CHARTING

ICAO Asia-Pacific FPP Office

REGULATORY REFERENCE

- Annex 4
- Annex 11
- Doc 8168-OPS/611
- Doc 8697 Charting Manual

OBJECTIVES

- Know the charting regulations
- Know the naming convention
- Know the method to identify the procedure
- Know how and where to express additional requirements for
  - Sensor
  - Functionalities
  - Specific operation
  - Specific system
- Know how to chart Altitude constraint
- Know how and where to provide coding information

CHARTING

Depiction of all necessary information

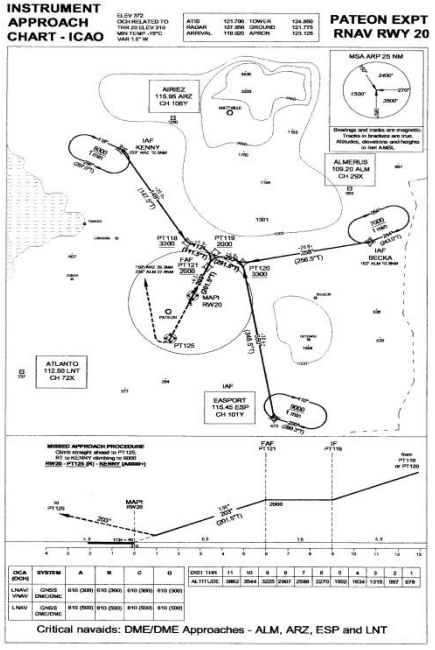
Clearly

According to users' needs

USERS

OPERATIONAL USERS

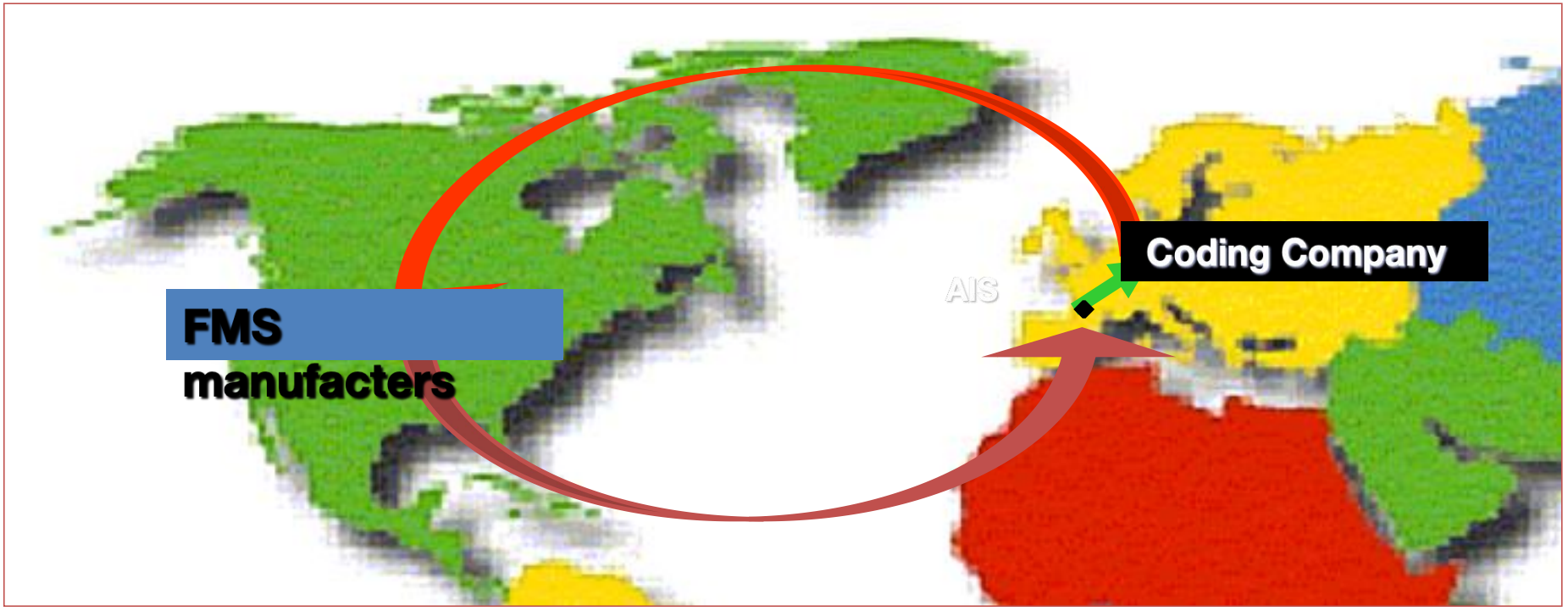
- Pilots
- Air Traffic Control



TECHNICAL SUPPORT USERS

- Flight planning support
- Navigation database providers
- RNAV system manufacturers
- Commercial charting providers

