

AERONAUTICAL CHARTING MEETING
Charting Group
Meeting – April 27 - 29, 2021

RECOMMENDATION DOCUMENT

FAA Control #21-01-354

Subject: Instrument Approach Charting in Support of Radius-to-Fix/Track-to-Fix Concurrent Operations

Background/Discussion:

NBAA submits and represents this recommendation document on behalf of the Performance Based Aviation Rulemaking Committee (PARC) and its Navigation Working Group (NAV WG). On July 5, 2018 and at the FAA's behest, the PARC submitted a [recommendation document](#) on instrument approach procedures (IAPs) with concurrent operations using procedures constructed with Radius-to-Fix (RF) leg types and procedures using Track-to-Fix (TF) leg types. Please see attached recommendation document for a complete discussion of RF/TF concurrent operations along with the PARC's recommendation to the FAA.

In developing the recommendation, the PARC NAV WG discussed three possible charting options that may be used on IAPs designed for concurrent RF/TF operations, which are:

1. The "Inset" option
2. The overlay option with the RF leg as primary and with the TF leg "ghosted"
3. The overlay option with the TF leg as primary and with the RF leg "ghosted"

Figures 1, 2, and 3 depict these three options. **These are not necessarily the only options nor the preferred "3" options.** Rather, they were identified by the PARC NAV WG as potential charting solutions that would depict both the RF leg path and the TF leg path on the IAP chart. There may be other options that are found preferable to users.

While most aspects of the RF/TF concurrent operations recommendation could be developed by the PARC NAV WG, it was recognized early on that a charting recommendation would require a wider discussion through the Aeronautical Charting Meeting – Charting Group. In January 2021, the FAA Flight Technologies & Procedures Division – Flight Procedures & Airspace Group (FPAG) stated that they were beginning the criteria implementation process in support of this PARC recommendation and requested action on the charting question.

Recommendations:

At the request of the FPAG and the PARC, NBAA is sponsoring the RF/TF concurrent operations charting initiative through this ACM-CG RD. We present the following three options for the ACM-CG's initial consideration. If desirable, the ACM -CG may elect to stand up a working group to evaluate the proposed charting solutions, along with any other charting solutions that this working group may conceive, and then present its recommendations to the ACM-CG for its review and acceptance.

Comments:

This recommendation effects:

- Interagency Aeronautical Charting Specification
- FAA Order 8260.19, Flight Procedures & Airspace

Submitted by: Richard J. Boll II

Organization: NBAA

Phone: 316-655-8856

E-mail: richjb2@rjb2.onmicrosoft.com

Date:

Please send completed form and any attachments to:

9-AMC-AVS-ACM-Info@faa.gov

Figure 2 - The overlay option with the RF leg as primary and with the TF leg "ghosted"

