Exemption No. 10883

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98057-3356

In the matter of the petition of **Fokker50Freighter STC Corporation** for an exemption from §§ 25.841(a) and (b)(6) of Title 14, Code of Federal Regulations	**Regulatory Docket No. FAA-2012-0396**

GRANT OF EXEMPTION

By letter received February 20, 2013, Randall Blosser, Chief Engineer, Fokker50Freighter STC Corp. (FFF STC), 13394 E. Control Tower Road, Englewood, CO 80112, petitioned the Federal Aviation Administration (FAA) for an exemption from 14 CFR 25.841(a) and (b)(6) for the Fokker Model F27 Mark 050 airplane modified by Supplemental Type Certificate (STC) ST0196LA. The petitioner requests exemption from the regulations to allow the modified airplane, with appropriate supplemental oxygen systems installed, to operate with cabin-pressure altitudes up to 11,300 feet when operated without passengers, by a maximum of three crew members, who are trained in the dangers of hypoxia and knowledgeable of supplemental oxygen systems, which would be used by the required pilots when the airplane is operated with a cabin-pressure altitude of more than 10,000 feet.

The petitioner requests relief from the following regulations:

Section 25.841 at Amendment 25-87 requires that:

> (a) Pressurized cabins and compartments to be occupied must be equipped to provide a cabin pressure altitude of not more than 8,000 feet at the maximum operating altitude of the airplane under normal operating conditions.
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> **(b)** Pressurized cabins must have at least the following valves, controls, and indicators for controlling cabin pressure:
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> **(6)** Warning indication at the pilot or flight engineer station to indicate when the safe or preset pressure differential and cabin-pressure altitude limits are exceeded. Appropriate warning markings on the cabin pressure differential indicator meet the warning requirement for pressure differential limits and an aural or visual signal (in

addition to cabin altitude indicating means) meets the warning requirement for cabin-pressure altitude limits if it warns the flight crew when the cabin pressure altitude exceeds 10,000 feet.

The petitioner supports its request with the following information:

This section summarizes the relevant information from the petitioner's request. The complete petition is available at the Department of Transportation's Federal Docket Management System, on the Internet at http://regulations.gov, in Docket No. FAA-2012-0396.

The Fokker 50 airplane (Type Certificate Data Sheet A-BI7 Model F27 Mark 050) is a pressurized airplane certified for a maximum operating altitude of 25,000 feet. A Large Cargo Door (LCD) can be installed in these airplanes per STC ST01916LA granted to FFF STC in November of 2006. For structural reasons, the LCD installation uses a reduced nominal pressure differential than the standard airplane. With the reduced pressure differential, the airplane is currently limited to 20,000 feet maximum operating altitude to have a cabin-pressure altitude of not more than 8,000 feet for compliance with § 25.841(a). FFF STC requests exemption from § 25.841(a) to allow the removal of the current STC maximum operating altitude limitation, such that the modified airplane can then be operated up to the standard airplane certified operating altitude of 25,000 feet. The change in operating procedures to the higher flight altitude would result in a maximum cabin-pressure altitude of 11,300 feet when the airplane is operated at its maximum altitude of 25,000 feet with the reduced pressurization levels required by the STC.

