

声明 statement

本文档是为那些需要手动构建 RNP(AR)程序的人准备的。仓库遵守 GPL-3 协议。2024 年 8 月 30 日。Eyderoe
this doc is for someone who need create procedure by their own. all items in this repository follow GPL-3. 8/30/2024 Eyderoe if something conflict,
Chinese is correct

版本记录

- 第一版 2024/4/6
- 第二版 2024/8/30 更便捷，修复了错误

需要编写的文件 files need to write

航路点 waypoint

文件名: XXXX_waypoint.txt
file name: XXXX_waypoint.txt
内容: 29.6 106.6 CK610 经度 纬度 名称 (只会读取前三个字段)
content: 29.6 106.6 CK610 latitude longitude ident (only read the first three filed)

数据库编码 procedure

只支持以下类型航段: "CA", "CF", "FA", "DF", "VA", "IF", "TF", "RF", "HM", "HF"
only support leg below: "CA", "CF", "FA", "DF", "VA", "IF", "TF", "RF", "HM", "HF"
文件名: XXXX_encode.txt
file name: XXXX_encode.txt

文件结构大概是这样的 这是一个包含离场和进场程序的例子
file struct just like this, include a SID and STAR

```
1 HE,03,02L,RWY02L 离场 SOSLI-1Z
2 CF,CK401,,19,,-1,-1,,,-1
3 TF,UGOPO,,,-1,-1,,,-1
4 TF,CK407,,,-1,-1,,,-1
5 TF,SOSLI,,,-1,-1,,,-1
6
7 HE,04,20L/20R,RWY20L/20R 进场 AKBEK-9K
8 IF,AKBEK,,,-1,-1,,,-1
9 TF,CK411,,,-1,-1,,,-1
```

每一个程序由两部分组成: 标题, 内容
标题由 4 部分组成:
1. HE 代表这是标题
2. 03 代表这是离场程序: 等待 00, 进近过渡 01, 离场跑道过渡 02, 离场 03, 进场 04, 进近和复飞 05
3. 02L 跑道: 多跑道程序以/划分 如 02/02L/02R
4. RWY02L 离场 SOSLI-1Z 程序名称由三部分组成: 4.1 RWY+跑道 4.2 类型, 标准的名称应该为以下其中之一:
[等待, 进近过渡, 离场过渡, 离场, 失效, 进场, 进近, 进近复飞, 复飞] 4.3 程序标识, 过渡和失效并不需
要标识, 进近以及复飞的标识为小写字母比如 x y z, 其余的建议为名称-编号比如 ABC-12D

内容:
(0)类型 航点 (2)飞越 航向 (4)转向 高度 L (6)高度 H 速度 (8)下滑道 中心点 (10)距离 性能
类型: 只能为支持的航段类型, 上面写了的
航点: 显然
飞跃: 1 为飞跃否则留空
航向: 整数磁航向
转向: L 左 R 右
高度: 留空为-1 左为低限制 右为高限制
速度: 3 位速度
下滑道: 正小数, 比如 2.8
中心点: RF 弧段圆心
距离: 不可用, 用于 RF。程序会自己算

性能：RNP 值， -1 表示不可用， 1 表示 RNP1， 03 表示 RNP0.3

对于复飞后的最后一个点，假如这个点在某个等待程序中存在，则自动添加等待。当然也可以直接写 HM，随你。

each procedure has two parts: title and contents

title have four parts

1. HE mean this is a title
2. 03 mean it's a SID: holding00, appr-trans01, sid-runway-trans02, sid03, star04, appr&ga05, appr06, ga07
3. 02L mean runway: multi-runway split by / eg. 02/02L/02R
4. RWY02L 离场 SOSLI-1Z mean procedure name combine with 3 parts: 4.1: RWY + runway 4.2 type: the standard name need include one in [等待 holding, 进近过渡 appr-trans, 离场过渡 sid-runway-trans, 离场 sid, 失效 eosid, 进场 star, 进近复飞 appr&ga 4.3 mark 4.3.1 no need for eosid, trans 4.3.2 x y z: some lower letter in appr/appr&ga/ga 4.3.3 common: ident-id eg. ABC-12D

content:

type ident flyover course turn alt_L alt_H speed gs arc distance RNP

type: only support legs list above

ident: obviously

overfly: yes:1 no: blank

course: in magnet 3 letter max int

turn: L R

alt: blank:-1, left is low limit, right is high limit

speed: 3 letter max int

glideslope: always plus float eg.2.8

arc fix: use in RF leg center fix

distance: INOP, use for RF, but this will auto calculate later

rnp: RNP value, -1:INOP, 1:RNP1, 03:RNP0.3

AND if the last fix of a ga procedure exist in one holding procedure, software will add a HM or holding leg automatic. or you can add it by yourself depend on you