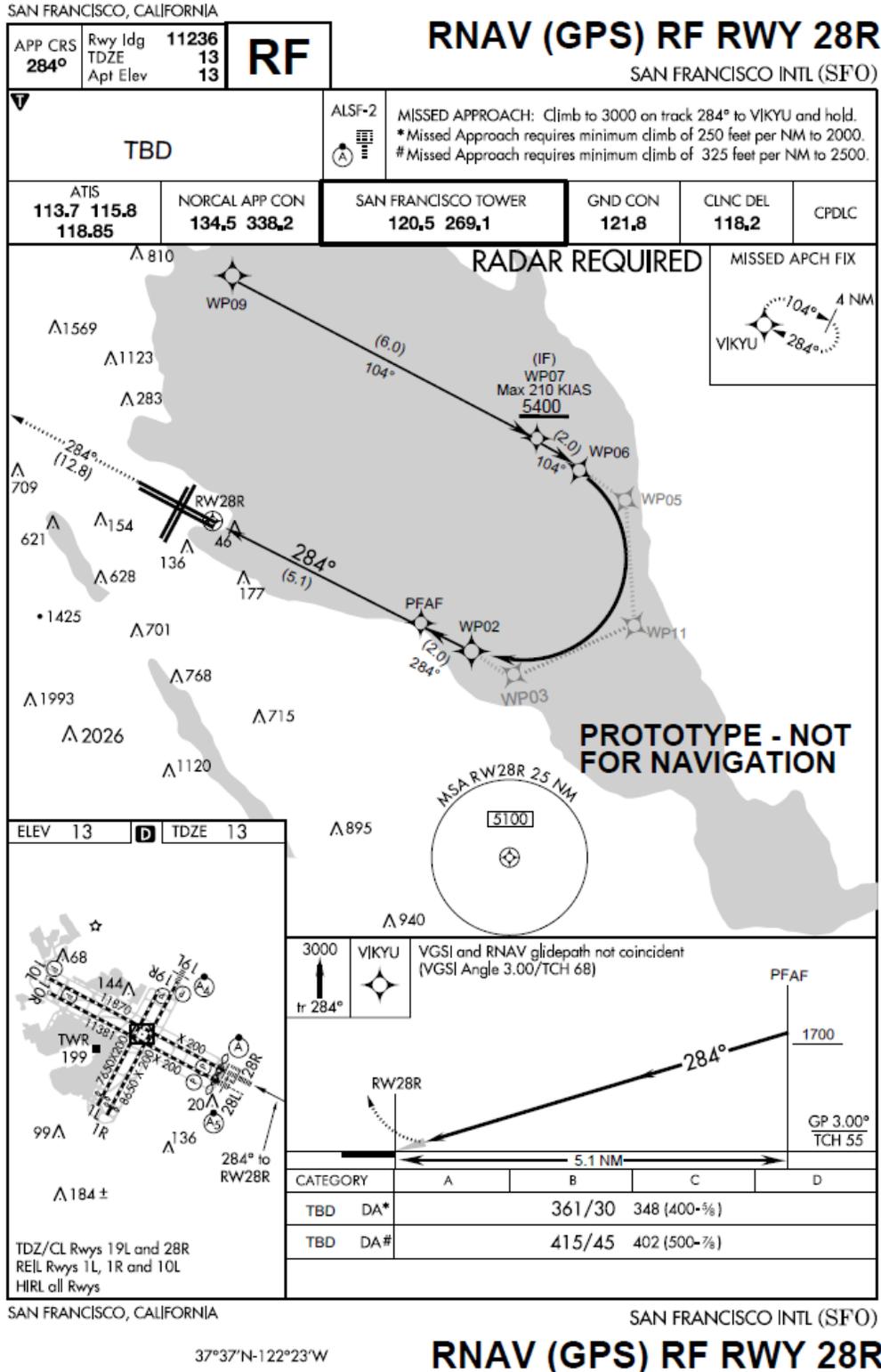
