Unit IV(B) – Arrival Procedures

1- Introduction

In order to use the limited arrival airspace effectively, the controller must be proficient at anticipating conflicts and providing accurate spacing between aircraft. In an attempt to be as complete and as realistic as possible the material in this module becomes quite detailed. Some topics are presented for information purposes only as they fall well beyond the scope of the knowledge required to control successfully on VATSIM.

3- Separation

A controller must separate aircraft by 1,000 feet vertically or, when directly behind and less then 1,000 feet below a preceding aircraft, or when following an aircraft conducting an instrument approach by one of the following minima:

Heavy behind a heavy - 4 miles
Medium behind a heavy - 5 miles
Light behind a heavy - 6 miles
Light behind a medium - 4 miles

When it is the lead aircraft, a B757 is considered to be a heavy. Typically the Arrival controller will maintain vertical separation between aircraft until such time that the above radar separation is established. For example, the arrival controller may have a faster aircraft overtake a slower one on downwind leg, maintaining vertical separation until the required radar separation is in place. Lateral radar separation between aircraft less than 1,000 feet apart vertically is 3 miles.

6- Communication and Control Transfer

In general, any handoff should occur as close as possible to the next controller's area of jurisdiction. On VATSIM it is advisable for controllers to initiate early handoffs. Handoffs from the Enroute controller to Arrival may occur up to ten miles outside of the terminal boundary in order to facilitate the communication transfer and to ensure that Arrival is in communication with the aircraft by the time the aircraft enters Terminal airspace. It is important to note that acceptance of a handoff from the Centre controller outside of the Terminal airspace does not constitute a transfer of control of that aircraft to the Arrival controller. Because Arrival does not have control of the aircraft until it enters the Terminal airspace, they may not authorize a change in the aircraft's altitude, route or speed. In addition, acceptance of a handoff by Arrival of an aircraft outside of the Terminal airspace does not relieve the Centre controller of ensuring separation for that aircraft. For example, if the Centre controller has two aircraft approaching the Terminal boundary and it appears that separation may be compromised, the Arrival controller is not responsible to ensure that separation between the two aircraft is sustained. If the Centre controller has failed to ensure separation, Arrival, with co-ordination with Centre must take action to attempt to preserve separation between aircraft if possible.

Arrival should initiate a handoff of an arriving aircraft to Tower as soon as they are satisfied that the aircraft is established on final approach to the proper runway and separation will be assured with other arrivals to the same.

9- Service Priority

Normally Air Traffic Controllers provide service to aircraft on a 'first come, first served' basis however there are exceptions to the rule.

Highest priority is given to:

- An aircraft that has declared an emergency, or appears to be in a state of emergency but is unable to inform ATC and

- An aircraft that informs ATC that it may be compelled to land due to factors other than fuel shortage effecting its safe operation.

Because of miscommunication between ATC and aircrews, reports of fuel shortage are handled as follows: If an aircraft informs ATC of fuel shortage or uses any non-standard phraseology which indicates a possible concern about a fuel shortage, the controller is to ask whether the pilot is declaring and emergency. Priority will be given to the flight if in fact an emergency is declared. In the past there has been some confusion when a pilot would declare they are at 'minimum fuel'. Minimum fuel is not a declaration of an emergency but it indicates that an emergency could occur with any undue delay. The Enroute controller will advise Arrival well in advance of any inbound aircraft that requires priority service.

11- Indicated Airspeed, True Airspeed, Ground Speed and Wind Effect

It is important for the Arrival controller to have an understanding of the relationship between true, indicated and ground speed. What is seen on the controller's radar display is ground speed while the airspeed that controllers and pilots refer to in practice is indicated airspeed. Indicated airspeed is the speed displayed in the flight deck and can be thought of as a measure of how hard air is being pushed against the aircraft's nose as it flies. Because of the effects of temperature and density with altitude, indicated airspeed is not an accurate measurement of how fast the aircraft is really moving through the air. True airspeed measures how fast an aircraft is actually moving through the air and can be calculated from IAS taking into account the effects of outside air temperature and density. Under standard conditions and at sea level, True Airspeed (TAS) equals Indicated Airspeed (IAS). However as altitude increases, TAS increases greater than IAS does. Under standard conditions, TAS increases 2% more than IAS does per 1000 feet of altitude. For an aircraft indicating 250 kts this equates to an extra 5 kts for every 1000 feet of altitude. Thus an aircraft indicating 250 kts at 10,000 under standard conditions will have a TAS of 300kts. With no wind, radar will show the aircraft moving at 300 kts GS while the pilot flies the aircraft at 250 IAS. The discrepancy in speed is further affected by the winds aloft. A 20 knot tailwind acting on this aircraft will show the controller the aircraft as having a ground speed of 320 kts which is 70 kts higher than the 250 kts IAS which the pilot is flying at.

