TWRTrainer

Traffic Generation Utility for VATSIM Controller Training
Current Version: 1.0 - Released: 10/14/2006

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Description

TWRTrainer is a traffic generator for use with the VATSIM sweatbox training environment. It is intended to be used to generate traffic local to a single airport for the purposes of training controllers for the Tower, Ground and Clearance Delivery positions. Aircraft can be commanded to taxi along specific routes, hold short, position and hold, take off, fly patterns, perform touch and goes, stop and goes, low approaches, depart the area, fly inbound for landing, etc. Aircraft can be added with commands or by loading pre-made scenario files.

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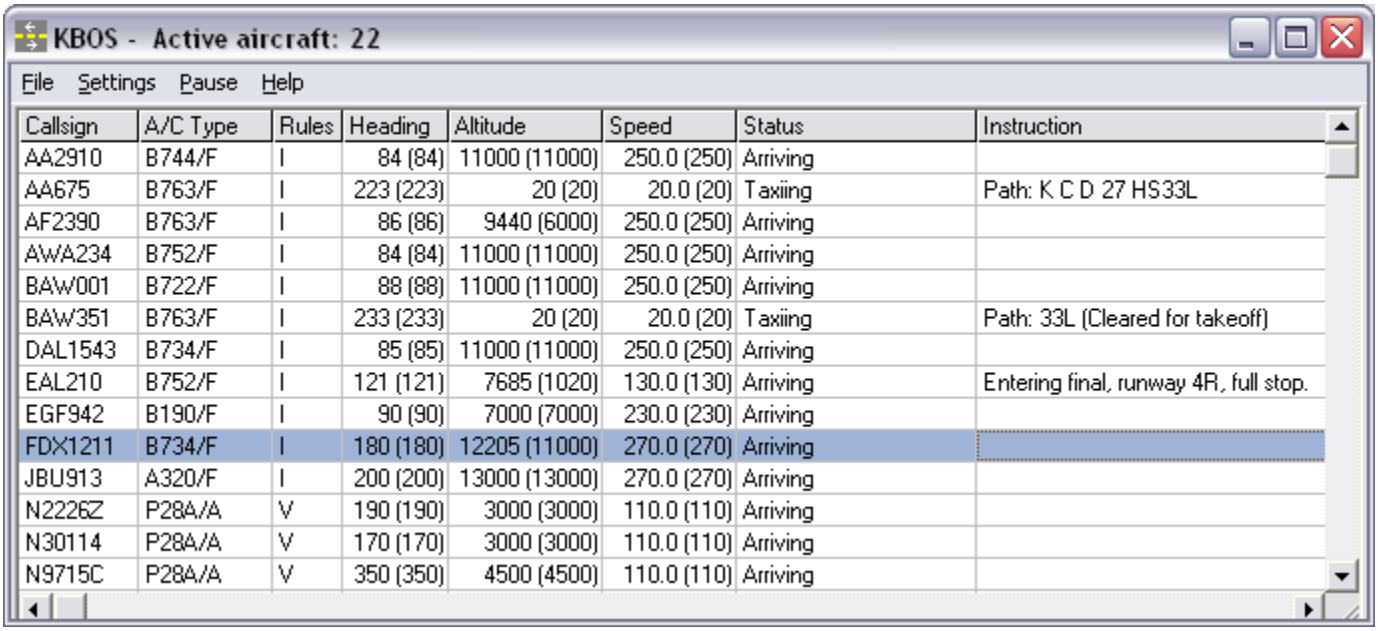
Screenshot



Callsign	A/C Type	Rules	Heading	Altitude	Speed	Status	Instruction
AA2910	B744/F	I	84 (84)	11000 (11000)	250.0 (250)	Arriving	
AA675	B763/F	I	223 (223)	20 (20)	20.0 (20)	Taxiing	Path: K C D 27 HS33L
AF2390	B763/F	I	86 (86)	9440 (6000)	250.0 (250)	Arriving	
AWA234	B752/F	I	84 (84)	11000 (11000)	250.0 (250)	Arriving	
BAW001	B722/F	I	88 (88)	11000 (11000)	250.0 (250)	Arriving	
BAW351	B763/F	I	233 (233)	20 (20)	20.0 (20)	Taxiing	Path: 33L (Cleared for takeoff)
DAL1543	B734/F	I	85 (85)	11000 (11000)	250.0 (250)	Arriving	
EAL210	B752/F	I	121 (121)	7685 (1020)	130.0 (130)	Arriving	Entering final, runway 4R, full stop.
EGF942	B190/F	I	90 (90)	7000 (7000)	230.0 (230)	Arriving	
FDX1211	B734/F	I	180 (180)	12205 (11000)	270.0 (270)	Arriving	
JBU913	A320/F	I	200 (200)	13000 (13000)	270.0 (270)	Arriving	
N2226Z	P28A/A	V	190 (190)	3000 (3000)	110.0 (110)	Arriving	
N30114	P28A/A	V	170 (170)	3000 (3000)	110.0 (110)	Arriving	
N9715C	P28A/A	V	350 (350)	4500 (4500)	110.0 (110)	Arriving	