INFORMATION TRIP



GENERAL CONCEPTS (1)

- All waypoints have
  - ONE identification,
  - UNIQUE coordinates published in WGS 84
- Convention for procedure identification
  - ONE identification per " Final + Missed APProach" , SID , STAR
- Publication of PROCEDURE ALTITUDES and sometimes minimum altitudes for obstacle clearance (MOCA)

GENERAL CONCEPTS (2)

- Description in a PLAN view
  - SID , STAR, IAC
- Description in a PROFILE view
  - IAC
- TEXTUAL description
  - Missed approach, SID and STAR
- Tabular description for CODING information
  - SID, STAR, IAC (RNAV)
- Minimum Boxes
  - IAC

GENERAL CONTENTS

- Identification
- Culture and topography
- Magnetic Variation
- Bearings, tracks and radials
- Aeronautical data

Aeronautical Data

- Aerodromes
- Prohibited, restricted and danger areas
- Minimum Altitudes
- Air Traffic Service System

Approach Chart - General

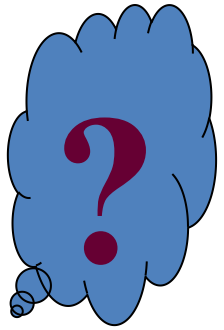
- Descent gradients/angles used in the final approach segment in 1/10 degree.
- Where appropriate, may also be published for the other approach segments.
- The IAF, IF, FAF, MAPt, TP and other essential fixes or points where established
- Track in magnetic degree
- Distance expressed in 1/10 of NM

INITIAL APPROACH SEGMENT

Doc 8168: Separate procedures shall be published when:

- different minimum altitudes;
- different timings; or
- different outbound tracks

are specified for different categories of aircraft.



Annex 4

- A single precision or non-precision approach procedure chart may be provided to portray more than one approach procedure when the procedures for the intermediate approach, final approach and missed approach segments are identical.

INITIAL APPROACH SEGMENT

- Speeds below the minimum value for initial approach in a given aircraft category shall not be specified
- If procedures are developed which exclude specific aircraft categories due to speed, or use a restricted speed, this must be stated explicitly.

FINAL APPROACH SEGMENT

- An OCA and/or an OCH shall be published for each instrument approach and circling procedure.
- For non-precision approach procedures, values shall be expressed in 10ft increments by rounding up as appropriate.
- A straight-in OCA/H shall not be published where final approach alignment or descent gradient criteria are not met.

FINAL APPROACH SEGMENT

- For procedures with a final descent gradient/ angle greater than the maximum value specified, a warning note shall be published on the instrument approach chart
- Where distance information is available, to facilitate a continuous descent final approach (CDFA), descent profile advisory information for the final approach should be provided through a table showing altitudes/heights at each 1 NM.

MISSED APPROACH SEGMENT

- The OCA/H for the nominal 2.5 per cent must always be published. Additional climb gradients only be published as alternative options.
- Where operationally required to avoid obstacles, reduced speeds may be used, provided the procedure is annotated “Missed approach turn limited to KT IAS maximum.”

VISUAL MANOEUVRING

- If a sector is ignored in the circling area, the published procedure must prohibit the pilot from circling within the total sector where the obstacle exists.
- The length and magnetic orientation of the diverging segment and “downwind” leg on prescribed track must be published.
- The maximum indicated speed if restricted below circling must be published on the chart.

PROCEDURE NAMING CONVENTION

PROCEDURE IDENTIFICATION

- The procedure identification shall only contain the name describing the type of radio navigation aid providing the final approach lateral guidance.

