JAPAN INTERNATIONAL COOPERATION AGENCY
Tajikairnavigation (TAN)

The Project for Capacity Development in Air Traffic Services in the Republic of Tajikistan

Project Completion Report

Separate Volume 3

December 2018

AIR TRAFFIC CONTROL ASSOCIATION JAPAN
ATCAJ

TASKFORCE 3

Documents

Basic Training on PANS-OPS Flight Procedure Design
Instructional Materials

Outline of Flight Procedure Design

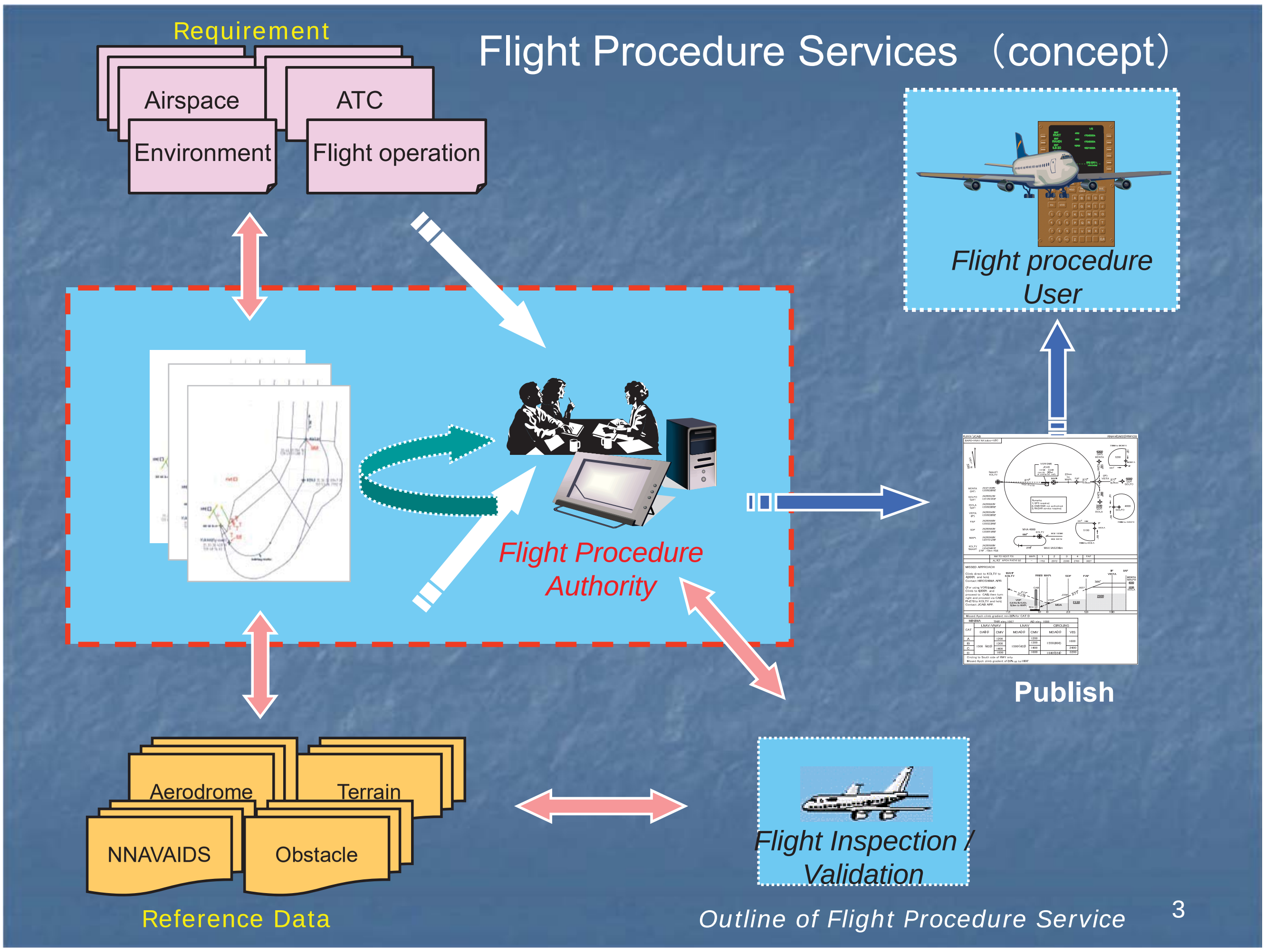
〈 Conventional Navigation Procedures 〉

TF-3 Activity
The Project for Capacity Development in Air Traffic Services in The Republic of Tajikistan
Organized by JICA, in Y2016 - Y2018

Outline of Flight Procedure Service

「Design」and「Establishment」

- 「Flight Procedure Design」:
  - Route design work based on criteria.
  - Feasibility assessment such as obstacle affection.
- 「Flight Procedure Establishment」:
  - Screening for route practice,
    ①Technical/Operational verification,
    ②Coordination with other airspace users,
    ③Coordination to community around airports, and
    ④Flight inspection and validation
  - Promulgation procedures, and so on.
  - **Actions done by state authority**



Items of Flight Procedure Design Services

Draft Design
方式(案)の設計

障害物の検討
Obstacle Assessment

チャート案の
Draft Charting

関係者(ATC、
Collecting of data and requirement

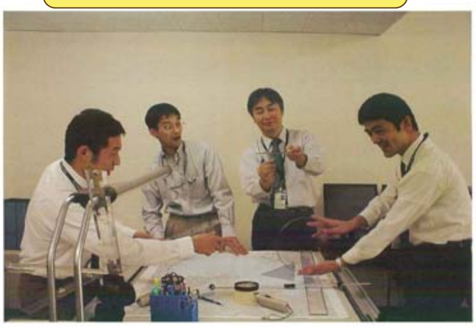
Draft Design;
- New design,
- Amendment,
- Alternate for inoperative of NAVAID,
- Alternate for temporal obstacle, such as construction, equipment, firework or balloon,

for IFP* & En-routes

* IFP: Instrument Flight Procedures

Working View

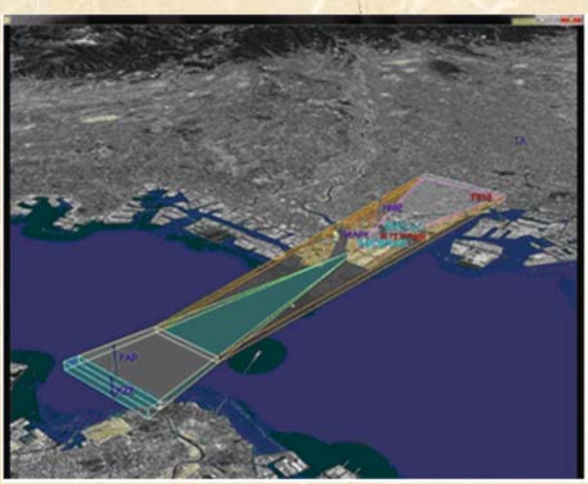
Drafting work

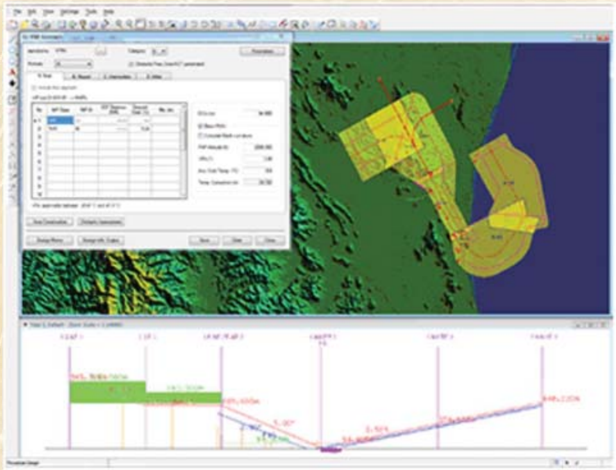


Progressive Training

Site Survey

Automation Tool of Flight Procedure Design

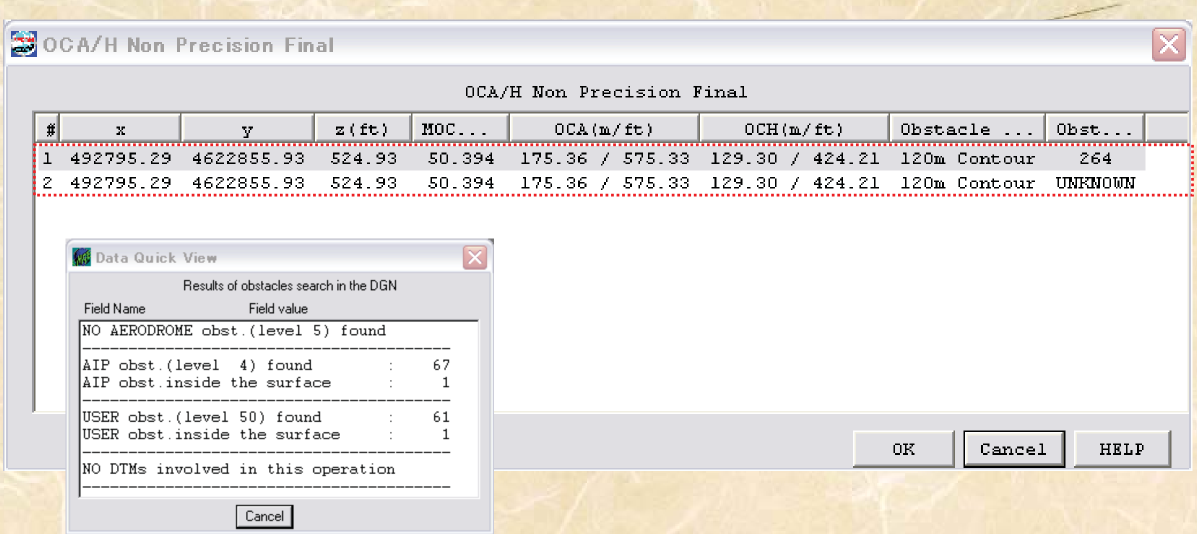




※PANADES design view, NTT DATA Website

(Obstacle Assessment)

Calculate OCA/H, MDA, DA or MEA


OCA/H Non Precision Final

OCA/H Non Precision Final

#	x	y	z(ft)	MOC...	OCA(m/ft)	OCH(m/ft)	Obstacle ...	Obst...
1	492795.29	4622855.93	524.93	50.394	175.36 / 575.33	129.30 / 424.21	120m Contour	264
2	492795.29	4622855.93	524.93	50.394	175.36 / 575.33	129.30 / 424.21	120m Contour	UNKNOWN

FPDAM design view, by IDS

Sequence of Flight Procedure Service

IFP Design ･････(Situational awareness & Design)

① Starting Design work ･･･ Confirmation of requirement for new establishment or amendment,
② Acquisition of Data ･･･Collecting data such as Obstacle, RWY, NAVAID, etc.,
③ Creating Design Concept ･･･ Basic design and scheme as requirement,
④ Review by Stakeholders･･･Necessity judgement of re-design,
⑤ Grand Design work･･･Practical Design based on criteria or regulations, and
⑥ Documentation･･･Description of establishing ground, back data, available data, and construction of procedure chart, etc..

IFP Establishment ･････(Validation & Publish)

⑦ Safety Assessment･･･Safety verification and feasibility judgement of flight procedure establishment,
⑧ Ground Validation ･･･ Assurance of design data,
⑨ Flight Validation ･･･ Assurance of design contents by actual flight,
⑩ Promulgation of Flight Procedures･･･ Publication with adequate format and contents according to AIRAC system, and
⑪ Maintenance of Flight Procedure･･･Periodical review and verification of amendment for flight procedures.

(Note) Situational Awareness

- Situational Awareness:

  To be aware of whole situational condition of aerodrome or airspace where we will establish Instrument Flight procedures.

  - Terrain,
  - Location and figure,
  - Available ATS facility, such as NAVAID,
  - Environmental restriction, such as noise impact, and
  - Operational restriction or requirement, such as airspace use.

Prerequisite Knowledge

Prerequisite Knowledge for FPD*

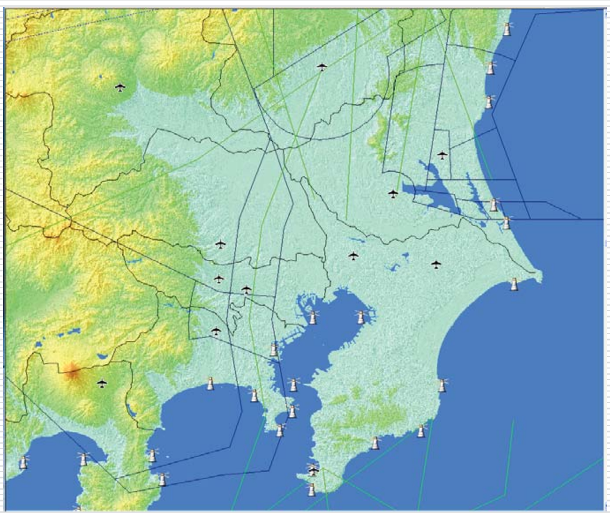
- Design Criteria or Relevant Regulations
- Geodesy or Geodetic Theory
  - Projection/Projective method
  - Coordination System (Geodetic System)
- Navigation theory and equipment (Avionics)
- Aircraft maneuvering
- Aircraft performance
- Category and availability of data or materials concerned

*FPD: Flight Procedure Design

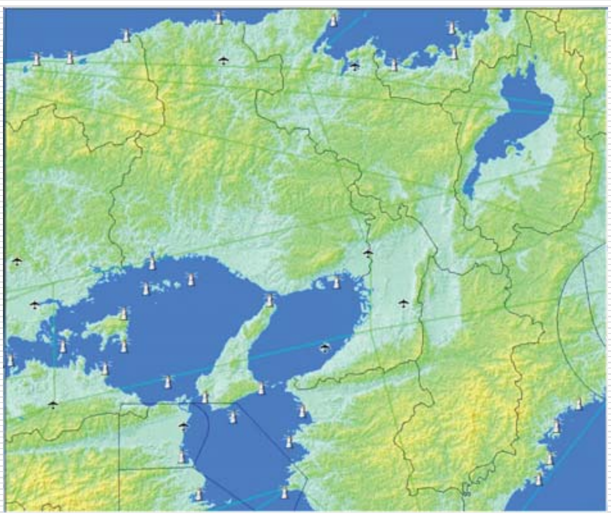
Available Materials for FPD

- Design Fundamental Data
  - Terrain Map (1/50,000), Topographic Map (1/200,000)
    ☆ Illustration map or guide map useful for Situational Awareness
  - Digital Map
  - Terrain Mesh Data (DEM: Digital Elevation Model)
  - Obstacle Database (Administrative data of building or temporal construction, etc., for instance setting aeronautical obstacle light)
- Design Tool
  - Drafting manual tool
    - Ruler, Triangle ruler
    - Compasses, Divider
    - Protractor (Plotter)
  - CAD Software and DEM Processing (Modeling) Software)
  - FPD Automation Tool / Software, such as PANADES, FPDAM, PHX, PANDA or GeoTITAN

Digital Material (Sample)



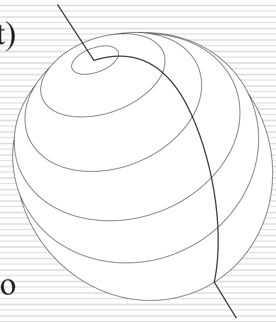
DEM Processing View（Tokyo, Japan)



DEM Processing View (Osaka, Japan)

Geodetic System

- Geodetic System is a prerequisite condition when the position on the earth is expressed by coordinates of longitude, latitude, and altitude. It is determined by the following three factors.
  - Reference Ellipsoid (Major Axis, Minor Axis, Oblateness)
  - Geodetic Coordinate System (where to be baseline)
  - Geoid surface as baseline of altitude (Baseline of Geodetic height)



- WGS84(World Geodetic System 1984) is adopted as worldwide geodetic standard by ICAO to produce AIP/AIC/NOTAM, and many states such as USA, Japan use WGS84 data.

WGS84 was constructed and is being maintained by USA as the worldwide geodetic system on which GPS is operating, and suitable to military and navigation field.

※SK42 ; Local geodetic system produced by old USSR in 1946 to be suitable to Europe, using Krasovsky ellipsoid.

Map Projection

The map projection is a method to be used when a terrain on Earth like a sphere shape is projected onto a plane map.

- Azimuthal equidistant projection (UN mark appears on north Pole.)
- Conic projection
- Cylindrical projection
- Mercator projection

UN Flag

To expand the cylinder in the polar direction, Polar regions can not be projected accurately.

- Universal Trans Mercator(UTM) Projection

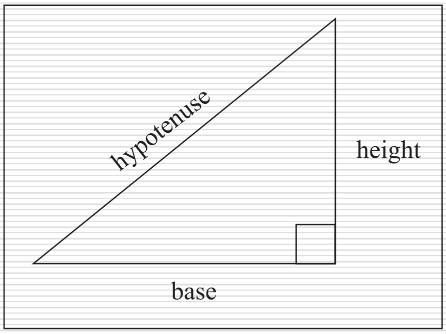
  Projected on an horizontally laid cylinder (to touch the Earth along one meridian).

UTM Projection

☆ **Many states adopt UTM projection.**
☆ **Every projection contains errors.**

Basic Mathematics

- Trigonometric function
  - sin = height / hypotenuse
  - cos = base / hypotenuse
  - tan = height / base



- tan; most usable
  - example:
    descent height = horizontal range × tan(GP)

☆ ***3 Ways to express SLOPE***

θ : Angle
Gradient (%)
Gradient : ft / nm , m / km , m / nm

General Definitions

★ PANS

- □ International Civil Aviation Conventions (Chicago Treaty)
  - └▪ (Annex)
    - └ ▪Procedures for Air Navigation Services(PANS)
      - └ ▪Technical Manual

☆ PANS(Procedures for Air Navigation):

- Regulations in detail rather than SARPs in Annexes
- Practical procedures and Supplemental rule for SARPs

PANS-ATM	Doc 4444	ATC, Phraseology, Flight Plan format, etc.
PANS-OPS*	Doc 8168	Aircraft operations (Flight Procedures)
PANS-ABC	Doc 8400	Abbreviation, Code

- PANS-OPS Used version in TJATS 2017; sixth edition-2014, Amendment 6, Corrigenda 1
- There are else PANS-TRaininG, PANS-AeroDrome in Y2017

★ PANS-OPS

- □ The Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS)

  - Volume I - Flight Procedures describes operational procedures, guidance of flight crew and flight operations personnel.
  - Volume II – Construction of Visual and Instrument Flight Procedures describes the essential areas and obstacle clearance requirements for the achievement of safe, guidance of procedures specialists.

★ PANS-OPS Vol.II

- The design of procedures in accordance with PANS-OPS criteria assumes normal operations.
- It is the responsibility of the operator to provide contingency procedures for abnormal and emergency operations.
- Material contained;
  - Part I – General ... general criteria for Conventional and RNAV
  - Part II – Conventional procedures ... specific to the sensor
  - Part III – RNAV procedures and satellite based procedures ... VOR/DME, DME/DME, basic GNSS, RNP, GBAS and SBAS* ...
  - Part IV – Helicopters ... RNAV procedures from Y2004 on.
- Details refer to the table of contents in main body
- The implementation of procedures is the responsibility of Contracting States.
- The States must comply but promulgate significant differences between their procedures and the related ICAO procedures.

* RNP, GBAS, SBAS will still be advancing on.

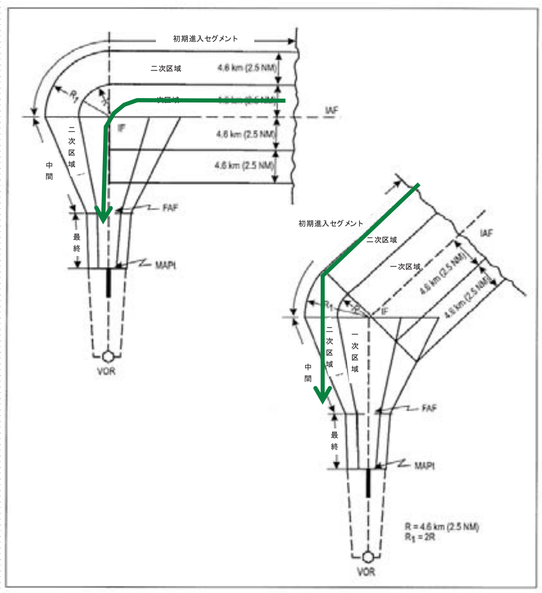
General Principles

Measurement Unit

- Units of measurement and Conversion factor described in Annex 5
  - 1ft = 0.3048m
  - 1NM = 1852m
  - 1NM = 6076ft
  - π= 3.1416 (circle ratio)
- In principle, Calculate in SI（m/km) unit.
  At last, converse to non-SI(ft/NM), if any.

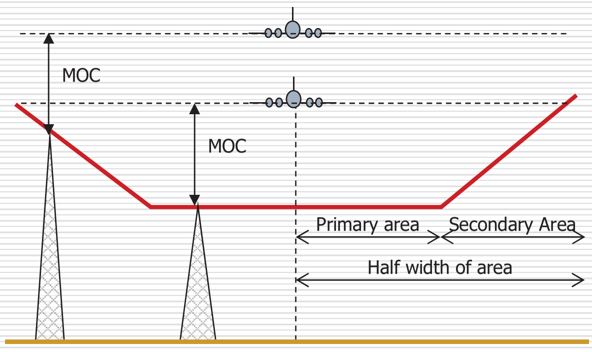
Nominal track and Protection Area

- Center line of Expected flight pass
- NOT actual route of flight, specially in turning
- Symmetry Area of nominal track (Straight), NOT (Turning)
- Protection area divided into primary area and secondary area

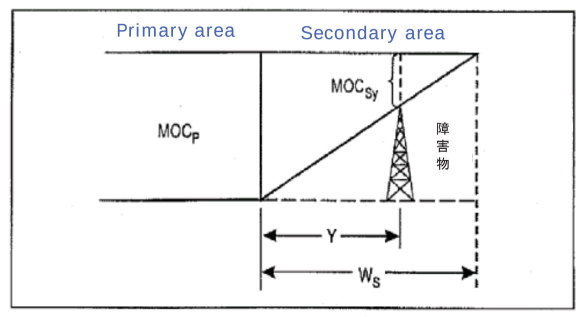


MOC: (Minimum Obstacle Clearance)

- 100% of MOC applied to Primary Area
- Decreasing integrally of MOC applied to Secondary Area



∗ MOCsy = MOCp × (1-Y/Ws)



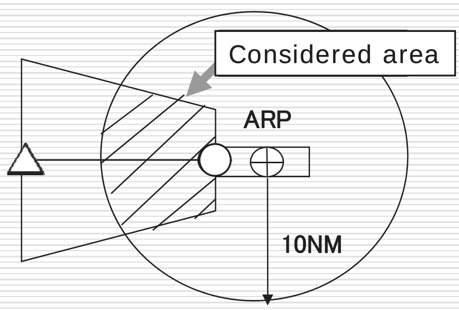
Increased Altitude/Height

- Correction of OCA/H in **Mountainous area**
  - An area of changing terrain profile where the changes of terrain elevation exceed 900m (3000ft) within a distance of 18.5km (10NM) … *Definitions*

    ⇒ MOC should be increased by as much as 100 per-cent

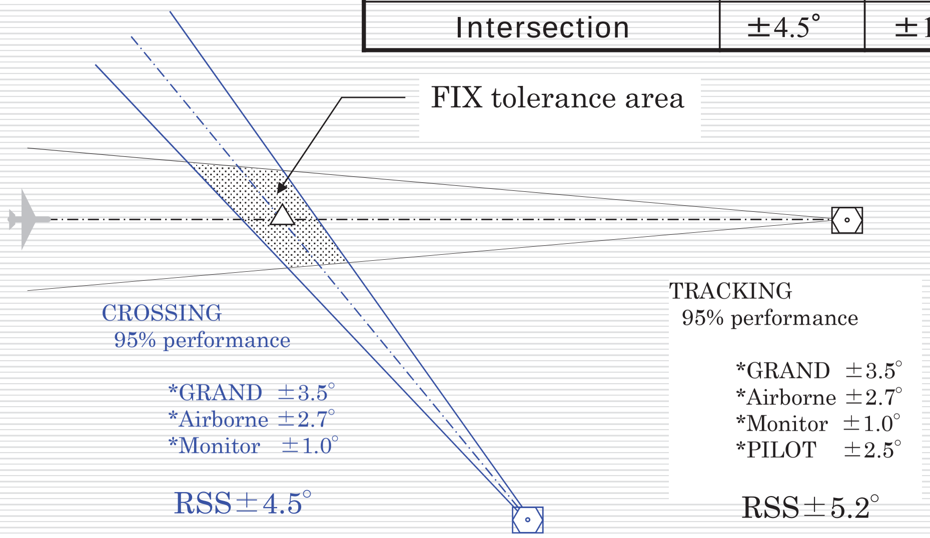
Case of Final approach segment;

MOC 75m → 150m at most



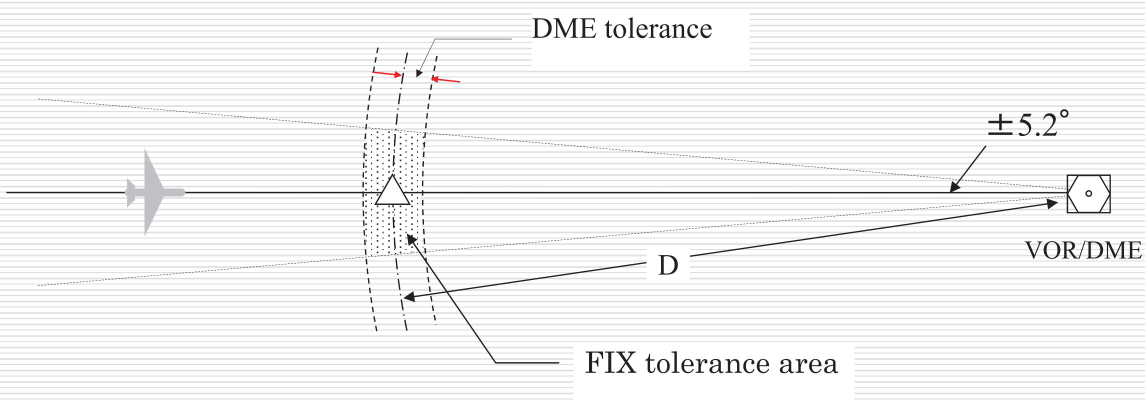
FIX Tolerance（Intersection FIX）

	VOR	ILS	NDB
Tracking	±5.2°	±2.4°	±6.9°
Intersection	±4.5°	±1.4°	±6.2°



FIX and FIX Tolerance（DME FIX）

DME tolerance [nm] = ±{ 0.25nm + (0.0125 × D)}



Requirement for DME FIX

- From VOR/DME to VOR/DME FIX, Minimum Distance(d_m)

d_m (km) = h × tan55°

h: Flight Altitude(1000m unit)

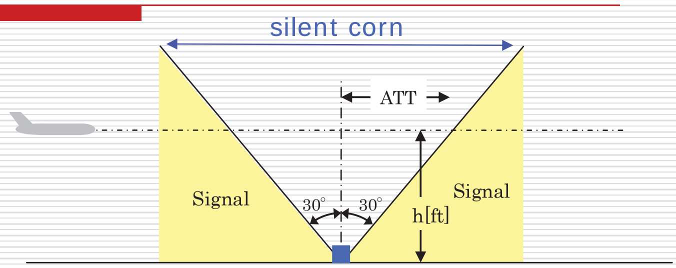
or

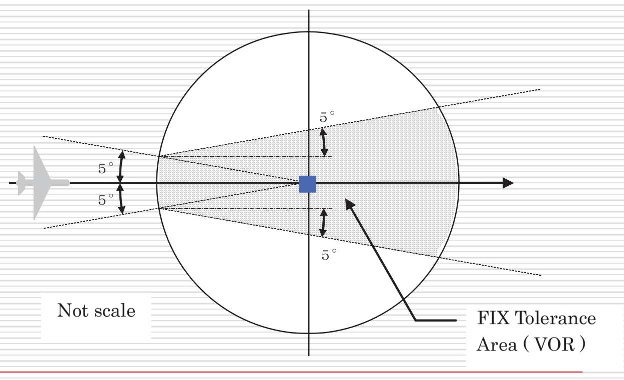
d_m (NM) = 0.164h × tan55°

h: Flight Altitude(1000ft unit)

Overhead Tolerance of NAVAIDS

- VOR (NDB) :
  - Silent corn=30°
    (NDB 40°)
  - Inbound angle = ±5°
    (NDB 15°)
  - Outbound angle =± 10°
    (NDB 20°)





Fix tolerance area over VOR

Aircraft Performance –Speed (IAS)

- IAS (Indicated Air Speed)*

  Aircraft Category ; determined by IAS
  - Categories A, B, C, D, (E)
  - STALL SPEED (IAS) + 30%
  - Maximum Landing Mass
  - At standard Meteorological Conditions ; ISA

CAT A < 91kt
CAT B 91/120kt
CAT C 121/140kt
CAT D 141/165kt

*Common speed on board indicator

Aircraft Performance – Speed (IAS)

ARRIVAL AND Approach procedures PI-S4-C1 1.8.9

Table I-4-1-2. Speeds (IAS) for procedure calculations in knots (kt)

Aircraft category	V_{at}	*Range of speeds for initial approach*	*Range of final approach speeds*	*Max speeds for visual manoeuvring (circling)*	*Max speeds for missed approach*	
					Intermediate	*Final*
A	<91	90/150(110*)	70/100	100	100	110
B	91/120	120/180(140*)	85/130	135	130	150
C	121/140	160/240	115/160	180	160	240
D	141/165	185/250	130/185	205	185	265
E	166/210	185/250	155/230	240	230	275
H	N/A	70/120**	60/90***	N/A	90	90
Cat H (PinS)***	N/A	70/120	60/90	NA	70 or 90	70 or 90

※Departure IAS = Final Missed Approach IAS +10%

Aircraft Performance – Speed (TAS)

- TAS (True Air Speed)
  - Procedure Design＝using 'TAS' ＝Convert IAS to TAS
  - Convert calculation

$$TAS = IAS \times \alpha$$

α : factor corresponded to Altitude & Temperature

※ It is proper to use average temperature in hottest season, Summer.

Aircraft Performance – Speed (TAS)

In case that INITIAL SEG / CAT C / Alt.5,000ft / ISA+15℃

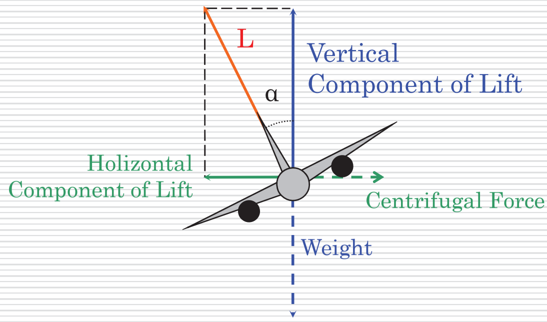
TAS = 240kt × **1.1059** = **265.416** = ***266kt***

Table I-2-1-App-2

Altitude (feet)	Conversion factor ISA−30	ISA−20	ISA−10	ISA	ISA+10	ISA+15	ISA+20	ISA+30
0	0.9465	0.9647	0.9825	1.0000	1.0172	1.0257	1.0341	1.0508
1 000.0	0.9601	0.9787	0.9969	1.0148	1.0324	1.0411	1.0497	1.0667
2 000.0	0.9740	0.9930	1.0116	1.0299	1.0479	1.0567	1.0655	1.0829
3 000.0	0.9882	1.0076	1.0266	1.0453	1.0637	1.0728	1.0818	$\boxed{1.0995}$
4 000.0	1.0027	1.0225	1.0420	1.0611	1.0799	1.0892	1.0984	1.1165
5 000.0	1.0175	1.0378	1.0577	1.0773	1.0965	$\boxed{1.1059}$	1.1153	1.1339

$$TAS = IAS \times 171233 \times [(288 \pm VAR) - 0.00198H]^{0.5} \div (288 - 0.00198H)^{2.628}$$

Aircraft Performance – Bank Angle



L ; Lift Vector / α; bank angle

L = 1G / cosα

α	L
15°	1.035G
20°	1.064G
25°	1.103G
30°	1.154G
35°	1.221G
40°	1.305G
45°	1.414G
60°	2.000G

Instrument Flight Angle for procedure Design

15° DEP / MA / ENROUTE

20° CIRCLING

25° APCH / HOLDING

Aircraft Performance – Rate of Turn

- R: Turn Rate (° /s)

$$\boxed{R = 3431 \tan \alpha / \pi V}$$

α: Bank angle V: TAS (kt) π=3.1416

- r : Turn Radius (NM)

$$\boxed{r = V / 20\pi R}$$

Centripetal Force

- Rate of turn

  $R = 3431\tan\alpha/\pi V$

- Radius of turn

  $r = V/20\pi R$

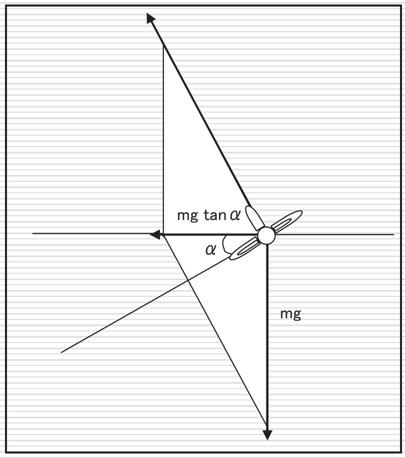
  $= V2/(68620\tan\alpha)$

Force affecting aitcraft turning

Centripetal Force; $F=(mv^2)/r=mg\tan\alpha$

Non SI unit, $g=68625NM/h^2$,

Then $r=V2/(68620\tan\alpha)$



Aircraft Performance – Turn Radius

- Calculation of Turn Radius(r)

INITIAL SEG / CAT C / Alt.5,000ft / ISA+15℃

TAS = 240kt × **1.1059** = ***266kt***

$$R = \frac{3431 \times \tan 25^\circ}{\pi \times 266kt} = \underline{1.91^\circ /sec}$$

$$r = \frac{266kt}{20\pi \times 1.91} = \underline{2.22NM}$$

Aircraft Performance – Wind Effect (1)

INITIAL SEG / CAT C / Alt.5,000ft / ISA+15℃

R=1.91° /s　r = 2.22nm

E_θ = 30kt × T

OMNI DIRECTIONAL WIND = 30kt

E_θ : during Turnθ, WIND effect (NM)

T : TIME（based on turn rate）

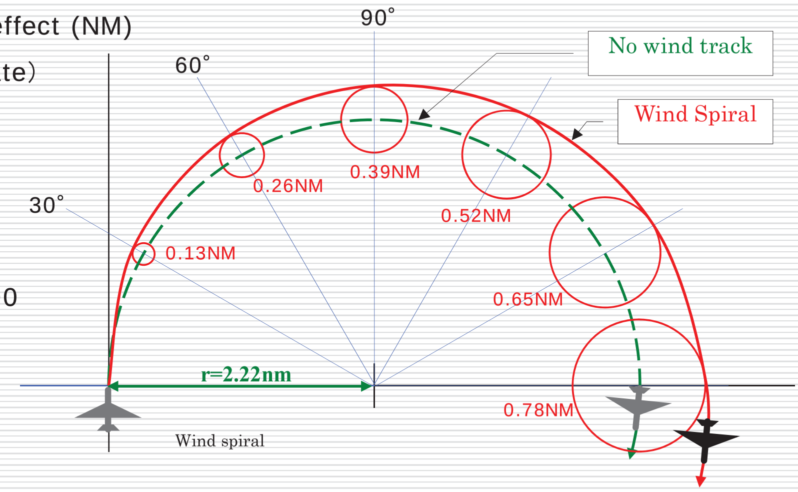
Necessary time for 30° turn

T=30° / 1.91 =15.707秒

30° turn and wind effect

$E_{30°}$ = 30kt ×15.707秒/3600

= 0.13NM



Aircraft Performance – Wind Effect (2)

INITIAL SEG / CAT C / Alt.5,000ft / ISA+15℃

R=1.91° /秒　r = 2.22nm

E = W / (40xR)

90° turn and wind effect

W: OMNI DIRECTIONAL WIND

= 30kt

R : turn rate

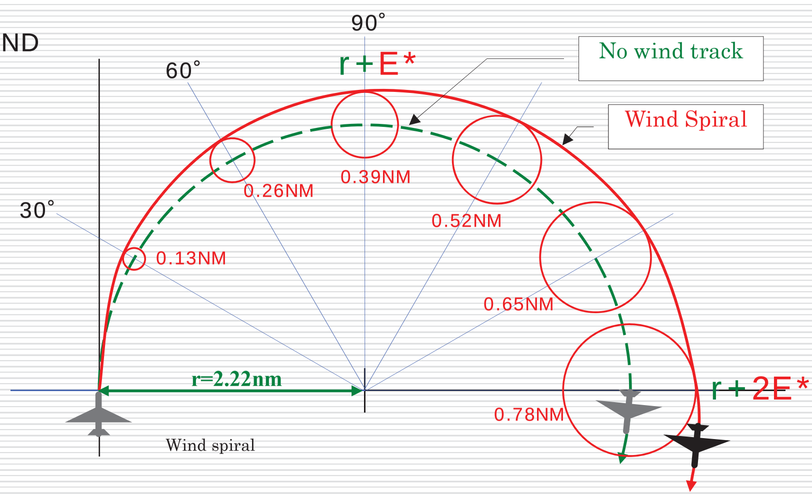
90° turn and wind effect

E= 30kt / (40× 1.91)

= 0.39NM

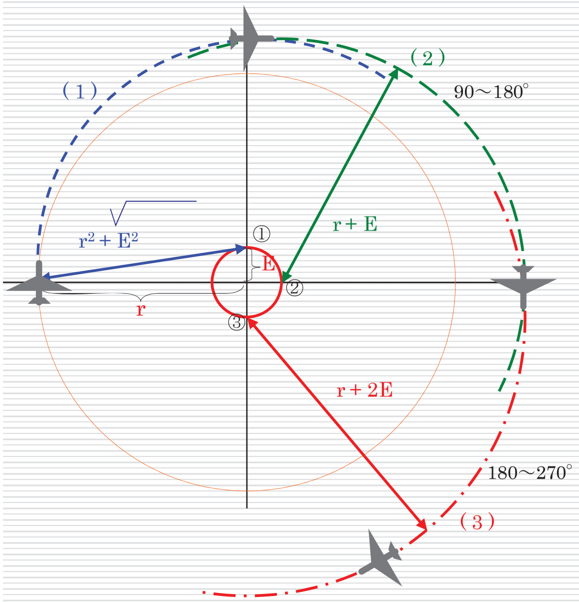
180° turn and wind effect

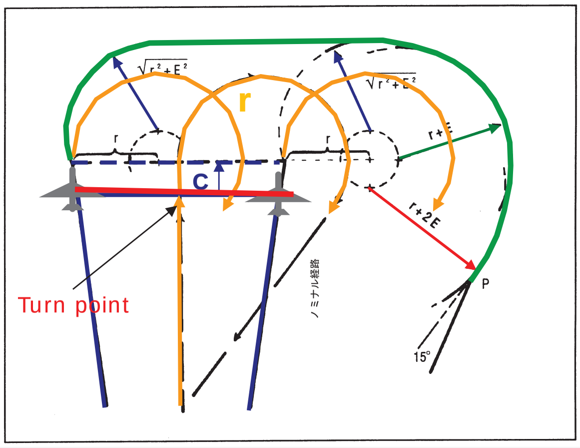
2E= 0.78NM



*'E' is the value of 90 degree

Aircraft Performance – Wind Effect (3)





C = PILOT REACTION TIME 3”
+ BANK ESTABLISH 3”

Turn Construction – bounding circle

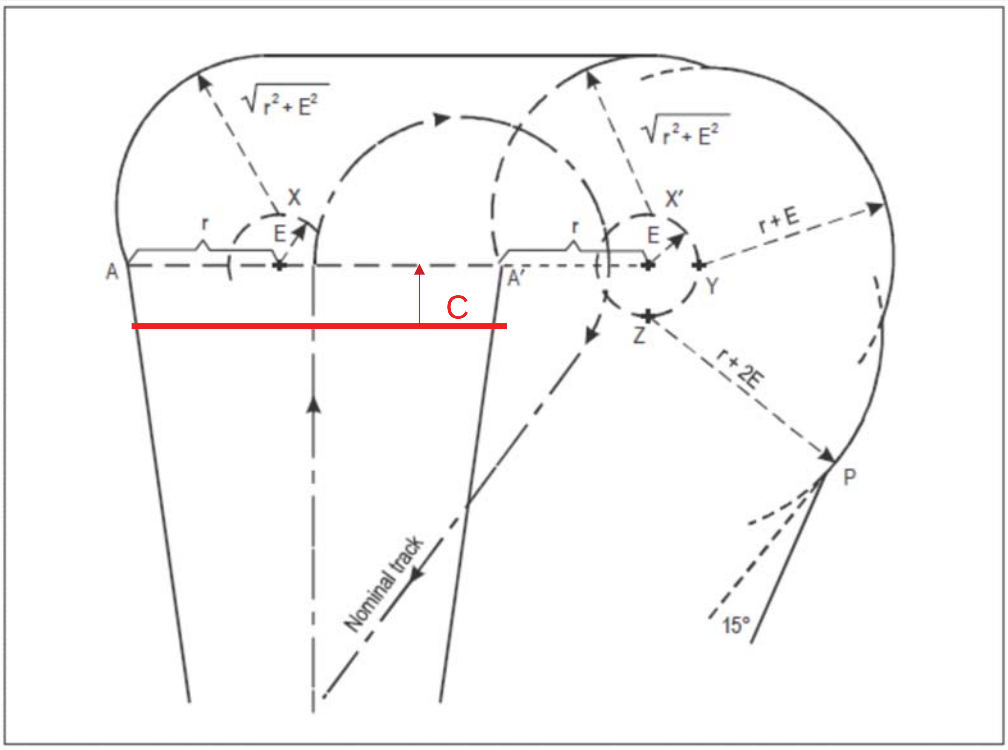


Figure I-2-3-5. Outer turn boundary construction

ARRIVAL & APPROACH Procedures

5 Main Factor of Arrival and Approach

- ***ALIGNMENT***

  IAF → IF → FAF / FINAL APC COURSE&RWY

- ***LENGTH***

  Necessary length in each segment MIN / OPT / MAX

- ***DESCENT GRADIENT***

  Permissible descent gradient in each segment (%) MIN / OPT / MAX

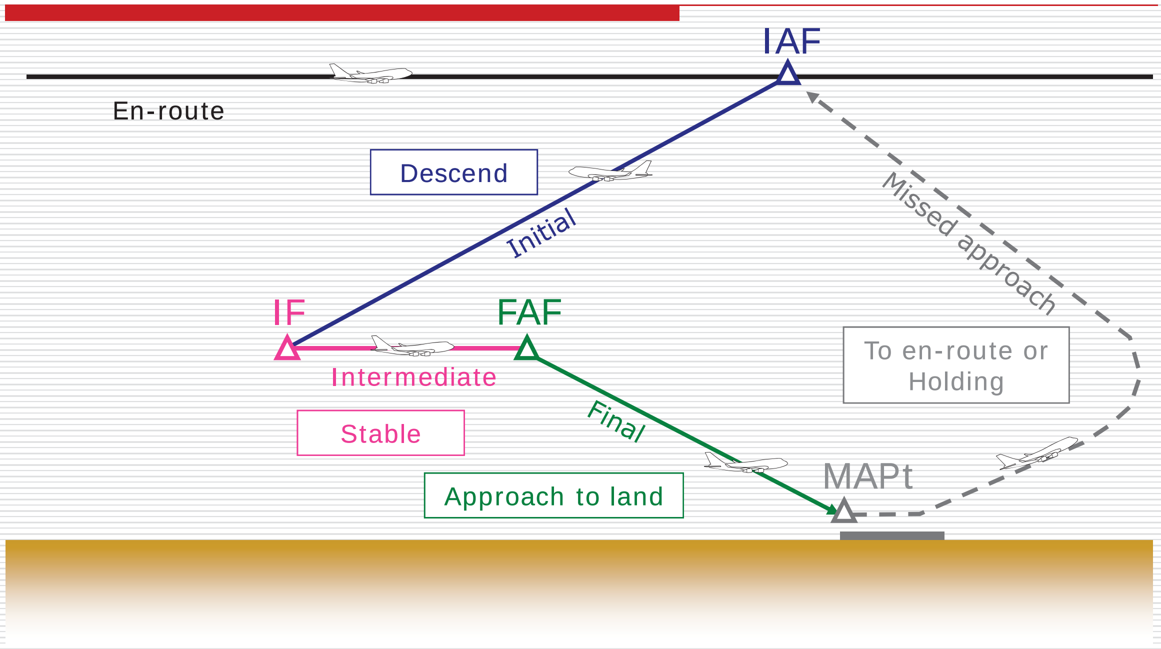
- ***AREA WIDTH***

  Area width in each segment

- ***MOC (MINIMUN OBSTACLE CLEARANCE)***

  Applicable MNM clearance to Obstacle in each segment OCA/OCH

Segments of Instrument Approach Procedure



ARRIVAL SEGMENT

- Two criteria for Area: Straight type and Arc type
  - Longer than 25NM from IAF: en-route criteria (±8NM width) applicable
  - Less than 25NM: initial segment criteria (±5NM width) applicable
- Two parts are connected by reducing 30°
- MOC : primary 300m (984ft)
  - Secondary area reducing linearly to zero at the outer edge.

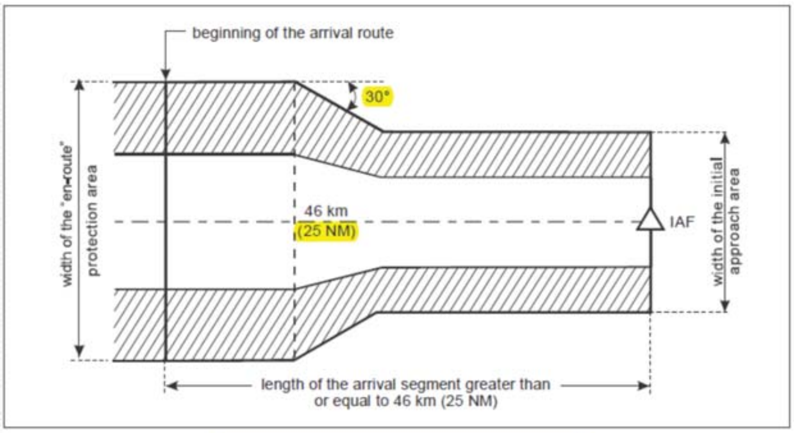


Figure I-4-2-1. Arrival segment — protection area (length of the arrival segment greater than or equal to 46 km (25 NM))

INITIAL APPROACH SEGMENT

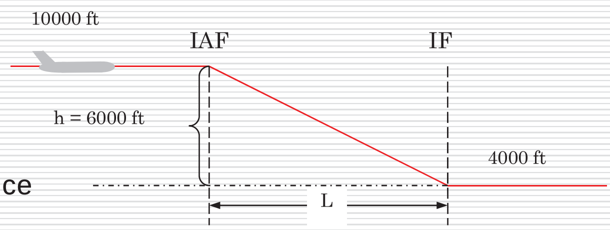
- Type of route
  - Straight track
  - DME arc
  - Reversal Procedure   Base-turn, Procedure turn
  - Racetrack Procedure

- Altitude assignment
  - MNM Altitude by 100ft
  - No less than the altitude succeeding intermediate or final approach starting altitude.

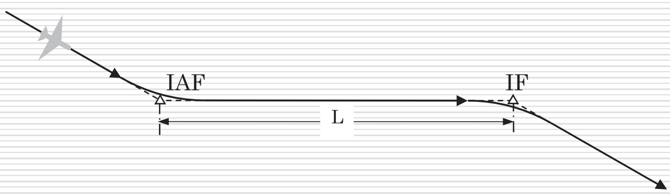
INITIAL APPROACH SEGMENT

- ALIGNMENT
  - TURN AT IAF ≦120˚
  - Turn in initial segment ≦120˚

- LENGTH
  - NO MAX LENGTH
  - appropriate length possible to descend
  - Considering turn performance



- DESCENT GRAD
  - 4% OPT
  - 8% MAX

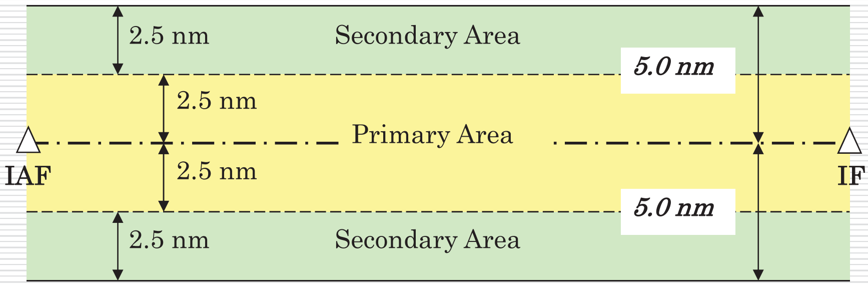


ADJUST LENGTH

INITIAL APPROACH SEGMENT

➢ AREA WIDTH

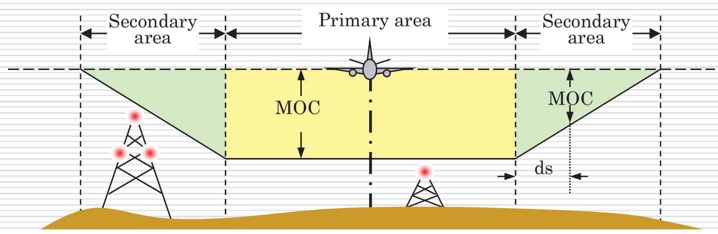
- ±5NM

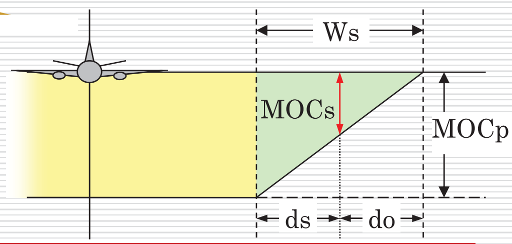


INITIAL APPROACH SEGMENT

➢ MOC

- 300m (984ft) Primary (PRIM)
- 300m → 0m Secondary (SEC)



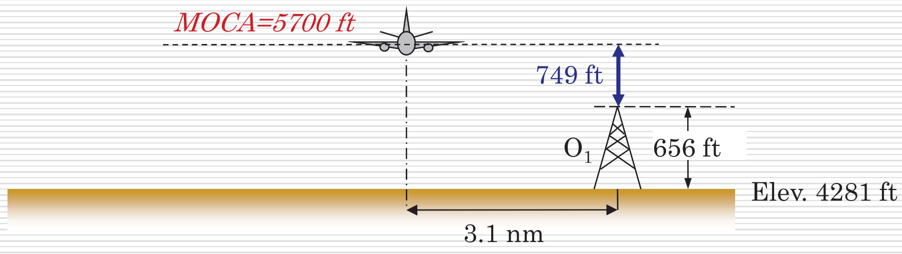


$$MOCs = MOCp - \{ MOCp \times (ds / Ws) \}$$

$$MOCs = MOCp \times (do / Ws)$$

INITIAL APPROACH SEGMENT [exercise]

➢Find the value of MOC and minimum altitude (ft)



MOCs = 300 m × { (5.0 – 3.1) / 2.5 }
= 228 m = 748.02 ft ⇒ 749 ft

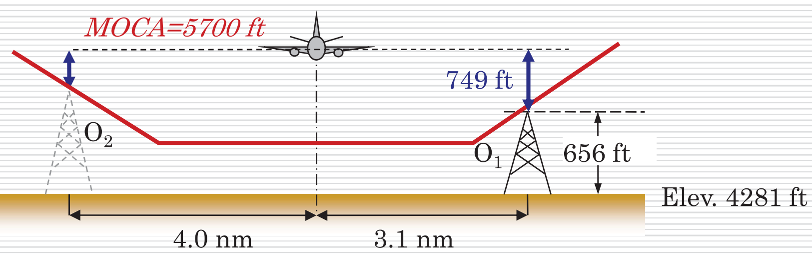
MNM Alt. (MOCA) = Elev. + O1 + MOCs

= 4281 + 656 + 749

= 5686 ft ⇒ 5700 ft (round up by 100 ft)

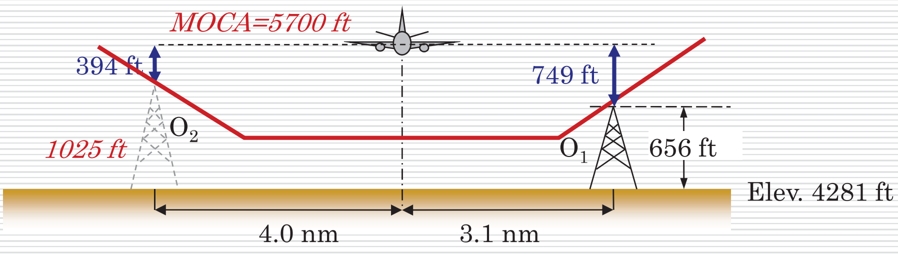
INITIAL APPROACH SEGMENT [exercise]

➢Calculate acceptable top height (ft) of obstacle at O2 not to affect MOCA 5700ft ?



INITIAL APPROACH SEGMENT [exercise]

➢Calculate acceptable top height (ft) of obstacle at O2 not to affect MOCA 5700ft ?



$$MOC_{(O2)} = 300\ m \times \{ (5.0 - 4.0) / 2.5 \}$$
$$= 120\ m = 393.69ft \Rightarrow 394ft$$

$$O2 = 5700ft - 394ft - 4281ft$$
$$\Rightarrow 1025\ ft$$

INITIAL APPROACH SEGMENT

- Racetrack Procedure* :
  - Same shape as holding pattern with different speed
  - Outbound time 1 to 3 minutes
- Reversal Procedure:
  - Base turn & Procedure turn types
  - Turn more than 120° (ILS 90°) at IF
  - Outbound time 1 to 3 minutes using ½ minute increments
- Area, MOC
  - Calculate parameters and construction
  - Primary area MOC 300m, secondary area applicable

* Detail is referred to Attachment – Construction of Racetrack area.

INTERMEDIATE APPROACH SEGMENT

- Purpose:
  - Preparation into final approach
  - Adjustment of configuration, speed, positioning, attitude etc.
- Type
  - Intermediate approach to start at the IF
  - Intermediate approach without the IF (after Reversal & Racetrack procedures)
- Designated Altitude
  - MNM Altitude established by 100ft

INTERMEDIATE APPROACH SEGMENT

- ALIGNMENT
  - TURN AT IF ≦120°
  - Permissible turn degrees at FAF ≦ 30° (FAF=NAVAIDs / WP)
- LENGTH
  - 15NM MAX (NOT exceed 10NM as far as no special reason)
  - 10NM OPT
  - 5NM MIN
  - More than 90° turn at IF, additional constrain[TableI-4-4-1]
- DESCENT GRAD
  - 0 % OPT (FLAT)
  - 5.2% MAX
    Required level flight of 1.5NM at least just before FAF

Table I-4-4-1. Minimum intermediate track length

Interception angle (degrees)	*Minimum track length*
91 — 96	11 km (6 NM)
97 — 102	13 km (7 NM)
103 — 108	15 km (8 NM)
109 — 114	17 km (9 NM)
115 — 120	19 km (10 NM)
Cat H	
61 — 90	5.6 km (3 NM)
91 — 120	7.4 km (4 NM)

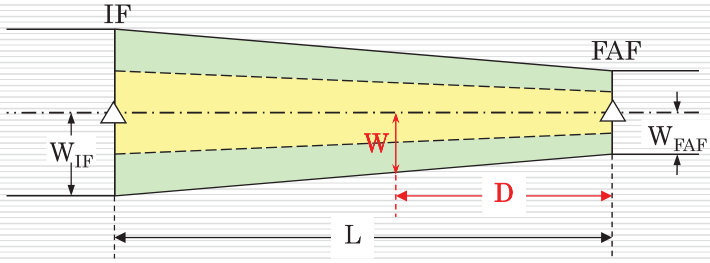
INTERNATIONAL APPROACH SEGMENT

- AREA WIDTH
  - Connect the width of Initial segment at IF to the width of final segment at FAF
  - NOT fixed width but flexible

    WIDTH AT IF = USUAL ±5NM

    WIDTH AT FAF= VARIABLE

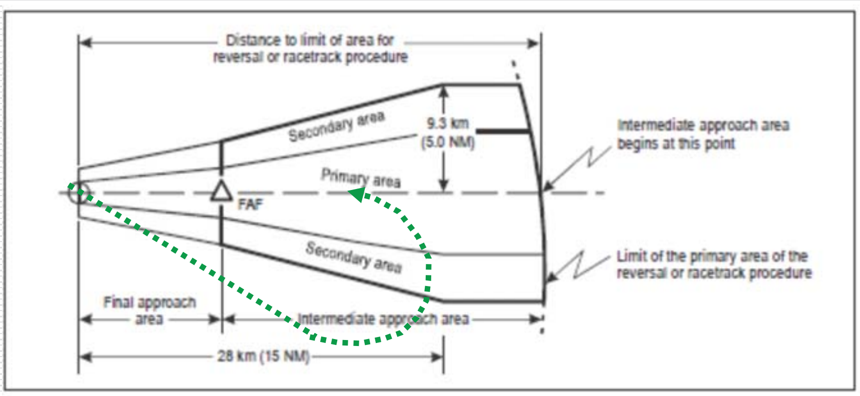
$$W = W_{FAF} + D \times \frac{W_{IF} - W_{FAF}}{L}$$



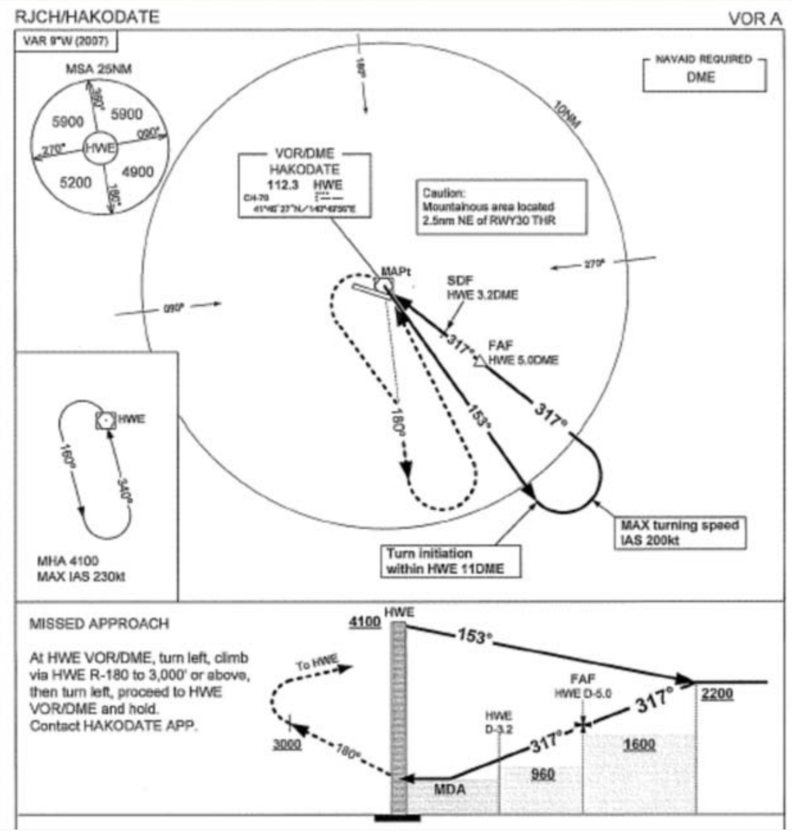
- MOC
  - 150m (492ft) Primary
  - 150m → 0m Secondary

INTERMEDIATE APPROACH SEGMENT
(Base turn)

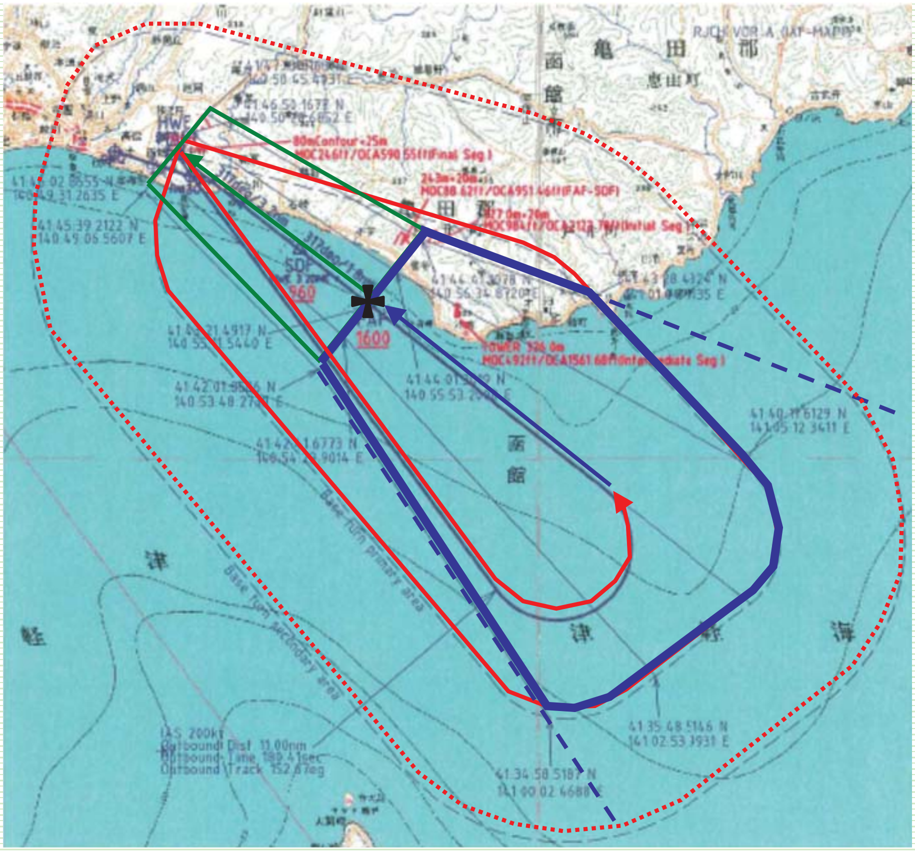
- In case without IF (FAF at the FIX)
- Intermediate approach edge by base turn area
  (Limit of the primary area of initial segment)



Example – Instrument Approach Procedure（Base turn）



Example – Instrument Approach Procedure Area（Base turn）



FINAL APPROACH SEGMENT

- Status:
  - Alignment and descent for landing along track guidance
- Type of Alignment
  - Straight-In >>> final approach to RWY
  - Circling >>> final approach to aerodrome
- Publication of altitude
  - Establishment of MNM altitude (OCA/H) by 5m(10ft), rounding up
- Future
  - Lateral guidance (LNAV) >>> with Vertical guidance (LNAV/VNAV)

P1S4C5.2

FINAL APPROACH SEGMENT

- ALIGNMENT
  - Course of Final Approach track in relation to extended RWY center line
    - Onset
    - Offset

      Case of Intersection,
      Case of NOT intersection
  - In case of Offset* > 5° ---> Lower limit on OCH (Table I-4-5-3)

    **Difference of angle between each direction/bearing/radial*
  - Alignment criteria apply for NPA such as LOC approach or RNAV/RNP approach, too
  - Under limits of Alignment ---> Straight-in approach

    Beyond limits of Alignment ---> Circling approach

FINAL APPROACH SEGMENT

➢ ALIGNMENT

- Case 1: Intersection between Final approach track and extended Runway center line by (θ)

MAX angle (θ) CAT A/B ; θ=30°
others ; θ=15°

✓ It is better to be offset up to 5° , because of no OCA/H penalty.
-------->

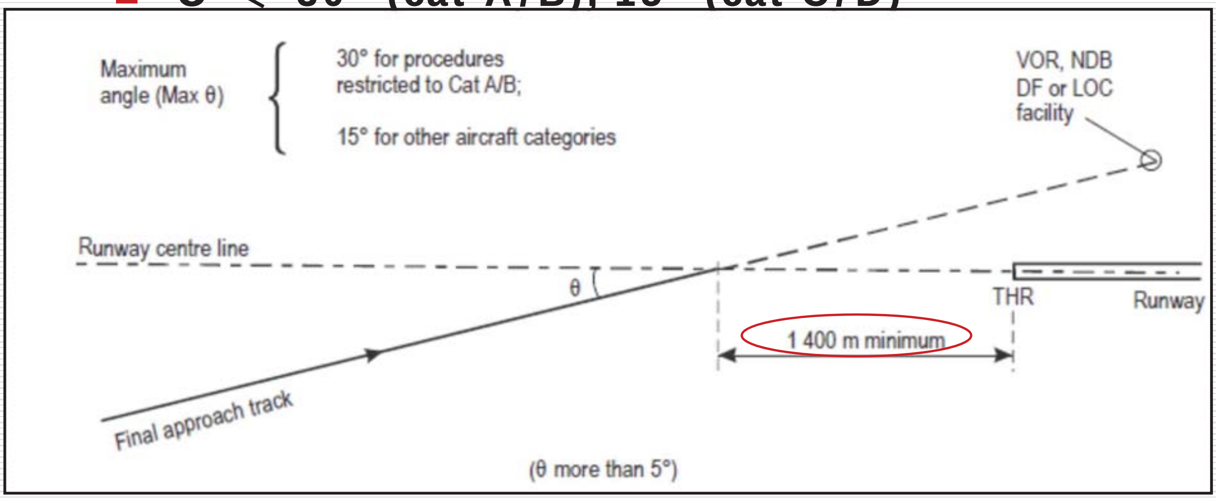
Table I-4-5-3. Lower limit on OCH

Aircraft category	*Lower limit on OCH (m (ft))*	
	$5° < θ \le 15°$	$15° < θ \le 30°$
A	105 (340)	115 (380)
B	115 (380)	125 (410)
C	125 (410)	
D	130 (430)	
E	145 (480)	

 # Showing on Upper figure, Figure I-4-5-1 (next page)

FINAL APPROACH SEGMENT - Alignment

- **Θ < 30° (cat-A/B), 15° (cat-C/D)**



★Intersection point 1400m or further from THR on extended RWY center line

FINAL APPROACH SEGMENT

➢ ALIGNMENT

- Case 2: Not Intersection between Final approach track and extended Runway center line by equal to or less than 5° (θ)

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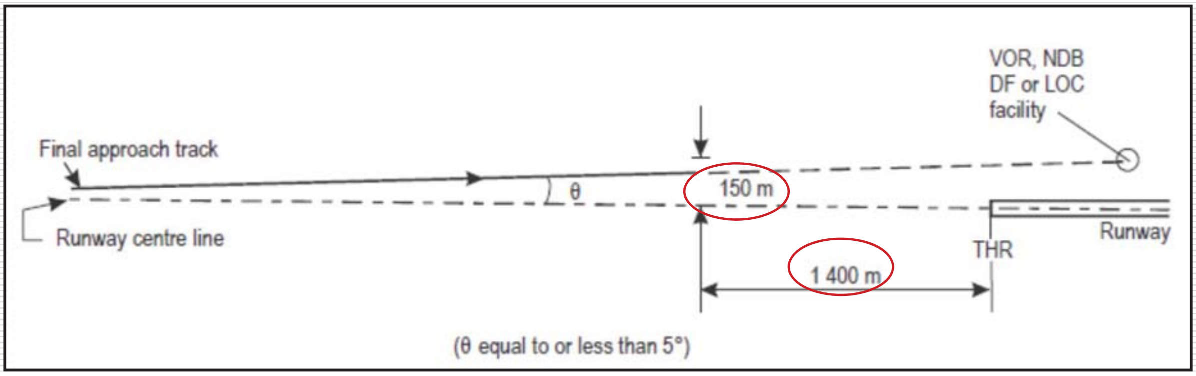
FINAL APPROACH SEGMENT - Alignment

- **$\theta \leqq 5°$**



★**Approach track passing within 150m laterally at the point of 1400m from THR on extended RWY Center line**

FINAL APPROACH SEGMENT

➢ Priority to design Final Approach Course (Cat-A/B/C/D)

1. Final approach track passing along extended Runway center line (by $\theta = 0°$)
2. Final approach track crossing extended Runway center line at 1400m from THR by $\theta \leqq 5°$ *(recommendation)*
3. Final approach track passing laterally to extended Runway center line within 150m at 1400m from THR by $\theta \leqq 5°$
4. Final approach track crossing extended Runway center line at 1400m or further from THR by $\theta \leqq 30°$ (cat-A/B), 15° (cat-C/D)

 # Considering relevance of total conditions

FINAL APPROACH SEGMENT

- When the alignment of straight-in approach is not fulfilled
  >>>>> Circling approach established and promulgated.
- Not applicable for landing MNM of Straight-in approach
- Approach track should pass over some portion of landing surface (RWY body) or within 1.9km(1.0NM) from the usable landing surface.

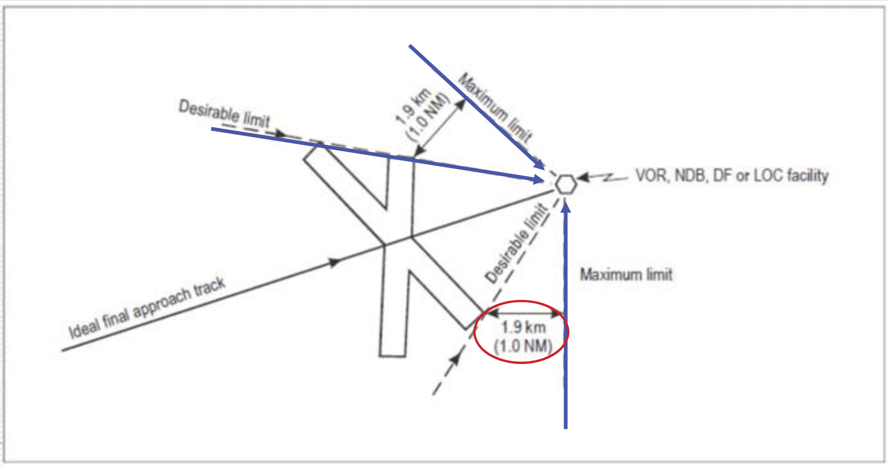


Figure I-4-5-2. Final circling approach alignment

FINAL APPROACH SEGMENT – NPA with FAFPA

- LENGTH
  - OPT 9.3km(5NM)
  - MAX not applicable (around 10NM desirable)
  - MIN 5.6km(3NM)

  # Exception on RNAV for some A/C by turning at FAF (Table I-4-5-1)

Table I-4-5-1. Minimum length of final approach segment

	Magnitude of turn over FAF			
Aircraft category	10° or less	20°	30°	60°
D and D_L	5.6 km (3.0 NM)	5.6 km (3.0 NM)	6.5 km (3.5 NM)	
E	5.6 km (3.0 NM)	6.5 km (3.5 NM)	7.4 km (4.0 NM)	
H	1.9 km (1.0 NM)	2.8 km (1.5 NM)	3.7 km (2.0 NM)	5.6 km (3.0 NM)

The values in this table may be interpolated. If turns of more than 30° (Cat H, 60°) are required, or if the minimum lengths specified in the table are not available for the procedure, straight-in minimums are not authorized and only the circling OCA/H should be published.

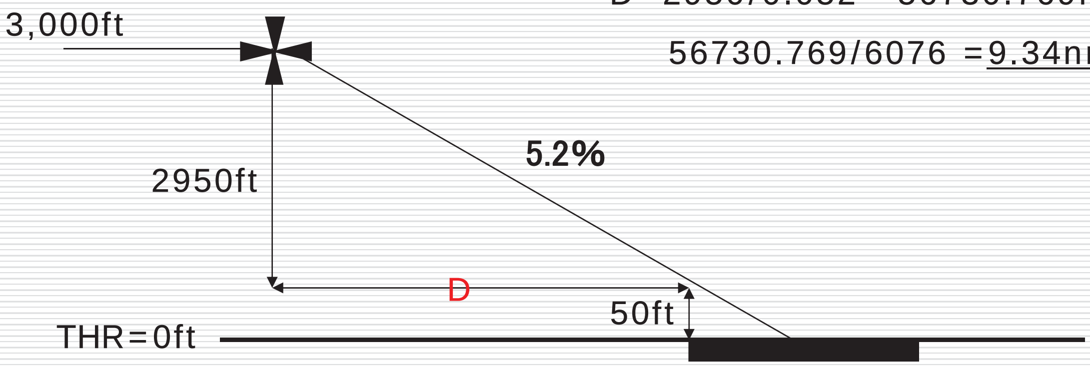
(The instance of no value in table will be calculated by ratio.)

FINAL APPROACH SEGMENT – NPA with FAF

- DESCENT GRAD OPTIMUN
  - 5.2% = 3.0° (FAF Alt. - (THR+50)) / (FAF-THR Dist.)

D=2950/0.052= 56730.769ft

56730.769/6076 =9.34nm



FINAL APPROACH SEGMENT – NPA with FAF

- DESCENT GRAD MAX

- NPA with FAF: 6.5% (Cat A/B)
  6.1% (Cat C/D/E)
  10 % (Cat H)

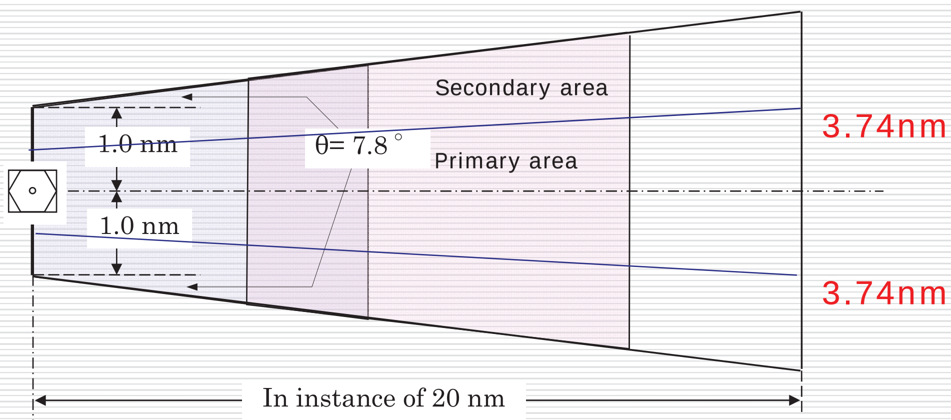
※ NPA without FAF: Defining Rate of descent(Table I -4-5-2)

Table I-4-5-2. Rate of descent in the final approach segment of a non-precision procedure with no FAF

Aircraft categories	*Rate of descent* Maximum	*Rate of descent* Minimum
Cat A/B	200 m/min (655 ft/min)	120 m/min (394 ft/min)
Cat H	230 m/min (755 ft/min)	N/A
Cat C/D/E	305 m/min (1 000 ft/min)	180 m/min (590 ft/min)

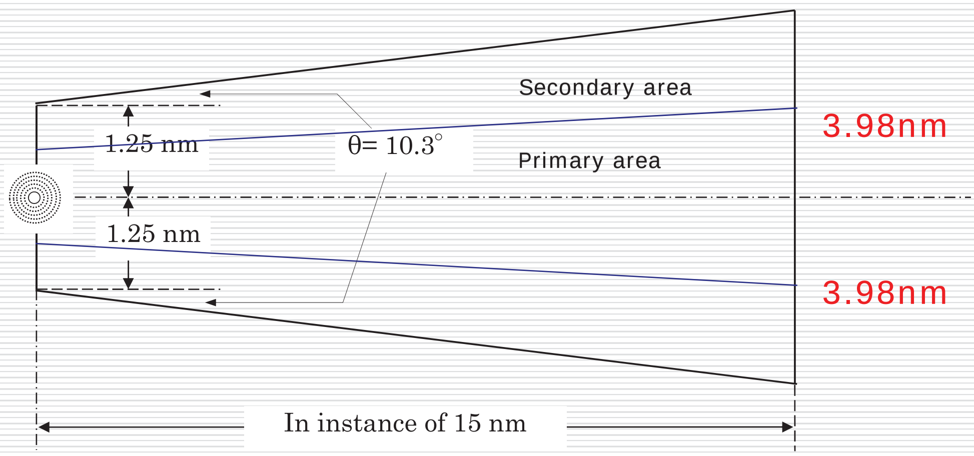
FINAL APPROACH SEGMENT - NPA with FAF

- AREA WIDTH - VOR



FINAL APPROACH SEGMENT - NPA with FAF

- AREA WIDTH - NDB



FINAL APPROACH SEGMENT - NPA

- MOC
  - 75m (246ft) PRIM : procedure with FAF
  - 90m (295ft) PRIM : procedure without FAF
  - OCA/H = Top obstacle altitude/height in the final approach area + MOC **MOC varies on primary or secondary area.*
  - In case off-set angle >5° , MNM OCH becomes increased as below;

A/C category	MNM OCH（m（ft））	
	5° <θ≦ 15°	15° <θ≦ 30°
A	105（340）	115（380）
B	115（380）	125（410）
C	125（410）	
D	130（430）	
E	145（480）	

FINAL APPROACH SEGMENT

What is OCA/H?

- Physical value determined to calculate operational MNM such as DA/DH or MDA/MDH (company MNM)
- Minimum Altitude to assure only the 'obstacle clearance'
- MINIMA promulgated in AIP is determined to select higher value among bellows;
  - Calculated OCA/H on design results,
  - MNM value as regulations for DA/H or other minimum altitude/height by PA or NPA.

  ** In Japan, not only OCA/H but also DA/H or MDA/H as well as minimum visibility or RVR/CMV is promulgated.*

FINAL APPROACH SEGMENT

Reference level(datum) of OCA/H

- OCA is referenced to mean sea level (MSL)
- OCH is referenced to;
  - Precision approach or APV : elevation of relevant runway THR
  - Non-precision approach : Aerodrome elevation or relevant runway THR*

    (*when it is 2m (7ft) or more below AD elevation)
  - Circling approach : Aerodrome elevation

FINAL APPROACH SEGMENT

Protection for VSS(Visual Segment Surface)

- All new or revised straight-in approach procedures after 15 March 2007 *(Procedures before then, assure protection by 15 MAR 2012)*
- No obstacles penetrate VSS:
  - Localizer type (ILS, LOC, APV I/II approach)… refer to Fig.I-4-5-6 a)
  - Other type (straight-in)… refer to Fig.I-4-5-6 b)
- Configuration of VSS
  - Originating 60m prior to the runway THR, the same height with THR and slope of 1.12° less than approach procedure angle
- If VSS is penetrated, aeronautical study and mitigation action* are required

* increasing descent gradient, THR displace or obstacle height less than 15m above THR
* Temporary moving obstacle, such as holding A/C are allowed

FINAL APPROACH SEGMENT

Protection for VSS(Visual Segment Surface)

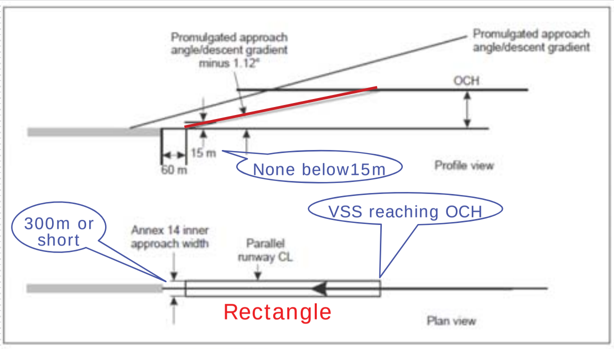


Figure I-4-5-6 a). Visual segment surface procedures with localizer or localizer look-alike lateral guidance aligned with Rwy CL

LOC Type

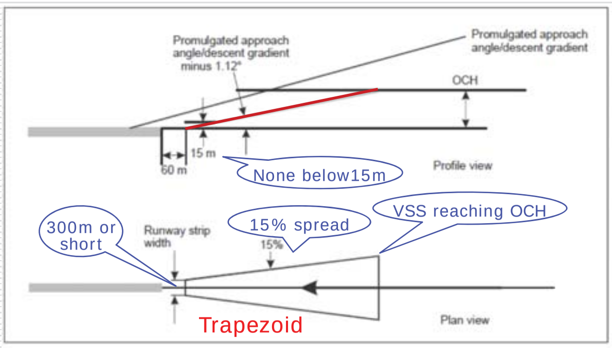


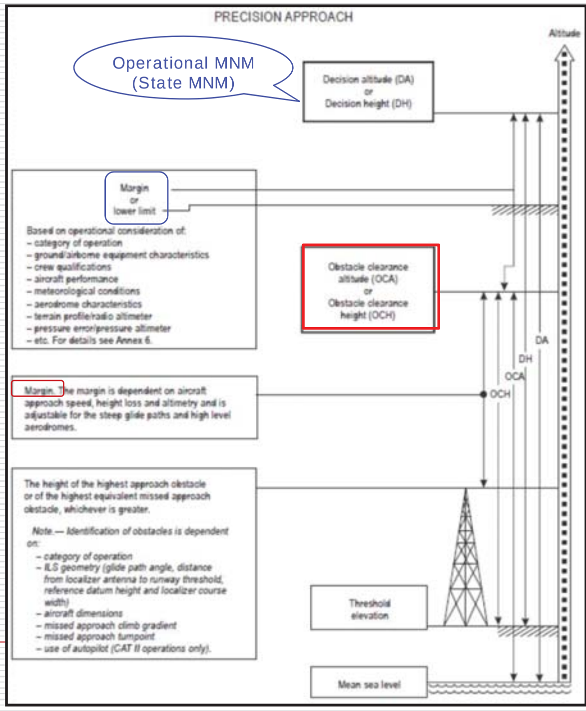
Figure I-4-5-6 b). Visual segment surface other approach procedures normal straight-in approach

Other Type

FINAL APPROACH SEGMENT

Precision Approach

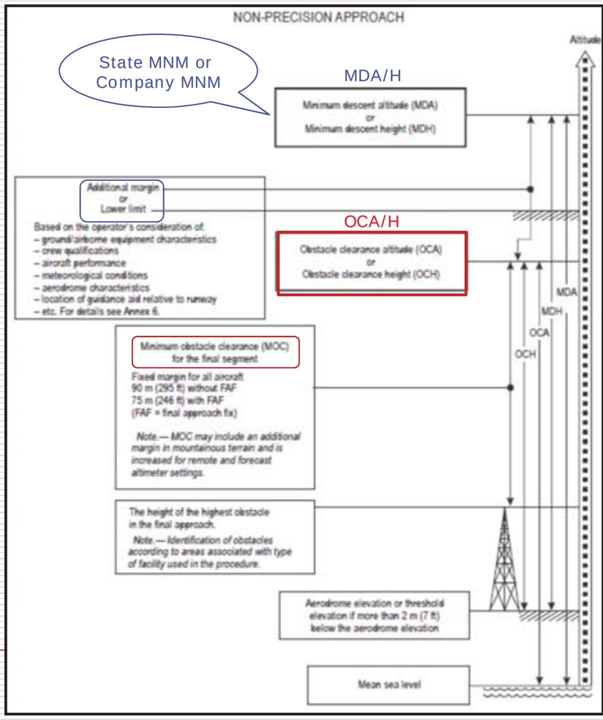
- Relationship of OCA/HとDA/H
- Refer to Figure I-4-5-3 a)



FINAL APPROACH SEGMENT

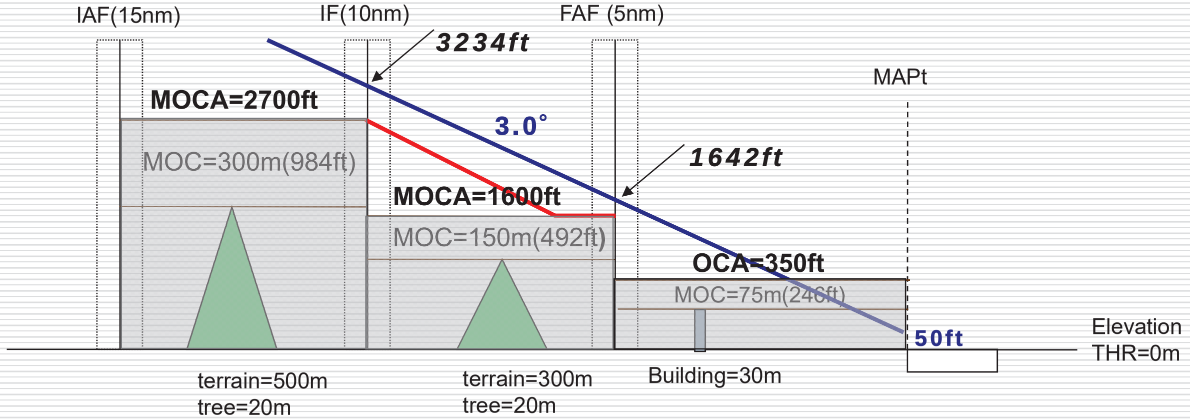
Non-Precision Approach

- Relationship of OCA/HとMDA/H
- Refer to Figure I-4-5-3 b) in PANS-OPS vol.2



MOC (Wrap-up)

MOC by each segment

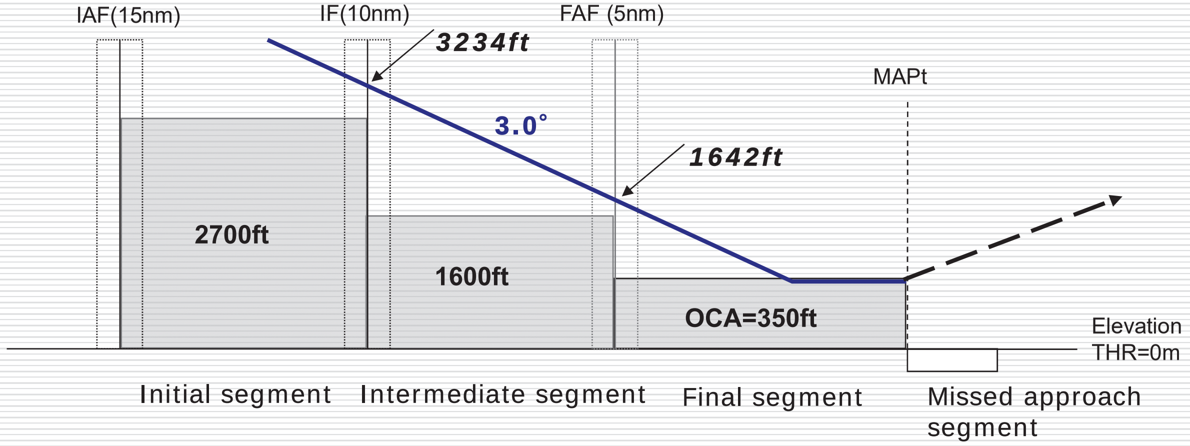


520+300=820m | 320+150=470m | 30+75=105m

820m=2691ft | 470m=1542ft | 105m=345ft

MOC (Wrap-up)

Profile view on AIP

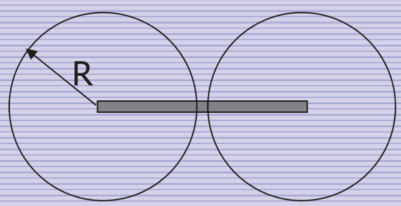


Circling Approach
(Visual Manoeuvring Area)

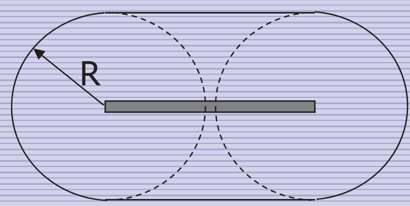
Circling Approach

Area

1. From THR center, draw circles by designated radius.
2. Connect each circle by tangent lines.



1.

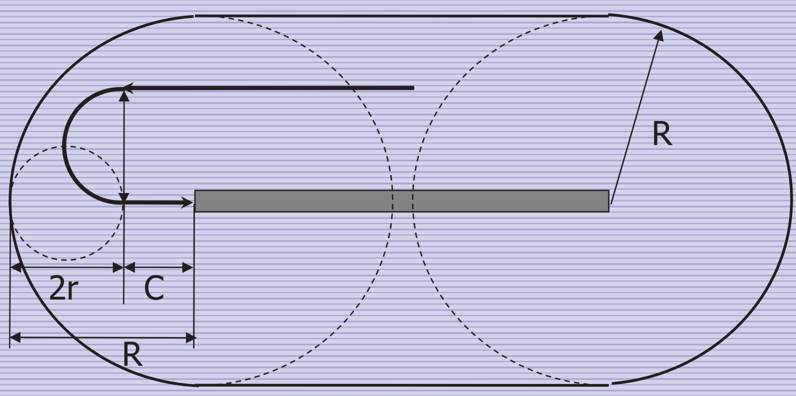


2.

Circling Approach

Radius

- (circle) radius R = 2r + c
  r: turn radius
  c: straight parts length (fixed value)
  (Cat A: 0.3NM, Cat B: 0.4NM, Cat C: 0.5NM, Cat D: 0.6NM)



Circling Approach

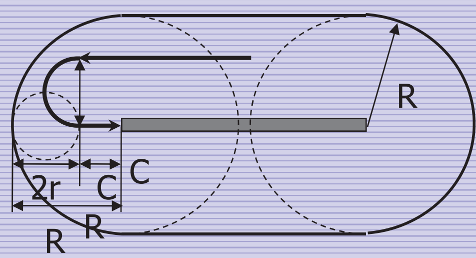
Radius Parameters

- IAS(kt)

category	A	B	C	D
Speed(PANS-OPS Final approach)	100	130	160	185
reference: (PANS-OPS) circling speed	100	135	180	205

- Omnidirectional wind: 25kt
- Bank: 20°
- Altitude: AP elevation+300m (1000ft)
- ISA + 15°

IAS⇒TAS⇒+wind factor⇒r ⇒ R
r= refer formula



Circling Approach

Table I-4-7-2. Example of determining radii for visual manoeuvring (circling) area for aerodromes at 1 000 ft MSL (non-SI units)

Category of aircraft/IAS (kt)	*A/100*	*B/135*	*C/180*	*D/205*	*E/240*
TAS at 2 000 ft MSL + 25 kt wind factor (kt)	131	168	215	242	279
Radius (r) of turn (NM)	0.69	1.13	1.85	2.34	3.12
Straight segment (NM) (this is a constant value independent of aerodrome elevation)	0.30	0.40	0.50	0.60	0.70
Radius (R) from threshold (NM)	1.68	2.66	4.20	5.28	6.94
JAPAN ⇒	**1.3**	**1.5**	**2.0**	**2.5**	

Note.— Radius from threshold (R) = 2r + straight segment.

Sample of originality

表 I -4-1-2 方式計算のための速度（IAS）：ノット（kt）単位

航空機区分	V_{at}	初期進入速度範囲	最終進入速度範囲	周回進入速度	進入復行最大速度 中間	進入復行最大速度 最終
A	<91	90/150(110*)	70/100	適用なし	100	110
B	91/120	120/180(140*)	85/130		130	150
C	121/140	160/240	115/160		160	185
D	141/165	185/250	130/185		185	185
E	166/210	185/250	155/230		230	275
H	N/A	70/120**	60/90***		90	90
Cat H (PinS)***	N/A	70/120	60/90		70 or 90	70 or 90

Japanese criteria

Table I-4-1-2. Speeds (IAS) for procedure calculations in knots (kt)

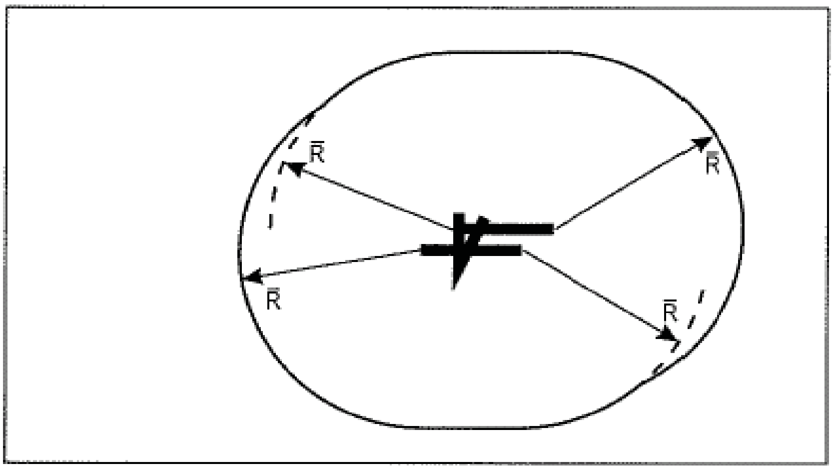
Aircraft category	V_{at}	*Range of speeds for initial approach*	*Range of final approach speeds*	*Max speeds for visual manoeuvring (circling)*	*Max speeds for missed approach* Intermediate	*Max speeds for missed approach* Final
A	<91	90/150(110*)	70/100	100	100	110
B	91/120	120/180(140*)	85/130	135	130	150
C	121/140	160/240	115/160	180	160	240
D	141/165	185/250	130/185	205	185	265
E	166/210	185/250	155/230	240	230	275
H	N/A	70/120**	60/90***	N/A	90	90
Cat H (PinS)***	N/A	70/120	60/90	NA	70 or 90	70 or 90

ICAO criteria

Circling Approach

Area Sample

- In case of multi-runways, circles drowned from each runway THR, then connect them by tangent lines.



Circling Approach

Calculation of OCA/H

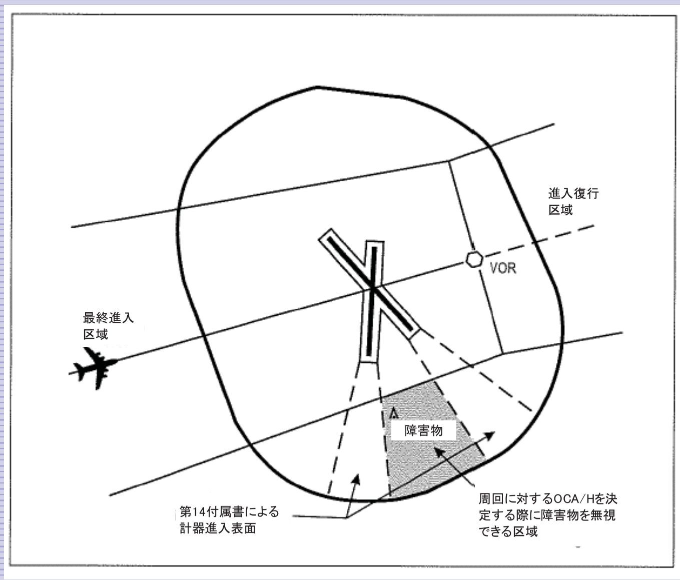
- Select Highest Value
  – OCA/H based on Final approach or missed approach
  – Lowest OCH
  – Top height of obstacles＋MOC

Category	A	B	C	D
Lowest OCH JAPAN ⇒	120m (394ft) 350ft	150m (492ft) 450ft	180m (591ft) 450ft	210m (689ft) 550ft
MOC JAPAN ⇒	90m (295ft) 295ft	90m (295ft) 295ft	120m (394ft) 295ft	120m (394ft) 295ft

Circling Approach

Limit of Area

- No flying side, except ICAO Annex 14 Approach surfaces boundary and approach procedure area.



- Aim of Constrain of Circling side
  - To reduce OCA/H
  - To avoid residence or training/designated area

- Note in AIP chart

MISSED APPROACH Procedures
〈 NON-PRECISION 〉

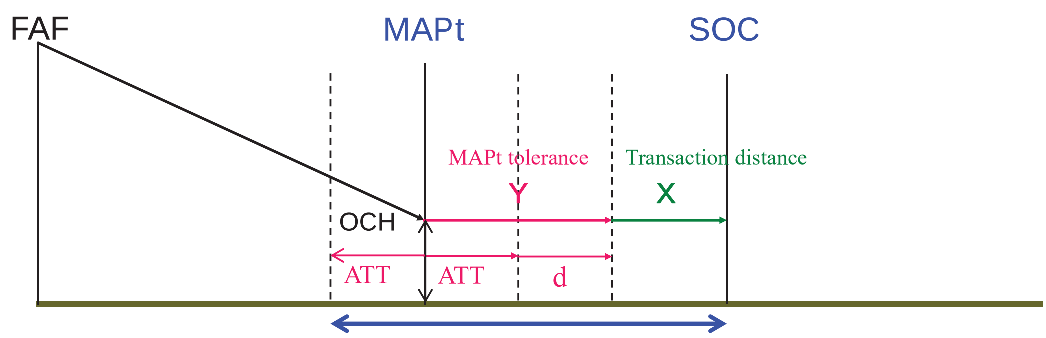
BASIC CONCEPT of MISSED APPROACH

NON-PRECISION

- 3 PHASES of Missed Approach (M/A) Segment
  1) INITIAL
  2) INTERMEDIATE
  3) FINAL

- Only one M/A procedure shall be published.

INITIAL PHASE



・・・Unable TRACK CHANGE

ATT＝MAPt TOL

d＝ 3sec (PILOT REACTION TIME)

X＝15sec (A/C TRANSITION)

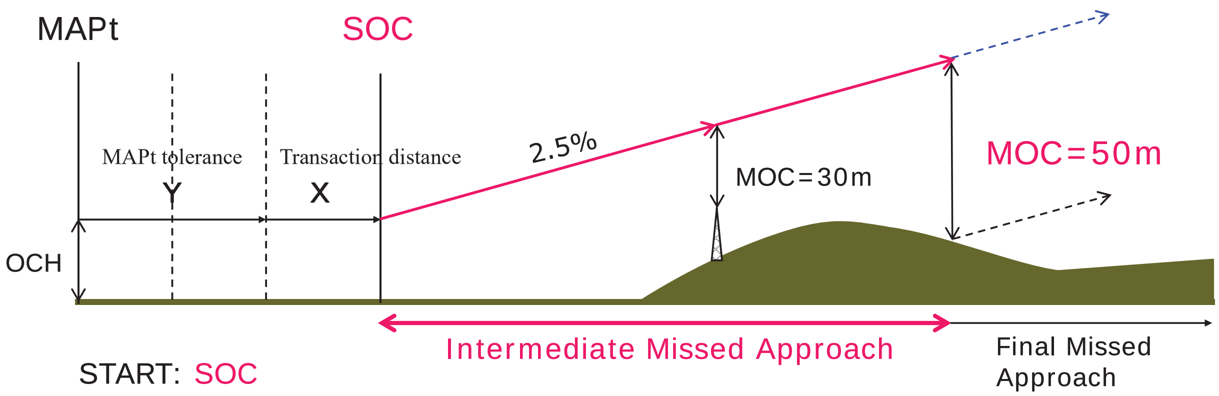
TAS ＝ IAS ×α
α： ISA＋15℃ / ALT

☆ALT ＝ AD ELEV＋300m

SPEED　FINAL APC IAS ⇒ TAS ⇒ TAS ＋ 10kt(TAIL WND)

MAPtがNAVAIDS(VOR,NDB,MM)の場合 ⇒ ATT＝0

INTERMEDIATE PHASE



START: SOC

CLIMB GRAD =2.5% (2.5%～5%)

MOC = 30m (98’)

END: MOC REACHES 50m（164‘）AND THERAFTER REMAINDS 50m

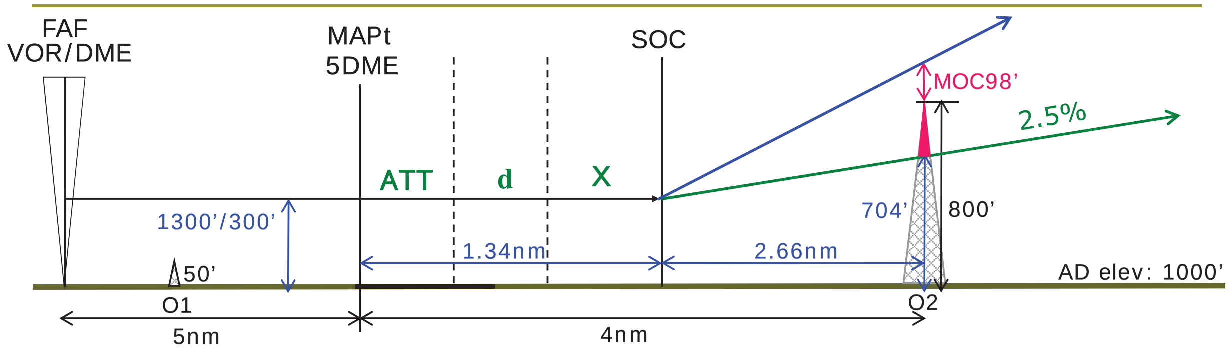
STRAIGHT ⇒ TRACK ≦15° FORM FAT

TURNING ⇒ TRACK ＞15 FORM FAT

TRACK GUIDANCE MAY BE USED ⇒ APPLY SECONDARY AREA

STRAIGHT MISSED APPROACH

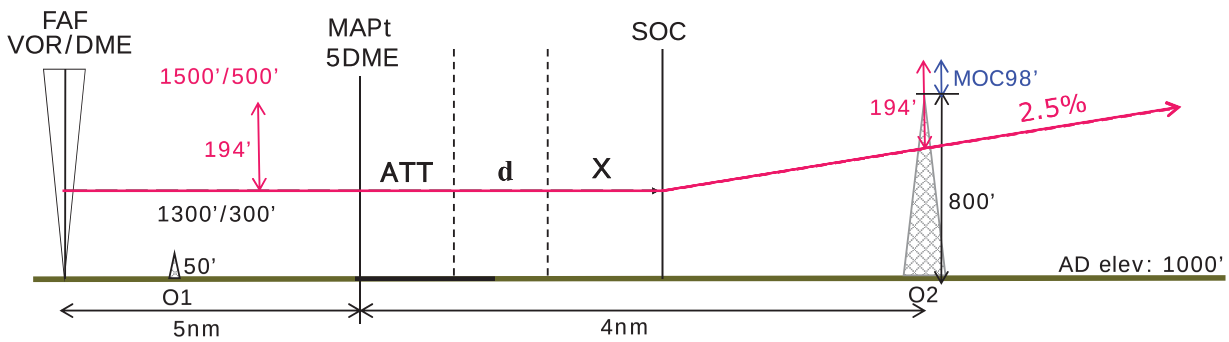
A/C; CAT D



MDA/H(final)	1000+50+246= 1296ft	1300/300
ATT MAPt	DME(tol)=0.25+0.0125D	
	=0.25+0.0125＊5	0.32nm
d+X	IAS= 185(final)	
	TAS= 185＊ 1.0411(AD elev)	193kt +10kt(WIND) 203kt
	203＊(3sec+15sec) /3600	1.02nm (1.015)
MAPt to SOC	0.32+1.02	1.34nm
$H_{A/C\ (O2)\ 2.5\%}$	300+(2.5%＊2.66＊6076)	704ft (704.054)
RH (O2)	800+98	898ft ＞ 704ft

A/C is too low by 194’

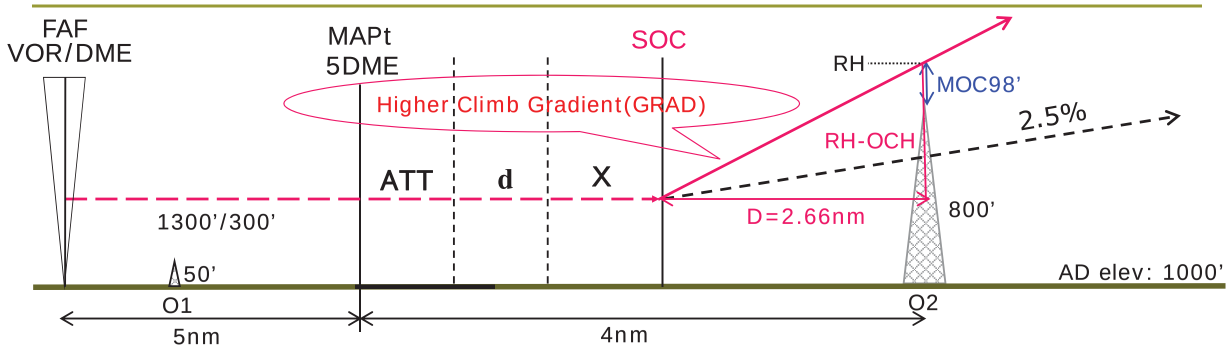
EXAMPLE
SOLUTION1 : RAISE OCA/H



OCA/H= 1000+300+194= 1494ft

$\boxed{1500/500}$

EXAMPLE
SOLUTION 2 : INCREASE THE CLIMB GRAD



RH= 800+98= 898ft

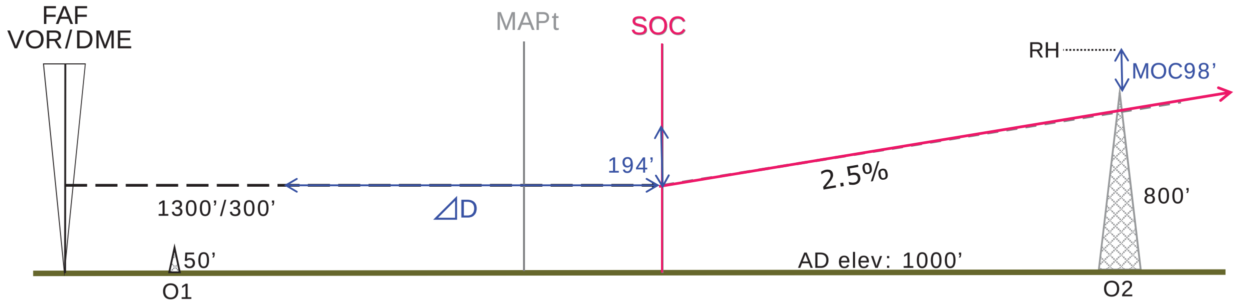
GRAD= (RH-OCH)/D = (898-300)/(2.66∗6076)

= 0.037 $\boxed{3.7\%}$

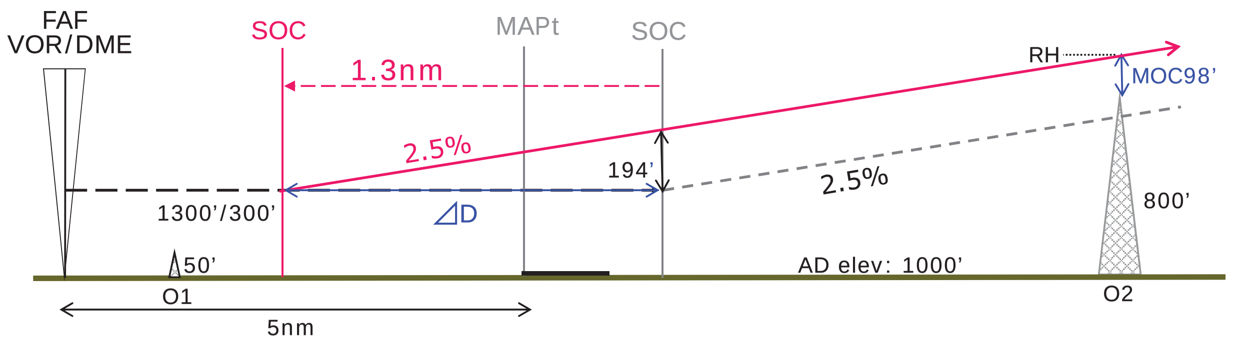
Adopt better at or less than 5.0%

GRAD; Gradient

EXAMPLE
SOLUTION 3 : MOVE MAPt



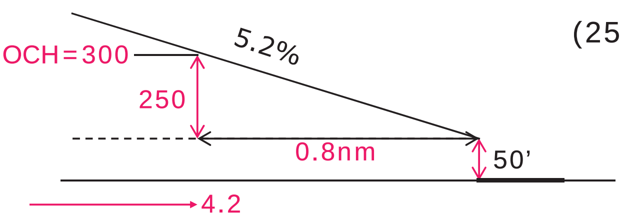
EXAMPLE
SOLUTION 3 : MOVE MAPt



$194/\Delta D = 2.5\%$

$\Delta D = 0.025/(194 * 6076) = 1.3\text{nm}$ Move SOC short by 1.3nm

CHECK EARLIEST MAPt



$(250/6076)/0.052 = 0.8\text{nm}$

5nm - 0.8nm = 4.2nm from FAF

Compare MAPt position and detailed check

EXAMPLE
SOLUTION 4: COMBINATION

- MOVE MAPt & RAISE OCH
- MOVE MAPt & CLIMB GRAD
- RAISE OCH & CLIMB GRAD
- MOVE MAPt & RAISE OCH & CLIMB GRAD

TURNING MISSED APPROACH

- TRACK CHANGE >15° from FAT
- 2 TYPE: TURN may be identified by
  - ALTITUDE/HEIGHT
  - DESIGNATED POINT - FIX / FACILITY
- PARAMETERs

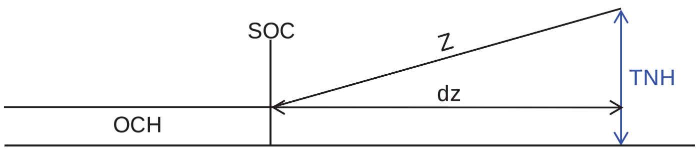
ALT	AD elev+1000ft or Defined ALT
TEMP	ISA+15℃
IAS	FINAL M/A SPEED (see Table I-4-1)
TAS	DEPEND ON TURN ALT (≧AD elev+1000)
WIND	30kt
BANK	15°
FIX tolerance	NAV SYSTEM
FTT	TAS(+WIND30kt) x (PILOT REACTION 3 sec.+BANK 3 sec.)

TURN AT ALTITUDE

- AVOID OBS AHEAD
- GAIN ALT/HEIGHT TO FLY OVER OBS AFTER TURNING

LATEST TP
= TNA/H POINT(K-K LINE) + “c” (6sec) ･･･with 30kt WIND

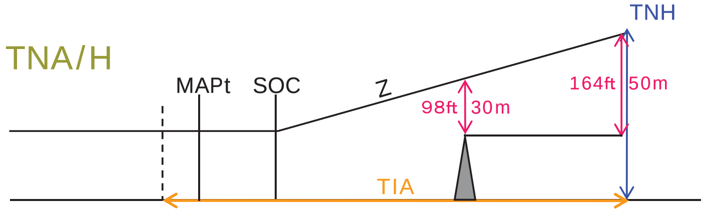
- TNA/H = OCA/H+dzTANZ



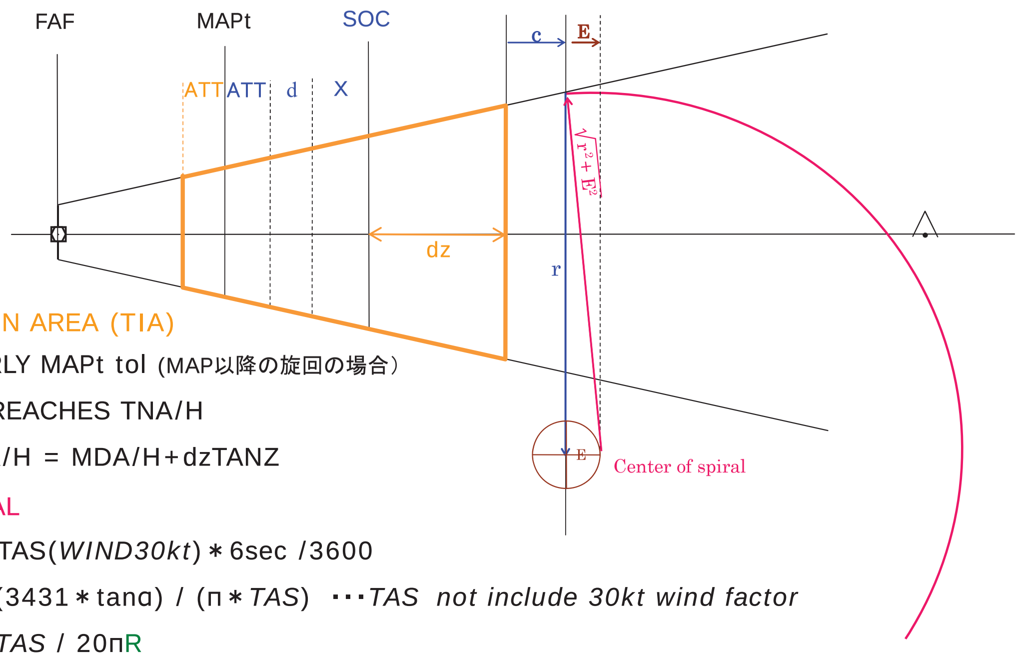
- TURN INITIATION AREA(TIA)
  = BIGINS EARLY MAPt tol
  = ENDS dz REACHES TNA/H (K-K LINE)

- MOC (TIA) = 164ft(50m) AT TNA/H

MAX OBS IN TIA
= TNA/H-50m



TURN AT ALTITUDE



TURN INITIATION AREA (TIA)

BEGINS EARLY MAPt tol (MAP以降の旋回の場合)

ENDS dz REACHES TNA/H

TNA/H = MDA/H+dzTANZ

WIND SPIRAL

c = TAS(*WIND30kt*)＊6sec /3600

R = (3431＊tanα) / (п＊*TAS*) ･･･*TAS not include 30kt wind factor*

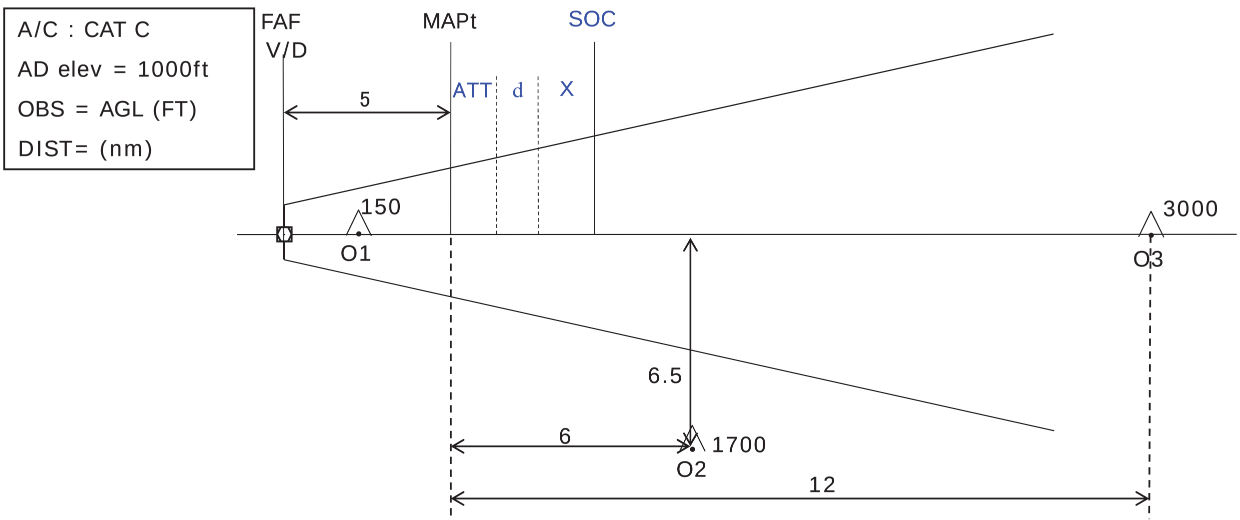
r = *TAS* / 20пR

E = W(*30kt*) / 40R

WIND SPIRAL = $\sqrt{r^2 + E^2}$

EXERCISE
TURNING M/A (Finding Proper Alt.)