报错 error

三种类型

1. 软件能检测到的错误，都会在 master 文件下会生成 Log.txt
2. 软件不能检测到的错误，合法但不合理
3. 运行到一半突然出现一坨文字，软件 Bug 或编写错的太离谱了

three type

1. error that can detect by software, record in Log.txt under master
2. error that cant detect by software, legal but not reasonable
3. many message appear on cmd window, software bug or fatal bug in XXXX_encode

注意 Caution

1. 即使有离场等待和进场等待，他们也不会被自动加入离场点或进场点或者之类的。只有程序本身存在 HM，此时才会编码，比如单发失效程序
2. 除等待程序和离场/离场过渡外的任何一个程序，第一个必须是 IF（即不可能是 TF, RF 之类的）。离场/离场过渡有 CA, VA 等可以选择。
 1. no way to encode a HM leg in sid or star. except the HM in procedure, for example in eosid
 2. IF must be the first leg except holding, sid/sid-rwy-trans. and sid/sid-rwy-trans may choose CA, VA, ...。

附录 Appendix

只有英文，没有一点办法。ARINC424-18

Procedure	Beginning Leg	Ending Leg
SID Runway Transition Route Type 0, 1, 4, F and T	CA, CD, CF, CI, CR, DF, FA, FC, FD FM, IF, VA, VD, VI, VM, VR	AF, CF, DF, FM, HA, HM ² , RF, TF, VM,
SID Route Type 2, 5, or M	CA ³ , CD ³ , CF ³ , CI ³ , CR ³ , DF ³ , FA, FC, FD, FM, IF ⁴ , VA ³ , VD ³ , VI ³ , VM ⁸ , VR ³ .	AF, CF, DF, FM, HA, IF ⁴ , TF, RF, VM
SID Enroute Transition Route Type 3, 6, S or V	FA, FC, FD, IF	AF, CF, DF, HA, RF, TF,
STAR Enroute Transition Route Type 1, 4, 7 or F	FC, FD, IF	AF, CF, DF, HM, RF, TF
STAR Route Type 2, 5, 8 or M	FC, FD, IF	AF, CF, DF, FM, IF ⁴ , RF, TF, VM
STAR Runway Transition Route Type 3, 6, 9 or S	FC, FD, HF, IF	AF, CF, FM, HF, HM, RF, TF, VM
Approach Transition Route Type A	FC, FD, HF, IF, PI	AF, CF, CI ⁵ , HF, HM, PI, RF, TF, VI ⁵
Approach Route Types in Section 5.7	IF	CF, RF, TF ⁶ ,
Missed Approach Route Type Z	AF ⁷ , CA, CD, CF, CI, CR ⁷ , DF, FA, FC, FD, FM, HA, HM, RF ⁷ , TF, VA, VD, VI, VM, VR	AF, CA, CF, DF, FM, HM, RF, TF, VA, VM,

Explanation of Notes in Table

- ¹ When followed by a CF or DF leg or when Route Type is “T,” Vector SID.
- ² When Route Type is “0,” Engine Out SID.
- ³ When SID Procedure has NO Runway Transitions
- ⁴ When “IF” leg is the one and only record in the SID/STAR route.
- ⁵ When Approach Transition is localizer based.
- ⁶ When Final Approach is GPS or some types of MLS Approach or other specific cases where it has been determined that a “TF” is more satisfactory than a “CF.”
- ⁷ When “AF” or “RF” are published to begin at the published Missed Approach Point.
- ⁸ When preceded by runway coded as an IF leg for SID runway transition.




