

S2 TWR – TRAINING HANDBOOK

Tower Controller S2 Training Handbook

Integrated Training for Nassau FIR Controllers To be used with [S1 Training for Handbook](#)



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Note: For simulated flight and controller use only

1 Introduction

1.1 This handbook is prepared to assist S1 rated students to train for the Tower (S2) Rating.

S2 Trainee Experience Requirements:

1. Basic understanding of VATSIM/ICAO flight rules and flight operations procedures.
2. Confidence in their knowledge of Clearance Delivery and Ground Control procedures prior to attempting this course.
3. Must log a minimum of 10– 20 GND hours before considering proceeding to the next level. (Hours can vary based on the student’s knowledge, learning abilities and Mentor/Trainer recommendation)
4. Possess the ability to read and understand arrival / departure charts and METAR information.

1.2 The Tower Controller (S2)

A tower controller has responsibility for aircraft in the airspace directly above and in the close vicinity of the airport. At large airports, the tower function could be split into several tower positions, which can be one for arrival and one for departure, as well as ground and delivery. The tower controller issues IFR clearances, keep the aircraft separated while taxiing on taxiways and clear aircraft for take-off and landing on the active runway. S2 controller is also responsible for the traffic in the Tower control zone including aerodrome traffic circuits. The tower works in close collaboration with the approach or en- route controller.

1.3 In order to start practical Tower Controller training

S1 student must meet the following requirements:

- VATSIM membership
- Tower Controller training request sent to and accepted by Nassau FIR training department
- Pass the theoretical ([Test](#)) at S1 level

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2 Theoretical Knowledge

2.1 Theoretical sessions cover the following:

1. VATSIM organizational awareness	a. VATSIM and VATCAR	
	b. Code of conduct: Being helpful and respect pilots	
	c. Radar range settings	
	d. Remain at position when logged on as active controller	
	e. The role of supervisors, when should they be called	
2. Supporting programs	a. ATC booking via Vroute and VATSIM Pre-file	
	b. ServInfo, VATSpy and Vroute	
3. Controller radar client software	a. Configuration files for country and airport	
	b. Configuration to see airport	i. control zone (airspace)
		ii. runway
		iii. taxiways
		iv. aprons and parking stands
c. Interpret aircraft label	i. Squawk: code, standby and mode C	
	ii. Altitude: present (maintaining, climbing, descending)	
	iii. Cleared flight level (Temporary altitude)	
	iv. Scratchpad	
	v. Additional information depending on local setup	
3. Controller radar client Software [continued]	d. Basic functions	i. Zoom and pan the radar display
		ii. Assign squawk code
		iii. View aircraft flight plan
		iv. Set cleared flight level (temporary altitude)
		v. Keep departure list updated
		vi. Enter info into scratchpad
		vii. Enter controller information (text ATIS)
		viii. Set up voice ATIS
		ix. Use controller list (be aware of other controller online)
		x. Acquire METAR for own airport
	e. Communication	i. Private chat with controllers and pilots
		ii. Communication with text pilots on the ATC channel
		iii. Transmit voice on the general ATC channel
		iv. Monitor another controller's frequency
		v. Supervisor call: .wallop command to contact SUP online

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3 Practical Knowledge

3.1 The practical part of the training will consist of both sweatbox sessions and live (online VATSIM) training sessions. These sessions will cover the following:

1. Preparations before logging in as active controller	a. Login as observer, and coordinate with adjacent controllers, if considered necessary
	b. Acquire current METAR for own airport
	c. Choose active runway in use
	d. Enter controller and airport ATIS
2. Log in as active controller	a. Valid position name
	b. Appropriate facility
	c. Rating
	d. Set appropriate radar range corresponding to position
	e. Log in with VATSIM ID, password and own name
	f. Select voice server and voice channel
	g. Make adjacent controllers aware that the position is active and operational, by transmitting on the controller coordination channel (ATC), if not in direct contact otherwise (TS)
3. Log out as active controller	a. Coordinate closing with adjacent controllers above
	b. Indicate position is going to close
	c. Use .break function
	d. Transmit on the controller coordination channel
	e. Transfer pilots on the frequency to other controller or Unicom
	f. Log out from VATSIM
	a. Spell out phonetic alphabet (Alpha, Bravo, etc.)

