SUPERCRITICAL SIMULATIONS GROUP
747-8 QUICK REFERENCE PILOT GUIDE

Congratulations on taking command of this 747-8 aircraft for X-Plane! Supercritical Simulations Group (SSG) has made every attempt to make this aircraft as realistic as possible in terms of flying qualities and performance. The following guidelines should be of some help to you when flying the aircraft.

Technical Information

The Boeing 747-8 was launched in 2005 by Boeing after several attempts at enhancing the popular 747-400 model, which first incorporated many advances compared to the initial 747 models (now known as “Classics”). All 747s up to the 747-400 series were the same length (except for the unique 747SP model that saw limited production). The biggest changes over the 747-400 are as follows:

<u>Airframe</u>

- A fuselage stretch of 18.3 ft (5.6 m)
- New thicker and deeper wing with supercritical airfoil and incorporation of some fly-by-wire technology (ailerons only)
- Vortex generators on the middle span of the upper wing
- New raked wingtips instead of winglets
- Slightly taller tail

<u>Engines</u>

- New General Electric GEnx-2B67 engines that are similar to engines on the new 787, although with a smaller fan and with bleed air
- “Scalloped” nacelles to reduce noise
- Inboard chines to smooth the airflow around the nacelles

Cockpit

A host of new technology and updates to the cockpit while maintaining the same type rating as the 747-400 for increased crew commonality. Some of these advances include:

- New FMS with larger memory and increased functionality
- New Vertical Situation Display (VSD)
- Integrated moving map display
- Built-in Electronic Flight Bag (EFB)

It should be noted that some later model 747-400s already had some advances versus the original models. Some airlines have retrofitted this equipment on some if their older models with these features. Some examples of these changes are listed below:

- Liquid Crystal Display (LCD) screens for all flight displays instead of Cathode Ray Tubes (CRTs).
- LCDs for the autoflight glareshield numerical displays
- Integrated Standby Flight Display (ISFD) instead of the original 3 standby instruments
- New “upside down” style standby compass

Systems

- Redesigned flaps with fewer segments, so it now has single-slotted outboard flaps and double-slotted inboard flaps
- Additional gap on leading edge slats
- Flaperons (ailerons that droop to also serve as flaps)
- Two segments on the lower rudder for enhanced directional control
- Ram Air Turbine (RAT) for additional hydraulic/electric power
- Improved interior and cargo handling equipment
- Improved fire suppression system
- Strengthened landing gear and wheels with bigger tires
- Redesigned external lights, including use of LEDs

As per the Boeing web site[1], here is some basic technical information on the Boeing 747-8 aircraft, supplemented by other publicly available information:

Basic Dimensions:

Wing Span	68.5 m (224 ft 7 in)
Overall Length	76.3 m (250 ft 2 in)
Tail Height	19.4 m (63 ft 6 in)
Interior Cabin Width	6.1 m (20.1 ft)

Thrust:

(Maximum thrust) GEnx-2B67 (x4)
66,500 lb (296 kn)

Maximum operating altitude:

Both Models 42,100 ft

Maximum Takeoff Weight (MTOW):

Both Models 987,000 pounds (447,696 kg)

Passengers (Typical 3-class configuration):

Intercontinental 467

Operating Empty Weight

Intercontinental	421,000 pounds (190,962 kg)
Freighter	470,000 pounds (213,188 kg)

Maximum Structural Payload

Intercontinental	181,000 pounds (82,100 kg)
Freighter	295,200 pounds (133,900 kg)

[1] http://www.boeing.com/commercial/747family/747-8_fact_sheet.html

Other Weights

Characteristics	Pounds	Kilograms
Max Taxi Weight	978,000	443,614
Max Landing Weight (F)	757,000	343,370
Max Landing Weight (i)	682,000	309,350
Max Zero Fuel Weight (F)	717,000	325,226
Max Zero Fuel Weight (i)	642,000	291,206

Fuel:

Usable Fuel Capacity	Gallons	Liters	Pounds	Kilograms
Freighter	60,211	229,980	407,045	184,628
Intercontinental	64,055	242,475	429,159	194,659

Typical Cruise Speed (at 35,000 feet):

Intercontinental Mach 0.855
Freighter Mach 0.845

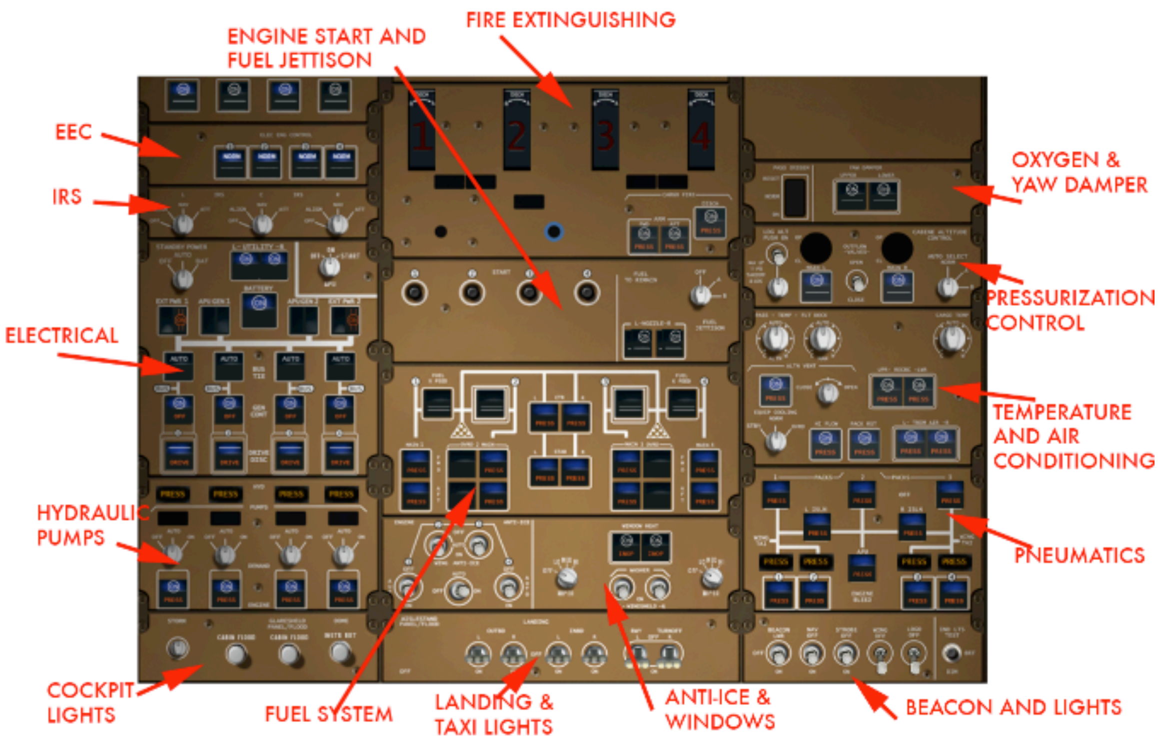
Maximum Range:

Intercontinental 8,000 NM (14,815 km)
Freighter 4,390 NM (8,130 km)

Panel

The SSG 747-8 aircraft includes a more advanced 2-D panel, and future releases will improve on this first version. A 3-D panel is also planned in the future. As with all X-Plane 2-D panels, the upper and lower portions of the 2-D panel are accessed using the up and down arrow keys.

