

VIRTUAL AIR TRAFFIC

END-USER MANUAL

Real-world-inspired traffic, airport operations and sequencing for X-Plane 12

Applies to Virtual Air Traffic 0.76 BETA

Updated 31 August 2026

For flight simulation use only.

This handbook explains what VAT does, how its traffic systems behave, how to use every visible control, and how to troubleshoot the most common operational situations.

Welcome to Virtual Air Traffic

This is our complete end-user guide to Virtual Air Traffic 0.76 BETA. It explains how VAT builds its traffic world, how aircraft are injected and flown, how airports and runways are managed, what every user-facing control does, and what to expect from the simulator in normal and high-traffic situations.

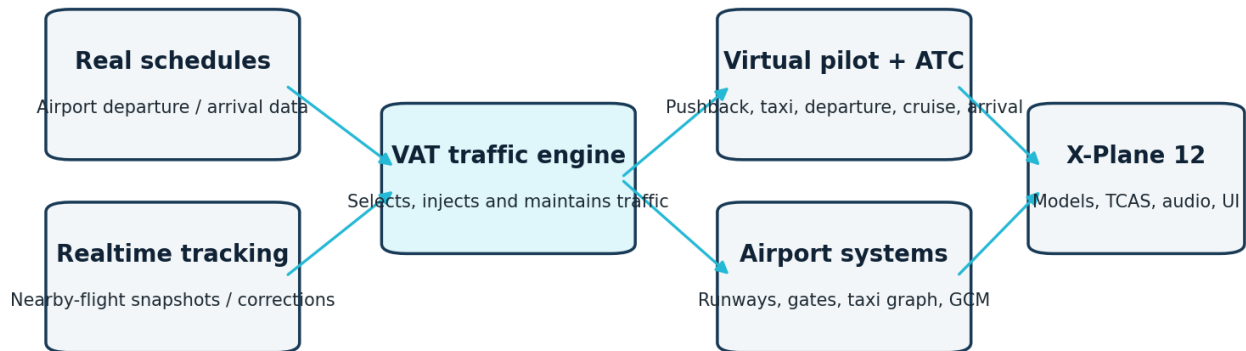
VERSION SCOPE

This manual applies to Virtual Air Traffic 0.76 BETA. Version 0.76 adds early SimBrief-destination traffic preparation, weather-driven static jet windmilling, multiple arrival-gate reservations, Mode A/C squawk and SSR-mode publishing in TCAS, additional runway-split fixes, improved arrival routing around active runways and further TCAS stability refinements.

We focus on what you can see, configure and rely on as a pilot. Where an internal mechanism directly explains visible behavior, performance or troubleshooting, we describe it in practical terms. VAT uses several specific concepts—Scheduled traffic, Realtime traffic, Static traffic, the Virtual Pilot, internal ATC and Ground Control Management (GCM)—and each is explained in the chapters that follow.

What VAT is—and is not

- **VAT is a traffic-injection and airport-operations system for X-Plane 12 with its own aircraft simulation logic.**
- **VAT is not a one-to-one radar replay. We combine real-world schedules with realtime tracking information to estimate where flights belong in our virtual traffic world. Once a flight is injected near you, VAT takes control of that aircraft and flies it as part of the simulation.**
- **VAT does not use X-Plane's standard AI-aircraft system to fly its traffic.** It does acquire X-Plane multiplayer/TCAS slots when TCAS integration is enabled.
- **VAT is free to use. A Portal account authenticates access to our online schedule and realtime traffic services.**



Once an aircraft is injected, VAT treats it as a living simulated aircraft rather than a one-to-one radar replay.

Figure 1. VAT combines external traffic data with its own traffic engine, pilot logic, airport systems and X-Plane integration.

Contents

1. Product overview
2. Specifications and compatibility
3. Installation, first run and authentication
4. Quick start
5. How VAT builds the traffic world
6. Traffic population and distance rules
7. Flight scheduling and airport time
8. The virtual pilot: gate-to-gate lifecycle
9. Airport data, parking and navdata
10. Runway selection and traffic-flow logic
11. Ground Control Management (GCM)
12. Internal ATC, runway protection and final sequencing
13. The user interface
14. SimBrief integration
15. Bluebell and X-CSL models
16. Aircraft animation, lights and contrails
17. Static jet windmilling
18. 3D traffic audio
19. Flight information labels
20. TCAS, Mode-S, squawk and ADS-B integration
21. Follow camera
22. Performance and traffic-density tuning
23. Virtual reality
24. Advanced configuration, commands and public dataref
25. Troubleshooting
26. Operational limitations and expectations
27. Glossary
- Appendix A — Settings reference**
- Appendix B — Aircraft-state reference**
- Appendix C — Behavioral thresholds**
- Version 0.76 notes and support**

1. Product overview

Virtual Air Traffic (VAT) is our real-world flight injection and airport-operations system for X-Plane 12. We maintain continuously refreshed schedules covering more than 600 supported airports and more than 600,000 real-world flight records. VAT combines airline/operator-aware traffic, gate-to-gate operations, sequencing, native TCAS integration, 3D audio, intelligent model matching and optional SimBrief integration into one living traffic environment.

The three traffic populations

Population	Purpose	How it appears	Typical behavior
Scheduled departures	Create believable departing airport traffic	Generated from the airport departure schedule when the departure is approaching	Starts parked, then pushback/direct taxi, runway, takeoff and onward flight
Realtime / midair traffic	Populate the surrounding airspace and inbound stream	Created from nearby-flight data and position estimates	Injected in flight, then flown by VAT toward its destination and gate
Static traffic	Fill unused local stands with believable parked aircraft	Generated only at the local/nearest airport	Decorative; no flight plan, no TCAS, no labels, no normal engine sound

IMPORTANT DISTINCTION

The Arrival board can show scheduled arrival rows that do not yet have an actual aircraft in X-Plane. Physical inbound aircraft are supplied by VAT's realtime/midair traffic path, not by the arrival-board schedule row itself.

A living virtual world

We first estimate flight progress from real schedules and realtime tracking inputs. Once an aircraft is injected near you, VAT's Virtual Pilot owns its simulated motion. That lets us sequence aircraft, protect runways, route traffic on the ground, command go-arounds and complete gate-to-gate operations without forcing every aircraft to remain glued to an exact live-radar coordinate.

As a result, you should expect the identity, route context and timing of traffic to be real-world inspired while the exact moment-to-moment position can differ from live tracking. This is intentional and is a central design choice rather than a tracking error.

2. Specifications and compatibility

Item	Current requirement / behavior
Simulator	X-Plane 12
Operating system	Windows only
Plugin architecture	64-bit native C++ X-Plane plugin
X-Plane API level	Built against XPLM 4.1.1 API definitions
Recommended CPU	Intel 12th generation or newer, or AMD AM5-class or newer recommended for full use
Recommended memory	32 GB or more recommended
Aircraft models	Bundled Bluebell model system; optional X-CSL model directory with Bluebell fallback
VR	Supported for aircraft, contrails and UI; 2D aircraft labels are currently not visible in VR
Internet	Required for Portal authentication, schedules, realtime traffic, update checks, SimBrief and online assets/services
Cost	VAT is free; optional donations support development and data services

Performance philosophy

VAT divides aircraft work into slices so not every aircraft must execute its full simulation step on every rendered frame in Medium mode. Model preparation and geometry work are also designed to run asynchronously where practical. The Settings tab exposes flight-loop timing, periodic spawn cost and a microstutter counter so you can judge the impact on your own system.

3. Installation, first run and authentication

Installation

1. Make sure you register at our website (<https://www.virtualairtraffic.com>). You will need the credentials later.
2. Windows: run the installer which will setup all files in into X-Plane 12's Resources/plugins directory, preserving the folder structure supplied with the release.
3. Start X-Plane 12. VAT should appear in the Plugins menu as "Virtual Air Traffic (open / close)".
4. Open the VAT window and enter your Portal email and password on the Traffic Manager tab, then choose Authenticate.
5. Optionally configure an X-CSL model directory and a SimBrief username in Settings.
6. Allow VAT several seconds after scenery/airport data has loaded. Airport parsing, model metadata loading, authentication and traffic downloads do not all complete on the first frame.

