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U. S. Department of Commerce — Civil Aeronautics Administration

Civil Aeronautics Manuals and supplements thereto are issued by the Office of Aviation Safety, Civil Aeronautics Administration, for the guidance of the public and are published in the Federal Register and the Code of Federal Regulations.

Supplement No. 1 — June 22, 1950

SUBJECT: 60.46
Instrument Approach Procedure

SPECIAL NOTICE

Pending such time as it will be possible for the CAA to issue a complete Civil Aeronautics Manual 60 including the appropriate Civil Air Regulation, there will be issued from time to time supplements such as this containing rules, policies, and interpretations in the form of pages to a manual. These pages should be retained by the recipient and combined with others that will be released periodically, thus permitting the compilation of all material on this particular regulation in one file. These supplements will be distributed by the CAA free of charge until such time as it is possible to release a complete Manual 60. Upon publication of the manual which will include all supplements to date, it will be placed on sale at the Government Printing Office.

This procedure eliminates the use of the Aviation Safety Release for the publication of CAA material explaining or implementing Civil Air Regulations and as time permits, all prior Aviation Safety Releases of this type will be replaced either by a complete manual or a supplement such as this.

The numbering system for this material follows exactly that of like material published in the Federal Register. The Civil Air Regulation is quoted using the numbering system established by the Civil Aeronautics Board and the Federal Register. CAA material is identified by appending a dash to the regulation number and then numbering as outlined in the attached pages. In this particular instance, the appended number is 10 because CAM 60.46-1 through 9 have been published in the Federal Register. They are reproduced in the Flight Information Manual or other CAA publications.

60.46-10 Ground Controlled Approach Procedures Determination

The Office of Aviation Safety announces the attached policy concerning the formulation and approval of ground controlled approach procedures. The

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attached new page headed "CAR 60.46 Instrument approach procedure." should be retained as the first in a series of similar statements that will be issued explaining or implementing Civil Air Regulation 60.

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Director, Office of
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Attachment

Distribution: Air 4, 4A, 5, 6, 9, 14,
22B-1 (3 each), 22C (3 each),
22C-1 (3 each), 33 (3 each), 33-1 (3 each),
33A, 40 all tabs, 40F-1

"CAR 60.46 Instrument approach procedure. When instrument let-down to an airport is necessary, a standard instrument approach procedure prescribed for that airport by the Administrator shall be used, unless:

"(a) A different instrument approach procedure specifically authorized by the Administrator is used, or

"(b) A different instrument approach procedure is authorized by air traffic control for the particular approach, provided such authorization is issued in accordance with procedures approved by the Administrator.

"NOTE: Standard instrument approach procedures prescribed by the Administrator are published in the CAA Flight Information Manual, for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Such procedures have been carefully investigated with respect to pattern and terrain clearance. Safety would not permit several aircraft to make simultaneous use of more than one instrument approach procedure unless such operations were controlled."

60.46-10 GROUND CONTROLLED APPROACH PROCEDURES DETERMINATION. (CAA policies which apply to section 60.46.)

(a) GENERAL. The policies set forth herein will be used by the Civil Aeronautics Administration in formulating and approving ground controlled approach procedures prescribed in CAM 60.46-11. However, the safe completion of a ground controlled approach procedure involves a dual responsibility. This responsibility includes (1) the interpretation of the information received by the controller on the radar scope and the relaying of this information to the pilot of the aircraft, and (2) the acceptance and compliance by the pilot with the advice received from the controller.

(b) INITIAL APPROACH PROCEDURE. The initial approach to the GCA will normally be made on the associated primary navigation facility, radio range or radio beacon, or from an intersection thereof.

All altitudes pertaining to initial approach on any approved route will not be less than the minimum initial approach altitude established for the associated radio facility. Where it is necessary to establish an initial approach altitude from directions other than over an approved route, an altitude will be prescribed which will provide vertical and lateral clearance in accordance with standardized radio range procedures set forth in CAM 60.46-3.

(c) TRANSITION TO GCA. During the approach on the associated primary facility, the pilot will notify approach control of his intention

to use the GCA system. The ground controller will normally take over when the aircraft is within approximately 25 miles of the airport. When necessary to insure positive identification, and on being so advised by the ground controller, the pilot will execute turns as directed by the ground controller.

(d) PATTERN.

