vACC BANGLADESH
DEPARTMENT OF ATC

ATC TRAINING HANDBOOK

Version 1.0

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Preface

This training handbook is prepared to the needs of Air Traffic Control (ATC) training at the vACC of Bangladesh and is aimed exclusively at simulation activities such as those conducted on VATSIM networks. Generally, this handbook presents vital instructions and concepts that ATC Controllers in training are expected to know. This handbook highlights a wide range of ATC procedures to be used in realistic settings or simulated environments so that trainees can follow procedures within the network. The material is intended as a baseline for training; however, these trainees need to undertake practical simulation sessions on a routine basis to consolidate their learning and skill development. This document is not to be regarded as an operational manual for real-world ATC and should solely be treated as a training guide in VATSIM environment.

Preliminaries

Purpose

Bangladesh vACC is part of the VATSIM Network and aims to provide air traffic control services for online flight simulation within the area of the People's Republic of Bangladesh (hereafter referred to as “ACCBGD Airspace”). To support this, ACCBGD promotes virtual air traffic in its airspace and organizes the basic and further education of virtual air traffic controllers and pilots. ACCBGD is also responsible for staffing of air traffic control positions. For administrative purposes, ACCBGD is part of VATSIM West Asia division (hereafter referred to as “VATWA”).

Limitation of Liability

This document has been prepared for use on the VATSIM network only. It should never be used for real world aviation operations. Under no circumstances shall the authors be held liable for any personal injury and/or death from the misuse of this document.

Scope

This document lays the foundation of basic of Air Traffic Controlling service and is intended solely for use within the VATSIM network and focuses exclusively on simulation-based Air Traffic Control (ATC) training under the Bangladesh vACC. It provides comprehensive guidance on the duties and responsibilities of a Ground Controller, including aircraft taxi management, gate and stand coordination, and ground-to-ground as well as ground-to-air communication procedures within the virtual environment. The procedures outlined are tailored specifically for VATSIM operations and do not represent or replicate real-world ATC practices. This document is designed for trainees and new controllers beginning their journey in ATC and is limited to the scope of ground control services at airports within Bangladesh vACC airspace.

Language of Communication

The International civil aviation authority (ICAO) requires all pilots and controllers to communicate in English using ICAO standard phraseology. The Bangladesh vACC requires all controllers to communicate in English when connected to the VATSIM network. standard phraseology can be found in the publicly available real-world radiotelephony manuals which controllers are always expected to follow.

Definition

“May” – the action or practice is discretionary.
“Will” – the action or practice is logically necessary; however, exceptions may exist.
“Should” – recommended, best practice.
“Shall” – the action or practice is strictly required.

Contents

CHAPTER 1

INTRODUCTION

This handbook serves as a structured guide for aspiring virtual air traffic controllers operating within the Bangladesh vACC on the VATSIM network. It is organized into progressive chapters that reflect the standard hierarchy of ATC responsibilities. The contents include detailed chapters on Ground Control, Tower Control, Approach Control, and Area Control Centre (ACC) operations—each designed to gradually build the knowledge and skills required to manage air traffic safely and efficiently in a simulated environment.

The Aerodrome Control chapter introduces the fundamental responsibilities of managing aircraft movements on the apron, taxiways, and runways before takeoff and after landing. The **Tower Control** chapter expands the scope to include runway operations and clearance delivery, focusing on active coordination between ground and airborne traffic in the immediate airport vicinity. The **TMA Controlling** chapter covers the handling of arriving and departing aircraft within the terminal control area, including sequencing and vectoring for approach or climb-out. Finally, the **Area Control Centre** chapter addresses en-route traffic management over Bangladesh's airspace, requiring higher-level coordination with adjacent FIRs and sectors.

Bangladesh, located in South Asia, has a rich cultural heritage, vibrant landscapes, and strategic geographical significance. It shares borders with India and Myanmar and has a vast network of rivers, contributing to its dynamic terrain and weather systems, factors that often influence ATC scenarios. Aviation in Bangladesh is governed by the Civil Aviation Authority of Bangladesh (CAAB), and while this handbook does not mirror real-world regulations, understanding the structure of the country's airspace enriches the simulation experience.

At the heart of Bangladeshi aviation lies **Dhaka Airport (VGHS)**, officially known as Hazrat Shahjalal International Airport. As the country's primary international gateway, VGHS handles the majority of international and domestic air traffic in the virtual skies of Bangladesh. It is the central hub for all ATC training within the Bangladesh vACC and provides an ideal setting for practical simulation exercises across all ATC roles.

This handbook is crafted not only as a training tool but also as a reference for continuous learning, aiming to cultivate disciplined, confident, and proficient virtual controllers capable of managing complex scenarios with professionalism on the VATSIM network.

CHAPTER 2

GENERAL INFORMATION

2.1 LIST OF AIRPORTS AND AIRSPACE CLASSIFICATION

List of airports are as follows:

VGHS	Hazrat Shahjalal International Airport - Dhaka	**Class - C**	**INTERNATIONAL AIRPORT OPERATIONS**
VGEG	Shah Amanat International Airport - Chattogram	**Class - C**	
VGSY	Osmani International Airport - Sylhet	**Class - C**	
VGCB	Cox's Bazar Airport	**Class - D**	**DOMESTIC AIRPORT OPERATIONS**
VGSD	Saidpur Airport	**Class - D**	
VGRJ	Shah Mokhdum Airport - Rajshahi	**Class - D**	
VGJR	Jashore Airport	**Class - D**	
VGBR	Barisal Airport	**Class - D**	
VGTJ	Tejgaon Khademul Bashar Airport	**Class - C**	**NON COMMERCIAL OPERATIONS** **OPERATED BY BAF**
VGIS	Ishurdi Airport	**Class - G**	
VGBG	Bogura Airport	**Class - D**	
VGSH	Shamshernagar Airpot	**Class - G Stolport**	
VGCM	Cumilla Airport	**Class - G Stolport**	
VGLM	Lalmonirhat Airport	**Class - G Stolport**	
VGSG	Thakurgaon Airport	**Class - G Stolport**	

2.2 ATS COMMUNICATION FACILITIES

AIRPORT	DESIGNATION	RADIO	CALLSIGN	FREQUENCY	NOTES
Area Control Center (ACC)	CTR	Dhaka Control	VGFR_U_CTR (VGFR_CTR)	125.700	Primary Upper ACC
	CTR	Dhaka Control	VGFR_L_CTR	126.700	Secondary Lower ACC
VGHS	GND	Dhaka Ground	VGHS_GND	121.800	Primary
	TWR	Dhaka Tower	VGHS_TWR	118.300	Primary
	APP	Dhaka Approach	VGHS_APP	121.300	Primary

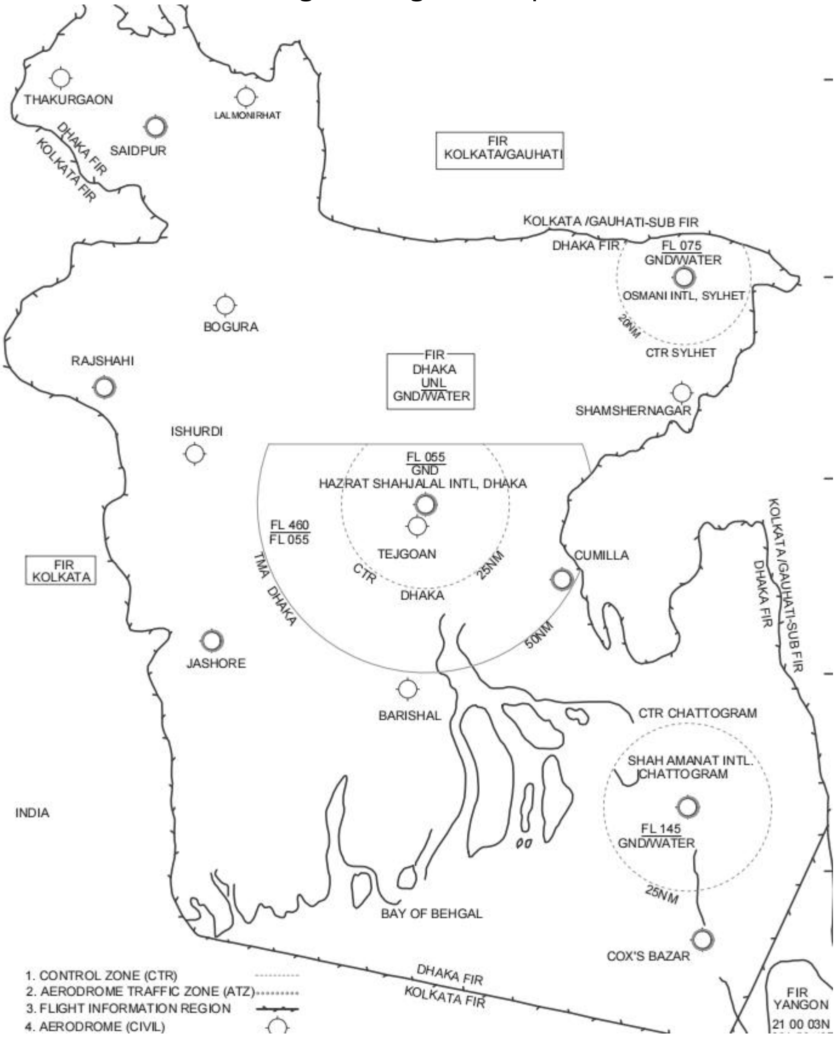
	ATIS	Dhaka Information	VGHS_ATIS	127.400	Primary
VGEG	GND	Chattogram Ground	VGEG_GND	121.800	Primary
	TWR	Chattogram Tower	VGEG_TWR	118.400	Primary
	ATIS	Chattogram Information	VGEG_ATIS	127.600	Primary
VGSY	TWR	Sylhet Tower	VGSY_TWR	122.900	Primary
VGJR	GND	Jashore Ground	VGJR_GND	121.800	Primary
	TWR	Jashore Tower	VGJR_TWR	123.200	Primary
VGRJ	TWR	Rajshahi Tower	VGRJ_TWR	128.300	Primary
VGCB	TWR	Cox's Bazar Tower	VGCB_TWR	129.500	Primary
VGSD	TWR	Saidpur Tower	VGSD_TWR	128.900	Primary
VGBR	TWR	Barisal Tower	VGBR_TWR	128.700	Primary
VGBG	TWR	Bogura Tower	VGBG_TWR	128.700	Primary
VGIS	TWR (FIS)	Ishurdi Information	VGIS_TWR	122.900	Primary

2.3 ACC, Approach and Tower Control Zone Ranges

- ✓ Bangladesh has three (3) class - C airports, which includes Dhaka, Chattogram and Sylhet.
- ✓ The horizontal control range of the control tower is 25 nautical miles (NM) for both Dhaka and Chattogram, whereas for Sylhet, it is limited to 20 NM.
- ✓ Dhaka Approach (TMA) provides coverage with a horizontal range of 50 nautical miles (NM).
- ✓ Dhaka Tower has a vertical control range from ground level up to 5,500 feet.
- ✓ Sylhet Tower has a vertical control range from ground level up to FL075 feet.
- ✓ Chattogram Tower has a vertical control range from ground level up to FL145.

✓ Rest of the airports in Bangladesh has a horizontal range of 10NM and vertical range of 4000 feet.

✓ Dhaka Control has a vertical range from ground upto FL460



2.4 Control Zone Ranges for VATSIM ATC Controllers (In Bangladesh only)

GND	10 NM	- X -
TWR	VGHS_TWR - 15 NM	Upto 4000 feet Vertically
	VGEG_TWR - 20 NM	Upto FL80 Vertically
	VGSY_TWR - 20 NM	Upto 6000 feet Vertically
	ALL Other Towers - 15 NM	Upto 3000 feet Vertically
APP	50 NM Horizontally	Upto FL 180 Vertically
CTR	Till the FIR Boundary (~280NM) Horizontally	Upto UNL Vertically

2.5 Squawk Ranges

- Domestic Squawk Ranges from 4100 - 4177.
- International Squawk Ranges from 4700 - 4777.
- VFR circuit and local flight should squawk 2000.
- VFR Cross country should squawk within the domestic squawk ranges.

2.6 Airways Information

For airways information, please refer to this document: http://www.caab.gov.bd/aip/general/genall.pdf

CHAPTER 3

AERODROME CONTROL

3.1 General

Aerodrome control unit consists of two (2) units, delivery and ground. Delivery and Ground are the initial and crucial components of an airport's Air Traffic Control (ATC) operations, where pilots first contact the Delivery controller to obtain their clearance and then communicate with the Ground controller for pushback, taxi, and related instructions. However, in Bangladesh and in several airports worldwide where a separate Delivery position does not exist, the responsibilities of both Delivery and Ground are managed by the Ground controller alone. This dual role demands heightened awareness and a constant presence of mind from the Ground controller to ensure safe and efficient aircraft movement on the ground.

Developing Controller (S1) starts VATSIM ATC career as aerodrome controller. VATSIM GCAP policy states about the rating competency as described below:

a. General

i. Demonstrates an understanding of the Clearance Delivery and Ground Controller.
ii. Uses prescribed phraseology with allowable local variances.
iii. Shows an understanding of flight strips (if used) and radar data blocks.
iv. Demonstrates situational awareness and basic scan techniques.
v. Demonstrates an understanding of weather conditions.
vi. Demonstrates ability to read METARs and TAFs
vii. Demonstrates an understanding of different Airspace Classes.
viii. Demonstrates an understanding of the role of each Air Traffic Control Position plays in the Air Traffic System.
ix. Ability to connect to the network and configure the controlling and audio
x. client to work Clearance Delivery and Ground positions.

b. Clearance Delivery Concepts

i. Defines all parts of a clearance
ii. Demonstrates a basic understanding of:
iii. Altimetry
iv. Navigation and Equipment Codes
v. Types of Navigational Aids
vi. Ability to issue a clearance correctly
vii. Ability to edit flight plans and issue reroutes to pilots.

c. Ground Control Concepts

i. Define and give examples of movement and non-movement areas.
ii. Ensure aircraft have proper weather information.
iii. Issue ground movement instructions efficiently and correctly

iv. Sequence aircraft on the ground for efficient departure flow.
v. v. Correctly transfer aircraft to Local (Tower) Control.

d. Coordination
i. Coordination with tower for crossing active runways.
ii. Coordination with other controllers for pushback sequencing.
iii. Coordination with other parties as necessary

3.2 Understanding METAR

It is a format for reporting weather information. A METAR weather report is predominantly used by aircraft pilots and by the meteorologists, who use aggregated METAR information to assist in weather forecasting.