A/C; CAT C

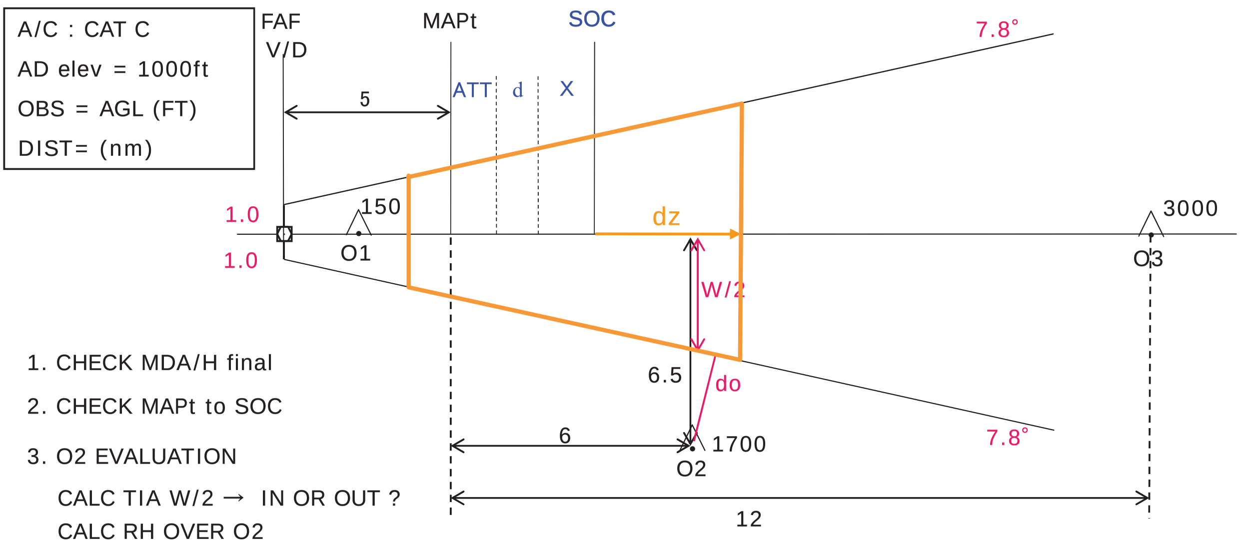


LEFT TURN M/A IS NOT APLICABLE FOR RESIDENTIAL AREA

EVALUATE THE OBSTACLEs AND DETERMINE <u>THE M/A</u> & <u>THE MDA/H</u>

EXERCISE
GUIDANCE FOR SOLUTION

AC; CAT C

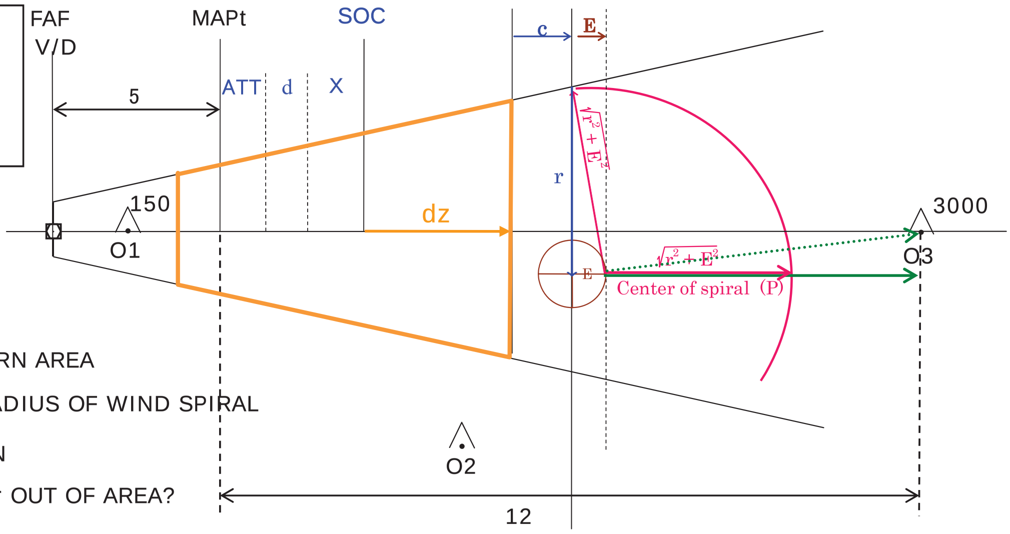


1. CHECK MDA/H final
2. CHECK MAPt to SOC
3. O2 EVALUATION
   CALC TIA W/2 → IN OR OUT ?
   CALC RH OVER O2
   CALC TIA to O2 = do
   CALC A/C CLIMB2.5% in do
4. DETERMINE dz DIST
   ※MDH +dzTAN Z +A/C CLIMB do =RH OVER O2

EXERCISE
GUIDANCE FOR SOLUTION

AC; CAT C

A/C : CAT C
AD elev = 1000ft
OBS = AGL (FT)
DIST= (nm)



1. DETERMINE TURN AREA

   c , R , r , E , RADIUS OF WIND SPIRAL

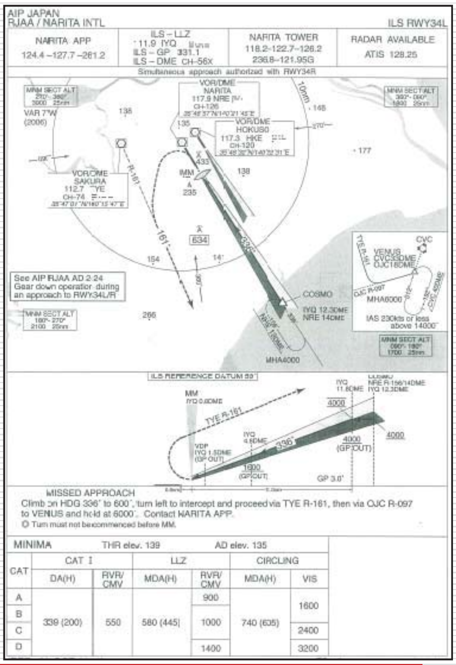
2. O3 EVALUATION

   IN THE AREA or OUT OF AREA?
   CALC (P) to O3

PRECISION APPROACH
Procedures

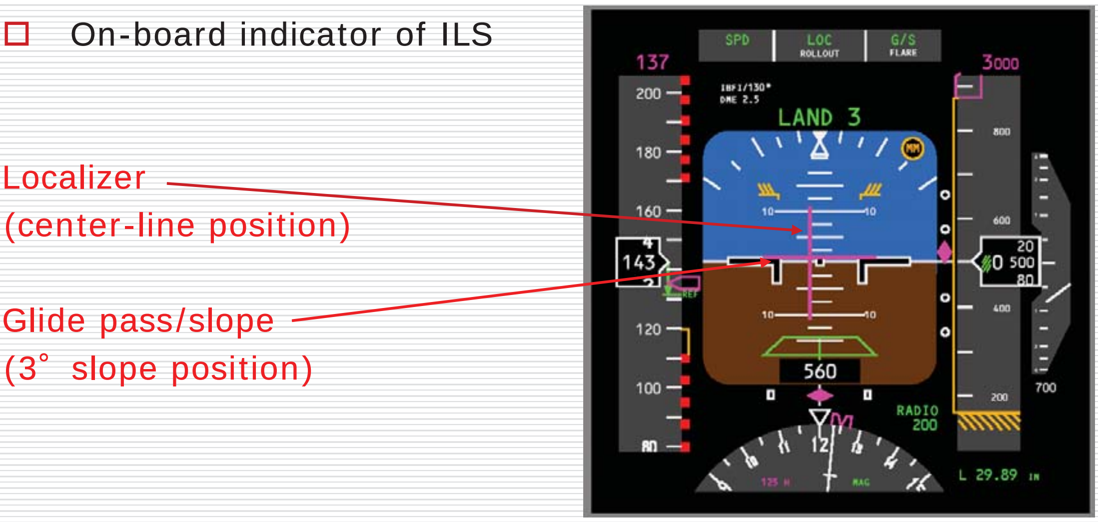
ILS Approach Procedure

- To receive course signal（LOC）and slope signal（GP）, it is 3 dimensional approach procedure and landing to RWY to keep constant descent angle, normally 3 degrees.
- major｢precision approach｣



ILS Approach Procedure

- On-board indicator of ILS



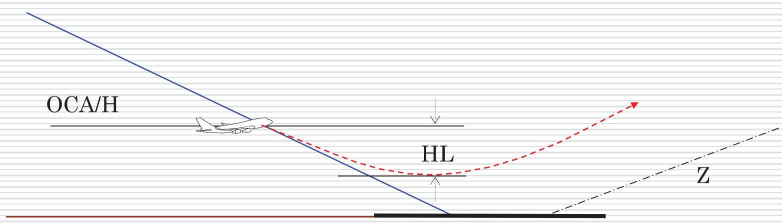
ILS approach procedure

- Differences from NON-Precision Approach

	Precision approach	NON-precision approach
Vertical guidance	necessary	nil
Approach minimum altitude	DA/DH	MDA/MDH
Segment	precision segment	Final approach segment / early missed approach
Obstacle assessment criteria	Penetration of OAS or specified surfaces	Obstacle + MOC

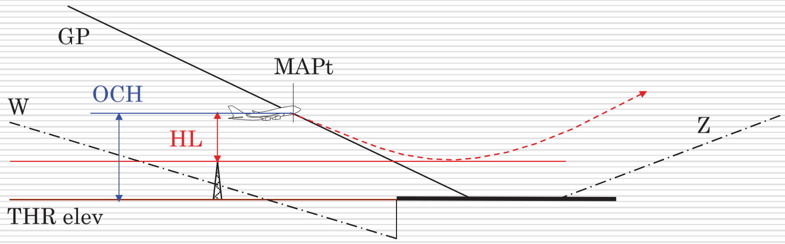
Decision Altitude / Height

- In case of NOT-in-sight of RWY or related lighting, pilots shall commence the missed approach steering at that altitude or height,
- To be different from MDA, it will be occurred to sink down below DA/H,
- To combine sinking and altimeter error is shown as the value of height loss (HL) or margin,
  - HL = sinking down + altimeter error



Precision Segment

Decision Altitude / Height (DA/H)



＊DA/H shall be determined as state minimum, and OCA/H is usually used for explanation.

Aircraft category (V_{at})	Margin using radio altimeter Metres	Margin using radio altimeter Feet	Margin using pressure altimeter Metres	Margin using pressure altimeter Feet
A – 169 km/h (90 kt)	13	42	40	130
B – 223 km/h (120 kt)	18	59	43	142
C – 260 km/h (140 kt)	22	71	46	150
D – 306 km/h (165 kt)	26	85	49	161
H – 167 km/h (90 kt)	8	25	35	115

Figure Ⅱ-1-1-5 Precision Segment

Operation category of ILS approach

- Categorized by applicable DH and RVR (VIS/CMV)
  - Cat I & II

	Cat I	Cat II
DH	At or above 200ft	At or above 100ft, and below 200f
RVR	*550m or more*	*300m or more*

Operation category of ILS approach

- Categorized by applicable DH and RVR (VIS/CMV)
  - Cat III

	Cat III a	Cat III b	*Cat III c*
DH	Below 100ft or Nil of DH	Below 50ft or Nil of DH	*Nil of DH* *(0m)*
RVR	*175m or more*	*50m or more* *but* *Below 175m*	*0m*

Methods of calculating OCA/H

- Three methods to apply and calculate OCA/H

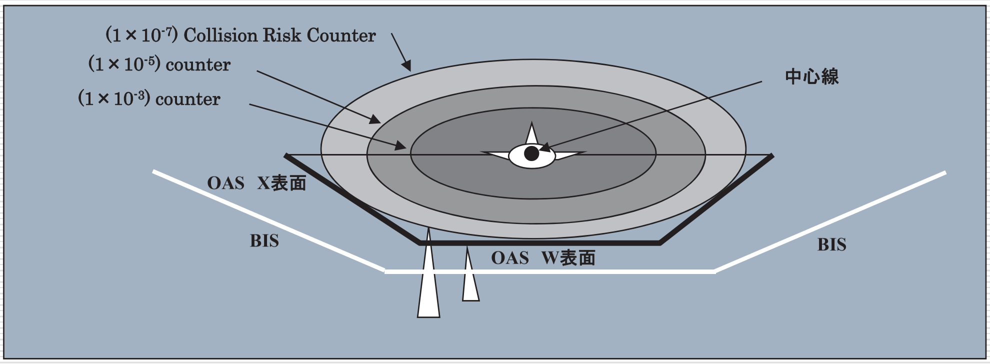
	1st method	2nd method	3rd method
Surface	BIS (Basic ILS Surfaces)	OAS (Obstacle Assessment Surfaces) Above BIS	CRM (Collision Risk Model) Computing model
Calculation	Standard condition Fixed shape of surface on Annex 14 Formula on each surface dimension	Standard condition Flexible surface on conditions Formula on each surface dimension Using ICAO software	Alternative of OAS Depending on Obstacle density Set aircraft condition and obstacle data Auto-Computing and judgement

CRM - General

- CRM(Collision Risk Model)
- Developed by ICAO OCP in 1970s
- One of design methods for ILS approach in PANS-OPS (BIS⇒OAS⇒CRM more strictly)
- Calculate probability of collision to obstacle on ground in ILS approach
- NOT applicable for Helicopter

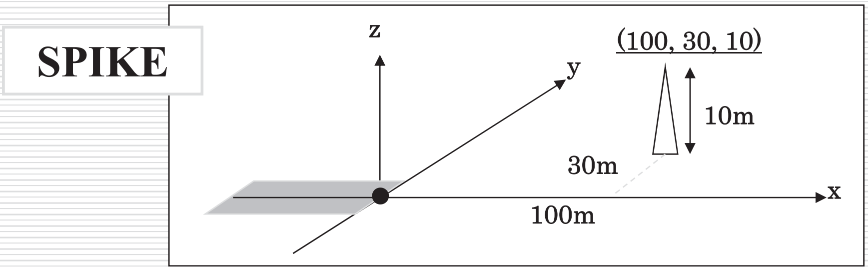
CRM – Concept Diagram

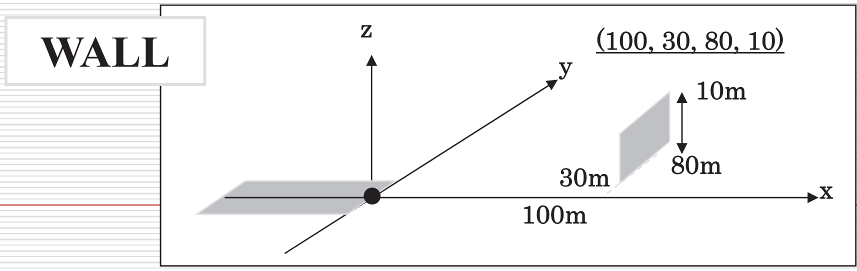
- Concept of Probability on CRM



CRM – Obstacle Data

- Coordinate of position and height at the origin of THR
- Two figures of Spike and Wall to appear mountain, building, tower etc. under the designated rule





What for CRM ?

1. Calculation total collision risk to specified OCA/H--- for single approach
2. Calculate required OCA/H to make total collision risk below 1×10^{-7}
3. Find controlled obstacle to affect OCA/H most

note : Collision Risk by ILS CRM is the probability as an occurrence of approach, NOT as an hour of approach.

Input Data of CRM

- ILS data, standard items
  GP angle, RDH, distance of LOC-THR, LOC course width at THR
- RWY, approach procedure data
  THR elevation, distance of FAP-THR, end of precision segment
- Aircraft data
  Size, missed approach performance gradient
- Required conditions
  Approach type of category(Cat I/II, Radio Alt, Autopilot, etc.)
  Target output data
- Obstacle data as formatted

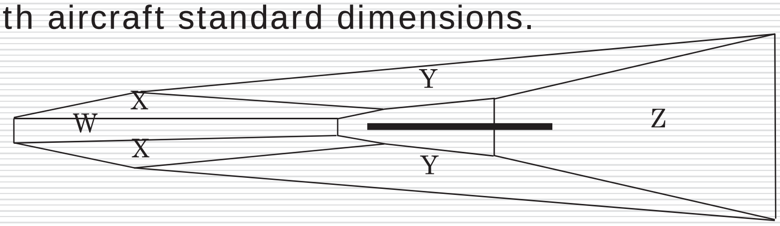
Precision Segment

- **3 type of criteria of obstacle assessment**

Strictly

- BIS(Basic ILS Surface): Expansion of annex14 OLS
- OAS(Obstacle Assessment Surface): Set of surfaces to approximate CRM
- CRM(Collision Risk Model): Probability model of risk distribution(computer software)

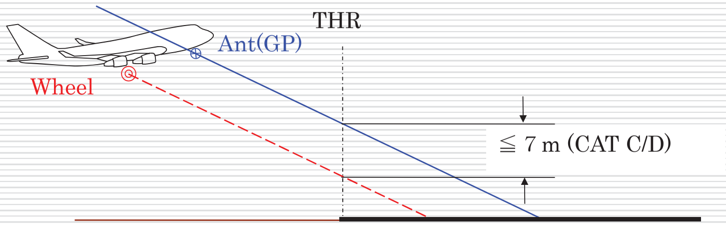
- OAS and CRM to validate a precision segment are developed with aircraft standard dimensions.



Standard Conditions

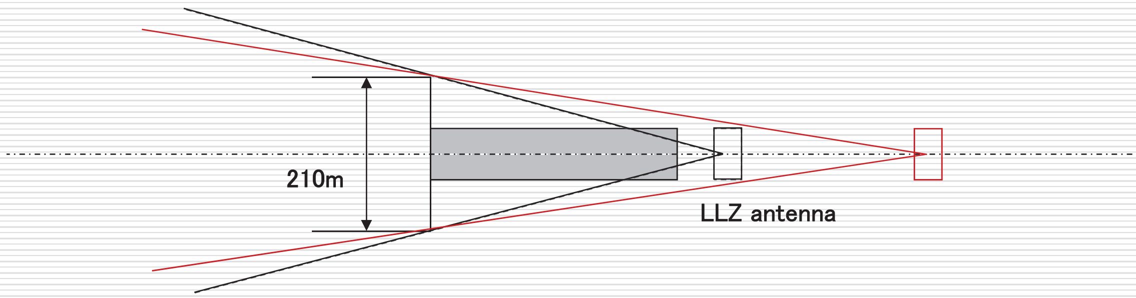
- Aircraft maximum dimension

Aircraft category	Wing span (m)	Vertical distance between wheel and GP antenna (m)
H	30	3
A, B	60	6
C, D	65	7
DL	80	8



Standard requirements

- Missed approach climb gradient, 2.5%(standards)
- ILS (Localizer) sector width at RWY THR, 210m

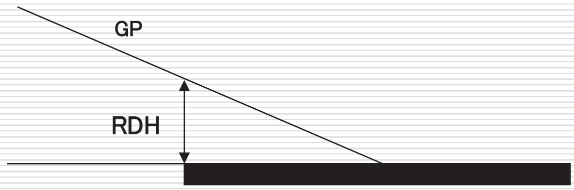


(**LLZ sector width**)

Standard requirements

- Limitation of GP angle
  - minimum：2.5°
  - optimum：3.0°
  - maximum：3.5°（3° for Cat Ⅱ・Ⅲ）

- ILS reference datum (RDH), 15m（50ft）



- Obstacle height is shown at the base of RWY Threshold elevation.

Obstacle Clearance Altitude (OCA/H)

- To determine OCA/H based on safety target, 1×10^{-7}（1/10Million）or lesser of collision risk to obstacles by a practice of approach according to statistics.

- OCA/H assures obstacle clearances by Instrument flight phase from final approach start point until intermediate missed approach end point.

☆ The obstacle clearance by Visual flight phase is not assured below OCA/H in case of no penetrating obstacle to respective surface concerned to ILS approach.

Obstacle Clearance Altitude (OCA/H)

- <u>Define Obstacle height to penetrate OAS</u>

$$h_a = \frac{h_{ma} \cot Z + (x_z + x)}{\cot Z + \cot\theta}$$

where:	h_a	=	height of equivalent approach obstacle
	h_{ma}	=	height of missed approach obstacle
	θ	=	angle of glide path (elevation angle)
	Z	=	angle of missed approach surface
	x	=	range of obstacle relative to threshold (negative after threshold)
	x_z	=	distance from threshold to origin of Z surface (900 m (700 m Cat H))

Obstacle Clearance Altitude (OCA/H)

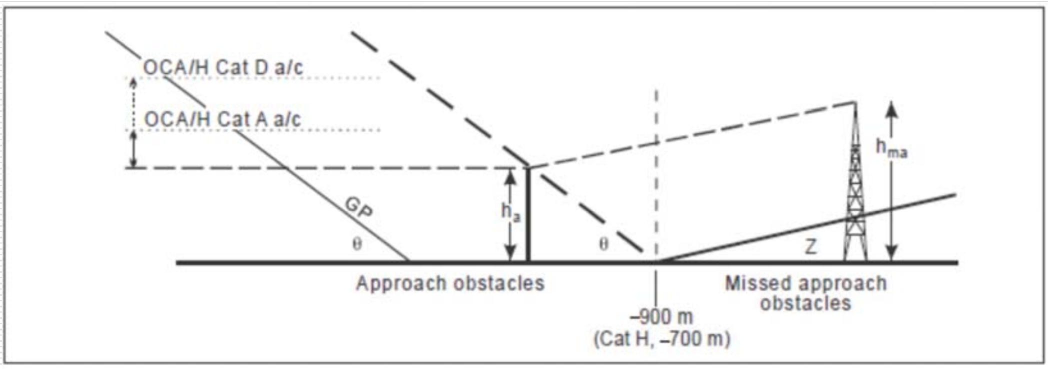


Figure II-1-1-15. Missed approach obstacle after range –900 m

- <u>**Standard method**</u> to distinguish approach obstacle and missed approach obstacle
- Missed approach obstacle (hma) could be shortened as equivalent approach obstacle (ha)

Obstacle Clearance Altitude (OCA/H)

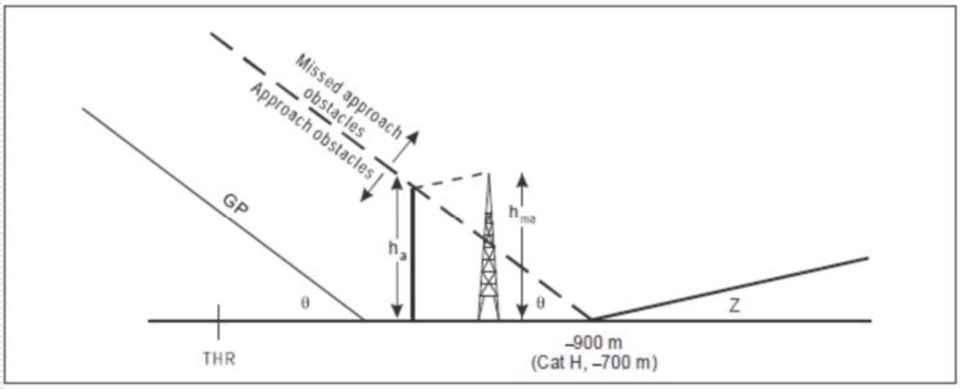


Figure II-1-1-16. Missed approach obstacle before range –900 m

- **Refined method** to distinguish approach obstacle and missed approach obstacle
- Missed approach obstacle (hma) could be shortened as equivalent approach obstacle (ha)

Objects to be ignored

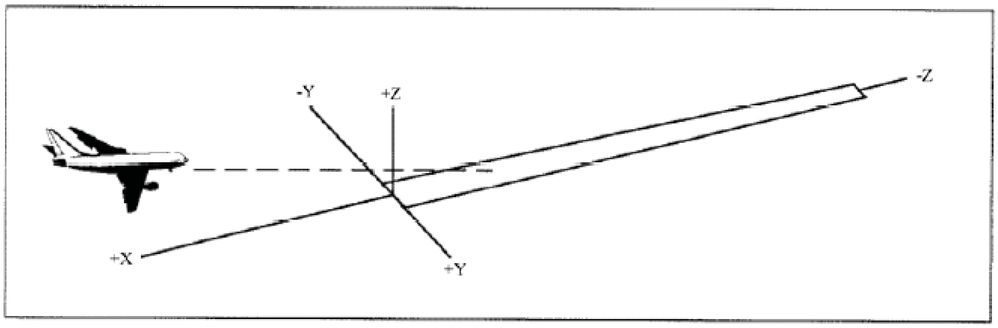
- Significant condition:
  - The sector width of Localizer course should be standard (210m).
- Objects to be ignored

Table II-1-1-3. Objects which may be ignored in OCA/H calculations

	Maximum height above threshold	*Minimum lateral distance from runway centre line*
GP antenna	17 m (55 ft)	120 m
Aircraft taxiing	22 m (72 ft)	150 m
A/C in holding bay or in taxi holding position at a range between threshold and –250 m	22 m (72 ft)	120 m
A/C in holding bay or in taxi holding position at a range between threshold and –250 m (Cat I only)	15 m (50 ft)	75 m

Coordination System

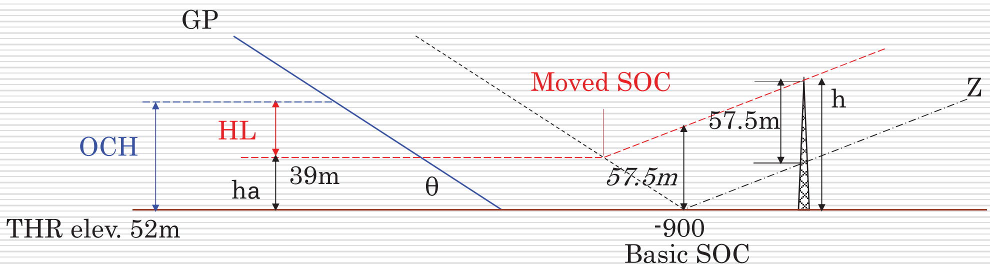
- Origin of THR, x,y,z coordinates are shown



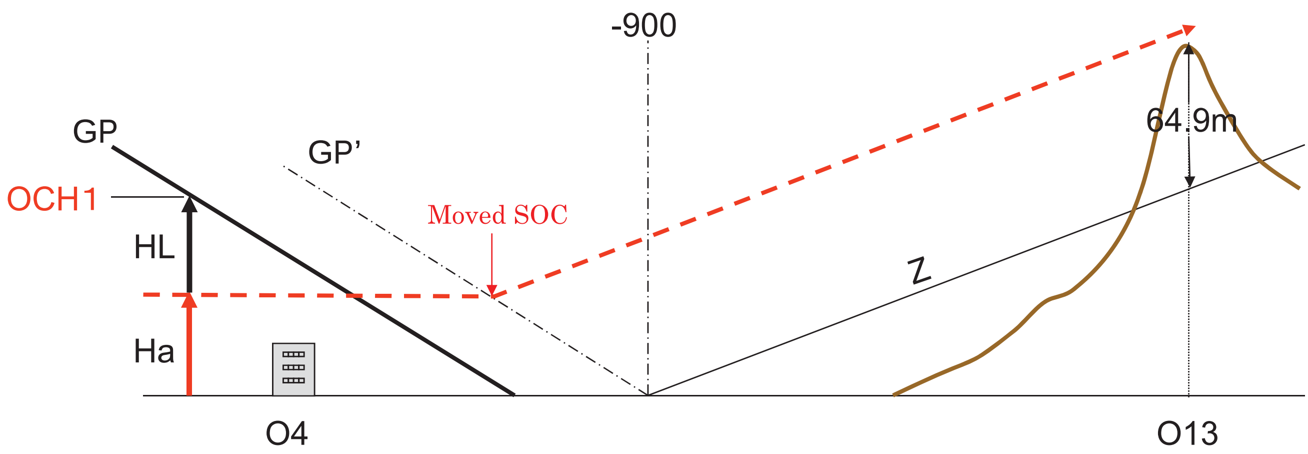
- Obstacle should set on these coordinates by distance (m) from the origin point, specially height(z) above THR level
- Only ‘x’ value set on both (+) before THR and (-) after THR

Missed Approach Procedure - example

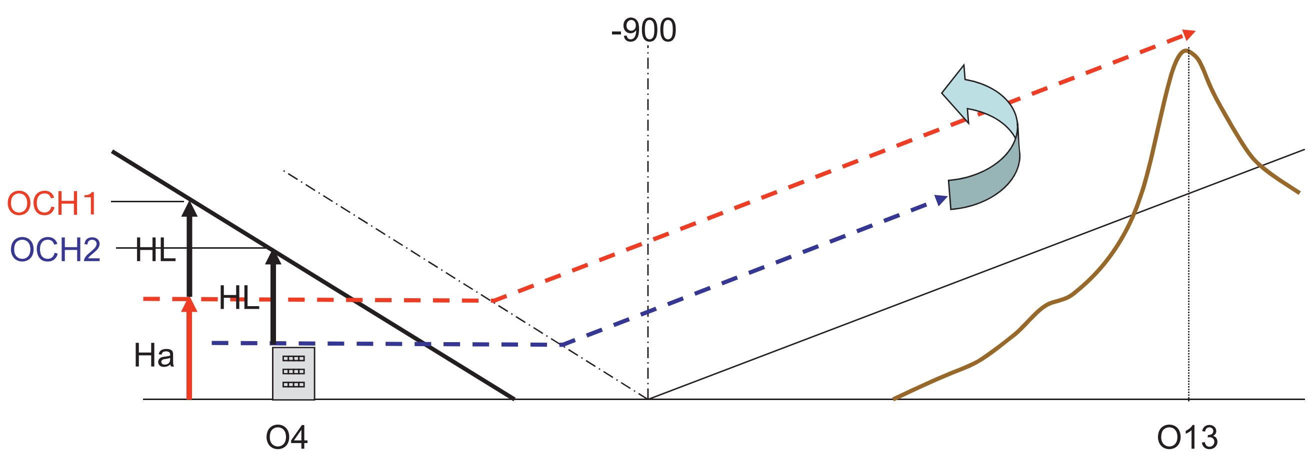
$$h\,a = \frac{h\cot Z + (900+x)}{\cot Z + \cot\theta}$$ h= height of the M/A OBS cot = 1/tan



New SOC ; 39m/tan3° = 744.16 → 744m x = -900+744 = -156m



	CAT A	CAT B	CAT C	CAT D
Ha	44			
HL	40	43	46	49
OCH	84	87	90	93



	CAT A	CAT B	CAT C	CAT D
OBS(H)	13			
HL	40	43	46	49
OCH	53	56	59	62

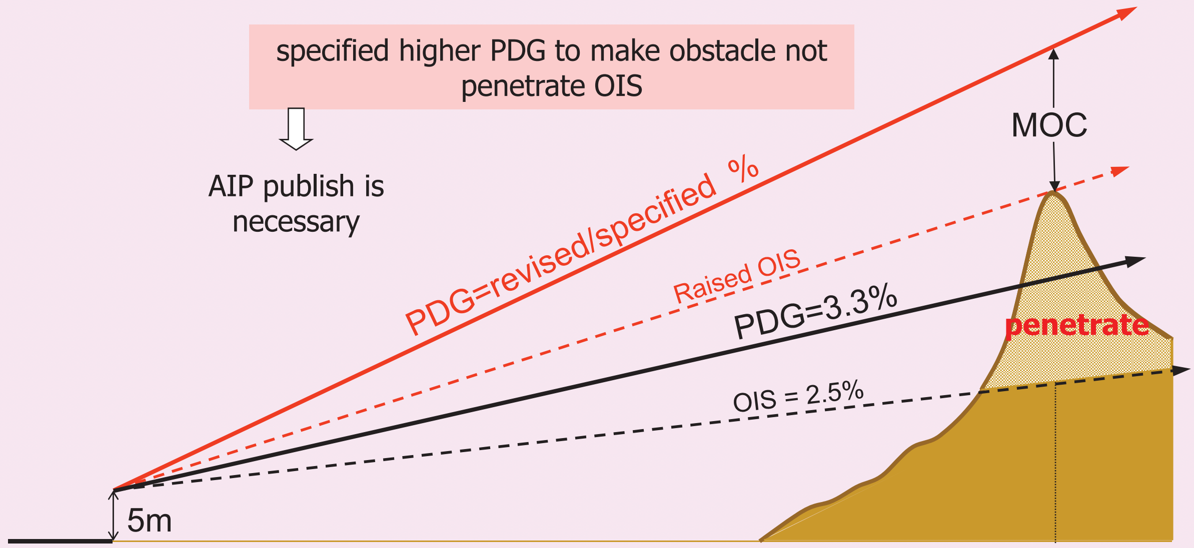
DEPARTURE Procedures (Basic Concept)

General criteria are almost common to Missed Approach Procedures

Avoid Obstacle by specified PDG

specified higher PDG to make obstacle not penetrate OIS

AIP publish is necessary



Verify obstacle by Obstacle Identification Surface (OIS), 0.8% lower than PDG

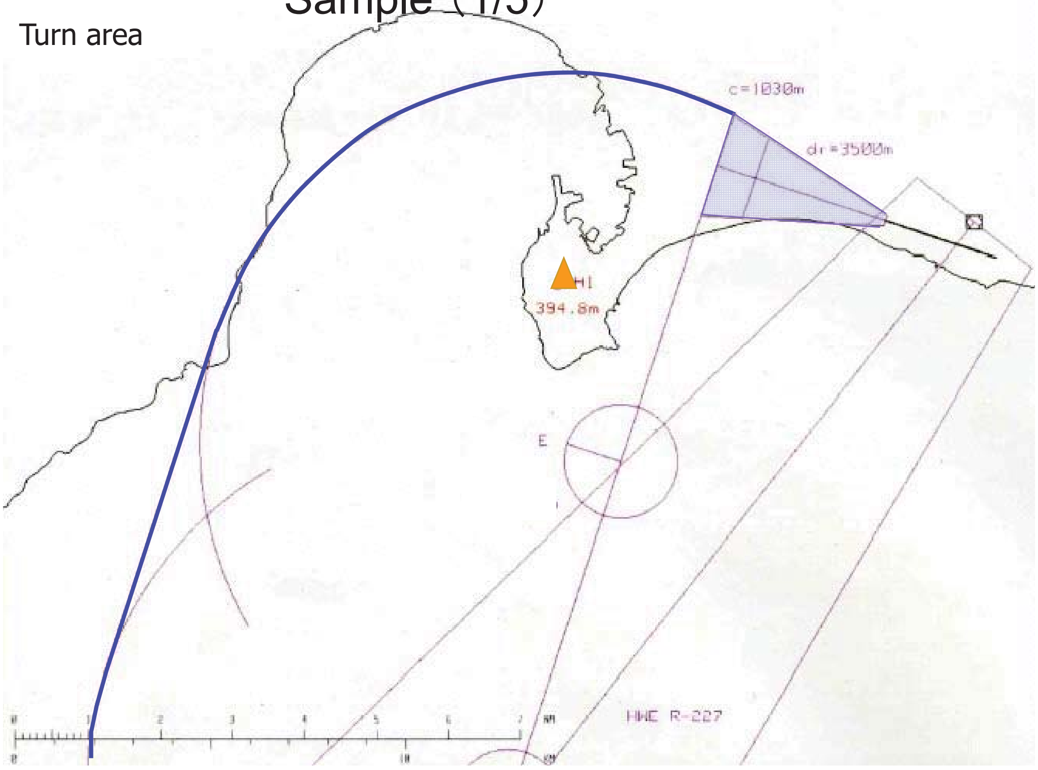
Specify PDG; it is better to coordinate it with flight operators in accordance with their flight operation standards.

※In Japan, it is no coordination to adopt PDG below 5%.

Avoiding Obstacle by Turning Departure

Sample（1/5）

Turn area

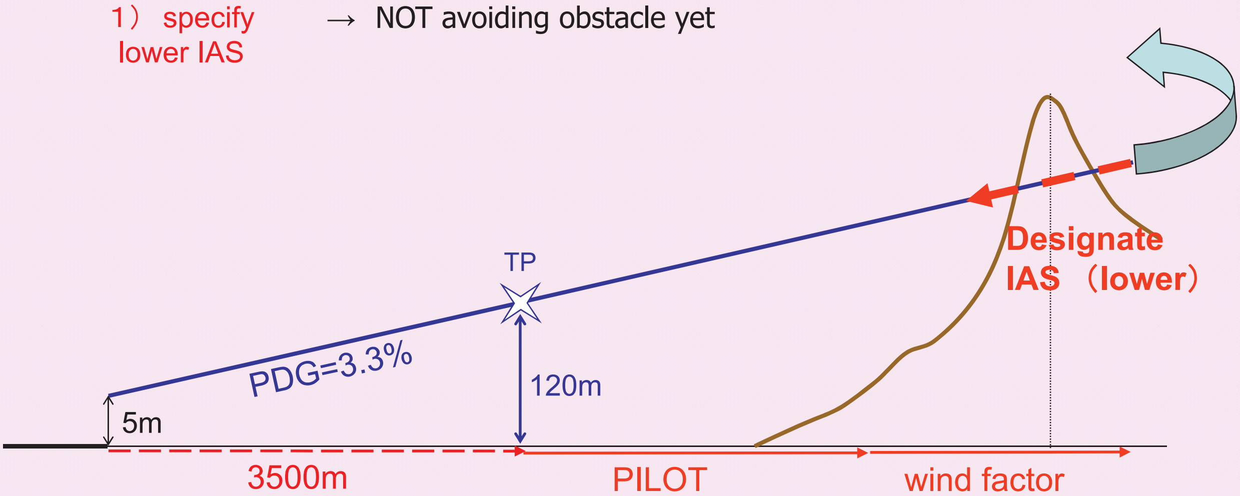


Avoiding Obstacle by Turning Departure

Sample （2/5）

Narrowing turn area

1） specify lower IAS → NOT avoiding obstacle yet

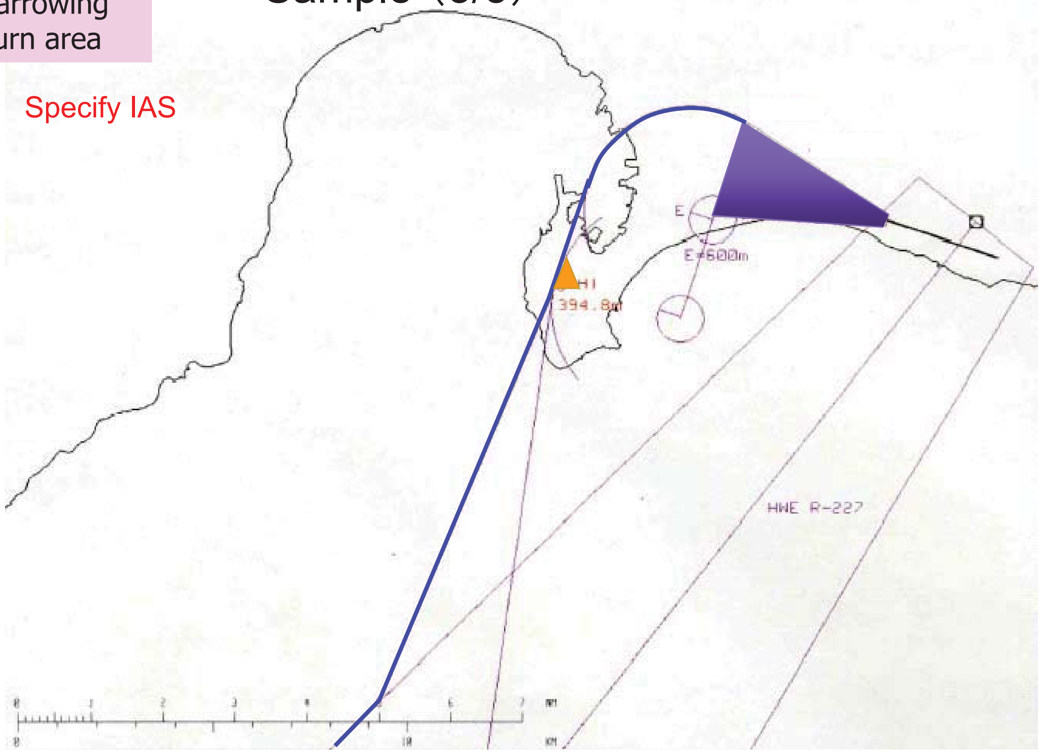


Avoiding Obstacle by Turning Departure

Sample（3/5）

Narrowing turn area

1） Specify IAS



Avoiding Obstacle by Turning Departure （4/5）

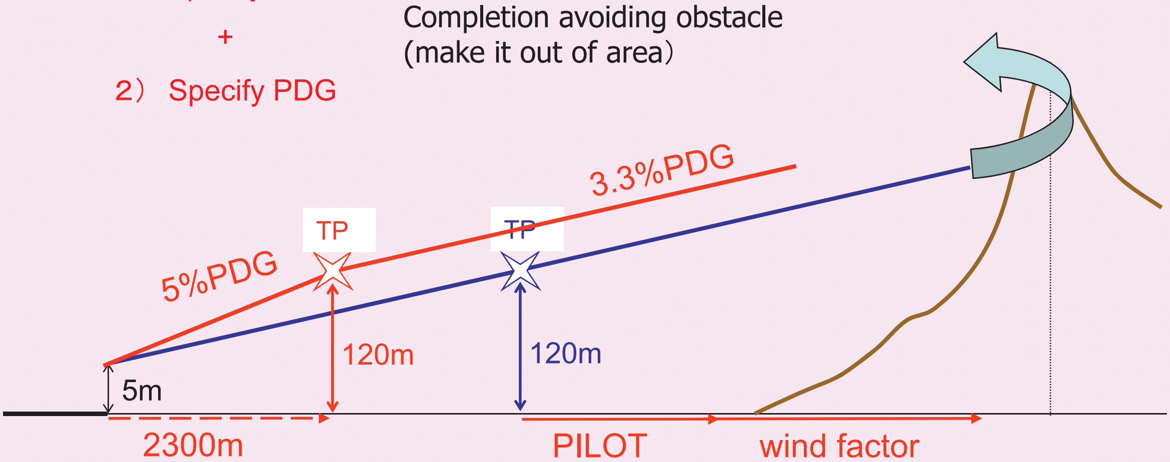
Narrowing turn area

1） Specify IAS

\+

2） Specify PDG

Completion avoiding obstacle
(make it out of area)

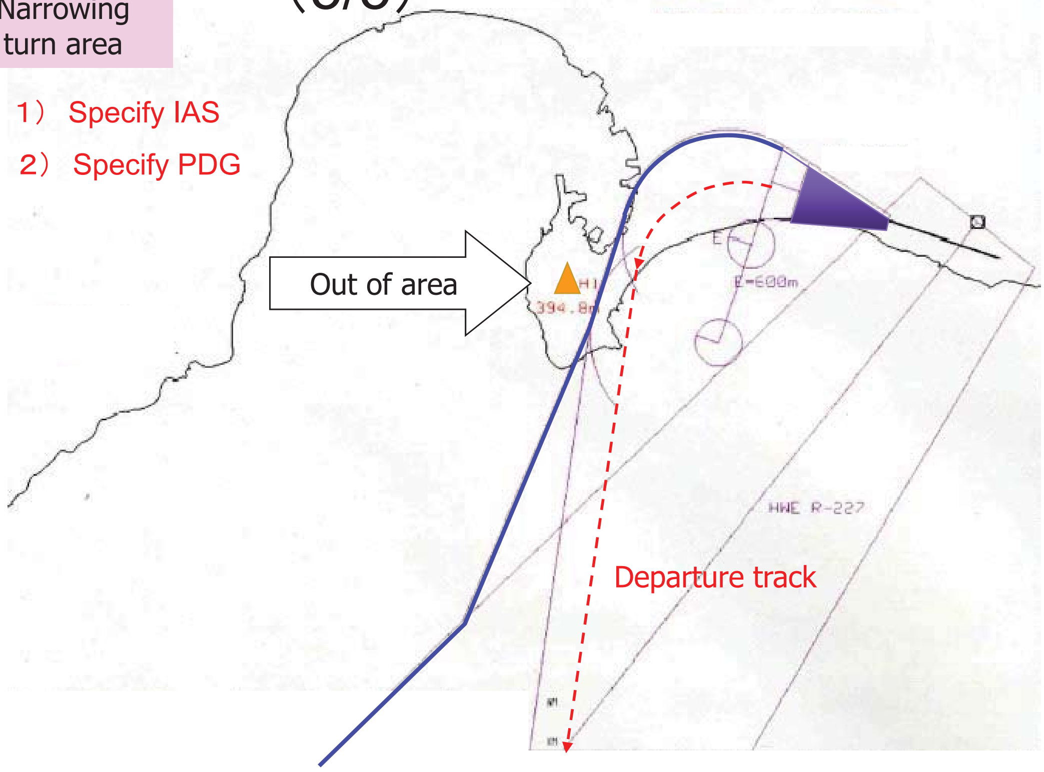


Avoiding Obstacle by Turning Departure (5/5)

Narrowing turn area

1） Specify IAS

2） Specify PDG



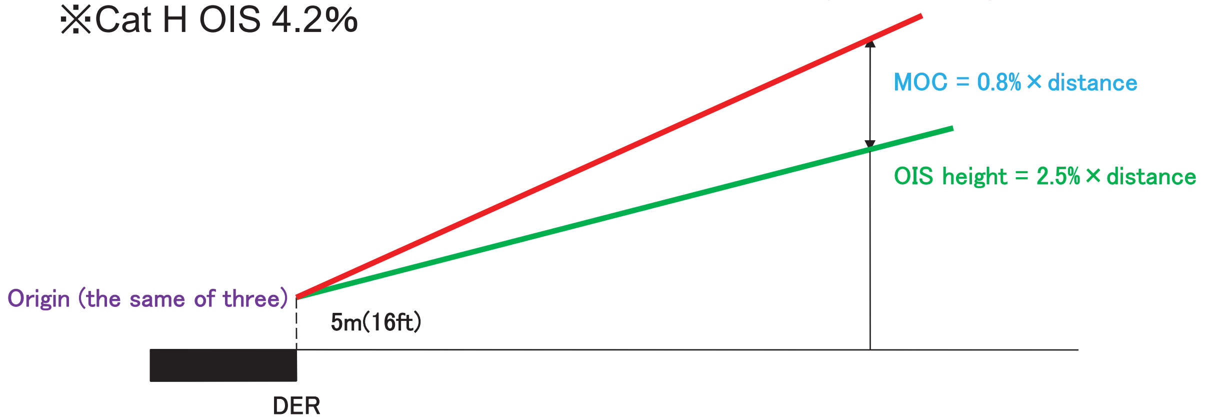
Principle of Departure Procedure

Climb Pass = OIS + MOC

Principle: 3.3% = 2.5% + 0.8% ･･･（in accordance with distances）

MNM and OPT pass = PDG 3.3%

※Cat H OIS 4.2%



Attachment

Construction of Race track or Holding area

Conventional Navigation Procedure

Construction of Race track or Holding area

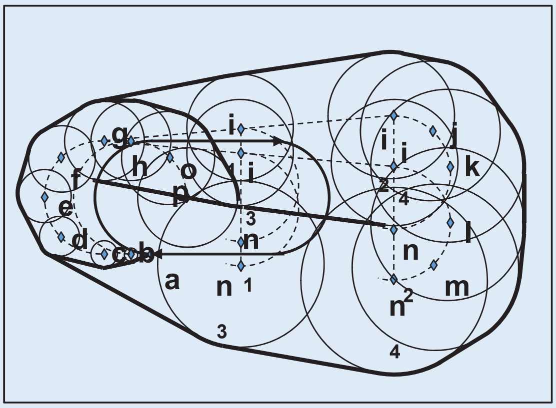
Type of Race track Procedure

- 1 : Fix Over Station of NAVAIDS
- *2 : DME Fix / Toward Station/NAVAIDS (omitted, out of training work)*

<u>Type 1</u>

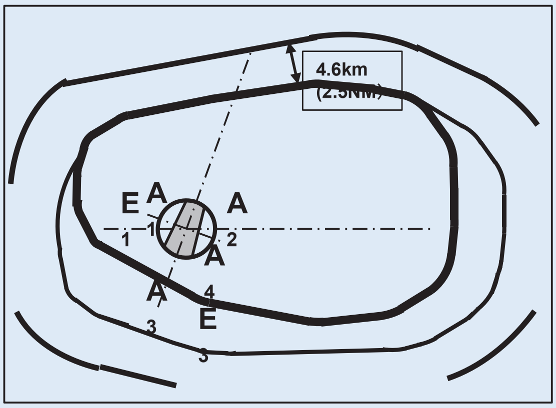
- **Fix Over Station of NAVAIDS**
  - Step 1: Construction Template
  - Step 2: Construction FIX tolerance area
  - Step 3: Construction of Basic area and Entry area

Completion Figure (sample)



Template Figure

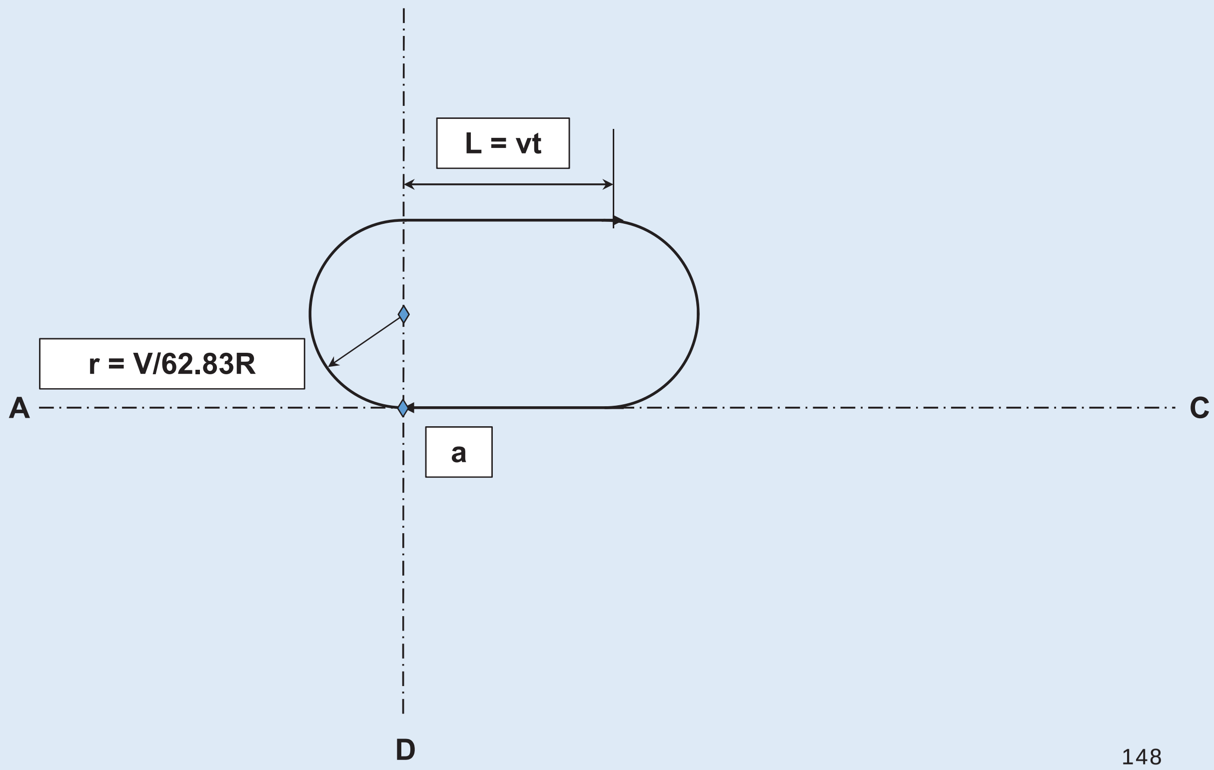
Protection Area



Design Step 1

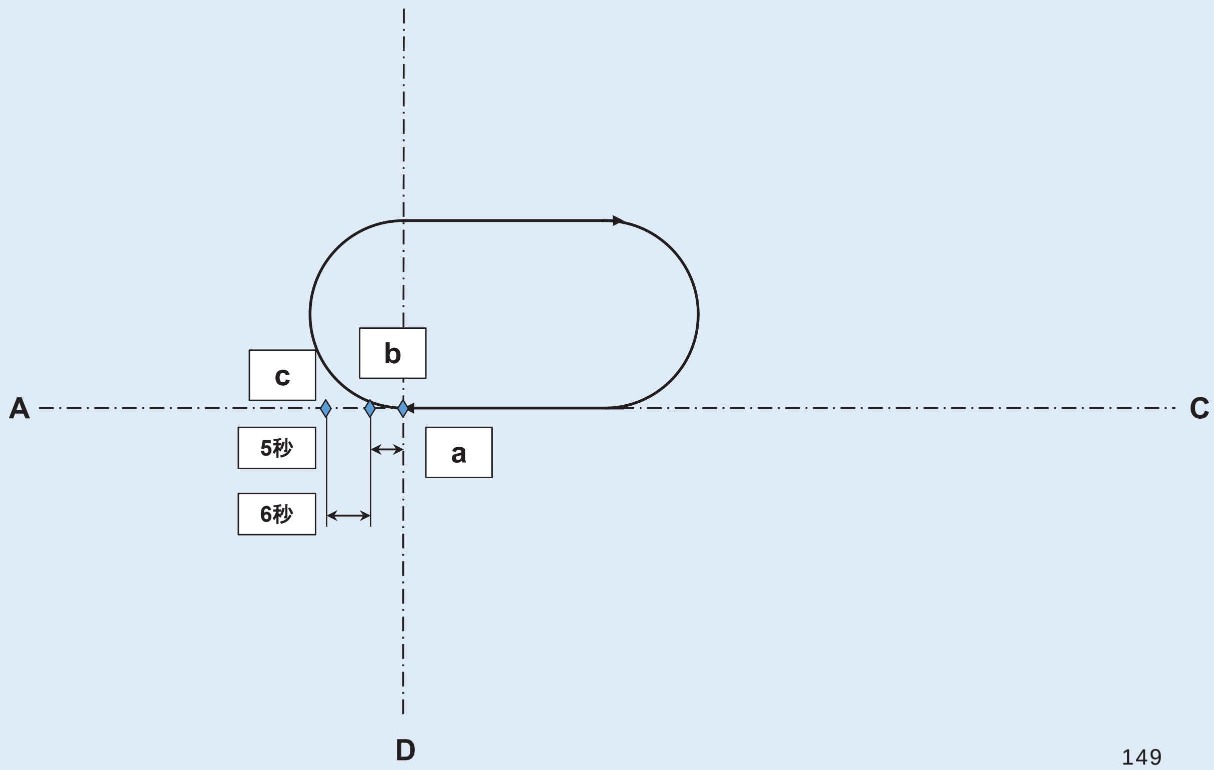
- Construction of Template

Nominal Track



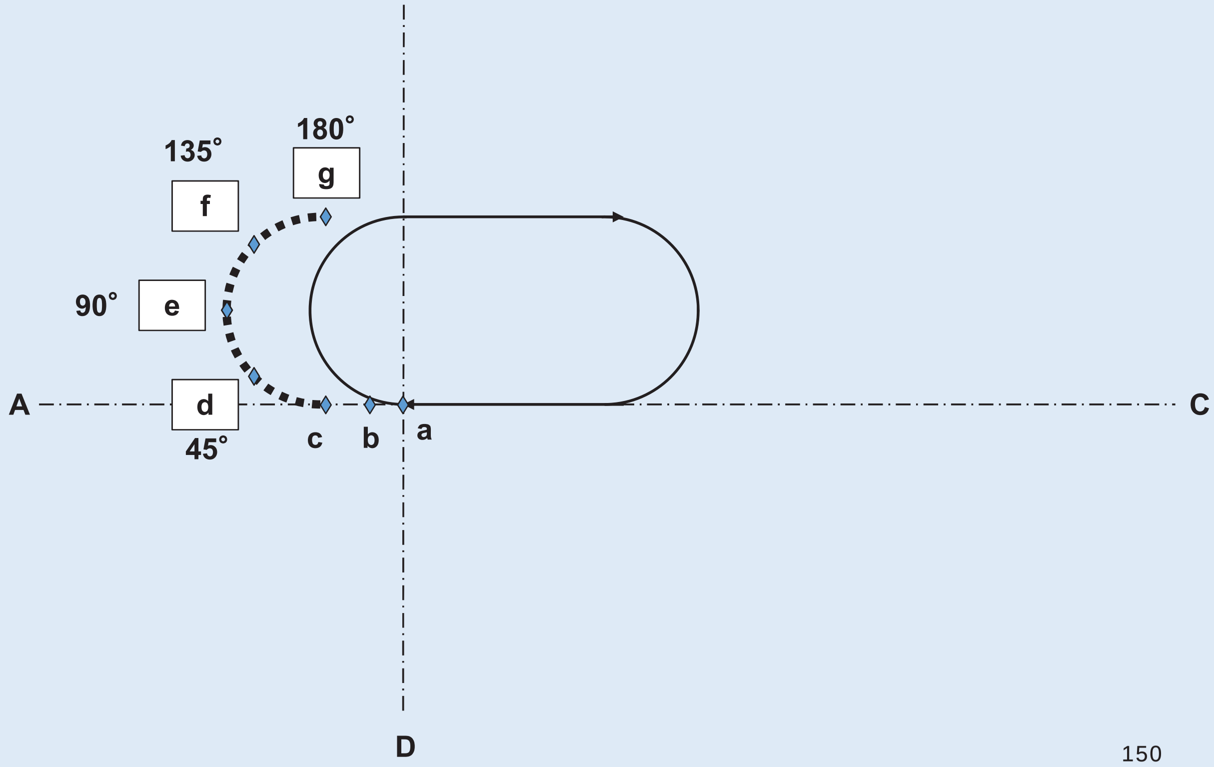
148

O/B Starting Point of Turn

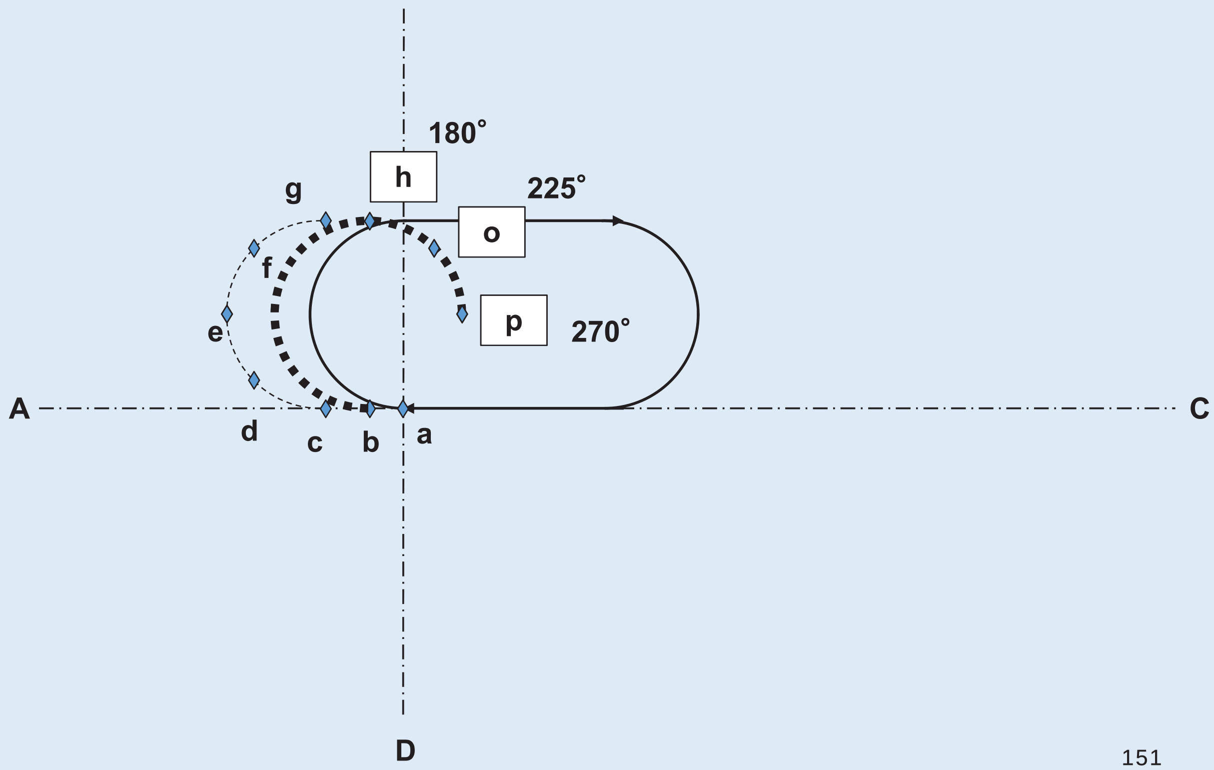


149

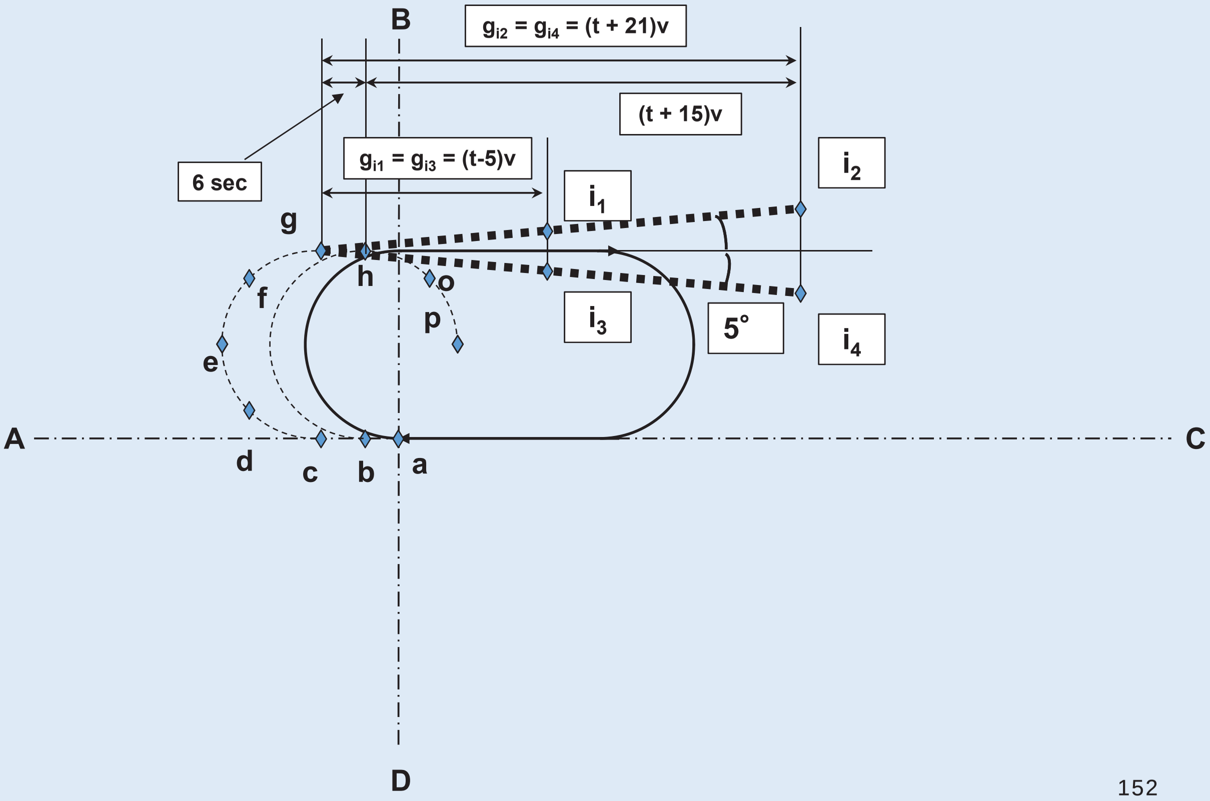
Latest Turn track of O/B in no wind



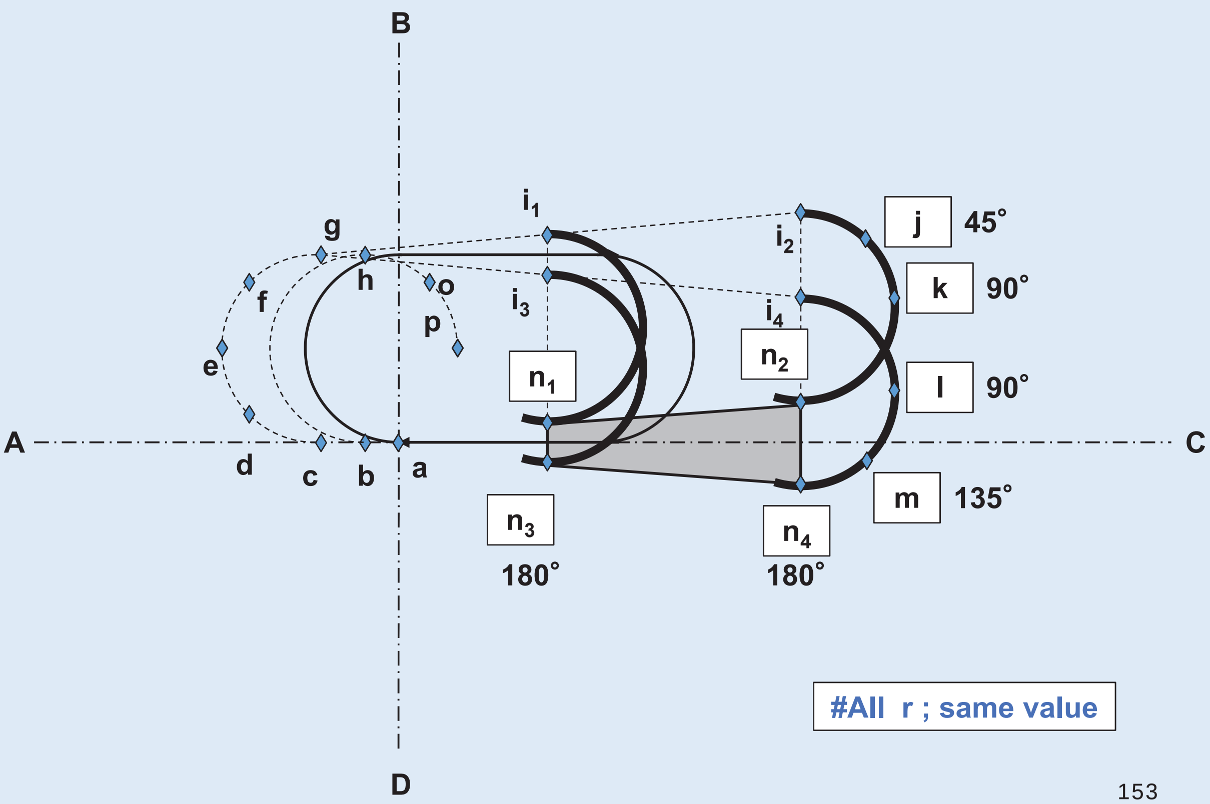
Earliest Turn track of O/B in no wind



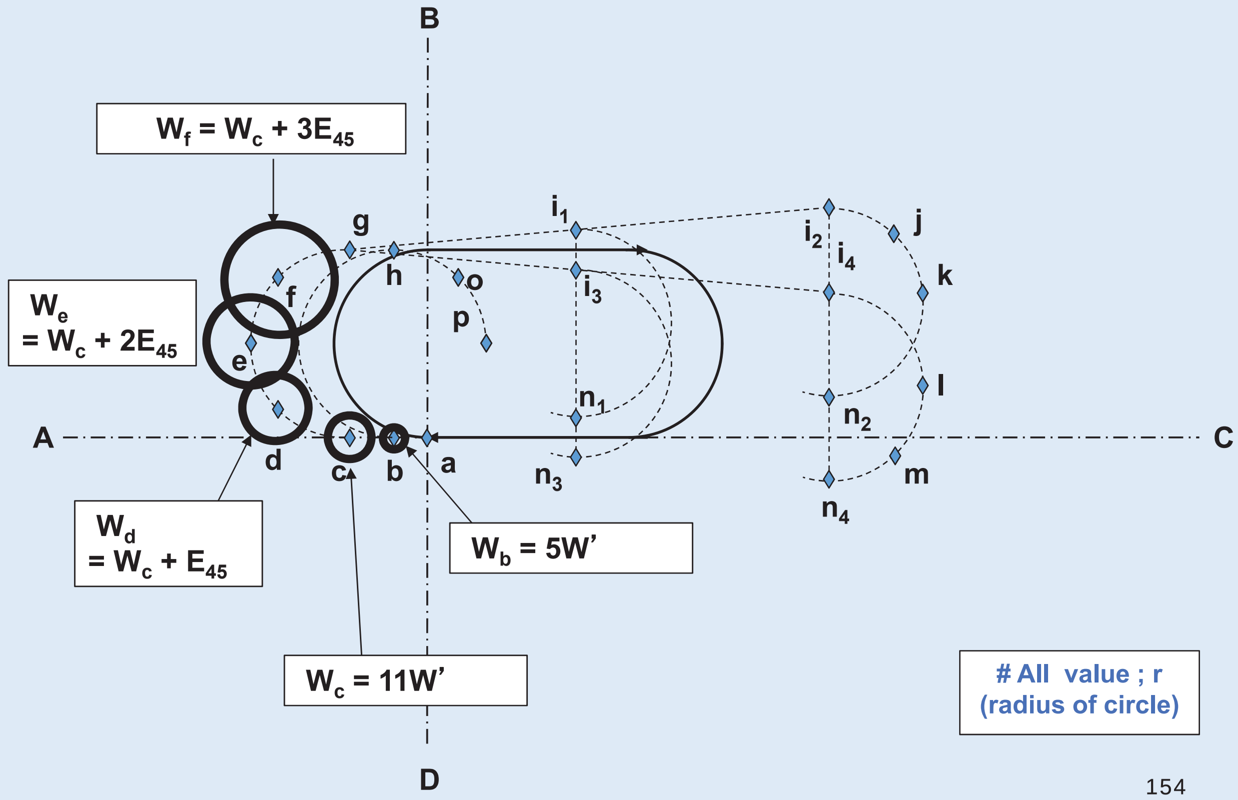
End Point of O/B in no wind



I/B Turn in no wind

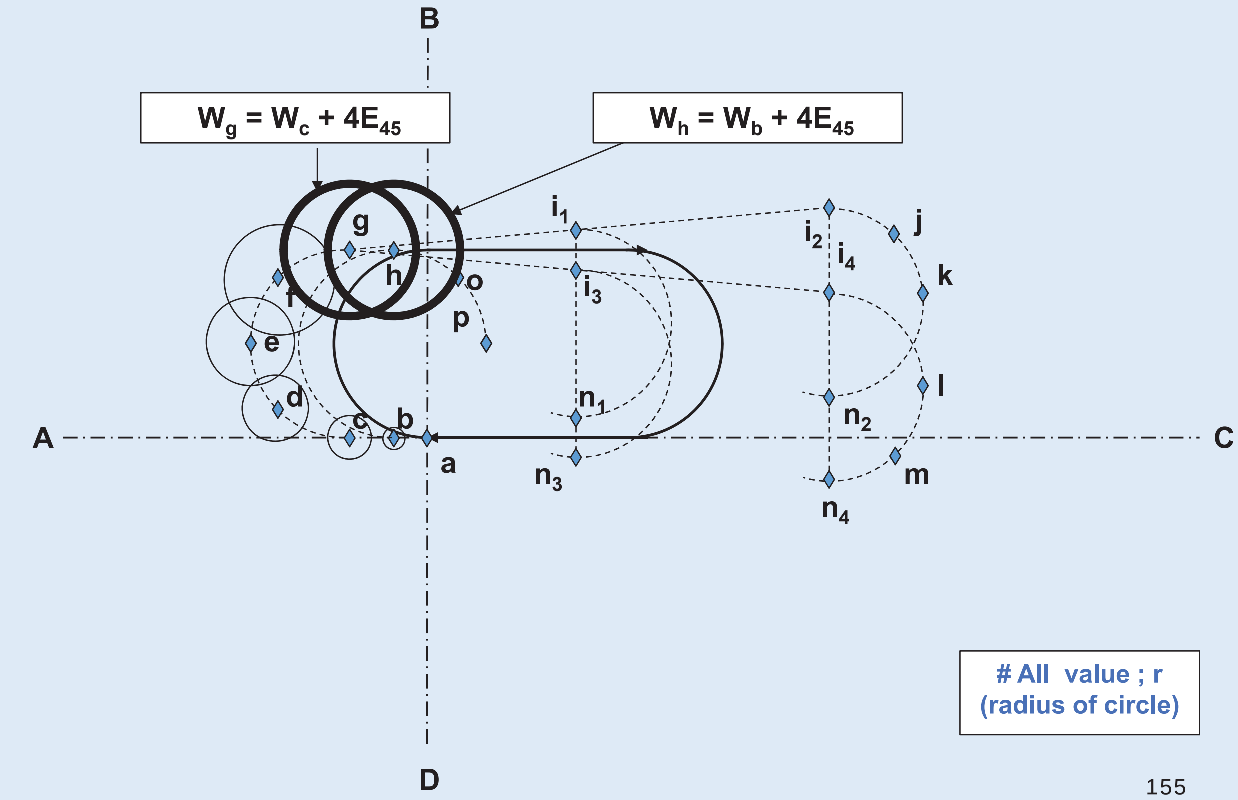


Wind Effect (O/B Segment)



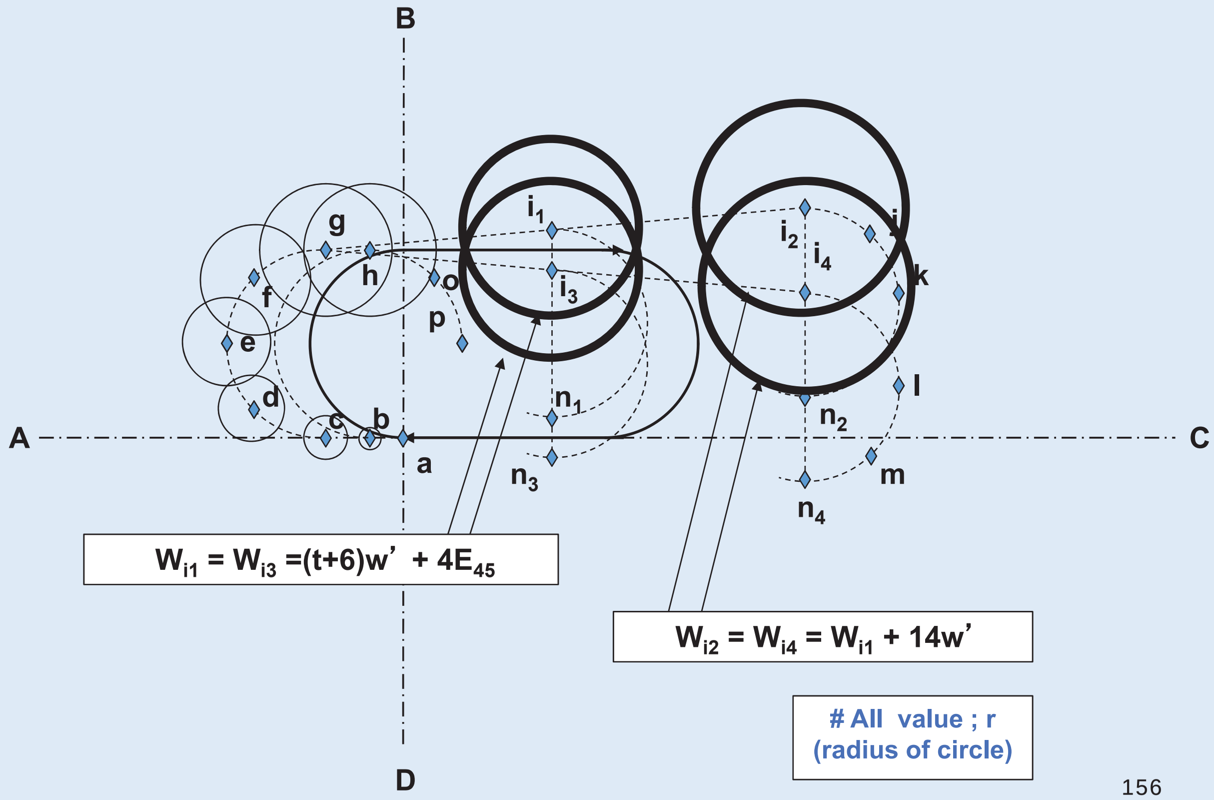
All value ; r (radius of circle)

Wind Effect (Termination of O/B turn)



All value ; r (radius of circle)

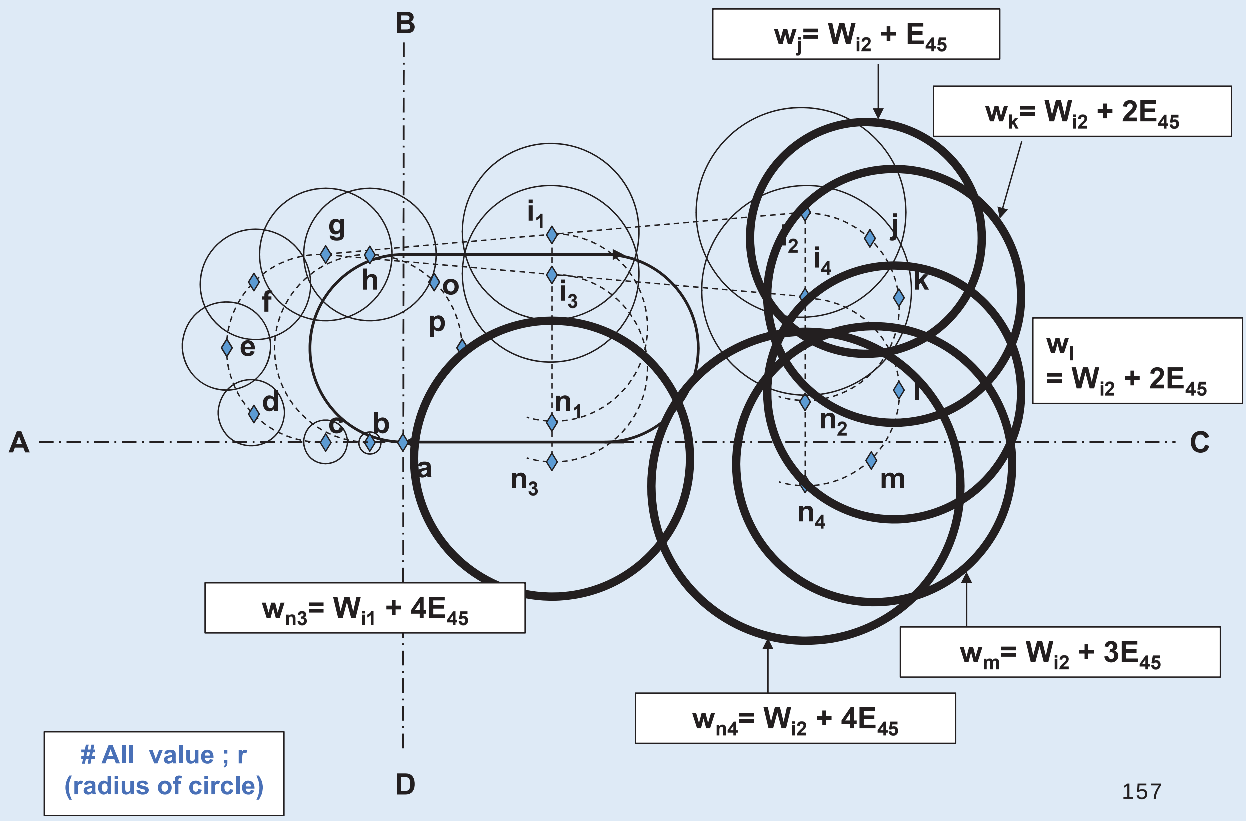
Wind Effect (Commencing I/B)



All value ; r (radius of circle)

156

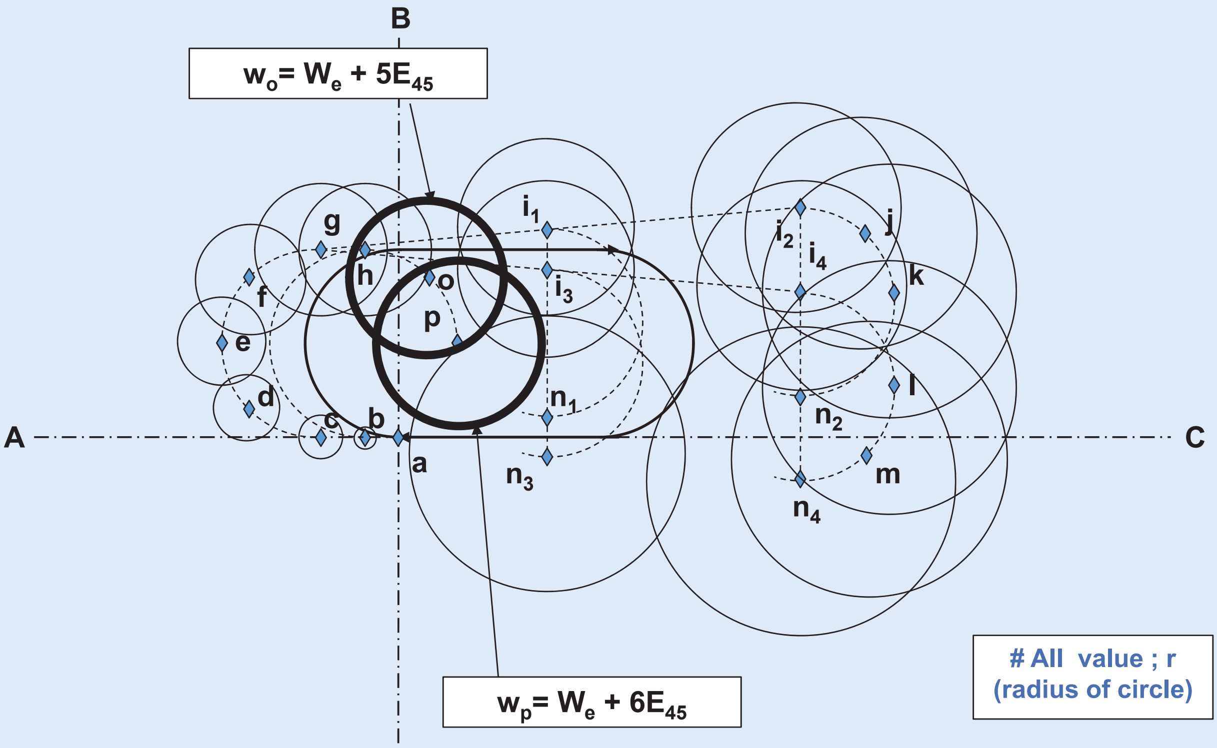
Wind Effect (I/B Drift)



All value ; r (radius of circle)

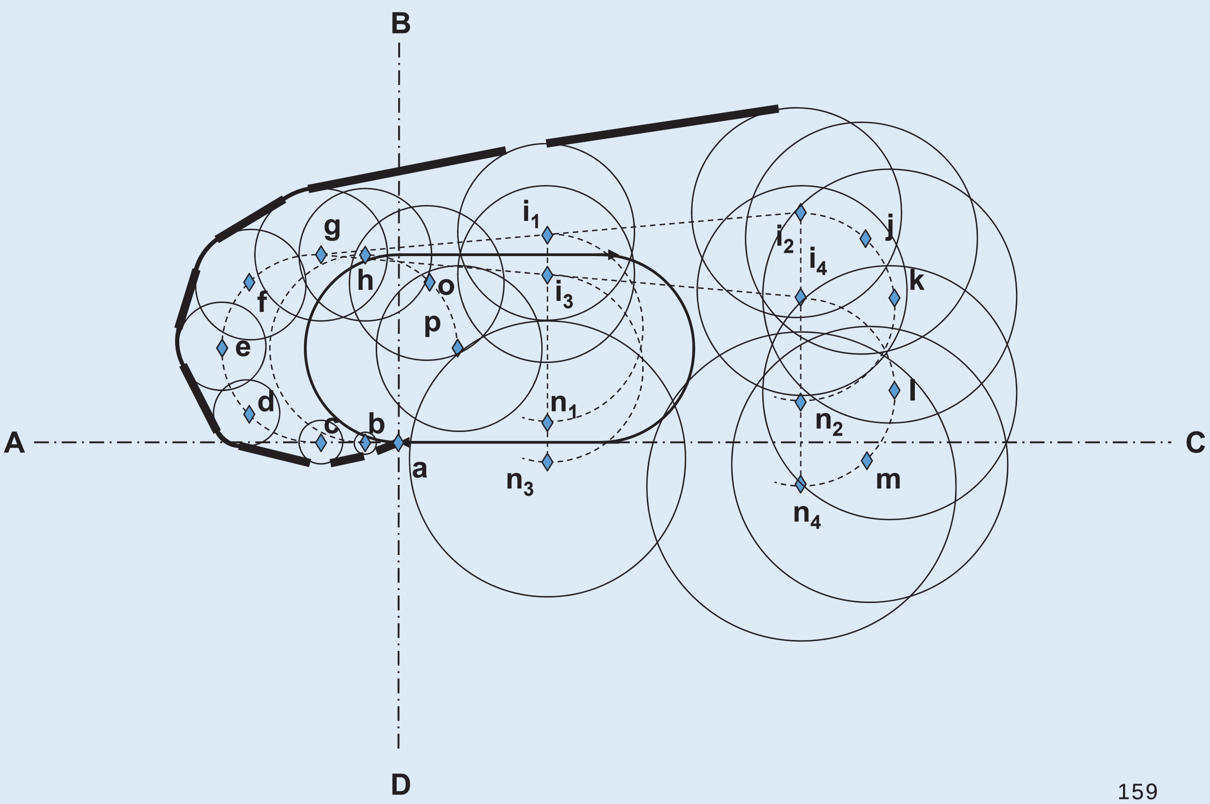
157

Wind Effect (I/B Segment)

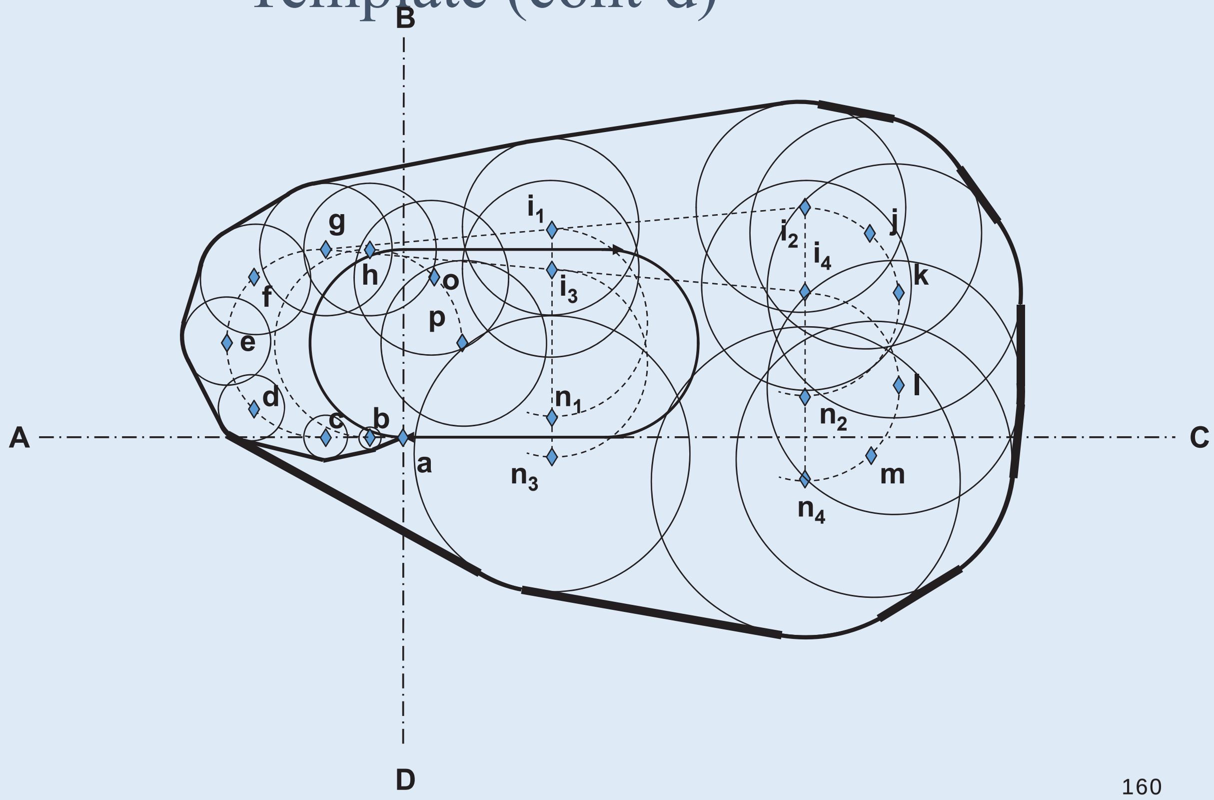


All value ; r (radius of circle)

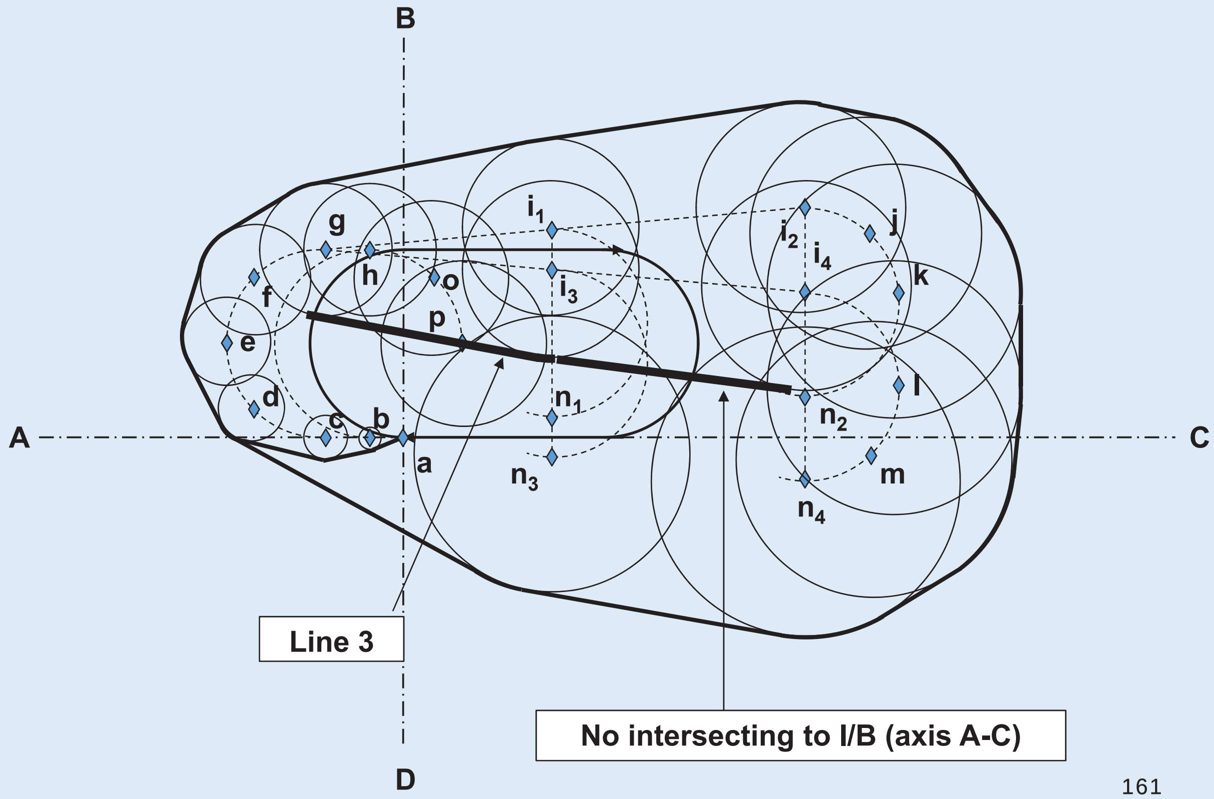
Construction of Outer boundary of Template



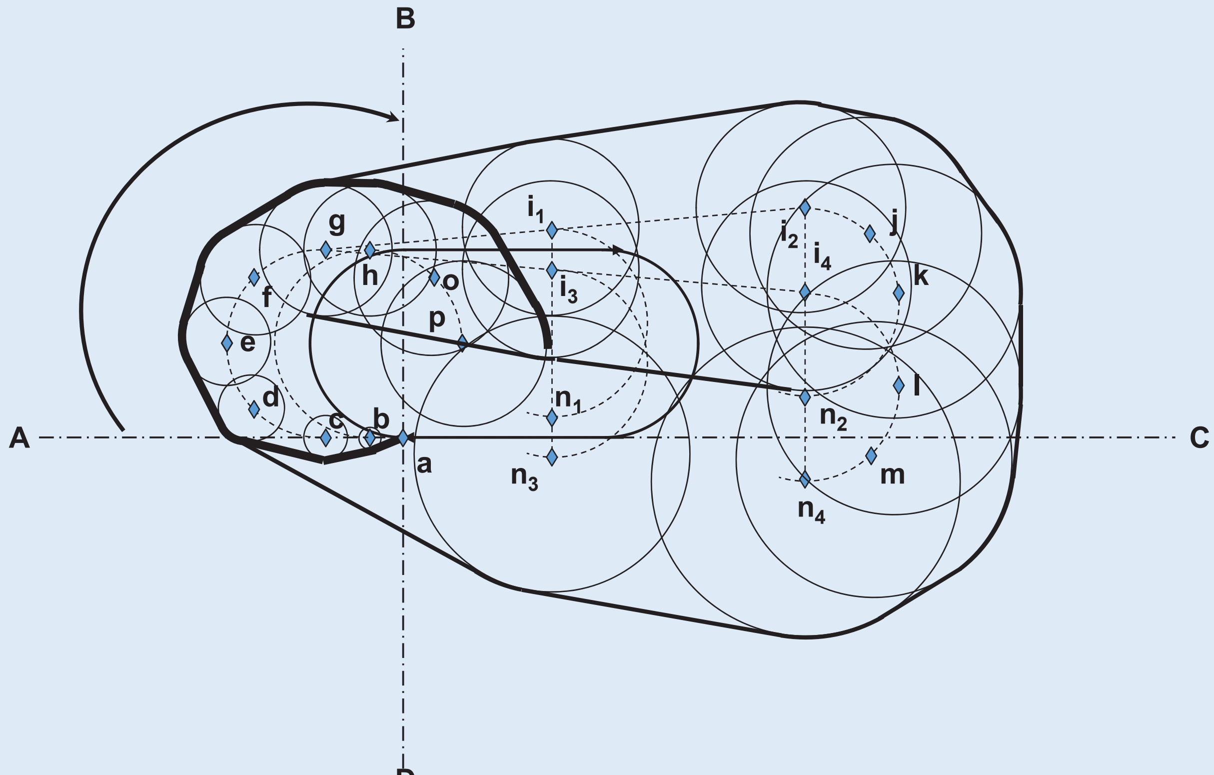
Construction of Outer boundary of Template (cont'd)



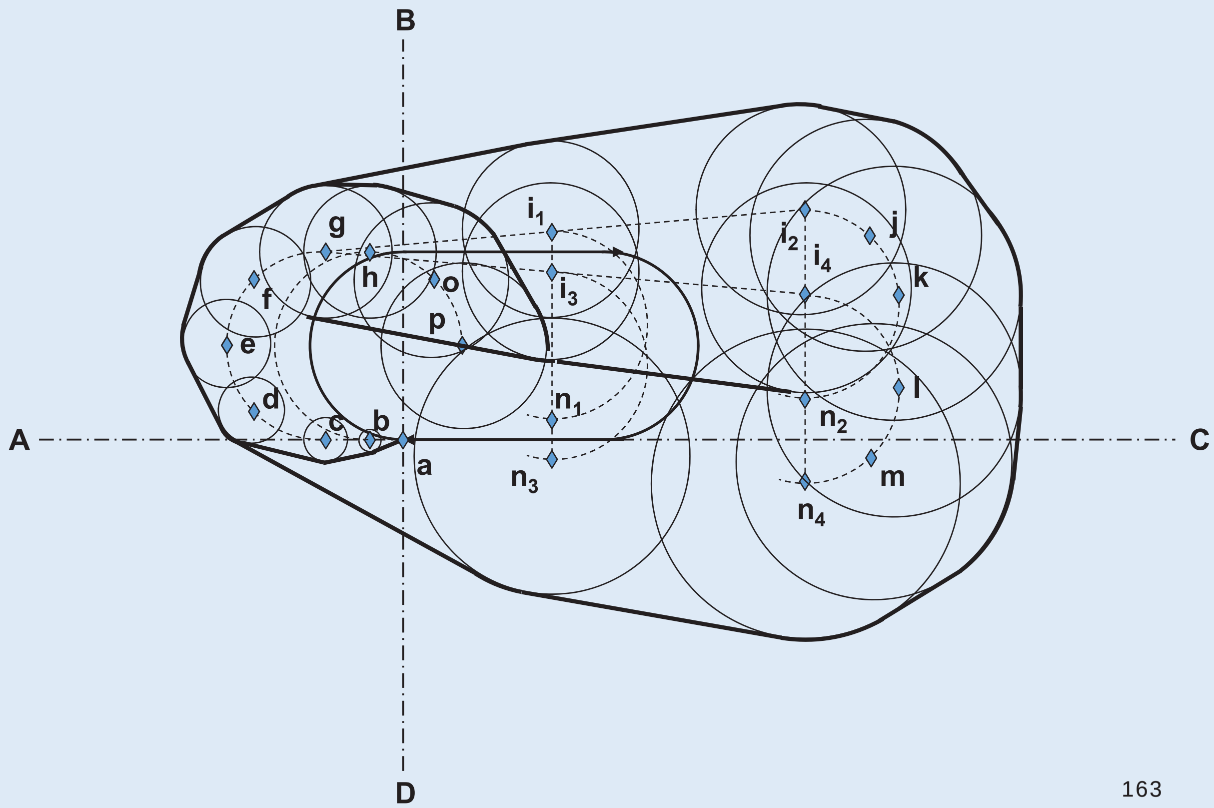
O/B Protection along D-axis



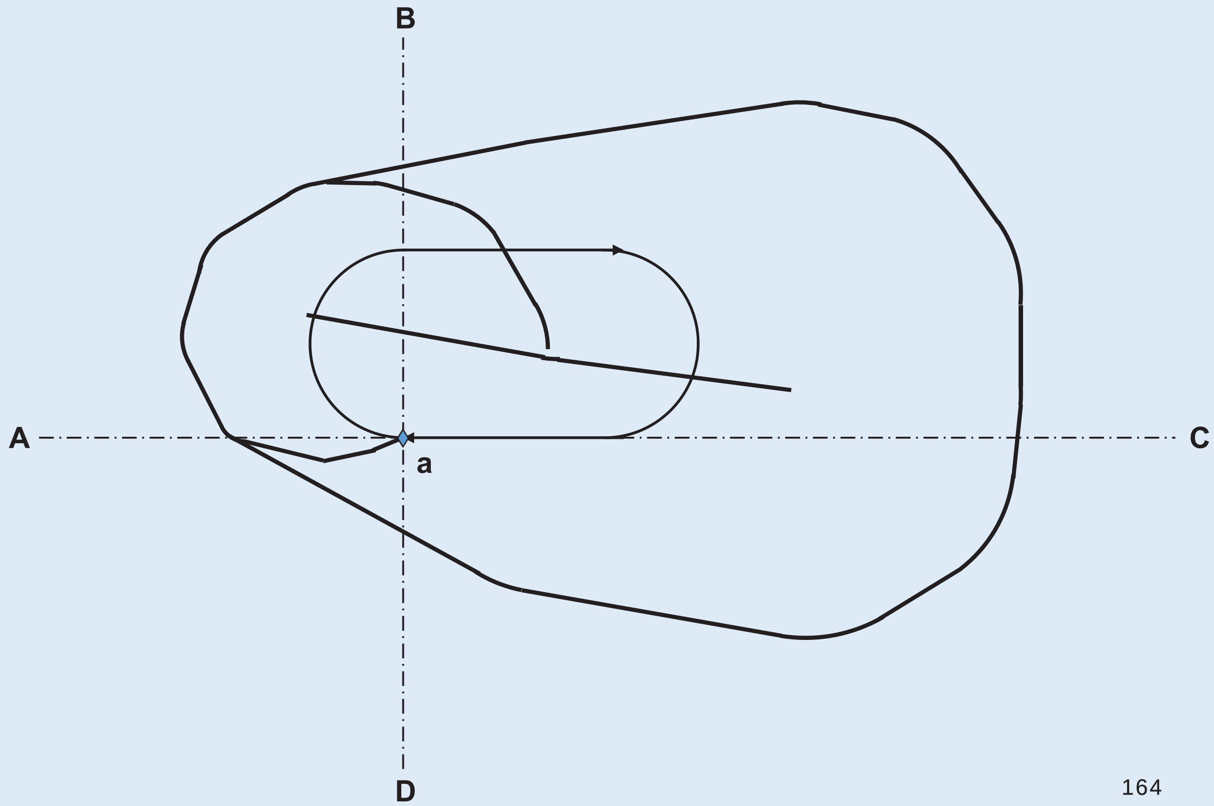
Protection of Turn over 180°



Completion of Template

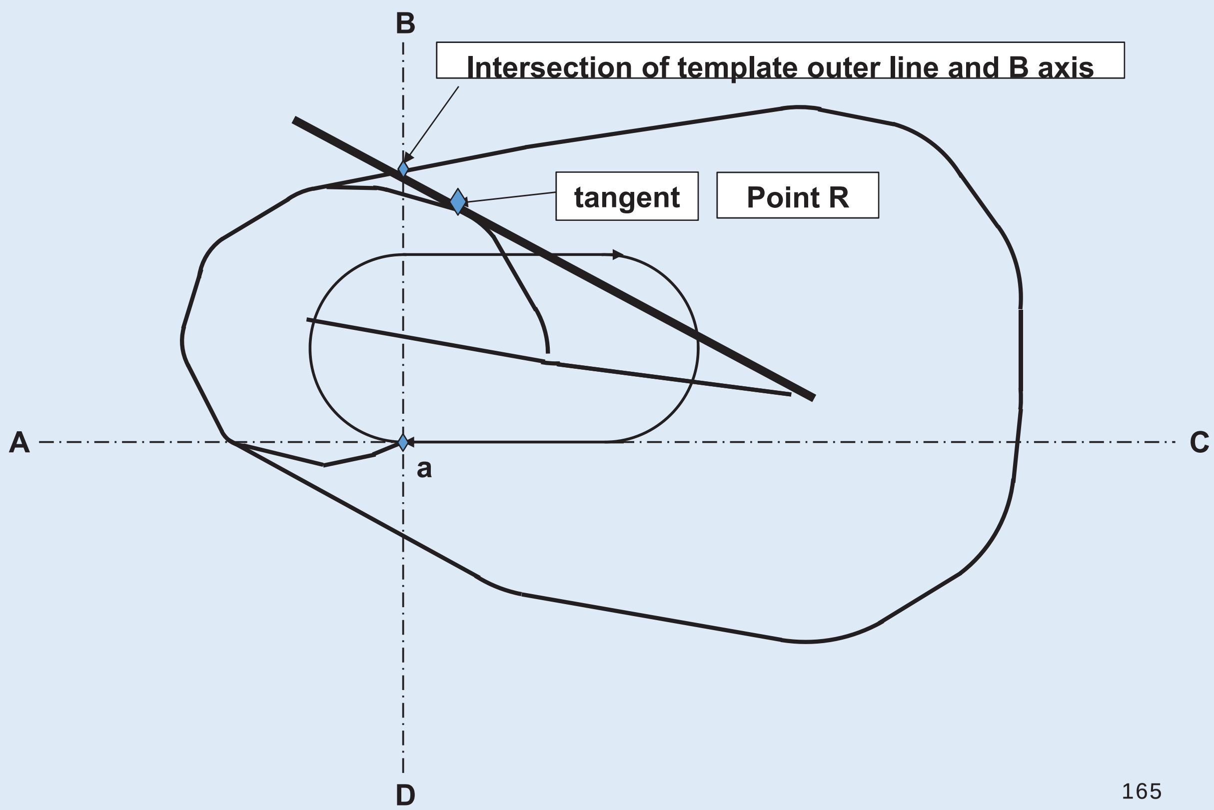


Template Production (no auxiliary line)



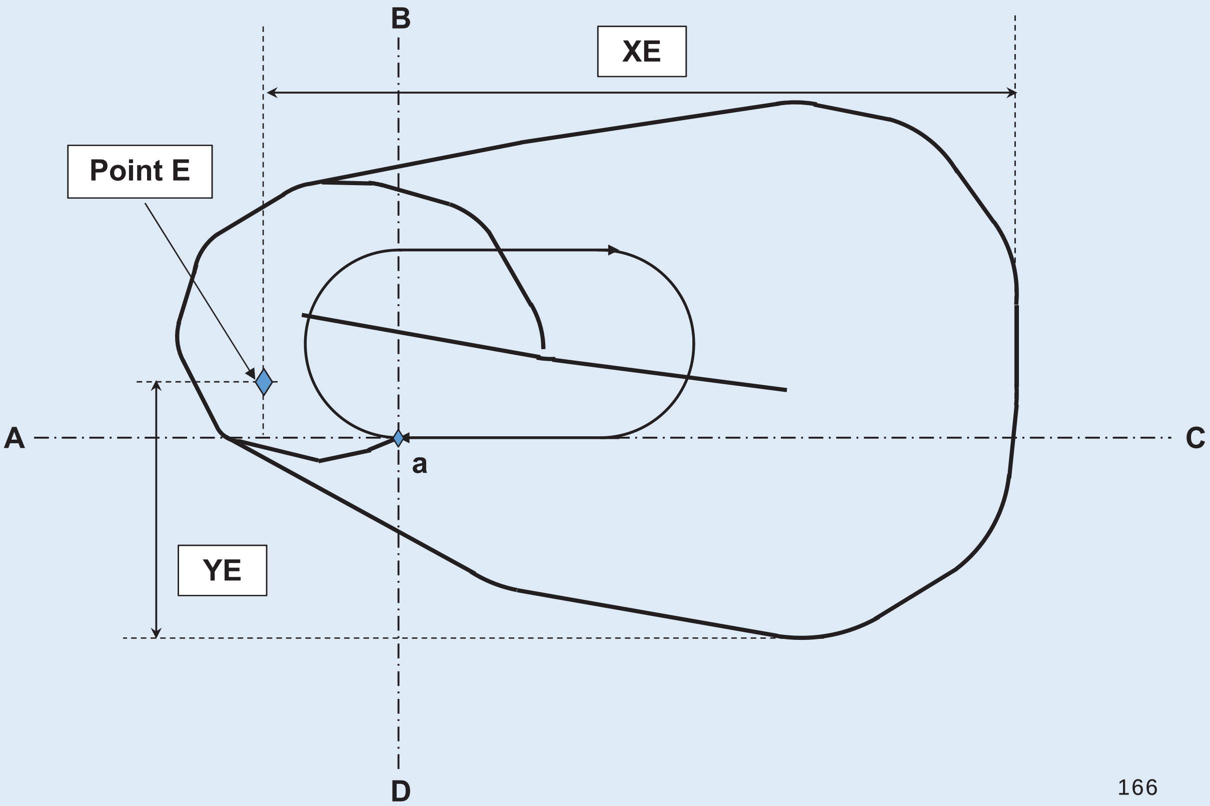
164

Point “R”



165

Description of Point E



Description of Line XE

$$\boxed{XE = 2r + (t+15)V + (11+90/R + t + 15 + 105/R)w'}$$

In order;

- 2r: 90° turn part x 2
- (t+15)V: out-bound (including timing error (+10 sec.) and bank establishing time(+5 sec.))
- (11+90/R + t + 15 + 105/R)w' :
  Elements are concerned to drifting as bellows, with flight time in the round mark;
  - 11: pilot reaction (6 sec.)＋Bank establishing (5 sec.)
  - 90/R: required time in First 90° turn
  - T+15: Out-bound (including timing error (+10 sec.) and bank establishing time (5 sec.))
  - 105/R: required time in the latter (90+15)° turn, 15° is considered as drift angle.

Description of Line XE (Figure)

$$XE = 2r + (t+15)V + (11+90/R + t + 15 + 105/R)w'$$

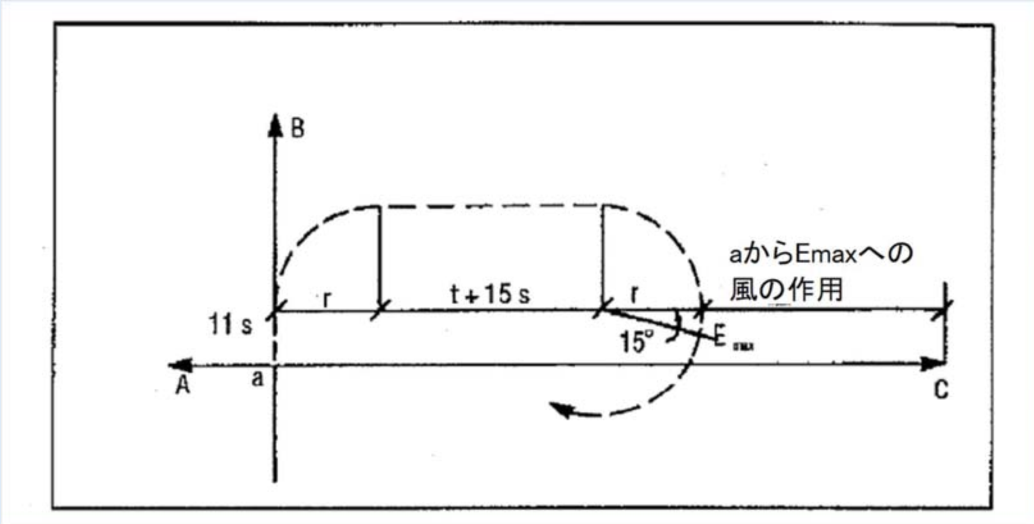


Fig. I -4-3-App C-8 in PANS-OPS vol. 2

Description of Line YE

$$YE = 11V\cos 20^\circ + r\sin 20^\circ + r + (t+15)V\tan 5^\circ + (11+20/R + 90/R + t + 15 + 15/R)w'$$

In order:

- $11V\cos 20^\circ$: proceeding distance in pilot reaction (6 sec.) + bank establishing time (5 sec.),
- $r\sin 20^\circ$: proceeding distance by turn (20°) till reaching D direction after I/B turn,
- r : 90° turn part
- $(t+15)V\tan 5^\circ$: Heading(HDG) error in out-bound (including timing error (+10 sec.) and bank establishing time(+5 sec.))
- $(11+ 20/R + 90/R + t + 15 + 15/R)w'$:
  Elements are concerned to drifting as bellows, with flight time in the round mark;
  - 11: pilot reaction (6 sec.)＋Bank establishing (5 sec.)
  - 20/R and 90/R: required time in First 20 ° or 90° turn
  - T+15: Out-bound (including timing error (+10 sec.) and bank establishing time (5 sec.))
  - 15/R: required time in 15° drifting flight.

Description of Line YE (Figure)

$$YE = 11V\cos 20^\circ + r\sin 20^\circ + r + (t+15)V\tan 5^\circ + (11 + 20/R + 90/R + t + 15 + 15/R)w'$$

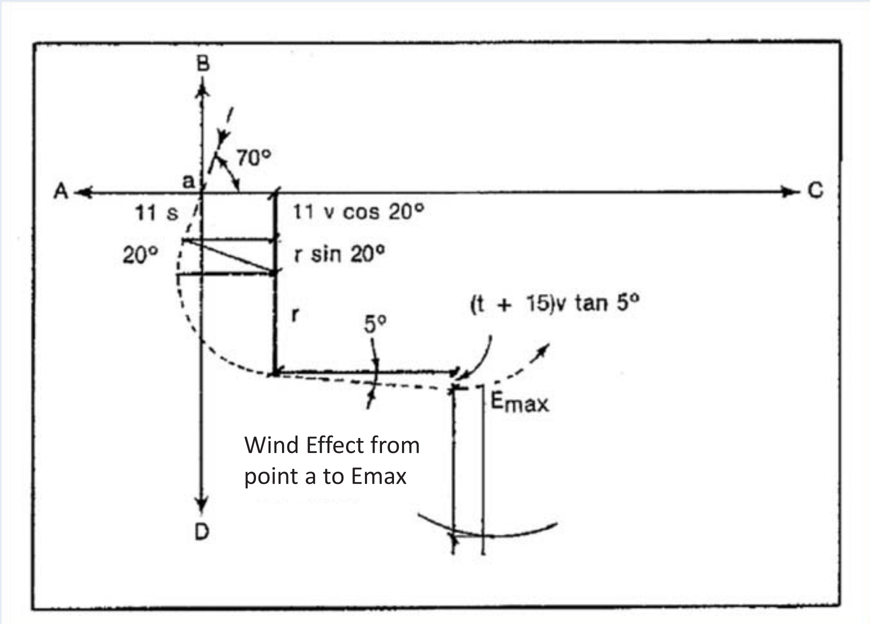
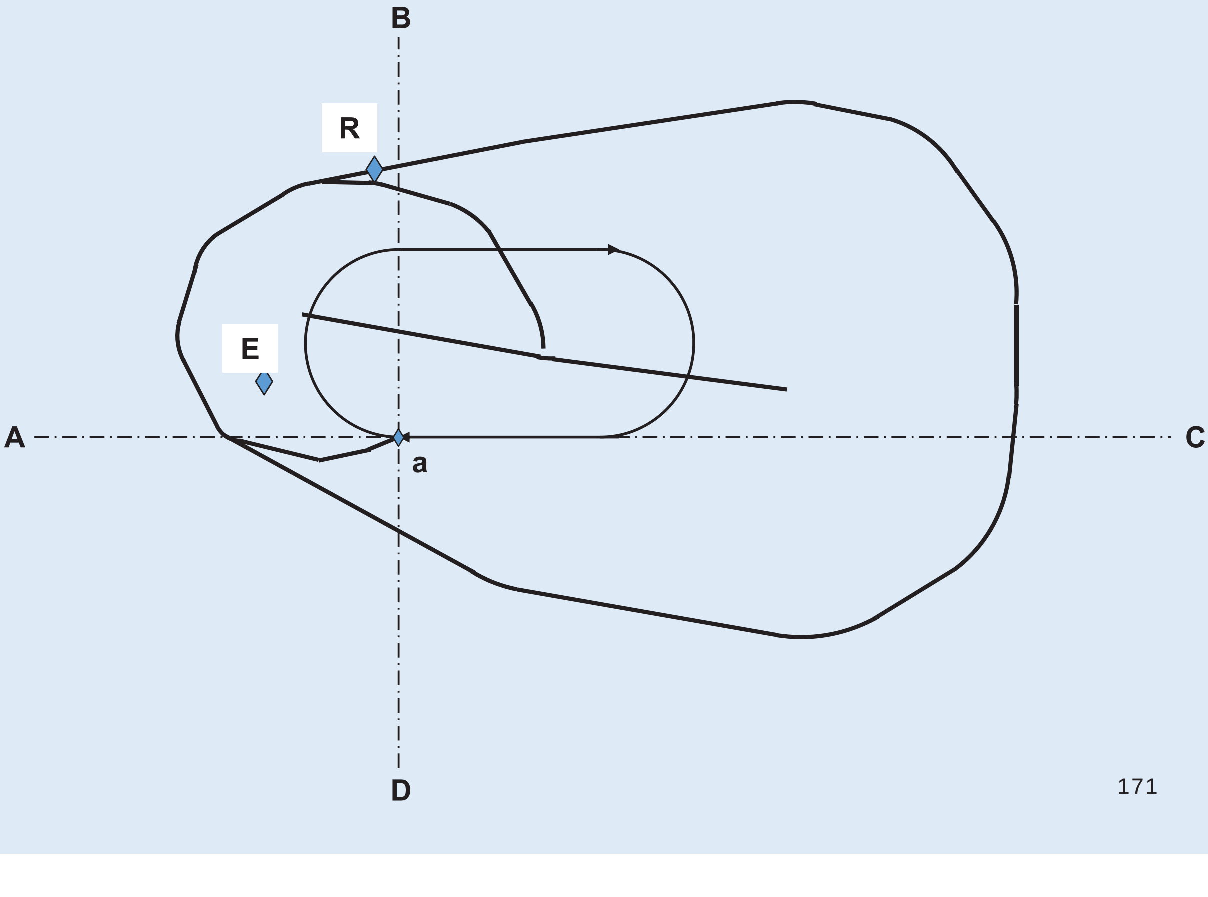


Figure I -4-3-App C-9 in PANS-OPS vol.2

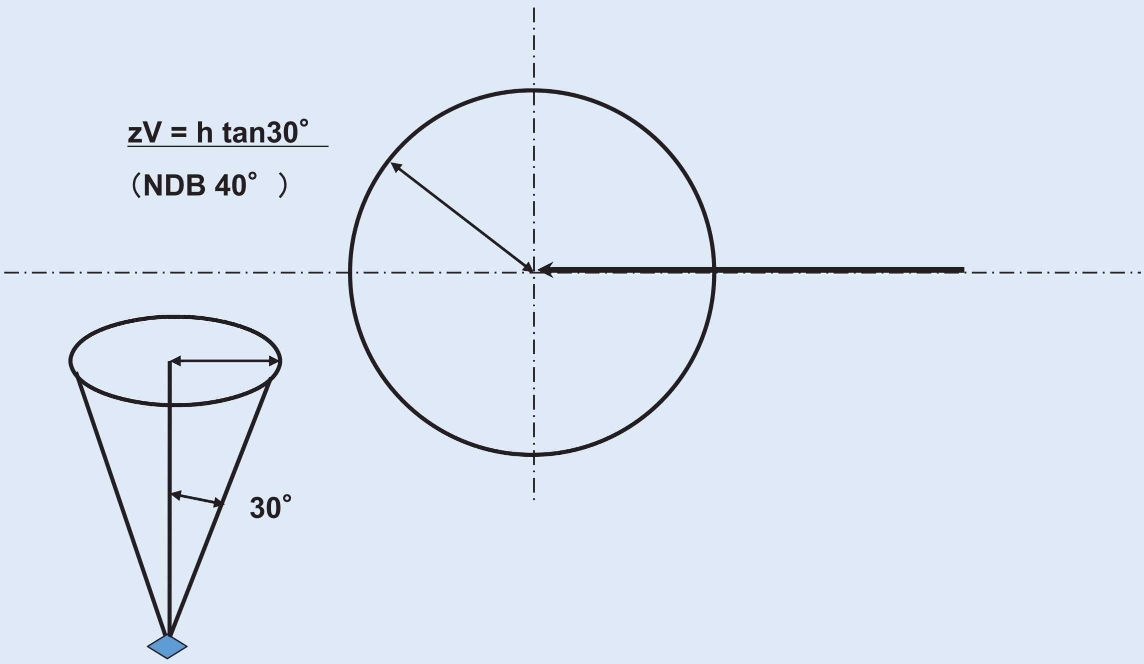
Template (with relation to Point R and E)



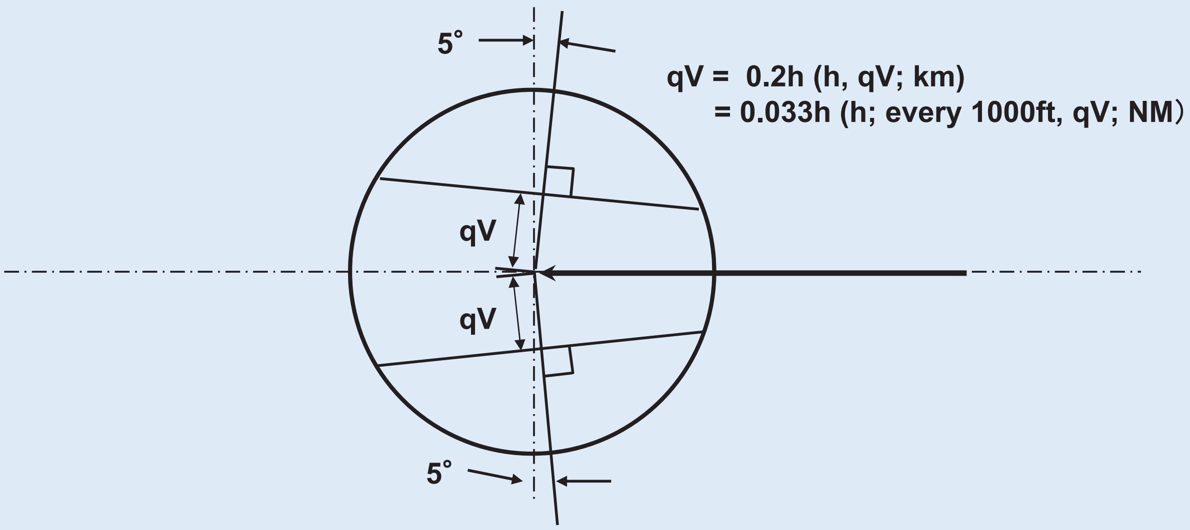
Step 2

- Construction of FIX Tolerance Area

Cone of Silence over NAVAID

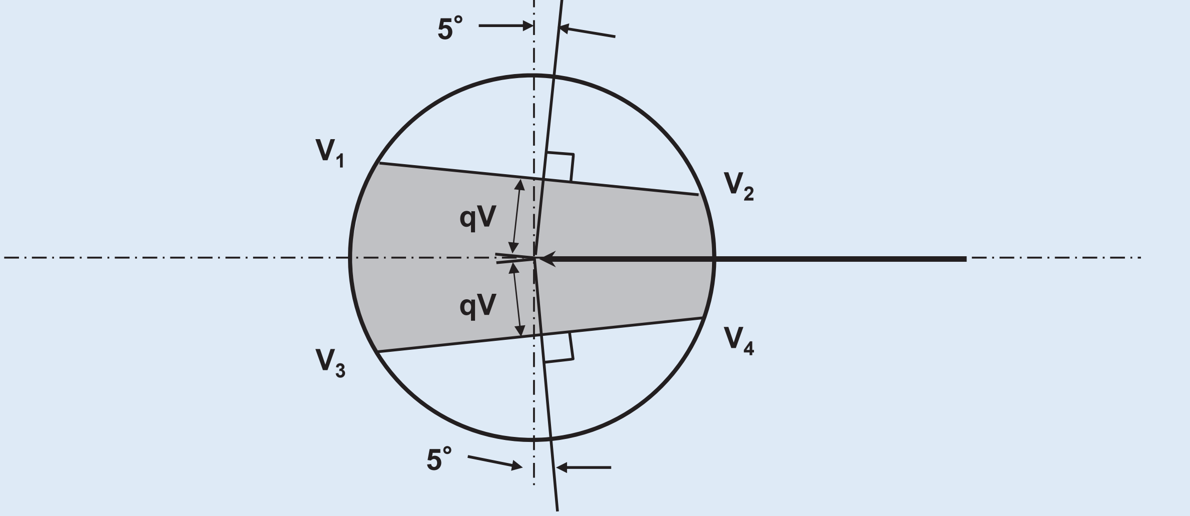


Construction of Tolerance Area over Station



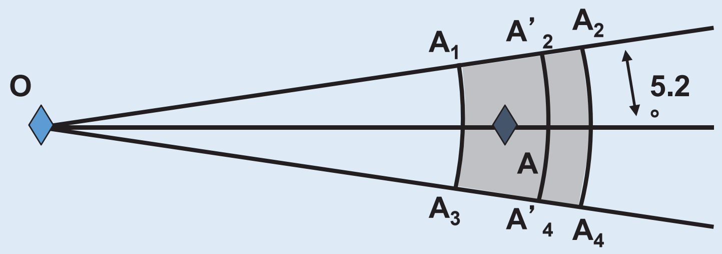
•Draw lines (x 2) 5° off perpendicular line to in-bound course, and
•Draw perpendicular line (x 2) on the point of qV distance from origin.

