AERONAUTICAL CHARTING MEETING
Charting Group
Meeting – April 26-30, 2021

RECOMMENDATION DOCUMENT

FAA Control #21-01-350

<u>Subject</u>: **Non-Standard Holding Pattern Length Charting (SID/STAR)**

<u>Background/Discussion</u>:
Standardized holding pattern data (referenced NAVAID, inbound/outbound course, distance) is stored in eNASR and the NASR HPF.txt subscriber file. Authoritative source for holding pattern data is the 8260-2 form. Such a form exists for each fix (RNAV WP, INT, NAVAID) in the NAS. ARINC 424 database suppliers rely on NASR and 8260-2 data to code procedural holding patterns in both the Enroute and Terminal environments. In many cases, discontinuities exist between 8260-2 holding data (authoritative source) and the IFR terminal procedure(s) that use holding patterns.

One such discontinuity exists between FAA/NACO STAR/DP charts and 8260-2 forms regarding non-standard holding pattern leg length. Many conventional (non-RNAV) SIDs and STARs depict holding patterns without 8260-2 derived distance information even in cases where the 8260-2 distance deviates from "standard".

Per FAA AIP, Part 2 (ENR), 1.9.2.3, "standard" holding patterns are defined at/below 14,000 MSL to be 1 minute. Above 14,000 MSL, 1 ½ minutes. AIP 1.9.2.4, the subsequent section referencing DME/GPS ATD (along-track distance) holding, states that the controller or IAP chart with specify the length of the outbound hold.

Without charted distances, aircrews would have no way to determine that a given hold exists with non-standard leg lengths. See the TOMSN EIGHT STAR serving Denver, CO:
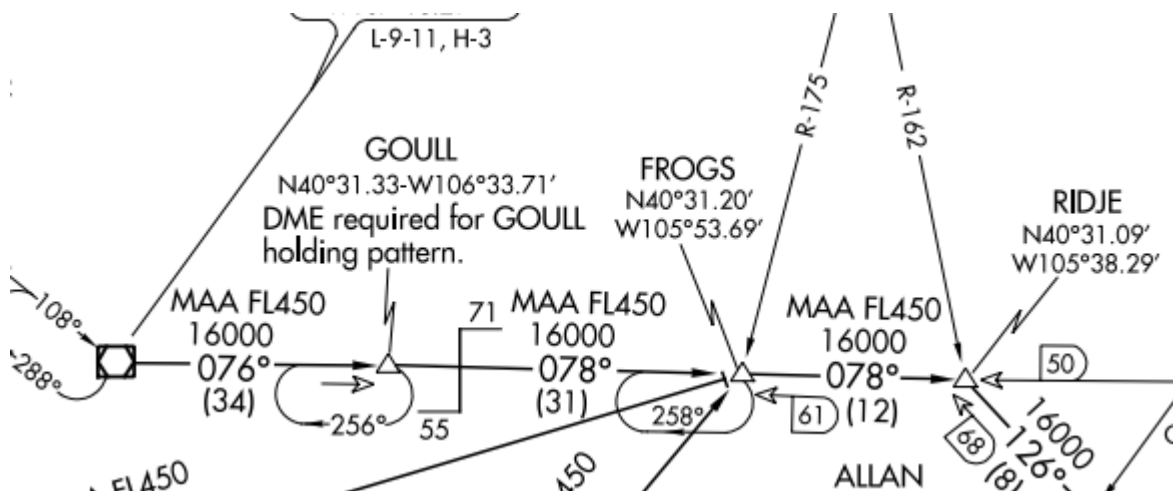
Holding patterns have been established at GOULL and FROGS intersections. Neither holding pattern is charted with a distance, leading to the assumption that both follow the aforementioned

"standard" of 1 1/2 minute legs. This creates a point of confusion since the 8260-2 forms for the fixes show GOULL's holding pattern exists with 10 DME legs.