Example of METAR:

VGHS 101730Z 12007KT 3500 HZ NSC 25/19 Q1012 NOSIG

Part by part Understanding:
VGHS – AIRPORT identifier
101730Z- time recorded in format DDTTTT, first 2 are date and last four are UTC time or Zulu (Z) time
12007KT – Wind information. Here wind is reading at 120 degrees at 7 knots.
3500 – Visibility in meters.
HZ – Haze.
NSC – No significant clouds
25/19 – Temperature/Dewpoint
Q1012 – Atmospheric pressure
NOSIG – No significant change

More examples of abbreviation:

DU- Dust, FU- Smoke/Fumes, TSRA – Thunderstorm rain (+/- in front of TSRA indicates heavy/light), SHRA – Showering rain, SKC – skies clear, TCU – Towering cumulus, CB – Cumulonimbus clouds, SCT – Clouds Scattered, 190V300 – winds are variable between 190 degrees and 300 degrees, VRB – Winds VARIABLE.

3.3 SMR Radar

Surface Movement Radar (SMR) is a type of Secondary Surveillance Radar (SSR) used primarily to monitor and manage aircraft and vehicle movements on the airport tarmac, especially during taxiing. It is particularly useful in adverse weather conditions and low visibility scenarios, where visual observation becomes challenging. For an aircraft to be visible on the SMR screen, it must squawk Mode C, enabling the radar to identify and track it effectively.

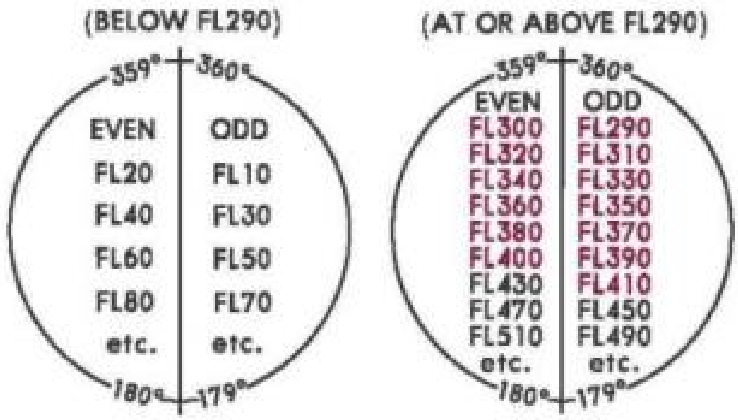
3.4 Understanding IFR and VFR

IFR (Instrument Flight Rules) refers to a set of regulations under which a pilot operates an aircraft primarily by relying on instruments for navigation and control, rather than visual cues. Aircraft flying under IFR must be equipped with a proper transponder and ADS-B, allowing for enhanced surveillance and tracking. These aircraft can perform RNAV (Area Navigation), ILS (Instrument Landing System) approaches, visual landings when conditions permit, and fly along designated airways or routes with ATC guidance.

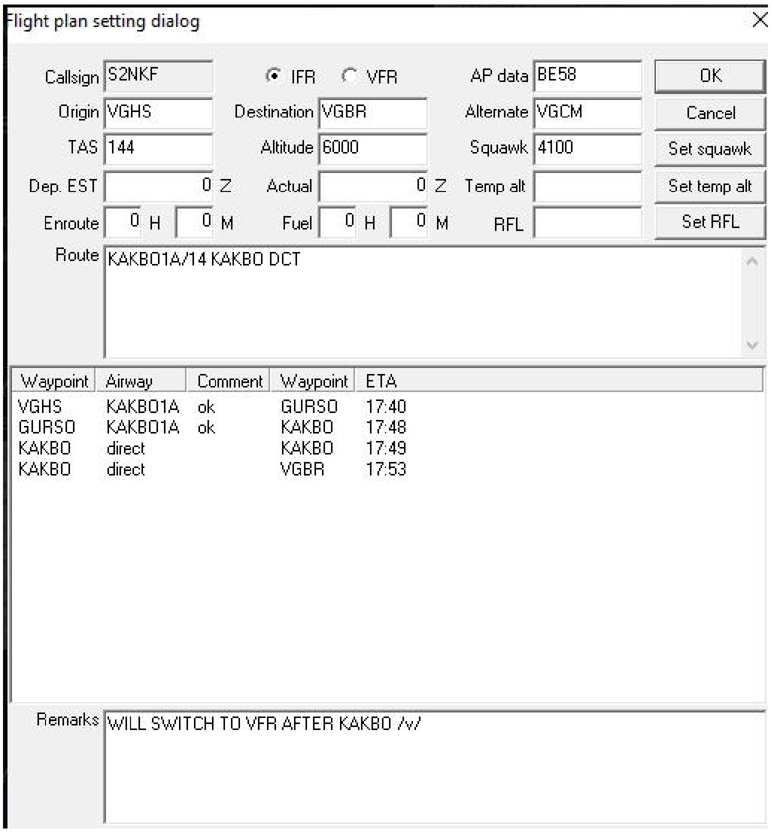
On the other hand, VFR (Visual Flight Rules) operations depend on visual references for navigation, requiring pilots to identify landmarks and maintain visual separation from terrain and other traffic. VFR pilots may navigate from VOR to VOR, follow airways under certain conditions, and may be equipped with transponders. They can also utilize localizers and radials for orientation, although they are not permitted to conduct instrument-based approaches like ILS under VFR conditions.

3.5 Flight Plan Management

- CHECK the whole flight plan of the aircraft by using Simbrief or other flight planning software
- Check the SID
- Check the correct cruising flight level.
- Memorize/Stick the Flight level chart somewhere.



- Give correct initial SID/heading, initial altitude squawk and other stuffs.
- If there is any important thing that controllers need to know, write it on the flight scratchpad box



3.6 SID Assignment

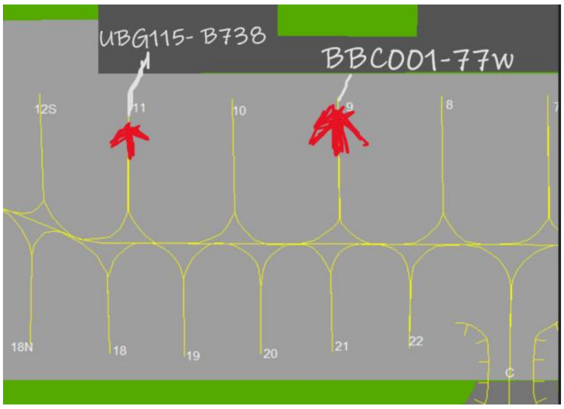
Initially, the flight plan must be thoroughly checked to ensure route validity and compatibility. The controller should then refer to the chart to verify where the Standard Instrument Departure (SID) ends and connects with the designated airway. If the SID does not align with the filed flight plan route or is not applicable, the aircraft should be instructed to follow a radar heading or to fly the runway heading after departure to maintain safe and efficient traffic flow. If TMA or ACC control is active, in that case coordination with upper controller should be established prior assigning the instructions.

3.7 Amp-up the proficiency

- Always be efficient. Here efficient means be fast but yet precise. If being fast
- Practice, practice and practice!
- Have a good attention during controlling and avoid all sorts of distractions.
- Think ahead of situation. Think of the surroundings
- Think about separation and other stuffs.
- Develop multi-tasking skills.
- ALWAYS KEEP TRACK OF THE FLIGHT PROGRESS AND SERIALS. IF YOU NEED TO WRITE THE TRACKS SOMEWHERE, WRITE IT ON A PAPER. VER USEFUL

Bonus:

If you see there are two traffics side by side, and simultaneously wanted the clearance:



Suppose BBC001 requested pushback, and after almost completing pushback, UBG115 wants to pushback as well. So instead of saying ****STANDBY** you can give them a *CONDITIONAL CLEARANCE*.**

CHAPTER 4

TOWER CONTROL

4.1 General

After the GROUND position, the tower is one of the key positions that plays an important role at an airport, handling all takeoffs, landings, circuits, and sequencing. The tower controller is essentially in charge of the airport and has full authority to decide which runway will be active, oversee weather-related decisions, and manage the permission and sequencing of departures and arrivals. The tower also plays a crucial role in coordinating traffic into and out of the airport.

VATSIM GCAP (Global Controller Administration Policy) rating competency requirements are as of follows:

a. General

i. Demonstrates an understanding of the role of the local (tower) controller.
ii. Selects the appropriate runway configuration based on weather, procedure, and operational requirements.
iii. Issues appropriate takeoff and departure instructions as needed.
iv. Uses prescribed phraseology for takeoff and landing clearances.
v. Defines all parts of a VFR traffic pattern (circuit).
vi. Ensures aircraft are separated as required.
vii. Issues missed approach / go around instructions using prescribed phraseology.
viii. Ensures adequate wake turbulence and departure separation exists.
ix. Correctly transfers aircraft to the next controller.
x. Demonstrates a basic level of scan.

b. Coordination

i. Coordinates missed approaches / go arounds with the appropriate controller.
ii. Coordinates changes in runway configurations with the appropriate controllers.
iii. Coordinates other elements as required with the appropriate controller.

4.2 Understanding TAF and weather condition determining

4.2.1 TAF – TERMINAL AERODROME FORECAST

In meteorology and aviation, *terminal aerodrome forecast (TAF*) is a format for reporting weather forecast information, particularly as it relates to aviation. TAFs are issued at least four times a day, every six hours, for major civil airfields: 0000, 0600, 1200 and 1800 UTC, and generally apply to a 24- or 30-hour period, and an area within approximately five statute miles (8.0 km) (or 5 nautical miles (9.3 km) in Canada) from the center of an airport runway complex. (WIKI)

Example of TAF:
OEJN 231100Z 2312/2418 23010KT 4000 DU FEW040 BECMG 2318/2320 VRB03KTS 6000 SCT040

Breakdown:
OEJN – Airport Identifier
231100Z – time recorded
2312/2418 – from 23rd 1200z to 24th 1800z
23010KT – Winds information
4000 – visibility in meters
DU – Dust
FEW040 – Few clouds at 4000 feet
BECMG – Becoming
2318/2320 – from 23rd 1800z to 23rd 2000z
VRB03KTS – winds direction variable at 3 kts
6000 – visibility in meters
SCT040 – clouds scattered at 6000ft

4.2.2 RVR – RUNWAY VISIBILITY RANGE

Runway Visual Range is an indication of the real visibility as measured down the runway either electronically or manually. RVR is taken when the Met visibility drops below 1500 meters and it will therefore only be shown occasionally in METAR reports. RVR visibility will always be prefixed by the letter R followed by the runway for which the value has been taken.
Example R24/1200 - RVR for runway 24 is 1200 meters.

4.2.3 WEATHER CONDITION DETERMINING

Tower has the authority to open/close the airport by determining the weather condition. Tower controller has also authority to determine whether to allow VFR traffic to fly in and IFR landing for an visual approach in regards of weather.

4.2.4 ATIS & RUNWAY SELECTION

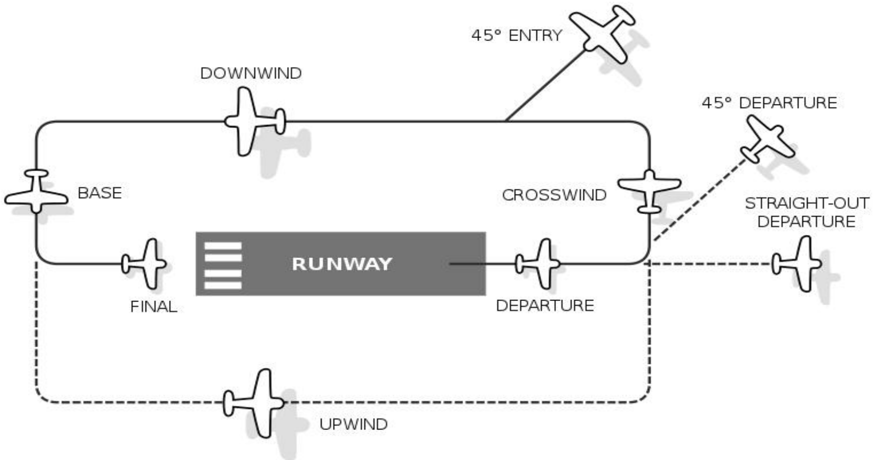
Runway selection is primarily determined by wind direction. In Bangladesh, each airport has a designated default runway. For example, at Dhaka (VGHS), the default runway is 14. A tailwind component of up to 5 knots is considered acceptable; if the tailwind exceeds this limit, the runway must be changed to the opposite direction to ensure safety and compliance.

ATIS (Aerodrome Terminal Information Service) provides essential and continuously updated operational information to pilots. On VATSIM, controllers use vATIS to generate ATIS transmissions. The system works by decoding the current METAR of the airport and combining it with the runway selected by the Tower controller. The ATIS is then automatically broadcast on the designated frequency.

It is also the responsibility of Tower controllers to acknowledge ATIS updates and relay the new information to both other controllers and pilots operating within the vicinity, ensuring that all parties remain fully informed.

4.3 VFR Traffic Handling

For the circuits:



- ✧ VFR circuits are always conducted on Left hand side, unless and otherwise there is a restriction on an area.

- ✧ Tower have to ask for the mandatory position reporting for two places. 1 – Downwind, 2- Finals.

- ✧ If there is more traffic than usual then Tower controller might have to report on base or extend downwind. And same case for traffic separation between VFR's & VFR's and VFR's & IFR's.

- ✧ Tower controllers are not permitted to separate using radar vectors. Tower controllers only can separate by extending downwind, by asking to reducing speed or fly on lower/higher altitude.

For VFR cross country flights, Tower controller can handle with 3 different techniques:

1. After departure, turn right, left, straight out or telling direction.
2. By reporting a landmark to exit the tower airspace
3. By giving radials and reporting how many DME out of an airport VOR/DME.

4.4 Departing and arriving traffic handling procedures

4.4.1 IFR TRAFFIC:

DEPARTING AIRCRAFT: after departure, ask the aircraft to report passing 1000/2000ft and thereafter send the aircraft to upper controller or Unicom if upper controller is offline.

ARRIVING AIRCRAFT: when an aircraft is about to join the finals, if upper ATC station is not online, then send a CONTACT ME message and give him landing clearance. After vacating the runway, transfer over to ground controller or if GND controller not online, then assign a stand.

4.4.2 VFR TRAFFIC:

CIRCUIT TRAFFICS: REFER to VFR traffic handling

For Departing traffics: Give departure information – also refer to the VFR Cross country flight procedure on the previous section

For Arriving traffic (cross country): Initially ask the flight to join the circuit (downwind, base and finals) and then give the aircraft arrival clearance.

