

## What is P-RNAV?

### History:

B-RNAV – Europe introduced Basic RNAV (B-RNAV) in order to make better use of EUR airspace. The JAA TGL 2, revision 1 was the first reference document. Basic RNAV was implemented in European airspace in January 1998. Each EUR state has a slightly different flight level at which B-RNAV equipment is required but, unless you fly light aircraft at low levels, you need to be approved for B-RNAV operations. The FAA reference document is AC 90-96A (look at Appendix 1). Your FAA LoA or Part 135 operations approval MUST include B-RNAV operations (sometimes listed as RNP 5). **SEE RNP BELOW.**

RNAV (area navigation) – (General observations). When flight management systems become available to almost every operator they made it possible to fly a system of waypoints in space rather than navigate over conventional ground based nav aids. Many FMS systems make navigation resolutions by inputting signals from both ground based and satellite systems. Others use GPS only to provide navigation output to course guidance displays. B-RNAV was introduced before many general aviation aircraft had an FMS so an alternative had to be found that did not exclude users from the airspace. The JAA TGL 3, revision 1 was published to enable the use of GPS only to meet B-RNAV requirements. (See: AC 90-96A).

P-RNAV – A US operator will be familiar with the many and varied types of RNAV approaches and procedures published in the USA. I personally find it difficult to understand just how many different types of RNAV procedures are available. Many states in Europe also published a variety of terminal procedures (SID's and STAR's) based on B-RNAV lateral containment and B-RNAV operator approvals. Quite some time ago it was realized that a new navigation standard was required, especially where waypoints were located below MSA or MRVA (min. radar vectoring alt.) This is why the P-RNAV initiative was born. After 27 October 2005 any new European SID's/STAR's below MSA/MRVA will be designed to P-RNAV standards.

Is P-RNAV mandated? – NO!, but if an operator wishes to fly P-RNAV procedures they MUST be approved for P-RNAV by their state authority. It is worth noting that service providers have committed to keep at least one conventional procedure after P-RNAV operations have been published at a specific location.

Why P-RNAV? – The FAA reference document is AC 90-96A (look at Appendix 2). You will see from my previous comments that lateral containment is a very important factor to safe navigation in terminal areas. With aircraft following predictable ground tracks and a high degree of accuracy it also helps considerably with a "good neighbour policy". Other benefits may include shorter inbound/outbound tracks and flight time saving for operators.

What's so different about P-RNAV – FMS systems and navigation displays have to be compliant with the guidelines listed in AC 90-96A or the JAA TGL 10. If you apply for FAA approval you need to use the AC 90-96A. The documents have different wording but the technical requirements are the same. The biggest difference between P-RNAV and other types of RNAV is that you need to obtain a database from an "LoA Type 2 accredited supplier" who has been approved by the FAA or EASA to supply P-RNAV navigation databases which have been compiled to AC20-153 standards.

# EU P-RNAV

9/05

Why an approved database? – The database contains all the coded waypoint information necessary to fly a specific P-RNAV procedure including the different types of leg terminators. It has been designed to work with your specific FMS system by the supplier. When flying P-RNAV procedures it is forbidden for the flight crew to input their own waypoints or modify existing waypoints. This does not prohibit the crew from accepting a “direct to” clearance providing that the “direct to” waypoint is “called up” from the database.

What is wrong with any other type of database? – P-RNAV procedures are based on selected “(flight) Path Terminators” as defined in ARINC 424. These “leg types” have been coded into the database and selected so that equipped/approved aircraft follow defined trajectories between waypoints in P-RNAV airspace. Other databases do not have this coding nor have they been accuracy scrutinized to the same extent.

RNP – “I am approved for RNP-1 in the USA so I guess that I am approved for P-RNAV?”. The simple answer is NO. AC 90-96A addresses this issue on page 1, first paragraph. Operators intending to fly P-RNAV procedures must have operations approval from their administrator and it must be stated on an LoA or similar operations approval document for each aircraft.

What is RNP? – In the context of P-RNAV it is defined as meeting a track keeping accuracy of equal to or better than +/- 1 NM for 95 percent of the flight time.

“I have heard other definitions of RNP” – Despite there being many reference documents both the European and FAA authorities recognize that absolute definitions need to arrived at before we can satisfactorily define the requirements for RNP operations. It is worth repeating that in the context of P-RNAV the RNP value is purely related to lateral track keeping performance.

Should you need further information please do not hesitate to contact me at:  
[Phil.evans@eurocontrol.int](mailto:Phil.evans@eurocontrol.int) or tel: +32 2 729 4633, fax +32 2 729 4634.

You are welcome to freely circulate this paper to operators.

Phil Evans  
AFN User Support - Airspace / Flow Management & Navigation (AFN) Business Division.  
For RVSM and P-RNAV websites see: [www.ecacnav.com](http://www.ecacnav.com)