

LATAM B787-9 AIRCRAFT CABIN PHOTO-RECON & METROLOGY INSPECTION PREFLIGHT & POST-FLIGHT MADRID->FRANKFURT AUG 01, 2018

(updated: 05 Sep 2018)

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On 01 August 2018, John Beattie and I conducted a photo reconnaissance and metrology inspection of a LATAM Airlines B787-9 aircraft identical to the charter aircraft to be used for our EFLIGHT 2019-MAX. We thank LATAM for the opportunity, and in particular Sr. Ortiz, station manager at the Madrid Airport, Mr. Arroyo the charter sales representative in the USA, and a very cooperative and friendly flight crew (who now would eagerly fly our intercept [see our scenario chart clipped to the pilot's yoke]) that gave us unimpeded access to the aircraft interior for this purpose while empty of any later boarding passengers.



First, however, let me say that looking out and up though those huge and tilted PAX windows at our mid-eclipse intercept 50 deg solar elevation angle will be no problem. When we did the photo-recon, the aircraft was parked so the Sun was very nearly “straight out” the PAX windows, and the altitude of the Sun was 63 deg above the horizon. This was no problem at all to see even ~ 15 degrees higher than that before encountering the top of the window frame along the line of sight! This is hard to believe until seen with your own eyes.

The information, with photos, given here are intended to augment some of the details that are already provided on my website at:

http://nicmosis.as.arizona.edu:8000/ECLIPSE_WEB/TSE2019/TSE2019_EFLIGHTMAX.html
with T.E.I. seat/row information linked therein that should be consulted as in concert.

The photos in this PDF file are only a (most informative) subset of a larger number taken. If you have specific questions, in particular about specific seat rows or windows, please let me know as I may have additional photos that might help in answering.

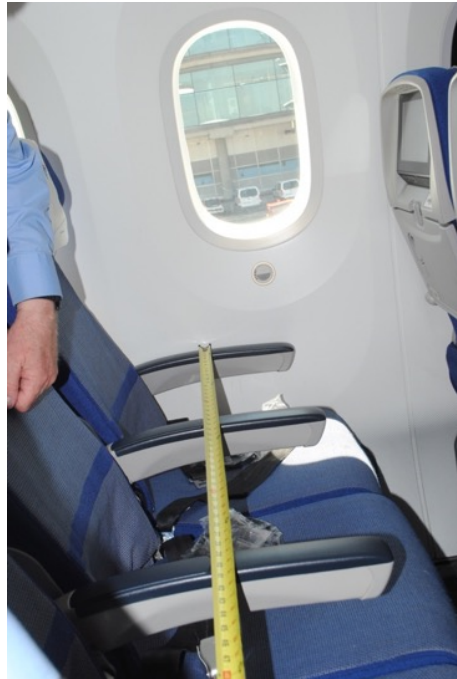
MAIN CABIN SEATING AND SPACE COMMON TO ALL ROWS/SEATS



All main cabin seats are 17.3" wide with armrests on both sides that are ~ 1-3/4" wide. The armrests between the window/middle and middle/aisle seats can lift up and tuck out of the way between the seat backs (not shown here).



The main cabin seat backs are 33 inches tall measured from the top of the seat cushion. The low point of the bottom of the overhead carryon storage bins are 46 inches above the floor.



The seat-row bench (3-side-by-side except row 43 which is 2-side-by-side) is 59-1/4" in length from the outside of the non-retractable arm rest on the left side of seat A to the non-retractable arm rest on the left side of seat C. There is a 1-1/4" to 1-3/4" gap between the left (seat A) side arm rest and the fuselage wall.



The seat cushion tops are 18" above the floor. The seat cushion bottoms are 13.5" above the floor.



The seat cushions are easily removable and reattached – held in place only by Velcro.

The top of the seat itself (with cushion removed) is ~ 14-3/4" inches above the floor.

N.B. There is some storage space, shared with inflatable life preservers, below the seats. Abundant storage space is provided in large overhead storage bins (see photo on page 43).