4.5 Spacing and wake turbulence separation

For spacing and sequencing: Ensure that spacing between arrivals and departures is appropriate to safely depart all awaiting aircraft and land all arriving aircraft as orderly and expeditiously as possible, in compliance with local procedures and adhering to regulated priority.

4.5.1 Wake Turbulence: Wake turbulence is a disturbance in the atmosphere that forms behind an aircraft as it passes through the air. It includes various components, the most important of which are wingtip vortices and jetwash. Jetwash refers to the rapidly moving gases expelled from a jet engine; it is extremely turbulent, but of short duration. Wingtip vortices, however, are much more stable and can remain in the air for up to three minutes after the passage of an aircraft. It is therefore not true turbulence in the aerodynamic sense, as true turbulence would be chaotic. Instead, it refers to the similarity to atmospheric turbulence as experienced by an aircraft flying through this region of disturbed air.

Aircraft Categories:

- Light – 7000kg
- Medium Aircraft 7000-136000kg
- Heavy Aircraft above 136000kg
- Super/Super Heavy – Airbus A380 and Antonov 225 Mriya

4.5.2 Air Traffic Wake Turbulence Separations

1. Because of the possible effects of wake turbulence, controllers are required to apply no less than minimum required separation to all aircraft operating behind a Super or Heavy, and to Small aircraft operating behind a B757, when aircraft are IFR; VFR and receiving Class B, Class C, or TRSA airspace services; or VFR and being radar sequenced.
    1. Separation is applied to aircraft operating directly behind a super or heavy at the same altitude or less than 1,000 feet below, and to small aircraft operating directly behind a B757 at the same altitude or less than 500 feet below:
        1. Heavy behind super - 6 miles.
        2. Large behind super - 7 miles.
        3. Small behind super - 8 miles.

        4. Heavy behind heavy -4 miles.
        5. Small/large behind heavy - 5 miles.
        6. Small behind B757 - 4 miles.
    2. Also, separation, measured at the time the preceding aircraft is over the landing threshold, is provided to small aircraft:
        1. Small landing behind heavy - 6 miles.
        2. Small landing behind large, non-B757 - 4 miles.
2. Additionally, appropriate time or distance intervals are provided to departing aircraft when the departure will be from the same threshold, a parallel runway separated by less than 2,500 feet with less than 500 feet threshold stagger, or on a crossing runway and projected flight paths will cross:
    1. Three minutes or the appropriate radar separation when takeoff will be behind a super aircraft;
    2. Two minutes or the appropriate radar separation when takeoff will be behind a heavy aircraft.
    3. Two minutes or the appropriate radar separation when a small aircraft will takeoff behind a B757.

Departure separation:

Leading Aircraft	Following Aircraft	Minimum time
A380 / SUPER	A380	2 minutes
	HEAVY	2 minutes
	MEDIUM	3 minutes
	LIGHT	4 minutes
HEAVY	HEAVY	2 minutes
	MEDIUM	2 minutes
	LIGHT	3 minutes
MEDIUM	LIGHT	3 minutes

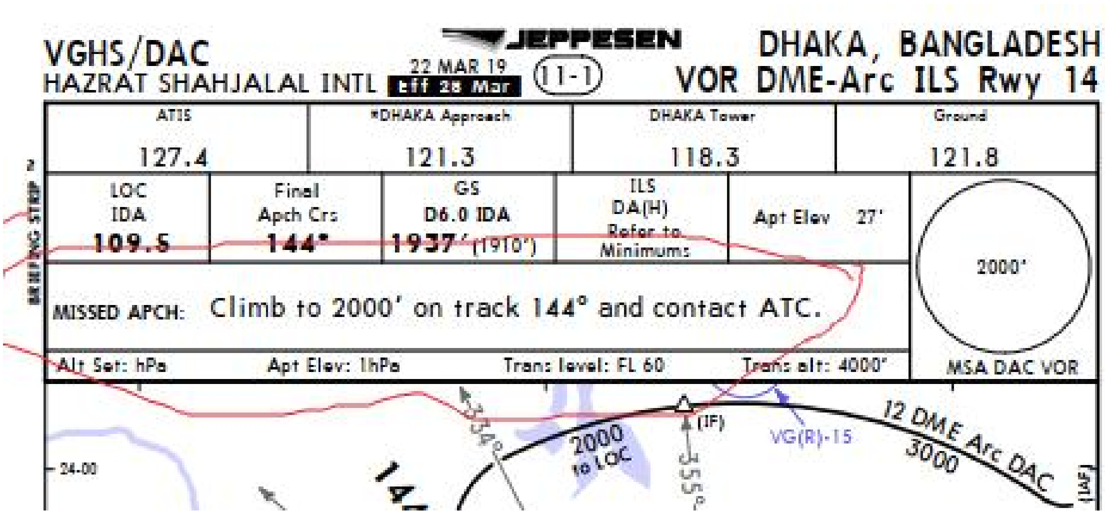
Arrival separation:

Leading Aircraft	Following Aircraft	Minimum Separation
A380 / SUPER	A380	4 NM
	HEAVY	5 NM
	MEDIUM	7 NM
	LIGHT	8 NM
HEAVY	HEAVY	4 NM
	MEDIUM	5 NM
	LIGHT	6 NM
MEDIUM	LIGHT	5 NM

4.6 Missed approach, Go-Around and emergency handling procedures

8.1 MISSED APPROACH HANDLING:

Whenever an aircraft is doing a missed approach procedure, check out the charts and instruct the aircraft accordingly. For suppose:



8.2 GO AROUNDS:

Aircraft calling for go around or ATC calling an aircraft for go arounf can be handled similarly to Missed approach procedures. But most of the cases, it is handled with radar vectors by upper controller.

8.3 EMERGENCY SITUATION:

Emergency situations should be handled appropriately according to the scenario. For suppose if engine fire failure, then all runway should be vacated. If there is aborted takeoff, then after vacating the runway, close that occupied taxiway and likewise for other scenarios.

4.7 Important bits of tower controlling

1. When Ground hands off an aircraft to you, ensure that the aircraft is squawking Mode C, or inform the Ground controller in advance if it’s not.
2. Always maintain awareness of priority and departure sequence. Using paper to keep track is an excellent and preferred method, especially during busy events.
3. Ensure you provide appropriate sequencing and spacing between aircraft.
4. Keep track of VFR traffic. If you tend to forget, jot it down on paper. Also, ensure you give proper traffic information, especially in Class C airspace.
5. Correctly transfer the tag to the appropriate controller, or release it to UNICOM if needed.
6. Always stay in contact and coordinate with other controllers — this is the most important part.
7. Ensure any necessary amendments to clearances or instructions are made promptly.

CHAPTER 5

TMA CONTROL

5.1 General

A Terminal Maneuvering Area (TMA), known in the US as a Terminal Control Area (TCA), is a controlled block of airspace around an airport with defined vertical and horizontal limits where air traffic controllers manage all arrivals and departures, including sequencing aircraft for departure into en-route airspace and organizing arrivals onto final approach, typically established at Class B or C airports, and in some cases at Class D airports depending on traffic needs.

VATSIM GCAP (Global Controller Administration Policy) rating competency requirements are as of follows:

a. General

i. Understands the role of the arrival and departure controller.
ii. Understands horizontal and vertical airspace boundaries.
iii. Ensures aircraft are properly transferred to the next controller.
iv. Handles uncontrolled field operations in accordance with policy.
v. Shows intermediate scan techniques.
vi. Verifies mode C altitude of aircraft
vii. Issues alerts / traffic information to aircraft using prescribed phraseology as required.
viii. Adjusts aircraft speed, heading, and altitude as needed to achieve required separation.
ix. Correctly transfer radar tag ownership and communication to the next controller.
x. Ability to utilize the approved ATC client to work the control position.

b. Approach Controller

i. Issues approach clearances using prescribed phraseology.
ii. Applies separation minima as required by airspace class.
iii. Ensures pilots have current weather.
iv. Provides runway and approach information as soon as practical to pilots.
v. Demonstrates an understanding of the different types of approaches.
vi. Issues holding instructions using prescribed phraseology.
vii. Correctly transfers radar identification and communication to the next controller.

c. Departure Controller

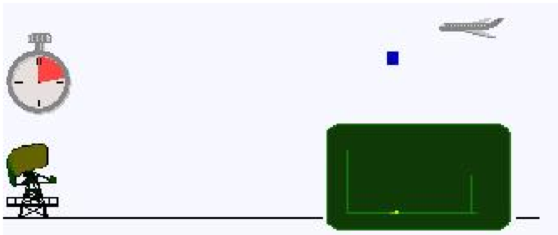
i. Ability to cancel departure procedures and apply vectors or additional instructions as necessary to transition aircraft from the terminal to the Enroute environment.

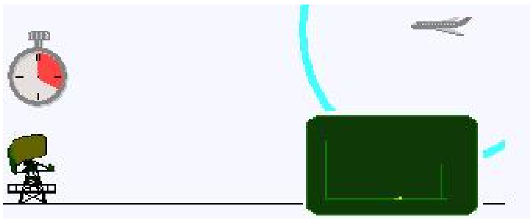
d. Coordination

i. Ability to coordinate missed approaches and runway changes with the local controller.
ii. Ability to coordinate exceptions to local standard operating procedures

5.2 Introduction to PSR, SSR and Radar Control Zone

PSR: A Primary Surveillance Radar (PSR) is a conventional radar system used in air traffic control that transmits electromagnetic waves and detects reflections from objects, allowing it to locate non-cooperative targets without requiring onboard equipment. It provides accurate range and radial speed with good horizontal resolution by scanning 360° at a fixed elevation angle, but it cannot directly identify targets or determine altitude, often requiring multiple radars for vertical position. While PSR is valuable for detecting all aircraft and even ground vehicles, its reliance on powerful emissions limits coverage compared to secondary surveillance radar systems.





SSR: Secondary Surveillance Radar (SSR) is a radar system used in air traffic control (ATC) that, unlike primary radar which detects targets through reflected radio signals, relies on aircraft equipped with transponders. These transponders respond to interrogation signals by transmitting encoded data such as identity codes, altitude, and other flight information depending on the selected mode. Originating from the military Identification Friend or Foe (IFF) technology developed during World War II, SSR remains compatible with IFF systems today. Modern advancements based on SSR principles include Monopulse Secondary Surveillance Radar (MSSR), Mode S, Traffic Collision Avoidance System (TCAS), and ADS-B.

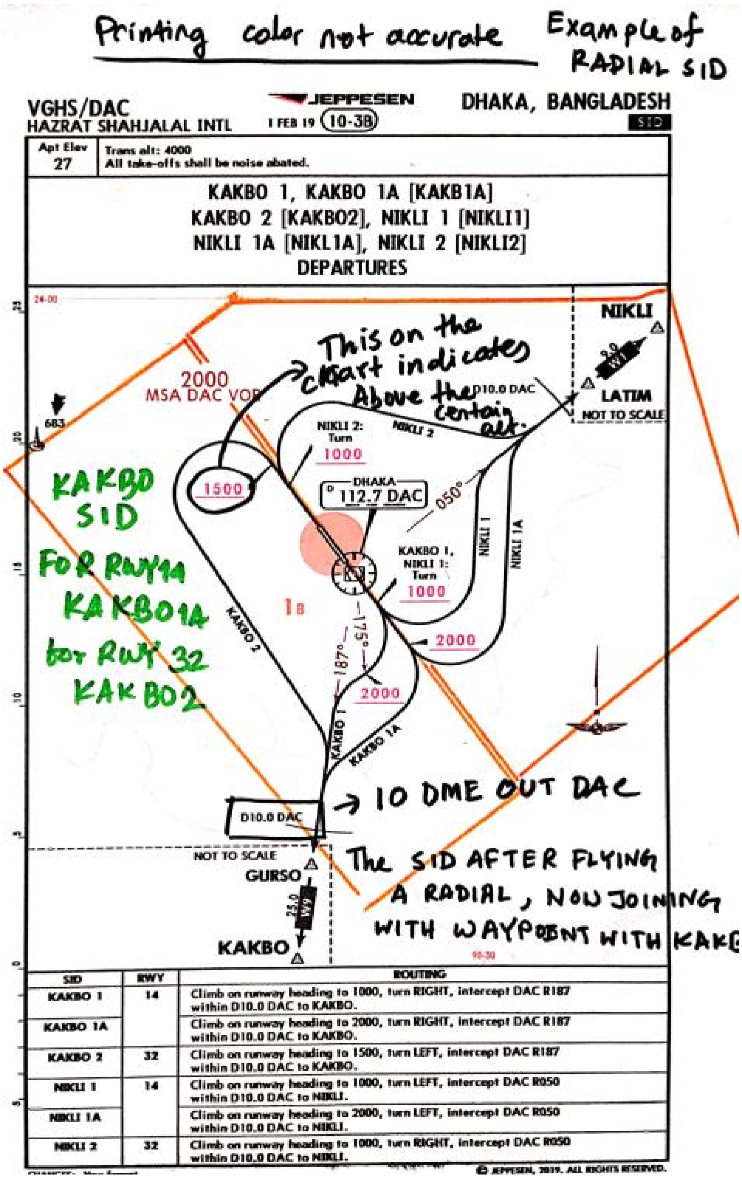
FIG: A SSR ANTENNA IN AN AIRPORT IN GERMANY

RADAR CONTROL ZONE: A Terminal Maneuvering Area (TMA) radar control airspace typically extends about 50 NM horizontally and up to FL150 (15,000 ft) vertically, though it can vary by region, ranging from as small as 25 NM and FL70 (7,000 ft) to as large as 100

NM and FL240 (24,000 ft), as published on airport charts. Usually circular in shape around the airport, the TMA is managed by radar controllers responsible for maintaining safe separation and sequencing of traffic within its boundaries.

5.3 Understanding SID, STAR and Approach Charts

A **Standard Instrument Departure (SID)** is a published flight procedure that provides aircraft with a safe, efficient, and standardized route from the runway to the en-route airspace under instrument flight rules (IFR). Designed to simplify clearances, reduce radio communication, and ensure obstacle clearance, SIDs define specific waypoints, altitude restrictions, and routing that guide departing aircraft along predictable paths while maintaining separation from other traffic. They are tailored to each airport's layout, terrain, and traffic flow, and are depicted on aeronautical charts for pilot and controller reference, forming an essential part of modern air traffic management.



