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UNITED STATES OF AMERICA
CIVIL AERONAUTICS BOARD
WASHINGTON, D. C.

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SPECIAL CIVIL AIR REGULATION

BASIS FOR APPROVAL OF MODIFICATION OF AIRPLANE TYPES DOUGLAS DC-3 AND LOCKHEED L-18

On October 7, 1953, the Civil Aeronautics Board adopted Special Civil Air Regulation SR-398, effective November 11, 1953, (18 F.R. 6448) which provided a basis for approval of modifications of DC-3 and L-18 airplanes, but limited the scope of that regulation to increases in engine take-off power limitation up to 1,350 horsepower per engine, to installation of engines of not more than 1,830 cubic inches displacement, and to the establishment of new maximum certificated weights not in excess of 26,900 pounds for the DC-3 and 19,500 pounds for the L-18. This regulation expands the scope of SR-398 to cover approval of additional modifications and maximum certificated weights for DC-3 and L-18 airplanes. In order to have all the regulations applicable to modifications and weight increases of the DC-3 and L-18 appear in one document, this regulation embodies herein the provisions of SR-398 and the additional regulations which are made applicable to these airplanes. SR-398 is thus superseded by this regulation.

The Douglas DC-3 and the Lockheed L-18 airplane types were originally designed and certificated on the basis of airworthiness standards in effect prior to 1940. These were contained in Bulletin 7-A promulgated by the former Bureau of Air Commerce and in the initial Part 04 of the Civil Air Regulations which was basically a recodification of Bulletin 7-A. Subsequently the Civil Aeronautics Board promulgated and kept up to date newer airworthiness requirements contained in Parts 3, 4a, and 4b of the Civil Air Regulations, the latter two parts containing rules for transport category airplanes. The DC-3 and L-18 are the only large airplane types now in general use in the United States which retain the old standards as a basis for their certification.

For a number of years after the initial certification of these two airplane types relatively few important design changes were introduced, and the airplane specifications regarding maximum certificated weights remained practically unchanged. More recently, however, several operators have made significant design changes in DC-3 and L-18 airplanes and it has become apparent that with the continued use of these airplanes, more operators are considering design changes, such as the installation of higher-powered engines and increases in maximum certificated weights. Although the basis for certification of these airplanes remains unchanged, the Administrator of Civil Aeronautics in some instances has made changes to the pertinent aircraft specifications by applying certain provisions of Part 4a of the Civil Air Regulations. The Board does not consider Bulletin 7-A and the early versions of Part 04 adequate regulatory bases upon which further modifications to these airplane types can be approved by the Administrator.

The provisions of this Special Civil Air Regulation provide the basis for approval by the Administrator of future modifications of individual DC-3 and L-18 airplanes. The provisions in section 1 of SR-398 permitting the Administrator to waive the requirements of the regulation when it was shown that a particular airplane was in the process of modification at the time that regulation became effective, has been omitted from this regulation because SR-398 has been in effect for sufficient time to eliminate the need for waiver authority by the Administrator.

This regulation continues the general provisions of SR-398 which required that modifications of DC-3 and L-18 airplanes be accomplished in accordance with the provisions of either Part 4a or Part 4b of the Civil Air Regulations applicable to the modification being made, and which were in effect on September 1, 1953, unless the applicant elects to make the modification in accordance with Part 4b as in effect on the date of modification. This regulation requires, also, that in electing to perform a modification under either Part 4a or Part 4b, each specific modification must be accomplished in accordance with all of the provisions of either Part 4a or Part 4b related to the particular modification. It does not permit selection of certain provisions of Part 4a and other provisions of Part 4b. For example, if it were desired to make a modification of the landing gear, it could be made under either Part 4a or Part 4b, but not partially under Part 4a and partially under Part 4b. This also applies when the applicant elects to make a modification in accordance with the provisions of Part 4b in effect on the date of modification in lieu of Part 4a or Part 4b as in effect on September 1, 1953.

In addition to the general provisions for modification, this regulation contains the specific requirements of SR-398 with respect to approval of increases in take-off power limitation and the installation of new type engines in DC-3 and L-18 airplanes and provides some additional requirements. The intent of these specific requirements is to ensure that such changes will not result in a decrease in safety. This is in general consistent with the policy followed by the Administrator in approving changes made prior to the adoption of SR-398.