Construction of Tolerance Area over Station (cont'd)



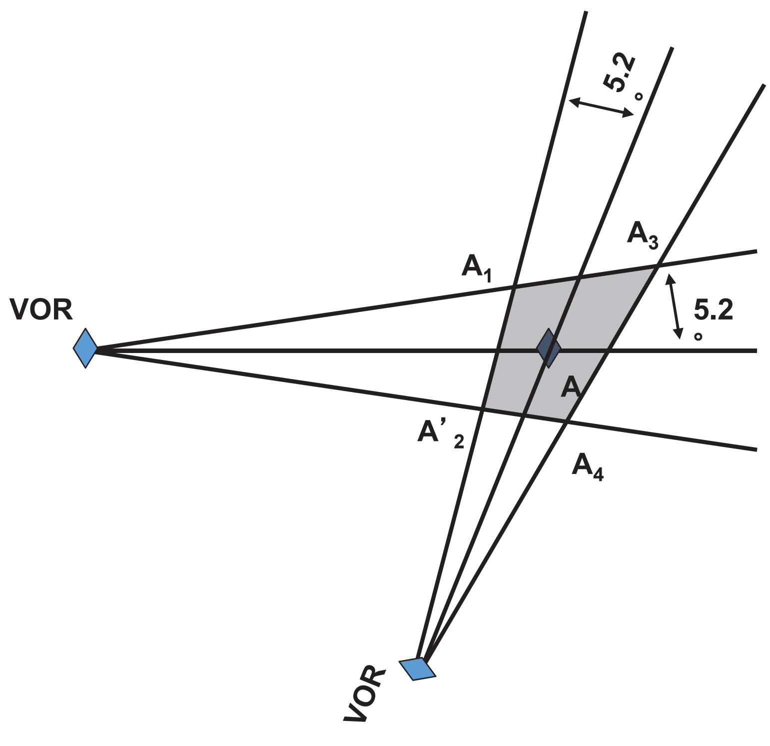
• Meshing area above is showing VOR tolerance area over station

Case of VOR/DME Fix



- OA= D (determined value of DME)
- $OA_1 = OA_3 = D - d_1$
- $OA'_2 = OA'_4 = D + d_1$
- $A_2A'_2 = A_4A'_4 = 6(v+w')$

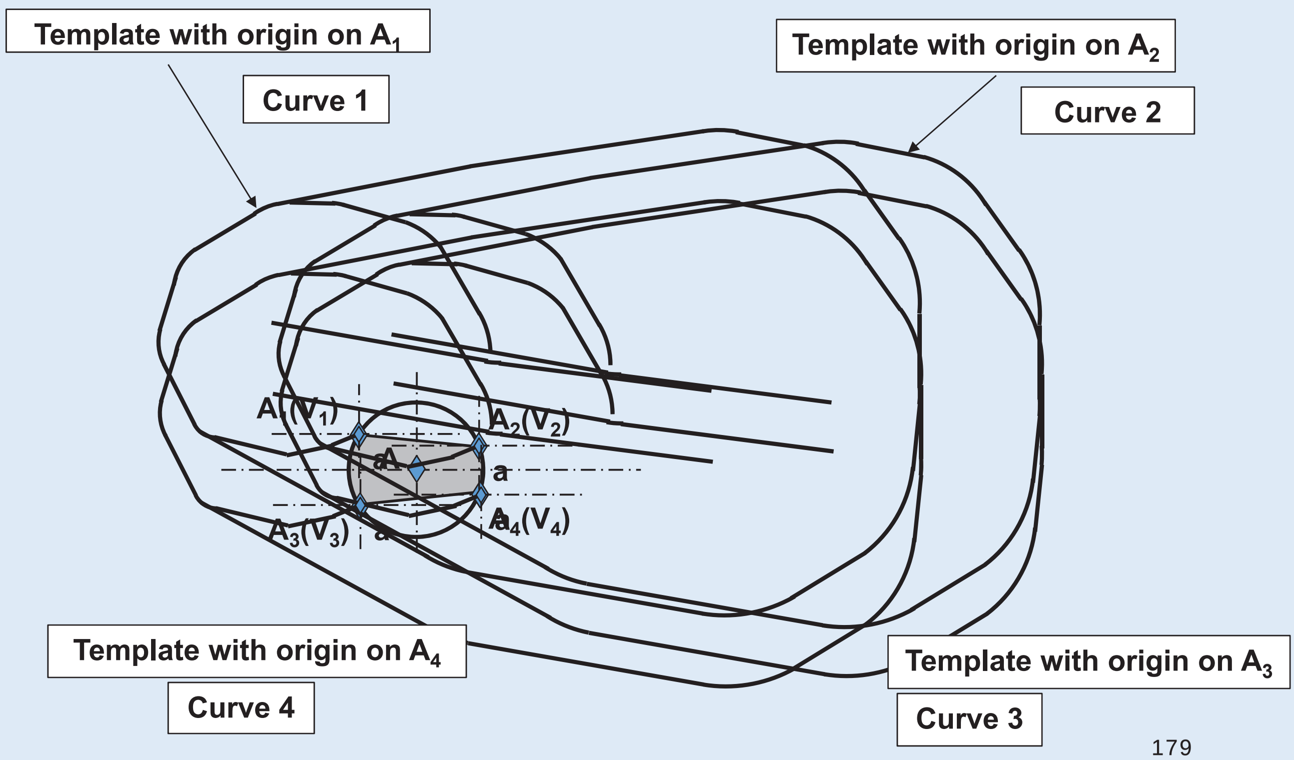
Case of VOR//VOR Fix



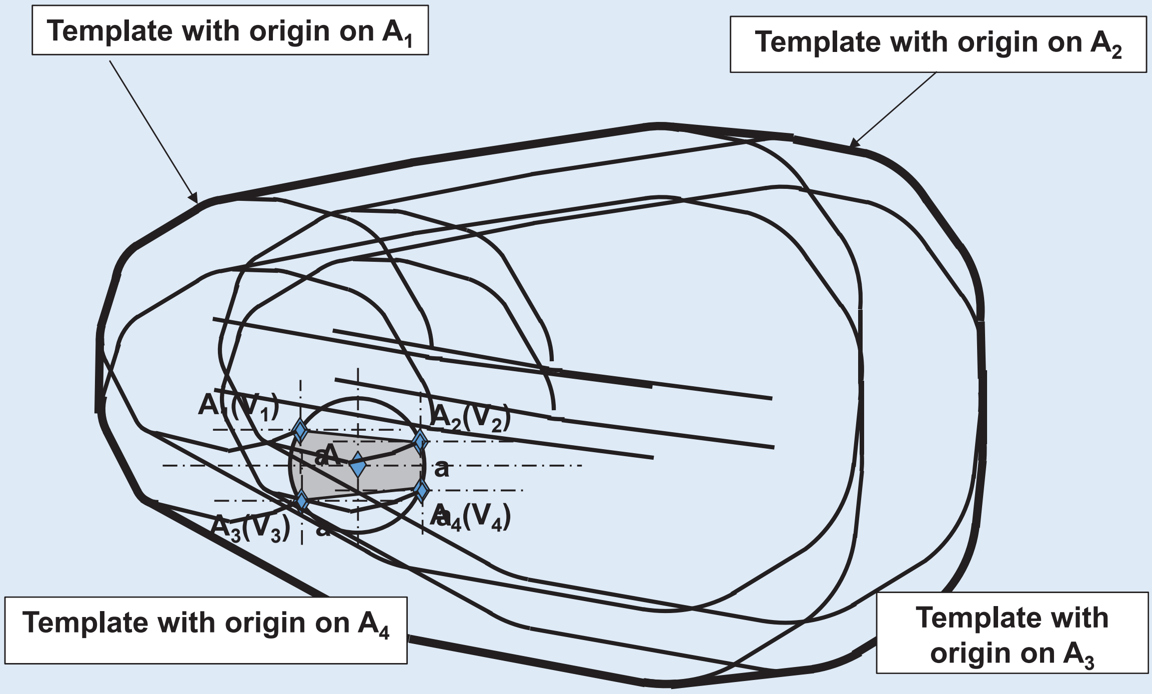
Step 3

- Construction of Basic Area and Entry Area

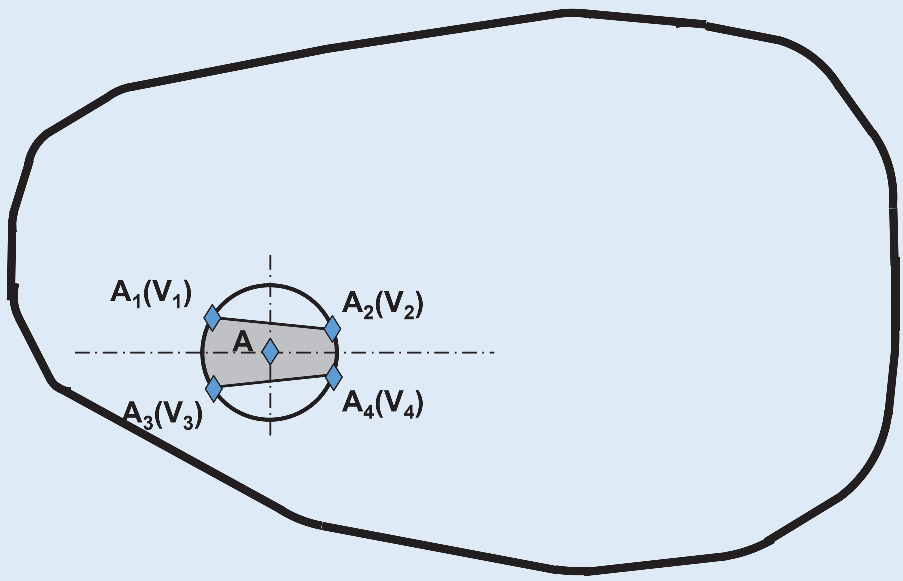
Drafting of Basic Area



Drafting of Basic Area (cont'd)

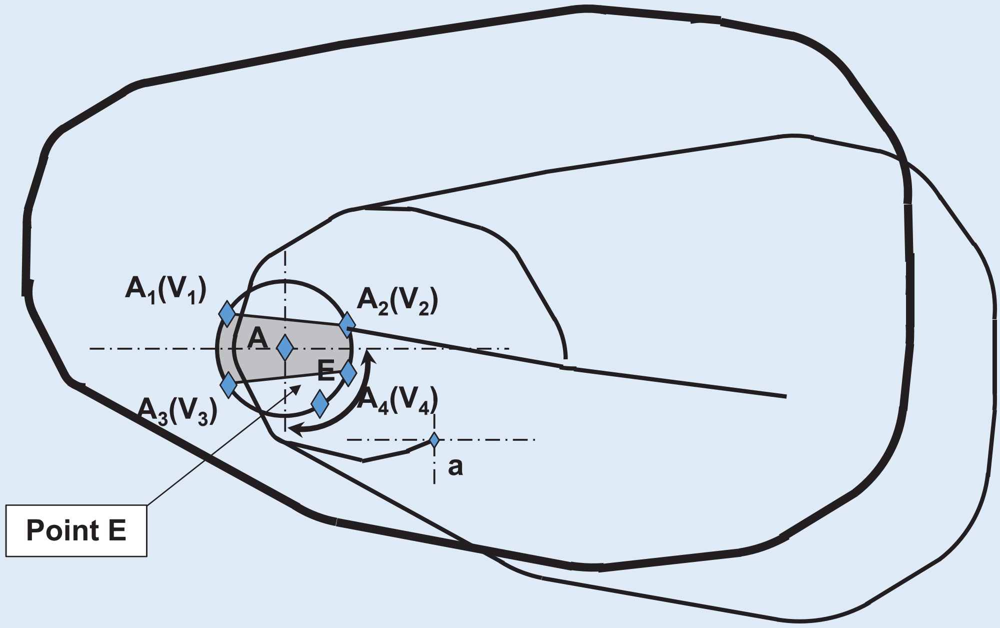


Basic Area (Completed)

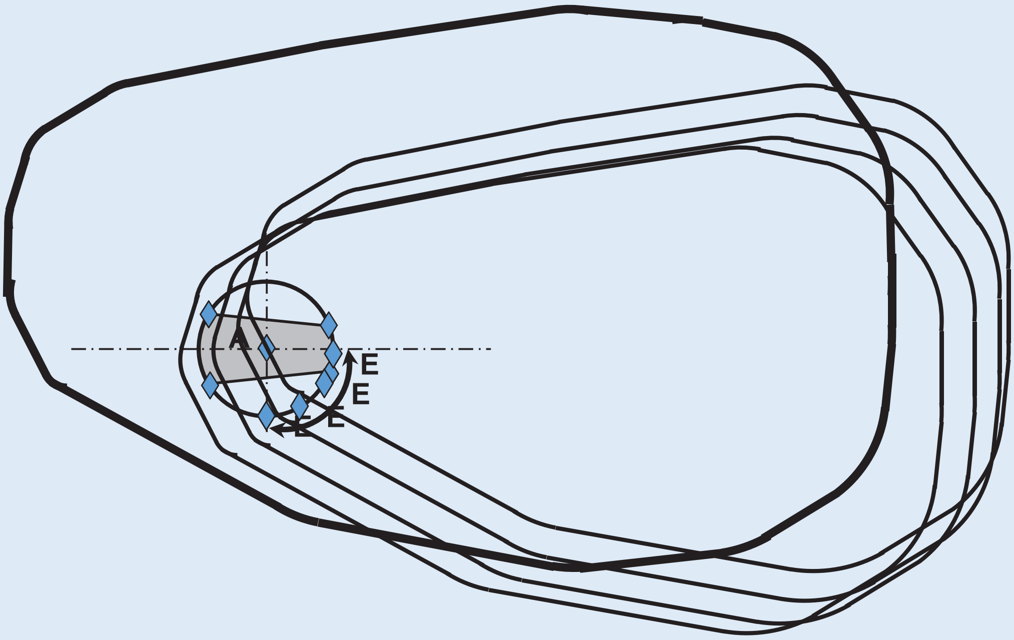


Basic Area of Race track / Holding on one direction

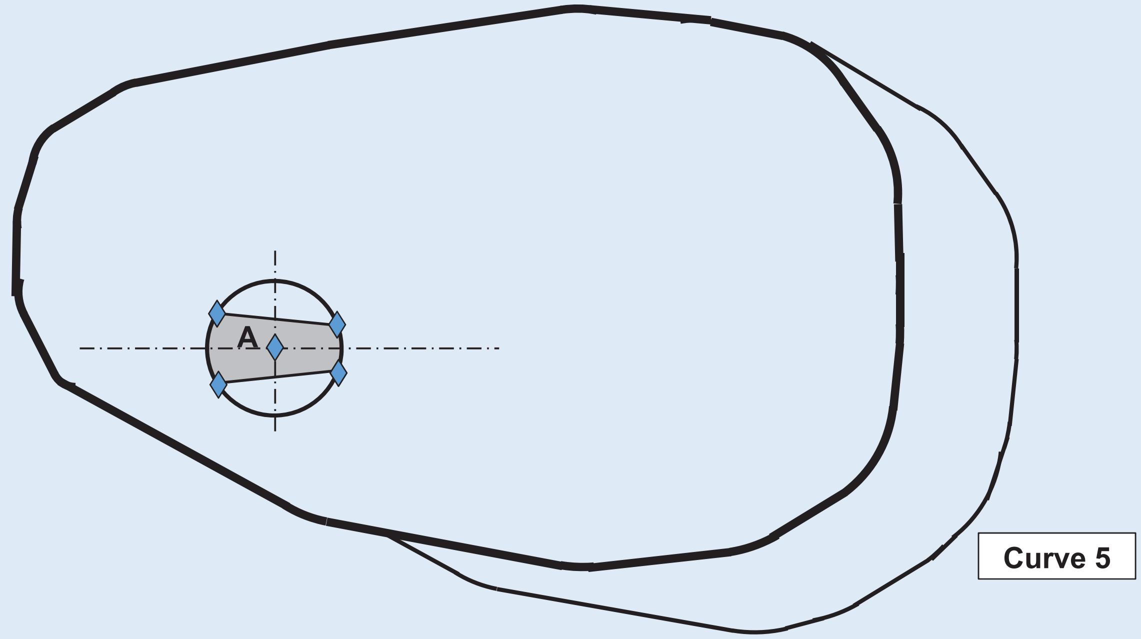
Entry Area by 360°



Entry Area by 360° (cont'd)

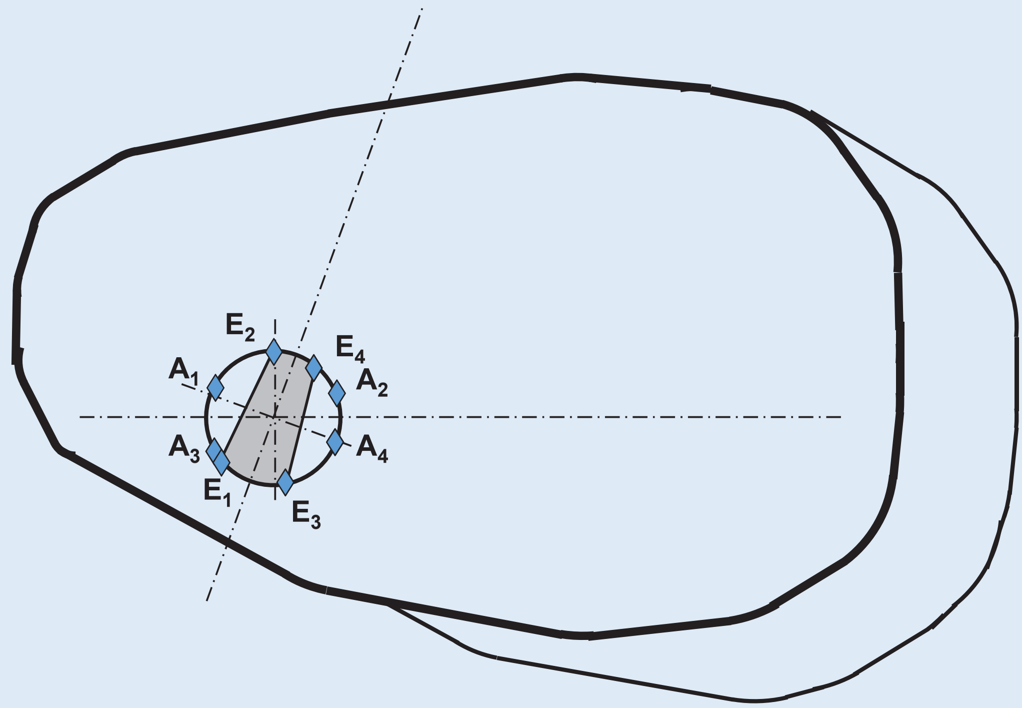


Entry Area by 360° (no auxiliary lines)



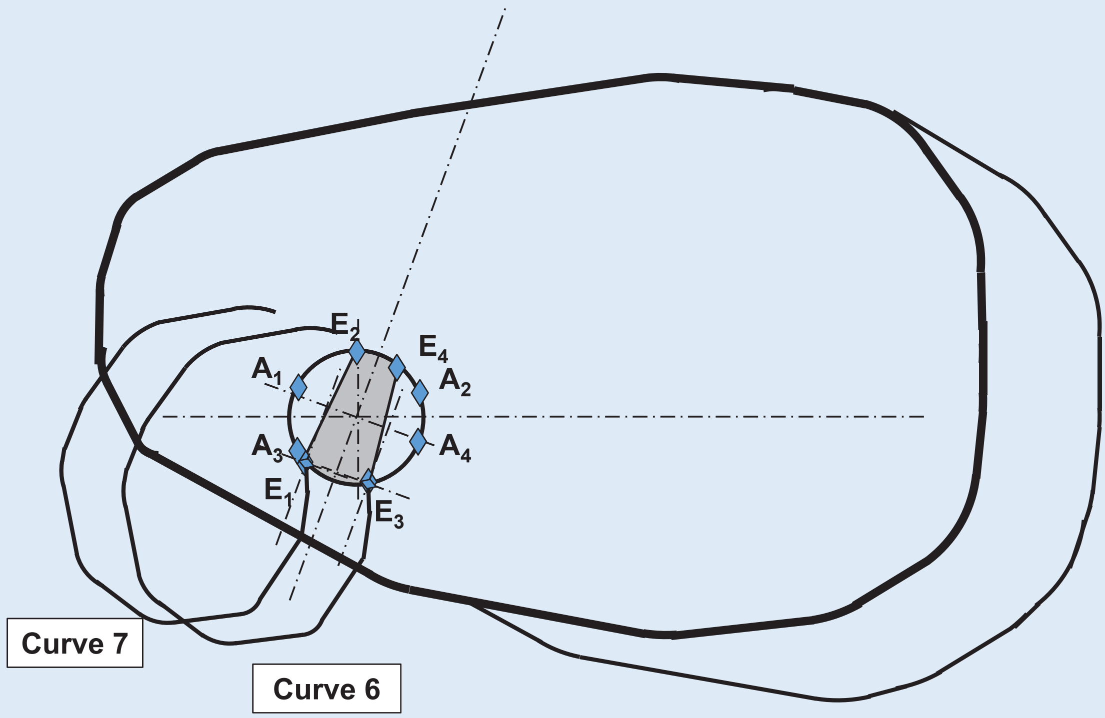
184

Entry along the boundary line of Sector 1 / Sector 3

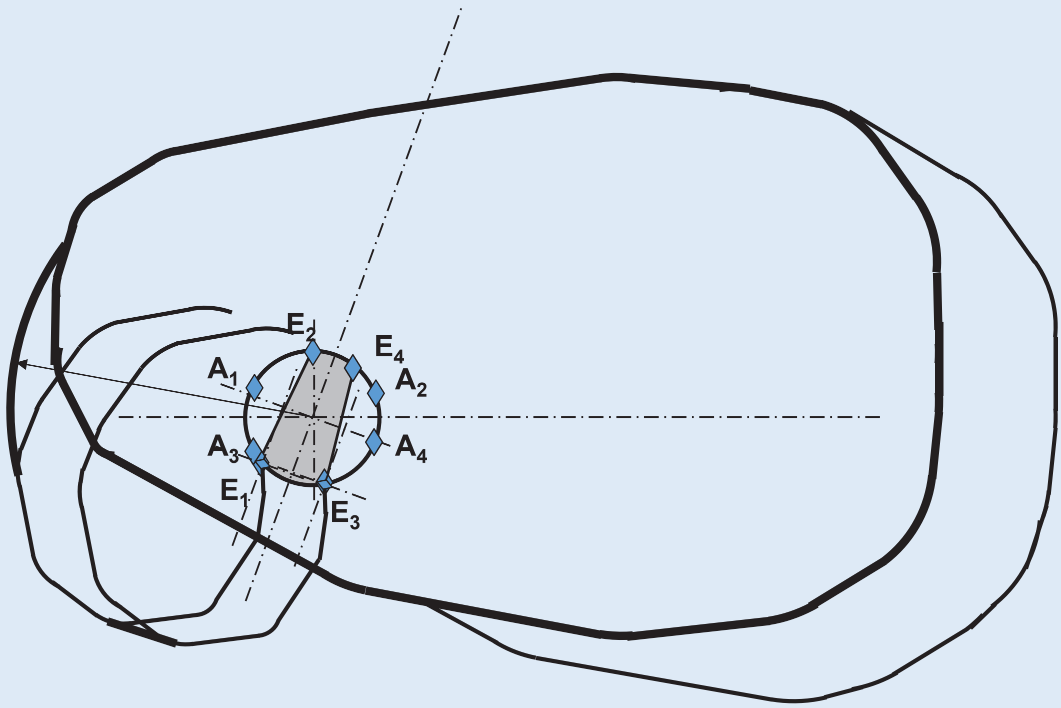


185

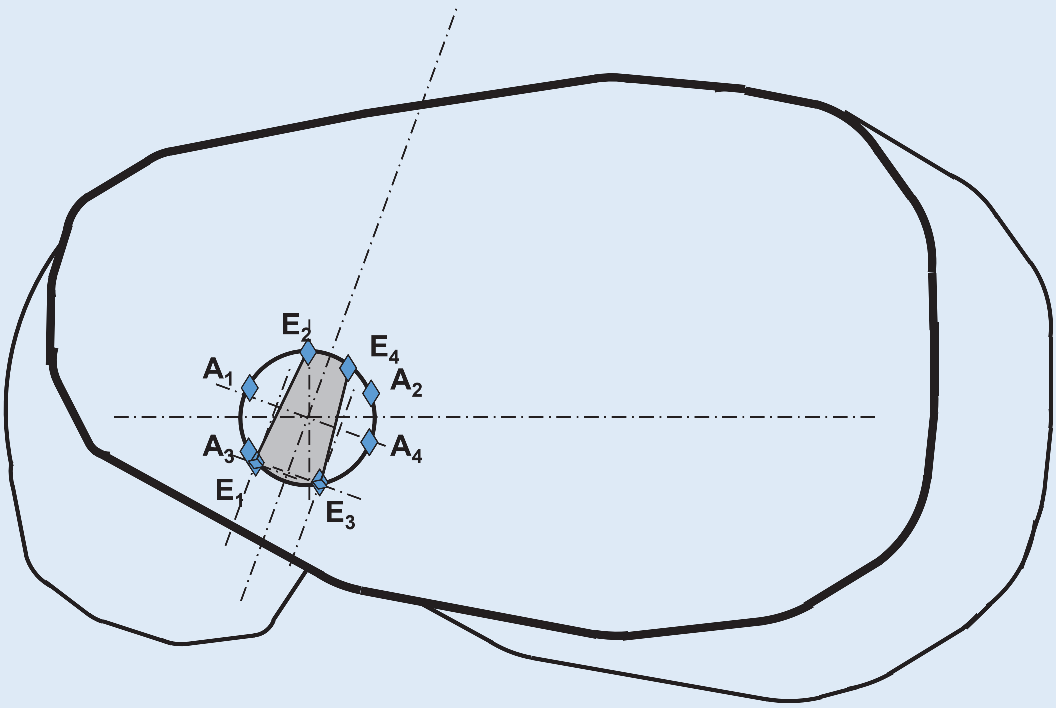
Direct Entry on the boundary line of Sector 1 / Sector 3



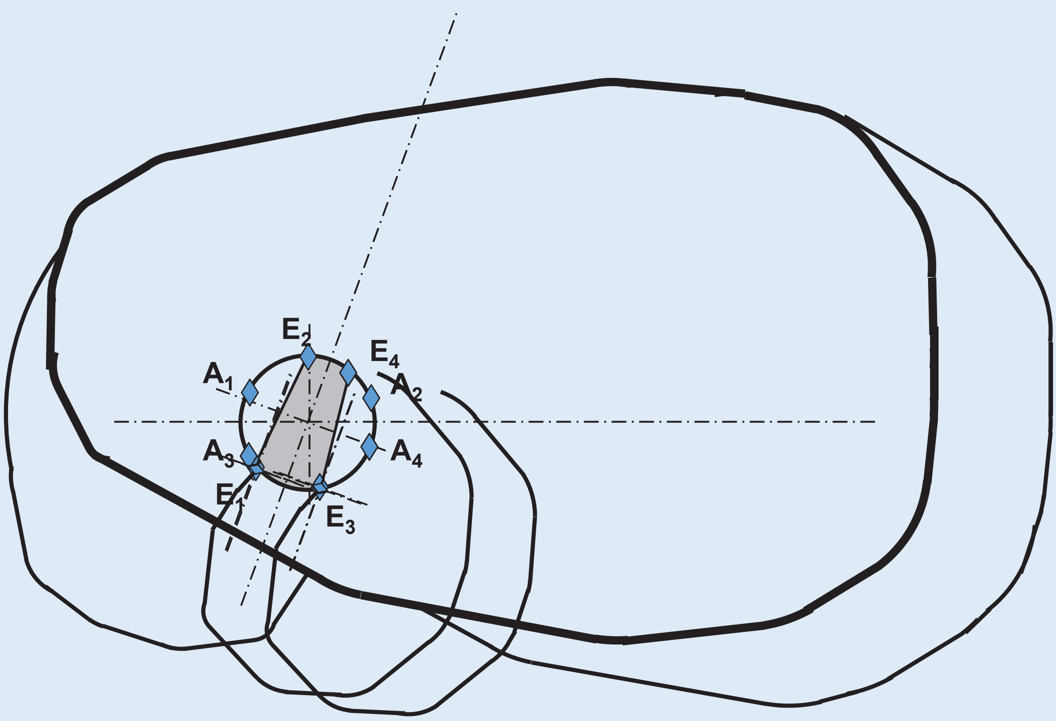
Direct Entry on the boundary line of Sector 1 / Sector 3 (cont'd)



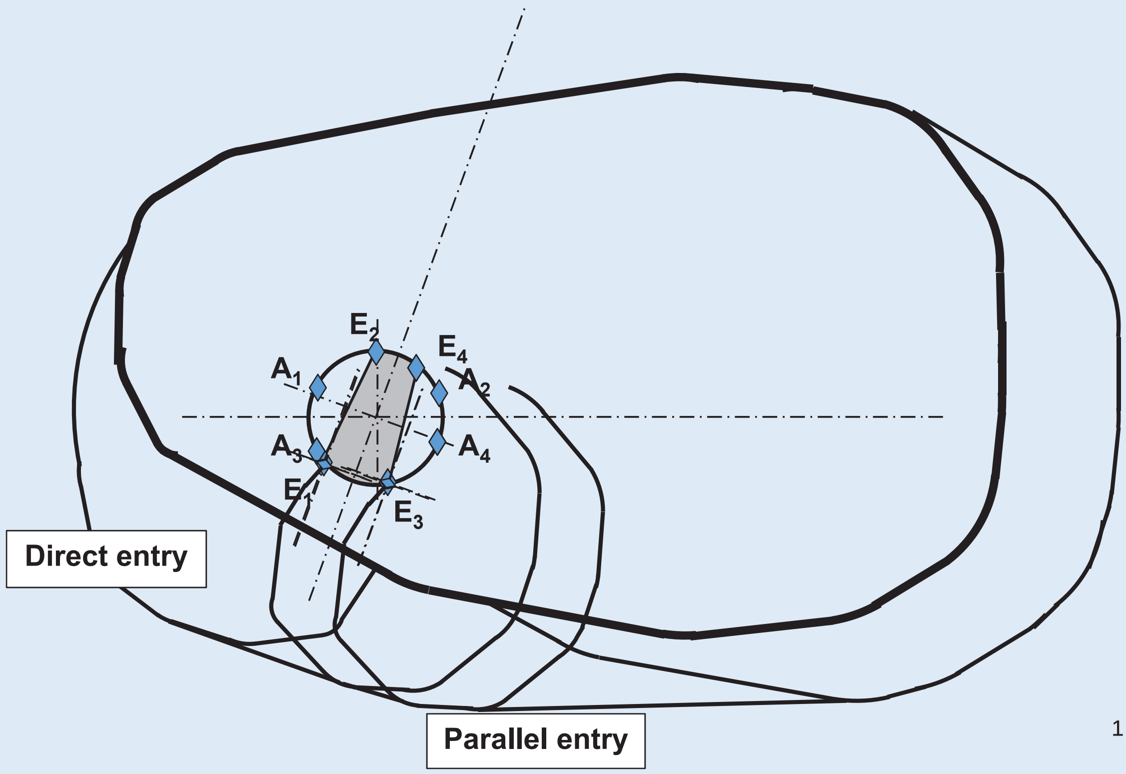
Direct Entry on the boundary line of Sector 1 / Sector 3 (no auxiliary lines)



Parallel Entry on the boundary line of Sector 1 / Sector 3

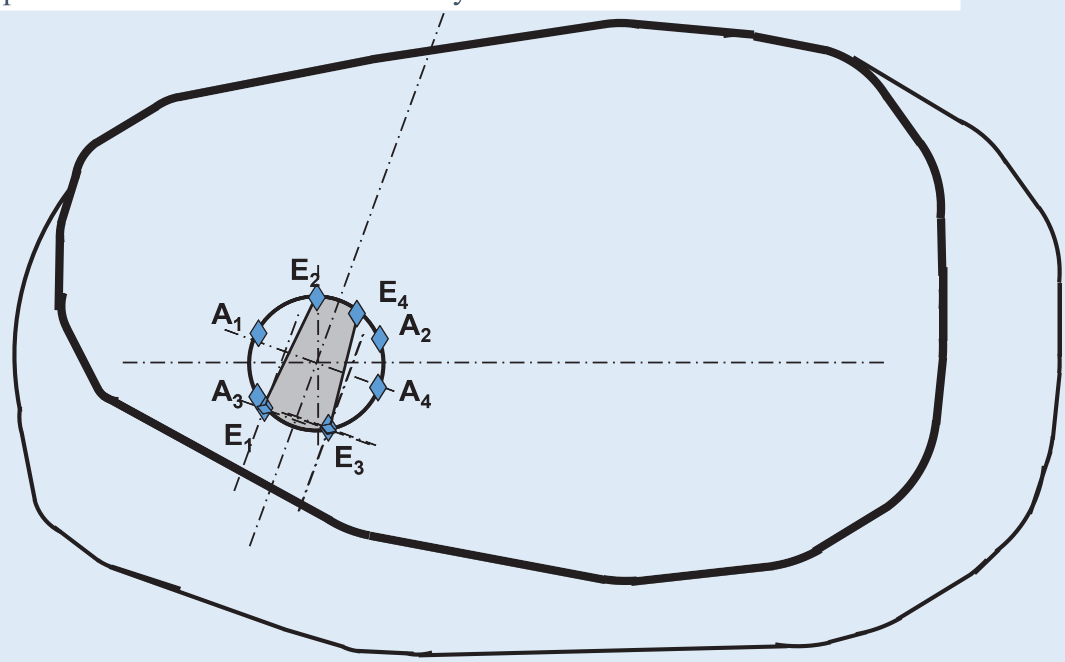


Parallel Entry on the boundary line of Sector 1 / Sector 3 (cont'd)

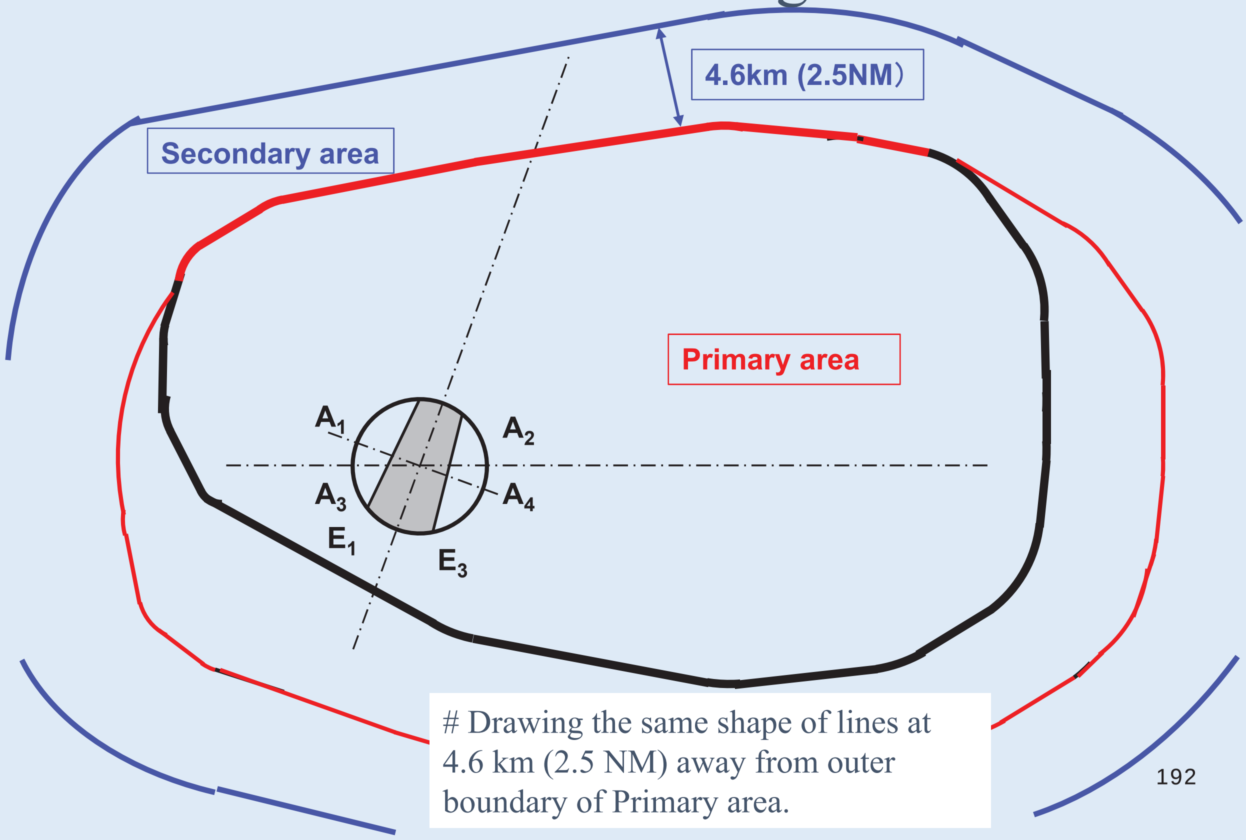


Integration of All Areas for Entry

Connecting outer spiral lines of every area drafted by tangent lines to produce one whole area as Primary Area.



Adding Secondary Area then Completion of Race track / Holding Area



Drawing the same shape of lines at 4.6 km (2.5 NM) away from outer boundary of Primary area.

Basic Training on PANS-OPS Flight Procedure Design
Instructional Materials

Outline of Flight Procedure Design

END

Basic Training on PANS-OPS Flight Procedure Design
Instructional Materials

Guidance of FPD Exercise

〈 Conventional Navigation Procedures 〉

TF-3 Activity
The Project for Capacity Development in Air Traffic Services in The Republic of Tajikistan
Organized by JICA, in Y2016 - Y2018

DESKTOP EXERCISE Instruction

- Personal exercise on desktop size to be conducted by each trainee
- Calculate to use handy calculator
- Draw to use manual drafting tools
- Work according to every assignment
- Find answer or draw it on a blank paper being provided
- As attachments, other small exercises and samples of achievement tests are provided

Exercise 1 - Drawing FIX & FIX Tolerance Area (1)

- Condition

  VOR A ; Tracking R-270

  VOR B ; Intersection R-310

- Please draft FIX and FIX tolerance area

Exercise 2 - Drawing FIX & FIX Tolerance Area (2)

- Condition – DME Fix

  VOR/DME A ; Tracking R-270,
  D= 6 DME(NM),

  Scale ; 1 : 50,000

- Please draft FIX and FIX tolerance area
- Draw the splay line of VOR signal without protractor.

※1NM=1852m

Process pf Drawing

1. Draw VOR tracking signal area (use 'TAN' (tangent) technic by ±5.2°)
2. Put DME fix on VOR certain Radial (6NM)
   *6NMx1852/500=22.224cm
3. Calculate DME tolerance
4. Draw DME tolerance area
5. Find whole FIX tolerance area

1m=100cm, 100/50000=1/500

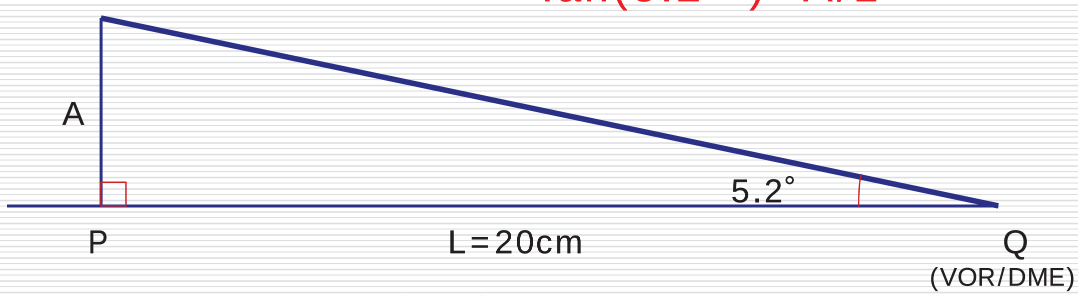
DME tolerance(NM)x1852/500-1.20..cm

Drafting error makes 1 decimal digit 'mm' ; O 5.2mm, × 5.24mm

Drawing Splay Line by Tangent value

- Distance & Degree

Tan(5.2°)=A/L



Vertical line at P

A = 20cm x Tan (5.2°) = cm

Exercise 3 - Calculation Turning Factor

- Conditions
  - ✓ IAS = 250kt
  - ✓ Alt. = 3,000ft
  - ✓ Bank angle = 15°
  - ✓ ISA+30
- Calculation

  R: Turn Rate (° /s)

  r : Turn Radius (NM)

※ You can use calculator.

Exercise 3 - Calculation Turning Factor

- TAS=250kt x =
  - ✓ Convert factor 1.0995
  - ✓ Alt. = 3,000ft
  - ✓ Bank angle = 15°
  - ✓ ISA+30
- R(Turn Rate)= (° /s)
- R(Turn Radius)= (NM)

Exercise 4 - Drawing Turning Area (bounding cercle)

- Conditions
  - ✓ IAS = 240kt
  - ✓ ISA+20
  - ✓ Alt. = 5,000ft
  - ✓ Wind = 30kt (omni-direction)
  - ✓ Bank angle = 15°
  - ✓ Flight technical error (c) = 3s + 3s = 6s
  - ✓ Initial width = 3NM

1. IAS to TAS
2. Calcurate 'c', 'r', 'E' (r is based on R)
3. Make length on paper by scale

- Drawing

Turn=280 degrees(°), Scale = 1:50,000
Initial width of area=2 NM (same length after FTT)

>>> Calculation result written in other paper

Result (Scale 1:50000)

	calculated value	scaled value/drawing value
'r'	3.91nm	14.5cm / 14.50cm
'c'	0.4461nm	1.654cm / 1.65cm
'E'	0.6868nm	2.544cm / 2.54cm
$\sqrt{(r^2 + E^2)}$	3.97nm	14.7cm / 14.70cm
'r + E	4.597nm	17.027cm / 17.03cm
' r + 2E	5.284nm	19.572cm / 19.57cm

GENERAL EXERCISE
Instruction

- Group exercise on table size to be conducted individually by 2 group of trainee
- Total FPD works by conventional navigation SID, IAP, ILS APCH or MSA
- Construct FPD on Japanese geographical maps and find procedure conditions based on PANS-OPS
- Work according to every assignment
- Find appropriate procedure conditions and describe on the result paper
- Presentation and evaluation with results and drafted chart by each group

General Exercise
Instrument Approach Procedures

- Exercise Subject
  - VOR/DME RWY02 approach procedure
  - VOR/DME RWY20 approach procedure
- Exercise Airport
  - Hanamaki Airport in Japan
- Method
  - Construct procedures by hand on geographical maps

General Exercise

Preparation & Conditions

- Hanamaki Airport in Japan
  - AD Elev. 294ft (90m)
  - RWY 02/20 (010. 73° /190.73° T)
    ※Find center-line on map.
  - RWY length 2500m (single RWY)
  - THR20 Elev. 297.5ft (90.7m),
    THR02 Elev. 283.4ft (86.4m)
  - VOR/DME (HPE)

General Exercise

Preparation & Conditions

- Geographical Maps
  - Combine 15 pieces, for scale 1/50,000
  - Combine 4 pieces, for scale 1/200,000
  - Attach outer line and corner of each sheet of map

General Exercise

Preparation & Conditions

- Design Exercise
  - Straight course from IAF to MAPt, then turn back to HPE, the same style of both RWY02 and RWY20
  - Circling area with assessment of OCA/H
  - Turn initiated at a designated turning point for missed approach, as optional location
  - Construct instrument approach procedures of both RWY02 and RWY20 by each group.

General Exercise

Preparation & Conditions

- Practice of Design
  - Prepare the maps with RWY, obstacles pointed on
  - Construct procedure design by hand on the tracing paper covering maps
  - Record the process of procedure design with condition or parameter, calculation formula, significant data such as OCA/H, MOC, target obstacle etc.

General Exercise

Preparation & Conditions

- Condition of Design (both RWY02/20)
  - Set IAF 23DME from VOR/DME (HPE)
  - Set nominal course by HPE, IF, FAF, MAPt and TP optionally but optimally
  - Read next terrain counters, point elevation as shown on the map with plus 20m of trees, but disregard surface conditions except some designated obstacles
  - Aircraft cat-C, ISA+15°
  - Others additional instruction or revision by trainer

General Exercise

Preparation & Conditions

- Evaluation of Design
  - Evaluate by group work of design process and result as well as presentation of work out of 2 approach procedures to review design construction and calculation outputs appropriately on criteria.

General Exercise

Preparation & Conditions

- Obstacles designated

  (every obstacle height above AD elevation)

  - Near RWY

    1. Control tower: 30m — West
    2. Terminal building: 20m — East
    3. Power cable pylon: 40m — West
    4. Power plant: 60m — West
    5. School building: 35m — East

General Exercise

Preparation & Conditions

- Obstacles designated

  (every obstacle height above AP elevation)

  - North side of airport

    6. Antenna tower: 70m — West
    3. Power cable tower: 40m — West
    8. School building: 15m — East
    14. School building: 20m — North
    15. Antenna tower: 100m — North
    16. Antenna tower: 150m — North

General Exercise

Preparation & Conditions

- Obstacles designated

  (every obstacle height above AP elevation)

  - South side of airport

9. Building (city hall): 20m	West
10. Antenna tower: 30m	South
11. Antenna tower(two): 50m	East
12. Antenna tower: 180m	South
13. Power plant: 200m	South

ARRIVAL AND APPROACH PROCEDURES

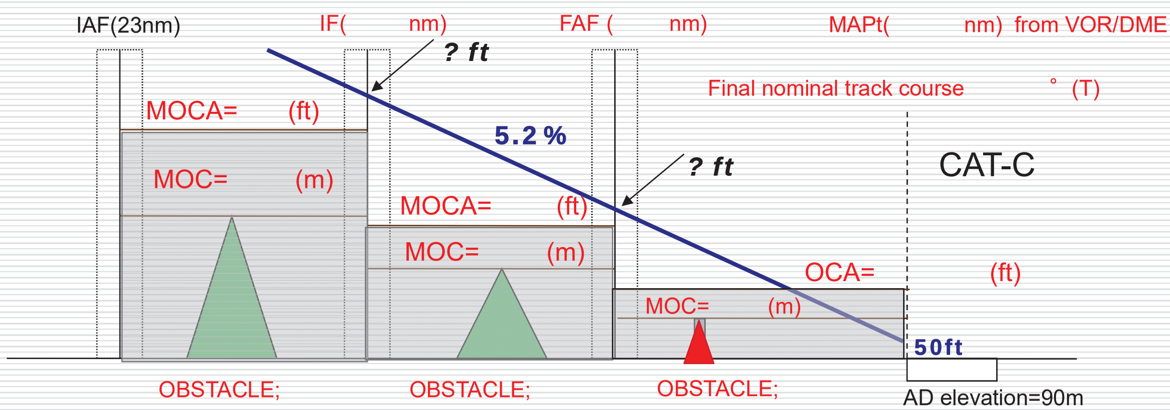
Review of General Exercise

2 May 2017

Group;

RWY:

1. Initial, Intermediate and Final Segments



= m = m = m

Procedure Alt; IF= ft FAF= ft

Descent gradient; Intermediate segment % Final segment %

ARRIVAL AND APPROACH PROCEDURES

Review of General Exercise

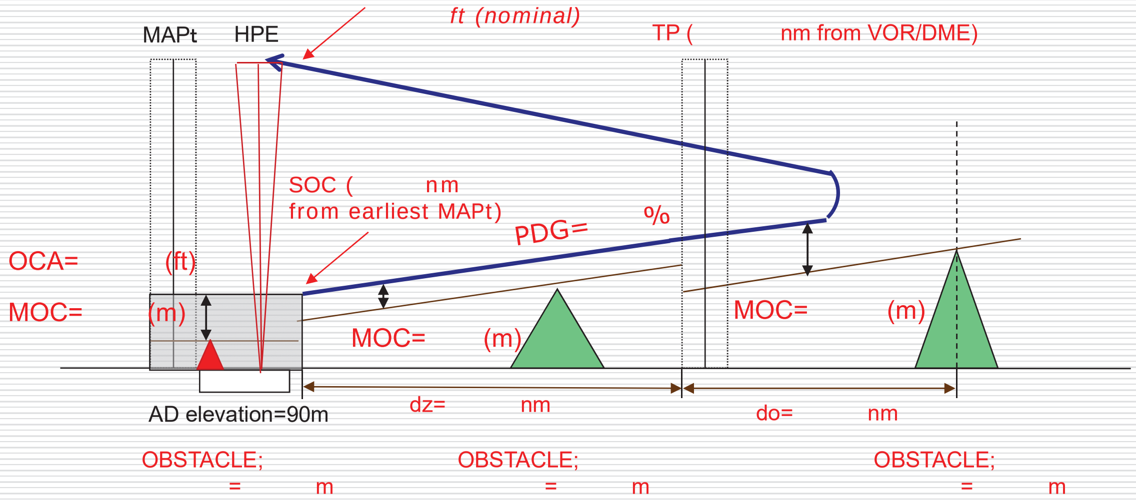
2 May 2017

Group;

RWY:

2. Missed approach Segments

CAT-C



General Exercise

Preparation & Conditions

- Working Group for Approach Procedures
  - Group A
    - Mr. CHORSHANBE
    - Mr. RUSTAM
    - Mr. ILHOM
  - Group B
    - Mr. AKBAR
    - Mr. FARRUH
    - Mr. BEHRUZ

General Exercise

Process of design work

1. Set nominal track by VOR/DME(HPE) based on proper final approach nominal track alignment.
   - Cross RWY center line at 1400m from THR and converging angle $< 5°$
2. Construct (protection) VOR procedure area along nominal track
   - Initial ± 1.0nm, $7.8°$ splay
3. Set IF, FAF and MAPt and, construct protection area of each segment

General Exercise

Process of design work

4. Do obstacle assessment in each segment to determine MOCA/H and tentative OCA/H (final)
5. Calculate descent gradient by each segment to achieve OPT or at least MAX criteria of PANS-OPS
6. Calculate procedure altitude over IAF, IF and FAF
7. Calculate and set SOC position

General Exercise

Process of design work

8. Calculate and set TP(DME Fix), then determine turning direction and the way returning to VOR/DME(HPE)
9. Calculate DME fix tolerance of TP and set K-K line
10. Construct prior turn area and TP area, then determine Missed approach climb gradient
11. Calculate turn parameters and construct turn area including area to proceed HPE

General Exercise

Process of design work

11. Do obstacle review with 50m MOC in turning area, and adjust TP position, climb gradient or OCA if necessary.
12. Determine and review total results such as OCA/H, descent or clime gradient in each segment or other data necessary for AIP chart

General Exercise
Instrument Departure Procedures

- Exercise Subject - SID
  - RWY02 departure procedure to intercept and proceed via HPE R090, and
  - RWY20 departure procedure to turn to HPE
- Target Airport
  - Hanamaki Airport in Japan
- Method
  - Construct procedures by hand on geographical maps

General Exercise
Preparation & Conditions

- Design Exercise
  - Turning at designated altitude is specified for RWY02 departures
  - Turning direction of RWY20 departure is both side available to turn at alt. or fix.
  - RWY20 departure shall get 5,000 ft over HPE along nominal track.
  - When climb gradient bigger than 3.3%, the altitude set back to 3.3% shall be designated.

General Exercise

Preparation & Conditions

- Design Exercise
  - Climb gradient may be possible to increase up to 5.0%.
  - Obstacles are available the same with Approach procedure exercise plus some.
  - Design conditions are also the same with Approach procedure exercise such as aircraft cat-C, ISA+15° .

General Exercise

Preparation & Conditions

- Working Group for Departure Procedures
  - Group A

    Mr. CHORSHANBE

    Mr. AKBAR

    Mr. FARRUH
  - Group B

    Mr. ILHOM

    Mr. BEHRUZ

    Mr. RUSTAM

General Exercise

Process of design work-Departure

1. Set nominal track alignment along RWY center line, and construct initial departure area on straight out course.
   - If track guidance of navaids is used, nominal track should be adjusted to specified course. (adjustment <5°)
2. Check obstacle penetration to OIS(2.5%) .
   - Initial ±1.0nm, 7.8° splay
3. Determine proper position of TP(FIX) or TP(altitude) to assess highest obstacle in turn initiation area.
   - Set K-K line, and calculate MOC, whichever it is greater, 75m or (do×0.8%)

General Exercise

Process of design work-Departure

4. Determine turn direction to be aware of situation of terrain on a map.
5. Set in-bound type to HPE to select designated course or direct course.
6. Check obstacle to affect PDG plus MOC, and find control obstacles.
   - calculate MOC, whichever it is greater, 75m or (dr+do)×0.8%
7. Calculate reaching altitude over HPE to use distance along nominal track and PDG.
   - Check higher than 5,000ft or NOT.

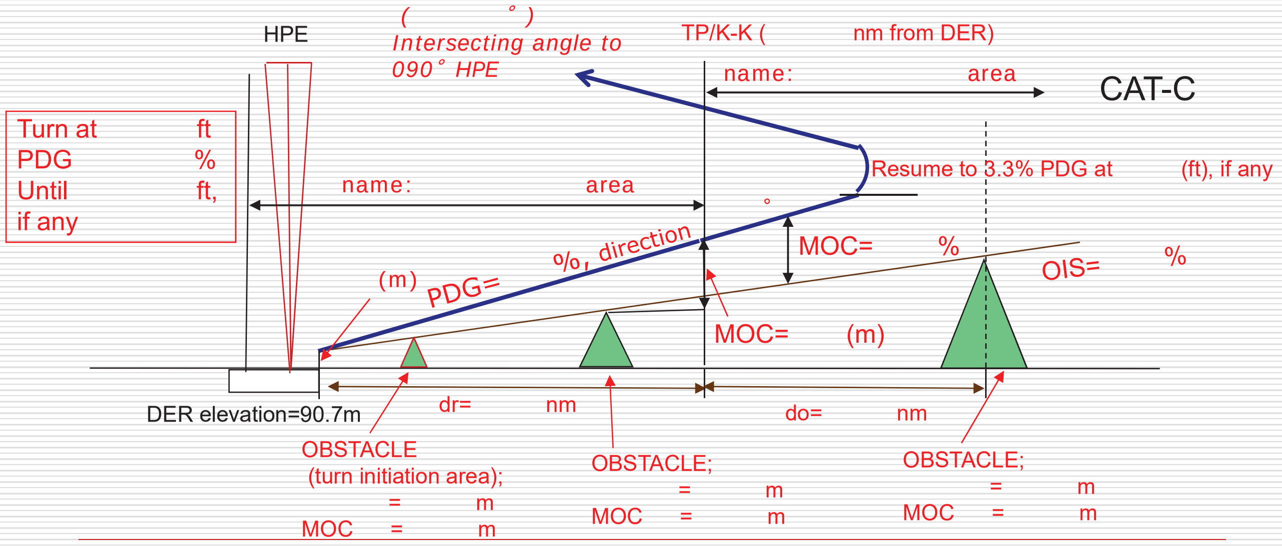
ARRIVAL AND APPROACH PROCEDURES
Review of General Exercise

11 May 2017

Group;

RWY: 02

1. Departure procedure, turn at designated altitude



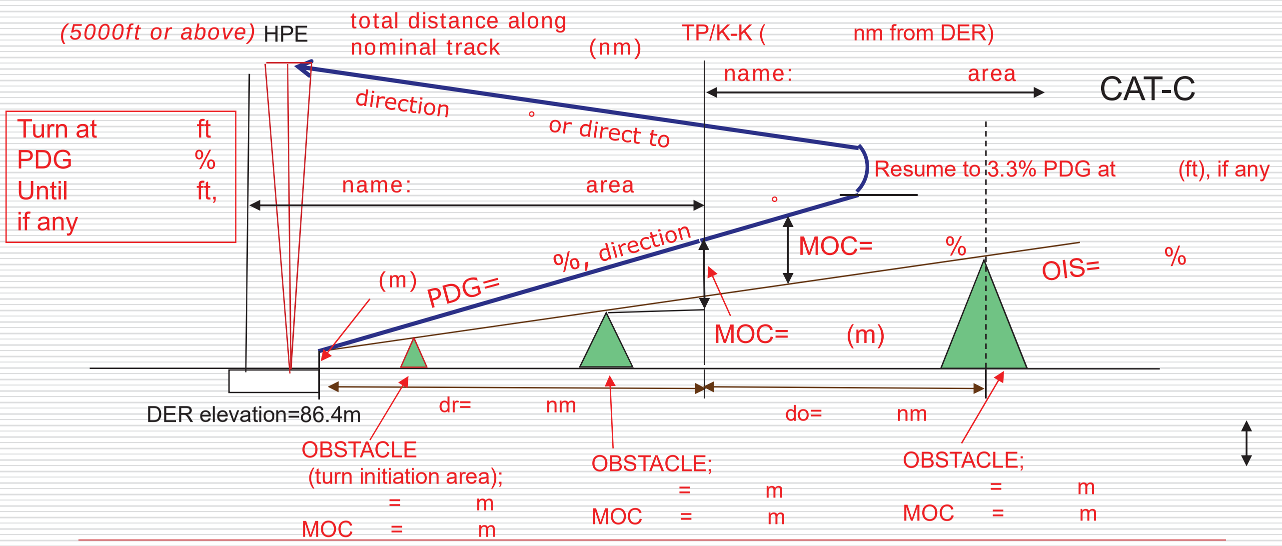
ARRIVAL AND APPROACH PROCEDURES
Review of General Exercise

11 May 2017

Group;

RWY: 20

2. Departure procedure, turn at designated altitude



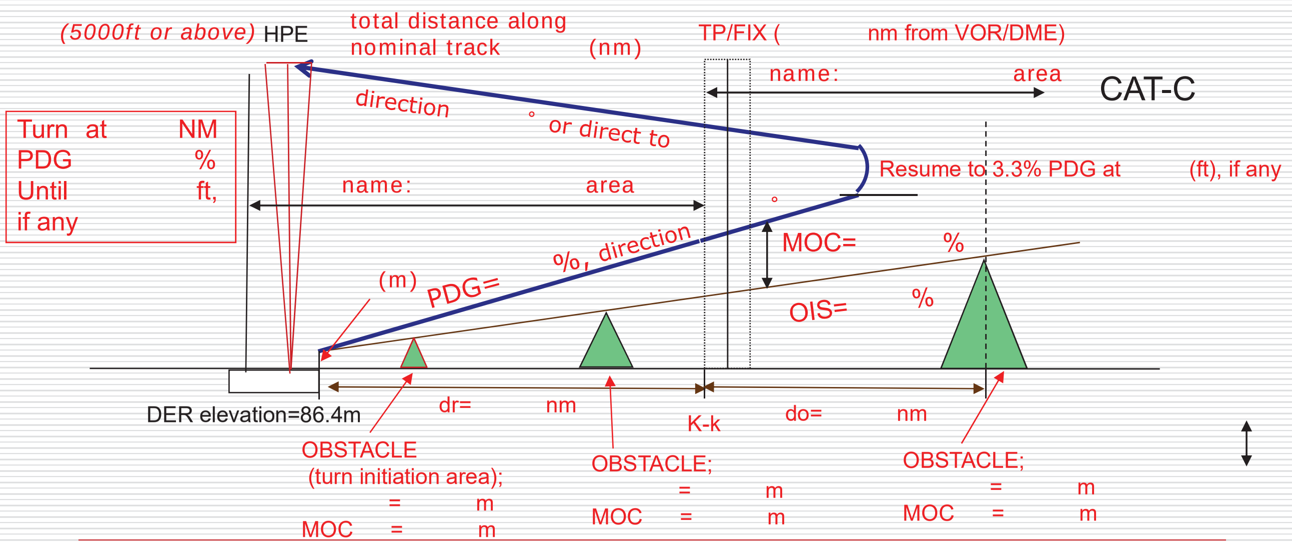
ARRIVAL AND APPROACH PROCEDURES
Review of General Exercise

11 May 2017

Group;

RWY: 20

2. Departure procedure, turn at designated FIX



16 May 2017

General Exercise
ILS approach procedure

- Exercise Subject
  - ILS approach RWY20 procedures (cat-I), from initial approach segment till missed approach segment
- Target Airport
  - Hanamaki Airport in Japan
- Method
  - Construct procedures by hand on geographical maps

General Exercise

Preparation & Conditions

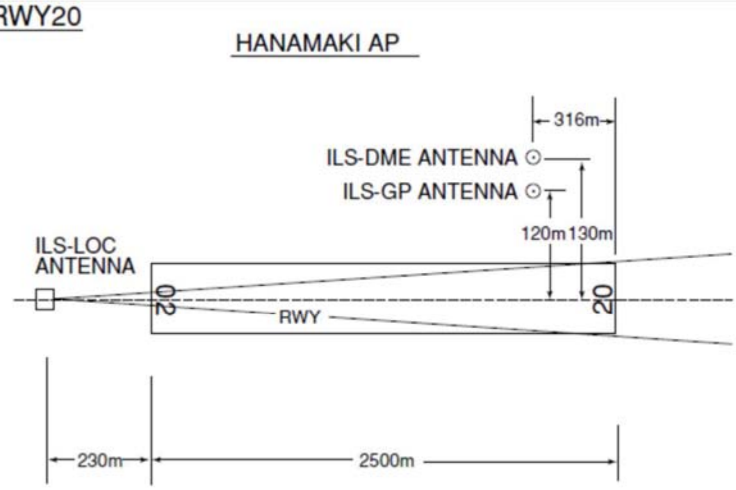
Design Exercise

- Set IAF at HPE R010 20DME(NM), and IF at appropriate position of DME by ILS-DME,
- Construct precision approach segment by OAS, with actual ILS system at Hanamaki AP, cat-D and other standard,
- Use OAS software on instructor’s PC to find components of surfaces and assess obstacles,
- Set FAP or FAF (ILS-DME) and extend precision segment certain surfaces to FAP/FAF,

General Exercise

Preparation & Conditions

ILS for RWY20



REMARKS :	1.LOC beam BRG(MAG)	199°
	2.HGT of ILS REF datum	16.4m(54ft)
	3.GP Angle	3.0°
	4.ELEV of ILS-DME	95.6m(314ft)

General Exercise

Preparation & Conditions

- Design Exercise
  - Missed approach should keep optimum climb gradient, 2.5% to set designated FIX(DME) for turning left to HPE,
  - Conduct assessment of every obstacle which is set previously as conditions of exercises to penetrate the surface concerned or NOT, and record the result in the table style on blank sheet.
  - Please find OCA/H by cat-A∼D of aircraft,

General Exercise

Preparation & Conditions

- Design Exercise
  - If obstacle affects in precision segment, you can raise the OCA/H or ‘Z’ (missed approach gradient) based on that obstacle concerned.
  - Obstacles are available the same with approach procedure exercise and departure procedure exercise to be adjusted to height above THR,

General Exercise

Preparation & Conditions

- Design Exercise
  - Design conditions are also the same with NPA procedure exercise such as ISA+15°, cat-D, but calculate OCA/H for cat-A~D to use controlled obstacle by cat-D OAS.
  - Please see the data changing to use OAS soft ware according to input cat-D or others.

General Exercise

Preparation & Conditions

- Working Group for ILS approach
  - Group A

    Mr. ILHOM

    Mr. CHORSHANBE

    Mr. FARRUH
  - Group B

    Mr. AKBAR

    Mr. BEHRUZ

    Mr. RUSTAM

16 - 17 May 2017

General Exercise
Process of design work- ILS approach

1. Set nominal track alignment along Localizer(LOC) course and VOR R020, and set IAF and IF temporarily,
   - If track guidance of navaids is used, nominal track should be adjusted to specified course. (adjustment <5°)
2. Construct precision approach segment and draw OAS with assigned conditions,
   - Initial ±1.0nm, 7.8° splay
3. Determine proper position of TP(FIX) or TP(altitude) to assess highest obstacle in turn initiation area.
   - Set K-K line, and calculate MOC, whichever it is greater, 75m or (do×0.8%)

ILS approach design
Review of General Exercise

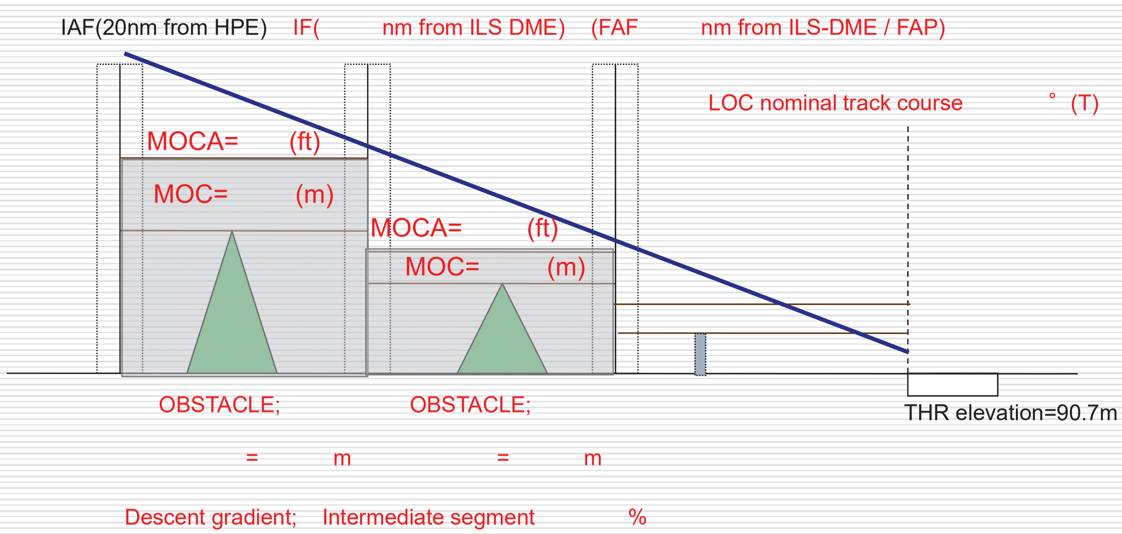
18 May 2017

Group;

RWY20

CAT-D

1. Initial and Intermediate Segments



ILS approach design
Review of General Exercise

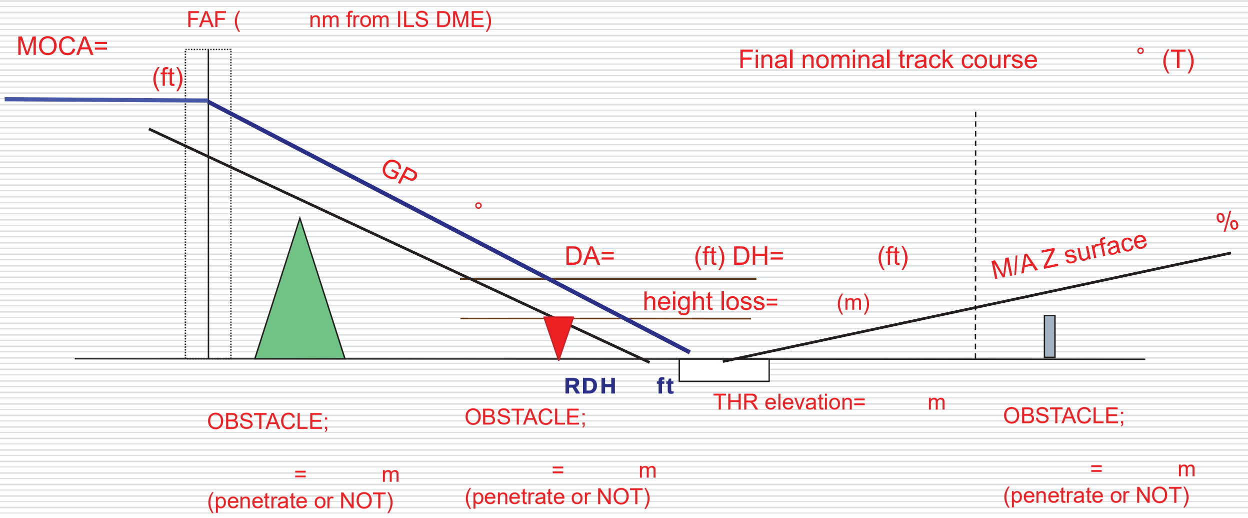
18 May 2017

Group;

RWY20

2. Precision Segment (cat- operation)

CAT-D



ILS approach design
Review of General Exercise

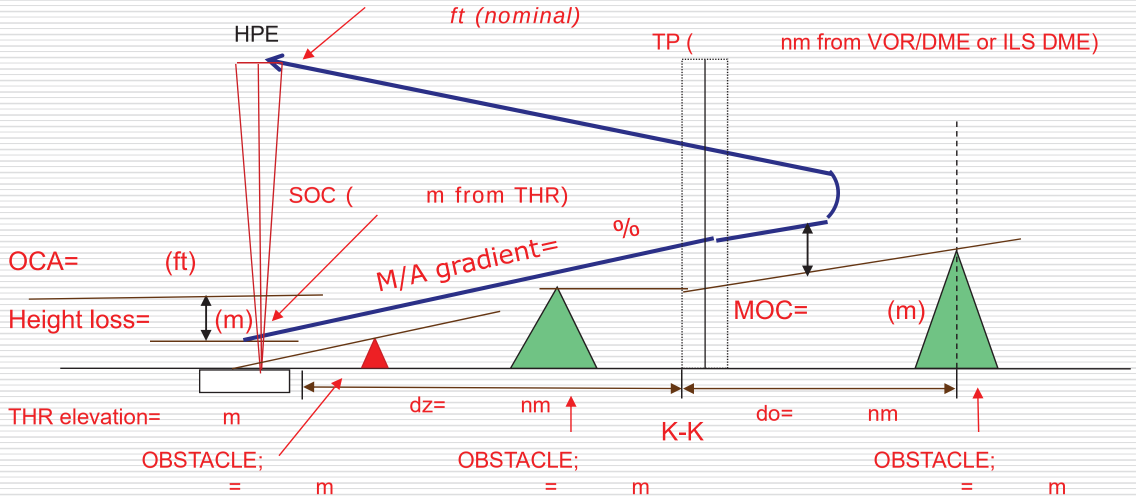
18 May 2017

Group;

RWY20

3. Final Missed approach

CAT-D



ILS approach design
Review of General Exercise

18 May 2017

Group;

RWY20

4. OCA / H

unit: ft

CAT	Operation CAT -	
	OCA	OCH
A		
B		
C		
D		

ILS approach design
Review of General Exercise

18 May 2017

Group;

RWY20

5. DA / H

unit: ft

CAT	Operation CAT -	
	DA	(DH)
A		
B		
C		
D		

ILS approach design
Review of General Exercise

18 May 2017

Group;

5. Obstacle Assessment by OAS

unit: m

	Height on THR	x	y	z	Penetrate (Y/N)	Surface
1						
2						
3						
4						
5						
6						
7						
8						
9						

ILS approach design
Review of General Exercise

18 May 2017

Group;

5. Obstacle Assessment by OAS

unit: m

	Height on THR	x	y	z	Penetrate (Y/N)	Surface
10						
11						
12						
13						
14						
15						
16						
17						
18						

General Exercise
MSA Construction

- Exercise Subject
  - Construct Basic MSA, quadrant by 90°
- Target Airport
  - Hanamaki Airport in Japan
- Method
  - Draw MSA as well as buffer area
  - Find height obstacle and determine MSA in each quadrant
  - Tree height, 20m should be added to terrain obstacle height.
  - New terrain maps, with scale of 1/200,00 are combined and used, and no additional OBST.

1/200,000 ; 1cm=2km

General Exercise
Preparation & Conditions

- Design Exercise
  - Make Magnetic North to divide quadrant by magnetic variation of W 8 °
  - Center of MSA is HPE (VOR/DME) facility center point. You can set it on approximate position on the map.
  - If you consider mountainous area, you can increase MOC.
  - Everybody works together by on group.

General Exercise

Result of MSA Construction

- Hanamaki Airport

	Category of Highest OBST	Elevation	MSA
000° - 090°			
090° - 180°			
180° - 270°			
270° - 360°			

Basic Training on PANS-OPS Flight Procedure Design
Instructional Materials

Guidance of FPD Exercise

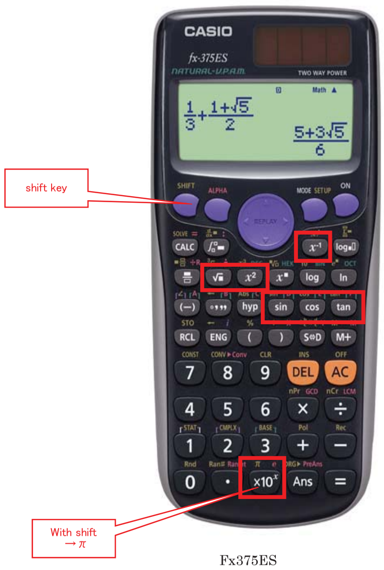
END

Attachment

Sample

Small exercise & Achievement tests

1. Function Calculator



Fx375ES

1.1. Formula

➢ Basic rule to in-put figures.

To select formula button, enter certain numbers, then push [=] button at last.
Showing answer/result of computing on the screen.

(Example)

4 × sin 30 × (30 + 10 × 3) = 120

- Input handling

4 [×] [sin] 30 [)] [×] [(] 30 [+] 10 [×] 3 [)] [=]

4×sin(30)×(30+10▷

120

1.2. Basic Calculation

➢ Percentage

After answer, push [SHIFT] [Ans] (%) → percentage value

150 × 20% = 30 150 [×] 20 [SHIFT] [Ans] (%) [=] 30

➢ Degree-minute-second

(degree value) [°'"] (minute value) [°'"] (second value) [°'"] Zero shall be entered.

2°20'30" + 9'30" = 2°30'00"

2 [°'"] 20 [°'"] 30 [°'"] [+] 0 [°'"] 9 [°'"] 30 [°'"] [=] 2°30'0"

1.3. Function calculation

➢ sin, cos, tan

※ push 'sin' or 'cos' or 'tan' + number +)

$\sin\theta = \frac{a}{c}$ a=c×sin θ =10×sin60°

10 [×] [sin] 60 [)] [=] 8.66025…

$\cos\theta = \frac{b}{c}$ b=c×cos θ =10×cos60°

10 [×] [cos] 60 [)] [=] 5

$\cos\theta = \frac{b}{c}$ c=b÷cos θ = 10÷cos60°

10 [÷] [cos] 60 [)] [=] 20

➢ $\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$

Push SHIFT key first.

sin-1(0.5)=30 [SHIFT] [sin] 0.5 [)] [=] 30

※ $\cos^{-1}$, $\tan^{-1}$ are handled with 'cos', 'tan' button.

$\tan\theta = \frac{b}{a}$ $\theta = \tan^{-1}\left(\frac{b}{a}\right) = \tan^{-1}\times(5\div 8)$

[SHIFT] [tan] 5 [÷] 8 [)] [=] 32.00538…

$\cos\theta = \frac{m}{l}$ $\theta = \cos^{-1}\left(\frac{m}{l}\right) = \cos^{-1}\times(4\div 5)$

[SHIFT] [cos] 4 [÷] 5 [)] [=] 36.86989…

➢ csc, sec, cot

Inverse trigonometric function of sin, cos, tan

Inverse 'cos' = 1/tan θ =cot θ (cotangent)

sec(60)=1/cos(60)=2 [cos] 60 [)] [x^{-1}] [=] 2

※ csc, cot are handled with cos, tan button.

$\cos\theta = \frac{b}{c}$ c = b÷cos θ = 10÷cos60°

10 [×] [cos] 60 [)] [x^{-1}] [=] 20

➢ others

√ + umber = [√] (64) [=] 8

x^2 + number = [x^2] (10) [=] 100

2. Mathematics
2.1. Primary
2.1.1. Basic calculation

Q. (1) Please calculate to answer for blank respectively to round at fifth decimal figure, as that 1ft = 0.3048m, 1nm = 1852m. You can use a calculator.

① 16ft ＝（　　　　　　）m

② 5nm ＝（　　　　　　）m

③ 3nm ＝（　　　　　　）ft

④ 1000ft ＝（　　　　　　）nm

⑤ 200kt ＝（　　　　　　）m/s

⑥ 25km ＝（　　　　　　）nm

⑦ 50 m ＝（　　　　　　）ft

⑧ 75m ＝（　　　　　　）ft

⑨ 150 m ＝（　　　　　　）ft

⑩ 300m ＝（　　　　　　）ft

⑪ 5.24% ＝ Tan（　　　　　　）°

⑫ 845km/h ＝（　　　　　　）kt

Q. (2) In case that $a=8$, $b=-4$, and $c=5$,
Please calculate each formula accordingly.

① $a-(b+c)$

② $a\times b$

③ $b\div c$

④ inverse figure of ‘c’ $(=1/c)$

⑤ a^2

⑥ $\sqrt{c}$

⑦ a^2+b^2

⑧ c^2-a^2

⑨ $\sqrt{(a^2+b^2+c^2)}$

⑩ $\sqrt{(c^2-a^2-b^2)}$

2.1.2. Rounding of answer value

Q. (3) Please round answer as required

① 245.46037 (Round-up into integral number) → ________

② 245.46037 (Round-down into 0.1 decimal number) → ________

③ 125.46037 (Round as effective 5 digits) → ________

④ 128 (Round-up by 100 unit) → ________

⑤ 128 (Round-down by 10 unit) → ________

2.2. Algebra

2.2.1. Transforming of unit or figure

Q. (4) Time

① Please transform 3 minutes into second. How much second is it?

② Please transform 1 hour into second. How much second is it?

Q. (5) Distance

Basic factor is that 1NM = 1852m

① Please indicate 5.0NM by meter unit (m).

② Please indicate 10km by NM unit. Answer shall be rounded to be decimal four digits.

Q. (6) Height

Basic factor is that 1ft = 0.3048m

① Please transform 2000ft into meter unit by integral number.

② Please transform 2000m into feet (ft) unit. Answer shall be rounded to be decimal digits.

Q. (7) Speed

① Please indicate 185kt by 'm/s' unit. Answer shall be rounded to be decimal four digits.

② Please indicate Velocity, 200m/s by knot (kt). Answer shall be rounded to be decimal four digits.

Q. (8) Distance (2)

① Please calculate distance with 'meter' unit to fly in 20 second by 185kt. Answer shall be rounded to be integral number.

② Please calculate distance with 'NM' unit to fly in 20 second by 185kt. Answer shall be rounded to be integral number.

2.2.2. Transforming by Scale

Concerning the calculation between actual distance and length on the map, the scale of map shall be regarded.

From Actual Distance into Length on Map : To divide by value of scale.
From Length on Map into Actual Distance : To multiply by value of scale.

Q. (9) From actual distance into length on map

① Map scale is that 1 : 50000.
Please calculate 3000m, 10000m and 1NM into the length on the map respectively.

② Map scale is that 1 : 200000.
Please calculate 3000m, 10000m and 1NM into the length on the map respectively.

Q. (9') From length on map into actual distance

① Map scale is that 1 : 50000.
Please calculate 5cm on the map into the actual distance by meter unit and NM unit respectively. Answer shall be rounded at the third decimal point.

② Map scale is that 1 : 200000.
Please calculate 5cm on the map into the actual distance by meter unit and NM unit respectively. Answer shall be rounded at the third decimal point.
Please calculate 3000m, 10000m and 1NM into the length on the map respectively.

2.2.3. Single equation form

Q. (10) Equation form is that 'y=ax+b'. In case that a=2, b=3, x=4.
Please calculate and answer the 'y' value.

Q. (11) Equation form is that 2y = 3x + 6.
Please indicate single equation form, and 'x' value in case of 'y=0'.

2.2.4. Simultaneous equation form

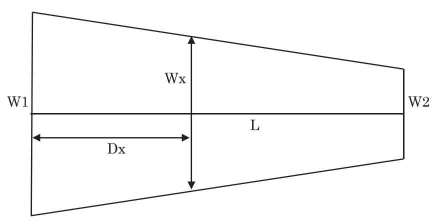
Q. (12) Please solve the simultaneous equation form below.
Answer shall be rounded to be integral number.

$$y=5x+200$$
$$y=9x+40$$

2.3. Geometry

2.3.1. Similarity function

Q. (13) In case that W1=3,000m、W2=2,000m、L=10,000m、and D=4,000m.
Accordingly, please calculate length of 'Wx'. Answer shall be rounded to be integral number.

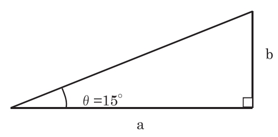


$$Wx = W2 + Dx / L\,(W1 - W2)$$

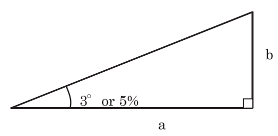
2.4. Trigonometric function

2.4.1. Formula of Right-triangle

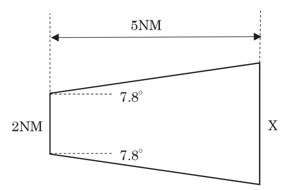
Q. (14) In reference of right triangle below, in case that a = 12NM, $\theta = 15^\circ$. Please calculate 'b' value by meter. Answer shall be rounded up to be integral number.



Q. (15) In reference of right triangle below, in case that 'a' value is constant, Please answer which is longer '3° ' or '5 %' ?



Q. (16) In reference of the figure below, Please indicate the length of 'X' by NM unit. Answer shall be rounded to be three effective digits.



2.4.2. Drafting by ruler and circular compass

Q. (17) Please draft perpendicular line at the center point on the line below by a ruler and circular compass without measuring length or degree.

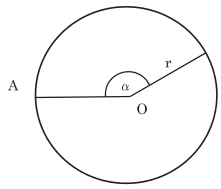
A B

Q. (17') Please draft splaying line from the end point A in both side. Angle of splaying is $\pm 15^\circ$ each side.
You should measure only length to use TAN(tangent) calculation without using a protractor (measuring degree) as well as the way above.

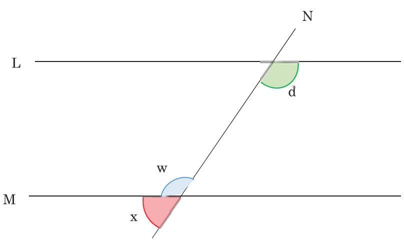
A

2.4.3. Circular

Q. (18) In reference of circular figure below, in case that radius, r=400m, $\angle\alpha = 130°$,
Please calculate the length of arc AB, accordingly. Answer shall be rounded to be one decimal digit number.



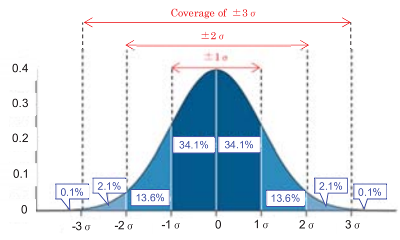
2.4.4. Corresponding angle



Q. (19) In reference of the figure above, line L and line M are parallel.
In case that d = 120° , Please calculate ‘ X ’ and ’ W ’ value.

2.5. Probability

2.5.1. Normal (Gaussian) distribution



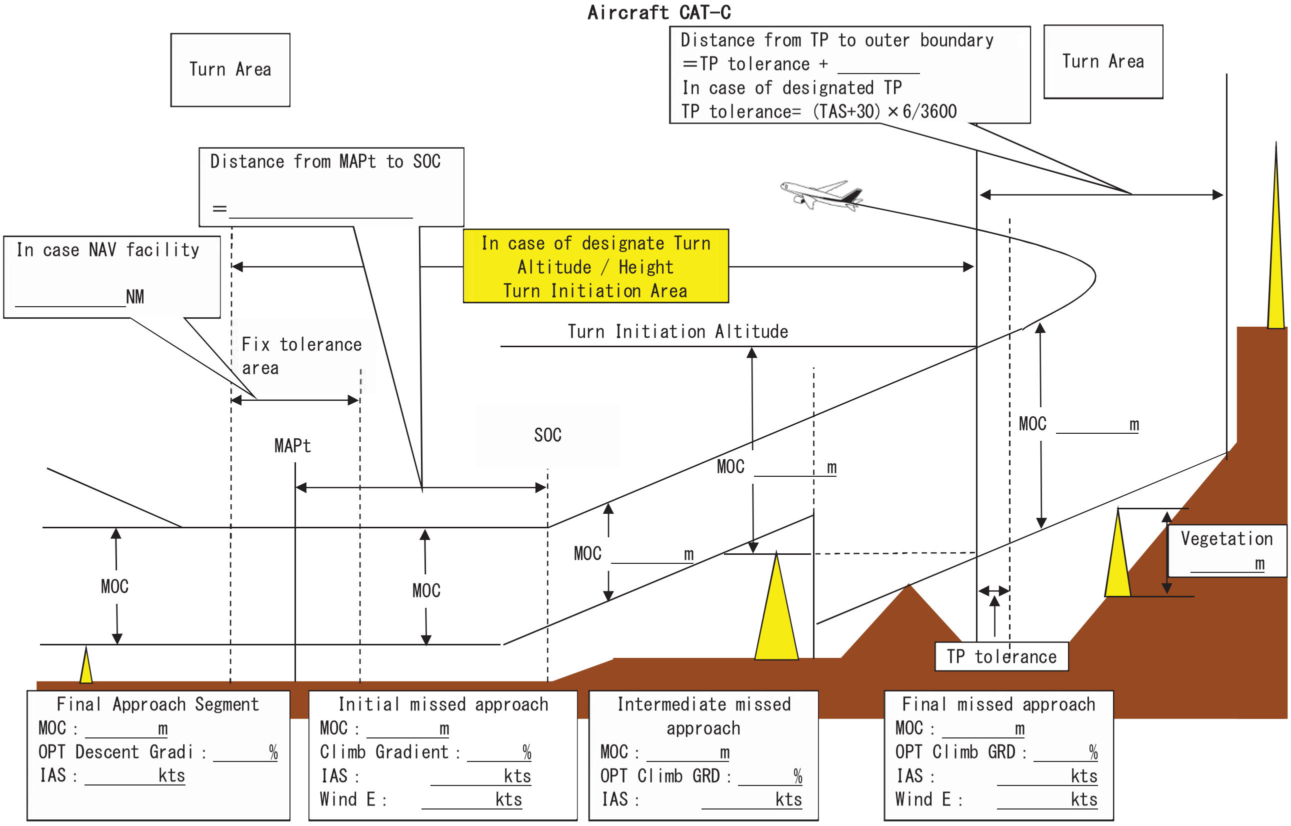
Graph of normal distribution

Q. (20) In case of normal distribution, Please indicate the probability percentage in the coverage of '±3σ'.

....

Exercise Profile View of Turn Missed Approach Area

Aircraft CAT-C



25 April 2017

Straight Missed Approach

Question;

In case aircraft conducting a straight missed approach, please calculate distance from MAPt to SOC, and check MOC over obstacles. If some obstacles affect, please revise OCH/OCA appropriately.

At first, please mark each obstacle on the A3 sheet and draw the area then calculate MOC.

Condition;

Aircraft : cat-C/D   Aerodrome elevation : 500ft

Position of MAPt : overhead of VOR facility (tracking guidance)

OCH: 350ft, OCA: 850ft (final approach segment)

Length of straight missed approach: 10 km (from MAPt)

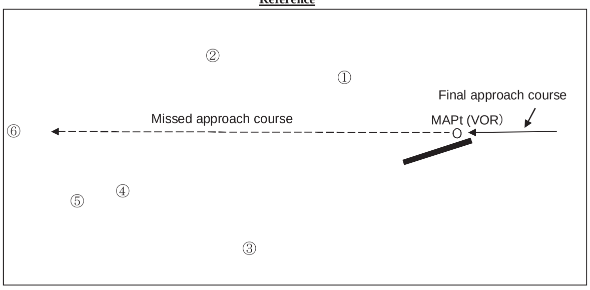
Drawing scale; 1/50,000

Obstacles of reference: in the table below

Obstacles	Distance from earliest MAPt (m)	Distance from center line of Missed approach course (m) *1	Height of Obstacle (above MSL(m))
1. Hotel	4,800m	+2,200m	250m
2. Tower	14,600m	+2,400m	280m
3. Building	13,200m	-3,700m	320m
4. Chimney	19,000m	-2,100m	400m
5. Power Plant	24,400m	-2,600m	560m
6. Antenna	25,100m	0m	680m

*1 (+) shows right side, and (-) shows left side of straight ahead course.

Reference



Answer #1 Distance from MAPt to SOC

CAT. C ____________ m   CAT. D ____________ m

Answer #2 Final OCA/H

CAT. C OCA ________ ft   CAT. D OCA ________ ft

OCH ________ ft   OCH ________ ft

25 April 2017

Turning Missed Approach

Question;

Please design a turning missed approach with conditions below.

You can implement any kind of turning missed approach to avoid obstacle with permissible conditions or applicable parameters.

At first, please mark each obstacle on the A3 sheet and draw the area then design appropriately.

Condition;

Aircraft : cat-D   Aerodrome elevation : 1000ft

Position of MAPt : overhead of VOR/DME facility (tracking guidance)

OCH: 480ft, OCA: 1480ft (final approach segment)

Direction; Left turning (more than 180°, NOT determined next track)

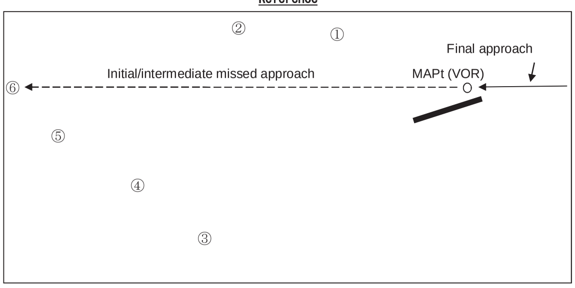
Drawing scale; 1/100,000

Obstacles of reference: in the table below

Obstacles	Distance from earliest MAPt (m)	Distance from center line of Missed approach course (m) *1	Height of Obstacle (above MSL(m))
1. Hotel	4,850m	+2,540m	470m
2. Tower	12,100m	+2,510m	640m
3. Building	14,600	-8,020m	1,140m
4. Chimney	16,400m	-4,080m	630m
5. Power Plant	22,700m	-3,050m	850m
6. Antenna	26,300m	0m	1,090m

*1 (+) shows right side, and (-) shows left side of straight ahead course.

Reference



Answer; (description of turning missed approach conditions or detail on the construction sheet)

Exercise for Obstacle Clearance of the Precision Segment

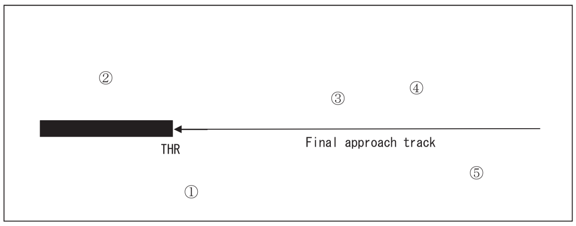
Please calculate and assess each obstacle in the table below to use both BIS figure and OAS figure which were drawn before.
Accordingly, fill out the result of each obstacle penetrating or not (YES or NO) with calculated height of a certain surface at the space in the table. (You can use a space on the figure sheet for calculation memo.)
This exercise should be done with conditions below

RWY length : 3,000 m
Aerodrome elevation : 65 m
THR elevation : 63 m
Aircraft category : cat-D
Others : standard conditions
Reference : Using OAS software to find the data of some points to draw figures, Obstacle data with the origin at THR center point.
Calculation process : Please write down on the drawing sheet of BIS or OAS respectively.
Scale : 1cm = 1,000m

1. Final approach side

obstacle	Location (x value)	Location (y value)	Obstacle height (above MSL)	Calculated height of surfaces (z value) (or out of surface) # add YES or NO penetrating	
				BIS	OAS
1.Hotel	290m	1,510m	144m		
2.Tower	-1,850m	1,240m	212m		
3.Antenna	3,170m	1,120m	393m		
4.Pylon	5,480m	1,230m	185m		
5.Building	7,410m	600m	168m		

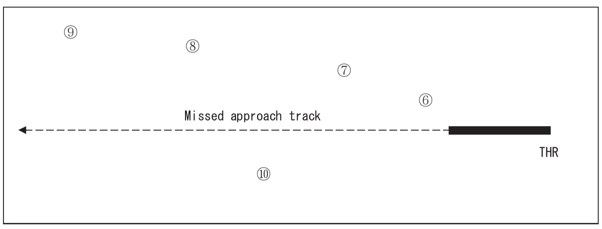
Reference for final approach side



2. Missed approach side

obstacle	Location (x value)	Location (y value)	Obstacle height (above MSL)	Calculated height of surfaces (z value) (or out of surface) # add YES or NOT penetrating	
				BIS	OAS
6.Hotel	-2,530m	920m	125m		
7.Tower	-3,520m	1,370m	208m		
8.Hospital	-8,150m	2,150m	147m		
9.Factory	-11,480m	1,960m	244m		
10.School	-5,560m	1,510m	106m		

Reference for missed approach side



2 MAY 2017

Basic PANS-OPS Course

Midterm Test

Trainee Name ______________________.

[Initial Approach Segment]

Q.1-1 Please calculate the descent gradient of initial approach segment.

(1) crossing IAF: 9,000ft

(2) crossing IF : 4,000ft

(3) distance from IAF to IF: 13NM

Answer ____________

Q.1-2 Please name three types of initial approach to be chosen when it is necessary to turn more than 120° 。

____________ ____________ ____________

[Intermediate Approach Segment]

Q.2-1 Please determine descent gradient of intermediate approach segment with conditions below, and adaption to PANS-OPS criteria.

(1) crossing IF: 3,200ft

(2) crossing FAF: 1,500ft

(3) Distance from IF to FAF: optimum

Answer Descent gradient (CAT-C) ____________

Adaptation to criteria (CAT-C) ____________

Q. 2-2 Please determine minimum altitude at IF with conditions below, according the length of segment.

(1) crossing FAF: 1,500ft

(2) Descent gradient: maximum

(3) Length of segment A: optimum (CAT-B)

B: optimum (CAT-D)

Answer Crossing Altitude at IF (CAT-B) ____________ft

Crossing Altitude at IF (CAT-D) ____________ft

[Final Approach Segment]

Q.3-1 Please determine descent gradient with conditions below;

(1) crossing FAF: 1,700ft

(2) THR elevation: 70ft

(3) Distance from FAF to THR: 5NM

Answer Descent gradient ____________

Adaptation to criteria Yes or No? ____________

Q.3-2 Please determine procedure altitude and minimum altitude at FAF with conditions below;

(1) THR elevation : 70ft

(2) Descent gradient : 4.9%

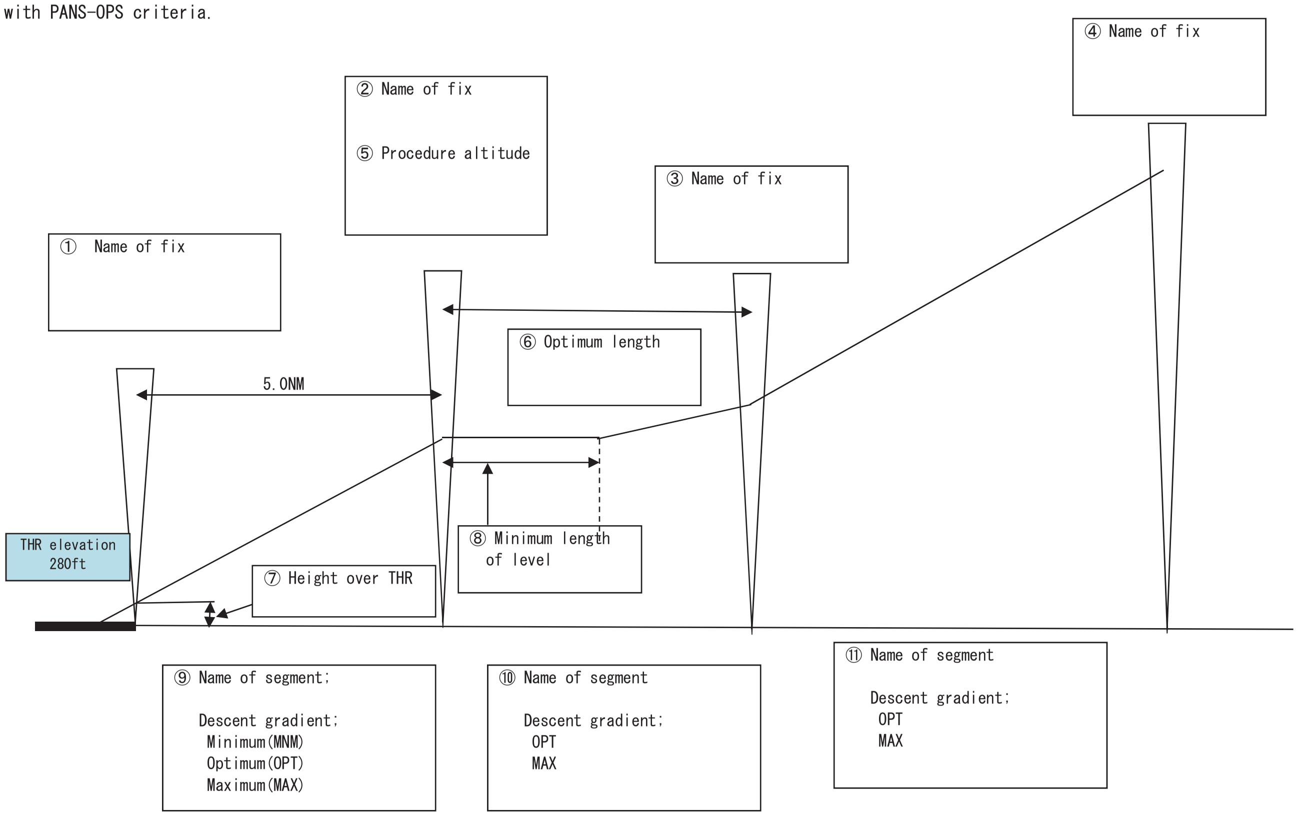
(3) Distance from FAF to THR : 5NM

(4) Obstacle altitude in intermediate segment: 300m

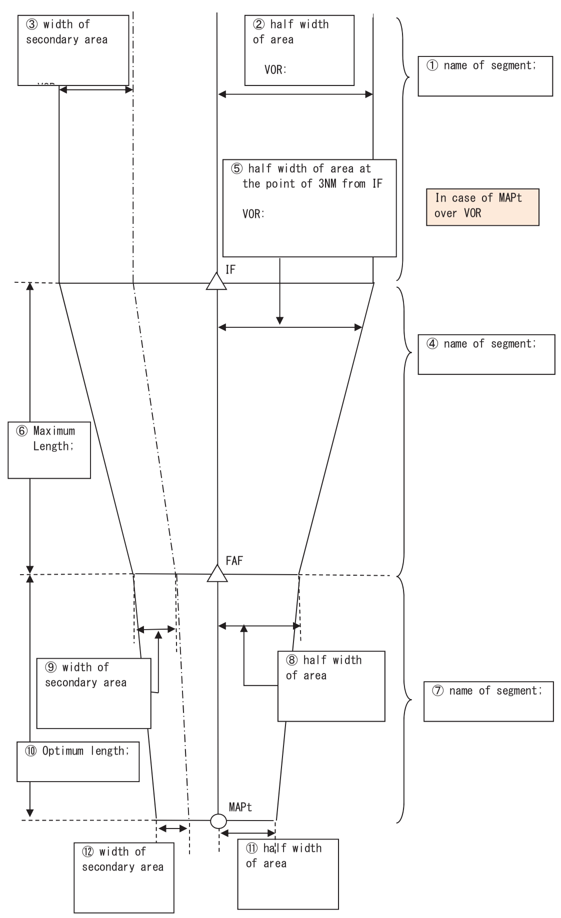
Answer Procedure altitude ____________ft

Minimum altitude ____________ft

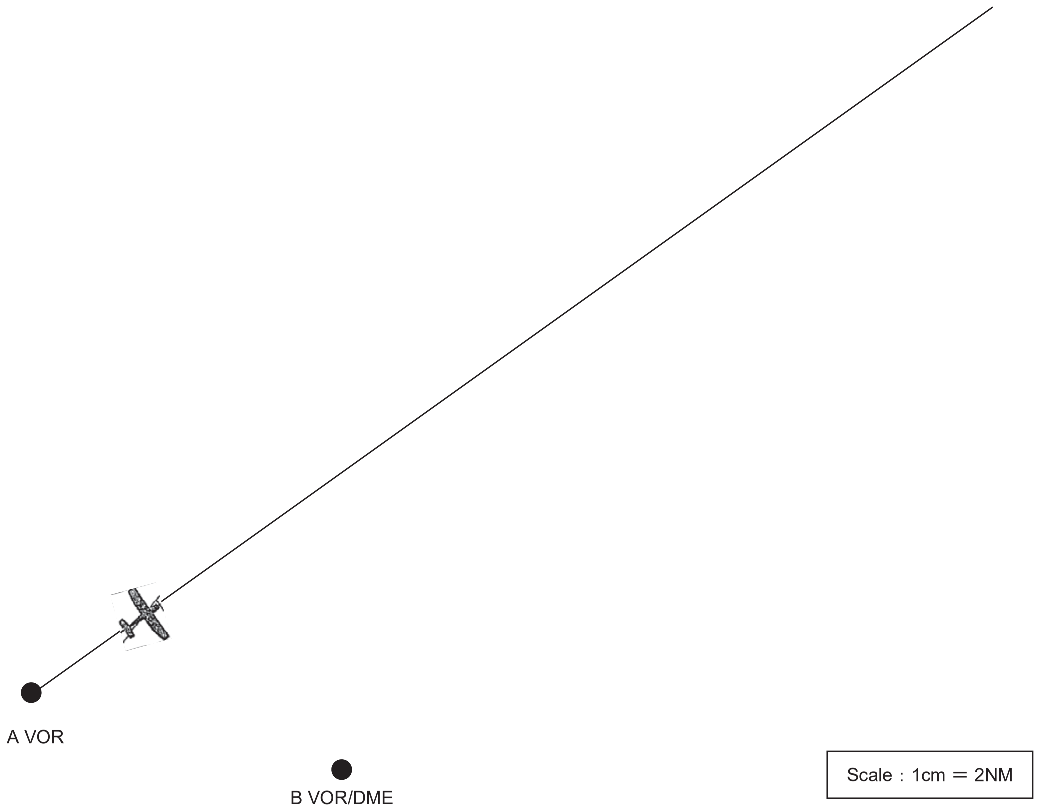
Q.4 Please determine any factors of profile view of approach procedure, and fill out boxes of ①~⑪ with PANS-OPS criteria.



Q.5 Please determine area width of approach segments by 'NM' with forth decimal digit, fill out boxes of ①~⑫.



Q.6 Construction of FIX. Please construct a fix and its tolerance area at an intersection point by 20°.



Q.7 Please determine a final approach course in optimum by VOR/DME and calculate the difference of angle between a final approach course and extended runway centerline with conditions below. The

RWY: 04/22 Q

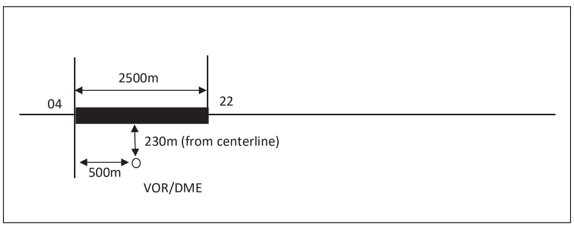
RWY bearing: T035.5°/215.5°

RWY length: 2500m × 45m

Location of VOR/DME; as the figure below

Approach direction: RWY22

Magnetic variation: 3.3°W



Answer ________°

[Covert to TAS]

Q.8 At final approach segment, please calculate TAS of cat-D aircraft at a maximum speed with altitude of 3,000ft and temperature of ISA+20°. It shall be answered by an integral number.

(1) IAS; ________kts

(2) Conversion factor; __________

(3) TAS; ________kts

[Calculation of turn parameter]

Q.9 According to the conditions below, please calculate TAS, Rate of turn(R), Radius of turn(r) and Flight Technical Tolerance(c). It shall be answered by forth decimal number.

Aircraft category : C

ISA : maximum final approach speed

ISA+15°

Turn altitude : 4,000ft

TAS __________kt

R __________°/s

r __________nm

FTT (c) __________nm

[Calculation of SOC]

Q.10 At missed approach segment, please calculate distance from MAPt to SOC with the conditions and process below. It shall be answered by forth decimal number. MAPt is defined to be nominal position.

MAPt: Missed Approach Point, SOC: Start Of Climb

A/C : cat-C

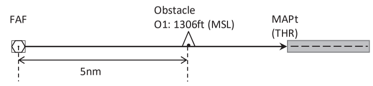
Aerodrome elevation : 1,000ft

MAPt : Fix (2 DME of VOR/DME)

① MAPt tolerance	NM
② IAS	kts
③ Conversion Factor	
④ convert to TAS	kts
⑤ Distance(d)	NM
⑥ Transitional distance(X)	NM
⑦ Distance from MAPt to SOC	NM

[Total Approach Procedures]

Q.11 DETERMINE OCH for VOR RWY09 (1) <u>CAT C aircraft</u>

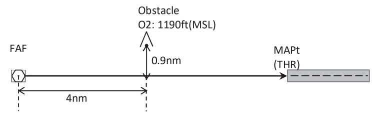


— DATA —
RWY09/27
3000m × 60m
AD elev. 1060ft
THR09 elev. 1064ft

(1) CALCULATE OCA/H

<u>OCA/H : ft/ ft</u>

Q.12 DETERMINE OCH for VOR RWY09 (2) <u>CAT D aircraft</u>

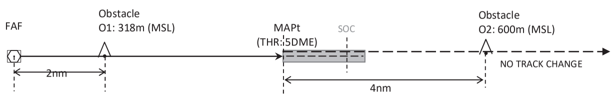


— DATA —
RWY09/27
2500m × 60m
AD elev. 305m
THR elev. 302m

(1) CALCULATE OCA/H

<u>OCA/H : ft/ ft</u>

Q.13 DETERMINE OCH for VOR RWY09 (3) <u>CAT D aircraft</u>



— DATA —
RWY09/27
3000m × 60m
AD elev. 1000ft
THR elev. 1000ft

(1) CALCULATE OCA/H for O1

<u>OCA/H : ft / ft</u>

(2) CALCULATE OCA/H for O2

i) Calculate distance from SOC to O2

MAPt to SOC ;

SOC to O2 ;

ii) Calculated Aircraft ALTITUDE OVER O2 (M/A 2.5% CLIMB) M/A; missed approach

iii) Required ALTITUDE OVER O2

iv) Raise M/A gradient to keep OCA/H, if you need.

<u>M/A gradient: %</u>

v) Raise OCA/H to keep M/A of 2.5%, if you need.

<u>OCA/H: ft/ ft</u>

Produced by Mr. Atsushi YAMANE,

TF-3 Expert

TJ-ATS

Training on Basic PANS-OPS Flight Procedure Design

Final Achievement Test

23 MAY 2017

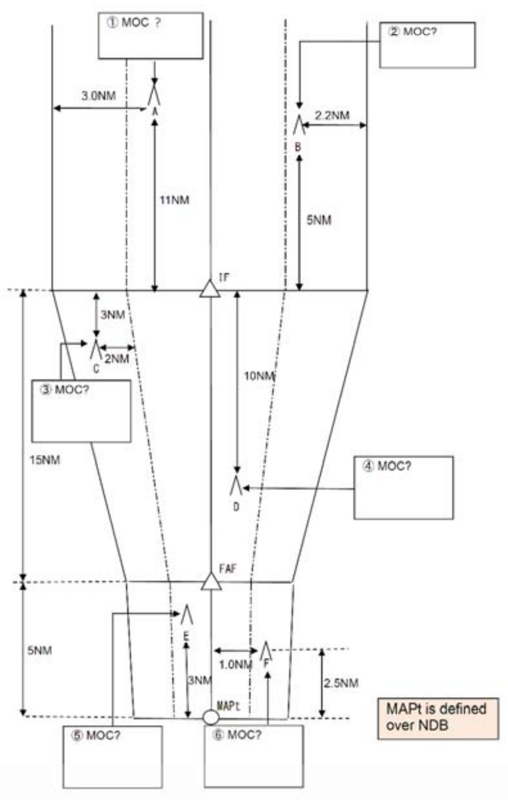
Trainee Name ______________________

Trainer Name ______________________

TF-3 Expert Atsushi YAMANE

Q. Calculate MOC in Approach Segments

Determine by meter (m), or round up as forth decimal digit; example 123.4567 m, if any.



Q. Calculate OCA/H in a final approach segment

Please calculate OCA/H regarding final approach segment with the conditions below;

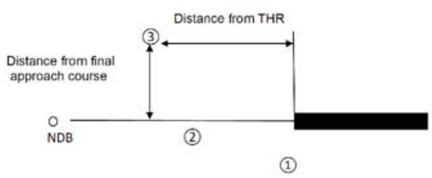
Type of approach procedure; NDB approach
- MAPt position : THR
- THR elevation : 200m
- FAF : NDB (set on the extended runway center line)
- Length of final approach : 5.0NM

Otherwise, please fill out in the table, obstacle is in a primary area or secondary area

Obstacle	Distance from THR	Lateral Distance from final approach course*1	Obstacle Height (above MSL)	Primary area or Secondary area *2
① Hotel	380m	+3,550m	286m	
② Tower	3,720m	+1,540m	268m	
③ Monument	4,500m	-3,600m	360m	

*1 (+) shows right side, and (-) shows left side of straight ahead course.
*2 All obstacle are not located under the final approach segment area.

Reference



Answer OCA/H ______________ ft / ______________ ft

Q. Calculation of SOC for Missed Approach Segment

Calculate distance from MAPt to SOC (Start of Climb) and answer the items below by NM four decimal digit; example 2.3456 NM.

Aircraft category : C
Aerodrome elevation : 2,000ft
MAPt(FIX) : 3 DME
Temperature : ISA+15°

① MAPt fix tolerance: ______________
② IAS: ______________
③ Conversion Factor: ______________
④ TAS: ______________
⑤ Pilot reaction time distance(d): ______________
⑥ Transitional distance(X): ______________

Answer : total distance from MAPt to SOC [NM]

Q. Calculation of turn parameter for Missed Approach Segment

According to the conditions below, please calculate TAS, Rate of turn(R), Radius of turn(r) and Flight Technical Tolerance(c). It shall be answered by four decimal digit.

Aircraft category : C
Aerodrome elevation : 2,000ft
Turn altitude : 3,000ft
Temperature : ISA+15°
FTT : 6 second

TAS ______________ kt

R ______________ °/s

r ______________ nm

FTT (c) ______________ nm

Q. Straight Missed Approach

In case aircraft conducting a straight missed approach under the condition below, please calculate distance from MAPt to SOC, and check MOC over obstacles. If some obstacles affect, please raise OCH/OCA appropriately.

At first, please mark each obstacle on the A3 sheet and draw the area then calculate MOC.