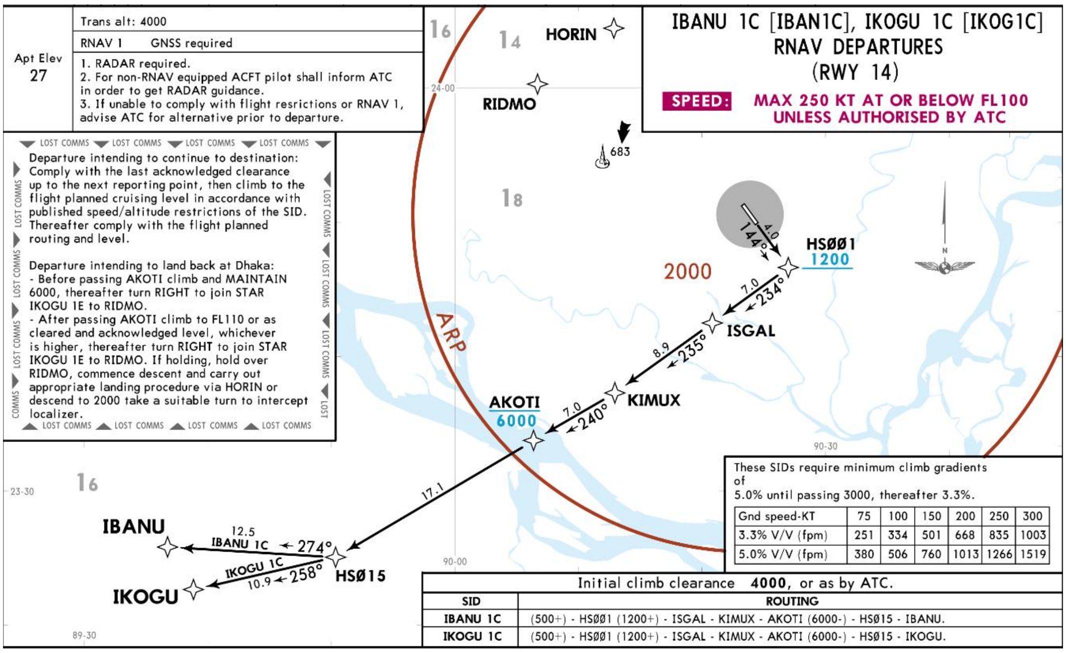
Let us start with a SID and some tips are written on the chart itself:

SID	RWY	ROUTING
KAKBO 1	14	Climb on runway heading to 1000, turn RIGHT, intercept DAC R187 within D10.0 DAC to KAKBO.
KAKBO 1A		Climb on runway heading to 2000, turn RIGHT, intercept DAC R187 within D10.0 DAC to KAKBO.
KAKBO 2	32	Climb on runway heading to 1500, turn LEFT, intercept DAC R187 within D10.0 DAC to KAKBO.
NIKLI 1	14	Climb on runway heading to 1000, turn LEFT, intercept DAC R050 within D10.0 DAC to NIKLI.
NIKLI 1A		Climb on runway heading to 2000, turn LEFT, intercept DAC R050 within D10.0 DAC to NIKLI.
NIKLI 2	32	Climb on runway heading to 1000, turn RIGHT, intercept DAC R050 within D10.0 DAC to NIKLI.

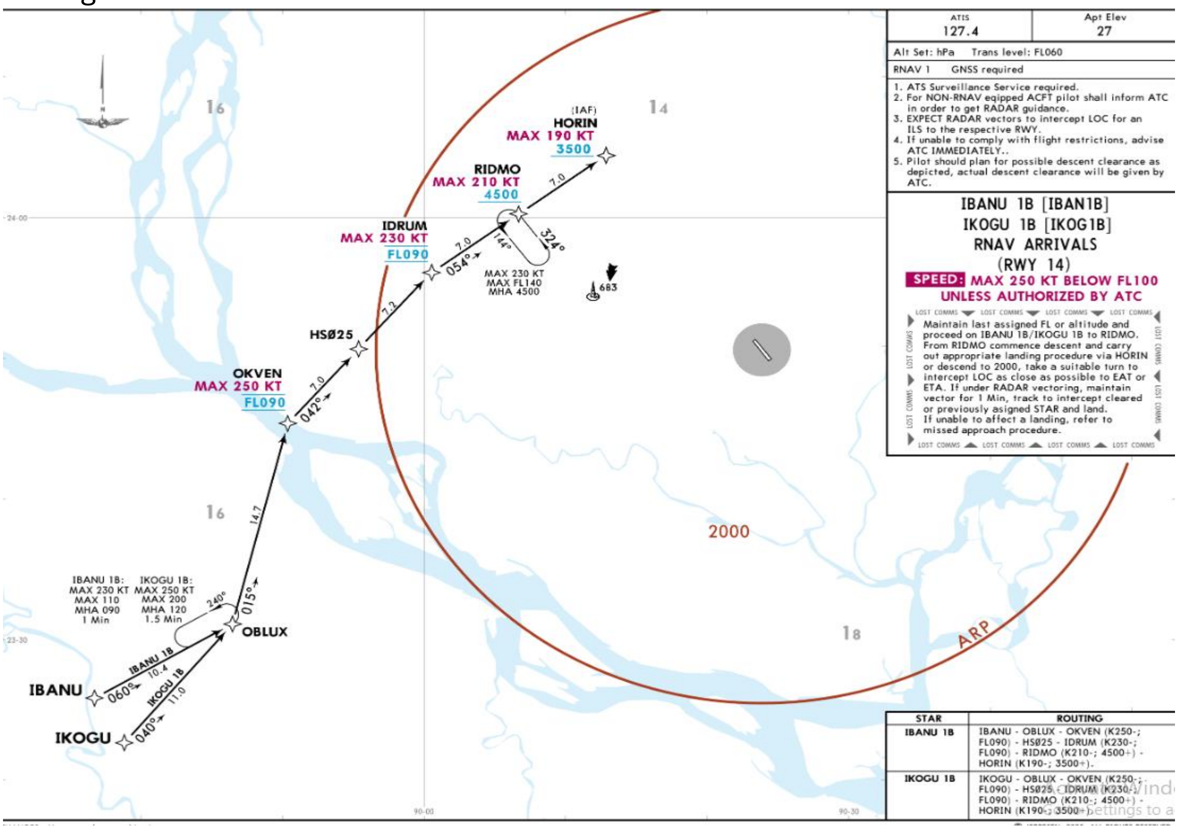
TMA approach needs to have the understanding incase of a pilot is unable to fly a SID, of course controller can give the pilot radar vectors, but for more realism, a controller can assign the routing via Radials or vector to follow as published on charts.

This chart is an example of RADIAL SID, but nowadays most airport use RNAV SID which takes help from the GPS navigational system.

Example of an RNAV SID:



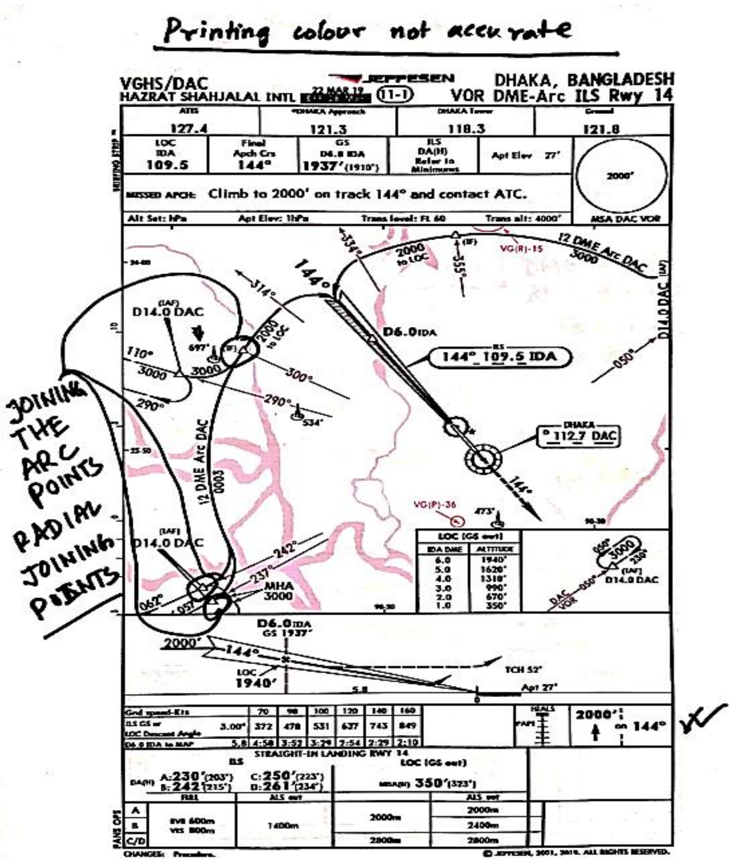
A **Standard Terminal Arrival Route (STAR)** is a published instrument procedure that provides a structured and predictable path for aircraft transitioning from the en-route phase to the approach phase of flight under IFR. Designed to streamline arrivals, reduce pilot-controller workload, and maintain safe separation, STARs specify waypoints, altitude, and speed restrictions that guide aircraft toward the initial approach fix while ensuring terrain and obstacle clearance.

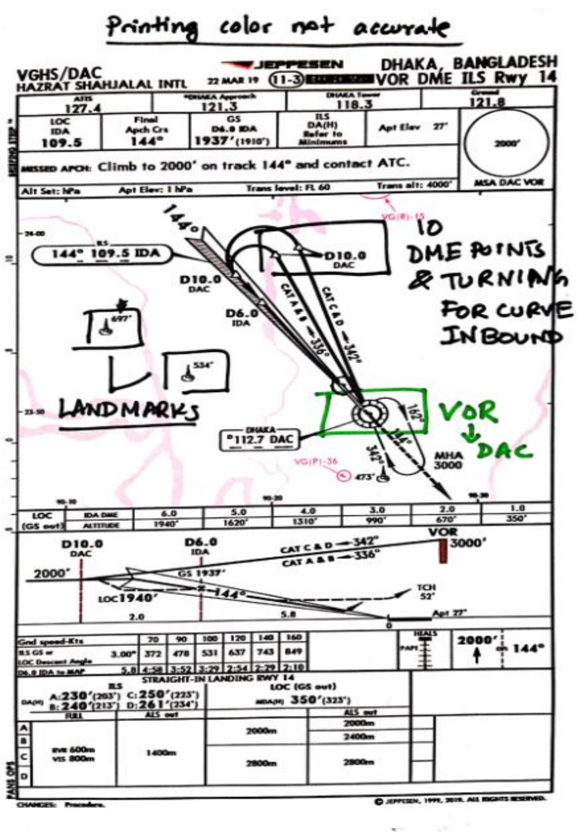


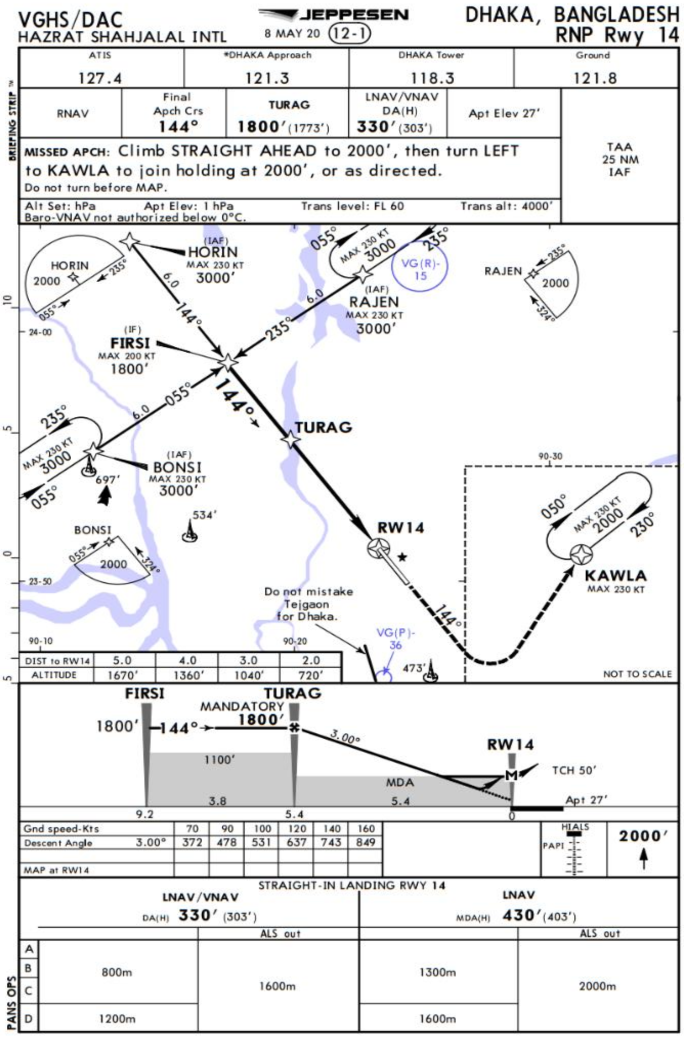
The previous figure is a STAR chart for VGHS/DAC-Dhaka. This chart is a Jeppesen RNAV (Area Navigation) STAR (Standard Terminal Arrival Route) for Runway 14 at Hazrat Shahjalal International Airport (VGHS/DAC), Dhaka, Bangladesh. It provides the required procedures for aircraft arriving from different directions to transition safely and efficiently from the en-route phase to the terminal environment, ensuring proper spacing, altitude, and speed control.

The chart shows two RNAV arrival procedures: IBANU 1B and IKOGU 1B, which are distinguished by the routes and waypoints they follow. For both arrivals, aircraft follow defined waypoints, altitudes, and speed restrictions, which are indicated alongside the route lines. For example, at waypoints such as OKVEN, RIDMO, IDRUM, and HORIN, specific maximum speeds and altitudes are assigned (e.g., OKVEN: max 250 KT at FL095, RIDMO: max 210 KT at 4500 ft, HORIN: max 190 KT at 3500 ft). These limitations help ensure safe separation between arriving aircraft and compliance with air traffic control (ATC) instructions. Additionally, speed restrictions are highlighted in pink to emphasize ATC-mandated limitations, such as "SPEED: MAX 250 KT BELOW FL100 UNLESS AUTHORIZED BY ATC," ensuring adherence to safety regulations in the terminal airspace.

Approach plates are aeronautical charts that provide pilots with all the essential information needed to safely execute an instrument approach to an airport. They include details such as approach procedures (e.g., ILS, VOR, RNAV), waypoints, altitudes, minimum descent altitudes, missed approach instructions, runway layout, lighting, and navigational aids. Approach plates ensure pilots can follow standardized paths during final descent under instrument flight rules (IFR), maintain obstacle clearance, and coordinate effectively with air traffic control for safe landing operations.