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Acquiring TWRTrainer

TWRTrainer must be acquired through your local training staff.

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Documentation

Available Documentation

In addition to the documentation included on this page below, the following reference files are available

- Command Reference
- Cheat Sheet (HTML)
- Cheat Sheet (Excel)

Initial Setup

Whenever you run TWRTrainer, the first thing you see is the "Load Airport File" window. Since this is yo
TWRTrainer, you may not have any airport files yet. Just press Esc to close the window. You can now cor
Settings menu, there are three items you need to configure. They are "Server", "CID", and "Password".
hostname or IP address of the server you wish to connect the simulated aircraft to. At the time of this w
will work is "sweatbox.vatsim.net". Enter your VATSIM CID and password for the other two items. All ai
TWRTrainer will connect to the VATSIM sweatbox server using your CID and password. (For this reason,
single CID to sweatbox.vatsim.net *are* permitted.)

Opening an Airport File

Before you can generate any aircraft, you must first load an airport file. You can only load one airport fi
If you need to switch to a different airport, you must close and restart TWRTrainer.

When you first start TWRTrainer, the "Load Airport File" window will automatically be shown. Select the
TWRTrainer will then load the airport file, including all the taxiways and runways it defines. See below f
airport files.

Opening an Aircraft File

After opening an airport file, you'll need to open at least one aircraft file. An aircraft file contains one or
created and connected to the specified server. The "Select Aircraft File" will automatically be shown afte
when you first start TWRTrainer.

If the aircraft file is successfully loaded, the aircraft will be connected to VATSIM, and information about
in the TWRTrainer window, as shown in the screenshot above. TWRTrainer will automatically pause itse
aircraft file. No aircraft will move while TWRTrainer is paused. Click the Unpause menu item to resume

See below for details on creating aircraft files.

Controlling Aircraft

TWRTrainer provides a comprehensive list of commands which you can use to tell the simulated aircraft
are sent to the aircraft via radio text messages on a normal radio frequency. By default, this frequency

the frequency that TWRTrainer listens on via the Settings menu. It's a good idea to use a frequency tha listening in on so that he/she cannot see what you are telling the aircraft to do.

To issue a command to an aircraft, set your transmit frequency in ASRC/VRC to the same frequency you configured to listen on. Then, radio-select the aircraft you want to control, and type the command (with ASRC/VRC command line, and press enter. The command will go out on the text frequency just like any send to actual VATSIM pilots while controlling. If the command is recognized and has no errors, the airc will simply begin to execute the command. The TWRTrainer window may also show confirmation that th received. If the command is not recognized, or you made a syntax error in the command, the aircraft w message.

See the Command Reference for a detailed list of all commands and their syntax.

Pausing the Scenario

When you first load an aircraft file, the scenario will start out paused. The aircraft will show up, but the unpause the scenario, issue the `un` command to any one of the aircraft, or click "Unpause" in the menu b subsequently load an aircraft file, the scenario will be paused, even if you are only adding new aircraft t progress.

To pause an active scenario, issue the `p` command to any one of the aircraft, or click "Pause" in the men

An Example TWRTrainer Session

To give you a better idea of how a typical TWRTrainer session works, I'll describe a small fictional scena TWRTrainer at Boston Logan airport. (KBOS)

First, I start up VRC and connect to the sweatbox server to meet up with the student and make sure no training on the sweatbox server in the KBOS area. Then I'll discuss with the student exactly what types work on in this session, whether it be streams of IFR arrivals, mixed heavy/large/small departure flows, mix of these, etc. Based on that, I'll know which aircraft file(s) to load.

