26 August, 2021

Mr. Ricardo Domingo
Executive Director, Flight Standards Service
Federal Aviation Administration
800 Independence Avenue, S.W.
Washington, DC 20591

Dear Rick,

The Performance-based Operations Aviation Rulemaking Committee (PARC) Steering Group is pleased to submit the following recommendations for your consideration:
1) Navigation Working Group (NAV WG) – Recommendation for a change to the 8260.3 as specifically to address a design limitation with Established on RNP (EoR).
2) Pilot/Controller Phraseology and System Integration Working Group (PCPSI WG) – ICAO Phraseology Harmonization Consensus and Recommendations

The NAV WG would like to recommend a change to EoR criteria that would remove the requirement to have a unique path for at least 50 seconds prior to crossing the first final approach course. There has been some PBN work done at one location that has yielded a design that cannot be built without removing this requirement. The attached paper below will highlight the issue and the reason for the recommendation.

The PCPSI WG had a Phraseology Harmonization Sub-Group tasked with looking at current US pilot/controller and looking at how the US could better align with the ICAO phraseology used for "Climb-Via" and "Descend Via". This is an especially complicated topic as the US took the lead in implementing this phraseology and then ICAO adaption took a slightly different approach. This leads to confusion for all pilots as we generally do not work just one region and have to adapt to difference meaning all over the globe.

The PARC looks forward to the FAA's review of these reports and any feedback on the items contained within. Thanks again for your help in improving the NAS.

Sincerely,

Ronald Renk
Chairman, PARC

Cc: Mark Steinbicker
        Chris Hope
        Brian Townsend
        Mike Cramer

Established on RNP (EoR) Approach Criteria

May 2021

Background
Since the inception of Established on RNP (EoR), many safety and environmental benefits have been realized, but the selection of wrong runways, in the flight management computer, resulted in the removal of important approach transitions. To help solve this issue, changes were made in FAAO 8260.3(Section 15-5-3) that required designers to build a 50 second unique flight path to provide air traffic controllers sufficient time to identify the pilot selection of a wrong runway.

One requirement of the unique path criteria instructs procedure designers to maintain the unique path until crossing the first final approach course (FAC). This requirement has proven to be problematic in procedure design meetings due to the downwind leg being moved further away from the runway (i.e., approximately a 6 NM wide downwind vs a 4 or 5 NM wide downwind) and the different distances in the radius to fix (RF) legs that has created aircraft overtake issues.

Issue
Current EoR approach criteria requires the design of a unique path that is separated from other approach tracks by 0.5 NM for at least 50 seconds prior to crossing the first FAC. However, the requirement to maintain the track separation, until crossing the first FAC, is preventing many approaches from being designed due to the need to increase the final controller's airspace. Additionally, event review of aircraft flying the wrong approach has shown once the aircraft starts the base leg turn, the controller must quickly see the error, and the pilot must promptly respond to prevent a loss of separation. The ability to identify and manage a wrong runway selection must be an integral part of approach design, but other procedure design methods can be used to comply with this requirement.

The current requirement to maintain a unique path (Figure 1) for at least 50 seconds until crossing the first FAC effects the location of the downwind leg. RNAV (RNP) approaches designed using the requirement shown below, moved the downwind leg path away from the airport creating airspace and environmental issues.

FAAO 8260.3E Guidance (Figure 1)
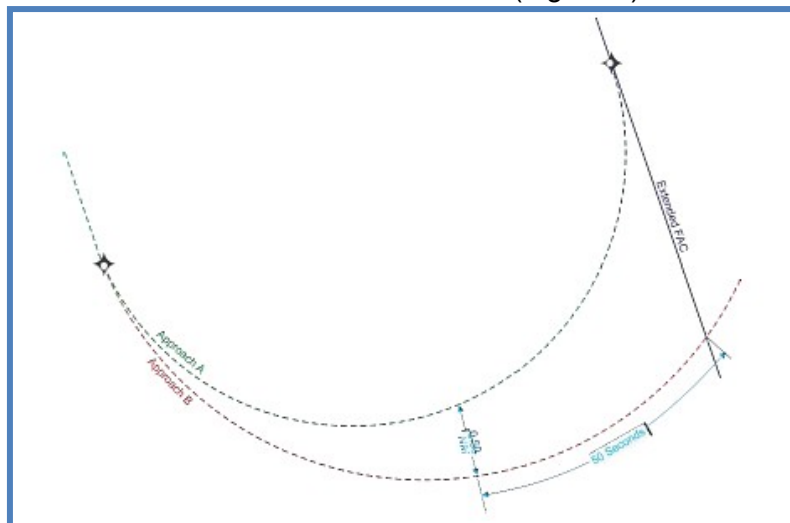
Recommendation
The recommendation of the PARC Navigation WG, is to remove the requirement to maintain a unique path until crossing the first FAC. To accomplish this goal the PARC Navigation WG reviewed several design concepts that provide early detection of a wrong runway selection. Each instrument approach procedure (IAP) design was separated a minimum of 0.5 NM for at least 50 seconds, or with diverging flight paths, and contained less complex nose to tail separation requirements.

The example below (Figure 2) shows one concept that will allow a feeder controller to assist with an early detection of a wrong runway selection. Standard Terminal Arrival Route (STAR) runway transitions would allow the feeder controller to determine what runway has been programmed in the flight management computer prior to the first waypoint in the approach.

The approach to the right runway would begin at waypoint A and the approach to the left runway would begin at waypoint B. Each STAR runway transition, and instrument approach procedure (IAP) initial or immediate approach fix would be separated by a minimum of 0.5NM.

