

ARINC 424 NDB

Draft 4 of Supplement 23
Proposal

Location: Virtual Meeting
October 4-7, 2021

ADD HOLDING PATTERN INBOUND COURSE NAVAID & THETA

V.1

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SUMMARY

Garmin is proposing to add the Inbound Course Navaid and Theta values to the Holding Pattern (EP) record.

Rev1: Changed to reuse the Recommended Navaid (5.23) field instead of created a new field definition.

ADD HOLDING PATTERN INBOUND COURSE NAVAID & THETA

1.0 INTRODUCTION/ BACKGROUND

The current Enroute Holding Pattern (EP) record does not indicate what makes up the inbound course of the holding pattern. Garmin would like to receive the recommended navaid & theta (radial/bearing) which was used to define the inbound course so that we could correctly adjust for the magnetic variation of the holds, and potentially auto-tune the navaid when that holding pattern is flown.

Below is an example of the DOWNE INT on the KLAX ILS or LOC RWY 7L which has 3 fix makeups.

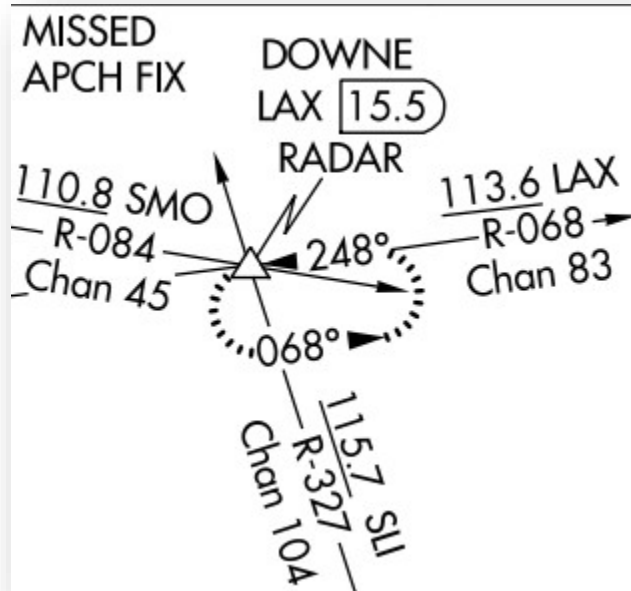


Figure 1: KLAX I07L

And looking at the FAA’s 8260-2 form the DOWNE INT has three holds each with a different inbound course makeup: LAX VORTAC R-068, WP (RNAV), SLI VORTAC R-327.

EFF 05NOV2020
NFDD 187
BM

RADIO FIX AND HOLDING DATA RECORD

NAME: DOWNE STATE: CA COUNTRY: US ICAO REGION CODE: K2
 LATITUDE/LONGITUDE: 335751.49N/1180725.42W TYPE: WP, RADAR, INT, DME
 AIRSPACE DOCKET: FIX TYPE OF ACTION: MODIFY

FIX MAKE-UP FACILITIES:		IDENT	TYPE	CLASS	MAG BRG	TRUE BRG	DME	DIST FROM FAC	MRA	MAA
FAC	NAME							NM FEET		
1	LOS ANGELES	LAX	VORTAC	H	068.00	083.00	15.52	15.50	3000	17500
2	SEAL BEACH	SLI	VORTAC	L	327.39	342.39	11.37	11.37	3000	17500
3	SANTA MONICA	SMO	VOR/DME	L	084.31	099.31	16.82	16.84	3000	17500

HOLDING: HOLDING TYPE OF ACTION: NO CHANGE

PATTERNS:		IDENT	TYPE	RAD/CRS/BRG	CRS INBOUND	TURN (L OR R)	LEG LENGTH TIME DME	HOLDING ALTITUDES	TEMPLATES
PAT	DIR							MIN MAX	MIN MAX
1	E	LAX	VORTAC	068.00	248.00	L	1	3000 14000	5 11
2	E	WP	WP	070.00	250.00	L	4	3000 14000	5 11
3	SE	SLI	VORTAC	327.39	327.39	L	1	3000 14000	5 11

Figure 2: KSEA CHINS4 Arrival

2.0 DISCUSSION and/or ACTION

Garmin proposes to add the fields to the Enroute Holding Pattern (EP) record for the inbound course’s Navaid and theta (radial/bearing).

