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PANS-OPS Flight Procedure Design Training for CAAs

23 August – 03 September 2021





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5 – Holding criteria

(Doc. 8168, Vol. 2, Part II, Section 4, Chap. 1)





1. General
2. Shape and terminology
3. Types of holding patterns
4. Entry and holding procedures
5. Protection
6. Publication

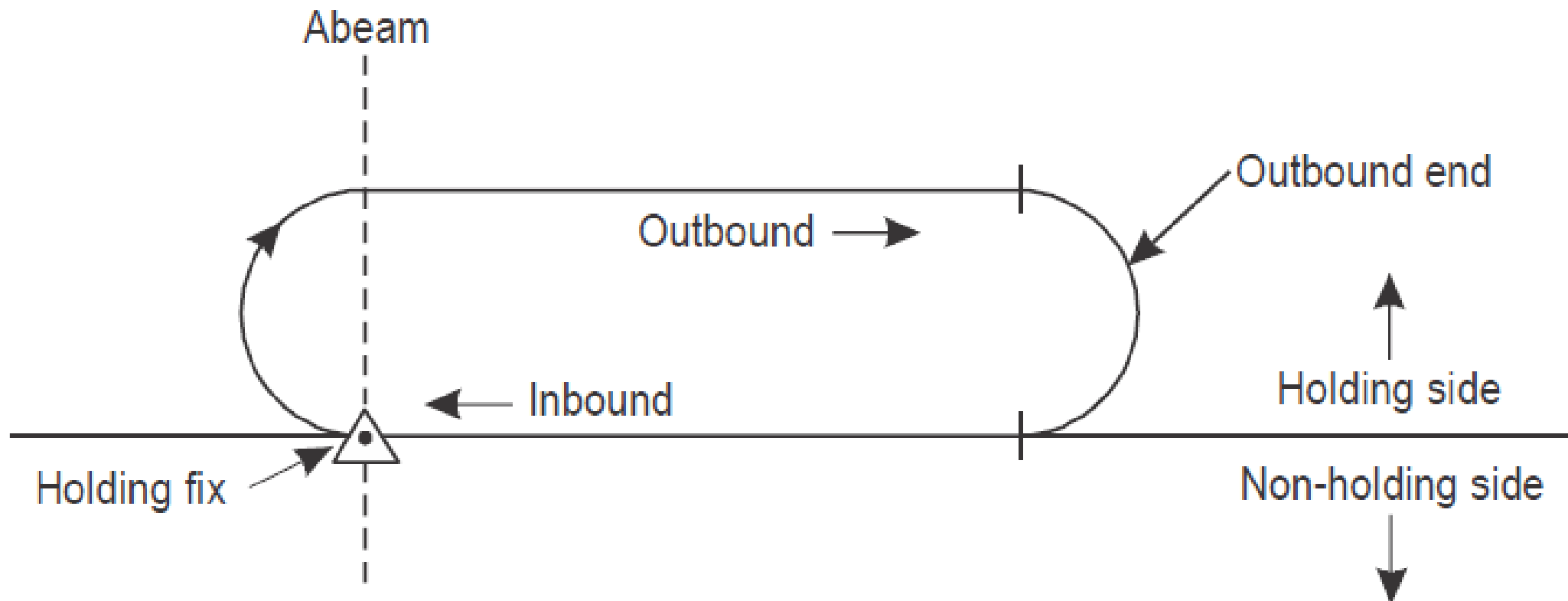
□ Kind of waiting room for aircraft:

- ☞ Adverse MET conditions at the airport?
- ☞ Airport is closed temporarily?
- ☞ Traffic jam?
- ☞ Technical issue?
- ☞ En-route holding vs terminal holding.

□ Holding:

- ☞ Specified and protected airspace volume:
 - Minimum protection altitude;
 - Maximum protection altitude.
 -

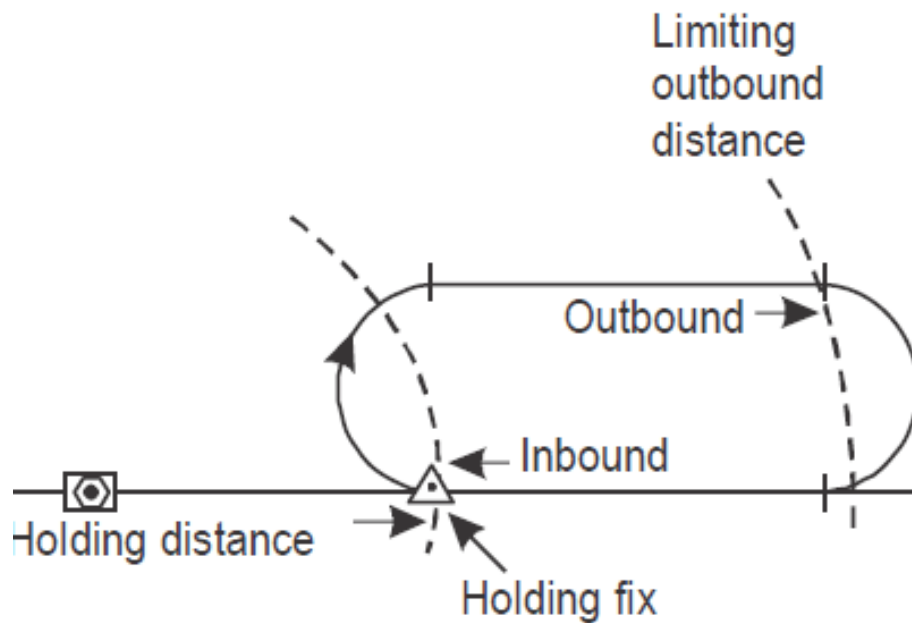
A. Holding pattern (right turns)



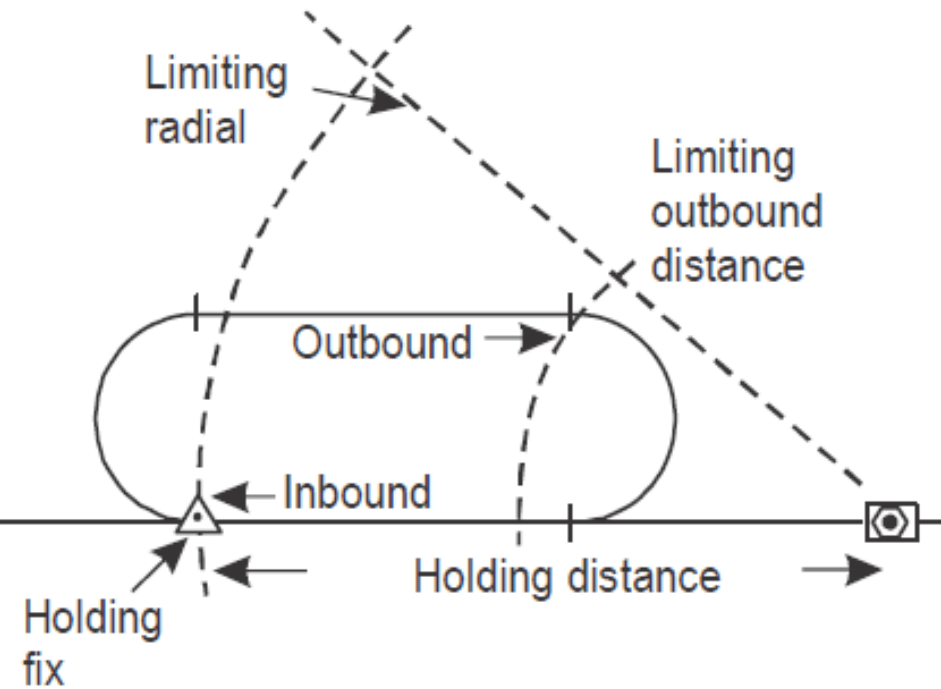
Shape and terminology

African Flight Procedure Programme (AFPP)