When the feeder controller transfers control to the final controller, they can quickly and accurately determine what runway has been programmed in the flight management computer for each aircraft. This type of procedure design provides a dual verification process and more efficient management of a wrong runway selection.

The red circle shows the crossing point of the unique path prior to the first FAC, and each inbound flight would be separated using standard traffic separation rules for more than 50 seconds using this type of design.

EoR Approach Example (Figure 2)
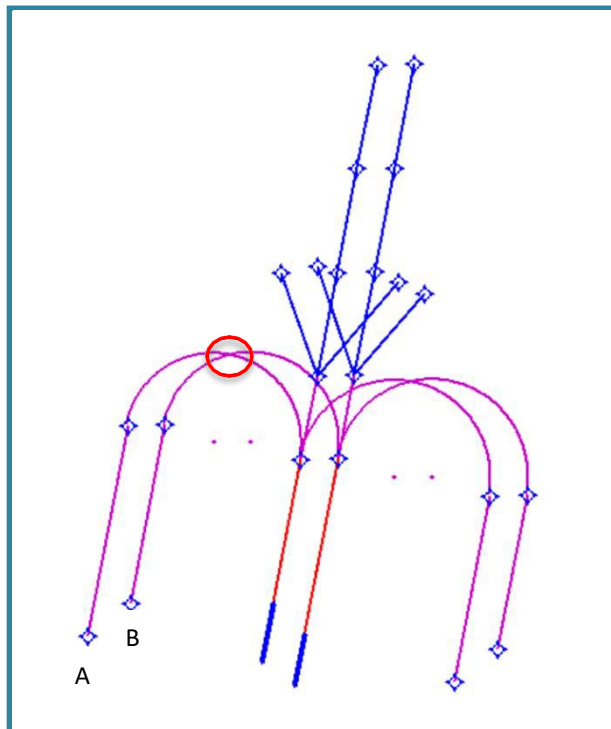
Nav Canada has successfully implemented RNAV (RNP) approaches at Calgary (Fig. 3 and Fig. 4) to parallel runways that cross prior to the first FAC. Each IAP connects to an RNAV STAR at OVEBI or MUPUV, and each approach has a unique path to runway 17L and 17R.

From the west side, both approaches cross prior to the first FAC at approximately OKUMI. From the eastside, both approaches cross prior to the first FAC at approximately VITAS. Both approaches diverge at OVEBI and MUPUV giving the controller greater than 50 seconds to verify the correct approach is flown.

This design allows the controller to verify the aircraft is on the correct approach after crossing OVEBI and MUPUV. If a wrong runway has been programmed into the flight management computer, a small heading and altitude assignment, by the controller, places the aircraft on a downwind leg prior to losing separation with other approach traffic. Nav Canada has no reported issues with this type of design.

EoR Approach Example

CYYC RNAV (RNP) Y Rwy 17L (Fig. 3)   **CYYC RNAV (RNP) Y Rwy 17R (Fig. 4)**
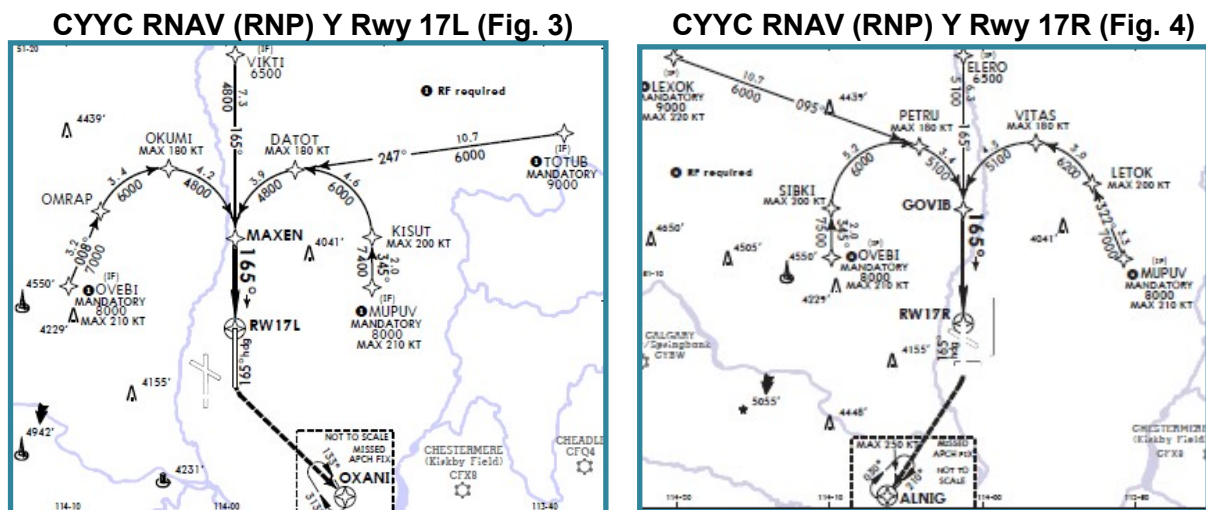
Removing the requirement to continue a unique path until crossing the first FAC will allow safe and efficient IAP designs. The key components of this recommendation are listed below and each provide a positive step toward increased EoR operations while decreasing risk.

- Separation of IAP's using different or diverging tracks.
- With 3 NM or greater nose to tail separation, vertical separation can be achieved.
- Future wrong runway alerting tools can be developed for ATC.
- Early detection of wrong runway selection can be achieved.

Conclusion

The PARC Nav WG recommends the requirement to maintain a unique path until crossing the first FAC be removed. Approval of this recommendation will allow a safe method of retaining needed EoR approach transitions within the NAS.