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4. General ATC procedures for Tower Controller

b. Weather information

- i. For departing aircraft, give departure information where not available in ATIS: RWY in use, wind, RVR (if applicable), temperature (for turbine engine aircraft), QNH, runway conditions (if applicable)
- ii. For arriving aircraft, give RWY in use and intended approach procedure, read MET REPORT and transition level, unless the information is available by ATIS or already transmitted by another controller.

c. Standard IFR departure

- i. Review flight plan (even/odd FL, routing) and assign SID.
- ii. Spell out aircraft call signs and destination ICAO codes.
- iii. Assign squawk code and set cleared flight level (temporary altitude)
- iv. Deliver departure clearance to pilot (SID and squawk code)
- v. Approve startup and pushback.
- vi. Taxi clearance to active runway for departure.
- vii. Lineup if aircraft needs to hold due other departing traffic or just landed traffic.
- viii. Takeoff clearance (including wind information)
- ix. Transfer to controller above
- x. Transfer to Vatsim Unicom (122.80)

d. Non-Standard IFR departure

- i. Coordinate non-standard departure with controller above
- ii. Coordinated heading and initial altitude for further radar vectoring during departure
- iii. Direct to first waypoint in flight plan

e. Standard IFR arrival

- i. Continue approach (if landing clearance can not be given due traffic)
- ii. Landing clearance and wind information
- iii. Taxi clearance to appropriate stand via taxiways
- iv. Go-around, (ATC or pilot initiated), coordinate with controller above.

f. VFR departure leaving Control Zone

- i. Taxi to holding point before active runway
- ii. VFR clearance using control zone VFR exit points

g. VFR arrival

- i. Clear into the circuit
- ii. Landing time and taxi to parking area

h. VFR traffic circuit

- i. Clearance for traffic circuit
- ii. Touch-and-go, stop-and-go, low approach, go-around

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4. General ATC procedures for Tower Controller [continued]

- i. Separation
 - i. Separate aircraft on ground
 - ii. Separate aircraft departing from same runway
 - iii. Separate arriving and departing aircraft
 - iv. Conditional clearances
 - v. Separate aircraft in the control zone (and TMA sector if applicable) according to airspace classification
- j. Coordination
 - i. Effective coordination with other controllers when required
 - ii. E.g. direct routing into other controllers' sector
- k. For piston engines:
 - i. Taxi to run-up area
 - ii. Rare on Vatsim, but in real life most small aircraft will want some minutes for engine run-up, and some may want to simulate this on Vatsim as well
 - iii. Some airports have designated run-up areas while others use a holding point where the aircraft is not in the way for other departures.
- l. Emergencies
 - i. Handling emergencies
 - ii. VATSIM [Code of Conduct](#) regarding emergencies

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4 Simulator Training Program

4.1 The first practical sessions will be in Sweatbox. The Sweatbox will offer the student a steady increase of traffic level, to allow a steady learning curve. All exercises have overlying/adjacent sectors online and takes place on a single or multiple runway airport.