Next, I'll set up my comms panel in VRC. I'll start up a voice connection to the voice channel we use for the comms panel entry which contains the TWRTrainer control frequency.

Next, I'll start up TWRTrainer. TWRTrainer then prompts me for the airport file to load, so I choose my prompted for an initial aircraft file. Usually I'll select a file I created called "KBOS_mixed_departures.air variety of aircraft parked all around KBOS, including some at the airline gates, some on the cargo ramp General Aviation ramp, as well as one or two helicopters. This file gives me a good starting point for jus TWRTrainer session. If I don't need some of the aircraft, I can either just let them sit on the ramp, or I

Next, I'll usually set up one or more streams of arrival aircraft using the `add` command. (Remember that existing aircraft radio selected before you issue a command, even a command which is not specific to ar `add` command. In other words, TWRTrainer will ignore text sent on the control frequency if it is not direc This is to allow more than one instance of TWRTrainer to be running at one time, using the same freque instructors controlling each one.)

One form of the `add` command allows you to create an aircraft already established on approach to a spec at the appropriate glideslope altitude for the specified distance from the threshold. So, usually I'll issue commands for the same runway, each one spaced 3 to 5 miles apart, the closest one just outside the ra This sets up a nice "string of pearls" for the student to deal with as soon as the session begins.

Once the student is ready to begin, I'll unpause TWRTrainer and begin making the pilot calls. I'll usually aircraft on the ramp call for taxi, assuming the student will be handling GND duties as well. If not, I'll ju and then report when they're holding short. If the student is going to be handling IFR clearances as wel those aircraft call for clearance first. Obviously, it depends on what position you are actually training th works equally well for training the DEL, GND or TWR positions.

When the student responds and gives the aircraft taxi instructions, I will issue the `taxi` command. A typi is `taxi k n 22r`. This tells the aircraft to taxi to runway 22R via the Kilo and November taxiways. Once issu aircraft will taxi from its present position directly to the closest waypoint (as defined in the airport file) taxi from there to the intersection of Kilo and November, then from there to the hold short point just be November and runway 22R. If TWRTrainer cannot find the intersection of any two taxiways/runways in transmit an error message on the control frequency (199.997 by default) so that you can issue a correc taxi route is okay, the aircraft will just start moving.

Here's another common taxi command for KBOS: `taxi k c d 27 hs 33l`. This command tells the aircraft to ta taxiways Kilo, Charlie and Delta, and to hold short of runway 33L on the way there. (The Delta taxiway is often active for arrivals when 27 is active for departures.) Once the aircraft reaches the intersection position and report on the command frequency that it is holding short of 33L. It will then wait there unt (resume) command, or the `cross 33l` command. It will then cross 33L on Delta, and continue down Delta at which point it will hold short, unless told to position and hold or take off.

Once a departure is holding short of its departure runway, I'll either issue the `cto` command to clear it fo or `ctomrt` commands to clear it for takeoff and into the left or right traffic pattern respectively. If required specific departure heading to fly on wheels-up with a command such as `cto 140`, which will make the aircr 140 on departure.

After an aircraft is cleared for takeoff, it will either fly the runway heading or the assigned departure he reaches the initial climb value specified in the airport file. Normally, the student will have instructed the departure controller (even though there really isn't one) by the time the aircraft reaches the initial clim does so, I'll usually delete the aircraft. It is important that you don't forget about departures and let the Since the sweatbox is a shared server, those aircraft may very well stumble into a training session bein

For aircraft remaining in the pattern, there isn't much you need to do other than make sure the studen pointouts and touch-and-go clearances in a timely manner. However, there are several commands avail control over the aircraft in the pattern. These commands allow you to do such things as making the airc for spacing, extend certain legs of the pattern, fly different types of landings (touch-and-go, stop and go etc. See the Command Reference for details.

In addition to having aircraft on the ground call up for taxi and takeoff instructions, I'll also have some final check in. When the student clears the arrival to land, there is nothing more you need to do to get assuming it was added using the `add` command format which specifies a runway. (See the Command Refe you do so, the aircraft are already intending to land on the specified runway. If the arrival was loaded a an aircraft file, then it will need to be told to enter the pattern before it will actually perform a landing.

After the arrivals land, they will slow down until reaching about 45 knots, at which point they will exit t available taxiway. The direction they choose to exit the runway (right or left) depends on the runway d (See below.) Once the aircraft has exited the runway, it will report clear on the control frequency. At th the student to notice that the aircraft is clear, at which point the student should tell the aircraft to cont instructions to the gate.

