AFVA Aircraft Operations Manual (AOM) Standards

First Edition

7 August 2011

Contents

Welcome

Welcome to the Air France Virtual Airlines Aircraft Operating Manual (AOM) for the B707.

This AOM is based upon the DVA Fleet Installer airplane. We are always seeking to improve the accuracy of this AOM.

Should you have questions about the specifics of this airplane, this manual or aviation in general, you should create a helpdesk issue at our website, www.afva.net that states your question and we will do our best to answer your questions.

If you would like to receive virtual flight training that is modelled after real world training, go to the Pilot Center on our website, www.afva.net where you can sign up for flight instruction in the AFVA Virtual Flight Academy.

This AOM is not designed for beginners of Flight Simulation as well as the B707 is not. The AOM explains the handling of our B707 not how simulation flying works and we assume the pilot knows how to fly an airliner with all the necessary procedures.

History and Overview

History of the B707:

The Boeing 707, developed in the early 1950s, is a narrow-body four engine jet-aircraft. The first airline to operate the B707 was Pan American World Airways with the first commercial flight on October 26, 1958 with the B707-120.

The following and more modern version was the longer B707-320.
A second type in development was the B707-020 for short- and medium-range operations. This "smaller sister" of the B707 was significant different from the original B707 and by this the result was a complete new aircraft called B720.

The B707 was produced until 1979 and operated by most airlines in the world for domestic as well as for intercontinental flights.

Nowadays it is no longer operated in commercial aviation, but is still used for military purposes as a KC-135 (air tanker) or as an E3A in AWACS missions as well as for military transports in several variants.

In total Boeing delivered 1011 aircrafts including the B720 and the military versions.

During the 1960s and 70s the B707 was a synonym for jet-airliners and with it the jet era was established.

Variants of the B707:

- B707-020 was a smaller B707 for small- and medium-range. It was equipped with 4 Pratt-&-Whitney-JT3D-1-Turbofans with a thrust of 75,6 kN. The first flight was on November 23, 1959. Later this aircraft was on the market as a separate type, the B720.

- B707-120 was the first B707. This type was not enabled for transatlantic flights and needed refuelling stops on its way between North America and Europe and had a capacity of 179 passengers.

-B707-120B was an improved version of the -120 with P&W JT3D-1 turbofans.

-B707-320 with the additional name "Intercontinental" was a longer version of the B707-120 with 4 P&W JT4A-3 turbofans for intercontinental and transoceanic flights. The first delivery was on July 19, 1959. This variant caused the "legend" of the B707.

In the history of this plane there were some more small variations, which are not mentioned here.

Additional information:

As one of the first and without doubts the most used Jetliner in that era, the B707 raised the prestige of every airline, as well as it is the pride of AFVA's historical program.
The B707 could be seen in every part of the world; in New York, Tokyo or Sydney as well as in Abidjan, Barbados, or Nadi.

One of the most amazing flights with the B707 was the daily Pan American Flight from Los Angeles (KLAX) to New York (KJFK) in 1973 ... westbound! The Routing was Los Angeles - Honolulu - Tokyo - Hong-Kong - Bangkok - Delhi - Karachi - Tehran - Beirut - Istanbul - Frankfurt - London - New York.

Flights with the B707 were a real challenge to the pilots and the flight-engineer because it was not equipped with an FMC, RNAV or GPS. The complete flights must be planned exactly concerning route, timing and fuel. In flight simulation models the challenge is the same.

The means of navigation were charts, maps, compasses radio-navigation, INS and a Doppler-radar system.

Specifications

	720 (707-020)	707-120B	707-320B
Cockpit crew	3		
Passengers	140	110 (2 class) 179 (1 class)	147 (2 class) 202 (1 class)
Length	136 ft 2 in (41.25 m)	145 ft 1 in (44.07 m)	152 ft 11 in (46.61 m)
Wingspan	130 ft 10 in (39.90 m)		145 ft 9 in (44.42 m)
Tail height	41 ft 7 in (12.65 m)	42 ft 5 in (12.93 m)	
Maximum Takeoff Weight (MTOW)	222,000 lb (100,800 kg)	257,000 lb (116,570 kg)	333,600 lb (151,320 kg)
Empty weight	103,145 lb (46,785 kg)	122,533 lb (55,580 kg)	146,400 lb (66,406 kg)
Runway needed at MTOW	8,300 ft (2,515 m)	11,000 ft (3,330 m)	10,840 ft (3,280 m)
Fuel Capacity	16,060 US gal (60,900 l)	17,330 US gal (65,590 l)	23,820 US gal (90,160 l)
Landing run	5,750 ft (1,740 m)	6,200 ft (1,875 m)	5,950 ft (1,813 m)

Operating range (Max Payload)	3,680 nmi (6,820 km)		3,735 nmi (6,920 km)
Range at MTOW	3800 nmi (7,040 km)	4,700 nmi (8,704 km)	5,750 nmi (10,650 km)
Cruising speed	540 kn (1000 km/h)		525 kn (972 km/h)
Fuselage width	12 ft 4 in (3.76 m)		
Powerplants (4 x)	Pratt & Whitney JT3C-7: 12,000 lbf (53.3 kN)	Pratt & Whitney JT3D-1: 17,000 lbf (75.6 kN)	PW JT3D-3: 18,000 lbf (80 kN) PW JT3D-7: 19,000 lbf (84.4 kN)

Source: "*Boeing 707 aircraft caracteristics*" (The Boeing company commercial airplane division)

Cockpit Checkout

For the further use of this AOM, we have to respect the long period of construction an delivery of the B707. In this approximately 50 years, many changes, developments and innovation accompanied the way of the B707. For this reason the AOM may differ from some models.
This AOM describes the functions of the B707 almost for the AFVA fleet-aircraft.

A deeper description of the avionics equipment will be omitted in this AOM. The knowledge of those components are explained in other AFVA-documents.

The Boeing 707 has a 3-crew-cockpit. The crew consists of:

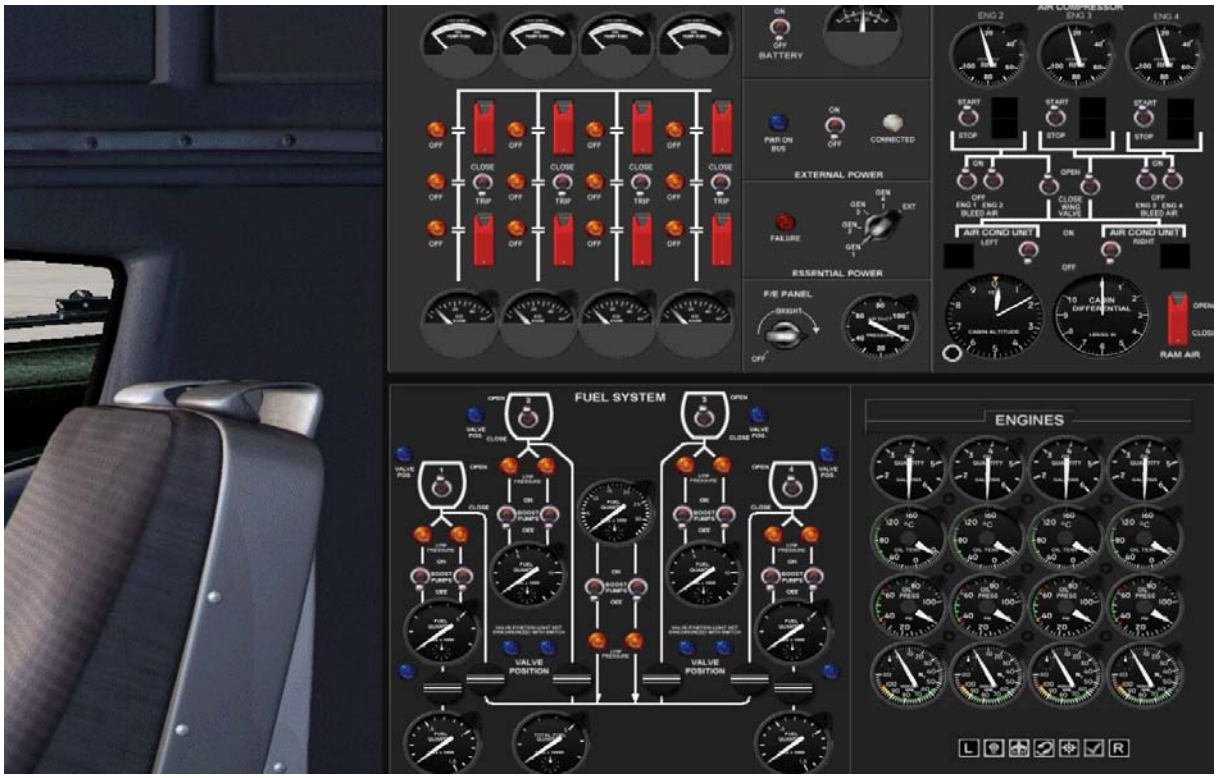
- Captain
- First officer
- Flight engineer

For this reason the B707 has three main panels:

The captain's panel:

The first officer's panel:

The flight engineer's panel:



For the captain's and first officer's use

The pedestal with the autopilot-panel:

The overhead-panel:

Description of the Captain's panel:

C-group instruments: (for the captain's use only):

C01 Airspeed indicator

- Pointer for the IAS (white)
- Pointer for max-speed VMO (green/white)
- Speed-bug
  The speed-bug is just an indication. It is not for adjusting the ATHR
  Please note: The B707 doesn't have a ATHR-function
- Speed-bug selector

C02 Turn indicator

- The TI is a spin and gravity controlled instrument and indicates the direction of turns or the appearance of slips

C03 MACH-indicator

- Indicates the MACH number between MACH 0.3 and MACH 1.0

C04 Master warning indicator

- Illuminates if a warning is detected

C05 Horizon flight director (HFD) consisting of

- Giro flag warning (a red flag labelled as "G")
- Bank angle indicator (on the upper circumference) with the roll indicator
- Pitch scale indicating the pitch in degrees (in the center)
- Flight director (FD) warning flag (labelled as "FD")
- Pitch command bar, controlled by the selected device (FD, GS)
- Attitude sphere, indicates the attitude of the plane relatively to the horizon
- Turn indicator (see C02)
- Localizer indicator (located at the bottom of this instrument)
- Localizer indicator warning flag (Labelled as "LOC")
- Horizon line, Symbolizes the horizon (The amber line in the centre of the instrument)
- Roll command bar, controlled by the selected device (FD, GS)
- Relative speed indicator:
  -indicates the speed deviation from the speed bug in the airspeed indicator (see C01).
  -located on the left side of the instrument
- Relative speed indicator warning flag. (Labelled as "FS")
- Glide slope indicator (GS) on the right side of the instrument
- Glide slope warning flag. (Labelled as "GS")

C06 Magnetic heading deviation indicator (MHDI)

This is the main instrument for lateral navigation because the B707 doesn't have a FMC

The heading group (Amber coloured):

- Heading bug at the circumference of the scale shows the preset heading
- Heading selector knob controls the heading bug (Lower right corner)

The VOR group (White coloured)

- Course counter (Left upper corner) shows the selected radial for VOR 1
- Course cursor, shows the selected radial for VOR1 graphically
- Navigation warning flag (Labelled as NAV)
- DME indicator (Right upper corner) shows the distance to VOR1 in nm
- Glide slope deviation bar (right side of the instrument)
- Glide slope indication warning flag (Labelled as GS)

- Course deviation bar indicates course deviation
- Course selector for adjusting the required VOR radial
- Course deviation scale (Horizontal scale in the center)
- TO/FROM indicator, the arrow extending the course deviation bar

C07 Ground proximity warning signal (GPWS)

- Creates an acoustic signal in case of ground proximity

C08 Barometric altimeter

- 100 ft pointer, the center rotating hand
- Altitude numerical counter, the lager window in the upper half of the instrument
- Altimeter setting windows, left in millibars and right in inches/Hg
- Barometric setting knob in the left lower corner

C09 Radio magnetic indicator (RMI)

- The RMI provides the radio and magnetic bearing for the VOR and ADF indication
- The dashed pointer indicates the bearing of the VOR1 or ADF, depending on its selection
- The double lined pointer indicates the bearing of the VOR1 or ADF, depending on its selection
- With the left selector knob the pilot can select the indication between VOR1 or ADF
- With the right selector knob the pilot can select the indication between VOR2 or ADF

C10 DME indication for VOR2

- The DME for VOR1 is indicated in the MHDI (C06)

C11 Pneumatic brake lever

C12 Instantaneous vertical speed indicator (IVSI)

- Indicates the vertical speed in 1000 ft/min
- Below 0 indicates a sink rate
- Above 0 indicates a climb rate

C13 Boardclock

- The hands indicate the set local time in hours and minutes
- Hours adjust knob (Left lower corner)
- Minutes adjust knob (Right lower corner)

C14 Radio altimeter

The radio altimeter indicates the height above the ground in feet

- Decision height selector knob for adjusting the decision height
- Radio altimeter warning flag covering the lower height indication if the altimeter is inoperable

C15 Flight director panel

- Flight director indication light indicates the FD is active
- The flight director switch activates the flight director
- The indication of the flight director is displayed on the HFD (See C05)

C16 Icing indication

C17 True airspeed indicator (TAS)

- It indicates the true airspeed

Brief introduction into IAS and TAS

The airspeed is measured by the air pressure in a device called the "Pitot-Tube"
With increasing altitude the surrounding pressure decreases. This results in a decreasing indicated airspeed (IAS)
The true airspeed indicator does a barometric calculation with the altitude and the IAS which results in the TAS (true airspeed)

C18 Spare horizon flight director

- The spare HFD(See C05)

Airliners are to have at least two, but three are preferred. One is placed in the Captain's panel, one in the FO's panel, and the spare HFD is in the middle section

C19 Oil pressure warning lamps

- Left lamp for the pressure in engine 1
- Right lamp for the pressure in engine 2
- The indications for engines 3 and 4 are displayed in M08

C20 Altitude alert counter

- The altitude to be alerted (Target altitude, cruise level, etc.) can be adjusted here
- Before reaching a window of 1000 ft around the alert altitude, the crew will be alerted by a buzzer

M-group instruments (For Captain's and FO's use)

M01 Engine indications horizontal

- Indications for all four engines (described in M02) in the order from left to right
  Eng.1 Eng.2 Eng.3 Eng.4
- The several indications for each engine are in vertical order

M02 Engine indications vertical

For every engines there is a group of five indications which are described here from top to bottom:

- Engine pressure ratio indicator (EPR)

  Indicates the ratio of exhaust gas pressure (Pt7) to inlet air pressure (Pt2).
  EPR=Pt7/Pt2 and is a parameter of the thrust developed by the engine.
  The indicator is used as a primary thrust setting instrument since EPR is directly proportional to thrust

- N1 tachometer

  Indicates low-pressure compressor in rpm.
  It is powered by a tachometer generator which is driven by the N1 shaft

- Engine Exhaust Gas Temperature Indicators (EGT)

  Indicates turbine exhaust gas temperature in hundreds of degrees centigrade

- N2 tachometer

  Indicates high-pressure compressor in rpm

- Engine flow meters and indicators for total flow

  The bug shows fuel flow to respective engine in pounds per hour X 1000.

