

b. Area Navigation (RNAV)

1. General. RNAV is a method of navigation that permits aircraft operation on any desired flight path within the coverage of ground- or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these. In the future, there will be an increased dependence on the use of RNAV in lieu of routes defined by ground-based navigation aids. RNAV routes and terminal procedures, including departure procedures (DPs) and standard terminal arrivals (STARs), are designed with RNAV systems in mind. There are several potential advantages of RNAV routes and procedures:

- (a) Time and fuel savings;
- (b) Reduced dependence on radar vectoring, altitude, and speed assignments allowing a reduction in required ATC radio transmissions; and
- (c) More efficient use of airspace.

In addition to information found in this manual, guidance for domestic RNAV DPs, STARs, and routes may also be found in AC 90-100, U.S. Terminal and En Route Area Navigation (RNAV) Operations.

2. RNAV Operations. RNAV procedures, such as DPs and STARs, demand strict pilot awareness and maintenance of the procedure centerline. Pilots should possess a working knowledge of their aircraft navigation system to ensure RNAV procedures are flown in an appropriate manner. In addition, pilots should have an understanding of the various waypoint and leg types used in RNAV procedures; these are discussed in more detail below.

(a) Waypoints. A waypoint is a predetermined geographical position that is defined in terms of latitude/longitude coordinates. Waypoints may be a simple named point in space or associated with existing navaids, intersections, or fixes. A waypoint is most often used to indicate a change in direction, speed, or altitude along the desired path. RNAV procedures make use of both fly-over and fly-by waypoints.

(1) Fly-by waypoints. Fly-by waypoints are used when an aircraft should begin a turn to the next course prior to reaching the waypoint separating

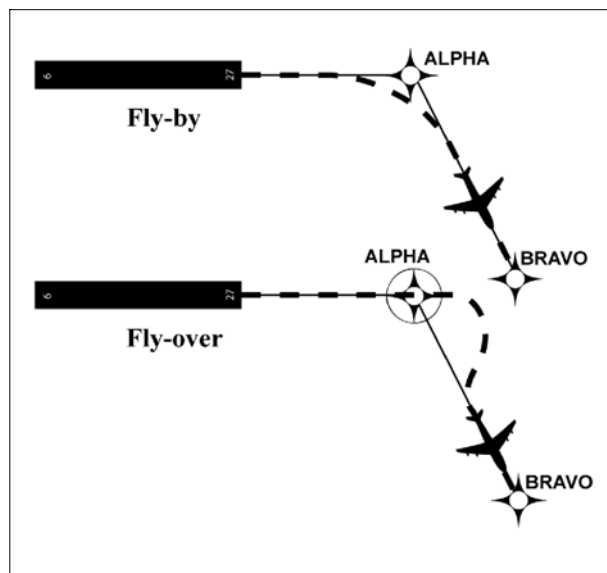
the two route segments. This is known as turn anticipation.

(2) Fly-over waypoints. Fly-over waypoints are used when the aircraft must fly over the point prior to starting a turn.

NOTE-

FIG 1-2-2 illustrates several differences between a fly-by and a fly-over waypoint.

FIG 1-2-2
Fly-by and Fly-over Waypoints



(b) RNAV Leg Types. A leg type describes the desired path proceeding, following, or between waypoints on an RNAV procedure. Leg types are identified by a two-letter code that describes the path (e.g., heading, course, track, etc.) and the termination point (e.g., the path terminates at an altitude, distance, fix, etc.). Leg types used for procedure design are included in the aircraft navigation database, but not normally provided on the procedure chart. The narrative depiction of the RNAV chart describes how a procedure is flown. The “path and terminator concept” defines that every leg of a procedure has a termination point and some kind of path into that termination point. Some of the available leg types are described below.

(1) Track to Fix. A Track to Fix (TF) leg is intercepted and acquired as the flight track to the following waypoint. Track to a Fix legs are sometimes called point-to-point legs for this reason. **Narrative:** “direct ALPHA, then on course to BRAVO WP.” See FIG 1-2-3.