RADIO FIX AND HOLDING DATA RECORD

NAME: GOULL   **STATE:** CO   **COUNTRY:** US   **ICAO REGION CODE:** K2

LATITUDE/LONGITUDE: 403119.74N/1063342.63W   **TYPE:** DME

AIRSPACE DOCKET: **FIX TYPE OF ACTION:** NO CHANGE

FIX MAKE-UP FACILITIES:

FAC	NAME	IDENT	TYPE	CLASS	MAG BRG	TRUE BRG	DME	DIST FROM FAC NM	FEET	MRA	MAA
1	HAYDEN	CHE	VOR/DME	H	075.55	089.55	34.00	34.00		16000	41000

HOLDING: **HOLDING TYPE OF ACTION:** NO CHANGE

PATTERNS:

PAT	DIR	IDENT	TYPE	RAD/CRS/BRG	CRS INBOUND	TURN (L OR R)	LEG LENGTH TIME	DME	HOLDING ALTITUDES MIN	MAX	TEMPLATES MIN	MAX
1	W	CHE	VOR/DME	075.55	075.55	R		10	16000	31000	17	25

CONTROLLING OBSTRUCTIONS:

PAT	AIRSPEED	OBSTRUCTION		COORDINATES	ELEVATION	ACCURACY CODE
1	265	AAO		403857.00N/1064054.00W	12153	4E

PRECIPITOUS TERRAIN ADDITIONS:

PAT	SPEED	ADDITION
1	265	360

HOLDING RESTRICTIONS:
HOLDING LIMITED TO ESTABLISHED PATTERN.

REMARKS:
HAYDEN (FAC 1) USED TO ESTABLISH FIX COORDINATES
PRECIPITOUS TERRAIN EVALUATION COMPLETED.
PAT 1 LEG LENGTH 10 DME PER ATC REQUEST
FIX NOT CHARTED ON LOW ENROUTE PER ATC REQUEST

FIX USE:

USE TYPE	USE TITLE	FAC	PAT	AIRPORT IDENT	CITY	STATE
EN ROUTE	J56	1	1			(US)
STAR	TOMSN	1	1	KBKF	AURORA	CO (US)
STAR	TOMSN	1	1	KAPA	DENVER	CO (US)
STAR	TOMSN	1	1	KBJC	DENVER	CO (US)
STAR	TOMSN	1	1	KCFO	DENVER	CO (US)
STAR	TOMSN	1	1	KDEN	DENVER	CO (US)
STAR	TOMSN	1	1	KFNL	FORT COLLINS/LOVELAND	CO (US)
STAR	TOMSN	1	1	KGXY	GREELEY	CO (US)

REQUIRED CHARTING: STAR, EN ROUTE HIGH, CONTROLLER HIGH

ARINC database suppliers would provide the hold record for GOULL including 10 DME. This disconnect between sources is confusing – while pilots are generally not familiar with 8260-series forms, they would be familiar with both FAA/NACO charts and GPS NavDB's (if so equipped). Any attempt to "draw" the aforementioned hold from ARINC/GPS NavData at GOULL INT would lead to a discontinuity between avionics and chart.

The above issue is further compounded by the depiction of holding at FROGS. As with GOULL, the holding pattern at FROGS is not accompanied by a charted distance. The assumption of "standard" leg lengths would be confirmed in the FROGS, case, though. The 8260-2 form for FROGS shows an established holding pattern with the "standard" distance referenced in AIP.

RADIO FIX AND HOLDING DATA RECORD

NAME: FROGS   **STATE:** CO   **COUNTRY:** US   **ICAO REGION CODE:** K2

LATITUDE/LONGITUDE: 403112.12N/1055341.21W   **TYPE:** INT, DME

AIRSPACE DOCKET: **FIX TYPE OF ACTION:** NO CHANGE

FIX MAKE-UP FACILITIES:

FAC	NAME	IDENT	TYPE	CLASS	MAG BRG	TRUE BRG	DME	DIST FROM FAC NM	FEET	MRA	MAA
1	GILL	GLL	VOR/DME	H	258.34	271.34	61.41	61.41		16000	45000
2	LARAMIE	LAR	VOR/DME	L	175.22	189.22		49.67		16000	45000