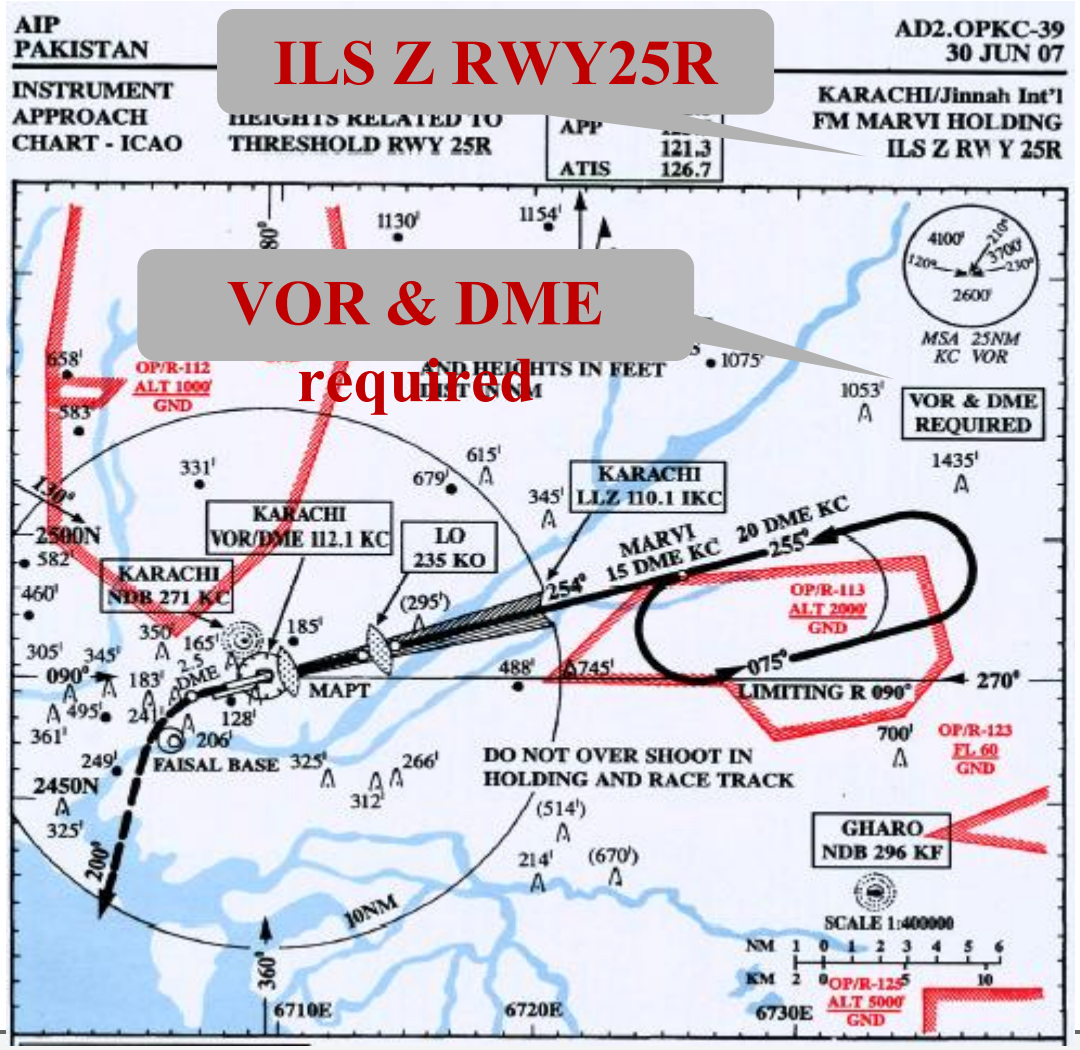
~~VOR/DME RWY14~~ VOR RWY14 ~~NDB/VOR RWY14~~

- Precision approach systems shall be identified by the system name (ILS, MLS, GLS, etc.).

~~LOC RWY 25R~~ ILS RWY 25R ~~VOR/ILS RWY14~~

ADDITIONAL EQUIPMENT

- Additional equipment requirement in plan view not in title
- Only equipment necessary to conduct the procedure



OPTIONAL EQUIPMENT

- Optional carriage of equipment that may support lower minima shall be evident from the minimum boxes.

DME is optional and result in lowering minima

		OCA/H	
Straight-in Approach	VOR/DME	490[1] (390[1])	
	VOR	690[1] (590[1])	
Circling		740[1](640[1])	890[1](790[1])

MULTIPLE PROCEDURES

- A single approach chart may portray more than one approach procedure
- The intermediate, approach, final approach and missed approach segments are identical.
- The title shall contain the names of all the types of navigation aids used for final approach lateral guidance.
  - ILS or NDB Rwy 35L

DUPLICATE PROCEDURE IDENTIFICATION

- To distinguish between duplicate procedures, a single letter suffix, starting with the letter z following the radio navigation aid type shall be used:

  VOR z Rwy 20 VOR y Rwy 20

Preferred approach is identified using the z suffix.