The digital counter shows total pounds consumed

M03 Engine fire handles and indications

Each engine has its own handle and indication (1 - 4)
The engines respective handle illuminates in case of detected significant temperature rise

Pulling a handle:
- arms the discharge button
- closes the following valves: engine anti-ice, low pressure bleed, fuel shutoff valve and the hydraulic-pump supply valve
- trips the engine generator

This action separates the respective engine from all systems and starts the fire extinguish process

Important note:
In case of engine fire, after pulling the fire handle all systems for supplying the engine must be checked manually as well and the crew has to make sure that the engines is completely separated.

M04 Wheel well fire warning light

M05 Gear door warning light

M06 Flaps indicators panel

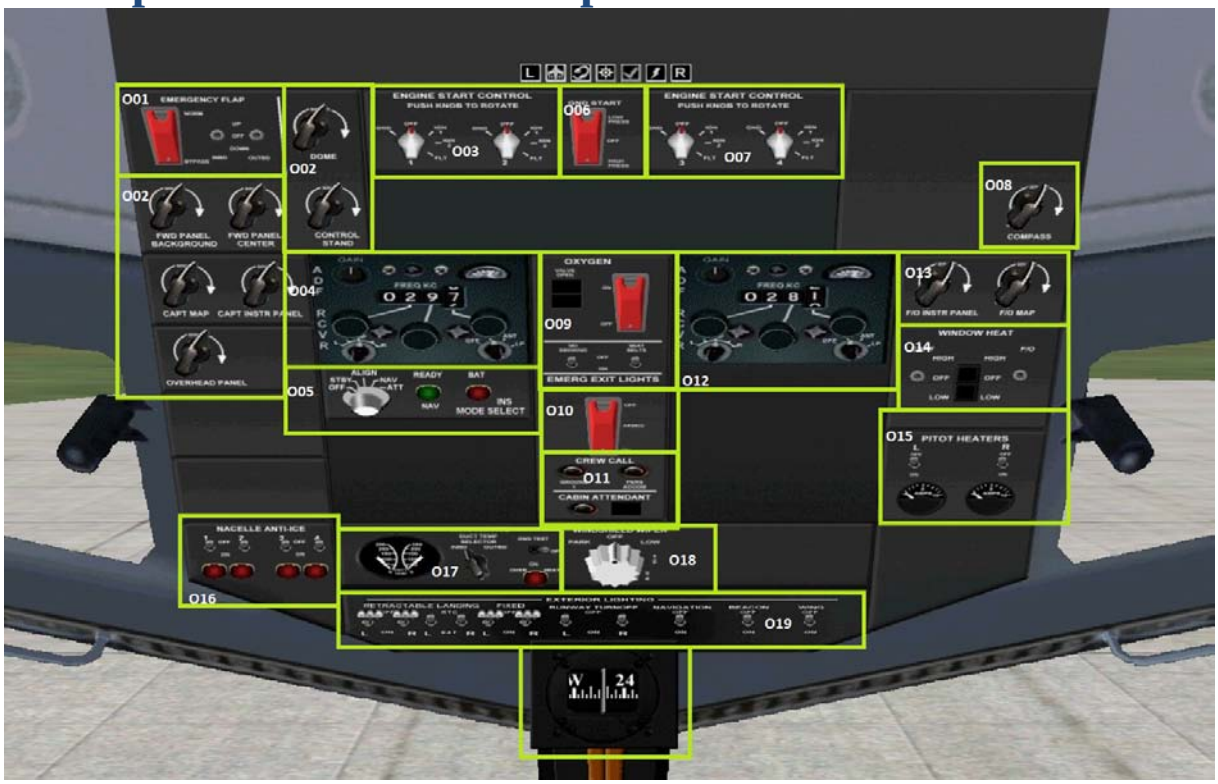
M07 Flaps indicators lights

M08 Oil pressure warning light (see C19)

Description of the First Officer's panel:

The first officer's panel provides the same instruments as the captain's panel.
See the description of the captain's panel.

Description of the overhead panel:



O01 Emergency Flap Switches

- The Norm-Bypass Switch
  - Norm: Disarms electric operation of trailing edge flaps and permits hydraulic operation.
  - Bypass: Bypasses hydraulic trailing edge flap system and arms adjacent INBD, OUTBD switches.
- INBD and OUTBD switches
  - Both switches override the normal operation of the flaps when operated in "up" or "down"-position.

O02 Light Controls

- With these switches the lighting for the flight deck and the instruments can be controlled

O03 Engine Start Controls (Engine 1 and 2)

- Ground-start
  - Has to be selected for engine start on ground
- Flight start is needed in situations like:
  - during takeoff
  - for immediate relight in the event of a flameout
  - for windmill starting in flight

O04 ADF 1 Control Panel

O05 CIVA INS Main control panel (explained in a separate manual)

O06 Ground Start Selector switch

With this switch the pressure for the ground start is to be selected

O07 Engine Start Controls (Engines 3 and 4)

(See O03)

O08 Compass Illumination Switch

O09 Oxygen pressure Switch

Is to be set to guarded mode in normal flight situations

O10 Emergency Exit Lights

When operated it illuminates the emergency exit signs and illuminated strips.

