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Supplement No. 4 December 29, 1950

SUBJECT: 40.101
Weather Minimums

40.101-1 Ceiling and Visibility Minimums

The Office of Aviation Safety announces the attached policy concerning the establishment of ceiling and visibility minimums for take-offs and landings at airports by scheduled air carrier aircraft.

The purpose thereof is to present all of the present policies on this subject in the form of an appropriate Civil Aeronautics Manual. This is in keeping with the decision of the CAA to make all such material available to the public in this manner. There have been no changes made in basic policy with respect to establishing ceiling and visibility minimums. An attempt has been made, however, to clarify and specify in detail certain items, to a greater extent than has been done in past publications.

These requirements supersede those outlined in Safety Regulation Release No. 262 and Aviation Safety Release 309.

Attached hereto is a supplement to Civil Aeronautics Manual 40 headed "Ceiling and Visibility Minimums." This supplement should be retained as one of a series that will be issued explaining or implementing Civil Air Regulation Part 40.

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Attachment

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"Miscellaneous Requirements.

"CAR 40.101 Weather minimums. Authorization of ceiling and visibility minimums for purposes of flight clearance and for transition from instrument to visual-contact flights and vice versa will be made by the Administrator and will be based upon the following considerations affecting the clearance and completion of the flight:

"(a) The terrain conditions affecting the flight area necessary for the working out of an approach and let-down-through procedure, or for a climb-up-through procedure; and

"(b) The skill and experience of dispatcher personnel; and

"(c) The skill and experience of pilot personnel; and

"(d) The type and maneuverability of the aircraft; and

"(e) The obstructions to flight, considered both vertically and horizontally, in the vicinity of the landing area; and

"(f) The quality and quantity of meteorological service and of other ground aids to flight available."

40.101-1 CEILING AND VISIBILITY MINIMUMS. (CAA policies which apply to section 40.101.)

(a) GENERAL. The ceiling and visibility minimums authorized by the Administrator for scheduled air carriers will be included in the operations specifications issued to the air carriers. The policies hereinafter set forth will be used by the Civil Aeronautics Administration in authorizing the ceiling and visibility minimums contained in the operations specifications.

(1) MILITARY AIRPORTS. When an air carrier is authorized to use a military airport, the ceiling and visibility minimums approved for take-off and landing at that airport will not be less than those agreed upon by the military authorities having jurisdiction over the facility.

(b) TAKE-OFF MINIMUMS.

(1) REGULAR, PROVISIONAL OR REFUELING AIRPORTS.

(i) TWIN-ENGINE AIRCRAFT. Twin-engine aircraft may have take-off minimums approved as low as 300 feet and one mile, if, after a consideration of all obstructions in the immediate vicinity of the end of the runway used and of the facilities and procedures used to avoid all obstacles in the take-off area, it is determined that a safe climb to the minimum en route altitude can be made. When an air carrier is authorized landing minimums lower than 300-1 at a particular airport through the utilization of ILS or GCA, the air carrier may also be authorized take-off minimums lower than 300-1 but not less than the landing minimums at that particular airport, provided that all conditions are such that an ILS or GCA approach can be executed at such minimums in accordance with the limitations set forth in the air carrier's operating certificate.

(ii) FOUR-ENGINE AIRCRAFT. Four-engine aircraft may have take-off minimums approved as low as 200 feet and one-half mile, if, after a consideration of all obstructions in the immediate vicinity of the end of the runway used and of the facilities and procedures used to avoid all obstacles in the take-off area, it is determined that a safe climb to the minimum en route altitude can be made and provided further that each pilot in command demonstrates during each six-month instrument check his ability to take off solely by reference to instruments in the make and model aircraft involved.

(2) ALTERNATE AIRPORTS. Take-off minimums for both two and four-engine aircraft may be approved as low as 300 feet and one mile, if, after a consideration of all obstructions in the immediate vicinity of the end of the runway used and of the facilities and procedures used to avoid all obstacles in the take-off area, it is determined that a safe climb to the minimum en route altitude can be made. When an air carrier has been approved for take-off minimums of 200-1/2 at an airport for regular, provisional or refueling use, this air carrier may have minimums of 200-1/2 authorized at the same airport when it is used as an alternate.

(c) LANDING MINIMUMS. In the approval of ceiling and visibility minimums for landing, two methods of approach will be considered. These are: A regular approach, involving a maneuver of the aircraft or circling of the airport in order to effect a landing, and a straight-in approach from a navigational aid to a landing. A landing is considered as straight-in when the difference between the runway direction and the track from the navigation aid to the approach end of that runway is 30° or less.