In addition, the current cabin-pressurization system would provide an annunciation to the flightcrew when the cabin altitude exceeds 10,000 feet pressure altitude for compliance with 14 CFR 25.841(b)(6). FFF STC reports that the standard airplanes use an aural and visual alerting system (Integrated Alerting Unit (IUA), and a separate Central Annunciator Panel (CAP)), which are unchanged by the existing LCD's STC modification with respect to cabin-altitude warnings. With the existing system, when the cabin altitude exceeds 10,000 feet, a Level 3 alert occurs, which consists of a continuous triple-chime audio signal plus two red master-warning lights, and a red light marked CABIN ALT illuminates on the Central Annunciator Panel. A cabin-pressure-differential indicator has appropriate warning markings, and cabin-altitude indicator. The existing alerting system activates at a minimum 9,200 feet cabin altitude. Note that the nominal pressure differential for the LCD installation equates to approximately a 21,000-foot operating altitude. FFF STC requests an exemption from 14 CFR 25.841(b)(6) to allow a cabin-altitude warning in excess of the 10,000-feet warning required per the regulation. This relief would prevent activation of the system during normal operations above 21,000 feet operating altitudes for the modified airplane. FFF STC states that the FAA has previously granted equivalent level of safety (ELOS) findings to other airplane designs for high-elevation airport operations where the cabin pressure may exceed the 10,000-feet warning requirement of 14 CFR 25.841(b)(6). The FAA has approved deviations in cabin-pressure warning for high-elevation airport operations. However, these warnings are of short duration. For this proposal, the time above the threshold of the cabin-altitude warning at 9,200 feet could be the entire time at cruise altitude, which could be over six hours. FFF STC states that ignoring or overriding a warning for an extended period is an unacceptable procedure because it could mask a latent failure of the pressurization system. Therefore, FFF STC proposes that the cabin-altitude warning be adjusted to provide an alert whenever the cabin altitude exceeds 12,000±500 feet. This level would still provide warning

of a pressurization failure that could potentially result in an unsafe cabin altitude but not cause activation during normal higher-altitude operations. FFF STC believes that the higher 12,000-foot warning level provides an acceptable level of safety based on FAA general-aviation operational rules that permit airplanes to operate with cabin-pressure altitudes of up to 12,500 feet for an unlimited amount of time, and commuter/on-demand and air-carrier operating rules, which allow cabin-pressure altitude up to 12,000 feet for a maximum of 30 minutes without the use of supplemental oxygen by the flight-deck crew.

FFF STC states that the flightcrew members who will operate the modified airplanes are trained to recognize the risks of hypoxia for exposures above 8,000 feet. Furthermore, FFF STC believes that current FAA operational regulations show that safety will not be adversely affected with the limited cabin altitudes and operational procedures being proposed. The current FAA general-aviation operating rules permit flight with a cabin-pressure altitude of up to 12,500 feet for an unlimited amount of time, and up to 14,000 feet for a maximum of 30 minutes without the use of supplemental oxygen (14 CFR 91.211). Whereas the commuter/on-demand and air-carrier operating rules permit flight with a cabin-pressure altitude of up to 10,000 feet for an unlimited amount of time, and up to 12,000 feet for a maximum of 30 minutes without the use of supplemental oxygen by the flight-deck crew (14 CFR 135.89 and 14 CFR 121.329). With the 20,000-foot operational limitation removed, the Fokker 50 with LCD could potentially have a cabin altitude of 11,300 feet for slightly more than six hours, with a fully fueled airplane and no traffic load.

FFF STC proposes that airplane operations above 20,000 feet would be conducted with no passengers and only the two required crew members, plus an optional observer in the jump seat, and that the pilots would use supplemental oxygen when the cabin altitude is more than 10,000 feet. The airplanes are already certified with a supplemental-oxygen system meeting the requirements of 14 CFR 25.1441, including quick-donning, full-face masks for each flight-deck member. Furthermore, each crew member is trained in the dangers of hypoxia and is knowledgeable in oxygen-system operations.

The petitioner's statement of public interest:

> The FFF STC feels that granting the petition to allow for relief from the maximum cabin altitude and cabin pressure warning requirements for the Fokker 50 aircraft equipped with a Large Cargo Door (LCD) per STC ST01916LA would be in the public's interest because;
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> - Turbojet aircraft operating at higher altitudes use less fuel (~9%) which leads to reduced air cargo fares and environmental benefits(~9% reduction in NOx).
> - Aircraft operating at higher altitudes can avoid more weather which improves safety and reduces operating costs associated with delays and diversions due to adverse weather conditions.
> - Aircraft operating at higher altitudes have increased safety margins for terrain avoidance.
> - A larger range of operating altitudes for aircraft allows more flexibility for air traffic control routing and avoidance of restricted airspace which improves the efficiency for the national airspace system and the individual aircraft.

