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ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SUBJECT: FLYING DME ARCs

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1. PURPOSE. This advisory circular describes the procedures and techniques for intercepting DME arcs from radials, maintaining DME arcs, and intercepting radials and localizers from DME arcs.

2. DEFINITION. The United States Standard for Terminal Instrument Procedures (TERPs) sets forth criteria for utilization of DME arcs for initial and intermediate segments of instrument approach procedures.

   The following terms appear in this circular:

RMI	-	Radio Magnetic Indicator
CDI	-	Course Deviation Indicator
OBS	-	Omni Bearing Selector
TERPs	-	United States Standard for Terminal Instrument Procedures

3. DISCUSSION.

   a. The FAA is publishing an increasing number of instrument approach procedures which incorporate DME arcs. The procedures and techniques given in this circular for intercepting and maintaining these arcs are applicable to any facility which provides DME information. Such a facility may or may not be collocated with the facility which provides final approach guidance.

   b. It is recognized that the pilot, particularly in a single pilot operation, is too busy during an instrument approach to use formulas for the computation of leads for arc and radial interception, therefore, none are included in this circular.

Initiated by: AAC-240

c. Unless the pilot is highly proficient in the use of his airborne equipment and in performing a specific procedure, it is recommended that DME arcs be flown only when RMI equipment is available.

4. DME ARC INTERCEPTION. A DME arc interception of approximately 90° may be required when flying on a radial either inbound toward or outbound from a facility (Figure 1).

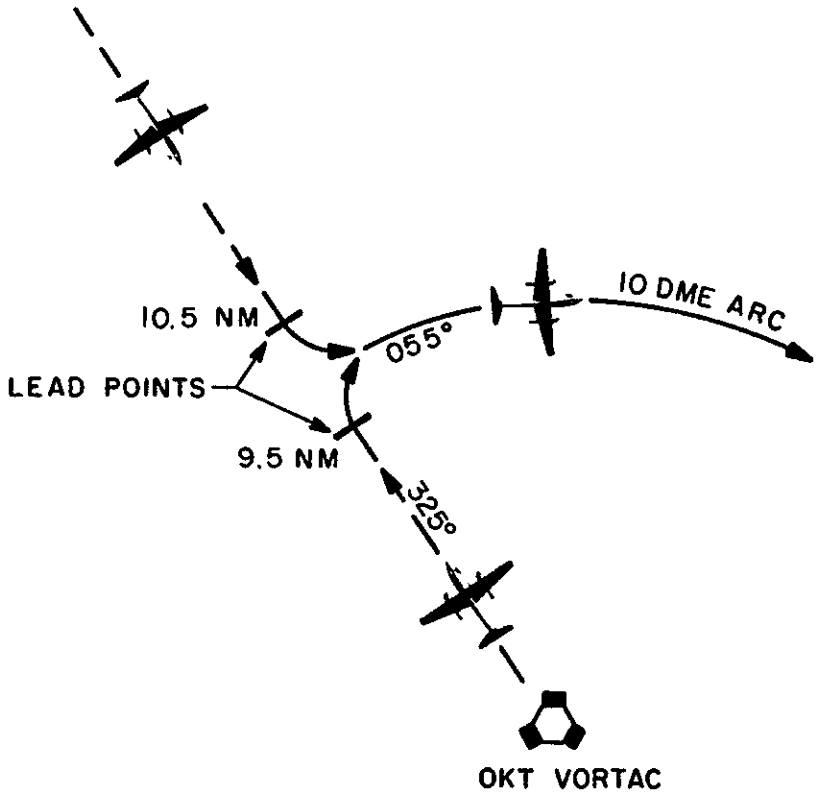

FIGURE 1. DME ARC INTERCEPTION

Referring to Figure 1, follow these steps to intercept a 10 DME arc when outbound on a radial.

a. Track outbound on the OKT 325° radial, frequently checking the DME mileage readout.

b. For groundspeeds below 150 knots, a .5 NM lead is satisfactory.

c. Upon reaching the lead point (9.5 NM) turn approximately 90° to the arc and set the OBS to 335°. The heading will be 055° in no-wind conditions.

d. During the last part of the intercepting turn, monitor the DME closely. If it appears the arc is being undershot, roll out of the turn early. If the arc is being overshot, continue the turn past the originally-planned rollout point.

The procedure for intercepting an arc when inbound on a radial is basically the same, the leadpoint being 10.0 NM plus .5 NM or 10.5 NM.