PARC PCPSI
Phraseology Harmonization
Consensus
Recommendations

July 9, 2021

Phraseology is the backbone of air traffic communication.

Therefore, due to various forms of phraseology used across the world and the issues those differences create; we will evaluate what the FAA and others are using to ensure our NAS provides a safe, sound, and efficient means of communication, whether done verbally or via DataComm.

Contents

Introduction

Communication is defined as the successful conveying or sharing of ideas and information. Throughout the world, specific phraseology is used both verbally and by means of data communications via Controller Pilot Data Link Communications (CPDLC) to communicate clearances and other instructions. A common understanding of the intention of the phraseology used is essential to aviation safety because it is the tool with which controllers and pilots build a shared mental model. Global harmonization of phraseology supports this idea by ensuring common understanding, while regional phraseology differences develop miscommunications and inhibit the construction of a shared mental model.

Despite International Civil Aviation Organization's (ICAO) recent adoption of Climb Via (CV) and Descend Via (DV) procedural phraseology, there remain significant variations in the phraseology used by dissimilar Air Navigation Service Providers (ANSPs). Several of these ANSPsincluding the FAA, ICAO and other international organizations, such as NAV CANADA, are working to identify these variations and make efforts to standardize. Some of those differencesremaining between the US and these desperate phraseology systems have been identified and extensively discussed.

To address some of these reported phraseology concerns being experienced in the current system, the Performance-Based Operations Aviation Rulemaking Committee (PARC) was approached by Industry to determine their willingness to discovery possible solutions. They agreed and responded by tasking the Pilot-Controller Procedures and Systems Integration (PCPSI) Workgroup (WG) to form the Phraseology Harmonization Subgroup. It is comprised of several experts representing many lines of business within government and industry including safety, airline & general aviation operations, air traffic, flight standards, data communications, and human factors. The PARC Steering Group (SG) scoped the Task/Activity as:

> *"The group will select and prioritize tasks (issues), to include: Performance-based Navigation (PBN) and Data Comm are core workareas, including phraseology, pilot-controller communication and coordination, and **global harmonization of phraseology and procedures with initial emphasis on Canada and Mexico."***

One particular issue of concern brought to the PCPSI WG was the use "except maintain" used in conjunction with a Climb Via SID (CV SID). The Allied Pilots Association expressed concern and presented ASAP data over the use of "CV SID except maintain (altitude)" followed by a standard CV clearance after departure, and confusion associated with "climb and maintain" and whether published constraints are cancelled. Additionally, NAV CANADA detailedtheir cancelation of CV and DV ICAO phraseology after three weeks of operation due to pilots accustomed to flying in the United States and confusion about the phraseology's intended

meaning. Discussion on these two topics revealed further opportunity to simultaneously address these issues, while harmonizing with ICAO Doc 4444. This would not only solve problems in North America, but also progress global harmonization of CV/DV phraseology.

PCPSI Methodology

Acknowledging the task of determining as many of the factors and unintended consequences of making a change to phraseology would be a massive undertaking, the co-chairs of the PCPSI started with some basic organizational decisions. At the outset of the PCPSItwo Co-Chairs were named, one from ATC and one from industry. The primary objective of thechairs was to record and guide discussion. Other members were invited from multiple facets ofthe industry to bring their expertise and gathered data to the discussion of the impacts any change would have on the system. A full list of members is attached in Appendix B.

Considering the given Scope Statement focusing on harmonizing North America and the possibility of fully harmonizing with ICAO, the group elected to organize the conversation into comparisons of each system, independent of each other, against the current FAA system and establish what effects the changes would make to our airspace system (see figure one). The group determined there were three comparisons it would consider. They are:

1. **ICAO:** Full harmonization with ICAO Doc 4444.
2. **North America:** Compare NAV CANADA's and SENEAM's phraseology to determine if wecould align, or more closely align our systems.
3. **Others:** A brief conversation of other creative possibilities not specifically in use, or mandated. This section also included a discussion of partial compliance with ICAO.
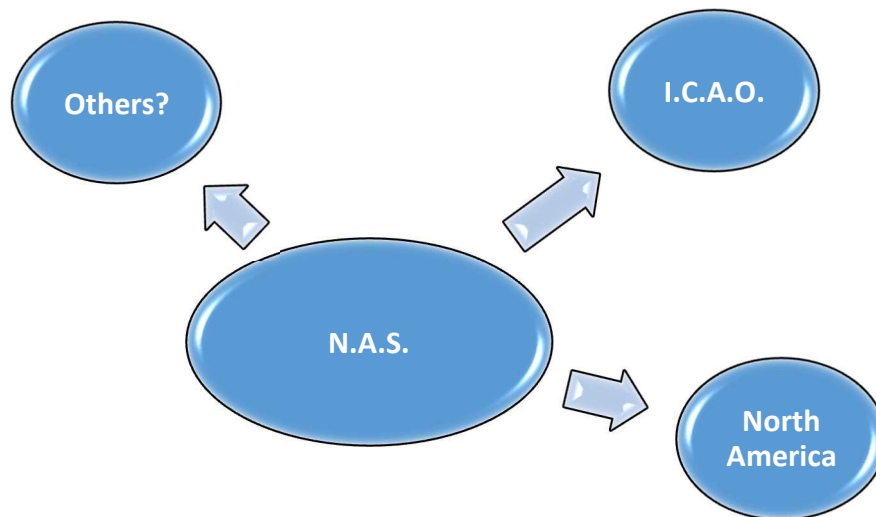

Figure 1: Comparing NAS to Considered Options

Once discussion was broken into these major categories, a methodical process was developed and remained consistent across the separate system discussions (see figure 2). This process consisted of five steps accomplished sequentially for each system. Once all the systems had been analyzed they would be combined into a final recommendation. The Five steps include:

1. **Identify:** Determining the consequential differences between ANSPs.
2. **Describe**: Defining and recording the differences for reference and common understanding.
3. **Organize**: The PCPSI then sensibly ordered the differences for logical conversation flow.
4. **Discuss:** The major effort was robust conversation and analysis of data. The meetingnotes of these conversations will be provided for SG/FAA reference.
5. **Consensus:** Once discussion had reached a point where the identified differences hadbeen discussed consensus was recorded.

| Identify | Describe | Organize | Discuss | Consensus | Recommend |
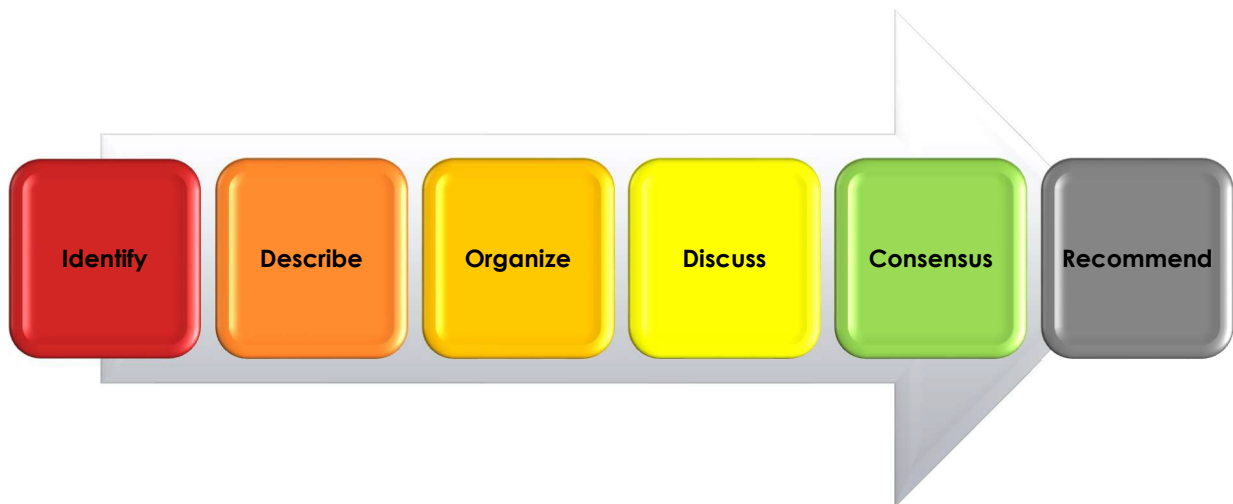
Figure 1: Methodology

The results of this process are outlined below and represent the PCPSI consensus recommendation. One recurring theme of the recommendations is the impact change may have on the system and the need to manage that change with an effective guiding team. Analysis of any change will require a desperate list of experts contributing relevant information at critical decision points. The PCPSI's recommendation to establish FAA change process leadership and analysis via a panel of industry SMEs. The following is guidance for directing thepanel through the best options for harmonization our group discovered during constructive debate and intensive discussion.

PARC PCPSI Recommendations

The Panel

NATCA participation throughout discussion was a requirement for any meaningful conversation about changing FAA phraseology. Near completion of discussion, the NATCAProcedures Committee (NAPC) held a meeting covering all the Phraseology Subgroup discussions and impending recommendation guidance and effectively summed the focus moving forward:

> *"…the recommended changes from the PARC Phraseology Harmonization SG associated with the proposed phraseology changes…require HITL simulations or other measures including both controller and pilot participation. A further analysis would help identify those challenges presented from various pilot-controller interactions and provide the experts with the necessary qualitative-based information for recommending changes to FAA Orders and AIM."*

Considering this focus, the PCPSI recommends the FAA establish a Phraseology Management Panel (PMP) with a Scope/Task of activity of managing the process of implementing the herein PCPSI phraseology harmonization subcommittee recommendations. This panel would ideally remain small (under 20 permanent members) and meet on a regular cadence. PMP members include a permanent membership of:

- FAA/Industry Co-Chairs: Empowered to bring required resources to bear
- PCPSI Phraseology Harmonization co-chairs to liaison with the PCPSI membership
    a. Currently Bennie Hutto -NATCA and Eric Morse -Delta
- Human factors SMEs from the FAA, NATCA, and Industry
- SMS/SRA management
- Pilot and controller union representation
- Industry Technical Pilots

Working alongside the panel and on a as needed basis would be other appropriate support and representation SMEs to add clarity on relevant topics. They include as an example, but not all inclusive:

- HITTLs
- DATA COMM
- ERAM
- FAA Air Traffic Organization
- Other

		SUMMARY COMPARISON		
ANSP	CV/DV Immediate or Discretionary	CV/DV Restriction CANCELLATION	NAME of Procedure Restated	Altitude Stated with CV/DV
FAA	Discretionary	Restrictions are removed with "and Maintain"	Yes	Only when an interim altitude is issued
SENEAM *OFFICIALLY ICAO	?	ATC would state explicitly	?	Yes
NAVCANADA *ICAO NONCOMPLIANT	Immediate	ATC would state explicitly	No	Yes
ICAO	Immediate	ATC would state explicitly	No	Yes
RECOMMEND	Discretionary	ATC would state explicitly	No	See specific recommendations

Table 1: Summary Comparison

CV/DV Immediate or Discretionary

Problem Statement: Inconsistencies between ANSP expectations of when a pilot initiates a cleared altitude change on a CV/DV procedure exists depending on where the clearance is issued. Having a harmonized understanding of the clearance and expected pilot response is critical to avoiding miscommunication and deviations from intent.