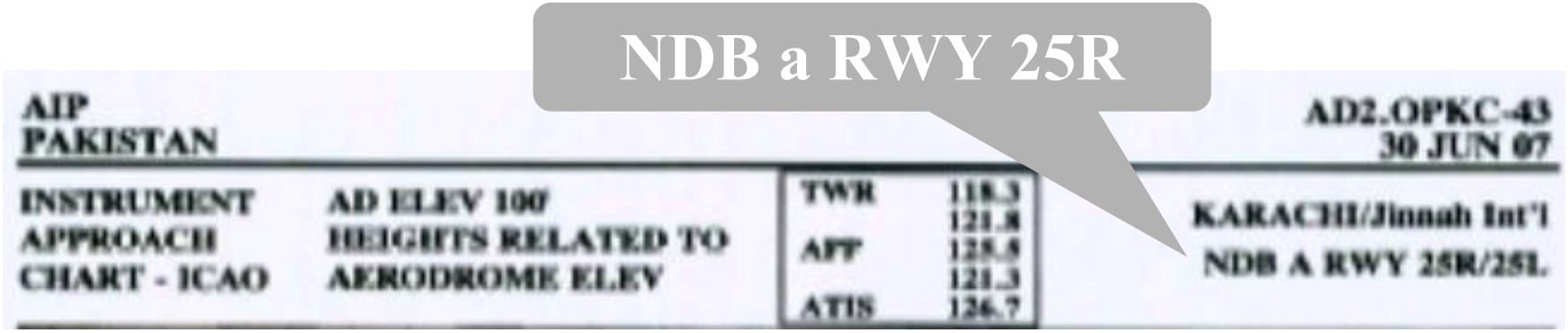
CIRCLING PROCEDURE IDENTIFICATION

- When only circling minima are provided, the approach procedure shall be identified by the last navaid providing final approach guidance followed by a single letter, starting with the letter a.

  NDB a Rwy 24

- When there are two or more circling approaches at an airport, different letter shall be used.

  VOR b Rwy 24



TITLE OF PROCEDURE (RNAV)

- RNAV or RNP procedure are charted with RNAV in the TITLE
- Type of PBN Application is added as note in the plan view if necessary or as general policy in the AIP

  e.g. : RNP1 or RNAV2….
- Where necessary, type of SENSOR required are specified in a NOTE in the PLAN VIEW, NOT in parenthesis in the TITLE

TITLE OF APPROACH PROCEDURE

(From 1st Dec 2022)

- For all RNP APCH procedure (NPA and APV)
  - Tittle is RNP RWY XX
  - *Ref part III section 5 § 1.4.2.2*
- For RNP AR procedure
  - Title is RNP RW XX (AR)
  - *Ref manual AR chapter 5 § 3*

SOME PROCEDURE NOTES

- Displayed as a procedure note to indicate equipment requirement for execution of procedure

- Reference VORDME “xxx”
- Critical navaid for DME sensor “xxx”
- RF required
- Dual VHF communications required
- Caution: Simultaneous close parallel operations

MINIMUM BOXES

- The OCA/H for each aircraft category shall be published in the minimum box on the chart.

- Where an OCA/H is predicated on a specific navigation aid (e.g. stepdown fixes), or a specific navigation specification or an RNP value, this shall be clearly identified.

MINIMUM BOXES

OCA(OCH)	CAT A	CAT B	CAT C	CAT D	CAT H
VOR/DME	610(300)	610(300)	610(300)	610(300)	610(300)
VOR	660(350)	660(350)	660(350)	660(350)	660(350)

Final Lateral Track guidance : VOR
Optional equipment :DME

MINIMUM BOXES

OCA(OCH)	CAT A	CAT B	CAT C	CAT D	CAT H
ILS CAT I	250(210)	250(210)	250(210)	250(210)	250(210)
ILS CAT II	140(100)	140(100)	140(100)	140(100)	140(100)

Final Lateral Track guidance : ILS

CAT II Minimum

MINIMUM BOXES

OCA(OCH)	CAT A	CAT B	CAT C	CAT D	CAT H
LNAV/VNAV	370			270)	370(270)
LPV	290			250)	290(250)
LNAV	490			310)	490(310)
RNP 0.3	290(250)	290(250)	290(250)	290(250)	290(250)