A. Runway Selection	i. Select appropriate runway based on current winds and local procedures
	ii. Attempt whenever possible to select as many runways possible to meet the current traffic volume, in compliance with local procedures
B. ATIS Issuance	i. Demonstrate the ability to correct record a valid ATIS broadcast
	ii. Advise all aircraft on the ground or within Tower airspace of current ATIS and ATIS updates
	iii. Ensure all departing aircraft have the current ATIS information
C. Departure Procedures	i. Demonstrate the ability to provide an aircraft with an appropriate departure release
	ii. Provide aircraft with the appropriate departure heading for their route of flight, in compliance with local procedure
	ii. Demonstrate knowledge of the appropriate regulations and procedures regarding helicopter departures
D. Arrival Procedures	i. Demonstrate knowledge of the different types of landing modes used by aircraft and the appropriate phraseology to use for landing clearances (landing, low approach, touch-and-go, etc.)
	ii. Demonstrate knowledge of the appropriate regulations and procedures regarding helicopter arrivals
E. Spacing and Sequencing	i, 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
F. Taxi Into Position and Hold (TIPH) and Land and Hold Short (LAHSO)	i. Observe the regulations regarding each of TIPH and LAHSO procedures as specified
	ii. Demonstrate appropriate use of Taxi into Position and Hold (TIPH) and Land and Hold Short (LAHSO), where applicable
G. VFR Traffic Pattern	i. Understands and demonstrates knowledge of segments of the VFR Traffic Pattern
	ii. Correctly issues appropriate instructions to VFR Aircraft utilizing the pattern
	iii. Maintains proper sequencing and separation between all VFR Traffic in the pattern and all other arriving/departing traffic
H. Wake Turbulence Separation	i. At all times remain in compliance of Wake Turbulence regulations as specified
	ii. Demonstrate phraseology when providing Wake Turbulence advisories to all affected aircraft
I. Converging or Parallel Runway Operations	i. When applicable, provide advisories for aircraft arriving on parallel or converging runways
J. Missed Approach Procedures	i. Understands missed approach procedures and go around operations
	ii. In compliance with local procedures issues the appropriate missed approach instructions for the facility they are controlling
	iii. When necessary coordinate with the overlying radar controller for appropriate missed approach procedures

5 Tower Controller Awareness

5.1 Wake Turbulence

All aircraft generate turbulence called vortex wake. Large aircraft flying at slow speeds create the most severe wake turbulence. This turbulence can cause problems for following aircraft, which in severe cases can cause the pilot of the following aircraft to lose control. In addition to vertical separation minimum, the lateral spacing minima to be taken into account. The wake turbulence categories are based on the certified maximum take-off weight (MTOW) of the aircraft.

Aircraft Category	MTOW	Preceding Aircraft	Following Aircraft	Separation-Time	Radar Separation-Distance
Light Aircraft (L)	7000 kg	HEAVY	HEAVY	1 min	4 nm
Medium Aircraft (M)	7000 – 136000 kg	HEAVY	MEDIUM	2 min	5 nm
Heavy Aircraft (H)	Above 136 000 kg	HEAVY	LIGHT	3 min	6 nm
Super Heavy (SH)	Airbus A380	MEDIUM	LIGHT	2 min	5 nm
		SUPER	MEDIUM	3 min	7 nm
		SUPER	LIGHT	4 min	8 nm

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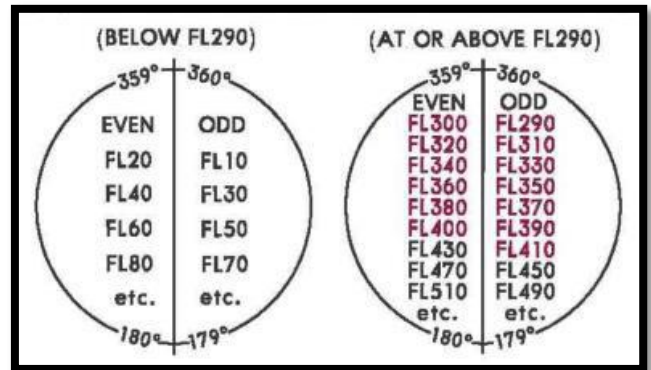
5.2 Vertical separation

Vertical separation should at least be:

1. RVSM: 1000ft
2. Non-RVSM: 2000ft

Aircraft are allowed to climb or descend to a level previously occupied by another aircraft provided that vertical separation is maintained. This is done by observing the transponder echo in mode C.

To make sure vertical separation is maintained, it has been decided that aircraft eastbound use odd flight levels and aircraft westbound use even flight levels. This, so called semi-circle-rule applies when no other rules override it. Some airways/routes have specific flight levels assigned to them that contradict the semi-circle-rule.