In the case of an increase in the take-off power limitation beyond 1,200 horsepower per engine, but not to exceed 1,350 horsepower per engine, this regulation continues the provisions of SR-398 which required that the increase in power shall not adversely affect the flight characteristics of the airplane. The intent of this provision is to permit increases in take-off power only if the applicant can show that the use of the increased power does not result in deterioration of the flight characteristics of the airplane when compared to its previous characteristics. It is believed, however, that increases in take-off power limitation above 1,350 horsepower per engine may result in changes in the engine installation and the airplane's flight characteristics to such an extent that the basis for approval of increases in horsepower provided in SR-398 is no longer appropriate. Since Part 4b represents the most recent design practices, this regulation provides that the take-off power limitation may be increased beyond 1,350 horsepower if compliance is shown with Part 4b at the increased power with respect to the engine installation provisions, the flight characteristics, and the ground handling requirements.

This regulation contains the provisions of SR-398 which established either Part 4a or Part 4b as the basis for approving the installation of engines not exceeding 1,830 cubic inches displacement which necessitate major modification or redesign, on the condition that there is no decrease in engine fire prevention and protection when compared to the prior engine installation. Since the use of engines with more than 1,830 cubic inches displacement will necessitate extensive modification of the entire engine installation, it appears necessary that such an installation be accomplished in accordance with the most recent airworthiness provisions of the regulations. This regulation, therefore, requires that the installation of these larger engines be accomplished in accordance with the requirements of Part 4b of the Civil Air Regulations.

This regulation also continues the provisions of SR-398 which permitted establishment of new maximum certificated weights not to exceed 26,900 pounds for the DC-3 and 19,500 pounds for the L-18. Where such new maximum weights are desired, the airworthiness certificate may be amended and the maximum weights established in accordance with the transport category performance requirements of either Part 4a or Part 4b, subject to the structural limitations of the airplane. With respect to maximum weights in excess of 26,900 pounds for the DC-3 and 19,500 pounds for the L-18, however, it is considered that such increases in weight may seriously affect not only the structural limitations, but also the flight and ground handling characteristics of the airplane. This regulation requires that weights in excess of 26,900 pounds for the DC-3 and 19,500 pounds for the L-18 shall be established in accordance with the performance, structural, flight characteristics, and ground handling requirements of Part 4b.

It should be noted that in certain cases, showing of compliance is required on the basis of Part 4b of the Civil Air Regulations. In some instances, literal compliance with the provisions of Part 4b may be extremely difficult to accomplish and would not contribute materially to the objective sought. In such cases this regulation provides that the Administrator may take into account the experience gained with the DC-3 and L-18 airplanes. Where such experience justifies it, he is authorized to accept in lieu of the literal provisions of Part 4b such measures of compliance as he finds will effectively accomplish the basic objectives.

SR-398 also required, as a basis for approval of new maximum certificated weights, that the applicant provide flight manual material containing information which will permit the application of the transport category performance operating limitations in the operation of the airplane. This Special Civil Air Regulation continues this requirement. In view of the fact that an applicant for new maximum certificated weights has such weights established in accordance with the transport category performance requirements of either Part 4a or Part 4b, this regulation also provides that an airplane having such newly established weights shall be considered a transport category airplane in applying the operating rules of the Civil Air Regulations. As a result, therefore, such airplanes when used in air carrier passenger service must be operated in accordance with the transport category performance operating limitations, but when used in other types of services the transport category performance operating limitations are not applicable as at present. Consideration is being given, however, to the problem of making them applicable to all types of operations conducted in transport category airplanes. If such rules are established, then all DC-3 and L-18 airplanes, having certificated weights increased in accordance with SR-398 or this regulation, will have to comply with these rules also. In the meantime, it is recommended that

operators, whose airplanes are approved for increased weights by reason of SR-398 or by this regulation, make use of this information to aid in assuring safety in their operations.

Interested persons have been afforded an opportunity to participate in the making of this regulation, and due consideration has been given to all relevant matter presented.

In consideration of the foregoing, the Civil Aeronautics Board hereby makes and promulgates the following Special Civil Air Regulation effective September 10, 1954:

1. Applicability. Contrary provisions of the Civil Air Regulations regarding certification notwithstanding1/ this regulation shall provide the basis for approval by the Administrator of modifications of individual Douglas DC-3 and Lockheed L-18 airplanes subsequent to the effective date of this regulation.

2. General Modifications. Except as modified in sections 3 and 4 of this regulation, an applicant for approval of modifications to a DC-3 or L-18 airplane which result in changes in design or in changes to approved limitations shall show that the modifications were accomplished in accordance with the rules of either Part 4a or Part 4b in effect on September 1, 1953, which are applicable to the modification being made: Provided, That an applicant may elect to accomplish a modification in accordance with the rules of Part 4b in effect on the date of application for the modification in lieu of Part 4a or Part 4b as in effect on September 1, 1953: And provided further, That each specific modification must be accomplished in accordance with all of the provisions contained in the elected rules relating to the particular modification.