RNP APCH with Baro-VNAV

APV I / APV II

RNP APCH

RNP Value

- For Baro-VNAV procedure publication of
  - minimal temperature

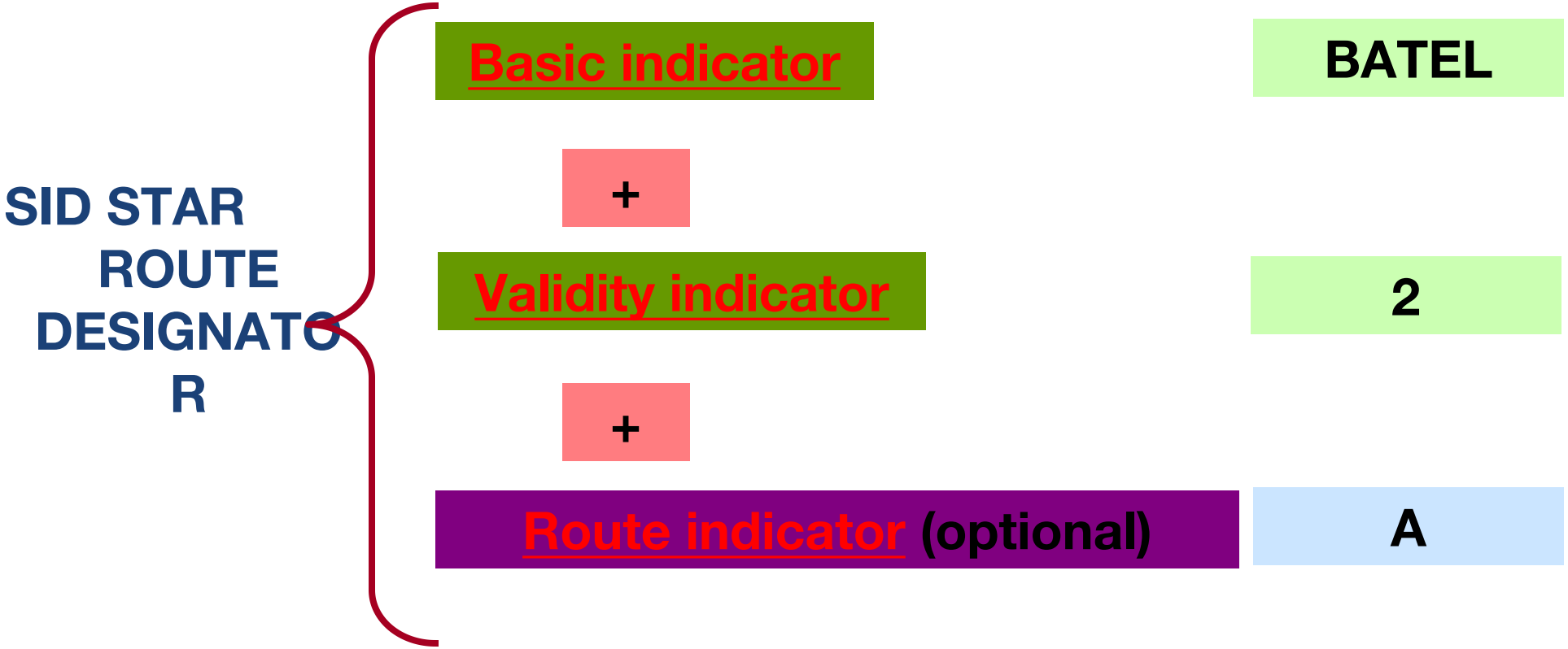
Additional Specific Information

- For Baro-VNAV procedure publication of
  - minimal temperature
- For APV procedure publication of
  - SBAS Channel

TITLE OF SID STAR

- Chart identification should include
  - an identifier (ref to annex 4 § 9.5 or 10.5) with reference to RWY or Fix or navaid
- Route designator
  - In accordance with annex 11 appendix 3
  - UNIQUE
  - the first 4 letters of any 5LNC used in the route designator is unique for the aerodrome
    - If BABEL is used BABET cannot be used on the same airport
    - When the route DESIGNATOR is LONGER than 6 characters, the FIFTH one is NOT CODED in the data base

TITLE OF RNAV SID STAR



WAYPOINT NAMING CONVENTION

WAYPOINT NAMING CONVENTION

- Format:
  - AAXNN
  - 5 alphanumeric characters
- Exception
  - Navaid
  - 5LNC (Use of ICARD)
  - Threshold : RWNNA (RW36L)

ICAO NAMING CONVENTION
PART III SECTION 5 CHAPTER 1 § 1.5

- Five - letter UNIQUE ICAO name code (5LNC)
  - En-route
  - final waypoint of a SID
  - first waypoint of a STAR
  - waypoints shared by more than one TMA or aerodromes
  - waypoints used by ATC for communication or for activation functions for specific tools