B. VOR/DME-holding towards the station



C. VOR/DME-holding away from the station



□ Fix definitions:

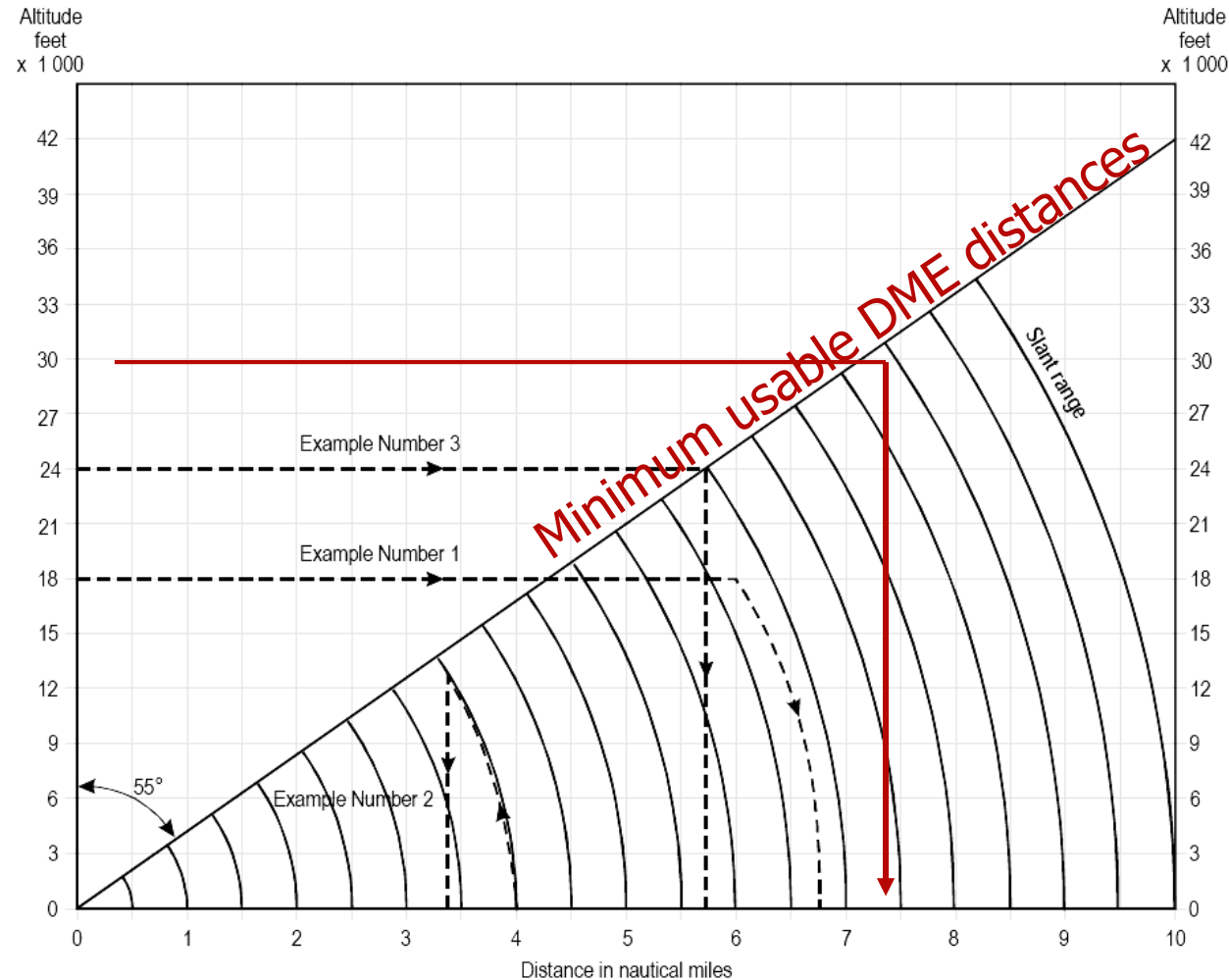
- ☞ Overhead a Navaid: VOR, NDB, etc.
- ☞ Intersection of information:
 - VOR-DME;
 - 2 radials or bearings.
- ☞ PBN fix.

□ Outbound limit:

- ☞ Time:
 - VOR-DME, VOR, NDB, PBN fix
- ☞ Distance:
 - DME distance.
- ☞ Limiting radial.