PORTAL ACCOUNT

VAT is free, but online scheduled and realtime traffic require successful Portal authorization. If authentication is unavailable, the traffic world will not match a fully connected session; static aircraft can still operate at a reduced fill level.

Startup notifications

- Update available VAT checks our latest-version service and can show a notification when a newer plugin version is published.
- **Portal setup reminder** If credentials are missing, the UI can remind a new user to configure the Portal account.
- **TCAS ownership warning** If another plugin owns X-Plane's multiplayer/AI aircraft slots, VAT explains which controller has them and automatically retries later.

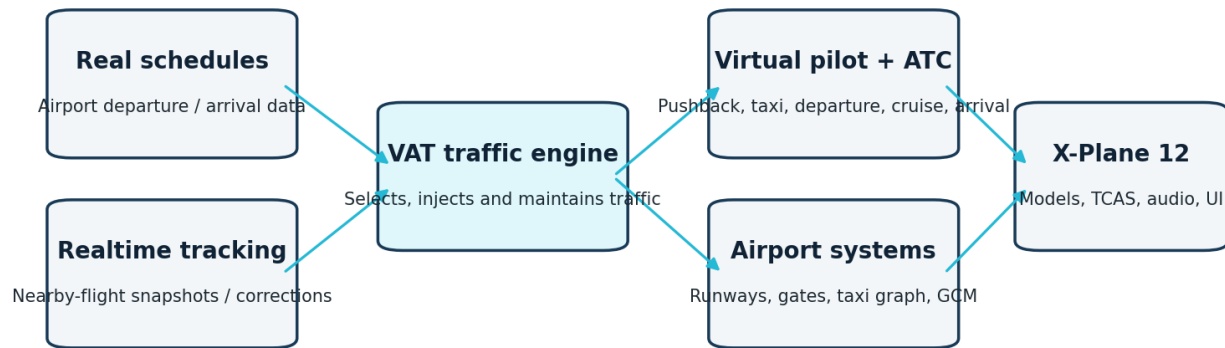
4. Quick start

1. Authenticate on the Traffic Manager tab.
2. Leave Performance on Full and Traffic Density near 100% for the intended “realistic skies” experience, then reduce them only if your simulator needs more headroom.
3. Confirm the Models section says either “X-CSL models with BlueBell as fallback” or “only BlueBell CSL models”.
4. Keep TCAS and Sounds enabled unless you deliberately want to disable those subsystems.
5. If you use SimBrief, enter the SimBrief username and wait for the status line to show the loaded origin and destination runways.
6. Use the Departures, Arrivals and Nearby tabs to inspect traffic. Follow a live aircraft if you want to watch VAT’s virtual pilot at work.
7. Use Airports → Runways only when you want to override automatic runway logic. Use Airports → Arv. Gates to reserve one or more parking positions for your own arrival.

BEST FIRST TEST

Start at a well-served airline airport with Traffic Density at 100%, Portal authentication active and Direct Model Matching Only disabled. This removes the most common reasons for seeing very little traffic.

5. How VAT builds the traffic world



Once an aircraft is injected, VAT treats it as a living simulated aircraft rather than a one-to-one radar replay.

Figure 2. Data becomes VAT-controlled traffic after injection.

Real schedules

Departure schedule data is downloaded per airport and interpreted in the airport's timezone. Scheduled traffic is not spawned for departures that have already passed their scheduled local departure time in the current session. This avoids the "burst" of old departures that earlier versions could create on startup.

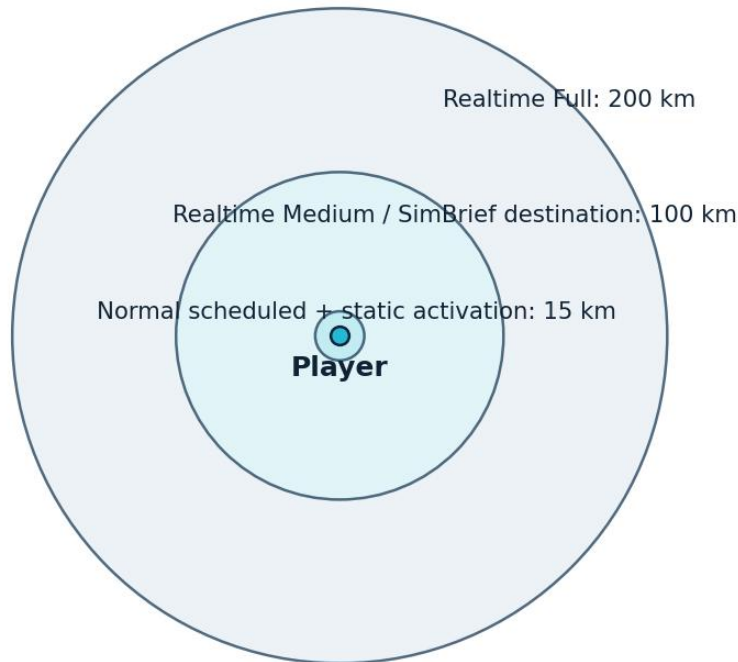
Realtime / nearby-flight snapshots

VAT periodically retrieves nearby traffic around the player, applies duplicate, range, handoff, density and model checks, and queues suitable aircraft for injection. Once a realtime aircraft is created, its own VAT flight plan and virtual pilot take over. Existing aircraft are not repeatedly deleted merely because they approach an airport; the origin/destination handoff distances apply to new realtime spawns.

Airport simulation

Airport behavior is driven by parking metadata, runway/traffic-flow restrictions, the taxi graph, X-Plane weather, CIPF procedure data, runway reservations and the global Ground Conflict Manager. This is why two aircraft with the same destination may not receive the same gate, runway or taxi sequence.

6. Traffic population and distance rules



Static fill also requires player altitude $\leq 10,000$ ft. Realtime cleanup: 105 km (Medium) / 205 km (Full). Eligible SimBrief-destination traffic can be protected while destination-bubble conditions remain true.

Figure 3. Main traffic activation ranges in Virtual Air Traffic 0.76. The diagram is schematic; the circles represent different subsystems, not a single hard draw distance.

Subsystem	Activation / spawn rule	Cleanup / handoff
Normal scheduled departures	Nearest airport when player is within 15 km	Aircraft then follows normal lifecycle and dynamic cleanup
SimBrief destination scheduled departures	Destination can begin scheduled preparation/population when player is within 100 km of the loaded SimBrief destination	Destination-related aircraft are maintained while eligible within the destination bubble
Static local traffic	Nearest airport within 15 km; player altitude must be $\leq 10,000$ ft	Airport static population removed after leaving roughly 31 km
Realtime — Medium	New traffic considered within about 100 km of player	Normal dynamic cleanup about 105 km
Realtime — Full	New traffic considered within about 200 km of player	Normal dynamic cleanup about 205 km
Early SimBrief destination arrivals	Realtime arrival can qualify while both player and aircraft are within 100 km of the SimBrief destination	Protected from ordinary distance cleanup while the destination-bubble conditions remain true

Realtime airport handoff

A newly discovered realtime flight is not created if it is within 15 km of its origin, because the scheduled-airport system owns the near-origin departure environment. A new arrival also needs more than 25 km distance-to-go so it has enough room to receive arrival data and establish an approach. These are creation rules only: an aircraft injected farther away continues normally through those distances.

Static fill level

Static traffic is computed from suitable, usable stands rather than from the raw parking count. Airports with more than 40 parking positions target roughly 60% static fill before the global Traffic Density factor; smaller airports use roughly 50%. User-reserved stands, unsuitable operation types and blocked/clipping positions are removed from usable capacity before the target is calculated.

WHAT TRAFFIC DENSITY CHANGES

Traffic Density directly scales static fill and realtime injection. Scheduled departures are not simply multiplied by the percentage; they are controlled by the schedule window, a maximum of three new scheduled aircraft per maintenance pass and randomized smoothing.