Note that when you issue a taxi instruction that ends in a parking space, the aircraft will automatically

the parking space. This is default behavior that can be disabled via the "Settings" menu. Here's an exan brings the aircraft to a parking space: `taxi f a @b3 hs 4l`. This is a typical taxi command given at KBOS to a runway 4R and exited on taxiway Hotel. When given this command, the aircraft will taxi from its presen intersection of Hotel and Foxtrot, then follow Foxtrot to the intersection of Foxtrot and Alpha, holding sl After it is told to cross 4L, it will continue up on Foxtrot, turn onto Alpha, then follow Alpha to the wayp closest to parking space B3, at which point it will turn off of Alpha and taxi directly to parking space B3,

Depending on the skill level of the student, I may also throw in some VFR pattern aircraft, helicopter ar departures, etc. Perhaps also some go-arounds, non-responsive pilots or pilots that don't follow instruct favorite training tactic is to **not** readback hold short instructions, and have the pilot blunder across an a told to hold short of that runway. This helps ensure that the student listens for the pilot to read back th and repeat them if needed.

Oviously, throughout the session I'll also add additional departures (at the gates or parking ramps) and command. You need to use your best judgement to determine how often to add new aircraft during the thumb is that if there is dead time on the radio frequency, it may be time to add some aircraft. If the st the scenario and has nothing to do but watch the blips fly around, then he's not learning much. At ZBW progress quickest when they're kept at or just beyond the edge of their capabilities as much as possible

During the session, I'll periodically issue the `ops` command. This command shows you how long the sessi including paused time), the number of arrivals and departures the student has handled, and the numbe These stats can be useful for setting standards for certification testing or gauging the student's progress

Creating Airport Files

An airport file consists of a few lines of general information about the airport, followed by multiple secti runways, hold points, and parking spaces. Note that airport filenames must end in .apt.

The Airport File Header

The first portion of an airport file contains general information about the airport. This group of lines is c Header. Here's an example of the header for KBOS:

```
icao=KBOS
magnetic variation=16
field elevation=20
pattern elevation=1020
pattern size=1
initial climb props=3000
initial climb jets=5000
jet airlines=AAL,ACA,AWE,BAW,BLR,BTA,CAL,CAX,COA,CVA,DAL
turboprop airlines=EGF,USA,COA,CJC,JZA
registration=N
```

The first line, icao, specifies the ICAO code for the airport. The magnetic variation line is self-explanato correct for aircraft to be able to fly headings correctly. The field elevation is self-explanatory, and must approaches and land correctly. It is specified in feet. Pattern elevation is also given in feet. Pattern size miles, and determines how long the crosswind and base legs of the traffic pattern will be, by default. Th at what altitude departing aircraft will level off if not given further climb instructions.

The "jet airlines" and "turboprop airlines" settings determine the callsign prefix used when generating a command. See the Command Reference for details. The "registration" setting determines the callsign pr

VFR aircraft.

Parking Space Sections

Using parking space sections, you can define points on the airport surface to which you can direct aircra would normally define one of these for each major gate or ramp parking spot. Here are a few examples

```
[PARKING A1]
44.46893 -73.15392

[PARKING A2]
44.46829 -73.15361

[PARKING B1]
44.4679 -73.15348

[PARKING B2]
44.46365 -73.15263

[PARKING GA1]
44.4637 -73.15221

[PARKING GA2]
44.4639 -73.15272

[PARKING GA3]
44.46538 -73.15325
```

The above example shows four gate parking spaces, plus three General Aviation parking spaces. Note th named anything you want (using letters and numbers, no spaces, dashes or punctuation) ... the ones sh For example, in the KBOS file, we use "CARGO1" to define a parking space on the cargo ramp.

Runway Sections

Each runway section defines a single runway (both directions) for the airport. Here's an example from t

```
[RUNWAY 33/15]
displaced threshold=500/0
turnoff=left
44.46571 -73.14166
44.46598 -73.14211
44.47044 -73.14932
44.47263 -73.15287
44.47329 -73.15394
44.47614 -73.15855
44.47953 -73.16403
44.48049 -73.16559
```

This defines the 33/15 runway, with a displaced threshold for runway 33 of 500 feet, and no displaced t defines the default exit turn direction for runway 33 as left. This means that for the reciprocal direction default exit to the right. You can override the turnoff direction using commands. See the Command Refe the displaced threshold and turnoff entries are optional for each runway.