Types of holding patterns

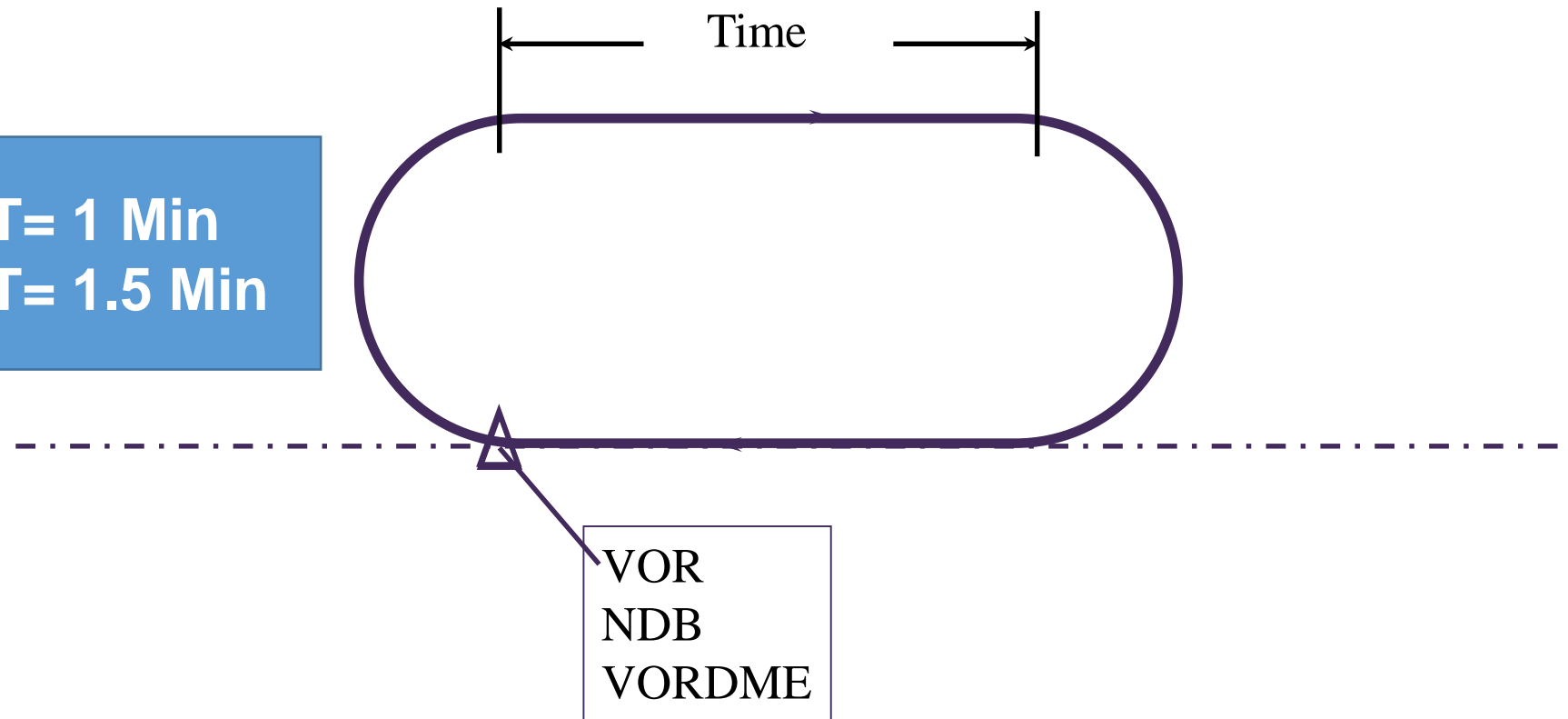
African Flight Procedure Programme (AFPP)



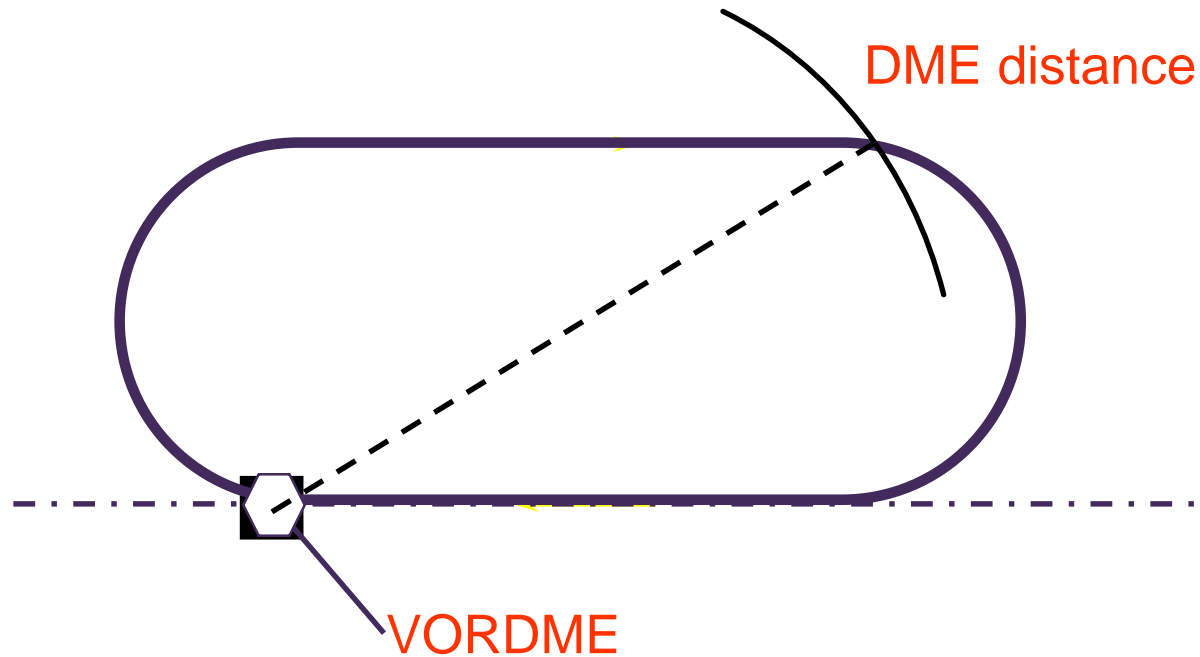
DME Dead cone (8168 II.4.1.AppA-12)

Over a navaid with outbound time

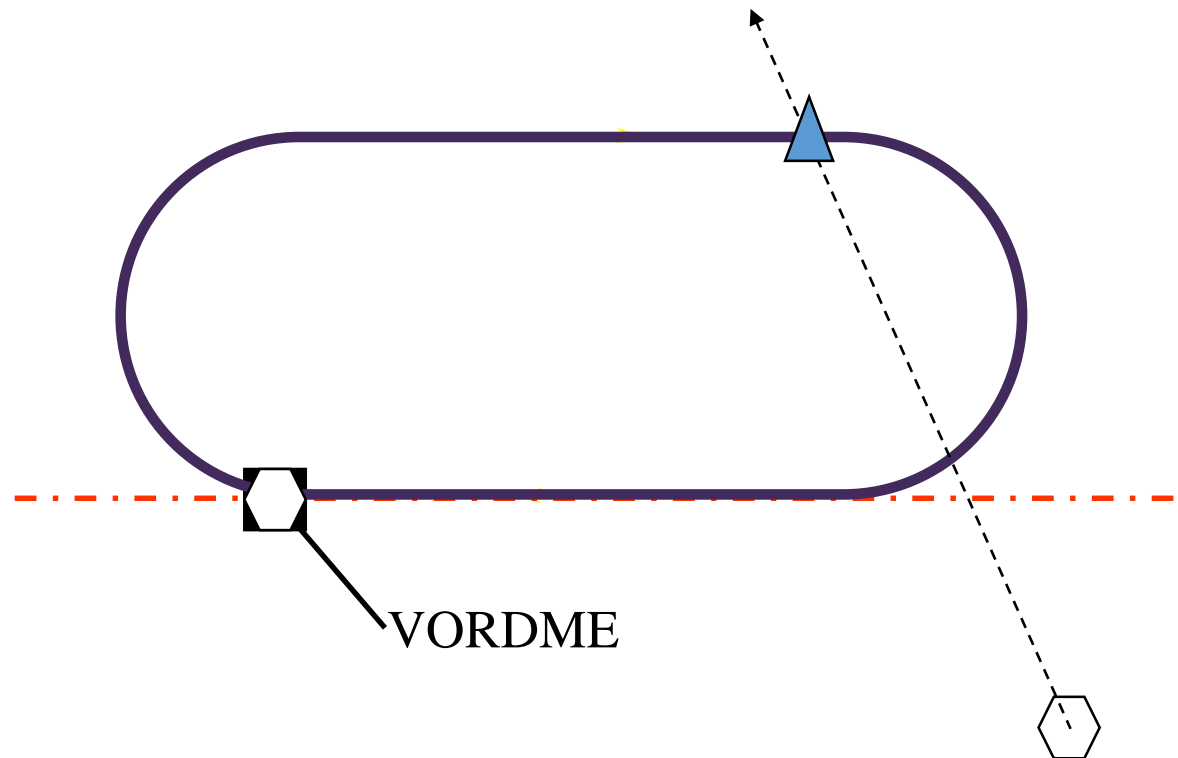
- $Z \leq 14\,000$ Ft $T = 1$ Min
- $Z > 14\,000$ Ft $T = 1.5$ Min