7. Flight scheduling and airport time

Departure schedule window

For a scheduled departure to become a physical VAT aircraft, its scheduled local departure must be no more than 15 minutes in the future and not already in the past. VAT adds at most three scheduled aircraft per 15-second airport-maintenance pass. New flights also have randomized load smoothing so a large batch does not all spawn at once.

Timezone and daylight-saving handling

Our airport schedule service supplies IANA timezone information. VAT uses the airport's own timezone rather than simply trusting the PC clock, and the UI shows airport-local time whenever that timezone is known. Version 0.76 also includes the accumulated timezone, daylight-saving and Sunday/day-of-week corrections introduced during the beta cycle.

Departure board versus physical aircraft

The Departures tab lists upcoming schedule rows for the nearest airport. A Follow button appears only after that schedule row has a real AirPlane object in the simulator. The board may therefore list a flight before VAT has found a free gate, matching model or completed asynchronous X-CSL preparation.

Arrival board versus inbound injection

The Arrivals tab combines the airport's expected arrival schedule with live VAT aircraft when available. Scheduled-only rows can be shown for the remainder of the day, while live inbound aircraft provide dynamic distance, ETA/status and Follow controls. A schedule row by itself does not create an inbound model.

Parking selection for a scheduled departure

- **Operator affinity** If the airport parking metadata explicitly assigns stands to an airline/operator, VAT prefers only those dedicated positions for that operator.
- **Operation type** Scheduled airline traffic uses airline parking rather than cargo, military or general-aviation positions.
- **Aircraft size** Width code and heavy/jet permissions are checked. Very small A/B parking positions are not used for the normal scheduled jet/heavy path.
- **Player protection** VAT avoids the player's detected parking position and also applies a distance safety check.
- **Traffic clearance** Occupied stands, nearby dynamic aircraft, reserved static positions, active pushback corridors and wing-clearance conflicts are rejected.
- **User reservations** Every parking selected through Arv. Gates is excluded.

8. The virtual pilot: gate-to-gate lifecycle



Runway availability, ground conflicts, procedure preparation and the player can delay or alter the sequence. Unsafe arrival spacing or a blocked runway can trigger a go-around.

Figure 4. Typical lifecycle for scheduled and injected VAT traffic.

Waiting at the stand

A scheduled aircraft begins in PARKED/Waiting state and waits for its scheduled airport-local departure time. VAT retains the departure stand during pushback until the aircraft has moved about 120 metres clear, preventing another aircraft from spawning into the vacated-looking but still operationally occupied area.

Pushback or direct taxi

VAT evaluates the parking geometry and taxi connection. A terminal-style gate normally produces a pushback sequence; some stands can taxi out directly. During pushback, VAT reserves a corridor so another aircraft is not spawned or routed into the maneuver. Engine-start and pushback sound events are triggered as appropriate.

Taxi to runway

The virtual pilot follows an A* route through the airport taxi graph, turns toward taxi nodes, adjusts speed for route geometry and interacts with the GCM. When a route would cross an active runway, VAT first attempts to find an alternate path around it. If that is impossible, the aircraft requests runway-crossing clearance from the internal ATC.

Line-up and takeoff

After takeoff clearance, the aircraft enters the runway, aligns precisely with the centerline and then observes a 15-second line-up wait once alignment is stable. Before accelerating, the runway is checked again. A newly entered aircraft or the player can therefore keep a cleared aircraft stopped on the runway until it is safe. Gear, flap, lights, takeoff sounds and engine animation follow the takeoff state.

Cruise and arrival preparation

Approach data begins preloading in small steps when the aircraft is within about 250 km of its destination. At roughly 200 km, the virtual pilot begins requesting an arrival runway and approach. This staged preparation reduces the risk of a large navdata lookup happening at the instant the arrival must be assigned.

Approach, landing and go-around

The aircraft follows procedure waypoints toward the assigned runway, deploys landing configuration and transitions to the straight landing phase. VAT continually protects the runway against the player and other dynamic traffic. If the runway is occupied close to touchdown, or final-spacing logic determines that the trailing aircraft is unsafely compressed, the virtual pilot can command a go-around and retry later.

Rollout and taxi to gate

After touchdown the aircraft enters a high-speed rollout, slows toward approximately 25 kt, and begins preparing its gate route once below 50 kt. ATC assigns a free airline parking position that is not reserved for static traffic, not user-excluded and not the player's stand. If no usable gate or taxi route can be found, the aircraft can enter a STALLED state rather than drive through scenery or other traffic.

9. Airport data, parking and navdata

Global Airports as the routing authority

VAT uses X-Plane's Global Airports apt.dat as its trusted routing dataset for runways, traffic flows, taxi nodes, taxi edges and runway active zones. This provides a consistent taxi graph even when a third-party scenery package has incomplete or unconventional WED routing data.

Custom scenery parking overlay

Custom Scenery apt.dat files are scanned and applied as parking/name/metadata overlays. Their parking positions can replace the default parking so VAT aircraft visually use the custom scenery's stands. The custom taxi/runway graph is deliberately not substituted; those operational paths continue to come from Global Airports. This design improves stand alignment while avoiding broken custom taxi networks.

POSSIBLE SCENERY MISMATCH

At a heavily modified airport, the custom gate can be visually correct while VAT's taxi centerlines still reflect the Global Airports network. If a third-party scenery has moved taxiways substantially, a VAT aircraft can appear slightly off the custom painted centerline even though the routing engine is following the trusted base graph.

Parking metadata VAT uses

Metadata	How it affects traffic
Parking type	Gate / hangar / misc / tie-down determines basic suitability
Allowed aircraft	heavy / jets / turboprops / props compatibility
ICAO width code	A–F is used for size and clearance decisions
Operation type	airline, cargo, general aviation, military, etc. affects which traffic can occupy the stand
Airline codes	Can create dedicated operator affinity for scheduled departure parking
Occupancy / static reservation	Prevents simultaneous dynamic/static use and supports safe release after pushback

CIFP procedure data

VAT prefers Custom Data/CIFP/<ICAO>.dat when available and falls back to X-Plane's default CIFP data. In 0.76, the active procedure parsers handle SID records and approach records—including ILS, RNAV, visual and other approach types—with waypoint altitude and speed information where available. VAT is procedure-aware throughout its flight-planning and arrival logic, while the exact procedures available for a flight depend on the CIFP data installed in X-Plane.

10. Runway selection and traffic-flow logic

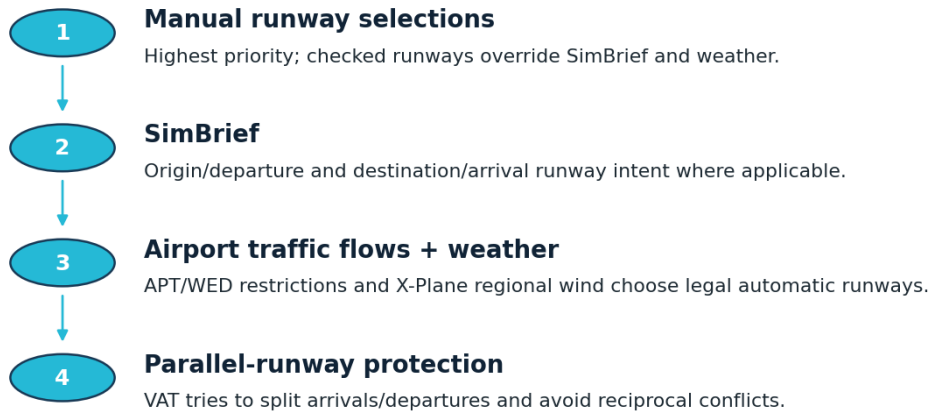


Figure 5. Practical runway-selection priority in Virtual Air Traffic 0.76.

Automatic selection

Without a manual selection, VAT refreshes regional X-Plane wind data approximately once per minute and evaluates airport traffic-flow rules. We respect departure/arrival operation restrictions, aircraft-type compatibility and available runway ends. If a selected traffic flow cannot be used, VAT falls back in a controlled way to operation-compatible runway ends rather than choosing an arbitrary runway.