An example of an RNP chart illustrates the similarities and differences between RNP and RNAV approaches, with the primary distinction being their relationship to the Instrument Landing System (ILS).

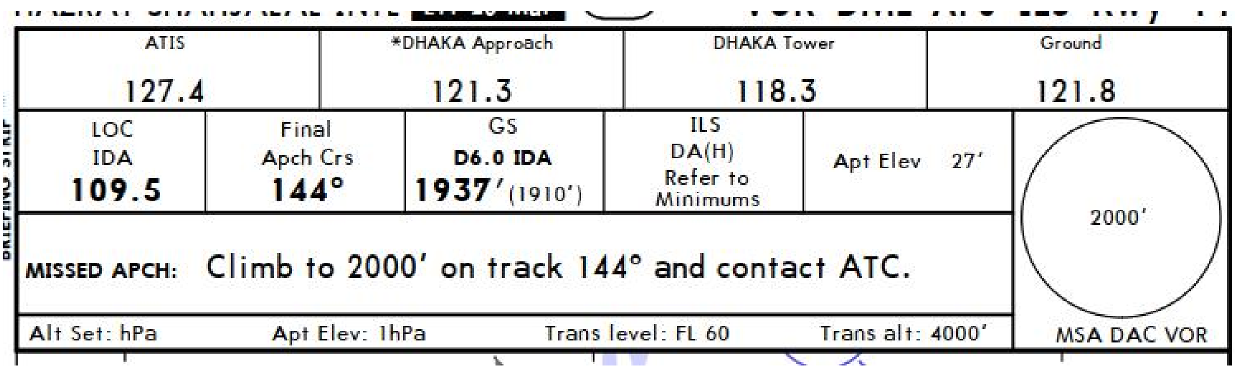
Both RNP and RNAV approaches are typically flown in good visibility conditions or when the ILS is unavailable.

In this particular RNP chart, there are three paths to join the final approach path FIRSI: from RAJEN on heading 235, from HORIN straight on the runway heading 144, and from westbound BONSI on heading 055.

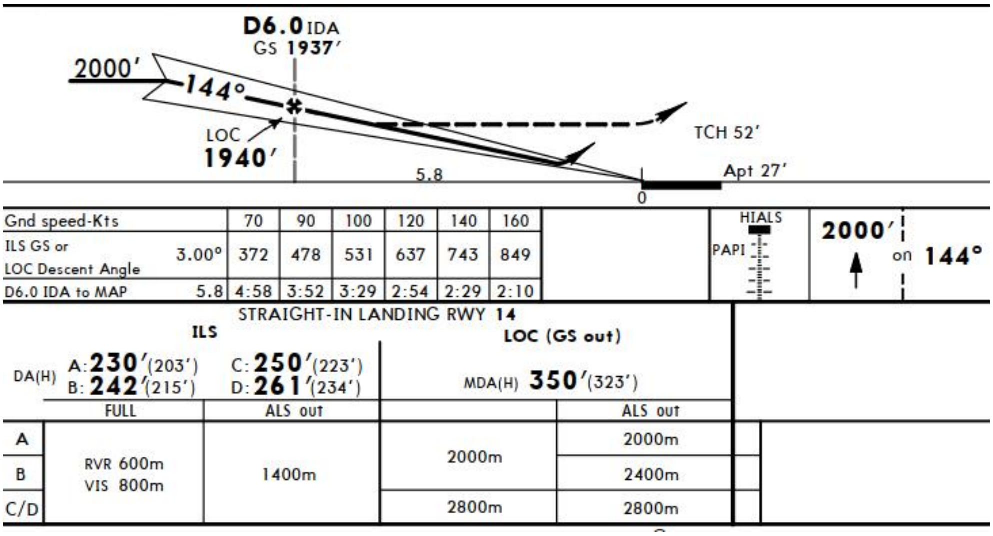
The missed approach procedure in an RNP approach differs slightly from conventional procedures.

After a missed approach, instead of immediately contacting ATC on the runway heading, the published procedure directs the aircraft to first fly on the runway heading, then join the KAWLA holding pattern, and thereafter follow ATC instructions. However, in certain situations, the controller may override the published holding pattern and provide radar vectors to join RAJEN and then FIRSI.

Top portion of the charts contains all the necessary details with missed approach information:



The bottom portion of the charts contains the descent glide, VIS, RVR and other information.

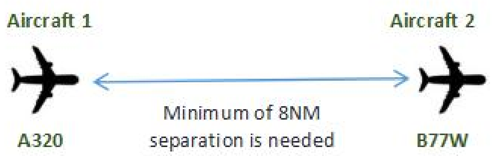


The approach starting from 6 DME IDA and 2000 feet on a 3 degree glide and capturing the glideslope at 1937 while Localizer on 1940 feet.

5.4 Separation management, position information and traffic advisories procedures

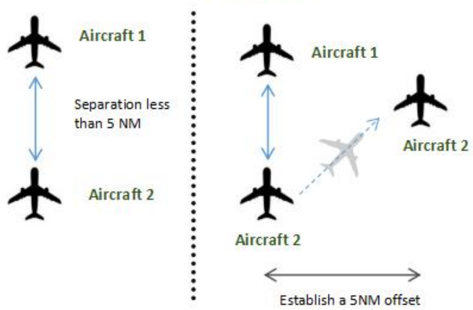
In approach control, traffic separation management is one of the most critical responsibilities. Effective separation management requires that a TMA (Terminal Maneuvering Area) controller have a strong understanding of key factors such as heading, speed control, altitude, and type-rated aircraft, along with a clear grasp of the required separation distance and time between two aircraft. Successful traffic separation also demands quick reaction times, high situational awareness, and the ability to accurately determine both distance and time to ensure safe and efficient operations within the airspace.

Figure -1: Normal Separation between two aircrafts given that the speed is same



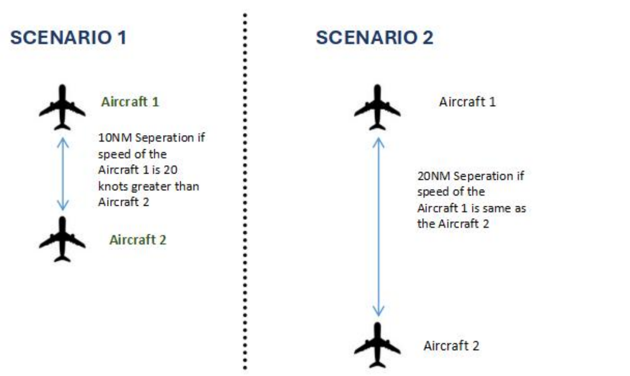
In Figure 1, a heavy Boeing 777 leads with an Airbus A320 following at approximately 250 knots below FL100, maintaining 8 NM separation. For wake turbulence between heavy and medium aircraft, a 10 NM separation is considered optimal.

Figure-2: Complying to parallel separation due to speed differences

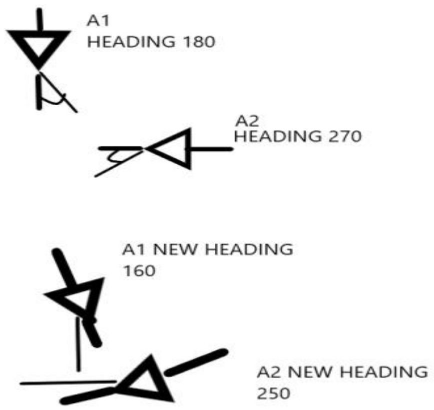


In Figure 2, separation is achieved by vectoring the trailing aircraft (Aircraft 2) to a 5 NM lateral offset from the preceding aircraft (Aircraft 1). As shown in Step 1, the controller first assesses the existing separation. If it is found to be less than the required minima, a lateral offset is applied, and the aircraft is vectored accordingly to maintain safe spacing.

Figure -3: Speed Control

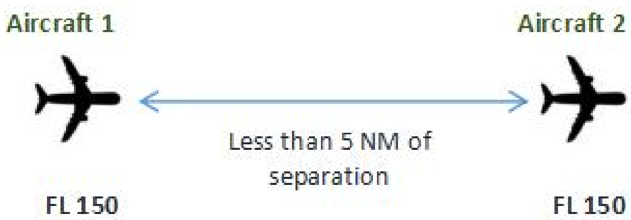


In Figure 3, a basic speed-related separation concept is illustrated. In Scenario 1, Aircraft 1 is cruising inside TMA airspace at a speed 20 knots faster than Aircraft 2, resulting in a 10 NM lateral separation. In Scenario 2, both aircraft maintain the same speed, and therefore the separation increases to 20 NM.



In **Figure 4.1**, a method to avoid perpendicular traffic conflict at the same flight level is shown. Traffic **A1** is on a **180° heading**, while traffic **A2** is on a **270° heading**. To ensure lateral separation, a **20° left turn** can be applied to reduce collision risk, while a **30° turn** provides even greater safety.

Figure - 4.2: Same level minimum separation loss



In Figure 4.2, a scenario is shown in the approach sector during cruise where the lateral separation between traffic A1 and A2 is approximately 4–5 NM. To resolve the conflict, vertical separation can be applied by instructing A2 to climb 2000 feet, A1 to descend 2000 feet.

POSITION INFORMATION: Requesting position information from traffic is sometimes necessary for a TMA controller, though not in every case. For instance, a controller may ask a pilot to provide the next waypoint or the next two or three waypoints. Upon receiving this information, the controller can issue a direct routing to a specific waypoint and subsequently instruct the pilot to report when that waypoint is reached. This process helps the controller maintain situational awareness and ensure safe and efficient traffic management within the TMA. For example:

- VGHS_APP: *UBG334, Dhaka Approach, identified. Say your next waypoint?*
- UBG334: *Our next waypoints are IKOGU and DAC.*
- VGHS_APP: *UBG334, roger, descent to FL80 and report overhead waypoint IKOGU.*

Just a fair example, there are many ways that a controller can take position information from the pilot.

TRAFFIC INFORMATION ADVISORY PROCEDURES: Traffic Information Advisory, also known as Air Traffic Advisory Service, refers to an airspace of defined dimensions or a designated route within which advisory service is available to aircraft. The primary objective of this service is to enhance the effectiveness of collision hazard information beyond what is provided by a standard Flight Information Service (FIS). It may be offered to aircraft conducting IFR flights within advisory airspace or along advisory routes, typically classified as Class F airspace.

Below info is from a reference from FAA document (BULLETIN ATB_MAY_2020,pdf)

-> Minimizing Conflicts. What is more effective in minimizing conflicts between IFR and VFR aircraft? Expectation Bias-Data suggests that expectation bias is prominent when IFR/VFR conflicts exist.

• What you need to know:
-> "See and avoid" is less effective than one might think. IFR/VFR conflict events reviewed showed that only one in three aircraft visually acquired the other aircraft after ATC provided a traffic advisory.
-> Controllers should have a backup plan even after a traffic advisory to prevent a conflict from developing further.

Be Prepared. Generate a plan and take appropriate action. Proactive planning and action is crucial in reducing the risk of IFR/VFR aircraft encounters.

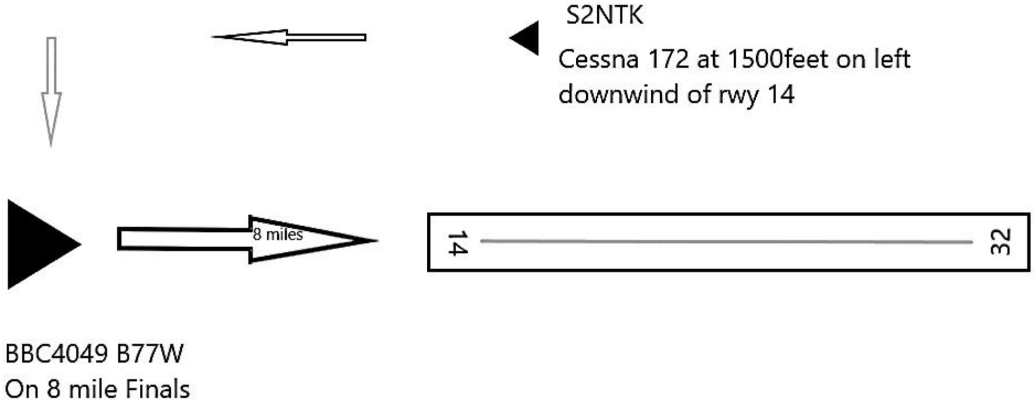
• What you need to know:
o Controllers must issue traffic advisories and safety alerts in time for pilots to be able to use them.
o The issuance of advisories/alerts after TCAS or Conflict Alert has gone off does not provide pilots with useful information to maintain safe distances from other aircraft.

What's my legal responsibility? One in three close proximity events in which a traffic advisory and/or safety alert was NOT issued was an IFR/VFR traffic mix.

• What you need to know:
o ATC has the legal responsibility and authority to issue control instructions, traffic advisories, and safety alerts to VFR aircraft.
o ATC instructions include headings, turns, altitude, and general direction.
o Pilots flying in controlled airspace must comply with all ATC instructions regardless of whether the pilot is flying VFR or IFR.

If you think an unsafe situation may develop, issue traffic advisories or exercise positive control by issuing a heading or an altitude restriction to separate the aircraft. If you feel that you are becoming overloaded in your area of responsibility, exercise good controller judgment by notifying your Mentor/Senior Controller and request assistance.

Let us get an example take an example of how traffic advisory works between an IFR and a VFR traffic:



In the figure, a Cessna 172 (VFR traffic) is established on the left downwind, while a Boeing 777 is on 8 NM final. The approach controller may issue a traffic advisory to the Boeing, for example:
"BBC4049, traffic advisory, Cessna 172 on your 10 o'clock, 9 miles, maintaining 1500 feet. Report traffic in sight."

Since VFR traffic is managed by the tower, the tower would normally provide the traffic advisory to the Cessna. If the tower is not present, the controller can advise the Cessna accordingly, for example:
"S2NTK, traffic advisory, Boeing 777-300ER on 8 miles final runway 14, 10 o'clock, 9 miles. Report traffic in sight."

Once the Cessna has the Boeing in sight, the controller may either instruct the Cessna to turn base after the 777 passes or to extend downwind before turning final in order to maintain proper wake turbulence separation.

