MD-80

CLS

Commercial Level Simulations

Welcome to our
McDonnell Douglas MD81
Commercial Level Simulations manual.

This manual contains everything needed to fly and understand our ***MD81** lite* airplane, but our intention is to offer more then that. For your convenience, we have split this manual in the following sub parts:

Chapter I:	User's manual
Chapter II:	Panel Description
Chapter III:	Operations manual
Chapter IV:	Flight tutorial KATL - KMIA
Chapter V:	Appendix

We know that you're enthusiastic and would like to start flying immediately, however we **advise** you either to print the manual or start reading the **User's Manual** with general aircraft information and of course, the **Panel Description**. This is vital to understanding the operation, handling and control in the cockpit as well as some hidden features.
The next logical step is the **Operations Manual**. Details about the different flight phases, how to handle the aircrafts, tables, charts, step climb details, are right here.

Finally, we welcome you on board of a non scheduled MD81 test flight from **KATL** (Atlanta/Hartsfield) to **KMIA** (Miami International Airport).
The flight will give you a very good idea of the possibilities of the MD81 Series.

The flight tutorial use combinations of flying SIDs, STARs, waypoints, VOR and if applicable NDB beacons. In other words, it will cover all kind of possible flight techniques and navigation devices. You need basic **navigation knowledge** and how airplanes fly.

We intentionally did not use any add-on free- or payware products. You are of course free to use any of those however, flying online at VATSIM or IvAo could give problems with the approach flight phase in relation to the tutorial profile.

Finally, we from CLS, wish you many happy flying hours with the
McDonnell Douglas MD81.

Kind regards,
The Commercial Level Simulations **team**

Disclaimer

This manual is not provided by, or endorsed by Boeing Commercial Company, or any airline in any way.
Any exact similarities between this manual and Commercial Level Simulations aircraft to actual aircraft, procedures, or airlines carriers are strictly coincidental.
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The procedures contained within are the Commercial Level Simulations interpretation of generic flight operations.

These procedures are not always accurate in all situations.
All diagrams have been either been recreated to mimic actual procedures or scenarios, or remain the copyrights of the respective owners.
The purpose of the manual is not to claim ownership of the procedures or diagrams herein, rather, to show flight operations of the MD81 based on available information. This manual is not intended for use within real world flight. Any aircraft from Commercial Level Simulations is intended as an add-on for Microsoft FSX.

History

McDonnell Douglas

Douglas Aircraft developed the DC-9 in the 1960s as a short-range companion to their larger DC-8. The DC-9 was an all-new design, using two rear fuselage-mounted turbofan engines, and a T-tail. The DC-9 has a narrow-body fuselage design with 5-abreast seating, and holds 80 to 135 passengers depending on seating arrangement and aircraft version.

The MD-80 series was the second generation of the DC-9. It was originally called the DC-9-80 series and the DC-9 Super 80 and entered service in 1980. The MD-80 series was then developed into the MD-90 entering service in 1995. The last variant of the family was the MD-95, which was renamed the Boeing 717-200 after McDonnell Douglas's merger with Boeing in 1997.

The DC-9 family is one of the most successful jet airliners with a total of over 2,400 units produced; it ranks third behind the second place Airbus A320 family with over 4,000 produced, and the first place Boeing 737 with over 6,000 produced.

MD 80 Series

The **MD-80 series** is a mid-size, medium-range airliner that was introduced in 1980. The design was the second generation of the DC-9 with two rear fuselage-mounted turbofan engines, small, highly efficient wings, and a T-tail. The aircraft has distinctive 5-abreast seating in coach class. It was a lengthened DC-9-50 with a higher maximum take-off weight (MTOW) and a higher fuel capacity. The aircraft series was designed for frequent, short-haul flights for 130 to 172 passengers depending on plane version and seating arrangement.

The development of MD-80 series began in the 1970s as a growth version of the DC-9 Series 50.

Availability of new Pratt & Whitney JT8D higher bypass engines drove early studies including designs known as Series 55, Series 50 (Re-fanned Super Stretch), and Series 60. The design effort focused on the Series 55 in August 1977. With the projected entry into service in 1980, the design was marketed as the "DC-9 Series 80". Swissair launched the Series 80 in October 1977 with an order for 15 plus an option for five.

The Series 80 featured a fuselage 14 feet 3 in (4.34 m) longer than the DC-9-50. The DC-9 wings were redesigned by adding sections at the wing root and tip for a 28% larger wing. The initial Series 80 first flew October 19, 1979.It entered service in 1980. Originally it was certified as a version of the DC-9, but was changed to MD-80 in July 1983, as a marketing move. New versions of the series were initially the MD-81/82/83 and the shortened MD-87, even though their formal certification was DC-9-81/82 etc. Only the MD-88 was given an "MD" certification, as was the later MD-90.The MD-80 versions have cockpit, avionics and aerodynamic upgrades along with the more powerful, more efficient and quieter JT8D-200 series engines, which are a significant upgrade over the smaller JT8D-15, -17, -11, and -9 series. The MD-80 series aircraft also have longer fuselages than their earlier **DC-9** counterparts, as well as longer range. The MD-80's production ended in 1999. Notably, customers such as American Airlines still refer to the planes in fleet documentation as "Super 80". This model is still flown extensively by American Airlines and Delta Air Lines. Comparable airliners to the MD-80 series include the Boeing 737 and Airbus A320.

Operational History

The MD-80 series has been used by airlines around the world. Major customers have included Aeroméxico, Alaska Airlines, Albanian Airlines, Alitalia, Allegiant Air, American Airlines, Austral Líneas Aéreas, Austrian Airlines, Avianca, China Eastern Airlines, China Northern Airlines, Delta Air Lines, Finnair, Iberia, Japan Air System(JAS),Korean Air, Lion Air, Reno Air, Scandinavian Airlines System (SAS), Spanair, Dutch Caribbean Airlines, and Swissair.
Due to the usage of the aging JT8D engine, the MD-80 is not fuel efficient compared to the A320 or newer 737 models; it burns 1,050 gallons of jet fuel per hour on a typical flight, while the larger Boeing 737-800 burns only 850 gallons per hour (19% reduction).

Many airlines have started to retire the type in the 2000s. Alaska Airlines' tipping point in using the 737-800 was the $4 per gallon price of jet fuel the airline was paying by the summer of 2008; the airline stated that a typical Los Angeles-Seattle flight would cost $2,000 less, using a Boeing 737-800, than the same flight using an MD-80.American Airlines has announced plans to retire at least 20 MD-80s,and has accelerated delivery of new 737-800s,while Midwest Airlines announced on July 14, 2008, that it would retire all 12 of its MD-80s (used primarily on routes to the west coast) by the fall. The JT8D's comparatively lower maintenance costs due to simpler design help narrow the fuel cost gap.

Variants

MD-81 (DC-9-81) Originally the **Super 81**, basic production variant with two 18,500 lb thrust JT8D-209 engines.
MD-82 (DC-9-82) Originally the **Super 82**, variant for hot and high operations with 20,000 lb thrust JT8D-217 engines and increased maximum take off weight.
MD-83 (DC-9-83) Long-range version with 21,000 lb thrust JT8D-219 engines.
MD-87 (DC-9-87) Short fuselage variant of the MD-80 with electronic flight instrumentation first flown in 1987.
MD-88 An MD-82 with updated glass cockpit of the MD-87.

McDonnell Douglas MD81

This chapter provides the flight crew with general airplane information and specific descriptive information for the following systems:

- Lavatories and galleys
- Passenger forward entrance door and stairway, forward service door
- Oxygen systems
- Lighting systems
- Emergency exits and equipment

General

The MD-81 airplane is powered by two aft-mounted turbofan engines and is designed to provide efficient operation and reliable transportation of passengers and cargo. Simplicity of design permits efficient operation with a crew of seven: a Captain, First Officer, and five Flight Attendants.
An Auxiliary Power Unit (APU) and an integral passenger forward stairway and aft stairway facilitates passenger loading, unloading, and engine starting at airports equipped with minimal ground support equipment. External service points may be reached without use of ladders or stands. Cargo may be manually loaded from the ground without special equipment resulting in an approximate turnaround time of 20 to 30 minutes.

Fuselage

The fuselage is of all-metal construction consisting of a nose section, a center section, and a tail section. In addition to the flight compartment and the passenger compartment, the fuselage contains a nose-gear wheel well, a forward accessory compartment, an electrical / electronics compartment, forward, mid, and aft lower cargo compartments, main gear wheel well, and an aft accessory compartment in the tail section aft of the pressure bulkhead.
All external doors and emergency exits, with the exception of the forward stair well door, are plug type and pressure sealed. Door operating instructions have either stenciled instructions or instruction plates adjacent to the latches.

Hydraulics

Hydraulic power is provided by two separate, hydraulically closed-circuit systems identified as the left system and the right system. The right system provides hydraulic power to the rudder, aft passenger entrance stairway, and the landing gear actuating subsystem; the left system provides hydraulic power to the elevator augmentor. All other hydraulic subsystems are served by both systems through separate valves and actuators. The primary source of hydraulic power for each system is an engine-driven pump with an electrically powered auxiliary pump in the right system. There is a power transfer unit between the right and left systems with adequate capacity to transfer full available power between systems.

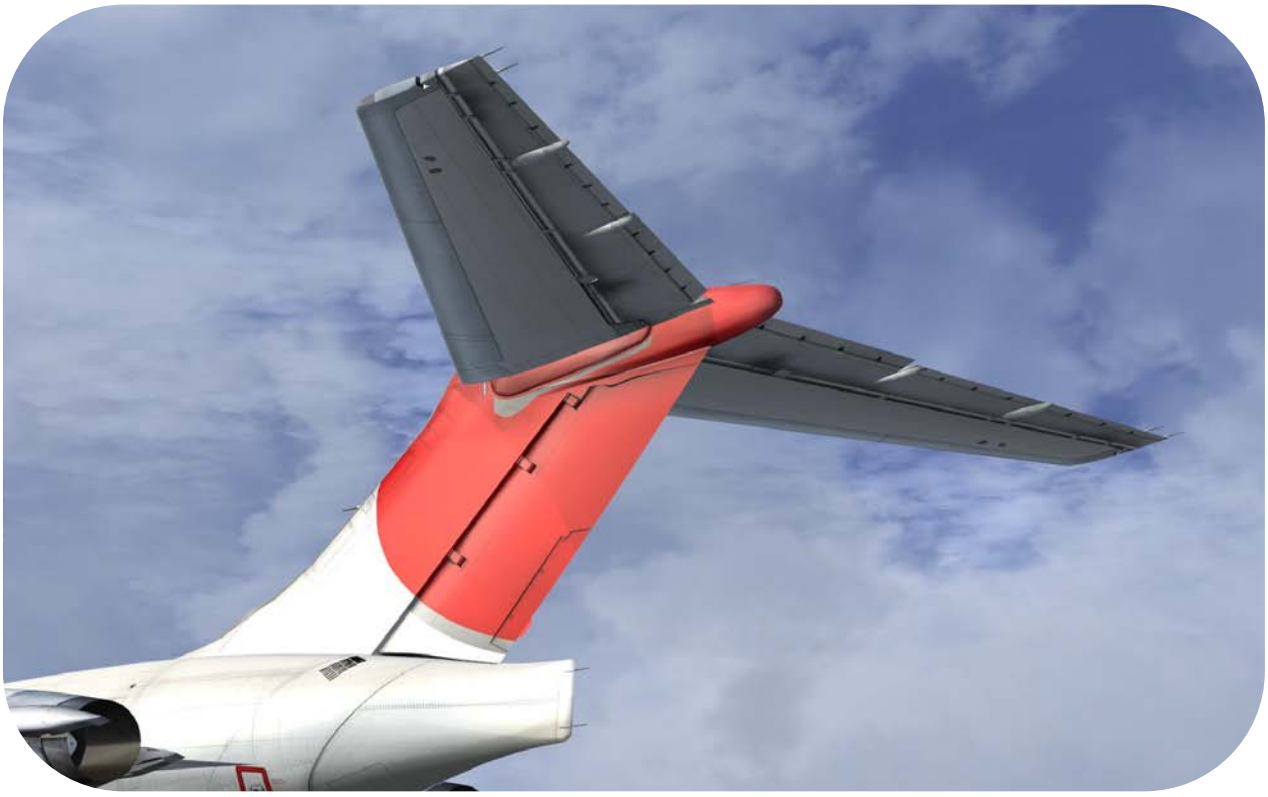
Construction and Flight Controls

The wing is all metal, fully cantilevered, sweptback, and mounted through the lower fuselage. The wing incorporates the leading edge slats, ailerons, spoilers, trailing edge flaps, integral fuel tanks, and supporting structure for the main gear.
The slats are located on the leading edge of the wings and are hydraulically actuated to the takeoff, landing, and retract positions by pressure from both hydraulic systems. The slat system permits slower takeoff and landing speeds and use of shorter runways.
The aileron and aileron trim tab system provide lateral control and trim of the airplane by aerodynamically operated ailerons. The aileron system provides input to control hydraulically actuated flight spoilers for lateral control assist.
The flaps are hinged to the trailing edge of each wing and are hydraulically operated. The flaps may be positioned from full up to full down to obtain increased drag, to increase the lift of the wind, and to lower the stall speed for landing and takeoff.
The spoiler system consists of hydraulically operated flight / ground spoiler panels on the upper surface of each wing, forward of the flaps. The flight spoiler system aids lateral control and also serves as a speedbrake during flight. The flight spoiler panels are also used as ground spoilers after landing to reduce stopping distance. An additional Inboard Ground Spoiler panel is installed on each wing to improve stopping performance – on the ground.

The tail group consists of a vertical stabilizer, a horizontal stabilizer, two elevators, and a rudder. The vertical stabilizer is mounted on the aft fuselage, and the horizontal stabilizer is mounted on the top of the vertical stabilizer. The rudder and elevators are mounted on the vertical and horizontal stabilizers, respectively.
The vertical stabilizer is fully cantilevered and sweptback.
The longitudinal trim control system is an electrically actuated system that controls the movement of the horizontal stabilizer to provide longitudinal trim. The system is controlled from the flight compartment. The longitudinal trim control system consists of a primary system and an alternate system. The leading edge of the horizontal stabilizer is heated when the Airfoil Anti-ice is operating in the Tail de-ice mode.
The elevators are aerodynamically positioned by mechanically controlled tabs, to provide longitudinal control during normal flight. In addition, a power boost system (hydraulic augmentation) is installed to position the elevators to the down position only if 10 degrees or more of up-tab is commanded.
An elevator load feel system is installed to improve longitudinal control. The system provides a variable force consistent with longitudinal trim movement. Therefore, the control column forces are light at low airspeeds and heavy at high airspeeds.
The rudder is normally operated with hydraulic pressure; however, if hydraulic pressure drops below normal operating pressure, the rudder system will automatically revert to manual operation. Manual operation of the rudder can also be selected by placing the hydraulic power shutoff valve control lever in the off position. The rudder is tab driven during manual operation.

Landing Gear

The airplane has a fully retractable tricycle landing gear arrangement. The nose gear assembly is a dual-wheel, steerable assembly with an oleo strut mounted in the forward, lower section of the fuselage. The two main gear assemblies consist of two oleo struts with a set of dual wheels and brakes attached to each strut. The struts are mounted in the wing root area, aft of the right and left rear wing spar. Each wheel well is completely enclosed by doors when the landing gear is retracted.



Air Conditioning and Pressurization

Cabin pressurization and conditioned air ventilation of the flight and passenger compartments are provided to maintain crew and passenger comfort. Pressurized, conditioned air is delivered through two independent air-conditioning systems designed for parallel operation but capable of independent operation. Engine bleed air is the primary source of air and energy for the air conditioning and pressurization system. During flight, cabin ventilation is also supplemented by a recirculation fan.
Separate, automatic temperature control systems are installed to regulate flight and passenger compartment temperature to the desired settings. All cargo compartments are pressurized. Heat is provided to the forward cargo compartment lining by vented heat air from the electrical/electronics compartment left and right radio racks. In addition, the forward cargo compartment has a fan and heater assembly to assist in maintaining the liner of the forward portion of the cargo compartment above freezing temperatures. The mid cargo compartment is provided with a fan to circulate ambient air.
Pressurization is normally controlled by one of two automatic controllers. Manual control of the Outflow Valve assembly is available by operation of a pressurization wheel on the cockpit pedestal. Ram air may be supplied to the distribution system through the coolant air scoop in the dorsal fin. The Ram Air ventilation feature may be used on the ground or during unpressurized flight when the air conditioning is inoperative.
Also, a separate external ground connector is installed to allow connection of a ground source to supply preconditioned air to the airplane during ground operation if required.

Pneumatics

The pneumatic system supplies bleed air for air conditioning, cabin pressurization, potable water pressurization and ice protection. Normally, engine bleed air is used to supply the system. In addition to engine bleed air, an external ground connection is installed to permit connection of a ground pneumatic power source for engine starting and air conditioning operation. The APU, when operating, can also supply the pneumatic requirements while the airplane is on the ground.

Auxiliary Power Unit (APU)

The gas turbine-powered APU supplies pneumatic and electrical power for ground operation and electrical power while in flight. The APU is located in the aft accessory compartment and is surrounded by a fireproof enclosure. The unit is protected by a fire detection and a fire extinguishing system which can be operated either from the flight compartment or the external ground control panel located in the left aft fuselage.

Ice and Rain Protection

Ice and rain protection is provided by the following systems:

- Airfoil leading edge, ram air scoop, and forward strakes anti-icing and horizontal stabilizer de-icing system and engine and engine nose cowl anti-icing system,
- Windshield and window anti-icing and anti-fogging system,
- Pitot tubes, static ports, and stall warning left transducer anti-icing system,
- Windshield wipers.

Electrical

The airplane is equipped with an AC and DC electrical power system. The systems are divided into two independent systems designated left and right. Two engine-driven AC generators, one on each engine, are normally the primary source of AC power. In the event that engine-driven AC generators fail in flight, or when external power is not available on the ground, auxiliary electrical power may be supplied by an auxiliary power unit driven generator installed in the tail section. The 28-volt DC electrical power is normally supplied by four transformer rectifiers installed in the forward accessory compartment. These T/R's are supplied 115/120-volt AC power from the AC distribution system.
Battery power is supplied by two 14-volt, NiCd batteries connected in series.

Communications

The airplane is equipped with air-to-ground and air-to-air voice flight communication systems. Cockpit / cabin / ground service interphone, passenger address, and voice recorder systems are provided. Flight attendant, pilot, mechanic, and passenger call systems are installed in the airplane. This system includes call lights and chime tones. A separate passenger entertainment system is also provided. All voice communication is provided through VHF radios. ACARS is installed to provide automatic data communications for many functions.

Instrumentation and Navigation

Instrumentation and navigation systems are provided to permit flight under limited visibility conditions. The navigation systems encompass both ground-dependent and independent systems. The systems provide instrument and annunciator displays for the flight crew to determine airplane attitude, airspeed, altitude, vertical speed, heading, course, geographical location, weather avoidance, time, and guidance during approach and landing.

Automatic Flight

The airplane is equipped for automatic flight guidance through the entire envelope of a flight (takeoff to landing). Digital flight guidance computers provide data for functions that follow: autopilot, stability augmentation, speed control, thrust rating, autothrottle, automatic reserve thrust, altitude alert, flight director, EPR synchronization, and on some airplanes Performance Management System.

Fuel

The fuel system consists of three integral tanks - one in each wing and one in the wing center section. The tanks are normally filled through a singlepoint, pressure-fueling adapter, located approximately mid-span of the right wing leading edge. The pressure-fueling control panel is located just inboard of this adapter. A manual defueling valve is located just inboard of the pressure-fueling control panel to permit defueling or fuel transfer through the pressure-fueling adapter.
An overwing gravity fueling adapter is located on top of the outboard section of each wing tank. Some airplanes are also equipped with two auxiliary fuselage fuel tanks; one in the mid cargo compartment and one in the aft cargo compartment. These tanks are not used at CAL.

Fire Warning and Protection

The fire warning and protection system provides for continuous detection of engine and/or APU fire, and crewmember notification through visual, aural, and vocal warnings. The airplane is equipped with fire extinguishing capability for each engine nacelle area or for the auxiliary power unit compartment. Cargo Compartment smoke detection and fire extinguishing is provided by a separate system.

Engines

The airplane is powered by two Pratt and Whitney JT8D axial-flow turbofan engines. In addition to powering the airplane, the engines supply pneumatic power for pressurization, air conditioning, anti-icing, portable water pressure, and de-icing.

Airplane Characteristics and dimensions
McDonnell Douglas **MD81**

Aircraft Dimensions

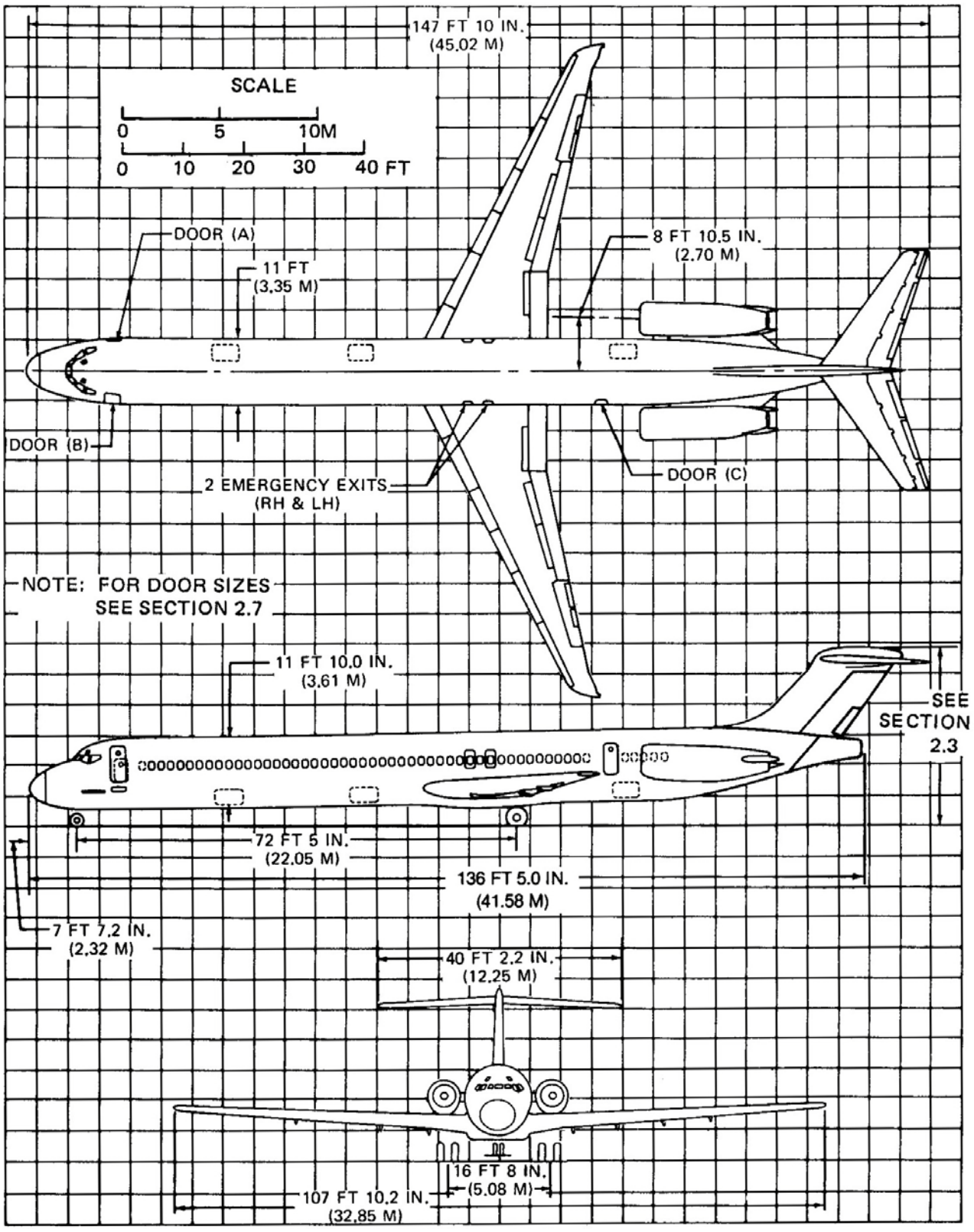
	metric	imperial
Overall length	41,58	136 ft. 5 in.
Height	9,20	30 ft. 2 in.
Fuselage diameter	3.34	131,6 in.
	5.28	17 ft. 4 in.
	45.00	147 ft. 8 in.
Wingspan (geometric)	32,85	107 ft. 10 in.
Wing Tip Height	2,80	9 ft. 1 in.
Wheel base	22,05	72 ft. 5 in.
Fuselage Height	4,8 m^2	15 ft. 7 in.