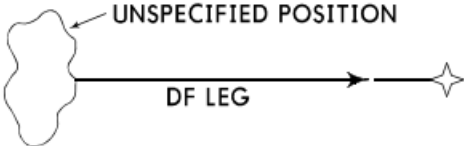
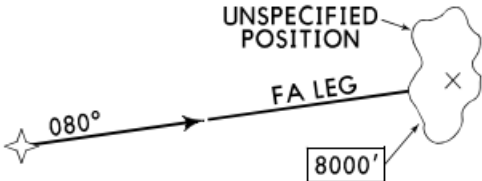
这是每一种程序起始和终止许可的类型


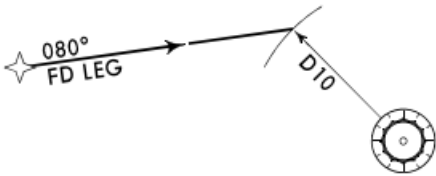

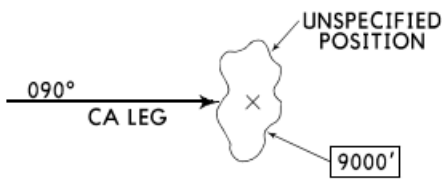

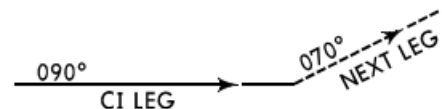
		N E X T L E G																							
C U R R E N T L E G		AF	CA	CD	CF	CI	CR	DF	FA	FC	FD	FM	HA	HF	HM	IF	PI	RF	TF	VA	VD	VI	VM	VR	
	AF																								
	CA																								
	CD																								
	CF																								
	CI																								
	CR																								
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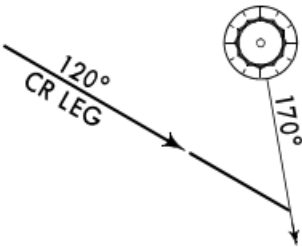
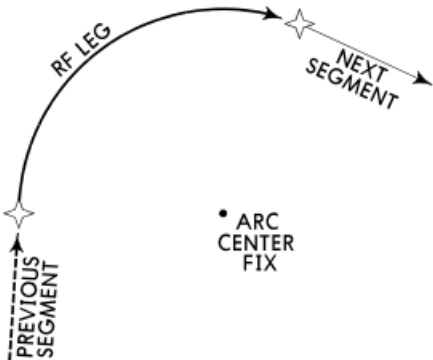
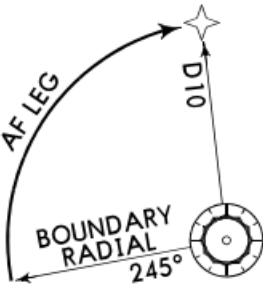
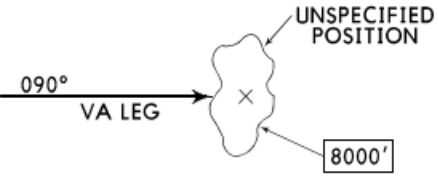
* = The IF leg is coded only when the altitude constraints at each end of the “FX,” “HX” or “PI” leg are different.

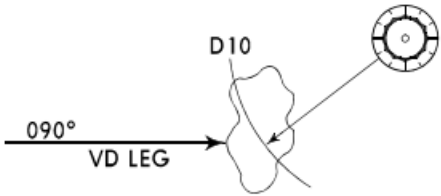
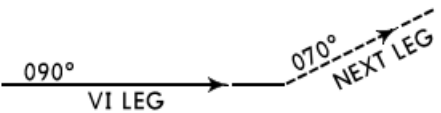
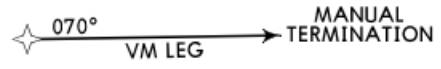
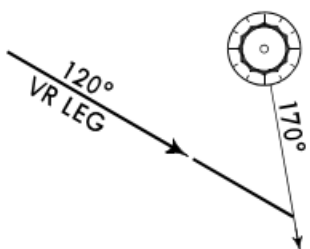
& = A CF/DF, DF/DF, TF/DF, or FC/DF sequence should only be used when the termination of the first leg must be overflown, otherwise alternative coding should be used. See Rule 3.1 in this attachment.