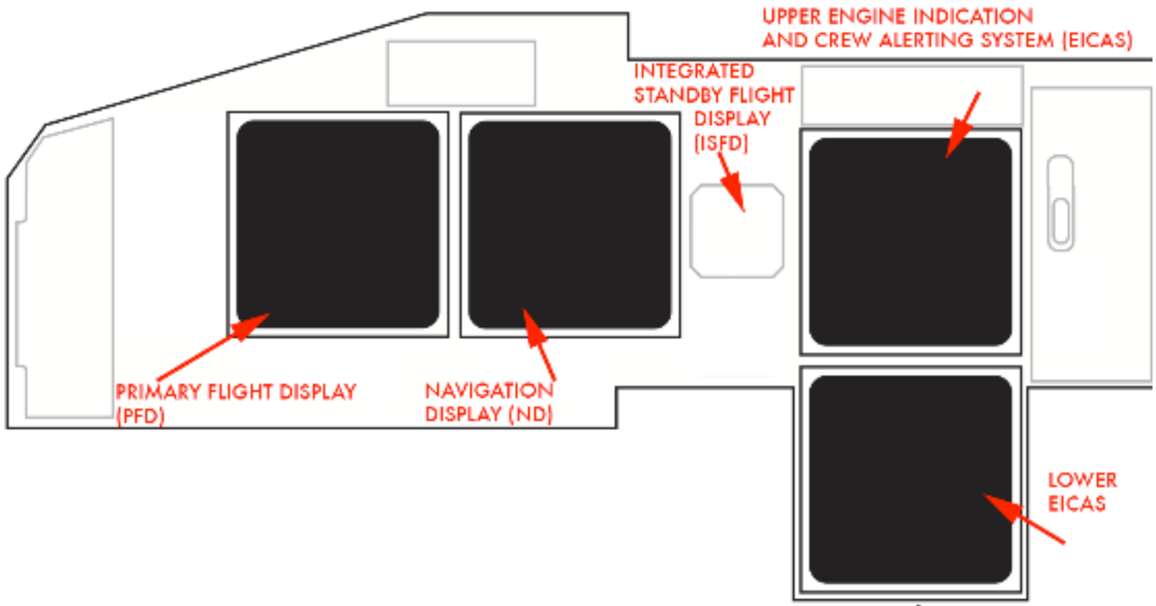
<u>Overhead Panel</u>



While not all aircraft systems are simulated, the controls and indicators are located in their proper places with respect to the real aircraft. The diagram above shows the overhead panel layout. With subsequent releases, systems will be implemented more fully and this panel will evolve to make it more realistic. One limitation is the level of control inherent within X-Plane. No plug-ins are being used at this time.

Note: As the aircraft is updated, so will this guide.

<u>Forward Panel</u>

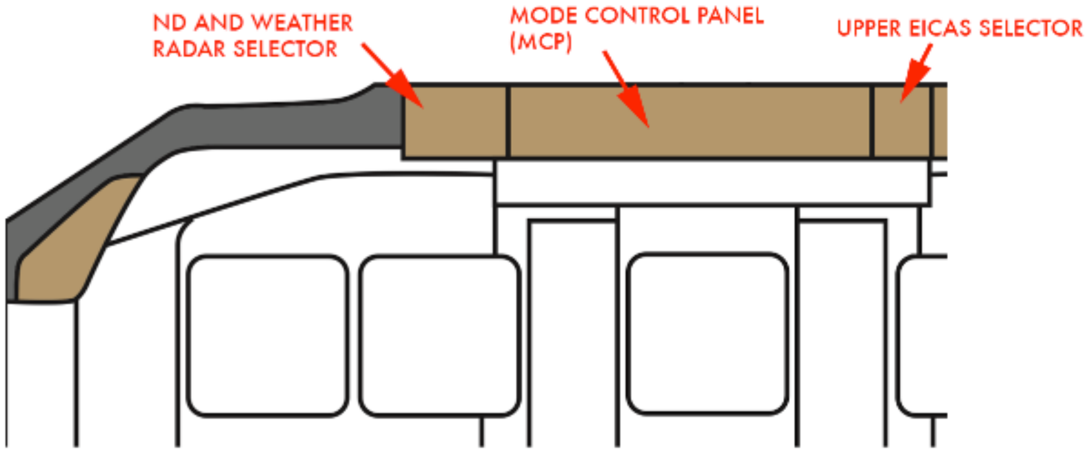


The forward panel screens on the SSG 747-8 panel are arranged in the same manner as in the real aircraft. They are described as follows:

- Primary Flight Display (PFD)
- Navigation Display (ND)
- Integrated Standby Flight Display (ISFD)
- Engine Indication and Crew Alerting System (EICAS) – both upper and lower

In the same manner as the overhead panel, with subsequent releases, SSG will implement more features to approximate the layout and functionality of the real 747-8 aircraft as much as possible.

Glareshield Panel



The 747-8 glareshield panel consists of several segments as shown above. The Mode Control Panel (MCP) includes the following controls and indicators:

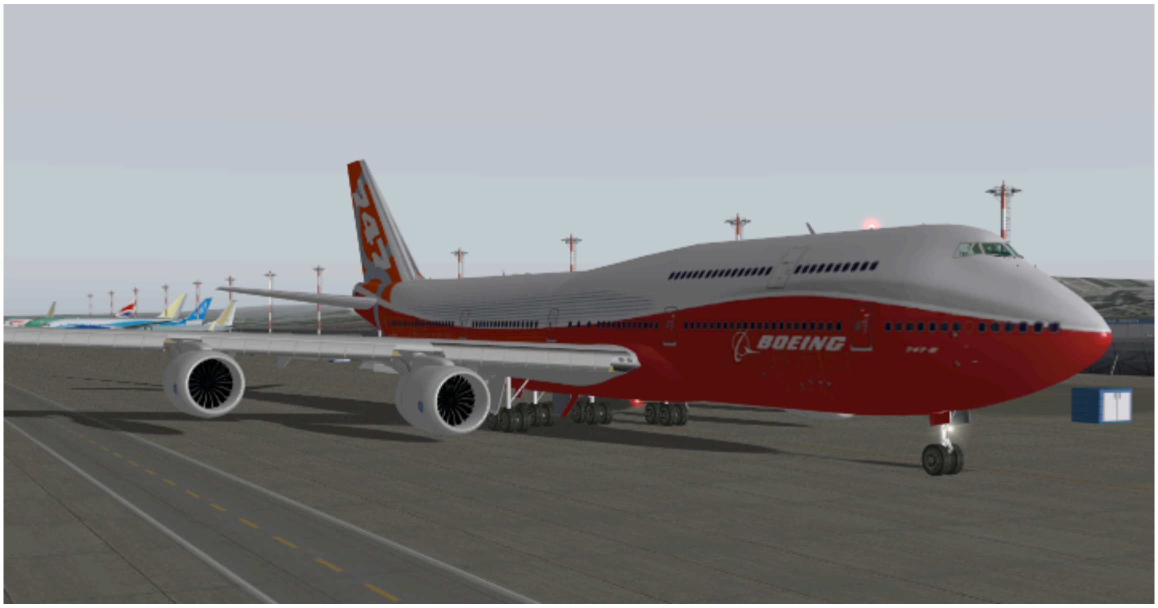
- Autothrottle selector
- Flight director selector
- Airspeed selectors
- Heading selectors
- Vertical speed knob
- Autopilot selectors
- Altitude selector