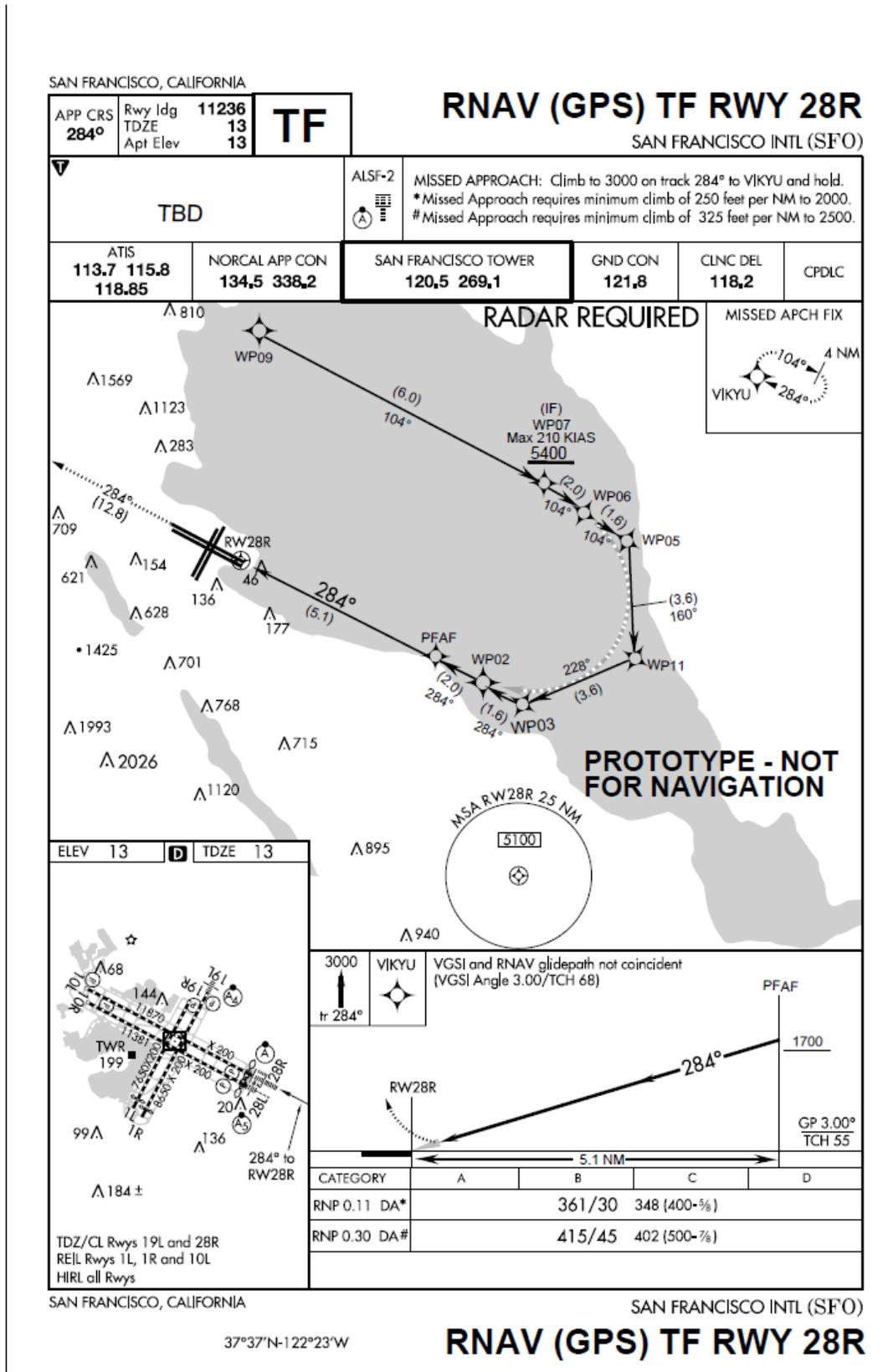