5.5 Radar vector management and understanding holding

RADAR VECTOR MANAGEMENT: It is a Navigational assist or an aid to avoid traffic, weather, or get you to a specific spot. ATC assigns you a heading to fly to accomplish what he/she wants you to do. A radar vector happens when a plane is visible to an air traffic controller on a radar screen, and the controller tells the pilot to fly a specific heading. This will typically position the aircraft for an instrument approach to a runway. A typical interaction would be for controller to say "N123 fly heading 270, vectors for the ILS". This tells the pilot to head west, and soon, the instrument landing system (ILS) localizer signal will start to appear on the aircraft instruments. After that, controller will tell pilot to make another turn, join the localizer, cleared for approach.
A controller can give radar vectors for delayed approach as well if the traffic is more than the expected in the TMA vicinity. Basically radar vectors assists pilot where he/she wants to go and if on the approach, then vector the aircraft for the finals.

- ✧ ***Departure vectoring:*** Departure vectoring is the process for if pilots are unable to take SID, TMA controller vector the departed AIRBORNE aircraft to the next waypoint.

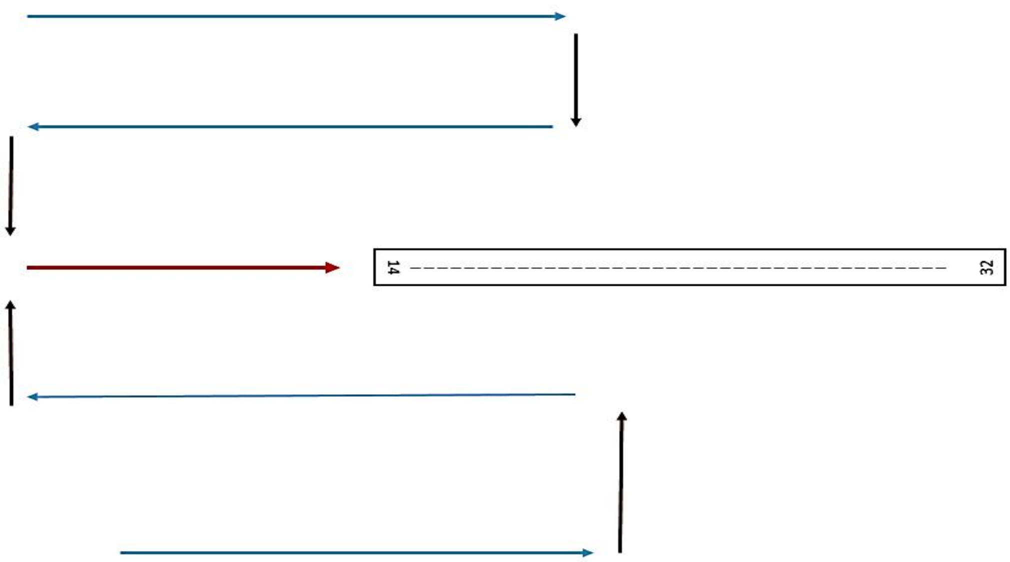
- ✧ ***Arrival vectoring:*** it is the process for the pilots to vector them till finals as mentioned in the introduction.

- ✧ ***Separation vectoring:*** process of separating between 2 conflicting traffics with the help of appropriate radar vectors to the offset and etc.

We will discuss about Arrival vectoring to the finals, as it is much important than Departure vectoring and Separation vectoring (already mentioned in topic 4, section 4.1)
There are several types of vectoring pattern a TMA controller can use, but the most common ones are:

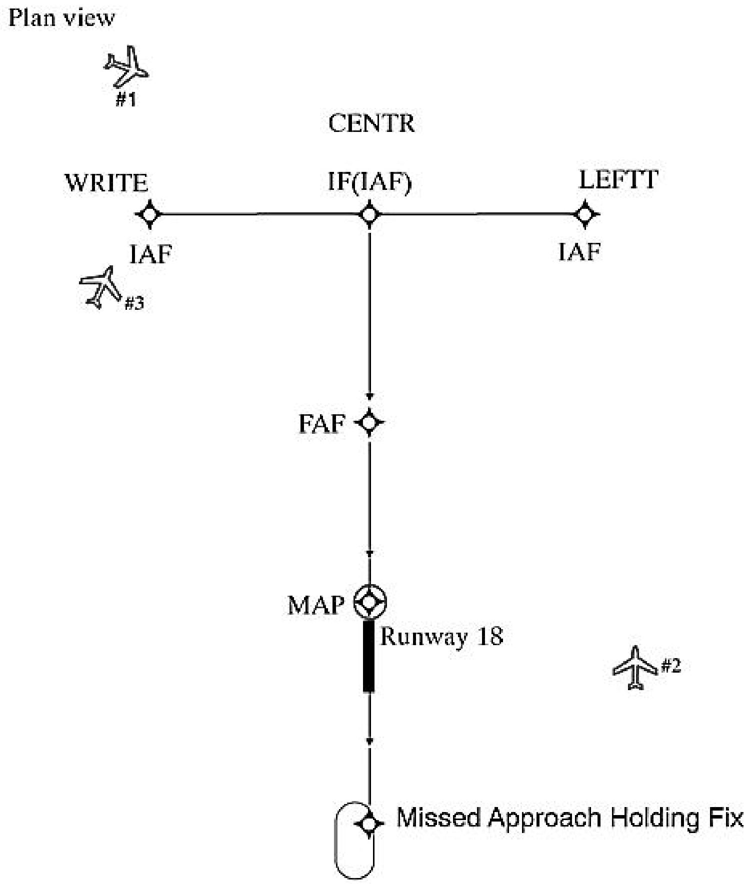
1. Snake pattern
2. VFR circuit pattern

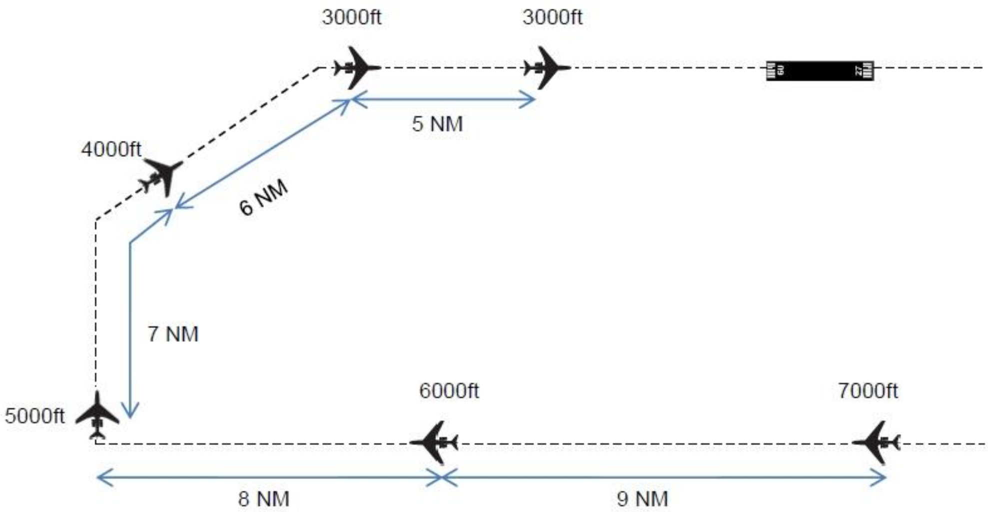
Let us start with snake pattern first.
Snake Patten as you can see the TMA controller can put into initially upwind pattern, then crosswind and then downwind for the runway to the finals.

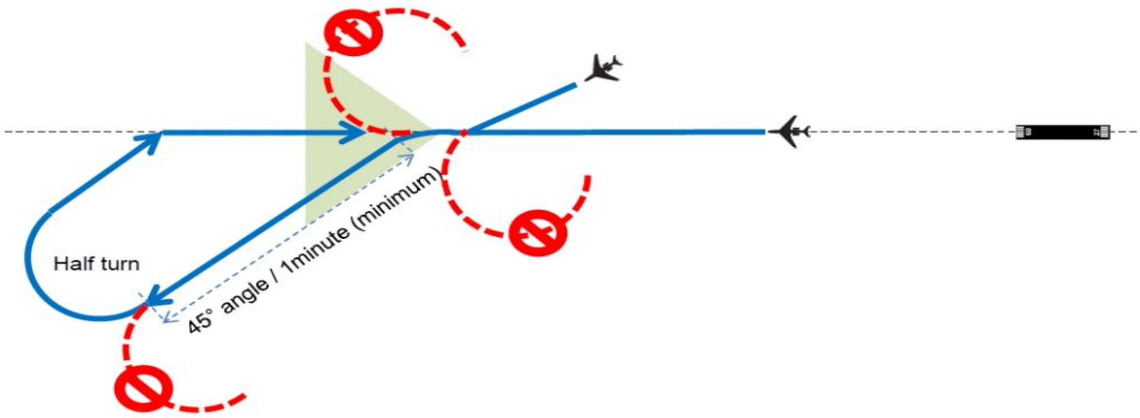


VFR CIRCUIT pattern is just similar, but reducing extra steps. TMA controller will put the traffic direct to downwind and then will advise to turn for Finals.

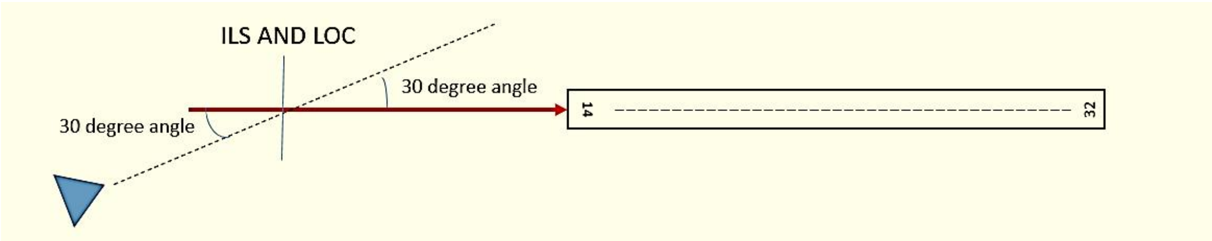
Let us also get introduced with more pictures for the final Approach fix:


Plan view
#1
CENTR
WRITE
IF(IAF)
LEFTT
IAF
IAF
#3
FAF
MAP
Runway 18
#2
Missed Approach Holding Fix


3000ft
3000ft
5 NM
4000ft
6 NM
7 NM
5000ft
6000ft
7000ft
8 NM
9 NM

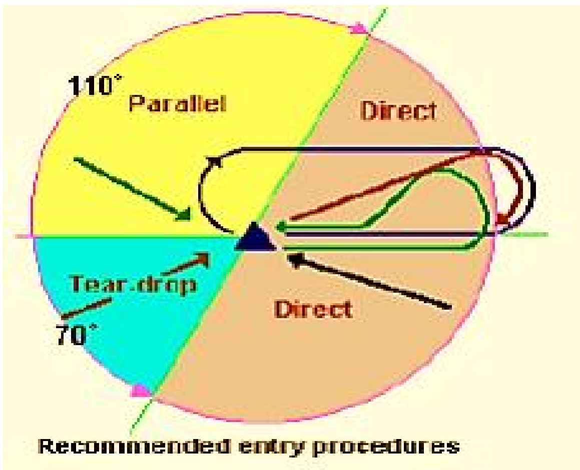


To make an aircraft intercept ILS, the controller have make sure that the angle between final heading and the current heading is no more than 30 degrees.



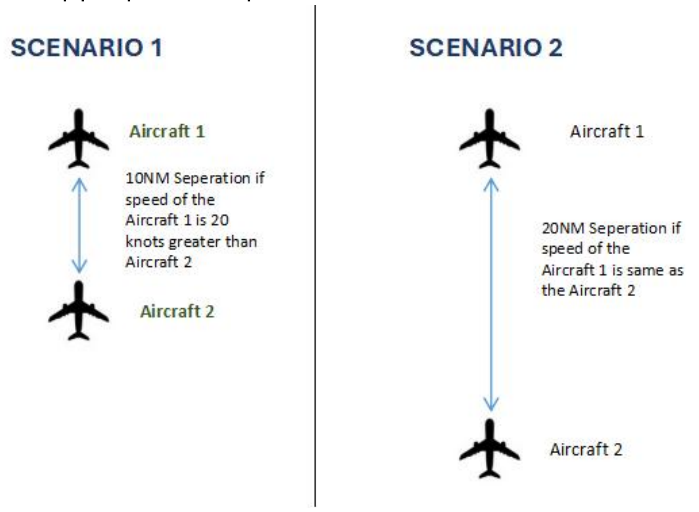
UNDERSTANDING HOLDING PATTERNS: Holding Pattern (Merriam-Webster) - the usually oval course flown by aircraft awaiting further clearance; especially to land. Hold Procedure (FAA Pilot/Controller Glossary) -a predetermined maneuver which keeps aircraft within a specified airspace while awaiting further clearance from air traffic control. Holdings are also used for separation between two traffics.

Figure on the left side is a perfect example of standard holding pattern.



5.6 Speed Control

Speed control is used to ease up the separation between 2 traffics to reduce the need for vectoring. A controller may request an aircraft to reduce or increase its speed in a fashion so that it can fit perfectly during the scenario when speed control is in need to establish the appropriate separation.



This particular scenario is for the aircrafts during descending in TMA airspace.

A TMA controller needs to use speed control frequently if the traffic is more than the expected into the TMA area.

5.7 VFR Cross Country Flights

Before we can even touch the topic, we need to understand what Class B & C requires for VFR flight as Dhaka TMA is a Class B airspace.

Class B - Class B airspace is generally airspace from the surface to 10,000 feet MSL surrounding the nation’s busiest airports in terms of airport operations or passenger enplanements. The configuration of each Class B airspace area is individually tailored, consists of a surface area and two or more layers, and is designed to contain all published instrument procedures once an aircraft enters the airspace. ATC clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace.

Class C: Operations may be conducted under IFR, SVFR, or VFR. All aircraft are subject to ATC clearance (country-specific variations notwithstanding). Aircraft operating under IFR and SVFR are separated from each other and from flights operating under VFR, but VFR flights are not separated from each other. Flights operating under VFR are given traffic information in respect of other VFR flights. Class C airspace is generally airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and have a certain number of IFR operations or passenger enplanements. Although the configuration of each Class C area is individually tailored, the airspace usually consists of a surface area with a five NM radius, an outer circle with a ten NM radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Each aircraft must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter must maintain those communications while within the airspace.

DHAKA TMA IS CLASS C airspace and for all IFR and VFR, ATC clearance is required. Dhaka TMA starts from ground to FL155 or 15,500 feet

So for VFR cross country flights, a controller's duty is:

- ✓ To make sure traffic doesn't cross 4000 feet on Class C airspace.
- ✓ To make sure traffic is continuously reporting position or reporting position when required.
- ✓ To provide separation to other IFR, VFR and SVFR's
- ✓ To provide traffic information and traffic advisories.
- ✓ To monitor that traffic does not fly over restricted air zones.