Discussion: In the US, a CV/DV clearance implies the pilot can initiate the maneuver at their discretion to comply with published constraints. According to ICAO and Canada, the pilot is expected to initiate the maneuver immediately unless the controller explicitly states, "when ready". Since the current system is a 'fail safe' discrepancy as pilots not familiar with the US interpretation would (safely) begin the maneuver as soon as the clearance is received, no change is recommended by the PCPSI. If Nav Canada implements CV/DV phraseology, a discretionary descent in conjunction with CV/DV clearances could be possible.

CONSENSUS RECOMMENDATION for explicit timing of CV/DV changes in altitude:
- No changes to current FAA procedure.
- Further discussion and action should be taken to convince ICAO to define CV/DV clearances as "discretionary" to realize the full environmental and operational benefits of the clearance.

CV/DV Restriction Cancelation

Problem Statement: The implicit removal of procedural restrictions with ''CLIMB AND MAINTAIN'' and ''DESCEND AND MAINTAIN'' phraseology in the current FAA system is contraryto the NAV CANADA and ICAO intended meaning of the same phraseology. This leads to occurrences where altitude restrictions on SIDs and STARs are disregarded by pilots when operating in other phraseology systems. This was considered a threat to global aviation safety.

Discussion: In the FAA, intervening restrictions are removed with the words "and maintain" so that a clearance to "Descend and maintain [altitude]" on a DV procedure cancels all published altitude restrictions to the issued altitude.

The PCPSI identified the use of "and maintain" as inconsistent with every other use of "maintain" in the US and is inconsistent with the operational meaning published in the Global Operational Data Link Document (GOLD). Additionally, removing the implicit cancelations of altitude restrictions linked to this phraseology would help the FAA align with Global Datalink meaning of CLIMB and DESCEND messages as defined in the Global Operational Datalink Document (GOLD – ICAO 9869), making it future proof while harmonizing with ICAO and NAV CANADA. Note: The US would continue to use the instruction to "maintain" an altitude as an instruction to *stay* at a given altitude.

CONSENSUS RECOMMENDATION on CV/DV restriction cancelation:

- Rescind use of "and maintain" for restriction removal on CV/DV procedures.
  - Addresses current implicit removal of restrictions using "and Maintain"
  - This will also most closely align with current and future builds of DATACOMM (Baseline 2).
- A clearance to Climb/Descend to an altitude on a route without published altitude constraints will state "Climb Flight Level One-Nine Zero" for a clearance to climb to FL190 or "Descend five thousand" for a clearance to descend to 5000.
- To clear an aircraft to climb/descend on a route of flight with remaining published altitudes and/or speeds and all the constraints are to be cancelled. Phraseology added to accomplish this would be:

  "Cli*mb/Descend one-five thousand, cancel/delete speed/alt restrictions*" or
  "*Climb/Descend unrestricted one-five thousand*"

- **Perceived Benefit:** There are numerous documented cases where the use of "climb and maintain" and "descend and maintain" have been used in conjunction with SIDs/STARs containing published altitudes and pilots that are not sure if they should comply with the

published constraints. This change provides a more explicit clearance that is not open to interpretation.

Name of Procedure Restated

Problem Statement: Inconsistencies exist between ANSPs on what information is required to be stated on each radio call with respect to CV/DV procedures, specifically after the initial clearance has been issued. Harmonization would reduce confusion when dealing with different procedure types in different airspaces.

Discussion: The FAA is the only ANSP requiring pilots and controllers to restate the name and number of a procedure with each subsequent ATC facility check-in when a CV/DV clearance is used. Most other ANSPs use the more generic instruction "Descend via STAR" or "Climb via SID"after readback of the initial clearance. Discussion also revealed pilots have low levels of compliance with correctly stating the procedure name for various reasons. Because of this, pilots have used the wrong procedure name in subsequent communications with ATC, even though it was programmed and flown correctly. This means that while the readback of a clearance is usually considered to be useful in ensuring that the pilot and controller have a common understanding of the clearance, it is not necessarily true in the case in the repeating of the procedure name on every check-in. The PCPSI recognizes these points and recommends removal of the current FAA requirement to state the procedure name and number on subsequent check-ins, aligning with other ANSPs.

CONSENSUS RECOMMENDATION for use of NAME and # of Procedure:

- An initial voice communicated CV/DV clearance will require the controller to state the procedure name, number, and runway transition (if applicable). The pilot will read back the full clearance as a verification.
- CV clearances issued and accepted by PDC or CPDLC is considered a read back and full clearance verification. DV clearances issued and accepted by CPDLC are considered a readback and full clearance verification.
- Subsequent check-ins do not require the procedure name, number, and runway transition to be restated.
- Additionally, a controller is not required to state the Procedure name and number if a CV/DV clearance is reissued on the same procedure in which the initial clearance was given.

- Additional contact with ATC on all subsequent radio calls include only "Climbing Via SID/Descending Via STAR".

<div align="center">

Call-sign; (current alt) CV/DV SID (*assigned alt)or
Call-sign; (current alt) / (*assigned alt), CV/DV SID

</div>

-if required.

- **Perceived Benefit:** Current requirements for pilots checking on frequency with a CV/DV clearance involve several elements to recite to the controller. This is often missed and/or clipped. This change reduces extraneous communications.

