single container or pallet.

For those cargo pallets which are completely or partially contained within Body Station 740 to Body Station 950 (the region of the wing box and main landing gear wheel well): Do not exceed a total weight of 6,000 pounds for any two adjacent containers or pallets and a total weight of 4,000 pounds for any single container or pallet.

These payload limits include the payload in the lower lobe cargo compartments and any other load applied to the bottom of the floor beams of the main cargo deck for the same body station location as the container or pallet on the main cargo deck.''

(2) For airplanes on which pallets or containers other than those specified in paragraph (c)(1) of this AD, are transported: Revise the Limitations Section of all FAA-approved AFM's and AFM Supplements, and the Limitations Section of all FAA-approved Airplane Weight and Balance Supplements, in accordance with a method approved by the Manager, Standardization Branch, ANM–113.

Note 6: The weight restrictions to be approved under paragraph (c)(2) will be consistent with the limitations specified in paragraph (c)(1) of this AD.

(d) For airplanes complying with paragraph (b) or (c) of this AD, within 28 months after the effective date of this AD, accomplish the requirements of paragraph (a) of this AD.

(e) For airplanes that operate under the 350 KIAS limitations specified in paragraph (b) or (c) of this AD: A maximum operating airspeed limitation placard must be installed adjacent to the airspeed indicator and in full view of both pilots. This placard must state: ''Limit Vmo to 350 KIAS.''

(f) As an alternative to compliance with paragraphs (a), (b), (c), (d), and (e) of this AD: An applicant may propose to modify the floor structure or propose differing payloads and other limits by submitting substantiating data and analyses to the Manager, Denver Aircraft Certification Office (ACO), FAA, Transport Airplane Directorate, 26805 E. 68th Avenue, Room 214, Denver, Colorado 80249. The Manager of the Denver ACO will coordinate the review of the submittal with the Manager of the Standardization Branch, ANM–113, in accordance with the procedures of paragraph (g) of this AD. If the FAA determines that the proposal is in compliance with the requirements of Civil Air Regulations (CAR) part 4b and is applicable to the specific airplane being analyzed and approves the proposed limits, prior to flight under these new limits, the operator must revise the Limitations Section of all FAA-approved AFM's and AFM Supplements, and the Limitations Section of all FAA-approved Airplane Weight and Balance Supplements, in accordance with a method approved by the Manager, Standardization Branch, ANM–113. Accomplishment of these revisions in accordance with the requirements of this paragraph constitutes terminating action for the requirements of this AD.

(g) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, Standardization Branch, ANM–113. Operators shall submit their requests through an appropriate FAA Principal Maintenance Inspector, who may add comments and then send it to the Manager, Denver ACO, who will coordinate the approval with the Manager of the Standardization Branch, ANM–113.

Note 7: Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the Standardization Branch, ANM–113.

(h) Special flight permits may be issued in accordance with sections 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the airplane to a location where the requirements of this AD can be accomplished.

(i) This amendment becomes effective on February 16, 1999.

Issued in Renton, Washington, on December 16, 1998.

Ronald T. Wojnar,

Manager, Transport Airplane Directorate, Aircraft Certification Service.

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