5.8 Importants tips of TMA Controlling

- ✓ Make sure you have the correct idea of which airspace you are controlling with appropriate idea of the region from the AIP.
- ✓ Make sure to keep a presence of mind.
- ✓ Make sure to think ahead of the scenario and plan the vectoring, arrivals, runway, contingency, etc.
- ✓ Always check the airport weather and ATIS information.
- ✓ Have a look on TAF and check on the forecast if possible.
- ✓ Ensure to maintain proper separation at all cost.
- ✓ Keep improving on vectoring skills.
- ✓ Maintain priority and serials.
- ✓ Make sure that Aircraft is Squawk Mode C.
- ✓ Make sure that the pilot have the correct ATIS information while making the first contact.
- ✓ Make sure to issue appropriate TMA instructions when required.
- ✓ Make sure to give correct Traffic advisory and traffic information.
- ✓ Make sure to apply FFP- Flight Following Procedures when a pilot request for it.
- ✓ For further information and tips, check ICAO4444 and VATEUD guide, Eurocontrol workshop: https://www.icao.int/MID/Documents/2014/PBN%20Workshop-Tunis/13%20%20EUR%20PBN%20Airspace%20Workshop_Designing%20Volumes%20+%20Sectors-vJUL2013%20.pdf

CHAPTER 6

ACC - AREA CONTROL CENTER

6.1 General

An Area Control Center (ACC) is a central hub in air traffic management that oversees aircraft once they are en route, ensuring safe and efficient operations within a designated Flight Information Region (FIR). Staffed by skilled air traffic controllers and supported by advanced radar, communication, and navigation systems, the ACC maintains safe separation between aircraft, provides clearances, and coordinates with neighboring control centers to manage smooth traffic flow. By monitoring aircraft across large sections of airspace, often covering international and domestic routes, the ACC plays a critical role in maintaining safety, minimizing delays, and supporting the overall efficiency of modern aviation.

VATSIM GCAP (Global Controller Administration Policy) rating competency requirements are as of follows:

a. General

I. Demonstrates an understanding of the enroute environment and role of the enroute controller.
II. Ability to connect to the network utilizing an approved enroute controller client and manage multiple frequencies / transceivers within the audio client.
III. Demonstrates an advanced level of situational awareness and scan.

b. Coordination

I. Coordinates with other Air Traffic Controllers when necessary, to ensure traffic is adequately spaced and sequenced.

c. Traffic Management

I. Using prescribed phraseology, provides necessary vectors to aircraft in a manner consistent with the expeditious flow of traffic.
II. Adjusts aircraft speed or track to achieve initial sequencing for arrival.
III. Provides appropriate lateral and vertical separation to aircraft in a surveillance / non-surveillance environment.
IV. Demonstrates the concept of positive control by avoiding issuing control instructions that could cause conflict.

d. Airspace Services

I. Provides traffic services as appropriate to the class of airspace.
II. Provides weather, traffic, and any other information to pilots using prescribed phraseology.
III. Issues descent and STAR clearances / instructions in a timely manner using prescribed phraseology.
IV. Understands and approves route deviation requests by pilots when able

6.2 Air Route Systems

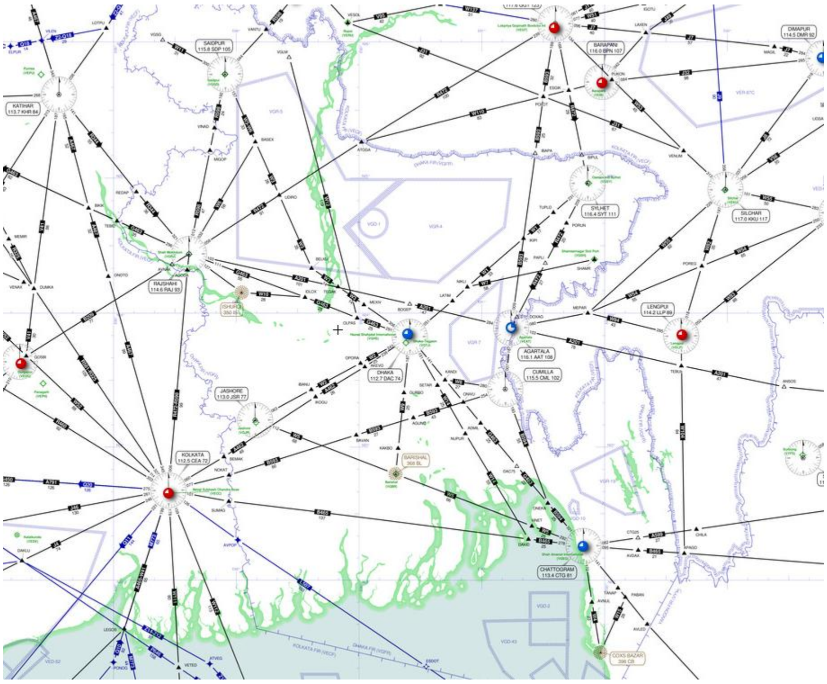


Figure: Airways

There are a number of ways of constructing a route. All scenarios using airways use SIDs and STARs for departure and arrival. Any mention of airways might include a very small number of 'direct' segments to allow for situations when there are no convenient airway junctions. In some cases political considerations may influence the choice of route (e.g. aircraft from one country can't overfly some other country).

- Airway-to-Airway Routing: The aircraft follows established airways from origin to destination, which is common for flights over land.
- Airway–Oceanic Track–Airway Routing: The aircraft departs via airways to the oceanic boundary, follows an assigned oceanic track, then re-enters airways to reach the destination, typical of flights over northern oceans.
- Airway–Free Flight–Airway Routing: The aircraft departs via airways to the oceanic boundary, transitions into a free-flight area across the ocean, and rejoins airways upon reaching land, commonly used over southern oceans.
- Full Free-Flight Routing: The aircraft operates entirely in a free-flight area from origin to destination, which is rare for commercial flights but may occur in special cases.

Airways and route systems form the backbone of global air navigation, ensuring safe, efficient, and organized flight operations. Airways are controlled corridors defined by navigational aids (Navaids), divided into high and low altitude segments, typically eight nautical miles wide with 1,000 feet of vertical separation between flight levels.

Navaids act as intersections for transitioning between routes, while RNAV systems provide greater flexibility by allowing navigation independent of ground-based aids.

Over oceans and remote regions, free-flight areas are used where aircraft are not confined to fixed airways but must report positions at regular intervals—generally every 10° of longitude east–west or 5° of latitude north–south. Flights usually follow a least-time-track to save fuel, although winds can alter the optimal route.

Air navigation relies on three main systems: the Low Altitude System (below 18,000 ft MSL), the High Altitude System (18,000 ft MSL to FL 450), and the RNAV Route System. Above FL 450, operations are point-to-point with guidance provided through high-altitude charts. Air traffic controllers may vector aircraft within controlled airspace for separation, efficiency, or noise abatement, while RNAV-equipped aircraft are generally permitted to navigate independently.

Two airways intersecting each other mark a so-called intersection. Airways may be suitable for both directions, called two-way airways, but there are also airways only suitable for one direction. These airways are called one way airways.

Airway Names Every airway has its own name, which normally consists of one or more letters and one or more numbers. Often when calling an airway the phonetic alphabet is not used, instead "colored" designations are used. A - Amber, B - Blue, G -Green, W - White, R - Red and V - Victor are the most common names for airways. The prefix U means, that the airway is only suitable for the upper airspace.

6.3 Position Reporting

Position reporting in aviation is a critical procedure for maintaining situational awareness and communication with Air Traffic Control (ATC).

Position Identification
The time of a position report is determined by the navigational aid being used:

- VOR Radio Facility: The reported time is the moment the "to/from" indicator completes its first full reversal.
- NDB Beacon: The reported time is the moment the ADF indicator completes a full reversal.
- Distance and Direction: If a position is given relative to a specific reporting point, the distance and direction must be calculated as accurately as possible.

It is important to note that ATC will not typically require position reports or navigation using aids not officially established for use in the airspace.

Reporting Points and Requirements
Position reports are generally required at designated reporting points, which are indicated by symbols on enroute charts.

- Compulsory Reporting Points: These are marked with a solid triangle (▲). Pilots must execute a position report when passing these points, unless otherwise instructed.
- "On Request" Reporting Points: These are marked with an open triangle (△). A report is only necessary when specifically requested by ATC.

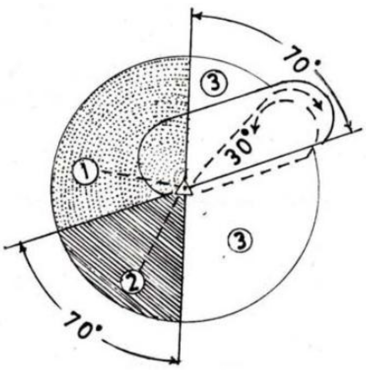
Reporting Environments

The requirements for position reporting can vary based on the flight environment:

- Along Airways or Routes: A position report is required if requested by the controller, regardless of altitude or flight level. Pilots must report over each designated compulsory reporting point and any requested reporting point defined in the flight plan.
- In a Radar Environment: When advised by ATC that their aircraft is in "Radar Contact," pilots should discontinue voice position reports over designated reporting points. Normal reporting should resume when ATC advises "RADAR CONTACT LOST" or "RADAR SERVICE TERMINATED."
- In an Oceanic (Non-radar) Environment: Position reports are required if requested by the controller. Pilots must report over each point used to define the flight route, even if it is an "on request" point. For aircraft with automatic position reporting, voice position reports should be discontinued.

6.4 Holding Patterns

A holding pattern is a predetermined maneuver designed to keep an aircraft within a specified block of airspace while awaiting further clearance from air traffic control. It is typically used during delays caused by traffic congestion, weather restrictions, or sequencing for approach and landing. A standard holding pattern consists of a racetrack-shaped course, usually aligned with a navigational fix such as a VOR, NDB, or GPS waypoint.



Entry Sectors
Right Hand Holding Pattern

- Throughout the procedure, strict altitude, speed, and time requirements are maintained to ensure safe separation between aircraft in the same or adjacent holding stacks.

- While holds are often viewed as operational delays, they play a critical role in maintaining safety, managing airspace capacity, and ensuring orderly flow into busy airports, particularly under adverse weather or peak traffic conditions.

6.5 Diversions

An aircraft may be diverted to an alternate aerodrome at the discretion of the pilot or on the request of ATC.

6.5.1 Reasons for Diversion
Diversions may occur when:
a) Weather at the destination is below the required minima.
b) Hazards or obstructions on the landing area cannot be removed promptly.
c) Excessive traffic or delays make landing impractical.

6.5.2 Pilot-Initiated Diversions
The pilot is responsible for the safety of the aircraft and decides if a safe landing is possible. If diversion is necessary, the pilot will inform ATC and request clearance.

6.5.3 Controller-Initiated Diversions
If ATC considers diversion necessary for traffic or safety reasons, the pilot will be advised, provided with the reason, and given the required clearance and instructions.

6.6 Handling the unexpected situation

Losing radar contact with an aircraft can be a stressful but manageable situation. While most air traffic control (ATC) operations, especially in environments like VATSIM, rely on radar, there are established procedures to handle situations where that contact is lost. The key is to remember that even if the aircraft disappears from your screen, it's still there and the pilot is still communicating with you.

How to Handle Loss of Radar Contact
When an aircraft unexpectedly disappears from your radar scope, it's considered a "loss of radar contact." Since the pilot is still in voice communication, you can continue to control the aircraft using non-radar methods, relying on pilot reports of their position, heading, and altitude.

Here's a breakdown of how to handle this situation:

- ✓ Communicate with the Pilot: The first step is to confirm the pilot is still with you on the frequency. Ask them to report their current heading, altitude, and any other relevant information.
- ✓ Vector Other Traffic: The primary concern is maintaining a safe separation between the aircraft you can no longer see and all other traffic. You must immediately vector any conflicting traffic away from the last known position and flight path of the aircraft that lost radar contact.

- ✓ Provide Procedural Guidance: Since you can't use radar to guide the pilot, you'll need to provide instructions based on a procedural approach. This is a pre-defined and published flight path that allows a pilot to navigate to an airport without radar assistance. It includes all the necessary turns, altitudes, and holding patterns to get the aircraft safely to the runway.

- ✓ Prepare for a Missed Approach: In the event the pilot cannot land safely, either due to poor visibility or other factors, they will execute a missed approach, also known as a go-around. This is a standard procedure where the pilot aborts the landing and climbs back to a safe altitude, following a specified flight path. ATC can also instruct a pilot to go around for various reasons, such as a runway not being cleared or the aircraft being improperly positioned for a landing.

Understanding Other Unexpected Situations
Beyond a loss of radar contact, there are other unexpected situations that ATC needs to be prepared for, including communication failures and emergency declarations.

Communication Failure (Loss of Radio)
In real-life scenarios, a radio failure is a serious event. A pilot will squawk the transponder code 7600, which immediately alerts ATC to a No Radio (NORDO) situation. Aircraft with a radio failure are given priority, and ATC can communicate with them using aviation light signals.

On VATSIM, however, a complete communication loss is unlikely because there are redundant systems (voice and text). If a pilot has a "simulated" radio failure, ATC can still track the aircraft on radar and guide other traffic away from it. The pilot will typically follow a published procedural approach, similar to what's done in a loss of radar contact situation.

Emergency Situations
Emergencies are categorized by their severity:

- ✓ Distress: This is a grave and imminent danger requiring immediate assistance. The spoken word for this is "MAYDAY," pronounced three times. A distress call has absolute priority over all other transmissions. All other aircraft and stations must cease broadcasting and listen on the frequency.

- ✓ Urgency: This is a situation where the safety of the aircraft or a person on board is threatened, but it does not require immediate assistance. The spoken word is "PAN-PAN," pronounced three times.

The initial distress or urgency call should be made on the current frequency in use. If that fails, the pilot should try to communicate on the general distress frequency 121.500 MHz.

6.7 VFR Cross-country flights

Before we can even touch the topic, we need to understand what Class B & C requires for VFR flight as Dhaka TMA is a Class C airspace. Class C airspace is generally airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports in terms of airport operations or passenger enplanements. The configuration of each Class C airspace area is individually tailored, consists of a surface area and two or more layers, and is designed to contain all published instrument procedures once an aircraft enters the airspace. ATC clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace.