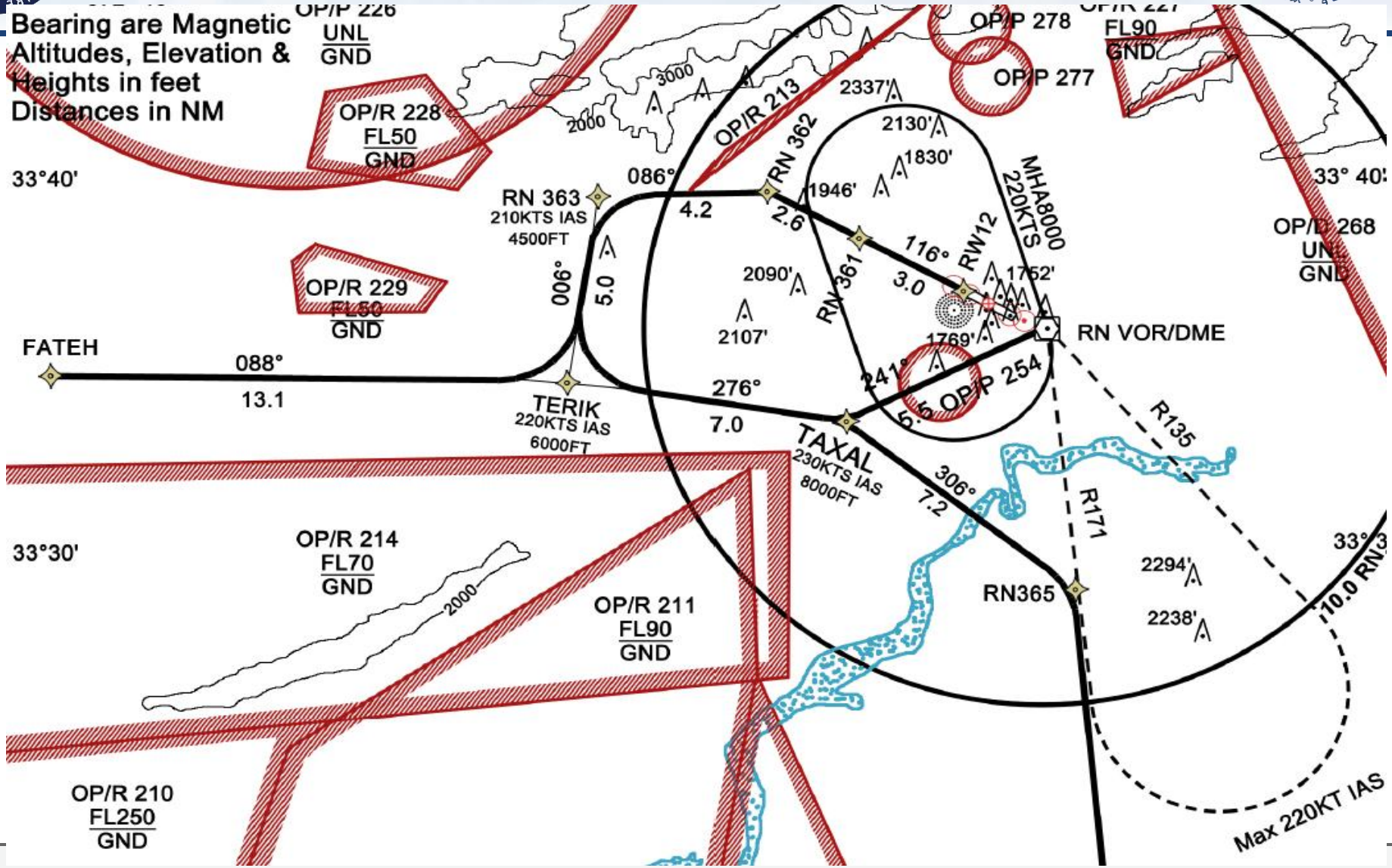
    called « STRATEGIC TWERMINAL AYPOINTS »

- Use of ICARD for Uniqueness (Annex 11)

OTHER WAYPOINTS

- The convention and rules of application are to be published in AIP
- Alphanumeric name code convention
  - at least 2 characters from the airport designator
  - 3 numbers between as maximum
  - restrict number allocation to [361,999, not ICAO]
- UNIQUE within a Terminal Area but NOT globally
  - Should be listed as Terminal waypoint in AIP
- No re-routing from EN ROUTE and STAR to an alphanumeric named waypoint by ATC

Waypoint Naming



PROCEDURE ALTITUDE CONCEPT

NEED OF DEPICTION OF DIFFERENT TYPES OF ALTITUDE

- Minimum altitudes include provision for obstacle clearance but also for different items, such as :
  - controlled airspace
  - radionavigation
  - communication
- Need to define two types of altitudes
  - MOCA : Minimum Obstacle Clearance Altitude
    - Associated with a SEGMENT
  - Procedure altitude
    - Associated with a WAYPOINT

DEPICTION OF DIFFERENT TYPE OF ALTITUDE

Operational Altitude
PROCEDURE ALTITUDE

Minimum Obstacle Clearance Altitude
MOCA

IMP : Procedure altitude are ALWAYS ≥ MOCA

PROCEDURE ALTITUDE DEFINITION

- From Vol II Part I Section 4 chap1
- Procedure altitude/height.