Figure 3: The overlay option with the TF leg as primary and with the RF leg "ghosted"



MEETING 21-01

Rich Boll, NBAA, [presented](#) the new recommendation. He explained that in 2016, the Performance Based Operations Aviation Rulemaking Committee (PARC) Navigation Work Group (NAV WG) was tasked to conduct an analysis addressing concurrent operations using procedures constructed with Radius-to-Fix (RF) leg types and procedures using Track-to-Fix (TF) leg types. The proposal was accepted by the PARC and submitted to the FAA. The proposal recommends the publication of (roughly parallel) RF and TF legs on the same Instrument Approach Procedure (IAP) chart. The start and end points (IF and PFAF) waypoints would be identical and thus the ground track would be nearly identical. Rich reported that the FAA has accepted the recommendation and is proceeding with the development of criteria to support RF/TF concurrent operations. The step being brought before the ACM is the development of charting standards for the depiction of these RF/TF legs on a single IAP.

The PARC NAV WG provided 3 possible charting solutions for consideration:

1. Use a chart inset depicting the alternative version while the main chart shows the primary ([slide 7](#)).
2. Depict the RF option as primary with the TF option ghosted ([slide 8](#)).
3. Depict the TF option as primary with the RF option ghosted ([slide 9](#)).

Jeff Rawdon, FAA/AFS-420, reported that the Flight Procedures and Airspace Group (FPAG) supports this proposal and will work to develop criteria. Jeff said the intent is to include documentation of both RF/TF legs on a single procedure with all the appropriate terminal route information included for both leg types.

Krystle Kime, FAA/AJV-A222, agreed that Terminal Charting would need full documentation on the 8260 procedure source forms for all legs intended for charting. Krystle stated that because insets are currently used for other purposes, because information in an inset is not in its true location relative to the rest of the graphic procedure, and because insets take up considerable planview space, possibly compromising the integrity of the chart, her team does not support the inset option. Her team could support either of the remaining options.

Pat Mulqueen, FAA/AJV-A440, voiced that though he supports the proposal, there are issues that require additional investigation. The 8260 procedure source form documentation guidance will need to be established. Assessment of the different types of obstacle evaluations that are required for TF and RF leg types will need to be investigated. Updates to documentation and automation tools to accommodate this change will need to be accomplished.

Michael Stromberg, UPS, said he prefers the TF in solid black with the RF ghosted, and suggested that the fix symbols should not be ghosted on either track so they are easier to read. A discussion took place regarding the notation on the 8260 source form to delegate solid versus ghosted attributes. Valerie Watson, FAA/AJV-A250, suggested that it might be better to simply describe both the RF and TF legs on the procedure source document and then write the charting rules into the specifications. This would allow third party chart providers to make their own decisions about how to depict this information. Rich agreed and said the PARCs intent is

that the charting decisions be left up to the individual charting providers. Rich said he will be forming a workgroup to discuss the details of charting.

Doug Willey, ALPA, asked how this information will be presented in the database so that aircraft only receive aspects of the procedure they are capable of flying. Rich said that has been discussed and is part of how these procedures will be loaded and coded in the database. He said pilots will only receive what they are capable of flying.

John Moore, Jeppesen, asked how this change will impact what notes go into the PBN requirements box. Valerie agreed that the notes will have to be part of the discussion. John also suggested that the human factors aspects need to be taken into consideration.

John Collins, ForeFlight, said that since both options will be loaded into the Flight Management System (FMS), the FMS will need the ability to allow for both provisions at the same time and be able to switch between the two. John also stated that he favors ghosting the RF leg because there is less information to be communicated on the ghosted RF leg option.

Rich will chair a workgroup to discuss this further, but he emphasized that the workgroup will only be focusing on changes to the Interagency Air Committee (IAC) specifications for the charting of RF/TF legs.

RF/TF Procedure Workgroup		
Krystle Kime	FAA	krystle.kime@faa.gov
Eric Morse	Delta Air Lines	eric.morse@delta.com
Jeff Rawdon	FAA	jeffrey.rawdon@faa.gov
Charles Wade	Delta Air Lines	charles.w.wade@delta.com
Adam See	Delta Air Lines	adam.see@delta.com
Mike Webb	FAA	mike.webb@faa.gov
Ron Brumback	NGA	ronald.e.brumbach@nga.mil
Valerie Watson	FAA	valerie.s.watson@faa.gov
Joshua Fenwick	Garmin	joshua.fenwick@garmin.com
Jennifer Hendi	FAA	jennifer.l.hendi@faa.gov
Darrell Pennington	ALPA	darrell.pennington@alpa.org
Gary McMullin	WNCO	gary.mcmullin@wnco.com
Craig Boxrucker	ALPA	craig.boxrucker@alpa.org
John Collins	ForeFlight	john@foreflight.com
Steve Woodbury	Fligh Safety International	steve.woodbury@fstatraining.com
Lev Prichard	Allied Pilots	lprichard@alliedpilots.org
Bill de Groh	Allied Pilots	wdegroh@alliedpilots.org
Steven Madigan	Garmin	steven.madigan@garmin.com
Jay Leitner	American Airlines	jay.leitner@aa.com
Diane Adams-Maturo	FAA	diane.r.adams-maturo@faa.gov
Paul Hannah	Lean Engineering	phannah@leancorp.com; paul.hannah.lc@flysfo.com
Andrew Riedel	Boeing/Jeppesen	andrew.v.riedel@boeing.com
Trey Turner	Southwest Airlines	lawrence.turner@wnco.com

STATUS: OPEN

ACTION: Rich Boll, NBAA, will report on the progress of the RF/TF procedure workgroup.