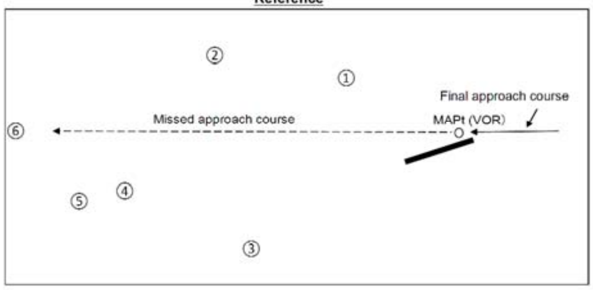
Condition;

Aircraft : cat-D Aerodrome elevation : 500ft Temperature : ISA+15°
Position of MAPt : overhead of VOR facility (tracking guidance) as optional site.
Missed Approach Climb Gradient : 2.5%
OCH_{fa}: 350ft, OCA_{fa}: 850ft (final approach segment)
Length of straight missed approach: 10 km (from MAPt)
Drawing scale; 1cm= 500m
Obstacles of reference: in the table below

Obstacles	Distance from MAPt (m)	Distance from center line of Missed approach course (m) *1	Height of Obstacle (above MSL(m))
1. Hotel	4,800m	+2,200m	250m
2. Tower	14,600m	+2,400m	280m
3. Building	13,200m	-3,700m	320m
4. Chimney	19,000m	-2,100m	400m
5. Power Plant	24,400m	-2,600m	560m
6. Antenna	25,100m	0m	680m

*1 (+) shows right side, and (-) shows left side of straight ahead course.

Reference



Answer #1 Distance from MAPt to SOC
CAT. D ______ m

#2 Final OCA/H
CAT. D OCA ______ ft
OCH ______ ft

Q. Calculation of turn altitude for Turn Departure Procedure

Please draw the turn initiation area on this sheet in case of turn at a specified altitude with conditions below.
So that, please find PDG and the turn specified altitude by feet.

1. No track adjustment or guidance before turn.
2. DER elevation 320m
3. Turn altitude and direction are determined only by these 6 obstacles.
4. Scale 1cm=500m

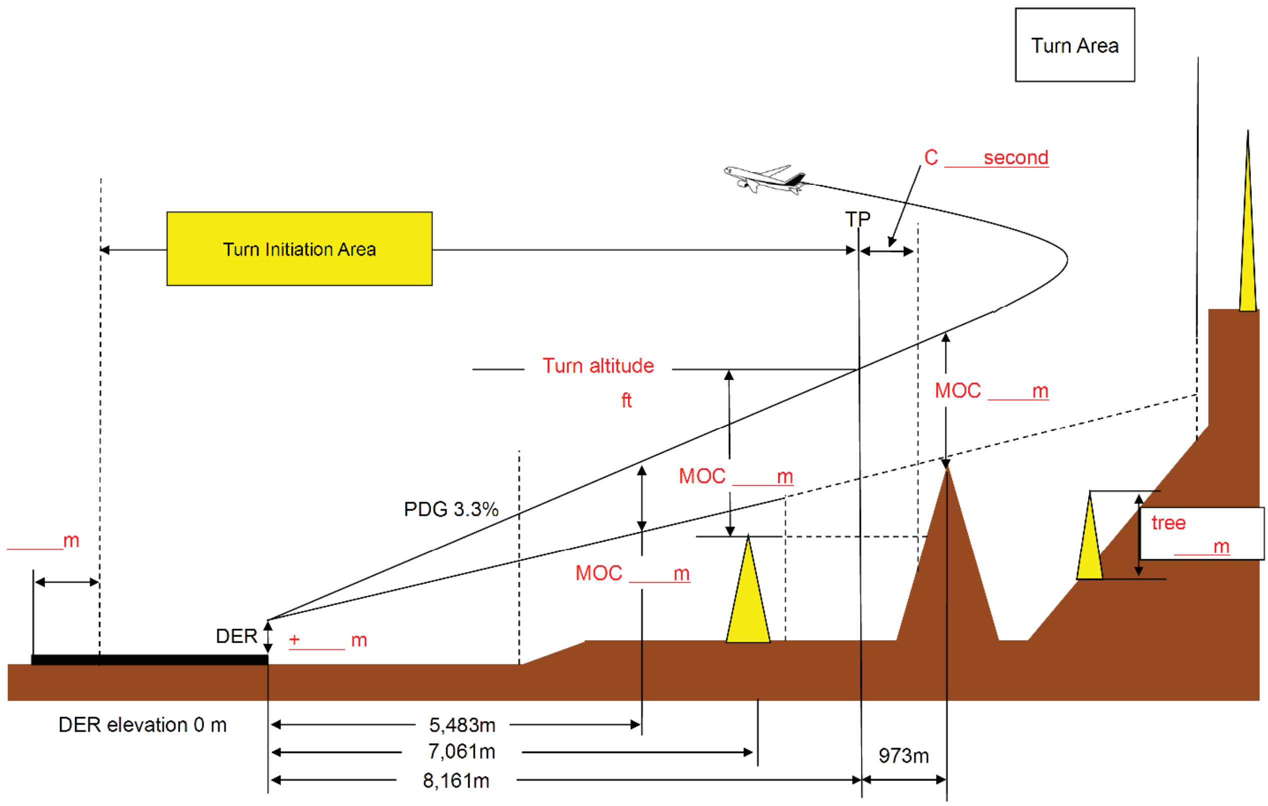
Answer; PDG ______ % Turn specified altitude: ______ ft (round up by 100ft)

★Obstacles' Data

	①	②	③	④	⑤	⑥
Distance from DER	1430m	2250m	3864m	4828m	5616m	6835m
Top altitude (MSL)	350m	385m	442m	474m	585m	613m

*Obstacle positions are the center of number mark

Q. Please fill out value at the red colored items in the profile view below, regarding turn at designated altitude



Q. Determine DA/DH for ILS RWY09 by OAS (CAT I operation) with general data and obstacle data

OBSTACLE;

- O1 ; X=1162m, Y=12m, Z=32m, W-surface
- O2 ; X=2739m, Y=126m, Z=72m X-surface
- O3 ; X= -2168m, Y=868m, Z=98m, Y-surface
- O4 ; X=3527m, Y=534m, Z=126m, X-surface
- O5 ; X= -5836m, Y=1385m, Z=158m, Z-surface

DATA -
RWY09/27
2500m×60m
AD elev. 21ft
THR elev.15ft
Aircraft CAT-C
LLZ to THR 3000m
RDH 15m
LOC THR width 210m
GP 3.0°
M/A 2.5%
Others Standard
OAS
Wz=0.0285*x-9.01
Xz=0.027681*x+0.1825*y-18.18
Yz=0.023948*x+0.210054*y-23.18
Zz= - 0.025*x-22.5

(1) To evaluate O1 ~ O5 with OAS SURFACE, please calculate and answer 'z' value.

Wz O1 ;

Xz O2 ;

Yz O3 ;

Xz O4 ;

Zz O5 ;

(2) Find obstacle to penetrate respective surface concerned or NOT. Answer Yes or NOT;

O1

O2

O3

O4

O5

(3) Calculate equivalent approach obstacle height, if any. You can define obstacle to use a standard method.

(4) Find obstacle and its height, namely approach obstacle height or equivalent approach obstacle height, to affect most to OCA/H

Obstacle: ____________ , ____________ ft

(5) CALCULATE DA/H finally

DA (H) : ____________ ft (____________ ft) .

Map Procurement Specification

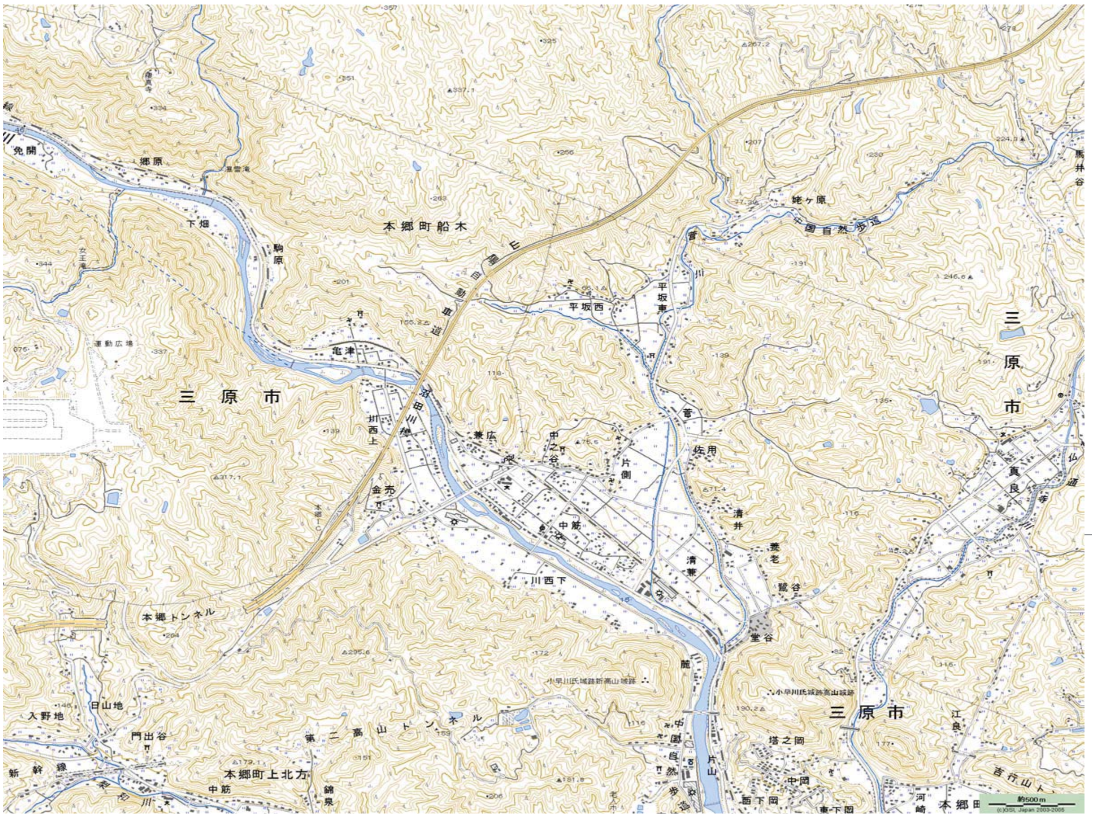
Data Quality Requirement

■Scale
- 1/200,000; almost whole territory
- 1/50,000 ; around Dushanbe airport almost within 50km

■Terrain
- 1/200,000; contour by every 100m elevation
- 1/50,000 ; contour by every ~~20m~~ 40m elevation
- Selected Peak or Spot height/Elevation

■Legend
- Road(10m width or more), Railway, River, Lake
- Residential area, others as we pointed on sheet
- NO name, code or registration

Sample 1/50,000 of Japanese map depiction



Draft

Rescue Coordination Center

Operation Manual
at
Tajikairnavigation

July 2018

Civil Aviation Agency of the Republic of Tajikistan

SUE Tajikairnavigation

This draft is focused on the point at to establish

the Rescue Coordination Center (RCC) activity on initial response

in the SAR operation

as

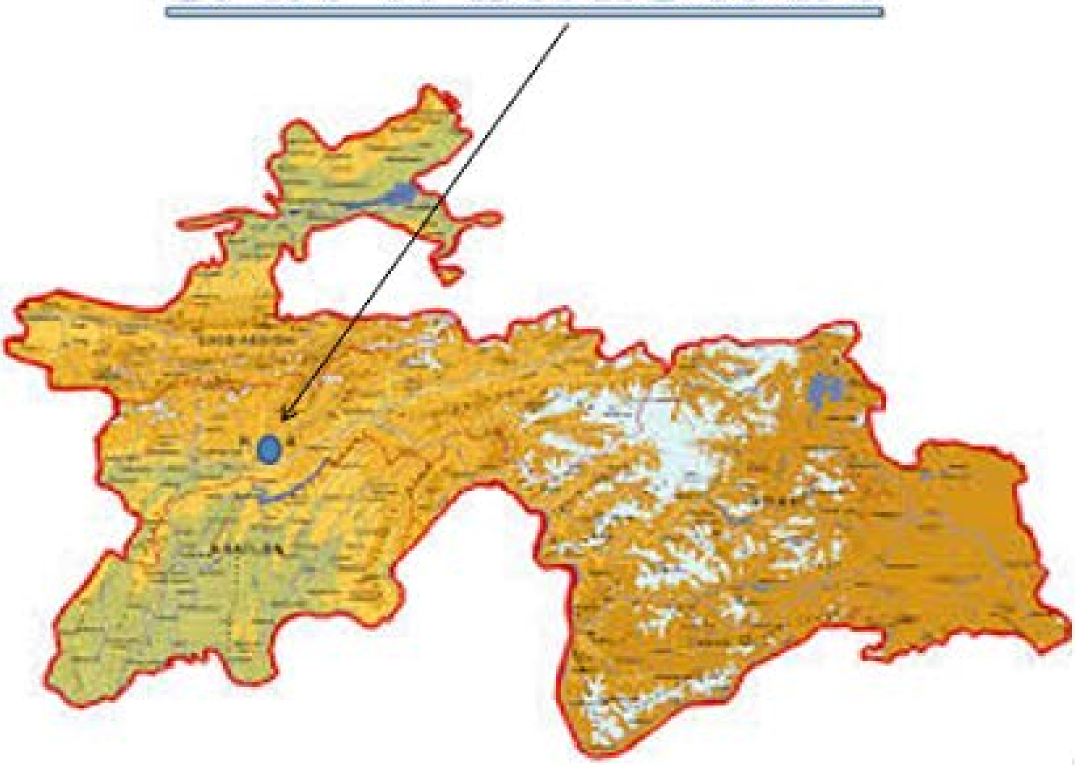
First version

the Republic of Tajikistan and the State Unitary Enterprise (SUE)

Tajikairnavigation.

Contents

SAR TAJIKISTAN



Preface

Search and Rescue (SAR) comprises the search for and provision of aid to persons who are believed to be in imminent danger of loss of life. The SAR operations may take many forms, depending on whether each situation is required or not, on the size and complexity of the operation and on the available staff and facilities. Search and Rescue does not include salvage or the saving of property except where the action is indivisible from that of safeguarding life.

The purpose of this manual is to provide a simple and clear guidance document for the establishment and operation of Search and Rescue (SAR) services on Aviation, allied matters in the territory of related persons and over the organizations where the provision of SAR services is the responsibility as Tajikistan in accordance with the regional Air Navigation Agreements.

Scope

The Standards and Recommended Practices contained in this Manual are in line with requirements of Annex 12 to ICAO Convention and Doc 9731 shall be applicable to all authorities, service providers and agencies responsible for the provision of SAR services to aircraft.

Objectives

To describe guidelines for Rescue Coordination Center operation work in Search and Rescue incidents, that will:

- Give the appropriate high priority to the protection of human life;
- Locate, provide necessary communication assist in distress:
  - using the most effective methods;
  - with the least elapsed time;
  - in the safest and most economical way; and
  - with the least impact on the resources and on the normal, day to day operations of Tajikistan.

Amendments to this "RCC Operation Manual" for Search and Rescue with Air Traffic services (ATS) in Tajikistan are issued by Civil Aviation Agency Tajikistan.

Amendment Records

The amendments listed below have been incorporated into this copy of the RCC Manual.

		Entered Date	Approved Date	Effective Date	Remarks
Amendment No. :					
	Subject :				
	Source :				
	Sections Affected :				
Ver. No. :					
Ver. No. :					
Amendment No. :					
	Subject :				
	Source :				
	Sections Affected :				
Ver. No. :					
Ver. No. :					
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	Sections Affected :				
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	Sections Affected :				
Ver. No. :					
Ver. No. :					
Amendment No. :					
	Subject :				
	Source :				
	Sections Affected :				
Ver. No. :					
Ver. No. :					

Definitions

Alert phase (ALERFA)
A situation wherein apprehension exists as to the safety of an aircraft and its occupants.

Crew member
A person assigned by an operator to duty on an aircraft during flight time.

COSPAS-SARSAT System
A satellite system designed to detect distress beacons transmitting on frequencies 406 MHz.

Distress phase (DETRESSFA)
A situation wherein there is a reasonable certainty that an aircraft and its occupants are threatened by grave and imminent danger and require immediate assistance.

Ditching
The forced landing of an aircraft on water.

Emergency Locator Transmitter (ELT)
Aeronautical radio distress beacon for alerting and transmitting homing signals.

Emergency phase
A generic term meaning, as the case may be, uncertainty phase, alert phase or distress phase.

False Alert
Distress Alert received from any source, including communications equipment intended for alerting, when no distress situation actually exists, and a notification of distress should not have resulted.

Global Positioning System (GPS)
A specific satellite-based system used in conjunction with mobile equipment to determine the precise position of the mobile equipment.

Local User Terminal (LUT)
An earth receiving station that receives beacon signals relayed by Cospas-Sarsat satellites processes them to determine the location of the beacons and forwards the signals.

Mission Control Center (MCC)
Part of the Cospas-Sarsat system that accepts alert messages from the local user terminal(s) and other mission control centers to distribute to the appropriate rescue co-ordination centers or other search and rescue points of contact. VIII May Day.

Spoken International distress signal, repeated three times.

Operator
A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Rescue
An operation to retrieve persons in distress, provide for their initial medical or other needs, and deliver them to a place of safety.

Rescue Coordination Center (RCC)
A unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region.

Search
An operation normally coordinated by a rescue coordination center or rescue sub center using available personnel and facilities to locate persons in distress.

Search and Rescue (SAR) aircraft
An aircraft provided with specialized equipment suitable for the efficient conduct of search and rescue missions.

SAR facility
Any mobile resource, including designated search and rescue units, used to conduct search and rescue operations.

SAR organization
The provider of search and rescue services within the search and rescue region.

SAR service
The performance of distress monitoring, communication, coordination and search and rescue functions, initial medical assistance or medical evacuation, through the use of public and private resources, including cooperating aircraft, vessels and other craft and installations.

Search and Rescue Region (SRR)
An area of defined dimensions, associated with a rescue coordination center, within which search and rescue services are provided.

SAR Area
An area in which the coordination of Search and Rescue is integrated by a single rescue coordination center.

State of Registry
The State on whose register the aircraft is entered.

Uncertainty phase
A situation wherein uncertainty exists as to the safety of an aircraft and its occupants.

Abbreviations

AIP	Aeronautical Information Publication
AIS	Aeronautical Information Services
ATC	Air Traffic Control
ATS	Air Traffic Services
ARCC	Aeronautical Rescue Coordination Center
COSPAS	Cosmicheskeya Systema Poiska Avariynich Sudov (Space System for Search of Vessels in Distress)
ELT	Emergency Locator Transmitter
FIR	Flight Information Region
ICAO	International Civil Aviation Organization
LUT	Local User Terminal
MOS	Manual of Standards
MCC	Mission Control Center
RCC	Rescue Coordination Center
SAR	Search and Rescue
SARSAT	Search and Rescue Satellite-Aided Tracking
SRR	Search and Rescue Region
SITREP	Situation Report
SPOC	Search and Rescue point of contact
SRU	Search and Rescue Unit

Distribution List

No.	Designtation Office Address	Telephone	
		Office	Residence

Chapter -1

1. Introduction

1.1 General

1.1.1 Search and Rescue (SAR) comprises the search for and provision of aid to persons who are, or are believed to be in imminent danger of loss of life. The two operations – Search and Rescue – may take many forms, depending on whether they are both required or not, on the size and complexity of the operation and on the available staff and facilities.

1.1.2 The primary purpose of the SAR is to ensure that the SAR organization meets the SAR needs and obligations under the Convention on International Civil Aviation.

1.1.3 The SAR organization should develop and improve its SAR services, co-operate with neighboring States and to consider the SAR services to be part of a global system.

1.1.4 The procedures, including means of SAR key operations, and RCC operations should be described to assist for the RCC operator.
RCC operations is a matter of it on initial response in the SAR operations.

1.1.5 This Rescue Coordination Center (RCC) Manual provides Standards and Requirements for the establishment, sustainable operation in SAR and RCC services within the Search and Rescue Region (SRR) of Tajikistan.

1.2 SAR Manual

1.2.1 For understanding of SAR Manual should be read in conjunction with:

a) ICAO Annex 12 – Search and Rescue
b) ICAO Annex 13 – Aircraft Accident and Incident Investigation
c) ICAO Annex 6 – Operation of Aircraft
d) ICAO Annex 10 – Aeronautical Telecommunications
e) ICAO Annex 11 – Air Traffic Services
f) ICAO Annex 14 – Aerodromes

Chapter - 2

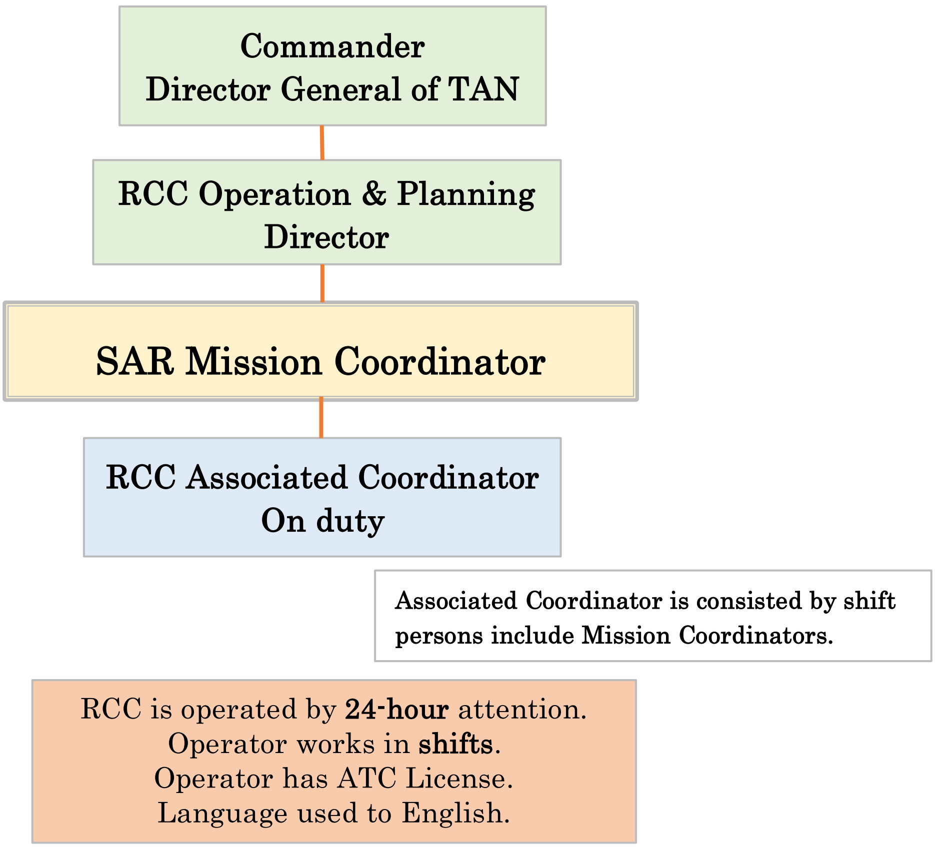
2. Organization

2.1 SAR Coordinating Organization of Tajikistan

The SAR Organization described in the "Agreement of Committee of Emergency Situation and Aviation Enterprise". (See attached APPENDIX- VI)

2.1.1 RCC Operational Organization Chart

The following chart shows the provisioned structure of RCC in an emergency of aviation at the Tajikairnavigation.



This chart is used to activate for the RCC operation when we happened to meet the emergency situation as the chain of command.

2.2 SAR Services

2.2.1 The SAR organization shall, individually or in cooperation with other States, arrange for the establishment and prompt provision of SAR services within Tajikistan SRR to ensure that assistance is rendered to persons in distress. Such services shall be provided on a 24-hour basis.

2.2.2 The SAR Procedures shall be prepared taking into consideration available resources within the **Structure of the State Commission on Emergency Situation (CoES),**

Civil Defense (CD) and other Organizations as may be applicable. The relevant Organizations shall render appropriate assistance and services as per the detailed role & procedures agreed upon and required for SAR Organization.

2.2.3 Those portions of the high seas or areas of undetermined sovereignty for which SAR services will be established shall be determined on the basis of regional air navigation agreements. The SAR organization, having accepted the responsibility to provide SAR services in such areas shall thereafter, individually or in cooperation with other States, arrange for the services to be established and provided in accordance with the provisions of the SAR manual.

2.2.4 Basic elements of SAR services shall include a legal framework, a responsible authority, organized available resources, communication facilities and a workforce skilled in coordination and operational functions.

2.2.5 SAR services shall establish processes to improve service provision, including the aspects of planning, domestic and international cooperative arrangements and training.

2.2.6 In providing assistance to aircraft in distress and to survivors of aircraft accidents, the SAR organization shall do so regardless of the nationality or status of such persons or the circumstances in which such persons are found.

2.2.7 The SAR organization having accepted responsibility to provide SAR services shall use SAR units and other available facilities to assist any aircraft or its occupants that are or appear to be in a state of emergency.

2.2.8 The SAR Organization shall ensure that the Rescue Coordination Center and if applicable Rescue Sub Center develops written Job Descriptions for each of their technical staff.

2.3 Search and Rescue Region (SRR)

2.3.1 The Dushanbe SRR is coincident with the boundaries of Dushanbe Flight Information Region (FIR) and Horog FIR covering the whole territory of Tajikistan.-

2.4 Rescue Coordination Center (RCC)

i. The SAR Coordinator shall establish an RCC within the SRR;

ii. RCC shall be arranged to be staffed 24 hours a day by trained personnel and they should be proficient in the use of the English Language for radiotelephony communications;

As the Dushanbe ACC has been designated as Search and Rescue Point of Contact (SPOC) and is available for 24-hour basis, arrangements shall be made so that anybody requiring contacting Dushanbe RCC can get Dushanbe ACC instantaneously whenever Dushanbe RCC is unmanned.

iii. RCC shall be employed with sufficient workforce skilled in coordination and operational functions;

iv. RCC should have job descriptions for each of its technical staff;

v. Training programs (Initial, Recurrent and Specialized) should be established for RCC staff and maintain Training Records;

vi. Any authority or any element of Search and Rescue Organization having to believe that an aircraft is in an emergency shall give immediately all available information to the RCC concerned.

vii. The RCC is located in the Dushanbe ACC.

viii Dushanbe ACC has been designated as the Search and Rescue (SAR) point of contact (SPOC) for the receipt of COSPAS-SARSAT distress data. Main Center office on duty shall act as an RCC in charge before activation of RCC.

2.5 Names, locations and telephone numbers of RCC are given below:

The address and telephone numbers for RCC point of contact are:

1. Dushanbe Area Control Center,
   AFTN;
   Tel:
   Fax:
   E-mail:

2. Dushanbe International Airport : Control Tower
   Tel:
   Fax:

2.6 Alerting Posts

The following Agency, Aerodromes and associated units are designated alerting post for Dushanbe RCC.

a) All Civil Airports and Aerodrome;
b) ATS units, aircraft, other persons or facilities which may receive and relay alerts;
c) Military units;
d) Civil Aviation Agency (CAA) in Ministry of Transportation (MOT);
e) Committee of Emergency Situation (CoES), Civil Defense (CD).

2.7 RCC Communications

2.7.1 The RCC shall have means of rapid and reliable two-way communication with:

a) associated Air Traffic Services units;
c) associated alerting post;

d) associated SAR Units;

e) a designated Meteorological office or Meteorological watch office; and

f) the Cospas- Sarsat Mission Control Center (MCC) is going to serve the SRR.

2.8 SAR/RCC Units

2.8.1 The RCC organization shall designate as RCC unit's elements of public or private services suitably located and equipped for RCC operations.

2.8.2 As parts of the SAR plan of operation, the SAR organization shall designate elements of public or private services that do not qualify as SAR units but are nevertheless able to participate in SAR operations.

2.9 SAR equipment

2.9.1 SAR units shall be provided with equipment for locating promptly, and for providing adequate assistance at the scene of an accident.

2.9.2 SAR unit should have means of rapid and reliable two-way communication with other SAR facilities engaged in the same operation.

2.9.3 Each SAR aircraft shall be equipped to be able to communicate on the aeronautical distress and on-scene frequencies and on such other frequencies as may be prescribed.

2.9.4 Each SAR aircraft shall be equipped with a device for homing on distress frequencies. (121.5 MHz)

Note 1: Emergency Locator Transmitter (ELT) carriage requirements are available in Annex 6, Parts I, II, and III and relevant Air Navigation Orders.

Note 2: Specification for ELTs is available in Annex 10, Volume III and relevant Air Navigation Orders.

2.9.6 The SAR organization should locate, at appropriate aerodromes, survival equipment suitably packed for dropping by aircraft.

2.9.7 The SAR Organization shall:

a) keep the SAR Plan and procedures in a readily accessible form;

b) amend the SAR Plan whenever necessary to keep its contents up-to-date.

2.9.8 SAR Unit shall:

a) be cognizant of all parts of the plans of operation prescribed that are necessary for the effective conduct of its duties; and

b) keep the RCC informed of its preparedness

2.9.9 The SAR Organization shall:

a) keep the SAR/RCC Manual, SAR plans of operation or Organization and procedure for SAR of aircraft in distress in a readily accessible form;
b) amend the SAR/RCC Manual, SAR plans of operations or Organization and procedure for aircraft in distress whenever necessary to keep its content up to date.

Chapter -3

3. Cooperation

3.1 Cooperation between States

3.1.1 The contracting States shall coordinate their SAR organizations with those of neighboring States.

3.1.2 SAR/RCC whenever necessary, coordinates their SAR operations with those of neighboring States especially when these operations are proximate to adjacent SRR.

3.1.3 Subject to the SAR agreements that had been concluded between Civil Aviation Agency of Tajikistan and the SAR authorities or agencies of neighboring States, the SAR organization shall permit immediate entry into its territory of SAR units of other States for the purpose of searching for the site of aircraft accidents and rescuing survivors of such accidents or provided the approval of entry is obtained from the higher authority.

3.1.4 SAR units entering the territory of neighboring States for SAR purposes shall transmit a request with prior approval from the higher authority, giving full details of the projected mission and the need for it, to the RCC of the neighboring State concerned or to such other authority as had been designated by that State.

3.1.5 Agreements with neighboring states should be made to strengthen SAR cooperation and coordination, setting forth the conditions for entry of each other's SAR units into their respective territories. These agreements should also provide for expediting entry of such units with the least possible formalities.

3.1.6 Requests for the entry of aircraft, equipment and personnel from other States to engage in search for aircraft in distress or to rescue survivors of aircraft accidents should be transmitted to the RCC.

The **RCC** shall:

a) immediately acknowledge the receipt of such a request,
b) forward the request, to the concerned authorities, and
c) as soon as possible, indicate the conditions, if any, under which the projected mission may be undertaken.

3.1.7 Instructions as to the control which will be exercised on entry of such aircraft and/or personnel shall be given by the RCC in accordance with the standing plan for the conduct of SAR in the area.
3.1.8 The SAR organization with prior approval from higher authority shall:

a) when request from other RCCs, provide assistance including assistance in the form of aircraft, vessels, persons or equipment, as may be needed;
b) grant any necessary permission for the entry of such aircraft, persons or equipment into its territory; and
c) make the necessary arrangements with the appropriate customs, immigration or other authorities with a view to expediting such entry.

3.1.9 The SAR organization shall make arrangement for joint training exercises involving its SAR/RCC units, those of neighboring States and operators, in order to promote search and rescue efficiency.

3.1.10 The SAR organization should make arrangements for periodic liaison visits by personnel of its RCC to the centers of neighboring States.

3.2 Cooperation with other Services

3.2.1 The SAR organization shall arrange for all aircraft and local services and facilities which do not form part of the SAR organization to cooperate fully with the latter in SAR and to extend any possible assistance to the survivors of aircraft accidents.

3.2.2 The provide for the most effective and efficient SAR services, the SAR organization should maintain the closet practicable coordination with the relevant aeronautical authorities.

3.2.3 The SAR organization shall ensure that their SAR services cooperate with those responsible for investigating accidents and with those responsible for the care of those who suffered from the accident. To facilitate accident investigation, rescue units should, when practicable, be accompanied by persons qualified in the conduct of aircraft accident investigations.

3.2.4 Any authority, Organization or element of the SAR Organization having reason to believe that an aircraft is in an emergency shall give immediately all available information to the RCC.

3.3 SAR Point of Contact (SPOC)

3.3.1 The SAR organization shall designate a SAR point of contact for the receipt of COSPAS-SARSAT distress data.

3.3.2 Dushanbe ACC/RCC has been designated as the SAR point of contact for receipt of COAPAS-SARSAT distress data.

3.3.3 SAR Organization will be arranged for carriage of ELTs and arrangements for registration of the 406 MHz beacon.

3.4 Dissemination of Information:

3.4.1 The SAR organization shall publish and disseminate all information necessary for the entry of SAR units of other States into its territory or, alternatively, include this information in SAR service arrangements.

3.4.2 When such information could benefit the provision of SAR services, the SAR organization should make available, through the RCC or other agencies, information regarding their SAR plans of operation.

3.4.3 The SAR organization should, to the extent desirable and practicable, disseminate information to the general public and emergency response authorities regarding actions to be taken when there is reason to believe that an aircraft's emergency situation may become cause for public concern or require a general emergency response.

3.4.4 Information necessary for SAR services shall be published in AIP Tajikistan.

Chapter -4

4. Preparatory Measures

4.1 Preparatory Information

4.1.1 The RCC shall have readily available at all times up-to-date information concerning the following in respect of its SRR:

a) SAR units, Rescue units and alerting posts;
b) air traffic services units;
c) means of communication that may be used in SAR operations;
d) addresses and telephone numbers of all operators, or their designated representatives engaged in operations in the region; and
e) any other public and private resources including medical and transportation facilities that are likely to be useful in SAR.

4.1.2 In addition, the RCC should have readily available all other information related to SAR, including information regarding:

a) the locations, call signs, hours of watch, and frequencies of all radio stations likely to be employed in support of SAR operations;
b) the locations and hours of watch of services keeping radio watch, and the frequencies guarded;
c) locations where supplies of droppable emergency and survival equipment are stored; and

d) objects which it is known might be mistaken for unlocated or unreported wreckage, particularly if viewed from the air.

4.1.3 The RCC whose SRR should have ready access to information regarding the position and course and flights within such areas that may be able to provide assistance to aircraft in distress and information on how to contact them.
Note: This information may either be kept in the RCCs or be readily accessible.

4.2 SAR Plans of Operation

4.2.1 The RCC shall prepare detailed plans of operation for the conduct of SAR operations within its search and rescue region.

4.2.2 SAR plans should be developed jointly with representatives of the operators and other public or private services that may assist in providing SAR services or benefit from them, taking into account that the number of survivors could be large.

4.2.3 The plans of operation shall specify arrangements for the servicing and refueling, to the extent possible, of aircraft and vehicles employed in SAR operations, including those made available by other States.

4.2.4 SAR plans of operation should be integrated with Airport Emergency Plans to provide for Rescue Services in the vicinity of aerodromes.

4.2.5 The SAR plans of operation shall contain details regarding actions to be taken by those persons engaged in SAR, including:

a) the manner in which SAR operations are to be conducted in the SRR;
b) the use of available communication systems and facilities;
c) the actions to be taken jointly with other rescue coordination centers, as appropriate:
d) the methods of alerting En-route aircraft;
e) the duties and prerogatives of persons assigned to SAR;
f) the possible redeployment of equipment that may be necessitated by Meteorological or other conditions;
g) the methods for obtaining essential information relevant to SAR operations, such as weather reports and forecasts, appropriate NOTAM, etc.;
h) the methods for obtaining, from other rescue coordination centers, such assistance, including aircraft, persons or equipment, as may be needed;
i) the methods for assisting distressed aircraft being compelled to ditch to rendezvous with surface craft;
j) the methods for assisting SAR or other aircraft to proceed to aircraft in distress; and

k) cooperative actions to be taken in conjunction with air traffic services units and other authorities concerned to assist aircraft known or believed to be subject to unlawful interference.

4.2.6 Search planning involves following

a) evaluating the situation, including the results of any previous searching;
b) estimating the distress incident location and probable error of that location;
c) estimating the survivors' post-distress movements and probable error of that estimate;
d) using these results to estimate the most probable location (datum) of survivors and the uncertainty (probable error of position) about that location;
e) determining the best way to use the available search facilities so the chances of finding the survivors are maximized (optimal search effort allocation);
f) defining search sub-areas and search patterns for assignment to specific search facilities;
g) providing a search action plan that includes a current description of the situation, search object description(s), specific search responsibilities to search facilities, on-scene co-ordination instructions, and
h) search facility reporting requirements.

These steps are repeated until either the survivors are located, or evaluation of the situation shows that further searching would be futile.

4.2.7 **Determination of search areas**

The many diverse criteria involved in estimating the likely location(s) and condition(s) of the survivors make it impossible to give detailed, step-by-step instructions on how to make such estimates. Sound judgment and careful analysis of all available clues are therefore required to produce a valid assessment on which to base a search.

4.2.8 General

The following factors should be considered for their possible effect on the probability area:

– errors in navigation by missing aircraft;
– drift (if applicable) to include currents and wind effect;
– last known position;
– weather in the area;
– elapsed time from last known position;
– aircraft endurance;
– known hazards along the aircraft's route.

Computer programs giving aid in search planning may be used to:

a) calculate drift;
b) calculate probability of detection;

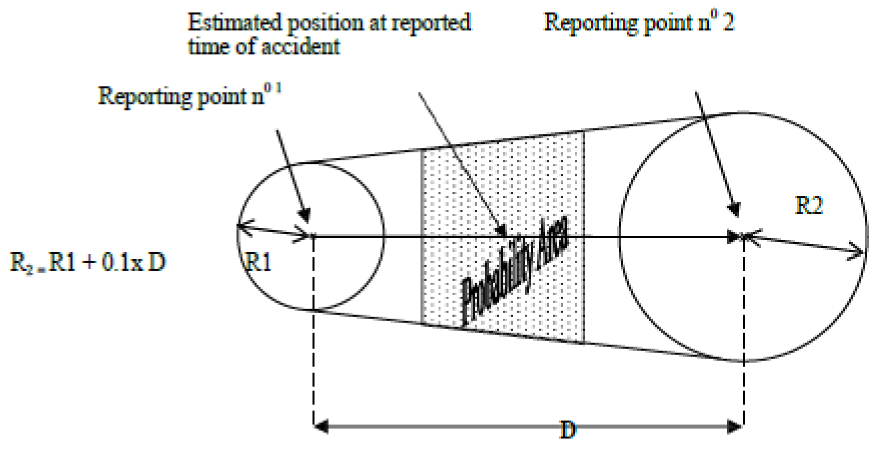
c) evaluate many different scenarios with a range of incident times, positions, situations and environmental factors; and
d) propose locations and areas most likely to contain the search object.

4.2.9 **The possibility area**
The possibility area is displayed as a circle drawn round the last known position of the aircraft. The radius is determined by the endurance at that time, expressed in terms of distance and taking into account the wind velocity. It is assumed that the aircraft may have proceeded in any direction, even opposite to that of the flight plan, until the fuel was exhausted. Determination of the possibility area will enable the SMC to filter incoming reports to identify those geographically irrelevant.

4.2.10 **The probability area**
Systematic search of a large area is normally not practicable, and concentrating the Search in the area where the search object is most likely to be located (the probability area) will make better use of the search Units available. Unless the position of an aircraft in distress is accurately known, the most Probable location of the missing aircraft should be calculated. This location, corrected for surface movements over time, is known as the datum. Determination of the probability area is based on the navigational accuracy of the last known position of the aircraft.

Basic determination of the probability area;
The probability area is determined as follows:
a) draw a circle with a radius R1 (e.g 10 NM) around the last position ;
b) draw a circle around the next reporting point with a radius of R1 plus 10% of the distance between the two points R2; and
c) draw straight lines tangential to the circle.

The datum area will be centered on the probable location of the aircraft based on the reported time of crash. (Probability area – accident between two reporting points)



Probability area – accident between two reporting point

When an aircraft disappears en-route, the first theory is that the aircraft is located on or the intended track or that it has experienced a communication failure and is proceeding in accordance with the flight plan. In this case, the search will be confined to the immediate vicinity of the track.

4.3 Equipage of RCC

RCC should be equipped with the following:

a Legal Documents such as ICAO Annex 10, 11, 12, & 13;
b Organization and procedure for SAR of aircraft in distress,;
c RCC operation manual;
d ANO (Air Navigation Order) on SAR; (further work);
e Sunrise/ Sunset Tables;
f AIP Tajikistan;
g Maps and Charts (Aeronautical, Topographical, and Hydrographical) of different scales;
h Log books pertaining to RCC;
i RCC location charts;
j Distress frequencies ; 121.5MHZ
k Plotting Equipment's;
l HF/ Dushanbe Radio;
m VHF/ Dushanbe TWR, Official Telephone;
n Satellite communication system for reception of COSPAS-SARSAT Distress Alert (406 MHZ).

4.4 Necessary Information & Preparedness

Each SAR units, shall;

a) having knowledge of all parts of the plans of operation that are necessary for the effective conduct of its duties; and
b) keep the rescue coordination center informed of its preparedness.

4.5 SAR Facilities & Logistics

The SAR Organization shall:

a) maintain in readiness the required number of SAR facilities;
b) maintain adequate supplies of rations, medical stores, signaling devices and Other survival and rescue equipment.

4.6 Training Policies & Programs

The Director General of Tajikairnavigation will be expected the development of detailed Training Policies & Programs and Annual Periodic Training Plans for SAR/RCC personnel to maintain a basic level of competency that includes Initial, Recurrent/Refresher, Specialized training, and knowledge about updates in ICAO provisions.

4.6.1 The following training will be included as Initial Training

a) Basic ATC Course
b) Basic SAR course;
c) SAR Administrators course;
d) SAR Management course;
e) SAR/RCC Mission coordinator course;
f) SAR/RCC Team leadership course;
g) SAR/RCC Operations course.

4.6.2 All SAR/RCC staff shall undergo Refresher/Recurrent, Specialized training on the above-mentioned fields.

4.6.3 Training in aeronautical SAR shall consist of theoretical and practical knowledge of aeronautical SAR operations. The following subject areas should be included to demonstrate a level of knowledge appropriate to conduct aeronautical SAR operations in the RCC:

a) General SAR procedures
- ICAO Annex 12 and International provisions
- SAR organization
- SAR resources
- SAR communications
- SAR operating procedures
- RCC as appropriate;
- Meteorological information for SAR
- Conduct of search and air search patterns
- Rescue of survivors

b) Aeronautical SAR procedures
- Aeronautical SAR organization
- Aeronautical RCC administration
- Basic navigation
- Search areas
- Search techniques
- Plotting exercises

4.7 SAR/RCC Training and Exercise

SAR/RCC services, to achieve and maintain maximum efficiency in SAR shall provide regular training of their SAR/RCC personnel and arrange appropriate SAR/RCC Exercise.

a) Simple type/Desktop/Communications Exercise; requires the least planning. It consists of periodic use of all means of Communications between all potential users to ensure capability for actual emergencies.

b) Co-ordination Exercise: (At least once in a year), involves simulated response to a crisis based on a series of scenarios. All levels of SAR services are involved but do not deploy. This type of exercise requires considerable planning, and usually one to three days to execute.

c) Full-Scale Exercise or a Field Exercise: (At least once in two years), differs from the previous types in that actual SAR/RCC facilities are deployed. This increases the scope of SAR/RCC system-testing and adds realistic constraints due to times involved in launching, transit and activities of the SRUs.

4.8 Maintaining Training Records and Files

The SAR/RCC organization shall maintain training records and files for their SAR/RCC staff.

Chapter - 5

5. RCC Operation

5.1 Job descriptions of RCC Officers

5.1.1 Duties and Responsibilities of RCC Operation/Planning Director

RCC Operation/Planning Director (ROPD) is the first SAR manager under the Director General of Tajikairnavigation. He is overall responsible for;

a) establishing, staffing, equipping and managing the RCC Operation;
b) establishing RCCs;
c) providing or arranging for RCC facilities;
d) coordinating RCC training;
e) developing RCC policies;
f) ensuring that the SAR/RCC personnel engaged in all RCC units are properly trained and maintained a level of competence as regards of their functions in the RCC Organization.
g) ensuring that their RCC services cooperate with those responsible for investigating accidents and with those responsible for the care of those who suffered from accident. To facilitate accident investigation, RCC personnel should, when practicable, be accompanied by persons qualified in the conduct of aircraft accident investigations.

5.1.2 Duties and Responsibilities of Search and Rescue Mission Coordinator (SMC)

a) arrange briefing and debriefing for RCC personnel.
b) maintain RCC equipment, including primary lines of communication, in good operational order;
c) Take measures to ensure that RCC receives timely notification from providers;

d) Ensure that information of serviceability, readiness and other particular facilities is suitably recorded in RCC;

e) Ensure that all operations are entered in a log and that they are reviewed and appraised;

f) Submit a report to the ROPD upon the termination of a SAR incident. Each RCC operation is carried out under the guidance of SMC. This function exists only for the duration of a specific SAR incident and is normally performed by the SMC. The SMC may have assisting staff.

g) gather information about distress situations

h) develop accurate and workable SAR/RCC action plans

i) dispatch and co-ordinate the resources to carry out SAR missions.

j) obtain and evaluate all data on the emergency

k) develop the search action plan and rescue action plan as appropriate

l) ascertain the type of emergency equipment carried by the missing or distress Aircraft as possible.

m) plot the areas to search and decide methods and facilities to be used.

n) coordinate the operation with adjacent RCCs when appropriate.

o) evaluate all reports and modify search action plan as necessary.

p) arrange for delivery of supplies to sustain survivors.

q) issue progress report.

r) determine when to suspend or terminate the search.

s) notify accident investigation authorities.

t) prepare a final report.

The SMC guides an RCC operation until a rescue has been affected or it becomes apparent that further efforts would be no avail. The SMC should be well trained in all RCC process, be thoroughly familiar with the applicable RCC plans.

5.1.3 Qualifications of Search and Rescue Mission Coordinator (SMC)

The SMC must be from Air Traffic Services with at least 10 years experience in Air Traffic Control and have completed appropriate SAR training and must keep proficiency as per the organizational procedure. The SMC must be capable of performing all SAR functions required by the SAR authority.

To fulfill the foregoing requirements, the SMC must have a good knowledge of the communications available, the geographical features of the region, and the capabilities and limitations of SAR assets.

5.1.4 Duties & Responsibilities of RCC Associated Coordinator (AC)

The RCC AC shall:

Performs duties in the event of RCC operations as per direction of SMC. In addition, they have responsibility for maintaining the RCC in a continuous state of preparedness, and shall:

a) remain informed on weather situation throughout the SRR;
b) make sure all the communication facilities are available;
c) keep the records of all SAR telephone directories up-to-date;
d) Initiate documentation/Maintain Log memo
e) Prepare material, maps, etc. for plotting;
f) Check up on SAR resources; and
g) Obtain information on;
   i. Origin of alert;
   ii. Type of incident;
   iii. Possibility to contact alerting person;
   iv. Position and/or route, flight plan, last reported position and radio frequency used.
   v. Time of incident;
   vi. Aircraft (Reg, Type and other particulars);
   vii. Persons on board;
   ⅷ. Type of cargo;
   ix. Assistance requested if any;
   x. Intentions of the pilot;
   xi. Communications;
   xii Verify weather (previous, present, prognosis);
   xiii Rescue equipment required;

5.1.4.1 The RCC AC shall consist of personnel who are experienced in ATC and/or trained in SAR operations.

5.1.4.2 When a period of heavy activity is anticipated or during major SAR incidents, the regular staff may be supplemented as required.

5.1.4.3 Person of CAA and Head of Tajikairnavigation that may be involved in providing SAR services to an RCC in the event of an incident are to be alerted as early as practicable so that staffing can be managed.

5.1.4.4 The number of personnel required to staff an RCC will vary with local requirements, such as traffic density, seasonal conditions etc.

5.2 RCC Operating Procedure

5.2.1 Information Concerning Emergencies

5.2.1.1 Any authority or any element of the SAR organization having reason to believe that an aircraft is in an emergency shall give immediately all available information to the RCC.

5.2.1.2 RCC shall, immediately upon receipt of information concerning aircraft in emergency, evaluate such information and assess the extent of the operation required.

5.2.1.3 When information concerning aircraft in emergency is received from other sources than air traffic services units, the RCC shall determine to which emergency phase the situation corresponds and shall apply the procedures applicable to that phase.

5.2.2 Procedure for Rescue Co-ordination Center

The procedure given below is intended to provide guidance to the authorities in charge of Rescue Co-ordination Centers and Alerting Posts. These are only basic procedures normally adopted and should be interpreted with a measure of flexibility because no two search and rescue situations are identical. The sequence of action indicated may have to be modified to suit the particular situation.

Notification of emergency by Alerting posts and/or Air Traffic Services Units shall notify the Rescue Coordination Center concerned immediately an aircraft is believed or reported to be in a state of emergency and also the phase of emergency.

5.2.3 Procedures where responsibility for operations extends to two or more Contracting States

5.2.3.1 When the conduct of operations over entire Search and Rescue region is the responsibility of more than one Contracting State, each involved State shall take action in accordance with the relevant plan of operations when so requested by the Rescue Coordination Center of the region.

5.2.4 Procedures for Authorities in the Field

5.2.4.1 The authority immediately directs to conduct of operations or any part thereof shall:

a) give instructions to the units under their direction and inform the RCC of such instructions; and
b) keep the RCC informed of developments.

5.2.5 Procedures for RCC during Emergency Phases

Three phases of emergencies are:

a) **Uncertainty phase**, when

i) no communication has been received from an aircraft within a period of thirty (30) minutes after the time a communication should have been received or from the time an unsuccessful attempt to establish communication with such an aircraft was first made, which ever was earlier.

ii) an aircraft fails to arrive within thirty (30) minutes of the estimated time of arrival last notified to or estimated by air traffic service units, whichever is the later, except when no doubt exists as the safety of the aircraft and its occupants.

Upon the occurrence of an uncertainty phase, the RCC shall cooperate to the utmost with Air Traffic services units and other appropriate agencies and services in order that incoming reports may be speedily evaluated.

b) **Alert phase,** when:

i) following the uncertainty phase, subsequent attempts to establish communication with aircraft or enquiries from other sources have failed to reveal any news of the aircraft, or when;

ii) an aircraft has been cleared to land and fails to land within five minutes of the estimated time of landing and communication has not been re-established with the aircraft, or when;

iii) information has been received which indicates that the operating efficiency of the aircraft has been impaired, but not to the extent that a forced landing is likely, except when evidence exists that would allay apprehension as to the safety of the aircraft and its occupants, or when;

iv) an aircraft is known or believed to be the subject of unlawful interference.

Upon the occurrence of an alert phase the Rescue Coordination Center shall immediately alert Search and Rescue units and initiate any necessary action.

c) **Distress phase**, when :

i) following the alert phase, further unsuccessful attempts to establish communication with aircraft and more widespread enquiries point to the probability that the aircraft is in distress; or when:

ii) the fuel on board is considered to be exhausted or to be insufficient to enable the aircraft to reach safety; or when:

iii) information is received which indicates that the operating efficiency of the aircraft has been impaired to the extent that a forced landing is likely ; or when:

iv) information is received, or it is reasonably certain that the aircraft is about to make or has made forced landing or has crashed.

5.2.5.1 Notification by ATS Units: The notification from an ATS unit to RCC or by RCC to RCCs of adjacent countries and to associated relation office in Tajikistan will contain the following information in the order listed:

a) INCERFA, ALERFA or DETRESFA, as appropriate to the phase of the emergency;
b) agency and person calling;
c) nature of the emergency;
d) significant information from the flight plan (call sign & registration marking of aircraft/owner/type/fuel/place of departure/destination etc.);
e) time of last communication, by whom received, and frequency used;
f) last position report and how determined;
g) color and distinctive marks of aircraft;
h) any action taken by the reporting officer including details of information when received through a reporting aircraft;
i) other information.

5.2.5.2 Notification by informants other than ATS Unit All persons are encouraged to report abnormal occurrences they have witnessed or may have heard of. Notification that an aircraft has crashed, is overdue or in a state of emergency, etc; may therefore reach to RCC from any source, either directly or relayed through ATS units and/or alerting posts.

5.2.5.3 Evaluation of Report and action by RCC
After evaluating the information, the RCC will declare the appropriate emergency Phases & will immediately inform:

a) Dushanbe ACC/FIS;
b) Details of information received shall be entered in a log book which shall also be used for recording subsequent developments. The initial notification of an incident should be entered on a standard “Initial Report Form” (Appendix-III) supplies of which should be available at RCC, ATS units and alerting posts (where applicable). Its use will be precluded the possible loss of certain important details because this was not called to the attention of the information;
c) Initial action to obtain full details of the aircraft in case of Dep. /Plan. Message not received;
d) Inform concerned ATS units and Alerting posts for necessary search and rescue action and the associated relation Office;

e) Inform other related parties.
f) Plot the probable estimated position of the aircraft on the map.

5.2.6 Initiation of SAR action in respect of an aircraft whose position is unknown

5.2.6.1 In the event that an emergency phase is declared in respect of an aircraft whose position is unknown and may be in one of two or more Search and Rescue regions, the following shall apply:

a) When a Rescue Coordination Center is notified of the existence of an emergency phase and is unaware of other centers taking appropriate action, it shall assume responsibility for initiating suitable action in accordance with 5.1.3 and confer with neighboring Rescue Coordination Centers with the Objective of designating one Rescue Coordination Center to assume responsibility forthwith.
b) Unless otherwise decided by common agreement of the rescue coordination centers concerned, the rescue coordination center to coordinate Search and Rescue action shall be center position for:
   i. the region in which the aircraft last reported its position; or
   ii. the region to which the aircraft was proceeding when its last reported position was on the line separating two Search and Rescue regions; or
   iii. the region to which the aircraft was destined when it was not equipped with suitable two- way radio communication or not under obligation to maintain radio communication; or
   iv. the region in which the distress site is located as identified by the Cospas-Sarsat system.

5.2.6.2 Passing of information to aircraft in respect of an emergency phase which has been
declared:

i. Whenever applicable, the RCC responsible for SAR action shall forward to the air traffic services unit serving the flight information region in which the aircraft is operating, information of the SAR action initiated, in order that such information can be passed to the aircraft.

5.2.7 Search

5.2.7.1 SAR Information Flow Chart

Organization chart is described for the Aviation SAR in Tajikistan centering on Rescue Co-ordination Center (RCC).

…. It is under consideration.

5.2.8 Procedures for RCC - termination and suspension of operations

5.2.8.1 SAR operations shall continue, when practicable, until all survivors are delivered to a place of safety or until all reasonable hope of rescuing survivors has passed.

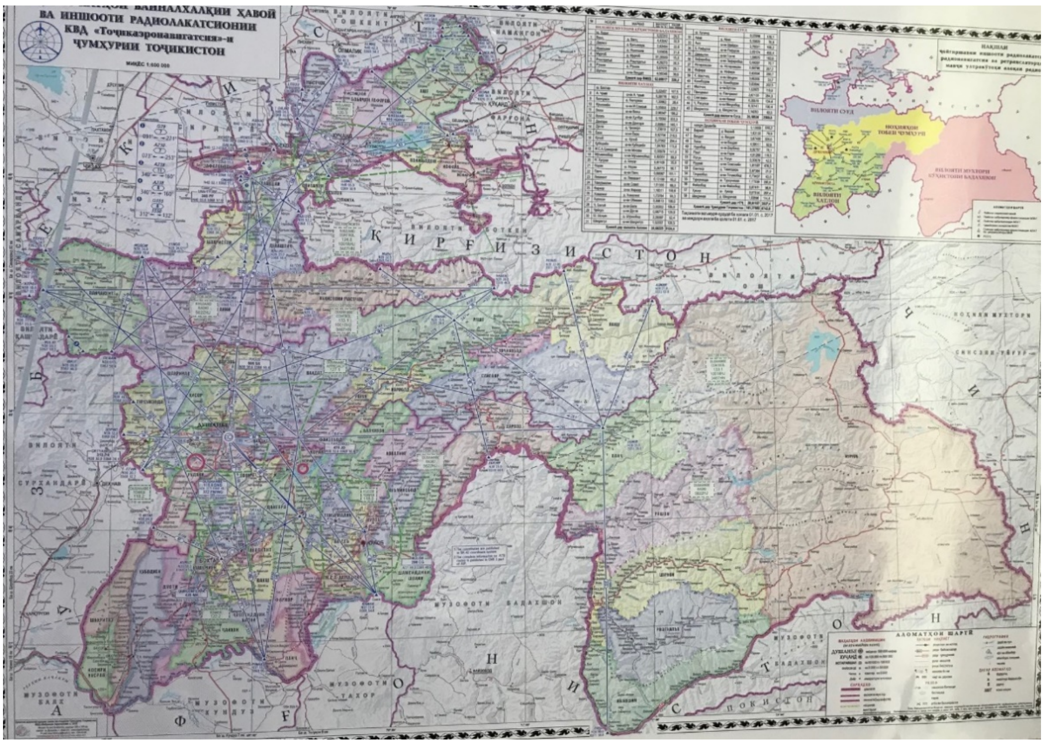
5.2.8.2 The responsible Rescue Coordination Center shall normally be responsible for determining when to discontinue SAR operations.

Note.- Contracting States may require input from other appropriate State authorities in the decision-making process leading to termination of SAR operations.

5.2.8.3 When a SAR operation has been successful or when an RCC considers, or is informed, that an emergency no longer exists, the emergency phase shall be cancelled, the SAR operation shall be terminated and any authority, facility or service that has been activated or notified shall be promptly informed.

5.2.8.4 If a SAR operation become impracticable and the RCC concludes that there might still be survivors, the center shall temporarily suspend on-scene activities pending further developments and shall promptly inform any authority, facility or service which has been activated or notified. Relevant information subsequently received shall be evaluated and SAR operations resumed when justified and practicable.

RCC AREA OF RESPONSIBILITY



APPENDIX

APPENDIX- I Address and Telephone numbers of SAR Services

Which are "Name" , "Office Address" and "Telephone No.".

No.	Name / Address	Office Address	Telephone No.
	Chairman Committee of Emergency Situation		Tel: Mob: Fax: e-Mail:
	Director Civil Aviation Agency		Tel: Mob: Fax: e-Mail:
	Director General Tajikairnavigation		Tel: Mob: Fax: e-Mail:
	First Deputy Director General Tajikairnavigation		Tel: Mob: Fax: e-Mail:
	Director RCC Operation and Planning		Tel: Mob: Fax: e-Mail:
	RCC Officer SAR Mission Coordinator		Tel: Mob: Fax: e-Mail:
	RCC Officer Duty Air Traffic Controller Control Tower Dushanbe International Airport		Tel: Mob: Fax: e-Mail:

And other related persons.

Chief Air Traffic Controller in Dushanbe ACC

APPENDIX-II Address and Telephone numbers of Alerting Posts

Name of Agencies, Office/Designation,	Telephone Numbers Office,	Residence
Military		
Meteorological Department		
Fire Services		
Medical Center		

APPENDIX-III Initial Report Form

1.1 Emergency Phase: INCERFA/ALERFA/DETRESFA

1. Date/ Time……………

2. Agency or person calling ………………………………

    Occupation………………………………………………………………………

    Address, Homes…………………………………… Phone No………………………

    Address, Business…………………………… Phone No………………………

3 Nature and location of emergency

……………………………………………………………………………………………

……………………………………………………………………………………………

……

4. Observation time and location…………………………………………………………

    Departure Point………………………………… Time……………………..

    Expected route……………………………………Cruising Speed…………...

    Intended destination………………………………ETA……………….

    Fuel endurance……………………………………………………………………

    Fuel endurances remaining at last known position………………………………

    Alternates or possible alternates…………………………………………………

5. Communication : Call RTF…………………RTG………………SELCALL

    Last Communication receive at…………………… (Time) by……………………

    (Station) on………………………………………… (Freq)…………………

6. Last Position report………………………… (Place, time) How determined……

7. Aircraft: Type……………………Registration……………………………………

    Color and distinctive markings……………………………………………

    Owner or operating agency……………………………………………......

    Emergency equipment carried………………………………………………

8. Local action taken…………………………………………………………………

9. If survival stores are to be dropped type and quantity likely to required

    ……………………………………………………………………………......

10. Persons involved in incident:

    Name of pilot ……………………………………………………………

    Crew…………………………………………………………………………

    Passengers…………………………………………………………………

    Number of uninjured ……………… injured………………Casualties………

11. Weather conditions in distress area, including sea condition if applicable, as reported by informant ……………………………………………………………

12. Action taken by person receiving report ………………………………………………

Signature……………………

APPENDIX- IV Sample of Search Action Message

1.1 Sample of Search Action Message-1

FROM.................................
TO.................................
DISTRESS C/SIGN.................. POSITION............................
SEARCH ACTION PLAN FOR DATE........... YEAR

1. SITUATION:
   A. C/SIGN REGN TEXT OF THE MSG (US REGISTERED AIRCRAFT xxxxx REPORTED ENGINE FAILURE AND INTENTIONS TO FORCED LANDING NEAR...............)
   B. TYPE OF ACFT..................... COLOUR OF THE ACFT.........................
   C. NO OF POB..................................
   D. PRIMARY SEARCH OBJECTS...............................

2. ACTION: (REQUEST ....TO PROCEED TO................TO SEARCH FOR SURVIVORS)
3. SEARCH AREAS.......................................
4. EXECUTION...
5 CO-ORDINATION...
6. COMMUNICATIONS..
7. REPORTS..

1.2 Sample of Search Action Message-2

FROM ....
TO...
DISTRESS C/Sign............DITCHED............EASTERN MAUNTAIN OF HOLONG
SEARCH ACTION PLAN FOR 10 APRIL 20xx

1. SITUATION..............
   A. TAJIKISTAN REGISTERED AIRCRAFT ...xxxxx REPORTED ENGINE FAILURE AND INTENTION TO DITCH NEAR _______50NM WEST OF _________ AT 1522UTC
   B. CESSNA-150, WHITE WITH BLUE TRIM
   C. TWO PERSONS ON BOARD
   D. PRIMARY SEARCH OBJECT: 7-PERSONS ORANGE RAFT WITH CANOPY, FLAYERS.
   SECONDARY: PERSONS IN THE POND, DEBRIS, MIRROR, ORANGE SMOKE.
2. ACTION: REQUEST........CAPT..... DIVERT TO SEARCH FOR SURVIVORS

3. SEARCH AREAS : (RED IN COLUMNS)

AREA CORNER POINTS

A-1 COORDINATES...

A-2 COORDINATES...

4. EXECUTION:(READ IN FIVE COLUMNS)

AREA........... FACILITY............ PATERN......... CREEP.......... CSP

A-1 MR.....X....... ....COORDINATES........

A-2 CAPT...... .... - DO-

5. CO-ORDINATION:

A. MR...X..... SAR CO-ORDINATOR IS SMC.

B. MR...Y..... DESIGNATED OSC.

C. COMMENCE SEARCH UPON ARRIVAL ON-SCENE.

D. TRACK SPACING 3 NM DESIRED.

6. COMMUNICATIONS:

A. CONTROL: ....

B. ON-SCENE: PRIMARY SECONDARY

VHF-FM CH-___ CH-___

7. REPORTS:

A. OSC SEND SITREP TO SMC UPON ARRIVAL ON-SCENE, THEN HOURLY THEREAFTER INCLUDE WEATHER, ETC. FOR EACH AREA IN ALL SITREPS.

B. OSC REPORT ACTUAL AREA SEARCHED (SQUARE NAUTICAL MILES)

HOURS SEARCHD, TRACK SPACING USED, COURNER POINTS OF ACTUAL AREAS SEARCHED IF DIFFERENT FORM THOSE ASSIGNED. SEND REPORTS VIA MOST RAPID MEANS.

APPENDIX-V RCC Operation Plan in Tajikairnavigation

Emergency Phase	Steps	Operation Plans	Case-A	Case-B
Uncertainty	Before Uncertainty	0) Receive phone call from COSPASS-SASAT MCC to SPOC (Same as RCC telephone number)		
		0) Receiving notification from ATC unit in case of Annex-11 5.2.1, a) -1) and 2)	ATS unit inform to MC ATS unit inform to Military (SPOC=PC on ACC)	ATS unit inform to MC MC informs to Military (SPOC = MC)
		0) Receive phone call from foreign RCCs, airlines or other various resources.		
		0) Receive notification from DIA in accordance with DIA Emergency Plan (inside of 8km-R)		
		1) 2) Inform to Military (Air space owner)		
	Initiate phase	3) Initiate the Uncertainty Phase	by PC in ACC	by MCC/SMC
	Cooperate with ATS unit	4) Verify the detail of flight which is suspected in destress	PC and SMC can do themselves ATS Inside by PC with SMC in ACC	SMC to it with ATS unit support ATS - MC by SMC/MCC in MC
		4) Log all information, progress reports and detail of actions		
		4) Determine the most probable location or most likely continuation of the route		
		6) Coordinate with ATS Unit and MC		
		7) Coordinate with Military		
Trigger to phase transit		8) Complete or initiate all relevant actions as detailed for Uncertainty Phase above	by PC in ACC	by MCC/SMC in MC
Alert	Verify	6) Receiving notification from ATC unit in case of f Annex-11 5.2.1, b) -1) to 4)		
		6) Review all information received	by PC with SMC in ACC	by SMC/MCC in MC
		6) Continue efforts to obtain information about distress aircraft from all resources		
	Alert	9) Immediately alert to SAR units (Military) and initiate necessary actions	by PC with SMC in ACC	by SMC/MCC in MC
		10) Immediately alert to SAR units (CoES) and initiate necessary actions		
		4) Carefully re-evaluate all known details of the flight to confirm estimated position	PC and SMC can do themselves by PC in ACC	SMC to it with ATS unit support by MCC/SMC in MC
		4) Estimate and plot the probable position, and maximum range from its last known position		
Trigger to phase transit		13) Complete or initiate all relevant actions as detailed for Alart Phase above		
Destress	Notification by AFTN	14) Send ALR message via AFTN (by Briefing office)	by ATS	by ATS
		15) Send NOTAM (SAR activity area) via AFTN	by MC	by MC
		16) Draw up a detailed plan of actions for conducting search and rescue operations	(by CoES)	(by CoES)
	SAR Units Movement	16) Ascertain the position of the aircraft	by ATS	by ATS
		11) Notify the Operator, other RCCs, associated ATC unit	by MC	by MC
		16) Request at an early stage such aircraft and maintain a listening 121.5MHz by VCS.	by ATS	by ATS
		16) Assist the aircraft in distress as far as practicable	by ATS	by ATS
	Others	11) Notify the appropriate accident investigation authority and the State of Registry of the aircraft	by MC	by MC
Cancelation	Others	XX) If it is determined that the aircraft is not in destress, the RCC will cancel SAR operation and immediately inform all parties concerned	by PC with SMC in ACC	by SMC/MCC in MC

ATS: Air Traffic Services
MC: Mission Coordinator
MCC: Mission Coordination Center
PC: Point of Contact
SMC.SAR Mission Coordinator

APPENDIX-VI Agreement of Committee of Emergency Situation and Aviation Enterprise

РАСПОРЯЖЕНИЕ

№ 13 "26" 01 2015 г. г.Душанбе

Об утверждении «Инструкции о порядке взаимодействия между авиационными предприятиями ГА и Комитета по чрезвычайным ситуациям и гражданской обороны при Правительстве Республики Таджикистан при проведении поисковых и аварийно спасательных работ по ликвидации последствий стихийных бедствий »

В целях совершенствования государственного надзора за деятельностью гражданской авиации, исполнение стандартов и рекомендуемой практики Международной организации гражданской авиации (ИКАО) р а с п о р я ж а ю с ь :

1. Утвердить «Инструкции о порядке взаимодействия между авиационными предприятиями ГА и Комитета по чрезвычайным ситуациям и гражданской обороны при Правительстве Республики Таджикистан при проведении поисковых и аварийно спасательных работ по ликвидации последствий стихийных бедствий» (прилагается).

2. Управлению гражданской авиации довести настоящее распоряжение до руководителей касающихся предприятий гражданской авиации Республики Таджикистан.

3. Контроль за исполнением настоящего распоряжения возложить на Государственную службу по надзору и регулированию в области транспорта.

Министр Х. Асозода

«УТВЕРЖДАЮ»
Председатель Комитета по чрезвычайным ситуациям и делам гражданской обороне при Правительстве Республики Таджикистан
генерал полковник Абдурахимов Х.С.

«УТВЕРЖДЕНО»
Распоряжением Министра транспорта Республики Таджикистан
№ 13 от 21-01 2015 г.

Инструкция

о порядке взаимодействия между авиационными предприятиями ГА и Комитета по чрезвычайным ситуациям и гражданской обороны при Правительстве Республики Таджикистан при проведении поисковых и аварийно спасательных работ по ликвидации последствий стихийных бедствий

ОСНОВНЫЕ ПОНЯТИЯ И ОПРЕДЕЛЕНИЯ

Чрезвычайная ситуация - нарушение условий жизни и деятельности людей на объекте или определенной территории (акватории), вызванное аварией, катастрофой, стихийным или экологическим бедствием, эпидемией, эпизоотией, эпифитотией, применением возможным противником современных средств поражения и приведшее к людским и материальным потерям.

Под ликвидацией ЧС понимается проведение аварийно-спасательных, аварийно-восстановительных и других неотложных работ по устранению непосредственной опасности для жизни и здоровья людей, восстановлению жизнеобеспечения населения.

Сокращение

ВПП	- взлетно-посадочная полоса
АА МТ РТ	Авиационные администрация министерство транспорта Республики Таджикистана
АО	- аварийный объект
ВС	- воздушное судно
ВТ	- воздушный транспорт
ГА	- гражданская авиация
ГВПП	- грунтовая взлетно-посадочная полоса
ГО	- гражданская оборона
ЛА	Летательное аппарат
КЦ	- координационный центр на базе КЧС и ГО ПРТ
КЧС и ГО ПРТ	-Комитет по чрезвычайным ситуатциям и гражданской обороне при Правительстве Республика Таджикистан
РКЦ	- районный координационный центр поиска и спасения (на базе КЧС и ГО при ПРТ)
СПАСОП	- служба поискового и аварийно-спасательного обеспечения полетов
ГСН и Р	- государственная служба по надзору и регулирование
РТ	-Республика Таджикистан
ЧС	- чрезвычайная ситуация
ЕСОВД РТ	- единая система обеспечение воздушной движение РТ
ИКАО	- международная организация гражданской авиации

I. Общие положения

1.1.Настоящая инструкция разработана в соответствии с Законом Республики Таджикистан «О защите населения и территорий от ЧС природного и техногенного характера и Закона Республики Таджикистан «О аварийно-спасательных службах и аварийно-спасательных формирований. «Положение о КЧС и ГО при ПРТ, Положение о Центре управления по ЧС и ГО». Постановление Правительство РТ №233 от 03.05.2010 года «Об утверждение порядок привлечение авиационное предприятий на проведение ПАСР, обеспечение лётных поисковых аварийно спасательное работ в Республике

Таджикистан». Выполнением обязательств РТ, международных соглашений о сотрудничестве по линии Международной организации гражданской авиации (ИКАО) .

1.2.Силы и средства оперативных подразделений Комитета по чрезвычайным ситуациям и гражданской обороны при Правительстве Республики Таджикистан для тушения пожаров и ликвидации последствий ЧС на объектах ГА привлекаются по решению руководителя поисково спасательных работ и РТП (руководителя тушения пожара). Порядок использования сил и средств подразделений КЧС и ГО ПРТ ликвидации последствий ЧС определяются, ОАПРТ -32, ОАПРТ-33 и планом привлечения сил и средств КЧС ГО ПРТ

1.3.Оно определяет порядок взаимодействия аварийно-спасательных служб организации ГА, органов исполнительной власти, органов местной администрации и организаций различных форм собственности ГА при организации поиска и спасания людей, терпящих бедствие ЛА на территория РТ. Основные задачи, организацию и функционирование ГА, как составной части государственной системы предупреждения и ликвидации ЧС, а также служит основой организации эффективного взаимодействия КЧС с управленческими структурами ГА.

Координация действий участников взаимодействия (организаций участников взаимодействия ГА) при поиске и спасании людей, терпящих бедствие ЛА, возлагается на КЧС и ГО ПРТ и МТ РТ. Осуществляют эти функции РКЦ и КЦ КЧС и ГО ПРТ. (Центр управления при ЧС и ГО)

РКЦ (Штабы по ЧС и ГО) в закрепленных за ними поисково-спасательных районах, координируют действия соответствующих подразделений (формирований) аварийно-спасательных служб участников взаимодействия.

Участие в поиске и спасании за пределами поисково-спасательных районов РТ осуществляется в соответствии с межправительственными соглашениями, заключенными Правительством РТ, при организующей и координирующей роли спасательные службы РТ.

1.4. Основное внимание в разработанном "Положении ..." уделено сложным условиям больших по масштабу ЧС, когда для их ликвидации привлекаются значительные силы и средства ГА и требуется отработка специальных вопросов организации взаимодействия при воздушных перевозках и ликвидационных работах между КЧС, МТ РТ и организациям ГА.

При разработке "инструкция ..." учтен опыт, накопленный ГА стран СНГ.

1.5. В целях организации и руководства всеми видами деятельности ГА в ЧС в предприятие ГА создана круглосуточная аварийно-спасательная служба (команда, расчеты из число штатных и нештатных АСК) и, подготовка выделенных сил и средств и другие структурные единицы, обеспечивающие в целом оперативное привлечение, непрерывное управление и эффективное использование ГА в экстремальных условиях ЧС.

1.6. Эксплуатация ВС ГА в условиях ЧС должна производиться в полном соответствии с существующей нормативно-технической документацией, введенной в действие АА МТ РТ для ЧС.
Допуск на право участия в работах по ликвидации последствий ЧС осуществляется КЧС и АА МТ РТ в части их касающейся путем сертификации и лицензирования организаций гражданской авиации, ВС, экипажей и производственного персонала.
1.7. Все работы ГА по ликвидации ЧС осуществляются на основе договоров (контактов), гарантирующих выполнение взятых обязательств сторон. При этом действиям авиации на аэродромах различных ведомств обеспечивается приоритет. Оплата расходов привлечению ВС ГА к ликвидации ЧС установлено законодательством РТ.
1.8. Деятельность ГА при ликвидации последствий ЧС освобождается от аэропортовых и аэронавигационных сборов.

2. ЗАДАЧИ, РЕШАЕМЫЕ ГРАЖДАНСКОЙ АВИАЦИЕЙ В УСЛОВИЯХ ЧРЕЗВЫЧАЙНЫХ СИТУАЦИЙ

2.1. Исходя из содержания мероприятий, на ВТ могут быть возложены три основных группы задач:
1. Всестороннее транспортное обеспечение проводимых работ по ликвидации ЧС с выделением необходимого числа пассажирских и транспортных ВС авиапредприятий различных форм собственности.
2. Проведение специальных авиационных работ специализированным подразделением ГА (независимо от форм собственности)
3. Ликвидация последствий стихийных бедствий на объектах ГА собственными силами.
2.2 Всестороннее транспортное обеспечение проводимых работ по ликвидации ЧС включает перевозки:
- оперативных групп специалистов КЧС на места ЧС;
- противопожарных, аварийно-спасательных команд и групп с необходимым оборудованием и снаряжением;
- медицинских формирований экстренной помощи, медикаментов, медицинского оборудования и имущества;
- раненых, пораженных и больных;
- правительственных и комплексных государственных комиссий;
- гуманитарных грузов по заявкам КЧС.
2.3. В группу специальных авиационных работ входит:
- воздушная разведка общей обстановки, состояния объектов народного хозяйства, коммуникаций, газопроводов, электролиний и других объектов;
- аэрофотосъемка районов бедствий, различных объектов и коммуникаций;
- радиационная разведка атмосферы и местности;
- тушение пожаров;
- спасание пассажиров и экипажей судов при бедстви
- спасание пострадавших с изолированных объектов и площадок;
- обеспечение приема на своих аэродромах иностранных ВС, оказывающих помощь в ликвидации последствий ЧС;

2.4. При ликвидации последствий стихийных бедствий на объектах отрасли (авиапредприятия, аэропорты и др.) кроме перечисленных перевозок и специальных работ ГА решает следующие задачи:
- выполняет спасательные, аварийно-восстановительные и другие неотложные работы;
- оказывает первую медицинскую и до врачебную помощь пострадавшим;
- оказывает жизнедеятельность производственного персонала и населения, восстанавливает функционирование предприятий ГА.
2.5. Необходимый уровень готовности к выполнению перечисленных задач обеспечивается созданием законодательно установленной системы закрепления соответствующих авиапредприятий ГА за структурными звеньями сил быстрого реагирования КЧС и ГО РТ , доставка которых в районы бедствия должна осуществляться незамедлительно.
Срок готовности ВС к вылету с момента подачи заявки не должны превышать указанное на план взаимодействие.

3. **Взаимодействие осуществляется:**

3.1. Внутри ведомственную координацию действий по поиску и спасанию людей, терпящих бедствие , организуют:
- в КЧС и ГО ПРТ
- в Минтрансе РТ, ГСН МТ РТ и организации ГА независимо от форма собственности.
3.2. Участники взаимодействия (организации участников взаимодействия) при обращении к ним РКЦ КЧС и ГО ПРТ выделяют для целей поиска и спасания людей соответствующие силы и средства, предусмотренные планами организации взаимодействия в поисково-спасательных районах, необходимое техники и летательные аппараты, находящиеся в районах аварии.
Все указания КЧС и ГО ПРТ, касающиеся поиска и спасания людей, терпящих бедствие, обязательны для выполнения соответствующими службами, подразделениями, силами и средствами, выделенными участниками взаимодействия для выполнения конкретной поисково-спасательной операции.
3.3. Спасание людей, терпящих бедствие, осуществляется безвозмездно, независимо от их статуса, государственной и национальной принадлежности, или обстоятельств, при которых они обнаружены.
3.4. Организация взаимодействия по поиску и спасанию людей, терпящих бедствие, осуществляется на основании настоящей инструкции. Положения и по мере изменения обстановки корректируются. В этих планах указываются:
- состав и дислокация сил и средств, выделяемых участниками взаимодействия по получении сигнала бедствия (донесения АО, оповещения об аварии);
организация управления и связи участников взаимодействия;
- организация и порядок обеспечения постоянной готовности аварийно-спасательных служб с указанием организаций участников

взаимодействия, которые несут ответственность за поддержание сил и средств в установленной степени готовности;

- система донесений, оповещений, связи и взаимного обмена информацией;

- первоочередные действия по получении сигнала бедствия;

-географические, навигационно-гидрографические, гидрометеорологические и другие особенности данного района, которые учитываются при организации и проведении поисково-спасательной операции;

3.5. координация и аэронавигационных служб (подразделений) для обеспечения эффективности поисково-спасательных действий, осуществляемых разнородными силами участников взаимодействия;

- порядок регистрации обнаруженных в ходе поиска предметов, их фотографирования (по возможности) и классификации;

- организация медицинской помощи пострадавшим, их эвакуации и госпитализации;

- пункты и порядок пополнения топливом ЛА и транспортных средств в ходе проведения поисково-спасательной операции, включая ЛА и транспортные средства, которые могут быть предоставлены иностранными государствами;

- перечень и особенности основных юридических аспектов в вопросах привлечения сил и средств различных форм собственности к решению задач поиска и спасания людей, терпящих бедствие;

- организация материально-технического обеспечения поисково-спасательных операций;

- карты зон ответственности с нанесением радиусов действия поисково-спасательных сил и средств, другие данные, необходимые для проведения поисково-спасательных операций.

3.6. Непосредственными исполнителями поисковых и спасательных работ соответствующие подразделения, ЛА участников взаимодействия, действующие как самостоятельно, так и совместно друг с другом.

Участники взаимодействия (организации участников) организуют работу своих подразделений, участвующих в поиске и спасании людей, терпящих бедствие , таким образом, чтобы обеспечить круглосуточную связь между взаимодействующими подразделениями.

- Минтранс РТ отправляют, отряды (группы) аварийно-спасательных гражданской авиации и пункты управления их полетами;

3.7. Обмен информацией о фактическом наличии, дислокации (передислокации), возможностях и установленной степени готовности поисково-спасательных сил осуществляется не реже одного раза в неделю и немедленно при изменениях. В первую очередь такая информация направляется в АА МТ РТ, ЦУКС и РКЦ и КЦ КЧС и ГО ПРТ .

3.8. По получении от ВС сигнала бедствия диспетчерская служба участников взаимодействия производит оповещение в соответствии с действующей системой донесений, оповещения.

В общем случае эта система должна обеспечивать:

- немедленную передачу (дублирование) сигнала бедствия, в зависимости от района бедствия и принадлежности АО, в аварийно-спасательные службам ГА , АА МТ РТ и КЧС ГО ПРТ;

- уведомление соседних, в том числе иностранный центр спасение могущих оказать помощь в проведении поисково-спасательной операции;

- уведомление владельца об аварии принадлежащего ему ВС, а также о мерах по обеспечению безопасности и производственной деятельности в районе бедствия;

- оповещение об аварии ВС , а также рейсовых ЛА, находящихся вблизи района бедствия, осуществляется их владельцами непосредственно или через узлы связи, радиоцентры и радиостанции, обслуживающие данный поисково-спасательный район;

- непрерывную надежную связь между РКЦ, штабами ГО ЧС субъектов , командными пунктами, постами управления, организациями, подразделениями и силами, участвующими в поисково-спасательной перации;

- использование международных частот бедствия и международных позывных в телефонном и телеграфном режимах на случай потери связи в радиосети, ранее согласованной участниками взаимодействия.

3.9. Во всех случаях связь между постами оповещения, с одной стороны, и участвующими в поисково-спасательной операции или обеспечивающими ее проведение РКЦ, КЦ КЧС и ГО ПРТ, ЕСОВД РТ, командными пунктами, постами управления и поисково-спасательными силами, с другой стороны, должна осуществляться надежными быстродействующими средствами – каналами телефонной и буквопечатающей связи, использующими ведомственные или государственные линии связи, радиотелефоны и радиотелеграф вне-очередным предоставлением каналов связи.

3.10. РКЦ, ЦК КЧС И ГО ПРТ и поисково-спасательные силы, находящиеся в готовности, по получении информации об аварийной обстановке немедленно приступают к действиям в соответствии с планом проведения поисково-спасательной операции в своем поисково-спасательном районе. РКЦ и ЦК КЧС и ГО ПРТ, через диспетчера ЕС ОВД РТ обязаны:

- запрашивать при необходимости о помощи, которая может быть оказана ВС, не входящими в службу поиска и спасания, но находящимися вблизи района бедствия;

- сообщать на АО о предпринимаемых действиях по спасанию людей и оказанию необходимой помощи;

- вносить, по мере изменения обстановки и развития операции, поправки в план ее проведения;

- выполнять другие функции, предусмотренные положениями об РКЦ, ЦК КЧС и ГО ПРТ, ЕС ОВД РТ и АА МТ РТ.

3.11. Если местонахождение АО известно, то ответственность за начало поисково-спасательной операции возлагается на тот организация, в районе которого этот АО находится.

В случаях, когда местонахождение АО неизвестно, а известно только предположительное местонахождение и при этом получивший информацию о бедствии РКЦ или КЦ КЧС ГО ПРТ совместно с АА МТ РТ принимают решение об отправки спецгруппы ГА и КЧС. Указанное на план совместного взаимодействие.

3.12. Руководитель спасателя*, прибывший к месту бедствия первым, принимает на себя функции " руководителя АСР на месте действия". Первый прибывший к месту бедствия немедленно начинаются работы по спасанию людей. До прибытия руководителем поисково-спасательных работ.

* Под термином "спасатель" здесь и далее понимается ВС, или отряд (группа), ЛА участников взаимодействия, укомплектованные обученным персоналом и оснащенные оборудованием для быстрого проведения поисково-спасательной операции.

Одновременно Руководитель спасателя запрашивает капитана АО о согласии принять услуги по спасанию людей и оказанию помощи ВС.

Поскольку поисково-спасательная операция может продолжаться в течение длительного времени, то в целях единоначалия назначается Руководитель АСР на месте действия (координатор), запроса дополнительных сил и средств, а также принятия или отклонения любых предложений, сделанных ему в ходе ведения работ.

4.Организация технического сотрудничества участников взаимодействия и подготовки их сил и средств, привлекаемых к выполнению работ

4.1. В интересах координации усилий, направленных на обеспечение единой государственной технической политики в области создания средств поиска и спасания людей участники взаимодействия при координирующей роли КЧС и ГО ПРТ организуют техническое сотрудничество, имеющее своей целью:

- разработку целевой программы по модернизации спасательных средств по поиска и спасание;
- организацию взаимодействия между ведомственными научно-исследовательскими, конструкторско-технологическими и другими организациями и учреждениями по обеспечению создания технических средств;
- обмен информацией, в установленном порядке, по проводимым Мероприятие , представляющих взаимный интерес.

4.2. Участники взаимодействия (организации участников взаимодействия) за свой счет обеспечивают проведение необходимых мероприятий по освоению новых оборудование и образцов техники, обучению персонала подчиненных сил и средств способам и методам ведения поисковых и спасательных работ.

На договорной основе участники взаимодействия могут по согласованным программам проводить взаимное обучение (подготовку, переподготовку) персонала способам и методам ведения указанных работ.

4.3. С целью отработки совместных действий участники взаимодействия регулярно, не реже одного раза в два год, проводят комплексные учения по поиску и спасанию людей, терпящих бедствие, которые могут совмещаться с международными учениями. Организация, планирование таких учений, согласование и координация действий сил и средств участников взаимодействия. Расходы по проведению учений несет организация, которая их проводит.

4.4. Сроки проведения учений и их тематика по согласованию между участниками взаимодействия (организациями участников взаимодействия) определяются по планом взаимодействие .

5.Международное сотрудничество

5.1. Организация мероприятий, связанных с выполнением обязательств РТ, вытекающих из международных соглашений о сотрудничестве в части касаюшся , возлагается:

- по линии Международной организации гражданской авиации (ИКАО) - на АА МТ РТ и КЧС и ГО ПРТ.

5.2. Взаимодействие со спасательными службами иностранных государств для целей поиска и спасания осуществляется на основании соответствующих международных договоров (соглашений). С целью отработки такого взаимодействия регулярно проводятся международные учения по поиску и спасанию людей, терпящих бедствие. Планирование и организация таких учений со стороны РТ соответственно осуществляют КЧС и ГО ПРТ при необходимости совместно с участниками взаимодействия.

В международных учениях участвуют подразделения, силы и средства участников взаимодействия с определьных государств.

5.3. Для рассмотрения вопросов координации действий аварийно-спасательных служб участников взаимодействия (организаций участников взаимодействия) и сопредельных государств в сроки, предусмотренные действующими международными договорами (соглашениями) РТ с этими государствами, продления срока действия этих договоров соглашений), внесения в них необходимых изменений, а также при подготовке к проведению международных учений проводятся встречи представителей указанных служб.

STRUCTURE OF THE STATE COMMISSION ON EMERGENCY SITUATIONS

Chairman of the Commission –
Head of the Government of the Republic of Tajikistan

First Deputy Chairman of the Commission–
Prime Minister of the Republic of Tajikistan

Deputy Chairman of the Commission–
Deputy Prime Minister of the Republic of of Tajikistan

Deputy Chairman of the Commission –
Chairman of the CoESCD under GoRT

Responsible Secretary of the Commission – Head of the Defense and Order Department of the Executive Office of the President

Members of the State Commission

1. Minister of Justice
2. Minister of Agriculture
3. Minister of Internal Affairs
4. Minister of Foreign Affairs
5. Minister of Education and Science
6. Minister of Labor, Migration, and Employment
7. Minister of Finance
8. Minister of Defense
9. Minister of Transport
10. Minister of Economic Development and Trade
11. Minister of Industry
12. Minister of Health
13. Minister of Culture
14. Minister of Energy and Water Resources
15. Chairman of the State Security Committee
16. Chairman of the Land Management Committee
17. Chairman of the State Investment and State Property Mgmt. Committee
18. Chairman of the Tax Committee
19. Chairman of the Construction and Architecture Committee
20. Chairman of the Television Committee
21. Chairman of the Environmental Protection Committee
22. Chief of Communication Services
23. Chief of Customs Service
24. Chief of State Oversight and Work Safety Services
25. Director of Agency of Land Reclamation and Irrigation
26. Director of State Reserve Agency
27. Director of Agency on Standard Control
28. Director of Forestry Agency
29. Chief of Main Geology Department
30. Director of Agency on Financial Control and Fight against Corruption
31. Director of Agency on Statistics
32. Chief of Agriculture and Environmental Protection Department of the Executive Office of the President

Scenario
for
the first SAR/RCC Coordination Exercise (SRCE)

Jun 28, 2018

Propose Activity

SAR/RCC Coordination Exercise (Exercise) (3-1)

In accordance with the SAR Coordination Manual which developed W/S on April, Expert and W/G will organize the first SAR/RCC Coordination Exercise (SRCE).

Seminar on SAR/RCC Coordination Manual Completion (Seminar) (3-1)

Expert conducts Seminar on SAR/RCC Coordination Exercise for review of exercise and the SAR coordination manual completion.
W/G will present the draft of AIP (GEN 3.6) in this Seminar.

Create a Scenario development with contact point and preparation
Execute the coordination meeting before the first Exercise
Conduct the first SAR/RCC Coordination Exercise which supported by JICA expert
Collecting all receiving data from related position by Fax
Evaluation by W/G and Expert

Description by ICAO Emergency phases

The Search and Rescue (SAR) function is a state obligation imposed by the Convention on International Civil Aviation (Chicago, 7 December 1944) which is generally referred to as the Chicago Convention. Annex 12 to the ICAO Chicago Convention defines three emergency phases which are referred to as the Uncertainty Phase, the Alert Phase and the Distress Phase. These phases are defined as follows:

- Uncertainty phase (**INCERFA**): a situation wherein uncertainty exists as to the safety of an aircraft and its occupants
- Alert phase (**ALERFA**): a situation wherein apprehension exists as to the safety of an aircraft and its occupants
- Distress phase (**DETRESFA**): a situation wherein there is a reasonable certainty that an aircraft and its occupants are threatened by grave and imminent danger and require immediate assistance

Phase Initiation

Each State is responsible for developing and promulgating clear criteria for the declaration of each emergency phase. Air Traffic Services (ATS) or the responsible Rescue Coordination Centre (RCC), as appropriate, will make the Emergency Phase declaration within the timeframe specified for the trigger event. As an example, loss of radio contact with an aircraft under ATS control could result in declaration of the

Uncertainty Phase within 10 minutes, the Alert Phase within 20 minutes and the Distress Phase within 30 minutes of the event whereas loss of radio contact with an aircraft not under ATS control might not trigger the Uncertainty Phase declaration until 30 minutes had lapsed with Phase upgrade occurring at 30-minute intervals.

Actions

Uncertainty phase (INCERFA)

Upon the declaration of an Uncertainty Phase by the RCC or by an ATS Unit, the RCC should:

- Verify the details of the flight as provided by the alerting unit. In particular, details of the aircraft involved should be gathered and confirmed to the extent possible. These details should include but are not limited to:
  - ✧ call sign or registration
  - ✧ aircraft description including type of aircraft, colors and marking
  - ✧ number of passengers on board (POB) and, if available, names
  - ✧ category of operation (visual flight rules (VFR) or instrument flight rules (IFR))
  - ✧ pilot rating and experience
  - ✧ place of departure, destination and planned route
  - ✧ actual time of departure and estimated time of arrival
  - ✧ fuel endurance and fuel expiry time
  - ✧ time of last communication
  - ✧ last known position
  - ✧ any other relevant information.
- Log all incoming information and progress reports, details of action taken and subsequent developments
- Maintain close liaison with relevant ATS Units for updates or changes in status
- Continue the communication search, either directly or through other ground or airborne assets
- Plot the flight path of the aircraft involved to the point that contact was lost, making use of all relevant information
- Determine the most probable location or most likely continuation of the route of the aircraft involved

☞If the communication search and/or <u>other information acquired indicates</u> that the aircraft is not in distress, the RCC will cancel the SAR phase and immediately inform all concerned parties. In cases where the aircraft has not been located after application of the above procedures, the need to upgrade the emergency phase will be considered.

Alert phase (ALERFA)

Upon the declaration of an Alert Phase, the RCC should:

- Complete or initiate all relevant actions as detailed for the Uncertainty Phase
- Ensure that a SAR Mission Co-ordinator (SMC) has been appointed

- Alert appropriate SAR facilities
- Review all information received;
- Continue efforts to obtain information about the distressed aircraft from all available sources
- Carefully re-evaluate all known details of the flight to confirm estimated position or most likely route of flight performance under adverse conditions
- Estimate and plot the probable position of the aircraft and its maximum range from its last known position
- Maintain close liaison with relevant ATS Units
- If appropriate, initiate search planning
- Whenever practicable, communicate all information received and action taken to the operator

If it is determined that the aircraft is not in distress, the RCC will cancel the SAR phase and immediately inform all parties concerned. However, if the aircraft has not been located after extensive application of the above procedures, the SMC should consider the need to review/upgrade the emergency phase.

Distress phase (DETRESFA)
Upon the declaration of a Distress Phase the RCC should:

- Complete all relevant actions as detailed for Uncertainty and Alert Phases
- Further develop a plan for the conduct of the required SAR operation and communicate that plan to the appropriate authorities/agencies inclusive of the affected Area Control Centers (ACC) and all RCCs whose areas of responsibilities lie within the maximum range of the aircraft based on its last known position
- Estimate the most likely position of the distressed aircraft, evaluate the degree of uncertainty of this position and determine the extent of the area to be searched
- Select and notify designated SAR Units for deployment
- Request aircraft, vessels, radio stations, and other facilities not specifically designated as SAR Units, that are appropriate and able to assist, to:
    - ✧ maintain a listening watch for transmissions from the aircraft in distress
    - ✧ assist the aircraft in distress as far as practicable
    - ✧ prepare for deployment on SAR tasks
    - ✧ inform the RCC of any developments

- Notify:
    - ✧ The State of Registry of the aircraft
    - ✧ The State of the Operator of the aircraft
    - ✧ The appropriate accident investigation authorities
    - ✧ The operator and keep them informed of developments

Exercise Object

We have to learn about how the SAR and RCC operations on Tajikistan's Aviation. Through this exercise, we have to obtain the emergency procedures of communication skill for RCC operations.

This exercise is focused to " Communicate information" in Rescue Coordination Center (RCC).

Communication tools: Telephone and Fax
Precaution: Prior to communication, you should be talk to them, " **This is a Drill, Drill, Communication Drill**" at first.

Other concerning in Transmission of Information

- Transmission System
- Information-carrying capacity
- Speed of information communication
- Rate of information communication

We will be make sure the current functional overview of RCC for feature upgrade and preparation.

Exercise Scenario

Date : July 13. 2018
Time : 10:00(TJT) a.m. to 11:00(TJT) a.m. 05:00(UTC) to 06:00(UTC)
Tool : Telephone and Fax
Simulated :

Aircraft : VFR Flight / Helicopter HBZGE / A-139
Detailed of Flight : Departure from Dushanbe to Horog
Location : ___NM East of Dushanbe (about 50 minutes after airborne)
Contact : Dushanbe TWR
RCC : After received information, execute RCC operation for inform to SAR related persons as follows step;

the first step on 10:04(TJT) ⇒ Uncertainty Phase (**INCERFA**),
the second step on 10:14(TJT) ⇒ Alert Phase (**ALERFA**),
the third step on 10:24(TJT) ⇒ Distress Phase (**DESTRESFA**)

Plot : Drawing figures, Investigating after receiving information regarding the case from Dushanbe TWR or other office.
Receiver : Let next person what one is hearing precisely with your name or initial by telephone, used by a preparing memo.

☞ See attached figure

Expected Contact Point

TAN : Dushanbe Radio, En-route Controller, Chief ATC,
Dushanbe TWR, Meteorological Information Center, Related TWR, Flight Information Services
Aeronautical Information Department, Head of ATFM Center, Director of TAN

Other communication: Committee of Emergency(MCHS), Military, Police,
Air Lines, Neighborhood countries of RCC, Vicinity City office

Attached other information

ELT Definition

ICAO defines an Emergency locator transmitter (ELT) as equipment which broadcasts distinctive signals on designated frequencies and, depending on application, may be automatically activated by impact or be manually activated. An ELT may take any of the following forms:

- **Automatic fixed ELT (ELT(AF)).** An automatically activated ELT which is permanently attached to an aircraft.
- **Automatic portable ELT (ELT(AP)).** An automatically activated ELT which is rigidly attached to an aircraft but readily removable from the aircraft.
- **Automatic deployable ELT (ELT(AD))**. An ELT which is rigidly attached to an aircraft and which is automatically deployed and activated by impact, and, in some cases, also by hydrostatic sensors. Manual deployment capability is also provided.
- **Survival ELT (ELT(S)).** An ELT which is removable from an aircraft, stowed so as to facilitate its ready use in an emergency, and manually activated by survivors.

Description

A suitably configured ELT is an integral component of the international satellite system for search and rescue (SAR) see COSPAS-SARSAT. When activated manually - or automatically by immersion in water or as a result of high 'g' forces on impact - ELTs transmit a distress signal which can be detected by non-geostationary satellites and then located precisely by either or both of GPS trilateration and doppler triangulation.

ICAO SARPs

ICAO Annex 10, Volume V requires that ELTs carried in compliance with the Standards of Annex 6, Parts I, II and III shall operate on both 406 MHz and 121.5 MHz. Although the SAR satellite systems are no longer able to use 121.5 MHz signals, this frequency is considered necessary to allow homing.

All ELTs capable of transmitting on 406 MHz must be coded in accordance with ICAO Annex 10 and registered with the national agency responsible for initiating Search and Rescue or another nominated agency.

In ICAO Annex 6, Part IIA, a Recommendation is made that all aero planes operated on extended flights over water and when operated on flights over designated land areas shall be equipped with an automatic ELT. There is an identical Recommendation in respect of certain Classes of helicopter when conducting overwater operations.

Emergency Communications

Description

When flight crew are confronted with an emergency or abnormal situation whilst in flight, they normally priorities their immediate actions in the following order.

- Aviate;
- Navigate;
- Communicate.

Aviate

The pilot's immediate priority is to ensure the safe flight path and condition of the aircraft. This not only includes the flying of the aircraft but also the completion of checklist drills. The safe flight path may even include the initiation of a controlled rapid descent.

For a modern two-crew flight deck, the flight crew distribute the responsibilities between the available crew members. Under normal conditions, one flight crew member (pilot flying) takes responsibility for the flight path of the aircraft while the other flight crew member (pilot not flying or pilot monitoring) deals with all radio communications and actions/reads out checklists. In order to maintain the correct balance of workload in an emergency when additional QRH checklists and AFM procedures may be required, the pilot flying will often assume responsibility for radio communications.

When there is a significant problem, the workload during the first moments is often high and the flight crew may elect to inform air traffic control immediately by the most direct means. This normally entails the use of an initial call incorporating the word "standby".

Navigate

The flight crew will decide on whether to continue the flight to the originally intended destination, initiate an immediate en- route diversion, carry out an emergency descent or just place the aircraft in a safe flying position. The decision to divert may be immediate but normally it will require coordination with air traffic control and other parties.

Communicate
Pilots believing themselves to be facing an emergency situation should declare an emergency as soon as possible and cancel it later if the situation allows.

The correct method of communicating this information to ATC is by using the prefix "**MAYDAY, MAYDAY, MAYDAY**" or "**PAN PAN, PAN PAN, PAN PAN**" as appropriate. This procedure, which is an international standard, is the single most effective means of alerting the controller to the need to give priority to the message that will follow.

In certain types of emergency (In-Flight Fire, Loss of Cabin Pressurisation), the flight crew will don oxygen masks. The wearing of oxygen masks may make the voice messages more difficult to understand and increases the risk of a clearance being misunderstood and the risk of readback/hearback errors.

Controller response to emergency situation
The Operators Guide to Human Factors in Aviation Briefing Note - Pilot-Controller Communication offers the following advice:

"Controllers should recognize that, when faced with an emergency situation, the flight crew's most important needs are:

- Time;
- Airspace; and,
- Silence."

The briefing note continues: "The controller's response to the emergency situation could be patterned after the **ASSIST** memory aid...:

- **A**cknowledge - Ensure that the reported emergency is well-understood and acknowledged;
- **S**eparate - Establish and maintain separation with other traffic and terrain;
- **S**ilence - Impose silence on your control frequency, if necessary; and do not delay or disturb urgent cockpit action by unnecessary transmissions;
- **I**nform - Inform your supervisor and other sectors, units and airports as appropriate;
- **S**upport - Provide maximum support to the flight crew; and,
- **T**ime - Allow the flight crew sufficient time to manage the emergency."

EUROCONTROL has produced guidelines for controller training in handling unusual or emergency situations which contain much useful information and advice, including sample checklists for various types of emergency.

★

Catch –up Exercise on Aeronautical Chart Drawing -2- (Aerodrome chart)

20 ～ 31 Aug 2017

By Mr. YAMANE, FPD Expert

Agenda & Practice

1. Concept and aim of this course
2. Outlines of AIP Chart Drawing, specially of Aerodrome parts
3. Review of basic functions and using of VISIO
4. Every Exercise output with VISIO
5. Flight Procedure Chart drawing of SID, STAR, Approach Procedures, inclusive of Holding, MSA and others
6. Other type of chart drawing in AIP (outlines)
7. Performance test
8. Group works with PC, to conduct individual exercise, and review of daily works by all participants

Participants

1. Mr. Rustamjon SAFAROV
2. Mr. Habibullo SHAMSOV
3. Mr. Ilhom KULIEV
4. Mr. Behruz MAJIDOV
5. Mr. Akbardzhon TADZHIBAEV

Schedule

day	date	items		venue	remarks
		AM (09:00 - 12:00)	PM (13:30:16:30)		
1	21-Aug Mon		Orientation & Outlines of Exercise contents	T.C.	preparing VISIO for exercise
2	22-Aug Tue	Starting, Introduction of VISIO & functions	Review on Chart Drawing Rules & Practice Review of daily works	T.C.	Start exercise on chart drawing-2
3	23-Aug Wed	Lecture on chart symbol creation	Exercise of chart symbol creation Review of daily works	T.C.	general matters
4	24-Aug Thu	Exercise of charting (SID)	Exercise of charting (SID) Review of daily works	T.C.	sample of procedure in DYU, Japan or others
5	25-Aug Fri	Exercise of charting (SID)	Exercise of charting (STAR) Review of daily works	T.C.	sample of procedure in DYU, Japan or others
	26-Aug Sat				
	27-Aug Sun				
6	28-Aug Mon	Exercise of charting (STAR)	Exercise of charting (Approach) Review of daily works	T.C.	sample of procedure in DYU, Japan or others
7	29-Aug Tue	Exercise of charting (Approach)	Exercise of charting (Approach) Review of daily works	T.C.	sample of procedure in DYU, Japan or others
8	30-Aug Wed	Exercise of charting (others)	Verification of charting Review of daily works	T.C.	pm: group work
9	31-Aug Thu	Evaluation of activity & output *performance test	Wrap-up & Closing with Certificate	T.C.	Close exercise

Summary of Chart Drawing (Catch-up Exercise – 1)

- Target to En-route Chart through 5 days
- Exercise on en-route chart drawing concerning Japanese Northeast Region
- Plotting airports, NAVAIDs and restricted area on the blank paper in reference to longitude and latitude coordinates to read Japanese AIP (relevant papers)
- Drawing air routes and fixes to design symbol marks, and putting names, distance, direction and altitude by segments
- Review of basic handy drafting skill of chart drawing

Chart Drawing Practice with VISIO (Catch-up Exercise-2)

1. ‘Cartographer course (NOT procedure specialist/designer course)
2. 2 PC with VISIO software are provided to participants
3. 2 participants are assigned to PC respectively
4. The venue of exercise is Aerodrome Simulator room or FPO small room
5. The instructor by Expert brings his own PC with Visio which is guided on Japanese language, Visio 2003.
6. First, we follow the figures on ICAO documents such as Annex 4 or Chart Drawing manual
7. Secondly, we follow the existing AIP charts such as ones concerning Dushanbe or foreign states

Document of Chart Drawing Practice

- Annex 4 Aeronautical Charts
- Doc 8697 Aeronautical Chart Manual (third Edit, 2016)

Annex 4 (regulation or concept)

- ✓ Standards and recommended practice…(shall or should)
- ✓ Definition and conceptual or common rule for aeronautical chart… (check contents of annex 14)
- ✓ To create ICAO style of aeronautical charts included in AIP, using common size, layout, note, chart symbols, color or ground feature in reference to appendixes in detail

Outline of Chart Drawing Rule

- Doc 8697 (Aeronautical Chart Manual)
  - ✓ Practical method, sample or common style related with charts
  - ✓ Requirements, maintenance, distribution, and preparation …. (check contents of doc 8697)
  - ✓ More practical guidance of chart creation to show in Chapter 7 or reference materials of ICAO publications in appendix……. For example of allocation of figures, style or size of character, layout of parts

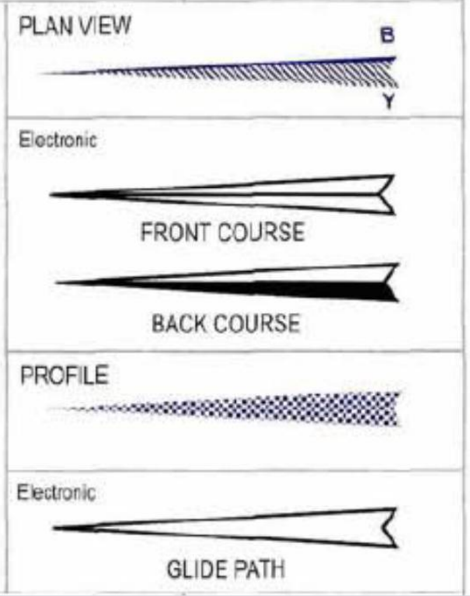
※ *Abbreviations are subject to Doc 8400, PANS-ABC.*

※ *Annex 15 Aeronautical Information Services and Doc 8126 AIS Manual are to regulate data creation or publication of aeronautical chart….. Refer contents of them.*

Significant Sample of Chart Drawing Rule

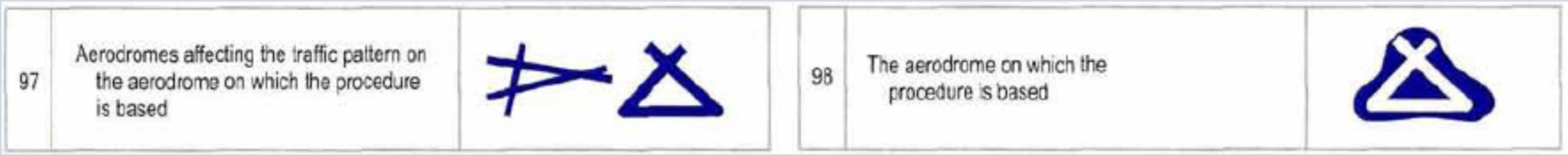
- Reference of Symbols in appendix, Annex 4 Aeronautical Charts...,
  - ✓ NAVAIDS

100	Non-directional radio beacon	NDB	
101	VHF omnidirectional radio range	VOR	
102	Distance measuring equipment	DME	
103	Collocated VOR and DME radio navigation aids	VOR/DME	

108	Instrument landing system	ILS	

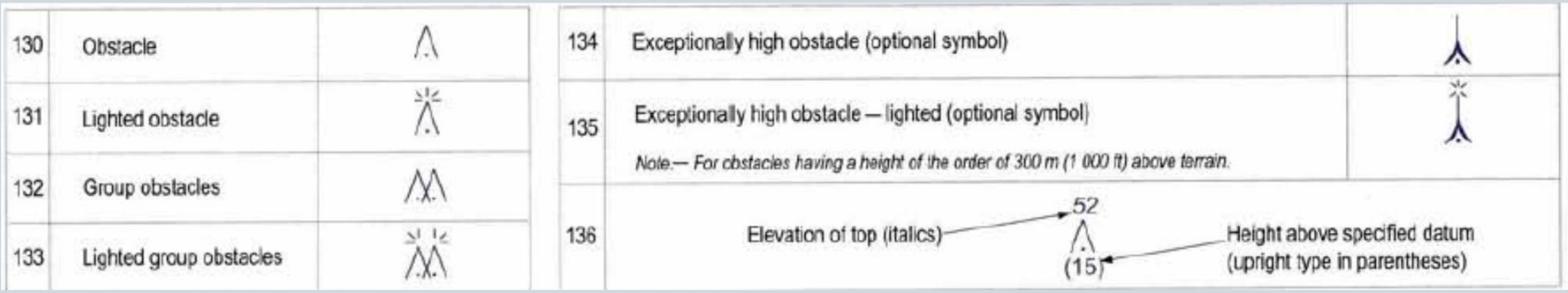
Significant Sample of Chart Drawing Rule

- Reference of Symbols in appendix, Annex 4 Aeronautical Charts…,
  - ✓ Aerodrome



97	Aerodromes affecting the traffic pattern on the aerodrome on which the procedure is based		98	The aerodrome on which the procedure is based

  - ✓ Obstacle



130	Obstacle	134	Exceptionally high obstacle (optional symbol)
131	Lighted obstacle	135	Exceptionally high obstacle — lighted (optional symbol) *Note.— For obstacles having a height of the order of 300 m (1 000 ft) above terrain.*
132	Group obstacles	136	Elevation of top (italics) *52* (15) Height above specified datum (upright type in parentheses)
133	Lighted group obstacles		

Significant Sample of Chart Drawing Rule

- Reference of Layout of parts, terms, configuration of segments, size or type of character, specified figure and others particularly in Chapter 7 Preparation of specific charts, Doc 8697.
  - ✓ Definitions(chapter 1), General specifications… (Check important abbreviations)
  - ✓ Each item, frame, figure, text style and illustration for specific chart…
  - ✓ Spot elevation, counter lines and layout tinting for culture and topography…

Significant Sample of Chart Drawing Rule

- Reference for flight procedures in Doc 8697. (continued)
  - ✓ Standard Departure Chart (SID) with specimen charts…
  - ✓ Standard Arrival Chart (STAR) with specimen charts…
  - ✓ Instrument Approach Chart (IAP) with specimen charts…
    - Plane View/ Profile View,
  - ✓ Visual Approach Chart…, and
  - ✓ ATC Surveillance Minimum Altitude (MVA) Chart

Significant Sample of Chart Drawing Rule

- Reference in Doc 8697. (continued)

In addition, (standard chart of publication)

※Aerodrome Obstacle Chart – Type A, Type B, Precision Approach Terrain Chart for ILS approach, En-route Chart, Aerodrome/Heliport Chart and so on.

※These original data or maps are provided from certain specialist of aeronautical business.

Drawing Exercise of Significant Sample

- General specifications (pointed)…
  - ✓ True North orientation
  - ✓ Basic sheet size 210mm x 148mm (A5 size) or more (A4 size)
  - ✓ Marginal layout… *see drafting illustration*
  - ✓ Titles(naming), Symbols(figures), Color and Unit(distance; nm/km, altitude; m/ft) are followed with Annex 4, Abbreviations(items) with PANS-ABC.
  - ✓ Roman alphabet or Gothic are selected for description or lettering by each items… *see sentences relevant*

Drawing Exercise of Significant Sample

- General specifications…
  - ✓ Culture and topography on the base… *see 7-2-15 ～ 7.2.20*
    - For Instrument approach chart, Interval 150m (500ft) or 300m (1000ft) mainly, and first even counter of 300m (1000ft) at least 150m (500ft) above aerodrome elevation
    - For SID, STAR chart, Interval 300m (1000ft) or 500m (2000ft) mainly, and first even counter of 300m (1000ft) at least 300m (1000ft) above aerodrome elevation

Drawing Exercise of Significant Sample

- ✓ Reference to chart samples of other states…

  Japan, German, England etc.

＊Exercise drafting illustration of basic symbols of NAVAIDs, Runway, obstacle, text parts as referred to Annex 4 appendix

- NDB, VOR, ILS, fix, single runway relevant, obstacle, holding, etc

Drawing Exercise of Significant Sample

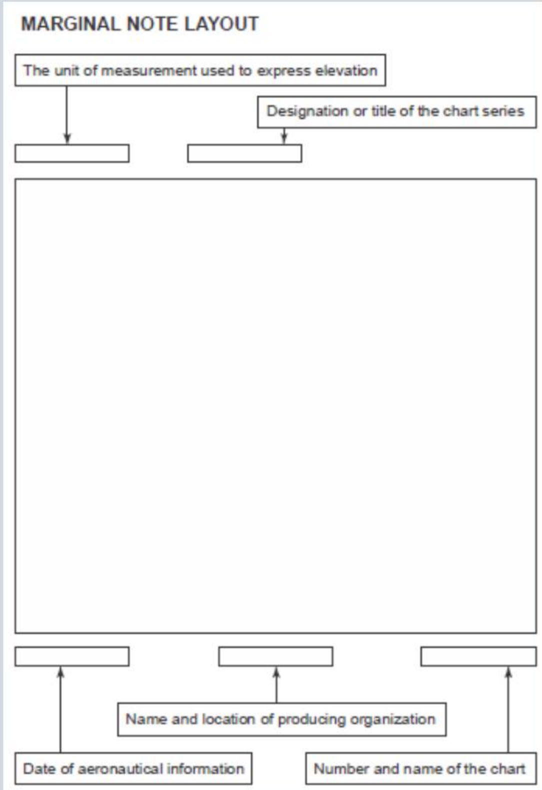
- Import of culture and topography data to the chart
  - ✓ Preparation scanned file or electric data of geographical map, and attachment of image data or Raster data on VISIO files
  - ✓ Trace selected features such as terrain spot, counter lines, water boundary etc on the map data, then remove,
  - ✓ Reference to chart samples of other states…

* Exercise drafting feature on the ground with PDF maps around Dushanbe airport which are attached as an image data, (NOT practice)

- Maps of 1/200,000 or 1/50,000 scale depending on the coverage of chart
- Counter lines, river, rail way or significant structure, aerodrome, etc

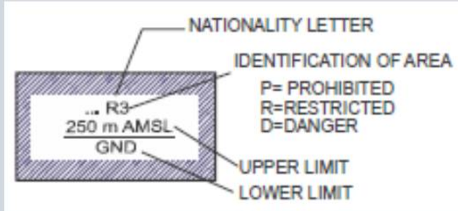
Drawing Exercise of Significant Sample

- Common specifications…
  - ✓ AIP format layout…
    - designation or title of chart series,
    - Name and reference of sheet



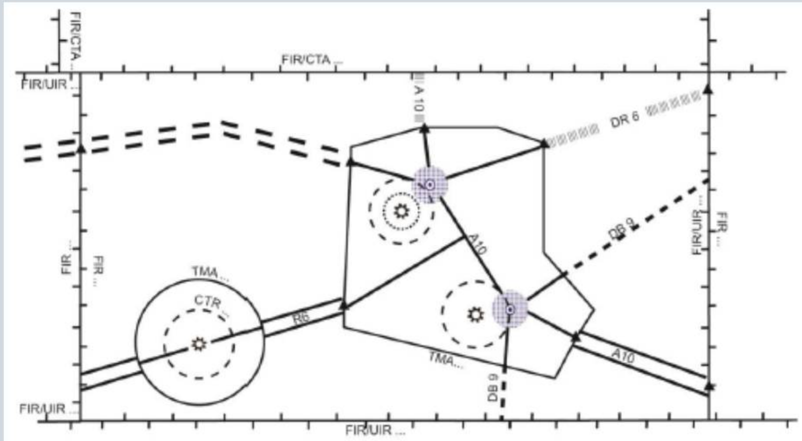
Drawing Exercise of Significant Sample

- Common specifications…
  - ✓ Prohibited, Restricted and Danger Area…



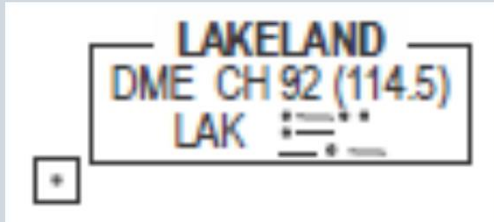
  - ✓ Magnetic Variation…

  - ✓ Air Traffic Services Symbols… (route, area boundary)
    - Bearing 000°, R000

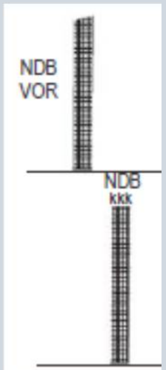


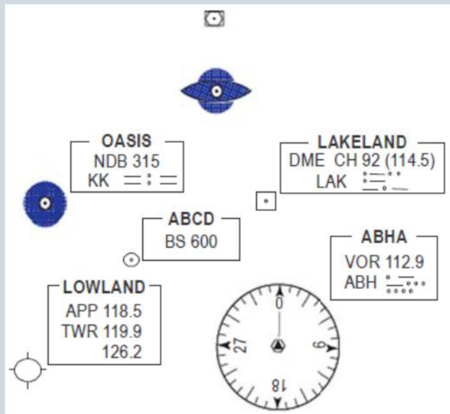
Drawing Exercise of Significant Sample

- Common specifications…
  - ✓ Radio Navigation Aids Symbols… *see Annex 4 appendix*
    - Detail of Radio communication facilities such as Name, identification, frequency, Morse signal etc.