3.0 Legacy ARINC 424 changes as depicted (Track Changes is Helpful)

3.1 Update Chapter 4, Table 4.1.5.1:

- 3.1.1 Add Inbound Course Navaid Identifier
- 3.1.2 Add Inbound Course Navaid ICAO
- 3.1.3 Add Inbound Course Section Code
- 3.1.4 Add Inbound Course Subsection Code
- 3.1.5 Add Inbound Course Navaid Airport ICAO Identifier
- 3.1.6 Add Inbound Course Navaid Airport ICAO Code
- 3.1.7 Add Inbound Course Theta

4.1.5.1 Holding Pattern Primary Records

Column	Field Name (Length)	Reference
...		
81	Leg Inbound/Outbound Indicator (1)	5.298
82 thru 9885	Reserved (Expansion) (17) Inbound Course Navaid Identifier	5.23
86 thru 87	Inbound Course Navaid ICAO	5.14
88	Inbound Course Section Code	5.4
89	Inbound Course Subsection Code	5.5
90 thru 93	Inbound Course Navaid Arpt ICAO Ident	5.6
94 thru 95	Inbound Course Navaid Arpt ICAO Code	5.14
96 thru 98	Inbound Course Theta	5.###
99 thru 123	Name (25)	5.60
124 thru 128	File Record No. (5)	5.31
129 thru 132	Cycle Date (4)	5.32

3.2 Update Chapter 5, Field Definition 5.23 – Recommended Navaid

5.23 Recommended Navaid (RECD NAV)

Definition/Description: The Recommended Navaid field allows the reference facility for the waypoint in a given record Fix Ident field or for an Airport or Heliport to be specified. VHF, NDB (Enroute and Terminal), Localizer, TACAN, GLS, and MLS Nav aids may be referenced.

Source/Content: The 1, 2, 3, or 4-character identification of the Navaid appears in this field. Nav aids recommended for waypoint reference in official government publications will be used when available. The following general rules on field content apply:

Procedures that use coding which require leg types referenced to specific nav aids are covered by the procedure coding rules in Attachment 5 to this specification.

ADD HOLDING PATTERN INBOUND COURSE NAVAID & THETA

- a. A VHF Navaid may be any VOR, DME, VORDME, VORTAC, TACAN, Un-Biased ILSDME or MLS DME available in the database following the specific rules in Table 5-18.
- b. An NDB Navaid may be any NDB or Locator available in the Enroute or Terminal NDB files in the database.
- c. Localizers and MLS Azimuth are used as Recommended Navaids for procedures that reference those navaids, including RNAV Transitions to these types of procedures.
- d. The Recommended Navaid in final approach coding will be the procedure reference facility. As not all Final Approach Procedure reference a Navaid, i.e., RNAV and GPS, the Recommended Navaid is not provided in these types of procedure, see Attachment 5 for specific rules.
- e. The Recommended Navaid in Airport and Heliport Records will be any VOR, VORDME, VORTAC, **TACAN, or Enroute NDB** available in the database.
- f. The Recommended Navaid in any Enroute Airway Record, when provided, will be any VORDME or VORTAC available in the database.
- g. The Recommended Navaid in any Terminal Procedure Record other than the final approach coding will be the procedure reference facility of a type from the Definition/Description paragraph above and will be in accordance with the rules governing Recommended Navaids for Path Terminators and coding rule as defined in Attachment 5 of this specification.
- h. The rules for Recommended Navaids for Converging ILS Approach Procedures are the same as for ILS Approach Procedures.
- i. The Recommended Navaid used in a GLS Approach Procedure will be the GLS Reference Path identifier appropriate to the runway and approach.
- j. The use of non-collocated facilities of the types VORDME, VORTAC, and Localizer/ILSDME or ILSTACAN as the recommended navaid in terminal procedure coding is limited to defined circumstances only. For a definition of non-collocated, refer to Section 5.35 of this specification. For the defined circumstances, refer to Table 5-18 of this specification.
- i. The Recommended Navaid in the Holding Pattern record indicates the inbound course Navaid which is used when navigating on the holding pattern's Inbound Holding Course (5.62).**

Used On: Enroute Airway Record, Airport and Heliport
SID/STAR/Approach Records, Airport and Heliport Record,
Holding Pattern

Length: 4 characters max.