SimBrief influence

At the loaded SimBrief origin, the planned departure runway is used when available. At the SimBrief destination, the planned arrival runway is protected above ordinary apt.dat/weather selection. On multi-runway airports VAT can choose a compatible parallel departure runway so local departures do not create head-on or reciprocal traffic against the protected arrival stream.

Manual runway selection

Airports → Runways is the hard user override. You may check one or more departure runway ends and one or more arrival runway ends. The popup explicitly states that checked runways override SimBrief and weather. Existing aircraft keep the runway assignments they already received; the new selection affects subsequent decisions.

Persistent runway selections

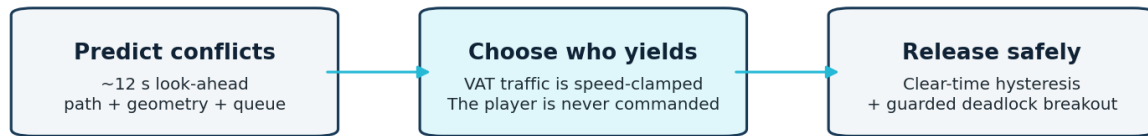
Selecting Persistent saves the airport's current manual departure/arrival selections in vat_settings.ini and restores them in later sessions. When persistence is disabled for that airport, VAT clears the manual sets and immediately returns future runway decisions to automatic SimBrief/traffic-flow/weather behavior. Saved runway names are validated when loaded, so obsolete runway identifiers are ignored after scenery changes.

Parallel and reciprocal protection

VAT treats reciprocal designators as the same physical strip for runway ownership. At parallel-runway airports it can establish an airport-wide split, using one physical runway preferentially for departures and

another compatible parallel for arrivals. The logic also avoids the reciprocal end of a protected arrival runway when possible.

11. Ground Control Management (GCM)



Player conflicts have priority. Protected queues and opposing taxi-edge reservations cannot be bypassed unsafely.

Figure 6. Ground Conflict Management is a continuous safety layer around taxi, queue and pushback behavior.

The Ground Conflict Manager runs every simulator frame and watches ground-relevant VAT aircraft for predicted near-term conflicts. It is not a simple “distance bubble”: it considers heading, velocity, airframe dimensions, taxi-edge context, queue order and whether an aircraft is pushing back or moving through a shared corridor.

What the GCM does

- **Predicts conflicts** using a roughly 12-second look-ahead and aircraft geometry/safety envelopes.
- **Creates taxi queues** so a same-direction follower does not drive through the aircraft ahead.
- **Reserves opposing taxi edges** to prevent two aircraft from entering a narrow/opposite-direction segment in conflict.
- **Protects pushback** so other traffic yields to or avoids an active pushback corridor.
- **Applies holds** through a separate speed clamp while preserving the virtual pilot’s requested taxi speed for later resumption.
- **Uses hysteresis** before releasing a hold so aircraft do not chatter between stop/go every frame.

The player has priority

The player aircraft is treated as a blocker, but VAT never commands the user aircraft. Injected traffic yields to you when a genuine collision path exists. Special logic prevents a player following closely from behind from permanently trapping an AI aircraft that should legitimately continue ahead, while crossing, head-on and player-ahead situations remain protected.

Deadlock breakout

Busy aprons can form circular waits. VAT detects closed wait-for cycles and can grant a temporary breakout token to one suitable aircraft only when geometry checks show that physical clearance remains safe. Ordinary long holds can become breakout-eligible after a randomized period of roughly 30–90 seconds. Breakout never overrides a real player conflict, a same-direction nose-to-tail queue or deliberate opposite-direction edge reservation.

WHAT YOU MAY SEE

A VAT aircraft can stop for an apparently distant aircraft because the manager is protecting a future route intersection or a pushback/taxi corridor. Conversely, an aircraft that has waited a long time may begin moving through a soft separation envelope to resolve a deadlock while still respecting hard airframe clearance.

12. Internal ATC, runway protection and final sequencing

Takeoff clearance and runway ownership

VAT's ATC checks runway occupancy, arrivals, the player, departure queue order and existing runway reservations before granting takeoff. Reciprocal runway ends share the same physical-runway key. A takeoff clearance creates a runway reservation; if the aircraft does not enter the runway within about 60 seconds the clearance can expire and be requested again. Version 0.76 also keeps a separate minimum interval of roughly 60 seconds between takeoff clearances.

A cleared aircraft revalidates its position in the queue and runway safety before accelerating. After takeoff, the physical runway remains protected until the departing aircraft has climbed through approximately 500 ft above airport elevation and/or is safely beyond the low-speed runway-occupancy phase. This prevents a following departure or arrival from being released too early.

Runway crossing

Taxiing aircraft request crossing clearance when their route must use an active runway. A takeoff reservation or a detected runway/approach conflict denies the crossing. Version 0.76 first tries to find a route around an active runway, reducing unnecessary crossing waits.

Arrival runway protection

Static aircraft are deliberately ignored as runway blockers because they are decoration. Dynamic VAT aircraft physically on the runway, a recent departure that has not safely climbed away, and the player can block an arrival. Close to touchdown, the virtual pilot responds with a go-around instead of continuing into an occupied runway.

Final approach sequencing (beta)

Once an AI aircraft is established in a reasonable runway-centerline corridor within about 15 NM, VAT groups aircraft by airport/runway and orders them from threshold outward. The player is inserted into the same sequence when established on that final, but the player is never speed-controlled.

Parameter	Version 0.76 behavior
Target spacing	~4.0 NM
Release spacing	Speed clamp removed at ~4.5 NM or more
Hard minimum	~1.5 NM
Go-around zone	Within ~6 NM when the trailing AI is inside the hard minimum
AI sequencing speed band	Approximately 105–138 kt maximum caps
Correction strength	About 12 kt of cap reduction per NM of spacing deficit

The speed control is an upper limit only; VAT does not accelerate a naturally slower aircraft just to satisfy the sequence. If speed management can no longer rebuild safe spacing on short final, the trailing AI is sent around.

13. The user interface

The VAT interface is an ImGui-based X-Plane window available in both normal and VR operation. It can be opened from the Plugins menu and toggled by a bindable X-Plane command. Tables are generally resizable, scrollable and in several cases sortable/hideable.

Traffic Manager tab

The landing page shows the VAT version, support contact and Portal authentication form. Enter the same Portal email/password used for the VAT service and choose Authenticate. The status string below the form reports whether authentication succeeded.

Departures tab

Column	Meaning
Departure time	Airport-local scheduled departure time
Airline	Airline logo when available, otherwise text
Flight	Flight number/callsign
Destination	Destination airport name
Status	Current board displays upcoming rows as On Time
Actions	Follow/UnFollow when the scheduled aircraft has physically spawned

The tab title and heading use the nearest airport and its local clock. Flights whose departure time has passed are omitted. A row can exist before a physical model, so the Follow control appears only after the corresponding Mode-S identity exists in the VAT aircraft list.

Arrivals tab

Column	Meaning
ETA	Scheduled or calculated arrival time depending on row type
Airline	Logo/name
Flight	Flight number
Origin	Origin airport
Distance	Live distance when a physical aircraft exists
Status	Live state or schedule-oriented status
Actions	Follow/UnFollow for physical arrivals

The Arrival board intentionally shows expected arrivals for the rest of the day as well as live aircraft. This means a schedule row may have no current model or distance yet.

Nearby tab

Nearby lists non-static VAT aircraft and can be sorted/filtered through the table UI. Columns include Flight, Airline, Origin, Destination, Type, Location, Altitude, Status and Actions.

- **Follow / UnFollow** Switches the VAT follow camera to that aircraft.
- **Remove** Safely removes the aircraft and adds its Mode-S ID to a session suppression set so the same flight does not immediately respawn.
- **Status** Can show Waiting, Pushback, Taxiing, Holding, Taking Off, Cruising, Landing, Finished and context such as climb/descent. Taxi labels can include the destination runway or gate.