O11 Crew Call Pushbutton

O12 ADF 2 Control Panel

O13 Light Controls

for the F/O panel

O14 Window Heating Controls

O15 Pitot Heating Controls

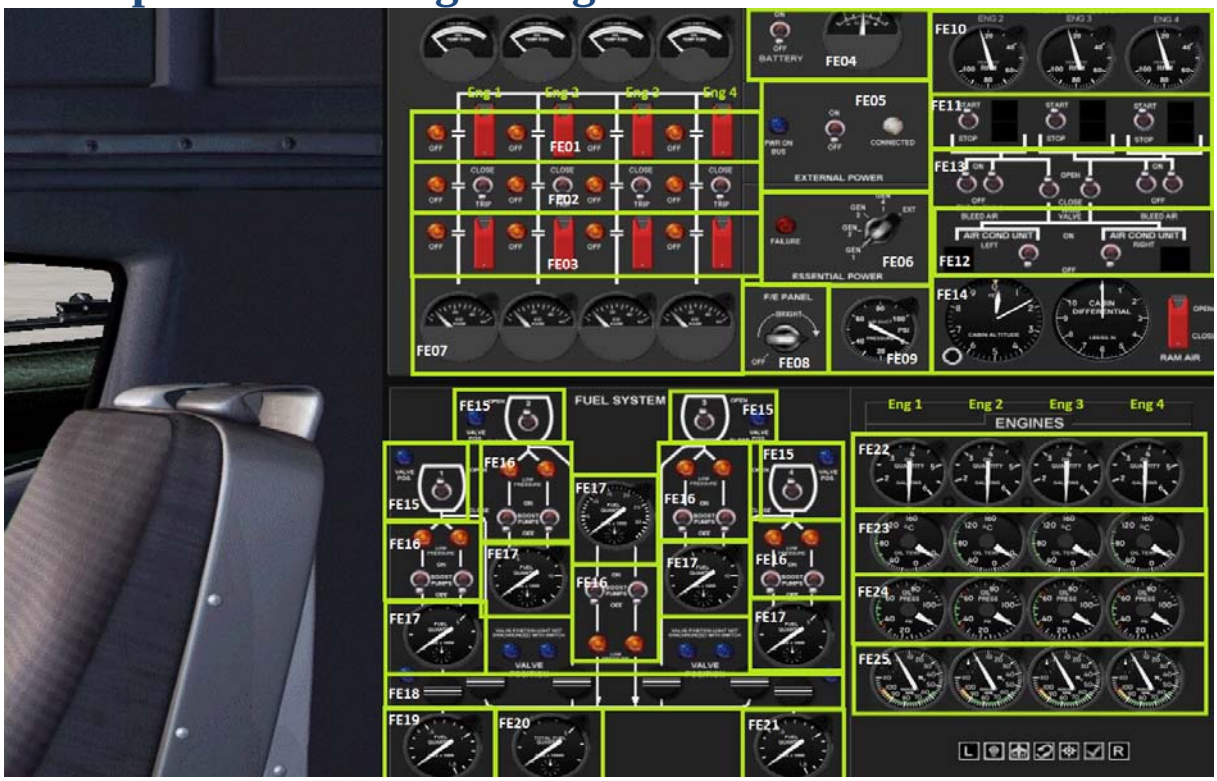
O16 Nacelle Anti Ice Controls

O17 Wing Anti Ice Panel

O18 Windshield Wiper Switch

O19 External Lighting Switches

Description of the Flight Engineer's Panel



FE01 - FE08 Description of the electrical panel

FE01 Bus tie breaker switches

There is a BTB switch for every engine (1-4) in combination with the respective indicator light.

FE02 Generator breaker switches

There is a GB switch for every engine (1-4) with its respective indicator light.

FE03 Generator control relays

There is a GC relay for every engine (1-4) with its respective indicator light.

FE04 Battery switch

FE05 External power switch with

- Bus tie indication light
- External power availability light

FE06 Essential power

- the essential power selector switch for selecting from Gen 1 to Gen 4 and external power.
- the essential power failure light illuminates if no essential power is available.

FE07 KW meters for engines 1 - 4

FE08 First officer's panel illumination switch

FE09 - FE14 Description of the pneumatic panel

FE09 Air duct pressure indicator

FE10 Air compressor tachometers (1-3)

FE11 Turbo compressor switches (1-3)

FE12 Air condition Unit Pack switches

FE13 Bleed air switches. This panel contains
- 4 engine bleed switches (outer positions of the panel)
- 2 wing valve switches (inner positions of the panel)

FE14 Cabin altitude panel
- Cabin altitude meter (left)
- Cabin difference pressure indicator
- RAM Air Switch

Important note: The B707 doesn't have an X-feed!
Balancing between the tanks can only be done by a manifold which can be fed by all tanks and can deliver fuel to all engines with a low fuel flow. This needs ALL TANKS to have been refuelled before starting the engines.

FE15 - FE21 Fuel panel

FE15 Engine shut off valves (1-4)

FE16 Fuel Boost Pump switches (1-8)
In combination with the Fuel Boost Pump Low pressure lights (1-8)

FE17 Fuel quantity indication for each of the five tanks
The tanks are
- inner right and left tank
- outer right and left tank
- center tank

FE18 Manifold valve switches (1-5)
- supplies the manifold with fuel from the selected tanks
- they are used for balancing the aircraft
- if the B707 is balanced correctly, all valves can be in open position

FE19 / FE21 Fuel quantity reserve tanks indication

FE20 Total fuel quantity indication

FE22- FE25 Engines gauges
All gauges are available by 4, one gauge for each engine (1-4)

FE22 Oil Quantity Indicators

FE23 Oil Temperature Indicators

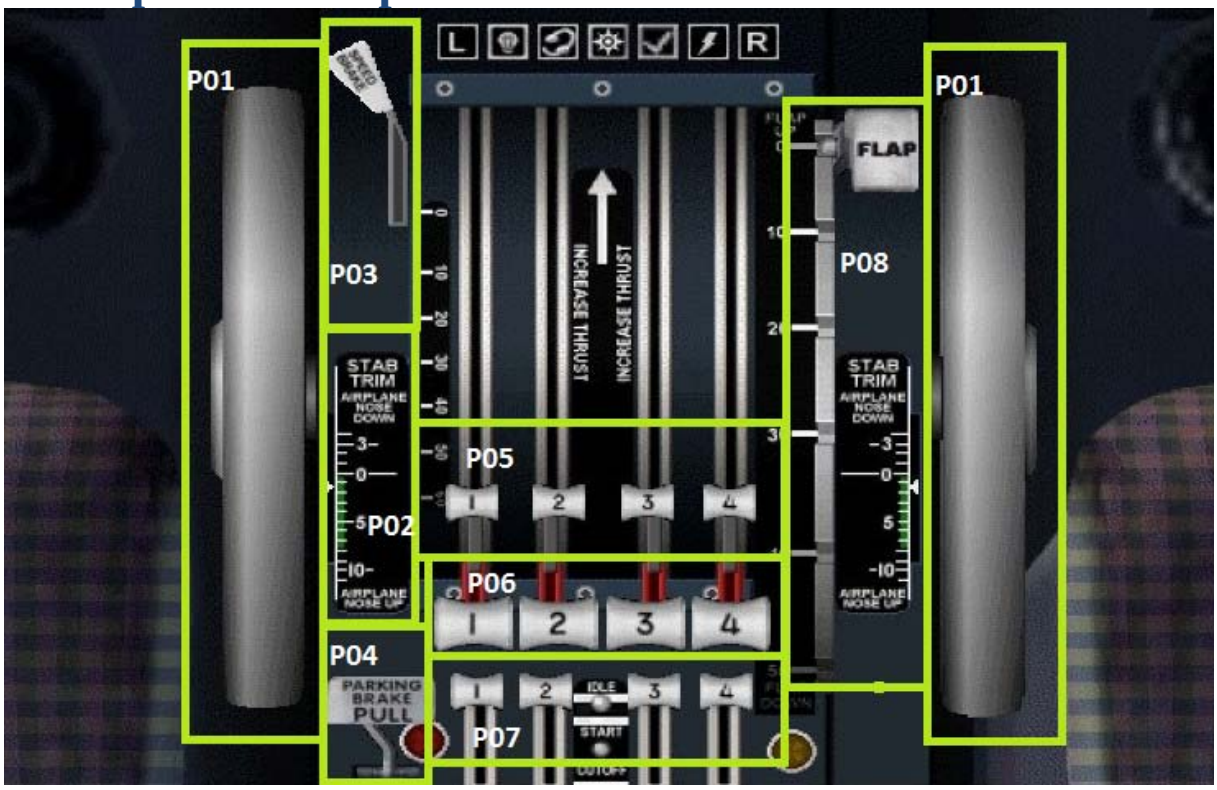
FE24 Oil Pressure Indicators

FE25 Engine N2-Tachometers

Refuelling recommendations for the B707:

- Refuel each of the 5 tanks with at least 4400 lbs (2 tons)
- Always fill the reserve tanks
- Refuel the residual missing quantity first to the outer tanks until full
- Refuel the now residual missing quantity to the inner tanks until full
- Refuel the now residual missing quantity to the center tank
- For engine start open all five manifold valve switches

Description of the pedestal



P01 Stab Control Wheel

P02 Stab Trim Indicator

- Must be set before Take-Off to the calculated CG (Center of gravity)
- If the setting is unknown, it has to be set in the green band between 0 and 5
- In-flight it is set by the autopilot automatically or can be set manually to the pilots' discretion

P03 Speed brake lever

P04 Parking break lever

P05 Reverse Thrust Levers (1-4)

P06 Engine Throttles

P07 Engine Start Levers (Main fuel valves)

P08 Flap Control Lever

Description of the autopilot panel

The autopilot of a B707 works quite differently from autopilots of other aircraft.
The reason is easy to understand. The B707 was developed between 1950 and 1980. In that time period computers as we know them today weren't available.
The B707 autopilot is a very simple but fine working device.

A01 Autopilot mode selector

- INS sets the AP to follow the headings given by the INS system
- HDG lets the AP follow the set heading (see C06)
- MAN set the AP to manual mode. The plane can be flown manually
- LOC/VOR sets the AP following a VOR or a localizer
- G/S sets the flight director following an ILS glide slope and the set localizer. The B707 can be landed manually by following the FD
- AUTO set the AP to performing a full automated landing

A02 Pitch Trim Wheels

- With the PTW the trimming of the B707 can be adjusted when the AP is ON.

A03 Turn controller

- With AP ON the aileron's left and right movement can be controlled here

A04 Autopilot ON/OFF-switch

- Switches the AP On
- When the AP is switched off here, the AP mode selector (see A01) will move back to the MAN position.

A05 Altitude hold/disconnect switch

- When ON the AP holds the present altitude

A06 Yaw Damper Switch

Description of the communication panel

The communication panel doesn't need a particular description because it works in the same way like in other aircraft.

Four selectors are available (from left to right)

- VOR 1, COM 1, VOR 2, COM 2

If a DME information is wanted from the selected VOR, the DME indication must be switched to ON.

Our first flight with the B 707 - Tutorial flight

After getting familiar with this plane we are able to start our first flight. Flying the B 707 is a dive into the history of aviation.

In these times, the development of computers was in a status of kindergarten. A lot of functions, which are computer controlled nowadays, had to be realized mechanically or with electrical loops.

It was incredibly difficult to develop an artificial horizon or the automatic functions of an autopilot.

Let us donate respect to the former engineers and we should not laugh about the simple but working technology of that era.

With this flight tutorial we will operate the flight AFH 8503 Leg 7 from LFPO to EDDF. In former times before the Paris CDG (LFPG) was available, Paris Orly was the main airport in Paris. We will perform this flight only with our means of radio navigation.

We have to pay attention to some points:

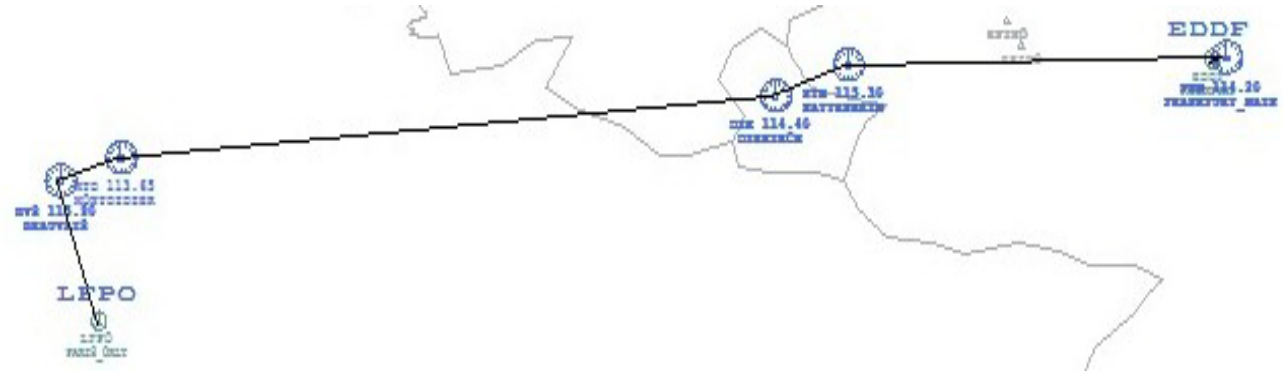
- We don't have RNAV or GPS
- We have to fly the particular SID and STAR only with radio navigation
- We cannot use AIRACS or RNAV-based route planners
- We will NOT follow predefined airways. The crews in that era even didn't do that.

Our first step for this flight is a good flight planning.

Because we don't get any information about the progress of our flight like fuel, timing, position, forecast etc., we have to follow the most important rule when flying these type of aircraft:
Plan Your flight and fly your plan!

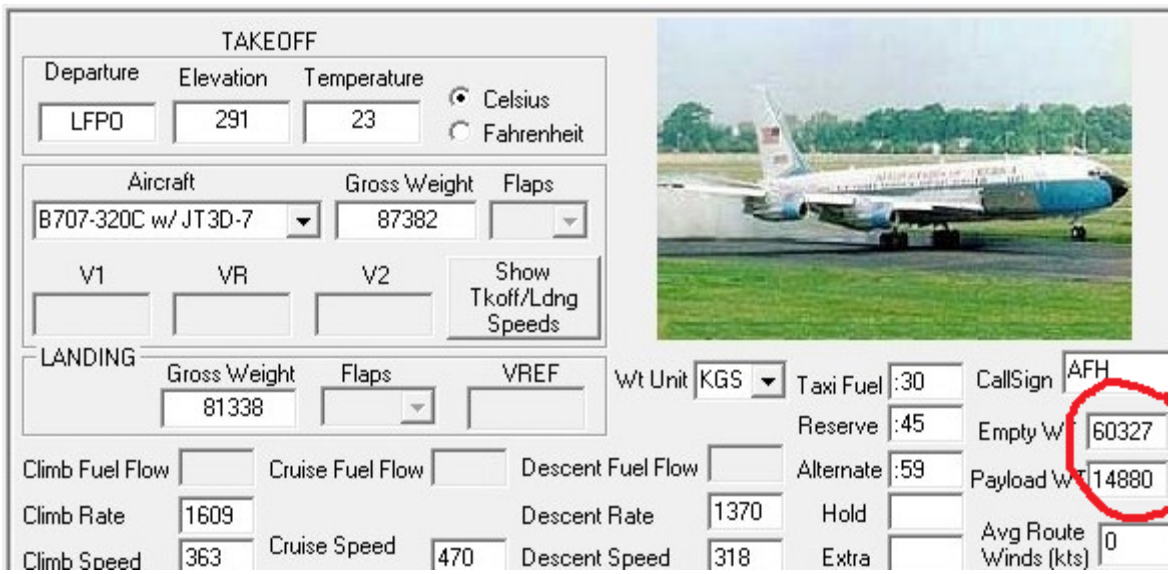
At the moment we are boarding at stand T27 in LFPO.
We decided on the following routing:

-Runway for departure at LFPO is 24
- the SID to our first waypoint VOR BVS (Beauvais 115.9) is AMOGA1P
- after passing BVS we fly
  - VOR MTD 113.65 (Montdidier)
  - VOR DIK 114.40 (Diekirch)
  - VOR NTM 115.30 (Nattenheim)
  - VOR FFM 114.20 (Frankfurt)
- after passing FFM we'll follow the STAR OSMAX2W
- we land on RWY 25R in EDDF



We already got the load sheet from the ramp-agent and see our weights and other relevant figures for our flight.