EXPANDED SERVICE VOLUME (ESV):

FAC IDENT	FAC TYPE	RADIAL/BEARING	DISTANCE	MIN ALTITUDE	MAX ALTITUDE
LAR	VOR/DME	R-175	50	15600	45000

HOLDING: **HOLDING TYPE OF ACTION:** NO CHANGE

PATTERNS:

PAT	DIR	IDENT	TYPE	RAD/CRS/BRG	CRS INBOUND	TURN (L OR R)	LEG LENGTH TIME	DME	HOLDING ALTITUDES MIN	MAX	TEMPLATES MIN	MAX
1	W	GLL	VORTAC	258.34	078.34	R	1 1/2		16000	45000	17	31

CONTROLLING OBSTRUCTIONS:

PAT	AIRSPEED	OBSTRUCTION	COORDINATES	ELEVATION	ACCURACY CODE
1	265	AAO (OBS-3742)	402906.80N/1053839.00W	13760	2A

PRECIPITOUS TERRAIN ADDITIONS:

PAT	SPEED	ADDITION
1	265	375

HOLDING RESTRICTIONS:
HOLDING LIMITED TO ESTABLISHED PATTERN.

REMARKS:
GILL (FAC 1) USED TO ESTABLISH FIX COORDINATES
PRECIPITOUS TERRAIN EVALUATION COMPLETED.

FIX USE:

USE TYPE	USE TITLE	FAC	PAT	AIRPORT IDENT	CITY	STATE
EN ROUTE	J56	1, 2				(US)
EN ROUTE	J84-100	1, 2				(US)
EN ROUTE	V101	1, 2				(US)
STAR	TOMSN	1, 2	1	KBKF	AURORA	CO (US)
STAR	TOMSN	1, 2	1	KAPA	DENVER	CO (US)
STAR	TOMSN	1, 2	1	KBJC	DENVER	CO (US)
STAR	TOMSN	1, 2	1	KCFO	DENVER	CO (US)
STAR	TOMSN	1, 2	1	KDEN	DENVER	CO (US)
STAR	TOMSN	1, 2	1	KFNL	FORT COLLINS/LOVELAND	CO (US)
STAR	TOMSN	1, 2	1	KGXY	GREELEY	CO (US)

REQUIRED CHARTING: STAR, EN ROUTE LOW, EN ROUTE HIGH, CONTROLLER LOW, CONTROLLER HIGH

Since both holding patterns appear identical on the chart with regards to holding pattern leg length, there would be no indication to aircrews that GOULL uses 10 DME legs and FROGS uses "standard" 1 ½ minute legs. GPS databases would create a distinction between GOULL and FROGS on this basis that is not reflected on current charts.

Current FAA Charting guidelines only include holding leg lengths when published on procedure 8260/7100 series forms. Under current guidelines, conventional procedures would require amendments to include charted leg lengths.

FIXES AND/OR HOLDING PATTERNS:

CHE VOR/DME (HOLD W, RT, 108.00 INBOUND); GOULL (HOLD W, RT, 075.55 INBOUND) (DME REQUIRED)
FROGS (HOLD W, RT, 078.34 INBOUND); TOMSN (HOLD NW, RT, 126.00 INBOUND)
CHART: BJC, DEN, DVV, SHAFT, HYGEN

Recommendations:
Garmin's recommendation is that holding pattern leg lengths should always be included on procedure source forms and charted regardless of procedure type (RNAV or Conventional).
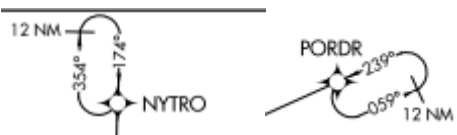
Comments:

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MEETING 21-01

Steven Madigan, Garmin, presented the new recommendation. Steve explained a discontinuity involving holding pattern leg lengths, especially on conventional Standard Terminal Arrivals (STARs) and Departure Procedures (DPs). Steve walked through the example included in the RD where two holding patterns are shown on a conventional STAR without leg lengths. One would assume those leg lengths are standard, however on the 8260-2 holding source form the leg lengths are non-standard. He pointed out that ARINC codes the holding patterns based on the 8260-2 which creates a discrepancy with the chart. Garmin recommends the charting of holding pattern leg lengths on all procedure types and the inclusion of holding pattern leg lengths on the procedure source forms.