MEETING 21-02

Samer Massarueh, FAA/AJV-A223, reviewed the issue. Rich Boll, NBAA, [briefed](#) the audience on the workgroup activities since the last ACM. He said they reviewed various options for depicting both Radius-to-Fix (RF) and Track-to-Fix (TF) legs documented as part of a single Instrument Approach Procedure (IAP). One idea was to use a chart inset. This option was rejected because it would result in too much chart clutter and because insets are already used on IAPs for other purposes. The ghosting method was preferable to insets but also has drawbacks ([slide 4](#)). The group then looked at creating two IAP charts. This option would use one FAA Form 8260 to create two procedure charts – one depicting the RF legs and one depicting the TF legs. The charted procedure titles would include “(RF)” and “(TF)” and would follow the current standard for ILS CAT I and CAT II charting from a single 8260 procedure source document. The workgroup found this to be the best option. See [slide 8](#) for IAP chart examples.

Mike Cramer, MITRE, asked whether the workgroup recommendations will include a mechanism to ensure the database or chart providers only provides the version of the chart that the pilot is capable of flying. If that is the case, he questioned why (RF) and (TF) need to be included in the charted titles. Rich said both charts would need to be included in the Terminal Publications Procedure (TPP) and for that reason, the title discriminators are necessary. He said commercial chart providers will be able to exclude the non-compatible charts.

Rich then discussed the changes to FAA Order 8260.19 and FAA Form 8260-3 that will be necessary ([slide 9](#)).

Joshua Fenwick, Garmin, explained ARINC 424 Navigation database changes that will be necessary to separately identify the two route types. He showed examples ([slides 11-13](#)) of how the data would be sorted and provided. He explained the intent is Flight Management Systems (FMS) will only carry the procedure version that the aircraft is capable of flying.

Rich then discussed how NOTAMs would be written. If both charts are generated from a single form, then the NOTAM must address the published regulatory procedure document. Whether the NOTAM affects both charts or not, the Amendment number would be updated in the P-NOTAM and the effective date would be revised on both charts. Rich then provided an example of a T-NOTAM ([slides 16-17](#)). Jeff Rawdon, FAA/AFS-420, asked if there was a scenario where the whole TF portion of the procedure could be NA. He asked if the NOTAM would be clear enough that pilots would know the RF version could still be used. Rich suggested this question be taken back to the workgroup.

Bruce McGray, FAA/AFS-420, thinks it would be better to handle these as two separate procedures so they don't get confused in the system. Valerie Watson, FAA/AJV-A250, reminded the group that decision had been previously made and this issue came to the ACM with direction to figure out how to chart the RF/TF information from a single procedure source form.

Rich emphasized that this is not a unique concept. This is the same way ILS Cat I and II charts are handled today and that the (RF) and (TF) portion of the title will not be verbalized by ATC. Gary Fiske, FAA/AJV-P310, agreed and said ATC is fine with the titling and with the overall concept. He said it is understood that the two leg types will result in slightly different tracks, but

any issues will be handled with local ATC training. Mike Cramer said they did some simulations of these tracks and they are so similar the difference is not detectable on radar.

Joshua explained how the FMS will be loaded. He said if you have a mixed fleet with a shared database where only some aircraft are capable of flying RF legs, you will likely end up with the TF version in the database because only one version can be included. Mike Cramer doesn't think this is the case and thinks it will be more FMS-specific than fleet-specific. Joshua said it will depend on the database provider. Mike said the working group studied this at the PARC and the determination was made it wouldn't happen often enough to be of concern. Other participants also expressed concerns about not getting the RF version in their database. Rich emphasized that nothing is lost if an aircraft cannot get the RF version, the procedure can still be flown.