The Arrival controller must also be aware of the effect of the winds aloft on an aircraft's track. For aircraft on FMS STARs, the effect of wind on their track is irrelevant since they fly directly from fix to fix. However, an aircraft that is flying a radar vector will show a track on radar which results from the compass heading being flown by the aircraft and the drift effects caused by wind. To try and maintain consistent downwind and base legs, the controller must take drift into account and correct for it. If unsure of what the winds aloft are, the controller may ask a pilot for a spot wind report to help determining what type of corrective heading should be used.

12- Arrival Pattern

The Arrival controller will try to maintain a constant rectangular pattern of arrival traffic in the vicinity of the airport. This is done by forming one or two linear downwind legs. Keeping downwind legs fairly close to the airport allows the Arrival controller to better judge when to turn aircraft from downwind leg onto base leg. Inbound aircraft that will have to fly from one end of the airport to the other for landing. This flight path helps to minimize the amount of time that a departing aircraft may have to level off below an arrival in a head-to-head situation. Aircraft which do not indicate an FMS or RNAV STAR in their flight plan are to be vectored to final.

13- Minimum Vectoring Altitude

The minimum vectoring altitude by definition is the lowest altitude at which an aircraft may be vectored by ATC. This altitude meets both obstruction clearance and radio coverage requirements in the airspace specified.

15- Initial Contact

On initial contact with an aircraft landing on VATSIM, the Arrival controller shall identify themselves and state the aircraft's assigned runway for landing. When giving a decent below the Transition Altitude you must state the local QNH.

Example: "Croatia 343, Sarajevo Arrival, runway 12."

Because there is no provision for a full, proper ATIS message on VATSIM it is not required for the aircraft to state they have received the Arrival controller's brief ATIS message

It is not required to inform an aircraft that they are radar identified if the aircraft was transferred via a radar handoff from Centre. When Centre is not on-line radar identification of an arrival is normally accomplished by having the aircraft 'squawk ident'. An arriving aircraft can also be radar identified when it makes a position report over a fix displayed on the radar display and its position and direction of flight is consistent with the pilot's report.

17- Vectoring Aircraft to Final Approach

Arrival is to vector aircraft to a position from which they are to be turned final:

- At an angle of 30 degrees or less and
- At a position at least 2 miles from the point where final descent begins

An intercept angle of 30 degrees or less permits the aircraft to execute a shallow turn to join final and, when using an autopilot should allow the aircraft to lock onto the localizer and become properly established without drifting through the final approach course. The phrase 'the point where final descent begins' refers to the location where the aircraft will leave its last assigned altitude and descend on the glide slope.

An Approach clearance is something that the Arrival controller gives at some point in time to every aircraft that they are in contact with. An approach clearance is an authorization for an aircraft to proceed to the destination airport by the means issued in the approach clearance, which may include restrictions. If the aircraft is vectored to the final approach course, the name of the airport need not be included in the approach clearance.

Approach information is to be issued to an aircraft when on the final approach course, or immediately before the turn to the final approach course. Approach information includes:

- The vector to intercept the final approach course
- The approach clearance and
- Instructions to change to the Tower

In practice, the Arrival controller would never issue a frequency change in conjunction with the approach clearance as above, because at that point in time the aircraft has yet to become established on the final approach course and must be monitored for compliance until it does. Instructions to change to the Tower are normally given later on VATSIM.

Because an approach clearance cancels any previously imposed altitude or speed restrictions issued to an aircraft, the controller must re-issue any necessary restrictions.