5.3 Take-off Clearance

1. Confirm departure release available.
2. Confirm no other traffic crossing the runway or failing to exit downfield.
3. Adequate separation from the previous departure or the wake of other heavy aircraft departing from other runways where flight paths may cross
4. No other aircraft on final approach (to any runway) that might create a conflict with this departure if they go around or declare a missed approach

The take-off clearance consists of the following information:

1. **Wind** (If applicable) - This is the current winds. If the winds are less than three knots, then state the wind as calm. **"WIND 240 AT 13"**
2. **Additional Instructions** (as necessary) - This can include items such as a heading for an aircraft to fly after departure, other traffic in the area, or other items as appropriate. **"MAINTAIN RUNWAY HEADING"**
3. **Runway** - State the runway that the aircraft is departing. **"RUNWAY 14"**. No need to state this if only one runway is in use.
4. **Clearance** - State the phrase **"CLEARED FOR TAKE-OFF"**

5.4 Landing Clearance

IFR Arrivals will be separated, sequenced, and cleared for approach by the Approach Control. Tower need only issue landing clearance.

The landing clearance consists of the following information:

1. **Runway in use** (as required) "14"
2. **Wind** (When applicable) "140 AT 08" (Low level wind shear advisories when available)
3. **Runway condition** (If applicable, RUNWAY SURFACE WET, Braking action reports when available and the braking action is reported as "POOR" or "NIL."
4. **Clearance** - State the phrase (wind and runway designator if applicable) "CLEARED TO LAND"

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5.5 Missed Approach / Go Around Procedures

5.5.1 A pilot on an IFR flight plan making an instrument approach may execute a missed approach if he is unable to safely descend to the runway due to weather or other factors. The Tower controller must check the local procedures of the facility s/he is working at to see how a missed approach should be handled. In general, the controller will advise the pilot that they copy the missed approach, instruct the aircraft to fly runway heading, climb to traffic pattern altitude, and hand the pilot over to approach control for re-sequencing.

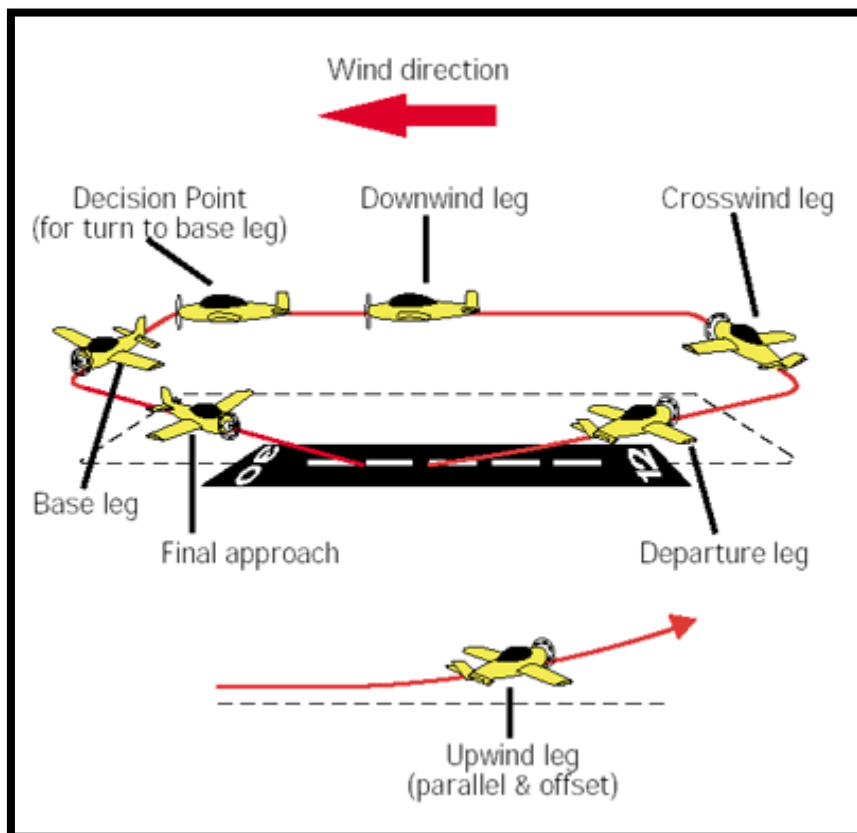
"FLY RUNWAY HEADING, CLIMB AND MAINTAIN <altitude>. CONTACT APPROACH ON <frequency>."