Over VORDME with outbound distance



Over facility with limiting radial



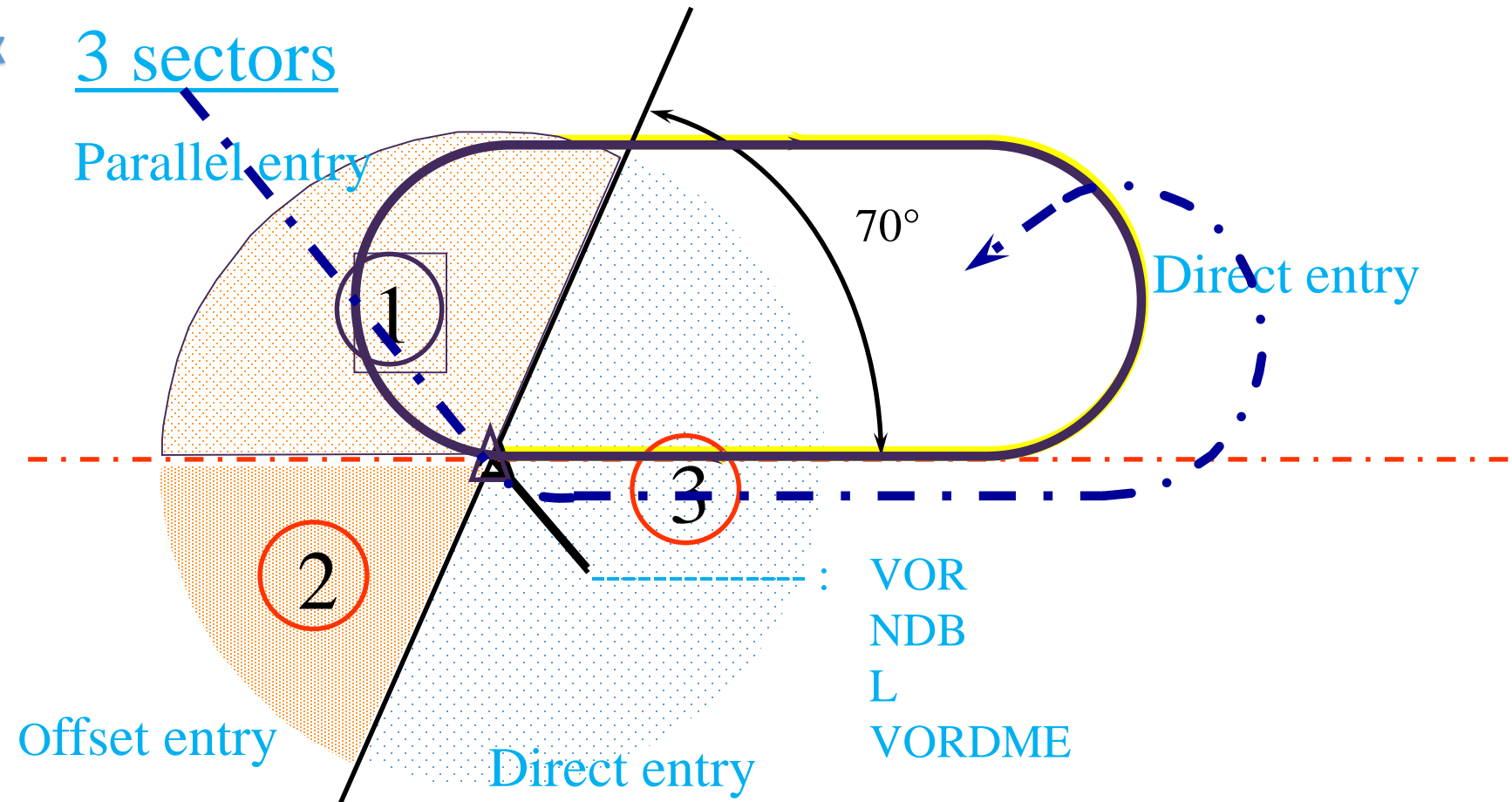
☐ Entry and holding procedures depend on type of fixes:

- 👉 Over Navaid or PBN fix;
- 👉 VOR-DME fix;
- 👉 Intersection of two radials.