- The above benefits of operating the Fokker50Freighter at higher altitude improve the marketability of the conversions which can lead to more sales and potentially increased employment.
- The increase in maximum cabin altitude and cabin pressure warning altitude requirements does not adversely affect safety if the above mitigating factors are taken.

Federal Register publication

A summary notice of the petition was published in the Federal Register on April 11, 2013 [78 FR 17746]. No comments were received.

The FAA's Analysis

In analyzing FFF STC's petition for exemption, the FAA considered the following factors:

1. Need for the exemption.

   Permitting cruise at a higher altitude would allow greater range of operating altitudes and greater flexibility for air traffic control routing; it would also allow avoidance of certain restricted airspace, which improves the efficiency within the national airspace system. In addition, higher cruise altitudes afford increased flexibility to avoid adverse weather conditions, which improves safety and reduces operating costs associated with delays and diversions.

2. Review of historical data, and research on hypoxia and onset of decompression sickness.

   We reviewed loss of cabin-pressurization control events, and published research on hypoxia and onset of decompression sickness, to evaluate the risk associated with granting this petition for exemption. The applicant's proposal includes mandatory use of oxygen masks for the flight-deck crew; and the maximum cabin altitude, when operating the airplane at the maximum cruise altitude, results in no risk of hypoxia or onset of decompression sickness.

3. Use of supplemental oxygen.

   As previously stated, the applicant has proposed mandatory use of oxygen masks for flightcrew members when the cabin altitude exceeds 10,000 feet pressure altitude, which affords protection against hypoxia.

4. Presence of a cabin-pressure warning system that provides annunciation to the flight-deck crew when the cabin altitude exceeds 12,000±500 feet pressure altitude.

   The airplane certified cabin-altitude warning of 10,000 feet pressure altitude will be replaced with a system that annunciates to the flightcrew when the cabin altitude exceeds 12,500 pressure feet. However, mandated use of supplemental oxygen and training of the flightcrew will ensure safe operation at cruise altitude.

5. Crew members trained in the dangers of hypoxia and knowledgeable in oxygen-system operations.

As previously stated, the operation of the airplane is restricted to flight crewmembers only; no passenger or supernumeraries are permitted to fly on the modified airplane. The flight crew will be trained to detect signs of hypoxia or decompression sickness and will be trained in the use of the supplemental-oxygen systems, which will ensure safe operation at maximum cruise altitude.

As a result, the FAA concluded that the FFF STC presented sufficient justification for a grant of exemption from § 25.841(a) and (b)(6), provided that the conditions discussed above were met, i.e., include, in the Operating Limitations section of the Airplane Flight Manual (AFM):

- the maximum indicated operating pressure altitude, as well as the approved flight-deck crew procedure to ensure adequate quantity of oxygen is available for all flight-deck occupants when airplane flight altitude is greater than 23,000 feet pressure altitude, for the maximum-duration cruise segment, during which time the pilots and observer will be on oxygen
- a cabin-altitude warning system that provides an alert whenever the cabin altitude exceeds 12,000±500 feet pressure altitude, and
- a flight-deck crew procedure requiring that all flightcrew members, plus an optional observer in the jump seat, use supplemental oxygen when the airplane flight altitude is greater than 23,000 feet (i.e., the cabin-pressure altitude is more than 10,000 feet)

The FAA also concludes that the exemption is in the public interest for reasons stated by the petitioner, and which is explained within this grant of exemption.