  A specified altitude/height flown operationally at or above the minimum altitude/height and established to accommodate a stabilized descent at a prescribed descent gradient/angle in the intermediate/final approach segment.

APPLICABLE TO WHICH PHASE OF FLIGHT

- To support CFIT prevention initiative, procedure altitude should be defined for all NPA

- Arrival and departure procedure altitudes are developed to separate arriving and departing traffic

ARTED ALTITUDES/FLIGHT LEVELS

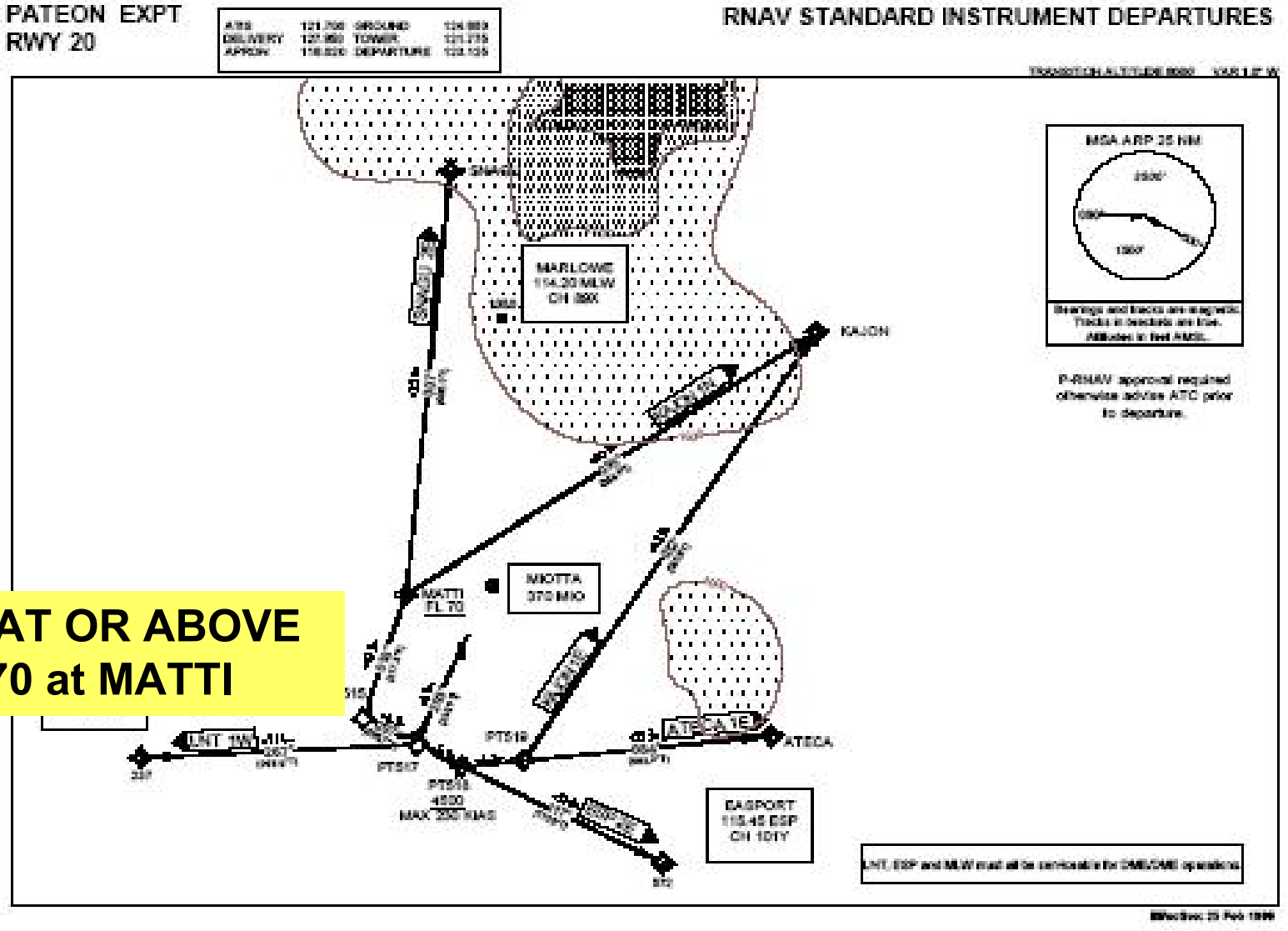
Representation	Altitude	Flight level
Altitude/flight level “Window”	17000 10000	FL220 FL100
“At or above” altitude/flight level	7000	FL60
“At or below” altitude/flight level	5000	FL50
“Mandatory” altitude/flight level	3000	FL30
“Recommended” altitude/flight level	5000	FL50
“Expected” altitude/flight level	Expect 5000	Expect FL50