"FLY RUNWAY HEADING, CLIMB AND MAINTAIN <altitude>. RE-JOIN DOWNWIND RUNWAY <number>, CALL ON FINALS"

5.5.2 "GO AROUND" is used to instruct a pilot to abandon his approach. The most common reasons is another aircraft still on the runway or possibility of a runway incursion by a rogue aircraft. (Note: Controller should not issue go around instructions for approaches that "look unsafe." The pilot is usually in the best position to determine if he is able to make a safe landing.)

"GO AROUND, RUNWAY IS STILL OCCUPIED, SAY AGAIN GO AROUND"

"FLY RUNWAY HEADING, CLIMB AND MAINTAIN <altitude>. CONTACT APPROACH ON <frequency>."



5.6 Hand-off

A handoff is an action taken to transfer the radar identification and control of an aircraft, from one controller to another. It consists of four steps:

1. Coordination before hand-off
2. Initiate and accept handoff, prior to traffic leaving the area of responsibility
3. Handoff of communication (advise the traffic on voice or text who they shall contact next), prior to traffic leaving the area of responsibility
4. Handoff of control either when traffic leaves the area of responsibility or immediately after handoff of communication.

6 Simulator Exercises

6.1 IFR DEPARTURES

The exercise starts with a number of departing aircraft at the gates.

Subjects covered:

- Provide IFR clearances, using SID or vector departure.
- Start-up
- Push-back
- Taxi
- Take-off
- Runway change halfway through the exercise

6.2 IFR DEPARTURES AND ARRIVALS

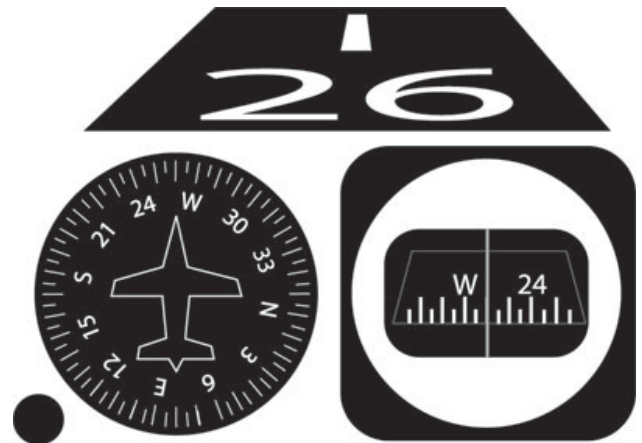
- Both inbound and outbound IFR
- Multiple aircraft on final, (Continue approach, number two...)
- Separate aircraft taxiing in from aircraft taxiing out

6.3 VFR TRAFFIC

- VFR clearances (circuit, traffic leaving CTR)
- VFR in the circuit
- Clearing inbound VFR into the circuit.
- Phraseology in the local language (when possible)
- Helicopter traffic

6.4 FINAL SIMULATOR SESSION

- Exercise combining IFR arrivals, IFR departures and VFR traffic.



6.5 OPTIONAL: BASIC APPROACH CONTROL SESSION

The following items might be included; however, they are regarded as advanced and/or optional at this level.

- Introduction to approach control
- Vertical separation
- Handling up to 3 aircraft simultaneously in the TMA
- Vectoring to approach (1 aircraft)
- Controller radar client software
- Communication

7 S2 Examination

7.1 Tower Controller (S2) check-out:

Tower position at a selected Major
Airport or Minor Outlying airport

Time frame: 60 to 90 minutes

Supporting ATC: on approach or area/enroute sector above, no ground

7.2 Required performance to pass:

- Log on as active Tower Controller
- Communicate with pilots and controllers online
- Respond to pilot calls and coordination requests from adjacent controllers
- Function as a Tower controller during normal traffic conditions
- Handle at least one IFR departure and one IFR arrival satisfactory
- Handle at least one VFR departure and one VFR arrival satisfactory
- Control at least 2 aircraft on the frequency simultaneously
- In total, handle 8 movements during the examination.
- Coordinate runway in use and non-standard departure with approach or area/en-route controller above
- Keep aircraft separated on taxiways and runway
- Separate aircraft taking off from and landing on the same runway
- Separate aircraft in the control zone
- Use correct English phraseology and phraseology in local language if applicable

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