Character Type: Alpha/numeric

Examples: P, PP, DEN, LAX, ILAX, MJFK

ADD HOLDING PATTERN INBOUND COURSE NAVAID & THETA

Table 5-18 – Recommended Navaid Usage Part 1

Facility Type	Procedure User															
	SID/STAR	Approach Transition	Missed Approach Procedure	Path Terminator -AF	Path Terminator -CR, VR	Path Terminator -CD, VD, FD	Localizer Final Approach & Transitions of Course or Heading to Intercept Localizer	VORDME/VORTAC Final Approach	VOR Only Final Approach Coding	NDB Only Final Approach Coding	NDB + DME Final Approach Coding	TACAN Final Approach Coding	GLS Final Approach Coding	MLS Final Approach Coding & Transitions of Course or Heading to Intercept MLS	Airports	Airways
Collocated VORDME/VORTAC	X	X	X	X	X	X		X			2				X	X
Non-collocated VORDME/VORTAC		X	X	X				X			2				X	X
Localizer		X	X		X		X									
VOR		X	X		X			X							X	X
DME			X	X		X					2					
TACAN	X	X	X	X	X	X					2	X			X	X
NDB		X	X						X		1					X
ILSDME or ILSTACAN			3	X		3					2 & 3					
GLS		X										X				
MLS		X											X			

- 1 On FACF and FAF Records
- 2 On Runway/MAP Records Only
- 3 ILSDMEs and ILSTACANs must be unbiased for use as a recommended navaid. They do not have to be collocated with the frequency paired localizer for use as a recommended navaid in the instances allowed.

Table 5-19 – Recommended Navaid Usage Part 2

Facility Type	Recommended Navaid Use
	Holding Pattern
Collocated VORDME/VORTAC	X
Non-collocated VORDME/VORTAC	X
Localizer	X
VOR	X
DME	
TACAN	X
NDB	X
ILSDME or ILSTACAN	X
GLS	
MLS	X

3.3 Update Chapter 5, Field Definitions: Add new field definition for Inbound Course Theta

5.### Inbound Course Theta

Definition/Description: The Inbound Course Theta indicates the magnetic radial/bearing from the inbound course Navaid which is used when navigating on the holding pattern’s Inbound Holding Course (5.62).

Source/Content: The Inbound Course Theta is derived from official government source when available. The values are provided with a resolution of one degree with a range of 001 through 360. The value of blank will be provided when the Inbound Course Theta is not available / not applicable.

Used On: Enroute Holding Pattern
Length: 3 characters
Character Type: Alpha/Numeric
Type:
Examples: 001, 123, 360, *blank*

ADD HOLDING PATTERN INBOUND COURSE NAVAID & THETA

NOTE: Do not include examples below in the ARINC 424 Specification

Examples of the DOWNE example with the LAX VORTAC R-068 and DOVES example of the I-OWB 359° course:

Column	Field Name (Length)	Example 1	Example 2
...			
82 thru 85	Inbound Course Navaid Identifier	LAX	IOWB
86 thru 87	Inbound Course Navaid ICAO	K2	K5
88	Inbound Course Section Code	D	P
89	Inbound Course Subsection Code		I
90 thru 93	Inbound Course Navaid Arpt ICAO Ident		KOWB
94 thru 95	Inbound Course Navaid Arpt ICAO Code		K5
96 thru 98	Inbound Course Theta	068	359
...			

4.0 XML ARINC 424 changes as depicted (Track Changes is Helpful)

- Jira Ticket: [ARINC-271](#)
- Git Feature Branch: [feature/ARINC-271-add-holding-pattern-inbound-course-navaid-theta](#)
- Summary of changes:

4.1 Update HoldingPattern.xsd:

4.1.1 Add element “inboundCourseNavaid” as PointReference

4.1.2 Add element “inboundCourseTheta” as unsignedInt

```
86 | </xs:element>
87 + | <xs:element name="inboundCourseNavaid" type="type:PointReference" minOccurs="0" maxOccurs="1">
88 + |   <xs:annotation>
89 + |     <xs:documentation>The "Inbound Course Navaid" field indicates the inbound course Navaid whi
90 + |   </xs:annotation>
91 + | </xs:element>
92 + | <xs:element name="inboundCourseTheta" type="xs:unsignedInt" minOccurs="0" maxOccurs="1">
93 + |   <xs:annotation>
94 + |     <xs:documentation>The "Inbound Course Theta" field indicates the magnetic radial/bearing fr
95 + |   </xs:annotation>
96 + | </xs:element>
97 | </xs:sequence>
```