(Please note: Air France is an European Airlines and the weight-calculations are done in metric tons; 1 metric ton = 2200 lbs)



We can enter the weights from this sheet into the Flight Simulator's load sheet now:

Empty weight: 60327 kg
Payload weight: 14880 kg

The result of a good flight planning is the FLIGHTLOG.

When done, we'll check the flightlog and we can order the fuel:

	ID	NAME	DIST	HDG	VIA	ALT	LAT	LON	FREQ	TYPE	SPD	ZT	ACTIME	FF	ZB	ACBO	FREM	GW	Wind
1	LFPO	PARIS_ORLY	43	349	DCT	291	N48:43:23	E02:22:46		APT	363	00:07:12	00:00:00	8174.6	981.0	0.0	12175.5	87382.5	0
2	BVS	BEAUVAIS	14	062	DCT	FL110	N49:26:10	E02:09:11	115.90	VOR	363	00:02:27	00:07:13	8174.6	333.8	981.0	11194.5	86401.5	0
3	MTD	MONTDIDIER	27	082	DCT	FL150	N49:33:09	E02:29:22	113.65	VOR	363	00:04:36	00:09:40	8174.6	626.7	1314.8	10860.7	86067.7	0
4	TOC	Top of Climb	114	082	DCT	FL230	N49:37:17	E03:12:02		TC/D	470	00:14:35	00:14:17	8174.6	1986.9	1941.5	10234.0	85441.0	0
5	DIK	DIEKIRCH	18	059	DCT	FL230	N49:51:41	E06:07:46	114.40	VOR	470	00:02:18	00:28:54	8174.6	313.4	3928.4	8247.1	83454.1	0
6	NTM	NATTENHEIM	0	087	DCT	FL230	N50:00:57	E06:31:54	115.30	VOR	470	00:00:00	00:31:13	8174.6	0.0	4241.7	7933.7	83140.7	0
7	TOD	Top of Descent	81	087	DCT	FL230	N50:00:57	E06:31:54		TC/D	318	00:15:16	00:31:13	7058.0	1730.1	4241.7	7933.7	83140.7	0
8	FFM	FRANKFURT_MAIN	2	244	DCT	1000	N50:03:13	E08:38:13	114.20	VOR	318	00:00:32	00:46:32	8174.6	72.7	5971.8	6203.6	81410.6	0
9	EDDF	FRANKFURT				364	N50:01:59	E08:34:13					00:47:04			6044.5	6131.0	81338.0	
10																			
11		Total Distance: 303 NM																	

Flight simulator can create its own internal flight log, too, which is more basic but sufficient for the flight planning. If using the internal flightlog, the fuel calculation must be performed manually (roughly 10 tons/h) or by the AFVA ACARS.

In the column FREM (fuel remaining) we see in the upper line the calculated fuel of 12.175 kg. We round it to 13.000 kg fuel and we order it now from the LFPO authority and fill the tanks as listed below.

Serbatoio	%	Kg	Capacità
Ausiliario sinistro	49.6	3502	7061
Sinistra	74.9	999	1334
Centro	6.5	2014	30981
Destra	74.9	999	1334
Ausiliario destro	49.6	3502	7061
Centrale 2	16.2	2004	12367

Now the refuelling is done, the First Officer is back on the Flight Deck from the external checks and we can perform the checks in the cockpit.
We can find the checklists after pressing Shift <F10> and clicking on "Checklist" and work it out.

In the meantime the F/O and the Flight engineer start the engines. We press STRG +E and set our radio navigation equipment properly that we can perform the SID AMOGA1P.

Please check the following steps with your Chart for LFPO AMOGA1P SID:

Step1: We have to follow a heading controlled by the VOR OL DME. We set the NAV2 to VOR OL 111.2 because from this VOR we need only the DME-information.
Step2: Later we have to approach the VOR BVS with a course of 24°. We set the NAV1 to VOR BVS 115.9 and the course to 24°.
Step3: We have to pass VOR BVS at FL100 and set the Altitude Alert Counter to 11000.
Step4: Set the heading control bug to our first heading 244°
The ADFs are not needed for this SID

After pushback we get taxi-clearance:
AF 8503,taxi to HP W42 Rwy 24 via W3 LR L42
On L42 we get the clearance:
AF 8503, after arriving at W42 line up and cleared for take-off RWY 24, Wind 272/05 knots, QNH 1002, climb to initial FL 110

Before entering the runway we will not forget to set the strobe and the landing light and we will set the transponder to mode C

Important note before take-off:
Remember, we don't have an FMC or EICAS display for checking every function of the aircraft with "one view". So we have to crosscheck all instruments and panels frequently including the Flight-Engineers'-Panel. It is a little difficult because we are alone in the cockpit instead of having 3 people as in a real B 707-cockpit. But violating this rule can cause uncontrolled flight situations.

Now let's take-off.

Take-Off and Initial Climb

1. Move the throttles smoothly to 100% (The B 707 doesn't have an ATHR-function or a FLEX-TO)

2. Rotate on V1, take off and pitch the aircraft to 15°

3. When the gear is up we stabilize the climb rate to 1500 ft/min and the speed to 220 knots by reducing the thrust gently. Retract the flaps to 0.

4. Activate the AP; set the AP Mode Selector to HDG.

5. Check the fuel flow. It should be 2.0 - 2.5 tons/h for each engine.

6. When passing DME 13.6 on NAV2 (VOR OL), change the heading to 300°.

7. Increase the speed to 240 knots and keep the climb rate stabile at 1500 ft/min.

8. Now set the AP mode selector to LOC and let the autopilot find the RAD 24 BVS. The B707 will automatically follow the radial.

9. After capturing the localizer BVS we can preselect the heading to our next VOR MTD. It is 62° (see the flightlog)

10. 2nm in front of BVS we change the AP mode selector to HDG and let our B 707 fly the new heading to the next VOR MTD. Now we leave the SID and follow our planned route.

11. After passing FL100, we know we have to retract the external lights, we increase the speed smoothly to 470 knots GS. Be always aware of the head- and tailwind components. The timing in the flight log is calculated to the given speed as Ground Speed.

En-route with Climb and Cruise

Now we follow our route as described above to the TOD. This is the first moment we can take a longer breath after our take-off. Between the route legs we will think about the calculations for descent. But first we have to bring our B 707 onto the correct path to EDDF.