Basic Operating Data

	metric	imperial
Engines	Pratt & Whitney JT8D-209 Series	
Engine thrust range	303-320 kN	68,000-72,000 lbs
Typical passenger seating	172 (1-class) 155 (2 class)	
Range (with maximum passengers)	29,100 km.	1,570 nm.
Maximum operating Mach number (Mno)	0.76 Mach	
CARGO volume	35,5 m^3	1,253 ft^3

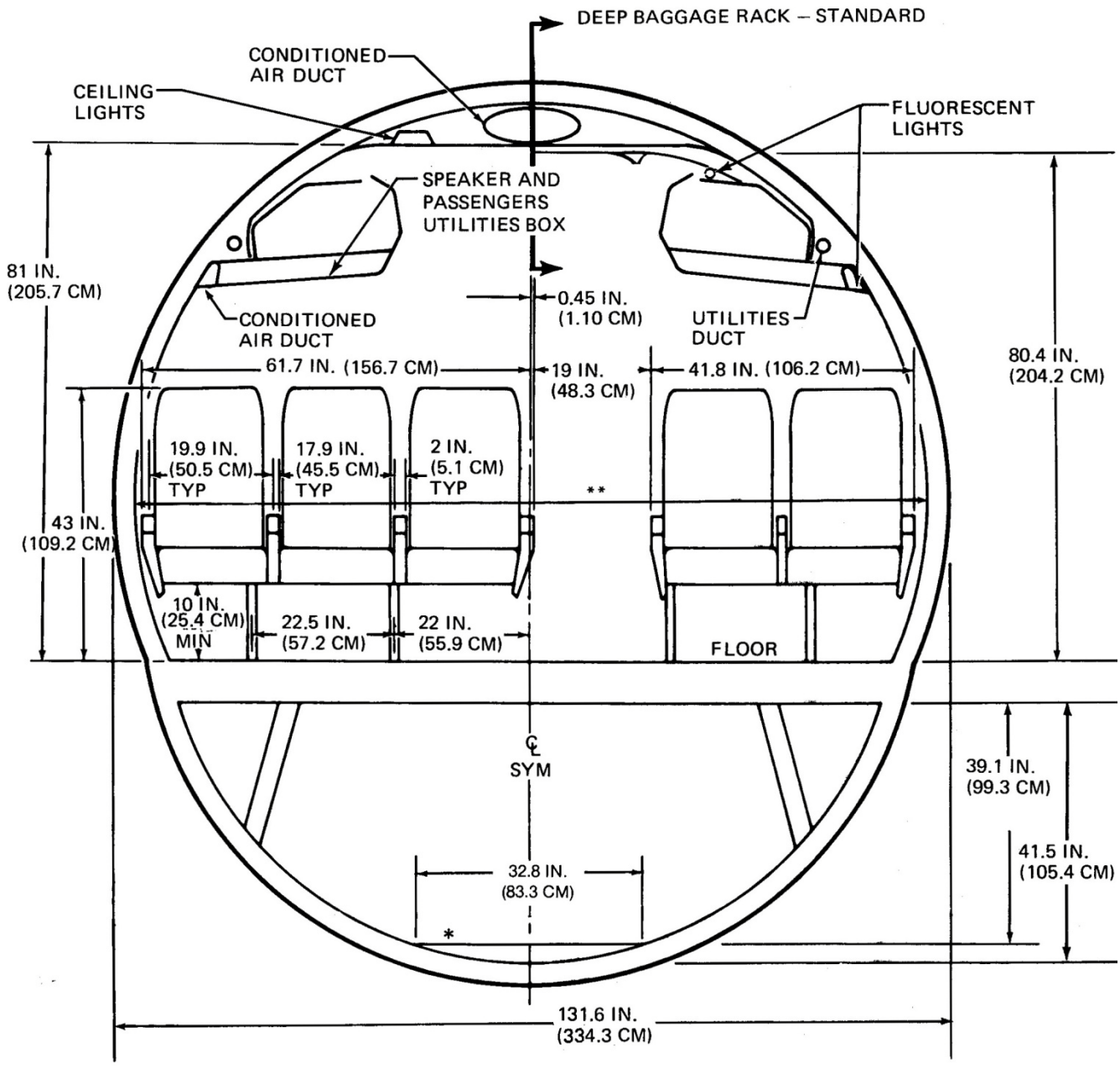
Design Weights

	metric	imperial
Maximum Ramp Weight	63,958 kilograms	141 lbs. (x1000)
Maximum Take Off Weight (MTOW)	63,504 kilograms	140 lbs. (x1000)
Maximum Landing Weight (MLW)	58,061 kilograms	128 lbs. (x1000)
Maximum Zero Fuel Weight (MZFW)	53,525 kilograms	118 lbs. (x1000)
Maximum Fuel Capacity	22,129 liters	5,846 US Gal.
Typical Operating Weight Empty	35,330 kilograms	77,9 lbs (x1000)
Typical Volumetric Payload	18,195 kilograms	40,1 lbs (x1000)



General Dimensions – **Model MD80 Series** excluding MD87

Passenger Compartment Cross-Section



*FLAT FLOOR STANDARD ON MD-80 SERIES IN THE CONSTANT FUSELAGE SECTION (EXCEPT MD-87 AFT CARGO COMPARTMENT)

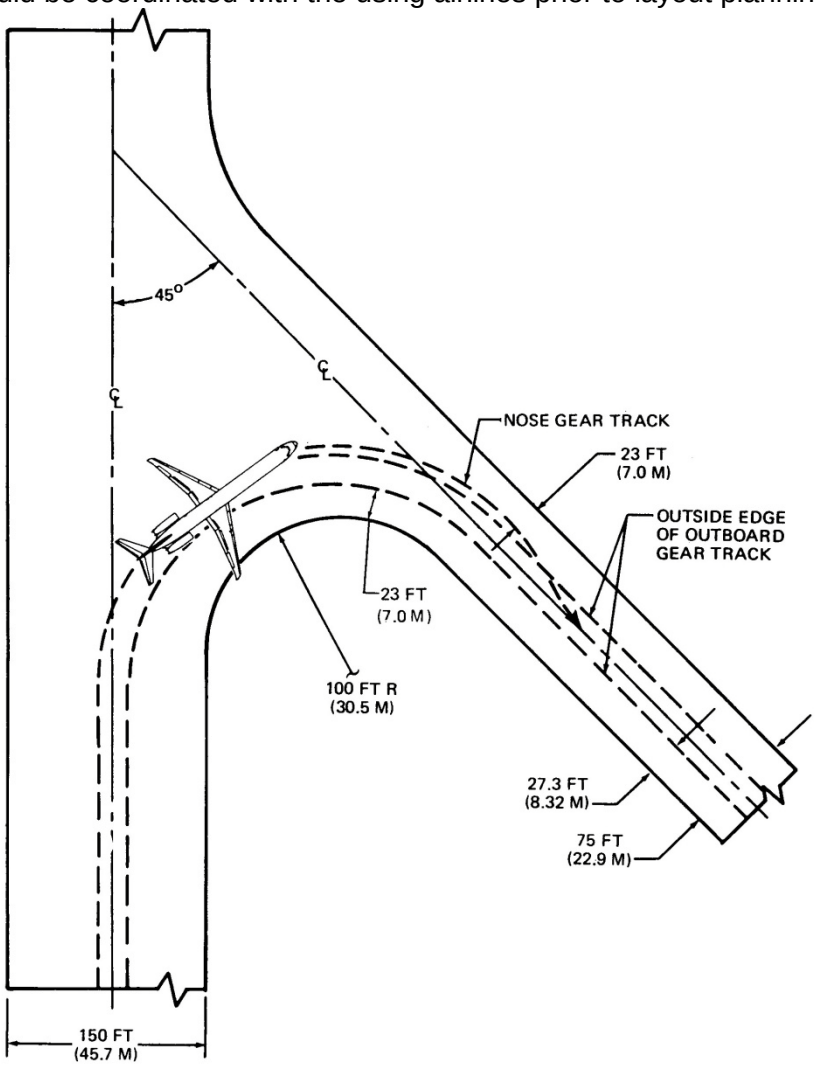
** TRIM TO TRIM 123.7 IN. (314.2 CM)

Example of the Economy Class

Model MD80 Series

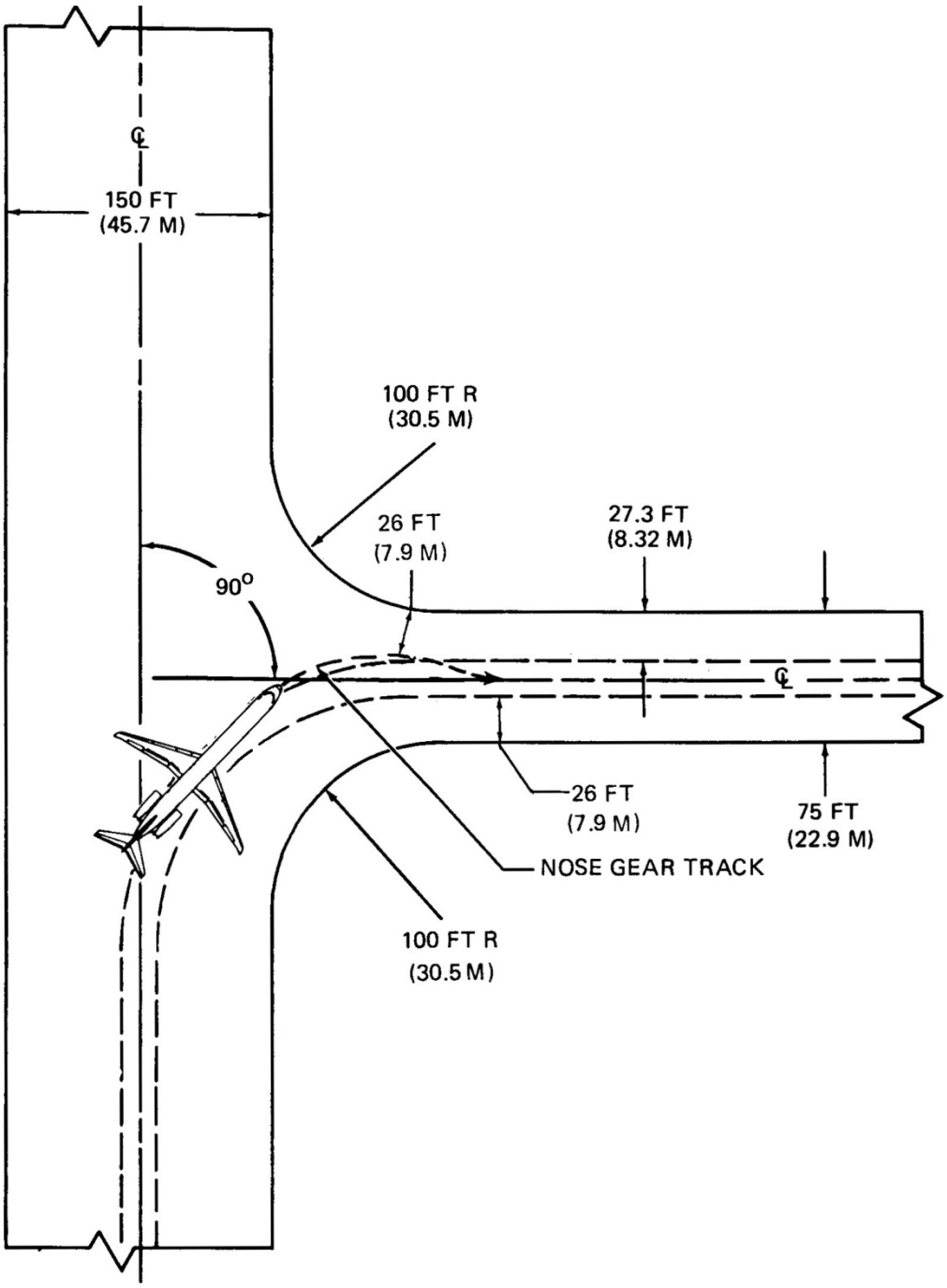
Ground Maneuvering

For ease of presentation, these data have been determined from the theoretical limits imposed by the geometry of the aircraft, and where noted, provide for a normal allowance for tire slippage. As such, they reflect the turning capability of the aircraft in favorable operating circumstances. These data should be used only as guidelines for the method of determination of such parameters and for the maneuvering characteristics of this aircraft.
In the ground operating mode, varying airline practices may demand that more conservative turning procedures be adopted to avoid excessive tire wear and reduce possible maintenance problems.
Airline operating procedures will vary in the level of performance over a wide range of operating circumstances throughout the world. Variations from standard aircraft operating patterns may be necessary to satisfy physical constraints within the maneuvering area, such as adverse grades, limited area, or high risk of jet blast damage. For these reasons, ground maneuvering requirements should be coordinated with the using airlines prior to layout planning.



Runway and Taxiway Turn Paths at more than 90° turn

Note: Before determining the size of the intersection fillet, check with the airlines regarding the operating procedures that they use and the aircraft types that are expected to serve the airport.



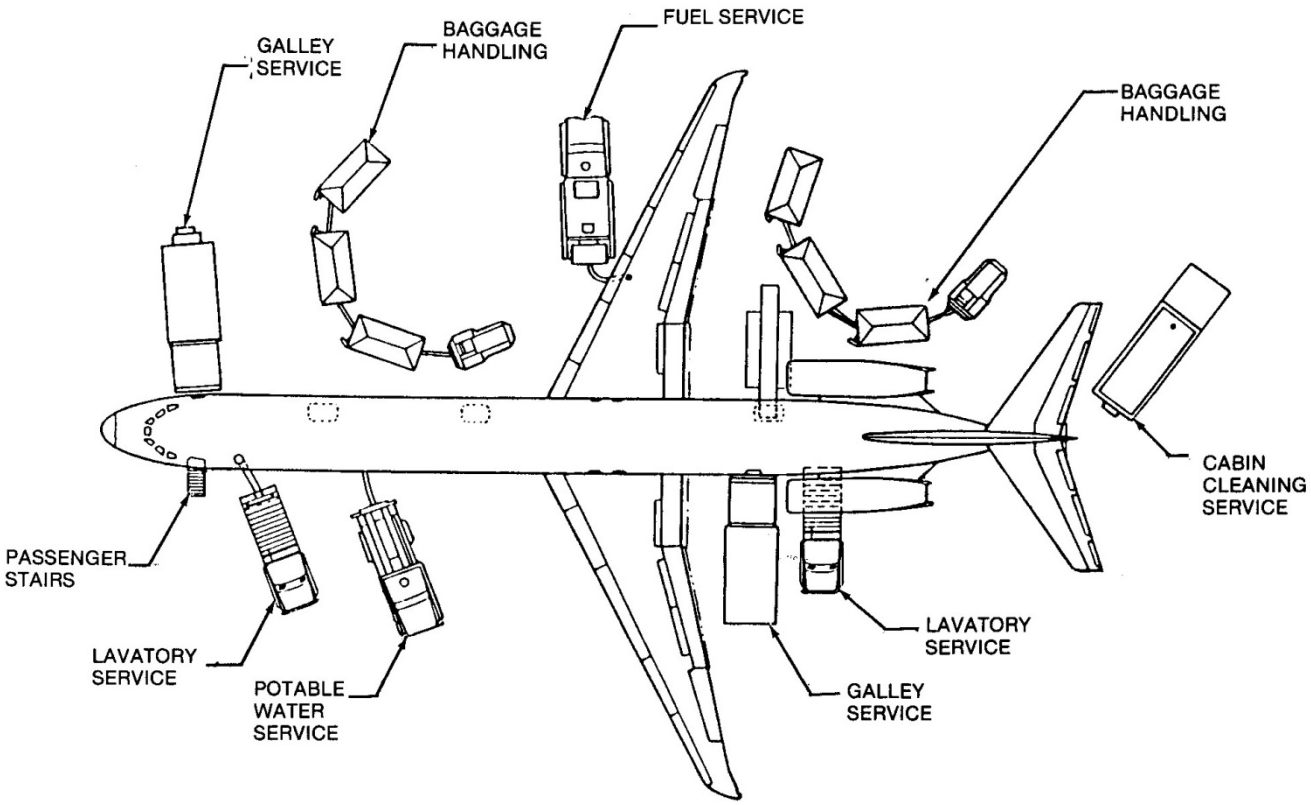
Runway and Taxiway Turn Paths at 90° turn

Note: Before determining the size of the intersection fillet, check with the airlines regarding the operating procedures that they use and the aircraft types that are expected to serve the airport.

Terminal Servicing

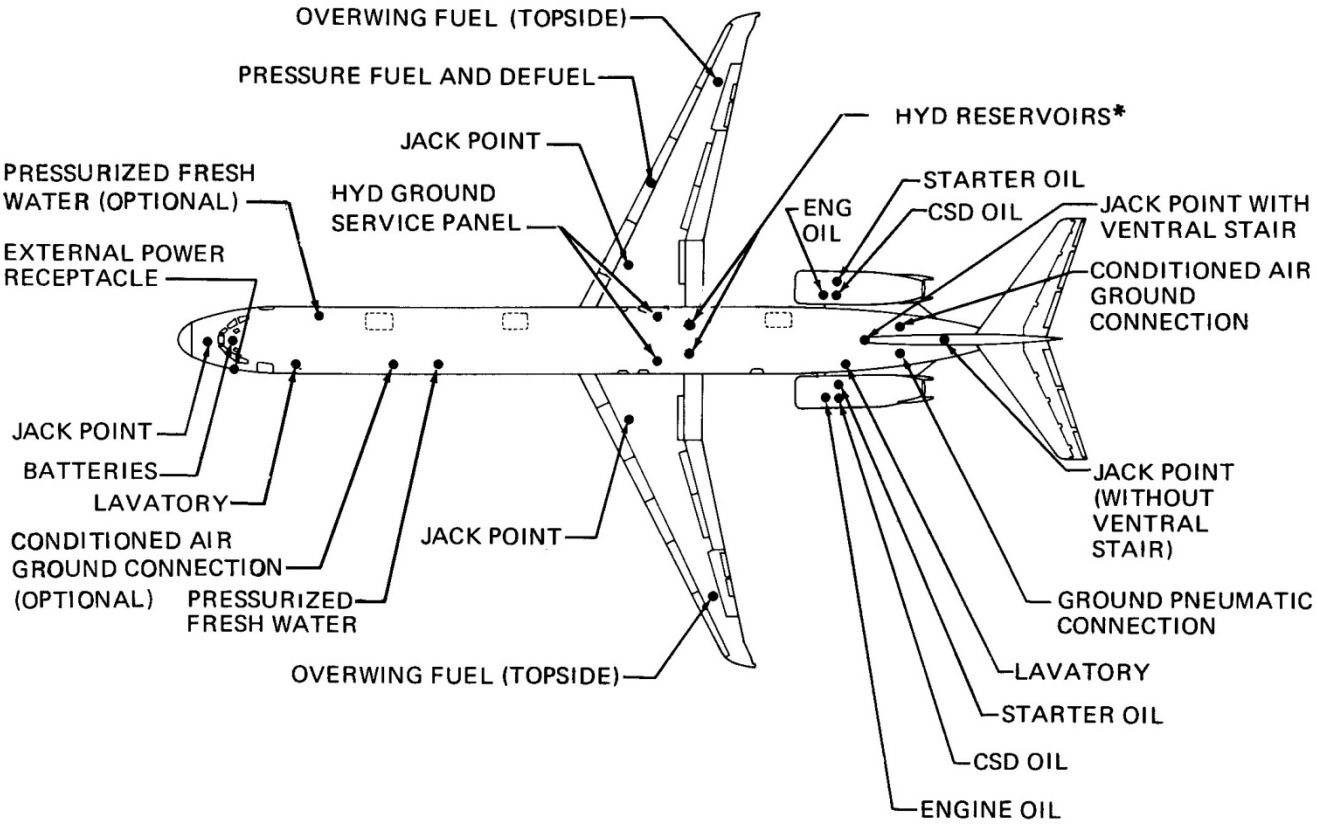
During turnaround at the terminal, certain services must be performed on the aircraft, usually within a given time, to meet flight schedules. This section shows service vehicle arrangements, schedules, locations of service points, and typical service requirements. The data presented in this section reflect ideal conditions for a single airplane. Service requirements may vary according to airplane condition and airline procedure.

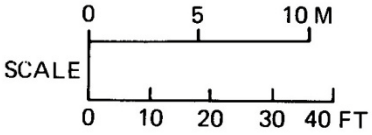
It shows typical arrangements of ground support equipment during turnaround. As noted, if the auxiliary power unit (APU) is used, the electrical, air start, and air-conditioning service vehicles would not be required. Passenger loading bridges or portable passenger stairs could be used to load or unload passengers.



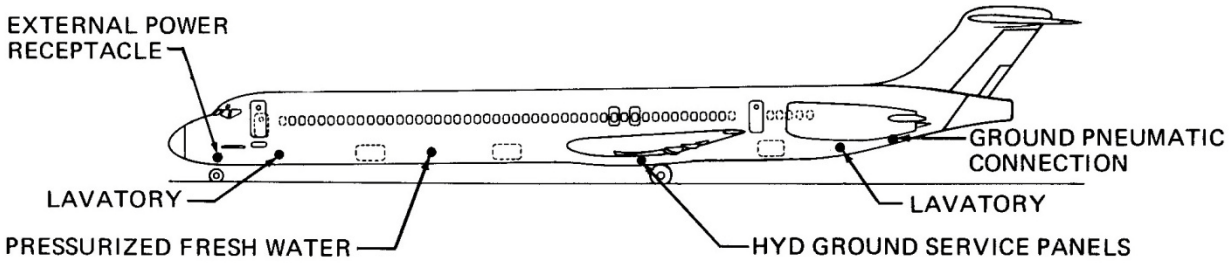
Airplane Servicing Arrangement – Typical Turn-Around **Model MD80 Series** excluding MD87

This section shows the locations of ground service connections in graphic form.





TOP VIEW



SIDE VIEW

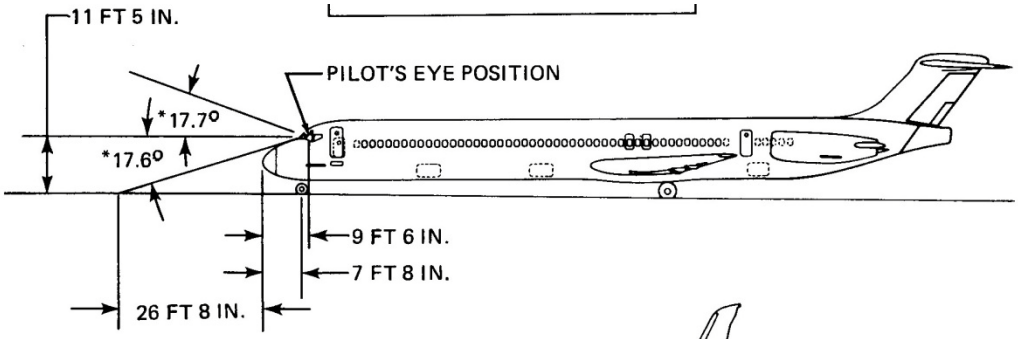
*(ACCESS THROUGH WHEEL WELLS)

Ground Servicing Connections – **Model MD80 Series** excluding MD87

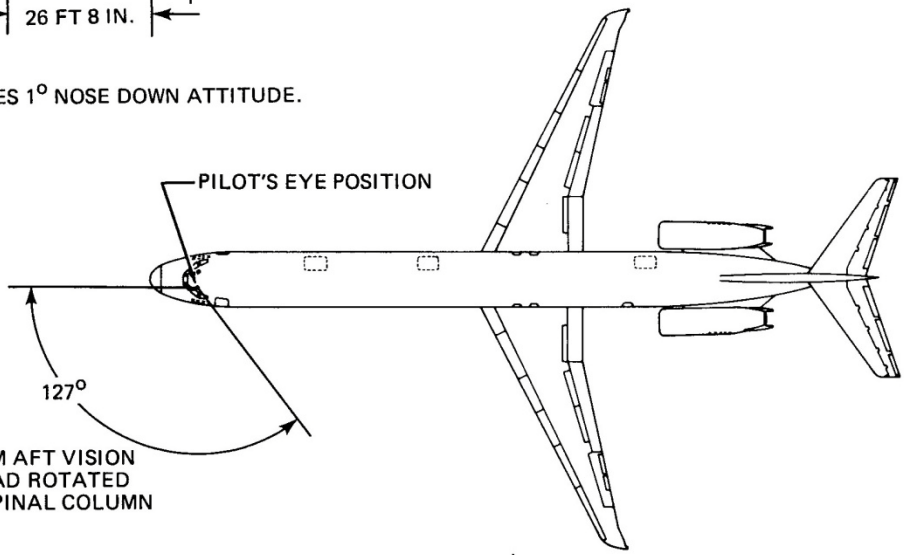
Chapter Two

Basic Pilot Information

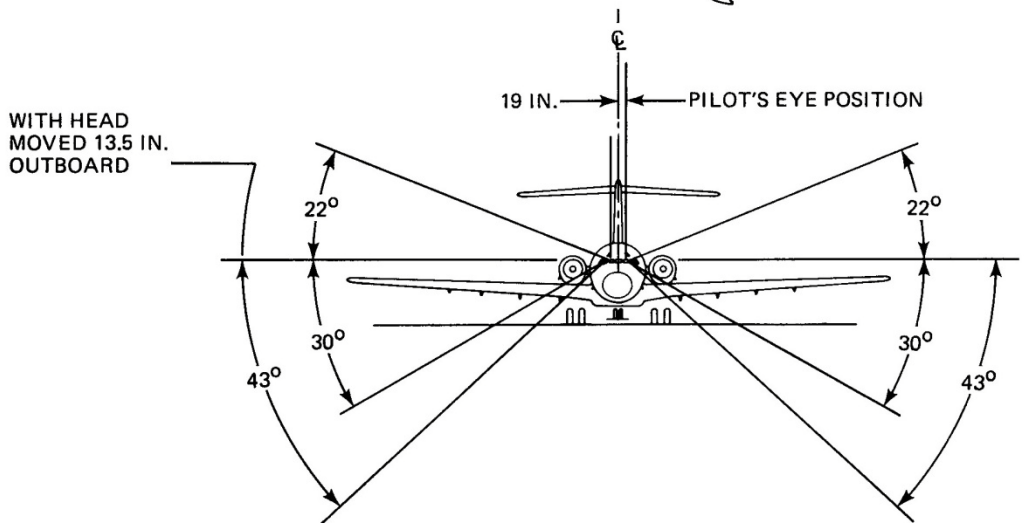
Pilot's view reference point is approximately 11.5 feet from the ground, with ground visibility limited to 36.4 feet looking down at an angle of 17.6 degrees. For proper engine and aircraft operations, the captain must view the engine parameters as the engines and wings **are not** visible from the flight deck. Pilot's rearward view is based on the captain's eye reference point with 127 degrees of travel.



*INCLUDES 1° NOSE DOWN ATTITUDE.