General Guidelines

It goes without saying that the 747 in general, and the 747-8 in particular, is a very large aircraft. As a result, it is slower to respond to control inputs than a smaller and lighter aircraft. Jet engines also have an inherent delay in responding to changes in commanded thrust. Due to these factors, any pilot control inputs have to be made in sufficient time for them to be effective. Another factor to consider is that the 747 operates over a wide range of weights, and behaves differently and lighter weights than at higher ones. In fact, 747 pilots have stated that it is harder to fly the 747 when it is very light because it climbs fast, everything happens very quickly, and it is easy to exceed flap and other speed limits.

One of Boeing's test program's goals was that the 747-8 should have the same flight characteristics as the older, and very successful, 747-400. That aircraft in turn behaved similarly to the so-called "Classic" 747s. Therefore, if you have experience flying other 747s in X-Plane or other desktop flight simulators, that experience should translate very well into flying this 747-8.

If that is not the case, and you are a "newbie" this quick reference pilot guide should help you fly this aircraft in an effective and professional manner. Clearly, a simple pilot guide cannot replace the hours of training and experience that real-world 747 pilots have. Nevertheless, it should be sufficient to permit you to take off, fly long distances, and land safely using the SSG 747-8 in X-Plane. This plane was made for long hauls.



Taxiing

One of the big difficulties for pilots transitioning to the 747 is the height of the cockpit relative to other aircraft. The cockpit sits at 28 feet 5 inches (8.66 meters) above the tarmac, so it is difficult to see how fast you are going. Therefore, pilots use the groundspeed indicator on the Navigation Display (ND) and limit turns to 10 knots in normal conditions, and 3 to 7 knots in adverse conditions such as ice and rain. In a straight line, speeds should be limited to 25 knots, while 15 knots is the preferred taxi speed in wet conditions, and 10 knots for icy conditions.

Furthermore, the main landing gear is located 97 feet 4 inches (29.6 meters) behind the nosewheel, and Boeing has provided the aircraft with a system called “body gear steering” that turns the body gear in the opposite direction of the nosewheel to aid in turns (this feature has been implemented in this SSG aircraft). To time turns while taxiing, one rule of thumb that works for 90 degree turns in 747s from the 747-100 to the 747-400 (which had the same, shorter, body length compared with the 747-8) is to wait until the centerline of the taxiway or runway you want to turn into is parallel to the pilot’s shoulders. The 747-8 is a bit longer, but this is still an effective technique because the nose gear is still just behind the plane of the pilot seats.

In X-Plane, we also have the advantage of accessing an external camera viewpoint to see the aircraft from behind and above the aircraft to judge when the turn has to be initiated. On the real aircraft, differential thrust (using engine power on either side of the aircraft) can be used, in slippery conditions, or in tight turns to avoid stopping during the turn. If this happens, significant thrust would be required to start moving again. Also, straighten the nosewheel and then use it to turn again once the aircraft starts moving to avoid putting too much stress on the nose gear.

One consideration that is not an issue in the simulator, but that should be adhered to for the sake of realism and professionalism, is to limit the amount of thrust used while taxiing. The aircraft's engines generate a great deal of thrust (their exhaust velocity is 50 mph / 80 kph when they are at idle), and can create a lot of damage to ground vehicles and aircraft servicing equipment found at airport ramps. The jet efflux can also damage, or even overturn, other aircraft, particularly smaller ones.

Takeoff

Due to the large variation in weights for the 747-8, the amount of runway the aircraft needs will vary. The following are some field length guidelines for takeoff at Maximum Takeoff Weight (MTOW). Of course, lower weights will require less runway, and a headwind will reduce the distance required, among other factors.

<u>Takeoff Field Length:</u>

Minimum 5,000 ft (approximate, MTOW sea level, standard day)
Maximum 10,000 ft (approximate, MTOW sea level, standard day)

It should be noted that real 747 pilots have sophisticated tables for various runways to calculate planned takeoff lengths that take into account wind, runway slope, and various performance penalties. These are beyond the scope of this pilot guide.

<u>Flaps</u>
Flap selection for takeoff is normally 20 degrees on the 747-8, but 10 degrees of flaps can be used as well. On the 747, slats (in front of the wings), also called “leading edge flaps” are deployed automatically in sequence with the flaps. One feature of the 747-8 versus older 747 models is the implementation of “flaperons”, which is that both the inboard and outboard ailerons droop with the

application of flaps to provide additional lift for takeoff and landing. The next time you fly on a 777 and sit where you can view the wing you can see this system in action. This feature has been implemented in the SSG 747-8 as well.

Take-off Speeds:
Different V-speeds are calculated for large transport aircraft to enable takeoffs to be accomplished safely. V_1 is the speed at which the pilots are committed to takeoff, so any faults identified before V_1 will cause pilots to abort the takeoff. After V_1 it is best to take off and address the issue, and land as soon as practical under the circumstances. While it may seem undesirable to take off with a known fault, rejected takeoffs are very hazardous. Brakes get extremely hot, and at speeds above V_1, stopping before the end of the runway may not be possible. Not all airports have flat, open, and undeveloped land beyond the runways, so this is not considered a viable option.

