What's In My Database?

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As the airspace in Canada continues to move to a Performance Based Navigation (PBN) standard with the expanding use of RNAV, understanding what is available in the GPS or FMS database is more important than ever. In the past, the navigation facility on the ground was the critical element to navigation combined with the aircrafts navigation receiver. Now with the use of GPS and FMS, the navigation database required for those systems to function properly becomes the defacto navigation facility making the navigation database critical. The problem is that not all navigation databases are created equal.

NAV Canada Flight Operations conducts validation flights on all instrument procedures within the Canadian ANS to insure accuracy, fly-ability and correctness, whether they are based on ground-based navaids, or FMS/GPS (RNAV). For FMS/GPS procedures, special attention is given to the navigation database to ensure that the procedure is correctly coded. New procedures are tested and validated using the same end-to-end process used for any new procedure. Once the flight check confirms the procedure, it is then moved into the public realm for publication of the required chart, as well as inclusion in the public FMS/GPS navigation database via AIRAC.

However, while we flight check/validate all procedures using the latest and newest flight management systems available; your system may not have all of the available procedures. Depending on the age of your FMS/GPS system, the software level of your FMS/GPS system or a possible database size limitation set by the FMS/GPS manufacturer, your FMS/GPS may only have a certain selection of procedures. Also, some FMS manufactures charge for the database based on the number of procedures included, so in an effort to limit cost, someone in your company may have limited what you are receiving when your database contract was established.

Furthermore, your database may be limited by aircraft type, operational capabilities, approved approach types and crew training. There is little point in buying data for gravel runways when your aircraft type is not approved for gravel operations. Likewise, there is little point in having circling-only approaches included in your database when your crews are not trained for circling procedures. Many large air carriers filter out approach types they no longer train for such as NDB approaches, Localizer Back-Course approaches and circling-only approaches.

Below is an example of one FMS manufacturers' standard offering for its database:

Contents Public use airports with a hard surface runway

- Departure Procedures, SIDs, STARs, and FMS Arrivals for included airports
- Approaches and missed approaches for included airports
- Terminal waypoints for included airports
- Communication frequencies for included airports

Navaids including VORs, DMEs, VOR/DMEs, TACANs, ILSs and NDBs

Airways excluding ATS routes

Note: Airports not meeting the criteria may be added to the database for an additional fee.

Airports Specific airports can be added or removed from the database

Gates Specific gate information can be added or deleted from the database

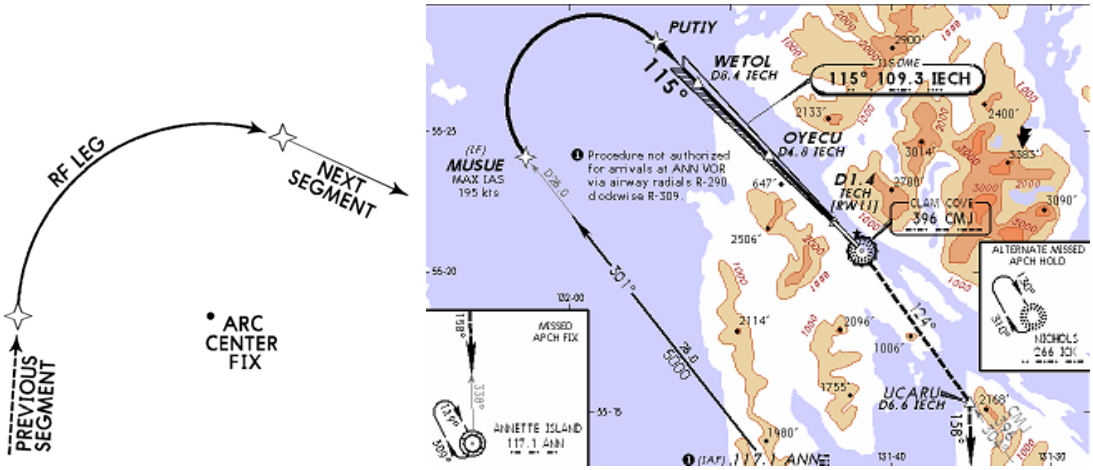
Regions Geographical coverage can be matched, limited or expanded as per customer request.

Runways The standard included runway length is 3500'. This can be varied at customer request.