(1) REGULAR APPROACH. Where it is necessary to circle or maneuver to effect a landing, aircraft with higher maneuvering, approach and landing speeds shall be operated with higher landing minimums than slower type aircraft. To effect this principle, the stall speed as established in the Airplane Flight Manual at maximum certificated landing weight with full flaps, landing gear extended and power off will be used to differentiate between the two types of aircraft. Regular approach minimums are generally the same for all instrument approach procedures without regard to the type of radio navigational facility serving the particular airport, and will be established in accordance with the following policy:

(i) For aircraft having stall speeds in excess of 75 mph, the ceiling minimums will be at least 500 feet above the established elevation of the airport and not less than 300 feet above obstructions over which all turns about the airport will normally be made. In addition, the ceiling minimums shall be 300 feet above all obstructions within two miles on either side of the center line of the track from the facility to the end of the nearest usable runway. To determine the obstruction clearance, the normal area for all turns about the airport will be considered as extending for two miles in all directions from the boundary of the airport, exclusive of any areas over which flight is prohibited. However, in certain cases where the location and characteristics of prominent obstructions within the normal turning area about the airport is such that they can easily be seen and avoided, ceiling minimums may be established, taking into account the aircraft's ability to maneuver around these obstructions. Normally, visibility minimums for such aircraft will not be less than one and one-half miles except that visibility minimums of not less than one mile may be authorized for twin-engine aircraft having a stall speed in excess of 75 mph but which can be safely maneuvered with a radius of turn of not more than one-half mile.

(ii) Aircraft having stall speeds of 75 mph or less will normally be authorized to operate into airports with ceiling minimums 100 feet lower and visibility minimums of one-half mile less than established for the faster type of aircraft, but in no case will the ceiling be less than 400 feet and the visibility less than one mile. The criteria with respect to obstruction clearance shall be the same as in (i) above except that the normal area about the airport for all turns shall be considered as extending one and one-half miles in all directions from the boundary of the airport.

(2) STRAIGHT-IN APPROACHES USING A RADIO RANGE OR COMPARABLE RADIO FACILITY (i.e. ADF, VOR, Localizer 1/). Where a radio facility is so located that the difference between the direction of the runway to be used for landing, and the track between the radio facility and the approach end of that runway is less than 30 degrees, straight-in approach minimums lower than the regular approach minimums may be authorized when a rate of descent of not more than 500 feet per minute will bring the aircraft from its final approach altitude over the radio facility to the end of the runway at zero altitude. In this configuration, the speed of the aircraft, having a stall speed in excess of 75 mph, shall be considered to be not less than 120 mph in still air, and the speed of the aircraft, having a stall speed of less than 75 mph, shall be considered to be not less than 90 mph in still air. For both classes of aircraft, the ceiling minimums will not be less than 400 feet, and the visibility minimums not less than one mile. The yardstick set forth above will be applied to each airport as a guide, and, where its rigid application would result in unrealistic or unreasonable minimums, such practical adjustment shall be allowed as will still provide adequate safety. In such cases, the air carrier's application shall include a full explanation of the reason for a deviation from the yardstick and must be concurred in by the flight operations personnel approving the minimums.

When an ADF or comparable facility is located on an airport, the ceiling minimums will not be less than 500 feet.

The use of facilities such as low frequency radio ranges, automatic direction finding facilities (ADF), high frequency radio range facilities (VAR), and omnirange facilities (VOR), is predicated on dependability of operation, location of the facility with respect

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1/ An ILS localizer course which has a suitable fix, is considered as a facility comparable to a radio range. A fix formed by the intersection of a localizer course and a range leg or radio bearing shall be considered as being suitable if:

(1) The fix is located, either on the front or back course of the localizer, within seven (7) miles of the airport, and

(2) The radio range station or source of the radio bearing is within twenty-five (25) miles of the fix, and

(3) The range leg or bearing intersects the localizer course at an angle greater than 45°.

to the airport, and monitoring of the facility in the case of a high frequency radio range or VOR. In exceptional cases, however, an approach may be authorized utilizing a radio facility which is deficient in some respect, such as its location in reference to the airport it is intended to serve, when the ceiling and visibility minimums are adjusted commensurate with the deficiency. In such case complete justification for the authorization of an approach using a low or high frequency radio range or automatic direction finding facility which is located more than seven (7) miles from the airport must be furnished by the air carrier. The ceiling and visibility minimums in such case will not be less than (a) 500 feet and two miles when the facility is located from seven (7) to ten (10) miles from the airport, (b) 700 feet and two miles when the facility is located from ten (10) to twelve (12) miles from the airport, and (c) visual flight rules shall be observed from the radio facility when such facility is more than twelve miles from the airport. At the present time, and until more operational experience has been gained utilizing VOR facilities for let-downs, the above-mentioned limitations will also apply with respect to the use of VOR facilities. When a high frequency radio range (VAR) or omnirange facility (VOR) is not adequately monitored, the ceiling and visibility minimums will be at least 1000 feet and one mile unless lower minimums can be fully justified.

(3) STRAIGHT-IN APPROACHES USING ILS OR GCA FACILITIES. Ceiling and visibility minimums established pursuant to this policy are for straight-in approaches only, utilizing ILS or GCA facilities.

(i) COMPONENTS OF AN ILS. The components which make up the instrument landing systems are (a) localizer, (b) glide path, (c) outer marker, (d) middle marker and (e) approach lights. 2/

2/ The above specified approach lights may be the high-intensity slope line system, the regular neon bar approach light system, or other approved approach light system.