MAXIMUM AFT VISION
WITH HEAD ROTATED
ABOUT SPINAL COLUMN



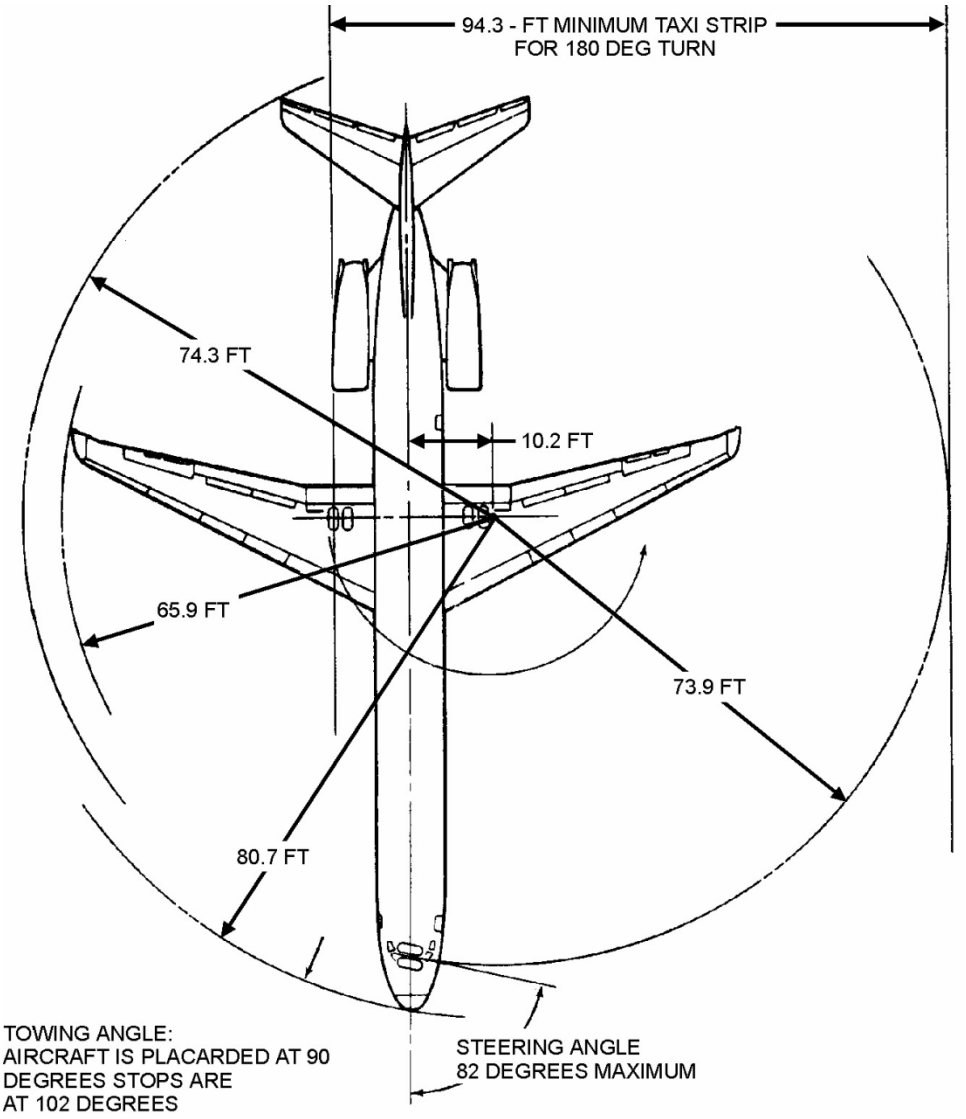
WITH HEAD
MOVED 13.5 IN.
OUTBOARD

Taxi phase

1. The nose wheel steering and the engine thrust are used to taxi the airplane.
2. Set takeoff trim depending on weight.
   Typical **trim position is 7 – 9 degrees**.
3. Set takeoff flap position.
   Recommended flap setting is flaps 11.
4. Make sure you have the necessary clearance when you go near a parked airplane or other structures.
5. When the APU in the taxi airplane or the parked airplane is on you must have a minimum clearance of 50 feet between the APU exhaust port and the adjacent airplane's wingtip (fuel vent).
6. The MD-80 typically has enough power to coast on its own power, with 0% idle at average gross weights. Apply 10 – 20% N1 to roll the aircraft, then, pull thrust back to idle.
7. The taxi speed must not be more than approximately 30 knots. Speeds more than 30 knots added to long taxi distances would cause heat to collect in the tires.
   Recommended taxi speed is 20 knots.
   Beware of changing GS numbers due to tailwinds during taxi.
8. Before making a **turn**, decrease the speed of the airplane to a speed of approximately **8 to 12 knots**. Make all turns at a slow taxi speed to prevent tire skids.
9. Do not try to turn the airplane until it has started to move.
10. Make sure you know the taxi turning radius.
11. Monitor the wingtips and the horizontal stabilizer carefully for clearance with buildings, equipment, and other airplanes.
12. When a left or right engine is used to help make a turn, use only the minimum power possible.
13. Do not let the airplane stop during a turn.
14. Do not use the brakes to help during a turn. When you use the brakes during a turn, they will cause the main and nose landing gear tires to wear.
15. When it is possible, complete the taxi in a straight-line roll for a minimum of 10 feet.
    Note: This will remove the tensional stresses in the landing gear components, and in the tires.
16. Use the Inertial Reference System (IRS) in the ground speed (GS) mode to monitor the taxi speed if applicable.
17. If the airplane taxi speed is too fast (with the engines at idle), operate the brakes slowly and smoothly for a short time.
    Note: This will decrease the taxi speed.
18. If the taxi speed increases again, operate the brakes as you did in the step before.
19. Always use the largest radius possible when you turn the airplane.
    Note: This will decrease the side loads on the landing gear, and the tire wear will be decreased.

Taxi Phase (con't)

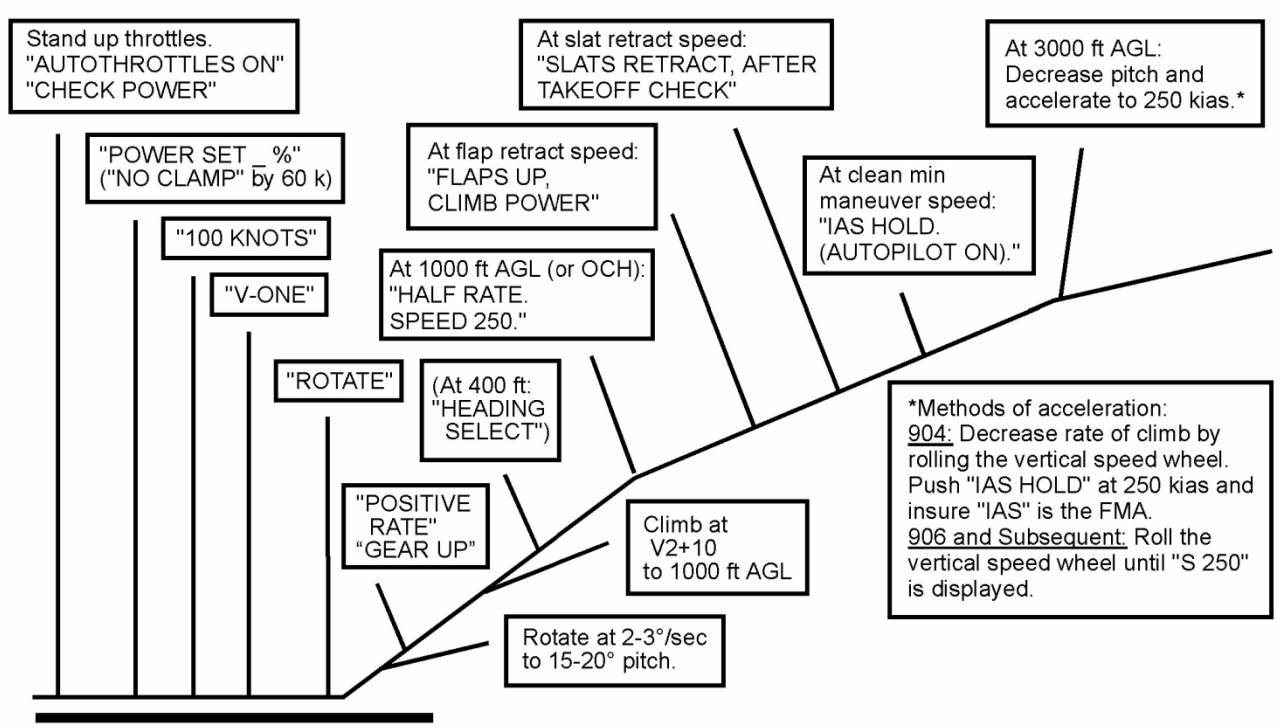
20. Extra care must be given to turn the aircraft due to the fuselage length and wingspan. A minimum distance from the edge of the pavement must be maintained to reverse the aircraft's direction. Minimum distance is 94.3 feet:



21. Operate the brakes to stop the airplane.
22. Set the parking brake after the airplane has stopped.

Takeoff (TO) phase

1. Restart 2nd engine if on single-engine taxi.
2. Align aircraft with runway centerline.
3. Increase power to approximately 60% N1 for 5 to 10 seconds.
4. Watch engine problems or aircraft alarms.
5. Increase power smoothly to pre-determined N1 speeds based on aircraft takeoff weight, (88% - 105% N1). This can either be done manually or using the auto throttle with the autopilot engaged.
6. At VR, rotate aircraft 10 degrees upwards.
7. Hold nose at +10 degrees until positive rate of climb is confirmed, then raise landing gear after V2.



Normal TAKEOFF
FLAPS 11 or 15

8. Set initial climbout speed to V2+20 knots.
9. Maintain +2000 FPM climb to 2000 feet at V2+20.
   Climb at 250 knots +2500 fpm after 2000 feet to 10,000 feet.
10. At 2000 feet, begin slat retraction.
    Maximum slat speed limits are:

FLAP Position	Maximum Speeds (knots)
0° - 13°	**280**
15° - 20°	**240**
21° - 25°	**220**
26° - 30°	**200**
31° - 40°	**195**

SLAT Position	Maximum Speeds (knots)
Mid position	**280**
Full extended	**240**

11. Increase speed to 200 knots and in accordance with ATC instructions
    (max 250 knots below 10,000 feet).
12. For full maneuverability beneath 10,000 feet, slats must be fully retracted with aircraft at minimum safe airspeed.

Climb (CL) phase

1. Once climb thrust or airspeed is set, the autopilot will compensate for environmental condition changes automatically during the climb.
2. It is recommended that the aircraft be flown manually up to 15,000 feet, weather and ATC traffic conditions permitting.
   However, in high traffic conditions, to easy the workload of the pilot, the autopilot MCP altitude intervention may be engaged above a minimum altitude of 80 feet with the landing gear up.
3. Climb settings use a 10 - 20%.
   De-rate the thrust up to 10,000 feet, then increases linearly to max thrust at 30,000 feet.
4. For en-route climb, climb at a rate of 1800-2500 FPM (Feet Per Minute), pursuant to ATC and traffic conditions. If there are no altitude or airspeed restrictions, accelerate to the recommended speed. The sooner the aircraft can be accelerated to the proper climb speed, the more fuel and time efficient the flight.
5. As engine and wing icing may occur during the climb and descent, the engine anti-icing system should be in the AUTO or ON position whenever icing is possible.
   Note: Failure to do so may result in engine stall, overheating, or engine damage.
6. For normal economy climb, follow ATC speed restrictions of 250 knots below 10,000 feet
   If permitted by ATC and no speed restriction below 10,000 feet, increase speed to 290 knots.
   Above 10,000 feet, climb at 320 knots or .76 Mach.
   Climb speed table is as follows:

Altitude	Speed (knots)
Sea Level till 10.000 feet (FL100)	250
Above 10.000 feet (FL100)	320 / 0.76 Mach

7. Max climb speed is 320 knots until reaching .76 Mach at crossover.
8. For engine out climb, speed and performance various with gross weight and altitude, however 250 knots at 1000 - 1500 FPM may be used.
9. Set standard barometer above airport transition level (depends on local airport geography).
10. Typical climb profile is as follows:
    - 2500 fpm: below 24,000 feet
    - 1800 fpm: FL240 - FL350
    - 800 fpm: FL350 - FL370
    - 300 fpm: above FL370

Cruise (CR) phase

1. **Cruise** at .76 Mach.
2. **Hi-speed** cruise at .78 at fuel burn penalty.
3. **Typical cruise altitude** 20,000s - low 30,000 Flight Levels.
4. **Fuel burn is** 3000 PPH (Pounds Per Hour) per engine at FL330.
5. **Headwinds** will increase engine power, reduce cruise speed and decrease range.
6. **Tailwinds** will decrease engine power, increase cruise speed and increase range.
7. Follow previously entered FMC waypoints.
8. **Fuel Freeze**
   Extended operation at cruise altitude will lower fuel temperature.
   Fuel cools at a rate of 3 degrees C per hour, with a max of 12 degrees C in extreme conditions. Fuel temperatures tend to follow TAT (Total Air Temperature).
   To raise fuel temperature/TAT, a combination of factors can be employed:
   - Descend into warmer air.
   - Deviate to warmer air.
   - Increase Mach speed.

   An increase of 0.01 Mach will increase TAT by 0.5 – 0.7 degrees C.
9. **Increased fuel burn** can result from:
   - High TAT
   - Lower cruiser altitude than originally planned.
   - More than 2,000 feet above the optimum calculated altitude.
   - Speed faster or slower than .76 Mach cruise.
   - Strong headwind.
   - Unbalanced fuel.
   - Improper aircraft trim.
10. **Fuel penalties** are:
    - 2000 feet above optimum - 3% increase in fuel usage
    - 4000 feet below optimum - 5% increase in fuel usage
    - 8000 feet below optimum - 12% increase in fuel usage
    - Mach .01 above Mach .76 - 3% increase in fuel usage
    - High speed cruise of Mach .81 - 19% increased fuel usage
11. In the case of **engine out cruise**, it may be necessary to descend.
12. Trim aircraft for proper elevator alignment.
13. In case of engine out cruise, trim rudder for directional alignment.
14. Deviate from flight plan for weather, turbulence, or traffic as necessary after receiving clearance from ATC.

Descent, Approach and Landing phase

1. Descend at pre-determined TOD (Top of Decent)
2. Descend at 274 knots above 10,000 feet.
   High speed descent will be 320 knots.
3. Use speedbrakes or thrust to minimize vertical path error.
4. Proper descent planning is necessary to ensure proper speed and altitude at the arrival point.
   Distance required for descent is 3NM/1000 feet.
   Descent rates are as follows:

Intended Speed	Descent Rate CLEAN Configuration	With SPEEDBRAKES
0.76 Mach / 274 knots	2500 FPM	5500 FPM
250 knots	1400 FPM	3600 FPM
VREF 28 + 80 knots	1100 FPM	2200 FPM

5. Plan to descent so that your aircraft is at approximately 10,000 feet above ground level / 250 knots / 30 miles from airport.
6. Using speedbrakes will reduce the times and distances by half.
7. Arm speedbrakes and auto-braking on initial descent.
8. Set airport altimeter below transition level.
9. Avoid using the landing gear for drag above 180 - 200 knots to avoid damage to doors or passenger discomfort.
10. **Recommended approach planning**, ATC and airport rules permitting:
    - 230 knots below 10,000 feet, 30 miles from airport.
    - 180-190 knots, 23 miles from airport.
    - 170 knots, 16 - 17 miles from airport.
    - VREF, 5 - 7 miles from airport.
11. **In case of rapid descend due to depressurization**, bring aircraft down to a safe altitude as smoothly as possible. Using the autopilot is recommended.
    Check for structural damage. Avoid high load maneuvering.
12. **Stall recovery** can be accomplished by lowering the aircraft's nose and increasing power at once to gain airspeed. Beware of terrain.
    Accelerate to VREF 15 + 80 knots. Do not retract gear until confirmed stall recovery and positive rate of climb.
    Keep nose at 5 degrees above the horizon or less.
13. If deployed, do not retract slats during the recovery, as it will result in altitude loss.
14. In the event of engine out approach, approach at VREF+5 at flaps 28.
15. Under normal conditions **land at VREF at flaps 28.**
    In the case of short field approach, slow to VREF at flaps 40.
16. The MD-80 Series is a CAT-II aircraft, meaning the aircraft is capable of landing on autopilot in conditions where visibility is down to 50 feet AGL.

17. **ILS Approach** - During initial maneuvering for the approach, extend flaps to 11 and slow to 180-200 knots. When the localizer is alive, extend flaps to 15 and slow to 170 knots.
    At one dot below G/S intercept, extend the landing gear and flaps to 28. Begin slowing to final approach speed. At the final approach fix, extend flaps to 28 (flaps 40 for short field) and slow to VREF + 5. Be stabilized by 1000 feet above field level. This means, gear down, flaps 28, VREF +5 and engines spooled.
    Plan to cross the runway threshold at VREF.
18. **Visual Approach** - Similar to the ILS approach.
    The major difference is that aircraft must be stabilized by 500 feet above field level, as opposed to 1000 feet.
19. When intercepting the G/S, trim nose up slightly to avoid excessive nose down pitch.
20. Land the aircraft.
    At average gross weights, at flaps 28 or 40 at VREF, the MD80 Series will have a 2 nose up pitch. When landing the aircraft, flare to 3 degrees nose up.
21. Disengage (autopilot auto-throttle will disengage) reverse thrust at 80 knots.
22. Disengage auto-braking at 60 knots or as necessary.
23. Turn off onto high-speed taxiways at 30 knots or less.
24. Decelerate to 8 - 12 knots for 90 degree turns.
25. Taxi to gate.

Speed Reference Cards
100,000 lbs / flaps 11°

TAKEOFF

FLAP SETTING	11
V1	115
V2	119
VR	127
FLAPS UP	132
SLAT RET	165

Not to be used for real-world flight performance.

Speed Correction

Add 1/2 the forward speed component in knots, and all of the gust component to your reference speed.

100,000 LBS

MANEUVERING

CLEAN	205
SLATS EXTEND	160
FLAPS 11	141
FLAPS 15	138
FLAPS 28	128

LANDING

28 / LND	119
40 / LND	115
0 / T.O.	145
UP/RET	171

110,000 lbs / flaps 11°

TAKEOFF

FLAP SETTING	11
V1	117
V2	125
VR	132
FLAPS UP	138
SLAT RET	173

Not to be used for real-world flight performance.

Speed Correction

Add 1/2 the forward speed component in knots, and all of the gust component to your reference speed.

110,000 LBS

MANEUVERING

CLEAN	215
SLATS EXTEND	168
FLAPS 11	148
FLAPS 15	144
FLAPS 28	135

LANDING

28 / LND	125
40 / LND	121
0 / T.O.	152
UP/RET	180

120,000 lbs / flaps 11°

TAKEOFF

FLAP SETTING	11
V1	125
V2	131
VR	138
FLAPS UP	144
SLAT RET	181

Not to be used for real-world flight performance.

Speed Correction

Add 1/2 the forward speed component in knots, and all of the gust component to your reference speed.

120,000 LBS

MANEUVERING

CLEAN	225
SLATS EXTEND	176
FLAPS 11	154
FLAPS 15	151
FLAPS 28	140

LANDING

28 / LND	131
40 / LND	127
0 / T.O.	159
UP/RET	188

130,000 lbs / flaps 11°

TAKEOFF

FLAP SETTING	11
V1	132
V2	137
VR	144
FLAPS UP	149
SLAT RET	188

Not to be used for real-world flight performance.

Speed Correction

Add 1/2 the forward speed component in knots, and all of the gust component to your reference speed.

130,000 LBS

MANEUVERING

CLEAN	234
SLATS EXTEND	183
FLAPS 11	160
FLAPS 15	157
FLAPS 28	146

LANDING

28 / LND	136
40 / LND	132
0 / T.O.	165
UP/RET	195

140,000 lbs / flaps 11°

TAKEOFF

FLAP SETTING	11
V1	138
V2	143
VR	150
FLAPS UP	155
SLAT RET	195

Not to be used for real-world flight performance.

Speed Correction

Add 1/2 the forward speed component in knots, and all of the gust component to your reference speed.

140,000 LBS

MANEUVERING

CLEAN	215
SLATS EXTEND	168
FLAPS 11	148
FLAPS 15	144
FLAPS 28	135

LANDING

28 / LND	125
40 / LND	121
0 / T.O.	152
UP/RET	180

Chapter Three Panel Description 2

Panel Description

General

Normal- or Wide screen

The CLS MCDonnell Douglas MD80 Series comes with many sub panels and individual instruments, but also with a choice between a standard 5:4 ratio cockpit panel or a wide-screen 16:9 ratio version. When you activate the aircraft, a screen opens where you can select either the (5:4) or (16:9) view simply by clicking the screen of your choice. This will bring up the chosen panel. (See screenshot) Sub-panels and individual instruments are not related to monitor sizes.

Panels, instruments and more

We'll show you the description and operation of the most important panels and/or instruments. For other elements, we'll show you how to recall them.

The easiest way to find out which panels, instruments or clusters of instruments are available, is by using the FSX menu option **Views - Instrument Panel** (see the screenshot below).
Using these views you've got a good overview what's available within the 2D cockpit view. As you can see on the screenshot below, it's a huge list and worth trying all the individual instruments by yourself. This manual explains all the ins and outs of each individual panel, instrument, light unit, switch, knob, selector etc. More information related to these panels and/or instruments including how they function under different flight conditions, are explained in the flight tutorial from KATL (Atlanta) to KMIA (Miami). See Chapter 4 for this tutorial.

Although not shown here, the wide-screen main instrument panel view covers both the captain's and co-pilot's instrument panels as one screen. In case you prefer to have only the captains- or co-pilots panel in view, you can select this via the FSX menu option.

The only consequence of using a non wide-screen bitmap on a wide-screen monitor, is the distortion of the instruments.
As long as you can live with that, you're free to use any panel you want.

Panel or instrument **opening**

As we mentioned on the previous page, panels such as the overhead or groups of instruments, can be called-up via the FSX menu. A much easier way is by simply clicking on an instrument, which will activate a popup of that particular instrument or a group/cluster of instrument and lights. This is, for example, applicable for the captains and/or co-pilots main instrument panels, section PFD[1] and ND[2] with additional instruments or a cluster of engine related instruments.
If you're not sure, just go to the FSX menu and select the instrument or cluster you want. from the Instrument Panel list.

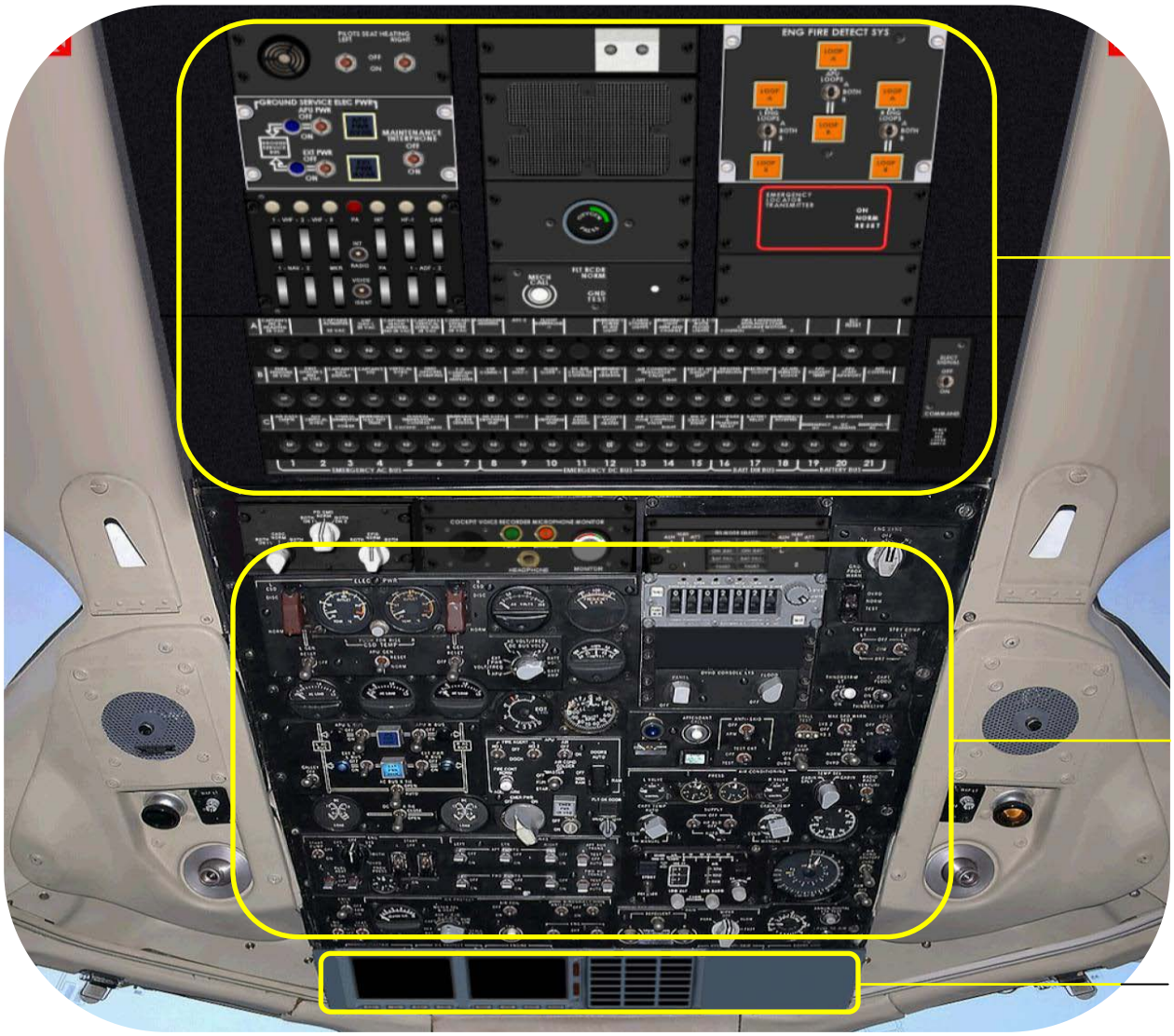
Panel or instrument **closing**

Generally, closing panels is done by clicking the red **X**. As an example, we have used the Side Panel (see screenshot). Normally each panel is equipped with two crosses. If there's no red cross visible, then just click the instrument itself, which will then return to it's normal size. Another option in closing a panel, instrument or cluster of instruments, is using the previously mentioned FSX menu Views - Instrument Panel.

The following panels are equipped with red crosses:
- Overhead panel overview and individual panels.
- Pedestal.
- Radio Stack.
- FMS MCDU.
- Side Panel.