Altitude Stated with CV/DV

Problem Statement: Non-harmonized ANSP clearance procedures and altitude issuance creates international pilot confusion, training burdens, and extrenuous pilot controller communication. NAV CANADA has stated this is a top priority topic of harmonization with their system, so the topic was afforded a great deal of thorough discussion and debate. It has also created safety concerns with the issuance of "except maintain", especially when used in certain common situations such as departure. Success of this concept in the National Airspace System (NAS) depends largely on a commitment from ATC to issue procedure altitudes.

Discussion: Various ANSPs across the globe are using explicit clearances to varying levels. This variation can create confusion for pilots using multiple airspace systems. Furthermore, in the FAA CV/DV system, the PCPSI wants to eliminate pilot confusion surrounding the use of "exceptmaintain." Evidence was presented to the group demonstrating pilot confusion after an "exceptmaintain" was issued followed by a CV clearance. While it appears, those issues do not seem toclearly transmit to the DV domain, the PCPSI expressed interest in being explicit with altitude clearances but could not determine which altitude should be issued without further testing.

CONSENSUS RECOMMENDATION on issuance of explicit altitudes with CV/DV clearances:

Ideally, the Top or Bottom altitude should be stated with the initial CV or DV clearance which would provide an explicit altitude for the pilot. This could possibly be more achievable with SIDs than with STARs. Due to robust PBN procedures, airspace complexities, human factors, and the lack of appropriate automation tools, it would be challenging to adopt this change in the near term for DV. We recommend the use of additional assessment to determinewhich of the below is the best path forward. Specific consideration during testing should be given to maintaining the current benefits of OPDs. The PCPSI puts forward the following three options:

- Standard Anchor Altitude**:** The best possible, repeatable, assignable altitude is agreed anddrafted in LOA/SOP between ARTCCs-TRACONs based on airport/procedure flow.
    a. **Note:** For DV, the altitude would need to be low enough to prevent inadvertent level-offs.
    b. **Perceived Benefit:** This could provide the closest benefit to issuing the bottom altitude with DV clearances and reduce the need for multiple stepdown clearances and the potential for error and frequency congestion.
- Boundary altitude issued: This would be done by agreement/LOA and the issuing controller would issue boundary limit.
    a. **Note:** This may/will require numerous DV clearances that could impact procedure benefits, increase frequency congestion.
- Blended Altitude Assignment**:** This recommendation would retain the current FAA element of referencing the published procedure chart to determine the "Top" or "Bottom" altitude when a CV or DV clearance is issued and an explicit altitude is not stated – "Descend Via STAR"/"Climb via SID".
    a. If ATC issues an altitude other than the Top or Bottom altitude, it will be explicitly stated – "Descend via STAR, five thousand"/" Climb via SID Flight Level one nine zero."
    b. **Note**: STARs would require charting standards for publishing "Bottom" altitudes similar to the current "Top" altitudes charted on SIDs.
    c. Note: This eliminates the use of "Except Maintain" clearances
    d. Note: This recommendation is non-compatible with one of NAV CANADA's stated prerequisites (ref. Appendix C). As a result, this recommendation may not allow them to harmonize with the implementation of CV/DV clearances.

Ancillary Recommendations

Throughout PCPSI discussions there were items the PCPSI indicated as relevant to harmonization but fell outside of, or were ancillary too, the main effort. These are presentedhere as additional recommendations related to phraseology.

<u>Use of the word TO/TWO & FOR/FOUR</u>

Problem: During research it was noted in *Phraseology: Pilots and Controllers Phraseology Studyand Phraseology Conflict: SID/STAR Report on Potential Misunderstanding* composed and conducted by IATA, IFATCA and IFALPA, there have been situations where "TO" has been confused by crews as "TWO". Similarly," FOR" can be confused for the number "FOUR" and create confusion. This is further complicated if radio clarity is less than optimal.

<div align="center">

ex: *"climbing **TWO** thousand **FOR** one zero thousand"*
can be mistaken as
*"climbing **TO** thousand **FOUR** one thousand"*

</div>

RECOMMENDATION: The use of the word TO/FOR should be at a minimum restricted to only optional, as ICAO recommends, or be completely restricted. It should not be included in standard phraseology but may be used at controller/crew discretion if its use adds clarity to the intended communication.

<u>Initial Pilot Check-In After Departure.</u>

Problem: One of the corollaries of not restating the name and procedure on every subsequent check-in is how does the initial radio transmission sound after takeoff. There is concern ATC needs verification the pilot has the correct procedure loaded. Many in the group felt this was too late and an inappropriate time to do this verification. Compliance with standard phraseology on this transmission is typically very low and we discussed several options for a more appropriate time/method to verify what procedure is loaded in the FMS. In order to alignwith our recommendation on stating procedure name discussed above, the PCPSI submits this ancillary recommendation.

RECOMMENDATION: DCL/Radio/PDC constitutes initial clearance acceptance and verification.This means the initial radio call with TRACON on departure would only include the phrase "Climbing Via". EX**:**
<div align="center">

Call-sign; (current alt) CLIMB VIA SID (assigned alt)
"Delta 01; one thousand four hundred, CLIMBING VIA SID; one zero thousand"or
Call-sign; (current alt) climb (assigned alt), Climbing VIA SID
"Delta 01; one thousand four hundred, climb one zero thousand; Climbing Via SID"

</div>

<u>Options for "and Maintain"</u>

Discussion: Conversation around the complete removal of "and maintain" revealed it may not be necessary to remove the phrase completely from the system, especially when not on a CV/DV procedure. This phrase has been integral in FAA phraseology for decades and its removalmay be difficult. The objection to its use is largely the implicit removal of restrictions. So, there are other possible paths to accomplish the desired end state of aligning the meaning. While we stand by our recommendation other options include:

1. Continuing use of the phrase but removing the implicit restriction deletion. The group thought this option was fraught with human factors risks and would lead to error. Just changing the meaning, without changing the phrase, could lead to large deviations when unintentionally reverting to the old meaning.