5. MAINTAINING THE DME ARC. In flying the DME arc (Figure 2), it is important that the pilot keep a continuous mental picture of his position relative to the facility. Since the drift correction angle is constantly changing throughout the arc, wind orientation is important. In some cases, wind can be used in returning to the desired track. Arcs of large radii are easier to fly because of their "flat" curve. High groundspeeds require more pilot attention because of the higher rate of deviation and correction. Maintaining the arc is simplified by keeping slightly inside the curve. Thus, the arc is always turning toward the aircraft and interception may be accomplished by holding a straight course. If the aircraft is outside the curve, the arc is "turning away" and a greater correction is required.

a. With an RMI, in a no-wind condition, the pilot should theoretically be able to fly an exact circle around the facility by maintaining a relative bearing of 90° or 270°. In actual practice, a series of short legs are flown. To maintain the arc, proceed as follows:

(1) With the bearing pointer on the wing tip reference (90° or 270° position) and the aircraft at the desired DME range, maintain the heading and allow the bearing pointer to move 5° to 10° behind the wing tip. This will cause the range to increase slightly.

(2) Next, turn toward the facility to place the bearing pointer 5° to 10° ahead of the wing tip reference and maintain the heading until the pointer is again behind the wing tip. Continue this procedure to maintain the approximate arc.

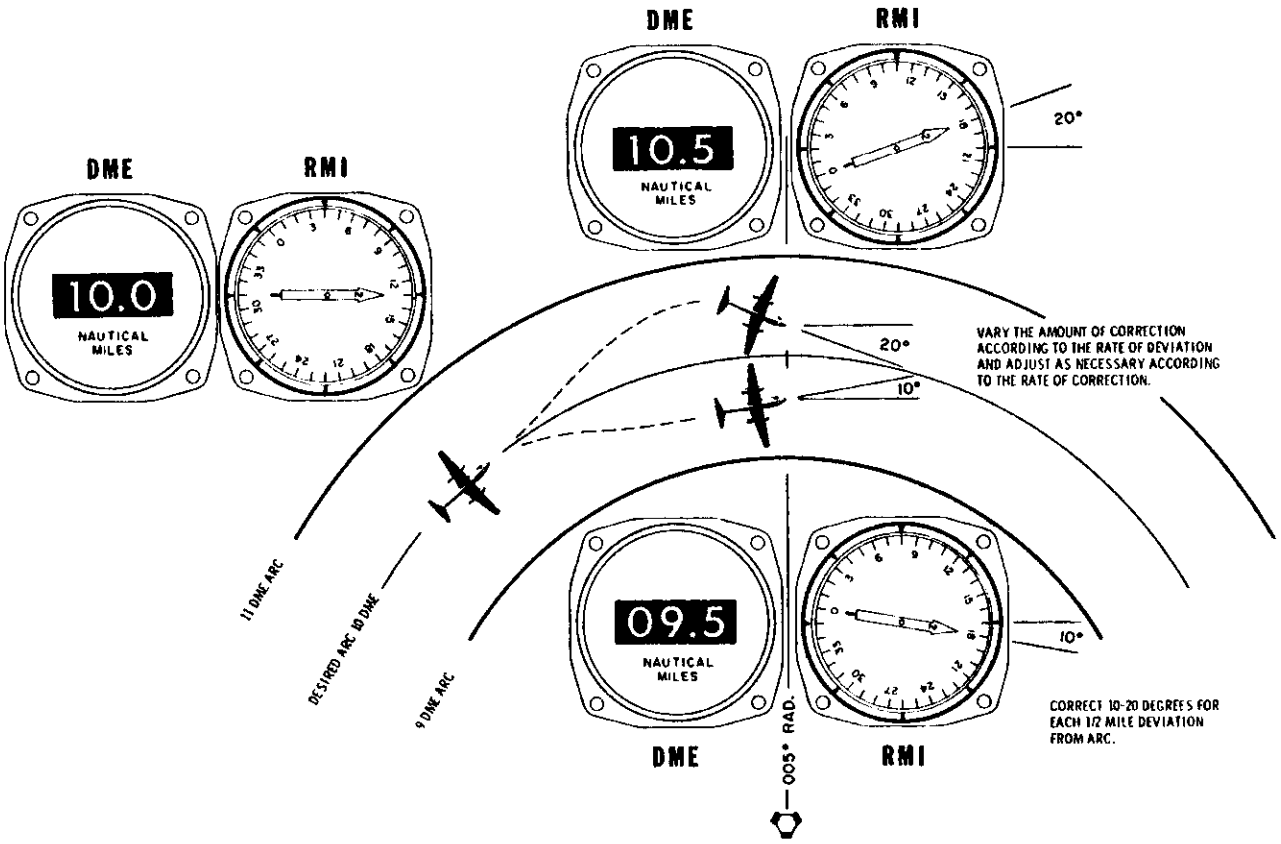

FIGURE 2. USING DME AND RMI TO MAINTAIN ARC

(3) If a crosswind is blowing the aircraft away from the facility, establish the reference ahead of the wing tip. If a crosswind is blowing the aircraft toward the facility, establish the reference behind the wing tip.

(4) As a guide in making range corrections, change the relative bearing 10° to 20° for each 1/2 mile deviation from the desired arc. For example, under no-wind conditions, if the aircraft is 1/2 mile outside the arc and the bearing pointer is on the wing tip reference, turn the aircraft 20° toward the facility to return to the arc (Figure 2).