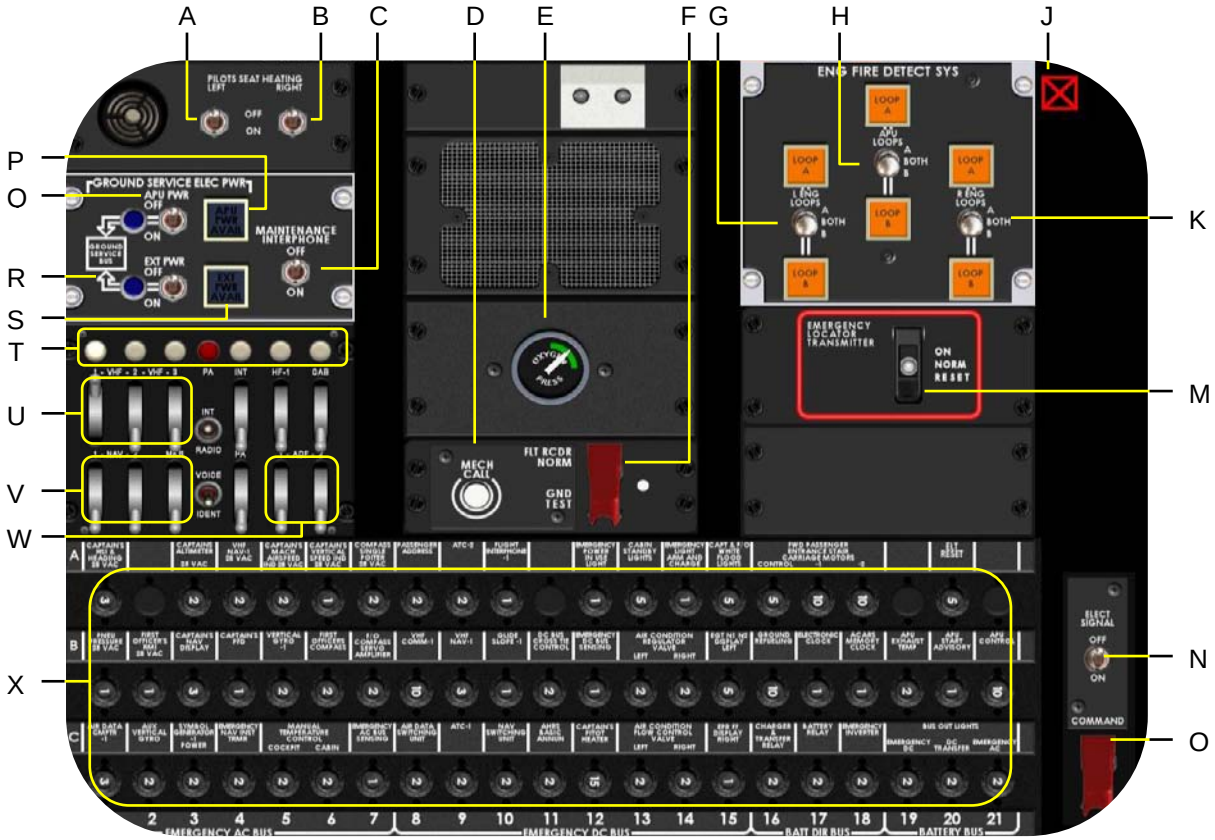
[1] PFD - Primary Flight Display
[2] ND = Navigation Display

Overhead panel
General



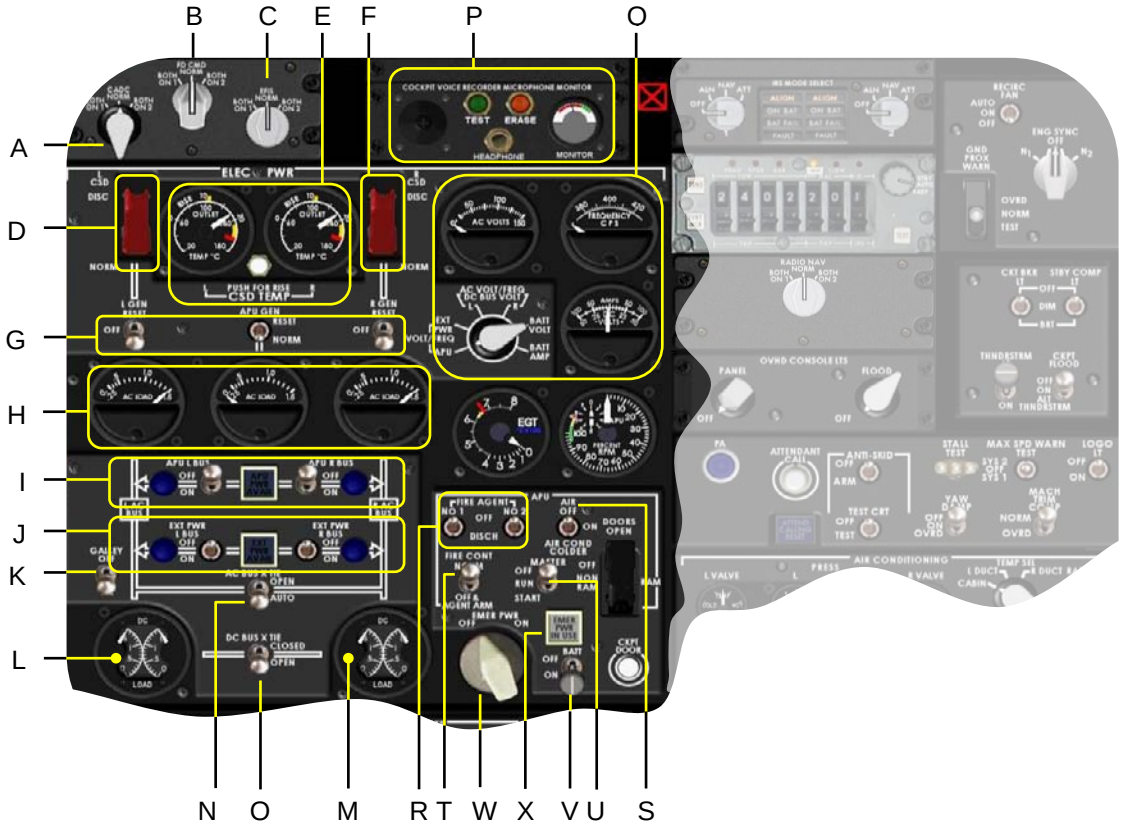
Because of the complexity and the way we've simulated the overhead panel, there was a need to split it into three sections. Each section will have every part explained and on the following pages each section is explained in-depth and where needed, additional background information is provided.

Overhead panel
Overview (AFT section)



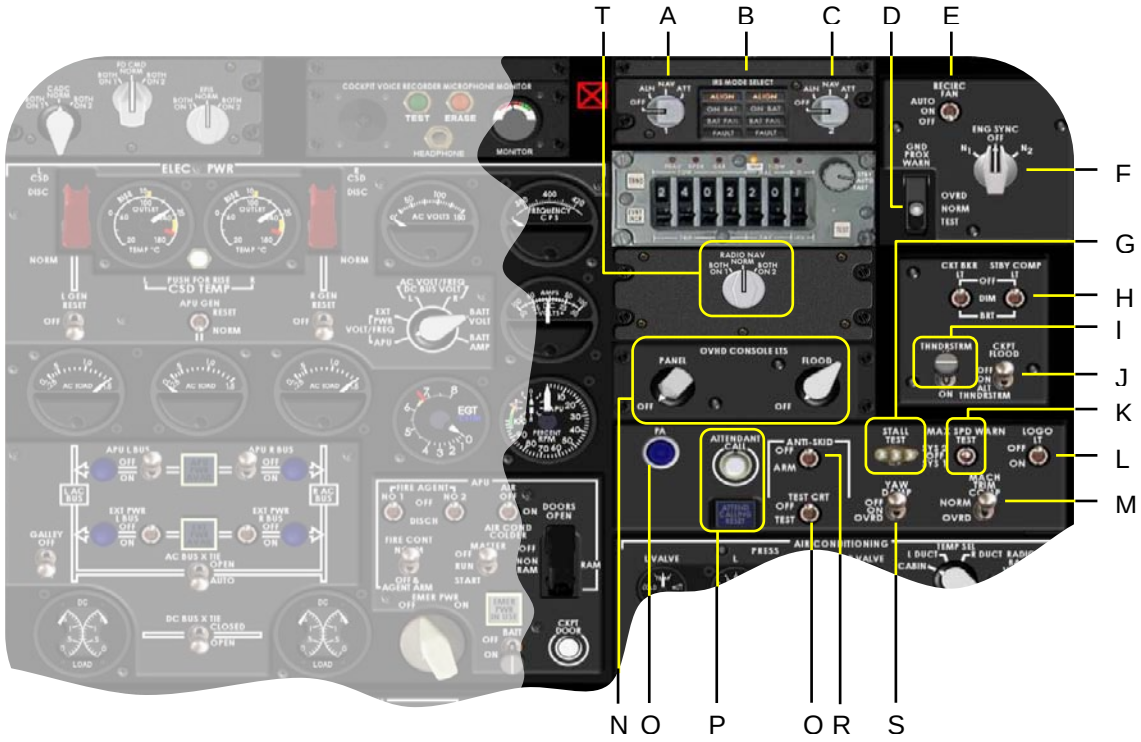
A L Pilot seat heating (not modeled).
B R Pilot seat heating (not modeled).
C MAINTENANCE INTERPHONE switch.
D MECH CALL button. Allows the pilot to contact the ground staff.
E CREW OXYGEN pressure indicator.
F FLT RCDR switch. Allows the pilot to perform a GND TEST.
G L ENG LOOP A-BOTH-B selector. Activation of LOOP A or B or both.
H APU LOOP A-BOTH-B selector. Activation of LOOP A or B or both.
J Panel closing symbol.
K R ENG LOOP A-BOTH-B selector. Activation of LOOP A or B or both.
M ELT selector switch.
N ELECT SIGNAL switch.
O Guarded command switch.
P APU PWR AVAIL light.
Q APU PWR switch. Allow you to select GROUND SERVICE to the aircraft.
R EXT PWR switch. Allow you to select GROUND SERVICE to the aircraft.
S EXT PWR AVAIL light.
T MIC buttons. Press either microphone button to start communication with. Depressed button illuminates.
U VHF COMM 1-2-3 volume control.
V VHF NAV 1-2 and MKR volume control.
W ADF 1-2 volume control.
X Circuit Breaker panel (not modeled).

Overhead panel
Overview (MID section part I)



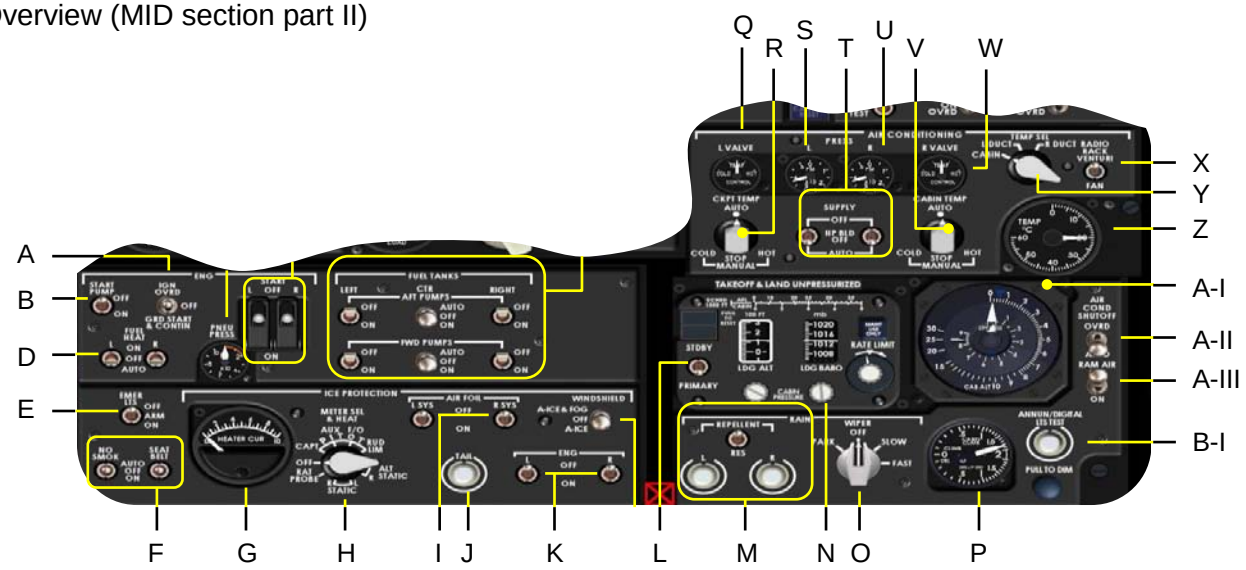
A CADC switch
B FD CMD switch (not modeled).
C EFIS switch (not modeled).
D L ENG CSD disconnect switch.
E L-R CSD OIL TEMP indicators.
F R ENG CSD disconnect switch.
G L-R-APU GEN RESET switches.
H L-R-APU AC LOAD indicators.
I APU L-R BUS switches.
J EXT PWR L-R BUS switches.
K GALLEY supply switch.
L L DC LOAD indicator.
M R DC LOAD indicator.
N AC BUS X TIE switch.
O DC BUS X TIE switch.
P COCKPIT VOICE RECORDER. Not modeled except for the TEST button, which allows the pilot to test the output via the indicator.
Q AC VOLTS-FREQUENCY-AMPS indicators with selector switch. Allows the pilot to select and check individual AC sub systems.
R APU FIRE AGENT bottle 1-2.
S APU BLEED AIR selector switch.
T APU FIRE CONTROL switch.
U APU MASTER switch.
V BATTERY switch.
W EMER PWR ON-OFF selector.
X EMER PWR IN USE light.

Overhead panel
Overview (MID section part I)



A	L IRS selector switch (not modeled).
B	IRS MODE SELEC caution lights.
C	R IRS selector switch (not modeled).
D	GND PROX WARN switch.
E	AIRCO RECIRC FAN ON-OFF switch.
F	ENG SYNC N1-N2 selector switch.
G	STALL TEST switch.
H	CKT BKR and STBY COMP integral lighting system switches.
I	Thunderstorm light switch.
J	Cockpit FLOOD light switch.
K	MAX SPD warning test switch.
L	LOGO light switch.
M	MACH TRIM COMP(ensator) switch.
N	Overhead console light switches.
O	PA (Public Address) activation light.
P	Attendant call pushbutton.
Q	ANTI-SKID TEST CTR (control) switch.
R	ANTI-SKID OFF-ARM switch.
S	YAW SAMPER ON-OFF switch.
T	RADIO NAV switch NORM: NAV1 is active navigation radio. - BOTH ON 1: NAV1 is active navigation radio. - BOTH ON 2: NAV2 is active navigation radio.

Overhead panel
Overview (MID section part II)



A IGN OVRD switch. Allows you to select alternate ways for ignition.
B FUEL START pump switch. Used for APU fuel supply in case of BAT only.
D FUEL HEAT selectors. Allows you to select FUEL HEAT ON or AUTO.
E EMER LTS light switch.
F NO SMOK and SEAT BELT switches.
G PROBE HEAT AMP meter.
H Probe heat selector switch.
I AIR FOIL selector switches for the LH and RH wing system.
J TAIL AI (Anti-Ice) system. Works in conjunction with the AIR FOIL system.
K ENG AI selector switches. Selected when needed for ground and flight operations.
L CABIN PRESS Controller selector switch for PRIM or STBY operation.
M RAIN REPELLANT (not modeled).
N LDG BARO selector. Allows you to select a landing cabin altitude.
O WINDSHIELD WIPER selector. Not modeled in either cockpit configuration).
P CABIN PRESS V/S indicator.
Q L AIRCO Flow Control VALVE indicator.
R AIRCO COCKPIT TEMP selector.
S L SUPPLY BLEED PRESS indicator.
T ENG BLEED SUPPLY control switches.
U R SUPPLY BLEED PRESS indicator.
V AIRCO CABIN TEMP selector.
W R AIRCO Flow Control VALVE indicator.
X RADIO RACK control switch. Allows the pilot to select between VENTURI and FAN position (not modeled).
Y TEMP SEL. Allows you to indicate different duct and zone temperatures.
Z TEMP SEL indicator. Indication depends on the TEMP SEL switch.
A-I CABIN ALT/ AIRCFT ALT indicator.
A-II AIRCO SHUTOFF switch.
A-III RAM AIR switch. Allows the pilot to select RAM AIR ON-OFF.
B-I ANNUN/DIGITAL LTS TEST button. Controls all the cockpit lights. Used to check failure of filaments.

Overhead panel
Overview (LWR section)

The overall panel is known as the **EOAP** (Electronic Overhead Annunciator Panel). It utilizes a LED's display caution panel.
All warning (red) and advisory (blue) message are provided, on the Warning Advisory Annunciator Panel (**WAAP**), by filament bulb display grouped together on the right hand side of the EOAP; all caution messages (amber) are displayed on the Caution Annunciator (**CA**), consisting of two LED display screens on the left hand side of the EOAP.

Each CA screen can display six messages at a time for a total of 12 messages.
The first message appears on the top of the left hand side screen, additional messages will fill the left hand screen before continuing on the right hand screen. If both screens are full a scroll arrow switch/light to the right of the screens illuminates to signify there are more messages stored off the screens.

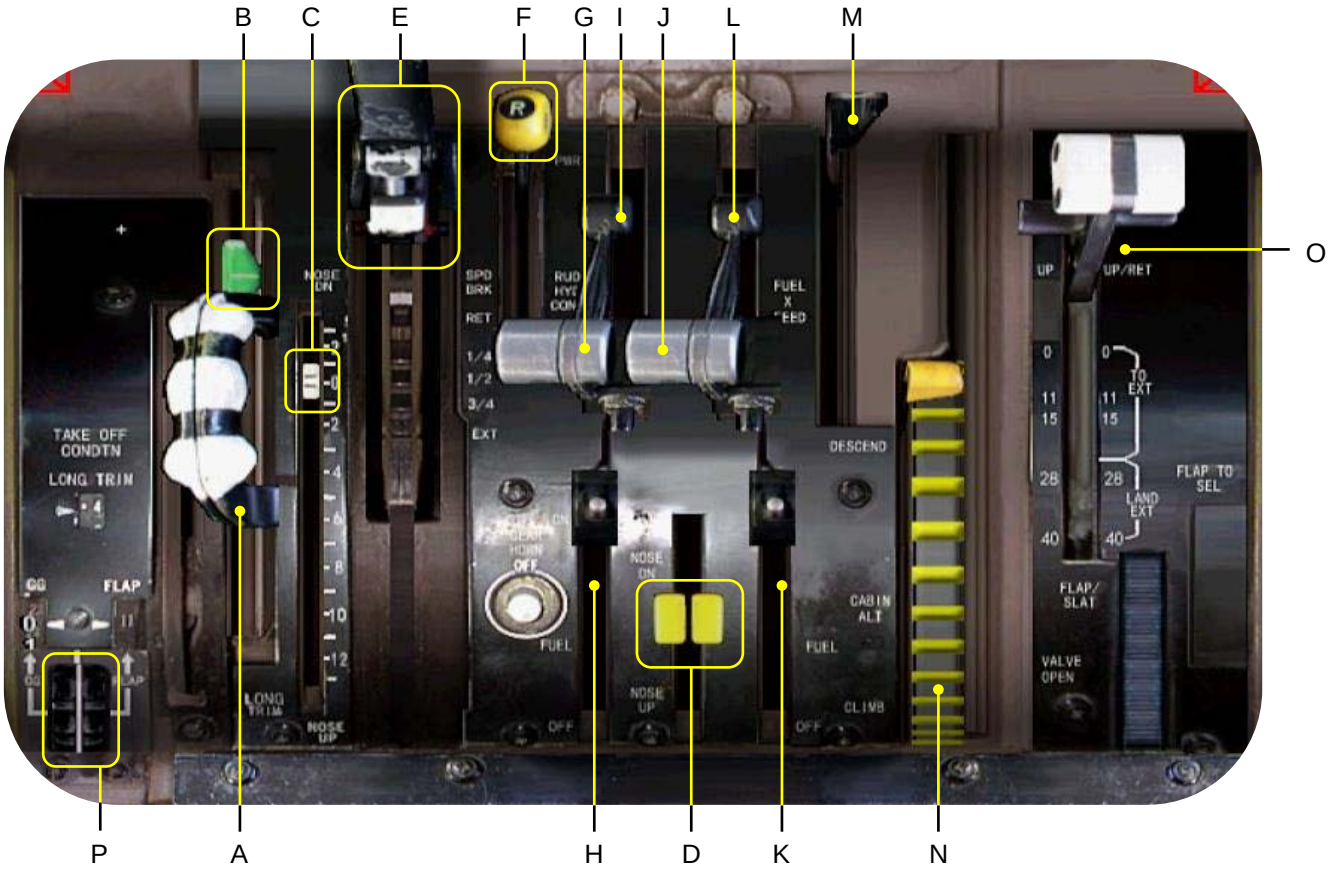
When the first and subsequent cautions are received by the EOAP, the associated cue switch/light at the bottom of the panel illuminates.
The cue switch/lights of the systems are:
- electrical (ELEC)
- ice (ICE)
- engine (ENG)
- controls (CONT)
- miscellaneous (MISC)
- hydraulic (HYD)
- doors (DOOR)

In additional there's a monitor (MON) cue switch/light.

All cue switch/lights (except DOOR and MON) remain illuminated only when an associated caution message is stored off the screen. This enables system cautions to be displayed even if the EOAP screen is full.

A EOAP Section **CA**
(Caution Annunciation)
B Cue switch/lights. Illuminate when an off screen caution is available.
C UP/DOWN arrow switches.
When illuminated, used to show the off screen caution messages.
D EOAP section **WAAP**
(Warning Advisory Annunciator Panel)

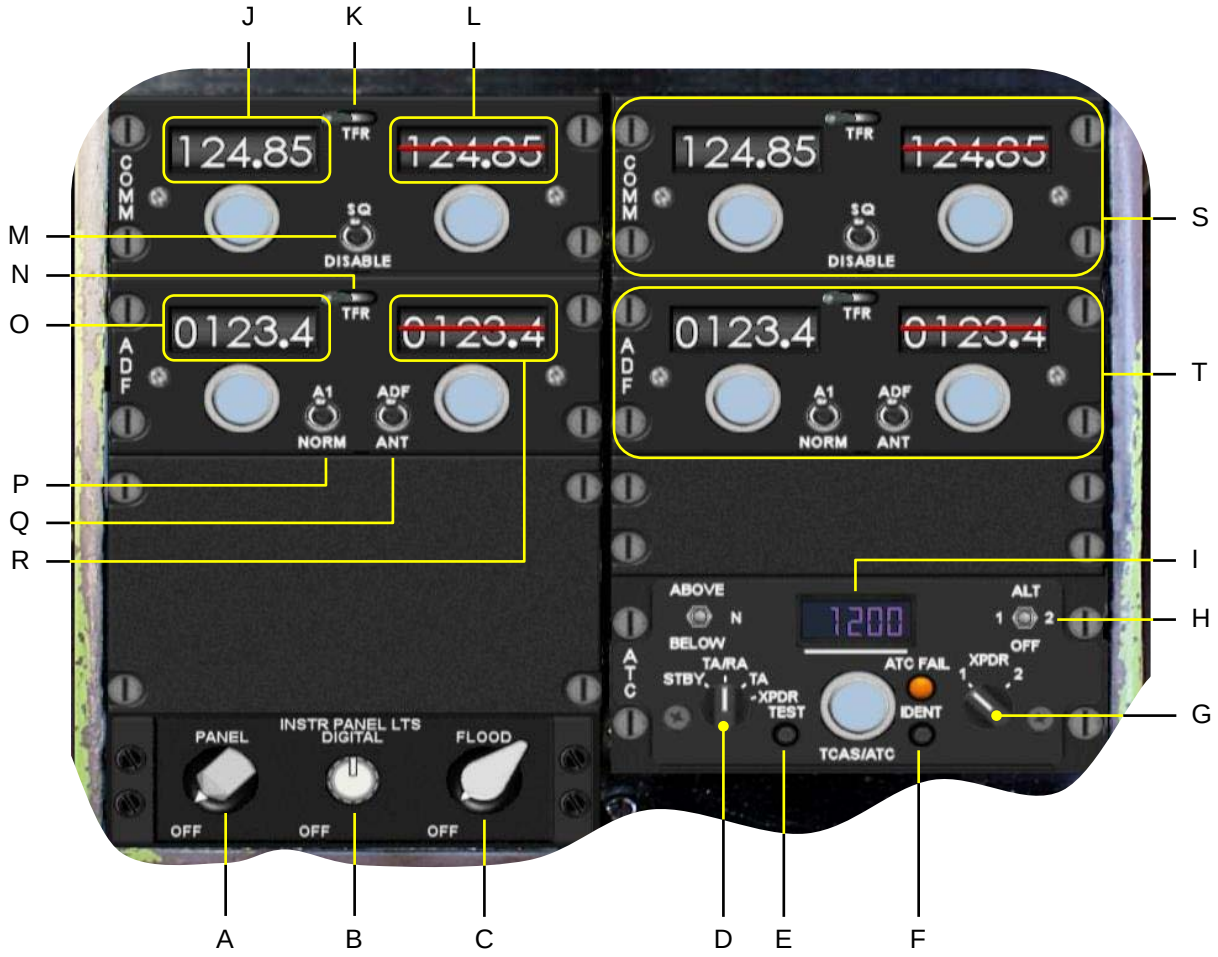
Throttle Quadrant Panel (pedestal)



A LONG TRIM handles.
The longitudinal trim handles are used to trim the horizontal stabilizer.
B LONG TRIM TO position indicator.
C Actual LONG TRIM position.
D ALT LONG TRIM control handles.
E Speedbrake handle.
F Rudder hydraulic power control.
G Throttle L engine.
H Fuel Shut Off lever L engine.
I Thrust Reverser handle L engine.
J Throttle R engine.
K Fuel Shut Off lever R engine.
L Thrust Reverser handle R engine.
M Fuel X-Feed valve.
N Cabin Pressurization outflow valve position (not modeled).
O FLAP/SLAT control handle.