2. Continuing to use "and maintain" outside the context of CV and DV. Again, there is no real objection to keeping the phraseology here, as it meets the primary objective. This does not align with ICAO or any other known ANSP phraseology system but could represent a viable path forward. There is a smaller risk of mistakes with phraseology only applying in certain situations, but the same phrase changes meaning in other situations.

RECOMMENDATION: The FAA should accept our recommendation and align with ICAO and discontinue use of "climb and maintain" and "descend and maintain" completely. This presents the best possible option for the largest conglomeration of possible scenarios and simplifies phraseology. This is presented as options discussed and considered workable, but not ideal.

Other Considerations

Discussions included members from the Data Comm Integration Team (DCIT). It became apparent immediate alignment with the current data comm message sets was not possible because the Future Air Navigation System (FANS) message set cannot be changed. We recognize some of our recommendations are in misalignment with current FANS phraseology, but the recommendations are the best compromise to harmonize while minimizing error.

Throughout the entire process and discussion representatives from NAV CANADA have been instrumental in our understanding and efforts to align North America, and possibly move the continent towards harmonization with ICAO compliant ANSPs. See the 12 Nov 2020 memo[Appendix C] from NAV CANADA official stating their position and stated minimum alignment goals. It is the recommendation of this group the FAA consider NAV CANADA's position when determining final phraseology. Furthermore, the PARC SG authorization of PCPSI leadership toengage in meaningful conversation with NAV CANADA and SENEAM will safeguard completelyaligning North America.

Closing Remarks

The leadership team of the PCPSI Phraseology Harmonization PCPSI would like to specifically thank all the members who spent countless hours discussing this topic with the expertise this exceptional group has gained in decades of experience and lessons learned. We would also like to thank the PARC SG for the continuous support and patience as the tasking evolved and extensive discussion and complexity led to an extended timeline. While this document represents our Consensus Recommendation to the PARC SG, we consider the work to be just beginning and members have expressed interest in staying engaged in the topic as itprogresses forward. Working together, we can find the right solution for the "*safest, soundest,and most efficient means of communication, whether done verbally or via Data-Comm.*"

Appendix A: Abbreviations

alt: altitude
ANSP: Air Navigation Service Provider
ARTCC: Air Route Traffic Control
CentersATC: Air Traffic Control
CPDLC: Controller Pilot Data-Link Communications.
CV: Climb Via
DATACOMM: Data Communications
DCL: Departure Clearance
DV: Descend Via
FAA: Federal Aviation Administration
FANS: Future Air Navigation Systems
FMS: Flight Management System
HITLS: Human-in-the-Loop Scenarios
IATA: International Air Transport Association
ICAO: International Civil Aviation Organization
IFALPA: International Federation of Air Line Pilots' Association
IFATCA: International Federation of Air Traffic Controllers' Association
LOA: Letter of Agreement
NAS: National Airspace System
OPD: Optimized Profile Descent
PARC: Performance Based Operations Aviation Rulemaking Committee
PCPSI: Pilot Controller Procedures System Integration
PDC: Pre-Departure Clearance
SENEAM: Servicios a la Navegacion en el espacio Aereo Mexicano
SG: Steering Group
SID: Standard Instrument Departure
SOP: Standard operating Procedure
STAR: Standard Terminal Arrival
TRACON: Terminal Radar Approach Control Facilities
US: United States
PCPSI: Work Group

Appendix B: PCPSI Phraseology WG Membership

Last	First	Email Address	Organization
Abbott	Kathy	kathy.abbott@faa.gov;	FAA
Alexander	Frank	Frank.Alexander@atlasair.com;	Atlas Air
Alvarez	Pascual	pascualsosa@me.com	AeroMexico
Araujo	Hugo	hugo.barron@coctam.org.mx	SINACTA
Armstrong	Merrill	merrill.armstrong@faa.gov;	FAA
Babcock	Ric	rbabcock@alliedpilots.org;	APA/American
Bachman	Will	w.bachman@mitre.org;	MITRE
Belk	John	John.Belk@faa.gov	FAA
Berndt	Raymond	Raymond.Berndt@NATCA.net;	FAA
Blair	John	John.Blair@faa.gov;	FAA
Boll	Rich	richjb2@rjb2.onmicrosoft.com;	NBAA
Boxrucker	Craig	craig.boxrucker@alpa.org;	ALPA (National)
Bradley	Mark	Mark.R.Bradley@delta.com;	Delta Air lines
Brents	Bob	rgbrents@mitre.org;	MITRE
Bryan	Mike	mike.a.bryan@boeing.com;	Boeing
Buergel	Richard	rbuergel@netjets.com;	NetJets
Cardosi	Kim	kim.cardosi@dot.gov;	DOT
Chandra	Divya	divya.chandra@dot.gov;	DOT
Cirilo	Carlos	ciriloc@iata.org;	IATA
Colling	Chris	ccolling@harris.com;	Harris
Connell	Sonny	robert.connell@faa.gov;	FAA
Dawson	Jeff	jeff.dawson@navcanada.ca;	Nav Canada
DeGroh	William	wdegroh@alliedpilots.org	APA
DeHart	Scott	Scott.dehart@wnco.com;	A4A/SWA
Dickson	Joel	joel.dickinson@faa.gov;	FAA
Dobias	Don	Don.Dobias@alpa.org;	ALPA (UAL)
Donovan	Colleen	colleen.donovan@faa.gov	FAA
Duda	Andy	Andrew.ctr.duda@faa.gov;	FAA
Fernandez	Juan	juanhungaro@yahoo.com	SINACTA
Fiske	Gary	Gary.ctr.Fiske@faa.gov;	FAA
Fry	Andy	afry@cghtech.com;	CGH Technologies
German	Olan	golan@harris.com;	Harris
Googe	Wes	wes.googe@aa.com;	American Airlines