DEPICTION OF PROCEDURE ALTITUDE FOR SID AND STAR

MATTI

FL070

A/C are AT OR ABOVE FL 070 at MATTI

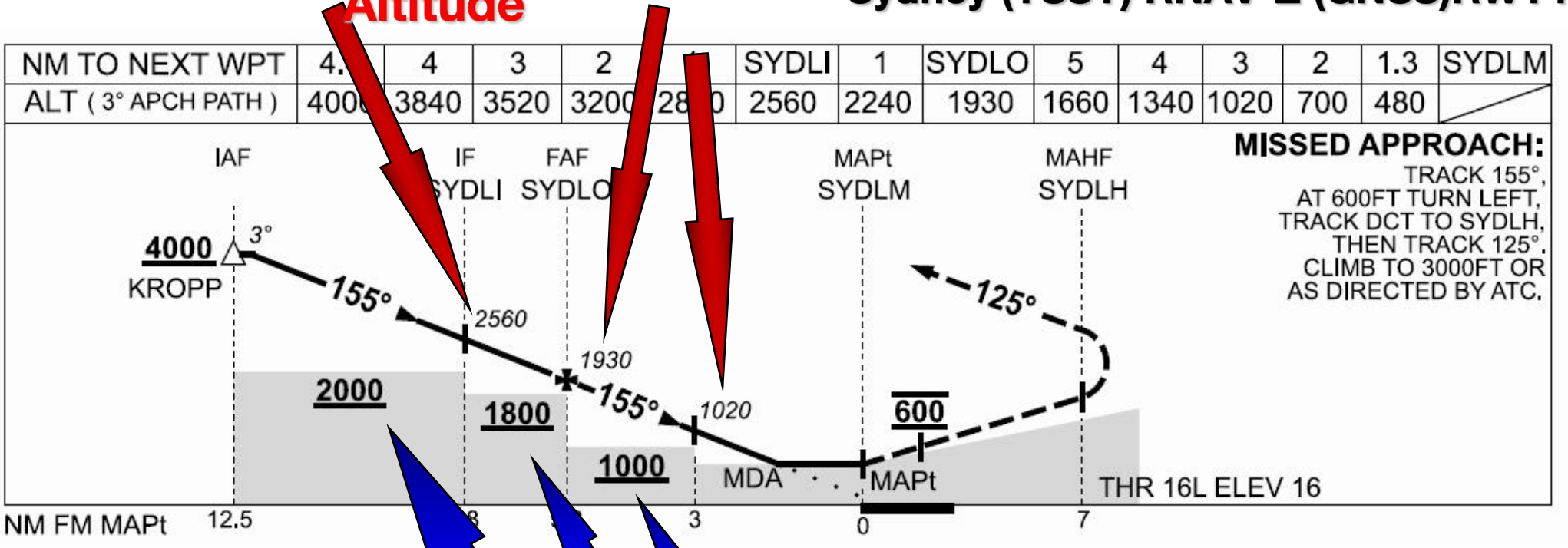


DEPICTION IN APPROACH CHART

- Procedure altitude is provided in the profile view (ref § 11.10.6.3 annex 4)
  - Associated with a WAYPOINT
- Minimum altitude (MOCA) or a ground profile is RECOMMENDED to be depicted (ref § 11.10.6.5 annex 4)
  - Associated with a SEGMENT
- MOCA along intermediate and final segments are depicted with SHADED BLOCKS

PROCEDURE ALTITUDE / MOCA

Procedure Altitude



MOC in Shaded block

CODING INFORMATION

FORMAL description

- (*Waypoint*) (underlined) denotes 'fly-over'.
- (*Waypoint*) (not underlined) denotes 'fly-by' or RF waypoint as appropriate.
- *To (Waypoint)* denotes a TF path terminator.
- *To (Waypoint) on course XXX°* denotes a CF path terminator.
- *Direct to (Waypoint)* denotes a DF path terminator.
- *(Waypoint) {R, NN.N, LatLong}* denotes an RF path terminator, the radius and the centre point of a fixed radius turn in terminal airspace.
- *Climb on track XXX°, at or above yyy feet turn right/left* denotes an FA path terminator.
- *From (Waypoint) to XXXX feet on track XXX°* denotes an FA path terminator.

THANK YOU!