In reviewing the petitioner's material, the FAA reached the following conclusions:

The FAA agrees with the petitioner's request to increase the Fokker Model F27 Mark 050 airplane maximum operating altitude. This decision is predicated on the basis that:

- the airplane is restricted to strictly cargo and/or freighter operations
- the occupancy is limited to three flightcrew members
- the flightcrew members are all trained in the risks of hypoxia and knowledgeable in oxygen-system operations
- the maximum operating altitude is limited to no more than 25,000 feet pressure altitude
- the airplane is provided with a cabin warning that provides annunciation to the flight-deck crew when the cabin altitude exceeds 12,000±500 feet
- the FAA pilot type rating has not been determined for the subject airplane. No U.S. pilot certificates for Fokker Model F27 Mark 050 airplanes may be issued until this is accomplished
- the operational suitability for Fokker Model F27 Mark 050 airplanes, under 14 CFR Parts 91, 121, and 125, has not been evaluated. This airplane may not be operated under those regulations until this operational-suitability evaluation has been accomplished

The FAA's Decision

In consideration of the foregoing, I find that a partial grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 40113 and 44701, delegated to me by the Administrator, the Fokker50Freighter STC Corporation's petition for exemption for relief from the requirements of § 25.841(a) and (b)(6), at Amendment 25-87, is granted for the Fokker50Freighter STC airplanes equipped with Large Cargo Door installations per STC ST01916LA, operated without passengers, and each crew member having been properly trained in the risks of hypoxia and knowledgeable in oxygen-system operations.

This grant of exemption is subject to the following conditions:

1. The Operating Limitations section of the associated Fokker50Freighter STC airplane AFM must state that the grant of exemption is for all cargo/freighter use only. No passengers or supernumeraries are to be carried on the airplane. The maximum occupancy is limited to three in the flight deck, two flightcrew members, and one optional observer in the jump seat.

2. The Operating Limitations section of the associated Fokker50Freighter STC airplane AFM must state that the pilot in command must ensure that all flightcrew members, plus an optional observer in the jump seat, have received training to recognize hypoxia and the onset of decompression sickness; and training on the use of the supplemental-oxygen system when the cabin altitude is more than 10,000 feet (i.e., at airplane-flight altitudes greater than 23,000 feet pressure altitude).

3. The Operating Limitations section of the associated Fokker50Freighter STC airplane AFM must identify the maximum allowed indicated operating pressure altitude of 25,000 feet pressure altitude.

4. The Operating Limitations section of the associated Fokker50Freighter STC airplane AFM must require confirmation that the oxygen quantity available is sufficient to meet continuous use from flight crew (up to 3 pilots) when operating the airplane at flight altitudes greater than 23,000 feet pressure altitude (i.e., cabin altitude 10,000 feet pressure altitude).

5. The Operating Limitations section of the associated Fokker50Freighter STC airplane AFM must contain applicable flight-deck crew procedures requiring that all flight-crew members, plus an optional observer in the jump seat, use supplemental oxygen when the cabin altitude is more than 10,000 feet (i.e., at airplane flight altitudes greater than 23,000 feet pressure altitude).

6. Fokker50Freighter STC airplanes must be equipped with an operational cabin-pressure warning system that provides annunciation to the flight-deck crew when the cabin altitude exceeds 12,000±500 feet pressure altitude. Fokker50Freighter STC must demonstrate that the cabin-pressure warning indication activates at no greater than 12,500 (i.e., 12,000+500) feet cabin-pressure altitude.

7. Fokker50Freighter STC must demonstrate that the Fokker50Freighter STC airplanes cabin-pressure altitude does not exceed 8,000 feet during flight-operating-pressure altitude of below 20,000 feet, and that the maximum cabin-pressure altitude does not exceed 11,300 feet at airplane maximum cruise-operating-pressure altitude of 25,000 feet.

Issued in Renton, Washington, on October 25, 2013.

/s/ Stephen P. Boyd

Stephen P. Boyd
Acting Manager, Transport Airplane Directorate
Aircraft Certification Service