MAIN CABIN HEADRESTS & EAR FLAPS

In the main cabin, the headrests can move up about 3", and also include adjustable "ear flaps" that can be bent forward to provide additional room to look "back" out the seat-adjacent windows to provide a better view of the approaching lunar shadow. This in addition to tilting a seat back if permitted in a given row per the seating chart booking information:

http://www.teitim.ipage.com/Documents/Seats_Photos_current.pdf



ROW-BY-ROW MAIN CABIN SEAT-ROW PHOTOS FROM BACK TO FRONT

ROW 43



Row 43, which is the last row in the aircraft with the rear cabin bulkhead behind, is unique in that it has only two seats (A and B). There is an air gap of appx 13-inches between the fuselage wall and the left side of the seat-A arm rest, and larger spacing from window to seat.



ROW 42



ROW 41 HAS NO WINDOW AND IS NOT OFFERED

ROW 40



ROW 39



ROW 38





ROW 36





ROW 34



ROW 33





ROW 31



ROW 30 – HAS NO WINDOWS
ROW 29 – THERE IS NO ROW 29

ROW 28 (last row in front section of main cabin)

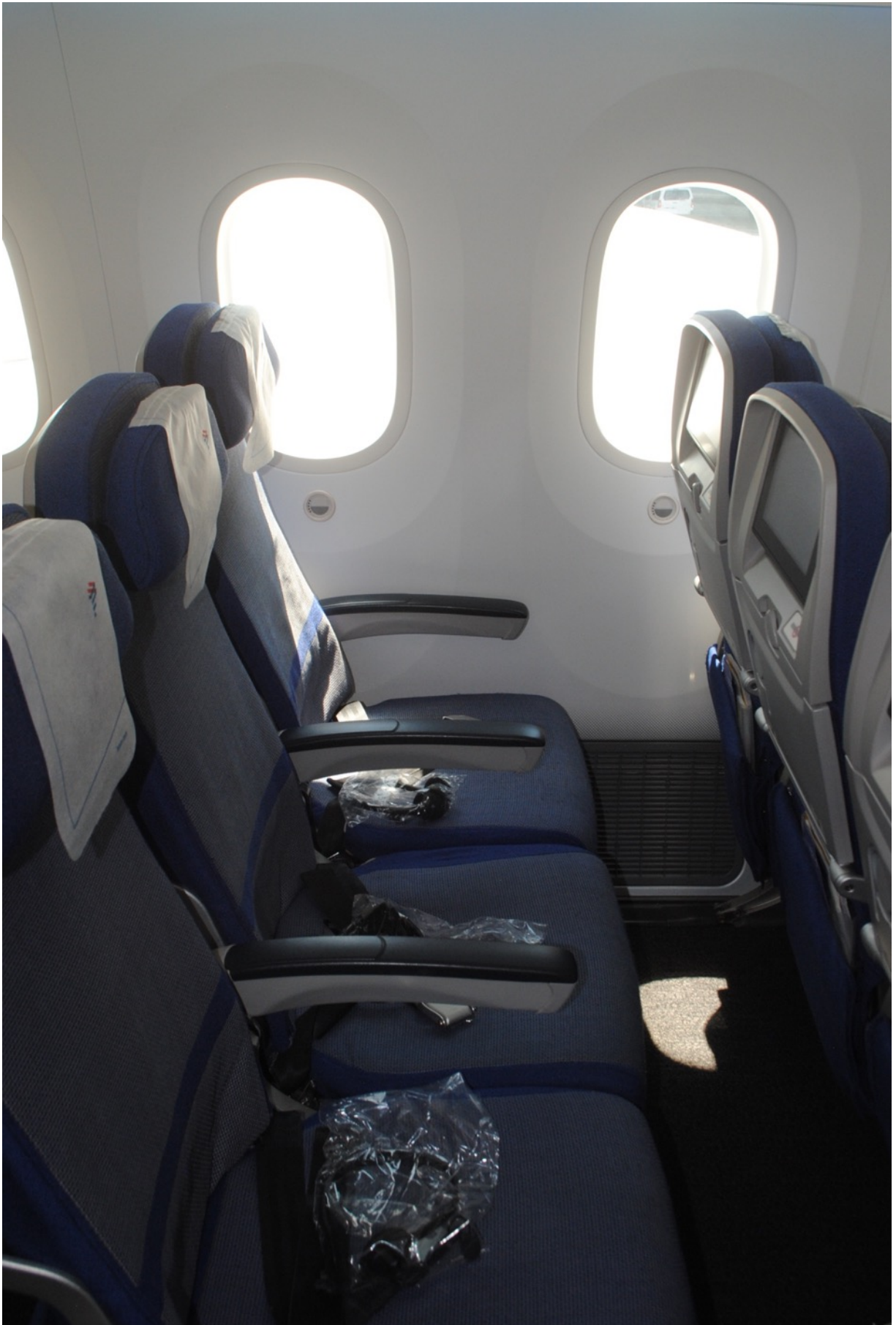


ROW 27









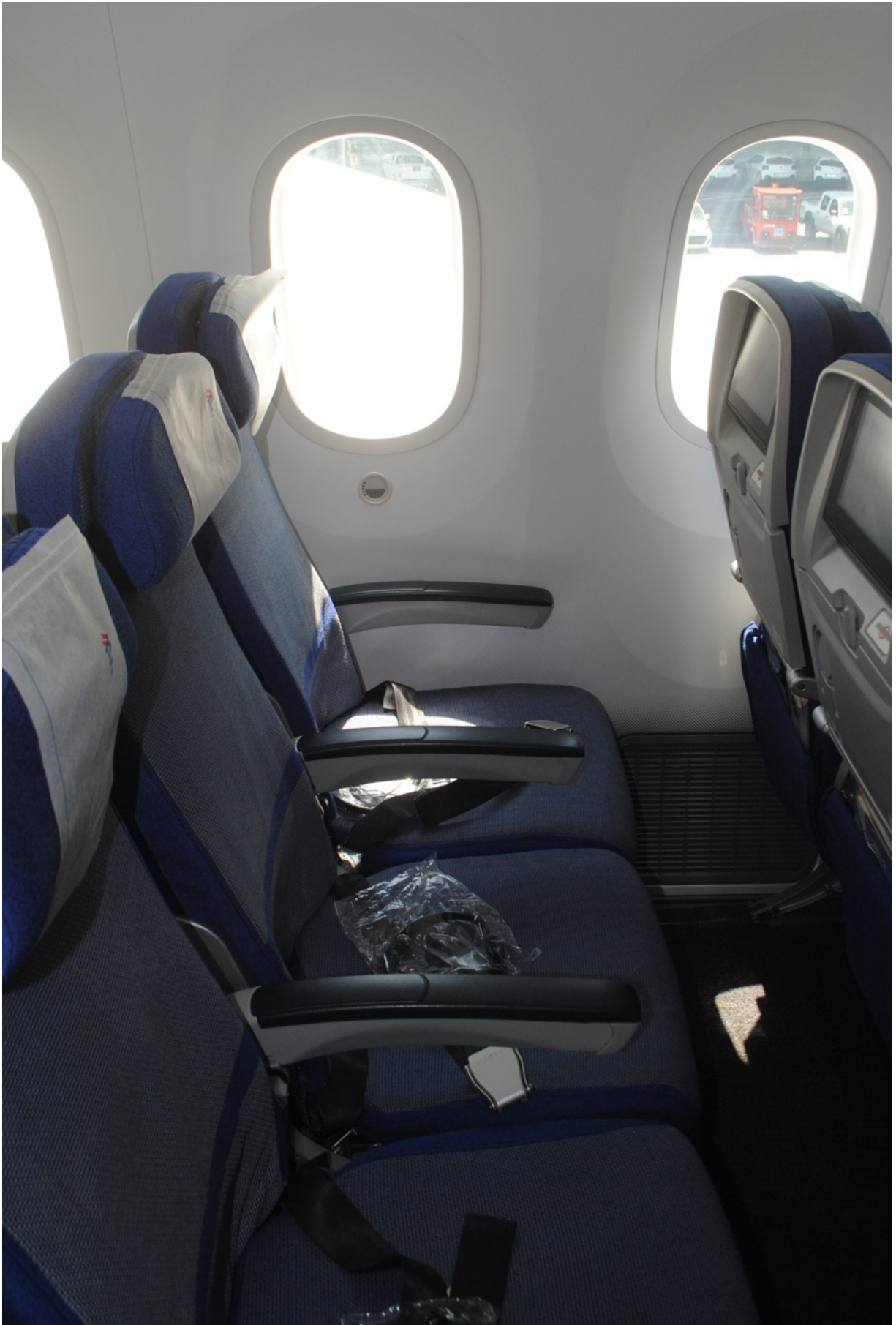
ROW 23



ROW 22



ROW 21







METROLOGY – ROW 19 to ROW 18 (Standard Economy) row spacing



Seatback headrest cushion pillow front (19) to pillow front (18) distance 32-inches