7. INTERCEPTING A LOCALIZER FROM A DME ARC. The technique is similar to that described for intercepting a radial from an arc; however, lead radials are ALWAYS DEPICTED (Figure 3). At the lead radial, a pilot having a single VOR/LOCALIZER receiver should simultaneously begin his turn to the final approach course and set in the localizer frequency. With dual VOR/LOCALIZER receivers, one unit may be used to provide azimuth information and the other set to the localizer frequency.

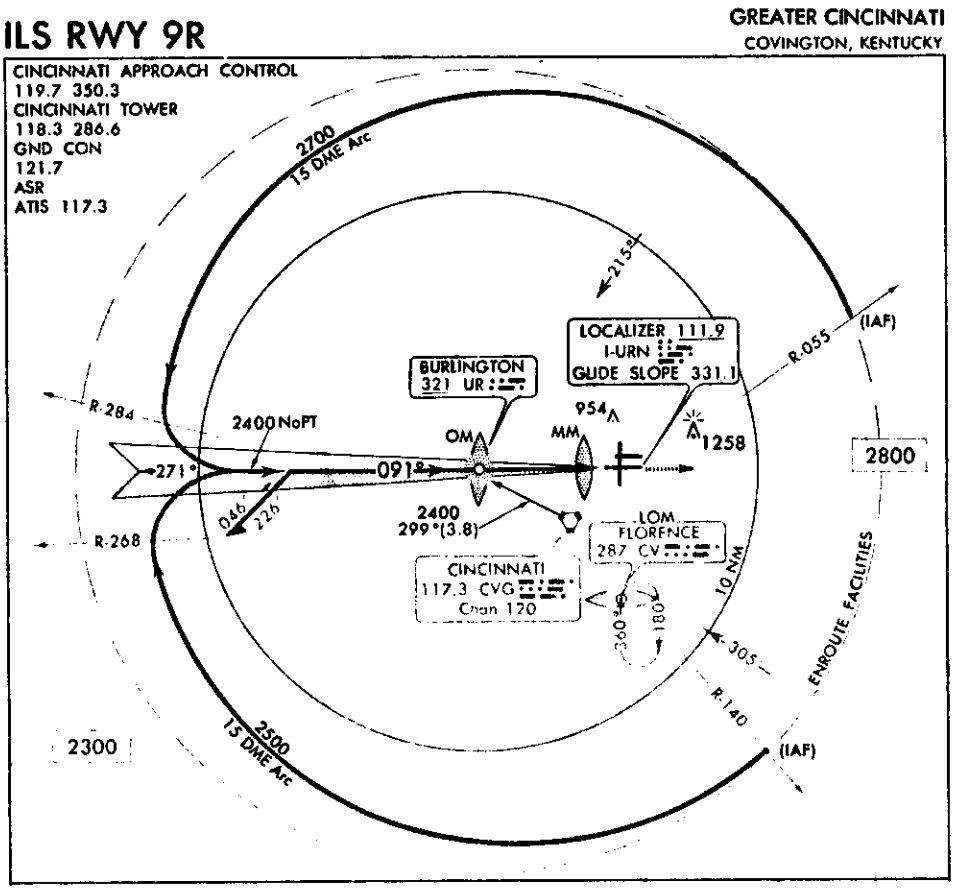

FIGURE 3. LOCALIZER INTERCEPTION FROM DME ARC
(lead radials are R-284 and R-268)

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b. Without an RMI, orientation is more difficult since the pilot does not have a direct azimuth reference. However, the procedure can be flown by using the OBS and CDI for azimuth information and the DME for arc distance.

Example (see Figure 1):

(1) If the rollout on the 055° heading places the aircraft on the arc, the DME will read 10.0 NM. If the CDI is centered (with the OBS set to 335°), the aircraft is crossing the 335° radial.

(2) If the CDI reads right of center and the DME reads 10.5 NM, the aircraft is outside (left) of the arc and approaching the 335° radial. Correct heading to the right and monitor the DME for closure with the arc.

(3) As the arc and the 335° radial are achieved, set the OBS ahead to 355° and correct heading 100° from the 335° radial (to a no-wind heading of 075°). Hold this heading until the 355° radial is crossed or the arc is intercepted. At this point, set the OBS ahead 20° and correct heading 100° from the radial the aircraft has intercepted. This technique will maintain a track slightly inside the desired arc (in no-wind conditions).

6. INTERCEPTING A RADIAL FROM A DME ARC. The lead will vary with arc radius and groundspeed. For the average general aviation aircraft flying arcs such as are depicted on most approach charts, at speeds of 150 knots or less, the lead will be under 5°. There is no essential difference between intercepting a radial from an arc and intercepting it from a straight course.

a. With an RMI, the rate of bearing movement should be monitored closely while flying the arc. Set the course of the radial to be intercepted as soon as possible and determine the approximate lead radial. Upon reaching this point, start the intercepting turn.

b. Without an RMI, the technique for radial interception is the same except for azimuth information, which is available only from the OBS and CDI.