Entry and holding procedures

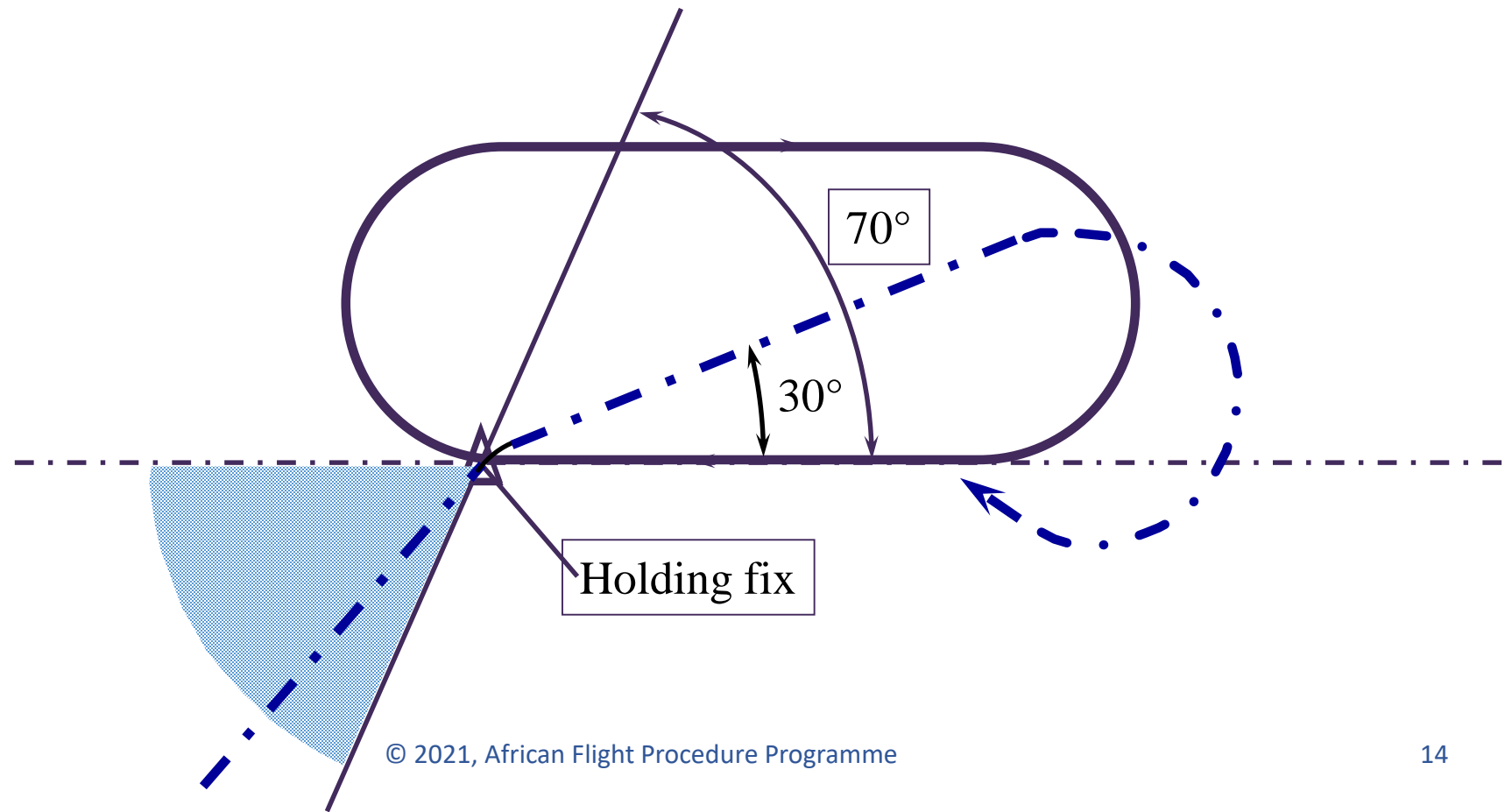
African Flight Procedure Programme (AFPP)