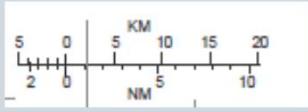
    - Profile Views…



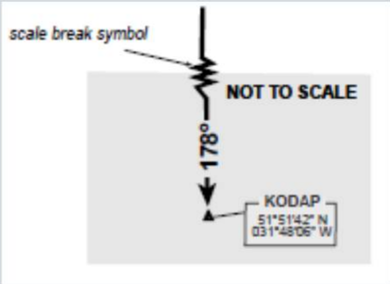


Drawing Exercise of Significant Sample

- Standard Departure Chart (SID)
  - ✓ Function and availability, title, identification … description, *assignment relevant*
  - ✓ Coverage… to indicate the point of beginning to the end meeting on en-route
  - ✓ Scale…



  - ✓ Drawing not to scale…

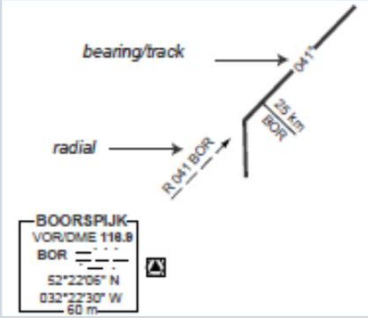


  - ✓ Unite of measurement, magnetic variation…

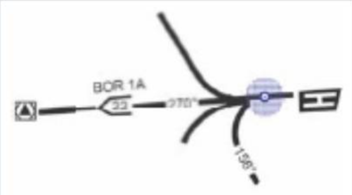
  - ✓ Culture and topography… shore lines of water area, river, lake … appearance *relevant*

Drawing Exercise of Significant Sample

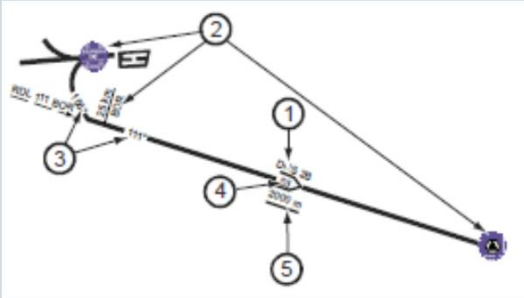
- Standard Departure Chart (SID)
  - ✓ Bearing, track and radial … description *relevant*

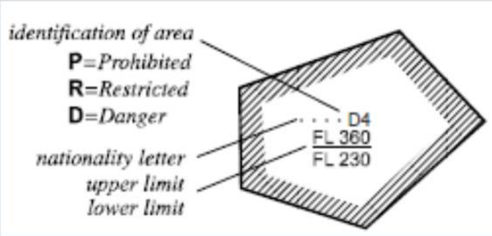


  - ✓ Aeronautical data … … *see Annex 4 appendix*
    - Aerodrome

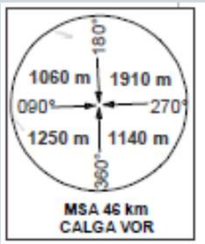


Prohibited area





    - MSA

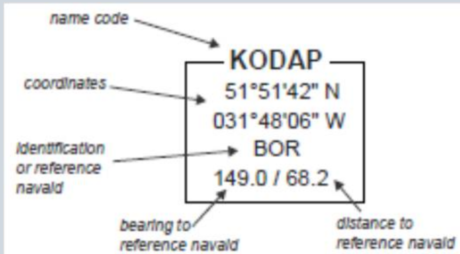


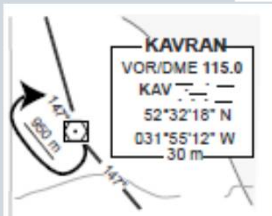
    - ATS system (SID components) information

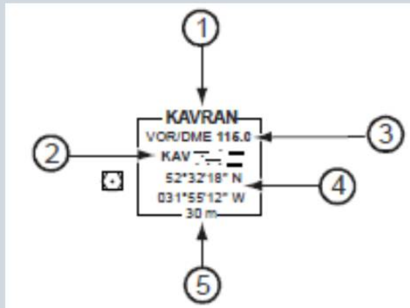
Drawing Exercise of Significant Sample

- Standard Departure Chart (SID)
  - ✓ Aeronautical data …
    - Minimum obstacle clearance or ATC assigned altitude …
    - Radio Navigation Aids …
    - Significant points …
    - Holding pattern …

Altitude/flight level "window"	17 000 10 000	FL 220 10 000
"At or above" altitude/flight level	7 000	FL 70
"At or below" altitude/flight level	5 000	FL 50
"Mandatory" altitude/flight level	3 000	FL 30
"Recommended" procedure altitude/flight level	5 000	FL 50
"Expected" altitude	Expect 5 000	Expect FL 50







Drawing Exercise of Significant Sample

- Standard Departure Chart (SID)
  - ✓ Aeronautical data … … *see Annex 4 appendix*
    - Transition altitude …

      TRANSITION ALTITUDE
      2450 m

    - Close-in obstacle …

      CLOSE-IN OBSTACLES
      RWY 27 -Trees 44m HGT,
      243 m from departure end

    - Reporting points …

Reporting point (REP)	Compulsory	▲
	On request	△
ATS/MET reporting point (MRP)	Compulsory	◭
	On request	◬

  - ✓ Others … see chapter 7 Doc 8697

Drawing Exercise of Significant Sample

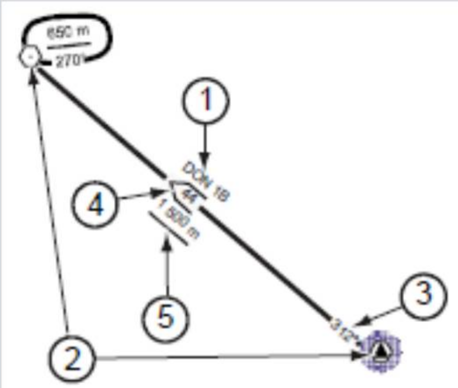
- Standard Departure Chart (SID)

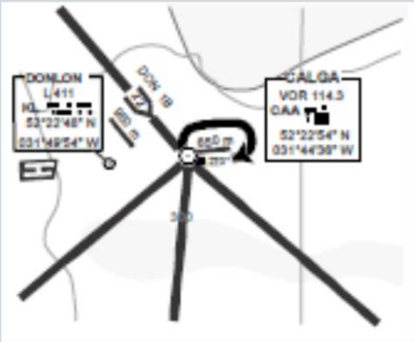
- Reference to chart samples of other states…
  - Respective runway type or combined runway type (Japan)
- Exercise drafting charts of current SID in Dushanbe airport based on ICAO style
  - Frame, Design of features on the ground such as counter lines, spot heights, water boundary etc. around Dushanbe airport for SID chart
  - Copy the feature of RWY09 Departure

Drawing Exercise of Significant Sample

Standard Arrival Chart (STAR)

- ✓ Function and availability, title, identification etc. … *almost the same with SID*
- ✓ Coverage… to indicate through the point of en-route to the approach phase beginning
- ✓ Aeronautical data … … *almost the same with SID*
  - Aerodrome runway pattern …
  - ATS system route components, such as holding pattern,





Drawing Exercise of Significant Sample

- Standard Arrival Chart (STAR)
  - ✓ Aeronautical data … … *almost the same with SID*
    - Minimum obstacle clearance altitude, vectoring altitude by nearest higher 50m or 100ft …
    - Reporting points … compulsory or on-request

Reporting point (REP)	Compulsory	▲
	On request	△
ATS/MET reporting point (MRP)	Compulsory	▲
	On request	△

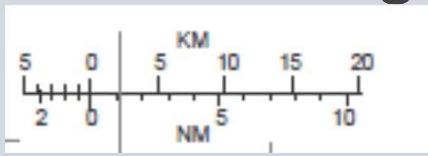
Drawing Exercise of Significant Sample

- Standard Arrival Chart (STAR)
- ✓ Others … *almost the same with SID* (chapter 7 Doc 8697)

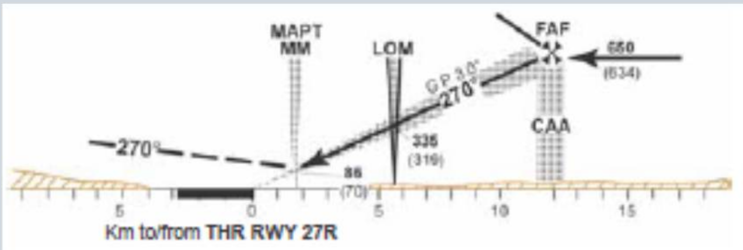
- Reference to chart samples of other states… Japan, German
- *Exercise drafting charts of current STAR in Dushanbe airport based on ICAO style,*
  - *Frame, Design of features on the ground such as counter lines, spot heights, water boundary etc. around Dushanbe airport for STAR chart*
  - *Copy the feature of RWY27 Arrival (NOT practice)*

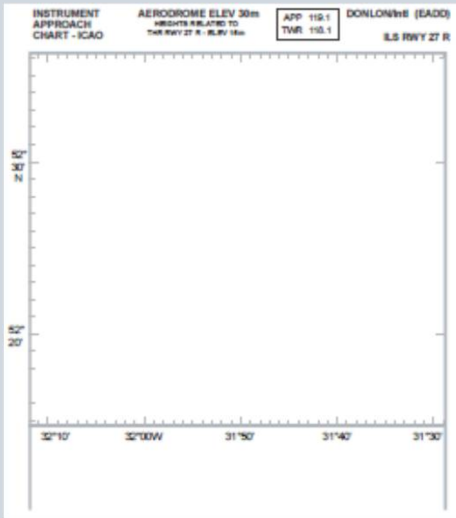
Drawing Exercise of Significant Sample

- Instrument Approach Chart (IAP)
  - ✓ Function and availability, title, identification … *see description relevant*
  - ✓ Coverage… to indicate the point of beginning and the end meeting on en-route or holding
  - ✓ Scale…



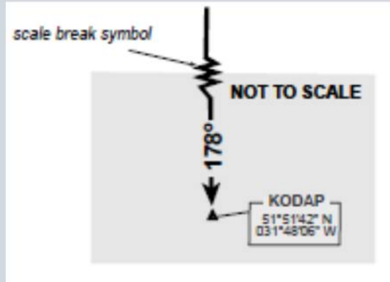
  - ✓ Distance scale… profile view





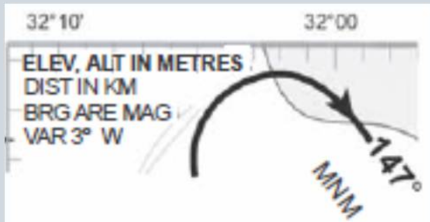
Drawing Exercise of Significant Sample

- Instrument Approach Chart (IAP)
  - ✓ Drawing not to scale…



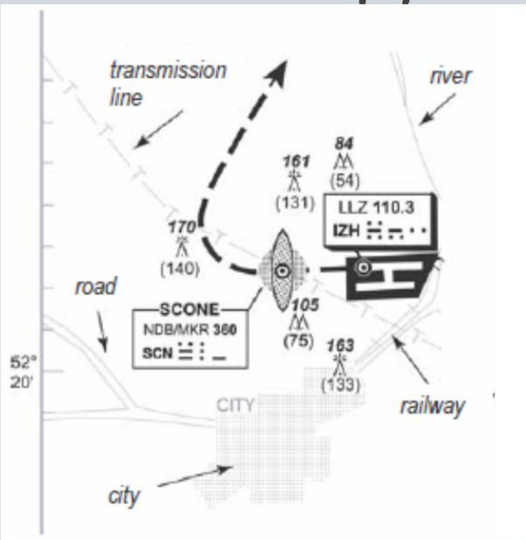
  - ✓ Unite of measurement, magnetic variation…

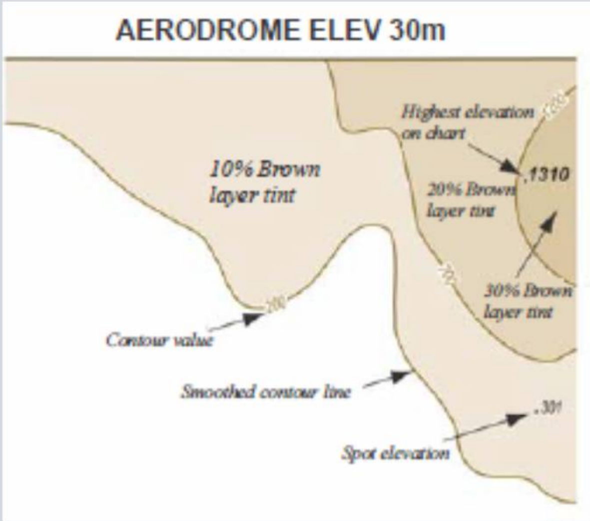
  - ✓ Date of validity… see *description on bottom left corner*
  - ✓ Magnetic variation…



Drawing Exercise of Significant Sample

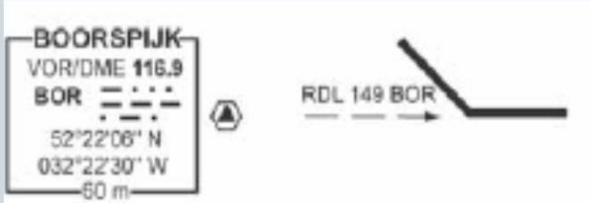
- Instrument Approach Chart (IAP)
  - ✓ Culture and topography… shore lines of water area, river, lake … *see appearance and description relevant*



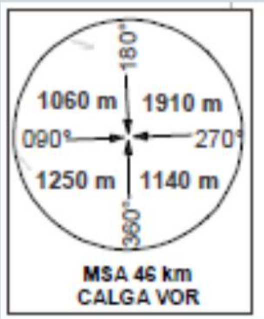


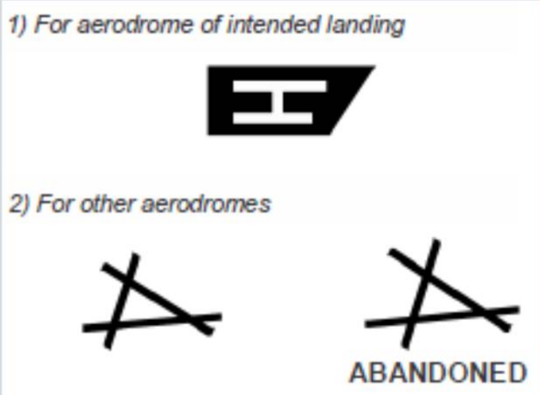
Drawing Exercise of Significant Sample

- Instrument Approach Chart (IAP)
  - ✓ Bearing, track and radial … 000˚,R000 XXX *(see description relevant)*



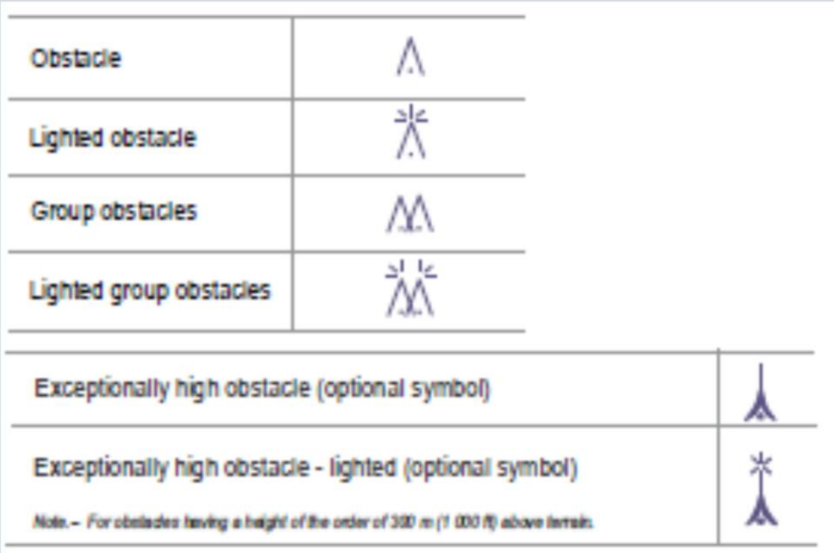
  - ✓ Aeronautical data … … *see Annex 4 appendix (prominent position)*
    - Aerodrome
    - MSA
    - Elevation



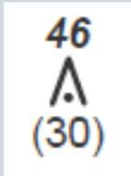


Drawing Exercise of Significant Sample

- Instrument Approach Chart (IAP)
  - ✓ Obstacles … … *see Annex 4 appendix*



Obstacle	
Lighted obstacle	
Group obstacles	
Lighted group obstacles	
Exceptionally high obstacle (optional symbol)	
Exceptionally high obstacle - lighted (optional symbol) *Note.– For obstacles having a height of the order of 300 m (1 000 ft) above terrain.*	

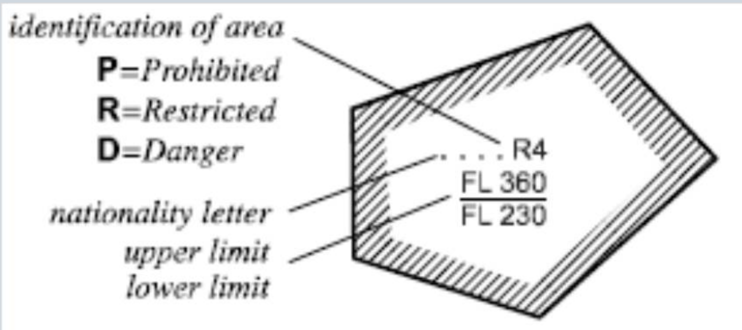


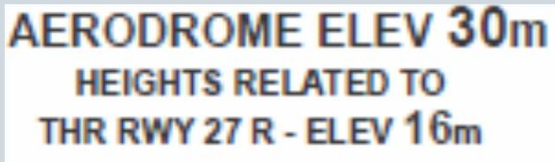
Elevation of the top of obstacle (m or ft)

Height of obstacle above a datum other than MSL (m or ft)

Drawing Exercise of Significant Sample

- Instrument Approach Chart (IAP)
  - ✓ Aeronautical data … … *see Chart Manual Chapter 7*
    - Aerodrome elevation or Threshold elevation (more than 2m (7ft) below AD elev.)
    - Prohibited, restricted and danger area



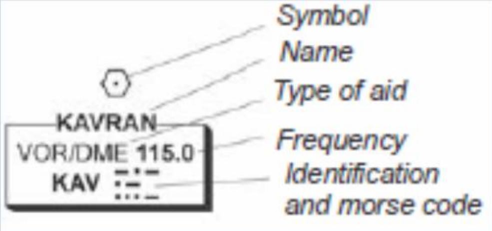


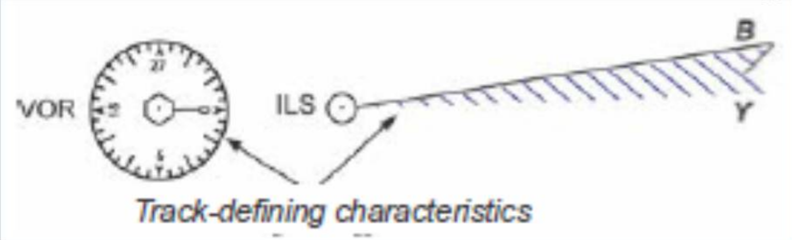
Drawing Exercise of Significant Sample

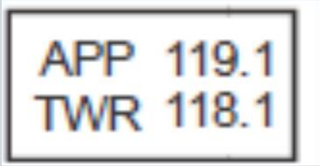
■ Instrument Approach Chart (IAP)

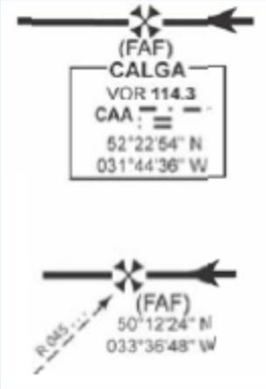
✓ Aeronautical data … … *Chart Manual Chapter 7*

● Radio Communication facilities and Navigation Aids …



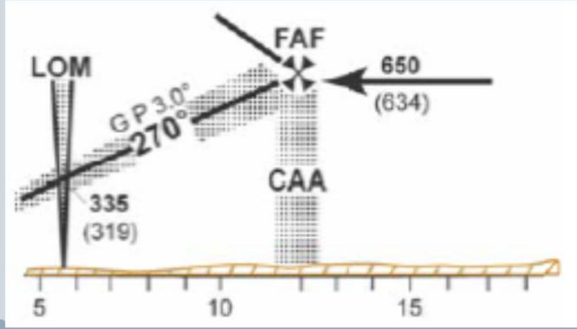






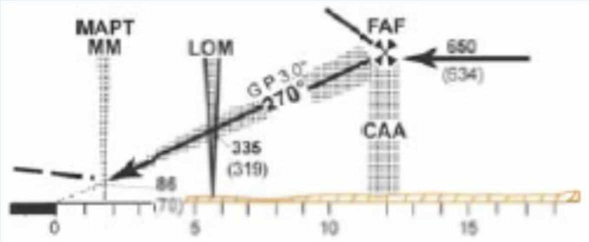
● Significant points …

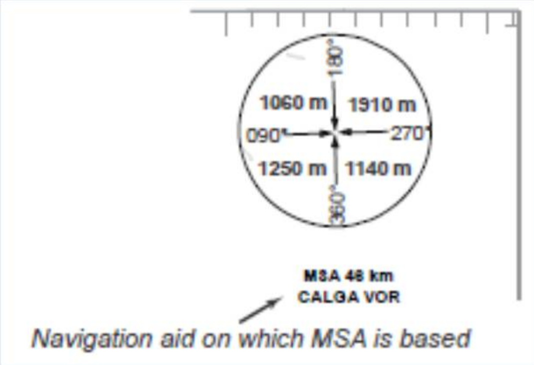
IAF, IF, FAP/FAP, MAPT



Drawing Exercise of Significant Sample

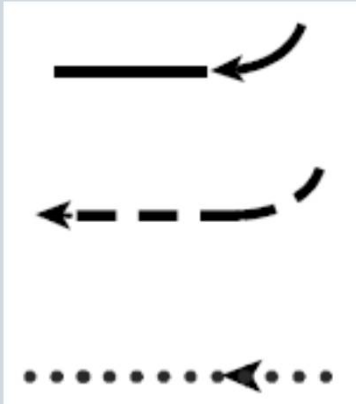
- Instrument Approach Chart (IAP)
  - ✓ Aeronautical data … *Chart Manual Chapter 7*
    - Distance to the aerodrome (THR) … on profile view
    - MSA (TAA by RNAV) *with* indication sectors and *magnetic bearing, in the top right area*





Drawing Exercise of Significant Sample

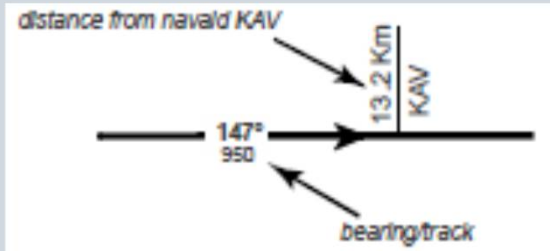
- Instrument Approach Chart (IAP)
  - ✓ Aeronautical data …*Chart Manual Chapter 7*
    - Procedure tracks
      … *on* plan view
    - Bearing, radial
      … nearest degree
    - Track distance
      … nearest two-tenths (nm/km)



Approach procedure track

Missed approach procedure track

Any additional procedure track

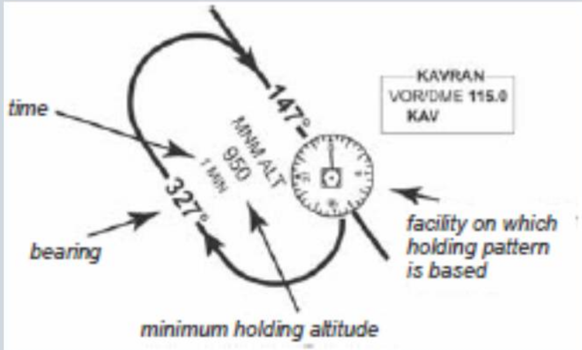


Drawing Exercise of Significant Sample

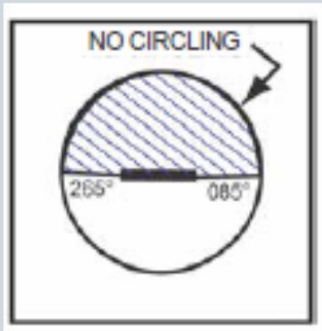
■ Instrument Approach Chart (IAP)

✓ Aeronautical data …*Chart Manual Chapter 7*

- Holding pattern …



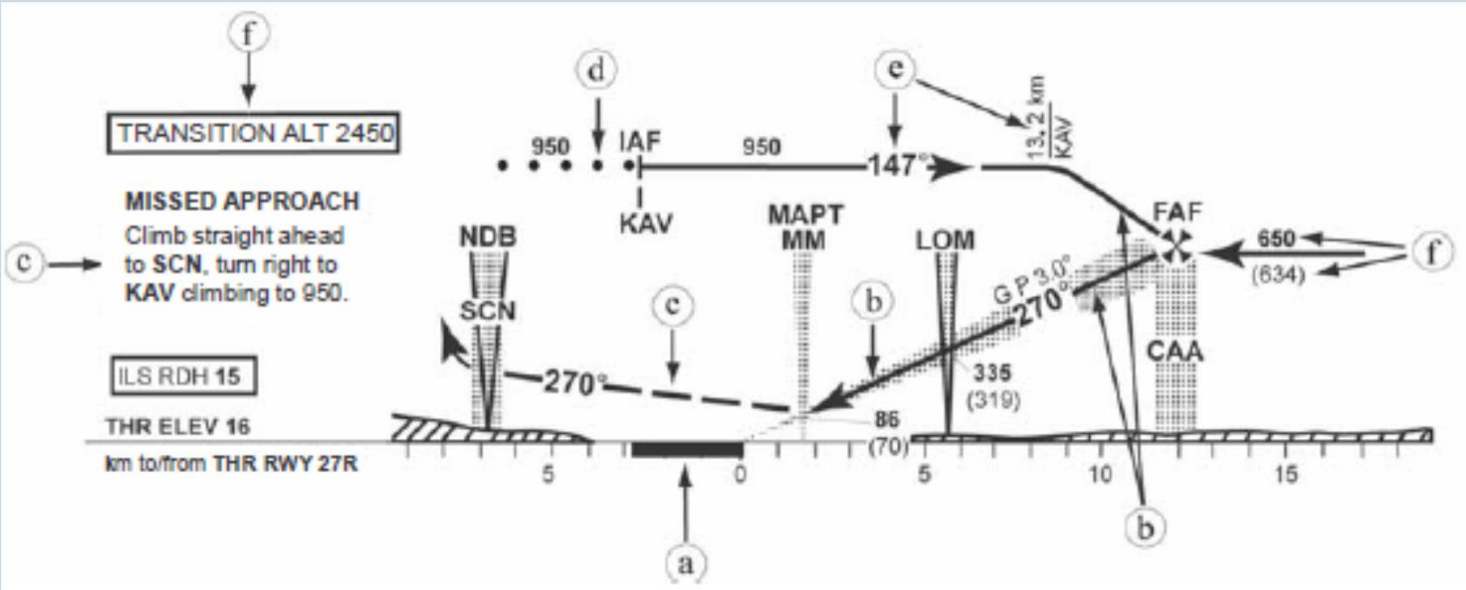
- Circling restriction …



Drawing Exercise of Significant Sample

- Instrument Approach Chart (IAP)
  - ✓ Aeronautical data …*Chart Manual Chapter 7*
    - Profile … *see descriptions and appearance*

A

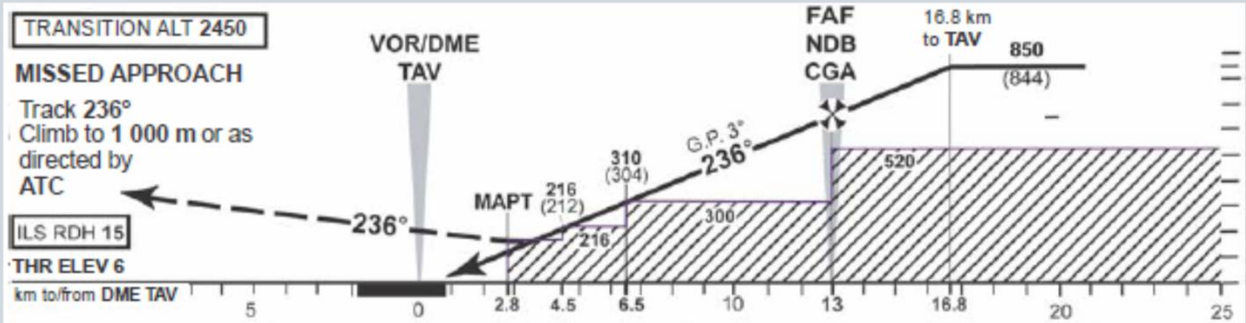


Drawing Exercise of Significant Sample

- Instrument Approach Chart (IAP)
  - ✓ Aeronautical data …*Chart Manual Chapter 7*
    - Profile … *see descriptions and appearance*

B

with operation minima provided by FPD



DME DIST (km)	3.8	6	8	10	12	14	16.8
ALT (HGT) 3.0° APCH	180 (174)	294 (288)	395 (389)	498 (492)	598 (592)	700 (694)	850 (844)

OCA (H)		A	B	C	D
Straight-in Approach	CAT I	64 (48)	67 (51)	70 (54)	73 (57)
	CAT II	(13)	(18)	(22)	(26)
	GP INOP		140	(124)	
Circling		385	465	630	680

GS	km/h	100	150	200	250	300
Rate of descent	m/s	1.4	2.2	2.9	3.6	4.3

Drawing Exercise of Significant Sample

- Instrument Approach Chart (IAP)
  - ✓ Aeronautical data … *see Chart Manual Chapter 7*
  - Supplementary information … as necessary or required with appropriate format or feature
    - Rate of descent on final approach

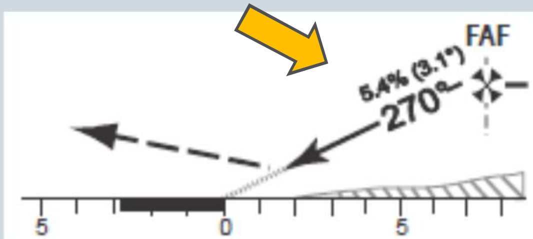
GS

GS	km/h	100	150	200	250	300
Rate of descent	m/s	1.4	2.2	2.9	3.6	4.3

DME

DME KRG, km	10	8	6	etc.
ALT (HGT) 2.4°APCH	491 (482)	398 (388)	305 (296)	etc.

    - Descent gradient on final approach
      … nearest one-tenth of a percent
      * NOT exceed maximum value



ILS RDH 15.5

    - For precision approach
      … ILS reference datum height by nearest half ‘m’ or ‘ft’
      … glide pass (vertical pass angle) by nearest one-tenth degree

Drawing Exercise of Significant Sample

- Instrument Approach Chart (IAP)
  - ✓ Others … see chapter 7 Doc 8697
    - ATS system information
    - Portrayal MNM Obstacle / Terrain altitude
    - Transition altitude …
    - Close-in obstacle …

TRANSITION ALTITUDE
2450 m

CLOSE-IN OBSTACLES
RWY 27 -Trees 44m HGT,
243 m from departure end

Drawing Exercise of Significant Sample

Instrument Approach Chart (IAP)

- Reference to chart samples of other states… Japan, German
- Exercise drafting charts of current IAC in Dushanbe airport according to ICAO style
  - Frame, Design of features on the ground such as counter lines, spot heights, water boundary etc. around the airport, **if possible**
  - Copy the feature of <u>ILS, 2 NDB RWY09 or RWY27 approach</u>

Drawing Exercise of Significant Sample

- Others or Special parts of AIP Charts, except flight procedures

- Reference to chart samples of other states… Japan
- Exercise drafting charts of typical styles based on ICAO documents to copy the samples of other states. **NOT PRASCTICE**

Evaluation of Activity & Output

- Performance test
  - ✓ 31 August, 10:00 ～ 12:00, 2 group to use PC with VISIO,
  - ✓ There are 2 exercises (SID, STAR), and please discuss and evaluate the result of each exercise by group,
  - ✓ Practice drafting work on IFR flight procedures chart by Visio to read description, seeking a sample or to advice of Expert, and
  - ✓ Create a new file and assign exercise to different page.
- Evaluate self performance & comments by Expert

Evaluation of Activity & Output

- Performance test

1. Draw SID chart figure as description below at Hanamaki AP in Japanese AIP, with abbreviation, bearing, distance, altitude except navaids data.

   RWY02: Climb RWY HDG to HPE 3.5 DME, turn right…

   RWY20: Climb RWY HDG to HPE 3.5 DME, turn left…

   … proceed to HPE VOR/DME, via HPE R236 to GTC VORTAC

   Cross HPE VOR/DME at or above 2200 FT.

   - Hanamaki RWY; 010.73°T/190.73°T (True BRG)
   - VAR 8°W
   - HPE; Hanamaki VOR/DME
   - HPE to GTC(Niigata VORTAC); 236°(regard as Mag. BRG)、130nm

Evaluation of Activity & Output

- Performance test

2. Draw STAR chart figure as description below at Hakodate AP in Japanese AIP, except text box.

   From over HIBAR, via HWE R194 to YHUKA, turn right via HWE 18.0DME counterclockwise ARC to EMINA…

   Cross EMINA at or above 4000FT.

   - Hakodate RWY; 107.98°T/287.98°T (True BRG)
   - VAR 9°W
   - HWE; Hakodate VOR/DME located north near the runway
   - HIBAR; HWE R194/D40.0(NM), YHUKA; HWE R194/D20.0PE, EMINA; HWE R153/D18.0

Basic Strategy of Drawing by VISIO

- Measure and Process of drafting
- General elements
  - ✓ Basement or format
  - ✓ Line, character, numeric, figure, graphic symbol …
  - ✓ Culture and topography / feature on the ground …

- *Discussion & tentative determination of chart drafting common type and feature style of TAN.*

[*Hands-on*]
VISIO

- General Contents
- Page setting
  - ✓A4 size (or A3 size)
  - ✓Scale 1mm : 500m or 1000m
    - Assignment figures or characters on the page to scale actual value to proper size by calculation or optimum size on the chart
    - Illustration or symbol are emphasized

[*Hands-on*]
VISIO

- ■General Setting 1
  - ✓Character
  - ✓Object
    - ●Line, Block, circle, arc …
    - ●Size of objects
  - ✓Text data (box)
    - ●Type, size, color, style …

[*Hands-on*]
VISIO

- General Function 2
  - ✓ Grouping on / off
  - ✓ Drawing
    - Line, Block, circle, free, arc …
    - Size of objects
  - ✓ Attaching Text data (box)
    - Select text box and typing for new data
    - Select text box by object selection tool, click text button, then re-typing for correct data …
  - ✓ Decoration
    - Painting, shadowing

[*Hands-on*]
VISIO

■General Function 3

- ✓Paging
  - ●Create New or add
- ✓Display of page
  - ●Line, Block, circle, arc …
  - ●Size of objects
  - ●Zooming
  - ●Guide, grid or ruler
- ✓Text data (box)
  - ●Type, size, color, style …
- ✓ Registration of objects
  - ●Symbol, constant figure etc., …

[*Hands-on*]
VISIO

- General Function 4
  - ✓ Object selection
    - Individual or group
  - ✓ Copy
    - Individual or group …
  - ✓ Layer
    - Type, size, color, style …
  - ✓ Object data arrangement
    - Origin point (X-Y), End point (X-Y), length, angle, height etc., …
    - Working

[*Hands-on*]
VISIO

- General Function 5
  - ✓Object selection
    - Individual or group
  - ✓Copy
    - Individual or group …
  - ✓Layer
    - Type, size, color, style …

[*Hands-on*]
VISIO

- ■General Function 5
  - ✓Working window … Figure
    - ●Basic figure
    - ●Original figure
    - ●Others … original, registered or special for respective purpose etc.
  - ✓Working window … Figure data
  - ✓Working window … Pan or zooming
  - ✓Working window … size, position or rotation
    - ● assign data and arrangement

[*Hands-on*]
VISIO

- Basic handling 1
  - ✓Object Copy
  - ✓Selection
    - Individual or group …
    - Size of objects
  - ✓Text data (box)
    - Type, size, color, style …
  - ✓ Decoration
    - Painting, shadowing

Q & A

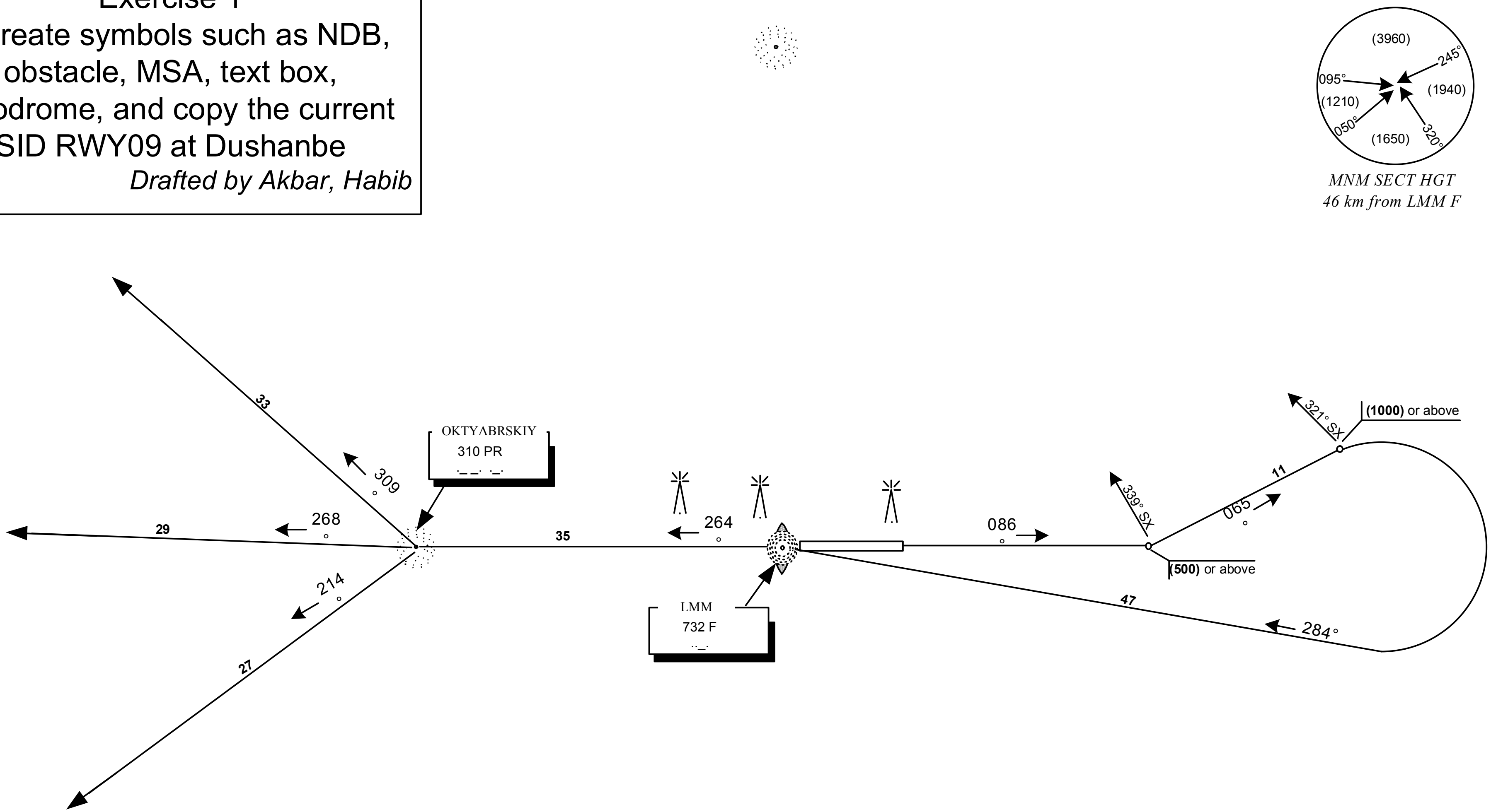
End

Attachment

Sample of Output

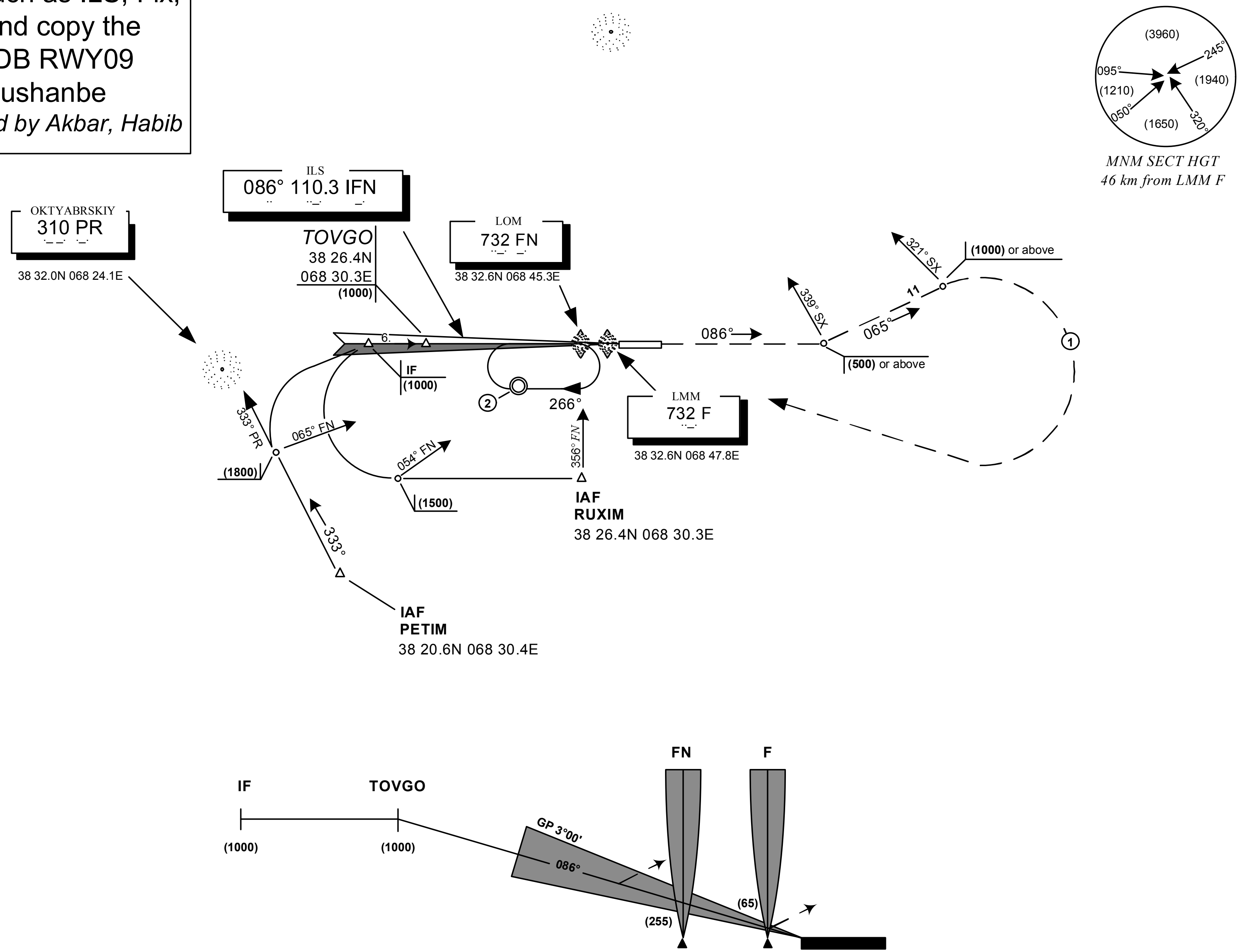
AIP chart drawing by participants

Exercise 1
to create symbols such as NDB, obstacle, MSA, text box, aerodrome, and copy the current SID RWY09 at Dushanbe
Drafted by Akbar, Habib



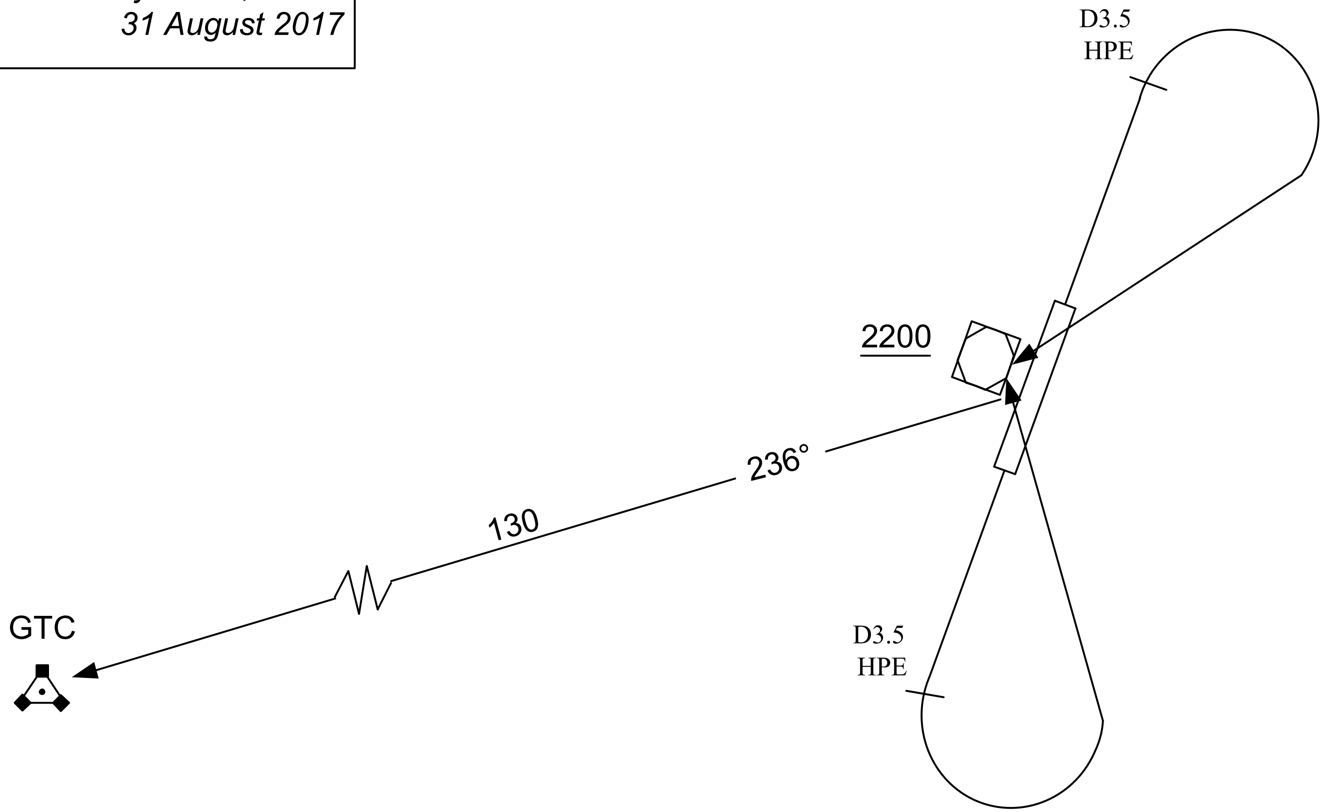
Exercise 2
to create symbols such as ILS, Fix, text box, route, and copy the current ILS, 2 NDB RWY09 approach at Dushanbe

Drafted by Akbar, Habib



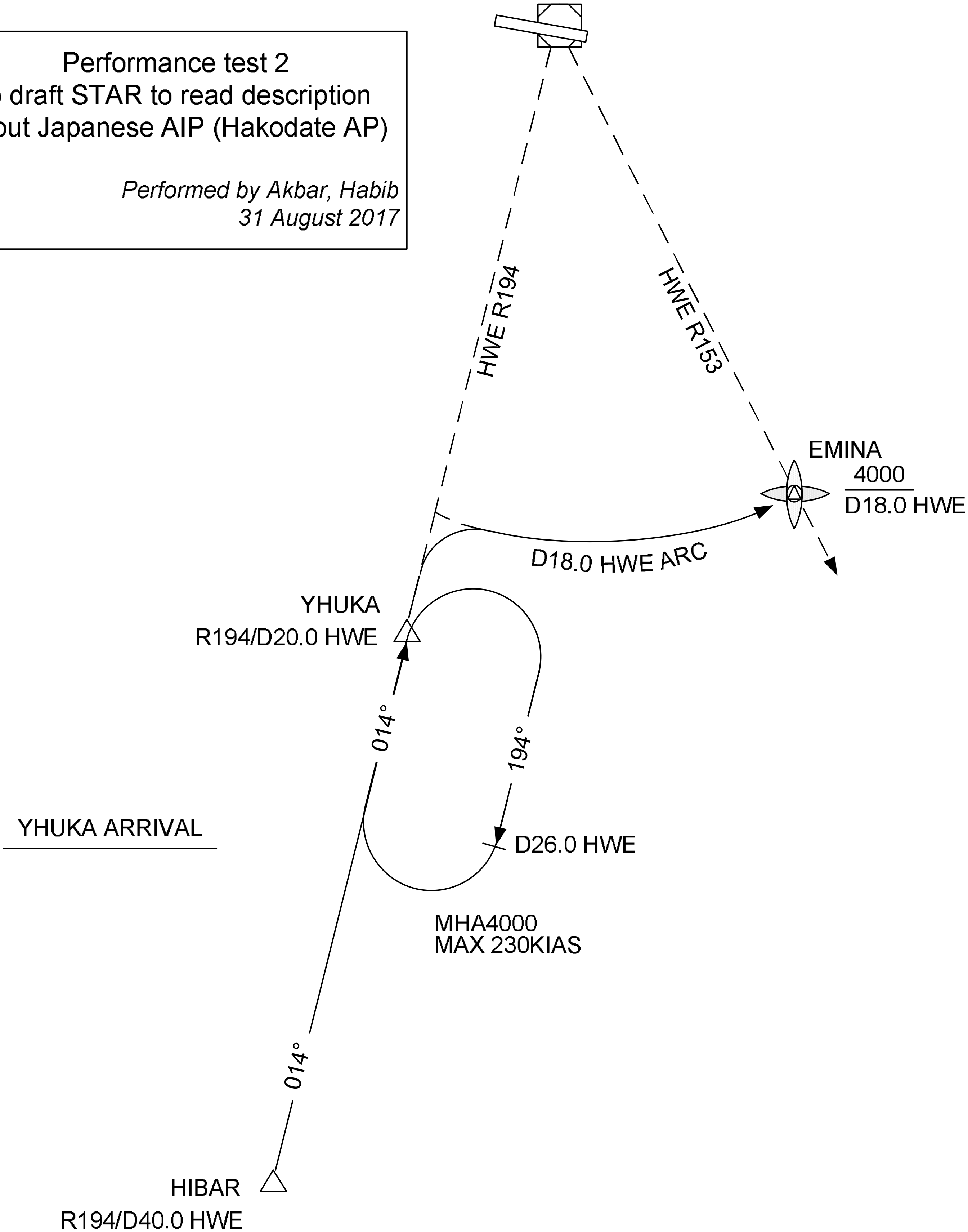
Performance test 1
to draft SID to read description about
Japanese AIP (Yamagata AP)

Performed by Akbar, Habib
31 August 2017



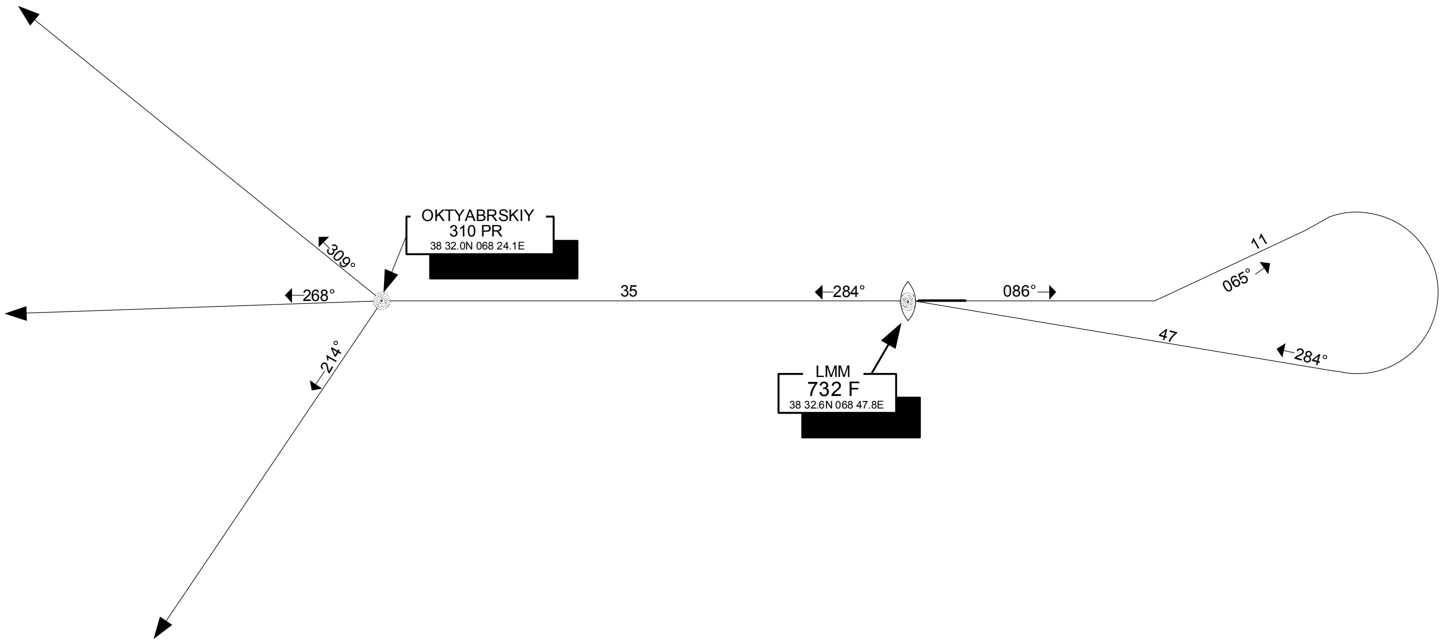
Performance test 2
to draft STAR to read description
about Japanese AIP (Hakodate AP)

Performed by Akbar, Habib
31 August 2017

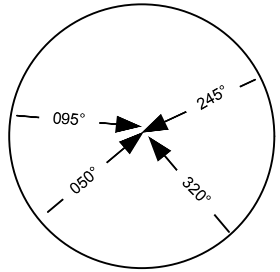


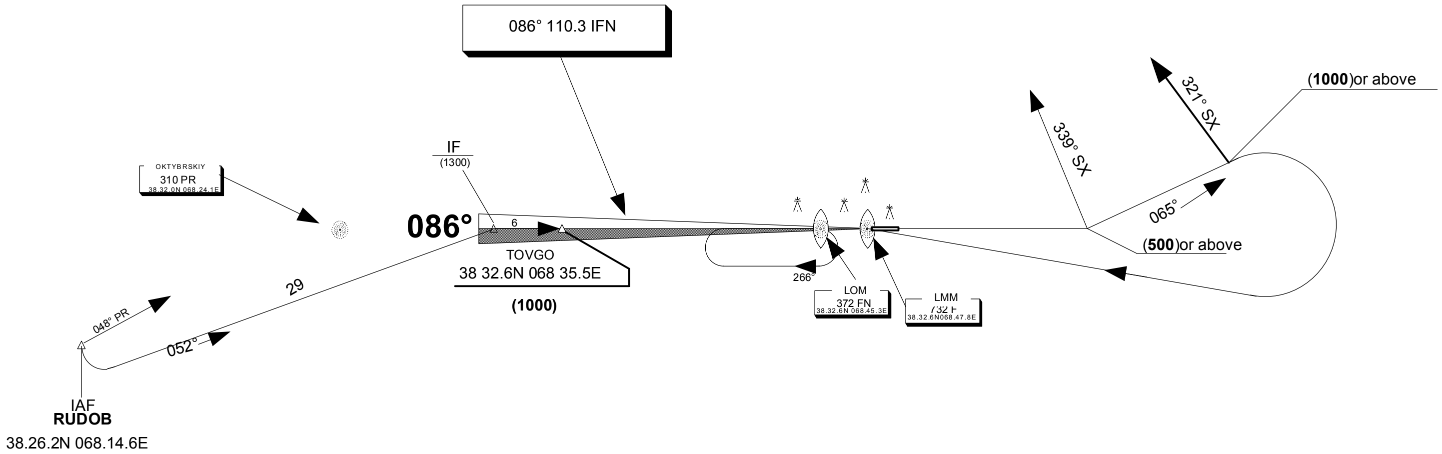
Exercise 1
to create symbols such as NDB, obstacle, text box, aerodrome, and copy the current SID RWY09 at Dushanbe AP

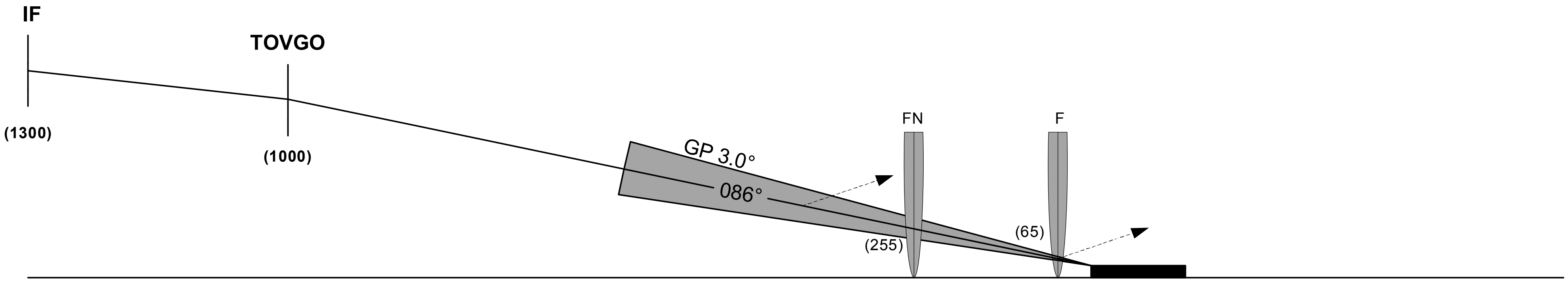
Drafted by Ilhom, Rustam



Exercise 2
to create symbols such as ILS, marker, text box, MSA, route, and copy the current ILS, 2 NDB RWY09 approach at Dushanbe AP
Drafted by Ilhom, Rustam

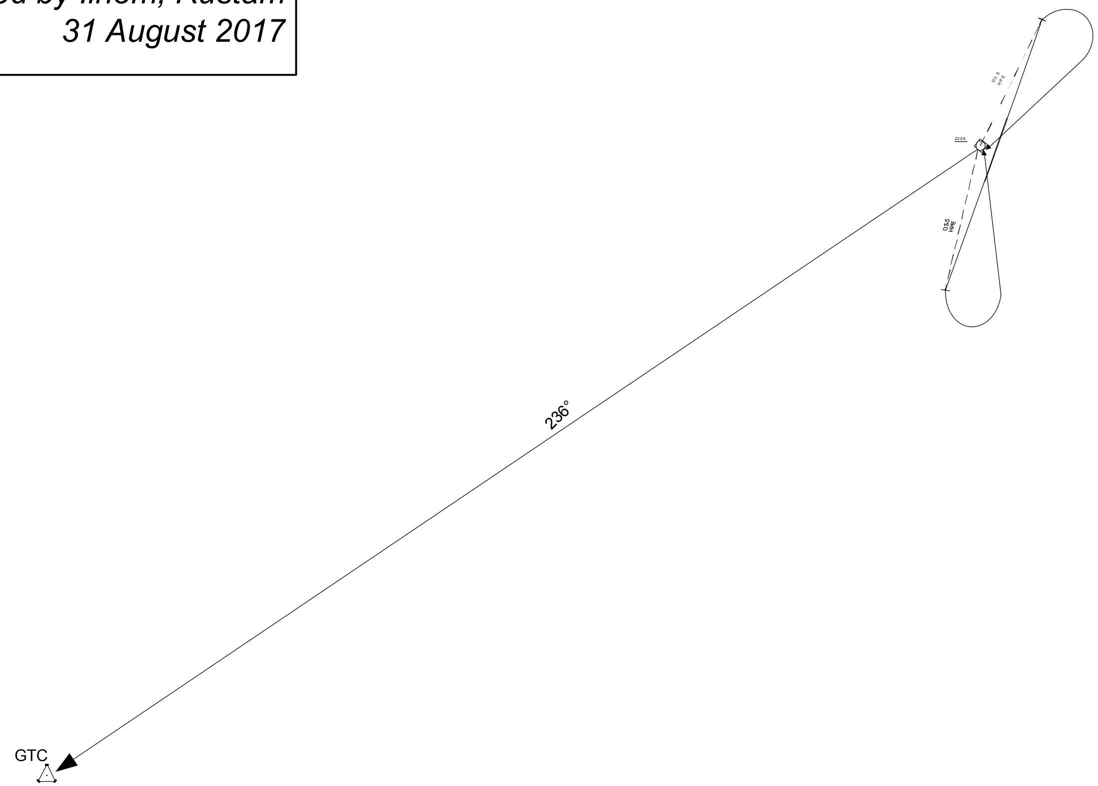






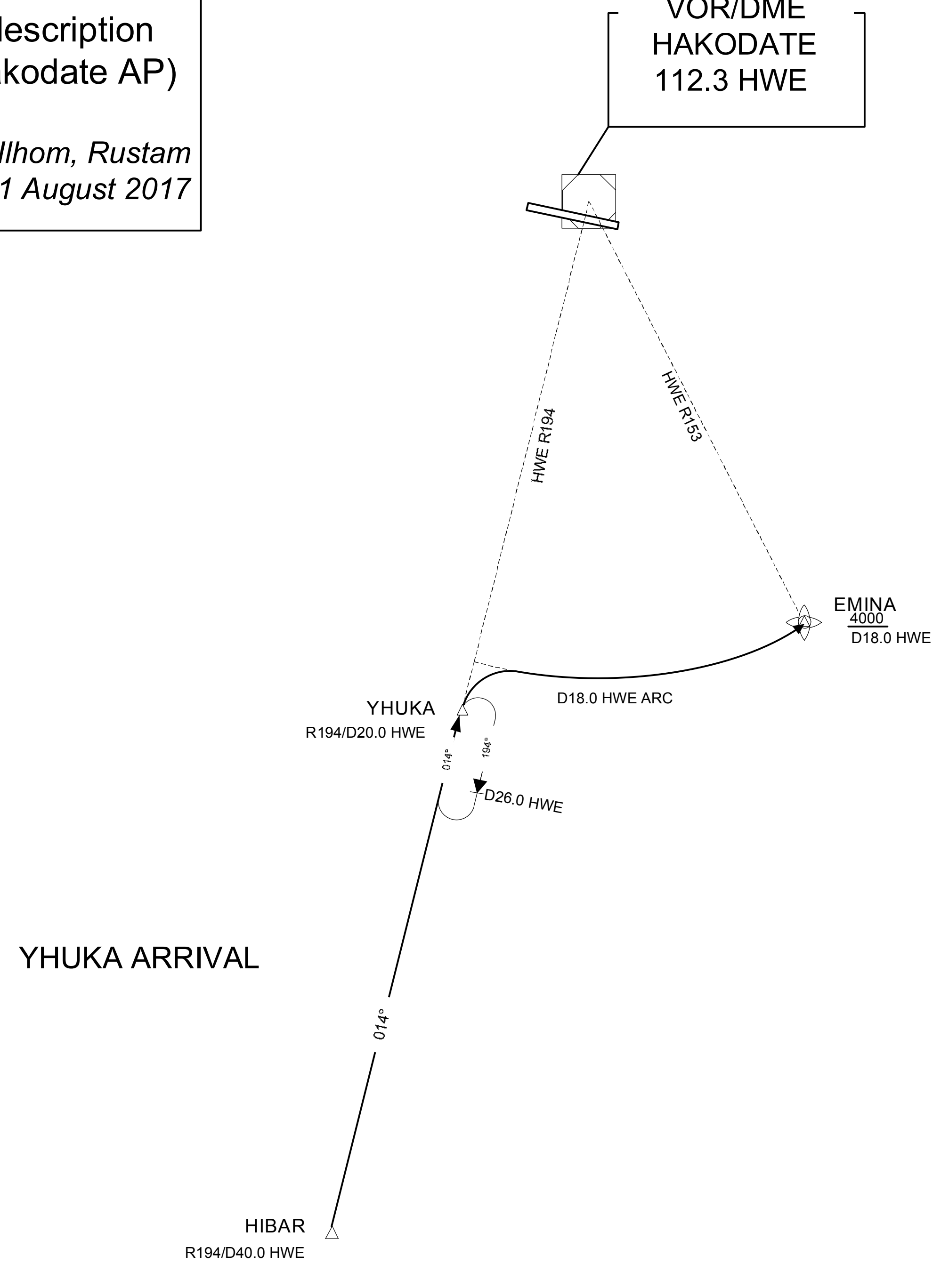
Performance test 1
to draft SID to read description about
Japanese AIP (Yamagata AP)

Performed by Ilhom, Rustam
31 August 2017



Performance test 2
to draft STAR to read description
about Japanese AIP (Hakodate AP)

Performed by Ilhom, Rustam
31 August 2017



Workshop

August. 8-14

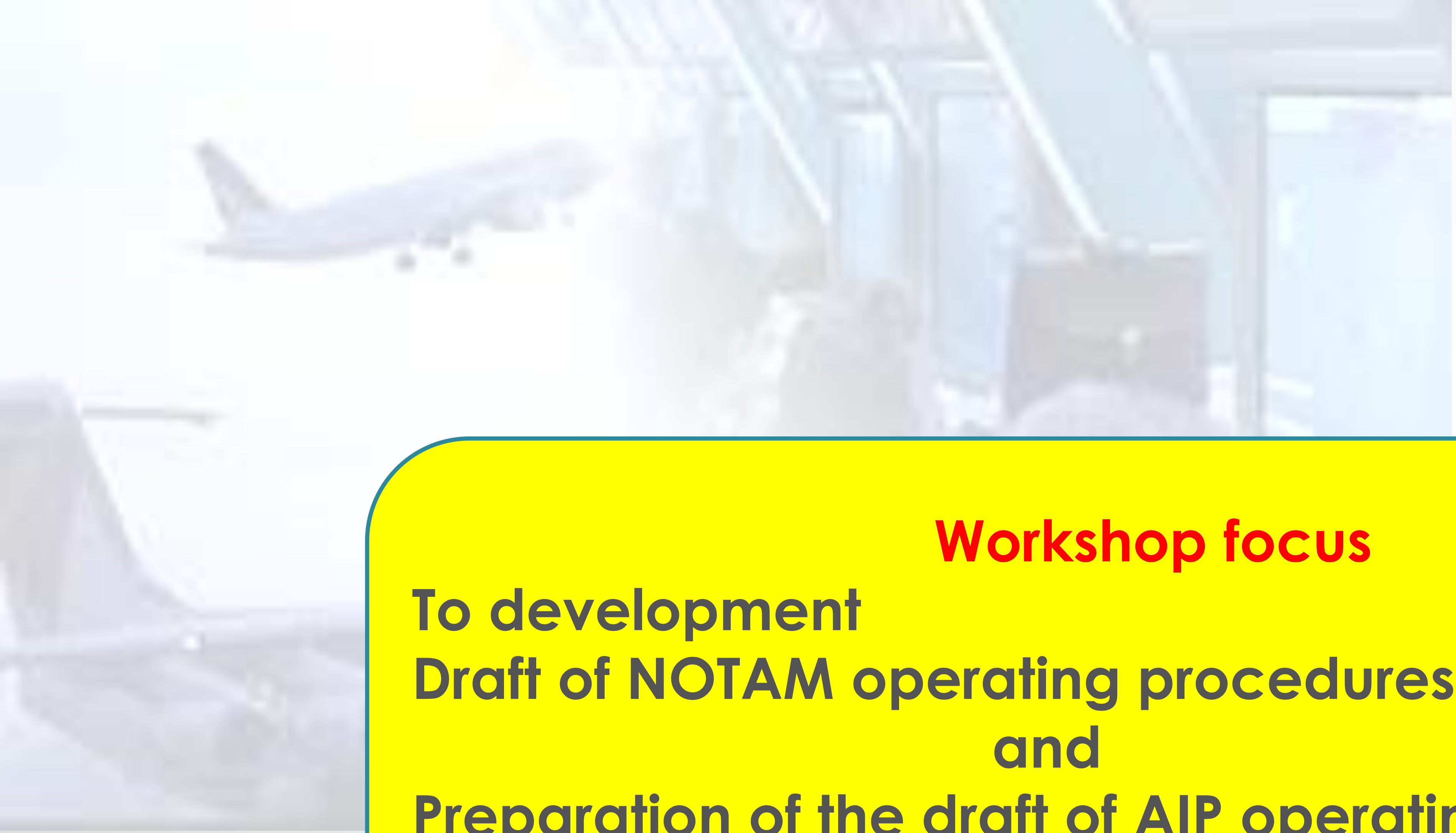
NOTAM & AIP Operating Procedures Manual

Shinichiro SUKEGAWA
Air Traffic Control Association Japan
JICA

Schedule

e		AM(09:00-12:00)	PM(13:00-16:00)	Remarks
5	Sun			Arrival by SZ256
6	Sat			
7	Mon	TF3 Meeting	Site-survey concerning NOTAM	Additional research
8	Tue	Overview of AIS	Organization structure by Doc.8126	Review of AIS
9	Wed	Terminology of NOTAM and Working process	Quality management of NOTAM	Annex15
10	Thu	ICAO trend and Eurocontrol on OPADD	Preparation draft of TAN's manual ①	Doc.8126, OPADD
11	Fri	Preparation draft of TAN's manual ②	Preparation draft of TAN's manual ③	Doc.8126, OPADD
12	Sat			
13	Sun			
14	Mon	Screening of NOTAM procedure draft manual	Amendment of draft manual	
15	Tue	Site-survey concerning AIP	Site-survey related AIP (ATC)	Additional research
16	Wed	Overview of AIP	AIP in Annex15	Annex15
17	Thu	Introduction of Japanese operation①	Introduction of Japanese operation②	
18	Fri	AIP General	AIP En Route	Doc.8126
19	Sat			
20	Sun			
21	Mon	AIP Aerodromes	Quality management of AIP①	Doc.8126
22	Tue	Quality management of AIP②	Preparation of effective manual for next step	OPADD
23	Wed	Preparation for MM	Wrap-up Meeting TF3	
24	Thu	adjustment for MM	Report to JICA Office	Return on Entering pass
25	Fri			Departure by KC132

Time allotted for NOTAM is 30 hours, for AIP is 33 hours



Workshop focus

To development
Draft of NOTAM operating procedures manual
and
Preparation of the draft of AIP operating procedures manual
....Documents compile by English version

Self-introduction

- **Let's start to introduce each other,**
- **at first by myself, Shinichiro Sukegawa**

September 1997-September 1999

Japan International Cooperation Agency (JICA) Expert in Directorate General of Civil Aviation on Ministry of Transportation of Indonesia

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New Tokyo International Airport in Ministry of Land Infrastructure Transport

April 2001-September 2004

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October 1999-March 2001

Tokyo International Airport in Ministry of Land Infrastructure Transport

Acknowledgment before starting!

① This Workshop is focused to improve the NOTAM Operating Procedures Manual in everyday conduct of our work.

② This is where it is created in the English version by JICA recommended.

③ This manual will be translated to the Tajik / Russian language from English after created this work.

④ Therefore, it will be make the manual in an easy-to-understand way and offering a useful example on the assumption that it will be translated to Tajik/Russian.

⑤ Excellent quality that the information NOTAM results in satisfied related persons.

⑥ Identify what the reception desk about NOTAM and AIP to any originator.

⑦ Aiming to improve operational system that everyone checks their work before start and periodic review of operation wide.

⑧ Try to do not forget <u>the daily check</u>, you are beginning the work at the morning and complete the operation at the evening.

⑨ Management of Manual for to <u>improve the quality.</u>

⑩ Be kept at a constant level of operation on any person in charge.

⑪ Data Base Architecture

⑫ Communication with the internal and one's neighboring person are improved and well clear.

⑬ Now is as good time as any, please establishing a collaborative relationship with AIS Center in Japan.

⑭ Now, the digitalization of Information in terms of NOTAM and AIP are an ongoing process in the world. So, it is necessary that the using of NOTAM sheets will be make the computerization form in the future.

⑮ The information gathering, the data distribution and the management of information have been very important work in TAN.

⑯ Workshop Journal : We will be make a note in daily workshop after 4pm by to take turns everybody.

Course Syllabus

8 Tuesday

09:00-12:00

Overview of AIS

Let's review of Aeronautical Information Services concept.

AIS included the Aeronautical Information Publication, NOTAM and Aeronautical Information Circular.

13:00-16:00

Organization structure

Doc.8126 recommended an Organizational structure as effective framework

9 Wednesday

09:00-12:00

The terminology to be used in NOTAM and the working flow of procedures

13:00-16:00

Quality Management of NOTAM procedures

10 Thursday

09:00-12:00

Current trend of ICAO and OPADD by Euro-Control

13:00-16:00

The development of the draft of NOTAM Operating Procedures manual for TAN, Part 1: 3 hours

11 Friday

09:00-12:00

The development of the draft of NOTAM Operating Procedures manual for TAN, Part 2: 3 hours

13:00-16:00

The development of the draft of NOTAM Operating Procedures manual for TAN, Part 3: 3 hours

14 Monday
09:00-12:00
Screening of the draft of NOTAM procedure manual

13:00-16:00
Amendment of draft manual
15 Tuesday
09:00-12:00
Site-survey concerning AIP
13:00-16:00
Site-survey related AIP (ATC)
16 Wednesday
09:00-12:00
Overview of AIP
13:00-16:00
AIP in Annex15
17 Thursday
09:00-12:00
Introduction of Japanese operation①
13:00-16:00
Introduction of Japanese operation②

18 Friday
09:00-12:00
AIP General
13:00-16:000
AIP En-Route
21 Monday
09:00-12:00
AIP Aerodromes
13:00-16:00
Quality management of AIP①
22 Tuesday
09:00-12:00
Quality management of AIP②

Спасибо вам за ваше сотрудничество

Otsukare sama !

FOREWORD

Annex 15 to the Convention on International Civil Aviation specifies that each Contracting State shall provide an "aeronautical information service". An aeronautical information service (AIS) is required to collect and distribute information needed to ensure the safety, regularity and efficiency of air navigation. Such information, which includes the availability of air navigation facilities and services and the procedures associated with them, must be provided to flight operations personnel, as well as the air traffic services unit responsible for flight information service and the services responsible for pre-flight information.

The effective functioning of an AIS is dependent upon the cooperative effort of all aeronautical services, such as communications, aerodromes and air traffic services, since the raw information must be originated by such services. It is, therefore, incumbent upon the national aviation authority to ensure that all the required information is supplied to the AIS as promptly as possible.

The purpose of this manual is to explain the basic functions of an AIS and to describe the basic organization it requires. It is also intended that the manual:

a) assist Contracting States in the uniform application of the Standards and Recommended Practices (SARPs) contained in Annex 15;
b) promote maximum efficiency in the organization and operation of an AIS; and
c) assist Contracting States in the training of AIS personnel.

This manual is published in furtherance of Recommendation 4/1 of the Meeting of the Aeronautical Information Services and Aeronautical Charts Division of ICAO (held at Montreal in April 1959).

It should be read in conjunction with the latest editions of the following related ICAO documents:

Annex 4 — Aeronautical Charts

Annex 15 — Aeronautical Information Services

Doc 8697 — Aeronautical Chart Manual

Doc 9674 — World Geodetic System — 1984 (WGS-84) Manual

Throughout this manual, references to the appropriate Annex 15 SARPs are shown within square brackets.

TABLE OF CONTENTS

Chapter 1 INTRODUCTION

1.1 PURPOSE OF AN AERONAUTICAL INFORMATION SERVICE (AIS)

Needs of the operator

1.1.1 The operator of any type of aircraft, be it small private aircraft or large transport aircraft, must have available a variety of information concerning the air navigation facilities and services that may be expected to be used. For example, the operator must know the regulations concerning entry into and transit of the airspace of each State in which operations will be carried out, as well as what aerodromes, heliports, navigation aids, meteorological services, communication services and air traffic services are available and the procedures and regulations associated with them. The operator must also be informed, often on very short notice, of any change affecting the operation of these facilities and services and must know of any airspace restrictions or hazards likely to affect flights. While this information can nearly always be provided before take-off, it must in some instances be provided during flight.

Responsibility of the pilot-in-command

1.1.2 The responsibility of the pilot-in-command to become familiar with all available information appropriate to the intended operation is stated in Chapter 2 of Annex 2. For international commercial air transport, there are stringent ICAO requirements which can only be satisfied by the provision of the type of information usually provided by an AIS. Pilots must be familiar with the regulations and procedures of all States to be overflown. Annex 6, Part I, specifies that certain specific types of information must be carried on board an aircraft, and that no flight may be commenced unless there is reasonable assurance that the facilities and services required for the flight are available and operational. The requirements for international general aviation and international helicopter operations, in Annex 6, Part II and Part III respectively, can also only be satisfied by the provision of the type of information provided by an AIS. Therefore, the ability to comply with these requirements of Annex 6 is dependent upon the existence of a well-organized and efficient AIS, adequately staffed with personnel trained for this specialty.

Responsibility of an aeronautical information service [3.1]

1.1.3 Annex 15 specifies that each Contracting State must provide an AIS for the collection and distribution of aeronautical information for use by all types of aircraft operations. This is the basic responsibility. A State could also:

a) make arrangements with one or more Contracting States for the provision of a joint AIS; or
b) delegate the authority for the provision of aeronautical information services to a nongovernmental agency, provided that the Standards and Recommenced Practices of Annex 15 are met.

1.1.4 Annex 15 also specifies that the State concerned remains responsible for the aeronautical information published. When the aeronautical information is published on behalf of a State it must be clearly indicated that it is published under the authority of that State.

1.1.5 The philosophy underlying Annex 15, which stems from Article 28 of the Convention on International Civil Aviation, is that each State is responsible for making available to civil aviation interests any and all information which is pertinent to and required for the operation of aircraft engaged in international civil aviation within its territory, as well as in areas outside its territory in which the State has air traffic control or other responsibilities.

1.1.6 Although the Convention and its Annexes are concerned primarily with international air operations, it should be noted that national aviation has the same need for an AIS.

Need for uniformity

1.1.7 In accordance with Article 37 of the Convention, Annex 15 is designed to promote uniformity in the collection and distribution of aeronautical information, in the interest of safety, efficiency and economy of civil aviation.
International exchange of aeronautical information [3.1]

1.1.8 Although the AIS operated by each State is primarily responsible for the provision of information regarding the facilities and services located within its territory, the exchange of similar information with AIS of other States enables the provision of the pre-flight information service needed by international operations which may traverse those States and information required by related air traffic service units for aircraft in flight. It will be apparent that the amount and scope of the information handled by an AIS will vary considerably from State to State.

1.2 INFORMATION HANDLED BY AN AIS

Origin of aeronautical information

1.2.1 An AIS does not normally originate the information it processes and ultimately issues. The “raw data” must be provided by those responsible for the operation of the various air navigation facilities and services. Since an AIS is one of several services that normally come under the control of the aviation administration of a State, and since its effectiveness is highly dependent upon the provision of required information by other services, it is most important that the position of an AIS in the overall picture, and the responsibility of other services for providing the required information, is well understood. The basic purpose of an AIS is to provide information needed to ensure the safety, regularity and efficiency of civil aviation and, regardless of the efficiency of its organization, its ability to perform this important function will be highly dependent upon the adequacy, accuracy and timely provision of the required raw data by each of the State services associated with aircraft operations. To secure this, an easy and effective liaison needs to be established between an AIS and other, related services. Also, the status accorded to the AIS within the aviation administration, as well as its physical location, should be determined with care to ensure the necessary priorities and liaison.

Scope and type of information

1.2.2 The information handled by an AIS may vary widely in terms of the duration of its applicability. For example, information related to airports and its facilities may remain valid for many years while changes in the availability of those facilities (for instance, due to construction or repair) will only be valid for a relatively short period of time. Information may be valid for as short a time as days or hours.

1.2.3 The urgency attached to information may also vary, as well as the extent of its applicability in terms of the number of operators or types of operations affected by it. Information may be lengthy or concise or include graphics.

1.2.4 Therefore, aeronautical information is handled differently depending on its urgency, operational significance, scope, volume and the length of time it will remain valid and relevant to users. Annex 15 specifies that aeronautical information be published as an Integrated Aeronautical Information Package. It is composed of the following elements: the Aeronautical Information Publication (AIP), including amendment service, AIP Supplements, NOTAM, pre-flight information bulletins (PIB), Aeronautical Information Circulars (AIC), checklists and lists of valid NOTAM. Each element is used to distribute specific types of aeronautical information.

1.3 QUALITY SYSTEM [3.2]

1.3.1 The need, role and importance of aeronautical information/data have changed significantly with the evolution of the Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) systems. The implementation of area navigation (RNAV), required navigation performance (RNP) and airborne computerbased navigation systems has brought about exacting requirements for the quality (accuracy, resolution and integrity) of aeronautical information/data.

1.3.2 The users’ dependence on the quality of certain aeronautical information/data is evident from Annex 15, paragraph 3.2.8 a) which, when describing critical data, states: “There is a high probability when using corrupted critical data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe”.

1.3.3 Since corrupt or erroneous aeronautical information/data can potentially affect the safety of air navigation because of the direct dependence upon it by both airborne and ground-based systems, it is imperative that each State ensure that users (aviation industry, air traffic services, etc.) receive timely and quality aeronautical information/data for the period of its intended use.

1.3.4 To achieve this, and to demonstrate to users the required information/data quality, States must establish a quality system and put in place quality management procedures at all stages (receiving and/or originating, collating or assembling, editing, formatting, publishing, storing and distributing) of the aeronautical information/data process. The quality system must be documented and demonstrable for each function stage, ensuring that the organizational structure, procedures, processes and resources are in place in order to detect and remedy any information/ data anomalies during the phases of production, maintenance and operational use. Explicit in such a quality management regime is the ability to trace all information/data from any point, back through the proceeding processes, to its origin.

1.3.5 Frequent audits form part of the quality system to ensure consistency and conformity. Where nonconformity is detected, action must be taken to determine the cause and to correct the anomaly. Reports, record keeping, and documentation form an integral part of this process.

1.3.6 The International Organization for Standardization (ISO) has developed a set of international standards (ISO 9000 series) dealing with quality management and quality assurance which are in wide use in different sectors throughout the world. Many States have used ISO 9000 standards as the basis for their quality systems. ISO 9000 accreditation is one way that a State's AIS is able to demonstrate that a quality system is in place which will enable them to meet established user requirements.

1.3.7 When formulating a quality assurance programme, an organization should not limit its focus to the processes and procedures that are involved in the provision of the service. It is equally important that the personnel, which are an integral part of the system, possess and utilize the skills and competencies necessary to operate within the quality system. In the context of the quality system, the objectives of skills and competency management must include:

a) the identification of the functions to be performed;
b) the identification of the knowledge and skills required for each step of each of the processes; and
c) the assurance that the personnel assigned to functions have the required knowledge and skills, and are competent to perform those functions.

1.3.8 Additionally, and in accordance with the quality system requirements, appropriate records of skills need to be kept so that the qualifications of personnel assigned to perform specific functions can be confirmed. Appropriate checks must also be undertaken periodically to ensure that personnel continue to meet the required standards and, if shortfalls in knowledge, skills or competencies are detected, corrective measures are taken.

1.4 COMMON REFERENCE SYSTEMS FOR AIR NAVIGATION [3.7]

Horizontal reference system

1.4.1 World Geodetic System — 1984 (WGS-84) must be used as the horizontal (geodetic) reference system for international air navigation. Consequently, published aeronautical geographical coordinates (indicating latitude and longitude) must be expressed in terms of the WGS-84 geodetic reference datum.

1.4.2 Comprehensive guidance material concerning WGS-84 is contained in the World Geodetic System —1984 (WGS-84) Manual (Doc 9674).

1.4.3 Specifications governing the determination and reporting (accuracy of field work and data integrity) of WGS-84-related aeronautical coordinates for geographical positions established by air traffic services are given in Annex 11, Chapter 2, and Appendix 5, Table 1, and for aerodrome/heliport-related positions, in Annex 14, Volumes I and II, Chapter 2, and Table A5-1 and Table 1 of Appendices 5 and 1, respectively.

1.4.4 Geographical coordinates that have been transformed into WGS-84 coordinates but whose accuracy of original field work does not meet the requirements in Annex 11, Chapter 2, and Annex 14, Volumes I and II, Chapter2, must be identified by an asterisk.

1.4.5 The order of publication resolution of geographical coordinates must be that specified in Annex 15, Appendix 1 and TableA7-1 of Appendix 7 while the order of chart resolution of geographical coordinates must be that specified in Annex 4, Appendix 6, Table 1.

1.4.6 In precise geodetic applications and some air navigation applications, temporal changes in the tectonic plate motion and tidal effects on the Earth's crust should be modelled and estimated. To reflect the temporal effect, an epoch should be included with any set of absolute station coordinates.

1.4.7 The epoch of the latest updated WGS-84 (G1150) reference frame, which includes plate motion model, is 2001.0. G indicates that the coordinates were obtained through Global Positioning System (GPS) techniques, and the number following G indicates the GPS week when these coordinates were implemented in the United States of America's National Geospatial-Intelligence Agency's (NGA's) precise ephemeris estimation process.

1.4.8 Another precise worldwide terrestrial coordinate system is the International Earth Rotation Service (IERS) Terrestrial Reference System (ITRS), and the realization of ITRS is the IERS Terrestrial Reference Frame (ITRF). Guidance material regarding the ITRS is provided in Appendix C of Doc9674. The most current realization of the WGS-84 (G1150) is referenced to the ITRF 2000 epoch. The WGS-84 (G1150) is consistent with the ITRF 2000 and in practical realization the difference between these two systems is in the one to two centimetre range worldwide, meaning WGS-84 (G1150) and ITRF 2000 are essentially identical.

1.4.9 A brief description of the horizontal (geodetic) reference system used must be provided in the AIP as specified in Annex 15, Appendix 1, GEN 2.1-3.

Vertical reference system

1.4.10 Mean sea level (MSL) datum, which gives the relationship of gravity-related height (elevation) to a surface known as the geoid, must be used as the vertical reference system for international air navigation.

1.4.12 The geoid globally most closely approximates MSL. It is defined as the equipotential surface in the gravity field of the Earth which coincides with the undisturbed MSL extended continuously through the continents.
1.4.13 Gravity-related heights (elevations) are also referred to as orthometric heights while distances of points above the ellipsoid are referred to as ellipsoidal heights.

1.4.13 The Earth Gravitational Model — 1996 (EGM-96), containing long wavelength gravity field data to degree and order 360, must be used by international air navigation as the global gravity model.

1.4.14 At those geographical positions where the accuracy of EGM-96 does not meet the accuracy requirements for elevation and geoid undulation specified in Annex 14, Volumes I and II, on the basis of EGM-96 data, regional, national or local geoid models containing high resolution (short wavelength) gravity field data must be developed and used. When a geoid model other than the EGM-96 model is used, a description of the model used, including the parameters required for height transformation between the model and EGM-96, must be provided in the Aeronautical Information Publication (AIP). (See Annex 15, Appendix 1, GEN 2.1.4.)

1.4.15 Specifications governing determination and reporting (accuracy of field work and data integrity) of elevation and geoid undulation at specific positions at aerodromes/heliports are given in Annex 14, Volumes I and II, Chapter 2, and Table A5-2 and Table 2 of Appendices 5 and 1, respectively.

1.4.16 In addition to elevation referenced to the MSL (geoid), for the specific surveyed ground positions, geoid undulation (referenced to the WGS-84 ellipsoid) for those positions specified in Annex 15, Appendix 1 must also be published in the AIP.

1.4.17 The order of publication resolution of elevation and geoid undulation must be that specified in Annex 15, Appendix 1 and Table A7-2 of Appendix 7, while the order of chart resolution of elevation and geoid undulation must be that specified in Annex 4, Appendix 6, Table 2.

1.4.18 A brief description of the vertical reference system used must be provided in the AIP as specified in Annex 15, Appendix 1, Gen 2.1.4.

Temporal reference system
1.4.19 For international civil aviation, the Gregorian calendar and Coordinated Universal Time (UTC) must be used as the temporal reference system.

1.4.20 Coordinated Universal Time (UTC) is a time scale maintained by the Bureau International de l'Heure (BIH) and the IERS and forms the basis of a coordinated dissemination of standard frequencies and time signals. See Attachment D of Annex 5 for guidance material relating to UTC.

1.4.21 ISO Standard 8601 specifies the use of the Gregorian calendar and 24-hour local or UTC for information interchange while ISO Standard 19108 prescribes the Gregorian calendar and UTC as the primary temporal reference system for use with geographic information.
1.4.22 When a different temporal reference system is used for some applications, the feature catalogue, or the metadata associated with an application schema or a data set, as appropriate, must include either a description of that system or a citation for a document that describes that temporal reference system. ISO Standard 19108, Annex D, describes some aspects of calendars that may have to be considered in such a description.
1.4.23 A description of the temporal reference system employed (calendar and time), as well as an indication of whether or not daylight savings hours are employed, must be provided in the AIP as specified in Annex 15, Appendix 1, GEN 2.1.2.

1.5 HUMAN FACTORS CONSIDERATIONS [3.6.8]

The organization of an AIS, as well as the design, contents, processing and distribution of aeronautical information, must take into consideration Human Factors principles which facilitate their optimum utilization. Guidance material on Human Factors concepts can be found in the Human Factors Training Manual (Doc 9683).

1.6 USE OF AUTOMATION [3.6.6]

Wherever practicable, the use of automation in AIS should be introduced with the intent of providing a more efficient service to end users. AIS automation is covered in greater detail in Chapter 9.

1.7 COPYRIGHT AND COST RECOVERY [3.3, 3.4, 3.5]

Copyright

1.7.1 Some States are applying copyright to their AIS products in accordance with national (and international)
laws to recuperate some of the costs associated with the collection, collation, maintenance, publication and distribution of aeronautical information/data and to ensure control of its use. In accordance with Annex 15, any product of a State's AIS that has been granted copyright protection by that State and has been provided to another State in conformance with the specifications in the Annex, can only be made available to a third party provided the third party has been informed that the product is copyright protected and the product has been so annotated. In addition, States may decide to apply copyright to their AIS products to ensure that aeronautical information/data released for use through a "second generation" information/ data provider comes from an authorized source and has the appropriate quality system protection.

1.7.2 The application of copyright does not affect the requirement for States to ensure the free exchange of aeronautical information/data between States in accordance with Articles 28 c) and 37 of the Convention.

Cost recovery

1.7.3 Although Annex 15 provides for the exchange of aeronautical information/data without charge between ICAO Contracting States, there may be occasions where other States or commercial or private entities seek to procure aeronautical information/data and other air navigation documents. In such cases, an AIS may wish to enter into a separate agreement with the party concerned regarding the conditions and costs, if any, that will be applied to the provision of that information/data.

1.7.4 Operators may choose to procure their aeronautical information/data either from the AIS of the State concerned or from a commercial vendor. There are, however, considerable costs associated with the provision of aeronautical information/data: first, the overhead costs associated with the ongoing operation of the AIS; next, the costs associated with collecting, verifying, compiling and collating the information/data; and finally, the costs associated with the publication and distribution of the information/data. States may decide to recover these costs by charging users for the aeronautical information/data provided. It is recommended that these costs be included in the cost basis for airport and air navigation services charges, as appropriate, in accordance with the principles contained in Doc 9082 — ICAO's Policies on Charges for Airports and Air Navigation Services.

Chapter 2 PROVISION OF RAW DATA

2.1 ASSIGNMENT OF RESPONSIBILITY FOR ORIGINATION OF RAW DATA

2.1.1 The State's aviation authority must assign to its technical branches at headquarters the responsibility of originating the raw data required by the aeronautical information service (AIS) for promulgation in the Aeronautical Information Publication (AIP), AIP Supplements, NOTAM, pre-flight information bulletins (PIB) and Aeronautical Information Circulars (AIC). Therefore, the technical branches should ensure that they have speedy and reliable lines of communication with the AIS. On receipt of the raw data, it is the responsibility of the AIS to check, record and edit it in order to distribute it in a standard format. Raw data includes both basic and temporary information and should be submitted to the AIS on the aeronautical information promulgation advice form (see Figure 2-1).

2.1.2 Ideally the aim is for the AIS to be in possession of all information, regularly amended, that is required or likely to be required by national operators flying from the State and international operators flying through the State, with due allowance for occasional flights by charter operators.

2.2 BASIC INFORMATION

Basic information usually covers the more permanent or static material destined for inclusion in the AIP and, as such, should preferably be authorized by the policy branches at headquarters level in order to ensure uniform format and compliance with present or future policy. All basic information should be supplied well in advance to the AIS to permit enough time for processing and distribution, thus affording reasonable advance notice to operators.

2.3 INFORMATION OF A TEMPORARY NATURE AND OF SHORT DURATION

2.3.1 Information of a temporary nature or of short duration may also be originated by the technical branches or sections, for example, when temporary changes are made to basic information, when special short-term procedures are introduced, or for certain navigational warnings.

2.3.2 Responsibility for origination of the majority of such information (which covers, for example, work in progress at airports/heliports and radio installations, unserviceabilities, or temporary withdrawal or reinstatement of operational facilities) should, however, be delegated to the local authority, who must be given the facilities to communicate directly with the AIS in order to ensure the fastest possible required action.

2.4 WORKING ARRANGEMENTS

2.4.1 To ensure promptness and accuracy in the distribution of aeronautical information, each of the services responsible for providing the AIS with raw data should designate individuals who are to be responsible for maintaining direct and continuous liaison with the AIS.

2.4.2 Additionally, liaison should be arranged and local agreements established, where necessary, between aerodrome/ heliport AIS units and those local authorities in aerodromes, communications, meteorology, air traffic services, search and rescue and facilitation responsible for the origination of current information on aerodrome/heliport conditions and services. This would include the serviceability and operational status of visual and non-visual aids and the state of the manoeuvring area. This is to ensure the fast distribution by the AIS of temporary information of concern in the approach, landing and departure phases of flight.

2.5 MODES OF COMMUNICATION

The modes of communication required for submission of raw data to the AIS should include:

a) messenger service: in all cases where such a service exists and time permits (It is necessary to have such data submitted in typescript on the aeronautical information promulgation advice form as this provides an authoritative record.);

b) postal service: in all cases where a messenger service is not available;

c) aeronautical fixed service: in all cases where the messenger or postal service would not meet the time factor (This should be followed by a completed aeronautical information promulgation advice form.);

d) telefax;

e) telephonic: in emergency cases only (This must be confirmed by a completed aeronautical information promulgation advice form.);

f) computer network; and

g) Internet (electronic mail and websites).

2.6 AERONAUTICAL INFORMATION REGULATION AND CONTROL (AIRAC)

The need for control

2.6.1 Information concerning changes in facilities, services or procedures in most cases requires amendments to be made to airline operations manuals or other documents produced by various aviation agencies. The organizations responsible for maintaining these publications up to date usually work to a pre-arranged production programme. If AIP Amendments or AIP Supplements concerning such information were published indiscriminately with a variety of effective dates, it would be impossible to keep the manuals and other documents up to date. Alternatively, if a schedule of predetermined dates on which changes were to become effective were fixed throughout the year, it would be possible for a production programme to take account of or be based on these predetermined dates.

Regulated system [6.1.1, 6.1.2, 6.1.4, 6.2.1]

2.6.2 Since many of the changes to facilities, services and procedures can be anticipated and become effective in accordance with a predetermined schedule of effective

dates, Annex 15, 6.1, calls for the use of a regulated system designed to ensure, unless operational considerations make it impracticable, that:

a) information concerning any circumstances listed in Appendix 4 of Annex 15 will be issued as AIP Amendments or AIP Supplements (see Figure 2-1, verso). These amendments and supplements must be identified by the acronym “AIRAC” and distributed at least 42 days in advance of the effective date for usual changes and 58 days in advance for major changes with the objective of reaching recipients at least 28 days in advance for usual changes and 44 days in advance for major changes;
b) the AIRAC effective dates must be in accordance with the predetermined, internationally agreed schedule of effective dates based on an interval of 28 days, including 29 January 1998; and
c) information so notified must not be changed further for at least another 28 days after the indicated effective date, unless the circumstance notified is of a temporary nature and would not persist for the full period.

2.6.3 Essentially, implementation dates other than AIRAC effective dates must not be used for pre-planned, operationally significant changes requiring cartographic work and/or updating of navigation databases.

2.6.4 The processing cycle for airborne navigation databases requires the database to be delivered at least seven days before the effective date. At least eight days are necessary to prepare the data in the database; therefore, the navigation data houses generally exercise a cut-off 20 days prior to the effective date in order to ensure that the subsequent milestones are met. Data supplied after the 20-day cut-off will generally not be included in the database for the next cycle (see Figure 2-2).

2.6.5 In addition to the use of a predetermined schedule of effective AIRAC dates, Coordinated Universal Time (UTC) must also be used to indicate the time when the AIRAC information will become effective. Since Annex 15, paragraph 3.2.3, specifies that the Gregorian calendar and UTC must be used as the temporal reference system for international civil aviation, in addition to AIRAC dates, when an effective time other than 0000 UTC is used, the effective time must be included explicitly with the AIRAC information.

Schedule of AIRAC effective dates

2.6.6 The schedule of predetermined, internationally agreed AIRAC effective dates for the years 2009 to 2018 inclusive is given in Table 2-1.

Coordination

2.6.7 In order for the AIRAC system to operate satisfactorily, it is essential that the technical branches of the State aviation authority that are assigned the responsibility of supplying raw data to the AIS be thoroughly familiar with the AIRAC system. In particular, they must be aware not only of the effective dates but also the latest dates on which the raw data must reach the AIS in order for an AIP Amendment or AIP Supplement to be published and reach recipients at least 28 days in advance of the effective date. It is the responsibility of the AIS to determine these latest dates in order to publish amendments/supplements that will meet the corresponding AIRAC effective dates. A convenient way of informing technical branches of these dates is for the dates to be printed on the reverse side of the aeronautical information promulgation advice form (see Figure 2-1, verso).

Table 2-1. Schedule of AIRAC effective dates, 2009-2018

2009	*2010*	*2011*	*2012*	*2013*
15 January	14 January	13 January	12 January	10 January
12 February	11 February	10 February	9 February	7 February
12 March	11 March	10 March	8 March	7 March
9 April	8 April	7 April	5 April	4 April
7 May	6 May	5 May	3 May	2 May
4 June	3 June	2 June	31 May	30 May
2 July	1 July	30 June	28 June	27 June
30 July	29 July	28 July	26 July	25 July
27 August	26 August	25 August	23 August	22 August
24 September	23 September	22 September	20 September	19 September
22 October	21 October	20 October	18 October	17 October
19 November	18 November	17 November	15 November	14 November
17 December	16 December	15 December	13 December	12 December

2014	*2015*	*2016*	*2017*	*2018*
9 January	8 January	7 January	5 January	4 January
6 February	5 February	4 February	2 February	1 February
6 March	5 March	3 March	2 March	1 March
3 April	2 April	31 March	30 March	29 March
1 May	30 April	28 April	27 April	26 April
29 May	28 May	26 May	25 May	24 May
26 June	25 June	23 June	22 June	21 June
24 July	23 July	21 July	20 July	19 July
21 August	20 August	18 August	17 August	16 August
18 September	17 September	15 September	14 September	13 September
16 October	15 October	13 October	12 October	11 October
13 November	12 November	10 November	9 November	8 November
11 December	10 December	8 December	7 December	6 December

In addition, the AIS publishes on a yearly basis, usually in the form of an AIC, a list of AIRAC effective dates, publication dates and latest dates on which material has to reach the AIS. Technical branches should endeavor to forward raw data to the AIS as early as possible and not wait until the latest date. This applies particularly where lengthy or complicated drafts are concerned. Early receipt will allow the AIS to process the data at a normal speed, whereas late receipt will normally mean that processing will be rushed, increasing the possibility of error.

Significant dates [6.1, 6.2, 6.3]

2.6.8 There are three significant dates associated with the AIRAC system:

a) the effective date;

b) the publication date; and

c) the latest date for raw material to reach the AIS.

2.6.9 There must be an interval of 42 days between the distribution date and the effective date. This allows for a period of up to 14 days' distribution time, by the most expeditious means, in order for recipients to receive the information at least 28 days in advance of the effective date.

2.6.10 In cases where major changes (i.e. extensive changes to procedures or services which will impact international air transport) are planned and more advance notice is desirable and practicable, a distribution date of 56 days (or even longer) in advance of the effective date should be used. Examples of major changes are:

a) the introduction of a new aerodrome;

b) the introduction of new approach and/or departure procedures at international aerodromes; and

c) the introduction of new ATS routes.

2.6.11 When the AIS does not receive AIRAC material from the responsible authorities/agencies for publication on the next scheduled AIRAC effective date, it must issue a NIL notification by NOTAM (or other means) at least one cycle (28 days or more) before the AIRAC effective date concerned.

Use of the AIRAC system during holiday periods [6.1.5]

2.6.12 In some areas of the world the use of an AIRAC effective date that falls within major holiday periods (e.g. Christmas/New Year, Haj, Mardi Gras, summer vacations) creates difficulties in processing the material received because of reduced staff during these periods. In addition, the increased burden on postal services during such periods frequently delays delivery of AIRAC material, causing considerable problems to users.

2.6.13 To improve the situation during the year-end holiday period, it is recommended that the AIRAC cycle date occurring in the 28-day period from 21 December to 17 January inclusive not be used for AIRAC effective dates for the introduction of significant operational changes. States experiencing similar problems during other holiday periods may wish to adopt a comparable system.

2.6.14 It should be emphasized, however, that the AIRAC system provides for considerable flexibility in its application, with a choice of thirteen AIRAC effective dates each calendar year. Bearing in mind that many significant changes to facilities, services and procedures can be anticipated well in advance, a suitable effective date can be selected which does not conflict with a major holiday period. In addition, a publication date can be selected that provides for as much advance notice as possible. Annex 15, 6.2.1, specifies that AIRAC material must reach recipients at least 28 days in advance of the AIRAC effective date. Preferably such material should reach recipients more than 28 days before the effective date (for instance, 42 or 56 days or more). Under the AIRAC system the maximum period of advance notification is essential. If this policy is applied it will give users ample time for processing changes to essential information, even if the effective date falls within a major holiday period.

Provision of aeronautical information in paper copy and electronic forms [6.2, 6.3]

2.6.15 The AIRAC system has proved to be an effective means of regulating and controlling the provision of aeronautical information affecting operation of aircraft. In addition, the AIRAC system has been used as a basic source of information for the updating of computer-based navigation systems. Recently, States have introduced or are increasingly introducing automation with the objective of improving the speed, accuracy, efficiency and cost effectiveness of aeronautical information services.

Aeronautical information may soon be provided to the user on line and in real time, which may change the AIRAC system. However, a large sector of the aviation community will continue to require aeronautical information (documentation) in paper copy form and States introducing provision of aeronautical information in electronic form must continue to provide it in paper copy form as well. Therefore, the AIRAC system must apply to the provision of aeronautical information in both the paper and electronic environments.

2.6.16 In view of the above, under the AIRAC system information must always be published in paper copy form and be distributed by the AIS at least 42 days in advance of the AIRAC effective date, to reach the user at least 28 days in advance of the effective date.

2.6.17 States with automated AIS systems must ensure that the effective dates of information in the database are the same as the AIRAC effective dates used for the provision of information in paper copy form. AIS must ensure that AIRAC material provided in electronic form is received by the user at least 28 days in advance of the AIRAC effective date. Where major changes are planned and more advance notice is desirable and practicable, information provided in electronic form should be issued at least 56 days before the AIRAC effective date.

Example

2.6.18 An example of the application of the AIRAC system follows:

a) On 1 January 2003 the appropriate authority of a State aviation administration decides that it will place in service a new final approach aid at a particular aerodrome within the next three months.

b) This authority consults the schedule of AIRAC effective dates and decides that 15 May 2003 would be the most suitable.

c) It further notes that the corresponding publication date is 3 April 2003 and that the information it wishes to issue must be provided to the AIS not later than 27 March 2003, i.e. a week before the date of publication.

d) The information is provided to the AIS on 25 March 2003, is published along with other similar information on 3 April 2003, and all matters covered by the AIP Amendment or AIP Supplement concerned become effective on the same effective date — 15 May 2003.

e) Typical recipients of AIP Amendments or AIP Supplements will know that normally AIRAC material will be published on 3 April 2003, that it usually takes one week to reach them and that they can plan on making the necessary amendments to their publication on or about 10 April 2003. If several States have adopted this procedure, the recipients will be able to prepare one amendment covering the information received from all such States.

Significance

2.6.19 It will be apparent from this example that the benefits to be derived from such a system are almost entirely dependent upon the degree to which the AIRAC effective dates are observed and used by the authorities that are responsible for originating changes in facilities, services or procedures. Such changes must be anticipated by these authorities, and AIRAC effective dates must be selected from the schedule of AIRAC effective dates sufficiently in advance to permit issue of the relevant information in accordance with the prescribed procedure. AIRAC effective dates are used by ICAO, when appropriate, as the date of implementation for amendments to ICAO Standards, Recommended Practices and Procedures.

Late receipt of AIRAC publications

2.6.20 When AIRAC AIP Amendments or Supplements are not received at least 28 days in advance of the AIRAC effective date, it is the responsibility of the recipient AIS to investigate whether late receipt is due to local postal, customs or administrative delays and, if so, to take remedial action as required. Otherwise, the recipient AIS will report this to the originating AIS, whose duty it will be to investigate and eliminate the cause of the delay.

Postponement of changes to aeronautical information

2.6.21 Postponement of changes to circumstances listed in Annex 15, Appendix 4, has the effect of cancelling information notified by AIRAC and reinstating previously valid information. Doing so by NOTAM less than 28 days before the effective date for changes to circumstances listed in Appendix 4, Parts 1 and 3, does not generally allow sufficient time for previously valid information to be reinstated in airborne navigation databases, with the result that erroneous information would be presented to flight crews. Furthermore, since charts used by flight crews and ATC are updated on a different schedule than airborne navigation databases, it is possible that valid information which is not reflected in the airborne database may nevertheless appear on charts. The resulting mismatch of information would give rise to considerable operational difficulties and potential safety hazards. In the worst case, RNAV procedures that require a navigation database may not be flown (operated).

2.6.22 In order to avoid negative consequences to the safety and efficiency of flights, all possible measures should

be taken to ensure that changes to circumstances listed in Annex 15, Appendix 4, Parts 1 and 3, take place as notified on the AIRAC date. This will require thorough planning of aeronautical information changes and the cooperation of all parties involved, including AIS.

2.6.23 It is important to recognize that a change to the effective date (or postponement) is information to be notified by AIRAC and therefore constitutes “withdrawal” as stated in Annex 15, Appendix 4. Postponement by NOTAM should be issued more than 28 days in advance of the previously indicated effective date unless the circumstances are of a temporary nature and would not persist for the full period.

CIVIL AVIATION DEPARTMENT

AIP AMENDMENTS, AIP SUPPLEMENTS AND NOTAM

All portions of this form must be completed. One copy of this form should be submitted for each section of the AIP affected (e.g. GEN, ENR, AD).

To: AIS
. . . .
. . . .
Tel.: . . . .
Copy to: . . . .

Originator: . . . .
. . . .
Section: . . . .
Tel.: . . . .
Date: . . . .

Originator's file reference	*AIP references (as applicable)*				*Text of NOTAM, AIP Amendment and/or Supplement*	*Effective date*	*For promulgation by †*
	*Page (date)**	*Para.*	*Line*	*Col.*			

* All AIP pages affected by each amendment should be quoted.
† Insert a, b or c as applicable, where: a — AIP Supplement and subsequent inclusion in AIP reprint page.
b — AIP page, when next due for reprinting (AIP Supplement not required).
c — AIP Supplement only (i.e. temporary information).

AIRAC — If applicable but not applied, please state reasons:
. . . .
. . . .
. . . .

The following Directorates/Branches have been consulted in respect of:
(a) Policy. . . . . (b) Accuracy of information . . . .
Signed. Head of. . . . .
(Originating Branch)
Date. . . . .

The above particulars and/or the attached draft are authorized for publication as indicated.

Signed . . . . Head of . . . . (Directorate/Branch) . . . . Date . . . .

Figure 2-1. Aeronautical information promulgation advice form

INFORMATION TO BE NOTIFIED BY AIRAC

(See Annex 15, Chapter 6 and Appendix 4)

Part 1

1. The establishment and withdrawal of, and premeditated significant changes (including operational trials) to:

1.1 Limits (horizontal and vertical), regulations and procedures applicable to:

a) flight information regions;
b) control areas;
c) control zones;
d) advisory areas;
e) ATS routes;
f) permanent danger, prohibited and restricted areas (including type and periods of activity when known) and ADIZ;
g) permanent areas or routes or portions thereof where the possibility of interception exists.

1.2 Positions, frequencies, call signs, identifiers, known irregularities and maintenance periods of radio navigation aids, communication and surveillance facilities.

1.3 Holding and approach procedures, arrival and departure procedures, noise abatement procedures and any other pertinent ATS procedures.

1.4 Transition levels, transition altitudes and minimum sector altitudes.

1.5 Meteorological facilities (including broadcasts) and procedures.

1.6 Runways and stopways.

1.7 Taxiways and aprons.

1.8 Aerodrome ground operating procedures (including low visibility procedures).

1.9 Approach and runway lighting.

1.10 Aerodrome operating minima if published by a State.

Part 2

2. The establishment and withdrawal of, and pre-meditated significant changes to:

2.1 Position, height and lighting of navigational obstacles.

2.2 Hours of service of aerodromes, facilities and services.

2.3 Customs, immigration and health services.

2.4 Temporary danger, prohibited and restricted areas and navigational hazards, military exercises and mass movements of aircraft.

2.5 Temporary areas or routes or portions thereof where the possibility of interception exists.

Part 3

3. The establishment of, and pre-meditated changes to:

3.1 New aerodromes for international IFR operations.

3.2 New runways for IFR operations at international aerodromes.

3.3 Design and structure of the air traffic services route network.

3.4 Design and structure of a set of terminal procedures (including change of procedure bearings due to magnetic variation change).

3.5 Circumstances listed in Part 1 if the entire State or any significant position thereof is affected or if cross-border coordination is required.

AIRAC predetermined dates

Operational changes to which the regulated system (AIRAC) is applied will be issued as AIP Amendments or Supplements.

The sample table below illustrates the latest dates by which material should reach the AIS in order to be promulgated on one of the selected publication dates. When possible, material should always be forwarded well ahead of these dates. In order to ensure that charts and route manuals are correct on the date of publication, it is essential that an effective date should not be notified until a high degree of certainty that it will be met exists. A complete list of AIRAC effective dates for the years 2009 to 2018 may be found in Doc 8126, Chapter 2.

Date to reach the AIS for major changes	Publication date for major changes*	Date to reach the AIS for normal changes	Publication date normal (Thursday)	Effective date (Thursday)
5 February 2009	12 February 2009	19 February 2009	26 February 2009	9 April 2009
5 March 2009	12 March 2009	19 March 2009	26 March 2009	7 May 2009
2 April 2009	9 April 2009	16 April 2009	23 April 2009	4 June 2009
30 April 2009	7 May 2009	14 May 2009	21 May 2009	2 July 2009
28 May 2009	4 June 2009	11 June 2009	18 June 2009	30 July 2009
		etc.		

* These dates are intended to take account of the time required for processing and subsequent mail delivery to the user, so as to provide adequate advance notice; they may need to be adjusted in light of practical experience.

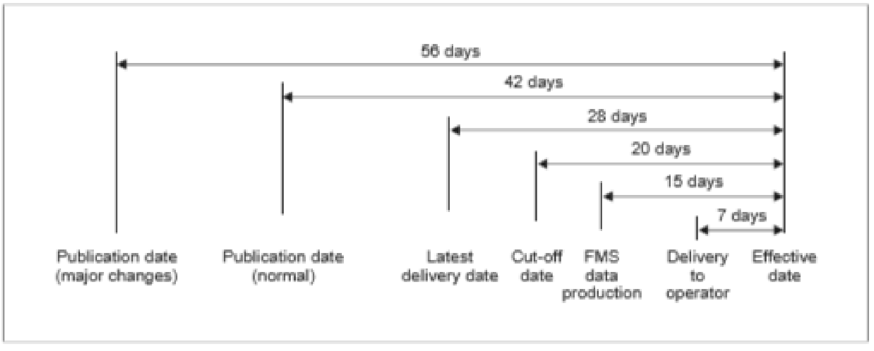


Figure 2-2. Processing cycle for airborne navigation databases

Chapter 3 ORGANIZATION OF AN AERONAUTICAL INFORMATION SERVICE (AIS)

3.1 STATUS OF AN AIS WITHIN THE AVIATION ADMINISTRATION [Chapter 1]

The object of aeronautical information services

3.1.1 The object of aeronautical information services, as stated in Annex 15, is to ensure the flow of information necessary for the safety, regularity and efficiency of international civil aviation.

Technical orientation, status and establishment

3.1.2 The most obvious user of aeronautical information is the pilot. Another category of user represents those engaged in airline operational control, chart and document producing agencies, and air traffic services. The AIS is thus technically oriented in the nature of the service it provides.

3.1.2.1 In this connection it must be emphasized that:

a) the State is responsible for the aeronautical information provided by an AIS;

b) the role and the importance of aeronautical information changed significantly with the implementation of area navigation (RNAV), required navigation performance (RNP) and airborne computer-based navigation systems; and

c) corrupt or erroneous aeronautical information can potentially affect the safety of air navigation.

3.1.2.2 Consequently, it is essential to establish a high level of technical proficiency within an AIS. In addition, the AIS should be given the appropriate status in the civil aviation administration in accordance with the important role it has in the provision of accurate aeronautical information.

3.1.2.3 An AIS should be established as a separate entity within a civil aviation administration. This could be as an entity with direct responsibility to the head of the civil aviation administration or as an entity at the same level of other air navigation services, such as the Aerodrome (AGA) Division, Communications (COM) Division or Air Traffic Services (ATS) Division. It should not be established as a part of any of these divisions. In addition, AIS officers should be remunerated at least at the same level as personnel in the AGA, COM and ATS divisions.

3.1.2.4 Suggestions for the location of an AIS in the administrative structure are given in Figure 3-1.

3.2 ORGANIZATION

Size and scope of a State's AIS

3.2.1 The volume of aircraft operations and the extent to which civil aviation facilities are provided will determine the size and scope of a State's AIS. While the amount of information to be processed will vary from State to State, the nature of the responsibilities remains basically the same.

Working arrangements

3.2.2 Efficient working arrangements within individual States have underlined a number of common factors which contribute to a sound organizational base. The main considerations are coordination of AIS headquarters with:

a) related technical services;
b) the international NOTAM office (NOF);
c) aerodrome/heliport AIS units;
d) cartographic services;
e) printing and distribution services;

and efficient communication facilities, particularly teletypewriter links, telefax and connection to the Internet (e-mail) for this coordination to function effectively (see Figure 3-2).

Liaison with related services [3.1, 3.3]

3.2.3 In order to fulfil efficiently the dual role of collecting and distributing information from and to all concerned, an AIS must also establish and maintain a direct and continuous liaison with related services, as follows:

a) the AIS in other States from which it is necessary to receive information to meet operational requirements within the State for pre-flight information;
b) technical services within the State that are directly concerned with the provision and maintenance of the various air navigation facilities, services and procedures — this, in turn, is necessary to ensure timely distribution of all significant information both within the State and to other States as required;
c) military services within the State, as necessary, to receive and distribute information concerning navigation warnings (military exercises, etc.) or any special military facilities or procedures available to or affecting civil aviation;
d) air traffic services within the State, to ensure immediate transmission of all required information to services for air traffic control and for in-flight information purposes;
e) all aircraft operating agencies conducting operations in or through the State, to ensure that pre-flight information requirements are adequately met; and
f) any other services that may either be a source of information of interest to civil aviation or have a legitimate reason for requiring information about civil aviation.