Standard economy “leg” room (seat cushion to seat-back pouch spacing)





ROW # 16





ROW #14



ROW # 13



ROW # 12



BIZ CLASS SEATS AND SEATING AREA

Each business class row area has two seats (A [window] and B [aisle]) and, EXCEPT for row #4, three windows. In each row, the windows are designated: Z (rearmost, next to the seat), Y (middle), X (front most). Row 4 has no “X” window. The layout of the seating and floor areas of these 4 rows are identical. Row #1 is a little different as at its forward end is the business cabin bulkhead, and its area is ~ 3-1/2” shorter than rows 2-5 as shown on page 39. Here is a view of a whole business section row area. This particular photo is actually for row #2. The tape measure shows the distance between the front of the row #2 head-rest cushion in the full upright position and the seat-back of row #1 – which is 65 inches. The full distance from seatback to seatback is 75 inches (except row 1 which is 71.5 inches).



The locations of the three windows to the individual seating areas vary a bit from row to row, and will also be shown for each row. Here is a supplemental photo that shows for row #2 the specific location of its X window with respect to the Row 1 seat back...



BUSINESS SECTION SEATS.

The business seat-A armrest abuts the fuselage wall as shown below. On the right side of the seat is a non-removable 33-inch long structure next to the seat from which a tray table can deploy with forward of that a flat area (normally) for seating drinks and snack (or tools and electronics). The photos here show the business seats in a full upright position where then the top of the seat cushion is 19-inches above the floor. The seat can fully recline flat, and when done so rides forward with a deployable mid-section that joins the top level of the footrests.



The business section seat cushions are also removable. If removed this exposes a flat frame surface behind a front positioning bar which is 15 inches above the cabin floor.



COMMON X & Y WINDOW FLOOR SPACE AHEAD OF X-WINDOW FOOT RESTS

In rows 2-5, the cabin floor space (not including the footrest area) from the front of the vertical section of the fully upright business class seat below the front of the seat cushion to the front of the footrest is 30.5 inches. This is shorter in row 1 where it is appx 27 inches.



Above: Rows 2 – 5. Below: Row 1.



BUSINESS SECTION FOOTRESTS (STOOLS) AND “X” WINDOWS

Here is what footstools look like in the front of rows 1-5, with the “storage areas” below.



The magenta-red cover is velcroed on. It is easily removable, revealing a split, hinged, top surface of which more than half can be flipped up so is then mostly out of the way:



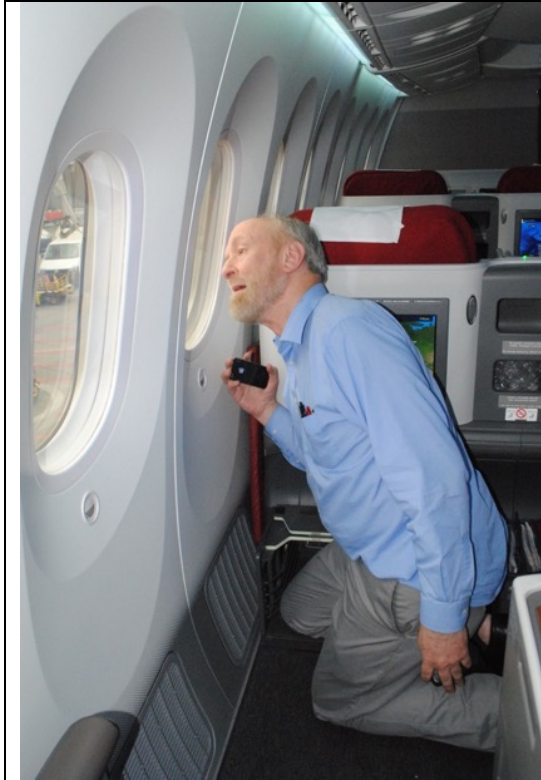
Here that is being folded up:



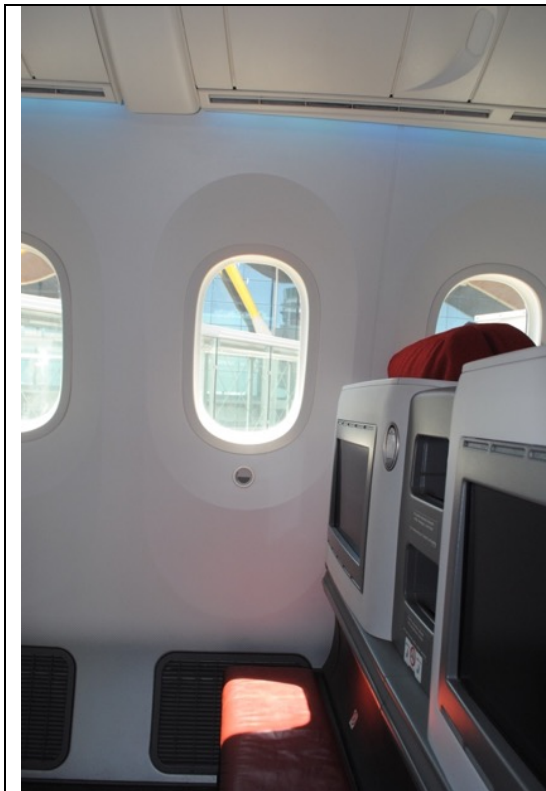
Here then is that space relative to the Y (middle window) and X windows in row 1 (left) and row 2 (right):



As a “Test” here is John Beattie, quite tall fellow, as he might hunker him/herself into that space for eclipse viewing with that photo taken looking forward from the seated position in seat 3A. (I wish I had caught John looking up, rather than to the left, but you can “get the picture”).



In this configuration, we found one person at the Y window and one person in the X window quite doable (though we did not get a photo of that). It is also possible, depending on the person size, to use the footrests in the flat, unfolded, top position and put a right derrière cheek on that:



OVERHEAD STORAGE SPACE AND OVERHEAD BIN UTILITY

In both the Main and Business section cabins, there is plenty of storage space for eclipse-chaser carry-ons in the very large overhead bins. I did not get a measure of this, but you can judge from the photo below. The bottom of the bins when opened are very flat and nearly horizontal, and could be used to hold computers or other ancillary equipment as a working “shelf” to provide additional working area. Of course the storage bins above the middle section and anti-sun side seats can also be used for storage.



ELECTRICITY

Both 110VAC/60Hz and USB power is provided in every passenger row – two sockets per row. If you need more than one power outlet, then either bring a “splitter” or extension cord to plug into another seat distribution point – but avoid running power cables that someone could trip over (i.e., tape down with duct tape or gaffers tape appropriately). The power sockets in the econ section are located on the seat backs of the row in front of your seat. In the business cabin, they are located next to your own seat back. The AC power sockets themselves accommodate U.S., European, and UK style power plugs (but note in all cases deliver only 110 VAC/60 Hz, **NOT** 220 VAC/50 Hz). The sockets are shown below, along with a photo of John Beattie using one to power a 75 Watt flood lamp*. Note: I have found that if you plug in a heavy, and off-center-balanced power supply charger (like an Apple MacBook Pro charger) with its short stubby power plug, it will likely fall out of the vertically mounted socket due to its own off-center weight. So if you will be using a modular power supply like that, bring an extension cord.



***PRO-ACTIVE WINDOW FROST MITIGATION**

Note: Window frost formation within the redesigned B787-9 window cavity is unlikely. We none-the-less will have several 75-Watt flood lamps on board our EFLIGHT 2019-MAX -- “just in case”. Window frost dissipation with such lamps is accomplished with their **radiant** (not convective or conductive) heat. We first demonstrated the effectiveness of this approach on our ex-Tahiti EFLIGHT flight in 2010. Such lamps were available for use on our ex-Billund 2015 eclipse flight (but were not needed). We have further tested this on other non-eclipse flights since then. We have found this steady radiant heat injection works somewhat slowly, but indeed steadily creates a sizable clean, clear, and expanding hole in such frost, dissipating the frost within a period of about 10-15 minutes. (By contrast we have found that **convective** heat

sources such as hair dryers are not effective in combatting frost formation on the inner window surfaces). In any event, while we conservatively will carry these lamps onboard, we expect doing so will be purely academic. On this Madrid-to-Frankfurt B787-9 inspection flight we only found only one left-side window which, while we were on the ground only, had a small amount of condensation moisture (not frost) which fully disappeared on its own soon after takeoff. We anticipate in all likelihood a similar set of clear left-side windows ex-Easter Island for EFLIGHT 2019-MAX... but if frost should develop on any of the windows, we'll be well prepared to dispose of it.