Jeff Rawdon, FAA/AFS-420, asked the Terminal Charting Team if they only chart the holding leg length when published on the 8260-17 for a STAR or the 8260-15B for a DP. Krystle Kime, FAA/AJV-A222, said the current standard for conventional DPs and STARs is to chart it from the procedure source form. Her team also looks at the 8260-2 but the *procedure forms* are considered source, per specifications. Krystle pointed out that this problem has grown as more RNAV components have been added to conventional procedures. She said if the 8260-2 or another source should be used rather than the procedure form, that clarification would need to be added to terminal charting guidance. Jeff said the Flight Procedures and Airspace Group (FPAG) would like to investigate this issue further to understand what needs to change before taking any action.

Pat Mulqueen, FAA/AJV-A440, acknowledged the disconnect and agreed that this information should be on the procedure source forms. Pat agreed that further discussion with the FPAG is needed.

Rich Boll, NBAA, also agreed that there is disconnect between the 8260-2 and the chart and that the leg lengths need to be charted. He also asked if there is a charting specification for the depiction of holding pattern leg lengths on Enroute charts. Valerie Watson, FAA/AJV-A250, said holding pattern leg lengths are not depicted on Enroute charts. She agreed with others that

holding pattern information should be documented on terminal procedure source forms if they are to be correctly charted on terminal charts.

Aaron Jacobson, Jeppesen, also agreed that it would be preferable to have the information on the procedure source forms to ensure that charts agree with coding as intended.

Scott Jerdan, FAA/AJV-310, stated his team is currently reviewing holding pattern information in the National Airspace System Resource (NASR) database and is coordinating with the Instrument Flight Procedures (IFP) group on discrepancies.

Steve Madigan again asserted that to completely clarify the holding pattern leg lengths to be used on a specific procedure, the data should always be on the procedure source forms. He said commonly a new 8260-2 may be published before an old procedure form is updated and this can result in a discrepancy. Valerie pointed out that there can be multiple holding patterns predicated on the same fix and NASR doesn't assign them to a specific procedure, so charting is forced to go back to the 8260-2. Steve asked if NASR could include 'Fix Use' similar to that on the 8260-2, so that holding specifics tied to procedure name would be easily accessible via that database. Scott said they will do whatever is necessary to support the stakeholders, but before any changes are made, the Flight Procedures and Airspace Group needs to investigate the issue first.

STATUS: OPEN

ACTION: Jeff Rawdon, FAA/AFS-420, and the Flight Procedures and Airspace Group will investigate the documentation of holding pattern leg lengths and report back at the next ACM.

MEETING 21-02

Samer Massarueh, FAA/AJV-A223, reviewed the issue. Jeff Rawdon, FAA/AFS-420, said the Flight Procedures and Airspace Group (FPAG) hasn't had an opportunity to fully investigate this issue so he would like to hold it open for an update at the next ACM.

Scott Jerdan, FAA/AJV-A310, said the Aeronautical Data Team recently completed a multi-year project to review all the holding pattern information in the National Airspace System Resource (NASR) database and compare it against the FAA Form 8260-2s and what is on the charts. He said they are working to resolve the discrepancies discovered. Valerie Watson, FAA/AJV-A250, suggested this information should also be shared with FPAG, so they can see where the discrepancies exist, how they occurred, and to better understand the difficulties in determining source.

Bill Tuccio, Garmin, said Garmin would appreciate seeing the discrepancies. Scott said he does not believe the information can be shared externally, but assured the group that his team is working to solve the discrepancies. Valerie pointed out that the report identifies the discrepancies, but not how to solve them or which source is correct. Krystle Kime, FAA/AJV-A222, added that in the meantime when there are discrepancies, Terminal Charting uses FAA Forms 8260-15 and -17 as the source for conventional graphic Departures (DPs) and Standard Terminal Arrivals (STARs). For Instrument Approach Procedures (IAPs) and RNAV DPs and STARs, the source is FAA Form 8260-2.