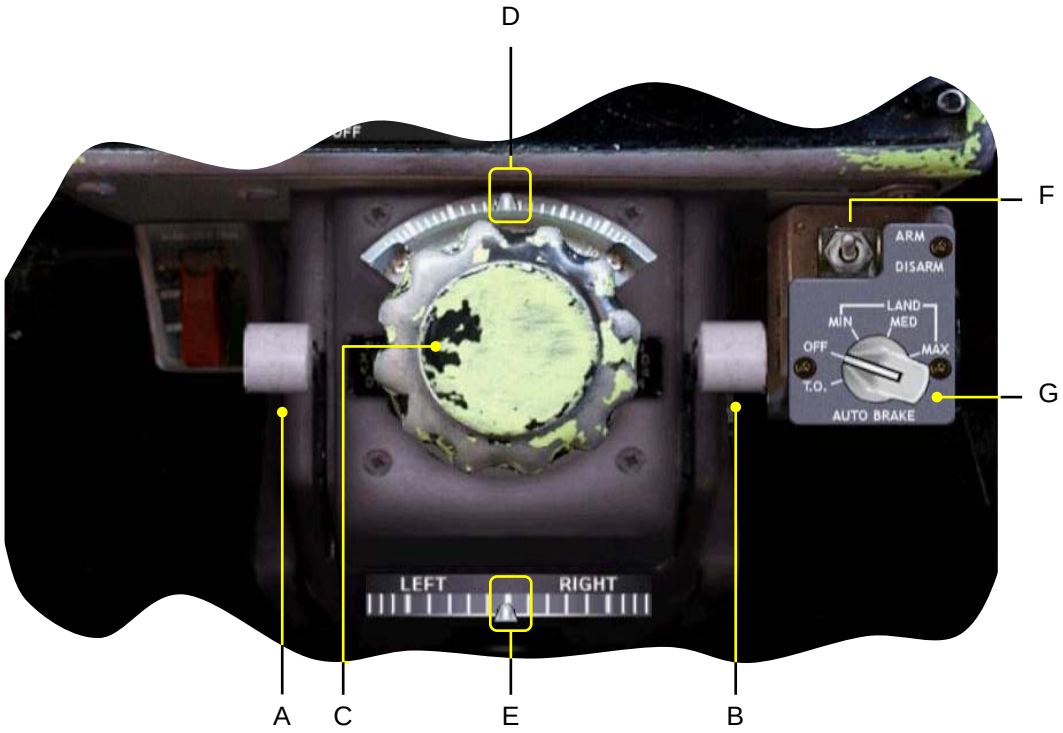
Radio Panel (pedestal)

Part I



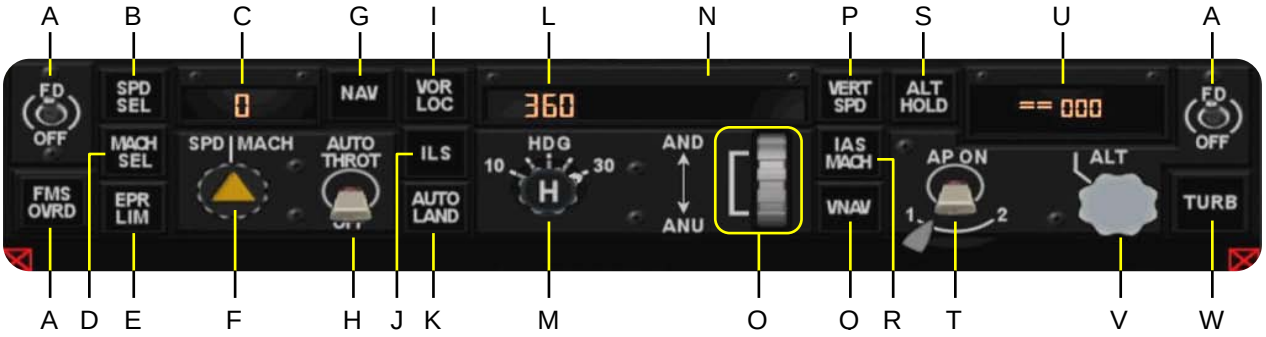
A Instrument panel lighting.
B Instrument digital lighting.
C Cockpit flood light switch.
D TCAS/Transponder Function Selector.
E ATC/TCAS TEST pushbutton.
F ATC IDENT button.
G ATC XPDR (Transponder) selector switch system 1-2 (not modeled).
H ALT (altitude) report switch system 1-2 (not modeled).
I ATC transponder code. Allows the pilot to change to any other code.
J VHF COMM 1 active selected frequency
K TRF (transfer) switch VHF COMM 1.
L VHF COMM 1 standby frequency.
M SQ DISABLE switch (not modeled).
N TRF (transfer) switch ADF 1.
O ADF 1 active selected frequency.
P A1/NORM switch (not modeled).
Q ADF/ANT selector switch (not modeled).
R ADF 1 standby frequency.
S VHF COMM 2 control panel. For detailed see information VHF COMM 1.
T ADF 2 control panel. For detailed information see ADF 1.

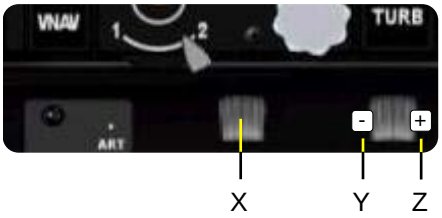
Radio Panel (pedestal)
Part II



A LH BLEED X-FEED (not modeled).
B RH BLEED X-FEED (not modeled).
C Rudder Trim knob.
D Actual rudder trim indicator. Used to provide rudder trim inputs. Trim inputs can also be given via the trim knob itself.
E Actual aileron trim indicator and used to provide aileron inputs.
F AUTO BRAKE ARM/DISARM switch. Allows you to arm or disarm the AUTO BRAKE System. When ARMED, the ABS indicator light on the glareshield panel illuminates. With the switch in the DISARM position, the indicator light is illuminated white.
G AUTO BRAKE selector knob.
TO is used during the take off, while the MIN, MID and MAX positions are used during landing.

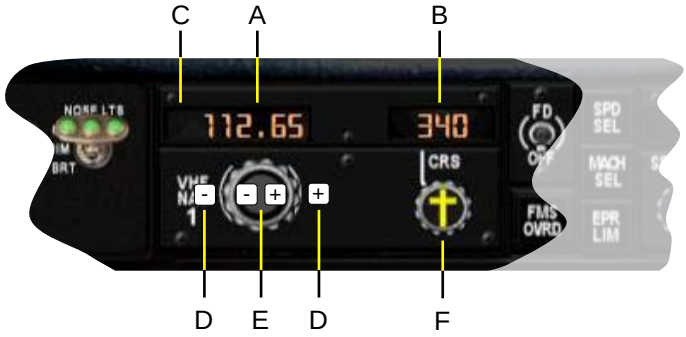
Auto Flight and Navigation Systems
Flight Guidance Control Panel (FGCP)





A FD 1/2 (Flight Director) ON-OFF switch.
B **SPD SEL** button.
Activates and holds the selected IAS.
C Selected IAS/Mach window.
D **MACH SEL** button.
Activates and holds the selected Mach.
E **EPR LIM** button (not modeled).
F SPD/MACH selector knob.
G **NAV** button.
Activates and connect the FMS flight plan to the Auto Pilot.
H AUTO THROT selector switch.
Selects the Auto Throttle ON-OFF.
I **VOR LOC** button.
Activates and controls the aircraft for following a selected LOC or VOR beacon or frequency.
J **ILS** button.
Allow the pilot to capture the LOC and G/S of a valid ILS frequency.
K **AUTOLAND** button (not modeled).
L Selected heading window.
M Heading/bank selector knob.
N Selected vertical speed window.
O Vertical Speed ANU (Aircraft Nose Up) and AND (Aircraft Nose Down) selector wheel possibilities.
P **VERT SPD** button.
Select the V/S mode.
Q **VNAV** button (not modeled).
R **IAS MACH** button.
Activates and control the pitch mode for IAS or Mach, whatever selected.
S **ALT HOLD** button.
Activates the altitude holding mode for the current altitude.
T AP ON selector switch.
Allows you to select AP1 or AP2 ON.
U Selected altitude window.
- LH mouse button-1000's of values
- RH mouse button-100's of values
V ALT (altitude) selector knob.
W TURB button (not modeled).
X FGCP integral lighting ON/OFF switch
Y FGCP digital dimming decrease
Z FGCP digital dimming increase

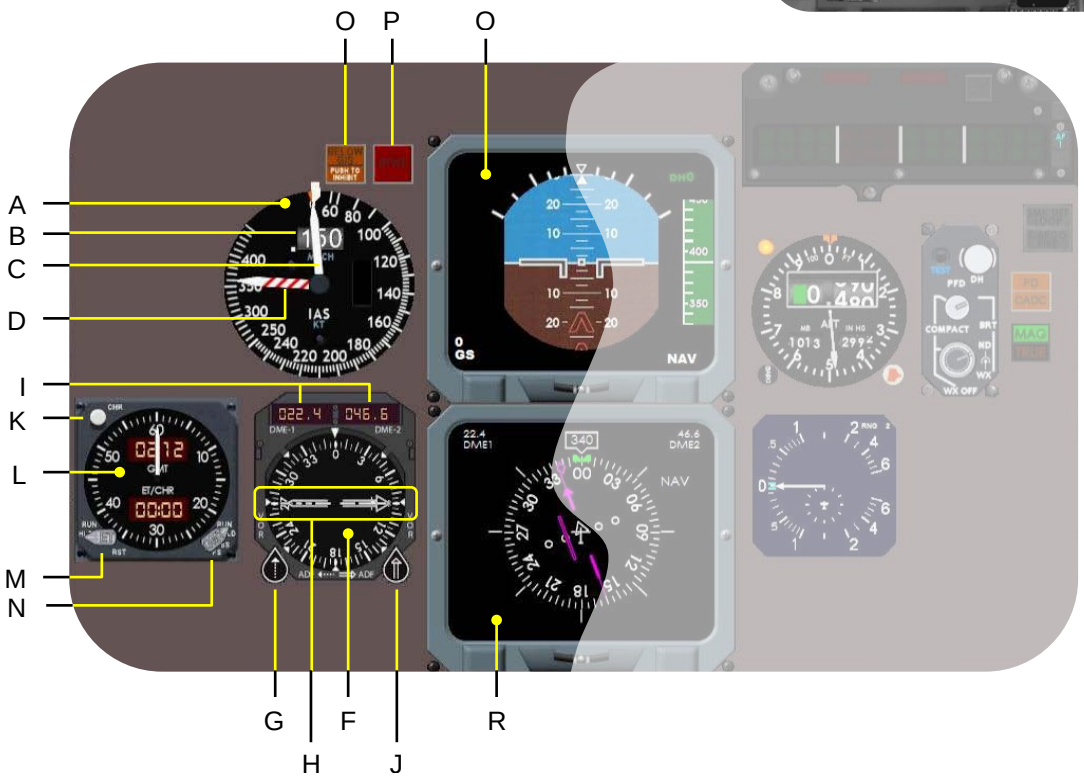
Auto Flight and Navigation Systems
NAV Control Panels[3]



A NAV 1 (2) frequency.
B NAV 1 (2) selected course.
C An **A** indicates that NAV 1 (2) is the active navigation system.
D Allows you to change the navigation frequency on the LH side of the dot.
E Allows you to change the navigation frequency on the RH side of the dot.
F Allows you enter a course in the same manner as item D.

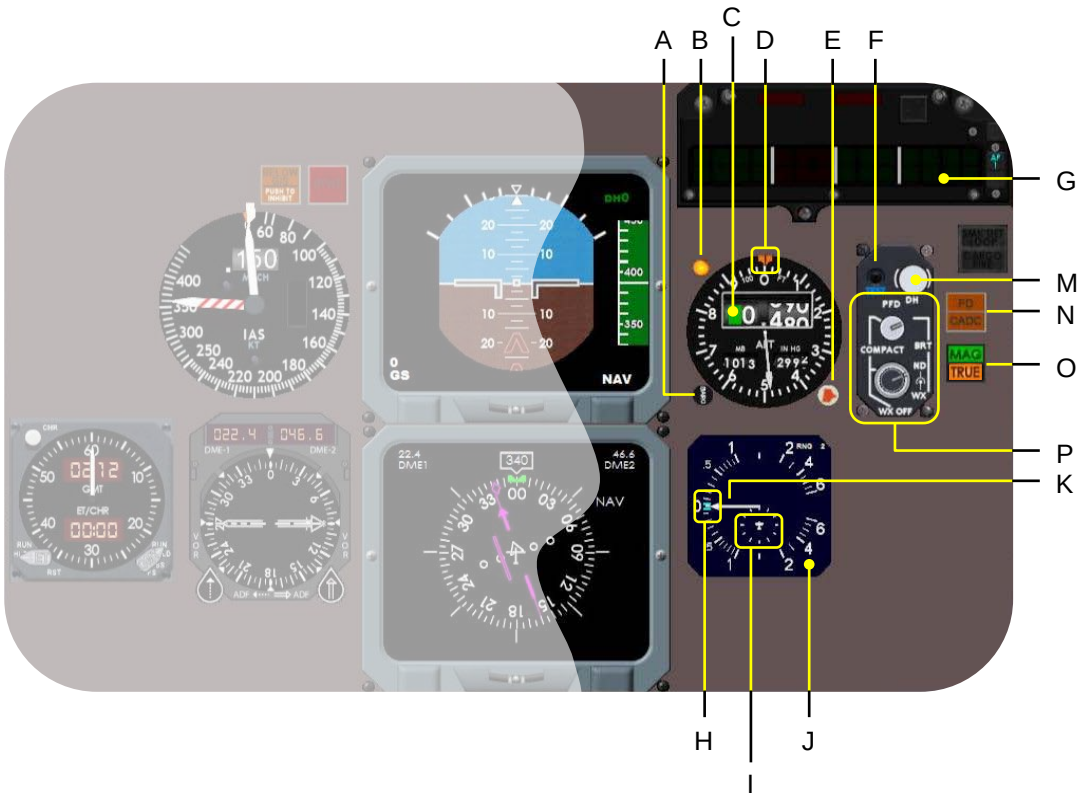
[3] NAV Control Panels
For clarity, only NAV1 panel is shown.
NAV2 control panel functions the same.

Auto Flight and Navigation Systems
Additional instruments (Group A) - Part I



A IAS (Indicated Air Speed) indicator.
B Actual Mach value.
Window is blanked when instrument not electrically powered e.g. BAT OFF.
C Actual analog IAS value (knots).
D Barber pole needle.
Also known as the over speed needle.
F RMI (Radio Magnetic Indicator).
G Single VOR/ADF 1 pointer selector.
H Single and double VOR/ADF pointers.
I DME1-2 distance indicator related to the selected VOR beacon.
J Double VOR/ADF 2 pointer selector.
K CHR (chronometer) knob.
L Aircraft clock.
M ET-RST-RUN selector knob.
N RUN adjustment knob.
O BELOW G/S caution light.
P GPWS warning light.
Triggered when corrective actions are required from the pilots.
Q PFD (Primary Flight Display).
Additional detailed information is available for you on page 16.
R ND (Navigation Display).
Additional detailed information is available for you on page 17.

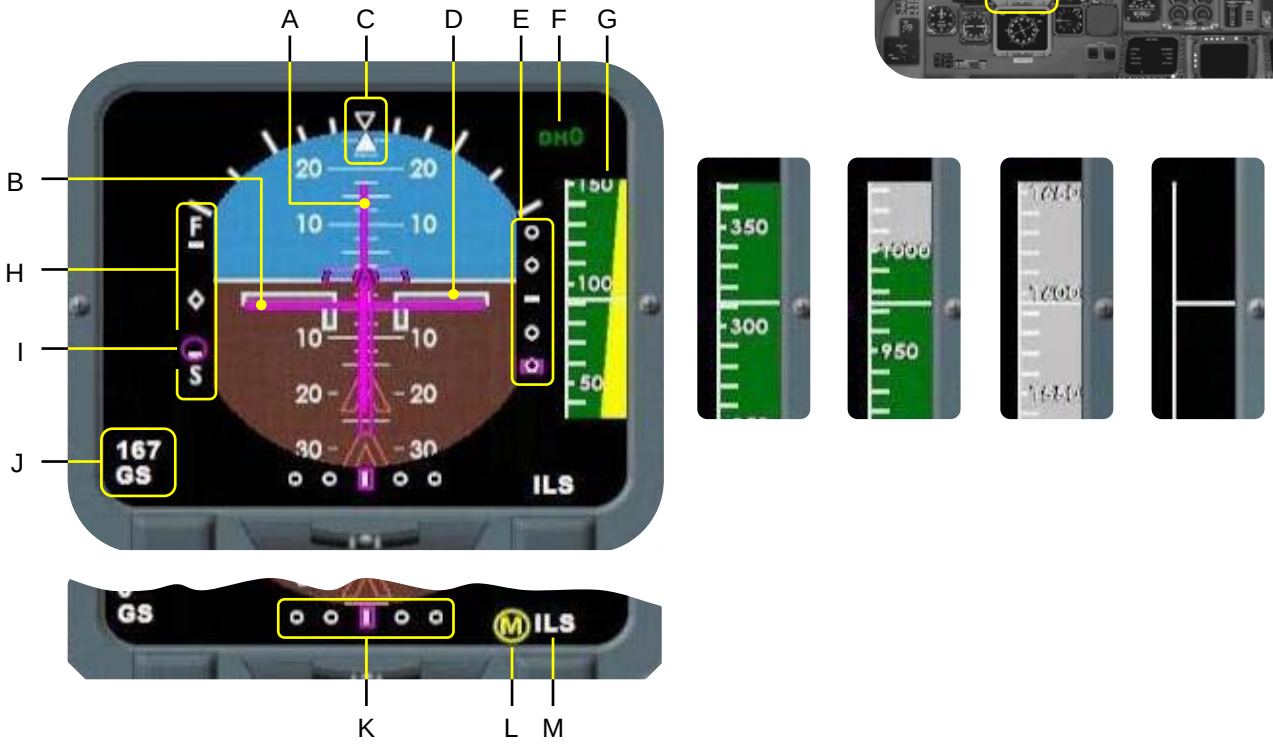
Auto Flight and Navigation Systems
Additional instruments (Group A) - Part II



A BARO (barometric) setting knob.
B ALT ALERT light. Illuminates when selected altitude is reached.
C Barometric altimeter.
D ALT ALERT indicator.
E ALT ALERT knob. Allows the pilot to set the required alert altitude.
F Simulates an ILS test signal on the PFD and ND. It also checks the marker beacon indication on the PFD.
G FMA (Flight Mode Annunciator). Additional detailed information is available for you on page 18.

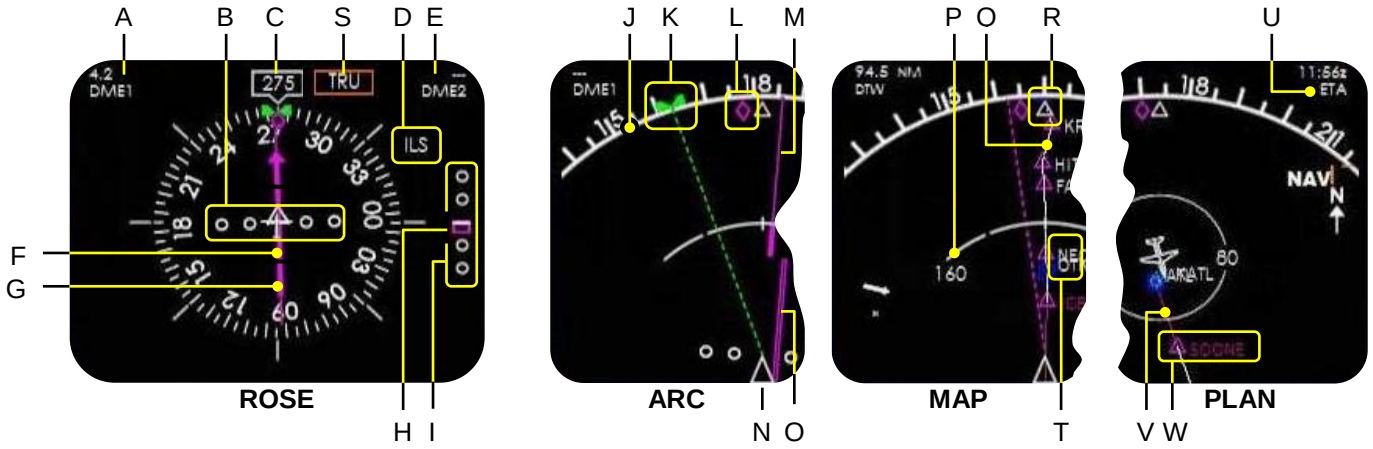
H Selected V/S (Vertical Speed) indicator.
I TCAS indicator.
J Electronic IVSI and TCAS indicator.
K Actual analog V/S needle.
M DH (Decision Height) selector knob.
N FD/CADC fault light.
CADC light illuminates when the selector is out of the NORM position.
O MAG/TRUE heading indication.
Click on the lamp unit to change between MAG or TRUE North.
P PFD and ND brightness rheostats. WX (Weather Radar) option is not modeled.

Auto Flight and Navigation Systems
PFD (Primary Flight Display)



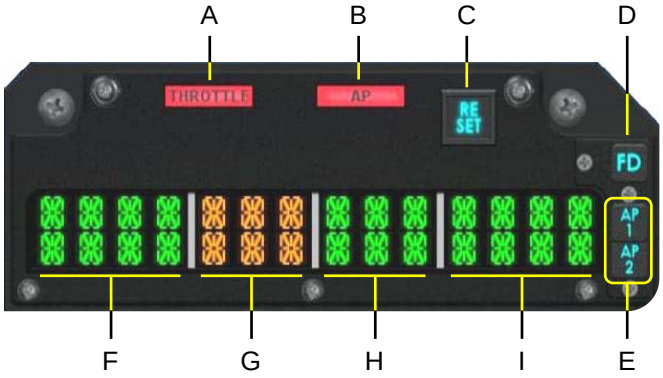
A ROLL FD (Flight Director) bar.
B PITCH FD bar.
C Lubber line defines the aircrafts longitudinal axis.
D Aircraft symbol.
E ILS G/S (Glide Slope) deviation bar.
It's only visible when you have tuned an ILS frequency.
F DH (Decision Height) indication in accordance with a selected value.
G RA (Radio Altimeter) tape.
Indicates the Radio height of the aircraft above AGL. The tape changes from color by increased radio height. If out of range, it disappears completely.
H FAST-SLOW speed scale.
I FAST-SLOW symbol.
It shows if you're flying too fast or too slow in relation to a calculated value.
J Actual GS (Ground speed) of the aircraft
K LOC (localizer) deviation scale.
L MIDDLE MARKER indication.
Triggered as long as the middle marker during an ILS approach is active. If the INNER or OUTER marker is detected, indications change accordingly.
M ILS or NAV mode.
During NAV operations, there's no NAV text indicated on the PFD however, during an ILS approach the ILS text is visible on the lower part of the PFD.

Auto Flight and Navigation Systems
ND (Navigation Display)



A DME1 indication in combination with a valid tuned ILS or NAV frequency on the NAV 1 control panel.
B LOC deviation scale.
C Actual aircraft heading.
D ILS mode active.
E DME 2 indication, if applicable.
F Course Deviation Bar, indicating if you're on the localizer or VOR.
G Course Pointer, pointing to the selected ILS or VOR beacon.
H Glide Slope deviation indicator.
I Glide Slope deviation scale.
J Arc section of the ROSE.
K Selected heading.
L TRACK pointer.
M Course Pointer.
N Aircraft position.
O Course Deviation Bar.
P Arcs of distance. The selected range can vary and is made on the EFIUS Control Panel (Side Panel).
Q Part of the flight plan.
R Waypoint symbol, which is located along the flight plan.
S TRUE indication.
Only visible when the MAG/TRUE switch/light unit is pressed and TRUE North is activated.
T Waypoint name.
U ETA (Estimated Time Arrival) in Zulu (GMT) according to the FMS CDU.
V Current section of the flight plan.
W Current waypoint flying to according to the FMS CDU.

Auto Flight and Navigation Systems
Flight Mode Annunciator (FMA)



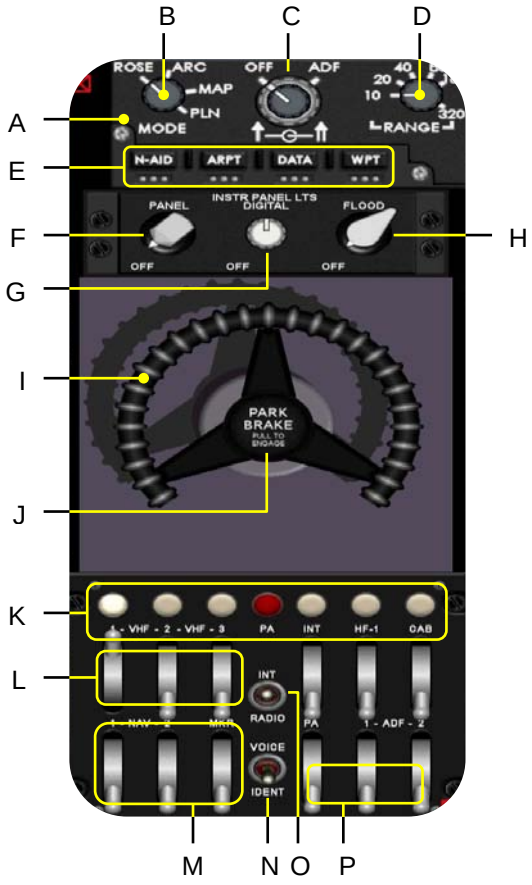
Flight Mode Annunciators (FMAs) are provided for the Captain and First Officer. The FMAs display the annunciations for selected Flight Guidance System mode of operation, **AP** and **THROTTLE** warning lights and FD and AP selection.
An ANNUN / DIGITAL LTS TEST button is provided on the overhead panel for testing the legend annunciation and warning lights and digital alphanumeric display lights, as can be seen on the screenshot above.
The three screenshots on the right hand side, show you some possible indications.

A THROTTLE warning light.
Activated when the AUTO THROT switch on the FGCP is set to OFF.
B AP warning light.
Activated when the AP switch on the FGCP is set to OFF.
C RESET button.
Resets the THROTTLE and/or AP light.
D FD (Flight Director. Either FD switch on the FGCP, is selected.
E AP1/AP2 light illuminated when either AP1 or AP2 selected.

F **AUTOTROTTLE** mode annunciations.
G **ARM** mode annunciations.
H **ROLL** mode annunciations.
I **PITCH** mode annunciations.

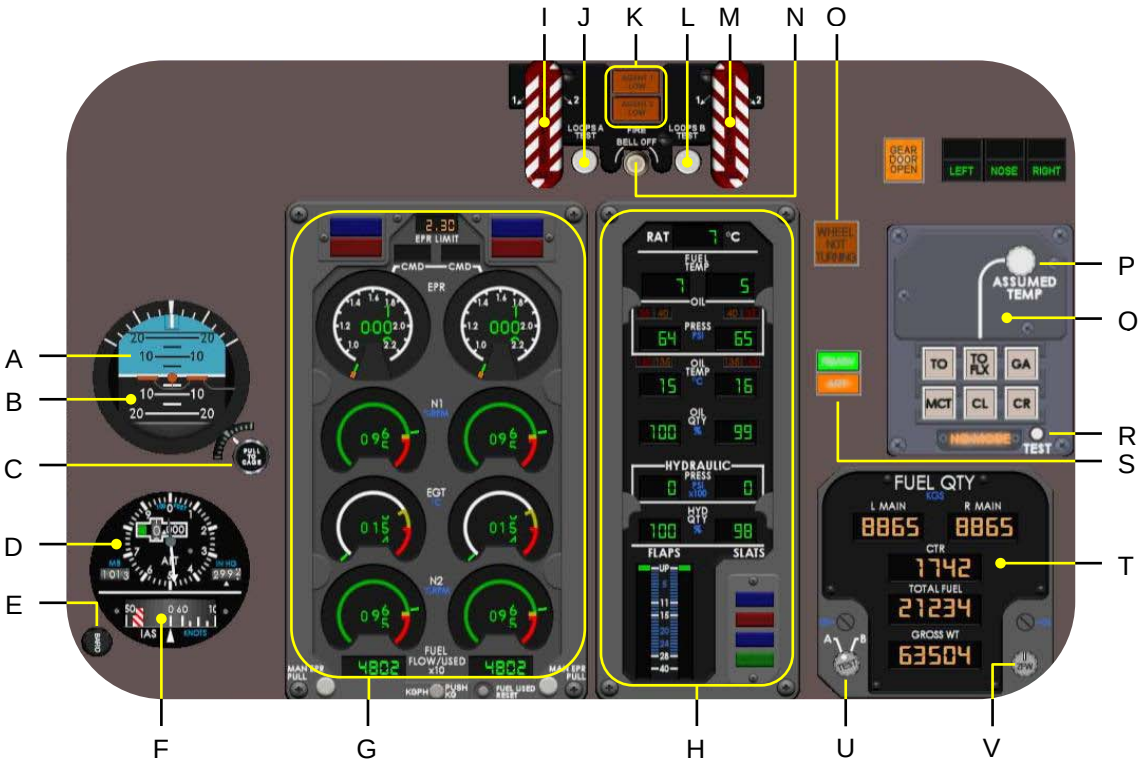
Due to the complexity of the possible FMA annunciations in the pitch, roll, arm and auto throttle modes, we will explain the different annunciations during the discussions of the flight tutorial.