3. Specific conditions for approval. An applicant for any approval of the following specific changes shall comply with section 2 of this regulation as modified by the applicable provisions of this section:

(a) Increase in take-off power limitation - 1,200 to 1,350 horsepower. The engine take-off power limitation for the airplane may be increased to more than 1,200 horsepower but not to more than 1,350 horsepower per engine if the increase in power does not adversely affect the flight characteristics of the airplane.

(b) Increase in take-off power limitation to more than 1,350 horsepower. The engine take-off power limitation for the airplane may be increased to more than 1,350 horsepower per engine if compliance is shown with the flight characteristics and ground handling requirements of Part 4b.

(c) Installation of engines of not more than 1,830 cubic inches displacement and not having a certificated take-off rating of more than 1,350 horsepower. Engines of not more than 1,830 cubic inches displacement and not having a certificated take-off rating of more than 1,350 horsepower which necessitate a major modification or redesign of the engine installation may be installed, if the engine fire prevention and fire protection are equivalent to that on the prior engine installation.

(d) Installation of engines of more than 1,830 cubic inches displacement or having certificated take-off rating of more than 1,350 horsepower. Engines of more than 1,830 cubic inches displacement or having certificated take-off rating of more than 1,350 horsepower may be installed if compliance is shown with the engine installation requirements of Part 4b: Provided, That where literal compliance with the engine installation requirements of Part 4b is extremely difficult to accomplish and would not contribute materially to the objective sought, and the Administrator finds that the experience with the DC-3 or L-18 airplanes justifies it, he is authorized to accept such measures of compliance as he finds will effectively accomplish the basic objective.

4. Establishment of new maximum certificated weights. An applicant for approval of new maximum certificated weights shall apply for an amendment of the airworthiness certificate of the airplane and shall show that the weights sought have been established, and the appropriate manual material obtained, as provided in this section. (Note: Transport category performance requirements result in the establishment of maximum certificated weights for various altitudes.)

1/ It is not intended to waive compliance with such airworthiness requirements as are included in the operating parts of the Civil Air Regulations for specific types of operation.

(a) Weights - 25,200 to 26,900 for the DC-3 and 18,500 to 19,500 for the L-18. New maximum certificated weights of more than 25,200 but not more than 26,900 pounds for DC-3 and more than 18,500 but not more than 19,500 pounds for L-18 airplanes may be established in accordance with the transport category performance requirements of either Part 4a or Part 4b, if the airplane at the new maximum weights can meet the structural requirements of the elected part.

(b) Weights of more than 26,900 for the DC-3 and 19,500 for the L-18. New maximum certificated weights of more than 26,900 pounds for DC-3 and 19,500 pounds for L-18 airplanes shall be established in accordance with the structural, performance, flight characteristics, and ground handling requirements of Part 4b: Provided, That where literal compliance with the structural requirements of Part 4b is extremely difficult to accomplish and would not contribute materially to the objective sought, and the Administrator finds that the experience with the DC-3 or L-18 airplanes justifies it, he is authorized to accept such measures of compliance as he finds will effectively accomplish the basic objective.

(c) Airplane flight manual - performance operating information. An approved airplane flight manual shall be provided for each DC-3 and L-18 airplane which has had new maximum certificated weights established under this section. The airplane flight manual shall contain the applicable performance information prescribed in that part of the regulations under which the new certificated weights were established and such additional information as may be necessary to enable the application of the take-off, en route, and landing limitations prescribed for transport category airplanes in the operating parts of the Civil Air Regulations.

(d) Performance operating limitations. Each airplane for which new maximum certificated weights are established in accordance with paragraphs (a) or (b) of this section shall be considered a transport category airplane for the purpose of complying with the performance operating limitations applicable to the operations in which it is utilized.

5. Reference. Unless otherwise provided, all references in this regulation to Part 4a and Part 4b are those parts of the Civil Air Regulations in effect on September 1, 1953.

NOTE: Parts 4a and 4b as amended and in effect on September 1, 1953, were published in the Federal Register at the following citations:
Part 4a, 14 F.R. 4072, 14 F.R. 3742, 14 F.R. 6769, 15 F.R. 28, 17 F.R. 11631.
Part 4b, 15 F.R. 3543, 15 F.R. 8903, 15 F.R. 9184, 16 F.R. 314, 16 F.R. 11759, 16 F.R. 12220, 17 F.R. 1087, 17 F.R. 11631, 18 F.R. 2213.

This regulation supersedes Special Civil Air Regulation SR-398 and shall remain effective until superseded or rescinded by the Board.

(Sec. 205 (a), 52 Stat. 984; 49 U.S.C. 425 (a). Interpret or apply secs. 601, 603, 52 stat. 1007, 1009, as amended; 49 U.S.C. 551, 553)

By the Civil Aeronautics Board:

/s/ M. C. Mulligan

M. C. Mulligan
Secretary

(SEAL)