Note: Do not use a leading zero when specifying runways. In other words, "`[RUNWAY 22/4]`" is valid, wh

The remainder of the RUNWAY section defines the coordinates that make up the runway. You need to sp

start of the runway, one for the end, and one for each intersection along the runway. These waypoints r aircraft to follow the runway properly. In the example above, there are 8 points defined for the runway runway 33. The next 6 are intersections along the runway. These include intersection points with taxiw last point is the end of runway 33, which also serves as the beginning of runway 15. See below for deta points.

Taxiway Sections

Taxiway sections are almost identical to runway sections. They obviously do not have displaced thresho Here's an example from the KBTV file:

```
[TAXIWAY F]
44.47371 -73.15058
44.48098 -73.16257
44.48108 -73.16299
44.4811 -73.16485
44.48049 -73.16558
```

This section defines the coordinates for taxiway Foxtrot. As with runway sections, these coordinates mu to follow the taxiway correctly. See below for details on defining the intersection points along the taxiw

Hold Point Sections

A hold point section defines a special location on a taxiway where aircraft must often hold position awai A good example is the "Bravo Hold Point" at KBOS. This is a point on the Bravo taxiway just prior to the where aircraft must hold position until the Ground or Tower controller tells them to continue taxi. Here' point:

```
[HOLD BHP]
42.35523 -71.01747
```

This creates a hold point called "BHP". Note that you can name the hold point anything you want, using cannot use spaces.

Also note that aircraft will **not** automatically hold at defined hold points. You must tell them to do so by hold point in your taxi command hold short list. See the Command Reference for details on forming the example:

```
taxi k b 4r hs bhp
```

This taxi command will instruct the aircraft to taxi to runway 4R via Kilo and Bravo, and hold short of th

How Intersection Points Work

When you command an aircraft to taxi from one taxiway to another, or along a runway, it does so by ex points defined in the airport file. (See above.) When attempting to taxi from one taxiway or runway to a for the one intersection point that the two taxiways/runways have in common. It will then taxi along th until reaching that point, then turn onto the intersecting runway/taxiway. These intersection points don they must only be within about 100 feet of each other. If the aircraft cannot find such an intersection, i saying that the two taxiways/runways do not intersect. If that happens, you'll need to redefine your airp precision.

Creating Aircraft Files

An aircraft file (also called a scenario file) consists of one or more aircraft definitions. An aircraft definit
containing the basic starting information for a single aircraft in the training scenario, such as location, h
Following is a description of what data goes in each colon-delimited field:

```
Callsign:Type:Engine:Rules:Dep Field:Arr Field:Crz Alt:Route:Remarks:Sqk Code:Sc
```

Type is the aircraft ICAO type code such as B738. Engine is either P for Prop, T for Turboprop, J for Jet,
either I for IFR or V for VFR. Cruise alt and current alt are specified in feet. Lat and Lon are specified in
mode is either N for normal or S for standby.

Here is an example aircraft file:

```
AAL123:B190/A:T:V:KBTV:KMHT:15500:BTV MPV LEB MHT:/V/VFR/CHARTS:1200:S:44.46370:
DAL211:B738/F:J:I:KBOS:KBTV:24000:MHT MPV:/V/CHARTS:3401:N:44.41194:-73.05567:60
```

This example file contains two aircraft, AAL123 and DAL211. AAL123 is parked on the ground, and DAL2
creating aircraft which are to start parked on the ground, make sure their current altitude matches the
the airport file, and make sure their speed is zero.

You can either create aircraft files by hand, or you can create aircraft within a TWRTrainer session using
save all current aircraft as an aircraft file. You do this by selecting "Generate Aircraft File" from the File
generate the aircraft file and copy it to your clipboard. You can then paste the lines into a text file and s
includes the position of each aircraft, and not their last instruction, so it cannot be used as a way to sav
later.

Note that aircraft file filenames must end in .air.

Obtaining Support

The best place to get support for TWRTrainer is via the Sweatbox forum on VATSIM. Also, feel free to en
comments or suggestions.

To Do List

- Create a way to save a session to be continued later.
- Create a way to record and play back sessions.

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Revision History

Version 1.0.0 - April 23rd, 2006

- *Initial Public Release*

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