Over Navaid or PBN fix



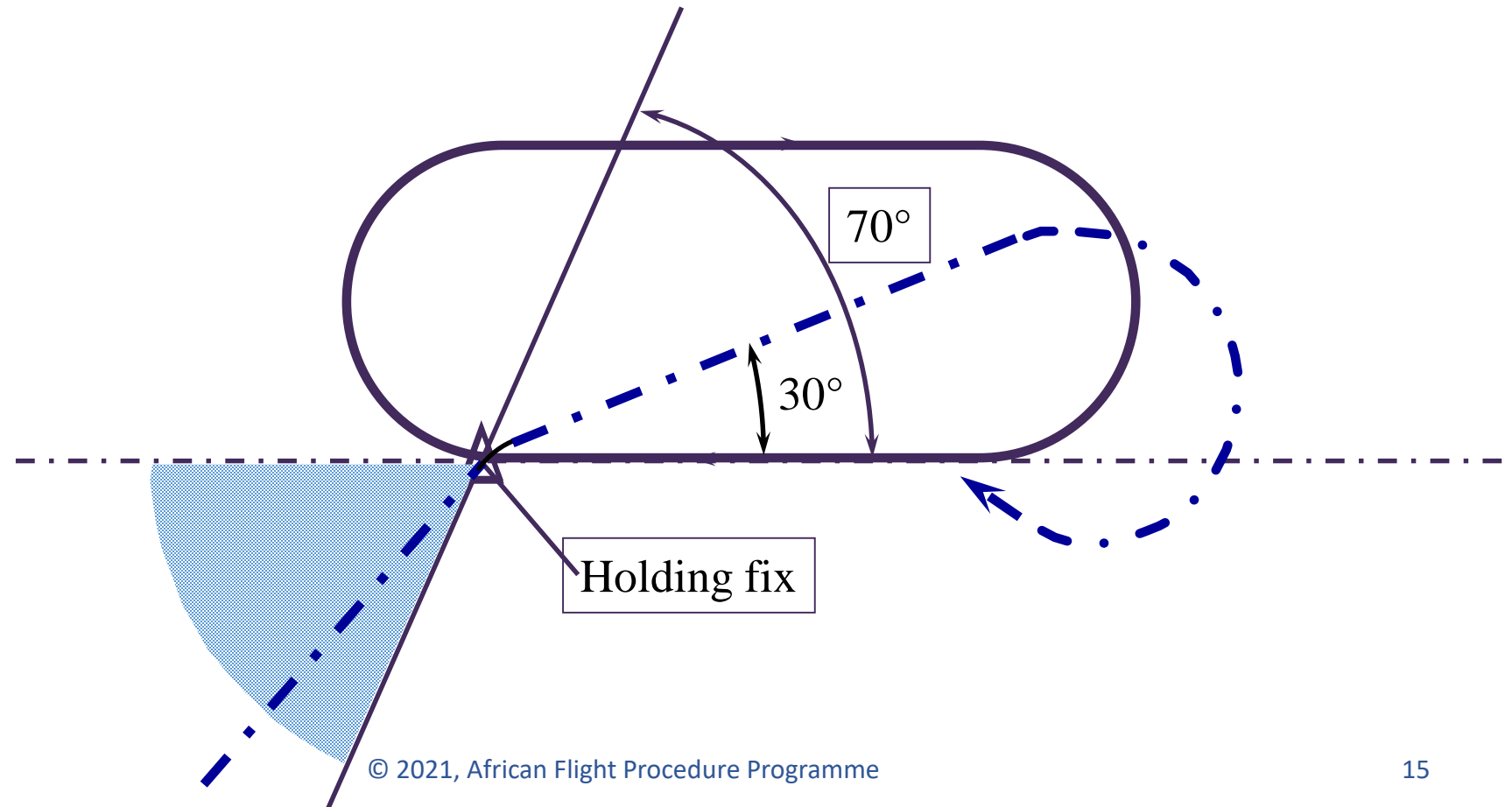
Sector 2 : Offset entry

Over Navaid or PBN fix



Sector 2 : Offset entry

Over Navaid or PBN fix



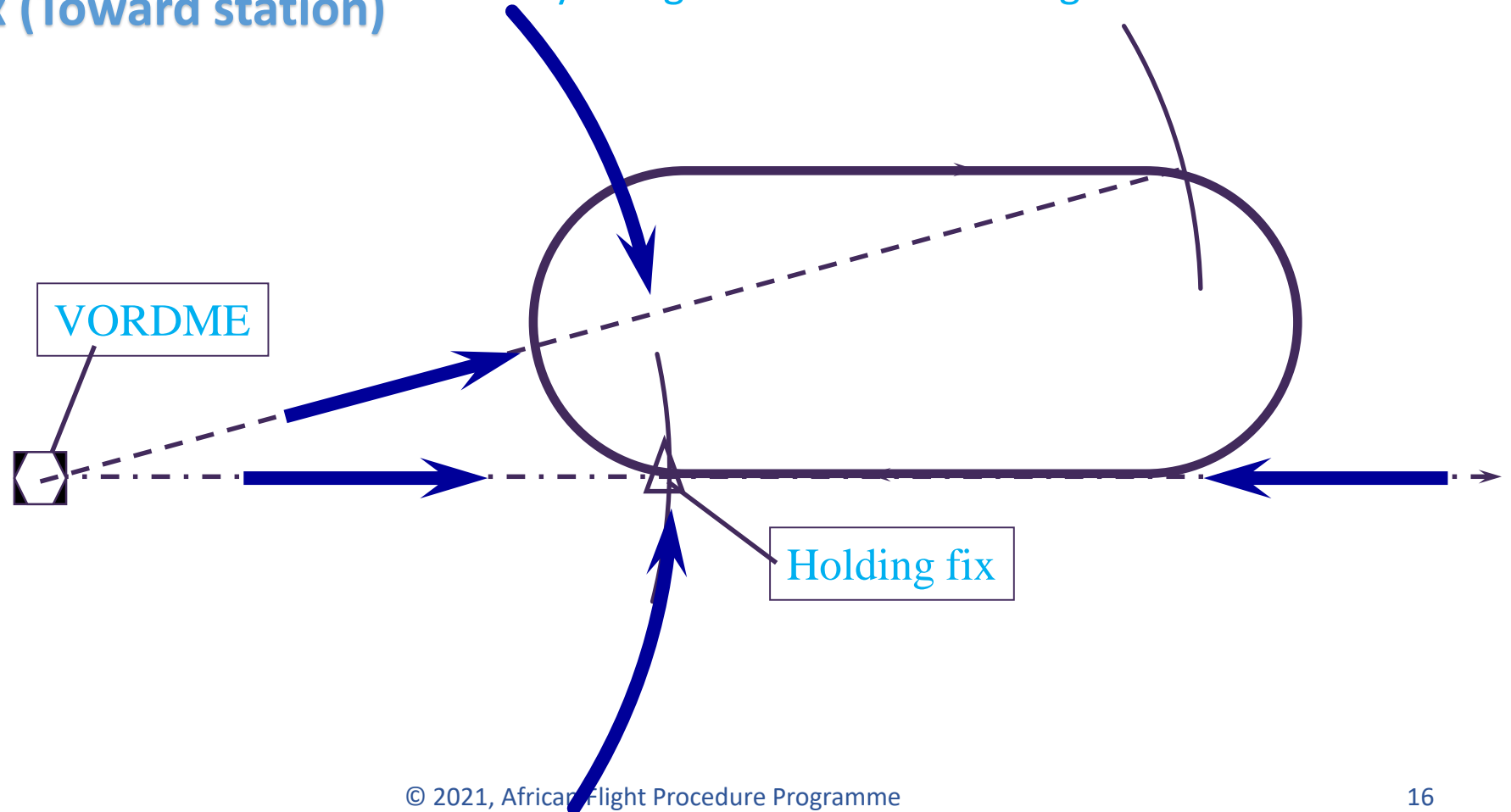
Entry and holding procedures

African Flight Procedure Programme (AFPP)

Over VOR-DME fix (Toward station)

Entry along DME arc if DME arc greater than 7 NM

Five entries

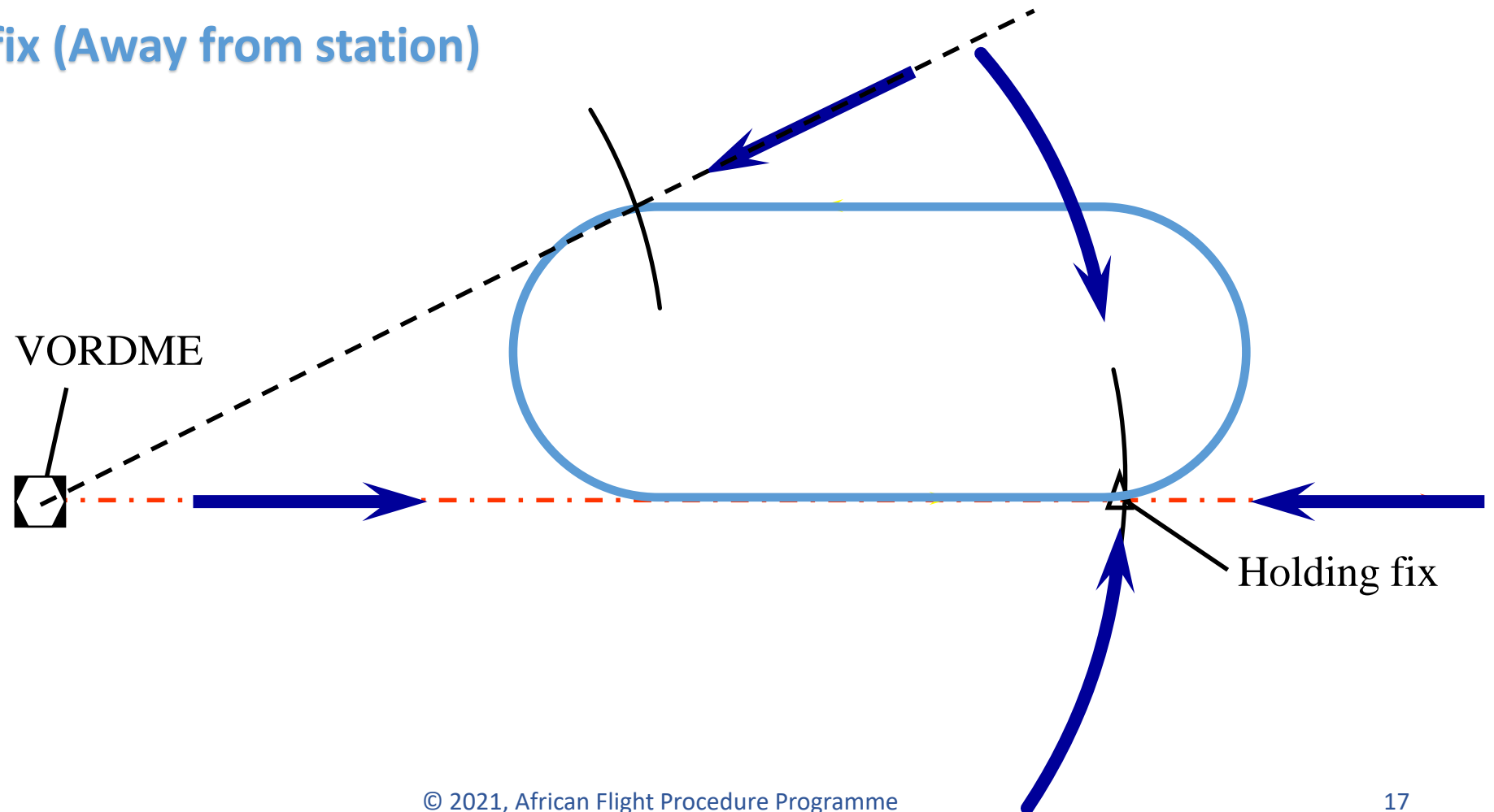


Entry and holding procedures

African Flight Procedure Programme (AFPP)

