

# AERONAUTICAL INFORMATION CIRCULAR 3/18

## AREA NAVIGATION INSTRUMENT APPROACH PROCEDURE WITH TURNS AT THE FINAL APPROACH FIX

In the Spring 2012 edition of NAV CANADA's publication *Direct Route*, an article was published detailing the differences in flight management system databases. These details included the dependency of the databases on both the type of flight management system and its age or software version. Differences in database content, such as which area navigation (RNAV) approaches are available, types of approach transitions or leg types that are available, and which types of conventional procedures were coded, were discussed. A copy of the article can be obtained here: <<http://www.navcanada.ca/EN/media/Publications/Direct-Route-Spring-2012-EN.pdf>>

Recent information from Transport Canada's National Aircraft Certification Branch has also discovered operational hazards that may be present depending on the method by which the flight management system was integrated into the aircraft flight director, autopilot, or both.

The aircraft may not transition to approach mode, may not capture the final approach course, may commence an undesired early turn to capture the final approach course outside the final approach fix (FAF), or may overshoot the final approach track if:

- the aircraft flight management system was integrated into the aircraft using the instrument landing system (ILS) or microwave landing system (MLS) flight director/autopilot channels; and
- the flight director/autopilot channels are used to provide lateral and vertical coupling for RNAV approaches; and
- the RNAV approach contains a track change at the FAF or final approach waypoint (FAWP).

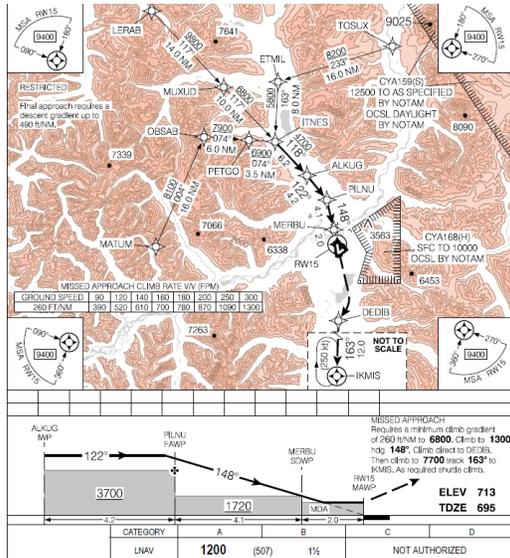
This type of system behaviour results from avionics integration design choices that were made prior to the advent of approach procedures with turns at the FAF or FAWP.

Aircraft that use flight management system (FMS) pitch and roll steering directly to the flight director/autopilot will not exhibit this behaviour.

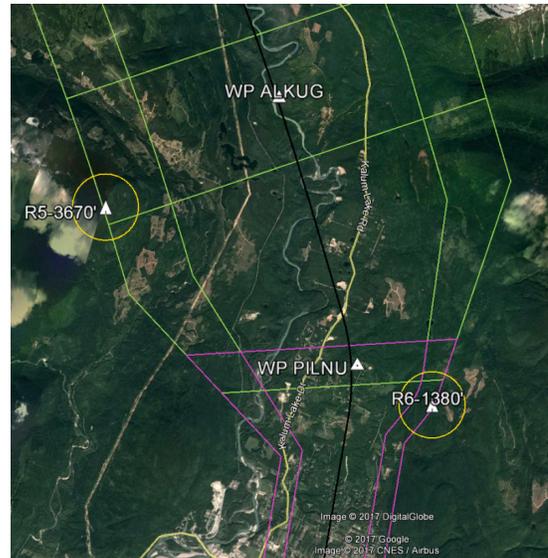
Track changes at the FAF are allowed for, by design, to be up to 15° for a localizer performance with vertical guidance (LPV) and lateral navigation (LNAV) vertical navigation (VNAV) approaches, and up to 30° for LNAV and localizer performance without vertical guidance (LP) approaches.

Track changes at the FAF are utilized where terrain, obstacles, or restricted airspace preclude a straight line transition from the intermediate segment to the final approach segment. Aircraft that are properly equipped to fly the approach with a track change at the FAF receive the significant safety benefit of an approach with straight in landing minima, versus a circling only procedure that would have otherwise been required or no approach at all.

By way of example, Terrace, British Columbia Runway 15 was only accessible via a circling procedure prior to the LNAV Runway 15 being published.



**Terrace RNAV (LNAV RWY 15)**



**Obstacle Assessment Area  
Intermediate Area (Green), and;  
Final Area (Magenta)**

Aircraft equipped to provide guidance to the flight director/autopilot via pitch and roll steering will correctly execute a smart turn at PILNU. These aircraft will stay coupled to LNAV and advisory VNAV or vertical speed (VS) correctly in the transition from the intermediate segment.

Aircraft utilizing the ILS/MLS channel into the flight director autopilot will either treat PILNU as a flyby waypoint and overshoot the final approach course (late intercept) or, at 2 nautical miles (NM) outside the FAF when the approach is activated, turn left to intercept the final approach inbound track of 148° (early intercept). Either scenario would place the aircraft away from the design approach track centreline and closer to the edge of the primary obstacle assessment area.

RNAV (LPV) approaches may have the same characteristics with a turn of up to 15° at the FAF. Below is an example of the RNAV approach at Trois-Rivières Quebec (CYRQ) with LPV and LNAV minima, where the approach is limited by restricted airspace to the south.