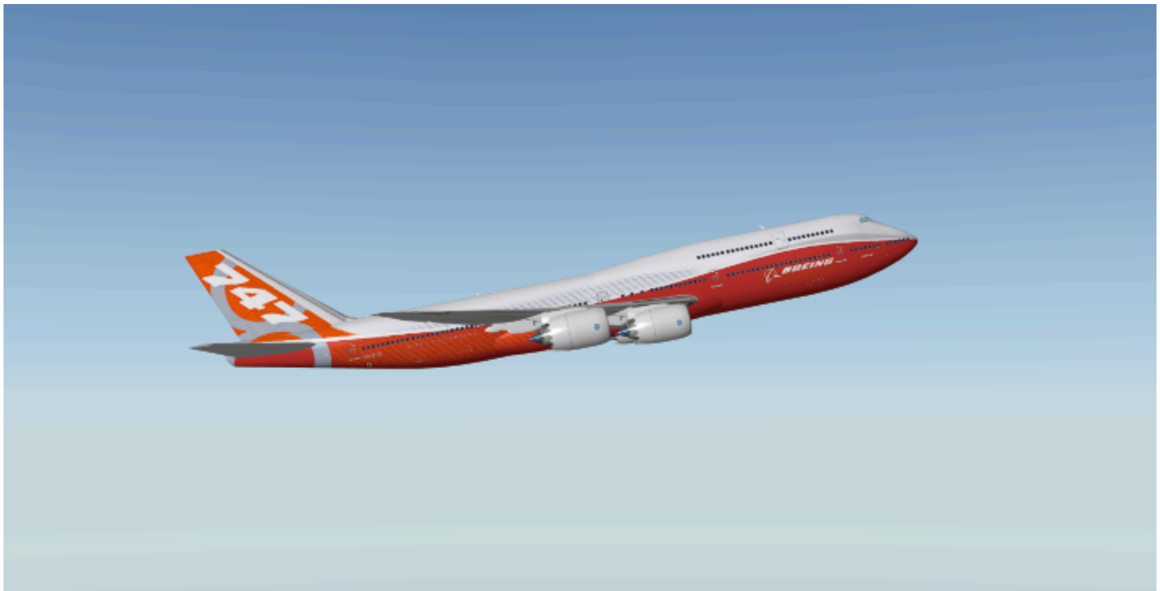
V_R is the rotation speed (when the pilot starts pulling back on the yoke for takeoff) and V_2 is the safe flying speed after which the landing gear can be retracted, as long as a positive rate of climb is achieved.

This table provides approximate takeoff speeds from low takeoff weight (TOW) to maximum TOW (MTOW) which is (500 - 987,000 lbs / 225 - 447,696 kgs) at normal N1 engine power setting, with a clean and dry runway):

V Speed	Flaps 10 (kts)	Flaps 20 (kts)
V_1	127 - 159	127 - 154
V_R	127 - 177	127 - 170
V_2	149 - 188	147 - 181

Note: Maximum tire speed is 235 MPH (376 KPH)

Takeoff Technique:
With respect to technique, once you are lined up on the runway, increase thrust evenly and smoothly up to 70% N1 and allow the engines to stabilize. Then, smoothly apply takeoff power. At V_R, pull back on the yoke at 2 to 3 degrees per second until reaching 10 degrees nose up (you don't want to get a tail strike, which on the 747-400 can occur at 12.5 degrees with the wheels on the ground). The 747-8 has built-in tail strike protection, but this feature has not been implemented in the SSG aircraft. Once the aircraft is airborne, you can increase the pitch up to 15 degrees for the climb. After gear retraction, lower the nose to about 10 degrees for the rest of the climb. Among other things, this guideline is for passenger comfort.



Climb

After rotation, ensure the aircraft is accelerating past V_2+10 knots, and after 1,500 feet, set climb power (slight reduction in thrust, certainly below 100% N1). This is set in the aircraft using the FMC, which is not implemented in the SSG 747-8 – only the default X-Plane GPS. However, if you own the excellent UFMC for X-Plane from FJCC, a customized configuration file for that add-on is included with the aircraft. The accuracy of this file will be optimized as the SSG aircraft is improved over time.

The autopilot can be engaged 250 feet above the runway, if desired. When flying manually, and an early turn after takeoff is desired, perform the turn once you are 500 feet above the airport, and limit the bank angle to 15 degrees at this point. The aircraft has a large wingspan after all with large pod mounted engines slung below those wings.

After 3,000 feet, and while still accelerating, start retracting the flaps one notch at a time, adhering to the flap limit speeds (listed at the end of this guide and placarded on the panel). In many countries, the speed limit below 10,000 feet is 250 kts, so once you climb through 10,000 feet, start accelerating to 300-310 kts for the rest of the climb until reaching cruising altitude (above transition altitude these are referenced using the term “Flight Level” or “FL”), at which time the operating speed is expressed in terms of percentage Mach (which is the speed of sound at that altitude), for example “Mach 0.84”. In the U.S. transition altitude is 18,000 feet, although it will vary from country to country. At that altitude, all aircraft adjust their altimeters to the standard value of 29.92” of mercury (or 1013

Hectopascals) so that everyone is using the same plane of reference.

ROC Rate Of Climb

These are some standard target rates of climb for the 747-8, depending on weight.

Below 10,000 ft

- Maximum 3,800 feet per minute (FPM) at 250 kts

Above 10,000 ft to Cruise FL

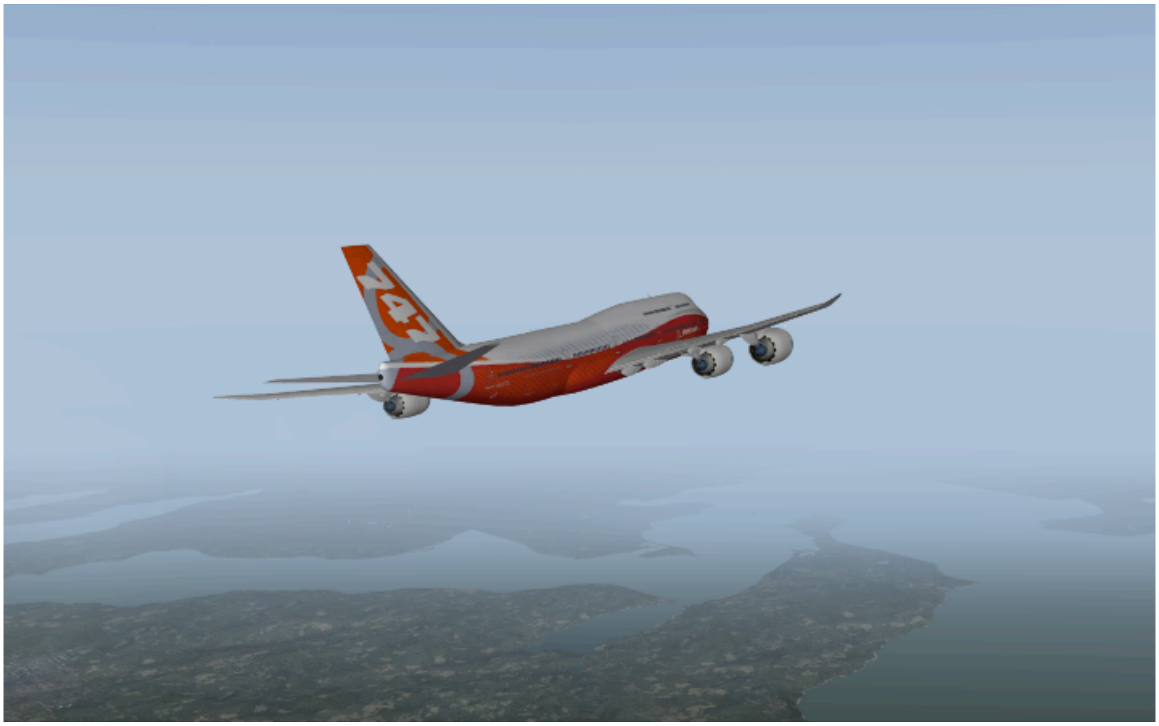
- 2, 200 FPM from 10,000 - 20,000 ft at 280 - 340 kts
- 2,000 - 1,500 FPM from 20,000 - 26,000 ft
- 1,500 - 400 FPM from 26,000 - 35,000 ft