Airports tab

Without a search, the airport table focuses on airports within roughly 150 km. Entering a search term scans all loaded airports by ICAO or airport name, making it possible to configure a distant destination before reaching it. Columns include ICAO, Name, Distance, departure/arrival runways in use, altitude, aircraft count and Actions.

Runways button

Opens the manual runway assignment popup. Check departure and/or arrival runway ends, clear either group, and optionally mark the override Persistent. The Runways action button is visually highlighted when a manual selection exists.

Arv. Gates button

Opens the arrival parking reservation popup. You can check multiple parking positions. Every selected position becomes unavailable for new static traffic, scheduled departures and arrived VAT aircraft. Pending static requests are cancelled; if a VAT aircraft currently owns a newly selected stand, it is queued for safe removal. The popup shows the number of reserved positions and includes Clear all. These gate reservations are session-only.

Settings tab

- **Performance mode** Medium or Full.
- **Traffic Density** 0 ("No traffic") to 100 ("Realistic skies").
- **X-CSL directory** Path to the /CSL folder that contains X-CSL package subdirectories; change takes effect after restarting VAT.
- **Plane labels** Enable labels outside VR and optionally minimize them to two lines.
- **TCAS updating** Take/release X-Plane TCAS override integration.
- **Sounds** Enable/disable VAT traffic audio.
- **Verbose logging** Adds diagnostic detail to X-Plane Log.txt.
- **Direct model matching only** Disables similarity/generic fallback after an exact model match fails.
- **SimBrief username** Loads the current SimBrief OFP and shows connected origin/destination runway information.

Donate tab

VAT is free to use. The Donate tab provides our optional PayPal donation information for users who want to help cover backend, schedule-data and ongoing development costs.

Popup messages

The UI can display a Portal-credentials reminder, update-available notice, TCAS ownership conflict and crash/exception information. TCAS ownership conflicts are not fatal to the traffic engine: VAT keeps its virtual traffic active and retries X-Plane slot acquisition later.

14. SimBrief integration

Enabling integration

Enter the SimBrief username in Settings. When editing is complete, VAT saves the value and reloads the plan. Clearing the username clears previously loaded SimBrief state. A successful load displays the username plus origin runway and destination runway in the Settings status line.

What VAT reads

- **Origin ICAO** Used to identify the player's planned departure airport.
- **Destination ICAO** Used for planned arrival behavior and the early destination traffic bubble.
- **Origin runway** Preferred departure runway at the SimBrief origin unless a manual user override takes precedence.
- **Destination runway** Protected arrival runway at the SimBrief destination unless a manual arrival selection takes precedence.
- **Initial cruise altitude** Used as contextual data; in 0.76, realtime traffic that would otherwise land on exactly the same cruise altitude can be shifted by 2,000 ft to reduce overlap and improve visual separation.

The 100 km destination preparation bubble

Version 0.76 extends the loaded SimBrief destination beyond the normal 15 km scheduled-airport radius. Once you are within 100 km of the SimBrief destination, VAT can begin downloading and populating scheduled departures there. Eligible realtime arrivals can also qualify early when both you and the arrival are within 100 km of the destination. The result is a destination airport and inbound stream that are already alive before you arrive overhead.

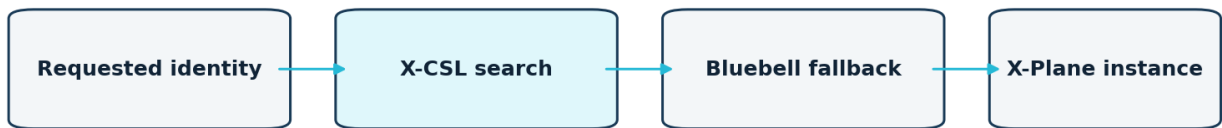
STATIC TRAFFIC REMAINS LOCAL

The SimBrief 100 km extension does not move ordinary static-aircraft filling to 100 km. Static decoration remains a local nearest-airport feature at roughly 15 km and below 10,000 ft player altitude.

Priority with manual runway settings

Manual runway checkboxes are the highest-priority user instruction. The UI explicitly says they override SimBrief and weather. If you want VAT to return to the SimBrief plan, clear the relevant manual runway selection or disable persistence for that airport.

15. Bluebell and X-CSL models



- 1 Exact X-CSL aircraft + operator identity is preferred.
- 2 If allowed, X-CSL may use a generic model of the correct aircraft type.
- 3 If X-CSL cannot supply a usable model, VAT tries the Bluebell fallback.
- 4 If both sources fail, the traffic item is skipped. Direct Model Matching Only stops after step 1 fails.

Figure 7. VAT prefers X-CSL when available, but Bluebell remains the fallback model system.

Bluebell

Bluebell is VAT's built-in fallback CSL model system. VAT reads Bluebell model metadata and tries to match the requested operator and aircraft type. When Direct Model Matching Only is disabled, Bluebell can fall back through less exact operator/type combinations and contains compatibility substitutions for aircraft variants that may not have a dedicated Bluebell ICAO model.

X-CSL

If the configured X-CSL directory exists and contains parseable `xs_b_aircraft.txt` package metadata, VAT enables X-CSL and gives it priority. The parser supports OBJ8-based X-CSL definitions, multi-part aircraft, package dependencies, `VERT_OFFSET/OFFSET` metadata and optional texture/lit-texture overrides. Old OBJ7 definitions are intentionally not supported by this path.

X-CSL matching order

1. Exact aircraft ICAO + airline/operator ICAO.
2. If several equally exact variants exist, VAT can randomly select among them, which creates livery/texture variety.
3. If Direct Model Matching Only is disabled and no exact airline model exists, a generic model of the correct aircraft type is preferred over showing the wrong airline.
4. If X-CSL cannot produce a usable prepared model, VAT falls back to Bluebell when possible.
5. If neither system can supply a model, that traffic item is skipped.

Derived X-CSL objects

VAT can prepare derived `.vat.obj` copies when an X-CSL object needs VAT-compatible animation datarefs or texture overrides. This preparation occurs in a background worker and cached/reused results are preferred. Geometry scanning also runs asynchronously so VAT can learn approximate wingspan/length and reduce clipping at gates.

Direct Model Matching Only

ACCURACY VERSUS QUANTITY

When enabled, Direct Model Matching Only stops fallback after an exact airline + aircraft match fails. This can improve the identity accuracy of the traffic you do see, but it can substantially reduce the number of visible aircraft if your installed model library is incomplete.

16. Aircraft animation, lights and contrails

VAT publishes the common libxplanemp animation datarefs expected by supported CSL objects. The exact visible result depends on the model, but VAT drives gear, flaps/slats, spoilers/speed brakes, reversers, thrust, yoke/steering inputs, wheel rotation, engine/propeller rotation and common external lights.

State-driven visual behavior

Phase	Typical visual cues
Waiting / parked	Navigation lights can be on for dynamic parked aircraft; engines are not treated as running until departure activity begins
Pushback / taxi	Engine start, beacon, taxi/nav lighting, nosewheel steering and wheel rotation
Takeoff	Takeoff flap setting, beacon/strobe/nav/landing lights, wheel/engine animation; gear retracts after liftoff logic
Cruise	Navigation/strobe lighting; landing lights normally off above 10,000 ft
Approach / landing	Gear, landing flaps, landing lights, alignment and descent animation
Touchdown / rollout	Spoilers, reverser-related animation, wheel spin and touchdown event; then taxi configuration
Static	Decorative only; no normal dynamic engine/sound lifecycle, but static jet fan windmilling can occur

Contrails

Non-static aircraft can create left/right VAT contrail instances in CRUISING state above 20,000 ft. Each aircraft receives a randomized contrail-lifetime parameter, producing variation rather than every trail having identical length. Disabling rendering through the advanced INI setting also disables contrail rendering.

MODEL DEPENDENCY

VAT sends animation values, but a CSL model must actually use the corresponding animation datarefs for every effect to be visible. A model with simplified or nonstandard animation can therefore show fewer moving parts than another model.