Auto Flight and Navigation Systems
Side Panel



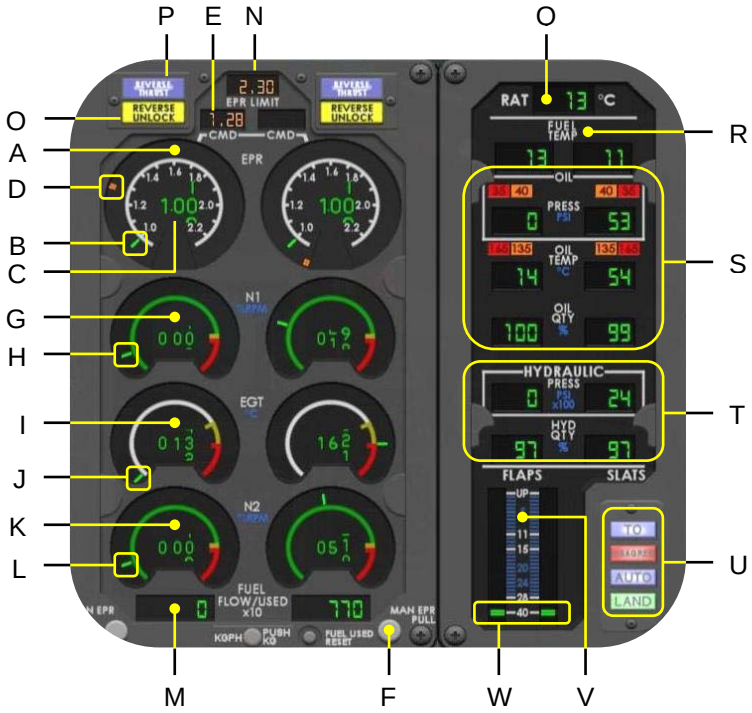
A EFIS Mode Select Panel.
B ND mode selector. Possible ND options are ROSE, ARC, MAP and PLAN.
C ADF needle activation on the ND.
D ND MAP and PLAN range selection.
E Activation of additional ND information like N-AID, ARPT, DATA and WPT. When pressed, the white bulbs on the bottom of the pushbutton illuminate.
F Instrument panel lighting.
G Flight Mode Annunciator dimming.
H Cockpit flood light switch.
I NWS (Nose Wheel Steering). Clicking on the L or R side of the steering collar, will activate the aircraft nose wheel steering.
J PARK BRAKE. Click on the knob to activation and/or deactivation.
K MIC buttons. Press either microphone button to start communication with. Depressed button illuminates.
L VHF COMM 1-2-3 volume control.
M VHF NAV 1-2 and MKR volume control.
N VOICE/IDENT switch. Filters/unfilters reception.
O RADIO/INT switch.
P PA and ADF 1-2 volume control.

Auto Flight and Navigation Systems
Additional instruments (Group B)



A Cage flag. In view during battery only.
B Standby Horizon.
C Pull to Cage the Standby Horizon.
D Standby Altimeter.
E Barometric set knob.
F Standby IAS.
G Engine Display Panel.
H System Display Panel.
I ENG 1 FIRE handle.
J LOOP A TEST pushbutton.
K AGENT 1/2 LOW bottle pressure light.
L LOOP B TEST pushbutton.
M ENG 2 FIRE handle.
N FIRE BELL OFF pushbutton.
O WHEEL NOT TURNING light
Indicates that the antiskid is not working.
P Turning the knob allows you to enter a assumed temperature for a TO FLEX.
Q Engine TRP (Thrust Rating Panel) with thrust ratings selections like TO, TO FLEX, GA, MCT, CL and CR.
R TRP test button.
S READY and ART light.
Connected to the ART (Automatic Reserve Thrust) switch.
T FQI (Fuel Quantity Indicator)
Shows the fuel in each tank including total fuel and aircraft gross weight.
U Allows you to select and test each channel of the FQC (Fuel Quantity Computer).
V Allows the pilot to enter the ZFW.

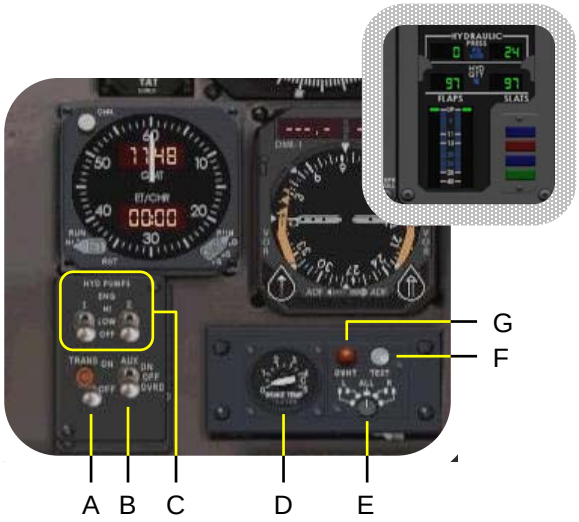
Aircraft Systems
Engine- and additional instruments



The MD80 Series has with two axial-flow, low bypass turbofan **Pratt and Whitney** engines. Each **JT8D-200 Series** engine has a normal static takeoff thrust rating of approximately 20,000 pounds and a maximum takeoff thrust of 20,850 pounds.
For monitoring the engines, a combined EPR (Engine Pressure Ratio)-, N1 and N2- and EGT (Exhaust Gas Temperature) instrument is used. Secondary parameters like FF (Fuel Flow), FU (Fuel Used), Oil Pressure, Oil Temperature and Fuel Temperature are provided as well.

A EPR indicator.
B Actual analog EPR indication.
C Actual digital EPR indication.
D Manual selected EPR pointer.
E Manual selected EPR value.
F Knob to set manual EPR value.
G N1 indicator with digital N1 value.
H Actual analog N1 indication.
I EGT indicator with digital EGT value.
J Actual analog EGT indication.
K N2 indicator with digital N2 value.
L Actual analog N2 indication.
M FF/FU indication.
N Digital readout of the EPR LIMIT for the selected operating mode.
O REVERSE UNLOCK light.
Engine reverser buckets are in transit. c.
P REVERSE THRUST light.
Engine reverser buckets are in position and reverse thrust can be applied.
Q Digital Ram Air Temperature indication.
R Fuel temperature. Measured down-stream of the Air/Fuel Heat Exchanger.
S Engine oil parameters cluster. Offers pressure, temperature and quantity.
T Hydraulic parameters cluster.
Offers pressure and quantity in %.
U SLAT indication lights.
V FLAP indicator.
W FLAP analog pointer.

Aircraft Systems
Hydraulic Power



The MD80 Series has two independent hydraulic systems. It's filled with fire-resistant hydraulic fluid, known as Monsanto Skydrol 500B4 or LD-4. Each system is equipped with a reservoir and is pressurized by a single EDP (Engine Driven Pump).
Airplane main wheel brakes can be applied by depressing the brake pedals. When they are depressed, hydraulic pressure from both hydraulic brake systems is applied to the brakes. Furthermore, the brake system is provided with an automatic controlled and monitored anti-skid system. A brake temperature gauge and an amber overheat light offer the pilots visual brake temperature indication.

A TRANS hydraulic pump
Mechanically connects (ON) or disconnects (OFF) the left and right hydraulic systems.

B AUX hydraulic pump
Switches ON-OFF the right hand situated hydraulic electrical pump.
In the OVRD position, a build-in overheat system is bypassed.

C HYD PUMPS switches
Allows the virtual pilot to select the EDP (Engine Driven Pump) OFF-LOW-HI.
In the position LOW, the pump output equals 1500 PSI, while in HI, it goes up to 3000 PSI.

D BRAKE temperature indicator. Use for all main wheels. Indication depends on the position of switch E.

E Allows you to select each wheel individual for indication or for ALL.

F BRAKE OVERHEAT test
Simulates a brake over temperature. This illuminates the amber light and the brake temperature indicator pointer moves to the + 400°C position.

G Illuminates when either brake exceeds a temperature of 400°C. Also triggered during the brake overheat test.

Aircraft Systems
Landing Gear

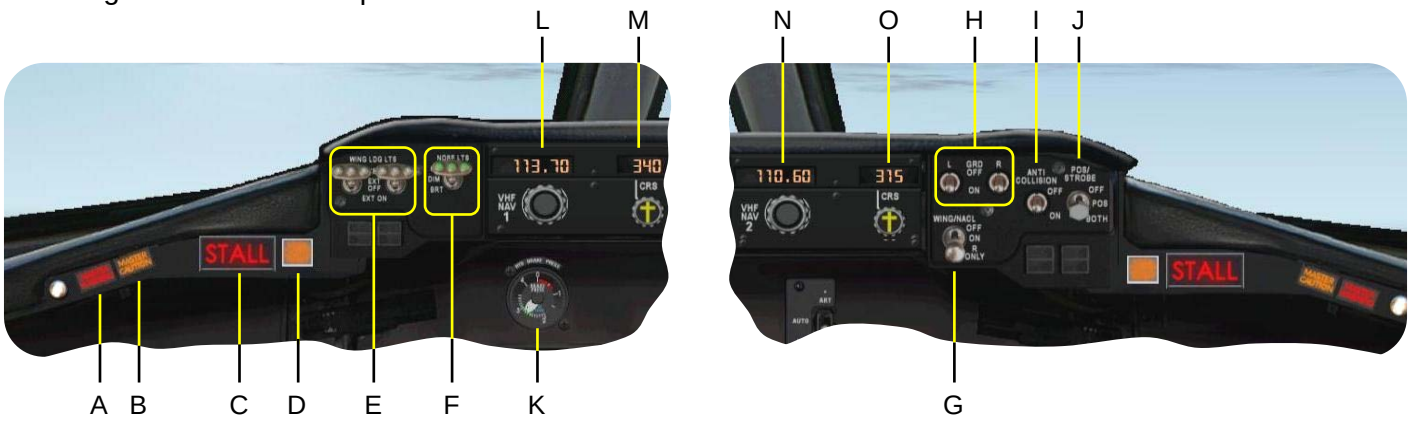
The MD80 Series has a tricycle landing gear that is mechanically actuated and hydraulically operated. Normally, actuated by a landing gear handle, the gear may be raised or lowered by pressure from the right hydraulic system or by pressure transferred from the left hydraulic system. When retracted, the gear is fully enclosed by doors.
An electrically monitored visual/aural/vocal indicating and warning system provides indication of gear system status. Spray deflectors on both main gear and nose gear assemblies serve to minimize water and slush ingestion on takeoff and landing.
A tail bumper assembly, mounted on the bottom of the aft fuselage, prevents structural damage if the aft fuselage should make contact with the ground.

A GEAR DOOR OPEN
This amber light illuminates when either main landing gear DOOR is not fully UP/LOCKED. If there's right hydraulic pressure, the light should be extinguished else it's ON.

B Green LEFT/NOSE/RIGHT lights mean that the respective gear is DOWN and LOCKED. A red light means;
- Respective gear not UP/LOCKED
- Gear handle in disagreement with gear

C Nose and Main gear handle with an UP and DOWN position.

Aircraft Systems
Lights and VHF NAV panels



A MASTER WARNING
These two **red** lights on the glare-shield panel are triggered in case of a warning, as well as the corresponding light on the EOAP, section WAAP.

B MASTER CAUTION
These two **amber** lights on the glare-shield panel are triggered in case of a caution, as well as the corresponding light on the EOAP, section CA.

C The two **red** STALL legends on the glare-shield panel are triggered in case of an aircraft stall condition.

D STICK PUSHER amber light
If activated, press to inhibit.

E WING LDG LTS
Allows the pilot to extend the lamp units as well as switching them ON.

F NOSE LTS
Allows you to switch ON-OFF the TAXI and TO lights, fitted on the front side of the nose landing gear.

G WING/NACL lights
Switching option for the wing and engine nacelle lights.

H GRD lights
Selection of the ground flood lights.

I ANTI COLLISION lights
OFF-ON position to illuminate the red top/bottom flashing red light units.

J POS/STROBE lights
Combined switch for switching option of the (navigation) lights and the white strobe lights, fitted on each wing tip.

K BRAKE PRESS indicator
Shows the applied left and right brake pressure on the main wheels.
When the needles are positioned in the green arc, it means OK. When situated in the red arc, it means too low pressure.

L **VHF NAV 1** Control Panel
Allows the pilot to select a LOC (ILS localizer) or NAV (navigation) frequency.
See page 14 for additional information.

M Enter a course belonging to the previous selected frequency. For an ILS frequency, check the landing chart.
For a VOR beacon, rotate the knob till the Course Deviation Needle is positioned in the middle.

N **VHF NAV 2** Control Panel.
For detailed information, see L.

O Course belonging to item M.

FMS CDU

Familiarization with the CDU

These pages cover some details of the CDU (FMS[4]), which we need during a normal flight. Although this is an introduction, we will provide more detailed information during the tutorial flight.

On the **CDU** check/set ..... - Call-up the CDU (Control Display Unit)

- **MAIN MENU** page, click LSK 3L (**< INIT**)
- **INIT** page, select LSK 6R (**ALIGN IRS >**)
- or you can click on the **INIT** menu key

- Click the **MENU** key on the keyboard
- **MAIN MENU** page, click LSK 4L (**< TO/APPR**)
- **TAKE OFF** page,
  Click LSK 1L (**< CALC/SET T/O V SPEEDS**)
- Write on a piece of paper those values:
  V1 **……** knots
  VR **……** knots
  V2 **……** knots

- Click the **MENU** key on the keyboard
- **MAIN MENU** page, click 5L (**< RAD NAV**)
- **RAD NAV** page or click on
  the **RAD NAV** menu key,
  Verify **NAV1** and **NAV1 STBY** frequencies

- Click the **MAIN** key on the keyboard
- **MAIN MENU** page, click 3R (**FLT PLAN >**)
- **FLIGHT PLAN** page or click on
- the **FLT PLAN** menu key.

- With the **PREV PAGE** and **NEXT PAGE** menu keys, we can change the MCDU display between **TIME /TRK** and **DIST/FREQ.**
- With the **UP/DOWN** arrow next of the PREV/NEXT keys, we can scroll through the flight plan.

- LSK 5R **WEATHER >** is not modeled.

[4] Flight Management System

Call up the CDU **FLT PLAN** page

- Click LSK3R **FLT PLAN >**
- Check your flight plan for all the waypoints according to the MSFS flight plan.
  This page shows you **TIME/TRK**

CDU **FLIGHT PLAN** TIME/TRK page

- With the **PREV/NEXT PAGE** key, we can switch to the **DIST/FREQ** page and visa versa.

CDU **FLIGHT PLAN** DIST/FREQ page

Call up the CDU **RAD NAV** page .....

- Click the **MENU** key on the keyboard
- On **MAIN MENU** page,
  click LSK 5L **< RAD NAV**
- If applicable, select a COM1 and/or COM 2 frequency. These frequencies can also be entered via the pedestal panel

CDU **RAD NAV** page

Call up the CDU **TO/APPR** page .....

- Click LSK 4L **< TO/APPR** or you can click the **TOFF APR** key on the keyboard
- Click LSK 1L **< CALC/SET T/O V SPEEDS**
- Note the values of:
  V_1 ... knots
  V_R ... knots
  V_2 ... knots

CDU **TAKE OFF** page

Call up the CDU **DATABASE** page

- Click the **MENU** key on the keyboard
- On MAIN MENU page,
  click LSK 2R **DATABASE >** or click directly on the keyboard the **DATA** key
- This CDU page shows you average data as pressure, OAT, wind, times in both - if applicable - Metric and the American system.

CDU **DATA** page

Call up the CDU **STATUS** page

Click the **MENU** key on the keyboard

- On MAIN MENU page,
  click LSK 2L **< STATUS**
- The STATUS page shows general (simulated) information like A/C model, navigation data, OP program, engine rating etc.
  It's pure an informative page!

CDU **STATUS** page

Call up the CDU **PROGRAM** page

- Click the **MENU** key on the keyboard
- On **MAIN MENU** page,
  click LSK 4R **PROG >** or direct access via the **PROG** key on the keyboard
- The PROGRAM page shows actual data calculated by the FMS and retrievable throughout the whole flight.
- The **FUEL PRED >** offers additional information regarding the calculated FUEL and distances.

CDU **PROG** page

Call up the CDU **FUEL PRED** page

- Click on the previous PROGRAM page
  LSK 6R **FUEL PRED >**
- All kind of data related to the arrival, fuel, GW, GMT (UTC) etc. is here.

CDU **FUEL PRED** page

Call up the CDU **INIT** page

- Click the **MENU** key on the keyboard
- On **MAIN MENU** page, click LSK 3L **< INIT** or direct access via the **INIT** key on the keyboard
- The INIT page shows actual data like longitude/latitude information, planned CRZ altitude, FROM/TO information. The screenshot shows the data after a flight plan was loaded. Worth mentioning is LSK 6R, the **ALIGH IRS** >. Clicking LSK 6R simulates the alignment procedure of the IRU's.

CDU **INIT** page

Call up menu key **DIR TO**

- Click the **DIR TO** key on the keyboard
- The DIR TO (direct to waypoint/VOR) page a part of the flight plan with the current DIR TO waypoint on top between brackets.
  If you want to go direct to ICBOD, do the following steps:
- Click LSK 4L **ICBOD**

CDU **DIR TO** page

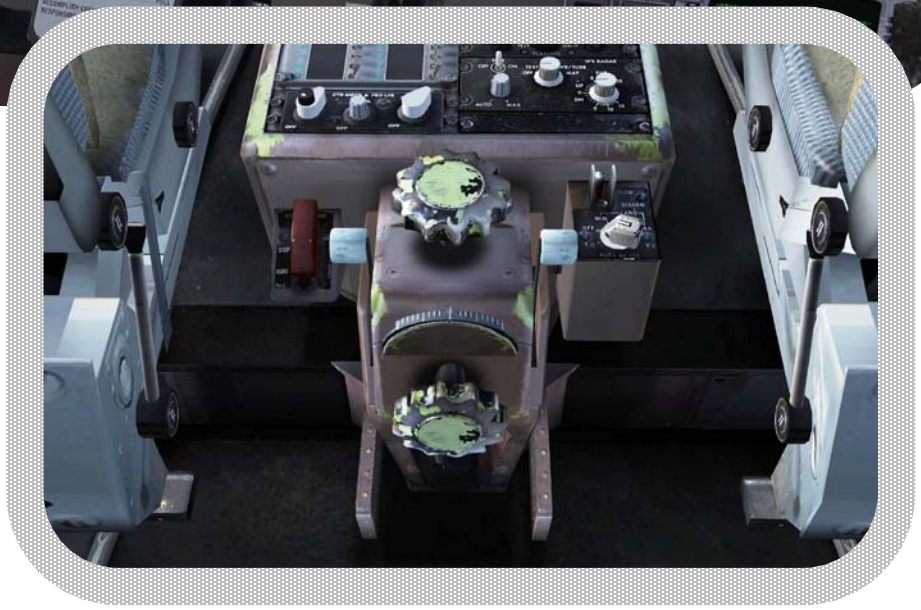
- After you've clicked LSK 4L, the DIR TO page should have changed as can be seen below.
- In-between the brackets, KATL changed into **ICBOD** DIR TO is now to ICBOD.

CDU **DIR TO - ICBOD** page
(this is just an example how DIR TO could work!)

Virtual Cockpit (VC)

Overview

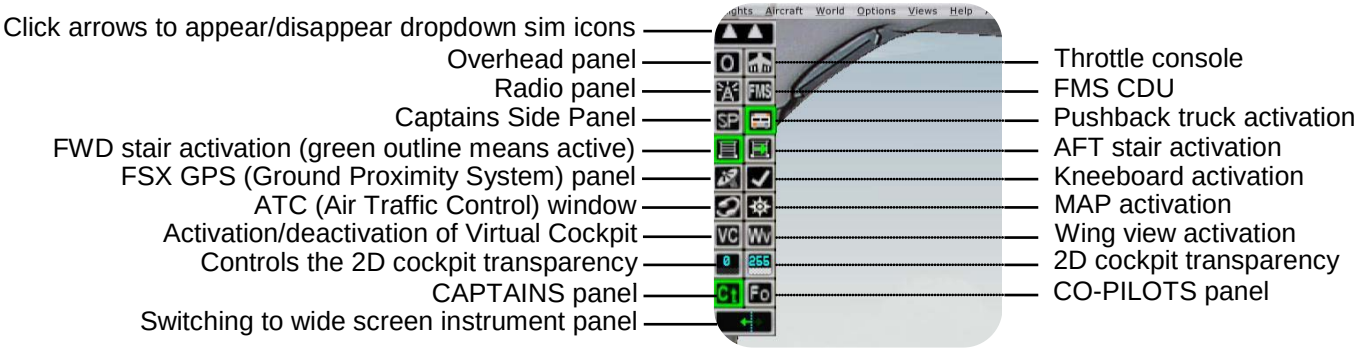
Our VC offers a high resolution, highly detailed, smooth running, and is completely interactive and "clickable". All items that are operable in the 2D cockpit are operable in the VC.
In other words; we succeeded to create a virtual cockpit that has been rendered in such a way that it literally "puts you in the cockpit".



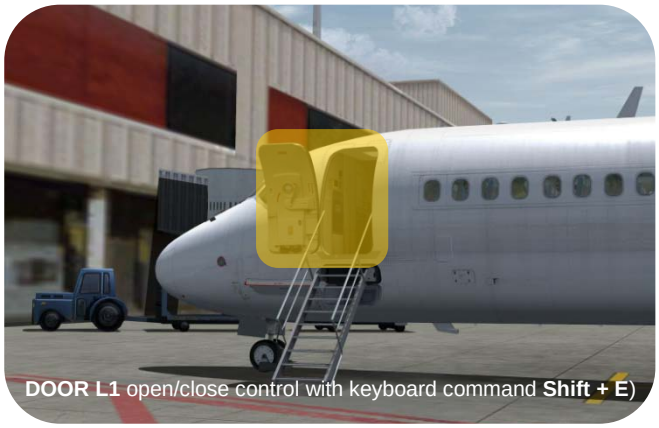
Every switch, knob, handle or instrument is fully operative, so you can fly your stretch completely from the VC. Just to give you an impression, look on the pedestal.
Zoom into it, see the details and click what is needed during your flight.

CLS MD80 Series Commands

Cockpit Sim Icons



FWD Passenger DOOR commands



AFT Emergency DOOR EXIT commands

Cargo DOOR commands

Introduction

General

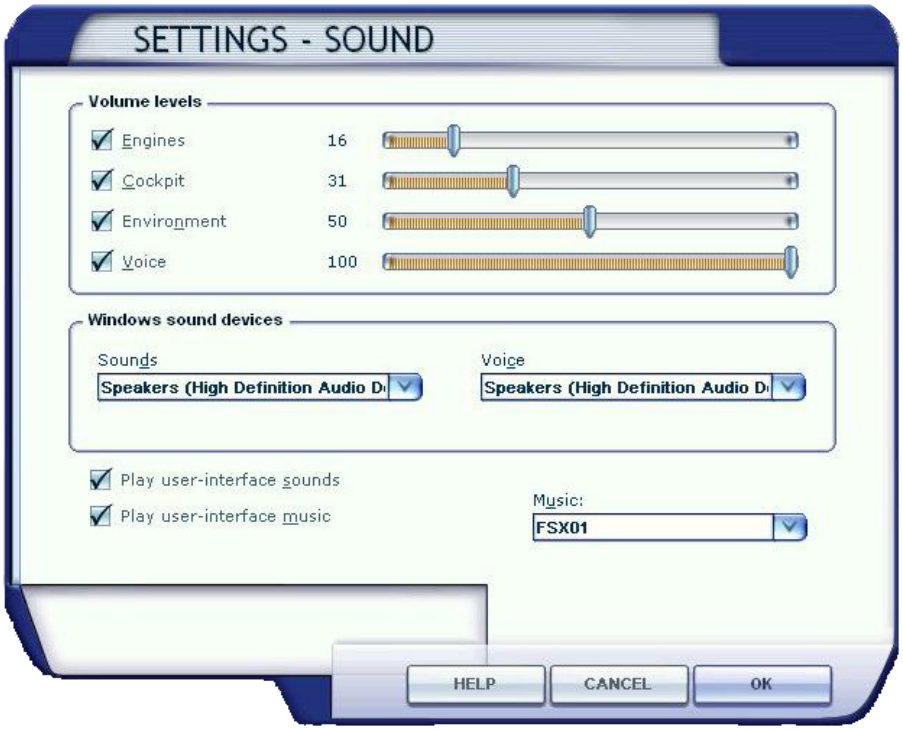
The **intention** of this flight tutorial is to give you **an overview** of how to handle the CLS MD-81 Series. Since this is a *lite* aircraft, many things have been designed to make aircraft operations easy for you. This means there's no need to perform complicated calculations, no need to follow the checklist step-by step and other elements to successfully fly this MD 81.
The Operations Manual, which has been previously published, offers you all the necessary information about aircraft performance as well as limitations. We also assume that you have basic aviation navigation knowledge including making a flight plan, by using either the MSFS Flight planner or any add on Flight Planner program. As part of making any flight plan, we also assume you're aware of low and high altitude routes, V- and J-routes for the United States and other areas of the world.
Furthermore, this tutorial will be a **guide** in helping you **understand** how to handle this aircraft. Some elements within the tutorial **may differ from your flight**!

This and much more information is freely accessible via the **FAA**[1], but there's much more. Here are some examples of interesting navigation sites; **AirNav**[2], **ADDS**[3], **AIM**[4], **MyAirplane.Com**[5], **VirtualSkies**[6] and **SkyVector.Com**[7].

[1] FAA - Federal Aviation Administration (http://www.faa.gov)
[2] AirNav - (http://www.airnav.com)
[3] ADDS - Aviation Digital Data Service (http://adds.aviationweather.noaa.gov)
[4] AIM - Aeronautical Information Manual
[5] MyPlane.Com - (http://www.myairplane.com/databases/approach/index.php?mode=d)
[6] VirtualSkies - (http://virtualskies.arc.nasa.gov/navigation/tutorial/tutorial1.html)
[7] SkyVector.Com - (http://skyvector.com/)

Sound Settings

Recommended **sound settings** for the MD80 Series are:



Note: Some machines will experience digital “tunneling” or may freeze when certain sounds are played, due to slower processors, lower amounts of RAM, and/or the large size of the sound files. If you experience either of these problems, we recommend that you set sound quality to medium or low.