DHAKA TMA IS CLASS C airspace and for all IFR and VFR, ATC clearance is required. Dhaka TMA starts from FL055 to FL460.

So for VFR cross country flights, a controller's duty is:
1. To make sure traffic doesn't cross 4000 feet on Class C airspace.
2. To make sure traffic is continuously reporting position or reporting position when required.
3. To provide separation to other IFR, VFR and SVFR's
4. To provide traffic information and traffic advisories.
5. To monitor that traffic does not fly over restricted air zones.

VFR (Visual Flight Rules) pilots may request, and ATC may provide, "VFR Advisory Services," provided that controller workload allows. This service is commonly known as flight following.

When available, ATC will use radar to identify VFR aircraft and provide pilots with traffic advisories and relevant weather information. It is important to note that controllers do not issue instructions regarding heading, altitude, or speed, nor do they provide separation services to VFR flights. The service is strictly advisory in nature and may be discontinued at any time, either by the pilot or by ATC.
In addition to traffic and weather information, optional services that may be provided include:

- ✓ Issuing safety alerts.
- ✓ Providing traffic advisories.
- ✓ Offering limited radar vectoring upon pilot request, subject to controller workload.
- ✓ Assisting with sequencing at locations where specific procedures or agreements are in place.

For a VFR flight to be conducted, weather conditions must always meet the minimum requirements for VMC. If these conditions are not satisfied, VFR operations are not permitted.
Specifically, no aircraft may operate under basic VFR if:

- ✓ Flight visibility falls below the prescribed minimums, or
- ✓ The aircraft is too close to clouds, as defined by altitude and airspace regulations.

If these conditions cannot be met, the flight must instead be conducted under IFR (Instrument Flight Rules).

VFR Waypoints
In real life operations VFR Waypoints exist, these ease navigation for VFR pilots, using GPS systems for additional information to that contained in their VFR charts.

The primary reason they were introduced was to enhance navigation when aircraft operate around congested airspace requiring route restrictions or mandatory reporting points VFR Waypoints are assigned a discrete five-letter designator, which will be added to navigation databases.

The waypoints will all begin with the letters "VP" and then have an additional three letters. The "VP" letters will provide immediate recognition that the waypoint is for VFR purposes only.

VFR Waypoints should not be used as a sole or primary means of visual navigation. Use of these waypoints, as one of many supplemental sources to navigation will increase proper situational awareness.

Reporting Points
To avoid VFR traffic from flying criss-cross within a Control Zone which is also used for IFR traffic and to enable ATC to mix and match these various flights into and out from an aerodrome a VFR pilot has to follow standard VFR Arriving and Departing Routes which begin, end or are intersected by Reporting Points.

Usually these Reporting Points are distinctive natural or man-made landmarks, or buildings. The VFR Arrival and Departure Routes usually follow a road or a river. All aircraft flying under VFR conditions have to follow these routes with the exception of Police and Search and Rescue Helicopters.

6.8 Enroute Separation

Enroute Air Traffic Control (ATC) ensures the safe and orderly movement of aircraft between airports through controlled airspace. The primary goal is to prevent collisions by maintaining safe distances between aircraft during the enroute phase.

Lateral separation is achieved by assigning aircraft different routes or airways, keeping them horizontally apart. Modern navigation systems allow more precise routing, which can reduce the required lateral spacing while maintaining safety.

Vertical separation ensures aircraft fly at different altitudes. Standard separation is 1000 feet below FL410 in RVSM airspace and 2000 feet above FL410. Controllers assign flight levels to maintain this safe altitude buffer.

Longitudinal separation maintains distance along the same route, based on time, distance, or speed differences. This prevents overtaking conflicts and ensures smooth traffic flow.

Separation can be maintained using radar monitoring or procedural methods when radar is unavailable. Radar allows direct monitoring of aircraft positions, while procedural separation relies on flight plans, position reports, and timing.

Enroute Separation (Collected from ICAO 4444 PANS ATM Book)

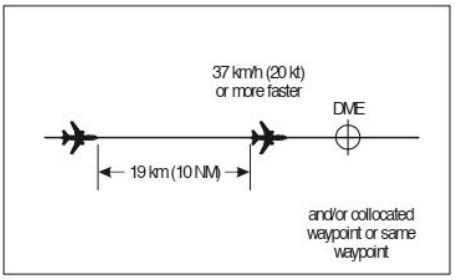


Figure 5-23. 19 km (10 NM) DME and/or GNSS-based separation between aircraft on same track and same level (see 5.4.2.3.3.1 b))

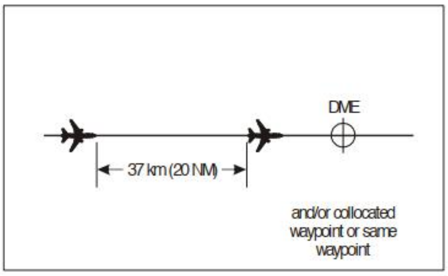


Figure 5-22. 37 km (20 NM) DME and/or GNSS-based separation between aircraft on same track and same level (see 5.4.2.3.3.1 a))

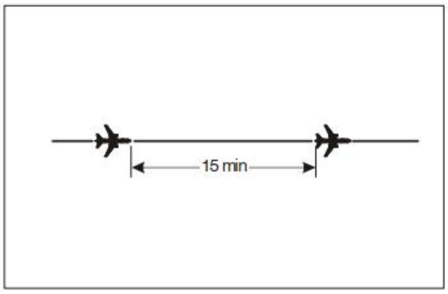


Figure 5-10. Fifteen-minute separation between aircraft on same track and same level (see 5.4.2.2.1.1 a))

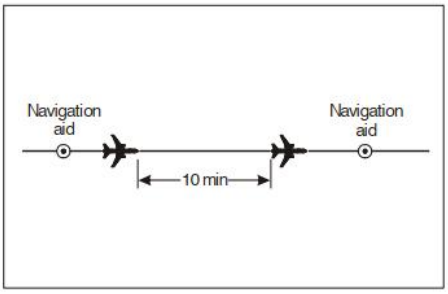


Figure 5-11. Ten-minute separation between aircraft on same track and same level (see 5.4.2.2.1.1 b))

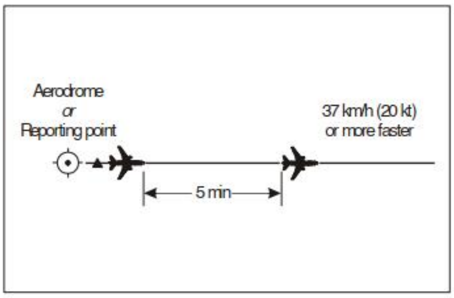


Figure 5-12. Five-minute separation between aircraft on same track and same level (see 5.4.2.2.1.1 c))

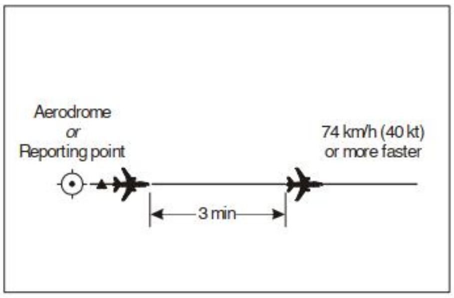


Figure 5-13. Three-minute separation between aircraft on same track and same level (see 5.4.2.2.1.1 d))

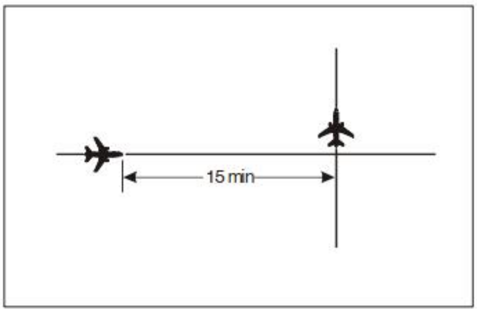


Figure 5-14. Fifteen-minute separation between aircraft on crossing tracks and same level (see 5.4.2.2.1.2 a))

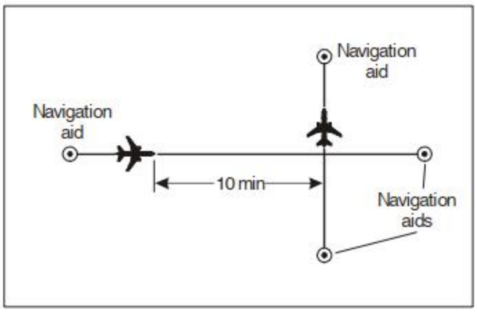
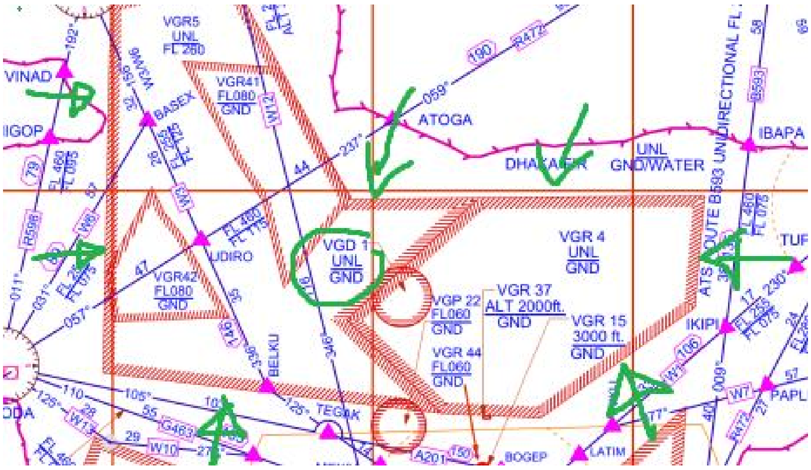


Figure 5-15. Ten-minute separation between aircraft on crossing tracks and same level (see 5.4.2.2.1.2 b))

6.9 Prevention of overflying over restricted zones



As an Air Traffic Controller, one of the critical responsibilities is to ensure that aircraft do not enter or overfly restricted, prohibited, or danger areas. These zones are established for reasons of national security, safety, or operational requirements, and unauthorized entry may lead to serious consequences.

To prevent such incidents, ATC employs the following measures:

- **Route Planning and Clearance**: During flight planning and clearance delivery, controllers ensure that approved routes do not conflict with restricted zones. If necessary, alternative routings are issued to keep the aircraft clear of such areas.
- **Continuous Monitoring:** Controllers actively monitor aircraft positions using radar and surveillance systems. Any deviation that might lead an aircraft toward a restricted area is identified early.
- **Timely Instructions:** If an aircraft appears to be on a trajectory that could penetrate a restricted zone, immediate corrective instructions are issued (e.g., heading changes, altitude adjustments, or re-routing).
- **Coordination with Adjacent Units:** ATC units coordinate with adjacent sectors and control centers to ensure that traffic handovers are safe and that no flight paths intersect restricted areas.

- **Pilot Awareness:** Controllers remind pilots of active restricted zones when necessary, especially in dynamic situations (e.g., military activity or temporary restrictions).

By maintaining vigilance, providing clear instructions, and ensuring close coordination, ATC minimizes the risk of aircraft inadvertently entering restricted airspace, thereby ensuring both safety and regulatory compliance.

6.10 Multiple airport handling techniques

Managing traffic around multiple airports within the same airspace is one of the most demanding responsibilities of an Air Traffic Controller. It requires constant vigilance, precise coordination, and sound judgment to maintain both safety and efficiency. The following principles guide effective multiple-airport handling:

- **Maintain Continuous Traffic Awareness:** Controllers must always maintain an accurate picture of traffic in the air and on the ground. This includes monitoring inbound and outbound flows for each airport, as well as overflying aircraft, to anticipate potential conflicts before they arise.

- **Prioritize Approaching and Radar-Vector Traffic:** Aircraft established on approach or under radar vectors must be given priority, as they are in the most critical phases of flight. Efficient sequencing minimizes the risk of go-arounds and reduces unnecessary delays.

- **Ensure Proper Separation:** Standard separation minima must be maintained at all times. With multiple airports operating in close proximity, controllers must carefully coordinate headings, altitudes, and departure clearances to avoid overlap in terminal airspace.

- **Handle Emergency Traffic with Absolute Priority:** Emergency flights override all other considerations. Controllers must promptly clear the path, resequence other aircraft if needed, and ensure the emergency aircraft receives uninterrupted priority handling.

- **Provide Direct Routings Where Possible:** Whenever traffic and airspace conditions permit, offering direct routings can significantly reduce track miles, fuel consumption, and congestion. This also improves pilot workload and operational efficiency.

- **Apply Procedural Control if Necessary:** In cases where radar control is limited or unavailable, procedural techniques are applied. This may include altitude separation, route segregation, or time-based separation to maintain order and safety.
- **Coordinate Effectively Across Units:** Seamless coordination between tower, approach, and en-route controllers is essential. Clear communication ensures smooth traffic flow across multiple airports and prevents conflicting instructions.

By combining situational awareness with proactive decision-making, controllers can safely manage complex multi-airport environments, balancing efficiency with the unwavering priority of safety.

CHAPTER 7

END NOTE

This training handbook has been developed to provide a structured foundation for aspiring air traffic controllers within the Bangladesh vACC. It consolidates essential procedures, concepts, and practices that are necessary for conducting safe and realistic operations in the VATSIM environment. From aerodrome control to en-route operations, the material is arranged progressively to reflect the standard responsibilities of controllers and to guide trainees in building their skills step by step.

While this document offers a comprehensive overview of procedures, it is not intended as a substitute for practical training. Simulation sessions remain a critical part of the learning process, as they allow trainees to apply knowledge in real-time scenarios, develop situational awareness, and strengthen decision-making abilities. Active participation, consistent practice, and constructive feedback from mentors and peers are key to transforming theoretical understanding into practical competence.

It should also be restated that this handbook is designed exclusively for virtual simulation activities and does not serve as an operational reference for real-world ATC. The examples and practices outlined here are adapted to meet the requirements of online networks such as VATSIM and should be followed only in that context.

As trainees progress, professionalism, discipline, and a commitment to continuous improvement will remain central to their development. Effective air traffic control in any environment depends not only on technical proficiency but also on clear communication, teamwork, and the ability to remain composed under varying levels of traffic demand.

In conclusion, this handbook should be regarded as a companion resource—one that supports ongoing training and provides a consistent reference point throughout a controller's development. The true value, however, lies in its application during live operations, where knowledge and practice come together to build confidence and competence. With dedication and steady progress, trainees will be well-prepared to contribute effectively to the Bangladesh vACC and the wider VATSIM community.

APPENDIX

Training Document Information

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