Over VOR-DME fix (Away from station)

Five entries

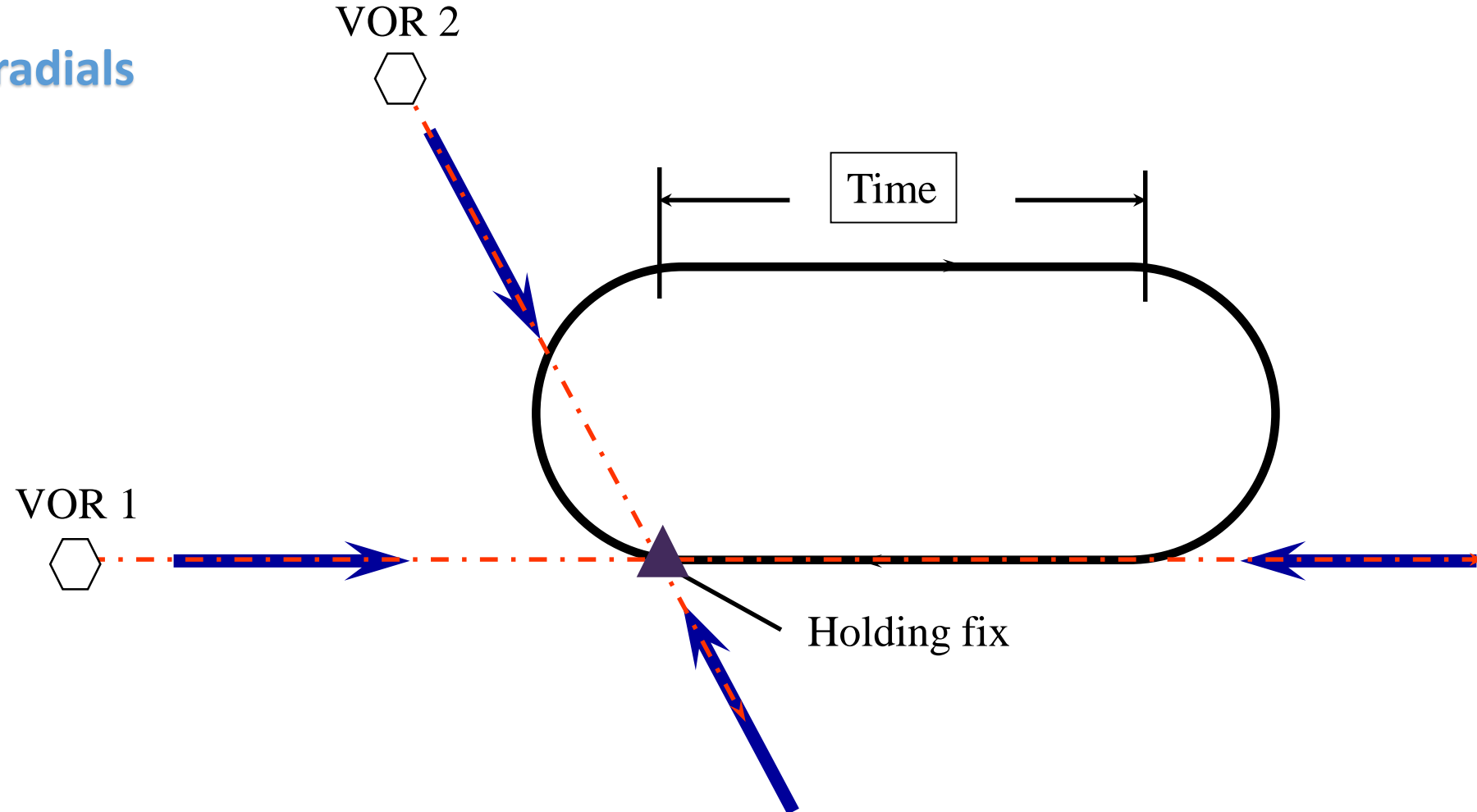


Entry and holding procedures

African Flight Procedure Programme (AFPP)

Intersection of two radials

Four entries



□ Key points:

- ☞ Holding over navaid or PBN fix: **3 entry sectors;**
- ☞ Holding over VOR-DME fix: **5 entries;**
- ☞ Holding over radial intersection fix: **4 entries.**

□ Protection parameters:

- ☞ Indicated Air Speed;
- ☞ Maximum pressure altitude;
- ☞ Temperature;
- ☞ Bank angle : 25 °;
- ☞ Outbound leg:
 - Time or distance.
- ☞ Wind:
 - ICAO, Statistical.
- ☞ Entry procedures.

☐ Indicated airspeed

Altitude (ft)	Standard IAS (kt)	IAS in turbulence (kt)
0 -14 000	230	280
15 000 – 20 000	240	Max(280;M0.8)
21 000 – 34 000	265	M0.83

☐ Minimum Obstacle Clearance (MOC)