Navigation (NAV) Control Panels

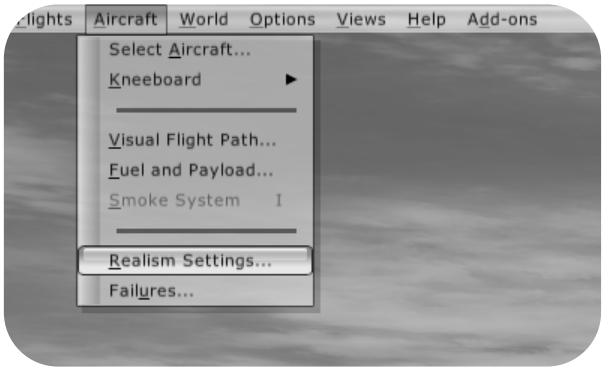
Due to last minute cockpit changes, the NAV control panels on each side of the glare shield offer additional information which are not included in this flight tutorial. When a NAV control panel is active, an amber **A** appears in the left hand side of the NAV control panel. Detailed information about these control panels can be found in Chapter Two (Panel Description) on page 14.

IAS (Indicated Air Speed) Settings

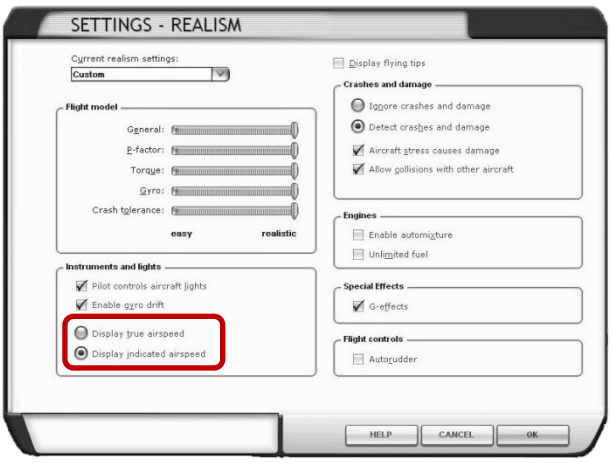
Requirement.
It is mandatory to configure FSX to display **Indicated Air Speed** (**IAS**) rather than True airspeed.

In the **Flight Simulator** menu

- From the FS menu **Aircraft** select **Realism Settings…**



- In the **Settings – Realism** window:
  - Tick **Display indicated airspeed** in the Instruments and lights part.



Flight Planning

Route Finder

We could use Route Finder (http://rfinder.asalink.net/free/), which is an on-line flight planning system for flight simulations. This route generator "service" does not contain all the logic and features of its counterpart aimed at real aviation users, but it's constantly updated with a current AIRAC. However, for this CLS test flight tutorial we'll use the FS Flight Planner. Keeping in mind the *lite* product philosophy, this is a much easier and uncomplicated way to create a route.
To be clear: you could use any other Flight Planner program than the FS Flight Planner, but Microsoft's own flight planner is a good start.

Ok, let's start with our route.
We depart from **Atlanta's Hartsfield - Jackson (KATL**) airport, where we're parked at **gate A30.** In a SSE (South South East) direction, we fly straight to **Miami International Airport (KMIA)**. We're aware this is not a long flight, but not a short hop either and is long enough for you to become familiar with this McDonnell Douglas MD-81.

We assume you are familiar with how to open the FSX Flight Planner and that you know how to create flight plans here. If, on the other hand, you have never done this before, we've created the flight plan file (IFR Hartsfield - Jackson Atlanta I to Miami Intl.PLN). The flight will be an **IFR** flight from KATL gate A30 to KMIA following **High Altitude Airways** on a cruising altitude of **FL310**. That is all the information that's needed right now.
Also, for your convenience below you can see the RouteFinder plan for this flight.

RouteFinder
*Route generator for PC flight simulation use - **NOT FOR REAL WORLD NAVIGATION***
(C)2005-2007 ASA srl - Italy

Computed route from **HARTSFIELD JACKSON ATLANTA INTKA** (KATL, KA) to **MIAMI INTL** (KMIA, KM): 8 fixes, 528.5 nautical miles

```
Cruise altitude between FL310 and FL310
KATL (0.0nm) -SID-> MCN (69.0nm) -J45-> AMG (159.4nm) -J45->
HILRD (210.3nm) -J45-> YULEE (220.1nm) -J45-> CRG (247.7nm) -J45->
OMN (313.3nm) -STAR-> KMIA (528.5nm)
```

Details:

ID	FREQ	TRK	DIST	Coords	Name/Remarks
KATL		0	0	N33°38'12.00" W084°25'40.80"	HARTSFIELD JACKSON ATLANTA INTKA
MCN	114.2	147	69	N32°41'28.26" W083°38'49.86"	MACON
AMG	115.1	143	90	N31°32'11.50" W082°30'29.08"	ALMA
HILRD		147	51	N30°50'48.45" W081°55'45.84"	HILRD
YULEE		148	10	N30°42'52.23" W081°49'10.73"	YULEE
CRG	114.5	148	28	N30°20'19.90" W081°30'35.80"	CRAIG
OMN	112.6	165	66	N29°18'11.71" W081°06'45.71"	ORMOND BEACH
KMIA		172	215	N25°47'36.00" W080°17'25.80"	MIAMI INTL

Tracks are magnetic, distances are in nautical miles.

```
KATL SID MCN J45 OMN STAR KMIA
```

Microsoft Flight Planner

Having a Route Finder flight plan in our hands is nice however, Microsoft's **Flight Planner** offers us a different route to Miami. Not strange since Route Finder offers an accurate flight plan keeping restrictions in mind while the Microsoft version offers just a flight plan between our departure and destination.

We could of course follow the MSFS flight plan completely and end up approaching from a Western direction, but we at CLS thought it would be a nice idea to introduce radar vectors. Radar vectors means that ATC guides us in a different direction than one set-up by the flight plan. It also allows you not only to work with the NAV (FMS) mode, but also the HDG HLD and/or HDG SEL mode.

Below you'll see the complete MSFS flight plan including the possible break-out point from ATC. Don't worry, we'll help you to make a safe landing at Miami International Airport runway 26L.

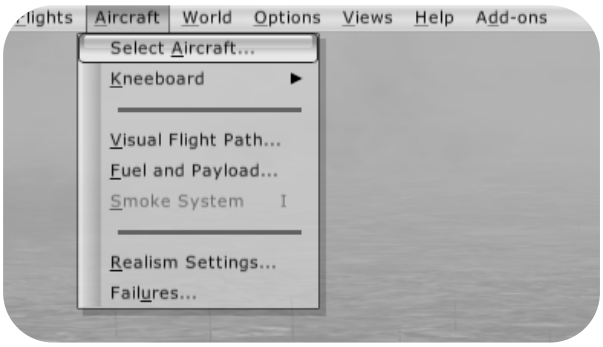
...rts	Route	Alt (ft)	Hdg	Distance	GS (kts)	Fuel (l/kg)	Tim.
				Leg		37.4	
ATL				Rem	Est	Est	ETE
				980.9	Act	Act	ATE
ATL (116.90) (VOR)	-D->	1373	169	1.6	87	0.1 / 0.1	0:00
				979.3		/	
SOONE (waypoint)	J89	15390	165	64.9	84	5.9 / 4.2	0:24
				914.3		/	
ICBOD (waypoint)	J89	31000	165	213.0	84	19.2 / 13.8	1:21
				701.3		/	
OTK (114.80) (VOR)	J89	31000	166	56.8	84	5.1 / 3.7	0:21
				644.6		/	
NECOS (waypoint)	J89	31000	161	34.6	84	3.1 / 2.2	0:13
				609.9		/	
FAGAN (waypoint)	J89	31000	161	128.8	84	11.6 / 8.4	0:49
				481.1		/	
HITTR (waypoint)	J89	31000	162	40.2	84	3.6 / 2.6	0:15
				440.9		/	
KRNEL (waypoint)	J75	31000	181	75.9	84	6.9 / 4.9	0:29
				365.1		/	
LAL (116.00) (VOR)	J73	31000	146	60.6	84	5.5 / 3.9	0:23
				304.4		/	
LBV (110.40) (VOR)	J73	31000	159	142.6	84	12.9 / 9.3	0:54
				161.8		/	
WINCO (waypoint)	J73	21603	143	61.8	84	5.6 / 4.0	0:23
				100.0		/	
DHP (113.90) (VOR)	J73	1614	143	92.6	84	8.4 / 6.0	0:35
				7.4		/	
A	-D->	8	106	7.4	84	0.7 / 0.5	0
				0.0		/	

After VOR LBV, CLS will guide you to VOR PBI (Palm Beach) via VOR PHK (Pahokee). This means no longer via the flight plan but via HDG SEL.

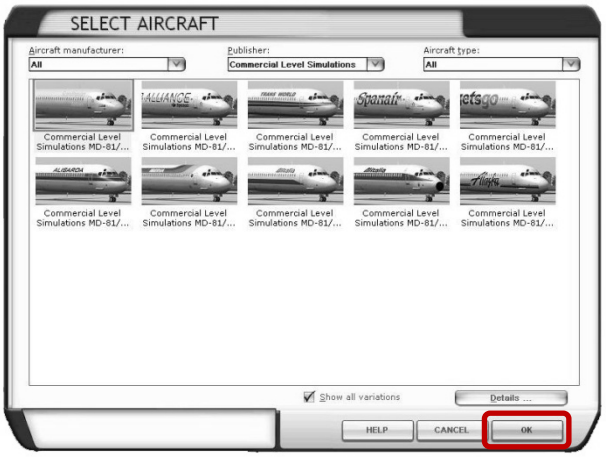
Initialization part I - Selecting manually the CLS McDonnell Douglas MD-81

In **Flight Simulator** menu

Select **Aircraft** from the FS menu and from the pull down menu **Select Aircraft**



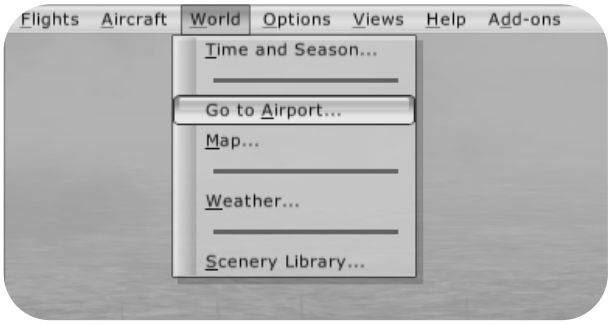
- Select from the **Publisher** menu **Commercial Level Simulations**
- Tick **Show all variations**
- Choose an airline out of the list.
- Click the **OK** button to confirm.



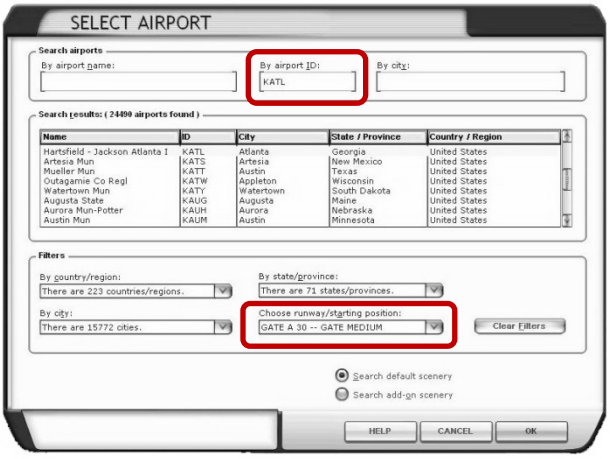
Initialization part II - Manually selecting your airport location

In **Flight Simulator** menu

- Select from the FS menu **World** and from the pull down menu **Go to Airport**



- Type it the **Airport ID** window: **KATL**
- Select from the Choose runway/Starting position window **GATE A30 – GATE MEDIUM**

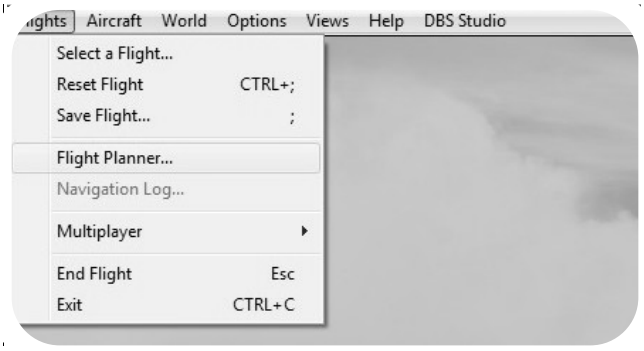


- Confirm the changes with the **OK** button

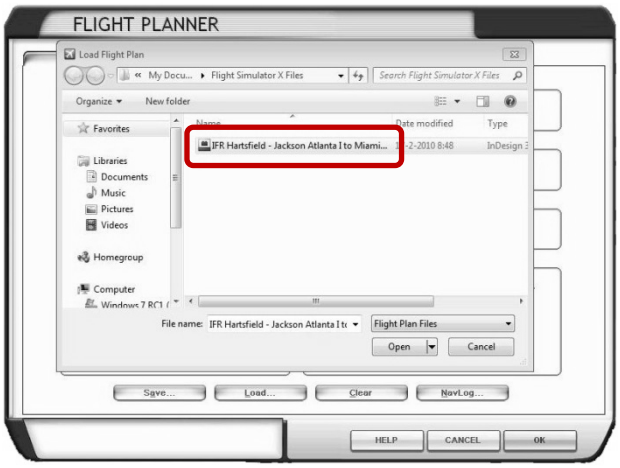
Initialization part III – Loading your flight plan

In **Flight Simulator** menu

- Select from the FS menu **Flights** followed by the pull down menu **Flight Planner**



- On the **Flight Planner** window click the **Load** button. This results in a Load Flight Plan pop-up window, as you can see below.
- Select from the available files **IFR Hartsfield - Jackson Atlanta I to Miami Intl.pln**.
  See the screenshot below.



- Confirm the changes with the **OK** button. The selected flight plan will be loaded.
- Confirm this by clicking the **OK** button. A window pops up asking if Flight Simulator should move your aircraft to the departure airport at the assigned position.
- Click the **No** button. Our aircraft has already been positioned at the correct gate by previous actions. Flight Simulator will load the flight plan data, but it will not reposition the aircraft.

Initialization part IV - Configure a **cold and dark** situation

On the **MID Overhead** panel

Set the following switches, selector, knobs and others, in accordance with the figure below:

- CADC switch **NORM**
- FD CMD switch **NORM**
- EFIS switch **NORM**
- L GEN | APU | R GEN switches **NORM**
- APU L and R BUS switches **OFF**
- EXT PWR L and R BUS switches **OFF**
- GALLEY switch **OFF**
- AC BUS X TIE switch **AUTO**
- DC BUS X TIE switch **AUTO**
- AC System Selector switch **APU**
- APU FIRE AGENT no.1 & 2 switches **OFF**
- APU AIR and MASTER switch **OFF**
- APU FIRE CONT switch **NORM**
- EMER PWR switch **OFF**
- BAT switch **OFF**
- IRS Mode Selectors **OFF**
- AIRCO RECIRC FAN switch **OFF**
- ENG SYNC switch **OFF**
- CKT BKR and STBY COMP switches **OFF**
- THNDSTRM and CKPT FLOOD switches **OFF**
- OVHD CONSOLE LTS switches **OFF**
- ANTI-SKID and LOGO light switches **OFF**
- STALL TEST switch **OFF**
- RADIO NAV switch **NORM**

Note: All knobs (selectors) on the overhead panel are movable via the operation of the mouse buttons.
LH mouse button - counter clockwise
RH mouse button - clockwise

On the MID **Overhead** panel (con't) ·····

Set the following switches, selector, knobs and others, in accordance with the figure below:

- MACH TRIM COMP switch **NORM**
- YAW DAMPER switch **OFF**
- ANTI SKID TEST CRT switch **OFF**
- TEMP Selector **CABIN**
- RADIO RACK switch **VENTURI**
- CKPT and CABIN TEMP Selectors **AUTO**
- SUPPLY switches **AUTO**
- CABIN PRESS switch **PRIMARY**
- AIR COND SHUTOFF switch **AUTO**
- RAM AIR switch **OFF**
- WINDSHIELD WIPER **OFF**
- START PUMP switch **OFF**
- FUEL HEAT switches (2) **OFF**
- IGN switch **OFF**
- START switches (2) **GUARDED**
- FUEL PUMP switches (6) **OFF**
- EMER LTS switch **OFF**
- NO SMOK and SEAT BELT switches (2) **OFF**
- PROB HEAT METER Selector **OFF**
- AIR FOIL L (R) SYS switches (2) **OFF**
- WINDSHIELD HEATING switch **OFF**
- ENG ANTI ICE switches (2) **OFF**

On the **AFT Overhead** panel ·····

Set the following switches, selector, knobs and others, in accordance with the figure below:

- PILOT SEAT HEATING switches (2) **OFF**
- GROUND SERVICE APU PWR switch **OFF**
- GROUND SERVICE EXT PWR switch **OFF**
- MAINTENANCE INTERPHONE switch **OFF**
- FLT RCDR switch **GUARDED**
- L ENG | APU | R ENG LOOP switches **BOTH**
- ELT switch **NORM**
- ELEC SIGNAL switch **OFF**

On the **LWR** (EOAP[8]) **Overhead** panel ·····

Verify that all lights are extinguished.

[8] EOAP - Electronic Overhead Annunciation Panel

On the **Radio Control** panel .....

Set the following switches, levers, handles and others in accordance with the figure below:

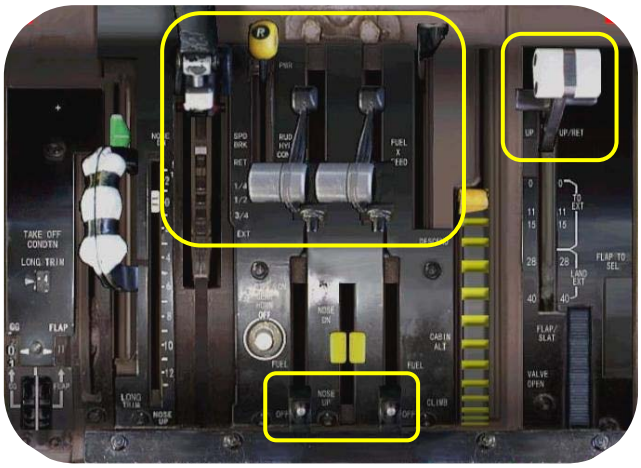
- PANEL light switch **OFF**
- DIGITAL rheostat knob **OFF**
- FLOOD light switch **OFF**
- ATC/TCAS selector switch **STBY**
- VHF COMM windows **disabled**
- ADF windows **disabled**

- RUDDER TRIM indicator at **0**
- AILERON TRIM at **0**
- AUTO BRAKE switch in **DISARM**
  The ABS (Auto Brake System) light on the glare-shield should become white.
- AUTO BRAKE selector in **OFF**

On the **Pedestal** .....

Set the following switches, levers, handles and others in accordance with the figure below:

- Throttles in **IDLE**
- Fuel levers (2) in the **OFF** position
- FUEL CONTROL switches in **CUTOFF** position
- Speed brake handle in **RET** position
- FLAP handle **UP/RET**
- FUEL X-FEED in the **CLOSE** position
- RUDDER PWR handle in the **ON** position



On the **Co-Pilot Glareshield** panel .....

Set the following switches, levers, handles and others in accordance with the figure below:

- L and R GRD light switches **OFF**
- WING/NACL light switch **OFF**
- ANTI COLLISION light switch **OFF**
- POS/STROBE light switch **OFF**

On the **Captain Glareshield** panel ..... Set or verify that the following switches in accordance with the figure below:
- WING LDG LTS switches **OFF**
- NOSE LTS switch **OFF**

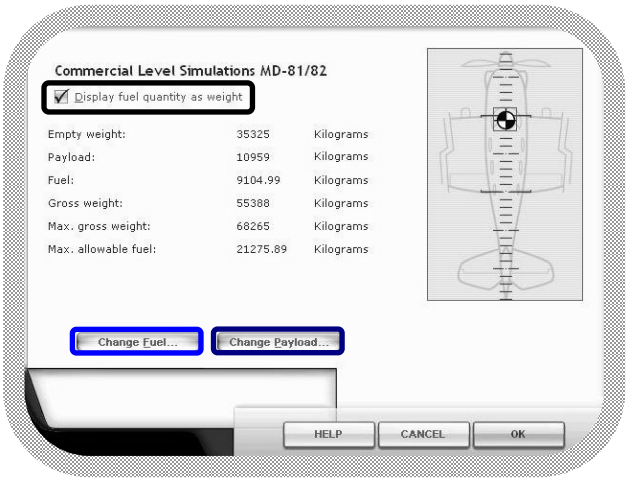
On the **FGCP** ..... Set or verify that the following switches are in accordance with the figure below:
- FD (Flight Director) switches (2) **OFF**
- AUTO THROT switch **OFF**
- AP (Auto Pilot) OFF, irrespective of the selected AP 1 or 2 system.

If you have followed the **Cold and Dark** procedure correctly, the co-pilot's and captain's instrument panels or the widescreen, should look like the previous overviews.
We wish you a pleasant flight.

Fuel and Payload

For this flight, we need approximately ± 8000 kg of fuel (± 17632 pounds). This includes extra fuel for the APU, taxi, holding(s), alternate airport, ATC and others.
Let say we **increase** to be safe this **value** to ± **9106** kg (± 20070 pounds).

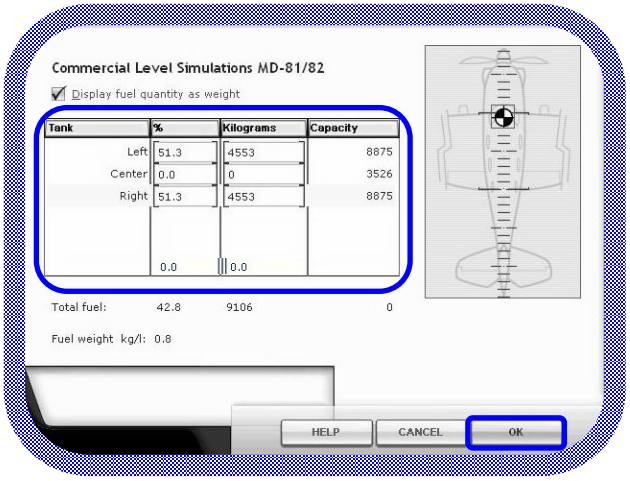
- Select **Aircraft** from the FSX menu.
- Select **Fuel and Payload**.
- Tick **Display fuel quantity as weight**.



Fuel and Payload

- Select **Change Fuel…**
- Enter ± 4553 kg (± 10036 pounds) into the left and right fuel tanks. Once you leave the field, the value could slightly change.
- Enter 0 kg (0 pounds) for the center fuel tanks. Once you leave the field, the value could slightly change.

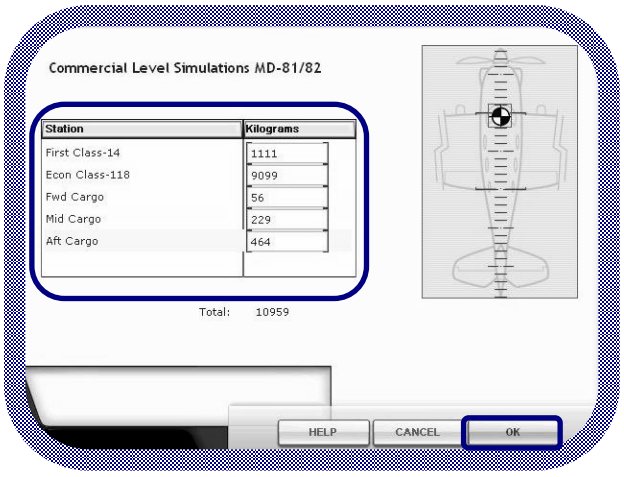
- Click the **OK** button.



Fuel Settings

- Select **Change Payload…**
- Enter the “kilograms” values as shown on the screenshot. When you use Pounds, verify the following values:
  - First Class-14 2449
  - Econ Class-118 20060
  - Fwd Cargo 123
  - Mid Cargo 505
  - Aft Cargo 1023
- One you leave the field, the value could slightly change.
  Click the **OK** button.

- Click the **OK** button to close the FUEL and PAYLOAD window.



Payload Settings

Cockpit Preparations

Power Up

Aircraft Performance data

For the necessary calculations and settings, we've collected the following data for you.

- **Aircraft data**;
  - Empty Weight ± **35325** kg (± 77856 Pounds)
  - GW ± **55388** kg ((± 122075 Pounds)
  - TAKEOFF MAX EPR
  - LONG TRIM **1.5°ANU** (Aircraft Nose Up)
  - Approximate TAKEOFF speeds (knots)
    V1 **≈ 71**
    V_R **≈ 96**
    V2 **≈ 114**
  - ATC Squawk code **2335**
- **Environmental data:**
  - OAT **15°C** (68 F)
  - Barometric Pressure **1013 hPa** (29.92")
  - Weather conditions **thunderstorms**
  - Runway **26L** (274°) and **dry**

On the **MID Overhead** panel

To get the aircraft up and running, first we need to connect the aircraft battery, followed by APU electrical power. If available, you could use EXT PWR supply in of APU power.

- Select the BATTERY switch **ON**.

On the **ENG FIRE** control panel

Perform a LOOP A and LOOP B TEST.

- Press the LOOP A TEST pushbutton as you can see on your left. While pressing the button, monitor the three AFT overhead panel LOOP A lights. The test is successful if all the three LOOP A lights illuminate.
- Press the LOOP B TEST pushbutton. The output is the same as with LOOP A TEST.

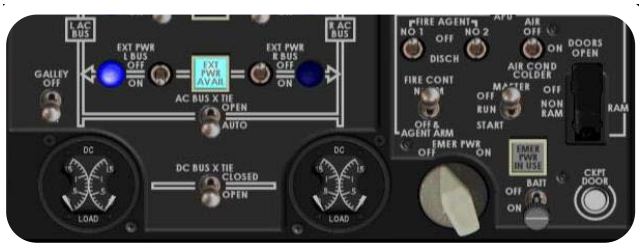
On the **MID Overhead** panel

- Place the APU master switch to **START** and release the knob.
  The knob returns to the RUN position.
- Monitor the APU EGT and RPM indicators.
- Check for the blue **APU PWR AVAIL** light.
- If illuminated, select the **APU L BUS** and **R BUS** switches to **ON**.
- This will illuminate the two other blue lights, indicating that the APU GEN is connected to the aircraft electrical system.
- You can also confirm this by the middle AC LOAD indication.

