

14
~~C-O-N-F-I-D-E-N-T-I-A-L~~

60
CIVIL AERONAUTICS AUTHORITY
BUREAU OF FEDERAL AIRWAYS
TECHNICAL DEVELOPMENT DIVISION

Washington

NOTE NO. 21

A PLAN TO FACILITATE APPROACHES AT CONTROLLED AIRPORTS

D. M. Rainey
Air Transport Section

January
1940

A PLAN TO FACILITATE APPROACHES AT CONTROLLED AIRPORTS

SUMMARY

The rapid growth in air carrier schedules during the past three years requires improved efficiency in expediting arrivals and departures at the major terminals. During overcast or instrument conditions at certain times of the day some terminals have reached the saturation point in number of arrivals that can be handled. Since the standard procedure used for approaching airports, while on instruments, is a fairly lengthy process an improved method is desirable and would immediately increase the capacity of the terminals. Since an improved plan should also be simpler a gain in potential safety would likewise be expected. With these objections in mind a possible plan for improved approach procedure has been developed and is herein presented for consideration.

INTRODUCTION

During instrument conditions costly delays are sometimes experienced due to the necessity of holding arriving aircraft at prescribed levels while each in turn works a problem of orientation. The time required for orientation should be lessened in the interest of economy and dispatch.

In addition to the skill required of pilots for instrument approaches their attention must also be given to preparations for landing, such as the lowering of landing gear and flaps, prior to arrival over the cone of silence. The adoption of a simplified plan of instrument approach procedure, making it unnecessary to pass

over the cone, would eliminate the possible errors of timing due to wind conditions, and the possible reversal of off-course signals. It would also decrease the necessity for skillful effort now required to make the approach. With the attainment of these objectives in view, the following plan is submitted.

Plan

The present program of the Civil Aeronautics Authority involves the installation of fan type markers on the approach legs of principal radio ranges, located approximately 30 miles from the station. These markers are intended primarily for use as holding points for Air Traffic Control. It would seem unfortunate to restrict them exclusively to such use, particularly when they may be so readily adapted to a system which would materially reduce traffic congestion, and speed up approaches.

If, in addition to the 30 mile markers, inner markers were installed approximately two miles from the airport boundary or range station, dependent upon the course alignment, the inner markers could be used to serve as reference points in determining the airplane's position. With markers so installed, instrument approaches could be made directly toward the station, or airport.

This arrangement would permit the pilot to start letting down to a predetermined safe minimum altitude at the instant he intercepted the fan marker, and continue at this altitude until he reached the inner marker indication. It would also enable him to line up with the runway to be used, under the existing wind

conditions, without the necessity of circling the field, and in most cases would permit him to establish contact shortly after passing the inner marker.

Under extreme instrument conditions it might be necessary to proceed directly to the radio range and work the usual procedure problem. In any case, the time consumed would be considerably less than that under the present procedures, since the aircraft has then arrived over the cone of silence at a relatively low altitude. Aircraft being held at other fan markers could be released in turn as each approaching ship established contact.

Wherever a course of the radio range is aligned to permit a direct approach to the airport from the cone of silence, it would be unnecessary to install inner markers on that leg since the cone of silence "Z" marker already serves in this capacity. Figure 1 represents, diagrammatically, this plan of installation.

Receiving Equipment

The present receiver used for the reception of ultra-high frequency markers is equipped for three audio frequency channels, only one of which is now utilized. The fan and "Z" type markers, operate on a frequency of 75 megacycles, and are modulated with a 3,000 cycle tone. The proposed inner markers should operate on the same frequency and could be modulated on 400 cycles. This would define clearly to the pilot the particular type of marker signal being received.

CONCLUSIONS

The proposed plan will simplify instrument approach procedures, increase the safety factor and efficiency by utilizing the radio range for directivity, and available types of markers, as position indicators.

After the pilots become familiar with the procedure, the approach could be performed in practically the same amount of time that is consumed in a direct visual contact approach.

The receivers now used for the reception of the ultra-high frequency markers, could be adapted to permit the realization of this plan at small cost. In addition, the inner marker could later be used in conjunction with the instrument glide path.

