

----- Original Message -----

From: [Conrad Wolff](#)

To: [Conrad Wolff](#)

Sent: Thursday, December 31, 2009 7:14 PM

Subject: Beneath Paris at 30 West

Dear Family and Friends,

A few shots of our company Airbus 330 flight from Paris (identical aircraft to the one we were flying) as we crossed 30 degrees west (mid Atlantic) on our way back from Rome this afternoon on North Atlantic Track F.

The Paris flight was 2,000 feet above. They were flying mach .81 while we were assigned mach .82 on the track and slowly overtook and passed directly beneath them. They landed right behind us in PHL 5 hours later.

It made for a great photo op.

Enjoy,
cw





----- Original Message -----

From: [Conrad Wolff](#)

To: [Conrad Wolff](#)

Sent: Saturday, January 02, 2010 6:33 AM

Subject: RE: Beneath Paris at 30 West

Dear Family and Friends,

After sending out the three photos of the Paris aircraft above us at 30 West on Thursday, I received the following reply:

GREAT photos! I forwarded them on, with a note saying that Jack was explaining mach .81 and .82 to me, and got this reply back from one of the former pilots:

Mach 1.0 is the speed of sound. To further confuse you, it isn't constant. It varies with temperature and altitude. Those planes were flying at 81% and 82% of the speed of sound at that altitude. The difference of 1% equates to about 6 1/2 miles per hour; or a brisk walk.

I wrote back to say that 3 miles per hour was MY idea of a brisk walk!

Thanks again <3

This is a great explanation and I think worth expanding upon because in the midst of taking those airplane photos, I also just happened to snap one shot of the Instrument Display panel. It was the only attempt I made and it came out rather blurry. But if you pretend it is New Years morning and squint a little, there is a lot of good info here.

The Display on the left is the Navigation Display **ND** and the one on the right is the Primary Flight Display **PFD**. I have also copied and further enlarged the **ND**.

There are 4 measures of speed which we routinely use. IAS (indicated airspeed), Mach (percentage of the speed of sound), GS (ground speed) and TAS (true airspeed).

In the top left of the **ND** you are able to see that when I took those pictures of the other aircraft, our Ground Speed (GS) was 486 knots and True Air Speed (TAS) was 478 knots. The difference between the two is the result of wind which in this case, you can see in the top left of the **ND**, was blowing from 019 degrees at 40 knots and also depicted with a green reference arrow which shows the wind blowing us right to left with a very small quartering tail wind component, which in this case is 8 knots of tail wind (486 GS minus 478 TAS). Actually a little unusual to have a tailwind and not to have a significant headwind coming west across the tracks.

On the left side of the **PFD** you can see that our indicated airspeed (IAS) is about 274 knots, as shown by the yellow horizontal bar on the grey speed tape. Indicated airspeed (IAS) is the speed measured by the pitot tubes attached to the outside of the aircraft, (ie actual air molecules passing the plane). Since the air is so much thinner at high altitude there are less molecules going through the pitot tubes. The "thinner" air fools the gauges into thinking the aircraft is traveling slower, only 274 knots in this case. The computers use temperature and altitude to convert the indicated airspeed (IAS) to true airspeed (TAS) and thus the name "True".

Because of the inaccuracy of indicated airspeed (IAS) and the great difference between IAS (derived from actual molecule data) and TAS (computer generated data) at high altitudes, we generally use Mach for our speed reference when flying above 25,000 feet. Below the IAS tape

in the lower left corner of the **PFD**, you can see that our actual Mach is .822 (slightly above our assigned speed of Mach .82).

The explanation in the above e-mail reply is excellent. Mach .82 is 82% of the speed of sound. So 478 knots is 82% of the speed of sound of 581 knots at this altitude and temperature. To convert knots to MPH multiply by 1.15. So our actual airspeed in MPH is 550 mph and the speed of sound in MPH is 668 mph at this temperature and altitude. (the mach .01 difference between the speeds of the two aircraft would be 1% of 668 mph or 6.68 MPH, the rate at which we passed the other aircraft). I have to say, I am really impressed with the simplicity and clarity of the e-mail reply explanation above.

Of course if we were to exceed Mach 1.0, we would break the sound barrier and that is a whole new discussion - Also, at sea level the speed of sound is closer to 760 mph.

On the right side of the **PFD** you can see the grey altitude tape and digital readout showing our altitude is 36,000 ft. At the top of the **ND** and the bottom of the **PFD** you can see that our heading is 286 degrees. (270 degrees is due west).

Some additional information displayed on the **ND**:

The green line is our cleared route of flight on Track F.

The yellow symbol at the bottom of the **ND** screen is representative of our aircraft. We are passing ETP01 (green diamond) just under the front of the aircraft symbol. Before the first white dotted mileage ring is the white (diamond) fix 5230N and between the second and third mileage rings is the green (diamond) ETP02 fix.

The white fix 5230N is Latitude 52 degrees North and Longitude 030 degrees West. That is just about half way across the Atlantic.

ETP is equal time point. ETP 01 on this flight is the equal time point between Shannon, Ireland and Keflavik, Iceland. The lower blue dashed line from ETP01 points back to Shannon and the other blue line from ETP01 points to north to Keflavik. Generally, if we had to make an emergency divert prior to ETP01 we would go back to Shannon and after ETP01 we would go to Keflavik, Iceland.

ETP 02 in this case is the equal time point between Keflavik and Gander, Newfoundland. The first dashed blue line from ETP02 points to Keflavik and the second to Gander. Generally between ETP01 and ETP02 an emergency divert would be to Keflavik and after ETP02 it would be to Gander.

In the top right of the **ND** you can see that the fix 5230N (where we cross longitude 30 degrees West) is 28 nautical miles ahead of us.

And finally, on the **ND** sitting right on the nose of our yellow aircraft symbol you see a white marker with +20 next to it. THAT is the symbol for the Paris aircraft 2,000 feet above.

I hope you have found this informative and/or interesting.

cw

PS Thank you Lynn!

ND

PFD



ND