(1) ESTABLISHMENT AND APPROVAL. Patterns will be established and approved by the Civil Aeronautics Administration for the completion of a GCA procedure and the guidance of the ground controllers. A pattern will normally provide for a final turn and/or interception of the final approach course at a distance of not less than five miles from the approach end of the runway to be used, and, wherever possible, a pattern will be designed to accomodate both right and left-hand turns into the final approach course. The ground controller will advise the pilot of the headings and altitudes to be flown and will also issue instructions to be followed in the event radio communications with the aircraft cannot be maintained.

To provide the flexibility required for air traffic control purposes, the ground controller may deviate from the pattern courses as required to provide separation from other aircraft and to make allowances for wind conditions, speed of aircraft, direction from which aircraft are approaching, or other reasons which may require deviations therefrom, provided that the minimum obstruction clearances are strictly adhered to.

(2) ALTITUDES. Except as provided below, all altitudes pertaining to the GCA pattern prior to interception of the final approach course will be at least three miles on either side of the pattern track, and will provide at least 500 feet above all terrain and obstructions to flight located within an additional two miles on either side of the pattern track. When an aircraft is observed to have definitely passed an altitude limiting feature or obstruction, the ground controller may descend the aircraft to a lower altitude, provided that the lower altitude affords the minimum obstruction clearances set forth above with respect to other obstructions farther along the course to be flown.

The interception of the final approach course shall normally be made at a distance not less than five miles from the approach end of the runway to be utilized, and the minimum altitude shall not be less than 1,000 feet above airport elevation and not less than 500 feet above all terrain and obstructions to flight, provided the reduction in terrain clearance is made within five miles of the point of interception. If, due to obstructions, it is necessary to intercept the final approach course at an altitude higher than 1,000 feet above airport elevation, sufficient distance must be available along the course line to allow descent to the established ceiling minimums.

(3) PARTIAL EXECUTION OF PATTERN. Where the foregoing terrain and obstruction clearance can be maintained, and at the discretion of the ground controller, a GCA pattern may be executed in part only, provided the final approach course can normally be intercepted not less than five miles from the approach end of the runway.

(e) FINAL APPROACH. The term "final approach" is defined as that portion of the approach procedure where the ground controller signifies that the aircraft inbound has intercepted the final approach course, and descent to final approach altitude is commenced.

(f) OBSTRUCTION CLEARANCE FOR FINAL APPROACH. The approach zone to instrument runways, together with the minimum obstruction clearances required for glide path is defined as:

(1) APPROACH SURFACE. The approach surface is an inclined surface located directly above the approach area. The dimensions of the approach area are measured horizontally.

(i) LENGTH. The approach area has a length of 50,000 feet beginning 200 feet from the approach end of each instrument runway and extending outward on the extended center line of the runway.

(ii) SLOPE. The slope of the approach surface along the runway center line extended is fifty to one (50:1) for the inner 10,000 foot section and forty to one (40:1) for the outer 40,000 foot section.

(iii) WIDTH. The approach area is symmetrically located with respect to the extended runway center line, and has a total width of 10,000 feet at a point 200 feet outward from the approach end of the runway. The approach area flares uniformly to a total width of 4,000 feet at the end of the 10,000 foot section, and to a total width of 16,000 feet at the end of the additional 40,000 foot section.

(2) HORIZONTAL SURFACE. The horizontal surface is a circular plane, 150 feet above the established airport elevation, having a radius of approximately 12,000 feet from the reference point at the center of the airport and connecting with the transitional surfaces or approach surfaces as hereinafter specified.

(3) TRANSITIONAL SURFACES. The transitional surfaces are inclined planes with a slope of seven to one (7:1) extending upward on either side of, and at right angles to, the runway center line or the runway center line extended.

Transitional surfaces inward from the approach end of the runway extend upward to an intersection with the horizontal surface from lines which are level with, parallel to and 500 feet from the runway center line.

The transitional surfaces for 200 feet outward from the approach end of the runway extend upward to an intersection with the horizontal surface from lines which are level with the runway center line at the approach end of the runway, and are parallel to and 500 feet from the runway center line extended.

Transitional surfaces more than 200 feet outward from the approach end of the runway extend upward from the outer edges of the approach surface to an intersection with the horizontal surface where the approach surface is below the horizontal surface, and for a lateral distance of 5,000 feet where the approach surface is outward from the horizontal surface.

(4) MINIMUM OBSTRUCTION CLEARANCE. For that part of the approach from the interception of the ground controller's glide path by the aircraft, the minimum terrain and obstruction clearance is that obtained between a two and one-half degree glide path passing through a point 20 feet above and 500 feet inward from the approach end of the runway, and the fifty to one (50:1) and forty to one (40:1) approach surface as previously defined.[1]

(5) CRITERIA. The minimum clearance in feet is a function of the distance D outward from the point at which the glide path intercepts the runway at zero altitude as follows:

(i) For D less than 10,950 feet, minimum clearance 0.02366D + 28 feet.