NOTES ON THE WINDOWS THEMSELVES: SIZE & LOOK-UP ANGLE

The windows really are HUGE (tall). 47cm x 27 cm. It is hard to really “get” this until looking out of one of them. It is hard to get a sense just looking at a photo of a window, so here is one, and then with my hand for comparison.



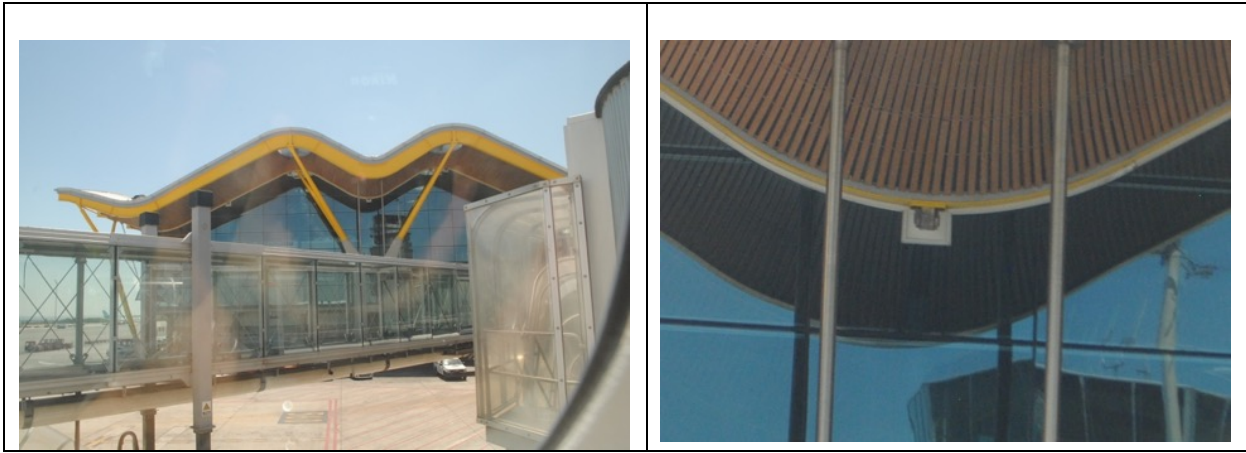
There is absolutely no problem looking “up” through these windows at our totality solar elevation angle of 50 deg. We tested this with the Sun nearly straight out the windows at 63 deg, and had plenty of unobscured space above even that – and confirmed the windows are tilted at the top toward the cabin interior by 16 deg.



NOTES ON THE WINDOWS THEMSELVES: SURFACE QUALITY

Visually the window quality seemed excellent, but I did not have an opportunity to photograph the Sun itself through the windows. I did however take some photos through the windows. I did not have a “long” lens but only a 24 – 55 mm EFL zoom used at the 55 mm EFL. The camera has only a 10 Mpix sensor, so is not very “high res” and in zoomed in display the image quality is limited by the pixilation of the sensor and not the quality of the windows.





NOTES ON THE WINDOWS THEMSELVES: SUCTION CUP CAMERA MOUNTS

If you are considering the use of a vacuum suction cup to affixed to the aircraft window to hold a camera (up to a reasonable weight of course) I found the plastic window cover should mechanically work fine. I found the B787-9 transparent window covers, however, a bit thinner and slightly more flexible than on prior aircraft and I could feel very low amplitude high-frequency mechanical vibrations transmitted to their surfaces due to the engines in flight. This likely would be mostly damped by a rubber or silicon suction cup itself, but I would suggest if possible to use a vibration reduction or image stabilized lens.

Related: If you are considering placing such a camera-mount suction cup on the cabin wall beyond the window-frame bezel that is a more ridged surface. However, the wall itself is not smooth like the window pane itself, but is very lightly stippled (textured). See photos of the wall around the window frame (zoom in with a PDF viewer). The stippling is very shallow, but may be enough to prevent a good vacuum seal. For that I suggest the use of a vacuum grease, e.g.:

<https://www.skygeek.com/dow-corning-976v-high-vacuum-grease-silicone-5-3-oz.html>

<https://www.amazon.com/Corning-High-Vacuum-Grease-Lubricant/dp/B00CLGS92M>