5

Daniel Wacker, FAA/AFS-420, said sometimes a holding pattern is not part of a procedure route/segment description and the information is only sourced on the 8260-2. He asked how that information gets loaded into the Flight Management System (FMS). Valerie said a lot of fixes have more than one holding pattern predicated on them. The particulars of each holding pattern are on the 8260-2, but that information is not captured in NASR and won't go into the FMS. Joshua Fenwick, Garmin, said the primary source from their suppliers is NASR with information supplemented by the 8260-2. He said the biggest issue is with the source for the holding pattern leg length. Valerie reminded everyone that at the last ACM, Terminal Charting, the Instrument Flight Procedures Group and Garmin all agreed that it would be preferable to have the holding pattern leg lengths documented the procedure source documents.

Steven Madigan, Garmin, said to a certain degree, this problem has roots in the abbreviated amendment process for STARs and DPs. He said commonly a new 8260-2 may be published before an old procedure form is updated and this can result in a discrepancy.

STATUS: OPEN

ACTION: Jeff Rawdon, FAA/AFS-420, and the Flight Procedures and Airspace Group will investigate the documentation of holding pattern leg lengths and report back at the next ACM.

MEETING 22-01

Jeff Rawdon, FAA/AFS-420, said the Flight Procedures and Airspace Group (FPAG) received data from the Aeronautical Data Team (ADT) regarding this issue, but that they still need to investigate this issue further to make a determination as to whether holding pattern leg lengths should be documented on all Departure and Arrival procedure source forms as Garmin proposed and as Jeppesen, AJV-A, and NBAA supported.

Scott Jerdan, FAA/AJV-A310, said ADT completed their review of all the holding pattern information in the National Airspace System Resource (NASR) database and are continuing to work on resolving the discrepancies.

Steve Madigan, Garmin, asked if they should report any discrepancies they find through the Aeronautical Information Portal. Scott said yes.

STATUS: OPEN

ACTION: Jeff Rawdon, FAA/AFS-420, and the Flight Procedures and Airspace Group will investigate the documentation of holding pattern leg lengths on procedure source forms and report back at the next ACM.

MEETING 22-02

Jeff Rawdon, FAA/AFS-420, reported the Flight Procedures and Airspace Group (FPAG) conducted a review of FAA Orders 8260.19 and 8260.46 and they believe the orders make it clear that holding pattern information will be documented on the procedure source forms.

6

Krystle Kime, FAA/AJV-A222, said Terminal Charting gets the holding pattern leg length for conventional Standard Instrument Departures (SIDs) and Standard Terminal Arrivals (STARs) from FAA Forms 8260-15 and -17 and for Instrument Approach Procedures (IAPs) and RNAV SIDs and STARs, from FAA Form 8260-2.

Steve Madigan, Garmin, reviewed his original recommendation and said they would like to have the holding pattern leg length always documented on the procedure source form for SIDs and STARs. He said discrepancies arise when the FAA Form 8260-2 has been updated but the procedure source form has not. Dan Wacker, FAA/AFS-420, said the 8260-2s and FAA Forms 8260-15 and -17 and should be submitted together and the information should be documented/updated on both. He said discrepancies are only occurring if the criteria is not being followed. Pat Mulqueen, FAA/AJV-A440, agreed that the holding pattern details should be maintained on the procedure source forms and on the 8260-2s and they are working on correcting this problem going forward.

Valerie summarized that FAA Orders 8260.19 and 8260.46 both have guidance documenting that the leg length will be documented on both the procedure source forms and on the 8260-2s. Going forward, holding pattern details will be maintained on the 8260-15, 8260-17, and on the 8260-2s. Steve and Krystle both support that as a solution. Krystle asked what to use if the procedure source doesn't match the -2. Pat said Terminal Charting should query any discrepancies. There was agreement to close this item.

STATUS: CLOSED