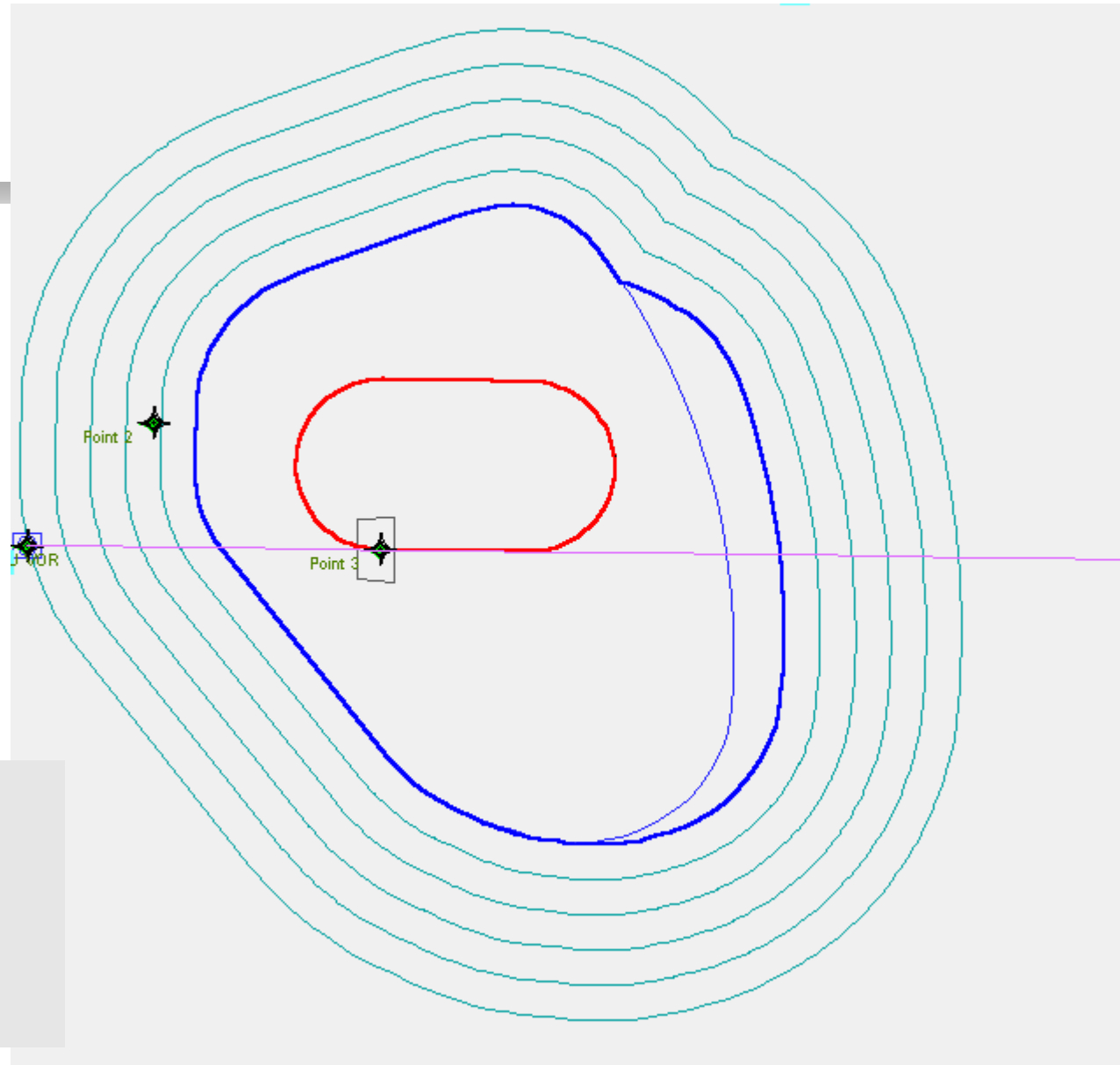
Part	MOC (m (ft))
Basic area	300(984)
Entries area	300(984)
Buffer area 1	300 (984)
Buffer area 2	150(492)
Buffer area 3	120(394)
Buffer area 5	90(294)
Buffer area 5	60(197)



Protection

Procedure Programme (AFPP)

Areas



- IAS : 220 Kt
- 5 entries
- Max Alt. : 14000 Ft

☐ For VOR-DME holdings:

- ☞ Secondary entry fix at the end of outbound fix may be established
 - Sector 1 and 2 entries are forbidden.

☐ Information to be published:

- ☞ Holding speed;
- ☞ Limiting distance expressed in whole NM (slant distance).

☐ Goal

☞ Waiting room

☐ Shape and terminology:

☞ Fixes, inbound, outbound, holding & non-holding side, turn direction.

☐ Types of holding patterns:

☞ Over a navaid or a fix (VOR-DME, 2 radials, PBN).

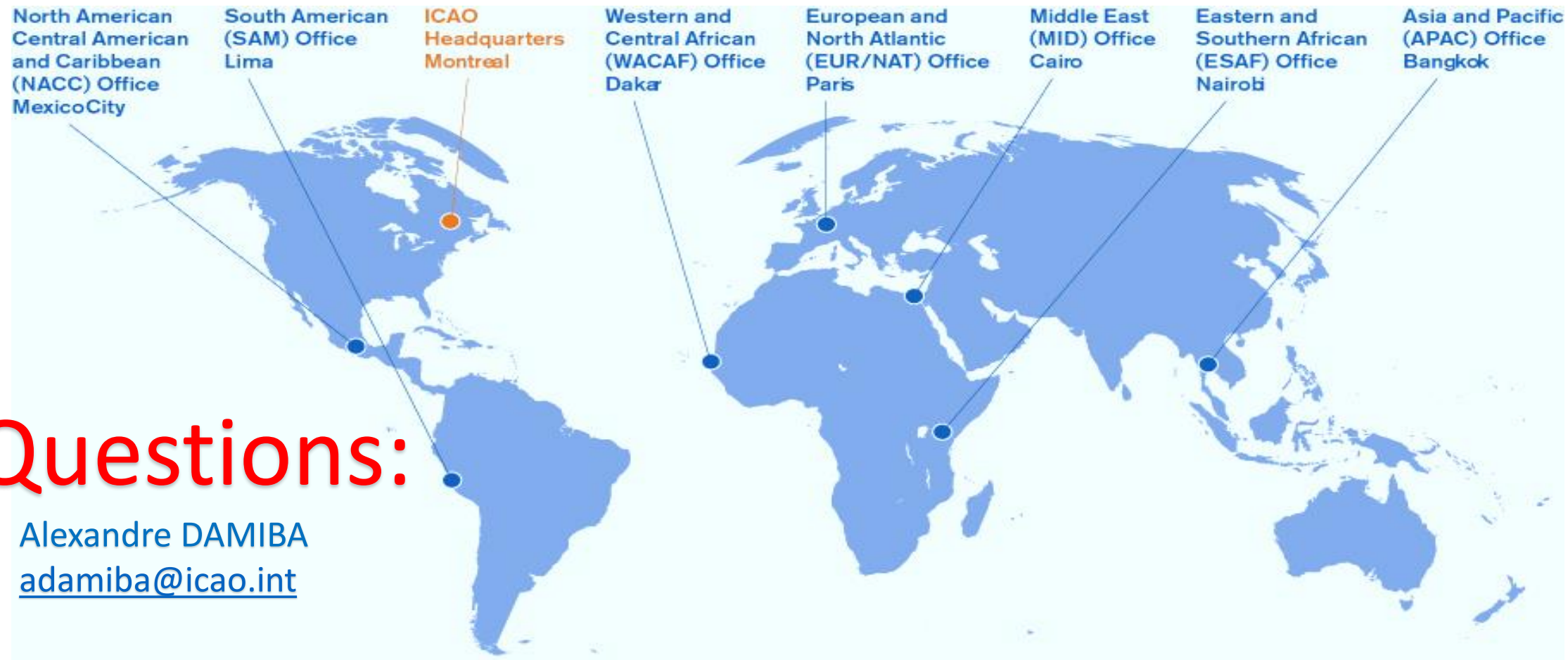
☐ Entry and holding procedures:

☞ Depending on the type of fix.

☐ Protection:

☞ Parameters, areas, MOC

☐ Publication



Questions:

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