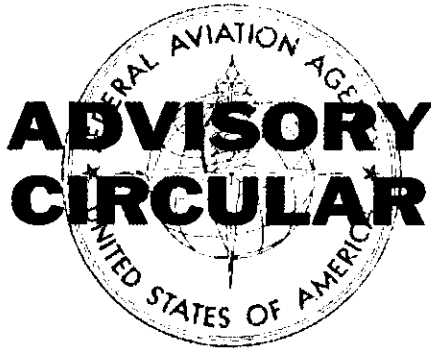


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# Federal Aviation Agency



AC NO: AC 90-27

AIR TRAFFIC AND  
GENERAL OPERATIONS

EFFECTIVE : 8/20/65

**SUBJECT :** Operation of Pictorial Display/Course Line Computer  
Equipment in the National Airspace System

1. PURPOSE. This circular sets forth the advantages to be gained by the utilization of airborne Pictorial Display/Course Line Computer (PD/CLC) equipment in conjunction with VOR/DME/TACAN ground facilities.
2. DEFINITIONS.
  - a. Pictorial Display (PD). An airborne equipment that displays to the pilot a continuous visual cockpit presentation of the geographical position of the aircraft, on a chart, with respect to the navigational environment.
  - b. Course Line Computer (CLC). An airborne equipment that computes bearing and distance information from airborne receivers and presents it for flight course guidance to any selected destination within the range of the ground station supplying the bearing and distance information.
3. BACKGROUND.
  - a. VOR/DME/TACAN ground facilities have an inherent capability of permitting more efficient airspace utilization than is now being realized. One method of effecting more efficient airspace utilization is through the use of Pictorial Display/Course Line Computer equipment (PD/CLC). Such equipment has been evaluated both through simulations and in operational environments in high-altitude jet aircraft, intermediate altitude pressurized aircraft, and a variety of low altitude unpressurized aircraft. These evaluations confirm the belief that additional safety and economic benefits could accrue to the airspace user by utilization of PD/CLC airborne equipment.
  - b. Fiscal limitations, siting problems, and frequency congestion have prevented the establishment of direct airways between all communities and the use of NAVAID facilities as approach aids at many locations.

PD/CLC equipment can extend the usefulness of VOR/DME/TACAN ground facilities by providing the equivalent of a VOR/DME/TACAN Station (Phantom Station) at any selected point within the coverage of the ground station. The Pictorial Display equipment provides the pilot with a continuous visual reference of the aircrafts position, on a chart, in relation to fixed facilities, the phantom station, and the intended route of flight. The increased flexibility of the VOR/DME/TACAN facilities through the use of phantom stations is readily apparent.

#### 4. OPERATIONAL ADVANTAGES.

- a. There is a need from a user standpoint for an aircraft instrument which will supplement the present rho theta navigation system by utilizing the area navigation capability which the ground facilities provide. Since early in the 1950's the FAA has been installing VORs with co-located DME or TACAN in order to provide area navigation capability where justified by air traffic volume. Therefore, the installation and use of PD/CLC equipment will be advantageous to the users in order to utilize the area navigation capabilities of the VOR/DME/TACAN system. Utilization of the full capabilities of the ground system cannot be considered complete without the Pictorial Display and/or Course Line Computer components.

#### 5. MAJOR BENEFITS TO USERS.

##### a. En Route.

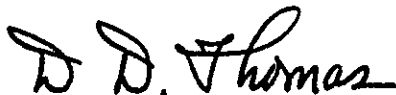
- (1) Reduces en route flight time by the establishment of direct IFR routes that are not now available. Flight evaluations of representative general aviation flight routes and air carrier route structures have shown reductions in en route distances exceeding 10%.
- (2) Enhances course tracking ability, and provides continuous visual position orientation. Flight evaluations have disclosed high accuracy levels for course tracking, plus the capability to double-check aircraft position by visual reference.
- (3) Permits the establishment of parallel or off-set routes where no VORTAC facility exists or where a facility cannot be sited. This may permit the use of an altitude which is desirable, but which could not be utilized because of prior assignment.

b. Terminal Areas.

- (1) Makes possible the establishment of instrument approach procedures for many airports that do not now have instrument approach capability. This is accomplished by the pilot positioning phantom stations in appropriate locations with reference to outlying airports.
- (2) Can provide for the establishment of straight-in instrument approaches where only circling approaches now exist. This also is accomplished by the pilot positioning phantom stations in appropriate positions with relation to airport runways.
- (3) Enhances safety while maneuvering under actual instrument conditions in terminal areas by providing continuous visual orientation capability in the cockpit.
- (4) Reduces communications workload by establishment of more diversified arrival/departure routes. This will reduce the need for radar vectors.

6. POLICY.

It is the FAA's policy to encourage orderly progression towards the further development and operational use of airborne PD/CLC equipment. The FAA will cooperate with appropriate manufacturers in the development of certification and installation standards at which time operational procedures will be developed and issued for IFR use of such equipment in the National Airspace System. The FAA's evaluation of PD/CLC equipment will be expanded to include its application to Helicopter IFR Operation.



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