Hand Flying and Trim

Those of you with real flying experience, and particularly instrument flying experience, understand the value of trim in proper flying technique. The importance of trim is a bit more difficult to appreciate in a desktop flight simulator because control forces are not normally fed back to the flight controls that are used to control desktop flight simulators like X-Plane.

Stabilizer trim is particularly important (which adjusts pitch, or the up/down motion of the aircraft nose) and the goal is for the aircraft to maintain its attitude when controls are relaxed. In other words, if you let go of the yoke/stick, there should be no change in pitch by the aircraft. Large jet aircraft with swept wings like the 747 operate at a large range of pitch angles (just look at a 747 on approach compared with a Cessna single-engine aircraft on approach and you will see the difference).

One feature of the 747, including the 747-8, is an automatic trim function in order to minimize drag, which automatically operates when the elevators have remained deflected in one direction from neutral for more than 3.5 seconds. This feature is implemented in the SSG 747-8, although not for the exact 3.5 seconds of the real aircraft. So, if you hold a particular pitch with your flight controls, after a second or two, the stabilizer trim will automatically engage to hold that pitch for you. This feature is very useful during approaches, and makes the airplane very easy to fly – a feature of the real 747 as well apparently.



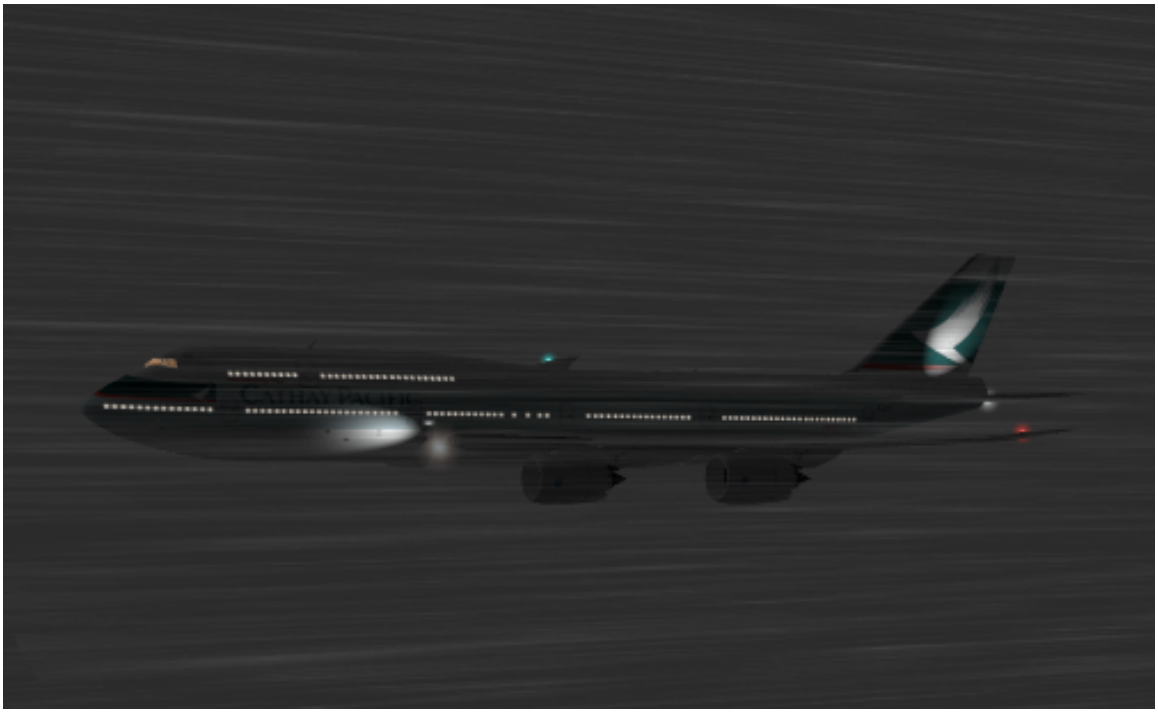
Cruise

Upon reaching cruising altitude, the aircraft should capture the set altitude (if on autopilot) and maintain it as desired. The SSG 747-8 incorporates the standard X-Plane autopilot, so you should familiarize yourself with its functions as much as possible.

Cruise altitude for the aircraft is 28,000 to 35,000 ft (depending on weight). At higher weights, it may be necessary to level off at a lower altitude and burn off fuel, climbing incrementally (in what are called “step climbs” of 2-3,000 feet) to reach the target cruising altitude. The 747’s high bypass engines are more efficient at higher altitudes, but they can only be reached when the aircraft is sufficiently light (otherwise the engines have to work too hard to maintain cruising speed), and it may not be possible to hold altitude.

Cruise Performance:

Typical Cruise Speed	0.80 – 0.85 Mach @ FL280 - FL350
Max cruising speed	0.845 Mach (-8F) / 0.855 Mach (-8i)
Maximum Operating Speed (M_{MO})	0.90 Mach (365 kts)
Never Exceed Speed (M_{NO})	0.92 Mach



Descent

First you should determine the amount of altitude that you need to lose. A good rule of thumb is to multiply the number of thousands of feet that you need to lose by 3. So for example, if you are at FL310 and want to descend to FL040 (a typical altitude above the ground for the start of an ILS approach) that works out to 27,000 feet (31,000 minus 4,000). Thus, 27 x 3 = 81. So you need start your descent at 81 NM from the start of the approach (which you can estimate as roughly 12 or so miles from the runway threshold). An easy way to get the distance to the airport is by using the GPS, just like with any other X-Plane aircraft.