During flight, we have to check fuel, speed, timing and fuel consumption frequently. No FMC tells us when and with how much fuel we'll arrive at our destination.

1. Set NAV 1 to the next VOR MTD 113.65 with the course 62° and after the preselected heading of 62° is our current course, set the AP mode selector back to LOC and our B 707 will capture the radial. We continue climbing to FL150.

2. After a few minutes, 2nm in front of MTD VOR we prepare the course to the next waypoint VOR DIK 114.40. We have a look to our flightlog, it's 82°.

Important note: Different to FMC-controlled flying, it can happen during the radio navigation that the distance to the next VOR or NDB is more than its range and we don't get a signal. In this case we follow the course given by the flightlog using the autopilot's heading mode until we get a signal. In a flight phase like this we possibly have a deviation from our course by crosswind influences. When the signal is there we can correct that mistake easily.

3. When passing MTD at FL150 we change the AP mode selector to HDG until we see the signal of VOR DIK.

4. Continue climbing to our cruise level FL230. Now we have a few minutes for relaxing and call to the cabin for a coffee.

5. With the coffee in our hands we can now think about the TOD, the descend rate and the speed.

We have to calculate these figures by ourselves. The flightlog provides some informations about that but it cannot replace a manual calculation.

The Top of Descent:
We'll calculate for a standard descend with an angle of 3°. A rough calculation is very easy. For a descent of 3000 ft we need 10 nm, for 30.000 ft 100 nm. Now we decide for the descent we want, divide it by 1000 and multiply it by 3. That is very roughly but sufficiently accurate for us because following this calculated descent slope manually will be less accurate than our calculation.
What does that mean for our flight now?
We cruise at FL230 and want to pass FRA VOR at FL60. The descent will be 17.000 ft:

17.000 / 1000 = 17
17 * 3 = 51 nm

Our TOD will be 51 nm in front of FRA VOR!

The descent rate:
Now we know the TOD for a 3°-descent but additionally we have to find out how to fly a 3°-descent for capturing the desired altitude at the correct waypoint. This can be calculated as easy as the TOD by rough calculation.
The current ground speed, multiplied by 5 equals the descent rate for a 3°-descent.
Example: we descend with a ground speed of 450 knots. Our descent rate has to be

450 * 5 = 2250 ft/min.

During descend we have to take care that the descent rate and speed always match and we will arrive at our waypoint at the correct altitude.

6. In the meantime we are approaching our next waypoint, the DIK VOR and now we set the heading to the NTM VOR as we can see in the flightlog. We pre-set the heading bug to 59°. Before passing DIK VOR the AP mode selector is to be set to HDG.

7. Now we can set the NAV1 to NTM VOR 115.3 with course 59° and as soon as the signal is received, we switch the AP mode selector back to LOC and let the AP find the way.

8. The same procedure takes place when passing NTM VOR. We set our course to FFM VOR 114.2 with the course 87°.

9. 51 nm in front of FFM VOR we arrive at our calculated TOD and start the descend. The altitude target counter is to be set the our target altitude FL 60.

The Descent

We know the normal procedure: Set the target altitude, select LVL CHG and we can leave the AP alone. This procedure is nice but not in our B 707.
We have to descend manually and that is very funny to do.
We reduce the thrust smoothly. How much depends on weight and speed. It needs a little practice.
When the nose starts pitching down, we lift it manually and keep it always at a pith of 0°.
Our B 707 starts descending slowly. If we get a significant speed reduction, we can pitch down a little for increasing the speed.
Now with the thrust we bring the descend rate to our calculated 2250 ft/min.
During the descent, every 3000 ft is recommended, we recalculate our current altitude with our target altitude and reduce or increase the descend rate a little.

During the descent we will see our speed coming down and down. As we approach FL100 we make sure not to have more than 240 knots which results in an descend rate of ....
Correct, it must be 1200 ft/min.
We continue our descent to FL60 as soon as we arrive at FFM VOR and reduce the speed to 220 knots. When arriving at FL60 set the flaps to 10°.

Now we need to pay attention to the EDDF STAR. We should prepare as soon as possible because if you do that while flying the STAR you will need 2 extra hands! You don't have four hands? Then prepare all as soon as possible!

After passing FFM VOR we'll proceed to MTR VOR 110.0 on RAD 31. So do the following:

1. set the heading bug to FFM VOR and

2. switch the AP mode selector to HDG because we need the NAV1 now for MTR.

3. The frequency of FFM VOR 114.2 is to be set to NAV2 to see the radial.

4. Before passing FFM VOR we switch the AP mode selector to LOC. The B 707 will turn to the course to MTR.

5. When passing FFM VOR we descend to 4000 ft and reduce our speed to 200 knots and set the flaps to 20°. Please note, the transition level in EDDF is FL50. We have to set the altimeter to the local QNH now and clip the approach chart for EDDF RWY 25R to the kneeboard.

6. We don't overfly MTR but make a steep right turn from our 31° to 160°. The B707 can do it automatically if we turn the NAV1 course selector to 160° a couple of miles before passing MTR. But turns like this should be performed manually with the HDG selector.

The Landing

1. Now we make sure that our heading bug is set to 160° and the AP mode selector is set to HDG because we'll need the NAV1 for the ILS now.
2. After passing MTR VOR we find ourselves on the base leg of EDDF RWY 25R with heading 160° from MTR VOR and the frequency set to the ILS 25R, which is 111.15 (or

109.5) and the course to 249°. The frequency depends on the FS-version and must be checked individually.
Set the AP mode selector to VOR and let the autopilot find the centreline

3. On the centreline, we have to be below the glide slope, we activate the autopilot for an automated GS-following by switching the AP mode selector to G/S AUTO.

4. As soon as we capture the glide slope we need to reduce the speed to approximately 140 knots. The exact speed depends on our weight.

   A short reminder: We don't have an FMC which can indicate speeds, flaps and weights.
   Now we reduce our speed to the correct descent rate for the current speed. The initial descent rate is 1000 ft/min and is to be reduced to 700 ft/min, which corresponds to a speed of 140 knots.

5. During the speed reduction the flaps must be set to full, but step by step. Please take care because the extension of the flaps will disturb the balance between descent rate and speed.
   A short suggestion: When the nose pitches up by speed reduction, set the next step of the flaps. Below 180 knots the landing gear can be extended