17. Static jet windmilling

Version 0.76 adds a visual-only windmilling effect for STATIC JET and HEAVY aircraft. It does not apply to dynamic scheduled/realtime aircraft and does not apply to PROP or TURBOPROP statics.

Weather and variation

- **Local weather** VAT samples X-Plane weather at each airport approximately every 15 seconds and shares that airport sample among its static jets.
- **Wind direction** Fan effectiveness varies with wind direction relative to the parked aircraft heading. Headwind is strongest; crosswind and tailwind still produce reduced visual effect.
- **Per-aircraft variation** Each eligible static aircraft receives slightly different start threshold, maximum RPM, sensitivity, response time and starting blade angle.
- **Slow motion** The randomized effective start threshold is approximately 4–7 kt and the maximum visual fan speed is intentionally very low (about 18–30 RPM).
- **Performance** Active/coasting windmilling is visually updated at a maximum of roughly 10 Hz; a fully stopped fan performs no instance updates.

NO FAKE ENGINE

Windmilling does not set enginesRunning, does not add thrust, keeps prop RPM at zero and does not enable static aircraft sound. It is strictly a decorative fan animation.

18. 3D traffic audio

VAT uses X-Plane's exterior-aircraft audio bus for positional traffic sound. The engine loop and event sounds follow the aircraft's X-Plane 3D position and velocity, so panning/distance changes as the aircraft moves relative to the camera.

Sound events

- **Engine start** Triggered before pushback/direct taxi, followed by the engine loop.
- **Pushback start** One-shot ground-operation sound.
- **Takeoff roll start** One-shot takeoff-roll event.
- **Touchdown** One-shot touchdown event.
- **Engine loop** Continuous exterior aircraft sound while the virtual engines are running.

Distance behavior

VAT stops aircraft audio beyond about 2 km from the camera. Engine loops use a 3D fade range of roughly 15 m to 1,000 m; one-shot events use approximately 10 m to 500 m and are not started beyond 1,000 m. Short fade-ins help reduce clicks and pops.

CURRENT SOUND-PACK IMPLEMENTATION

Version 0.76 loads jet engine idle/start/takeoff-roll WAV files plus universal pushback and touchdown sounds. Prop-specific sound branches also exist in the audio system, although the standard 0.76 startup sound pack does not load separate prop loop/start/takeoff files.

Static aircraft are always kept silent by the traffic engine. Disabling rendering through the INI also stops traffic audio, while the normal "Enable sounds" checkbox disables audio without changing traffic logic.

19. Flight information labels

Labels are available for non-static VAT aircraft within approximately 50 km of the player.

Membership/cleanup is checked every traffic-engine frame so a deleted aircraft cannot leave a stale label; the more expensive label text is refreshed at about 5 Hz.

Full label contents

1. Operator – flight number – current state.
2. Origin ICAO → destination ICAO.
3. Altitude and speed in knots.
4. Next waypoint with target altitude and distance-to-go in NM when the data is available.
5. Distance from the player in NM.

Taxiing status can be expanded with “to gate <name>” after an arrival gate has been assigned, or “to runway <designator>” for a departure taxi. Negative aircraft speed is interpreted as Pushback for the displayed state.

Minimized labels

When Minimize plane labels is enabled, VAT deliberately stops after the first two lines: operator/flight/state and origin/destination. This keeps traffic identity visible while reducing screen clutter.

VR limitation

VAT supports VR for injected aircraft, contrails and the full VAT menu. Aircraft labels are not currently visible in VR because of an X-Plane windowing limitation.

20. TCAS, Mode-S, squawk and ADS-B integration

When TCAS updating is enabled, VAT acquires X-Plane's multiplayer aircraft slots and sets the global TCAS override. This makes VAT traffic available to X-Plane's default navigation displays, G1000, map and IOS console, and allows X-Plane to disseminate that traffic through its ADS-B output to compatible external EFB applications such as FlyQ and ForeFlight.

Target selection

- **Capacity** VAT publishes up to 60 traffic targets, leaving X-Plane slot 0 for the user aircraft.
- **Eligibility** **STATIC, PARKED, TAXIING and STALLED VAT aircraft are excluded from TCAS target selection. Airborne and active transition states can be included.**
- **Nearest-first** When there are more candidates than slots, nearer aircraft are favored.
- **Hysteresis** An already tracked target receives about a 1 km selection advantage, reducing rapid slot churn.
- **Stable slots** A target that remains selected keeps its previous TCAS array slot where possible, which is friendlier to third-party consumers.
- **Unique Mode-S** Duplicate Mode-S providers are not published twice.

Identification fields

VAT publishes each traffic aircraft's 24-bit Mode-S identity, flight ID/callsign, aircraft ICAO type, position, velocity, attitude and vertical speed. In 0.76, every non-static aircraft with a valid Mode-S ID also receives one stable session-local Mode A/C squawk. Squawks use valid octal digits and avoid common/reserved codes such as 1000, 1200, 2000, 4000, 7000 and the 75xx/76xx/77xx special/emergency ranges. TCAS SSR mode is published as 7, representing Mode S TA/RA capability.

When another traffic plugin owns TCAS

X-Plane allows only one controller to own the multiplayer aircraft slots at a time. If another plugin has control, VAT leaves the rest of its traffic simulation running, identifies the current controller in a warning popup, and asks X-Plane to notify it when the slots become available so acquisition can be retried automatically.

21. Follow camera

Follow controls in the Departures, Arrivals and Nearby tables switch X-Plane to a VAT-controlled camera centered on the selected aircraft. The default view orbits at roughly 200 m radius with a slow automatic rotation and slight vertical movement.

Mouse look

On Windows, holding the right mouse button while following an aircraft changes the camera from automatic orbit to manual yaw/pitch drag. Releasing the right button resumes the orbit from the angle where you left it. Pitch is limited to avoid flipping the camera.

Terrain safety

The follow camera probes terrain at its own X/Z position and clamps itself to at least about 2 m above terrain when necessary. It then recalculates pitch so the view continues to look toward the followed aircraft rather than into the ground.

LEAVING FOLLOW MODE

Changing X-Plane view or choosing UnFollow relinquishes VAT camera control. If the followed aircraft is removed, VAT's safe-removal path also cleans up the camera associated with that aircraft.

22. Performance and traffic-density tuning

Medium versus Full

Setting	Medium	Full
Realtime spawn radius	~100 km	~200 km
Realtime cleanup radius	~105 km	~205 km
Aircraft simulation slicing	Traffic list split into 3 slices; one slice processed per frame	All aircraft simulation slices processed each frame
Accuracy / density intent	Lower CPU load, fewer/farther traffic opportunities	Most complete/accurate simulation; higher CPU load
Static spawn queue	Maximum 1 static creation per frame	Maximum 1 static creation per frame

Traffic Density

The 0–100 Traffic Density slider is a generation control, not a draw-distance slider. It directly scales static-aircraft fill and probabilistically filters new realtime traffic before model preparation. Scheduled departures remain governed by the real schedule, the 15-minute look-ahead, per-pass spawn cap and smoothing logic.

Performance counters

The Settings tab reports current TrafficEngine flight-loop cost, the highest observed cost, the cost of the last periodic spawn pass and a microstutter count. VAT increments the microstutter counter when a traffic-engine loop exceeds about 50 ms and logs unusually expensive periodic spawn work above about 250 ms.

Practical tuning order

1. First switch Full → Medium if CPU time or stutters are high.
2. Then reduce Traffic Density to lower static/realtime generation.
3. Disable labels if you do not need them; their content is already throttled, but every visible label still has projection/draw work.
4. Disable sounds if audio-channel workload or noise is undesirable.
5. Use the advanced `disable_rendering INI` option only for diagnostics or when you want virtual/TCAS traffic without visual models and contrails.
6. Avoid Direct Model Matching Only as a performance “fix” unless you specifically prefer fewer, exact-identity models; its primary purpose is visual-match accuracy, not CPU tuning.