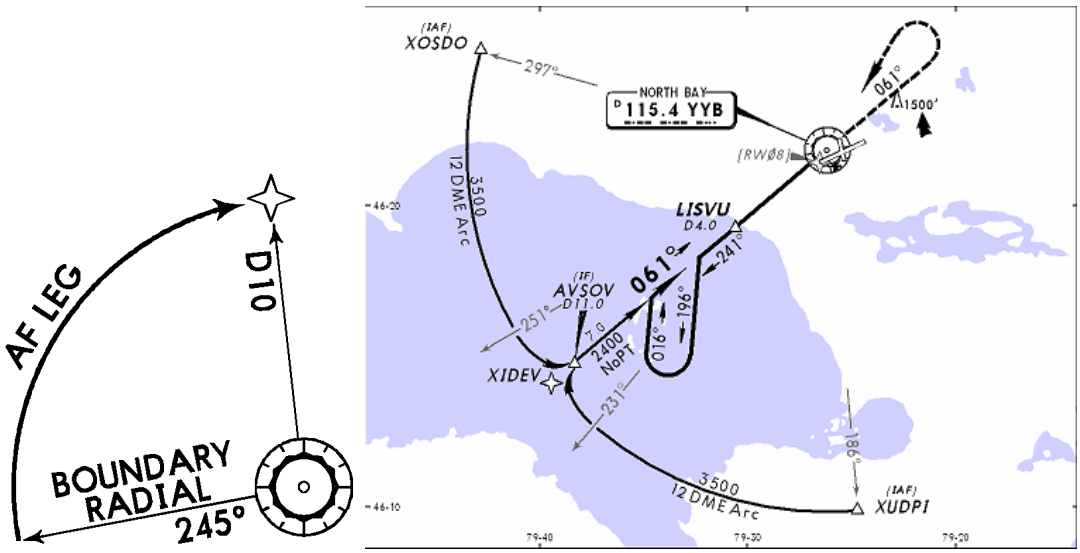
Tailored Procedures

May be included on request for an additional charge (I.E. Canadian RCAP procedures operators are considered "tailored")

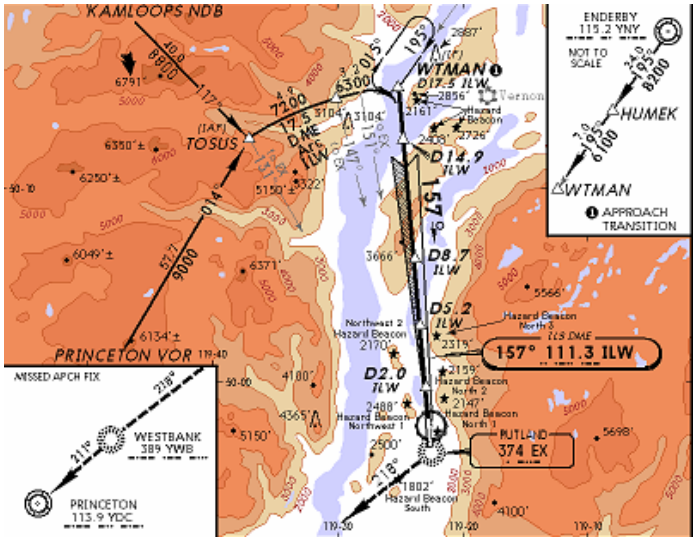
As an aircraft operator, once you have selected your data from the pick list above, then you have to determine if your FMS/GPS system is capable of flying all twenty-three ARINC 424 procedural leg types. Some earlier FMS/GPS models cannot fly AF leg types or RF leg types and as a result, instrument procedures containing those leg types will not be included in your FMS/GPS database.



ARINC 424 RF Leg Type
(Between MUSUE - WETOL)