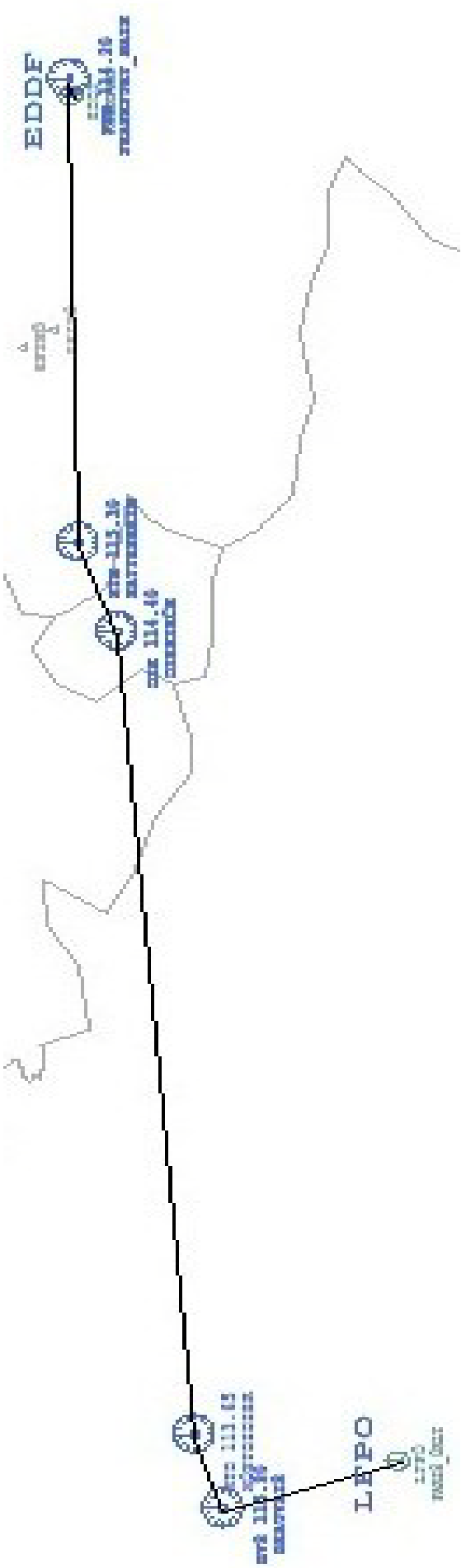
6. An AUTO-LAND is possible but not realistic with a B707. So on passing 500 ft we deactivate the autopilot and do a manual landing.
   We flare as we know it from other planes and land from a fantastic flight with one of the first jet-airliners in the world.

7. We vacate to the right, taxi via M to one of the V-stands on the east apron. Hopefully we have a lot of traffic in EDDF and at this apron our Queen can be watched by everyone.

Now we stop the engines and we are one of the few simulator pilots who did a flight with this wonderful historic airliner, the B707!

Annex:

	ID	NAME	DIST	HDG	VIA	ALT	LAT	LON	FREQ	TYPE	SPD	ZT	ACTIME	FF	ZB	ACBO	FREM	GW	Winc
1	LFPO	PARIS_ORLY	43	349	DCT	291	N48:43:23	E02:22:46		APT	363	00:07:12	00:00:00	8174.6	981.0	0.0	12175.5	87382.5	0
2	BVS	BEAUVAIS	14	062	DCT	FL110	N49:26:10	E02:09:11	115.90	VOR	363	00:02:27	00:07:13	8174.6	333.8	981.0	11194.5	86401.5	0
3	MTD	MONTDIDIER	27	082	DCT	FL150	N49:33:09	E02:29:22	113.65	VOR	363	00:04:36	00:09:40	8174.6	626.7	1314.8	10860.7	86067.7	0
4	TOC	Top of Climb	114	082	DCT	FL230	N49:37:17	E03:12:02		TC/D	470	00:14:35	00:14:17	8174.6	1986.9	1941.5	10234.0	85441.0	0
5	DIK	DIEKIRCH	18	059	DCT	FL230	N49:51:41	E06:07:46	114.40	VOR	470	00:02:18	00:28:54	8174.6	313.4	3928.4	8247.1	83454.1	0
6	NTM	NATTENHEIM	0	087	DCT	FL230	N50:00:57	E06:31:54	115.30	VOR	470	00:00:00	00:31:13	8174.6	0.0	4241.7	7933.7	83140.7	0
7	TOD	Top of Descent	81	087	DCT	FL230	N50:00:57	E06:31:54		TC/D	318	00:15:16	00:31:13	7058.0	1730.1	4241.7	7933.7	83140.7	0
8	FFM	FRANKFURT_MAIN	2	244	DCT	1000	N50:03:13	E08:38:13	114.20	VOR	318	00:00:32	00:46:32	8174.6	72.7	5971.8	6203.6	81410.6	0
9	EDDF	FRANKFURT				364	N50:01:59	E08:34:13					00:47:04			6044.5	6131.0	81338.0	
10																			
11		Total Distance: 303 NM																	


EDDF
LIPO

Crew Take-Off Briefing

Captain to Co-pilot

We will be taking off on RWY (active runway), climbing to (altitude). If we encounter an engine malfunction, fire or other emergency before **V1** (critical engine failure recognition speed) KIAS, the flying pilot will retard the throttles to flight idle and bring the aircraft to a complete stop on the runway. The non flying pilot will notify the proper ATC of our intentions and assist the flying pilot as requested or needed to operate the aircraft in a safe manner.

If the aircraft has reached **Vr** (roate speed) KIAS, the flying pilot will fly the aircraft per company procedures and the non flying pilot will notify the appropriate ATC of our intentions and assist the flying pilot as requested or needed to operate the aircraft in a safe manner and land the aircraft as soon as possible.

Aircraft Weight is: _____ Taxi Instructions to Active: _____

V Speeds for this flight are (calculated) See prepared Flip Chart(s)

Flap Settings: Takeoff _____ Engine Failure Approach _____

Discuss the Departure Procedures for this flight (Ref Charts, SIDs)

Discuss Weather considerations (Ref ATIS, METAR, TF)

Crew Approach/Landing Briefing

Captain to Co-pilot

Weather conditions are (obtain from ATIS, Metar and TF).

Landing on RWY (active runway) at (airport) using the (**???**) approach (Ref STAR)

Descend at (**???**). Our Final Approach altitude will be (**???**)

V Speeds for this approach are (calculated) (See prepared Flip Chart(s))

Missed approach Procedures are (Ref Approach Plates)

Taxiway Turnoff _____ Taxi Route from Active _____

Parking at Gate (**???**) t

CREW ANNOUNCEMENTS

- Departure
- "Ladies and gentlemen, on behalf of the flight crew, this is your (captain or first officer) (insert name), welcoming you aboard Air France Virtual Airlines flight number (flight) with service to (destination). Or flight time today will be approximately (time en route) to (destination). At this time, I'd like to direct your attention to your to the monitors in the aisles for an important safety announcement. Once again, thank you for flying Air France Virtual Airlines."

- Climbing above 10,000 feet MSL
- Inform cabin crew that use of approved electronic devices is authorized.

- At Cruise Altitude
- "Ladies and gentlemen, this is the (Captain or First Officer) speaking. We've reached our cruising altitude of (altitude). We should be approximately (time) enroute and expect to have you at the gate on time. I've turned off the fasten seatbelt sign, however, we ask that while in your seat you keep your seatbelt loosely fastened as turbulence is often unpredicted. Please let us know if there is anything we can do to make your flight more comfortable, so sit back and enjoy your flight."

- Approach
- Inform cabin crew of approach and to discontinue use of electronic devices.

- Landing
- "On behalf of Air France Virtual Airlines and your entire flight crew we'd like to welcome you to (destination) where the local time is (time). We hope you've enjoyed your flight with us today and hope that the next time your plans call for air travel, you'll choose us again. Once again, thank you for flying Air France Virtual Airlines

Acknowledgements and Legal Stuff

Air France Virtual Airlines is a non-profit entity engaged in providing an avenue for flight simulation enthusiasts.

This manual was created and updated by the following authors: Dirk Weimer.

Flight Sim screenshots courtesy Dirk Weimer.

While we strive to mirror real-world operations, this manual is not designed for use in the operation of real-world aircraft.

NOT FOR REAL WORLD AVIATION USE