International NOTAM office [3.3.3, Chapter 9]

3.2.4 Annex 15 defines an international NOTAM office (NOF) as "an office designated by a State for the exchange of NOTAM internationally". It further states "An aeronautical information service shall arrange, as necessary, to satisfy operational requirements, for the issuance and receipt of NOTAM distributed by telecommunication."

3.2.5 Each NOF must be connected to the aeronautical fixed service (AFS), and to the following points within the territory for which it provides service:

a) area control centers and flight information centers; and

b) aerodromes/heliports at which an information service is established in accordance with Chapter 8 of Annex 15.

The connections must provide for printed communications.

3.2.6 For organizational purposes this usually means that the NOF needs to be staffed on a 24-hour basis, it being the focal point within a State for the issuance and receipt of NOTAM to and from other States.

Availability of service [3.1.1.3, 3.1.2, 3.3.3]

3.2.7 The provisions of Annex 15 are applicable to all types of international civil aviation and this includes the requirements of international general aviation. It would be impossible for an AIS to meet the need for in-flight information (see Annex 15, 3.1.2) unless the service is available during the period when an aircraft is in flight in the area of responsibility of that service. Further, the requirement in Annex 15, 3.3.3, for an AIS to satisfy operational requirements for the issuance and receipt of NOTAM distributed by telecommunication implies extension of service to meet the operational requirements whenever necessary. Where 24-hour service is not provided, service must therefore be available during the whole period an aircraft is in flight in the area of responsibility of an AIS, plus a period of at least two hours before and after an aircraft enters or leaves the area of responsibility.

3.2.8 In addition, the service must be available at such other time as may be requested by any ground organization legitimately requiring aeronautical information necessary

for the safety, regularity or efficiency of international flight operations, provided that the information sought falls within the responsibility of the service and is relative to a route stage originating at an aerodrome/heliport within its area of responsibility. Units affected by such extensions of service would normally be the NOF(s) and any aerodrome/ heliport AIS unit concerned with the flight operation.

Line structure and information flow

3.2.9 For organizational purposes the general principles of line structure and information flow are shown in Figure 3-2. These should be adapted to meet local needs. For example, the smaller aviation administration may find it more convenient and economical to locate the whole AIS organization at the main international airport. Having the AIS headquarters and the NOF at one location facilitates the receipt, checking and dispatch of information. It also reduces the number of units to be administered separately, as well as the number of records and reference documents that have to be maintained. Such collocation thus introduces savings. Also, printing and distribution services are normally quicker and more economical if they are placed under the direct control of AIS, either within the AIS organization or by means of local contract.

3.3 RESOURCES

Adequate resources

3.3.1 As with any other aeronautical service, adequate resources are essential to AIS. Highly skilled and competent staff in sufficient numbers, suitable accommodation and the necessary equipment are prerequisites to expeditious provision of accurate aeronautical information.

Training

3.3.2 Although the operational environment in which AIS personnel work and the tasks they may be required to perform may vary between States, there is a need to establish a common standard for the depth and scope of knowledge, skills and attitude which must be met by all AIS technical officers. Part E-3 of Doc 7192 (Training Manual) contains a curriculum of training for AIS technical officers and provides guidance to States for the preparation of their respective curricula to be used in courses for training of AIS technical officers.

Minimum requirements for staff and accommodation

3.3.3 A general guide as to the minimum requirements for staff and accommodation is given in the following table:

	Technical officers	*Clerical officers*	*Space in square metres (square feet)*
Headquarters			
large	3	3–6	28–93+ (300–1 000+)
small	2	1–2	14 (150)
NOTAM office (24 hours)			
large	5–6	3	28–37 (300–400)
small	4	1	14 (150)
Aerodrome/heliport AIS unit			
major airport (24 hours)	5–6	5–6	28+ (300+)
airport (limited hours)	2+	2+	14 (150)

Minimum facilities and equipment

3.3.4 The following minimum facilities and equipment, in addition to basic office furniture and stationery, should be provided for the AIS headquarters and each NOF and aerodrome/heliport AIS unit:

AIS headquarters

- personal computers (PCs) for each post, printer and connection to the Internet
- photocopying equipment
- teletypewriter terminal (AFS/AFTN connection)
- telephones
- telefax equipment
- clock.

NOF and aerodrome/heliport AIS unit

- adequate table/counter space for processing information
- adequate filing/card index systems
- full teletypewriter service (receive and transmit) linked to the AFS
- PC/computer terminal, printer, connection to the Internet and typewriter (if necessary)
- photocopier for pre-flight bulletin production
- telephone
- telefax equipment
- a reliable clock and, for the NOF, a time-stamp clock, both showing UTC and, where appropriate, a second clock showing local time
- reference charts and documents required for consultation and pre-flight briefing.

3.4 ARRANGEMENTS FOR EXCHANGE OF AERONAUTICAL INFORMATION WITH OTHER STATES [3.1.5, 3.3.1, 3.3.4, 3.3.5]

3.4.1 Annex 15 requires that a State's AIS promptly provide the AIS of other Contracting States with any aeronautical information required by them.

3.4.2 Each State is required to designate an office or offices to which all elements of the Integrated Aeronautical Information Package originated by other States are to be addressed. This must be published in the GEN part (GEN 3.1) of a State's aeronautical information publication (AIP). Such office(s) must have the authority and be equipped to deal with requests for information from other States. At least one copy of all elements of the Integrated Aeronautical Information Package in paper, electronic form or both must, on request, be made available without charge to the AIS of other Contracting States. It is usually sufficient to directly approach the AIS of another State to arrange for the necessary copies of AIP, AIP Amendments and Supplements, aeronautical information circulars (AIC), checklists and lists of valid NOTAM and to be placed on their NOTAM distribution list.

3.4.3 In general, the aim should be to:

a) establish the levels and sources from which information can be gathered reliably;
b) ensure that new or changed information is promptly made available to the AIS headquarters for processing and distribution, with special regard to the requirements of the AIRAC system of advance notification; and
c) ensure accuracy in the raw data notified to the AIS as well as immediate notification of errors or omissions in published aeronautical information.

Designation of channels

3.4.4 Arrangements with other States should provide for a single channel to be used for the flow of all information required. This should include, for example, topographic data necessary for the preparation of aeronautical charts. Elements of the Integrated Aeronautical Information Package delivered to foreign subscribers should, however, be sent directly to the subscriber's address. NOTAM are exchanged between NOTAM offices via the AFS.

Preservation of channels

3.4.5 Wherever possible the exchange of aeronautical information should continue even when two States find themselves temporarily in diplomatic disagreement. It must be borne in mind that the information is required not only for the national airlines of the respective States but also for international operators flying routes that connect the States. These operators will, in all probability, have no part in the disagreement and there can be no justification for penalizing them by denying them information essential for the safety of their operations. In such cases, AIS should be treated in the same manner as meteorological services or the World Health Organization and the preservation of existing channels of communication should be guarded in the light of international obligations.

Substitute sources

3.4.6 When information is required from States that have not yet produced an AIP, it is necessary to find a substitute source of information. Quite a lot can be achieved through the intelligent use of NOTAM, if they are issued. If nothing is published by the civil aviation administration, useful information can often be obtained from military handbooks or manuals produced by private aeronautical service agencies or by airlines. It should be borne in mind, however, that such information may often be abbreviated and intended only for certain types of operations. Furthermore, such information is likely to contain little or nothing relating to formalities and procedures associated with international traffic and accordingly it should be treated with reserve.

3.5 RECORDING, FILING AND DISTRIBUTION OF INFORMATION

General

3.5.1 The essential requirements are that incoming and outgoing material can readily be identified through serial number and date and that supplementary information may be similarly verified and, where necessary, authenticated.

3.5.2 Raw data gathered within a State for publication in the AIP or AIP Supplement should be filed in chronological order on suitable files, together with a record of action taken and a copy of the publication made. It will probably be found necessary to provide a separate file for each subject, part, section or subsection of the AIP and, depending on the volume of information handled and the organization employed, duplicate "policy" files may also be found useful. Ephemeral information can be filed the same way but in the case of short-term information, such as unserviceabilities, for distribution by NOTAM, a card index system may be found adequate and more convenient. A separate card for each facility or aerodrome/heliport is advisable (see Figure 3-3). The period of retention of all domestic information, even when superseded, should be determined by the appropriate authority in each State, bearing in mind possible planning or historical value.

Distribution lists

3.5.3 Normally, the AIS headquarters is responsible for the distribution of relevant information to all aerodrome/heliport AIS units to enable them to maintain and have available up-to-date information. The administrative problems associated with the necessary selective distribution of incoming information, especially NOTAM material, may not be as difficult as they seem. The simplest solution is the adoption of a multi-distribution list system. Some of the incoming material will be common to all aerodrome/heliport AIS units. Such material would be assigned to List 1. Other items will be common to the majority of aerodromes/heliports and assigned to List 2. Material common to subgroups of aerodromes/heliports would be assigned to subsequent lists until all incoming information has been accounted for. Then, when material is received, all that would be necessary would be to determine which list it relates to and to redistribute it in accordance with that list of addresses.

NOTAM from other States

3.5.4 NOTAM received from other NOFs should be recorded in a signals log as soon as they are received. This log should record:

a) State of origin;
b) originator indicator;
c) series and number;
d) time of receipt;
e) time of distribution; and
f) addresses to which redistributed.

3.5.5 These entries represent the minimum needed for successful operation and for the investigation of complaints of late receipt or non-receipt. After NOTAM have been processed they should be filed. The redistributed copy may be attached to the original. The filing should be done by State and, where there is a large volume of traffic from any one State, it may be considered advisable to further subdivide NOTAM by filing them under facilities or subjects within that State. Where appropriate, NOTAM should also be used to annotate the relevant AIP. This annotation should include the series, number and date of the NOTAM.

3.5.6 The system proposed in 3.5.4 and 3.5.5 is somewhat time-consuming and may only be suitable in a large organization where extensive screening of incoming NOTAM can be performed before redistribution. For a smaller unit the following may be sufficient:

a) At the communication station serving the NOF, each incoming message should be time-stamped immediately upon receipt. After retransmission at the communication station, a copy of the message should be time-stamped again.

b) Each incoming message carrying the word "NOTAM" at the beginning of the text should then be passed on immediately by the teletypewriter operator at the communication station to the NOF, aerodromes/heliport AIS units, aircraft operators, etc. by teletypewriter or telex, using tape relay and without changing the address section of the NOTAM. Some screening would take place as all NOTAM are passed on to the NOF. The NOF could delegate the screening responsibilities to the communication station serving it or to a selected aerodrome/heliport AIS unit. As the message is tape-relayed all the way from the originating station to the NOF, aerodrome/heliport AIS units, aircraft operators, etc., the source of errors during transmission is eliminated. At the NOF and at the aerodrome/heliport AIS units, all messages should be time-stamped upon receipt.

c) If a NOTAM number is missing, or if the NOTAM is unreadable or some explanation is required, the necessary steps must be taken by the NOF to rectify the inconsistency and the result or action should automatically be transmitted to all concerned. If an AIS unit needs an explanation, the NOF may be able to answer or may need to ask the originator.

d) At the NOF and the aerodrome/heliport AIS units, NOTAM should be filed in simple binders, one for each originating NOTAM office and the contents divided into suitable sections (consistent with the division of information included in pre-flight information bulletins). In each binder there should be a checklist containing only the series and number of each NOTAM and the section in the binder under which the message is to be found. From that checklist it will be easy to determine if a NOTAM is missing. On cancellation, the number should be struck out and the NOTAM removed from the binder. Thus, the list will always show only the numbers of valid NOTAM and the binders will contain only valid NOTAM.

Validation and verification of incoming NOTAM

3.5.7 It is imperative that all incoming NOTAM be verified since it is possible for figures or groups to be transposed or accidentally corrupted during transmission. When a NOTAM is received relating to, for instance, a runway at a foreign aerodrome/heliport, a check should be made against the AIP of the provider State to ensure that the NOTAM is consistent with published information, before it is redistributed. Such NOTAM should also be checked after transmission to ensure that similar errors have not occurred during this process. (See also Chapter 6.)

AIP Amendments, AIP Supplements and Aeronautical Information Circulars from other States

3.5.8 The AIS headquarters should maintain a record of AIP Amendments, AIP Supplements and AIC and a record of requests for missing material originated through the AIS headquarters. AIP Supplements and AIC should be recorded in a register to show, as appropriate:

a) State of origin;
b) serial number and year;
c) series (if any);
d) date of receipt;
e) addresses to which they have been forwarded; and
f) date of dispatch.

3.5.9 After they have been so recorded, they should be filed by State in series and/or sequence. Cancelled AIP Supplements and AIC should be crossed out in the register and removed from the file. The register should carry the initials of the official authorized to make the entry or deletion, together with the date on which such action was taken. Contrasting colours may be used for entries and deletions. AIP Amendments should be recorded to show:

a) State of origin;
b) number and date;
c) date of receipt;
d) addresses to which they have been forwarded; and
e) date of dispatch.

3.6 BASIC REFERENCE MATERIAL (PUBLICATIONS OF ICAO AND OTHER INTERNATIONAL ORGANIZATIONS)

ICAO publications

3.6.1 Since national rules, regulations and procedures, and the characteristics of facilities and services, are based on ICAO regulatory and guidance material, it is advisable to maintain certain ICAO documents for reference purposes, both at the AIS headquarters and at aerodrome/ heliport AIS units.

3.6.2 Annexes concerned with the provision of facilities or services, together with any related procedures for air navigation services, are required as a minimum, i.e.:

Standards and Recommended Practices

Annex 2 — Rules of the Air
Annex 3 — Meteorological Service for International Air Navigation
Annex 4 — Aeronautical Charts
Annex 5 — Units of Measurement to be Used in Air and Ground Operations
Annex 6 — Operation of Aircraft

Part I — International Commercial Air Transport — Aeroplanes
Part II — International General Aviation — Aeroplanes

Part III — International Operations — Helicopters

Annex 7 — Aircraft Nationality and Registration Marks

Annex 9 — Facilitation

Annex 10 — Aeronautical Telecommunications —

Volume I — Radio Navigation Aids

Volume II — Communication Procedures including those with PANS status

Volume III — Part I – Digital Data Communication Systems

Annex 11 — Air Traffic Services

Annex 12 — Search and Rescue

Annex 14 — Aerodromes

Volume I — Aerodrome Design and Operations

Volume II — Heliports

Annex 15 — Aeronautical Information Services

Annex 16 — Environmental Protection

Volume I — Aircraft Noise

Volume II — Aircraft Engine Emissions

Annex 17 — Security

Annex 18 — The Safe Transport of Dangerous Goods by Air

Procedures for Air Navigation Services

Doc 4444 — Air Traffic Management (PANS-ATM)

Doc 7030 — Regional Supplementary Procedures (SUPPS)

Doc 8168 — Aircraft Operations (PANS-OPS)

Volume I — Flight Procedures

Volume II — Construction of Visual and Instrument Flight Procedures

Doc 8400 — ICAO Abbreviations and Codes (PANSABC)

Designators and indicators

Doc 7910 — Location Indicators

Doc 8585 — Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services

Doc 8643 — Aircraft Type Designators

Manuals

Doc 8126 — Aeronautical Information Services Manual

Doc 8697 — Aeronautical Chart Manual

Doc 8896 — Manual of Aeronautical Meteorological Practice

Doc 9674 — World Geodetic System — 1984 (WGS-84) Manual

3.6.3 Additionally, a number of facility and service documents of worldwide coverage and Air Navigation Plan Publications for each ICAO region are available from ICAO. The latter provide useful information on major facilities planned for international air navigation and give a general picture of the facilities that require inter-State coordination, such as high frequency radiotelephony networks.

Facility and service documents

Doc 7100 — Manual of Airport and Air Navigation Facility Tariffs
Doc 7101 — Aeronautical Chart Catalogue
Doc 7383 — Aeronautical Information Services Provided by States

Air Navigation Plan Publications

Doc 7474 — Africa-Indian Ocean Region
Doc 7754 — European Region
Doc 8733 — Caribbean and South American Regions
Doc 8755 — North Atlantic, North American and Pacific Regions
Doc 9634 — North Atlantic Region
Doc 9635 — Facilities and Services Implementation Document (FASID) — North Atlantic Region
Doc 9673 — Asia and Pacific Regions
Doc 9708 — Middle East Region

Other publications

3.6.4 A number of publications of other international organizations concerned with certain aspects of aviation also provide useful reference material, e.g.:

International Air Transport Association (IATA)/ International Aeradio Limited (IAL)

IATA/IAL Air Distances Manual

International Telecommunication Union (ITU)

List of Broadcasting Stations Operating in Frequency Bands below 5950 kHz
List of Radiodetermination and Special Service Stations (ITU List VI)
Radio Regulations
Telegraph Regulations

World Meteorological Organization (WMO)

Weather Reporting — WMO — No. 9. TP. 4
- Volume A — Observing Stations
- Volume C — Transmission

Manual on Codes
- Volume I.1 — International Codes
  - Part A — Alphanumeric Codes — WMO No. 306

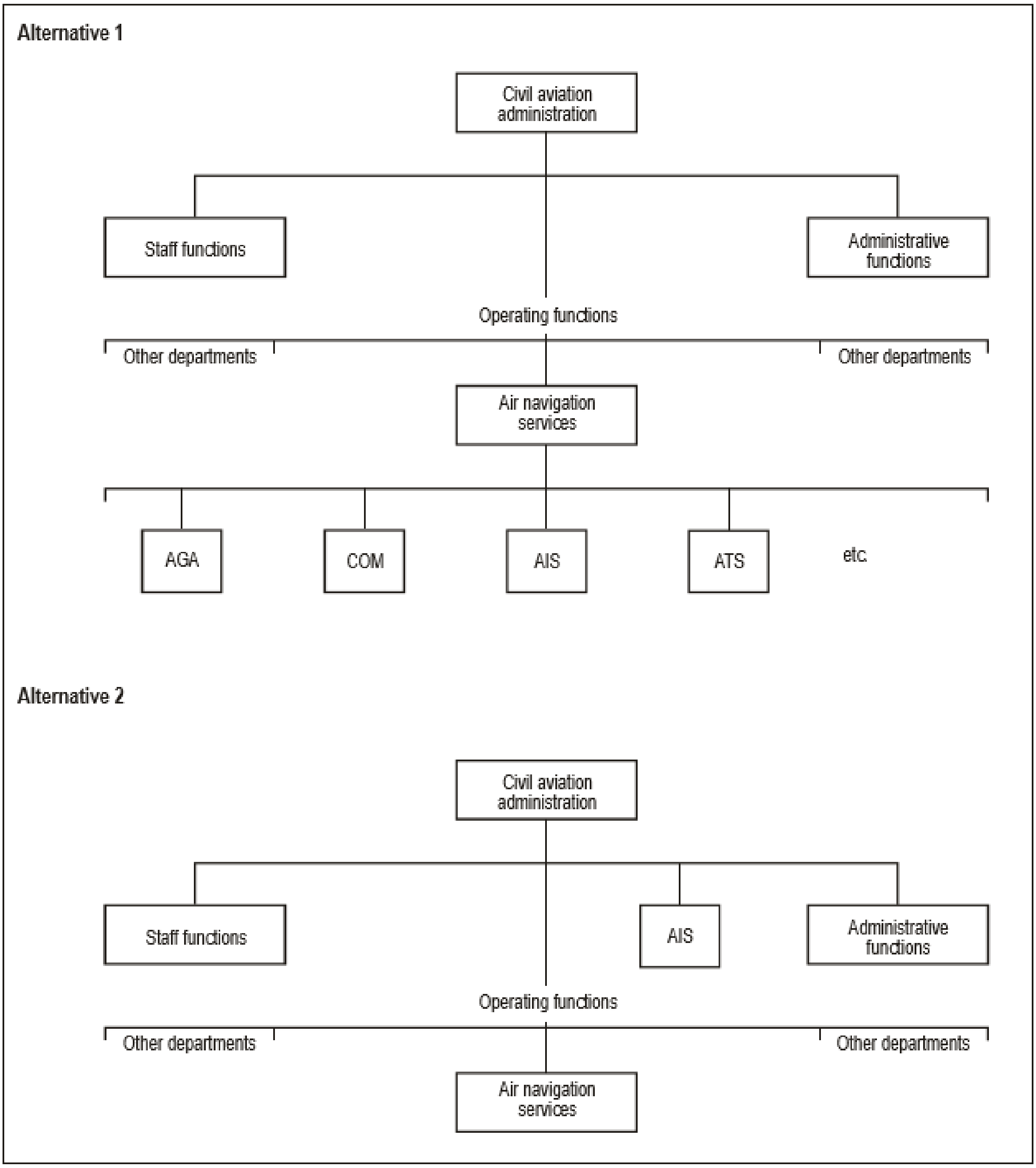


Figure 3-1. Location of AIS within the aviation administration

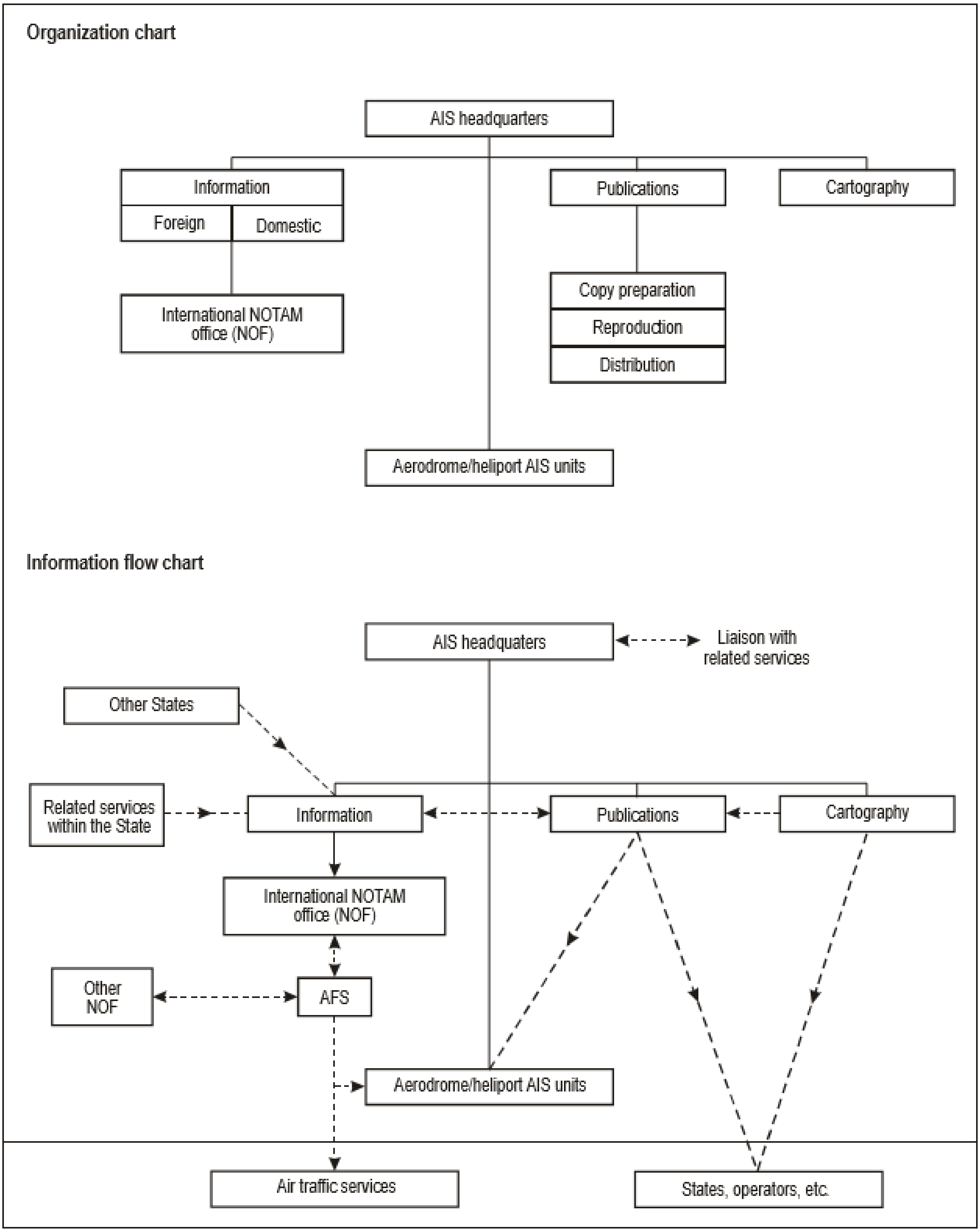


Figure 3-2. Organization and information flow charts

Name of facility or aerodrome/heliport				
NOTAM number	*Date*	*NOTAM text*	*Cancelled (C)/Replaced (R)*	
			NOTAM number	*Date*
A0121/03	030602	Approach lights RWY 27 U/S	C A0123/03	030603
A0130/03	030607	Surface movement radar on test		

Figure 3-3. Specimen of index card for recording of ephemeral NOTAM information

Draft

Aeronautical Information Publishing Process Manual

Руководство
по разработке Сборника Аэронавигационной Информации (AIP)

January 2018

SUE Tajikairnavigation

This draft is focused on the point at to be made
the Aeronautical Information Publishing Process (AIP) Manual
in
the Republic of Tajikistan and the State Unitary Enterprise (SUE)
Tajikairnavigation.

Разработка руководства по ИАИ

В плане ставится вопрос о подготовке процедуры выдачи для выпуска руководства **САИ** (Сборник Аэронавигационное Информации) и т. д. В Республике Таджикистан / ГУП «ТАН» (Государственное Унитарное Предприятие «Таджикаэронавигация»).

Table of Contents

FOREWORD

The Republic of Tajikistan and the SUE Tajikairnavigation are proceeding the plan to enforce the publishing about any documents of Aeronautical Information Publication (AIP) and Aeronautical Information Circular (AIC) for to be contributed to the sustainable development of safety and well air traffic flow.

This manual is organized for pursuant to the standard of ICAO Annex 15 and Doc.8126 regarding the object of Aeronautical Information Services (AIS) and the standard operation.
And it is provided the necessary documents for the issuance, application forms and others, then included the manual of documents publishing process.

As a member of the ICAO country, the Civil Aviation Authority of Tajikistan, the SUE Tajikairnavigation, the Airline company and the relevant organizations will continue the cooperated discussion for the responsible work and the quality and ensure stable supply of its information in the future. Also, we would like to exercise this work based on the agreement of all constituent members.
Further, based on this draft, we want to strive to improve quality of AIS work in Tajikistan.

<Предисловие к руководству>

Республика Таджикистан / ГУП «ТАН» (Государственное Унитарное Предприятие «Таджикаэронавигация») разработало руководство по издания таких документов, как, Сборник Аэронавигационной Информации (AIP) и Циркуляр Аэронавигационной Информации (AIC) который способствует устойчивому развитию бесперебойного потока информации для обеспечения авиационной безопасности и воздушного движения.

Данное руководство создано в соответствии со стандартами осуществления работы Служб аэронавигационной информации (САИ) согласно Приложения 15 ИКАО и док. 8126, которые описывают соответствующие документы и процедуры, необходимые для выпуска Сборника Аэронавигационной Информации (AIP).

В качестве страны, члена ИКАО, Управление гражданской авиации Таджикистана, ГУП «Таджикаэронавигация», Авиакомпании и соответствующие организации будут продолжать совместную дискуссию о ответственной работе и качестве и обеспечить стабильное предоставление своей информации в будущем. Кроме того, мы хотели бы использовать эту работу на основе согласия всех участников. Далее, на основе этого проекта, мы хотим стремиться улучшить качество работы Службы аэронавигационной информации (САИ) в Таджикистане.
Кроме того, на основе этого предложения, мы хотели бы еще больше улучшить его как лучшее содержание.

Amendment Records

The amendments listed below have been incorporated into this copy of the Aeronautical Information Publishing Process Manual (AIPM).

Amend. no.	Ver. no.	Subject	Source	Sections Affected	Entered (Date)	Approved (Date)	Effective date
Ex.	Ex.	Quality system to be ISO 9000 complianc	Ministerial Direction No 1/2010 Arising from xxx	All	Name (1 Oct 2016)	Name (1 Oct 2016)	3-Oct-16

Definitions and Abbreviations

See Attachment B for Definitions and Abbreviations.

Chapter Ⅰ General

1 Purpose of Document

The Aeronautical Information Publishing Process Manual (AIPM) is described the detailed of the requesting of issuance and message methods as the working of Aeronautical Information Service (AIS) based on the ICAO Annex 15, supplemented by the guidance Doc.8126, and aims to contribute to a smooth procedure of the issuance request.

One thing to keep in mind, the effective functioning of an AIS is dependent upon the cooperative effort of all aeronautical services, such as communications, aerodromes and air traffic services, since the raw information must be originated by such services.

The AIS manual should be read more in conjunction with the latest editions of the following related ICAO documents:
Annex 4 — Aeronautical Charts
Annex 11 — Air Traffic Services
Doc 8697 — Aeronautical Chart Manual
Doc 9674 — World Geodetic System — 1984 (WGS-84)

2 Application

The Issuing Request organization and the Notification office are conducted based on this manual for Aeronautical Information Service Division in the SUE "Tajikairnavigation".

3 Common Understanding for to work AIS

(1) General Concept

The object of the aeronautical information service (AIS) is to ensure the flow of aeronautical data and aeronautical information necessary for global air traffic management (ATM) system safety, regularity, economy and efficiency in an environmentally sustainable manner.

The role and importance of aeronautical data and aeronautical information changed significantly with the implementation of area navigation (RNAV), performance-based navigation (PBN), airborne computer-based navigation systems, performance-based communication (PBC), performance based surveillance (PBS), data link systems and satellite voice communications (SATVOICE). Corrupt, erroneous, late, or missing aeronautical data and aeronautical information can potentially affect the safety of air navigation.

The AIPM is used to form the basic element of the Integrated Aeronautical Information Package. The manual has how to compile and edit the aeronautical information of a permanent nature and temporary changes to this information of long duration. It is the task of each AIS to provide a comprehensive document, to maintain it up to date and to make it simple to use.

The content of an AIPM is governed by Annex 15, supplemented by the guidance in ICAO Doc.8126 as to how the requirements might best be met. Taking into consideration the increased use of automation in AIS, the information contained in the AIPM was arranged in such a manner that automation could be used, both for the production of the "paper" AIP and related documents as well as for creation of a database for retrieval of that information. In addition, duplication of information was avoided.

(2) Common Reference Systems for Air Navigation

a) Horizontal reference system

World Geodetic System — 1984 (WGS-84) shall be used as the horizontal (geodetic) reference system for international air navigation. Consequently, published aeronautical geographical coordinates (indicating latitude and longitude) shall be expressed in terms of the WGS-84 geodetic reference datum.

b) Vertical reference system

Mean sea level (MSL) datum, which gives the relationship of gravity-related height (elevation) to a surface known as the geoid, shall be used as the vertical reference system for international air navigation.

(3) State responsibilities

Each Contracting State shall:

a) provide an aeronautical information service (AIS); or

b) agree with one or more other Contracting State(s) for the provision of a joint service; or

c) delegate the authority for the provision of the service to a non-governmental agency, provided the Standards and Recommended Practices of this Annex are adequately met.

Each Contracting State shall ensure that the provision of aeronautical data and aeronautical information covers its own territory and those areas over the high seas for which it is responsible for the provision of air traffic services.

Each Contracting State shall ensure that the aeronautical data and aeronautical information provided are complete, timely and of required quality in accordance with (6).

Each Contracting State shall ensure that formal arrangements are established between originators of aeronautical data and aeronautical information and the AIS in relation to the timely and complete provision of aeronautical data and aeronautical information.

(4) AIS Responsibilities and Functions

An AIS shall ensure that aeronautical data and aeronautical information necessary for the safety, regularity or efficiency of air navigation are made available in a form suitable for the operational requirements of the air traffic management (ATM) community, including:

a) those involved in flight operations, including flight crews, flight planning and flight simulators; and
b) the air traffic services unit responsible for flight information service and the services responsible for pre-flight information.

An AIS shall receive, collate or assemble, edit, format, publish/store and distribute aeronautical data and aeronautical information concerning the entire territory of the State as well as those areas over the high seas in which the State is responsible for the provision of air traffic services. Aeronautical data and aeronautical information shall be provided as an Integrated Aeronautical Information Package.

Where 24-hour service is not provided, service shall be available during the whole period an aircraft is in flight in the area of responsibility of AIS, plus a period of at least two hours before and after such a period. Service shall also be available at such other time as may be requested by an appropriate ground organization.

An AIS shall, in addition, obtain aeronautical data and aeronautical information to enable it to provide pre-flight information service and to meet the need for in-flight information:

a) from the AIS of other States;
b) from other sources that may be available.

(5) Exchange of Aeronautical Data and Information

Each State shall designate the office to which all elements of the Integrated Aeronautical Information Package originated by other States shall be addressed. Such an office shall be qualified to deal with requests for aeronautical data and aeronautical information originated by other States.

Where more than one international NOTAM office is designated within a State, the extent of responsibility and the territory covered by each office shall be defined.

An AIS shall arrange, as necessary, to satisfy operational requirements for the issuance and receipt of NOTAM distributed by telecommunication.

Wherever practicable, direct contact between AIS shall be established in order to facilitate the international exchange of aeronautical data and aeronautical information.

One copy of each of the elements of the Integrated Aeronautical Information Package that have been requested by the AIS of a Contracting State shall be made available by the originating State in the mutually-agreed form(s), without charge, even where authority for publication/storage and distribution has been delegated to a non-governmental agency.

Note. — See Attachment 6 to be used as reference the recommendation of Annex 15.

(6) Data Quality Specifications

The information management resources and processes established by an aeronautical information service (AIS) shall be adequate to ensure the timely collection, processing, storing, integration, exchange and delivery of quality-assured aeronautical data and aeronautical information within the air traffic management (ATM) system.

Material to be issued as the information packages shall be thoroughly checked before it is submitted to the AIS, in order to make certain that all necessary information has been included and that it is correct in detail prior to distribution.

An AIS shall establish verification and validation procedures which ensure that upon receipt of aeronautical data and aeronautical information, quality requirements (accuracy, resolution, integrity and traceability) are met.

Accuracy

The order of accuracy for aeronautical data shall be as specified in Annex 11, Chapter 2, and Annex 14, Volumes I and II, Chapter 2. In that respect, three types of positional data shall be identified: surveyed points (runway thresholds, navigation aid positions, etc.), calculated points (mathematical calculations from the known surveyed points of points in space/fixes) and declared points (e.g. flight information region boundary points).

Note.— The accuracy requirements for electronic terrain and obstacle data are specified in Annex 15 Appendix 8.

Resolution

The order of publication resolution of aeronautical data shall be as specified in Attachment 7.

Integrity

The integrity classification for aeronautical data shall be as specified in Tables A7-1 to A7-5 of Attachment 7.

The integrity of aeronautical data shall be maintained throughout the data process from survey/origin to distribution to the next intended user (the entity that receives the aeronautical information from the AIS provider). Based on the applicable integrity classification, the validation and verification procedures shall:

a) for routine data: avoid corruption throughout the processing of the data;

b) for essential data: assure corruption does not occur at any stage of the entire process and include additional processes as needed to address potential risks in the overall system architecture to further assure data integrity at this level; and

c) for critical data: assure corruption does not occur at any stage of the entire process and include additional integrity assurance processes to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks.

Data protection

Aeronautical data and data sets shall be protected in accordance with data error detection, security, and authentication techniques.

Chapter Ⅱ Documentation and Record

1 Document's Compiling and Editing

The need to use great care in compiling any documents an AIP and related one cannot be over-emphasized. The information should be carefully checked to ensure its authenticity. Then, it should be edited and presented in the simplest form possible, both to restrict the amount of material in the document to that necessary to achieve its purpose and to enable those not thoroughly familiar with the language used to understand and interpret the information. Especially, the AIP must not duplicate information within itself or from other sources. When information is considered doubtful, a degree of reliability should be assigned to it and clearly indicated.

Language

The documents must include English text for those parts expressed in plain language. The necessity to use local languages is of course recognized. If publication in more than one language is undertaken, it is usually more economical to produce a bilingual or multilingual edition rather than a separate edition for each language. It assists in the interpretation of questionable text to have the possibility of comparing two languages. This is particularly true where the producing State is non-English speaking and the translation into English may not be perfect.

2 Documents and Records to be Sustained

The AIS provider shall sustain all documents and records which are necessary for the operation of the service. Copies of these documents shall also be made available to personnel where needed. These documents shall include but not limited to:

(a) the Manual of Standards – Aeronautical Information Services,
(b) the AIS provider's operations manual,
(c) ICAO Annexes 4 and 15, Doc 8126, Doc 9859 (Safety Management Manual in Annex 19) and other relevant ICAO documents,
(d) records of all incoming and outgoing aeronautical information to be identified by serial number and date,
(e) records of each person who is authorized to check, edit and publish aeronautical information,
(f) records of internal quality and safety audit reports,
(g) records of reporting, investigation and correction of error,
(h) records of job description, training program and plan of each staff.

Document of page numbering

Document of page numbering adaptable to the addition or deletion of sheets should be adopted. The page number should include:

— an identification of the part of the AIP and necessary documents;
— the section; and
— subsection, as applicable;

thus creating a separate set of numbers for each subject (e.g. GEN 2.1-3, ENR 4.1-1 or AD 2.2-3). This document has been used in the Specimen AIP and should be followed as fully as possible, with numbering as indicated therein reserved for pages containing the associated information/ tabulation. Any gaps in page sequence would be accounted for by the checklist of pages which should appear at page GEN 0.4-1 (or ENR 0.4-1 and AD 0.4-1 if the AIP is issued in three separate volumes). Maps and charts should be paginated in the same manner as other material.

3 Document Control

The AIS provider shall establish a process for the authorization and amendment of the documents stipulated in the preceding paragraph to ensure that they are constantly updated. The AIS provider shall establish a system to ensure that:

(a) the currency of the documents can be readily determined,

(b) amendments to the documents are controlled in accordance with established quality management principles; and,

(c) only current versions of documents are available.

The AIS provider shall ensure that where documents are held as computer based records and where paper copies of computer based records are made to the extent possible, they are subjected to the same control as paper documents.

Chapter Ⅲ Contents of Aeronautical Information

This manual is described to regulate how to handle of following documents which is utilized for the Aeronautical Information Service established within the defined area of coverage responsible for the provision of aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation.

(1) Aeronautical Information Publication (AIP)

(2) Aeronautical Information Publication (AIP) Amendment

(3) Aeronautical Information Publication (AIP) Supplement

(4) NOTAM

(5) Aeronautical Information Circular (AIC)

(6) ※ Electronic Terrain and Obstacle Data (e-TOD)

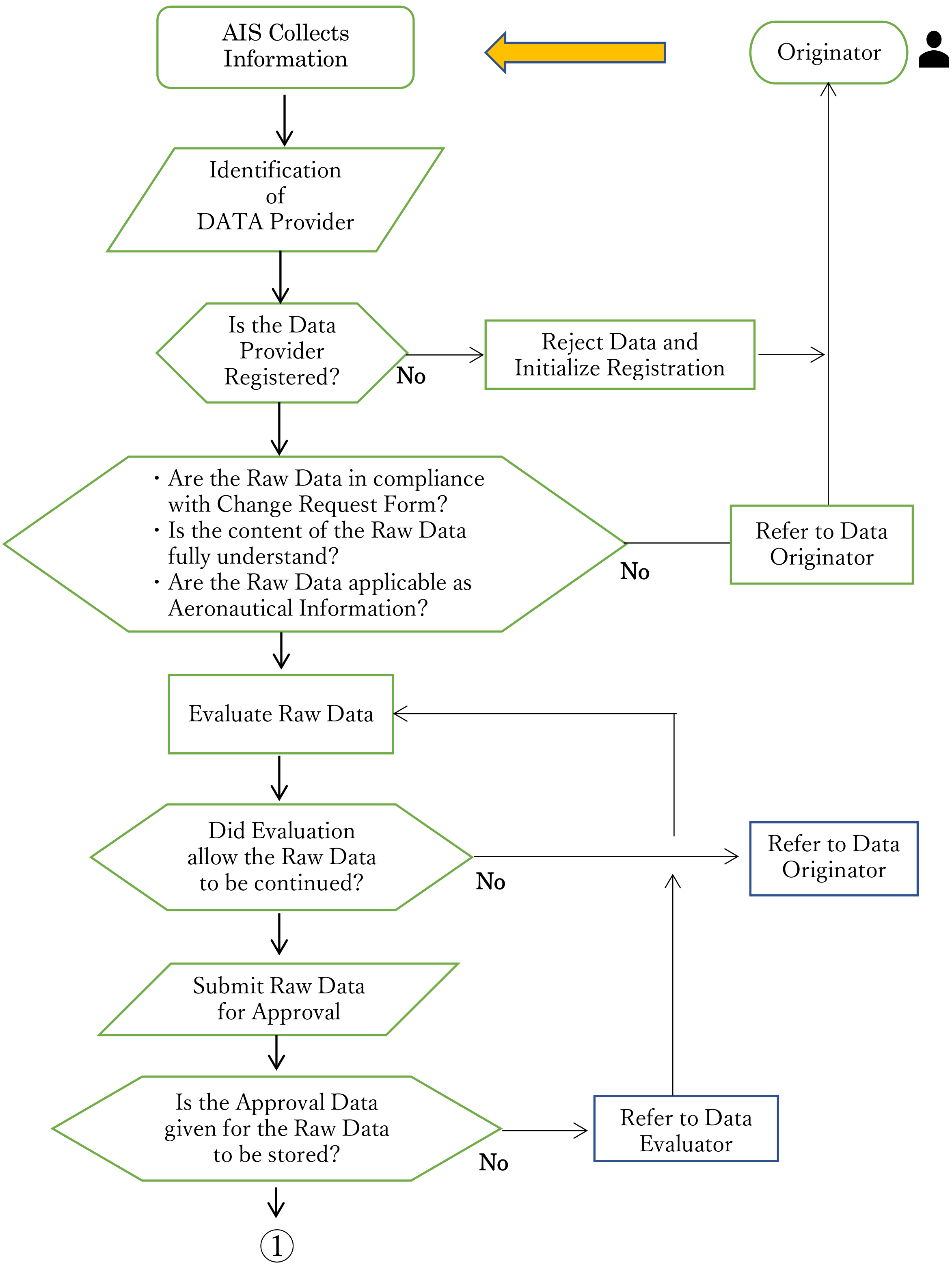
Chapter Ⅳ Procedure for Issuing Request of Aeronautical Information

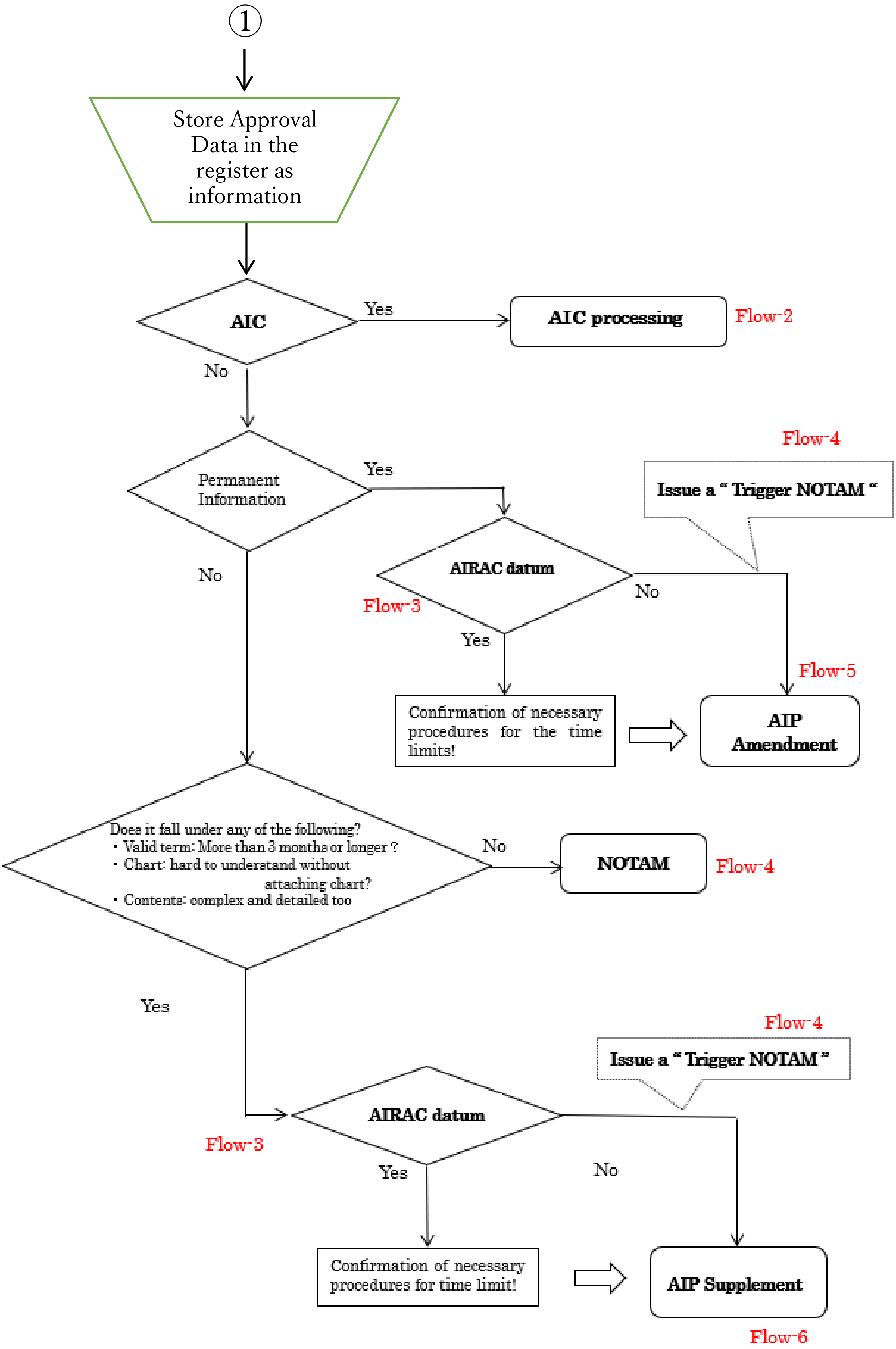
1 Decision of Aeronautical Information forms

The Classification of Aeronautical Information is based on Attachment -1 and the decision of Aeronautical Information forms should be decided based on as follows;

(1) Flow of Issuing Procedure of Aeronautical Information

Flow-1




①
Store Approval Data in the register as information
AIC
Yes
No
AIC processing
Flow-2
Permanent Information
Yes
No
Flow-4
Issue a " Trigger NOTAM "
AIRAC datum
No
Flow-3
Yes
Flow-5
Confirmation of necessary procedures for the time limits!
AIP Amendment
Does it fall under any of the following?
・Valid term: More than 3 months or longer ?
・Chart: hard to understand without attaching chart?
・Contents: complex and detailed too
No
NOTAM
Flow-4
Yes
Flow-4
Issue a " Trigger NOTAM "
AIRAC datum
Flow-3
Yes
No
Confirmation of necessary procedures for time limit!
AIP Supplement
Flow-6

(2) AIC processing

Flow-2

AIC (Aeronautical Information Circular)
To provide for the possible need to distribute information that does not qualify for inclusion in the AIP or in NOTAM, Annex 15 includes specifications for Aeronautical Information Circulars (AIC). These cover such matters as long-term advance notifications of major changes in procedures or facilities, information of an explanatory or advisory nature, or information concerning administrative matters. (See also chapter 7 of Doc 8126 AN/872.)

↓

a) a long-term forecast of any major change in legislation, regulations, procedures or facilities;
b) information of a purely explanatory or advisory nature liable to affect flight safety; and
c) information or notification of an explanatory or advisory nature concerning technical, legislative or purely administrative matters.

↓

The types of information appropriate to AIC are comply with Doc8126/AN872, Chapter 7. 7.1.2

↓

Seasonal information supplementing the snow plan published in the AIP must be issued in an AIC and based on the Doc8126/AN872, Chapter7. 7.1.3

↓

Seasonal Information's AIC must be issued not less than one month before the normal onset of winter conditions. The information, or any part of it, listed under a), b), d), e) and f) chapter 7.7.1.3 may, if so desired, be included in the snow plan published in the AIP, Part 3, Aerodromes (AD), Subsection AD . A specimen of a seasonal AIC supplementing a snow plan is contained in Figure 7-2.

↓

ANNUAL REVIEW AND CHECKLIST
A checklist of AIC currently in force must be issued as an AIC (see Figure 7-1) at least once a year

↓

DISTRIBUTION
AIC thus selected must be given the same distribution as the AIP, AIP Amendments and AIP Supplements.
AIC be color coded by subject where there are sufficient circulars in force to warrant such identification, e.g.:

a) White- administrative
b) Yellow- ATC
c) Pink- safety
d) Mauve- danger area map
e) Green - maps/charts

⇒See next page for Figure 7-1, Figure 7-2

Figure 7.1

Format for an Aeronautical Information Circular

TEL: 0123 697 3464 FAX: 0123 697 3474 Telex: 99 1236 AFS: EADDYAYX E-mail: AIS@donc.xx	**REPUBLIC OF DONLON** DEPARTMENT OF CIVIL AVIATION AERONAUTICAL INFORMATION SERVICE P.O. BOX 744 DONLON CITY	**AIC** Series A 11/03 14 OCT

Note.— Sheet size should be 21 × 27 centimetres (8 × 10½ inches).

Figure 7-2

Specimen of a seasonal Aeronautical Information Circular supplementing a snow plan

TEL: 0123 697 3464 FAX: 0123 697 3474 Telex: 99 1236 AFS: EADDYAYX E-mail: AIS@donc.xx	**REPUBLIC OF DONLON** DEPARTMENT OF CIVIL AVIATION AERONAUTICAL INFORMATION SERVICE P.O. BOX 744 DONLON CITY	**AIC** Series A 11/02 14 OCT

SEASONAL SNOW PLAN FOR THE WINTER SEASON 2002/2003

1. During the winter season 2002/2003 snow, ice and standing water on aerodrome pavements will be reported by means of the SNOWTAM Format for DONLON/International, HOLMSTOCK/Landa and NIBORD/Nibord.

2. Information concerning the status of clearance is coordinated and SNOTAM will be issued by the AIS Unit at DONLON/International and sent to the following aerodromes:

   (List the aerodromes by name and AFTN address)

3. The following changes have been made to the Snow Plan:

   (List changes, if any.)

4. The following clearance equipment will be used:

   DONLON/International: 4 snow ploughs, 3 snow blowers;
   HOLMSTOCK/Landa: 3 snow ploughs, 3 snow blowers;
   NIBORD/Nibord: 2 snow ploughs, 2 snow blowers.

5. During the winter season, continuous snow clearance will be carried out.

6. Critical snowbanks outside runways and taxiways will be reported if the h eight exceeds 60 cm and a lateral distance of 15 m measured form the edge of the row of runway lights.

Note.— Sheet size should be 21 × 27 centimetres (8 × 10½ inches).

(3) AIRAC datum

Flow-3

AIRAC datum

(Aeronautical Information Regulation And Control)

AIRAC signifying a system aimed at advance notification based on common effective dates, of circumstances that necessitate significant changes in operating practices

↓

Contents of Object

Information concerning the circumstances listed in Appendix 4, Part1,Annex-15, shall be distributed under the regulated system (AIRAC), i.e. basing establishment, withdrawal or significant changes upon a series of common effective dates at intervals of 28 days, including 29 January 1998. The information notified therein shall not be changed further for at least another 28 days after the effective date, unless the circumstance notified is of a temporary nature and would not persist for the full period.

Whenever major changes are planned and where advance notice is desirable and practicable, a publication date of at least 56 days in advance of the effective date should be used.

Appendix 4, Part 1

↓

1. The establishment, withdrawal of, and premeditated significant changes (including operational trials) to:

2. Limits (horizontal and vertical), regulations and procedures applicable to:

a) flight information regions;

b) control areas;

c) control zones;

d) advisory areas;

e) ATS routes;

f) permanent danger, prohibited and restricted areas (including type and periods of activity when known) and ADIZ;

g) permanent areas or routes or portions thereof where the possibility of interception exists.

3. Positions, frequencies, call signs, known irregularities and maintenance periods of radio navigation aids and communication facilities.

4. Holding and approach procedures, arrival and departure procedures, noise abatement procedures and any other pertinent ATS procedures.

5. Meteorological facilities (including broadcasts) and procedures.

6. Runways and stopways.

↓

When information has not been submitted by the AIRAC date, *a NIL notification* shall be originated and distributed by NOTAM or other suitable means, not later than one cycle before the AIRAC effective date concerned.

AIRAC predetermined dates

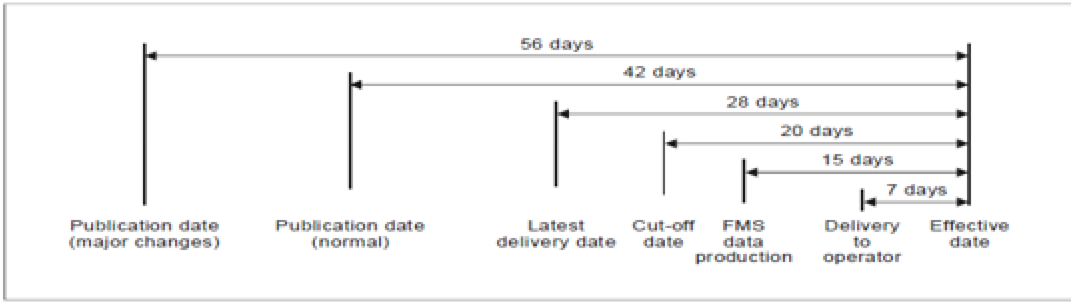
Operational changes to which the regulated system (AIRAC) is applied will be issued as AIP Amendments or Supplements.

The sample table below illustrates the latest dates by which material should reach the AIS in order to be promulgated on one of the selected publication dates. When possible, material should always be forwarded well ahead of these dates. In order to ensure that charts and route manuals are correct on the date of publication, it is essential that an effective date should not be notified until a high degree of certainty that it will be met exists. A complete list of AIRAC effective dates for the years 2009 to 2018 may be found in Doc 8126, Chapter 2.

NIL notification

A NIL notification must be issued when an AIP Amendment will not be published at the established regular interval or on the publication date. This NIL notification should be included in the monthly printed plain-language list of valid of NOTAM

Processing cycle for airborne navigation databases



Format: Sample of AIRAC AIP

TEL: 0123 697 3464
FAX: 0123 697 3474
Telex: 99 1236
AFS: EADDYAYX
E-mail: AIS@donc.xx

REPUBLIC OF DONLON
DEPARTMENT OF CIVIL AVIATION
AERONAUTICAL INFORMATION SERVICE
P.O. BOX 744
DONLON CITY

AIRAC
AIP

Amendment 11
1 May 2003

EFFECTIVE DATE: 12 June 2003

1. Contents

   AD Donlon/International — Additions to SID and STAR

2. On 12 June 2003 remove and insert the following pages:

   AD 2-31

   AD 2-35

3. Record entry of Amendment on page 0-2.

4. This amendment incorporates information contained in the following AIP Supplements and NOTAM which are hereby cancelled:

   NOTAM A0350/03

Specimen of an AIRAC AIP Amendment cover page

See: form of Specimen of an AIRAC AIP Supplement page, Figure 5-4, Doc8126/AN872

(4) NOTAM Issuance Process

Flow-4

Some types of information deal with changes to facilities and services which are of a temporary nature or of short duration. In addition, notification of operationally significant changes of a temporary or permanent nature is sometimes required at short notice.
For example, construction at an aerodrome may necessitate the closing of a runway, or a radio navigation aid may be removed from service for 24 to 48 hours for modification or maintenance, or a visual aid may be permanently removed from service. Such information is issued in the form of a notice known as a "NOTAM" and is distributed via the aeronautical fixed service (AFS). Chapter 5 of Annex 15 specifies the types of information to be distributed as NOTAM. (See Doc8126/AN872, Chapter 6.)

NOTAM Issuance Process

The circumstances which make it necessary to issue NOTAM are set out in 5.1.1.1 of Annex 15. Because of their importance, these circumstances are repeated here for ease of reference Doc 8126- 6.1.5.

Trigger NOTAM — Yes → Trigger NOTAM (Flow3-1)

No

Check List — Yes → Issuance of Check List

No

NOTAM R/C — Yes → Issuance of NOTAM C/ NOTAM R

No

The "raw data" must be provided by those responsible for the operation of the various air navigation facilities and services.

NOF or AIS headquarter

Authenticity — No → Working arrangement of raw data

The NOTAM Format should be made up by the Instructions and Guidance for the completion of the NOTAM Format, and essentially consists of two parts;

a) the part of interest to the communication service handling the AFS message, i.e. the part containing the priority indicator, addresses, date and time of filing and the originator's indicator;

b) the part containing the NOTAM information.

Instructions for the completion of the NOTAM format which relates to the part containing the NOTAM information are provided in Appendix 6 of Annex 15. These instructions are repeated in Appendix A to this chapter for ease of reference, and Appendix A provides additional guidance and examples of NOTAM/ Doc 8126-AN/872

Example

Example:
Q) RJCG/QLBAS/IV/M/A/000/999/4248N14140E025
A) RJCC B) 0304200921 C) 0304211800
E) ABN U/S

Meaning:
The aerodrome beacon at Sapporo/Chitose aerodrome became unserviceable at 0921 on 20 April 2003 and will remain out of service until 1800 hours UTC on 21 April 2003.
Text

"NOTAM" and is distributed via the aeronautical fixed service (AFS). Chapter 5 of Annex 15 specifies the types of information to be distributed as NOTAM.
(See also Chapter 6 of Doc8126/AN872)

The priority normally accorded to messages sent over the AFS is GG. Under exceptional circumstances and when justified by a requirement or special handling, a NOTAM may be given the higher DD priority

NOTAM given international distribution must conform, where necessary, with the relevant provisions of the ICAO communication procedures (Annex 10, Volume II), the ICAO NOTAM Code and abbreviations (see *Procedures for Air Navigation Services — ICAO Abbreviations and Codes* (PANS-ABC, Doc 8400)), indicators, identifiers, etc., and plain language where required for clear understanding. When a NOTAM is distributed by means other than the AFS, a six-digit datetime group indicating the date and time of filing the NOTAM and the identification of the originator must be given preceding the text.

SNOWTAM A special series NOTAM notifying the presence or removal of hazardous conditions due to snow, ice, slush or standing water associated with snow, slush and ice on the movement area, by means of a specific format.

Information concerning snow, slush, ice and standing water on aerodrome/heliport pavements shall, when reported by means of a SNOWTAM, contain the information in the order shown in the SNOWTAM Format in Appendix 2.

ASHTAM A special series NOTAM notifying by means of a specific format change in activity of a volcano, a volcanic eruption and/or volcanic ash cloud that is of significance to aircraft operations.

Information concerning an operationally significant change in volcanic activity, a volcanic eruption and/or volcanic ash cloud shall, when reported by means of an ASHTAM, contain the information in the order shown in the ASHTAM Format in Appendix 3.

(5) Trigger NOTAM

Flow-4-1

See: Figure 4-2, Handling of Permanent and Temporary types of Information with Doc8126/AN872

↓

When an *AIP Amendment or an AIP Supplement* is published in accordance with AIRAC procedures, “trigger” NOTAM must be originated and promulgated

↓

The intent of this NOTAM is *to serve as a* reminder in the pre-flight information bulletin (PIB) by signaling the coming into effect of operationally significant permanent or temporary changes to the AIP,

↓

Trigger NOTAM *must contain* a brief description of the contents of the amendment or supplement, the effective date-time and the reference number of the amendment or supplement.

↓

Trigger NOTAM must remain valid, as a reminder in the PIB, for a period of 14 days.

Example:

1) Trigger NOTAM relative to AIRAC AIP Amendments

The fourth and fifth letters (condition) must always contain the letters TT. This exclusive TT condition must be used in trigger NOTAM regardless of the subject of NOTAM code listed in the PANS-ABC.

Q) LOVV/QARTT/I/BO/E/245/999/4720N01330E999
A) LOVV
B) 0603161000 *(AIRAC effective date-time)*
C) 0603301000 *(AIRAC effective date-time + 14 days)*
E) TRIGGER NOTAM — PERM AIRAC AIP AMDT 3/06 WEF 16MAR2006 IMPLEMENTATION OF NEW ATS ROUTE UA15

Must include an indication that permanent changes are taking place.

2) Trigger NOTAM relative to AIRAC AIP Supplements

A0034/06 NOTAMN
Q) ESMM/QFATT/IV/BO/A/000/999/5739N01217E005
A) ESGG B) 0604131000 C) 0604271000
E) TRIGGER NOTAM — AIRAC AIP SUP 14/06 WEF 13APR2006 TIL 25MAY2006 USE OF AERODROME RESTRICTED DUE TO MAJOR CONSTRUCTION WORK.

The second and third letters are selected from Doc 8400 and must never be “XX”.
FA: Aerodrome

AIRAC AIP Supplements represent temporary operational changes of long duration (three months or longer) or operational changes of short duration containing extensive text or graphics.

Example TRGGER NOTAM of Malta on Nov 2017

Single Notam Retrieval 23-11-2017 11:53

MALTA
AERONAUTICAL INFORMATION SERVICES

Single NOTAM retrieval	Validity: -
Date: **23 NOV 2017** Time: **11:53**	Start: -
NOF: **LMMM**	End: -
Type: -	Status: -
Series: **A1241/17**	

\- A1241/17 NOTAMN (LMMM A1241/17)
Q) LMMM/QOATT/IV/BO/AE/000/999/3551N01429E005
A) LMML **B)** 1801040000 **C)** 1801172359
E) TRIGGER NOTAM PERM AIP AIRAC AMDT 19/18. EFFECTIVE 4 JANUARY 2018.

IN GEN SECTION

1) GEN 0.1 UPDATED MATS ADDRESS
2) GEN 0.3 UPDATED RECORD OF AIP SUPPLEMENTS
3) GEN 1.1 UPDATED BAAI CONTACT DETAILS
4) GEN 1.2 MODIFIED SECTION
5) GEN 1.7 UPDATED LIST OF DIFFERENCES FROM ICAO ANNEX 6
6) GEN 2.2 MODIFIED FRA (1) DEFINITION AND INSERTED NEW ABBREVIATIONS
7) GEN 2.7 WITHDRAWN 2017 SUNRISE/SUNSET TABLE AND INSERTED 2019 SUNRISE/SUNSET TABLE
8) GEN 3.1 UPDATED MATS ADDRESS AND TABLE OF AIRAC AMENDMENT DATES
9) GEN 3.2 UPDATED CHART DATES
10) GEN 3.3 UPDATED MATS ADDRESS
11) GEN 3.4 UPDATED MATS ADDRESS

IN AD SECTION

1) LMML AD 2.8 UPDATED APRON AND TWY DATA
2) LMML AD 2.9 UPDATED RWY AND TWY MARKINGS DATA
3) LMML AD 2.12 UPDATED RWY PHYSICAL CHARACTERISTICS,INSERTED RESA DIMENSIONS
4) LMML AD 2.13 UPDATED DECLARED DISTANCES TABLE
5) LMML AD 2.15 UPDATED AERODROME LIGHTING TABLE
6) LMML AD 2.20 UPDATED LOCAL TRAFFIC REGULATIONS
7) AD 2-LMML-ADC UPDATED CHART AND TABLES
8) AD 2-LMML-APDC-APN1 UPDATED CHART
9) AD 2-LMML-APDC-APN3 UPDATED CHART
10) AD 2-LMML-APDC-APN5 UPDATED CHART
11) AD 2-LMML-APDC-APN8 UPDATED CHART
12) AD 2-LMML-APDC-APNSAF UPDATED CHART
13) AD 2-LMML-AGMC UPDATED CHART
14) AD 2-LMML-AOC-A UPDATED RWY DECLARED DISTANCES
15) AD 2-LMML-AOC-B UPDATED RWY AND CWY DIMENSIONS

NOTE: Briefing does not include any obsolete NOTAM older than 95 days.

END OF SINGLE NOTAM RETRIEVAL

(6) ATFN format (NOTAM)

Flow-4-2

Priority Indicator

Address

Date and time of filing

Originator's Indicator

Message Series, Number and Identifier

NOTAM containing new information	.... (series and number/year)	NOTAMN
NOTAM replacing a previous NOTAM	.... (series and number/year)	NOTAMR .... (series and number/year of NOTAM to be replaced)
NOTAM cancelling a previous NOTAM	.... (series and number/year)	NOTAMC .... (series and number/year of NOTAM to be cancelled)

Qualifiers

	FIR	NOTAM Code	Traffic	Purpose	Scope	Lower Limit	Upper Limit	Coordinates, Radius
Q)		Q						

Identification of ICAO location indicator in which the facility, airspace or condition reported on is located — A)

Period of Validity

From *(date-time group)*	B)		
To *(PERM or date-time group)*	C)		EST* PERM*
Time Schedule *(if applicable)*	D)		

Text of NOTAM; Plain-language Entry (using ICAO Abbreviations)

E)

Lower Limit F)

Upper Limit G))

Signature

*Delete as appropriate

Note: See below item 3 (Report of NOTAM matter)

(7) AIP Amendments

Flow-5

AIP Amendments are issued whenever new information necessitates a permanent change or addition to the information already contained in the AIP.

The following items abstracted from item 5.9, Doc8126/AN872, Please see if you want to see more detail such as publication of the regular interval and so

↓

Each AIP Amendment must be allocated a serial number which must be consecutive. The normal method of amendment must be by issue of replacement pages. Any operationally significant changes to an AIP must be published in accordance with the AIRAC procedures and clearly identified as such. The monthly printed plain-language list of valid NOTAM includes an indication of the latest AIP amendments.

↓

Purpose of *issuing amendments to the AIP* is to keep the information up to date. An AIP that is not up to date can jeopardize the safety of air navigation. Some States may prefer to schedule the interval between AIP Amendments every three, four or six months, or more.

↓

A State may decide that the AIRAC common effective dates are too far apart to keep their AIP up to date and may decide *to issue an amendment every 14 days*. Other States may decide to issue amendments on only one AIRAC date per year

↓

When a State has established the regular interval or publication dates for its AIP Amendments, *these intervals or publication dates* must be published in the AIP, Part 1 — General (GEN).

↓

When an AIP Amendment is issued, it must include references to the serial numbers of those elements, if any, of the Integrated Aeronautical Information Package that have been incorporated into the amendment. A brief indication of the subjects affected by the amendment must be included on the AIP Amendment cover sheet.

↓

Each amendment must include *a checklist* giving the current date of each loose-leaf page in the AIP, unless there are only two or three replacement sheets involved, and must provide a recapitulation of any outstanding manuscript corrections. The checklist must carry both the page number and

Distribution

↓

The intent of this NOTAM is also serves as a reminder to AIS officers responsible for updating AIP to insert a new AIP Amendment or AIP Supplement in the affected AIP on the amendment or supplement effective date

Example AIP Amendment

Current and Proposed Sheet for AIP Amendment at the request issuance (text doc.)

Example 1

Revision

RJXX AD 2.10 AERODROME OBSTACLES

In approach/TKOF areas

Change

RWY/Area affected	Obstacle type	Coodinates	Elevation	Markings/LGT	Remarks
RWY14/APCH	Tree	333333.3N1444444.4E	21ft	Marked/LIL(Red)	
		(Remove)			
RWY14/APCH	Antenna	333335.5N1444446.6E	20ft	Marked/LIL(Red)	

Add

Current

RJXX AD 2.10 AERODROME OBSTACLES

In approach/TKOF areas

RWY/Area affected	Obstacle type	Coodinates	Elevation	Markings/LGT	Remarks
RWY14/APCH	Tree	333333.3N1444444.4E	20ft	Marked/LIL(Red)	
~~RWY14/APCH~~	~~Tree~~	~~333334.4N1444445.5E~~	~~25ft~~	~~Nil~~	Remove

Example 2

RJXX AD 2.10 AERODROME OBSTACLES

In approach/TKOF areas

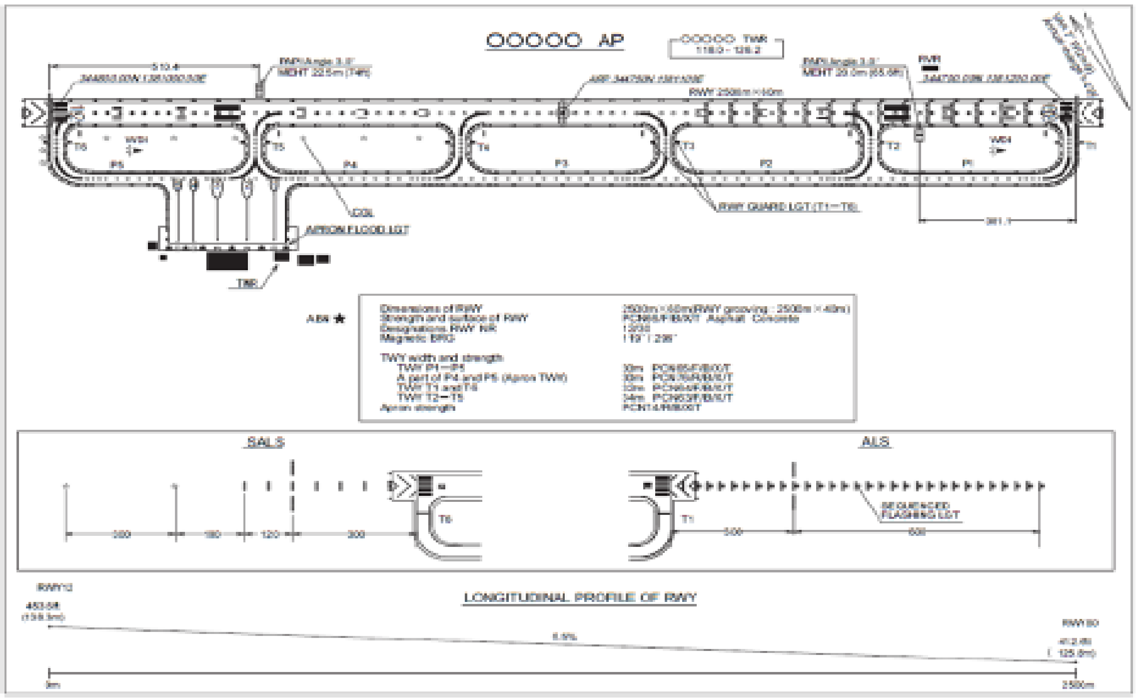
21ft Change

RWY/Area affected	Obstacle type	Coodinates	Elevation	Markings/LGT	Remarks
RWY14/APCH	Tree	333333.3N1444444.4E	~~20ft~~	Marked/LIL(Red)	
~~RWY14/APCH~~	~~Tree~~	~~333334.4N1444445.5E~~	~~25ft~~	~~Nil~~	Change
RWY14/APCH	Antenna	333335.5N1444446.6E	20ft	Marked/LIL(Red)	

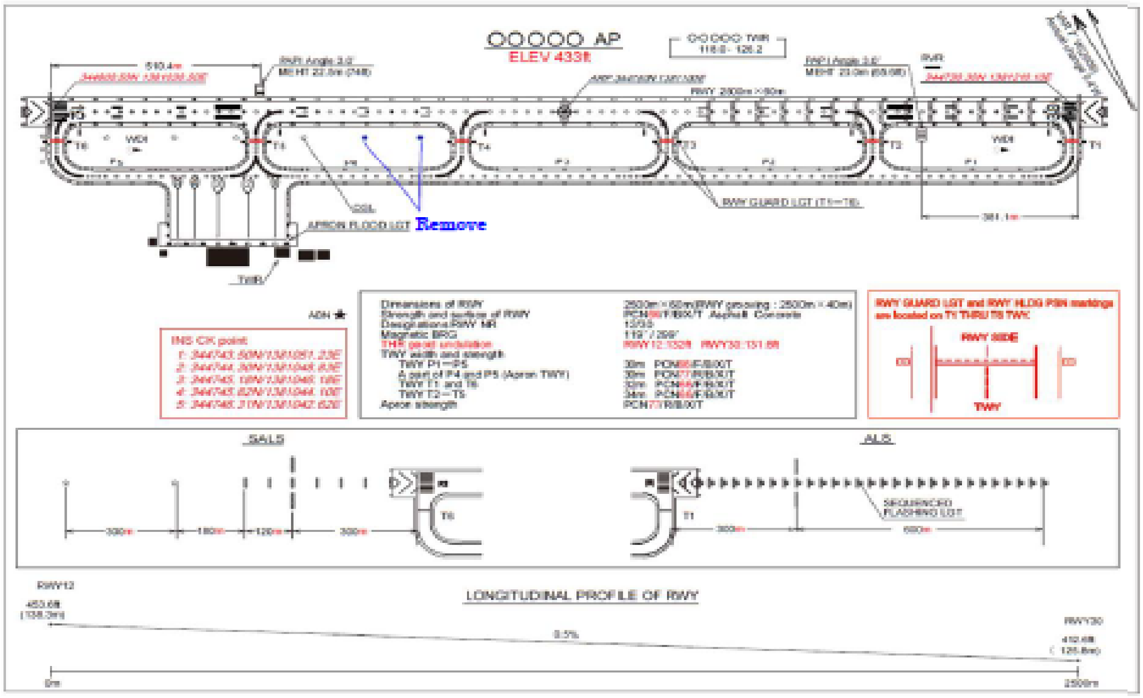
Add

Current and Proposed Sheet for AIP Amendment at the request issuance

Current



Revision



(8) AIP Supplements

Flow-6

Temporary changes of long duration (more than three months) or changes requiring the issuance of extensive text and/or graphics which affect the contents of an AIP are published and distributed as AIP Supplements

The following items abstracted from item 5.10, Doc8126/AN872, Please see if you want to see more detail such as publication of the regular interval and so

↓

The purpose of an AIP Supplement is to bring to the attention of users both temporary changes of long duration (three months or longer) and information of short duration containing extensive text or graphics which affect one or more parts of the AIP. Operationally significant changes to the AIP issued as an AIP Supplement must be published under the AIRAC procedures

↓

Temporary changes anticipated to last less than three months are considered to be information of short duration, which is distributed by NOTAM. When this period is exceeded and expected to last for an additional three months or more, an AIP Supplement is issued replacing the NOTAM. Whenever an AIP Supplement is issued as a replacement of a NOTAM, a reference to the series and number of the NOTAM should be included.

↓

A checklist of all AIP Supplements currently in force must be issued at intervals of not more than one month. Such information is to be included in the monthly printed plain-language list of valid NOTAM

Distribution ↓

When an AIP Amendment or an AIP Supplement is published in accordance with AIRAC procedures, "trigger" NOTAM must be originated and promulgated.

↓

The intent of this NOTAM is also serves as a reminder to AIS officers responsible for updating AIP to insert a new AIP Amendment or AIP Supplement in the affected AIP on the amendment or supplement effective date

※ See Example of AIP Supplement of MAURITIUS on Attachment 10

2 Issuing Request of AIP Amendment, AIP Supplement, AIRAC and AIC

(1) Issuing Request Procedure

The issuing request or the revised edition should be notified to the director of AIS Center by the official document.

① By way of Issuing Request

a. Airport office, Airport branch office, En-route surveillance radar office are requested by way of director of principal of regional civil aviation bureau.

b. When it is to be requested by regional CAA and Air Traffic Control Center (ACC), and to require the notification procedure, it should be sent via the head of principal section of bureau.

c. Administrator or operation director of aerodromes and air navigation facilities (except for a. and b. and Ministry of Defense) and airport office and airport branch office, it should be informed to the corresponding regional civil aviation bureau branch organization in principal. Furthermore, if there are no local CAA branch organization, it should be assigned the point of contact in arrangement of associated organization in advance.

d. In other organization, especially, excluding the one with specification as a rule, make the report to the such as head of AFTN central.

② Contents of Issuing Request

a. Titles indicating the brief of information summary

b. Contents of information

c. Date of Issuance

(a) In the event of AIP Amendment, date of issuance (the date of AIRAC) and effective date of relevant information

(b) In the event of AIP supplement, date of issuance (the date of AIRAC) and effective period of relevant information

(c) In the event of AIC, date of issuance and effective period of relevant information (if it's necessary)

d. Drawing (attached as required)

e. Other informative matter

③ Closing Date

30 day's advance notice to Aeronautical Information Service Center before issuing request. However, when admit it is necessary in consideration of

holiday, AIS Center inform the other closing date separate preliminarily.

Reference: Attachment 9

「AIRAC Date」 as for use the issuing request route and issuance date, effective date and closing date.

(2) Contact of Issuing Request

When submitted the official document, the client of issuing request makes a contact by telephone the intent of issuing request to the Aeronautical Information Service Center or the person in charge of AIS office.

(3) Basic Consideration

① With information or drawing related to AIRAC, Note it to become effective from a day of issue and an effective day of information concerned that it passed at least 28 days as rule .

② It's make a sufficient coordination with relevant organization to arrival the issuing request in the Aeronautical Information Center until close date.

③ Descriptive process about issuing request use AIP publishing information guide as a reference.

④ The name of facility use facilities name which is specified with Aviation Law and related regulation, aeronautical safety service processing regulations and airport civil engineering facility design standards.

⑤ AIP Supplement relating to operation restriction of aerodrome facilities is doing the issue request to one airport bringing it together in one as a rule.

⑥ It is being issued of the AIP Supplement involving with the operation restrictions of facilities in the airport, and requesting the operation restrictions newly, issuing request should be done by the content that arranges the operation restrictions. In this case, the content of newly operational restrictions should be considered, whenever possible, in the cycle of 28 days or more.

⑦ Issuing request of AIP Supplements relating to operation restrictions of aerodrome facilities use the Form A.

⑧ When being issued the AIP Supplement relating to operational restrictions of aerodrome facilities and when defined the accurate date and time as to estimated period of time of such information inform the NOTAM items as to definite of applicable date. And when it is updated the AIP Supplement, report the NOTAM items updated regarding to the fixation at the date. Also, when AIP Supplement is updated, report the NOTAM to be updated related the determined of the date.

⑨ Effective date and effective period of applicable information indicates the time and the minutes as a rule, and fill out the TJT/UTC.

⑩ Latitude and longitude use the WGS-84 ,and fill in the word using 「degree」「minutes」「second 」clearly, whenever possible.

⑪ AIP Amendments distribute by letter, and get the best out of benefit expressible by the map and the diagram.

⑫ When modify or delete the information that has already issued, Specify by the old and new contrast after indicating a part concerned by the underline or the cancellation line and coloring (The example: the change is red and the deletion is blues), and indicate it to understand the change point etc. clearly.

3 Report of NOTAM matter

(1) Messaging Operation

① Normal

As a rule, its use NOTAM matter notification and inform to the person in charge of Aeronautical Information Center based on the following “a” to “e”.

a. Facsimile

(a) Based on specific Ⅲ of this regulation, its transmit to the Aeronautical Information Center by Facsimile line in advanced.

(b) Send the NOTAM matter notification to the Aeronautical Information Center

(c) After transmission completed, call to the Aeronautical Information Center and confirm it whether NOTAM notification was received or not.

b. E-mail

(a) Based on specific Ⅲ of this regulation, transmit the NOTAM matter notification to the Aeronautical Information Center by e-mail address notified in advanced.

(b) Send the NOTAM matter notification attached in e-mail

(c) Subject of e-mail should be same as the NOTAM matter notification

(d) In case of attaching the file to the e-mail, it should be any software that can be read.

Microsoft Word 2003

Microsoft Excel 2003

Microsoft Reader 7.0

(e) The response e-mail received by Aeronautical Information Center was sent, if it is no response, it makes a call to the Aeronautical Information Center and confirm that there is no e-mail received.

c. Postal

Send the NOTAM matter notification to the Aeronautical Information Center.

d. Counter Desk

Submit the NOTAM matter notification directly to the Aeronautical Information Center

e. Other way

The method of separated determined by the head of ATFN communication network and so forth.

② Emergency

When require the emergency, it inform based on the following “a” as a rule. Furthermore, when informing by ① “a” “b” “e” on above mention without depend as follows. Make a contact with phone indicating as emergency by all means

a. Oral

(a) Based on specific Ⅲ of this regulation, it make a call to the Aeronautical Information Center using the telephone number in advanced.

(b) Report the belonging and the name of the contact person, and notify the content of the NOTAM matter notification

(c) Confirm it is errorless that the person in charge of Aeronautical Information Center repeats the content of message

(d) Submit the NOTAM matter notification on above mentioned depending on ① “a” “b” “e” without any delay.

(2) Description method of NOTAM matter notification

① Date and Hour of Message

Enter the year, month, date and time into the appropriate NOTAM matters to be sent.

② Organization

Enter the name of organization belonging to following ③.

③ Originator

a. Enter the name of each section chief person or responsible person belonging Civil Aviation Authority (Tajikairnavigation), such as director of each section including regional CAA, ACC and so forth.

b. In the organizations other than Civil Aviation Authority (Tajikairnavigation), enter the name of responsible person in the NOTAM matter.

④ Name of person in charge

Enter the division name and person responsible.

⑤ Contact point

Enter the phone number which informed in advanced based on following Ⅲ.

⑥ Details of Message

a. Subject

(a) Describe the tile of table indicating the information brief.

(b) Enter the purport of relevant NOTAM number and modification or cancellation when change or cancel of already issued NOTAM.

b. Contents (what, when, where, how, it concretely describes)

(a) Name of facilities (relevant RWY, Light facilities, weather observation equipment and so forth)

(b) Status (installation, decommissioning or stop of operation and its recovery. etc.)

(c) Beginning and end of event concerned

ⅰ enter the time of beginning and end of event concerned. But when cancel the NOTAM already has issued, not describe the finish time of event.

Reference: the cancellation NOTAM is to invalid the NOTAM of the canceled event, and no notify the restoration time of the event.

ⅱ In the period , describe a specific period concerned in the period when the event is limited in the specific period.

ⅲ The case where it informs of the cancellation is excluded. Enter the estimate (scheduled) finishing time when it possible, enter the word (EST) followed the relevant time in case of the finishing time of occurrence or restoration is uncertainty. In this case, it is necessary to change or cancel the issued NOTAM until the estimated finishing time. When become definite the estimated finishing time, issue the change or cancellation message as soon as possible.

(d) Enter the contributing factor that an event concerned occurs

c. Result of coordination with organization concerned

Enter the result when it has coordinated with related organization.

d. Other informative matter

Enter the reference matter, with or without of an attached material.

(3) Points of concern in case of entering of NOTAM matter notification

① All notation such as year, month, date and minutes should be Arabic numerals.

② The years fill in four digits on the age at the Christian era.

③ Be careful on February 29 in the leap year.

④ Make to the standard or Coordinated Universal Time, and fill in the filling in time by either of tense in one NOTAM matter notification.

⑤ Fill in "TJT" following time concerned when use the local standard time.

⑥ Fill in (UTC) following time concerned when use the Coordinate universal time.

⑦ Do not use the expression on a day of the week or holiday.

⑧ When use the expression of "Sunrise" or “Sunset”, fill in the earliest time for the sunrise or the latest time for sunset in the period of an event concerned is executed.

⑨ Latitude and longitude use the WGS-84 ,and fill in the word using 「degree」「minutes」「second 」clearly, whenever possible.

⑩ Append material and the drawing, etc. where details were shown if necessary.

⑪ Adjust beforehand with Aeronautical Information Center, and inform of the NOTAM matter when the necessity for issuing the NOTAM (Hereafter referred to as "NOTAM of reading in a different way") related the change or corrected of AIP, AIP Amendment, and AIP Supplement is caused. Do the issue request related the change or corrected of AIP Amendment or AIP Supplement additionally. However, it is not this as for the change in the estimate period in the AIP Supplement relevant to the Operation restrictions of aerodrome facilities.

⑫ The name of facilities must use the name that is described in AIP, AIP Supplement or Aeronautical Information Circular.

⑬ The description of a concrete content of message refer to the example of description of the attachment 4 NOTAM matter notification.

(4) Procedure such as natural disasters and accidents

When it is not possible to inform due to the natural disaster and the accident by regular means, inform the messages to Aeronautical Information Center with usable any possible means.

4 Issuing Request of electric terrain and obstacle data

(1) Content of Issuing Request

① Flight Procedures and Airspace Program Office, Air Navigation Services Department Obstacle information relating to the flight procedure design.

② Visual Aids and Electrical Systems Office
Obstruct light / daytime obstruct beacon installed objects information.
Obstruct light・daytime obstruct beacon installed exemption objects information.

③ Operation and flight inspection division in Regional CAA
Obstruct light / daytime obstruct beacon installed exemption objects information （except for information of wind power generator comprising of aerial line and wind power generator group.)

④ General Director of Airport

⑤ In the AIP, Administrator or Operational Director of Airport placing of aerodrome obstacle drawing, Survey research information for developing aerodrome obstacle

(2) Method of Issuing Request

① Append Form 5 to "Electronic geographical features and obstacle data matter issuance request" provided in the issue procedure as a rule, convert into the CSV format according to the data accuracy etc. that describe to following “d”, and do the issue request by E-mail. When depending on E-mail is not suitable, the issue request can be done by the electromagnetic record medium such as DVD.

② When it is not suitable to use Form 5, Adjust format with Aeronautical Information Center.

(3) Interval of Issuing Request

As a rule, the message date is made the first day of every month. However, adjust it with Aeronautical Information Center when depending on this by communicator’s circumstances is not suitable.

The informed data is assumed to be the latest one on the message day. Moreover, inform there is no data when there is no informed data.

(4) Data Accuracy

Refer to the Attachment 7 as the Data Publication Resolution and Integrity Classification for the kind of the accuracy of data and the item, Attachment 8 respectively for the specification of the point data and the line data.

Note.— Electronic terrain and obstacle data is intended to be used in the following air navigation applications, and see also Attachment 8 as Obstacle Data is supplemented by Annex 15. :

a) ground proximity warning system with forward looking terrain avoidance function and minimum safe altitude warning (MSAW) system;

b) determination of contingency procedures for use in the event of an emergency during a missed approach or take-off;

c) aircraft operating limitations analysis;

d) instrument procedure design (including circling procedure);

e) determination of En-route "drift-down" procedure and En-route emergency landing location;

f) advanced surface movement guidance and control system (A-SMGCS);

g) aeronautical chart production and on-board databases.

5 Notification items by Originator and using Form

(1) The matter provided in Aeronautical Information Issue Procedure is as follows.

a) Section, Division and Name of person in charge (personnel) (nothing like the issuance request of the revised edition in the name)

b) Telephone number (all telephone numbers when representative number notification function is not used for dial-in method) used for issue request, fax number and E-mail addresses.

(2) In the organization that informs of the NOTAM matter, use Form 1.

(3) In the organization that does the issue request of the revised edition such as each section (room) in this bureau etc. directly to Aeronautical Information Center, use Form 1 and 4.

(4) In the organization that informs of electronic geographical features and the obstacle data, use Form 1. However, the person in charge's report can be omitted with the same when having already informed as an organization that does the issuance request etc. of the notice to airman.

(5) Inform by the facsimile terminal equipment, E-mail or mail.

(6) Inform Aeronautical Information Center promptly when there is a change in the informed content. In this case, it only must send only Form to which the matter with the change has been described.

Chapter Ⅴ Distribution and Confirmation

1 Distribution

AIP, AIP Amendments and AIP Supplements and related documents must be distributed to recipients of the Integrated Aeronautical Information Package by the most expeditious means available.

When an AIP Amendment or an AIP Supplement is published in accordance with AIRAC procedures, "trigger" NOTAM must be originated and promulgated. The intent of this NOTAM is to serve as a reminder in the pre-flight information bulletin (PIB) by signaling the coming into effect of operationally significant permanent or temporary changes to the AIP, thus ensuring that users are aware of changes that may affect their flights.

It also serves as a reminder to AIS officers responsible for updating AIP to insert a new AIP Amendment or AIP Supplement in the affected AIP on the amendment or supplement effective date.

(1) Significant dates for AIP Production and Distribution

There are three significant dates associated with the AIRAC system:

a) the effective date;

b) the publication date; and

c) the latest date for raw material to reach the AIS.

There must be an interval of 42 days between the distribution date and the effective date. This allows for a period of up to 14 days' distribution time, by the most expeditious means, in order for recipients to receive the information at least 28 days in advance of the effective date.

In cases where major changes (i.e. extensive changes to procedures or services which will impact international air transport) are planned and more advance notice is desirable and practicable, a distribution date of 56 days (or even longer) in advance of the effective date should be used.

Examples of major changes are:

a) the introduction of a new aerodrome;

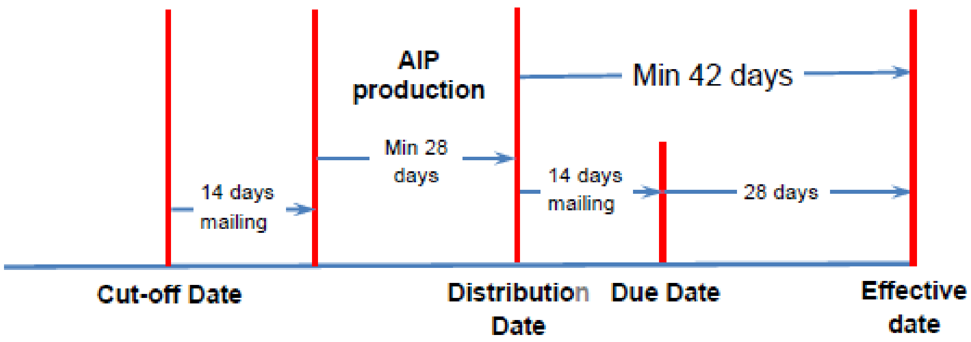
b) the introduction of new approach and/or departure procedures at international aerodromes; and

c)the introduction of new ATS routes.

When the AIS does not receive AIRAC material from the responsible authorities/agencies for publication on the next scheduled AIRAC effective date, it must issue a NIL notification by NOTAM (or other means) at least one cycle (28 days or more) before the AIRAC effective date concerned.

Under the AIRAC system information must always be published in paper copy form and be distributed by the AIS at least 42 days in advance of the AIRAC effective date, to reach the user at least 28 days in advance of the effective date.

(2) Timeline and deadlines, cut - off dates, due dates



Cut-Off date: latest date raw data should be available at AIS Division

Distribution date: latest date for publishing new amendments, calculating 14 days for delivery postal mailing

Due date: latest date new information should be on hand of customers (Air Lines, other AIS units, Aircraft operators, Navigation Data provider, etc.)

Effective date: new information coming in force

2 Confirmation of Issued Aeronautical Information

(1) Issued Aeronautical Information should be confirmed on the preflight information service provision site described in AIP GEN 3.1.5 or following websites.

https://aisjapan.mlit.go.jp

Furthermore, on the website, Cancel NOTAM that is already issued cannot confirm.

(2) Confirm NOTAM (Refer to Attachment 5 「Composition of NOTAM and details」 by the NOTAM number notified by Aeronautical Information Center.

(3) Contact Aeronautical Information Center at once, and request the change or the cancellation when you send the wrong issuance request.

Chapter Ⅵ Contact address of Aeronautical Information Center

・・・Contact address for Dushanbe

(1) Name and address

Fill in the Tajikistan AIS office's name and address

(2) Telephone number ・・・Official parties

① Inquiry exclusive use for Aeronautical Information

(a) Tel

(b) E-mail

② Inquiry exclusive use for issuance request of revised edition

(a) Tel

(b) Fax

(c) E-Mail

③ Message exclusive use of NOTAM matter

(a) Tel

(b) Fax

(c) E-mail

④ Inquire exclusive use for electronic geographical features and the obstacle data,

(a) Tel

(b) E-mail

Attachments　A

Attachment 1 The Classification of Aeronautical Information

Aeronautical Information is aeronautical data and aeronautical information necessary for the safety regularity and efficiency of air navigation covers its own territory and those areas over the high seas for which it is responsible for the provision of air traffic services.

At first, Aeronautical Information are classified by from NOTAM message to be distributed with telecommunication such as AFTN to the printing paper contained the complex contents, aerodrome mapping data, electronic terrain and obstacle data.

And, Aeronautical Information shall be classified by following category;

1. **NOTAM**・・・A notice distributed by means of telecommunication such as ATFN containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations. There are comprised in NOTAM, SNOWTAM,ASHTAM、Trigger NOTAM and the check of NOTAM.

2. **AIP**・・・A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation.

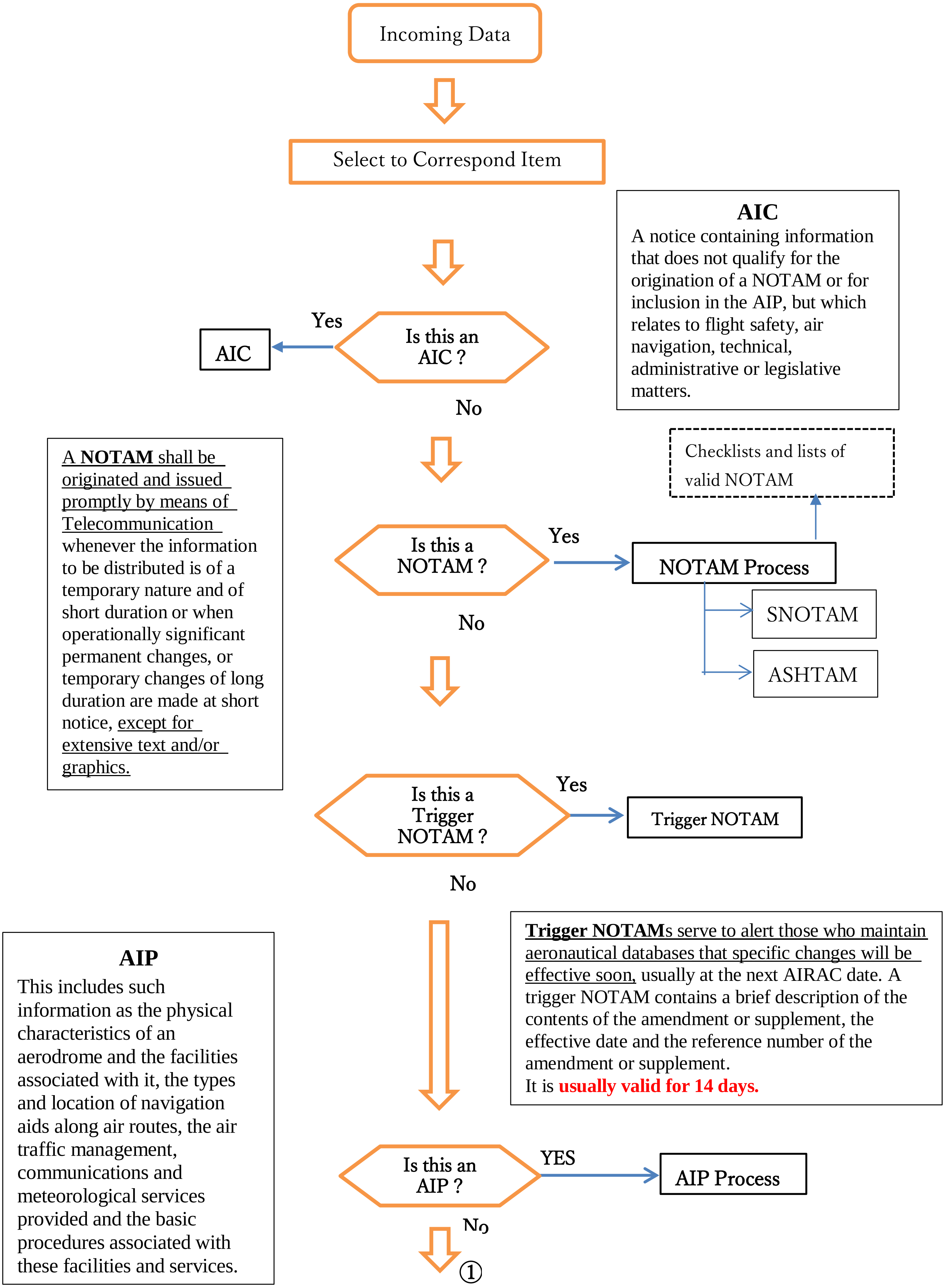
3. **AIP Amendment**・・・Permanent changes to the information contained in the AIP.

4. **AIP Supplement**・・・Temporary changes to the information contained in the AIP which are published by means of special pages.

5. **AIRAC**・・・An acronym (aeronautical information regulation and control) signifying a system aimed at advance notification, based on common effective dates, of circumstances that necessitate significant changes in operating practices.

6. **AIC**・・・A notice containing information that does not qualify for the origination of a NOTAM or for inclusion in the AIP, but which relates to flight safety, air navigation, technical, administrative or legislative matters.

The Classification Flow

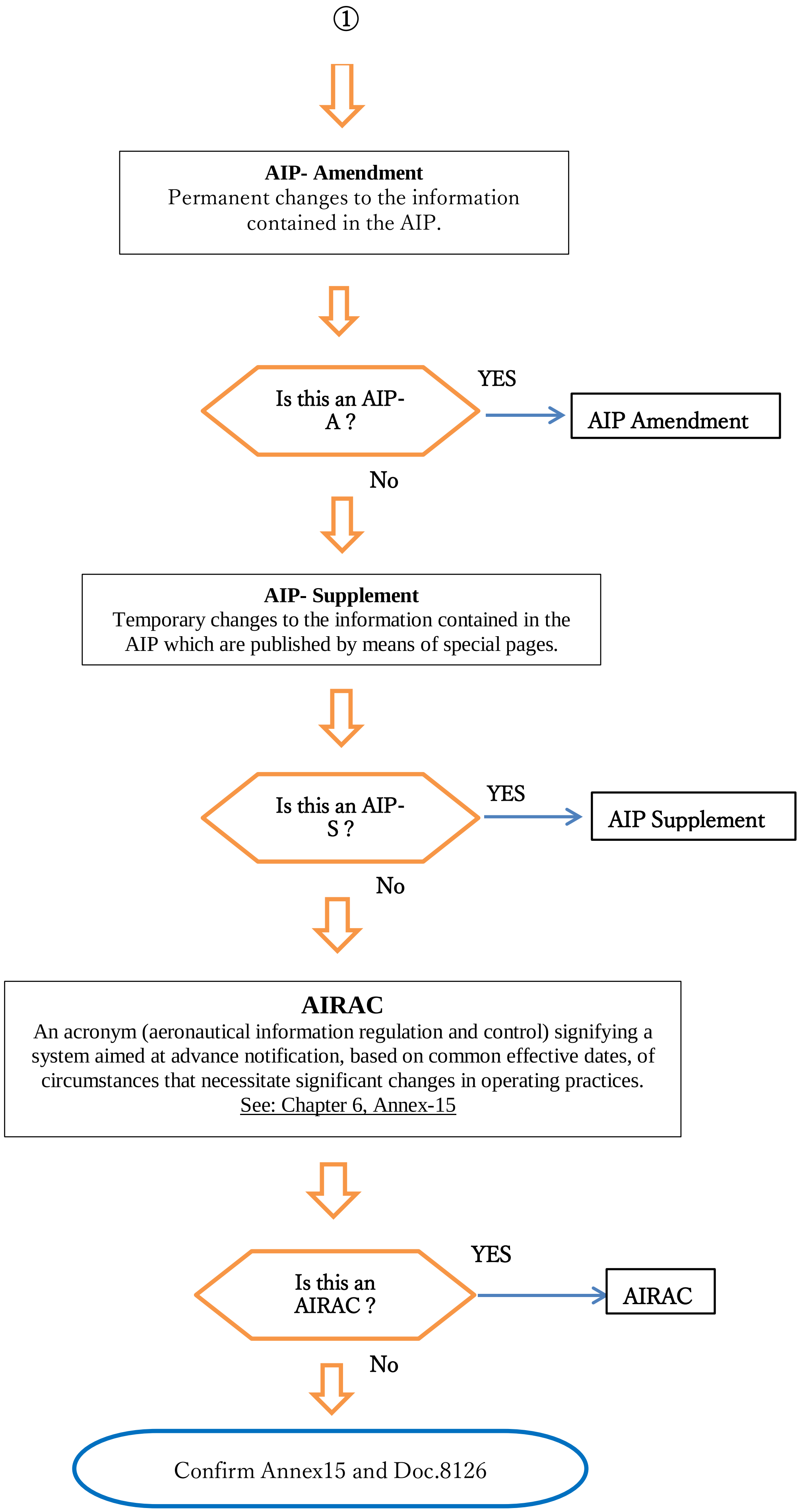


AIC
A notice containing information that does not qualify for the origination of a NOTAM or for inclusion in the AIP, but which relates to flight safety, air navigation, technical, administrative or legislative matters.

A **NOTAM** shall be originated and issued promptly by means of Telecommunication whenever the information to be distributed is of a temporary nature and of short duration or when operationally significant permanent changes, or temporary changes of long duration are made at short notice, except for extensive text and/or graphics.

Trigger NOTAMs serve to alert those who maintain aeronautical databases that specific changes will be effective soon, usually at the next AIRAC date. A trigger NOTAM contains a brief description of the contents of the amendment or supplement, the effective date and the reference number of the amendment or supplement.
It is **usually valid for 14 days.**

AIP
This includes such information as the physical characteristics of an aerodrome and the facilities associated with it, the types and location of navigation aids along air routes, the air traffic management, communications and meteorological services provided and the basic procedures associated with these facilities and services.


①
AIP- Amendment
Permanent changes to the information contained in the AIP.
Is this an AIP-A ?
YES
AIP Amendment
No
AIP- Supplement
Temporary changes to the information contained in the AIP which are published by means of special pages.
Is this an AIP-S ?
YES
AIP Supplement
No
AIRAC
An acronym (aeronautical information regulation and control) signifying a system aimed at advance notification, based on common effective dates, of circumstances that necessitate significant changes in operating practices.
See: Chapter 6, Annex-15
Is this an AIRAC ?
YES
AIRAC
No
Confirm Annex15 and Doc.8126

Attachment 2 AIC matters

An AIC shall be originated whenever it is necessary to promulgate aeronautical information which does not qualify:

a) under the specifications in 4.1 for inclusion in an Aeronautical Information Publication (AIP); or

b) under the specifications in 5.1 for the origination of a NOTAM.

Note: see Annex-15, Chapter4, AIP and Chapter 5 NOTAM

An AIC shall be originated whenever it is desirable to promulgate:

a) a long-term forecast of any major change in legislation, regulations, procedures or facilities;

b) information of a purely explanatory or advisory nature liable to affect flight safety;

c) information or notification of an explanatory or advisory nature concerning technical, legislative or purely administrative matters.

This shall include:

1) forecasts of important changes in the air navigation procedures, services and facilities provided;
2) forecasts of implementation of new navigation systems;
3) significant information arising from aircraft accident/incident investigation which has a bearing on flight safety;
4) information on regulations relating to the safeguarding of international civil aviation against acts of unlawful interference;
5) advice on medical matters of special interest to pilots;
6) warnings to pilots concerning the avoidance of physical hazards;
7) effect of certain weather phenomena on aircraft operations;
8) information on new hazards affecting aircraft handling techniques;
9) regulations relating to the carriage of restricted articles by air;
10) reference to the requirements of, and publication of changes in, national legislation;
11) aircrew licensing arrangements;
12) training of aviation personnel;
13) application of, or exemption from, requirements in national legislation;
14) advice on the use and maintenance of specific types of equipment;
15) actual or planned availability of new or revised editions of aeronautical charts;
16) carriage of communication equipment;
17) explanatory information relating to noise abatement;

18) selected airworthiness directives;
19) changes in NOTAM series or distribution, new editions of AIP or major changes in their contents, coverage or format;
20) advance information on the snow plan (see 7.1.1.2);
21) other information of a similar nature.

The snow plan published under AD 1.2.2 of Appendix 1 shall be supplemented by seasonal information, to be issued well in advance of the beginning of each winter — not less than one month before the normal onset of winter conditions — and shall contain information such as that listed below: see: Note1

a) a list of aerodromes/heliports where snow clearance is expected to be performed during the coming winter:
   *1) in accordance with the runway and taxiway systems; or
   *2) planned snow clearing, deviating from the runway system (length, width and number of runways, affected taxiways and aprons or portions thereof);

*b) information concerning any centre designated to coordinate information on the current state of progress of clearance and on the current state of runways, taxiways and aprons;
c) a division of the aerodromes/heliports into SNOWTAM distribution lists in order to avoid excessive NOTAM distribution;
*d) an indication, as necessary, of minor changes to the standing snow plan;
*e) a descriptive list of clearance equipment;
*f) a listing of what will be considered as the minimum critical snow bank to be reported at each aerodrome/heliport at which reporting will commence.

* see: Note2

Note1; Annex-15, Appendix AD 1.2.2
Snow plan
Brief description of general snow plan considerations for aerodromes and heliports available for public use at which snow conditions are normally liable to occur, including:
1) organization of the winter service;
2) surveillance of movement areas;
3) measuring methods and measurements taken;
4) actions taken to maintain the usability of movement areas;

5) system and means of reporting;
6) the cases of runway closure; and
7) distribution of information about snow conditions.

Note.— Where different snow plan considerations apply at erodromes/heliports, this subparagraph may be subdivided accordingly.

Note2: ＊This information, or any part of it, may be included in the AIP, if so desired.

Attachment 3 Authenticity NOTAM

Received Raw Data

Originator

The "raw data" must be provided by those responsible for the operation of the various air navigation facilities and services.

NOF or AIS Headquarter

Authenticity

Reject

Working arrangement of raw data

Approve

The NOTAM Format should be made up by the Instructions and Guidance for the completion of the NOTAM Format, and essentially consists of two parts;

a) the part of interest to the communication service handling the AFS message, i.e. the part containing the priority indicator, addresses, date and time of filing and the originator's indicator;

b) the part containing the NOTAM information.

Instructions for the completion of the NOTAM format which relates to the part containing the NOTAM information are provided in Appendix 6 of Annex 15. These instructions are repeated in Appendix A to this chapter for ease of reference, and Appendix A provides additional guidance and examples of NOTAM/ Doc 8126-AN/872

"NOTAM" and is distributed via the aeronautical fixed service (AFS). Chapter 5 of Annex 15 specifies the types of information to be distributed as NOTAM. (See also Chapter 6 of this manual.)

The priority normally accorded to messages sent over the AFS is GG. Under exceptional circumstances and when justified by a requirement or special handling, a NOTAM may be given the higher DD priority

NOTAM given international distribution must conform, where necessary, with the relevant provisions of the ICAO communication procedures, the ICAO NOTAM Code and abbreviations, indicators, identifiers, etc., and plain language where required for clear understanding. When a NOTAM is distributed by means other than the AFS, a six-digit datetime group indicating the date and time of filing the NOTAM and the identification of the originator must be given preceding the text.

Example

Example:
Q)
RJCG/QLBAS/IV/M/A/000/999/4248N14140E025
A) RJCC B) 0304200921 C) 0304211800
E) ABN U/S

Meaning:
The aerodrome beacon at Sapporo/Chitose aerodrome became unserviceable at 0921 on 20 April 2003 and will remain out of service until 1800 hours UTC on 21 April 2003.
Text

Format (NOTAM)

Priority Indicator	→
Address	
	≪≡
Date and time of filing	→
Originator's Indicator	≪≡(

Message Series, Number and Identifier

NOTAM containing new information	.... (series and number/year)	NOTAMN	
NOTAM replacing a previous NOTAM	.... (series and number/year)	NOTAMR............	(series and number/year of NOTAM to be replaced)
NOTAM cancelling a previous NOTAM	.... (series and number/year)	NOTAMC............	(series and number/year of NOTAM to be cancelled) ≪≡

Qualifiers

	FIR	NOTAM Code	Traffic	Purpose	Scope	Lower Limit	Upper Limit	Coordinates, Radius	
Q)	/	Q /	/	/	/	/	/		≪≡

Identification of ICAO location indicator in which the facility, airspace or condition reported on is located	A) →

Period of Validity

From *(date-time group)*	B)		→
To *(PERM or date-time group)*	C)	EST* PERM*	≪≡
Time Schedule *(if applicable)*	D)		→
			≪≡

Text of NOTAM; Plain-language Entry (using ICAO Abbreviations)

E)

≪≡

Lower Limit	F) →
Upper Limit	G)) ≪≡
Signature	

***Delete as appropriate**

Attachment 4 Fill-in example of NOTAM matter notification

Table of contents

Attachment 5 Composition and detail of NOTAM

A NOTAM shall be originated and issued concerning the following information:

a) establishment, closure or significant changes in operation of aerodrome(s) / heliport(s) or runways;

b) establishment, withdrawal and significant changes in operation of aeronautical services (AGA, AIS, ATS, CNS, MET, SAR, etc.);

c) establishment, withdrawal and significant changes in operational capability of radio navigation and air-ground communication services. This includes: interruption or return to operation, change of frequencies, change in notified hours of service, change of identification, change of orientation (directional aids), change of location, power increase or decrease amounting to 50 per cent or more, change in broadcast schedules or contents, or irregularity or unreliability of operation of any radio navigation and air-ground communication services;

d) establishment, withdrawal or significant changes made to visual aids;

e) interruption of or return to operation of major components of aerodrome lighting systems;

f) establishment, withdrawal or significant changes made to procedures for air navigation services;

g) occurrence or correction of major defects or impediments in the maneuvering area;

h) changes to and limitations on availability of fuel, oil and oxygen;

i) major changes to search and rescue facilities and services available;

j) establishment, withdrawal or return to operation of hazard beacons marking obstacles to air navigation;

k) changes in regulations requiring immediate action, e.g. prohibited areas for SAR action;

l) presence of hazards which affect air navigation (including obstacles, military exercises, displays, races and major parachuting events outside promulgated sites);

m) erecting or removal of, or changes to, obstacles to air navigation in the take-off/climb, missed approach, approach areas and runway strip;

n) establishment or discontinuance (including activation or deactivation) as applicable, or changes in the status of prohibited, restricted or danger areas;

o) establishment or discontinuance of areas or routes or portions thereof where the possibility of interception exists and where the maintenance of guard on the VHF emergency frequency 121.5 MHz is required;

p) allocation, cancellation or change of location indicators;

q) significant changes in the level of protection normally available at an aerodrome/heliport for rescue and fire fighting purposes. NOTAM shall be originated only when a change of category is involved, and such change of category shall be clearly stated (see Annex 14, Volume I, Chapter 9, and Attachment A, Section 18);

r) presence or removal of, or significant changes in, hazardous conditions due to snow, slush, ice, radioactive material, toxic chemicals, volcanic ash deposition or water on the movement area;

s) outbreaks of epidemics necessitating changes in notified requirements for inoculations and quarantine measures;

t) forecasts of solar cosmic radiation, where provided;

u) an operationally significant change in volcanic activity, the location, date and time of volcanic eruptions and/or horizontal and vertical extent of volcanic ash cloud, including direction of movement, flight levels and routes or portions of routes which could be affected;

v) release into the atmosphere of radioactive materials or toxic chemicals following a nuclear or chemical incident, the location, date and time of the incident, the flight levels and routes or portions thereof which could be affected and the direction of movement;

w) establishment of operations of humanitarian relief missions, such as those undertaken under the auspices of the United Nations, together with procedures and/or limitations which affect air navigation; and

x) implementation of short-term contingency measures in cases of disruption, or partial disruption, of air traffic services and related supporting services.

Recommendation.— The need for origination of a NOTAM should be considered in any other circumstance which may affect the operation of aircraft.

The following information shall not be notified by NOTAM:

a) routine maintenance work on aprons and taxiways which does not affect the safe movement of aircraft;

b) runway marking work, when aircraft operations can safely be conducted on other available runways, or the equipment used can be removed when necessary;

c) temporary obstructions in the vicinity of aerodromes/heliports that do not affect the safe operation of aircraft;

d) partial failure of aerodrome/heliport lighting facilities where such failure does not directly affect aircraft operations;

e) partial temporary failure of air-ground communications when suitable alternative frequencies are known to be available and are operative;

f) the lack of apron marshalling services and road traffic control;

g) the unserviceability of location, destination or other instruction signs on the aerodrome movement area;

h) parachuting when in uncontrolled airspace under VFR, when controlled, at promulgated sites or within danger or prohibited areas;
i) other information of a similar temporary nature.

Attachment 6 Exchange of aeronautical data and information

Recommendation by Annex 15:

Recommendation.— The exchange of more than one copy of the elements of the Integrated Aeronautical Information Package and other air navigation documents, including those containing air navigation legislation and regulations, should be subject to bilateral agreement between Contracting States.

Recommendation.— The procurement of aeronautical data and aeronautical information, including the elements of the Integrated Aeronautical Information Package and other air navigation documents, including those containing air navigation legislation and regulations, by States other than Contracting States and by other entities should be subject to separate agreement with the originating State.

Attachment 7 Data Publication Resolution and Integrity Classification

Table A7-1. Latitude and longitude

Latitude and longitude	Publication resolution	Integrity classification
Flight information region boundary points	1 min	routine
P, R, D area boundary points (outside CTA/CTR boundaries)	1 min	routine
P, R, D area boundary points (inside CTA/CTR boundaries)	1 sec	essential
CTA/CTR boundary points	1 sec	essential
En-route NAVAIDS, intersections and waypoints, and holding, and STAR/SID points	1 sec	essential
Obstacles in Area 1 (the entire State territory)	1 sec	routine
Aerodrome/heliport reference point	1 sec	routine
NAVAIDS located at the aerodrome/heliport	1/10 sec	essential
Obstacles in Area 3	1/10 sec	essential
Obstacles in Area 2	1/10 sec	essential
Final approach fixes/points and other essential fixes/points comprising the instrument approach procedure	1/10 sec	essential
Runway threshold	1/100 sec	critical
Runway end	1/100 sec	critical
Runway holding position	1/100 sec	critical
Taxiway centre line/parking guidance line points	1/100 sec	essential
Taxiway intersection marking line	1/100 sec	essential
Exit guidance line	1/100 sec	essential
Aircraft stand points/INS checkpoints	1/100 sec	routine
Geometric centre of TLOF or FATO thresholds, heliports	1/100 sec	critical
Apron boundaries (polygon)	1/10 sec	routine
De-icing/anti-icing facility (polygon)	1/10 sec	routine

Table A7-2. Elevation/altitude/height

Elevation/altitude/height	Publication resolution	Integrity classification
Aerodrome/heliport elevation	1 m or 1 ft	essential
WGS-84 geoid undulation at aerodrome/heliport elevation position	1 m or 1 ft	essential
GBAS reference point	1 m or 1 ft	essential
Heliport crossing height, PinS approaches	1 m or 1 ft	essential
Runway or FATO threshold, non-precision approaches	1 m or 1 ft	essential
WGS-84 geoid undulation at runway or FATO threshold, TLOF geometric centre, non-precision approaches	1 m or 1 ft	essential
Runway or FATO threshold, precision approaches	0.1 m or 0.1 ft	critical
WGS-84 geoid undulation at runway or FATO threshold, TLOF geometric centre, precision approaches	0.1 m or 0.1 ft	critical
Threshold crossing height (reference datum height), precision approaches	0.1 m or 0.1 ft	critical
Obstacles in Area 2	1 m or 1 ft	essential
Obstacles in Area 3	0.1 m or 0.1 ft	essential
Obstacles in Area 1 (the entire State territory)	1 m or 1 ft	routine
Distance measuring equipment/precision (DME/P)	3 m (10 ft)	essential
Distance measuring equipment (DME)	30 m (100 ft)	essential
Minimum altitudes	50 m or 100 ft	routine

Table A7-3. Declination and magnetic variation

Declination/variation	Publication resolution	Integrity classification
VHF NAVAID station declination used for technical line-up	1 degree	essential
NDB NAVAID magnetic variation	1 degree	routine
Aerodrome/heliport magnetic variation	1 degree	essential
ILS localizer antenna magnetic variation	1 degree	essential
MLS azimuth antenna magnetic variation	1 degree	essential

Table A7-4. Bearing

Bearing	Publication resolution	Integrity classification
Airway segments	1 degree	routine
Bearing used for the formation of an en-route and a terminal fix	1/10 degree	routine
Terminal arrival/departure route segments	1 degree	routine
Bearing used for the formation of an instrument approach procedure fix	1/100 degree	essential
ILS localizer alignment (True)	1/100 degree	essential
MLS zero azimuth alignment (True)	1/100 degree	essential
Runway and FATO bearing (True)	1/100 degree	routine

Table A7-5. Length/distance/dimension

Length/distance/dimension	Publication resolution	Integrity classification
Airway segment length	1/10 km or 1/10 NM	routine
Distance used for the formation of an en-route fix	1/10 km or 1/10 NM	routine
Terminal arrival/departure route segment length	1/100 km or 1/100 NM	essential
Distance used for the formation of a terminal and instrument approach procedure fix	1/100 km or 1/100 NM	essential
Runway and FATO length, TLOF dimensions	1 m or 1 ft	critical
Runway width	1 m or 1 ft	essential
Displaced threshold distance	1 m or 1 ft	routine
Clearway length and width	1 m or 1 ft	essential
Stopway length and width	1 m or 1 ft	critical
Landing distance available	1 m or 1 ft	critical
Take-off run available	1 m or 1 ft	critical
Take-off distance available	1 m or 1 ft	critical
Accelerate-stop distance available	1 m or 1 ft	critical
Runway shoulder width	1 m or 1 ft	essential
Taxiway width	1 m or 1 ft	essential
Taxiway shoulder width	1 m or 1 ft	essential
ILS localizer antenna-runway end, distance	1 m or 1 ft	routine
ILS glide slope antenna-threshold, distance along centre line	1 m or 1 ft	routine
ILS marker-threshold distance	1 m or 1 ft	essential
ILS DME antenna-threshold, distance along centre line	1 m or 1 ft	essential
MLS azimuth antenna-runway end, distance	1 m or 1 ft	routine
MLS elevation antenna-threshold, distance along centre line	1 m or 1 ft	routine
MLS DME/P antenna-threshold, distance along centre line	1 m or 1 ft	essential

Attachment 8 Obstacle Data

(1) Standard format specification
(2) Point date specification
(3) Line data specification

1 Coverage areas and requirements for data provision

1.1 The coverage areas for sets of electronic terrain and obstacle data shall be specified as:

— Area 1: the entire territory of a State;

— Area 2: within the vicinity of an aerodrome, sub-divided as follows;

— Area 2a: a rectangular area around a runway that comprises the runway strip plus any clearway that exists.

