UNITED STATES OF AMERICA
FEDERAL AVIATION AGENCY
WASHINGTON, D. C.

Civil Air Regulations Amendment 40-41
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PART 40—SCHEDULED INTERSTATE AIR CARRIER, CERTIFICATION AND OPERATION RULES

Wing-Flap-Actuated Landing Gear Warning System

The Federal Aviation Agency published as a notice of proposed rule making (28 F.R. 4958), circulated as Notice No. 63-19 dated May 10, 1963, a proposal to amend Parts 4b, 40, 41, and 42 of the Civil Air Regulations to require the installation of a wing-flap-actuated landing gear warning system.

All airplanes airworthiness regulations require, for airplanes with retractable landing gear, that a means be provided for indicating to the pilot when the gear is secured in the extended and in the retracted positions; that, in addition, landplanes be provided with an aural warning device to function continuously when one or more throttles are closed if the gear is not fully extended and locked. The airplane airworthiness regulations that permit a manual shutoff for the aural warning device also require that it be installed so that reopening the throttles will reset the warning mechanism. A third safety provision, required in §§ 4b.740 and 40.357, is the cockpit check procedure (checklist) to be used by the flight crew during all phases of operation.

The Agency finds, from a review of the accident record over the past 8 years, that 17 inadvertent gear-up landing accidents involved airplanes operating under Parts 40, 41, and 42. Fifteen of these accidents involved a number of airplane models, irrespective of performance or type of powerplant used, whose maximum weight exceeded 12,500 pounds. Although these accidents did not result in either major injuries or fatalities, such accidents are potentially hazardous, particularly because of possible ignition of fuel which might be spilled.

From the analysis of the accident record and from a study of operational practices relating to landing gear aural warning systems, the Agency finds that the currently prescribed throttle-acuated aural warning device and the other safety provisions are not sufficiently effective in preventing inadvertent gear-up landing accidents. The Agency further finds that installation of a wing-flap-actuated aural warning system should reduce the number of such accidents, thereby eliminating the potential hazard to the airplane occupants and preventing damage to the airplane.

Among the comments received in response to the notice of proposed rule making were objections to the proposed requirement. It was contended that the installation of a fourth safety device was unjustified. The Agency disagrees because 10 of the 15 inadvertent gear-up landing accidents involving transport category airplanes probably would have been prevented if a wing-flap-actuated warning system had been installed. These accidents occurred after long approaches with throttles retarded and with the aural warning device manually shut off and not reset prior to landing, or after long power-on approaches and the aural warning device actuated too late to discontinue the approach and initiate a go-around. (The remaining 5 accidents involved 2 deactivated aural warning circuits because of a missing fuze and a pulled circuit breaker; a landing with the pilot aware that the gear was still extending; a complete electrical failure; and a no-flap landing during training.) The comment went on to say that the justification in the notice refers only to jet airplanes but the specific proposal applies to all type airplanes. It should be noted that the notice states that "the currently prescribed landing gear warning system is inadequate because of the faster pace of present day operations (which reduces the effectiveness of the checklist on all airplanes) and because of the operational characteristics of jet transports (long straight-in approaches with throttles retarded, occassionally all the way to touchdown) * * *" The notice clearly speaks of all transport category airplanes and is not limited to any particular class. Although the notice refers only to jet transports in regard to long straight-in approaches with throttles retarded, 4 of the 10 transport gear-up landing accidents that the Agency believes would have been prevented by wing-flap-actuated landing gear warning involved propeller-driver airplanes making approaches with throttles retarded. The proposal, therefore, is applicable to all transport airplanes irrespective of method of propulsion.

A comment was received suggesting that the presently required throttle-actuated gear-up warning system is adequate on airplanes which do not have the optional manual shutoff on the aural device and, therefore, on such airplanes the proposed flap-actuated warning system should not be required. The throttle-actuated warning system is not activated during a power-on approach, even if the aural warning device is functioning. Of the transport airplane gear-up landing accidents previously mentioned, one definitely and probably two others occurred after a power-on approach. Therefore, the suggestion has not been accepted.

A comment was received questioning the validity of the premise in the notice that the faster pace of present day operations reduces the effectiveness of the landing checklist. It was contended that the landing checklist may be too long and cumbersome, and suggested shortening it so that flight crews would be more aware of important items such as extending the gear prior to landing. The Agency does not consider that landing checklists are unnecessarily long or cumbersome. In none of the gear-up accident investigations was this suggested by flight crewmembers. There is no evidence that shorter checklists would change the cockpit procedures to make the existing warning and indication systems more effective or reduce the frequency of inadvertent gear-up accidents.

A comment was received contending that on certain airplanes the presently required throttle-actuated warning system is ineffective because it activates too many nuisance warnings, and suggests that the proposed wing-flap-actuated system alone should be considered adequate. The proposed warning system is activated when wing flaps are extended beyond a prescribed position; however, if a landing is made in which the wing flaps are not extended beyond the prescribed position, the throttle-actuated warning system is needed. Therefore, the suggestion has not been accepted.