23. Virtual reality

VAT fully supports VR for injected aircraft, contrails and the menu interface. The interface responds to X-Plane VR state changes so the VAT window remains usable in VR. Aircraft labels remain the one notable exception because X-Plane's 2D windowing path does not currently make them available in VR.

LABELS IN VR

2D aircraft labels are currently unavailable in VR because of an X-Plane windowing limitation. Aircraft, contrails and the VAT interface itself remain available in VR.

Follow-camera behavior is separate from the UI's VR mode. If a particular camera/view workflow is uncomfortable in VR, use the table's UnFollow control or change the X-Plane view to release VAT camera control.

24. Advanced configuration, commands and public dataref

vat_settings.ini

VAT stores persistent preferences in `vat_settings.ini` in the plugin directory. Most settings should be changed through the UI; the file is useful for troubleshooting, deployment or the one setting that is intentionally INI-only in version 0.76: `disable_rendering`.

Bindable X-Plane commands

Command	Purpose
<code>virtualairtraffic/interface/toggle</code>	Show/hide the VAT interface
<code>virtualairtraffic/labels/toggle</code>	Enable/disable plane labels

Assign these through X-Plane's normal keyboard or joystick command settings under the Virtual Air Traffic command group.

Public traffic JSON dataref

VAT registers a read-only data-type dataref named `virtualairtraffic/traffic/planes_json`. Version 0.76 refreshes the JSON snapshot at a maximum of 10 Hz. It provides other plugins, scripts and diagnostic tools with a structured view of VAT traffic without requiring access to internal memory.

JSON field	Meaning
<code>schemaVersion</code>	Currently 1
<code>planeCount</code>	Number of non-null aircraft records in VAT's current list
<code>vectorIndex</code>	Current array index only—explicitly not a permanent aircraft ID
<code>modeSId</code>	24-bit Mode-S identity where applicable
<code>flightNumber</code>	Callsign/flight number; blank for static aircraft
<code>operatorName</code>	Operator text known to VAT
<code>aircraftICAO</code>	Aircraft ICAO from the flight plan; blank for statics
<code>originICAO / destinationICAO</code>	Flight-plan airports; blank for statics
<code>state</code>	None, Static, Stalled, Waiting, Pushback, Taxiing, Holding, Taking Off, Cruising, Landing or Finished
<code>latitude / longitude</code>	Current geographic position
<code>altitudeFt / speedKt / headingDeg / verticalSpeedFpm</code>	Current dynamics; speed can be negative during pushback
<code>cruiseAltitudeFt</code>	Flight-plan cruise altitude
<code>rendered / loadingObject / enginesRunning</code>	Runtime status flags
<code>nextWaypoint</code>	Next flight-plan waypoint name or null

JSON field	Meaning
nextWaypointTargetAltFt	Target altitude for that waypoint or null

INTEGRATION STABILITY

Use modeSId as the natural traffic identity when present. Do not treat vectorIndex as stable; it is only the aircraft's current position in VAT's internal traffic vector.

25. Troubleshooting

No traffic at all

- **Check Portal authentication.** Scheduled and realtime online population require an authorized Portal session.
- **Check Traffic Density.** 0% intentionally suppresses generated traffic.
- **Wait for airport parsing.** The engine does not begin normal simulation until apt.dat/custom-parking parsing completes.
- **Check model availability.** If Direct Model Matching Only is enabled and exact models are missing, many flights can be skipped.
- **Check the log.** Enable verbose logging temporarily and inspect X-Plane Log.txt for authentication, schedule, model or X-CSL messages.

Scheduled airport looks empty

Remember that scheduled departures are only created within a 15-minute departure window, no more than three per 15-second pass, and with randomized smoothing. They also need a suitable free stand and model. The 100 km SimBrief destination extension starts destination scheduled preparation early, but it does not guarantee that every parking position is occupied immediately.

No static aircraft

- **Range** Static fill is a local nearest-airport feature within about 15 km.
- **Altitude** The player must be at or below 10,000 ft for the static fill pass.
- **Capacity** Only suitable non-excluded stands count. Heavy operator/geometry constraints can reduce eligible capacity.
- **Density** Traffic Density scales the target.
- **Portal unavailable** VAT reduces the static fill target by half while Portal authorization is inactive.

X-CSL not being used

- **Path** Point Settings to the CSL root containing model package subdirectories, not to one individual aircraft folder.
- **Restart** The UI explicitly requires VAT restart after changing the X-CSL path.
- **Metadata** X-CSL must contain parseable xsb_aircraft.txt metadata and supported OBJ8 definitions.
- **Fallback** If X-CSL preparation fails, VAT can silently continue with Bluebell; enable verbose logging to see the match/preparation path.

Traffic visible but absent from TCAS

First confirm Enable TCAS updating is checked. Parked, taxiing, stalled and static VAT aircraft are intentionally excluded from the TCAS candidate set. If another plugin owns X-Plane multiplayer/AI slots, VAT shows a conflict popup and retries later; you may need to disable the other plugin's TCAS/AI ownership if you want VAT to publish targets immediately.

Traffic is stuck

A stopped aircraft may be waiting for GCM conflict clearance, runway ownership, departure queue order, player clearance, an active runway crossing or a deadlock breakout. Give it time before assuming it is broken. If a specific aircraft remains unusable, Nearby → Remove safely removes it and suppresses its Mode-S identity for the rest of the current session.

Wrong runway

Check Airports → Runways for active manual selections first. If Persistent is enabled, those manual choices return every session and outrank SimBrief/weather. Clear the selections or disable persistence to restore automatic behavior. Then verify the SimBrief plan if integration is enabled, because the origin/destination runway can intentionally override the ordinary traffic flow.

Wrong or occupied arrival gate

Reserve your intended positions using Airports → Arr. Gates. Multiple stands can be selected. The reservation is session-only and protects each selected stand from static, scheduled and arrived VAT traffic. If a VAT aircraft already owns a stand when you reserve it, VAT queues that aircraft for safe removal rather than leaving it in your protected position.

Aircraft appear to clip at gates

VAT uses model geometry, ICAO width codes, neighboring parking positions and pending static reservations to reject many wing/airframe conflicts. Model geometry can still be imperfect, especially with third-party CSL objects whose origin or dimensions are unusual. Try a better X-CSL/Bluebell model or verify custom-scenery parking positions.

Performance or stutters

Switch to Medium, reduce Traffic Density, and watch the live timing values in Settings. Model loading/preparation, dense airports, complex ground conflict situations and large numbers of active aircraft can all create transient work. Verbose logging itself can also make a diagnostic session heavier than normal, so turn it back off after troubleshooting.

Labels missing

Labels are not shown for static aircraft, are only maintained within roughly 50 km, must be enabled in Settings, and are currently unavailable in VR. The separate Minimize option changes the number of lines rather than label visibility.

No sound

Check Enable sounds, camera distance and aircraft state. Static aircraft are intentionally silent, and all traffic audio is stopped beyond roughly 2 km. The advanced disable_rendering INI setting also disables traffic audio by design.

26. Operational limitations and expectations

- **Not live-radar exact.** We intentionally prioritize a coherent simulated traffic world and reliable sequencing over exact one-to-one live positions.
- **Beta behavior.** Final sequencing and several airport/ground systems are explicitly beta/work-in-progress areas; unusual geometry or airport data can still create edge cases.
- **Model-dependent animation.** VAT can only animate features implemented by the selected CSL object.
- **Custom scenery routing.** Parking comes from custom scenery overlays, but taxi/runway routing intentionally remains based on Global Airports.
- **Procedure data.** Procedure availability depends on X-Plane CFP data. Version 0.76 actively parses SID and approach records; missing or invalid procedure data can delay or prevent an arrival assignment.
- **TCAS exclusivity.** Only one plugin can own X-Plane multiplayer aircraft slots at a time.
- **Arrival parking availability.** If all suitable airline stands are occupied or user-reserved, an arrival can stall instead of violating parking constraints.
- Traffic density is not uniform. Real schedule availability, model matching, parking suitability and available traffic data all affect what you see, so 100% density does not mean every possible traffic record becomes a model.