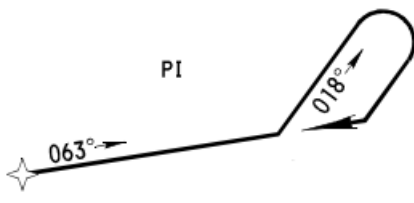
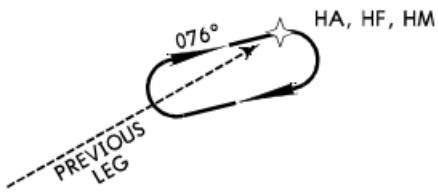
这是哪种航段后面可以接哪种航段

Leg Code	Example Path	Description
IF		Figure 1: Initial Fix or IF Leg. Defines a database fix as a point in space.
TF		Figure 2: Track to a Fix or TF Leg. Defines a great circle track over ground between two known databases fixes.
CF		Figure 3: Course to a Fix or CF Leg. Defines a specified course to a specific database fix.
DF		Figure 4: Direct to a Fix or DF Leg. Defines an unspecified track starting from an undefined position to a specific database fix. Note: See also Table 1.3, Leg Sequencing, for other uses of the DF Leg.
FA		Figure 5: Fix to an Altitude or FA Leg. Defines a specified track over ground from a database fix to a specified altitude at an unspecified position.

FC		Figure 6: Track from a Fix for a Distance or FC Leg. Defines a specified track over ground from a database fix for a specific distance.
FD		Figure 7: Track from a Fix to a DME Distance or FD Leg. Defines a specified track over ground from a database fix to a specific DME Distance which is from a specific database DME Navaid.
FM		Figure 8: From a Fix to a Manual termination or FM Leg. Defines a specified track over ground from a database fix until Manual termination of the leg.
CA		Figure 9: Course to an Altitude or CA Leg. Defines a specified course to a specific altitude at an unspecified position.
CD		Figure 10: Course to a DME Distance or CD Leg. Defines a specified course to a specific DME Distance which is from a specific database DME Navaid.
CI		Figure 11: Course to an Intercept or CI Leg. Defines a specified course to intercept a subsequent leg.

CR		<p>Figure 12: Course to a Radial termination or CR Leg. Defines a course to a specified Radial from a specific database VOR Navaid.</p>
RF		<p>Figure 13: Constant Radius Arc or RF Leg. Defines a constant radius turn between two database fixes, lines tangent to the arc and a center fix.</p> <p>Note: While the arc initial point, arc ending point and arc centerpoint are all available as database fixes, implementation of this leg type may not require them to be available as fixes.</p>
AF		<p>Figure 14: Arc to a Fix or AF Leg. Defines a track over ground at specified constant distance from a database DME Navaid.</p>
VA		<p>Figure 15: Heading to an Altitude termination or VA Leg. Defines a specified heading to a specific Altitude termination at an unspecified position.</p>

VD		Figure 16: Heading to a DME Distance termination or VD Leg. Defines a specified heading terminating at a specified DME Distance from a specific database DME Navaid.
VI		Figure 17: Heading to an Intercept or VI Leg. Defines a specified heading to intercept the subsequent leg at an unspecified position.
VM		Figure 18: Heading to a Manual termination or VM Leg. Defines a specified heading until a Manual termination.
VR		Figure 19: Heading to a Radial termination or VR Leg. Defines a specified heading to a specified radial from a specific database VOR Navaid.

PI		Figure 20: 045/180 Procedure Turn or PI Leg. Defines a course reversal starting at a specific database fix, includes Outbound Leg followed by a left or right turn and 180 degree course reversal to intercept the next leg. A Maximum excursion Time or Distance is included as a data field.
HA, HF, HM		<p>Figure 21: Holding in lieu of Procedure Turn (HF) for Approach Procedures and Mandatory Holds (HA, HM) in SID/STAR and Missed Approach coding. The HA, HF, and HM Leg Types define a holding pattern in lieu of procedure turn course reversal or a terminal procedure referenced mandatory holding pattern at a specified database fix. Leg time or distance is included as a data field.</p> <p>The three codes indicate different path termination types:</p> <p>HA = Altitude Termination</p> <p>HF = Single circuit terminating at the fix.</p> <p>HM = Manual Termination.</p>