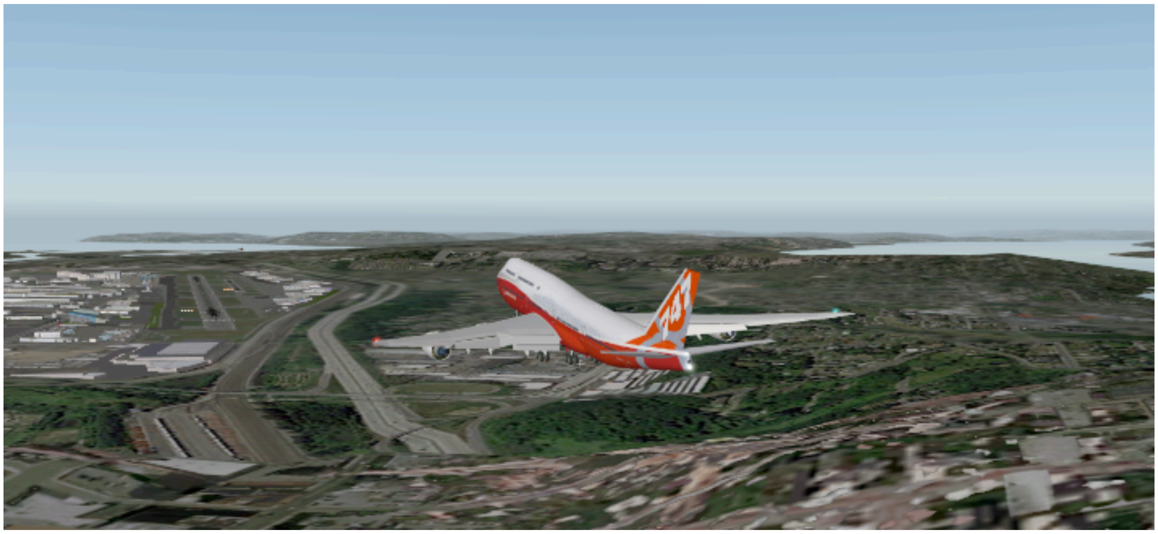
Because the aircraft is so aerodynamically clean, and the wing is swept and efficient, descent should be initiated by closing the throttles and pushing the yoke forward to achieve 340 knots and 3,000 feet per minute of descent. Or you can dial in the rate of descent and new target altitude into the autopilot, remembering to adjust the speed either manually or with autothrottle.

Before passing through 10,000 feet, you should reduce your speed to 250 knots to comply with typical speed limits below that altitude. Use speedbrakes if necessary, otherwise reduce your rate of descent and reduce the aircraft's speed by using pitch. All of these factors interplay with each other, and it takes some experience and finesse to get it right. Incidentally, this is common when transitioning to jets.

Below 10,000 ft the rate of descent can vary, but should be between 1,600 and 2,400 FPM depending on whether speedbrakes are used. Remember to adhere to flap limit speeds during the descent and bring in the flaps on schedule to slow you down and provide sufficient lift for the approach phase of the flight.

Here's a guideline for flap extensions under normal procedures.

250 kts:	(10,000 ft and below during descent): Flaps 1
220 kts:	Flaps 5
200 kts:	Flaps 10 (typically downwind/base)
180 kts:	Flaps 20 (early final)
170 kts:	Flaps 25 (glideslope capture, typically Flaps 25, then gear down)
Vref+5-10	(depending on wind): Flaps 30 (short final but after gear extension).



Approach

Once in the airport vicinity, and using an ILS for example, descend on the ILS glideslope at between 1,500 and 500 FPM (ideally 600 - 700 FPM), but in all cases following the needles. Then reduce the rate of descent at the runway threshold to between 400 and 200 FPM for a smooth touchdown.

Complete all checklists, including arming the speedbrakes. This is accomplished by bringing the handle down slightly, without engaging them. This will enable them to deploy automatically on landing to act as spoilers and help prevent any bounce of the aircraft by killing lift.

Approach Speed:

Note:

V_{SO} is the stall speed with full flaps and gear down
V_{S1} is the stall speed in the clean configuration

V_{REF} is calculated as V_{SO} x 1.3 and is specified for a particular flap setting (25 to 30 degrees). V_{REF} will be reduced when landing under MLW.

Range is from low to maximum operational landing weights, (450 - 757,000 lbs / 205 - 343,370 kgs) using Flaps 25. These values are for the Freighter, the Intercontinental passenger model has lower landing weight values.

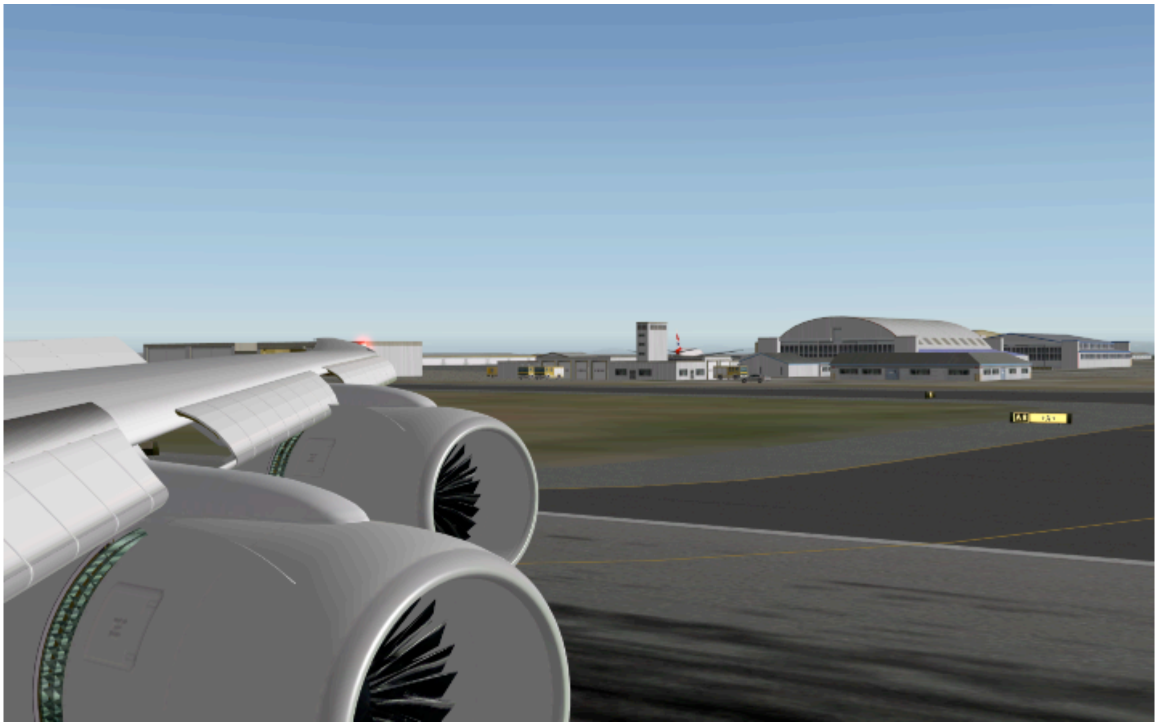
V Speed	Low Wt	Max Wt
V_{so}	112	152
V_{s1}	152	214