- “Croatia 343, turn left heading 260 intercept the 12 localizer”

- “Croatia 343, when intercepted LOC rwy 12 contact Tower now 118.25”

24- Visual Approaches

By definition a visual approach is a procedure where an IFR aircraft operating in VFR weather conditions when authorized to do so, proceeds to the destination airport in visual meteorological conditions (VMC). Visual approaches are beneficial to Arrival because when they can be authorized the aircraft becomes responsible for their own separation and wake turbulence avoidance from their traffic. The controller may not authorize a visual approach clearance unless the weather meets the official criteria, whether or not the aircraft requests or states they are able to fly a visual approach. In addition to the weather requirements, the aircraft must be within 15 miles of the airport in order to be issued a visual approach clearance. The restrictions in place for visual approaches are the same as the noise abatement restrictions that we have seen previously. However the Arrival controller, workload permitting is expected to provide guidance to a pilot who they have reason to believe may be unfamiliar with them.

An aircraft may be cleared for a visual approach provided:

A- IFR separation is maintained from other aircraft until the aircraft is instructed to maintain visual separation from the proceeding arriving aircraft once cleared for a visual approach.

B- The aircraft reports sighting the airport if there is no proceeding aircraft, or the aircraft they will be instructed to follow

C- You ensure that the aircraft will be able to complete its approach by following a flight path that will not compromise separation with other IFR aircraft

D- In multiple traffic situations you ensure that there is no mistaken identification by having the pilot confirm the type and position of the aircraft to be followed

25- Missed Approaches

Normally the aircraft is received on a heading to take it out of the arrival box. The Arrival controller then takes the aircraft and re-sequences it with other arrivals for a second approach by bringing the aircraft back into the arrival box as soon as possible.

26- Arrival Techniques

To become proficient at Arrival, the controller must be able to look ahead and project the flight paths of aircraft. In addition to practice, the following information may be of use.

Resolve conflicts early

It is important to identify and resolve traffic conflictions as early as possible. The main confliction points are the locations abeam the landing runway at the mid-downwind points. When the controller decides who they will make number one, control techniques of speed control, vertical separation and vectoring are used in order to make the sequence work. If an aircraft needs to be vectored for spacing from other traffic they can be taken off an FMS arrival at any point in time however the reason for the cancellation of the STAR should be given. Care should be taken when deciding to slow an aircraft to establish a sequence if the aircraft still has many miles to fly within the Terminal. Slowing an aircraft when they are still quite far from the airport can cause a ripple effect if it is busy. Slowing one aircraft may necessitate slowing subsequent aircraft behind them also. For this reason vectoring should be the primary means of establishing a downwind sequence and it is best accomplished when initiated far from a confliction point.

Altitude and Speed

Remember that aircraft are heavy and typically cannot descend and reduce speed at the same time. If a descent is issued to an aircraft along with a speed reduction, the controller should not expect the aircraft to be able to accomplish this reasonably well. When asking for a speed reduction in conjunction with a descent clearance, when one action is desired to be accomplished before the other, the controller should state the requests sequentially. For example ‘Croatia 343 speed 210 kts or less then maintain 4,000’, or ‘CTN 343 maintain 4,000 when level speed 210 kts’.

Get aircraft onto final as soon as possible

In order to stay ahead in Arrival, the controller must continually strive towards keeping spacing to a minimum on final. When space is used more effectively aircraft will be spending as little time in the air as possible not adding to the workload. There are two critical times for Arrival- one is deciding when to turn an aircraft from downwind onto base to follow traffic on final and the other is deciding when there is enough of a gap to turn an aircraft onto final ahead of one already established on a straight-in approach. One method to keep finals as short as possible is to realize that an aircraft on a good downwind leg is typically 3 miles from their final approach course. When deciding weather or not there is enough room to 'stuff a hole' with an aircraft, the controller must first know how much space they will have to have in front of, and behind their traffic. If the gap is not sufficient to accommodate the aircraft then that aircraft will have to continue downwind unless control instructions can be issued to help increase the size of the hole in time.

Always have a backup plan

Always be ready with 'plan B' if things don't unfold the way they had been originally planned. This holds especially true on VATSIM where the unexpected must always be prepared for. Pilots on VATSIM can fly unpredictably even at the best of times and quick reaction by Arrival is necessary.