Note.— See Annex 14, Volume I, Chapter 3 for dimensions for runway strip.

— Area 2b: an area extending from the ends of Area 2a in the direction of departure, with a length of 10 km and a splay of 15% to each side;

— Area 2c: an area extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a; and (Area 2c)

— Area 2d: an area outside the Areas 2a, 2b and 2c up to a distance of 45 km from the aerodrome reference point, or to an existing TMA boundary, whichever is nearest;

— Area 3: the area bordering an aerodrome movement area that extends horizontally from the edge of a runway to 90 m from the runway center line and 50 m from the edge of all other parts of the aerodrome movement area.

— Area 4: The area extending 900 m prior to the runway threshold and 60 m each side of the extended runway center line in the direction of the approach on a precision approach runway, Category II or III.

Note.— See following next page Appendix 8 for descriptions and graphical illustrations of the coverage areas.

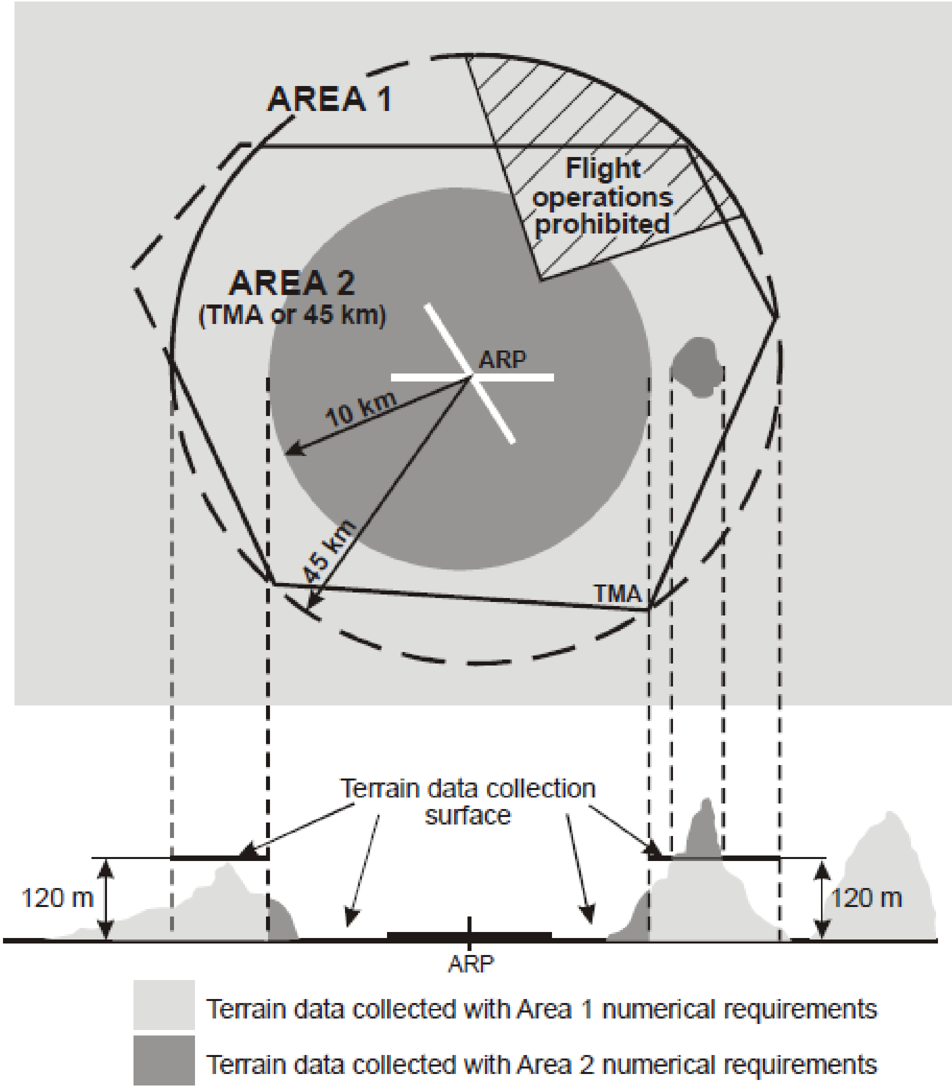


Figure A8-1. Terrain data collection surfaces — Area 1 and Area 2

1. Within the area covered by a 10-km radius from the ARP, terrain data shall comply with the Area 2 numerical requirements.
2. In the area between 10 km and the TMA boundary or 45-km radius (whichever is smaller), data on terrain that penetrates the horizontal plane 120 m above the lowest runway elevation shall comply with the Area 2 numerical requirements.
3. In the area between 10 km and the TMA boundary or 45-km radius (whichever is smaller), data on terrain that does not penetrate the horizontal plane 120 m above the lowest runway elevation shall comply with the Area 1 numerical requirements.
4. In those portions of Area 2 where flight operations are prohibited due to very high terrain or other local restrictions and/or regulations, terrain data shall comply with the Area 1 numerical requirements.

Note.— Terrain data numerical requirements for Areas 1 and 2 are specified in Table A8-1.

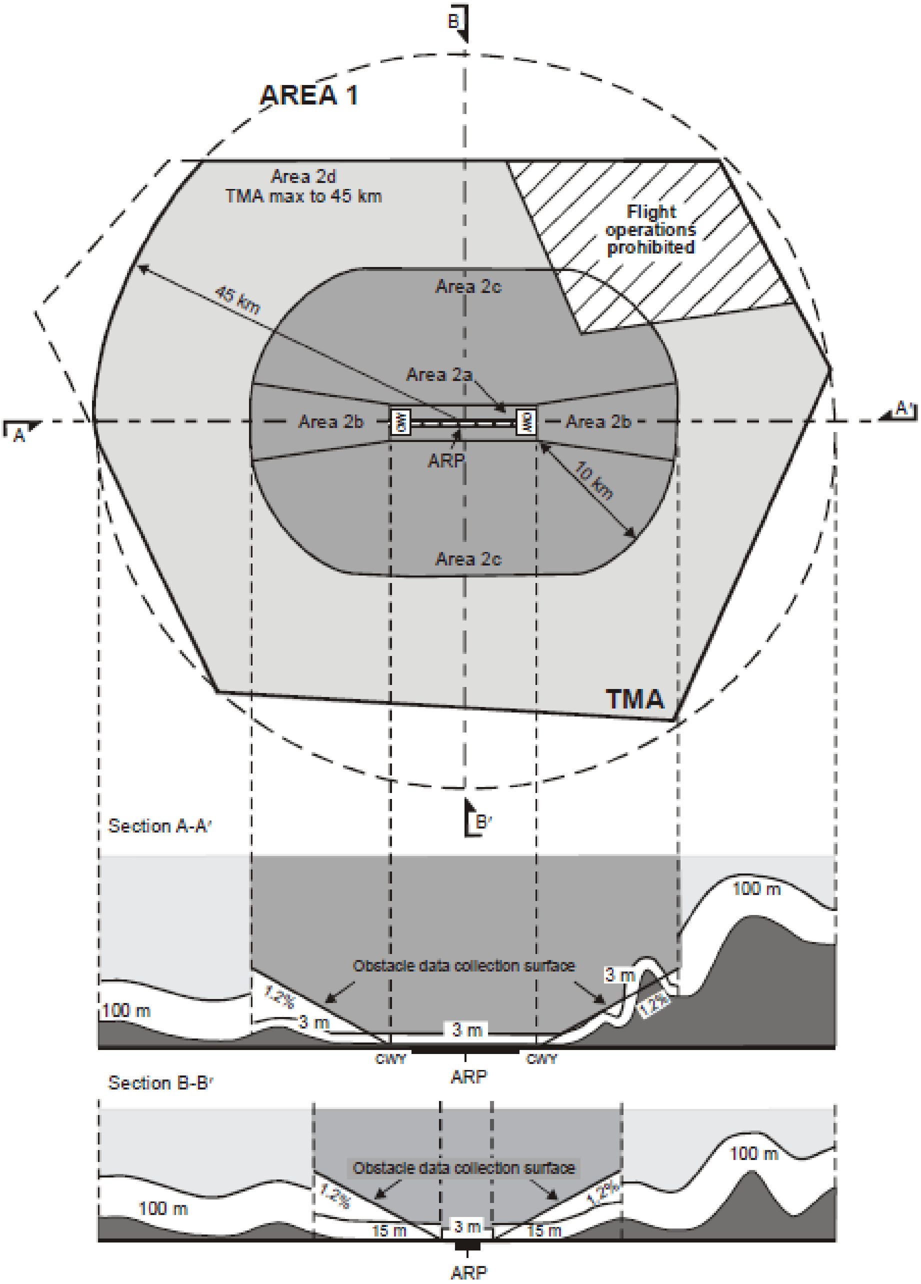


Figure A8-2. Obstacle data collection surfaces — Area 1 and Area 2

1. Obstacle data shall be collected and recorded in accordance with the Area 2 numerical requirements specified in Table A8-2:
   a) Area 2a: a rectangular area around a runway that comprises the runway strip plus any clearway that exists. The Area 2a obstacle collection surface shall have height of 3 m above the nearest runway elevation measured along the runway center line, and for those portions related to a clearway, if one exists, at the elevation of the nearest runway end;
   b) Area 2b: an area extending from the ends of Area 2a in the direction of departure, with a length of 10 km and a splay of 15% to each side. The Area

2b obstacle collection surface has a 1.2% slope extending from the ends of Area 2a at the elevation of the runway end in the direction of departure, with a length of 10 km and a splay of 15% to each side. Obstacles less than 3 m in height above ground need not be collected;

c) Area 2c: an area extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a. The Area 2c obstacle collection surface has a 1.2% slope extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a. The initial elevation of Area 2c shall be the elevation of the point of Area 2a at which it commences. Obstacles less than 15 m in height above ground need not be collected; and

d) Area 2d: an area outside the Areas 2a, 2b and 2c up to a distance of 45 km from the aerodrome reference point, or to an existing TMA boundary, whichever is nearest. The Area 2d obstacle collection surface has a height of 100 m above ground.

2. In those portions of Area 2 where flight operations are prohibited due to very high terrain or other local restrictions and/or regulations, obstacle data shall be collected and recorded in accordance with the Area 1 requirements.

3. Data on every obstacle within Area 1 whose height above the ground is 100 m or higher shall be collected and recorded in the database in accordance with the Area 1 numerical requirements specified in Table A8-2.

1.2 Recommendation. — Where the terrain at a distance greater than 900 m (3 000 ft) from the runway threshold is mountainous or otherwise significant, the length of Area 4 should be extended to a distance not exceeding 2 000 m (6 500 ft) from the runway threshold.

1.3 Electronic terrain data shall be provided for Area 1. The obstacle data shall be provided for obstacles in Area 1 higher than 100 m above ground.

1.4 From 12 November 2015, at aerodromes regularly used by international civil aviation, electronic obstacle data shall be provided for all obstacles within Area 2 that are assessed as being a hazard to air navigation.

1.5 From 12 November 2015, at aerodromes regularly used by international civil aviation electronic terrain and obstacle data shall be provided for:

a) Area 2a , for those obstacles that penetrate the relevant obstacle data collection surface specified in Appendix 8;

b) penetrations of the take-off flight path area obstacle identification surfaces; and

c) penetrations of the aerodrome obstacle limitation surfaces.

Note.— Take-off flight path area obstacle identification surfaces are specified in Annex 4, 3.8.2.1. Aerodrome obstacle limitation surfaces are specified in Annex 14, Volume 1, Chapter 4.

1.6 Recommendation.— At aerodromes regularly used by international civil aviation, electronic terrain and obstacle data should be provided for Areas 2b, 2c and 2d for obstacles and terrain that penetrate the relevant obstacle data collection surface specified in Appendix 8.

1.7 Recommendation.— At aerodromes regularly used by international civil aviation, electronic terrain and obstacle data should be provided for Area 3 for terrain and obstacles that penetrate the relevant obstacle data collection surface specified in Appendix 8.

1.8 At aerodromes regularly used by international civil aviation, electronic terrain and obstacle data shall be provided for Area 4 for terrain and obstacles that penetrate the relevant obstacle data collection surface specified in Appendix 8, for all runways where precision approach Category II or III operations have been established and where detailed terrain information is required by operators to enable them to assess, the effect of terrain on decision height determination by use of radio altimeters.

Note.— Area 4 terrain data and Area 2 obstacle data are normally sufficient to support the production of the Precision Approach Terrain Chart — ICAO. When more detailed obstacle data is required for Area 4, this may be provided in accordance with the Area 4 obstacle data requirements specified in Appendix 8, Table A8-2. Guidance on appropriate obstacles for this chart is given in the Aeronautical Chart Manual (Doc 8697).

1.9 Recommendation.— Where additional electronic obstacle or terrain data is collected to meet other aeronautical requirements, the obstacle and terrain data sets should be expanded to include these additional data.

1.10 Recommendation.— Arrangements should be made for the coordination of providing Area 2 electronic terrain and obstacle data for adjacent aerodromes where their respective coverage Areas overlap to assure that the data for the same obstacle or terrain is correct.

1.11 Recommendation.— At those aerodromes located near territorial boundaries, arrangements should be made among States concerned to share Area 2 electronic terrain and obstacle data.

2 Terrain data set — content, numerical specification and structure (10.2, AMD 36)

2.1 A terrain data set shall contain digital sets of data representing terrain surface in the form of continuous elevation values at all intersections (points) of a defined grid, referenced to common datum. A terrain grid shall be angular or linear and shall be of regular or irregular shape.

Note.— In regions of higher latitudes, latitude grid spacing may be adjusted to maintain a constant linear density of measurement points.

2.2 Sets of electronic terrain data shall include spatial (position and elevation), thematic and temporal aspects for the surface of the Earth containing naturally occurring features such as mountains, hills, ridges, valleys, bodies of water, permanent ice and snow, and excluding obstacles. In practical terms, depending on the acquisition method used, this shall represent the continuous surface that exists at the bare Earth, the top of the canopy or something in-between, also known as "first reflective surface".

2.3 In terrain data sets, only one feature type, i.e. terrain, shall be provided. Feature attributes describing terrain shall be those listed in Table A8-3. The terrain feature attributes listed in Table A8-3 represent the minimum set of terrain attributes, and those annotated as mandatory shall be recorded in the terrain data set.

3 Obstacle data set — content, numerical specification and structure (10.3, AMD 36)

3.1 Obstacle data shall comprise the digital representation of the vertical and horizontal extent of the obstacle. Obstacles shall not be included in terrain data sets. Obstacle data elements are features that shall be represented in the data sets by points, lines or polygons.

3.2 In an obstacle data set, all defined obstacle feature types shall be provided and each of them shall be described according to the list of mandatory attributes provided in Appendix 8, Table A8-4. (10.3.2, AMD 36)

Note.— By definition, obstacles can be fixed (permanent or temporary) or mobile. Specific attributes associated with mobile (feature operations) and temporary types of obstacles are annotated in Appendix 8, Table A8-4, as optional attributes. If these types of obstacles are to be provided in the data set, appropriate attributes describing such obstacles are also required.

3.3 Electronic obstacle data for each area shall conform to the applicable numerical requirements in Appendix 8, Table 8A-2.

4 Terrain and obstacle data product specifications

4.1 To allow and support the interchange and use of sets of electronic terrain and obstacle data among different data providers and data users, the ISO 19100 series of standards for geographic information shall be used as a general data modelling framework.

4.2 A comprehensive statement of available electronic terrain and obstacle data sets shall be provided in the form of terrain data product specifications as well as obstacle data product specifications on which basis air navigation users will be able to evaluate the products and determine whether they fulfil the requirements for their intended use (application).

Note.— ISO Standard 19131 specifies the requirements and outline of data product specifications for geographic information. (10.4.2, Note, AMD 36)

4.3 Each terrain data product specification shall include an overview, a specification scope, data product identification, data content and structure, reference system, data quality, data capture, data maintenance, data portrayal, data product delivery, additional information, and metadata.

4.4 The overview of terrain data product specification or obstacle data product specification shall provide an informal description of the product and shall contain general information about the data product. Specification of terrain data may not be homogenous across the whole data product but may vary for different parts of the data sets. For each such subset of data, a specification scope shall be identified. Identification information concerning both terrain and obstacle data products shall include the title of the product; a brief narrative summary of the content, purpose, and spatial resolution if appropriate (a general statement about the density of spatial data); the geographic area covered by the data product; and supplemental information.

4.5 Content information of feature-based terrain data sets or of feature-based obstacle data sets shall each be described in terms of an application schema and a feature catalogue. Application schema shall provide a formal description of the data structure and content of data sets while the feature catalogue shall provide the semantics of all feature types together with their attributes and attribute value domains, association types between feature types and feature operations, inheritance relations and constraints. Coverage is considered a subtype of a feature and can be derived from a collection of features that have common attributes. Both terrain and obstacle data product specifications shall identify clearly the coverage and/or imagery they include and shall provide a narrative description of each of them.

Note 1. —ISO Standard 19109 contains rules for application schema while ISO Standard 19110 describes feature cataloguing methodology for geographic information.

Note 2.— ISO Standard 19123 contains schema for coverage geometry and functions.

4.6 Both terrain data product specifications and obstacle data product specifications shall include information that identifies the reference system used in the data product. This shall include the spatial reference system and temporal reference system. Additionally, both data product specifications shall identify the data quality requirements for each data product. This shall include a statement on acceptable conformance quality levels and corresponding data quality measures. This statement shall cover all the data quality elements and data quality sub-elements, even if only to state that a specific data quality element or sub-element is not applicable.

Note.— ISO Standard 19113 contains quality principles for geographic information while ISO Standard 19114 covers quality evaluation procedures.

4.7 Terrain data product specifications shall include a data capture statement which shall be a general description of the sources and of processes applied for the capture of terrain data. The principles and criteria applied in the maintenance of terrain data sets and obstacle data sets shall also be provided with the data specifications, including the frequency with which data products are updated. Of particular importance shall be the maintenance information of obstacle data sets and an indication of the principles, methods and criteria applied for obstacle data maintenance.

4.8 Terrain data product specifications shall contain information on how data held with data sets is presented, i.e. as a graphic output, as a plot or as an image. The product specifications for both terrain and obstacles shall also contain data product delivery information which shall include delivery formats and delivery medium information.

Note.— ISO Standard 19117 contains a definition of the schema describing the portrayal of geographic information including the methodology for describing symbols and mapping of the schema to an application schema. (10.4.8, Note, AMD 36)

4.9 The core terrain and obstacle metadata elements shall be included in the data product specifications. Any additional metadata items required to be supplied shall be stated in each product specification together with the format and encoding of the metadata.

Note.— ISO Standard 19115 specifies requirements for geographic information metadata.

4.10 The obstacle data product specification, supported by geographical coordinates for each aerodrome included within the dataset, shall describe the following areas:

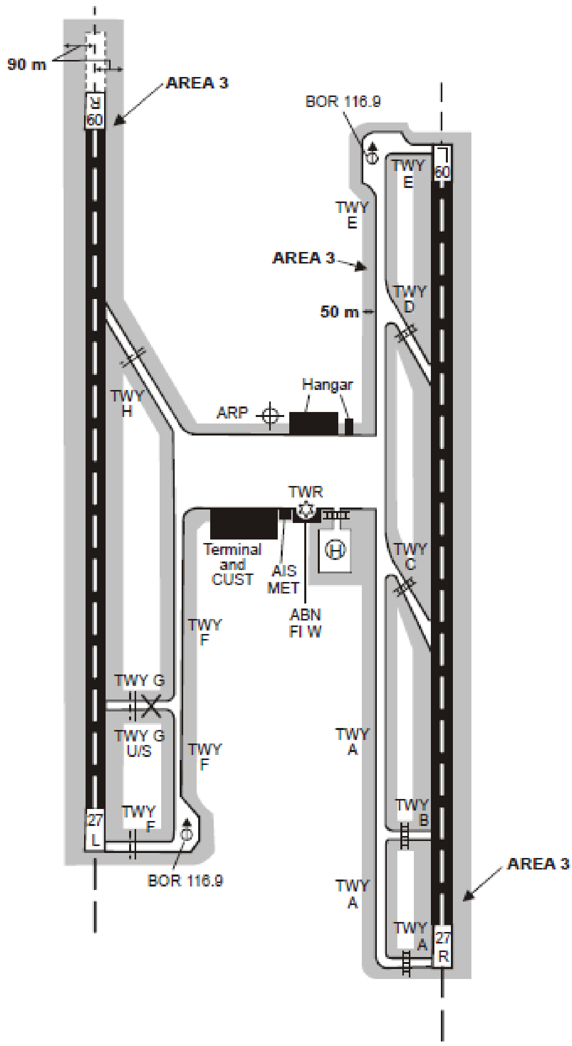


Figure A8-3. Terrain and obstacle data collection surface — Area 3

1. The data collection surface for terrain and obstacles extends a half-metre (0.5 m) above the horizontal plane passing through the nearest point on the aerodrome movement area.

2. Terrain and obstacle data in Area 3 shall comply with the numerical requirements specified in Table A8-1 and Table A8-2, respectively.

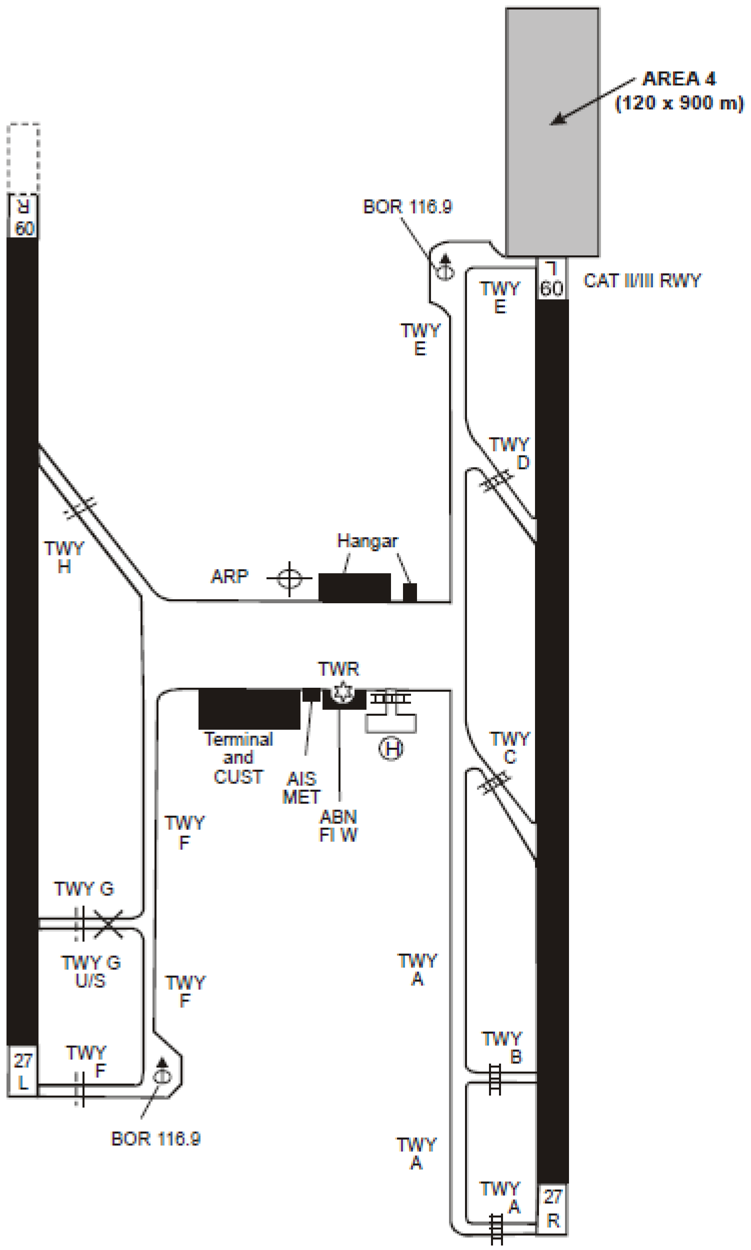


Figure A8-4. Terrain and obstacle data collection surface — Area 4

Terrain and obstacle data in Area 4 shall comply with the numerical requirements specified in Table A8-1 and Table A8-2 respectively.

Table A8-1. Terrain data numerical requirements

	Area 1	Area 2	Area 3	Area 4
Post spacing	3 arc seconds (approx. 90 m)	1 arc second (approx. 30 m)	0.6 arc seconds (approx. 20 m)	0.3 arc seconds (approx. 9 m)
Vertical accuracy	30 m	3 m	0.5 m	1 m
Vertical resolution	1 m	0.1 m	0.01 m	0.1 m
Horizontal accuracy	50 m	5 m	0.5 m	2.5 m
Confidence level	90%	90%	90%	90%
Integrity classification	routine	essential	essential	essential
Maintenance period	as required	as required	as required	as required

Table A8-2. Obstacle data numerical requirements

	Area 1	Area 2	Area 3	Area 4
Vertical accuracy	30 m	3 m	0.5 m	1 m
Vertical resolution	1 m	0.1 m	0.01 m	0.1 m
Horizontal accuracy	50 m	5 m	0.5 m	2.5 m
Confidence level	90%	90%	90%	90%
Integrity classification	routine	essential	essential	essential
Maintenance period	as required	as required	as required	as required

Table A8-3. Terrain attributes

Terrain attribute	Mandatory/Optional
Area of coverage	Mandatory
Data originator identifier	Mandatory
Data source identifier	Mandatory
Acquisition method	Mandatory
Post spacing	Mandatory
Horizontal reference system	Mandatory
Horizontal resolution	Mandatory
Horizontal accuracy	Mandatory
Horizontal confidence level	Mandatory
Horizontal position	Mandatory
Elevation	Mandatory
Elevation reference	Mandatory
Vertical reference system	Mandatory
Vertical resolution	Mandatory
Vertical accuracy	Mandatory
Vertical confidence level	Mandatory
Surface type	Optional
Recorded surface	Mandatory
Penetration level	Optional
Known variations	Optional
Integrity	Mandatory
Date and time stamp	Mandatory
Unit of measurement used	Mandatory

Table A8-4. Obstacle attributes

Obstacle attribute	Mandatory/Optional
Area of coverage	Mandatory
Data originator identifier	Mandatory
Data source identifier	Mandatory
Obstacle identifier	Mandatory
Horizontal accuracy	Mandatory
Horizontal confidence level	Mandatory
Horizontal position	Mandatory
Horizontal resolution	Mandatory
Horizontal extent	Mandatory
Horizontal reference system	Mandatory
Elevation	Mandatory
Height	Optional
Vertical accuracy	Mandatory
Vertical confidence level	Mandatory
Vertical resolution	Mandatory
Vertical reference system	Mandatory
Obstacle type	Mandatory
Geometry type	Mandatory
Integrity	Mandatory
Date and time stamp	Mandatory
Unit of measurement used	Mandatory
Operations	Optional
Effectivity	Optional
Lighting	Mandatory
Marking	Mandatory

Attachment 9 AIRAC Date

The use of the date in the AIRAC cycle which occurs between 21 December and 17 January inclusive should be avoided as an effective date for the introduction of significant changes under the AIRAC system

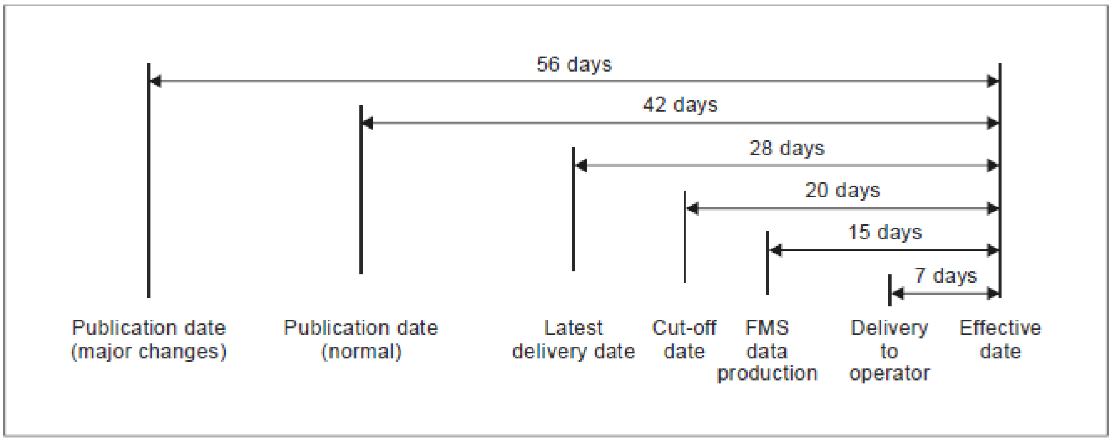
Information provided under the AIRAC system in paper copy form shall be distributed by the AIS unit at least 42 days in advance of the effective date with the objective of reaching recipients at least 28 days in advance of the effective date.

Recommendation.— Whenever major changes are planned and where advance notice is desirable and practicable, information provided in paper copy form should be distributed by the AIS unit at least 56 days in advance of the effective date. This should be applied to the establishment of, and premeditated major changes in, the circumstances listed in Appendix 4, Part 3*1, and other major changes if deemed necessary.

*1: see Annex-15

Note— Guidance material on what constitutes a major change is included in Doc 8126.

Processing cycle for airborne navigation databases



Attachment 10 Example of AIP Supplement of MAURITIUS

REPUBLIC OF MAURITIUS
DEPARTMENT OF CIVIL AVIATION
Aeronautical Information Service
Sir Seewoosagur Ramgoolam International Airport
Plaine Magnien

TEL: (230) 603 2000 **FAX:** (230) 637 3164 **AFS:** FIMPYNYX		**AIP Supplement** **S002/16**

- Safety line of bay 7 adjusted to allow for clearance of code E aircraft towing on the deviated taxi-line;
- Safety line of bay 8 slightly adjusted and has no operational impact on its use for code E aircraft;
- Closure of TWY Y between TWYs F and G; and
- Aircraft stand 7 restricted for code C and below aircraft only.

3. OPERATIONAL INSTRUCTIONS – DUE CLOSURE OF TWY A, B & F

- The closed TWYs A, B and F will be marked by Yellow Cross and lighted with fixed red lights. The associated signage (Runway Holding Position Signage TWYs A/B, runway exit signs TWYs A/B, aircraft stand identification sign and other signs showing taxiways A/B/F) will be blanked off;
- The work area will be demarcated with safety bollards and flashing yellow lights;
- Departing aircraft using RWY 14 shall enter RWY via TWY C;
- Landing aircraft on RWY 32 shall backtrack RWY and exit via TWY C;
- Departing aircraft using RWY 32 shall enter RWY via TWY D or TWY E and
- Aircraft exiting or entering TWY Y to or from TWY N shall be either via TWY G, or H or J.

4. AIRCRAFT ROUTING / PUSHBACK

4.1 PUSHBACK Instructions

4.1.1 Pushback manoeuvres shall be coordinated with ground handlers prior to start of work.

4.1.2 ATC instructions for push back shall be concise.
Ex: "Call sign, pushback for RWY14/32 approved. Report ready for start-up.";

4.2 RWY 14/32 IN USE

a) Arriving aircraft proceeding to bays 1 – 15 (except bay 5) shall exit TWY Y via TWY G, or H or J.

b) Arriving code C aircraft and below proceeding to bays 1 – 4 shall follow the **"Follow Me"** vehicle as from the deviated marking on TWY N.

c) Arriving code D & E aircraft shall stop abeam bay 8 and then be towed to bay 2.

d) Departing code C aircraft from bays 1 – 3 shall start up in its bay, taxi behind the **"Follow Me"** vehicle up to the following appropriate intermediate holding positions:
   1. Intermediate holding position marking adjacent to bay 3; or
   2. Intermediate holding position marking abeam bay 9; or
   3. Intermediate holding position marking on TWY Y between TWY G and TWY H,

   then continue taxi following ATC instructions.

e) Departing code C aircraft (turbofan) on bay 4 shall be pushed back and aligned on the taxi line behind bay 5 for engine start up, taxi behind the **"Follow Me"** vehicle up to the following appropriate intermediate holding positions:

1. Intermediate holding position marking abeam bay 9; or
2. Intermediate holding position marking on TWY Y between TWY G and TWY H,

then continue taxi following ATC instructions.

f) Departing ATR aircraft from bay 4 shall start-up on its bay and taxi behind the **"Follow Me"** vehicle up to the following intermediate holding positions:

1. Intermediate holding position marking abeam bay 9; or
2. Intermediate holding position marking on TWY Y between TWY G and TWY H,

then continue taxi following ATC instructions.

Note: Bay 5 shall be closed during the work period

g) Departing code D and E aircraft from bay 2 shall be pushed back on the taxi-line behind bays 1, 2 and 3, then be towed up to the intermediate holding position marking abeam bay 9 for start-up.

For taxi, follow ATC instructions.

Note: Aircraft may be requested to follow the **"Follow Me"** vehicle up to the intermediate holding position marking on TWY Y between TWY G and TWY H.

h) Due to the deviation route to bays 1, 2, 3 and 4, bay 7 shall be used for code C aircraft and below only. Departing code C aircraft from bay 7 shall be pushed back onto the deviated taxi-line behind bay 7, nose facing southeast, for start-up.

For taxi, follow ATC instructions.

i) ATR aircraft from bays 7, 8, 9 and 10 shall continue to use the Turning Guidance on Apron for entering and exiting its bays as laid down in AIP.

j) Departing aircraft from bays 8 and 9 shall be pushed back onto TWY N with nose facing southeast, then be pulled forward to the intermediate holding position marking abeam bay 9 for start-up.

For taxi, follow ATC instructions.

k) Departing aircraft from bays 10 to 13 shall use the normal pushback procedures as laid down in the AIP.

l) Depending on traffic configuration, departing code F aircraft from bay 12 shall be pushed back onto TWY N,

i) nose facing southeast up to nose-wheel stop position A, or
ii) nose facing northwest up to nose-wheel stop position B,

and then follow ATC instructions to taxi out via TWY H.

m) No signage and intermediate holding position lights will be available at the intermediate holding positions marking. Aircraft shall follow the **"Follow Me"** vehicle.

n) Due to work in progress, aircraft will be expected to hold at the intermediate holding position Y.

o) Departing aircraft from bay 14 shall be pushed back onto taxi lane P nose facing north and be pulled forward up to the intersection of center-line TWY H with taxi lane P and then start engines.

p) Departing aircraft from bay 15 shall be pushed back onto taxi lane P up to TWY N with nose facing southeast and then start engines.

5. PUSHBACK PROCEDURES FOR AIRCRAFT ON BAYS 14 & 15 FROM 07 SEPTEMBER 2016 TO 24 JANUARY 2017

5.1 To segregate the landside and the airside for the construction of bay 16, a temporary fencing has been installed annexed to bay 15. The fencing alignment goes across extended portion of TWY P beyond bay 15. As a result, the pushback procedures from bay 14 and 15 have been revised and the applicable instructions are as follows:

a) Departing aircraft from bay 14 shall be pushed back onto taxi-lane P nose facing north and be pulled forward up to the intersection of centerline TWY H with taxi lane P and then start engines; and

b) Departing aircraft from bay 15 shall be pushed back onto taxi-lane P up to TWY N with nose facing southeast and then start engines.

The fencing alignment does not compromise the safety of aircraft taxiing in to dock on bay 15.

6. AIRCRAFT PUSHBACK AND TOWING TO/FROM HANGAR

6.1 During the Phase 2B works (07 September to 07 November 2016) aircraft shall use the diverted marking (see chart at Annex 1 & 2) of TWY N behind bay 7 to access and egress from the hangar.

7. INTERMEDIATE HOLDING POSITION MARKING

7.1 An Intermediate Holding Position Marking will be painted on the deviated taxilane adjacent bay 3, on TWY N abeam bay 9 and on TWY Y between TWY G and TWY H as shown at Annex 1 & 2.

8. OPERATIONAL CONSTRAINT

8.1 Aircraft may be subjected to significant delays.

9. EFFECTIVE DATE

9.1 This AIP Supplement will become effective on 07 September 2016.

10. CANCELLATION

10.1 This AIP Supplement will remain in force until completion of works.

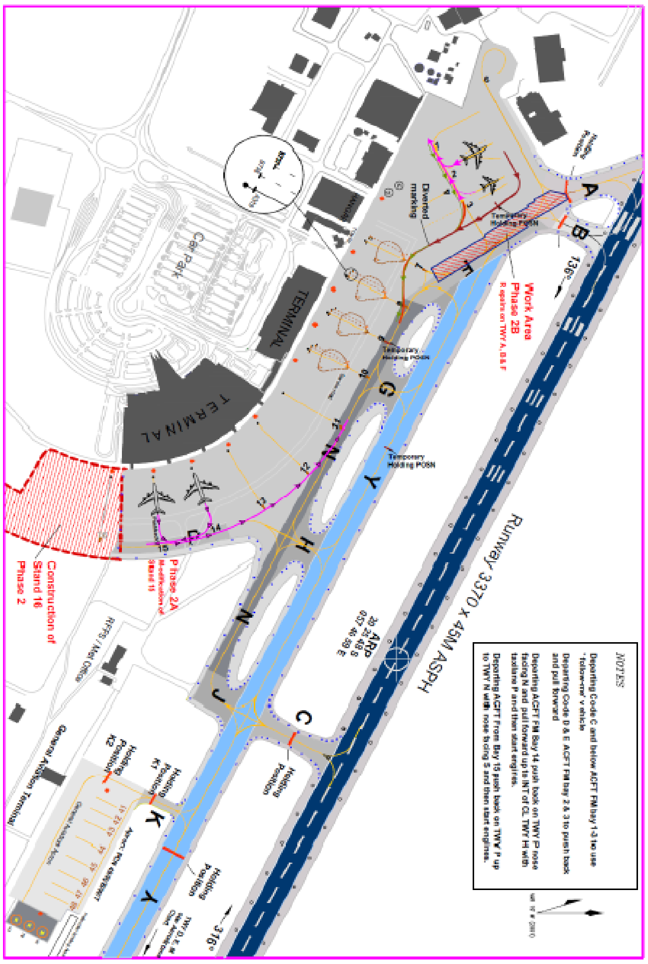
This AIP Supplement replaces AIP Supplement S001/16

R.K. GURUVADOO
For Director of Civil Aviation

Appendix 1

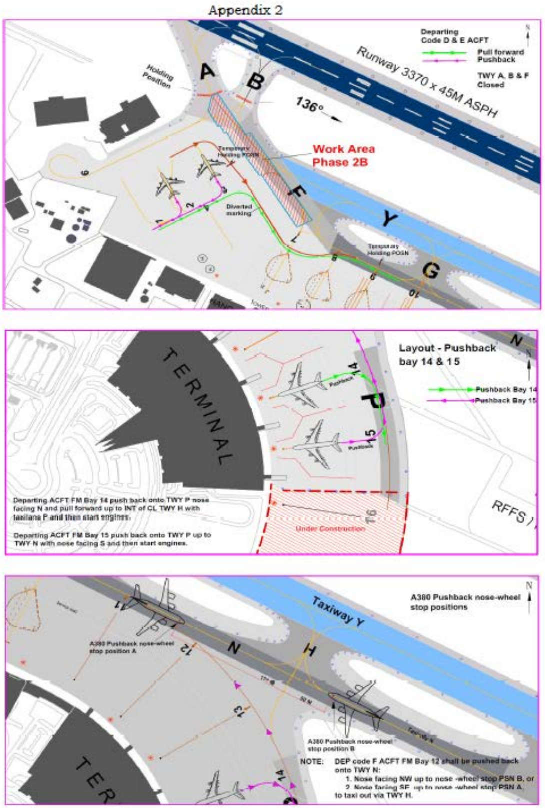
MAURITIUS/ Sir Seewoosagur Ramgoolam International Airport

Construction of aircraft parking stand 16, enlargement of taxiway P, repair of taxiway A B & F



Department of Civil Aviation AIP Sup 02/16

Appendix 2



Department of Civil Aviation AIP Sup 02/16

7

Form A Issuing Request Form A

It is description matter of AIP supplement pertinent to operation restriction of Aerodrome facility

Form A

Name of Airport : ______________________________

Reason of Ristricted Operation : ______________________________

Nomber of Madification AIP Supplement : ______________________________

No.	Ristricted Operation		Scheduled Period			Chart No.	Remarks
	Facility / Location	Condition	Start Date / Time	End of Date / Time	Ristricted Hour		

Form 1 Person in charge - Basic information sheet

Form -1

Person Responsible Basic Information Sheet

Divison ____________________

Division Name ____________________

Postal Number ____________________

Address ____________________

____

Main Swichboard ____________________

Extension Number ____________________

Direct Tele-Number ____________________

Facsimil Number (FAX) ____________________

Form 4 List of persons in charge

The List of persons in charge is used to contact to related person for AIP Amendment, AIP Supplement, AIC issuance request.

Form 4

List of Person in Charge

AIP Amendment, AIP Supplment, AIC Issurance Request

Divison ____________

Divison Name ____________

Name	Telephone number	E-Mail address	Remarks

Attachment B

1 Definitions

2 Abbreviations

WGS-84 Survey Data Report

Sample

Data NEW /REVISION	(date) DD.MM.YYYY			
Surveyer	FAZO	(members)		
airport	Dushanbe	UTDD	Supervisor	Akbar. Ilhom (assistant)
Survey date	04 / Sep ～ xx / Sep, 2017		Adviser	*Yamane (JICA Expert)*

ID	Code	Date to Register	Target Item	supplemental name	category	focusing point	Equipment
(unit)							GPS or TS
T***	geodetic station	01-08-'17	PACS-1	airport deodetic station	point	center of marker	GPS
T***	AD	01-08-'17	ARP	airport reference point	point	nail/pin on the surface	GPS
T***	AD	01-08-'17	Parking station Nr 3	spot Nr 3-A	point	center of front intersection between lead line and bar	GPS
T***	AD	01-08-'17	Parking station Nr 3	spot Nr 3-B	point	center of front intersection between lead line and bar	GPS
T***	NAV/COM	01-08-'17	LLC27	localizer for RWY27	structure	middle of total width and back side top of	TS
T***	OBST	01-08-'17	TWR	main ATC control tower	building	middle of antenna on the top of roof	TS
T***	OBST	01-08-'17	Apron light pole	Apron light ##	pylon	upper corner of square lamp on top of structure	TS

*AD; aerodrome, NAV; naviaids, COM; communication, OBST; obstacle

GPS / TS data (ITRF2005)						WGS-84 data				
X (m)		Y (m)		Z (m)		Latitude				
data	differential	data	differential	data	differential	N	deg	min	sec	differential
metre	metre	metre	metre	metre	metre				(5 decimal digit)	sec
1806028.6152	±0.0014	4657834.6581	±0.0017	3953179.6030	±0.0014	N	38	32	32.85753	±0.0005

							UTM data		No..42	
Longitude					Ellipsoidal Height		**** 69			
E	deg	min	sec	differential	[m]	differential	X(Northing) [M]	differential	Y(Easting) [M]	differential
			(5 decimal digit)	sec	metre	metre	metre	metre	metre	metre
E	68	48	24.11207	±0.0013	742.3732	±0.0022	4266022.6250	±0.0005	483154.3517	±0.0013

GEOID	ORTHOMETRIC Height		Top height of obstacle	Ground elevation of obstacle	
Height	EGM2008		if additional	if available	Remarks
[m]	H [m]	differential	[m]	[m]	
metre	metre	metre	metre	metre	
	782.6291	±0.0022			
					small pole, 1.5m length above survey point

Supprementary Data / Description					
Measuring station	Auxiliary station, if any location (number)	WGS84 data		Ellipsoidal height [m]	Description of location or others, if necessary
		Latitude	Longitude		
		dd˚mm'ss.sssss" N	ddd˚mm'ss.sssss" E	metre	
					existing marked by nail on RWY center line, approximately abeam Fire Station
	back of LLC antenna (2)	dd˚ mm'ss.sssss" N	ddd˚ mm'ss.sssss" E		
					in front of VIP building toward RWY

WGS-84 Survey Data Report Obstacles

Data NEW / REVISON	(date) DD.MM.YYYY				
Surveyer	FAZO	(members)			
airport	Dushanbe	UTDD	Supervisor	Akbar, Ilhom (assistant)	
Survey date	04 / Sep ～ xx / Sep, 2017		Advisor	*Yamane (JICA Expert)*	

Code	ID	Date to Register	Target Item	supplemental name	category (example)	focusing point	Method
(unit)							GPS or TS
T***	32_1	01-12-'17	Factory		Building	upper antenna on top of Factory	TS
T***	32_2	01-12-'17	Factory		Building	under of Factory	TS
T***	33_1	01-12-'17	Green house behid MILT		Building	center of Green house behind MILT	TS
T***	33_2	01-12-'17	Green house behid MILT		Building	under of Green house behind MILT	TS
T***	34_1	01-12-'17	Tall big antenna sets		Structure	center of Tall gig antenna sets	TS
T***	34_2	01-12-'17	Tall big antenna sets		Structure	under of Tall gig antenna sets	TS
T***	35_1	01-12-'17	Tall big antenna sets		Structure	Conner of top Tall gig antenna sets	TS
T***	35_2	01-12-'17	Tall big antenna sets		Structure	under of Tall gig antenna sets	TS
T***	36_1	01-12-'17	Tall big antenna sets		Structure	center of Tall gig antenna sets	TS
T***	36_2	01-12-'17	Tall big antenna sets		Structure	under of Tall gig antenna sets	TS
T***	37_1	01-12-'17	Tall big antenna sets		Structure	center of Tall gig antenna sets	TS
T***	37_2	01-12-'17	Tall big antenna sets		Structure	under of Tall gig antenna sets	TS
T***	38_1	01-12-'17	Building		Building	right Conner of top of building	TS
T***	38_2	01-12-'17	Building		Building	under of building	TS
T***	39_1	01-12-'17	Power line Tower		Structure	center of Power line Tower	TS
T***	39_2	01-12-'17	Power line Tower		Structure	under of Power line Tower	TS
T***	40_1	01-12-'17	Power line Tower		Structure	center of Power line Tower	TS
T***	40_2	01-12-'17	Power line Tower		Structure	under of Power line Tower	TS
T***	41_1	01-12-'17	Power line Tower		Structure	center of Power line Tower	TS
T***	41_2	01-12-'17	Power line Tower		Structure	under of Power line Tower	TS

T***	42_1	01-12-'17	Building		Building	Left Conner of top of building	TS
T***	42_2	01-12-'17	Building		Building	under of building	TS
T***	43_1	01-12-'17	Mobile Antenna Tower		Structure	top of Mobile Antenna Tower	TS
T***	43_2	01-12-'17	Mobile Antenna Tower		Structure	under of Mobile Antenna Tower	TS
T***	44_1	01-12-'17	Mobile Antenna Tower		Structure	top of Mobile Antenna Tower	TS
T***	44_2	01-12-'17	Mobile Antenna Tower		Structure	under of Mobile Antenna Tower	TS
T***	45_1	01-12-'17	Power line Tower		Structure	center of Power line Tower	TS
T***	45_2	01-12-'17	Power line Tower		Structure	under of Power line Tower	TS
T***	46_1	01-12-'17	Building		Building	right Conner of top of building	TS
T***	46_2	01-12-'17	Building		Building	under of building	TS
T***	47_1	01-12-'17	TV antenna Tower		Structure	top of TV antenna Tower	TS
T***	47_2	01-12-'17	TV antenna Tower		Structure	under of TV antenna Tower	TS
T***	48_1	01-12-'17	Flag pole		Pole	top of Flag pole	TS
T***	48_2	01-12-'17	Flag pole		Pole	under of Flag pole	TS
T***	49_1	01-12-'17	Twin Building		Building	Left Conner of top of Twin Building	TS
T***	49_2	01-12-'17	Twin Building		Building	under of Twin Building	TS
T***	50_1	01-12-'17	Sheraton Hotel		Building	center of object	TS
T***	50_2	01-12-'17	Sheraton Hotel		Building	under of building	TS
T***	51_1	01-12-'17	Building light brawn color		Building	right Conner of top of building	TS
T***	51_2	01-12-'17	Building light brawn color		Building	under of building	TS
T***	52_1	01-12-'17	Police Academy Building		Building	center of building	TS
T***	52_2	01-12-'17	Police Academy Building		Building	under of building	TS
T***	53_1	01-12-'17	Factory		Building	upper antenna on top of Factory	TS
T***	53_2	01-12-'17	Factory		Building	under of Factory	TS
T***	54_1	01-12-'17	Old Smokestack		Stack	center of object (Old Smokestack)	TS
T***	54_2	01-12-'17	Old Smokestack		Stack	under of object (Old Smokestack)	TS
T***	55_1	01-12-'17	SSR antenna		Structure	center of SSR antenna	TS
T***	55_2	01-12-'17	SSR antenna		Structure	under of SSR antenna	TS
T***	55_3	01-12-'17	SSR antenna		Structure	center of object	TS
T***	55_4	01-12-'17	SSR antenna		Structure	under of object	TS
T***	55_5	01-12-'17	SSR antenna		Structure	center of object	TS
T***	55_6	01-12-'17	SSR antenna		Structure	under of object	TS
T***	56	01-12-'17	dprm 27		Structure	conner of building (dprm 27)	TS
T***	56_1	01-12-'17	dprm 27		Structure	top of antenna (dprm 27)	TS
T***	56_2	01-12-'17	dprm 27		Structure	under of antenna (dprm 27)	TS
T***	57_1	01-12-'17	bprm 09		Structure	top of antenna (bprm 09)	TS

T***	57_2	01-12-'17	bprm 09		Structure	under of antenna (bprm 09)	TS
T***	58	01-12-'17	Anntena	Fayzobod	Structure	under of antenna (Fayzobod)	TS
T***	59	01-12-'17	Anntena	Varzob	Structure	under of antenna (Varzob)	TS
T***	60	01-12-'17	Anntena	Shahrinav	Structure	under of antenna (Shahrinav)	TS
T***	61	01-12-'17	dprm 09		Structure	under of antenna (dprm 09)	TS
T***	61_1	01-12-'17	dprm 09		Structure	top of antenna (dprm 09)	TS
T***	61_2	01-12-'17	dprm 09		Structure	under of antenna (dprm 09)	TS
T***	62_1	01-12-'17	Mobile antenna tower		Structure	upper antenna on top of Factory	TS
T***	62_2	01-12-'17	Mobile antenna tower		Structure	under of Factory	TS
T***	63_1	01-12-'17	Mobile Antenna Tower		Structure	upper of Mobile Antenna Tower	TS
T***	63_2	01-12-'17	Mobile Antenna Tower		Structure	under of Mobile Antenna Tower	TS
T***	64_1	01-12-'17	Factory		Building	upper of Mobile Antenna Tower	TS
T***	64_2	01-12-'17	Factory		Building	under of Mobile Antenna Tower	TS
T***	65_1	01-12-'17	Building		Building	center of building	TS
T***	65_2	01-12-'17	Building		Building	under of building	TS
T***	66_1	01-12-'17	Building		Building	upper antenna on top of Building	TS
T***	66_2	01-12-'17	Building		Building	under of Building	TS
T***	67_1	01-12-'17	Building		Building	upper of antenna on top of Building	TS
T***	67_2	01-12-'17	Building		Building	under of Building	TS
T***	68_1	01-12-'17	Building		Building	top of Building	TS
T***	68_2	01-12-'17	Building		Building	under of Building	TS
T***	69_1	01-12-'17	Building		Building	upper of antenna on top of Building	TS
T***	69_2	01-12-'17	Building		Building	under of Building	TS
T***	70_1	01-12-'17	Building		Building	upper of antenna on top of Building	TS
T***	70_2	01-12-'17	Building		Building	under of Building	TS
T***	71_1	01-12-'17	Building		Building	Upper of construction on top of Building	TS
T***	71_2	01-12-'17	Building		Building	under of Building	TS
T***	72_1	01-12-'17	Building		Building	upper of antenna on top of Building	TS
T***	72_2	01-12-'17	Building		Building	under of Building	TS
T***	73_1	01-12-'17	Building		Building	upper of antenna on top of Building	TS
T***	73_2	01-12-'17	Building		Building	under of Building	TS
T***	74_1	01-12-'17	Mob antenna		Structure	upper of Mobile Antenna (hmoba)	TS
T***	74_1	01-12-'17	Mob antenna		Structure	under of Mobile Antenna (hmoba)	TS
T***	75_1	01-12-'17	Building		Building	upper antenna on top of Factory	TS
T***	75_1	01-12-'17	Building		Building	under of Factory	TS
T***	76_1	01-12-'17	Building		Building	upper antenna on top of Factory	TS

T***	76_2	01-12-'17	Building		Building	under of Factory	TS
T***	77	01-12-'17	Mob antenna		Structure	upper of Mobile Antenna	TS
T***	78_1	01-12-'17	Building		Building	Upper of construction on top of Building	TS
T***	78_2	01-12-'17	Building		Building	under of Building	TS
T***	79_1	01-12-'17	Building		Building	upper of antenna on top of Building	TS
T***	79_2	01-12-'17	Building		Building	under of Building	TS
T***	80_1	01-12-'17	Smokestack		Stack	center of object (Smokestack)	TS
T***	80_2	01-12-'17	Smokestack		Stack	under of object (Smokestack)	TS

*AD; aerodrome, NAV; naviaids, COM; communication, OBST; obstacle

GPS / TS data (ITRF2005)						WGS-84 data				
X (m)		Y (m)		Z (m)		Latitude				
data	differential	data	differential	data	differential	N	deg	min	sec	differential
metre	metre	metre	metre	metre	metre				(5 decimal digit)	sec
1805083.8717		4658490.2149		3952876.8159		N	38° 32' 19.72679"			
1804922.6709		4658514.8152		3952871.0206		N	38° 32' 20.29302"			
1804740.1326		4658581.8204		3952914.2442		N	38° 32' 21.45930"			
1804751.7083		4658567.9836		3952890.1722		N	38° 32' 21.02494"			
1807807.9926		4661954.6327		3947712.1047		N	38° 28' 43.58027"			
1807941.8459		4661811.8234		3947569.6972		N	38° 28' 41.67524"			
1807249.7873		4662029.6705		3947813.4861		N	38° 28' 48.81363"			
1807276.6970		4662058.3004		3947595.6592		N	38° 28' 42.54926"			
1807430.8975		4661691.4826		3948053.6032		N	38° 28' 59.95032"			
1807374.5696		4661590.6503		3948089.6122		N	38° 29' 03.17236"			
1809509.0065		4656440.0361		3953280.2627		N	38° 32' 36.23233"			
1809516.8780		4656421.0722		3953238.4092		N	38° 32' 35.47038"			
1802286.3618		4658484.9990		3954201.0840		N	38° 33' 13.81980"			
1802293.0568		4658469.2883		3954173.0434		N	38° 33' 13.35604"			
1793988.6523		4661533.4915		3954452.0927		N	38° 33' 23.07543"			
1793978.8833		4661511.0603		3954435.0293		N	38° 33' 23.13677"			
1792897.8422		4661768.0983		3954749.8504		N	38° 33' 34.11622"			
1792892.3934		4661754.4400		3954735.9198		N	38° 33' 34.06020"			
1793862.0358		4662403.1586		3953463.5873		N	38° 32' 42.52473"			
1793852.8419		4662370.6432		3953443.8168		N	38° 32' 42.70322"			

1789165.5926		4663494.7125		3954374.6434		N	38° 33' 19.07492"	
1789157.9239		4663428.6290		3954386.8227		N	38° 33' 20.68622"	
1801278.5997		4659061.7211		3954015.5370		N	38° 33' 05.59048"	
1801279.1392		4659025.0976		3953999.3518		N	38° 33' 05.86643"	
1796734.6681		4661264.2209		3953460.3651		N	38° 32' 43.05905"	
1796702.9245		4661219.0404		3953480.5326		N	38° 32' 44.65305"	
1800097.3126		4659399.2421		954158.5283		N	38° 33' 11.46009"	
1800092.6720		4659390.1340		954129.5671		N	38° 33' 10.93118"	
1789724.9229		4663049.9590		3954657.8895		N	38° 33' 30.59932"	
1789721.6739		4663007.5649		3954617.8733		N	38° 33' 30.40814"	
1805710.0976		4655982.0394		955895.5038		N	38° 34' 18.96141"	
1805610.6104		4655825.1542		955814.6953		N	38° 34' 20.59731"	
1807334.5833		4654798.4450		956488.0251		N	38° 34' 44.40926"	
1807108.9058		4654692.1832		956453.4673		N	38° 34' 47.18790"	
1806745.9919		4655483.5270		955836.4813		N	38° 34' 19.28643"	
1806675.2117		4655436.4316		3955769.5036		N	38° 34' 18.99383"	
1805184.8524		4656777.0739		3954950.1727		N	38° 33' 43.84824"	
1805248.9642		4656758.3100		3954841.2365		N	38° 33' 40.97137"	
1805395.7843		4657426.9551		3954043.7939		N	38° 33' 07.07762"	
1805406.2581		4657411.0956		3953980.6193		N	38° 33' 05.69791"	
1804460.1922		4657810.9965		3954016.6006		N	38° 33' 05.98328"	
1804461.2593		4657810.7842		3953940.9249		N	38° 33' 04.06043"	
1803930.8901		4657920.2141		3954166.7924		N	38° 33' 11.59734"	
1804088.1894		4657846.2843		3954074.8301		N	38° 33' 09.51044"	
1802867.3580		4658100.8584		3954424.3661		N	38° 33' 22.48457"	
1802846.6030		4658085.6155		3954365.6991		N	38° 33' 21.43564"	
1804352.1495		4655681.5212		3956867.2801		N	38° 34' 59.18536"	
1804343.2235		4655660.5963		3956848.6576		N	38° 34' 59.17312"	
1804346.0870		4655668.8712		3956876.5927		N	38° 34' 59.70423"	
1804339.4762		4655651.6567		3956861.6849		N	38° 34' 59.69926"	
1804336.6419		4655642.5579		3956889.1456		N	38° 35' 00.58758"	
1804338.3894		1804338.3894		3956881.1665		N	38° 35' 00.50121"	
1799859.8811		4660143.4601		3953276.1729		N	38° 32' 36.78381"	
1799949.5651		4660104.5049		3953316.1854		N	38° 32' 37.87996"	
1799944.0325		4660089.3524		3953303.6747		N	38° 32' 37.88854"	
1806940.0609		4657384.9448		3953291.6915		N	38° 32' 37.51260"	

1806937.4233		4657378.5268		3953286.4694		N	38° 32' 37.52033"	
1764818.3934		4673864.7689		3953557.8268		N	38° 32' 37.53038"	
1795437.0699		4639908.6506		3979686.8002		N	38° 50' 40.06634"	
1839616.3769		4645026.3529		3952772.9124		N	38° 32' 15.87953"	
1810247.4240		4656083.4814		3953300.3348		N	38° 32' 38.05090"	
1810250.4652		4656096.0815		3953314.6439		N	38° 32' 38.15425"	
1810245.0783		4656081.9770		3953303.1832		N	38° 32' 38.16865"	
1808603.9067		4656624.7060		3953475.3012		N	38° 32' 44.32338"	
1808569.2324		4656584.4253		3953484.0952		N	38° 32' 45.55878"	
1808746.8763		4656911.8264		3953076.0333		N	38° 32' 27.74355"	
1808872.1747		4656788.4552		3953101.0566		N	38° 32' 29.78513"	
1806773.6410		4657419.9892		3953354.1758		N	38° 32' 39.65338"	
1806782.4062		4657431.2760		3953294.7724		N	38° 32' 37.87013"	
1809120.3073		4657621.1381		3952061.6308		N	38° 31' 45.92494"	
1809119.7544		4657572.5246		3952053.4648		N	38° 31' 46.63716"	
1809752.3495		4657118.6095		3952406.6543		N	38° 31' 59.51538"	
1809719.2167		4657085.3391		3952353.2752		N	38° 31' 59.03027"	
1809627.1807		4656558.9436		3953094.3064		N	38° 32' 28.41184"	
1809626.0502		4656535.1216		3953055.6162		N	38° 32' 27.88744"	
1809860.6160		4656136.6504		3953491.6025		N	38° 32' 44.73233"	
1809845.4383		4656096.8776		3953472.7197		N	38° 32' 45.11361"	
1808665.6699		4655677.8351		3954646.6755		N	38° 33' 31.41285"	
1808589.8242		4655658.6355		3954580.0958		N	38° 33' 30.64146"	
1809353.6069		4656043.8510		3953847.5413		N	38° 32' 59.21826"	
1809386.6634		4656011.3536		3953788.1135		N	38° 32' 58.08133"	
1808902.1010		4655613.9535		3954601.3613		N	38° 33' 29.73680"	
1808845.9683		4655543.3995		3954594.7305		N	38° 33' 31.30877"	
1809392.3819		4656861.2099		3952846.0357		N	38° 32' 18.14085"	
1809330.1085		4656877.1492		3952779.4761		N	38° 32' 16.60812"	
1808827.1341		4656704.3564		3953264.4639		N	38° 32' 35.84295"	
1808845.2424		4656708.5345		3953209.7469		N	38° 32' 34.24404"	
1807628.9731		4657072.9560		3953385.9532		N	38° 32' 40.74430"	
1807625.1735		4657048.3634		3953364.3045		N	38° 32' 40.68628"	
1800814.0918		4659500.5745		3953666.5710		N	38° 32' 51.85343"	
1800734.8764		4659524.9531		3953622.6135		N	38° 32' 50.85619"	
1789167.7329		4663877.6939		3953851.8955		N	38° 32' 56.90840"	

1789271.5930		4663916.6450		3953844.7098		N	38° 32' 58.57724"	
1806391.8957		4657686.9769		3953212.9061		N	38° 32' 33.83039"	
1806954.5622		4655268.9033		3955885.1198		N	38° 34' 23.03894"	
1806939.0269		4655236.7072		3955883.1616		N	38° 34' 23.70979"	
1806370.2729		4657213.0456		3953830.1194		N	38° 32' 58.56993"	
1806327.4469		4657191.2684		3953819.1300		N	38° 32' 59.01449"	
1808222.5649		4655992.9076		3954447.5321		N	38° 33' 23.66988"	
1808085.8922		4655862.4778		3954570.9326		N	38° 33' 30.25630"	

					Ellipsoidal Height		**UTM data**		**No.42**	
Longitude							**** 69			
E	deg	min	sec	differential	[m]	differential	X(Northing) [M]	differential	Y(Easting) [M]	differential
			(5 decimal digit)	sec	metre	metre	metre	metre	metre	metre
E	68° 49' 10.26338"				764.7477		4265615.6270		484270.7620	
E	68° 49' 16.83616"				733.5243		4265632.7690		484429.9140	
E	68° 49' 24.86293"				757.7456		4265668.3420		484624.3000	
E	68° 49' 24.21092"				735.9263		4265654.9840		484608.4900	
E	68° 48' 17.11601"				847.1499		4258956.0270		482970.0000	
E	68° 48' 09.83788"				692.1940		4258897.6850		482793.5340	
E	68° 48' 39.70477"				807.0356		4259116.1910		483517.6290	
E	68° 48' 39.09662"				700.0079		4258923.1370		483502.4980	
E	68° 48' 27.69551"				760.8648		4259460.0550		483227.3820	
E	68° 48' 28.35839"				693.7414		4259559.3330		483243.6490	
E	68° 45' 49.31349"				773.2801		4266135.4000		479407.3410	
E	68° 45' 48.72695"				735.6059		4266111.9510		479393.0820	
E	68° 50' 57.90351"				796.1700		4267278.2410		486879.3150	
E	68° 50' 57.41158"				769.1244		4267263.9660		486867.3850	
E	68° 57' 02.90373"				840.7649		4267553.9280		495713.7870	
E	68° 57' 02.94753"				811.0151		4267555.8180		495714.8480	
E	68° 57' 48.42499"				891.3020		4267893.7240		496815.6610	
E	68° 57' 48.43254"				871.1208		4267891.9970		496815.8430	
E	68° 57' 20.67986"				823.9148		4266303.8180		496143.4160	
E	68° 57' 20.55205"				785.2783		4266309.3210		496140.3250	

E	69° 00' 37.86990"		871.2953		4267429.5260		500916.5690	
E	69° 00' 37.18807"		828.4896		4267479.1890		500900.0610	
E	68° 51' 45.30661"		816.9039		4267022.7920		488026.2620	
E	68° 51' 44.74049"		780.2548		4267031.3180		488012.5720	
E	68° 55' 13.09424"		798.0616		4266322.3690		493055.0280	
E	68° 55' 13.64626"		768.7276		4266371.4890		493068.4330	
E	68° 52' 35.83064"		819.2004		4267201.9760		489249.4070	
E	68° 52' 35.87385"		793.1986		4267185.6720		489250.4310	
E	69° 00' 09.72518"		879.8331		4267784.6930		500235.3690	
E	69° 00' 09.22310"		823.0304		4267778.8000		500223.2180	
E	68° 48' 08.71511"		994.4083		4269293.8570		482788.6600	
E	68° 48' 10.20327"		801.5422		4269344.2030		482824.7780	
E	68° 46' 48.47288"		960.6701		4270082.6490		480848.8710	
E	68° 46' 55.57458"		797.8293		4270167.8860		481020.9010	
E	68° 47' 21.37789"		887.1757		4269306.4200		481643.2380	
E	68° 47' 23.39961"		791.0682		4269297.2890		481692.1380	
E	68° 48' 40.81185"		836.1739		4268209.9300		483563.1010	
E	68° 48' 38.06301"		772.7072		4268121.3930		483496.3940	
E	68° 48' 42.39014"		804.6943		4267076.4710		483598.9760	
E	68° 48' 41.75017"		756.7186		4267033.9760		483583.3990	
E	68° 49' 24.14375"		803.4096		4267040.7350		484609.5260	
E	68° 49' 24.09950"		756.3939		4266981.4690		484608.3410	
E	68° 49' 46.15398"		827.1492		4267212.7710		485142.5900	
E	68° 49' 38.99431"		760.3492		4267148.7700		484969.1780	
E	68° 50' 29.80328"		819.1420		4267546.4580		486199.6480	
E	68° 50' 30.37539"		765.6014		4267514.1030		486213.4390	
E	68° 48' 56.52747"		997.5903		4270531.2800		483948.0890	
E	68° 48' 56.55891"		968.2032		4270530.9010		483948.8490	
E	68° 48' 56.57215"		992.4652		4270547.2710		483949.2020	
E	68° 48' 56.56980"		968.7532		4270547.1180		483949.1450	
E	68° 48' 56.54315"		978.4466		4270574.5000		483948.5550	
E	68° 48' 56.37398"		968.9912		4270571.8460		483944.4570	
E	68° 52' 56.04889"		745.3690		4266132.5100		489737.3970	
E	68° 52' 52.01512"		767.1522		4266166.4220		489639.7950	
E	68° 52' 52.00280"		746.7423		4266166.6870		489639.4970	
E	68° 47' 42.31185"		742.0634		4266168.2990		482142.7950	

E	68° 47' 42.31753"		733.3834		4266168.5370		482142.9330	
E	69° 18' 49.74126"		1168.4815		4266195.6170		527347.6440	
E	68° 50' 44.85095"		1280.8063		4299527.9870		486617.6640	
E	68° 23' 40.02594"		746.9314		4265655.3660		447224.8160	
E	68° 45' 15.56267"		735.0974		4266193.5950		478590.4800	
E	68° 45' 15.63416"		754.0607		4266196.7760		478592.2190	
E	68° 45' 15.63043"		735.1108		4266197.2200		478592.1300	
E	68° 46' 26.90920"		773.0925		4266382.5030		480318.0380	
E	68° 46' 27.64163"		739.3873		4266420.5380		480335.8610	
E	68° 46' 25.69866"		774.1236		4265871.5360		480287.4780	
E	68° 46' 19.03212"		735.2499		4265934.8620		480126.2510	
E	68° 47' 49.24134"		759.4739		4266233.9120		482310.6830	
E	68° 47' 49.07248"		733.1683		4266178.9560		482306.4740	
E	68° 46' 21.93013"		765.1136		4264582.7900		480193.0650	
E	68° 46' 21.22481"		724.4209		4264604.7850		480176.0420	
E	68° 45' 50.09666"		792.6657		4265003.6280		479423.3940	
E	68° 45' 50.87411"		725.7661		4264988.6270		479442.1780	
E	68° 45' 46.54396"		777.5799		4265894.5220		479339.6770	
E	68° 45' 46.23119"		735.7853		4265878.3780		479332.0640	
E	68° 45' 31.24400"		783.4237		4266398.5310		478970.6180	
E	68° 45' 31.23314"		738.3629		4266410.2840		478970.3860	
E	68° 46' 10.37454"		830.3676		4267834.9340		479921.4320	
E	68° 46' 13.00706"		753.3962		4267810.9980		479985.0850	
E	68° 45' 49.36894"		793.9412		4266843.8910		479410.5040	
E	68° 45' 47.61059"		742.5812		4266808.9570		479367.8530	
E	68° 46' 00.31802"		822.5135		4267783.8870		479677.9130	
E	68° 46' 01.42355"		751.0577		4267832.2720		479704.7920	
E	68° 46' 00.09985"		776.7463		4265577.1010		479667.0330	
E	68° 46' 02.73465"		729.2577		4265529.6960		479730.6990	
E	68° 46' 19.50834"		762.9982		4266121.5530		480138.2420	
E	68° 46' 18.87387"		737.0783		4266072.3080		480122.7610	
E	68° 47' 11.13355"		768.2433		4266269.6270		481388.2930	
E	68° 47' 10.91237"		735.7472		4266267.8510		481382.9350	
E	68° 52' 09.73062"		788.5798		4266598.5140		488616.8280	
E	68° 52' 13.14446"		756.6379		4266567.6590		488699.4190	
E	69° 00' 40.02398"		878.7932		4266746.2950		500968.7870	

E	69° 00' 43.45191"		825.7363		4266797.7440		501051.7540	
E	68° 48' 07.92291"		758.1608		4266053.4450		482762.5180	
E	68° 47' 10.13905"		820.0746		4269422.7120		481371.5550	
E	68° 47' 10.25604"		790.9930		4269443.3830		481374.4340	
E	68° 48' 01.67919"		791.0763		4266816.3170		482613.0290	
E	68° 48' 03.00273"		756.2376		4266829.9500		482645.0950	
E	68° 46' 32.14273"		810.4477		4267594.9690		480447.6830	
E	68° 46' 35.45411"		753.5966		4267797.7870		480528.3210	

GEOID	ORTHOMETRIC Height		Top height of obstacle	Ground elevation of obstacle	
Height	EGM2008		if additional	if available	Remarks
[m]	H [m]	differential	[m]	[m]	
metre	metre	metre	metre	metre	
	805.0490				
	773.8240				
	798.0420				
	776.2240				
	887.9760				
	733.0240				
	847.8510		849.351		pluse 1,5m to top of object
	740.8340				
	801.6620		802.6620		pluse 1m to top of object
	734.5320				
	813.4930				
	775.8210				
	836.2960				
	809.2520				
	880.8380				
	851.0880				
	931.3360				
	911.1550		907.155		minus 4m under of object
	864.1230				
	825.4860				

	911.3770				
	868.5660				
	857.0560				
	820.4060				
	838.2730				
	808.9340				
	859.3290				
	833.3290				
	919.8780		921.878		plus 2m to top of building
	863.0760				
	1034.2990				
	841.4270		839.4270		minus 2m under of object
	1000.4520		1002.4520		plus 2 m top of object
	837.6030				
	927.0570				
	830.9510				
	876.1940				
	812.7370				
	844.8420				
	796.8710				
	843.5640				
	796.5550				
	867.2850		868.285		pluse 1m to top of antenna
	800.4920				
	859.2390				
	805.7020				
	1037.3360				
	1007.9490				
	1032.2090				
	1008.4970				
	1018.1870		1018.687		plus 0,5m top of object
	1008.7320				
	785.6100				
	807.3900				
	786.9800				
	782.2990				

	773.6190				
	1208.2170				
	1316.9520				
	786.4560				
	775.2930				
	794.2560				
	775.3060				
	813.2900				
	779.5810				
	814.3740				
	775.4920				
	799.7040		801.204		plus 1,5 m top of object
	773.4040				
	805.4930				
	764.7980				
	832.9970		833.9970		plus 1m top of object
	766.0990				
	817.8170				
	776.0240				
	823.6030				
	778.5410				
	870.4010				
	793.4330				
	834.0800				
	782.7230				
	862.5500				
	791.0890				
	817.0210				
	769.5380				
	803.2210				
	777.3060				
	808.4630				
	775.9670				
	828.7760				
	796.8370				
	918.9470				

	865.8850				
	798.4120				
	859.9400				
	830.8560				
	831.2490				
	796.4090				
	850.5140		852.5140		plus 2m top of object
	793.6410				

Supremenatary Data / Description					
Measuring station	Auxiliary station, if any location (number)	WGS84 data Latitude	 Longitude	Ellipsoidal height [m]	Description of location or Others, if necessary
		dd° mm'ss.sssss" N	ddd° mm'ss.sssss" E	metre	
					existing point marked by a nail on RWY center line, approximately abeam Fire Station
		dd° mm'ss.sssss" N	ddd° mm'ss.sssss" E		
					i

Dushanbe Airport

UTDD	latitude	Longitude		elevation (m)
3ARP	**38° 32' 37.32925" N**	**68° 49' 29.29630" E**	**742.8333**	**783.0800**
4THR RWY09	**38° 32' 37.47838" N**	**68° 48' 23.93185" E**	**744.6407**	**784.8820**
5THR RWY27	**38° 32' 37.18060" N**	**68° 50' 32.29240" E**	**731.1423**	**771.3894**
6D THR27	**38° 32' 37.21546" N**	**68° 50' 15.41495" E**	**734.6024**	**774.8501**
11E-TWY	**38° 32' 41.36898" N**	**68° 49' 58.46752" E**	**741.9295**	**782.1648**
12D-TWY	**38° 32' 41.90267" N**	**68° 49' 12.95738" E**	**744.9837**	**785.2153**
13F-TWY	**38° 32' 43.78025" N**	**68° 48' 24.19618" E**	**747.6613**	**787.8828**
14B1A	**38° 32' 53.27747" N**	**68° 48' 54.77753" E**	**749.5429**	**789.7376**
14B1B	**38° 32' 53.21252" N**	**68° 48' 54.78888" E**	**749.4992**	**789.6940**
14B1C	**38° 32' 53.18035" N**	**68° 48' 54.79493" E**	**749.4917**	**789.6867**
15B2A	**38° 32' 52.16914" N**	**68° 48' 53.77796" E**	**749.1083**	**789.3063**
15B2B	**38° 32' 52.10946" N**	**68° 48' 53.74322" E**	**749.0997**	**789.2980**
16B3A	**38° 32' 53.21902" N**	**68° 48' 51.18714" E**	**749.6741**	**789.8686**
16B3B	**38° 32' 53.15434" N**	**68° 48' 51.19883" E**	**749.6519**	**789.8466**
16B3C	**38° 32' 53.12259" N**	**68° 48' 51.20277" E**	**749.6327**	**789.8274**
17B4A	**38° 32' 52.17729" N**	**68° 48' 50.16829" E**	**749.3088**	**789.5065**
17B4B	**38° 32' 52.11755" N**	**68° 48' 50.13314" E**	**749.2850**	**789.4828**
18B5A	**38° 32' 52.24850" N**	**68° 48' 45.83214" E**	**749.7509**	**789.9479**
18B5B	**38° 32' 52.15112" N**	**68° 48' 45.83199" E**	**749.7155**	**789.9128**
19B6	**38° 32' 52.25205" N**	**68° 48' 43.35538" E**	**749.9207**	**790.1174**
31aB1WA	**38° 32' 53.10886" N**	**68° 48' 54.59991" E**	**749.4894**	**789.6845**
31aB1WB	**38° 32' 52.97935" N**	**68° 48' 54.60016" E**	**749.4213**	**789.6169**
31aB1WC	**38° 32' 52.88101" N**	**68° 48' 54.59964" E**	**749.3803**	**789.5762**
31aB1WD	**38° 32' 52.76160" N**	**68° 48' 54.59940" E**	**749.3236**	**789.5199**
31bB3WA	**38° 32' 53.11619" N**	**68° 48' 50.99407" E**	**749.6492**	**789.8440**
31bB3WB	**38° 32' 52.98488" N**	**68° 48' 50.99219" E**	**749.5819**	**789.7771**
31bB3WC	**38° 32' 52.88662" N**	**68° 48' 50.99148" E**	**749.5385**	**789.7340**
31bB3WD	**38° 32' 52.76836" N**	**68° 48' 50.99089" E**	**749.5062**	**789.7021**

Dushanbe Airport

UTDD	latitude	Longitude		elevation (m)
10LOCa271	38° 32' 37.51422" N	68° 48' 06.73899" E	745.9435	786.1830
10LOCa272	38° 32' 37.54315" N	68° 48' 06.75246" E	748.9086	789.1480
20CT1	38° 32' 54.53034" N	68° 48' 55.07613" E	749.9913	790.1820
20CT2	38° 32' 55.09787" N	68° 48' 55.91838" E	776.8630	817.0520
21CTB1	38° 32' 41.94146" N	68° 50' 01.09054" E	742.1415	782.3750
21CTB2	38° 32' 42.00000" N	68° 50' 01.10516" E	752.0957	792.3290
28VIP1	38° 32' 53.71184" N	68° 49' 00.68439" E	749.5402	789.7340
28VIP2	38° 32' 53.69155" N	68° 49' 00.69374" E	773.1801	813.3740
22VIP1	38° 32' 53.43527" N	68° 49' 01.74733" E	749.3132	789.5080
22VIP2	38° 32' 54.46321" N	68° 49' 02.00194" E	773.8525	814.0440
23H1	38° 32' 52.69383" N	68° 48' 22.30546" E	751.7328	791.9260
23H2	38° 32' 52.70930" N	68° 48' 22.30389" E	772.8858	813.0790
24Alp1	38° 32' 46.38703" N	68° 49' 04.94412" E	746.6319	786.8490
24Alp2	38° 32' 46.34092" N	68° 49' 04.93647" E	765.9337	806.1510
25APL2	38° 32' 46.34219" N	68° 48' 59.24399" E	765.9991	806.2160
25Alp1	38° 32' 46.38976" N	68° 48' 59.29018" E	746.7462	786.9630
26APL2	38° 32' 52.15300" N	68° 49' 10.71196" E	770.1878	810.3870
26Alp1	38° 32' 52.19492" N	68° 49' 10.67377" E	749.3739	789.5730
27ALP2	38° 32' 52.08103" N	68° 49' 41.35260" E	770.2471	810.4480
27Alp1	38° 32' 52.09102" N	68° 49' 41.31089" E	749.2261	789.4270
29NDP271	38° 32' 37.97948" N	68° 51' 11.44385" E	734.9532	775.1960
29NDP272	38° 32' 37.96758" N	68° 51' 11.45416" E	744.1372	784.3800
30FSH1	38° 32' 43.92762" N	68° 49' 28.03685" E	746.2311	786.4570
30FSH2	38° 32' 43.78859" N	68° 49' 27.88157" E	760.8387	801.0650
7GP091	38° 32' 42.22484" N	68° 48' 36.20711" E	746.4334	786.6610
7GP092	38° 32' 41.84513" N	68° 48' 35.81248" E	761.8092	802.0380
7GP093	38° 32' 42.00740" N	68° 48' 36.52227" E	764.5047	804.7330
8GPa271	38° 32' 40.81083" N	68° 50' 05.18446" E	779.9600	779.9600
8GPa272	38° 32' 40.80268" N	68° 50' 05.18290" E	754.4751	794.7120
9LOCa091	38° 32' 37.06514" N	68° 51' 07.30844" E	734.0391	774.2850
9LOCa092	38° 32' 37.06252" N	68° 51' 07.31060" E	737.6361	777.8820

Dushanbe airport	Obstacle				
UTDD					elevation (m)
32 Factory-1	38° 32' 19.72679" N	68° 49' 10.26338" E	764.7477		805.0490
32 Factory-2	38° 32' 20.29302" N	68° 49' 16.83616" E	733.5243		773.8240
33 Green house behid MILT-1	38° 32' 21.45930" N	68° 49' 24.86293" E	757.7456		798.0420
33 Green house behid MILT-2	38° 32' 21.02494" N	68° 49' 24.21092" E	735.9263		776.2240
34 Tall gig antenna sets-1	38° 28' 43.58027" N	68° 48' 17.11601" E	847.1499		887.9760
34 Tall gig antenna sets-2	38° 28' 41.67524" N	68° 48' 09.83788" E	692.1940		733.0240
35 Tall gig antenna sets-1	38° 28' 48.81363" N	68° 48' 39.70477" E	807.0356		847.8510
35 Tall gig antenna sets-2	38° 28' 42.54926" N	68° 48' 39.09662" E	700.0079		740.8340
36 Tall gig antenna sets-1	38° 28' 59.95032" N	68° 48' 27.69551" E	760.8648		801.6620
36 Tall gig antenna sets-2	38° 29' 03.17236" N	68° 48' 28.35839" E	693.7414		734.5320
37 Tall gig antenna sets -1	38° 32' 36.23233" N	68° 45' 49.31349" E	773.2801		813.4930
37 Tall gig antenna sets -2	38° 32' 35.47038" N	68° 45' 48.72695" E	735.6059		775.8210
38 BuiIding-1	38° 33' 13.81980" N	68° 50' 57.90351" E	796.1700		836.2960
38 BuiIding-2	38° 33' 13.35604" N	68° 50' 57.41158" E	769.1244		809.2520
39 Power line Tower-1	38° 33' 23.07543" N	68° 57' 02.90373" E	840.7649		880.8380
39 Power line Tower-2	38° 33' 23.13677" N	68° 57' 02.94753" E	811.0151		851.0880
40 Power line Tower-1	38° 33' 34.11622" N	68° 57' 48.42499" E	891.3020		931.3360
40 Power line Tower-2	38° 33' 34.06020" N	68° 57' 48.43254" E	871.1208		911.1550
41 Power line Tower-1	38° 32' 42.52473" N	68° 57' 20.67986" E	823.9148		864.1230
41 Power line Tower-2	38° 32' 42.70322" N	68° 57' 20.55205" E	785.2783		825.4860
42 BuiIding-1	38° 33' 19.07492" N	69° 00' 37.86990" E	871.2953		911.3770
42 BuiIding-2	38° 33' 20.68622" N	69° 00' 37.18807" E	828.4896		868.5660
43 Mobile Antenna Tower-1	38° 33' 05.59048" N	68° 51' 45.30661" E	816.9039		857.0560
43 Mobile Antenna Tower-2	38° 33' 05.86643" N	68° 51' 44.74049" E	780.2548		820.4060
44 Mobile Antenna Tower-1	38° 32' 43.05905" N	68° 55' 13.09424" E	798.0616		838.2730
44 Mobile Antenna Tower-2	38° 32' 44.65305" N	68° 55' 13.64626" E	768.7276		808.9340
45 Power line Tower-1	38° 33' 11.46009" N	68° 52' 35.83064" E	819.2004		859.3290
45 Power line Tower-2	38° 33' 10.93118" N	68° 52' 35.87385" E	793.1986		833.3290
46 BuiIding-1	38° 33' 30.59932" N	69° 00' 09.72518" E	879.8331		919.8780
46 BuiIding-2	38° 33' 30.40814" N	69° 00' 09.22310" E	823.0304		863.0760
47 TV antenna Tower-1	38° 34' 18.96141" N	68° 48' 08.71511" E	994.4083		1034.2990
47 TV antenna Tower-2	38° 34' 20.59731" N	68° 48' 10.20327" E	801.5422		841.4270
48 Flag pole-1	38° 34' 44.40926" N	68° 46' 48.47288" E	960.6701		1000.4520
48 Flag pole-2	38° 34' 47.18790" N	68° 46' 55.57458" E	797.8293		837.6030
49 Twin Building-1	38° 34' 19.28643" N	68° 47' 21.37789" E	887.1757		927.0570
49 Twin Building-2	38° 34' 18.99383" N	68° 47' 23.39961" E	791.0682		830.9510
50 Sheraton Hotel-1	38° 33' 43.84824" N	68° 48' 40.81185" E	836.1739		876.1940
50 Sheraton Hotel-2	38° 33' 40.97137" N	68° 48' 38.06301" E	772.7072		812.7370
51 Building light brawn color-1	38° 33' 07.07762" N	68° 48' 42.39014" E	804.6943		844.8420
51 Building light brawn color-2	38° 33' 05.69791" N	68° 48' 41.75017" E	756.7186		796.8710
52 Police Academy Building-1	38° 33' 05.98328" N	68° 49' 24.14375" E	803.4096		843.5640
52 Police Academy Building-2	38° 33' 04.06043" N	68° 49' 24.09950" E	756.3939		796.5550
53 Factory-1	38° 33' 11.59734" N	68° 49' 46.15398" E	827.1492		867.2850
53 Factory-2	38° 33' 09.51044" N	68° 49' 38.99431" E	760.3492		800.4920
54 Old Smokestack-1	38° 33' 22.48457" N	68° 50' 29.80328" E	819.1420		859.2390

54 Old Smokestack-2	38° 33' 21.43564" N	68° 50' 30.37539" E	765.6014	805.7020
55 SSR antenna-1	38° 34' 59.18536" N	68° 48' 56.52747" E	997.5903	1037.3360
55 SSR antenna-2	38° 34' 59.17312" N	68° 48' 56.55891" E	968.2032	1007.9490
55 SSR antenna-3	38° 34' 59.70423" N	68° 48' 56.57215" E	992.4652	1032.2090
55 SSR antenna-4	38° 34' 59.69926" N	68° 48' 56.56980" E	968.7532	1008.4970
55 SSR antenna-5	38° 35' 00.58758" N	68° 48' 56.54315" E	978.4466	1018.1870
55 SSR antenna-6	38° 35' 00.50121" N	68° 48' 56.37398" E	968.9912	1008.7320
56 dprm 27-1	38° 32' 37.87996" N	68° 52' 52.01512" E	767.1522	807.3900
56 dprm 27-2	38° 32' 37.88854" N	68° 52' 52.00280" E	746.7423	786.9800
56 dprm 27	38° 32' 36.78381" N	68° 52' 56.04889" E	745.3690	785.6100
57 bprm 09-1	38° 32' 37.51260" N	68° 47' 42.31185" E	742.0634	782.2990
57 bprm 09-2	38° 32' 37.52033" N	68° 47' 42.31753" E	733.3834	773.6190
58 Fayzobod	38° 32' 37.53038" N	69° 18' 49.74126" E	1168.4815	1208.2170
59 Varzob	38° 50' 40.06634" N	68° 50' 44.85095" E	1280.8063	1316.9520
60 Shahrinav	38° 32' 15.87953" N	68° 23' 40.02594" E	746.9314	786.4560
61 dprm 09	38° 32' 38.05090" N	68° 45' 15.56267" E	735.0974	775.2930
61 dprm 09-1	38° 32' 38.15425" N	68° 45' 15.63416" E	754.0607	794.2560
61 dprm 09-2	38° 32' 38.16865" N	68° 45' 15.63043" E	735.1108	775.3060
62 Mobile antenna tower-1	38° 32' 44.32338" N	68° 46' 26.90920" E	773.0925	813.2900
62 Mobile antenna tower-2	38° 32' 45.55878" N	68° 46' 27.64163" E	739.3873	779.5810
63 Mobile Antenna Tower-1	38° 32' 27.74355" N	68° 46' 25.69866" E	774.1236	814.3740
63 Mobile Antenna Tower-2	38° 32' 29.78513" N	68° 46' 19.03212" E	735.2499	775.4920
64 Mobile Antenna-1	38° 32' 39.65338" N	68° 47' 49.24134" E	759.4739	799.7040
64 Mobile Antenna-2	38° 32' 37.87013" N	68° 47' 49.07248" E	733.1683	773.4040
65 BuiIding-1	38° 31' 45.92494" N	68° 46' 21.93013" E	765.1136	805.4930
65 BuiIding-2	38° 31' 46.63716" N	68° 46' 21.22481" E	724.4209	764.7980
66 BuiIding-1	38° 31' 59.51538" N	68° 45' 50.09666" E	792.6657	832.9970
66 BuiIding-2	38° 31' 59.03027" N	68° 45' 50.87411" E	725.7661	766.0990
67 BuiIding-1	38° 32' 28.41184" N	68° 45' 46.54396" E	777.5799	817.8170
67 BuiIding-2	38° 32' 27.88744" N	68° 45' 46.23119" E	735.7853	776.0240
68 BuiIding-1	38° 32' 44.73233" N	68° 45' 31.24400" E	783.4237	823.6030
68 BuiIding-2	38° 32' 45.11361" N	68° 45' 31.23314" E	738.3629	778.5410
69 BuiIding-1	38° 33' 31.41285" N	68° 46' 10.37454" E	830.3676	870.4010
69 BuiIding-2	38° 33' 30.64146" N	68° 46' 13.00706" E	753.3962	793.4330
70 BuiIding-1	38° 32' 59.21826" N	68° 45' 49.36894" E	793.9412	834.0800
70 BuiIding-2	38° 32' 58.08133" N	68° 45' 47.61059" E	742.5812	782.7230
71 BuiIding-1	38° 33' 29.73680" N	68° 46' 00.31802" E	822.5135	862.5500
71 BuiIding-2	38° 33' 31.30877" N	68° 46' 01.42355" E	751.0577	791.0890
72 BuiIding-1	38° 32' 18.14085" N	68° 46' 00.09985" E	776.7463	817.0210
72 BuiIding-2	38° 32' 16.60812" N	68° 46' 02.73465" E	729.2577	769.5380
73 BuiIding-1	38° 32' 35.84295" N	68° 46' 19.50834" E	762.9982	803.2210
73 BuiIding-2	38° 32' 34.24404" N	68° 46' 18.87387" E	737.0783	777.3060
74 hmoba-1	38° 32' 40.74430" N	68° 47' 11.13355" E	768.2433	808.4630
74 hmoba-2	38° 32' 40.68628" N	68° 47' 10.91237" E	735.7472	775.9670
75 BuiIding-1	38° 32' 51.85343" N	68° 52' 09.73062" E	788.5798	828.7760
75 BuiIding-2	38° 32' 50.85619" N	68° 52' 13.14446" E	756.6379	796.8370
76 BuiIding-1	38° 32' 56.90840" N	69° 00' 40.02398" E	878.7932	918.9470

76	BuiIding-2	38° 32' 58.57724" N	69° 00' 43.45191" E	825.7363	865.8850
78	BuiIding-1	38° 34' 23.03894" N	68° 47' 10.13905" E	820.0746	859.9400
78	BuiIding-2	38° 34' 23.70979" N	68° 47' 10.25604" E	790.9930	830.8560
77	Mob antenna	38° 32' 33.83039" N	68° 48' 07.92291" E	758.1608	798.412
79	BuiIding-1	38° 32' 58.56993" N	68° 48' 01.67919" E	791.0763	831.2490
79	BuiIding-2	38° 32' 59.01449" N	68° 48' 03.00273" E	756.2376	796.4090
80	Smokestack-1	38° 33' 23.66988" N	68° 46' 32.14273" E	810.4477	850.5140
80	Smokestack-2	38° 33' 30.25630" N	68° 46' 35.45411" E	753.5966	793.6410

Survey Points or Objects (implementation)

Dushanbe Airport, as of 22 September 2017

Side	ID-Nr	Target	Category	Position / Target description
Inside	1	PACS-1	surface point	abeam THR09
	2	PACS-2	surface point	abeam GP27
	3	Airpoort Reference Point	surface point	mark on middle position of rwy
	4	THR RWY09	surface point	mark on rwy end
	5	THR RWY27	surface point	mark on rwy end
	6	Dispaced THR27	surface point	mark on rwy
	7	GP antenna 09	NAVAID	top and corner close to THR
	8	GP antenna 27	NAVAID	top and corner close to THR
	9	LOC antenna 09	NAVAID	center and front upper end of antenna
	10	LOC antenna 27	NAVAID	center and front upper end of antenna
	11	Holding point on E-TWY	surface point	point extending TWY center line to holding line
	12	Holding point on D-TWY	surface point	point extending TWY center line to holding line
	13	Holding point on F-TWY	surface point	point extending TWY center line to holding line
	14	Aircraft parking spot B3	surface point	point extending lead line to nose gear stop line
	15	Aircraft parking spot B3	surface point	point extending lead line to nose gear stop line
	16	Aircraft parking spot B3W	surface point	point extending lead line to nose gear stop line
	17	Aircraft parking spot B3W	surface point	point extending lead line to nose gear stop line
	18	Aircraft parking spot B4	surface point	point extending lead line to nose gear stop line
	19	Aircraft parking spot B4	surface point	point extending lead line to nose gear stop line
	20	Aircraft parking spot B5	surface point	point extending lead line to nose gear stop line
	21	Aircraft parking spot B6	surface point	point extending lead line to nose gear stop line
	22	Control Tower	building	antenna top on the roof of building
	23	Control Tower-Sub	house	antenna top on the roof of building
	24	VIP Building	building	top of equipment on pole (front pole of light)
	25	Hangar	bulding	center and front top of roof
	26	Apron light pole	pole	top and front to rwy of equipment on pole
	27	Apron light pole	pole	top and front to rwy of equipment on pole
	28	Apron light pole	pole	top and front to rwy of equipment on pole
	29	Apron light pole	pole	top and front to rwy of equipment on pole
	30	Apron light pole	pole	top and front to rwy of equipment on pole
	31	Fire station house	house / pole	top of antenna pole or roof top of building
South	32	Old Factory	building	near RWY
	33	Green house	house	near RWY
	43	Tall tower antenna sets (4)	pylon	far south over river, select highest one
	35	Tall tower antenna sets (4)	pylon	far south over river, select highest one
	36	Tall tower antenna sets (4)	pylon	far south over river, select highest one
	37	Tall tower antenna sets (4)	pylon	far south over river, select highest one
East	38	Building	building	factory
	39	Power line Tower	pylon	middle far, from north to south
	40	Power line Tower	pylon	middle far, from north to south
	41	Power line Tower	pylon	on the hill
	42	Power line Tower	pylon	on the hill
	43	Mobile Antenna Tower	pylon	near RWY end
	44	Mobile Antenna Tower	pylon	near RWY end
	45	Mobile Antenna Tower	pylon	near RWY end
	46	Building	building	far east, about 10km

Survey Points or Objects (implementation)

Dushanbe Airport, as of 22 September 2017

Side	ID-Nr	Target	Category	Position / Target description
North	47	TV antenna Tower	Tower	city center area
	48	Flag pole	Pole	city center area
	49	Twin Building	Building	city center area
	50	Sheraton Hotel	Building	city center area
	51	Building light brawn color	Building	in front of terminal building
	52	Police Academy Building	Building	near airport
	53	Factory	Building	near airport
	54	Old Smokestack	Tower	near TWY end
	55	SSR antenna	Antenna	on the hill
West	56	Apartment building	Building	north-west near RWY end
	57	Apartment building	Building	north-west near RWY end
	58	Mobile antenna tower	Tower	near RWY end
	59	Mobile antenna tower	Tower	near RWY end
	60	Mobile antenna tower	Tower	middle between RWY end and river
	61	Mobile antenna tower	Tower	near river
	62	Mobile antenna tower	Tower	near river
	63	Building	Building	along road (east side of river)
	64	Building	Building	along road (east side of river)
	65	Building	Building	along road (east side of river)
	66	Building	Building	along road (west side of river)
	67	Building	Building	along road (west side of river)
	68	Building	Building	along road (west side of river)
	69	Building	Building	along road (west side of river)
	70	Building	Building	along road (west side of river)
	71	Building	Building	along road (west side of river)
	72	Smokestack	Tower	along road (east side of river)
	73	Factory	Building	along road (east side of river)
Others	74	NDB/Marker	NAVAID	FN
	75	NDB/Marker	NAVAID	F
	76	NDB/Marker	NAVAID	WG
	77	NDB/Marker	NAVAID	W
	78	NDB	NAVAID	PR
	79	NDB	NAVAID	SX
	80	NDB	NAVAID	JD

The Project for Capacity Development of ATC in Tajikistan
TF-3 Activity (3-5)

Outline of OJT on Flight Procedure Design

1 Nov. ～ 15 Dec. 2017

By Mr. YAMANE, FPD Specialist

Summary of OJT

o Aim

To acquire practical skill and knowledge based on latest ICAO standards through OJT on conventional Flight Procedure Design in model airport, Dushanbe for participants in succession to “Training on basic PANS–OPS Flight Procedure Design” course.

Summary of OJT

□Stage

2nd stage of Flight Procedure Designer Training through ICAO Quality Assurance Manual for FPD（Doc 9906）

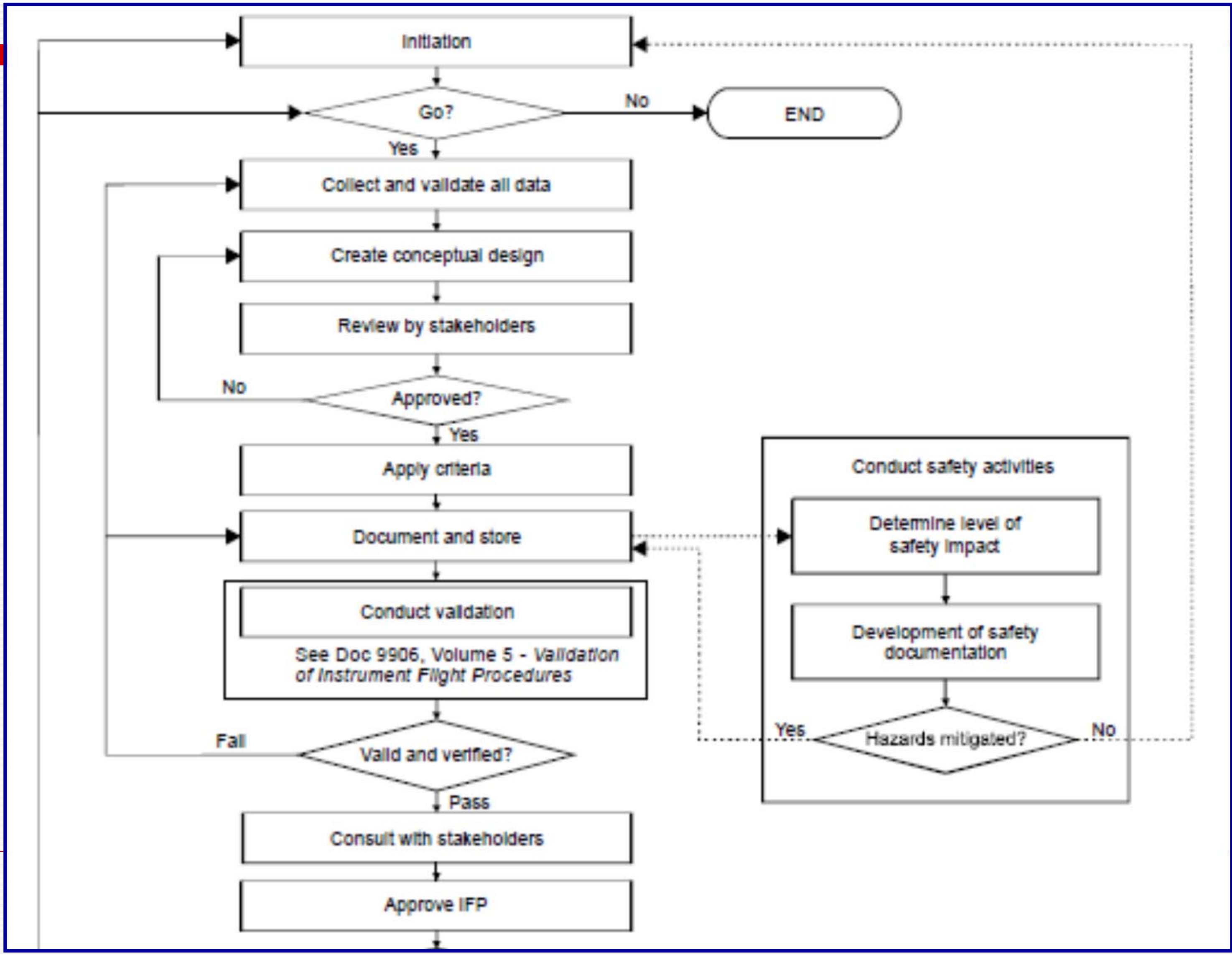
※Japanese case; for example

↓ Primary / initial Training

↓ OJT in ATMC（Flight Procedure Office）

↓ Recurrent training, refresh training, periodical evaluation

IFP process flow diagram (initial part)



Summary of OJT

□Main contents

- Situation awareness and an obstacle survey as the aspect of flight procedure designer,
- manual designing of several sample flight procedures, such as STAR, IAP(instrument approach procedure), SID, holding etc.
- design verification/ground validation,
- documentation of materials,
- preliminary matters of flight inspection/validation, and
- safety oversight of the design,

Summary of OJT

☐Exercise

- FPD will be drafted on tracing papers with geographical maps and WGS–84 data concerned which were prepared previously,
- The output data of FPD will be converted to AIP chart formats by using VISIO finally,
- The exercise will mainly consist of group work and the lecture and supplementary explanation will be conducted accordingly,
- The daily works will be reviewed at the end of class.

Summary of OJT

□Program

- Date; 1 Nov.～15 Dec. 2017
- Hours; 09:00 – 16:30 (12:00 – 13:30 lunch time)
- Venue; *Class room* in Training Center
- Style; Group exercise and supplemental lecture
- <u>Room work</u>; design concept study, design manual drafting, documentation, design verification and ground validation, and other supplemental lecture and work
- <u>Site work</u>; situation awareness, obstacle survey, stakeholder meeting

Daily Schedule

	Month	Day		Iitems		Venue	Remarks
				AM (09:00-12:00)	PM (13:30-16:30)		
1	Nov.	1	Wed		Opening, Introduction of OJT	T.C.	Start OJT
2		2	Thu	Lecture on basic theory of FPD	Lecture on practical approach of FPD	T.C.	
3		3	Fri	Data collection for FPD concerned	Preparation of data collection	T.C.	
		4	Sat				
		5	Sun				
		6	Mon	Holiday			
4		7	Tue	Preliminary study for FPD (STAR, APCH)	Preliminary study for FPD (SID)	T.C.	group work
5		8	Wed	Site awareness & obstacle check	Site awareness & obstacle check		using handy GPS & measure
6		9	Thu	Establishment of design concept	Establishment of design concept	T.C.	group work
7		10	Fri	Meeting with stakeholders (flight)	Meeting with stakeholders (ATC, AD)	T.C.	group work
		11	Sat				
		12	Sun				
8		13	Mon	Preparation of practice	Design work of STAR	T.C.	group work
9		14	Tue	Design work of STAR	Design work of STAR	T.C.	group work
10		15	Wed	Design work of Approach Procedure	Design work of Approach Procedure	T.C.	group work
11		16	Thu	Design work of Approach Procedure	Design work of Approach Procedure	T.C.	group work
12		17	Fri	Design work of Missed Approach	Design work of Missed Approach	T.C.	group work
		18	Sat				
		19	Sun				
13		20	Mon	Design work of ILS approach	Design work of ILS approach	T.C.	group work
14		21	Tue	Design work of ILS approach	Design work of ILS approach	T.C.	group work
15		22	Wed	Design work of Holding pattern	Design work of Holding pattern	T.C.	group work
16		23	Thu	Design work of Holding pattern	Design work of MSA, VSS	T.C.	group work
17		24	Fri	*Seminar on PBN Introduction*	Design work of SID	T.C.	*tentative date of Seminar*
		25	Sat				
		26	Sun				
18		27	Mon	Design work of SID	Design work of SID	T.C.	group work
19		28	Tue	Design work of SID	Catch-up of design work	T.C.	group work
20		29	Wed	Documentation of STAR/Approach	Documentation of STAR/Approach	T.C.	share work
21		30	Thu	Documentation of ILS Approach	Documentation of SID	T.C.	share work

Daily Schedule

	Month	Day		Iitems AM (09:00-12:00)	Iitems PM (13:30-16:30)	Venue	Remarks
22	Dec.	1	Fri	Documentation of others	Method of validation & design verification	T.C.	
		2	Sat				
		3	Sun				
23		4	Mon	Design verification of STAR/Approach	Design verification of ILS Approach / SID	T.C.	share work
24		5	Tue	Ground validation of STAR/Approach	Ground validation of SID/others	T.C.	group work
25		6	Wed	Ground validation on site	Ground validation on site	field	group work
26		7	Thu	Meeting with Stakeholders for output	Design finalization of STAR/Approach	T.C.	group work
27		8	Fri	Design finalization of SID / others	Final documentation	T.C.	share work
		9	Sat				
		10	Sun				
28		11	Mon	Final documentation	Lecture on Safety oversight of FPD	T.C.	
29		12	Tue	Introduction of VISIO & function	FPD charting material (STAR)	T.C.	VISIO drafting
30		13	Wed	FPD charting material (Approach)	FPD charting material (SID/others)	T.C.	VISIO exercise
31		14	Thu	Review of charting depiction	Preparation for pseudo-FI/FV	T.C.	
32		15	Fri	Final Examination and Evaluation	Wrap-up & Closing with Certificate	T.C.	Close OJT
		16	Sat				
		17	Sun				
		18	Mon	*Review of WGS-84 data survey for regional airports by CP*		T.C.	remote oversight
		19	Tue	*Review of CP's assignment and Preparation for next activity***		T.C.	**Observation for FPD in DYU

*T.C.: Training Center of TAN

Participants

1. Mr. AKBAR （ATC)
2. Mr. CHORSHANBE (ATC)
3. Mr. BEHRUZ（ATC)
4. Mr. ILHOM（AIS)
5. Mr. RUSTAM (AIS)
6. Mr. Farruh (AIS), Mr. Habib (AIS) and
   Anyone as observers

OUTPUT/RESULT

- TARGET
  - Review of current conventional flight procedures in Dushanbe
  - Redesign one procedure among STAR, Instrument Approach Procedure and SID respectively, and new ILS RWY27 approach
  - Use WGS−84 data for object and geographical map
- OUTPUT/RESULT
  - FPD approved with documents, figures and AIP charts

The Project for Capacity Development of ATC in Tajikistan
TF-3 Activity (3-5)

Guidance of OJT on Flight Procedure Design

1 Nov. ～ 15 Dec. 2017

By Mr. YAMANE, FPD Specialist

Review & Theory of Flight Procedures Design

- Review previous materials, remember･････････

What is FPD?

What did you do in Basic training?

What are the main factors for FPD?

●Concept

●Rule

●Data

Review & Theory of Flight Procedures Design

□Standards・・・・・・・・・

ICAO Doc 9602 Quality Assurance Manual for Flight Procedure Design

★Volum 1 Flight Procedure Design Quality Assurance System

Points;

●IFP Process

●Description of each step

Practical Approach of Flight Procedures Design

- Concept……
- Factor……
- Relationship with stakeholder & System of airspace user……
- Guidance & Reference materials……
- Input……
- Output……

Implementation of OJT

- Lecture; instruction, advice or review part by part
- Exercise; main group working
- Output; manual drafting, documentation and creation of significant data or figure by theme
- Assignment; one organizer assigned by every theme
- Coordination; should be done by trainees

Data for FPD Concerned

through QA manual

- Terrain data
- Obstacle data
- aerodrome data
- Aeronautical data
- Navaid data
- Existing significant points to local navigation (Local restriction)

Annex 15;
- *Data Quality Requirement*
- *Obstacle collection surface (2.0% up from ARP)*

【Exercise】
Data for FPD Concerned in Dushanbe AP

- Consider current aquisition/preparation

□ terrain data　within 30nm

Raster data, Vector data(ArcGIS), paper map with scale 1/50,000, or (1/200,000, if we need for MSA)

※SK42, if any.

- ◆ with Information on terrain surface,
  WGS–84 system coordinate,
  40m counter, spot elevation, sample of surveyed OBST, residence area, no vegitation, River, Road, Power lines,

【Exercise】
Data for FPD Concerned in Dushanbe AP

Obstacle data

- Simple OBST, almost 70 points,
- WGS–84 coordinates, UTM cooedinates,
- elevation from MSL=ortrometric data, Top height,
- Survey data by FAZO, and put on the map data,
- 10–15 points around AP,
- NOT enough, then survey roughly by handy measure,
- SK–42 data, if reliable, convert to WGS-84 data by calculation.

【Exercise】 Data for FPD Concerned in Dushanbe AP

Aerodrome data

- Surveyed data on Some positions, such as ARP, THRs,
- Surveyed data of some obstacle such as AFL TWR,
- Magnetic variation; through WMM web site
- Weather statistic data; section in TAN

【Exercise】
Data for FPD Concerned in Dushanbe AP

- Aeronautical data

- Latest data through reliable authority,
- Sections concerned;
  - ◆ ATC; traffic operation, flow formation
  - ◆ ATFM/AIS; airspace use, en-route

【Exercise】

Data for FPD Concerned in Dushanbe AP

Navaid data

- LLC, GP 27, LLC, GP 09 suerveyed data, WGS–84 and elevation
- 4 NDBs, 3 beacons, PR, JD, SX, WG,G, FN, F suerveyed data, WGS–84 coordinates and elevation
- Service coverage etc. are informed by Engineers

【Exercise】
Data for FPD Concerned in Dushanbe AP

- Existing significant points for local navigation (Local restriction)

NO flight or restricted flight conditions

- Prohibit(Mountainous) area -- north side of RWY
- Militaly area – 2 sites east and west of AP, with coordinated restrictions
- Location, figures and detail shown in AIP
- Operating aircraft without restriction of category
- None of Noise abatement, such as
- Climb gradient, descent gradient,

User Requirement for FPD Concerned in Dushanbe AP

➢ Preliminaly Study for current Conditions

- ATS route / flow configuration
- ATC operation
- Users requirement as flight operator, and others
- Airspace design / MVA MSA, Drawing/figure, MNM alt value
- Environmental constraints
- Schedule, and Others
- Relation with MOT, regulatory or procedural work

User Requirement for FPD Concerned in Dushanbe AP

➢Pick–up Stakeholders and Objects

- Flight procedures, ATS routes;
- ATCors/TAN, Flight operators/Tajik air, Samon air, Red–cross, heli–copter,
- Military; new or modify the routes or procedures, helicopter

- ATC and others;
- ATC/TAN, ATC/Military, Termez/Samarkand ACC,
- position, altitude, routes, direction,

User Requirement for FPD Concerned in Dushanbe AP

➢Pick-up Stakeholders and Objects

- Flight Operators … aircraft type and performance
  - Tajikair, Somonair, Red cross,
  - Military (helicopter)

- Aerodrome Operator
  - DIA; RWY data, to accommodate with WGS-84 data, OBST data if necessary, and noise mitigation
  - Military; operational conditions, if necessary

User Requirement for FPD Concerned in Dushanbe AP

➢Pick–up Stakeholders and Objects

- Airspace Users
  - Military; training/prohibit/restric area operating information such as configuration, height, occupying hours
- Others
  - Organization, Business, Private users

【Exercise】
User Requirement for FPD Concerned in Dushanbe AP through QA manual

- Preliminaly Study for current Flight Procedures

- Containing;
  - En-route (ATS routes)
  - STAR
  - Instrument Approach Procedures
  - SID
  - Others such as holding points

【Exercise】

User Requirement for FPD Concerned in Dushanbe AP

through QA manual

- Preliminaly Study for current Flight Procedures
- Find problem or benefit
- Points to be assessed or researched;
  - In–bound and out–bound flow, connecting on en–route, congestion area/point with traffic volume,
  - Operational request from ATC or flight operator
  - Air space constrain as hand–off point, TMA/APC range,
  - position of FIX, distance, altitude assignment, decsent or climb gradient,
  - turning, straight–out or short–cut course
  - navigation condition, bearing, course, intersection, coverage
  - Constrain from others, etc.

Data for FPD Concerned

through QA manual

- Terrain data;complete, scale enough
- Obstacle data; put on the map, find additional OBST on site after basic design
- Aerodrome data; facility data OK, <u>weather data</u>
- Aeronautical data
- Navaid data;
- Existing significant points to local navigation (Local restriction)

∗Collect and validate Data
∗Find problem, etc.
∗Prepare questionnaire to data owner / stakeholders

【Exercise】
User Requirement for FPD Concerned in Dushanbe AP

- Pocedure design information acquisition
  - ATS route / flow configuration
  - ATC operation, flight routes by Air Lines
  - Users as flight operator, and others
  - Airspace design / MVA
  - Environmental constraints
  - Schedule, and Others

∗Collect and validate Data
∗Find problem, etc.
∗Prepare questionnaire to data owner / stakeholders

Practices of FPD on OJT

- Overlay
- Modify
- Create new
- New procedue of ILS RWY27 Approach to succeed on existing NDB approach procedure
  - with WGS–84 data on PANS–OPS
  - Consensus?; New 2 STAR, 2 SID, ILS 27, option 1 New NDB approach

Practices on 2nd Step

- Data Collection and validation or preparing questionnaire, if necessary
- Create Conceptual Design
  - Situation awareness and assess current condition,
  - Find procedure concept and main condition to create or improve

** Do on 8 NOV.*

Conceptual Design

Flight Course Configuration

- Spreading basically
- Crossing points or altitude of outbound and inbound
- Converging points of outbound or inbound
- Position and altitude
- Impact for ATCors, traffic flow

Create Conceptual Design (New SID)

- User Comments or Desires

RWY09;

- (Right) Turn at Alt direct to PR……Operators (SMR, TJK) request many times
- Climb gradient 6.6% by terrain near AP to make straight–out course to JD….. Operating Instructions of DYU
- Maybe, Climb gradient 4.8% below is acceptable.
- Coordinate passing Alt over PR

Create Conceptual Design (New SID)

- Studying

RWY09; Option, for Northbound

- North mountain area provide restriction area, except route area between AP and SX,
- West area below FL190 and East area below FL180,
- Buffa area should be added.

Climb Straight-out on RWY course to [certain alt.] then turn right direct to [FN/WG], then SX, climb gradient 6.6% or above is requred until [ft], or

Climb Straight-out on RWY course to [certain alt.] then turn right to intercept and proceed on bearing xxx° of JD, to xxx(new FIX) then turn to [FN/WG], then SX……, climb gradient 6.6% or above is requred until [ft].

Create Conceptual Design (New SID)

- Studying

RWY27; Option, for North bound to SX

- Climb straight out to xxx(ALT) then turn left to WG/W/VEVAN, then to….

\# *coordinate climb gradient*
\# *check passing ALT over FIX/W/WG or mountain area*
\# *check direct to FIX(VEVAN) with PANS-OPS criteria*

Create Conceptual Design (New STAR)

- Studying

RWY09; Option, from Southside

- from LIVDI to PR to FN(IAF), then ILS, 2 NDB approach…RWY09

- to make proper descent of higher alt arrival or sequence for many arrival,

coordinate descent gradient with Flight operator
coordinate sequencial method with ATC

Create Conceptual Design (New STAR)

- Studying

RWY09; Option, from Eastside

- from JD to (new course/bearing) to New FIX(Abeam FN), to New FIX2 (Base, IF on approach procedure) then approach....RWY09
- to make shorter course to approach.....,

coordinate NAVAIDS performance and checking descent ALT or gradient with Flight operator
coordinate spacing or sequencial method for traffic with ATC

Create Conceptual Design (New STAR)

- Studying

<u>RWY09;</u> Option, from Northside

- No benefit course of new STAR for both RWY09/27 from SX

confirm benefit with flight operator and ATC

Create Conceptual Design (New STAR)

- Studying

RWY27;

- From West side; from PR bearing xxx° to New FIX (South abeam WG), then proceed course xxx° to New FIX2(Base of RWY 27, IAF), then start approach.
- to make short course, distance.

Research new course and Alt. from PR, descent gradient.

