

# North American Simmod User Group

*Falls Church, Virginia*

Presented to: NASUG

By: John Zinna, FAA

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Federal Aviation  
Administration



# Model Release

- Version 3.1 of FAA's *Airport & Airspace Simulation Model* released September 2008
  - Window version
  - Linux version
- Received 9 requests for the FAA's engine since last release.
- Model changes are sent to ATAC Corporation.

# Model Maintenance

- New input: Gate service times may be defined for individual airlines. This is listed in the AIRLINES record using a probability distribution reference (PROBDIST).
  - Airline gate service times takes precedence over the TAMPS gate service times.
- Two existing inputs in the AIRLINES record that are not used by the model are now optional:
  - airline type
  - airport
- New input: Departure Runway Occupancy Time
  - Overcomes calibration problem
  - Data is entered in the new RUNWAY\_TAKEOFF\_OCCUPANCY record.
  - Uses probability distribution

# Model Maintenance

- Corrected ground link blocking logic (AFLINKBLOCKING). Some aircraft models or TAMPs groups were not blocking aircraft on the specified links.
- Corrected ground link blocking logic (AFLINKBLOCKING). Rewrote the logic that implemented reverse blocking which was not blocking aircraft.
- Enhanced runway exit selection logic. An arriving aircraft was holding on runway due to its exit being fully occupied by other aircraft.
  - Logic will now check for available link capacity.
  - Logic will now check for link blocking.

# Model Maintenance

- Enhanced DSTAGING record – new optional method to determine how departing aircraft will stage.
  - Existing method: define stage area near departure queue with a TAXICLKPT. The engine automatically sends all departures to stage area, where departure rolls over TAXICLKPT to determine to stage or head to departure queue.
  - Problem: If the staging area is located in the middle of the airfield, some departures will be taxiing further away from the runway when the departure queue is not fully occupied.
  - New method: staging area can be located anywhere. Departures taxi to staging area only if departure queue is full. No need to use the TAXICLKPT record.
  - New input field lets user select which method to use (Default is existing method).
- Enhanced departure staging output tables in SIMU10.
  - Data for each iteration was missing. Two tables (iteration & cumulative data) will now be written for each iteration.
  - Added new column of data: total time for all aircraft for each stage area

# Model Maintenance

- Corrections to gate logic:
  - An error prevented an aircraft from seeking an alternate gate when its assigned gate was not available (with alternate gate flag set to Yes).
  - When seeking an alternate gate, an aircraft erroneously selected a gate that was not available.
  - Aircraft were being destroyed because no gate was available. Aircraft will now taxi to an occupied gate and hold until gate becomes available.
  - When used with Towing operations, the engine crashed with a “fatal occupancy count” message. The internal gate occupancy counts were not being updated correctly.
  - In some instances, a Towed aircraft was not releasing its gate after unloading passengers, preventing other aircraft from using gate.
  - Aircraft that entered Towing area were immediately assigned a new gate (for later departure), this prevented other aircraft from using these gates. Fixed.

# Model Maintenance

- Departure re-routing was not functioning for multiple departure queues to the same runway. Fixed.
- The global variable `add_dq_lower_limit` had no effect on departure re-routing, due to incorrect processing of input data. Fixed.
- The gate data field for the `RUNWAY_EXITS_LINKS` and `RUNWAY_EXITS_PROHIBITED_LINKS` records is no longer a required input.
  - If omitted, the record would apply to all gates.

# Model Maintenance

- Engine was crashing for an airspace study that modelled the airport as a single node (Degenerate airport). Engine was attempting to process ground data (GATES, TAMPS, and DEPARTQ blocking links) that did not exist. Fixed.
- Corrected taxi logic. Infinite loop occurred during a gridlock situation. A flaw in the logic repeatedly attempted to hold an aircraft for 0 seconds of delay. Fixed.
- Corrected missed approach logic. An aircraft performed a missed approach, continued on its missed approach path, and then attempted a second landing. The engine crashed due to an initialization error. Fixed.
- Corrected input logic to read Touch-n-Go data. Unexpected end of file caused engine crash. Fixed.



# Model Maintenance

- Problem: no method exists to assign ground speeds to aircraft that require towing. Two new implementations:
  - Assign probability distribution to the TOWING record. A towing speed will be determined for each towed aircraft.
  - New input card “TOWING\_SPEED”. Allows towing speeds to be assigned to specific ground links. Speeds are computed from a probability distribution. Examples of use:
    - the ground link connected to a gate or Tow area
    - sloped taxiways

# Model Maintenance

- Corrected TAXCHKPT logic. The existing data field 'NumAhead' previously had no effect. Now, a taxiing aircraft can assess the number of aircraft in its immediate path; if more than the threshold value, then a new taxi plan will be selected.
  - Can be used to avoid ground congestion.
- Enhanced TAXCHKPT logic. When used with departure staging, there is now an option to assign a defined Taxipath to departures whose destination was changed to a departure queue.

# Model Maintenance

- New functions added to the TAXICHKPT record allow a taxiing aircraft to change their current taxi plan depending on ground or airspace conditions.
  - A new taxiplan can be selected if the number of aircraft that occupy a ground link, departure queue, airspace link or an airspace node exceeds a threshold value.
  - A new taxiplan can be selected for a taxiing aircraft based on the other aircraft's model.
  - Option to assign a defined Taxipath, or engine may compute an optimal taxipath.
  - Backwards compatibility is maintained when using TAXICHKPT with existing departure staging method.

# TAXICHKPT- Examples of Use

- Avoid ground congestion by checking traffic on any ground link.
- If a runway is very busy, have taxiing aircraft taxi around the runway instead of crossing it.
- An arriving aircraft that is taxiing to its gate can avoid the traffic of a long departure queue.
- Avoid an A380 that is taxiing on a nearby link.

- Email:
  - [john.zinna@faa.gov](mailto:john.zinna@faa.gov)