In the event that the length of runway available exceeds by 3000 feet, the landing distance required by CAR 61.216 (a) and (b), and high intensity runway lights are installed and operative on the entire length of the runway, this extra length of runway may be substituted in lieu of the approach lights as a component of the ILS or GCA.

Compass locator stations may be installed at the sites of the outer and middle markers of an instrument landing system, but are not considered a component of the ILS. However, when so installed, they may be used in lieu of the outer or middle marker for establishing a definite position over the fix, provided the aircraft is equipped with dual automatic direction finding receivers. If an aircraft is equipped with a single ADF receiver, only one compass locator may be used in lieu of the marker at the corresponding position.

(ii) COMPONENTS OF A GCA SYSTEM. The components which make up the ground controlled approach system include (a) surveillance radar (PPI), (b) altitude and azimuth control radar (PAR), and (c) approach lights. 2/

(iii) DEMONSTRATION OF ABILITY. Approval of minimums for utilization of ILS or GCA, whichever is proposed for use, will be predicated on satisfactory demonstration of ability by the air carrier to use the proposed facilities. An air carrier will have demonstrated such ability when (a) the aircraft has installed and properly functioning, approved airborne receiving equipment and associated controls, indicators and antenna, (b) the air carrier's training program includes a satisfactory familiarization program in the use of the proposed facilities and procedures, for all flight personnel to be engaged in the operation, and (c) the flight personnel concerned have demonstrated under simulated instrument conditions, the ability to safely accomplish the ILS or GCA approach and landing procedures down to the proposed minimums.

(iv) TRANSITION TO LOWER MINIMUMS. The transition to lower minimums will be made in increments of 100 feet ceiling and one-fourth mile visibility from the straight-in minimums which could be authorized at a particular airport for a radio range or comparable facility procedure, as set forth herein. The first reduction of minimums by these increments will be based on satisfactory demonstration of ability by the air carrier as outlined under sub-paragraph (iii) above. Subsequent reduction in minimums will be based on satisfactory operation by the air carrier at the authorized minimums for an approximate period of six months using the particular facilities, unless it is deemed necessary for an air carrier to demonstrate ability either as specified in (c) of sub-paragraph (iii) or under actual instrument conditions. The pattern of reduction in minimums is illustrated as follows: When present straight-in approach minimums are 400-1, the initial minimums for ILS or GCA will be 300-3/4 and at the end of an approximate six-month period of satisfactory operation using the particular facilities, the next reduction would be to 200-1/2.

(v) LOWEST LANDING MINIMUMS. Where no adjustment to the ceiling minimums is necessary for obstruction clearance as explained in (a) below, landing minimums of 200-1/2 are the lowest minimums which may be approved at the present time with all components of the ILS or GCA facilities in operation. Exception to these minimums may be made at specific locations where the installation of improved navigational aids so warrants.

(a) ADJUSTMENT OF CEILING MINIMUMS FOR OBSTRUCTION CLEARANCE. When the minimum obstruction clearance as described in CAM 60.46-8 cannot be met in the approach area, consideration will be given to establishing ceiling minimums which will afford comparable safety. In this event, the ceiling minimums will be determined by the application of the following formula to all obstructions projecting above the established slope line and located, in the case of an ILS procedure, in the approach area between the outer marker and the end of the runway, or in the case of a GCA procedure, in the approach area within a distance of five miles, outward from the end of the runway:

(i) Extend a line horizontally outward from the top of each obstruction and parallel with the runway center line to a point of intersection with the established slope line, and from that point extend a line vertically to a point of intersection with the glide path. The point of intersection at the highest level of the glide path as established by the foregoing formula will determine the minimum ceiling that may be considered.

(ii) Where minimum obstruction clearances cannot be met in the transitional and horizontal surfaces immediately adjacent to the approach area and when deemed necessary, consideration will be given to an adjustment in the ceiling minimums commensurate with the degree of interference presented by the particular obstruction or obstructions.

(iii) When application of the formula set forth in the preceding sub-paragraphs to an obstruction projecting above the established slope surface indicates a ceiling of less than 300 feet, the ceiling will not be reduced below 300 feet until it has been determined by flight checks that the lower ceiling may be authorized.

(4) PPI APPROACH. Minimums for a PPI approach will be established in the same manner as outlined in paragraphs (c)(1)(i) and (c)(1)(ii) above for a regular or circling approach.

(5) AIRPORTS NOT SERVED BY A RADIO NAVIGATIONAL OR LET-DOWN FACILITY.

(i) TAKE-OFF MINIMUMS. Take-off minimums for both two and four-engine aircraft may be approved as low as 300-1 if, after a consideration of all obstructions in the immediate vicinity of the end of the runway used, and of the facilities and procedures used to avoid all obstacles in the take-off area, it is determined that a safe climb to the minimum en route altitude can be made.

(ii) LANDING MINIMUMS. Landing minimums as low as 1000-1 may be approved for airports located outside of control zones; and as low as 1000-3 for airports located in control zones if, after consideration of the terrain in the vicinity of the airport and the traffic density in that area, the Administrator deems that operations at these minimums assures an adequate level of safety.