A comment was received which estimated the cost of modification of the total air carrier fleet to be over one million dollars and that this represents only the initial cost and does not include recurring costs for maintenance or delays due to malfunctioning equipment. The comment went on to state that if the proposed installation could contribute materially to safety the cost would not be excessive, but questioned that this has been demonstrated. The Agency does not agree that it is questionable that the proposed installation could contribute materially to safety, but finds that significant improvement in safety will be provided as evidenced in the foregoing discussion.

Several comments indicate that some interpretations of the proposal could result in the warning sounding for long periods of time during approach and takeoff. The intent of the proposal was that on those airplanes for which an approach flap position is determined by the climb performance requirements under which the airplane is type certificated, the warning system would be activated when the wing flaps are extended beyond the maximum approach position. On airplanes whose type certification basis does not include climb performance requirements that determine approach flap positions, the intent of the proposal was to activate the warning system when the flaps are extended beyond the position normally used during landing gear extension. The final rule is clarified in this respect.

A comment was received suggesting that flexibility be permitted in selecting the flap position at which the gear-up warning system is activated. If the selected position is less than that specified in the proposal, as clarified in the preceding paragraph, a large number of nuisance warnings would occur during approaches and takeoffs. On the other hand, if the selected position is greater than that specified in the proposal, as clarified above, the gear-up warning system would lose effectiveness because it would sound late in the approach. Therefore, the suggestion has not been accepted.

A comment suggested changing the proposal to apply only to those airplanes in which the main landing gear is used as a speed control device. None of the inadvertent gear-up landing accidents involved the main gear down and nose gear up, which would occur if the landing gear were not lowered after using the main gear to control airspeed. Therefore, this suggestion has not been accepted.

One comment recommended that, if the proposal is adopted, provision should be made for continuation of flight with the device inoperative. This will be determined by a Flight Operations Evaluation Board for each model airplane affected by the rule and included in the appropriate part of each air carrier's manual, in accordance with § 40.391.

There were other comments which recommended amending the proposal to apply to all aircraft with retractable gears rather than limiting it to airplanes with a maximum weight of more than 12,500 pounds. This recommendation goes beyond the scope of the notice, and would require that an additional notice of proposed rule making be issued. The Agency is conducting a separate study of inadvertent gear-up landing accidents involving small airplanes. If the study indicates that amendments to the gear-up warning system requirements are needed, appropriate proposals will be made.

A number of comments requested that the proposal be revised to specify clearly that the flap position revising unit can be installed at either the flap or the flap control handle. The intent of the proposal was that the sensing unit can be installed at any suitable location in the airplane and the final rule is so amended.

A comment was received requesting that the compliance date for installation of the proposed warning system be one year after adoption of the rule, to permit adequate time to design, fabricate, and install the system on all airplanes in air carrier operations. The Agency believes that this is a reasonable request and the final rule is amended accordingly. The Agency also considers it appropriate to provide for the possibility that an air carrier may not be able to meet the compliance date due to circumstances beyond his control. The final rule is further amended to include provisions whereby the Agency's assigned inspector may authorize a limited extension of the compliance date.

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.

This amendment is made under the authority of sections 313(a), 601, and 604 of the Federal Aviation Act of 1958 (49 U.S.C. 1354, 1421, 1424).

In consideration of the foregoing, Part of the Civil Air Regulations (14 CFR Part 40, as amended) is hereby amended as follows, effective May 22, 1964:

1. By adding a new § 40.155 to read as follows:

§ 40.155 Landing gear aural warning device.

(a) Except as otherwise provided in paragraph (b) of this section, on and after May 1, 1965, landplanes having a maximum weight of more than 12,500 pounds shall be provided with a landing gear aural warning device to function continuously when the wing flaps are extended in accordance with subparagraph (1) or (2) of this paragraph and the landing gear is not fully extended and locked. There shall be no manual shutoff provided for the warning device. The flap position sensing unit may be installed at any suitable location in the airplane. The wing-flap-actuated warning system shall be in addition to the throttle-actuated device installed in compliance with the airworthiness requirements under which the landplane was type certificated. The system required by this paragraph may utilize any portion of the throttle-actuated system including the aural warning device.

(1) For landplanes having an established approach wing-flap position, when the wing flaps are extended beyond the maximum certificated approach climb configuration position in the Airplane Flight Manual.

(2) For landplanes without an established approach climb wing-flap position, when the wing flaps are extended beyond the position at which landing gear extension normally is performed.

(b) Prior to February 1, 1965, the air carrier may submit to the assigned Federal Aviation Agency principal inspector, in writing, a request for extension of the May 1, 1965, date specified in paragraph (a) of this section, together with supporting data along the lines set forth in subparagraphs (1) and (2) of this paragraph. The inspector may extend the May 1, 1965, compliance date, but in no event shall such compliance date be extended beyond August 1, 1965, if he finds that the air carrier—

(1) Made a diligent effort to comply with the May 1, 1965, date, but will not be able to comply by that date due to procurement or installation problems beyond its control; and

(2) Has undertaken specific action to comply with the requirements of paragraph (a) of this section at the earliest practicable date following May 1, 1965.

§ 40.170 [Amended]

2. By amending § 40.170(c)(1) by deleting the reference "§§ 40.150 through 40.153" and inserting in lieu thereof the reference "§§ 40.150 through 40.155".

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N. E. HALABY,
Administrator.

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