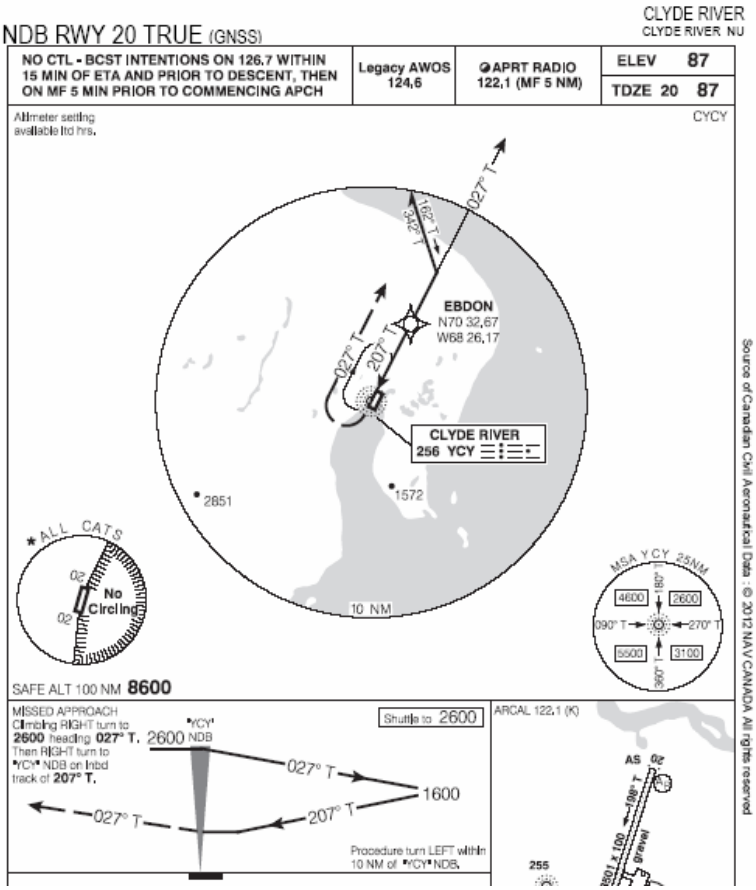
ARINC 424 AF Leg Type
(Between XOSDO - XIDEV and XUDPI – XIDEV)



In the case of Kelowna, we have an example of an arc between TOSUS and WTMAN that looks like it should be coded in your FMS/GPS as an AF leg, but in fact it is not. Under ARINC 424 coding rules, an ARC or AF leg can only be coded using a VOR/DME combination.

In the case of the TOSUS - WTMAN arc transition in Kelowna, the ARC is based on NDB/DME combination which is not allowed. This is a case where past instrument approach design procedures and policy is not compatible with GPS/FMS operational coding requirements.

Some conventional instrument approach procedures may also not be included in your FMS/GPS database due to ARINC 424 leg type coding rules. In the case of the procedure for Clyde River, NU, the leg type required for the missed approach is a CF or Course-to-Fix leg as per the approach design. As the ARINC 424 coding rules require a VOR/DME to be within 40 NM to allow for the use of this leg type, and a VOR/DME does not exist within 40 NM of this airport, this missed approach cannot be coded. Therefore the entire procedure cannot be coded and will not be included in your database.



As instrument procedures are reviewed and redesigned, consideration for ARINC 424 coding rules are evaluated and applied where possible thereby allowing for the conventional procedure to be coded.

Another major issue is where the airport has two approaches of the same type but different names. Kelowna is a great example of this where it has the ILS/DME 1 in the CAP and the ILS/DME 2 in the RCAP. As many of the legacy FMS/GPS systems cannot handle multiple approach path indicator names, the FMS/GPS manufacturer will normally choose to include only the CAP or Public procedure. If as an aircraft operator you decide that you would prefer the ILS/DME 2 (RCAP) procedure to be included in you database, you can contact your FMS/GPS database supplier and have the procedures switched in your database, normally for a fee.

Summary

As Canada's ANSP, NAV Canada distributes via AIRAC all instrument procedures for publication and inclusion in navigation databases. The database warehouses code all procedures that NAV Canada provides via AIRAC into their master navigation database. In turn, the FMS/GPS manufactures purchase that data from the database warehouses to

sell to you, the end user. The FMS/GPS manufactures only include the data for your subscription that your FMS/GPS is capable and certified to fly, and that you have requested to be included in your database.

If you find a database problem, or you have questions about why a certain procedure is not in your database:

1. Contact your FMS/GPS manufacturer/database supplier. They can normally advise you quickly as to whether the issue is related to your selected subscription, FMS/GPS capability, coding error or source navigation data problem.
2. If it is a coding error, the FMS/GPS manufacturer will contact the database warehouse that supplied them with the data to see if the error can be corrected, and likely a "Database Alert" will be issued by either the database warehouse and/or the FMS/GPS manufacturer.
3. If it is a source navigation data error, the database warehouse will contact the ANSP that supplied them with the data to advise them of the potential error. In this case you will likely see a "Database Alert" issued by either the database warehouse or the FMS/GPS manufacturer and a NOTAM issued by the affected ANSP.

Database management is critical to the safe transition to a PBN operating environment. An excellent starting point for most aircraft operators is to establish a solid relationship with the FMS/GPS manufacturer and their database supplier to fully understand the capabilities of their FMS/GPS system and what you have actually purchased for navigation data.