<u>Standard Approach</u>:

- Approach speed 150 - 180 kts
- Typical approach speed 153 kts
- V_{REF} 121 - 156 kts

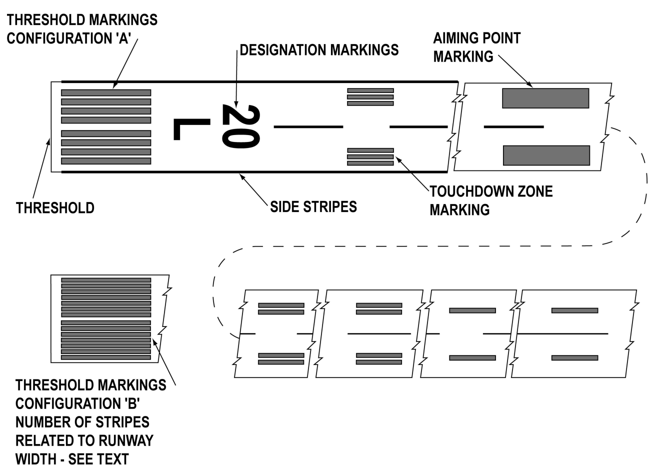
Range is from Low LW to MLW (450 - 757,000 lbs / 205 - 343,370 kgs), again, these values are slightly lower for the Intercontinental.

V_{REF}	Low Wt (kts)	MTOW (kts)
V_{REF25}	125	160
V_{REF30}	121	153

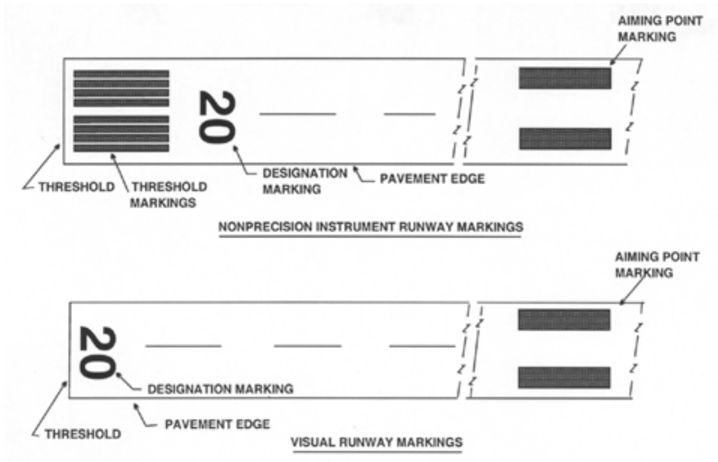


Landing

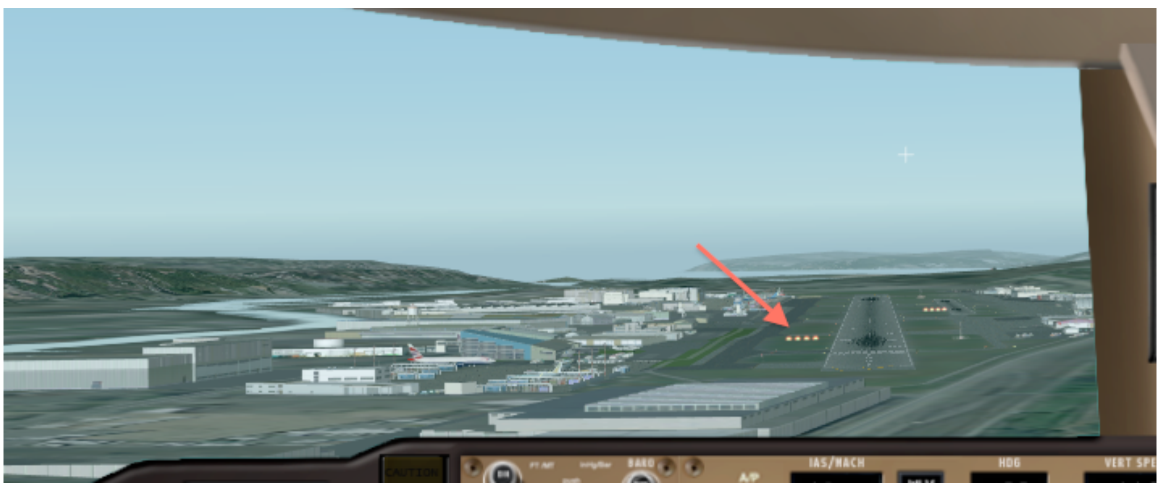
On finals to the runway, you should aim towards the far end of the aiming point markings on the runway. The markings should also appear fixed and not rising or descending as you approach on glideslope. Of course, of VASI or PAPI lights are available, use them because they are more accurate. See below for images of what these aiming point markings look like.[2]



[2] Taken from the FAA's Aeronautical Information Manual (AIM) at http://www.faa.gov/air_traffic/publications/atpubs/aim/



These are VASI lights as seen in X-Plane:



As you get closer to the runway threshold, things start happening faster. The rate at which the aircraft descends through the radar altimeter callouts of "100 - 50 - 40 - 30 - 20 -10" helps real 747 pilots because they can keep their eyes outside and use their hearing as another sense to measure their rate of descent. At 50 feet, the runway threshold should just be passing under the nose of the aircraft.

These callouts used to be made by the copilot (or pilot-not-flying), but on newer aircraft it is a computer-generated voice. You may be able to see this in action in videos shot in the cockpit of 747s that are available commercially and on the Internet. These callouts are also audible in the SSG 747-8.

At 10 feet, close the throttles, and if you have timed things right, the airplane should settle nicely on the 16 wheels of the main landing gear. This is a feature that makes 747 landings smoother than on some other large aircraft because they absorb a lot of energy. Engage the reverse thrust and use full reverse until you reach 80 knots, at which point disengage the reverse thrust and brake manually, or you can preset the autobrakes to do that for you.