Why traffic can differ from the real world

We simulate traffic in our own three-dimensional environment, using schedules and realtime information to keep that world aligned with real operations. A flight in VAT can therefore be ahead of or behind the exact live-tracked aircraft while still carrying the correct identity and occupying a plausible position in our virtual traffic world.

27. Glossary

Term	Meaning in VAT
Scheduled departure	Airport schedule row that can become a physical parked departure near its STD
Realtime / midair traffic	Nearby-flight traffic injected in the air and then handed to VAT's virtual pilot
Static aircraft	Decorative parked model without a flight plan or dynamic lifecycle
Virtual pilot	Per-aircraft logic that drives pushback, taxi, flight, approach, landing and gate arrival
ATC	VAT's internal runway/crossing/arrival clearance and gate assignment logic
GCM	Ground Conflict Manager; predicts ground conflicts and chooses which VAT aircraft yields
Active zone	Taxi/runway graph area that marks runway entry/crossing context
Mode-S ID	24-bit aircraft identity used for traffic uniqueness/TCAS
Mode A/C squawk	Four-octal-digit transponder code generated for VAT dynamic traffic in version 0.76
SSR mode 7	Mode S TA/RA value published by VAT to X-Plane TCAS in version 0.76
Bluebell	Bundled/fallback CSL model family
X-CSL	Optional external CSL model packages parsed from xsb_aircraft.txt / OBJ8 metadata
Direct model matching	Setting that prevents fallback when an exact aircraft+operator model is unavailable
SimBrief destination bubble	100 km early-preparation zone around the loaded SimBrief destination in version 0.76
Persistent runway override	Manual airport runway selection saved to vat_settings.ini across sessions
Arrival gate reservation	Session-only parking exclusion selected by the user in Airports → Arv. Gates

Appendix A. Settings reference

INI section / key	UI exposure	Meaning
Performance / perfmode	Medium / Full radio buttons	1 = Medium; 2 = Full
Performance / TrafficDensity	Traffic Density slider	0–100 generation percentage
Other / showlabels	Enable plane labels	Label visibility
Other / minimize_plane_labels	Minimize plane labels	Only first two label lines
Other / enabletcas	Enable TCAS updating	X-Plane TCAS override publishing
Other / enablesounds	Enable sounds	Traffic audio
Other / disable_rendering	INI only	Hide aircraft/contrails and stop traffic audio while keeping virtual traffic logic active
Other / enableddebuglog	Enable verbose logging	Extra Log.txt diagnostics
Other / enabledirectmodelmatch	Direct model matching only	Disable model fallback
Auth / simbrief_username	SimBrief username	Current SimBrief plan lookup
Auth / portal_username	Portal Email	Online service authentication
Auth / portal_password	Portal Password	Saved Portal credential (stored by the plugin in its settings format)
Dirs / xcsd_dir	X-CSL model directory	CSL root path; restart VAT after change
RunwayOverrides / ...	Persistent checkbox	Airport-specific persistent manual runway selections

EDITING THE INI

Close VAT/X-Plane before manual edits when possible so a later save does not overwrite your changes. Prefer the in-sim UI for normal settings.

Appendix B. Aircraft-state reference

Internal state	User-facing interpretation	Typical use
NONE	None	Initialization / no meaningful flight phase
STATIC	Static	Decorative local parking aircraft
STALLED	Stalled	VAT cannot safely continue (for example missing taxi route/gate)
PARKED	Waiting	Scheduled aircraft at stand; also temporarily used during landing rollout below the straight-landing phase
PUSHBACK	Pushback	Logical state exists; visual/status can also infer pushback from negative speed
TAXIING	Taxiing	Taxi to runway or taxi to gate
HOLDING	Holding	Waiting for ATC/GCM/runway clearance
TAKING_OFF	Taking Off	Runway entry, lineup, roll and initial departure phase
CRUISING	Cruising	Airborne en-route and procedure-following before straight landing phase
LANDING	Landing	Final straight-in/touchdown logic
FINISHED_AT_PARKING	Finished	Arrived at destination parking

Appendix C. Behavioral thresholds in version 0.76

Behavior	Approximate value	Why it matters
Normal scheduled airport activation	15 km	Nearest airport schedule population starts locally
SimBrief destination scheduled activation	100 km	Destination can build scheduled ground traffic early
Static fill activation	15 km and player $\leq 10,000$ ft	Static decoration remains local
Static airport removal	~ 31 km	Local static set is discarded after leaving area
Realtime Medium spawn / cleanup	100 / 105 km	Lower CPU/range mode
Realtime Full spawn / cleanup	200 / 205 km	Full traffic range
New realtime origin handoff	15 km	Near-origin departures belong to scheduled airport traffic
New realtime arrival minimum	25 km to go	Allows enough room to establish arrival behavior
Scheduled look-ahead	15 minutes	Earliest normal gate spawn before STD
Scheduled creation cap	3 per 15-second pass	Reduces bursts
Arrival preparation	Starts ~ 250 km; assignment ~ 200 km	Spreads procedure work and prepares approach early
Takeoff lineup wait	15 seconds after stable alignment	Creates line-up delay and final safety recheck
Takeoff clearance cooldown / reservation age	~ 60 seconds / ~ 60 seconds	Controls runway release cadence and stale clearances
Departure stand release	~ 120 m clear	Prevents premature reuse during pushback/taxi
Final sequencing monitor	15 NM	AI separation management begins on established final
Final target / release	4.0 / 4.5 NM	Speed-clamp target and release margin
Final hard minimum	1.5 NM within 6 NM	Trailing AI can be sent around
Label range	~ 50 km	Labels outside this are not maintained
Label detail refresh	~ 5 Hz	Reduces formatting work
Traffic JSON refresh	≤ 10 Hz	Public dataref snapshot rate
Audio stop distance	~ 2 km	Traffic sound stopped beyond camera range
Contrail threshold	Cruise above 20,000 ft	Visual contrail creation
PARKED ground terrain re-probe	~ 10 seconds	Keeps distant scheduled aircraft grounded across scenery/local-coordinate changes
Static wind weather refresh	~ 15 seconds per airport	Low-cost fan target updates
Static windmill visual update	≤ 10 Hz when active	Limits decorative instance-update cost

CURRENT 0.76 TUNING VALUES

These thresholds describe the current 0.76 tuning and are useful for understanding VAT behavior. Because VAT is still in beta, individual values can change in future builds as sequencing, performance and airport logic are refined.

Version 0.76 and support

This manual applies to Virtual Air Traffic 0.76 BETA. The features, settings, ranges and operating behavior documented here describe the 0.76 release and may continue to evolve during the beta program.

Version 0.76 includes early SimBrief-destination traffic preparation, weather-driven static jet windmilling, multiple arrival-gate reservations, Mode A/C squawk and SSR-mode publishing through TCAS override, additional parallel-runway fixes, improved arrival routing around active runways and further TCAS stability refinements.

Coverage figures such as supported airports and available flight records are maintained by our online services and can grow independently of a plugin update. For the latest release news, downloads and support information, visit virtualairtraffic.com.

Support

Website: virtualairtraffic.com Support: support@virtualairtraffic.com

Quick reference: what to check before every flight

Check	Recommended normal-flight setting
Portal	Authenticated
Performance	Full if system can sustain it; Medium when CPU limited
Traffic Density	100% for intended maximum realism; reduce to taste/performance
Models	X-CSL + Bluebell fallback if X-CSL library is installed; otherwise Bluebell
Direct Model Matching Only	Off for the most traffic; On only when exact visual identity matters more than quantity
TCAS	On unless another traffic plugin must own X-Plane slots
Sounds	On to taste
Labels	On/off to taste; minimize if cluttered; unavailable in VR
SimBrief	Username configured when you want runway synchronization and early destination preparation
Arrival parking	Reserve one or more stands in Airports → Arv. Gates before arrival if you want guaranteed clear positions
Runways	Leave automatic unless you intentionally need a manual override; remember persistent overrides outrank SimBrief/weather