Research constructing new FIXs.

Create Conceptual Design (ILS Approach RWY27)

- Studying

New procedure for RWY27

- Initial segment (IAF)….. Course, length, OCA
- Intermediate segment (IF)….. Course, length, OCA, SDF
- Final segment (FAF/FAP)….. LOC course, GP, OCA
- Missed approach segment (MAPt/DA)….. Course, length, Climb Gradient
- Holding/Initial point ….. Inbound course, length, MHA

Create Conceptual Design (ILS Approach RWY27)

- Studying

New procedure for RWY27

- To use present NDB approach configuration and missed approach, holding too but change final approach to ILS approach,

\#   ILS Procedure of straight–in from JD may be optionally researched, if available.

\#   OAS/BIS assessment is important and carefully.

Continuing to Work below….

- Preparation Data for FPD Concerned
- Situation Awareness for FPD, around Airp ort, RWY09 THR, RWY27 THR
- ….. Others effective

Preliminary Design (ILS RWY27 approach)

Basic data

- LOC–THR distance; 415m LOC–nearest THR +
- RWY distance (LDOR)
- Which THR is used for ?;
- DME elevation; DME is installed!! It 's very good news !!
- 6.4m AGL by engineering figure,
- DME providing 'km' distance/range
- RDH; *15* m
- LOC Sector width 210m<

Preliminary Design (ILS RWY27 approach)

Basic data

- LOC beam: ° ? (RWY center line or LOC center–THR center course)
- GP angle; 3.0° 2.991° →3.0° (OAS software)
- LOC Service coverage;
- GP Service coverage;

・・・.. These data are obtained by Radio Engineer in AD company

Preliminary Design (ILS RWY27 approach)

Basic data

- Flight check / Carriburation data is noted. (copy)
- ILS (RWY27) user manual by manufacturer (INDRA) is noted
- Layout drawing is noted

…….. These data are provided by Radio Engineer in AD company

- Temperature data, annual average at DYU

…….. The data are provided by Meteorological Section in TAN

Preliminary Design (ILS RWY27 approach)

① STAR for RWY27

- Connecting point IAF or IF position
- OKTAB, ABNAR, or others ….. as staring
  - ✓ Change coordinate of SK42 to WGS84 's
  - ✓ conversion formula ← by excel from web site
  - ✓ ° value ⇔° ' " value by mathematics calculation
- Plot OKTAB, ABNAR on the map
  - ✓ to use grid of map, 1 '=?cm
  - ✓ Find the position measuring distance from certain grid line
  - ✓ Plotting error or Drafting error acknowledged by PANSOPS
- Put IAF(end) and intermediate FIXs on STAR

Preliminary Design (ILS RWY27 approach)

① STAR for RWY27

- Route planning from ABNAR
- Assign IAF(end) and intermediate FIXs on STAR
  - ✓ course(navigation), altitude, descent gradient
  - ✓ ABNAR direct to VASUD
- Apply criteria….
  - ✓ course(straight): T
  - ✓ distance/segment area (Fix tolerance area);
  - ✓ ABNAR semi-width 8NM decrease by 30° to semi-width 5NM, distance ABNAR to IAF(VASUD)

Preliminary Design (ILS RWY27 approach)

① STAR for RWY27

- Apply criteria….
  - ✓ MNM altitude (MOC);
  - ✓ Control obstacle (primary area or secondary area);
  - ✓ vegitation;
  - ✓ descent gradient;
- Assign IAF(end) and intermediate FIXs, if necessary on STAR

Preliminary Design (ILS RWY27 approach)

② FNL / OAS (Precision segment)

- Route planning straight course from IF to FAF/FAP (LOC course); providing bearing (NDB) to IF
- Assign FAF to use DME-GP (FAP?); ___nm

 # course(navigation), altitude, descent gradient

- Apply criteria.... OAS area construction

 # input; LOC-THR distance 415m + 2705 m correct? =3120m (dispalased THR)....(calculate UTM XYdata; 2698.69m?) T

Preliminary Design (ILS RWY27 approach)

② FNL / OAS (Precision segment)

- Control obstacle (primary area or secondary area);
- Vegitation;
- Descent gradient;
- Drafting parameter calculated to use EXCEL software and arrange proper format;
- Use OAS software provided by ICAO through Website;

Preliminary Design (ILS RWY27 approach)

◆Process & Procedure (Practice & Example)

1. Design STAR

<u>MOCA</u>

OBST: 2,420m (counter) ….. +40m + 30m (vegitation) = 2,490m
MOC: 300m (Primary area)
MOCA: <u>2,790m</u> ….. control OBST

OBST; 2,126m (spot) ….. 2,140m + 30m = 2,170m
MOC: 300m (Primary area)
MOCA: 2,470m …..

OBST; 1,716m (spot) ….. 1,740m + 30m = 1,770m
MOC: 255m (Secondary area)
MOCA: 2,025m …..

Preliminary Design (ILS RWY27 approach)

2. Design intial approach segment

- Control obstacle (primary area or secondary area);
- power line/tower; 50m (general)
- vegitation;30m (general)
- descent gradient; %

MOCA

\# OBST: 2,120m (counter) ….. +40m + 30m (vegitation) = 2,190m
MOC: 300m (Primary area), MOCA: 2,490m ….. control OBST
\# OBST; 1,812m (spot) ….. 1,840m + 30m = 1,870m
MOC: 300m (Primary area), MOCA: 2,170m …..
\# OBST; 1,781m (spot) ….. 1,800m + 30m = 1,830m
MOC: 300m (Primary area), MOCA: 2,130m …..
\# OBST; 2,320m (counter) ….. 40m + 30m = 2,390m
MOC: 20m (Secondary area), MOCA: 2,410m …..

Preliminary Design (ILS RWY27 approach)

3. Design intermediate approach segment

- assign FAF 5nm, IF 8nm (from DME)
- drafting straight area on xxx° W/WN
- Control obstacle (primary area or secondary area);
- power line/tower; 50m (general)
- vegitation;30m (general)
- descent gradient; ··· Level flight 1.5NM before FAF

IF–FAF : intermediate max, 10 nm (10–1.5=8.5 nm descent)...... 8.5nm x 1852m x 0.052 (max descent gradient)= , IF set at nm on straight course from DME

※ DME, horizental distance is determined with NM (temporary, KM will be used, if necessary later.), vertical distance is with 'm' not feet...... in This OJT consensus

Preliminary Design (ILS RWY27 approach)

3. Design intermediate approach segment

MOCA

OBST: 1,232m (spot) ….. 1,240m + 30m (vegitation) = 1,270m

MOC: 150m (Primary area)

MOCA: 1,420m → 1,450m ….. control OBST

FAF mnm ALT 1,450m → FAF position (1450m – ?)

※OBST; 920m (contour)…. +40 + 50m = 1,010m (Antenna)

MOC: 150m (Primary area)

MOCA: 1,160m ….. disappear with FAF 7nm from GP

Preliminary Design (ILS RWY27 approach)

4. Design presicion segment

- Draw OAS (data calculation by OAS software)
- Extend X surfase till FAF alt.
- OAS check

OBST: 1,232m (spot) ….. 1,240m + 30m (vegitation) = 1,270m
MOC: 150m (Primary area)
MOCA: 1,420m → <u>1,450m</u> ….. control OBST

※OBST; 920m (contour)…. +40 + 50m = 1,010m (Antenna)
MOC: 150m (Primary area)
MOCA: 1,160m ….. disappear with FAF 7nm from GP

Preliminary Design (ILS RWY27 approach)

How to use OAS software

- OBST or Terrain data; position and height
- Position; X, Y coordinate with origin of THR（displaced THR27）
- Height; above THR elevation
- OBST data from FAZO and terrain on map… position measuring on map;

\# *Height：calculate（Top height －THR elevation）*

\# *First, Find OBST inside OAS and surface name*

\# *M/A climb gradient 2.5%, 3.0%, 4.0% or 5.0% (fixed)*

【Temporary Result】
OJT on FPD – ILS RWY27 Approach

- First design

STAR

Modified design

ABNAR – VUSUD;

ABNAR; intersection fix

VUSUD; intersection fix

MOCA 2,790m→2,800m (2420+40+30+300m=2790m)

OBST; Terrain spot (Mountain) 2420m?, position?

next contour 40m, tree 30m

MOC; 300m (primary)

Initial Segment

VUSUD (IAF) – JD – IF; course change 117° ?

MOCA 2420m→2450m (2050+40+30+300=2420)

OBST; Terrain spot (Mountain) 2050m?, next contour 40m, tree 30m

MOC; 300m (primary)

【Temporary Result】

OJT on FPD – ILS RWY27 Approach

Missed Approach
straight and turn at Alt (left turn to the south)
Design with track back (inbound to WG)
T/alt; 1,800m (1025m above THR)
turn area drawing (parameter, cat-D)
M/A climb gradient; 5.0%, SOC position
inbound track; 046° T
OBST
Terrain spot 1125m (1160m+30m=1190m), do =900m, AH*=1768.5m … control
Terrain spot 1605m (1640m+30m=1670m, d0= 11100m, AH=2278.5m…3rd
Terrain spot 1465m (1480m+30m=1510m, d0= 8100m, AH=2128.5m…2nd
Description;
climb on track (266° ?) to 1800m Alt, turn left on track 046° to WG, climbing to (holding alt) and join the holding area. maintain clibm gradient is 5.0%
Reaching Alt. on WG ….. ?
＊AH; Acceptable Height

【Temporary Result】
OJT on FPD – SID

➢ New SID of RWY09

<u>Circumstances of airspace or NAVAIDs, ATC</u>

Restriction area on Mountains, <u>FL190</u> (Northwest), <u>FL180</u> ()Northeast)

<u>Planning & Conceptual design</u>

Draft 1.

Turn at Alt.

Right turn to southside,

Direct/course to PR

Draw straight course and departure area, and estimate OBST impact

→ Climb gradient 4.6%, T/alt 1500m AGL(DER)

Draft 2.

Course (overlay present SID on first stage)

Turn at Point

Right turn to FIX, then

Proceed/course to GETLI

【Temporary Result】
OJT on FPD – SID

New SID of RWY09

Process of Turning Dearture (at Alt.)

1. Find remarkable OBSTs
2. Calculate MOC on those OBSTs
   higher {75m or (dr+do)x0.8%}
3. Calculate PDG to be clear of OBST
4. Choose highest PDG 6.0% control OBST 1914m terrain spot, MOC 190m
5. Find T/alt. and Draw area with this PDG T/alt; 2000m MSL
6. Check OBST again to comolete or modify

close−in OBST?… Nothing,

Terrain 900m contour near DER affected?…?

PDG 6.0% untill 2200m (control obst…1920+30+190=2140m)

After PR… continue SID to GETIZ, … NDB area/increase MOC, +−5nm/MOC300m, +−8nm/MOC300m,

En−route MOC 300m → 600m (mountainous area) proper in Tajik airspace?

Documentation

Purpose

- Traceability; To understand contents of Flight procedure,
- Assurance; To conduct design verification and validation accurately
- Accountability; To share Flight procedure with others well, and
- Sustainability; To keep quality and modify the change of conditions or requirement efficiently and recreate procedures in the future, if necessary

Documentation

Output of documentation

- Summary of flight procedure design,
- Check list of documents, validation or design verification
- Materials for ground/flight validation,
- Materials for publication or AIP chart
- Materials for coordination with stakeholder

Documentation

Works of dcumentation

■To record or report result, process, reason and others useful about flight procedure design

■To compile or construct contents, conditions/requirement,

■OBST, calculation, applied criteria, and **other effective information,**

■ (**refer to PANS−OPS P1S2C4**) , on original format

■To explain on design figures/charts

■To prepare and use the same format and rule of description

■To describe and store the data such as coordinate, position,

■course, distance or etc., for theoretical note

Documentation

Remarks

■OBST should be in accordance with ID, number or name in the OBST surveyed list by FAZO

✓ Terrain + next contour* + tree/vegitation(30m)…

** 40m by FAZO production map*

■Tree/vegitation as control obstacles should be survayed, and plus increasing height.

■FIX, OBST or other points should be described with Coordinate (WGS-84 base) additionally.

■Refer to QA manual (Doc 9602), and "6.3 Process Description"

Documentation

Works on OJT

- Check drafting figure and design memo, pick-up the data or description along Expert instant, according to construction of flight procedure design to conduct design verification at once.
- Adjust them to your/TAN 's style with Rossian/Tajik language
- Arrange materials for validation (ground validation* or flight validation) or AIP publications, and the check list

**Ground validation includes Stakeholder meeting, on-site check and design verification*

Documentation

General parts

Sample of General parts of Summary of flight procedure design

〈General〉 *in reference to JAPANESE documents*

Type of procedure or ATS route; e.c. IAP(Instrument approach procedure), SID

Name of procedure or ATS route; e.c. Dushande ILS RWY27 Approach

Distinct of New establishment or Revision

Name of applied criteria document / e.c. PANS-OPS 5th edit Amdt 7…

Magnetic Variation data; (NAV) or (ARP) or (RWY THR)

ARP(Air field /AD) elevation(elev.) m (FT),

**THR number and elevation(elev.) m(FT)….. for IAP*

**DER number and elevation(elev.) m(FT)….. for SID*

Requirement of design; (New establishment or modification)

Remarks; points of modificatios from present procedure… only Revised case and others

WPT/FIX list; name distinct of new/existing and coordinates

List of Design file/drawing; Name and (scale), date

** designers ' name, documentation/drafting date*

【Practical Example】

Documentation - GENERAL

- Basic Contents of Description
  (Summary of flight procedure design)

<General>

- To describe general matters
- for instance; Design of ILS RWY27
- Type of procedure or ATS route; e.c. IAP(Instrument approach procedure), SID, STAR, En-route
- (Airport name; Dushanbe)
- Name of procedure or ATS route; e.c. ILS, NDB RWY27
- Distinct of New establishment or Revision; New
- Name of applied criteria document; e.c. PANS-OPS 5th edit Amdt 6… exactly

【Practical Example】

Documentation - GENERAL

➢ Basic Contents of Description (Summary of flight procedure design)

<General> …cont ‘d

- General conditions, such as ARP coordinate, AD elevation, VAR
  - ✓ ARP coordinate; 38° 32’37.32925” N 68° 49’29.29630” E (38° 32.6 ‘N, 068° 49.5’ E…..published data)
  - ✓ VAR; magnetic variation; 4.27° E(Y2018)*. …Expected Procedure Published data ＊check Web site
  - ✓ THR RWY09 elev… 784.8820m(784.7m…Published)
  - ✓ THR RWY27 elev… 771.3894m(NOT Published),
  - ✓ THR RWY27D elev… 774.8501m (774.7m…Published)
- Requirement of design; (New establishment or modification)
- Remarks; points of designed procedure, describe briefly …. Coorporated with AD company…..
- Designer … every name in FPD Team,

【Practical Example】

Documentation - GENERAL

➢ Basic Contents of Description (Summary of flight procedure design)

<General> ...cont ‘d

- documentation complete date 01 DEC 2017/ ver.1
- drafting complete date 30 NOV 2017/ ver.1
- Attachment; list up of attachment materials such as below
  - ✓ WPT/FIX list; name, distinct of new/existing and coordinates
  - ✓ List of Design file/drawing; Name and (scale), date

<Design Summary Description>··· for instance

- ILS RWY27 including STAR, Initial, Intermediate, Missed approach
- Precision Segment by OAS (5.0%/4.0%/3.0%/2.5%) or BIS
- Holding, MSA(Minimum Sector Altitude)
- … and others

【Practical Example】

Documentation - GENERAL

➢ Basic Contents of Description (Summary of flight procedure design)

<Precision approach procedure>

- To explain contents on design of ILS approach such as output data of design, conditions or requirement, applicant criteria, process of culculation and obstacle…
- To describe by segments respectively, including such Circling, MSA and Holding as non−precision approach.

for instance;

Operation Category; Cat−I

GP angle; 3.0 °, RDH;17.89m, LOC−THR distance; 3,120 m

【Practical Example】

Documentation –Precision Segment

<Precision approach procedure>

- FAT (final approach track); xxx.x ° M/ xxx.x ° T, (promulgation xxx °)
- if Off-set; on-set angle xxx.x ° ,
- intersection point; (GP height over THR) hh.h ft (m)
- THR- distance, dd.dd NM (km), if Off-set Fictious THR (coordinate)
- GP intersection Alt; hhhh FT (m)
- FAF/FAP; name, position, distance from THR, DME distance, if any

… (name) D27FA, Coordinate, 5nm from GP/DME, 5DME

【Practical Example】

Documentation – OAS

OAS assessment;

- Z surface gradient… 5.0%
- OBST penaterate surface; name/ID, top altitude, coordinate, x-y system data, surface position, equivalent height,

  # All data surveyed are plotted, assessed, and listed up

  ✓ GP antenna 27; 794.71m elev., 38° 32' 40.80268" N 68° 50' 05.18290" E, (x, y)=(-250m, 125m), botom of OAS, no equivalent,

  ✓ Fire station; 801.0m elev./ 26.15m H , 38° 32' 43.78859" N 68° 49' 27.88157" E, (x, y, z)= (-1150m, 200m, 6.25m), Z-surface, equivelent 6.3457m above THR
- OCA/H; by A/C category…. data, calculation (DA/DH)
- OCH;Cat-A,?, Cat-B ? CAT-C ?, Cat-D= 67m?, DH=60m? (OCA?, DA?)
- RVR; install or NOT Yes, 3 (middle, both end side)
- Relevant lighting facility; ALS/PALS 900m RWY27, RTHL27, RCLL, RTZL?
- Depiction with OBST data, counter measure, if any.

【Practical Example】

Documentation – VSS

Visual Segment Surface (VSS); … Type of ILS approach

- Description with OBST data, counter measure, if any.

  ∗attachment the figure of ILS.

OCH 57m…… 58m（design & assessment again?）

NO OBST penetrate,

OBST Antenna 784.3m , 784.3−774.5（THR）=9.8m＜15m

Building 777.9m, 777.9−774.5=3.4m＜15m

Terrain+tree Unknown height?….. Check later

【Practical Example】

Documentation – PA MISSED APPROACH

<Precision approach procedure>

Missed approach segment,

SOC…. position, height

cat−D; x=747.35m, height…OCH−49m=8m (THR)

type….. description of procedure

Turning Missed Approach (turn at designate Alt),

Straight to turning alt (1,000m above THR/ 1,800mALT), then t

to southside or left, direct WG

Turn at Alt;

OCA…. by A/C cat with OBST data, MOC

OCA; 831m….Cat−D

【Practical Example】

Documentation – PA MISSED APPROACH

<Precision approach procedure>

Missed approach segment,

SOC→M/A T/P (intermediate stage)…

clmb gradient with OBST data, MOC,

SOC→T/P(latest T/P) distance; 18,850m, Turning Alt=1,800m

(Earliest T/P; OAS D point)

Turn initiation area; Terrain 1190m(1125m spot, next contour 11

<1768.5m (AHO), MOC 30m, M/A:5.0%…control OBST

∗Turn alt= 1190+50=1240m →1300mm…∗ Turn alt increas

(Check OBST later)

【Practical Example】

Documentation – PA MISSED APPROACH

<Precision approach procedure>

Missed approach segment,

M/A T/P → end/holding point (final stage)… clmb gradient, OBST with OBST data, MOC,
position of end and holding data with MHA
Climb gradient… 5.0%, end point… WG (NDB)
OBST Terrain 1670m (1605m spot next contour 1640+30)
Cat-D <2278.5m (AHO), MOC 50m, M/A 5.0%
∗more later describe
Holding; over WG, MHA FL130 (≒3978m)(present chart)
∗ detail refer to holding page
optimum reaching alt along nominal track… 4000m > FL130
∗(Turn at FIX)
For Cat-A/B/C … almost same item recorded

【Practical Example】

Documentation – PA FINAL DATA

<Precision approach procedure>

Final data;

OCA/H or DA/H by A/C category respectively,
Cat-A ?, Cat-B ?, Cat-C ?, Cat-D OCH=57m, OCA=831m
(Cat-A/B/C should be designed and reported later)
＊ We may re-design and calculate data to use OCH=67m again, after design verification and validation.

For preliminary data for F/I-V, AIP chart and store all involbed lighting system data; approach lighting system (length, density)?, RWYTHL?, REDL, (no RWCL, RTZL?))
MNM data (Chart MNM box data) describe later with chart drawing
assessment result with OBST data (all data table as attachment, if any)

【Practical Example】

Documentation – PA INTERMEDIATE

<Precision approach procedure> ILS approach RWY27

Intermediate segment;

IF; (name), position/coordinate, alt (and *procedure alt., if any), DME,
I27IF(new), 11NM from GP-DME/ (coordinate data? …later) , alt. 1750m
FAF; (name, position/coordinate, alt (and FAP procedure alt.), DME
I27FA(new), 6NM) from GP-DME/ (coordinate data?…later,
FAF/FAP 1250m* (FAP 4.9NM from GP-DME)
*SDF as well, if any; NO
Course; 266 ° M/ 270.0 ° T … LOC (name checked later?),VAR 4.27° E?
Distance; 5.0 NM/km, (*divided if SDF set)
Descent gradient; by parts with calculation data
(1750m-1250m)/{(5NM-1.5NM)x1852m/NM}=7.7%>5.2%
(exceeding criteria)

【Practical Example】

Documentation – PA INTERMEDIATE

〈Precision approach procedure〉 ILS approach RWY27

Intermediate segment;

OCA/H with OBST data ===> MOCA

Terrain contour 920m + 40m + 30m = 990m (primary area)

OCA 990+150=1140m (MOC 150m)→1150m ＜ FAF/FAP 1260m

【Practical Example】

Documentation – PA INITIAL

<Precision approach procedure>

Initial segment; description of procedure and type

IAF… (name), position, distance, course change degree, if any

course… direction 266° M/ 270.0° T, course change 0 degree, if any,

Distance… NM (KM),

∗Lead-info. (if course changed)…

OCA(H)…with OBST data, MOC, calculation process

IF-SDF; Terrain contour 1360m + 40m + 30m = 1430m

→ 1450m (primary area) OCA 1450m+300m=1750m (MOC 300m)

Descent gradient;

SDF data, OBST and calculation, if any

Lead radial/bearing/DME; ,

*if course change more than 70° and below 120°

Other restrictions, if any

【Practical Example】

Documentation – PA

<Precision approach procedure>

… continuous as below;

Circling approach procedure, if applicable,

Holding procedure, and

MSA

….

All segments or procedures satisfied with criteria and intentional condition,

Yes ===> Complete

No ===> Re-design to cope with improper result

【Practical Example】

Documentation – NPA INITIAL

<Non-precision approach procedure>

Initial segment; description of procedure and type

… almost the same with PA

【Practical Example】

Documentation – PA INTERMEDIATE

<Precision approach procedure> ILS RWY27 approach

Second design

Intermediate segment

course… direction 266° M/ 300.0° T (extend FNL course)

*FAF position… 6? NM from THR / 6.0 DME-GP on 300.0° T LOC , ° ‘ “ N/E?

*FAF/FAP altitude… 1350m, *described in Final(precision) segment, 5nm

IF position… 12? NM from THR / 12.0 DME on 300.0° T LOC, ° ‘ “ N/E?

alt….. 1750m

MOCA… 1300m

OBST; Terrain contour 1080m, ° ‘ “ N/E?, Primary area

1080m + 40m + 30m + MOC(150m) = 1300m < 1350m

Distance… 6 NM

Descent Gradient… 5.2% (level in 1.5NM before FAF)

【Practical Example】
Documentation – PA INITIAL

<Precision approach procedure> ILS RWY27 approach

Second design

Initial segment

course… direction 029 ° M/ 025.0? ° T course to JD,
then 266° M/ 300.0° T on LOC course
course changing by 115 ° (> 70° , < 120°)

Lead info…. WG? bearing ?°

IAF position… fix name VASUD, 38 ° 26 ‘11.76“N/069 ° 15 ‘00.00”E
alt…. FL120 (existing)

SDF position….16? NM from THR / 16.0 DME on 300.0° T LOC, ° ‘ “ N/E?
alt…. 2300m

【Practical Example】

Documentation – PA INITIAL

<Precision approach procedure> ILS RWY27 approach

Second design

Initial segment

MOCA (SDF – IF)… 1730m

OBST; Terrain contour 1360m / ° ‘ “ N/E?, Primary area

1360m + 40m + 30m + MOC (300m) = 1730m <IF alt 1750m

MOCA (IAF – SDF)… 2300m

OBST; Terrain contour 2080m / ° ‘ “ N/E?, Secondary area

2080m + 40m + 30m + MOC(159m) = 2309m > 2300m

*MOC calculation?

*(coment) check height of tree, if it is lower than 20m, then it is clear.

Documentation - General

<u>Basic Contents of document</u> (Summary of flight procedure design)

<Non-precision approach procedure>

●To explain contents on design works such as output data of design, conditions or requirement, applicant criteria, process of culculation and obstacle,

●To describe by segments respectively, including Circling, MSA and Holding.

Documentation - FINAL

<Non-precision approach procedure> **for instance**

Final approach segment;

FAT (final approach track); ° M/ ° T,

point of intersection to RWCL m from THR

FAF; (name, position, alt (and procedure alt.), distance

∗SDF as well, if any

MAPt; (name, position, alt (and procedure alt.), distance

Descent gradient; by parts with calculation data

OCA/H with OBST data

VDP* position, if any. with calculation process

VDP; Visual Descent Position

Documentation – MISSED APPROACH

<Non-precision approach procedure>

Missed approach segment; description of procedure

MAPt→SOC (first stage)… OCA by A/C cat with OBST data, MOC
SOC→M/A T/P (intermediate stage)… type, position,
clmb gradient with OBST data, MOC,
M/A T/P → end/holding point (final stage)… clmb gradient
with OBST data, MOC,
position of end and holding data with MHA

VSS;

assessment result with OBST data

Documentation – FINAL DATA

<Non-precision approach procedure>

Final data;

●OCA/H by A/C category respectively, with lighting system data

●MNM data (Chart MNM box data)

●Assessment result with OBST data

Documentation - INTERMEDIATE

<Non-precision approach procedure>

Intermediate segment; description of procedure

IF… (name), position, distance, course change degree, if any

course… direction ° M/ ° T, distance,

OCA(H)…with OBST data, MOC, calculation process

Descent gradient,

∗SDF data, OBST and calculation, if any

Other restrictions, if any

Documentation - INITIAL

<Non−precision approach procedure>

Initial segment; description of procedure and type

IAF… (name), position, distance, course change degree, if any

course… direction ° M/ ° T, course change degree, if any, distance,

OCA(H)…with OBST data, MOC, calculation process

Descent gradient,

∗SDF data, OBST and calculation, if any

Lead radial/bearing/DME; ,

∗if course change more than 70° and below 120°

Other restrictions, if any

Documentation - CIRCLING

<Non-precision approach procedure>

Circling / Visual manuvering segment;

description of procedure and type/limitation

IAF… (name), position, distance, course change degree, if any

course… direction ° M/ ° T, course change degree, if any, distance,

OCA(H)…by A/C type with OBST data, MOC, calculation process

∗OCA lower limit by A/C type, if any

∗OCA final… combine Final approach data

Other reference or restrictions, if any

Documentation - HOLDING

<Non–precision approach procedure>

<u>Holding procedure</u>; description of procedure and type/limitation

Holding FIX… (name), position, distance, course change degree, if any

Providing NAV…name and type of Facility

Entry type… all derection or limiting

Holding pattern… type, turning direction, inbound course ° M/ ° T

Design Data… assumed alt with reason, IAS, outbound time(s) / DME

OCA(H)…by A/C type with OBST data, MOC, calculation process

Other reference or restrictions, if any

∗Promulgation data… course, (direction), MHA, limitation, if any

Documentation - MSA

<Non−precision approach procedure>

MSA

Centre; (name), position/coordinate, VAR(Magnetic variation)

Sector; describe type of sector and restriction, if any

OCA(H)…by Sectors respectively with OBST data, MOC, calculation process

Other reference or restrictions, if any

∗Promulgation data… direction, MSA, limitation, if any

∗Compare the existing MSA data, if necessary

Documentation - SID

<SID>

General

RWY; (name/No.) RWY09

Description; charactor of procedure in reference to AIP chart,

Modify existing SID RWY09

Design concept and reason; description Straight−out then turn…

Type of SID; Straight, Turn at point, Turn at Alt.

DER; alt (2530.8 FT) / 771.4 m

RWY centre line; bearing/course 090° M/ 086 ° T

Documentation - SID

<SID>

Straight climb area (stage)   Turn initiation area

Initial track;   guidance, course.... by heading, NAV or DR

off-set, track adjustment

086° T/DR (RWY Heading or Heading 090), on-set, No track adjustment

*Turn at designate Point; (name), coordinate ° N, ° E

position/distance of NAV(NDB/VOR/DME) NM

DER-Earliest T/P (dz); distance, check on criteria

* No case

Documentation - SID

<SID>

<u>Straight climb area</u>

Turn at designate Altitude; 2000m (no feet)

Turn initiation area;

Description, calculation with OBST data(name, positon/coordinate, top altitude, MOC)

OBST Terrain 1094m ° ' "N/E?

1120m, MOC ? m,

RAO=1120m+30m+MOC m= m, Climb gradient ? %

1120m+75m=1195m < 2000m

∗ Highest obstacle in the turn area, Control OBST described respectively with data calculation

∗ RAO(Required above Obstacle)…. m,

Nominal Above Obstacle….. m

Turn before DER; Yes/No, optionally if NO, earliest turning point moves to DER

Documentation - SID

<SID>

<u>Turn area</u>

Track/course after Turn; description, heading / designate course

Right turn, direct to PR(NAV)

(to intercept, intercept angle °, DR distance)

OBST; Terrain 1971m, ° ‘ “ N/E? (control obstacle)

RAO 2000m+30m+MOC(190m)=2220m, PDG=6.0%

(dr+do)x0.8%= …… =190m

Documentation - SID

<SID>

Assessment

PDG; 6.0 % untill 2200m Alt (? FT) (after that, return to 3.3%)

OBST; all assessment on OIS(2.5%).....

penetrate (name/ID/No.), top altitude/terrain altitude+tree, position/coordinate, distance (dr/do) m,

MOC (primary/Secondary) m

OBST1 Terrain........ RAO m, PDG1=

OBST2 Antenna.... RAO m, PDG2=

.....

＊Highest obstacle in the turn area, Control OBST described respectively with data calculation

＊Required Above Obstacle.... m,

Nominal Above Obstacle..... m

Documentation - SID

<SID>

Close–in OBST

Existing; Yes/NO

OBST; (name/ID/No.), top altitude, height, position/coordinate

OIS; height, relation to OBST, MOC, PDG height over OBST

….. with calculation, other information (counter measure)

Altitude restriction; if any at or above FL180 (west bound) or FL190 (North or northwest bound) over PR

Track distance; 118619m / nominal(direct) track from DER to PR

Reaching altitude at the end; (6.0% until 2200m then 3.3%)
5331 m = FL170 at PR < FL180/190 actually keep higher climb gradient a little to PR (above 2200m,3.8%)

*description, actual climb gradient; % , if necessary

Others

Documentation - STAR

<STAR>

General

Name, airport, New/Rev;
Criteria applied;
Common data; Date, magnetic variation, AD elevation, requirement, remarks, etc., ID/name/No of design sheet or figures
FIX(WPT); name and position/coordinate,

Summary of procedure;

result of route, altitude or restrictions, if any,
back-ground of design

Documentation - STAR

<STAR>

Design Detail   Re-design

Segment; Straight/Arch by each segment (between FIX and FIX)

Straight, ABNAR – VASUD(IAF)

course 030.8 ° M/ 026.5 ° T, distance 21.5 km/ 11.6 NM,

FIX(WPT); (name), position (DME/bearing intersection),

coordinate (° ' " N/E)

ABNAR… 38 ° 15 ' 36.51 " N 069 ° 08 ' 44.77 " E

VASUD… 38° 26 ' 11.76 " N 069° 15 ' 00.00 " E

When (DME) arch; direction (CW/CCW)…CrockWise, CounterCW

Arch radius… NM (>10NM)

Turning at FIX; (name/ID/No.) … degree… °

＊70° more but below 120°

description, lead radial/bearing/distance, if any

Documentation - STAR

<STAR>

Design Detail (cont 'd)

OCA; by each segment (between FIX and FIX).... FT

Reason.... OBST(name/ID/No.)/Terrain ,

Position (coordinate)... , (° ' " N/E),

Top altitude m, MOC (Primary/Secondary) m

MOCA (ABNAR – VASUD) 2490m

OBST Terrain 2126m, primary area, 2160m+30m+MOC(300m)=2490m

Alt. over VASUD.... 2500m

Altitude restriction; description, reason, No

Descent gradient; % (< 8%), calculation, distance... m,

starting altitude... FT, Ending altitude... FT

ABNAR(3650m), (3650m−2500m)/21.5km= 5.35% < 8.0%

Others;

Speed limitation etc., if any.......*RNAV more data

Design Review

Pick up review points & Site awareness objects

•SID RWY09 / 27

① Tree around DER .... < 30m? (straight area)

② Mobile antenna near DER ...< 40m? (ditto)

③ Terrain surface on middle north edge (ditto)

④ if higher OBSTs are there near DER (ditto)

Design Review

Pick up review points & Site awareness objects

•ILS RWY27

① Intermediate area OBST on hill top?

② Higher OBST are there near THR on RWY C.L.

③ Re−measure GP antenna ground elev. & height.

④ There are still higher OBSTs or not wetside

⑤ There are still higher Tree/OBSTs or not near THR09

Ground Validation

Primary design points

- **OBST data and others**

  FAZO data are available.

- **Procedure critical points (SID 09_OJT)**

  PDG 6.0% (5.0% < ?)

  heavy A/C, Russian A/C … difficult

  smaller A/C … possible

  Speed limitation ?…. NO effective

  Control OBST(Terrain) top ? tree or NOT

  Reaching alt on PR…. FL180(west)/ FL190(N.W) or above? …..
  if PDG 3.8%, clear

Ground Validation

Primary design points

- **Procedure critical points (SID 09_OJT)**

PDG 6.0% (5.0% < ?)

heavy A/C, Russian A/C … difficult

smaller A/C … possible

Speed limitation ?…. NO effective

Control OBST(Terrain) top ? tree or NOT

Reaching alt on PR…. FL180(west)/ FL190(N.W) or above?

….. if PDG 3.8%, clear

Ground Validation

Primary design points

■ Procedure critical points （for ILS RWY27_OJT trial）

FAF, IF, IAF, SDF position.... coverage of GP? (FAF), LOC? DME?

GP effective coverage; facility data (lateral 37km?) / vertical ?

LOC effective coverage; facility data (lateral 47km?) / lateral bearing ?....

･･･ every fix locates within coverage.

alternative SDF/IF......by NDB? providing WG, intersection SX

IAF position.... VASUD, providing JD, bearing WG

Final Segment; distance... 6 NM (possible measuring 0.5NM),

FAF position/coordinate

VSS.... OBST/Tree ＜ 15m? or below VSS by calculation

Terrain, **primary area**, **secondary area**, or **at edge**

==> <u>OCA calculation</u>

【Practical example】

Ground Validation - Critical design points

- ■ Procedure critical points (ILS RWY27_OJT Trial)
- ➢ Final Segment; distance... 6 NM
- ➢ Intermediate Segment; distance... 6 NM

  IF ; FIX tolerance area apply 15% surface, OBST under 15% surface is possible NOT to be effect to OCA
- ➢ Initial Segment; .... Straight, or course change to intermediate segment (<90°),
- ➢ Descent gradient

Terrain, under primary area, secondary area, or at boundary edge

- ➢ OCA calculation with MOC on mountain area or not, if applicable

【Practical example】

Ground Validation - Critical design points

- ■ Procedure critical points (ILS RWY27_OJT Trial)… cont' d
- ➢ Precise measuring height of GP antenna RWY27…to measure it by a long ruler;
- ➢ Height on ground level…. antenna body 14.60m, small fragile pole +2m. ground level 779.96m(FAZO report)
- ➢ Height from THR level… (779.96+14.60) −774.85m =19.71m……>15m,
- ➢ Penetrate OAS; 2.5%… GP27, Fire Station(Z surface) 801.065m ….. ha '=
- ➢ What % of Z surface?, M/A climb gradient?
- ➢ Initial, Intermedient Segment; Allocate position of FAF, IF, SDF to use 15% down-gradient obstacle free rule,
- ➢ Make check list…!

The Project for Capacity Development of ATC in Tajikistan
TF-3 Activity (3-5)

Guidance of Observation for FPD in Dushanbe Airport

1 Feb. ～ 7 Mar. 2018

By Mr. YAMANE, FPD Specialist

Coordination Meeting (TF3M/12)

1 Feb 2018

Agenda

1. Confiramation of Schedule, Place & Members of FPD team
2. Target procedures of design & conditions
3. Issues of establishment of QA & Approval System of IFP

Coordination Meeting (TF3M/12)

Agenda 1: Confiramation of Schedule & Members of FPD team

- schedule, member, place

Agenda 2: Target procedures of design & conditions

- Overlay, Modify or Create new ?
- What condition?
- They coordinate and select as a consensus of TF-3, TAN

Agenda 3: Issues of establishment of QA & Approval System of FP

- Next stage

Summary of Oservation

- To supervise and courch creating practical flight procedures in Dushanbe Airport by FPD team in TAN, so that to complete almost series of IFP process except FI/FV on ICAO QA manual with approriate outputsFliP
- To supervise and courch management or coordination stakeholders and out-sourcing bodies concerned to IFP process, sor examle FI/FV organizations.

Special Task on FPD Oservation

◆ Follow up PANS-OPS basic design

- Special lecture, instruction and exercise throgh the progress of FPD works effectively
- Mr. Rustam

◆ Follow up OJT on FPD

- Personal instruction and enforcement of theorical matters throgh the progress of FPD works effectively
- Working with Mr. Akbar on priority
- Mr. Behruz

FPD team

- Manager(coordination, NOT technical business);
  Mr. Firuz / Khumorov Bakhutyor
- Leader (technical handling);
  Mr. Rustamson
- Members
  Mr. Akbar, Mr. Chorushanbe, Mr. Behruz
  Mr. Ilhom, *Mr. Burhon(assistant)*

OJT on FPD Follow-up

On going wotks or assignment (1)

1)ILS OAS re-assessment....

form up all obstacle that FAZO surveyed data by (x, y) dista

2)ILS RWY27 Missed approach segment re-design...

find T/A and climb gradient,

3)ILS RWY27 Initial and Intermediate segment re-design....

check all obstacles and terrain including terrain in Seconda area to find minimum altitude, on FAF, IF and SDF with MO and descent gradient below PANS-OPS criteria,

4)Reversal and Race track procedure parameter calculation...

create Excel file format, and try to design and draw on the tracing paper for ILS RWY27 approach, if possible.

OJT on FPD Follow up

On going wotks or assignment (2)

5)Documentation…

Prepare the form and record the result of design to pick up the main contents, conditions, reason, caliculation and supplement data,

6)Confirm FAZO…

To get modified map products and electric data soon.

7)Our targets of FDP…

To complete design, at least 1 ILS RWY27 APCH, 1 NDI 1 SID and 1 STAR including Holding pattern in the Pro as much as possible by April.

Others Memo

- Oritasan explain FPD ensuring system by picture
- manager(coordination),
- leader(technical handling),
- members

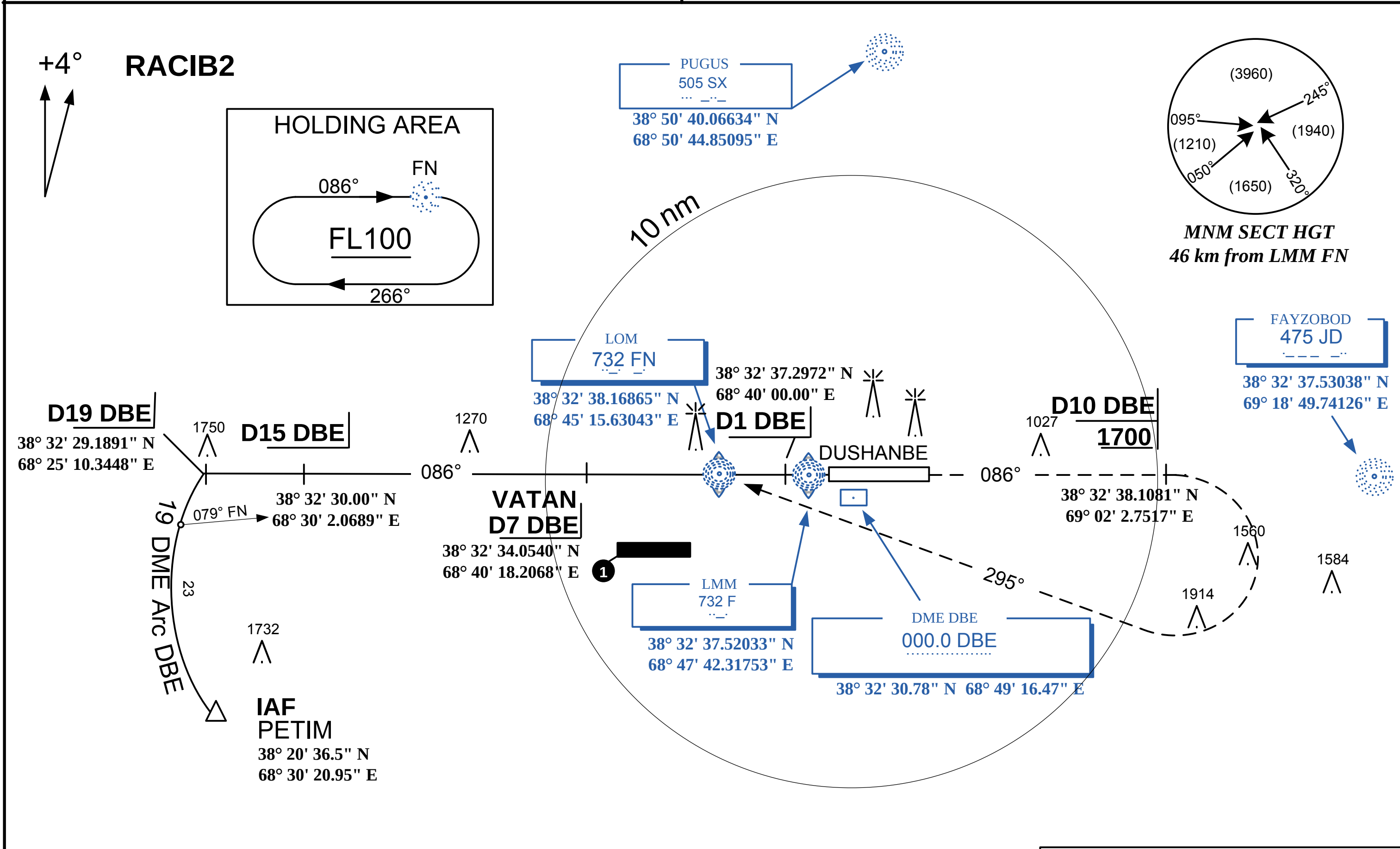
- Follow up PANS-OPS Basic Design Training
- Special lecture, instruction and exercise throgh the progress of FPD works effectively
- Trainee : Mr. Rustam

INSTRUMENT APPROACH CHART - ICAO

APPROACH	**127.100**
TOWER	**119.200**

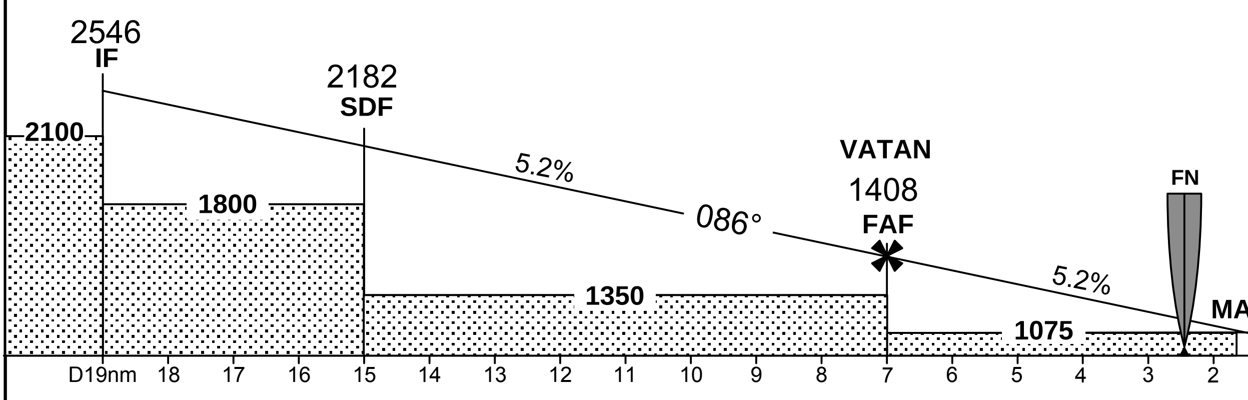
DUSHANBE, TAJIKISTAN
DUSHANBE
2 NDB RWY 09

TRANSITION LEVEL: **FL100**	AD ELEV: **783m**
TRANSITION HEIGHT: **(1800)**	THR ELEV: **784.9m**



Alt set: -mm(hPa on req);
-QFE(QNH on req).

BEARINGS AND TRACKS ARE MAG
ELEV , HGT , ALT IN METRES
DISTANCES ARE IN KILOMETRES
DISTANCES FROM DME ARE IN NAUTICAL MILES



MISSED APPROACH
Climb on bearing 086 from FN to 10 DME DBE with climb gradient 4.0% turn RIGHT Direct to FN climbing and join the holding area at FL100 and contact ATC

OCA(H)		A ❷	B ❷	C	D	CAT	CIRCLING OCA(H) SOUTH of RWY
Straight-in Approach		1075(292)	1075(292)	1075(292)	1075(292)	A	1060(276)
						B	1100(316)
						C	1390(606)
						D	1590(706)

❶ Attention
There is an aerodrome with the similar RWY bearings in south-west of UTDD AP

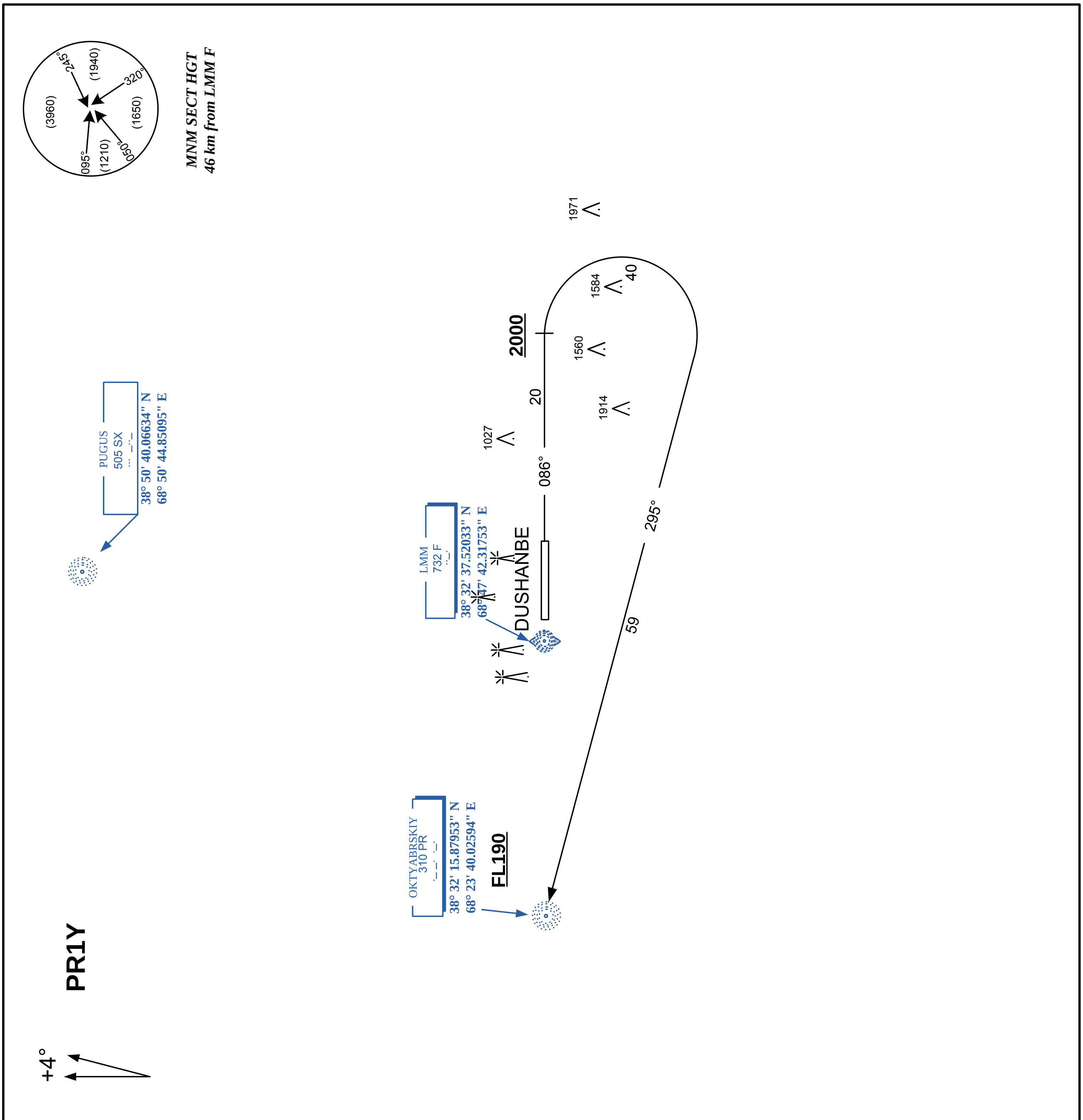
❷ Holding will be provided by ATC instruction.

GROUND SPEED	km/h	150	180	210	240	270	300	330	360	390	420	450
RATE OF DESCENT	m/s	2.1	2.6	3.0	3.4	3.8	4.3	4.7	5.1	5.5	5.9	6.4

STANDARD DEPARTURE CHART
INSTRUMENT (SID) - ICAO

TRANSITION
HEIGHT : **(1800)**

DUSHANBE, TAJIKISTAN
DUSHANBE
RWY 09



TOWER	**119.2**
RADAR	**119.2**
APPROACH	**127.1**

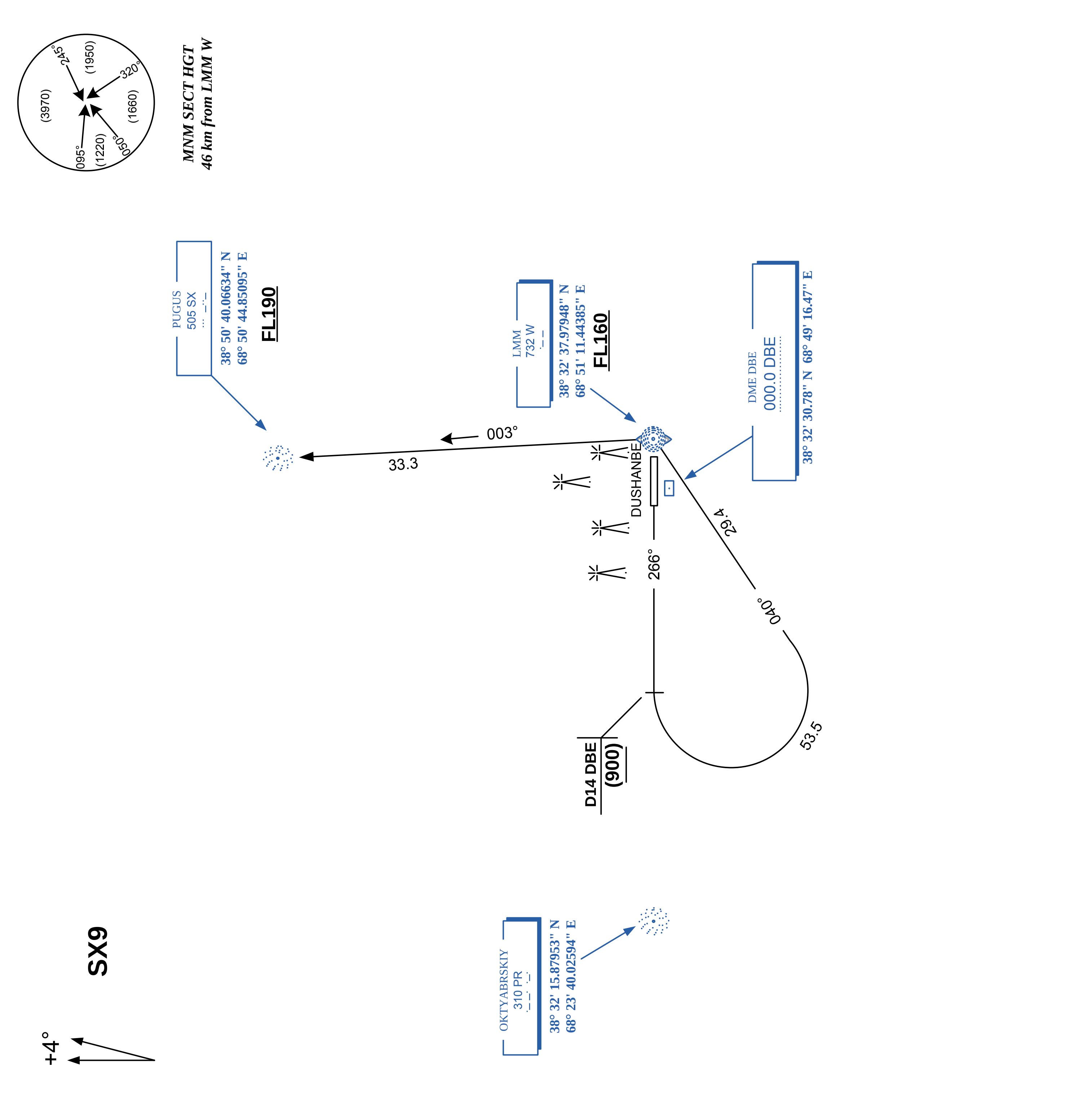
Climb on bearing 086° from F to 2000m altitude or above, than turn RIGHT 295° to PR
Minimum climb gradient up to FL100 is 6.0%

BEARINGS AND TRACKS ARE MAGNETIC
ALTITUDES, HEIGHTS AND ELEVATIONS ARE IN METRES
DISTANCES ARE IN KILOMETRES/DME

STANDARD DEPARTURE CHART INSTRUMENT (SID) - ICAO

TRANSITION HEIGHT : **(1800)**

DUSHANBE, TAJIKISTAN
DUSHANBE
RWY 27



TOWER	**119.2**
RADAR	**119.2**
APPROACH	**127.1**

Climb on bearing 266° from W to D14 DBE,
than turn LEFT 040° to W, and proceed to SX,
cross W at or above FL160
Minimum climb gradient up to FL160 is 3.8%

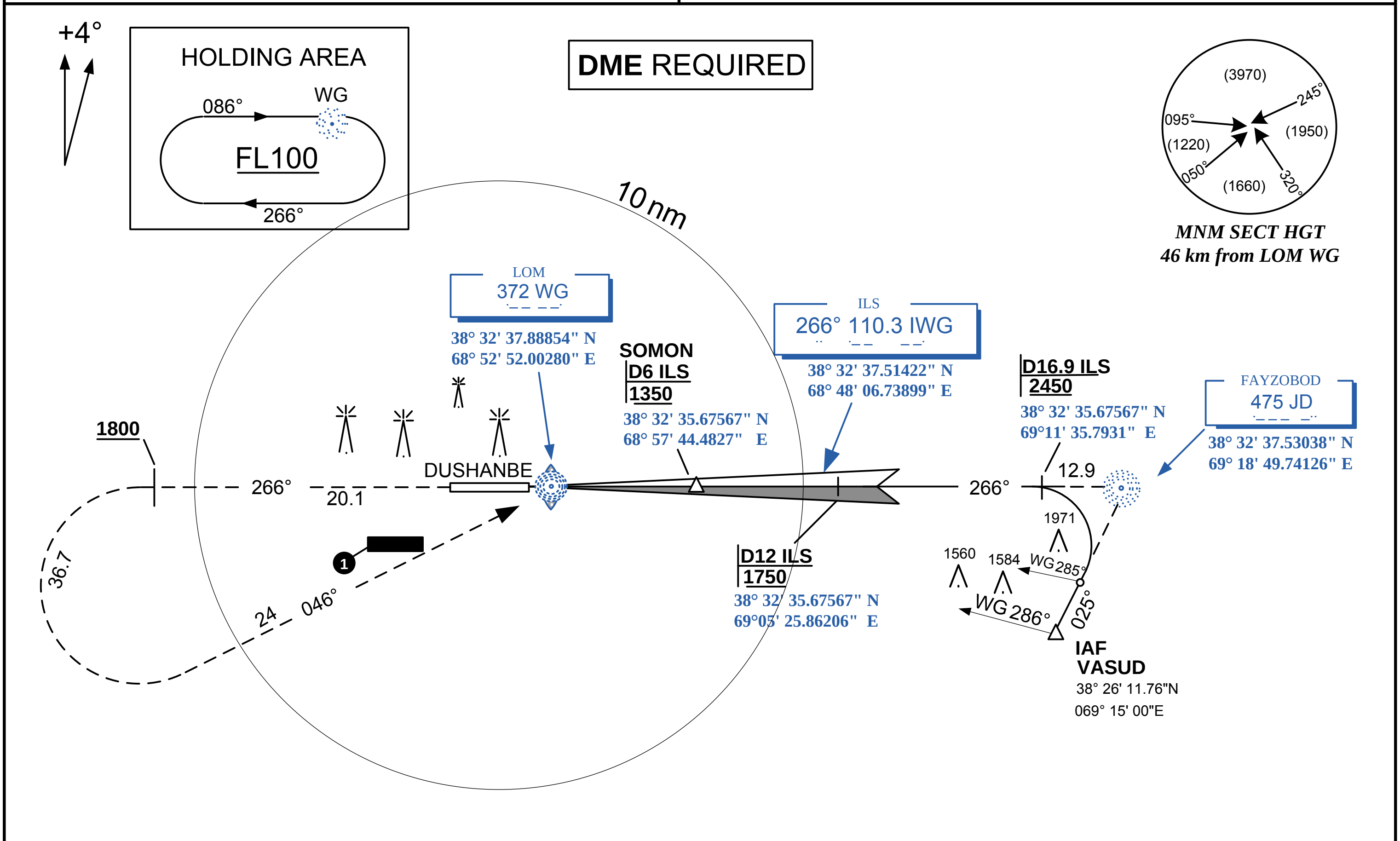
BEARINGS AND TRACKS ARE MAGNETIC
ALTITUDES, HEIGHTS AND ELEVATIONS ARE IN METRES
DISTANCES ARE IN KILOMETRES/DME

INSTRUMENT APPROACH CHART - ICAO

APPROACH	**127.100**
TOWER	**119.200**

DUSHANBE, TAJIKISTAN
DUSHANBE
ILS RWY 27

TRANSITION LEVEL:	**FL100**	AD ELEV:	**783m**
TRANSITION HEIGHT:	**(1800)**	THR ELEV:	**774.85m**

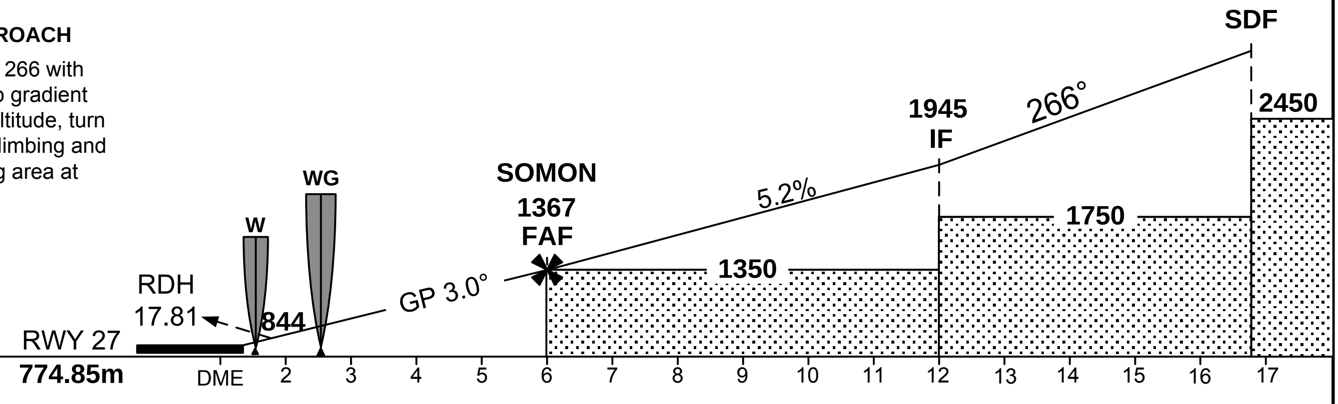


Alt set: -mm(hPa on req);
-QFE(QNH on req).

BEARINGS AND TRACKS ARE MAG
ELEV , HGT , ALT IN METRES
DISTANCES ARE IN KILOMETRES
DISTANCES FROM DME ARE IN NAUTICAL MILES

MISSED APPROACH

Climb on track 266 with minimum climb gradient 5.0% 1800m altitude, turn LEFT to WG climbing and join the holding area at FL100.



OCA(H)		A	B	C	D
Straight-in Approach	CAT I	835(61)	838(64)	841(67)	844(70)

CIRCLING OCA(H)	
CAT	SOUTH of RWY
A	1060(276)
B	1100(316)
C	1390(606)
D	1590(706)

1 Attention
There is an aerodrome with the similar RWY bearings.

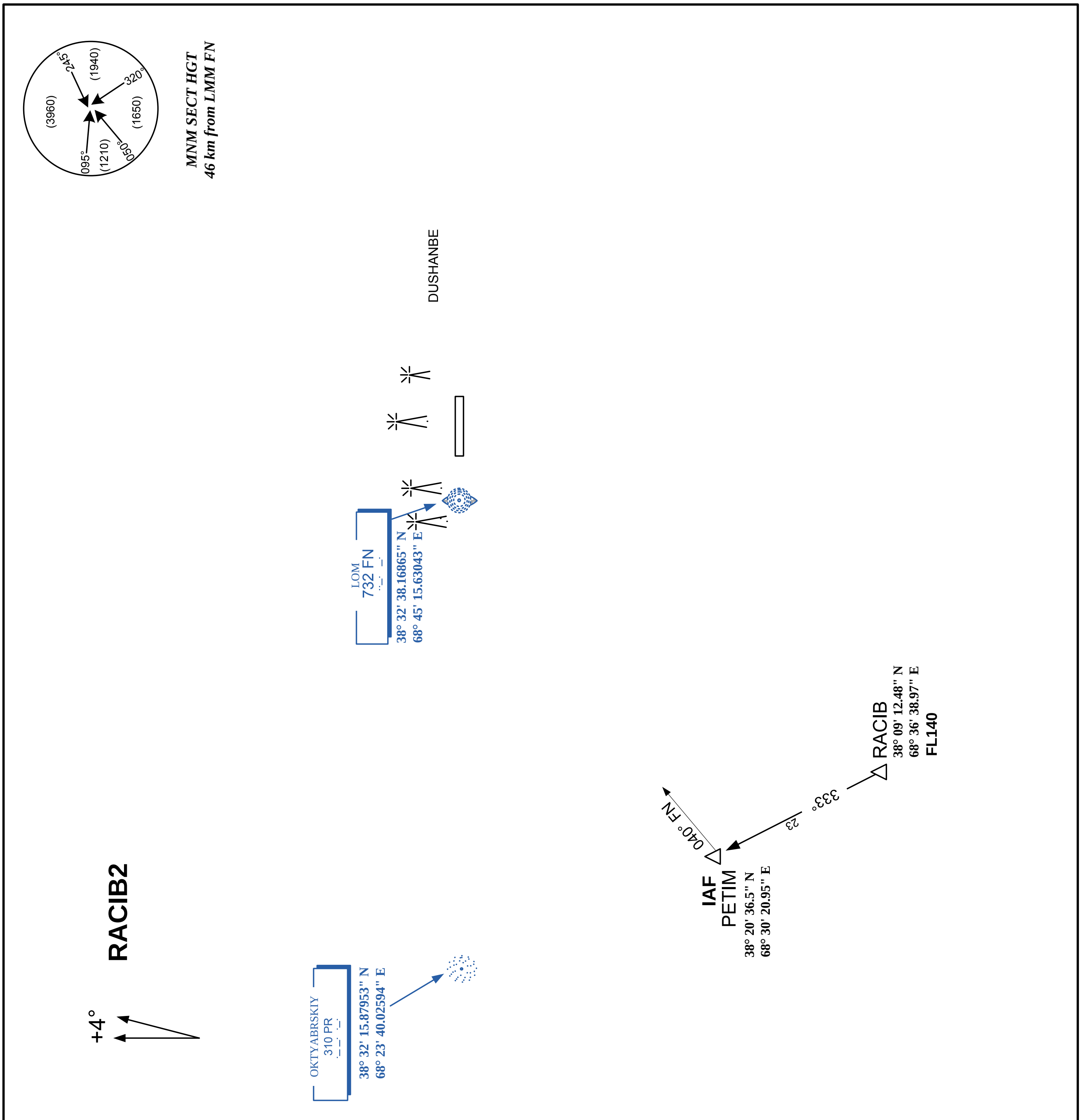
2 Holding will be provided by ATC instruction.

GROUND SPEED	km/h	150	180	210	240	270	300	330	360	390	420	450
RATE OF DESCENT	m/s	2.1	2.6	3.0	3.4	3.8	4.3	4.7	5.1	5.5	5.9	6.4

STANDARD ARRIVAL CHART
INSTRUMENT (STAR) - ICAO

TRANSITION
LEVEL : **FL100**

DUSHANBE, TAJIKISTAN
DUSHANBE
RWY 27



TOWER **119.2**
RADAR **119.2**
APPROACH **127.1**

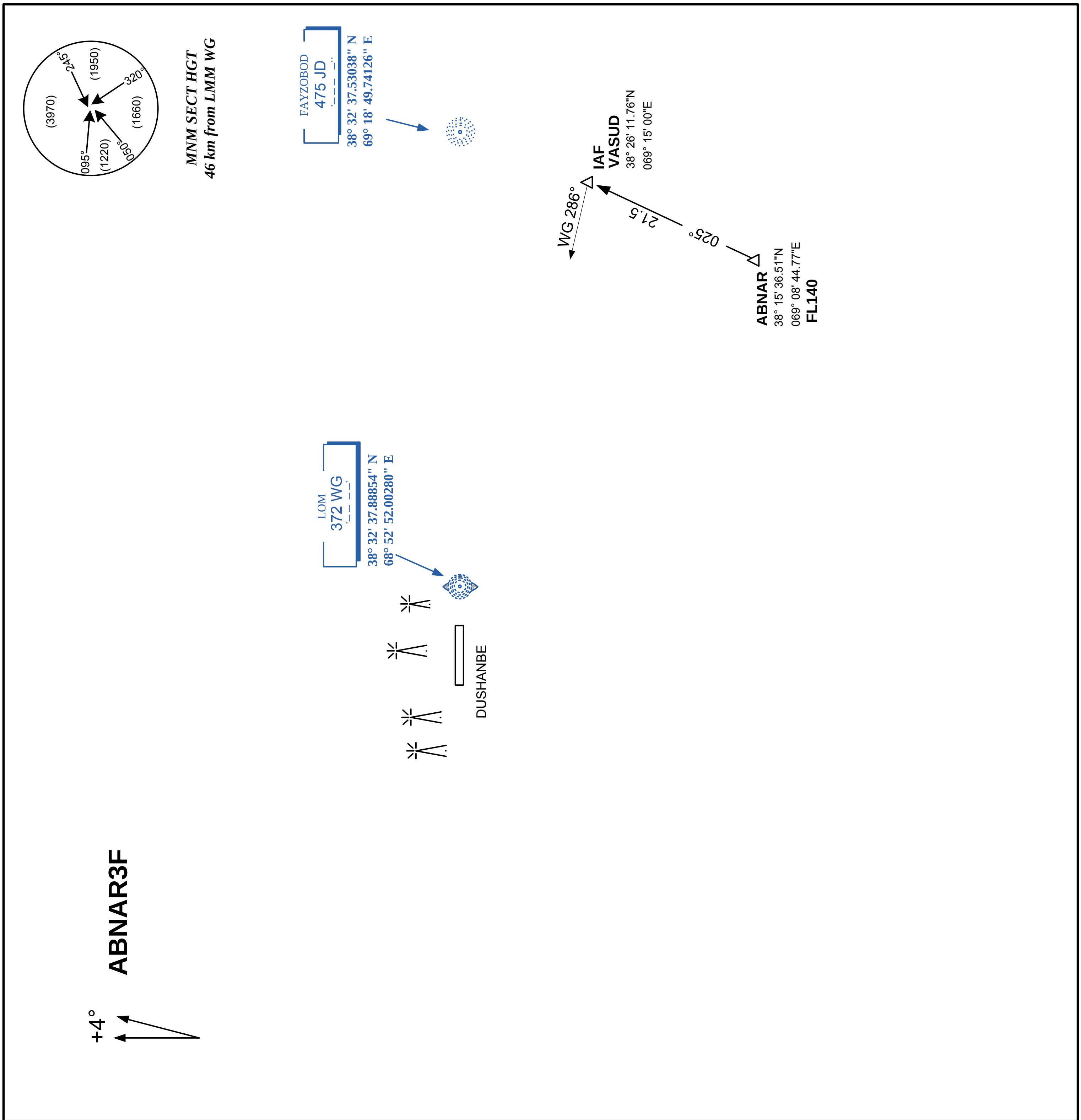
After passing RACIB at FL140 or above proceed on track 333° to PETIM (IAF)

BEARINGS AND TRACKS ARE MAGNETIC
ALTITUDES, HEIGHTS AND ELEVATIONS ARE IN METRES
DISTANCES ARE IN KILOMETRES/DME

STANDARD ARRIVAL CHART
INSTRUMENT (STAR) - ICAO

TRANSITION
LEVEL : **FL100**

DUSHANBE, TAJIKISTAN
DUSHANBE
RWY 27



TOWER	**119.2**
RADAR	**119.2**
APPROACH	**127.1**

After passing ABNAR at FL140 or above proceed on track 025° to VASUD (IAF)

BEARINGS AND TRACKS ARE MAGNETIC
ALTITUDES, HEIGHTS AND ELEVATIONS ARE IN METRES
DISTANCES ARE IN KILOMETRES/DME

PANS OPS

The Project for Capacity Development of ATC in Tajikistan
TF-3 Activity (3-5)

Finalizing & AIP Charting Design in Dushanbe Airport

Reference

10 ～ 25 APR 2018

By Mr. YAMANE, FPD Specialist

Required Works until April (Regularly)

- Design NDB/DME RWY09 Approach (cat-C/B/A)
- *Design Circling Approach/Visual Maneuvering
- Design VSS and find latest MSA
- Design Holding over FN or others
- Documentation of all designs of new flight procedures
- Consulting with stakeholders, airline, ATC or others by drawing charts of all designed procedures and description

** If you add Circling OCA on AIP chart*

Finalizing New FPD in Dushanbe AP (Outline of Activity on last stage of FPD)

Contents;

- Confirm the result of FPD works by TAN FPD team
- Design review by Expert or FPD team respectively with all outputs of 4 + α FPD package
- Pre-flight validation of new FPD to research flight operation issues on desktop or consulting operators
- AIP publication design works on finalized FPD and WGS-84 data according to PANS-OPS and the AIP manual such as contents, form and charactors.

Schedule;

- Normal as attached, Confirm venue, temporary FPO?

Finalizing New FPD in Dushanbe AP (last Stage of FPD Activity)

Practice;

- 1st week FPD matters by FPD team
- 2nd weeks AIP design exercise by associated team
- 3rd week other matters by associated team
- Introduction of FPD -QA and Ground validation for ceratin staff on ceitain date

Seminar on AIP Development;

- Presentation of FPD result by CP and presentation of FPD progress by Expert

Road map to PBN Implementation
(Development of FPD Services in Tajikistan)

Main Process;

- All Existing FPs unknown Grounds
- 1st Step... All FPs Transferred on latest PANS-OPS
- 2nd Step... WGS-84 data transferred
- 3rd Step... Introducing PBN designed on PANS-OPS one by one
- Conventional procedures exist parallelly to new PBN procedures for transitional operation

Important Issues;

- Prepare FPD Manual or other essential manual or guidance

Средство Facilities	Название станции Name of station	Позывной ID	Координаты Coordinates	
			SK-42	WGS-84
NDB	FAYZOBOD	JD	3832.6N 06918.8E	38°32'37.53038"N 069°18'49.74126"E
NDB	OKTYABRSKIY	PR	3832.0N 06824.1E	38°32'15.87953"N 068°23'40.02594"E
NDB	PUGUS	SX	3850.6N 06850.4E	38°50'40.06634"N 068°50'44.85095"E
LOM 09	------	FN	3832.6N 06845.3E	38°32'38.16865"N 068°45'15.63043"E
LMM 09	------	F	3832.6N 06847.8E	38°32'37.52033"N 068°47'42.31753"E
LOM 27	------	WG	3832.6N 06853.3E	38°32'37.88854"N 068°52'52.00280"E
LMM 27	------	W	3832.6N 06851.2E	38°32'37.97948"N 068°51'11.44385"E

OBST LIST INSIDE AD

#	OBST	Coordinates by WGS-84	Top ALT (m)
1	GP Antenna 09	38° 32' 41.84513" N 68° 48' 35.81248" E	804.7330
2	GP Antenna 27	38° 32' 40.80268" N 68° 50' 05.18290" E	794.7120
3	LOC antenna 09	38° 32' 37.06514" N 68° 51' 07.30844" E	777.8820
4	LOC antenna 27	38° 32' 37.51422" N 68° 48' 06.73899" E	789.1480
5	Control Tower antenna	38° 32' 55.09787" N 68° 48' 55.91838" E	823.0520
6	Control Tower Branch antenna	38° 32' 42.00000" N 68° 50' 01.10516" E	792.3290
7	VIP Building Flag	38° 32' 54.46321" N 68° 49' 02.00194" E	814.0440
8	Hangar	38° 32' 52.69383" N 68° 48' 22.30546" E	813.0790
9	Apron light pole 1	38° 32' 46.38703" N 68° 49' 04.94412" E	806.1510
10	Apron light pole 2	38° 32' 46.38976" N 68° 48' 59.29018" E	806.2160
11	Apron light pole 3	38° 32' 52.15300" N 68° 49' 10.71196" E	815.387
12	Apron light pole 4	38° 32' 52.08103" N 68° 49' 41.35260" E	810.4480
13	Apron light pole 5	38° 32' 53.69155" N 68° 49' 00.69374" E	813.3740
14	LMM 27	38° 32' 37.96758" N 68° 51' 11.45416" E	784.3800
15	Fire station house antenna	38° 32' 43.78859" N 68° 49' 27.88157" E	801.0650

The Project for Capacity Development of ATC in TajikistanTF-3 Activity

FPD-QA Preliminary Material <Basic Outlines>

April 2018

By Mr. YAMANE, FPD Expert

Agenda

- Guidance
- Priciple
- Definition
- IFP Participants
- IFP Design Chain
- IFP Process
- Concept of GV

Guidance

- ISO 9000 series…Quality Management System (Product or Service))

International Organization for Stardardization

- Quality Assurance Manual for Flight Procedure Design (Doc 9906)
  - vol.1 Flight Procedure Design Quality Assurance System…General, Methodology
  - vol.2 Flight Procedure Designer Training … contents, period, methodology, process

Guidance

- vol.3 Flight Procedure Design Software Validation … automation design tool requirement or specification
- vol.4 Flight Procedure Design Construction … (to be developped)
- vol.5 Validation of Instrument Flight Procedures … validation method and system on GV or FV
- vol.6 Flight Validation Pilot Training and Evaluation … FV pilot qualification, training or examination

Guidance

- PANS-OPS (Doc 8168) vol.2 P1S2C4 … to comply with process, data assurance, verification or validation

Principle of IFP QA

- Data Quality Management … FPD & validation process, both input and output
- Procedure Designer Training … qualification, competency, contents & period, examination
- *(Validation of software … specification of automation tool of FPD)*

Principle of IFP QA

- Qualifyed Data + Authorized Designer >>> Formal FPD
- Qualified Data/Requirement + Competent Designer + Competent Validator + Organized AIS >>> Formal IFP
- If an outosourcing is used, the examination must be conducted by the state authority, or the outsourcing company must verify its competency with certificates or *state approval.*

Principle of IFP QA

- Instrument Flight Procedure Design Service has been defined in Annex 11 recently.....

  >>> State responsible service

- Qualified Data/Requirement... Annex 15
- Competent Designer... PANS-OPS
- Competent Validator... QA manual
- Organized AIS... Annex 15 and manuals

  >>> The State should prepare own regulations as grounds.

Definition

- Assurance;

Review. An activity undertaken to determine the suitability, adequacy and effectiveness of the subject matter to achieve established objectives (see ISO 9000:2000 *Quality management systems — Fundamentals and vocabulary*, section 3.8.7).

Validation. Confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled (see Annex 15 — *Aeronautical Information Services*).The activity whereby a data element is checked as having a value that is fully applicable to the identity given to the data element, or a set of data elements that is checked as being acceptable for their purpose.

Verification. Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled (see Annex 15).The activity whereby the current value of a data element is checked against the value originally supplied.

- check others important technical words

IFP Participants or Stakeholders

- Stage

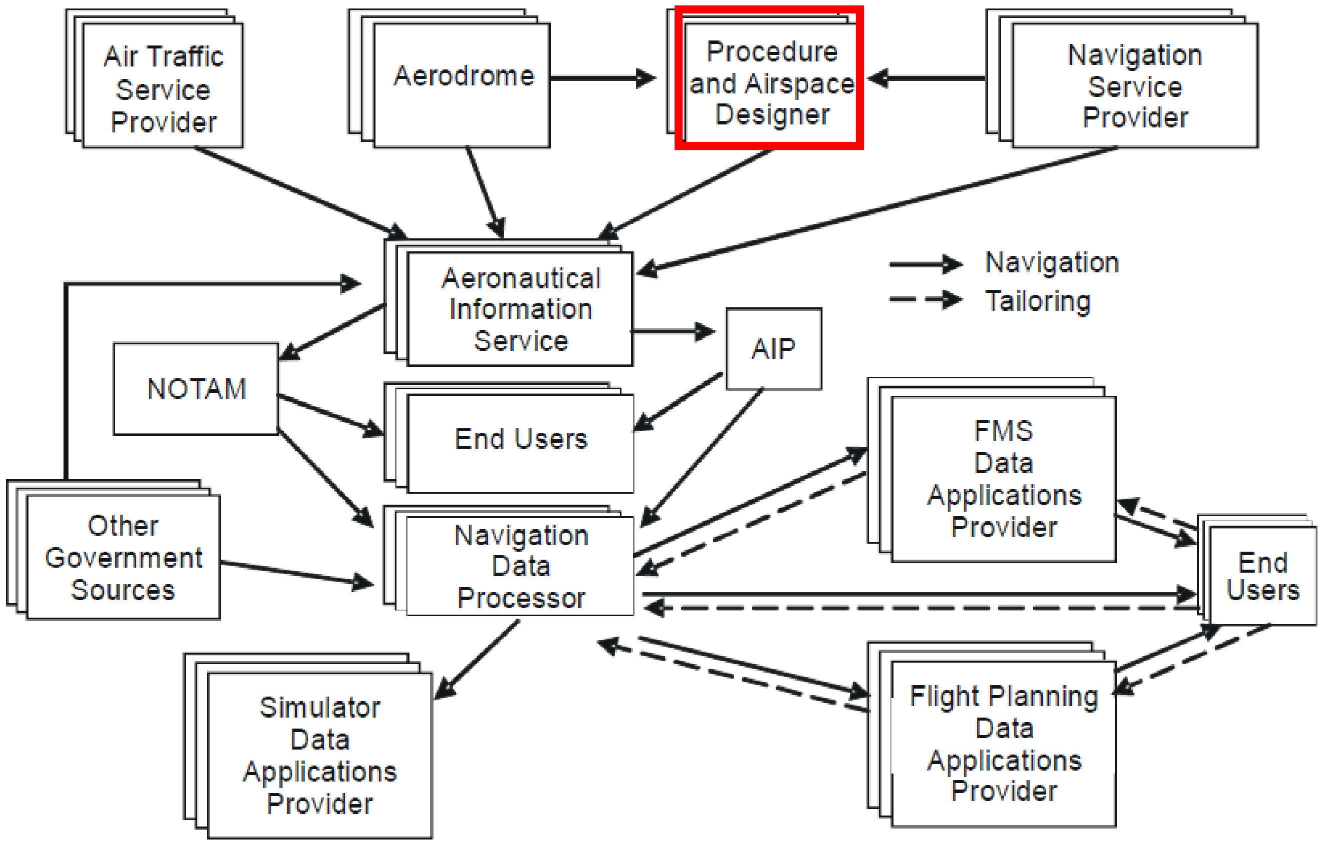
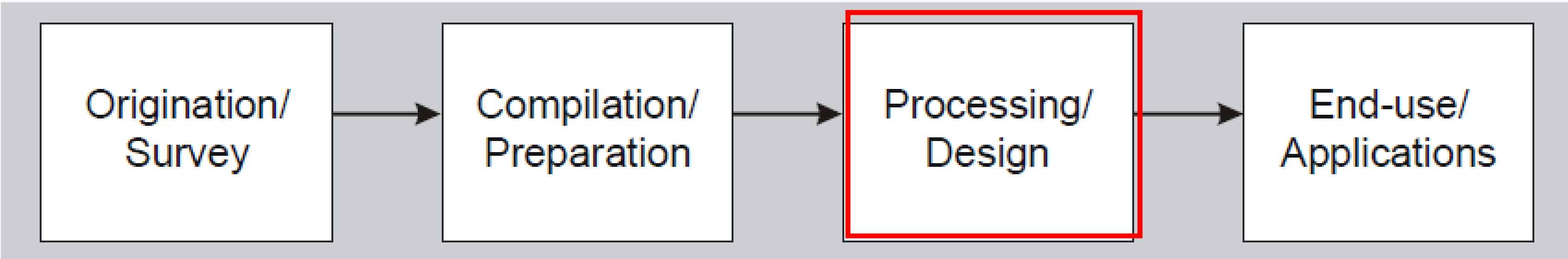


Figure 1. Participants in the development of an IFP.

IFP Design Chain

- Basic process

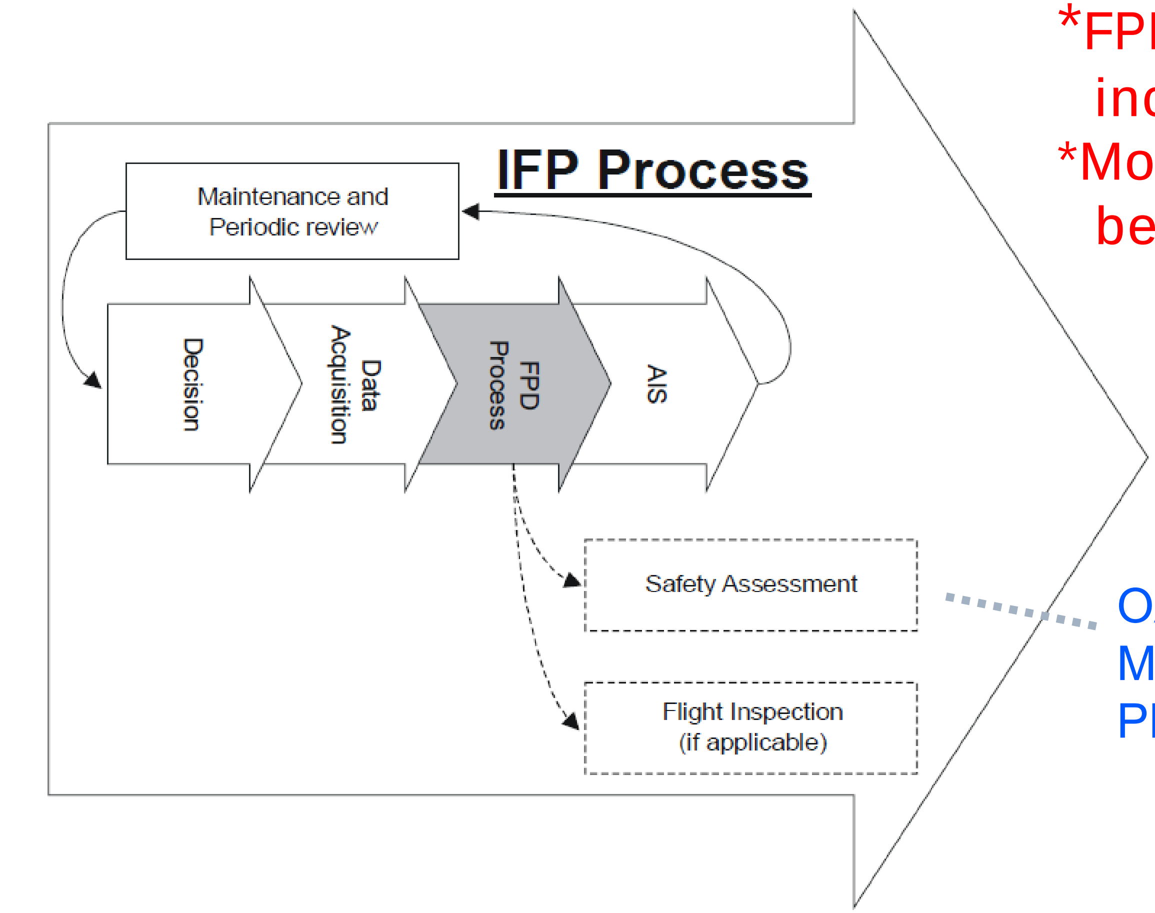


** Design and validation*

- Concept refer to other samples
- Basic data should be compiled and stored on the appropriate format or requirement
- Cyclic implementation at least 5 years

IFP Process

☐IFP development process



*FPD process include Validation
*Modification will be done as maintenance

OAS check for ILS,
MNM/OCA check for NPA
PDG check for SID

IFP Process

- See Figure 2 … IFP process flow diagram; QA manual vol.1, FPD should comply with IFP process
- See Figure I-2-4-1. Instrument flight procedure process; PANS-OPS vol.2
- Process description … QA manual

>>> For outsourcing, documentation should be requested completely with output of software, if they use.

Concept of Ground Validation

- QA ,anual vol.5 … Validation of Instrument Flight procedures
- Validation … Confirmation, through the provision of *objective evidence, that the rquirements for a specific intended use or application have been fulfilled. This activity consists of ground and flight validation

*output of application of computer or automation tool, data review

- Items verified through GV … Accuracy and completeness of all obstacle and navigation data considered in procedure design, and any other factors by FV

>>> Validation Process flow chart … See Fig. 1-1

Concept of Ground Validation

- Independent IFP Design Review … QA manual

Who? … flight procedure designer other than the one who designed,

What? … Review of IFP design package,

How? … # confirm correct application of criteria,

confirm data accuracy and integrity,

Verify mitigations for deviations from criteria, if any…,

othetrs

Concept of Ground Validation

Practice of IFP Design Review …

- Input …Detailed report of IFP design
  (FPD package or documentation)
  *Main FPD package… 1. Drawing with OBST/terrain map
  2. Design Descriptions
  3. Chart Drawing

- Main practice … for **FPD package;**

•Review Input data, calculation and output data/data style,
•Confirm application of criteria,
•Retry to measure parts on design drawing with OBST/terrain map,
•Examine control OBST and critical points of design
•Other specific matters

Concept of Ground Validation

Practice of IFP Design Review …

- Verification… Subject, part of designing process, by designer's view
- Validation … Object, confirm corrigenda, style of output data, by product's view
- Validation terget … for **FPD package**;

As design review;

- Input data & criteria, specially OBST identification
- Output data/data style

As pre-flight validation

- Operational requirement…. To check impact to IFP operation

--- Consult or ask for A/L, if required, with draft chart

- Safety analysis

The Project for Capacity Development in ATS in Tajikistan
TF-3 Activity

Follow-up Guidance of Flight Procedure Design

September 2018

By Mr. YAMANE, FPD Specialist

Concept of Project Taskforce-3

★*Abstract from Project Design Matrix (PDM)*

〈Overall Goal〉

To improve Air Traffic Services (ATS) in Tajikistan

〈Output 3〉

To enhance capacity of Aeronautical Information Services (AIS) officers with regard to ICAO recommendations

〈Indicator - outputs〉

3-4 *2 flight procedure designers* have successfully completed basic course on PANS-OPS.

3-5 *2 flight procedure designers* have successfully completed OJT on conventional flight procedure design.

3-6 *Draft of Aeronautical Information Publication (AIP)* of the model airport has been produced.

Concept of Project Taskforce-3

★*Abstract from Project Design Matrix (PDM)*

〈Activities – collaborative works between Tajikistan and Japan〉

3-4 To conduct basic training on flight procedure design (PANS-OPS).

3-5 To conduct OJT of flight procedure designers for model airport (Dushanbe).

3-6 To produce draft of AIP of the model airport (Dushanbe).

draft AIP ≒ draft chart of flight procedures

〈Inputs〉

- ■Flight Procedure Design Expert (Japanese side),
- ■AIS Training and others as necessary in the third countries
- ■AIS/Flight Procedure Design Task Force (Tajikistan side)
- ■*TAN assigns AIS personnel*
- ■Class room, equipment, data, information related to PJ (Tajikistan side)

TJ-ATS Project Sub-Activities Plan Taskforce-3

〈abstract〉

3-4	Training on basic PANS-OPS Flight Procedure Design (Lecture and Exercise)	FPD Expert provides PANS-OPS conventional Flight Procedure Design Training to nominated 1 AIS and 3 ATC officers. The training consisted a lecture on FPD regulation / guideline and drawing exercise using map of Hanamaki airport in Japan which was brought by Expert on a tracing paper. Expert will bring two sets of drawing tools for four participants. Expert will submit developed training material to JICA as one of output of this activity.	2 AIS 2 ATC 2 observers	6 weeks x1 2017/4/11-5/26	Doc8168 FPD Expert developed training materials drawing tools
3-5	WGS-84 data survey (Step-1) (Order)	Making two PACS (Primary Airport Control Station) in Model airport Dushanbe using Static GPS method by FAZO. FPD Expert supports making specification for ordering survey works to FAZO, and coordinate PACS marker making with Dushanbe International Airport Company (DIA).	TAN Airport Geodesy	2 weeks 2017/5/29-6/9	Doc9674 Implementing by Project Coordinator
	WGS-84 data survey (Step-2a/b) (OJT)	Obstacle data collection in airport and 10km radius from ARP in DYU. Map procurement 1/50,000 and 1/200,000 for Dushanbe. FPD Expert teaches the obstacle survey for Area-3 and Area-2 in Dushanbe to the CP of TAN, FAZO and DIA. FPD Expert supports that TF3 CP could make the AIP for WGS-84 survey data in DYU.	TAN Airport Geodesy	4 weeks 2017/9/1-30	Doc9674 Implementing by FPD Expert
	WGS-84 data survey remote oversight for 3 regional airports (Oversight) (Out of the PDM)	FPD expert remotely oversights TAN ordered WGS-84 PACS making and obstacle survey for 3 regional airports from Dushanbe Project office or Japan. FPD Expert supports that TF3 CP could make the AIP for WGS-84 survey data in 3 regional airports. Implementation date will be depended on TAN's budget allocation.	TAN Airport Geodesy	(TAN's work) UTDT: 9/13 UTDK:1/12 UTDL: 2/8-10	Doc9674 Implementing by FPD Expert
	OJT on Flight Procedure Design (Exercises and OJT)	FPD Expert provides the OJT on conventional FPD in model airport Dushanbe for trained 4 officers by "Training on basic PANS-OPS Flight Procedure Design". The Training contains an obstacle survey, design several sample flight procedures (SID/STAR、Missed Approach and Holding) on tracing paper, Design Verification / Grand Validation, pseudo-Flight inspection / validation and safety oversight of the designs. The output data of FPD will be converted AIP chat by using VISIO in the last week. Supplementary OJT for MA, holding and difficult patterns.	1 AIS 3 ATC	OJT 6 weeks + VISIO 1 week 2017/11/1-12/22 +Supplementary 2017/2 2 weeks	Doc8168 WGS-84 maps ILS data from DIA
	Observation for FPD in DYU	FPD Expert supervises 4 trained counterparts to conduct the series of actual design activities in Dushanbe.	2 AIS	2018/2 3 weeks	

TJ-ATS Project Sub-Activities Plan Taskforce-3

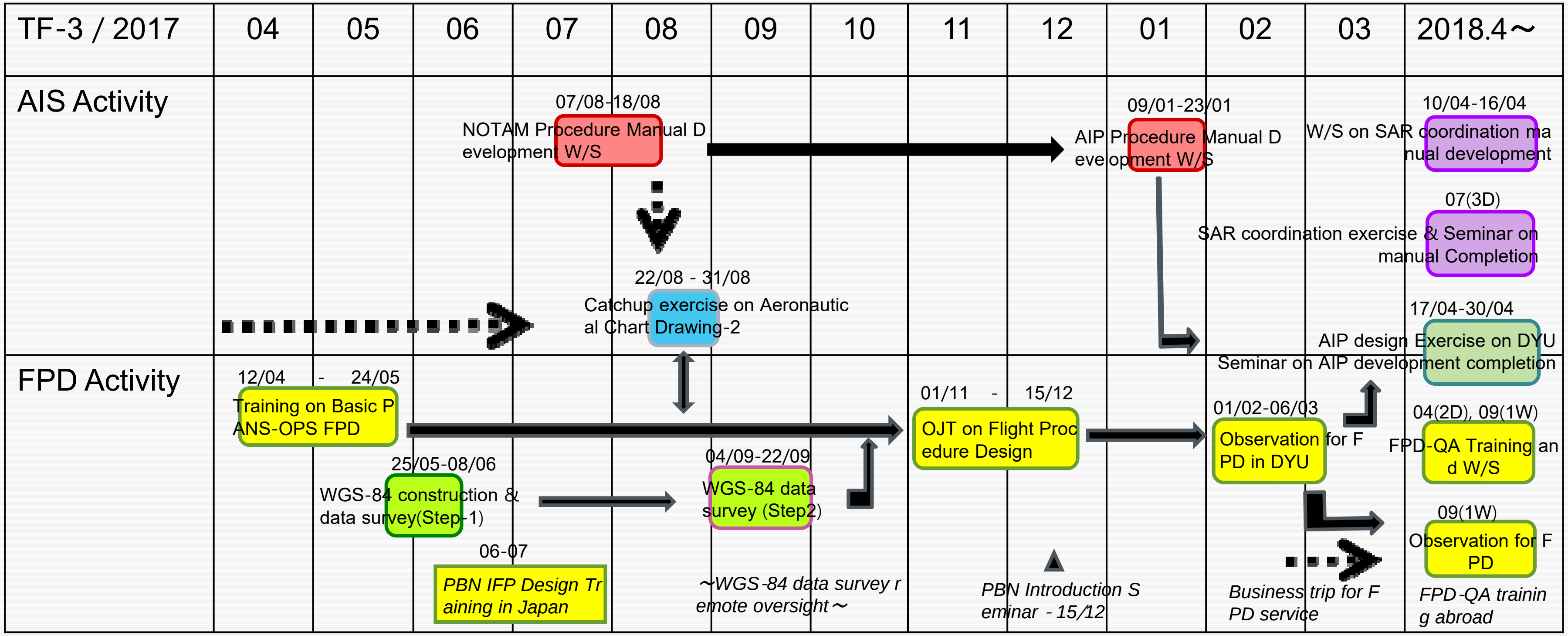
〈abstract〉

	(Group training in Japan) (Out of the PDM)	and the rest will probably have same opportunity in 2018.	3 for 2018	2017/6/11-7/29 2018/6/?	
	PBN Introduction Seminar （Seminar） (Out of the PDM)	FPD Expert conducts half day seminar on introduction of PBN implementation. - FPD Expert (Yamane): PBN introduction (optimizing TAN's situation) - AIS Dep. (Firuz): Report on WGS-84/FPD activities in UTDD and plan for three regional airports. - TF-3 Leader (Khumorov): Explanation of new PBN Project in accordance with official request form - PM (Sherariev): Explanation of State PBN Implementation Plan which was approved CAA in July.	All	0.5day x 1 2017/12/15	Doc9613
	Business Trip to cooperative ANSPs and outsourcing FPD GV/FV Service Providers in Ru / Kg / Kz	TF3 CPs Business trip, visit to: Kyrgyz CAA/ANSP, FI/FV-SP, Kazakhstan FI/FV-SP; 2018/3/11-14 Russian ANSP (RM / QMS in AIS), FPD-SP(St.P and Moscow), GV/FV SP, CAIGA: 2018/3/11-20		2018/3/11-14 2018/3/11-20 Report: 3/30	
	FPD-QA Training and W/S	Expert conducts training for GV, FV and Quality Assurance for FPD and conduct W/S for actual outsourcing and design check process. Expert will confirm all procedure on FPD, QA and Designer approval, then if necessary create FPD manual for TAN.		2018/1/16 QA 2018/4/25-6 GV 2018/9 1 week	Doc9906 Vo;-5
	FPD-QA Training (Training abroad)	ICAO China FPP/SC will have FPD-QA training in 2018/7 If remaining seat will be available for non-member state, Project try to use this opportunity for ensuring formality of FPD-QA officers.		1 week x 2CPs 2018/7?	
3-6	AIP design Exercise on DYU (Exercise)	AIS and FPD Experts corporately provide an exercise for making draft AIP in Dushanbe airport by integrating outcomes AIS activities and FPD activities. Developed procedure of AIP through "NOTAM & AIP Procedure Manual Development W/S" and designed several flight procedures by "Observation for FPD in DYU" will be used by CPs in this activity under exercise by two Experts. (AD AIPs (4 FPDs and 1 WGS-84) by VISIO, SID/STAR and others in UTDD, defined by TF3M in Sep. 2017) AIS Expert review the improved AIPs for separation from Russian AIP. AIS Expert makes AIS roadmap, confirm AIP(AIC) and NOTAM process are followed developed Manuals.	1 AIS 3 ATC	AIS and FPD 6 days x1 2018/4/17-24	Developed Procedures Developed FPD
	Seminar on AIP development completion (Seminar)	AIS and FPD Experts corporately have the draft AIP development completion seminar for introducing outcome from the series of TF-3's various activities.	All	0.5day x1 2018/4/30	Developed Procedures Developed FPD

Package of Activities on the site by FPD Expert of Taskforce-3

Timing	Abstract of Activities	category	CPs	Remarks
Apr – May 2017 (8 weeks)	Training on basic PANS-OPS Flight Procedure Design	Lecture & Exerc ise	6 assigned from ATC or ATFM Certificate; 5	Added WGS-84 Survey issues
	WGS-84 data survey (Step-1)	Assist of Order		
Aug – Sep 2017 (6 weeks)	*Catchup exercise on Aeronautical Chart Drawing – 2 (3-2)*	*Exercise*	*5 assigned from ATC or ATFM Certificate; 4*	*Included VISIO t raining*
	WGS-84 data survey (Step-2a/b)	OJT	3 assigned from ATC or ATFM C ertificate; 2	
Dec – Nov 2017 (7 weeks)	OJT on Flight procedure Design	Exercise and OJ T	5 assigned from ATC or AIS Certificate; 4	Included VISIO training, *PBN Introduction Seminar*
Feb – Mar 2018 (5 weeks)	Observation for Flight procedure Design in Dushanbe airport, *Assist for ILS 27 FPD order*	Observation (CP FPD works)	5 of FPD team	FPD team establ ished
Apr – May 2018 (5 weeks)	AIP design Exercise on Dushanbe airport	Exercise	4 of FPD team, *None additional of AIS Certificate; 3*	
Aug – Sep 2018 (3 weeks)	Observation for Flight procedure Design in Dushanbe airport	Observation (CP FPD works)	3 or 4 of FPD te am	
	Flight Procedure Design – Quality Assurance Training and W/S	Training	FPD team and *some of TAN* (Certificate); 4	Last activity reduced to 3 days

General Prpgress & Correlation of TF-3



Outcomes… in last stage

- Draft IFP for UTDD on PANS-OPS with design descriptions & AIP charts
- Draft MVA chart, area division and height grouping (additional)
- Basically understood QA manual
- Design description of STAR from North, STAR from West in UTDD,
- Prepared draft design checklist,
- Trial GV check to use draft checklist for deign outputs of new STAR

In the Future

- Conducting strategic FPD activity and developing Quality of IFP and Designer ‘s Competency
- Hoping to establish FPD system well in TAN

See you again, if........

Conventional FPD Course

END of Instructions

The Project for Capacity Development of ATC in TajikistanTF-3 Activity

Outline of FPD Quality Assurance & Ground Validation

September 2018

By Mr. YAMANE, FPD Expert

Agenda

- Guidance
- Priciple
- Definition
- IFP Participants
- IFP Design Chain
- IFP Process
- Concept of GV

Guidance

- ISO 9000 series…Quality Management System (Product or Service))

International Organization for Stardardization

- Quality Assurance Manual for Flight Procedure Design (Doc 9906)
  - vol.1 Flight Procedure Design Quality Assurance System…General, Methodology
  - vol.2 Flight Procedure Designer Training … contents, period, methodology, process

Guidance

- vol.3 Flight Procedure Design Software Validation … automation design tool requirement or specification
- vol.4 Flight Procedure Design Construction … (to be developped)
- vol.5 Validation of Instrument Flight Procedures … validation method and system on GV or FV
- vol.6 Flight Validation Pilot Training and Evaluation … FV pilot qualification, training or examination

Guidance

- PANS-OPS (Doc 8168) vol.2 P1S2C4 … to comply with;

process, data, criteria and application

assurance, verification or validation

Principle of IFP QA

- Data Quality Management … FPD & validation process for both input and output
- Procedure Designer Training … step-up, qualification, competency, contents & period, examination
- *(Validation of software … specification of automation tool of FPD)*

Principle of IFP QA

- Qualifyed Data + <u>Maintained IFP Process</u> + Authorized Designer >>> **Formal FPD**
- Qualified Data/Requirement + Competent Designer + Competent Validator + Organized AIS >>> **Formal IFP**
- If an outosourcing is used, the examination must be conducted by the state authority, or the outsourcing company must verify its competency with <u>certificates or *state approval*</u>.

Principle of IFP QA

- Instrument Flight Procedure Design Service has been defined in Annex 11 recently.....

  >>> State responsible service

- Qualified Data/Requirement… Annex 15
- Competent Designer… PANS-OPS
- Competent Validator… QA manual
- Organized AIS… Annex 15 and manuals

  >>> The State should prepare own regulations as back grounds.

Definition

- Asurance;

Review. An activity undertaken to determine the suitability, adequacy and effectiveness of the subject matter to achieve established objectives (see ISO 9000:2000 *Quality management systems — Fundamentals and vocabulary*, section 3.8.7).

Validation. Confirmation, through the provision of objective evidence, that the requirements for a specific intended use or application have been fulfilled (see Annex 15 — *Aeronautical Information Services*).The activity whereby a data element is checked as having a value that is fully applicable to the identity given to the data element, or a set of data elements that is checked as being acceptable for their purpose.

Verification. Confirmation, through the provision of objective evidence, that specified requirements have been fulfilled (see Annex 15).The activity whereby the current value of a data element is checked against the value originally supplied.

- Check others important technical words

IFP Participants or Stakeholders

- Stage

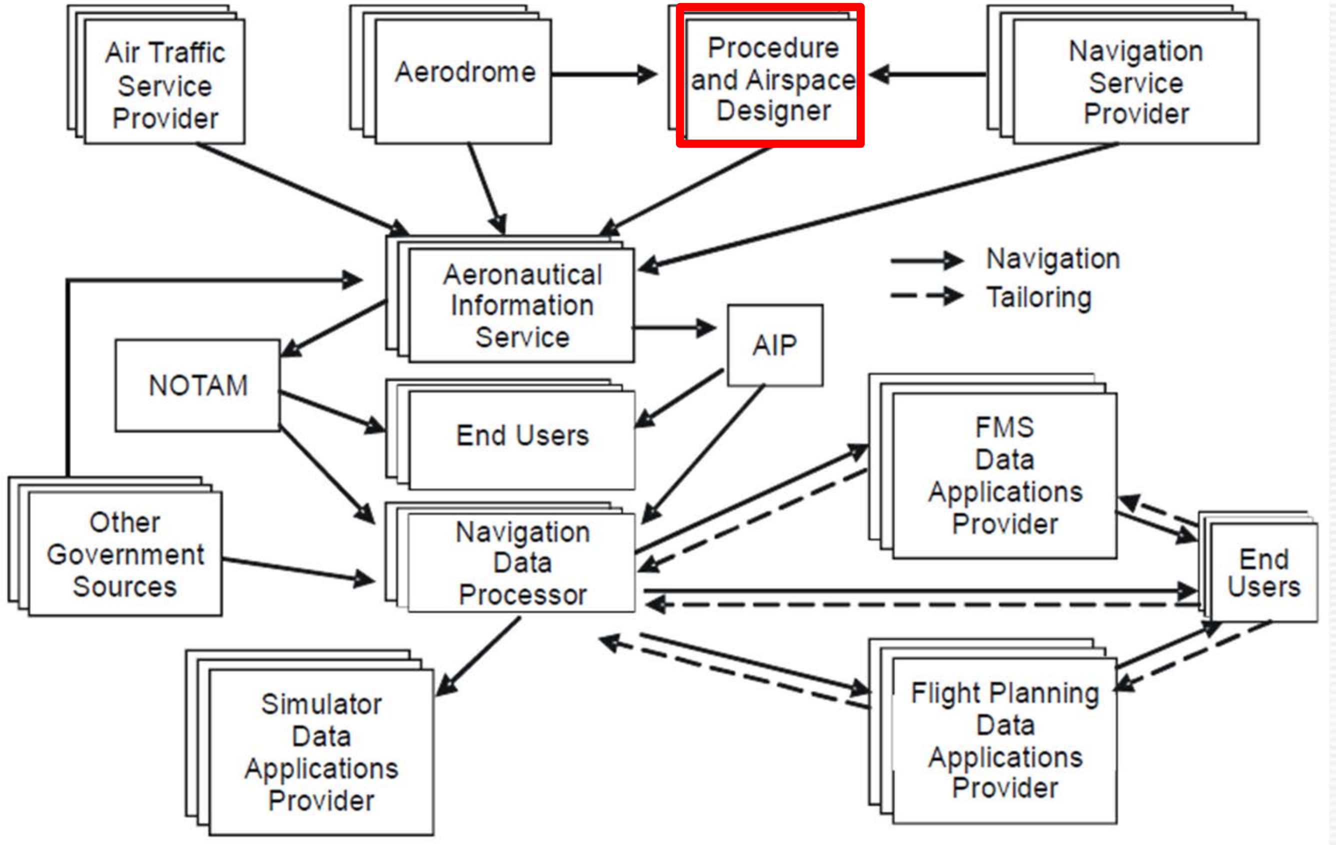
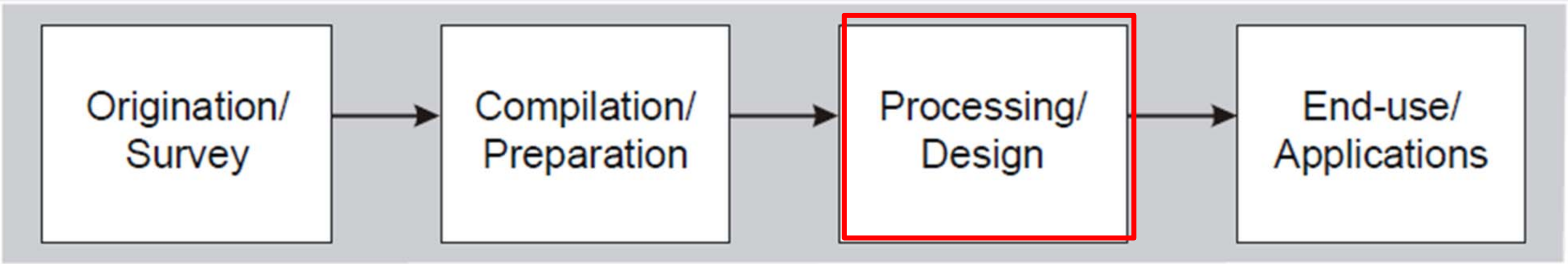


Figure 1. Participants in the development of an IFP.

IFP Design Chain

Basic process

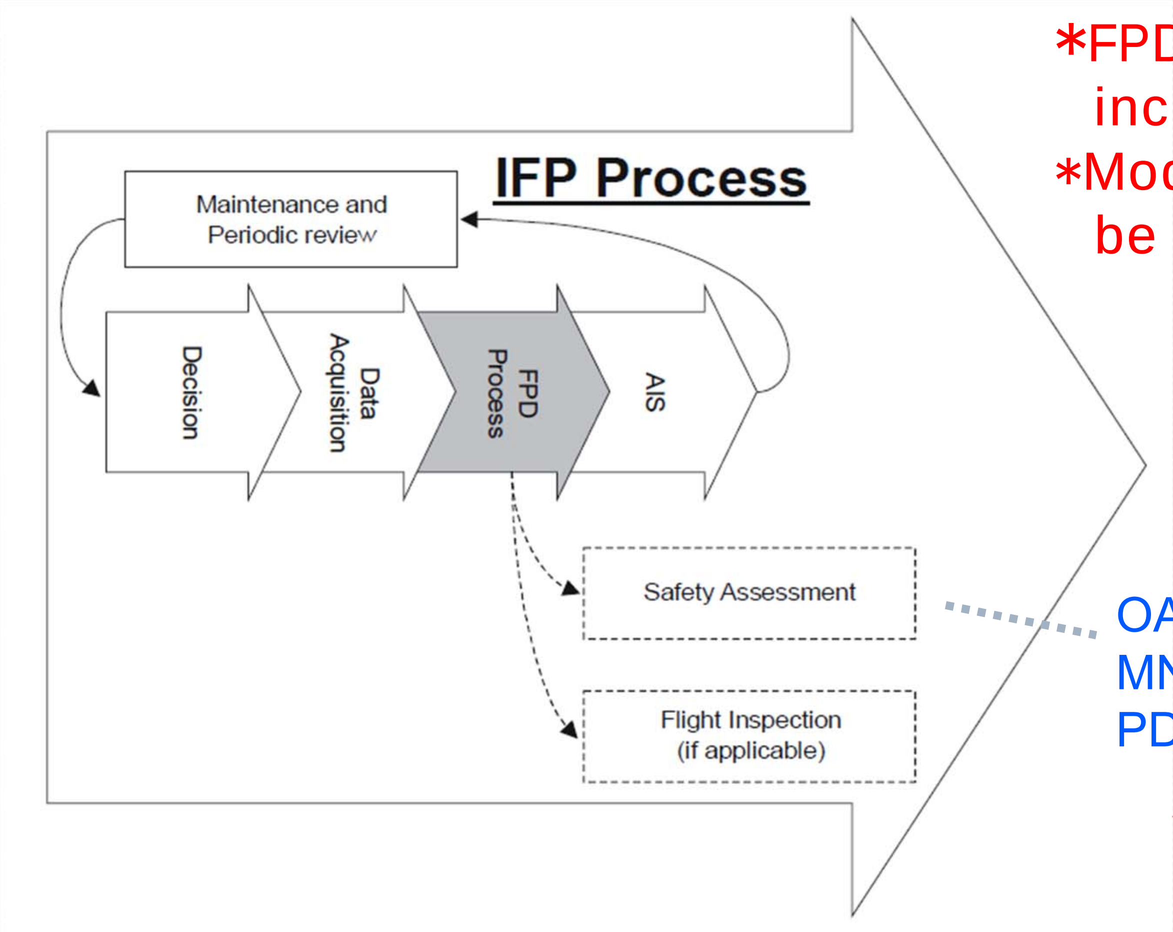


＊Design and validation

- Concept refer to other samples
- Basic data should be compiled and stored on the appropriate format or requirement
- Cyclic implementation at least 5 years

IFP Process

☐IFP development process



*FPD process include Validation
*Modification will be done as maintenance

OAS check for ILS,
MNM/OCA check for NPA
PDG check for SID

IFP Process

- See Figure 2 … IFP process flow diagram; QA manual vol.1, FPD should comply with IFP process
- See Figure I−2−4−1. Instrument flight procedure process; PANS−OPS vol.2
- Process description … QA manual

For outsourcing, documentation should be requested completely with output of software, if they use.

Concept of Ground Validation

- QA ,anual vol.5 … Validation of Instrument Flight procedures
- Validation … Confirmation, through the provision of ∗objective evidence, that the rquirements for a specific intended use or application have been fulfilled. This activity consists of ground and flight validation

  ∗output of application of computer or automation tool, <u>data review</u>
- Items verified through GV … Accuracy and completeness of all obstacle and navigation data considered in procedure design, and any other factors by FV
- Validation Process flow chart … See Fig. 1−1

Concept of Ground Validation

- Independent IFP Design Review … QA manual

Who? … flight procedure designer other than the one who designed,

What? … Review of IFP design package,

How? … # confirm correct application of criteria,

confirm data accuracy and integrity,

Verify mitigations for deviations from criteria, if any…,

othetrs

----> Annex15, Data Requirement(accuracy, resolution)

Concept of Ground Validation

Practice of IFP Design Review …

➢ Input …Detailed report of IFP design
(FPD package or documentation)
∗Main FPD package… 1. Drawing with OBST/terrain map
2. Design Descriptions
3. Chart drawing

➢ Main practice … for **FPD package**;

·Review Input data, calculation and output data/data style,
·Confirm application of criteria,
·Retry to measure parts on design drawing with OBST/terrain map,
·Examine control OBST and critical points of design
·Other specific matters

Concept of Ground Validation

Practice of IFP Design Review …

- Verification… Subject, part of designing process, by designer's view
- Validation … Object, confirm corrigenda, style of output data, by product's view
- Validation terget … for **FPD package**;

  As design review;

·Input data & criteria, specially OBST identification

·Output data/data style

  As pre-flight validation

·Operational requirement…. To check impact to IFP operation

 --- Consult or ask for A/L, if required, with draft chart

·Safety analysis

Basic Factor for GV (Design Review)

Japanese case;

- No official check−list for independent design review. Completed design documents package with fixed formats such as;
- design drawing,
- design map,
- design description,
- designed draft chart, as well as
- AIP facility or airspace data,
- obstacle data and terrain data used appropriately.

>>> We examine FPD to review these documents.

Basic Factor for GV (Pre-flight Review)

Japanese case;

- Conducting by Flight Inspection / Validation Section,
- Using desk-top simulation software to verify FV procedure, situation and performance,
- Asking for flight operator to review the contents of flight procedure with their viewpoints on request, or validation by a pilot training simulator on serious or special case.

W/S on Design Review and Validation

- 25th April 2018, 09:30 – 12:00, 13:30 – 15:00
- Class Room
- Attend; Sheraliev (am only), Akbar, Chorshanbe, Ilhom, Rustam, Habib
- Document, Reference, QA manual vol1, vol5
- Will continue through coming activity in next September

W/S on Design Review and Validation

- QA Manual, Vol.1/5, IFP Process and description of independent design review, Pre-flight validation in the table and diagramme were used so that Expert explain in detail and practically QA concept and process, as well as method of GV and difinition, etc.

GV Introduction Lecture

- 2nd May 2018, 09:30 – 12:00
- Class Room
- Attend; Akbar, Chorshanbe, Ilhom
- QA Manual, Vol.5, description of independent design review, Pre–flight validation in the table and diagramme were used so that Expert explain in detail and practically
- Output data is checked to refer to data integrity in Annex 15

Basic Factor for GV (Design Review)

- Recording on sheets to check completion of stag ed work
- Conceptual evaluation result such as
- IFP design package
- (prepared all documents or not),
- Basic data verification
- (with the view of correctness, latest, practice, acc uracy, resolution or any requirement),
- Design criteria

Basic Factor for GV (Design Review)

- Any sample of organization appropriate of check-list or materials.
- Sankt design company's method observed or materials obtained by Mr. Akbar…
- (with the view of correctness, latest, practice or any requirement with compliance of State rules based on PANS-OPS)

IFP Process

- See Figure 2 … IFP process flow diagram; QA manual vol.1
- See Figure I−2−4−1. Instrument flight procedure process; PANS−OPS vol.2
- Process description for quality assurance of FPD … QA manual vol. 1
  - 1 ～ 16 Steps
  - input, output
  - evaluation, record, key performance indicator

IFP Process
Step by Step

- See Figure 2 … IFP process flow diagram; QA manual vol.1
- See Figure I−2−4−1. Instrument flight procedure process; PANS−OPS vol.2
- Process description … QA manual