Landing Field Lengths:

Flaps 25

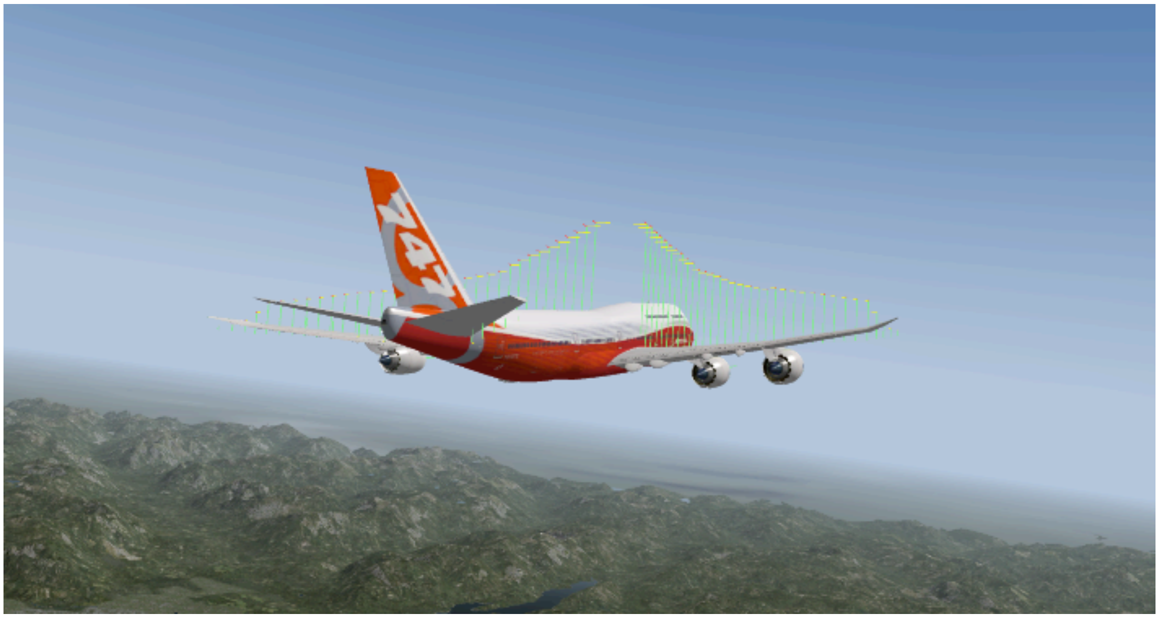
Minimum 5,000 ft (approximate value for dry runway at sea level)
Maximum 8,600 ft (approximate value for dry runway at sea level)

Autobrake Settings:

The following are the various deceleration values for the various autobrake settings. The “RTO” setting stands for “rejected takeoff” and applies maximum braking when throttles are closed to assist the pilot when aborting a takeoff.

Setting	Deceleration (Dist/Sec/Sec)
1	4 ft (1.2 M)
2	5 ft (1.5 M)
3	6 ft (1.8 M)
4	7.5 ft (2.3 M)
MAX AUTO	11 ft (3.4 M)

Once you have slowed down sufficiently, exit the runway and clean up the aircraft, accomplishing all checklists. Now you are back in taxi mode to go to the parking spot or gate.



Limitations

These are some of the more pertinent limitations for the 747-8 aircraft.

Flap Limit Speeds:

Flaps 1	-	285 kts
Flaps 5	-	265 kts
Flaps 10	-	245 kts
Flaps 25	-	210 kts
Flaps 30	-	185 kts

Gear Limit Speeds:

Retract	Extend	Extended
270 kts (Mach 0.82)	270 kts (Mach 0.82)	320 kts (Mach 0.82)

Sample Data Cards

These can be filled out with target speeds and flap retraction and deployment schedules as a convenient reference for flights operations.

747-8

wt	TAKE-OFF FLAPS __ DRY THRUST	
V_1		INITIAL CLIMB ATTITUDE **15°**
V_R		
V_2		
V_2 + 10		
V_{F5}		(V_2 + 10)
V_{F1}		(V_2 + 40)
V_{F0}		(V_2 + 65)
V_1 WIND ADJUSTMENTS		
ADD 1 KT PER 15 KT HEAD		
SUBT 4 KT PER 10 KT TAIL		

747-8

Landing	wt
V_{P1}	V_{REF} + 60
V_{P5}	V_{REF} + 40
V_{P10}	V_{REF} + 20
V_{P20}	V_{REF} + 10
V_{REF}	
V_{TH30}	
V_{GA} Min	

Sample Checklist

POWER UP

Battery	ON
Generators	ON
Inverters	ON
Avionics	ON
APU	START
Bleed Air	APU
APU Generator	ON
Nav Lights	ON

BEFORE START

Fuel Control Switches	CUTOFF
Throttles	VERIFY CLOSED
Fuel Quantity	CHECKED
Annunciators	TEST
Yaw Damper	ON
Performance Data	CHECKED AND SET
NAV Systems	SET
Altimeters	SET
Autopilot	SET
Seatbelt Sign	ON/AUTO
Beacon	ON
Fuel Pumps	ON
Parking Brake	ON

AFTER START

Bleed Air	BOTH
APU	OFF
APU Generator	OFF
Anti-Ice Systems	SET
Trim	SET
Autobrakes	RTO
Ground Equipment	REMOVED
Exterior Lights	SET

BEFORE TAKEOFF

Flaps	SET (10-20°)
Flight Controls	CHECKED
Take-off Data	CHECKED
Crew Briefing	COMPLETE
Cabin	READY AND ALERTED
Transponder	CODE & TA/RA
Exterior Lights	SET
Radar	SET
Takeoff Clearance	RECEIVED

AFTER TAKEOFF

Anti-Ice Systems	SET
Exterior Lights	SET
Gear	UP
Flaps	UP
Pressurization	SET

DESCENT

Terrain Clearance	CHECKED
Approach Briefing	COMPLETE
Seatbelt Sign	ON

APPROACH

Exterior Lights	SET
Descent Limit	….. ft SET
Landing Data	COMPLETE
NAV Systems	SET
Landing Data	SET
Autobrakes	SET
Speedbrakes	ARMED
Altimeters	SET

LANDING

Gear	DOWN & 3 GREEN
Cabin	ALERTED
Spoilers	ARMED
Flaps	SET (25-30°)

AFTER LANDING

Reverse Thrust	AS NEEDED THEN STOW
Exterior Lights	SET
Radar	OFF
Autobrakes	OFF
Speedbrake	DOWN
Flaps	UP
Transponder	STANDBY
Radar	OFF
APU	START
Pressurization	SET
Trim	SET

SHUTDOWN

Parking Brake	SET
APU Generator	ON
Fuel Control Switches	CUTOFF
Fuel Pumps	OFF
Anti-Ice Systems	OFF
Flight Directors	OFF
Exterior Lights	SET
Seatbelt Sign	OFF
Yaw Damper	OFF
Generators	OFF
Bleed Air	APU

TERMINATION

Electrical System	SET
APU	OFF
Bleed Air	OFF
APU Generator	OFF
Avionics	OFF
Nav Light	OFF
Battery	OFF
Inverters	OFF
Parking Brake	OFF

Recommended Reading

The following books are references that SSG recommends in order help you when learning to fly the SSG 747-8 in X-Plane.

- Davies, D.P., *“Handling the Big Jets”,* U.K. Civil Aviation Authority, 2004

- Stewart, Stanley, *“Flying the Big Jets”,* Airlife Publishing (particularly the 3rd edition that focuses on the 747-400 and was published in 1992. It is often available at on-line auction sites)

- Ray, Mike, *“The Unofficial Boeing 747-400 Simulator and Checkride Procedures Manual”*, University of Temecula Press, 2009 (also available on line as a PDF file at http://www.utem.com/)