Hutto	Bennie	critpbn@natca.net;	FAA/NATCA
Jacobson	Aaron	Aaron.Jacobson@jeppesen.com;	Jeppesen
Jones	Brett	brett.jones@atlasair.com;	Atlas Air
Karason	Kari	kka@icelandair.is	Icelandair
Kernaghan	John	JKernagh@its.jnj.com;	Johnson & Johnson
Kerr	Jeff	jeffrey.kerr@faa.gov;	FAA
Kreseen	Stephanie	Stephanie.kreseen@faa.gov;	FAA
Knight	Shawn	shawn.g.knight@faa.gov	FAA
Lawson	Tony	Tony.r.lawson@faa.gov;	FAA
Lennertz	Tracy	tracy.lennertz@dot.gov;	DOT
Marcos	Barak	barak.marcos@aircanada.ca	Air Canada
McAdoo	Dick	RMACLLC@gmail.com;	FAA
McClay	Jim	airtrafficservices@aopa.org	AOPA
McDonald	William	wmcdonald@airlines.org;	
McMullin	Gary	gary.mcmullin@wnco.com;	Southwest Airlines
Miller	Jordan	jmiller@alliedpilots.org;	APA/American Air
Morris	Craig	cmorris@thaneincorp.com;	Thane
Morse	Eric	eric.morse@delta.com;	Delta Air lines
Murdock	John	procedures@natca.net;	FAA/NATCA
Murphy	Bill	murphyw@iata.org;	IATA
Passerini	Alex	apasserini@qantas.com.au;	Quantas Airlines
Pennington	Darrell	Darrell.Pennington@alpa.org;	ALPA (National)
Picard	Yan	picardy@navcanada.ca;	Nav Canada
Prichard	Lev	lprichard@alliedpilots.org;	APA/American Air
Rehaluk	Jeff	rehalukj@iata.org;	IATA
Renk	Ron	ron.renk@united.com;	United Airlines
Rieken	Christopher	Christopher.Rieken@navcanada.ca	NAVCANADA
Ruiz	Jose	ruizjo@iata.org;	IATA
Santos	Phill	psantos@fedex.com;	FedEx
Serura	Steven	Steven.serura@faa.gov	FAA
Sims	Brad	bsims@swapa.org;	SWAPA/SWA
Singh	Harjit	Harjit.CTR.Singh@faa.gov;	FAA
Smith	Jerry	jerry.smith@harris.com;	Harris
Sparko	Andrea	andrea.sparko@dot.gov;	
Spaude	Ian	ian.spaude@faa.gov;	FAA
Stagg	Andrew	Andrew.Stagg@aa.com;	American Airlines
Steinmetz	George	George.F.Steinmetz@faa.gov;	FAA

Stewart	Mike	Michael.J.Stewart@nasa.gov;	NASA
Surridge	Dave	David.Surridge@aa.com;	American Airlines
Townsend	Brian	Brian.Townsend@aa.com;	American Airlines
Tree	John	jonathan.tree@fedex.com;	FedEx
Turner	Lawrence	Lawrence.Turner@wnco.com	Southwest Airlines
von Valtier	Karl	kvonvaltier@netjets.com;	Netjets
Wacker	Daniel	Daniel.wacker@faa.gov;	FAA
Waddell	Brad	Brad.Waddell@aircanada.ca	Air Canada
Watson	Valerie	Valerie.S.Watson@faa.gov;	FAA
White	Roger	Roger.d.White@alpa.org;	ALPA (DAL)
Wiggam	Eric	eric.wiggam@faa.gov;	FAA
Wijntjes	Jesse	Jesse.Wijntjes@faa.gov;	FAA
Wilkerson	Jim	james.m.wilkerson@boeing.com;	Boeing
Williams	Heidi	hwilliams@nbaa.org;	NBAA
Wollert	Matthew	mwollert@harris.com;	Harris
Morse	Glenn	gfmorse@optonline.net	MRO

Appendix C: Nov 12, 2020 NAV CANADA Memo to PCPSI

November 12, 2020

Brian Townsend – American Airlines
Kathy Abbott - FAA
PCPSI (Pilot Controller Procedures & Systems Integration Workgroup)

Subject: SID/STAR Phraseology

Dear Kathy and Brian,

As the PCPSI – Phraseology Working Group is getting ready to formulate its recommendations, we would like to take this opportunity to thank the team and leaders for its efforts. Eric, and Bennie have worked relentlessly and have kept an open mind on the discussions throughout the whole process.

We also felt important to reiterate our support for a recommendation that would;

- Rely on explicit Voice, or Data Communication issuance of altitude by ATC at all times.

and

- Ensure an explicit Voice or Data Communication means of cancelling restrictions is mandated for ATC personnel. (e.g. R/T "UNRESTRICTED")

The implementation of these two recommendations in the United States NAS would go a long way in enabling Canada to reconsider harmonizing its SID and STAR phraseology with ICAO and the FAA.

Additionally, we would like to offer our complete support should the PCPSI, the PARC, or any related body require us to clarify our views further on this topic.

We would finally like to extend our deepest appreciation for the opportunity given to contribute to this important work.

Sincerely,

Jeff Dawson
Director, ATS Standards
NAV CANADA

Serving a world in motion
Au service d'un
monde en mouvement
navcanada.ca

NAV CANADA