(ii) For D between 10,950 feet and 5 miles, minimum clearance 0.01866D + 83 feet.

Example: If an obstruction is 10,250 feet from the glide path unit, formula (i) would apply, and the minimum clearance above the obstruction = (10,250' X 0.02366) + 28' = 243' + 28' = 271'.

It should be noted that the criteria provides a minimum clearance of approximately 500 feet at five miles from the runway intersection point with a gradually reduced clearance from that point inward. This clearance is a minimum requirement. However, a greater clearance may be necessary due to terrain features adjacent to the approach area of the instrument runway or peculiarities of the installation which are revealed by flight check.

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[1]This is the condition when the glide path extended inward and downward from the point 20 feet above and 500 feet inward from the approach end of the runway intersects the runway at zero altitude 750 feet inward from the approach end of the runway or at normal position of the ILS glide path unit.

(g) GLIDE PATH SETTING. Where the minimum obstruction clearance can be obtained in the approach area and adjacent transitional surfaces inward from the point of interception with the controller's glide path, the glide path will be set to the normal optimum setting of two and one-half to two and three-fourths degrees. This will result in obtaining the desirable intersection of the glide path at a point approximately 200 feet above and 4,250 feet outward from the runway intersection point.

Where terrain and obstruction clearances more than that established by the criteria can be provided, the glide path may be set at a lesser angle. The minimum glide path angle will be two degrees.

When necessary to obtain the minimum obstruction clearance, the glide path may be raised to a maximum angle of three degrees. Angles greater than three degrees will not normally be used. Where the minimum obstruction clearance cannot be obtained with the maximum three degree glide path angle and the length of the runway permits, consideration may be given to locating the point at which the glide path intercepts the runway inward from the standard location at a distance necessary to obtain the specified minimum clearance.

(h) ADJUSTMENT OF CEILING MINIMUMS FOR OBSTRUCTION CLEARANCE. When minimum obstruction clearance cannot be obtained with a maximum three degree glide path angle, and the length of the runway does not permit a compensating adjustment, consideration will be given to establishing ceiling minimums which will afford comparable safety. In this event, the ceiling minimums will be determined by application of the following formula to all obstructions projecting above the established slope line and located in the approach area within a distance of five miles outward from the end of the runway.

(1) FORMULA. 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.

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.

(i) SURVEILLANCE (PPI) APPROACH. The ground controlled approach utilizing the surveillance scope may be authorized when the position of the aircraft can be definitely determined and the flight path controlled by means of the surveillance scope under the following conditions:

(1) The ground electronics equipment is sufficiently accurate and free from ground clutter, to assure positive aircraft identification and azimuth course guidance.

(2) The obstruction clearance between the end of the runway to be used and a point five miles out meets the criteria presently required for standard radio ranges (300 feet clearance above all obstructions two miles each side of the center line of the runway extended).

(3) Satisfactory patterns are provided which will insure that the aircraft on final approach will be at or above the altitudes specified in section (d) Pattern at a point five miles from the approach end of the runway to be used.

(4) Weather minimums are prescribed which are equal to or better than the regular (i.e., circling) minimums approved for that particular airport.

(j) MISSED APPROACH.

(1) STANDARD MISSED APPROACH. A standard missed approach will be specified and utilized when necessary. The missed approach will be initiated at the point where the aircraft has descended to the altitude of the authorized ceiling minimum for the type of approach being made (PAR or PPI), unless previously directed by the ground controller. In the case of a precision approach (PAR), the ground controller will not permit the aircraft to deviate below the center line of the glide path to a distance greater than that afforded by a line of one-half degree from the beginning of the glide path. Should the aircraft continue below this line, the ground controller will advise the pilot to initiate a missed approach procedure.

(2) ALTERNATE MISSED APPROACH. An alternate missed approach procedure will be specified where considered necessary. An alternate missed approach procedure may be used only on prior approval of Air Traffic Control.

(k) OPERATION PERSONNEL FOR GCA EQUIPMENT. Normally, ground controlled approach procedures will be established at those installations operated by Civil Aeronautics Administration personnel. Before establishing a ground controlled approach procedure at an installation which is not operated by CAA the operating agent will be required to furnish a list of all personnel responsible for operating the GCA equipment, and to certify that the personnel are competent in their respective duties. The operating agency will also be required to establish a training program for the training of the personnel concerned in standardized GCA phraseology.