An informal poll was conducted to gauge support for the two chart solution. There was ACM support.

STATUS: OPEN

ACTION: Rich Boll, NBAA, will report on the progress of the RF/TF Procedure Working Group recommendation.

MEETING 22-01

Rich Boll, NBAA, [reported](#) that at ACM 21-02 the working group received ACM Charting Group consensus to move forward with the proposal of charting two charts from a single procedure source document, identified with title suffixes Radius-to-Fix (RF) and Track-to-Fix (TF). Since the last ACM, the working group prepared a [set of recommendations](#) and posted them on the ACM Charting Group website for review. Rich said that pending ACM concurrence, the recommendations will be formally forwarded to the Performance Based Aviation Rulemaking Committee (PARC) Navigation Working Group for their review, acceptance, and incorporation into the full RF/TF Concurrent Operations recommendation.

Gary Fiske, AJV-P310, said he supports the proposal, but said he's never seen a procedure titled "RNAV (GPS)" that contains RF legs. They've always been titled "(RNP)." Rich agreed that though not common, it is allowable under current criteria to have an RF leg on an RNAV (GPS) approach. John Barry, FAA/AIR-622, pointed out that while not common on standard GPS approaches, RF legs have been used on Instrument Landing System (ILS) approaches. The key to the RF/TF two chart approach is that aircraft not RF-capable are still eligible to fly the TF version of the procedure. Bennie Hutto, NATCA, said he sees an issue with titling it an RNAV (GPS) procedure, when in reality it is a RNP APCH (Approach) according to International Civil Aviation Organization (ICAO) standards. Since more of these procedures with RF capability are coming, he supports changing the name to RNP APCH or RNP AR to match ICAO. Rich agreed that Aeronautical Information Manual (AIM) guidance will likely be necessary to explain the procedure titles, but clarified the U.S. is not yet moving to the ICAO titling standard.

Dan Wacker, FAA/AFS-420, asked if there is already criteria in FAA Orders 8260.3 and 8260.19 for these types of procedures or will those Orders need to be updated. Valerie Watson, FAA/AJV-A250, said those changes still need to be addressed. The PARC requested the ACM develop a charting recommendation first, which if approved by this audience will be forwarded to the PARC steering group for consideration. If the full PARC recommendation is approved by the

FAA, Flight Standards will then address the order changes and AJV-A will update the Interagency Air Committee (IAC) charting specifications.

Diane Adams-Maturo, FAA/AFS-420, said there will be a lot of underlying changes necessary if this recommendation goes forward. She explained that all procedure changes have to go to the Federal Register and the FAA will have to gain authorization for these procedures to result in two charts. Dan Wacker said the changes would be much simpler if both TF and RF operations could be depicted on a single chart. Valerie explained that this would follow the current standard for ILS Cat I and Cat II/III charting from a single 8260 procedure source document and that we have a precedent. She reiterated the ACM Charting Group was tasked to come up with a recommendation for the best depiction of RF/TF concurrent operations and the two chart solution was determined to be optimal. The working group was not asked to assess the ease of the processes required to arrive at that solution.

Charles Wade, Delta Air Lines, said Delta has already deployed this two chart solution on specials. Pilots receive both the RF and TF charts and it is only the selection in the database that is aircraft-specific. Charles explained they originally used the inset, but that resulted in too much chart clutter. He said the only difference is they don't use the TF title on the charts, but do use RF in the title of that version of the chart.

An informal poll of the audience was conducted and there was support for the two chart solution. The ACM audience also voted in support of forwarding the workgroup recommendations document to the PARC Navigation Working Group. Rich will take the recommendation to the PARC and this ACM issue can be closed.

STATUS: CLOSED