On the **Side Panel**

- Verify that the PARKING BRAKE is SET.
  Confirm this by the red FSX message
  PARKING BRAKE - Press PERIOD to release

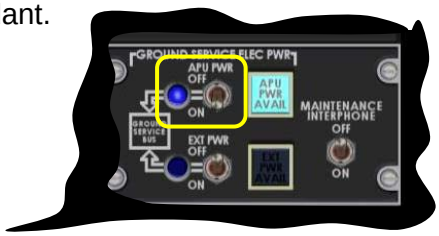
Note: If you set the parking brake, automatically EXT PWR becomes available. This is visible on the overhead panel as you can see on the screenshot. Here we have for example set the **EXT PWR L BUS** switch to **ON**, while the **R BUS** is still **OFF**.



On the **MID Overhead** panel

- Set IRS selectors to **NAV**
- Set RECIRC FAN switch to **AUTO**
- Set CKT BKR and STBY COMP switches **BRT**
- THNDSTRM LT and CKPT FLOOD switch **ON**
- SET OVHD CONSOLE LTS selectors in the **12 o'clock** position
- Set ANTI SKID switch to **ARM**
- Set LOGO LT switch to **ON**
- Set YAW DAMPER switch to **ON**
- Set AIRCOND. SUPPLY switches to **AUTO**
- Set GALLEY switch to **ON**
- Set EMER PWR switch **ON**
- Set ENG FUEL HEAT switches to **AUTO**
- Set LEFT/RIGHT TANK FUEL switches (4) **ON**
- Set EMER LTS switch to **ARM**
- NO SMOK and SEAT BELT switches (2) **AUTO**
- PROB HEAT METER Selector **CAPT**

On the **AFT Overhead** panel ..... - Set the APU PWR (GROUND SERVICE) **ON**. The round blue light illuminates, indicating that the APU electrical power being connected to the ground service system. Since the APU was already connected to the aircraft system, this switch is redundant.



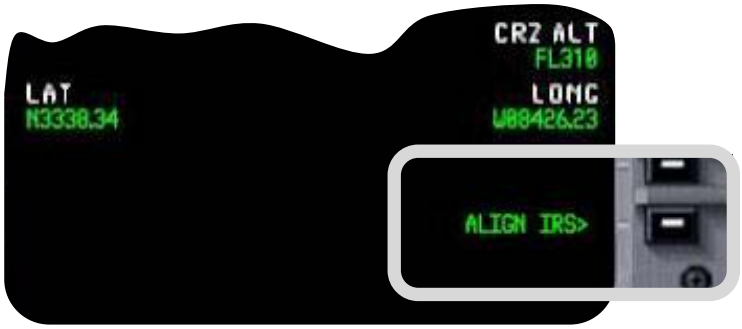
On the **Co-Pilot Glareshield** panel ..... - Select the POS/STROBE light switch to **POS**. This illuminates the navigation lights.

On the **Captains Instrument** panel ..... - Set BARO setting to **1013**hPa or **29.92** inHg. Follow the **+/-** procedure as identified on the right. The Captains and/or Co-pilots altimeters are interconnected, therefore no need to make additional changes on the other instrument.

Call-up the **FMS CDU**

Note: For detailed FMS CDU description and operation look for **Chapter III Panel Description**.

- The FMS CDU should appear with the MAIN MENU page active. If not, click the MENU key on the CDU keyboard.
- Click LSK 3L **<INIT**
  This brings up the initialization page with some interesting data like CRZ altitude, flight plan going from KLGA to KATL etc.
- Click LSK 6R **ALIGN IRS>**
  When correctly done, the ALIGN IRS message disappears from the CDU screen.



- To continue to the next check, click the **MENU** key on the CDU keyboard.
- Click LSK 3R **FLT PLAN>** or you can use the **FLT PLAN key** on the **CDU** keyboard.
- This will confirm that your flight plan is loaded and that the loading process worked correctly.

- With the **UP**/**DOWN** keys on the CDU keyboard you can **scroll** thru the flight plan.
- The **PREV**/**NEXT PAGE** keys on the CDU allow you to switch between **TIME/TRK** and **DIST/FREQ** pages.

Call-up the **FMS CDU** (con't)

- Click on the CDU keyboard the **TOFF/APR** key.
- Click LSK 1L **<CALC/SET T/O V SPEEDS**
  This action leads to a calculation of V1, VR and V2 speeds as well as data for flap, gear and slat retraction and appears in the CDU display.

Values could slightly differ from your configuration.

- Bring the FMS CDU display to the normal pre-flight condition by clicking the **FLT PLAN** key on the CDU keyboard.

On the **FGCP**[9]

Make the following adjustments:

- Select either FD (Flight Director) switch to **ON**
  Check the FMA for correct FD illumination.
- Set a speed in the ATS window of **145**
- Set the Auto Throttle switch to **ON**
- Dial a HDG of 274
- Click on the **VERT SPD** button
- Set an initial VS of **1800**
- Set an initial altitude of **11000** feet

On the **Radio Control** panel

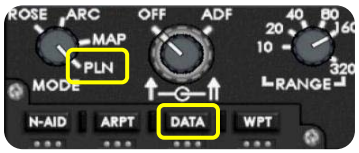
- Set a transponder code of **2335**.

1 1st digit
2 2nd digit
3 3rd digit
4 4th digit

[9] FGCP - Flight Guidance Control Panel

On the **Side Panel**

- Place the mode selector in **PLN** (Plan Mode). This allows you to scroll thru the flight plan. At the same time you're able to check the waypoints towards KMIA on the ND.



- Set the range selector to **160** (nautical miles).
- Press - if needed - the **DATA** key to de-clutter the PLAN display.
- Clearly visible is the first waypoint **SOONE**. If you want to see more waypoints, just set the range selector to 320.

- When you've checke place the mode. selector in **MAP** or **PLAN** mode. That's up to you!

For **clarity** during **TO** and **initial climb**:
- Set the RANGE selector back to **10** or **20** NM.

On the **FGCP**

Although not really needed since our flight will be FMS **flight plan controlled**, it is a good idea to select the first VOR/DME beacon (**MCN 114.2**). This gives us additional distance (DME) information on the RMI. See it as a backup!
- Dial **114.2** on the LH panel. There is no need to enter a CRS value.

1 left digits
2 right digits

On the **Overhead** panel

Perform an ANNUN/DIGITAL (filament) LTS TEST:

- Click the **marked button** on the left, which is located on the MID overhead panel RH lower section.
- All the annunciator lights on the instrument panels, EOCP, and overhead panel illuminate.

- See the screenshots below.

For this tutorial we only display the captains instrument panel and the EOAP[10].
You can check all the other available panels for faulty filaments at your convenience.

[10] EOAP - Electronic Overhead Annunciator Panel

Before Engine Start

On the **EOAP** (section CA) .....

- Double check that the PARKING BRAKE is **SET** before engine start. When the brakes are correctly set, the **PARK BRAKE ON** light as indicated below should illuminate.

On the **Co-Pilots Instrument** panel .....

- Set the ENG HYD PUMP switches to **HI**.
- Set the AUX PUMP switch to **ON**.
- Set the TRANS PUMP switch to **ON**.

On the **RH Glareshield** panel .....

- Set the ANTI COLLISION switch to **ON**

On the **Engine Control** panel .....

Before starting the engines, verify the following engine and system parameters:

- OIL QTY at least > 90%
- OIL PRESS lights illuminated
- HYD QTY at least > 90%

Engine Start

On the **Overhead** panel .....

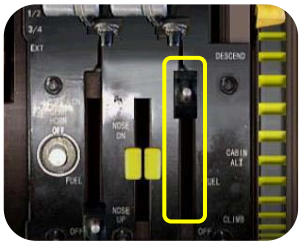
- Set ignition switch to **GRD START & CONTIN**
- Confirm you've got pneumatic pressure. This is checked via the PNEU PRESS indicator.
- Click the **R START** switch.
  This will open the black guard.
- **Click** directly **below** the visible **start switch**.
  The switch visually moves down, which will engage the air starter and drive the N2 spool.
- On the EOAP you should see the message **R START VALVE OPEN**. If not visible, click one of the arrow buttons next to it.

On the **Engine Control** panel .....

- **N2 rotation** can be seen on the R ENG N2 indicator. Also the R ENG OIL PRESS will rise and the HYD PRESS.

On the **pedestal** .....

- At least at **22% N2**, select the R FUEL SHUTOFF lever **ON**.
  This will start the ignition and fuel supply.



On the **Engine Control** panel .....

- The result is an **EGT rise**, a further increase of the **N1 and N2 spool**.
  Very important is the oil pressure increase.
  Wait until all parameters are stabilized and check that at approximately 35 psi, the red OIL PRESS light extinguishes.

- Verify on the EOAP section CA that the **R START VALVE OPEN** text has been extinguished and that the starter valve is closed.

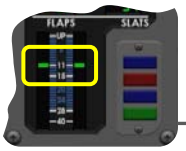
Starting other engine .....

Ok, it's now up to you to start the L ENG using the same procedures that we used for the R ENG

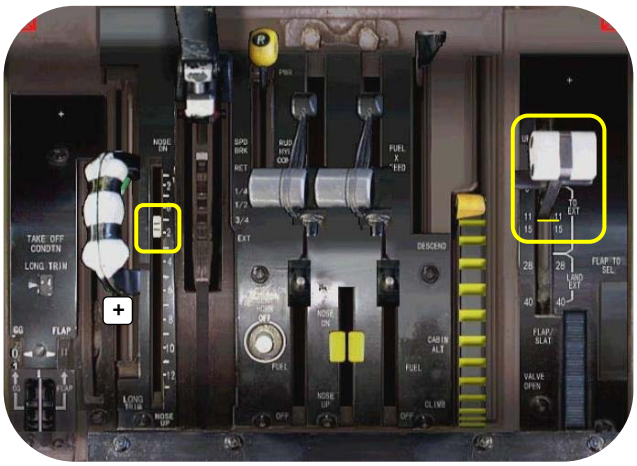
After Engine Start

Finalizing settings and adjustments

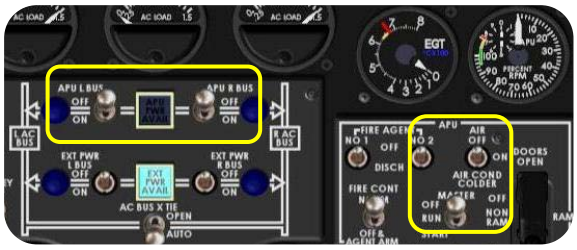
On the **pedestal** .....



- Set LONG TRIM **1.5° ANU** (Aircraft Nose Up). Click the **"+"** area to adjust the stabilizer pointer. See the screenshot below.
- **ARM** the speed brakes by entering keyboard command **Shift + /** (not shown).
- Select **FLAPS 11**.
- Monitor actual FLAP position.



On the **MID Overhead** panel .....



- Select the APU BLEED switch **OFF**.
- Select the L APU BUS and R APU BUS switches in **OFF**.
- Place the APU MASTER switch in **OFF**. Shutdown of the APU is monitored on the APU RPM- and EGT indicators. In addition, the blue APU AVAIL light extinguishes.

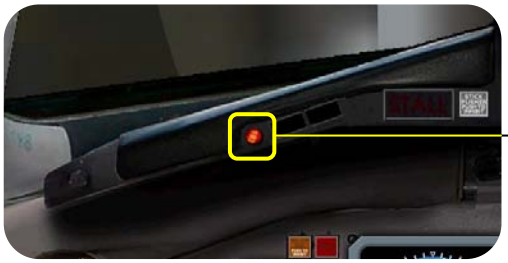
On the **Co-Pilots Instrument** panel .....

- Set the AUX PUMP switch to **OFF**.
- Set the TRANS PUMP switch to **OFF**.

On the **Radio Control** panel

Section **TCAS/ATC** control and indication:

- Perform the TCAS TEST by pressing and holding the **TEST pushbutton**.
- All the **8888's** should show in the window.
- Monitor the V/S TCAS indicator for **TEST** mode.



Followed by a succesful test, make the necessary settings on the radio control panel:

- Verify that the AUTOBRAKE ARM/DISARM switch is set to ARM.
- Select the AUTOBRAKE selector to **T.O.**
- A **red indicator** light on both sides of the glareshield should illuminate.
- On the TCAS/ATC control panel:
  - Select ABOVE
  - Select ALT 1
  - Select ATC selector to TA/RA
  - Select XPDR to 1
- Set the INSTR PANEL LTS switches as required, depending on the light conditions.
- Verify that both the RUDDER and AILERON TRIM are at 0 position. If not, click on the L or R side of the pointer to adjust it accordingly.

Taxi Profile

After receiving ATC clearance (if applicable) we request the ground crew to start with the pushback.

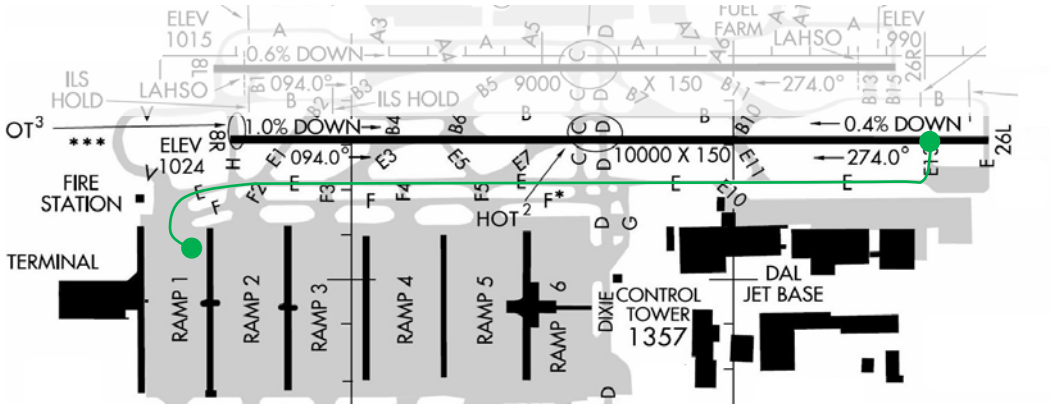
- PARKING BRAKES Press PERIOD (.) to release
- Start the pushback via keyboard combination "**Shift** + **P**". For further details on left/right rotation at the end of the pushback, see MSFS.
- For more realism, connect the CLS pushback truck via the simicon.

On the L and R **glare-shield** panel .....

- After pushback and cleared for taxi, we need to perform the following actions:
  - Select the NOSE LTS switches **ON**
  - Select L and R GRD switches **ON**
  - Select WING/NACL switch **ON**

Taxi to **runway 26L** KATL .....

Taxi from your gate **A30** via taxiway E to **holding point E13** runway **26L**



TO Profile (runway 26L)

On the L and R **glare-shield** panel .....

- Select the WING LDG LTS EXT switches **ON**.
- Select the POS/STROBE switch to **BOTH**.

Commence Take Off .....

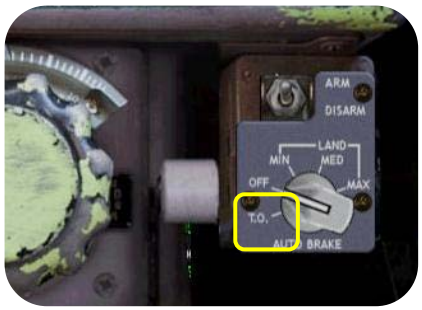
- Set the ET switch on the clock to **RUN**.
- Align the aircraft with runway centerline.
- On the TRP (Thrust Rating Panel) select **TO**.
- Press the brake pedals - if you have them - to keep the aircraft in the current position.
- Increase the throttles to approximately 60% N1, pause briefly to verify that the engines have run-up properly.
- Watch the **EPR**, **N1**, **EGT** and **N2** gauges on the main instrument panel.
- Advance the throttles to **MAX TO** thrust.
- While TO in progress, watch your V SPEEDS

At aircraft rotation ..... - At **V_R**, gentle pull and bring the aircraft into approximately **10**° PITCH UP position.

When there's a positive climb ..... - While holding the pitch **raise the landing gear** after **V_2** as follows;
- Click the landing gear handle **UP** or use the **keyboard** command **G**.
- Verify all **gear lights extinguish**.

- Maintain a speed equal **145**.
- Maintain a **HDG 274°** as set on the FGCP.

On the **radio control** panel ..... - Select the AUTOBRAKE selector to **OFF**



Climb Profile

At Thrust Reduction Altitude (1500') ..... - Retract FLAPS in steps to **UP**

On the **FGCP** ..... - Engage **AP 1** (or select AP 2).
- Press/select the **SPD SEL** button.
- Press/select the **NAV** button.
  This connects your FMS flight plan to the AP.
- Click the **ALT** knob to activate the selected V/S.

Note: The buttons are not equipped with integral "activation" lights. Correct activation can therefore be monitored on the FMA.

On the **FMA** (Flight Mode Annunciator) ..... - Monitor the different indications.
  This will reflect the FGCP settings.

- **SPD SEL** button — **SPD 145**
- **NAV** button — **NAV** and **NAV CAP**
- **ALT** text — **ALT**
- **AP 1** selected — **IAS** and **AP1**

On the **glare-shield** panel ..... - Set the NOSE LTS switch **OFF**.
- Select the WING /NACL light switch **OFF**.
- Select the GRD light switches to **OFF**.

Passing 5000 feet

On the **FGCP** ..... Although we have just passed 5000 feet, we're re-cleared for FL260 (26,000 feet).
Make the following settings:
- Set the altitude to **26,000 feet**
- Reduce the V/S to **1600**.
- Click the **ALT** knob to activate the selected V/S.
- Set a new speed of **250**
- Align the HDG with the actual track. In this example, it will be **HDG 165**. The reason to do this is to keep the HDG SEL selector on the FGCP equal/aligned with the A/C TRACK.

On the **FMA** (Flight Mode Annunciator) ..... - Verify the changes on the FMA.
Because we are following the flight plan, the **CAP** (capture) is replaced by **TRK** (tracking).
Furthermore, the speed window shows **250** kts.

On the **TRP** ..... - Select the **CL** button.
This tells the system to set climb (EPR) thrust.

Passing FL100 (10,000 feet)
On the **overhead** panel ..... - Select **WING LDG LTS** switches **OFF**.

On the **FGCP** ..... - Increase the SPD to **300**
Double check the FMA for **SPD 300** indication.

At TRANSITION altitude (18,000 feet)
On the **Captains Instrument** panel ..... - Set BARO PRESSURE on altimeter and standby altimeter/IAS indicators to Standard Atmosphere. Because we started with a 1013 mbar at KATL, there is no need to adjust this.

Approaching FL260 (26,000 feet)
On the **FGCP** .....

Before reaching FL260, you can proceed directly to your final cruising altitude.
- Set an altitude of **31,000 feet**.
- Reduce the V/S to **1400**.
- Click the **ALT** knob to activate the selected V/S.
- Click on the **MACH** text on the FGCP and enter a Mach value of **.76**.
- Click the **MACH SEL** button.
  Because of this action, the FMA **SPD 300** indication changes to **MACH 760**.

Leveling off at FL310

On the **Captains Instrument** panel .....

Aircraft is approaching our cruise altitude, which means that:

- **ALT ALERT** light in the altimeter illuminates.
- V/S indicator returns to 0 when actual altitude is equal to selected altitude.

On the **FMA** .....

- Monitor the chance from IAS into **ALT CAP M** and the **MACH 760** (0.76) indication.

On the **TRP** .....

- Select the **CR** (CRUISE) EPR thrust button.

Cruise Profile

Relax and enjoy

Although our cruise lasts for only a few hours, it is still a relaxing time. The landscape passing under us is not the most impressive that you could hope for. Nevertheless, when you have installed some of the add-on programs, it all becomes more attractive.
Anyway, enjoy this short cruise flight moment of relative rest before the descent starts.

Relaxing is nice however, the following two pages offer the necessary background information of your descent, approach and landing at Miami International Airport.

Descent and approach preparations

This is a good moment to review our descent, approach and landing at KMIA.
Proper descent planning is necessary to ensure proper speed and altitude at the arrival point.
Approximate descent rates are as follows:

Intended speed	**Descent Rate**	
	Clean Configuration	with **speed brakes**
0.76 / 300 knots	2300 FPM	4500 FPM
250 knots	1400 FPM	3000 FPM

Generally, plan the descent so that your aircraft is approximately at FL100 / 250 knots at 30 NM from the airport.
To calculate the point of beginning of our descent, we will use the old-fashioned rule of thumb, saying that distance to descent roughly equals the number of thousands of feet of altitude that we are to descend multiplied by three, plus five.
Oops, that seems complicated! Let us take this flight as example. In our case, we have to descend from 31,000 feet to roughly sea level. This means the distance from our destination at which we should start our descent is then (31000/1000) x 3 = 93NM.

As you probably can remember from the pages 4 and 5, our MSFS flight plan is different than the Route finder version. This means that our planned STAR[11] could lead to problems. Ok pilots, it is good to **start your descent** at VOR/DME station **LBV** (110.40).
From LVB (La Belle) we fly towards Palm Beach. Since from this point on we no longer fly and follow the MSFS flight plan, we need to tune for VOR **PHK** (Pahokee - 115.40) and the FGCP is set to VOR mode. From Pahokee, we fly in an Eastern direction straight to VOR **PBI** (Palm Beach - 115.70).

From VOR PBI we maintain a heading of approximately 170°. On the FGCP we change for a moment from VOR to HDG SEL mode. At 15NM out of VOR PBI, we go back to the VOR mode. We select therefore VOR VKZ (Virginia Key). After several NMs, select a heading 272° which should lead us to the localizer from runway 26L. Of course, we need to select the localizer or ILS frequency of runway 26L.

Because of the difference between the Route Finder and MSFS flight plan, there's no need to bother you about how and which STAR we need. Therefore we'll leave this out of the tutorial. Instead, we'll train you not only how to fly the NAV mode, but also how to use the VOR and HDG SEL modes on the FGCP..

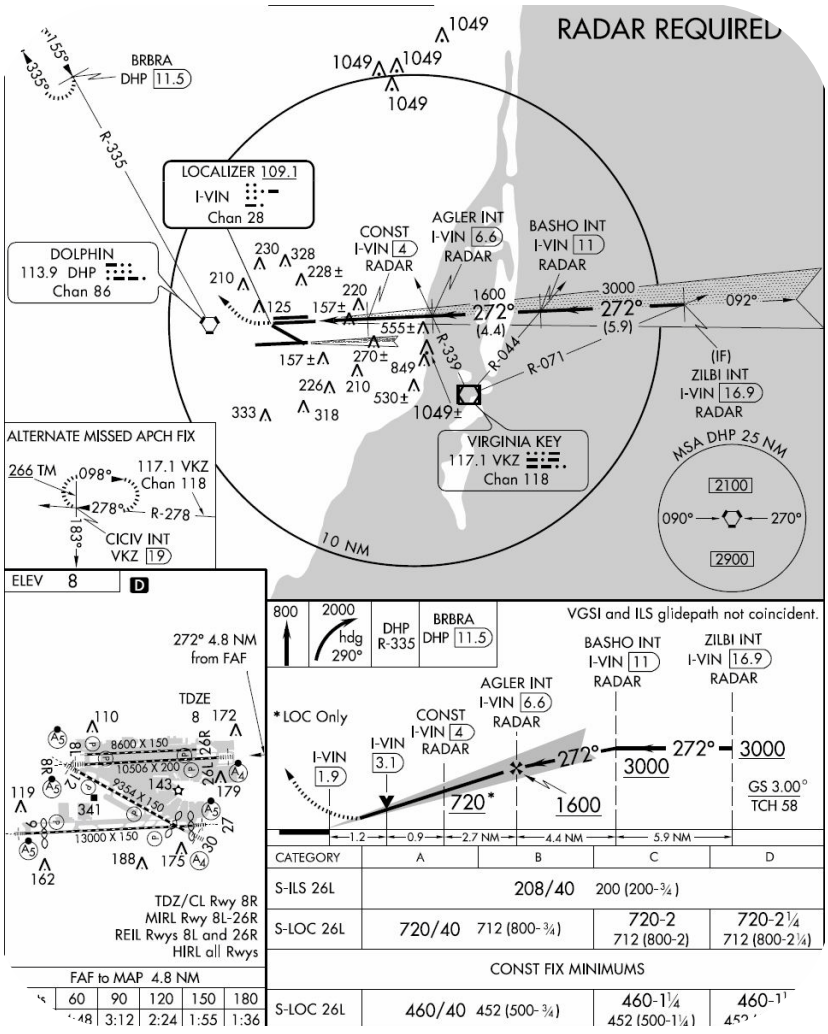
Overall approach planning with ATC/airport clearance available:
- 250 knots below FL100 at around 30NM from the airport
- 180-230 knots while 23 NM out of the airport
- Slow down to VREF at GS[12] capture
  VSPEEDS can be found at the CDU APPROACH page.

[11] STAR - Standard Terminal Arrival Route
[12] Glide Slope, part of the Instrument Landing System (ILS)

Landing (ILS runway 26L) preparations

We have already discussed the planned or proposed runway for landing at Miami.
For making a successful landing we need the **ILS frequency** or I should say the **LOC** (localizer) frequency, which is **109.1** with a course of **272°**. That's it!
Since the CLS MD80 Series doesn't have a functional IRS (Inertial Reference System), for navigation we can only use VOR and/or NDB beacons. Let's stick to VOR beacons; we could enter different VOR's however, since we fly over sea, it's not that easy to find something.
Therefore, let's stick to a RMI reading with VOR/DME beacon **DHP** (Dolphin - 113.90).

Conclusion:
When we have passed VOR **PBI** (**115.70**), we fly on a heading of 170°. At 15NM out of VOR PBI, we go back to the VOR mode. We select therefore VOR VKZ (Virginia Key). and continue in that same heading. After several NMs, we set a heading of approximately 272°, followed by entering the **ILS LOC** frequency of **109.10**. It's also important that we make our final descent to 2500 feet. If you've done all of this correctly, the ILS should be picked up, but it will be a very short localizer guidance. Short because we're jumping in close to the runway. For your convenience, we added the ILS 26L arrival chart below.
A full size charts of ILS 26L can be found in Chapter 5 - Appendix.
As we said, when you've done all of this, it should not go wrong, so let's go for it!



VOR, ADF or Waypoints

The following section is just an example of the RMI and data indications while in cruise. You could do this exercise at any other position along the route. The idea of this section is to understand how to tune VHF NAV frequencies versus RMI indications while still flying in the navigation (NAV flight plan guidance) mode.

At 5-15NM before VOR **OTK**
On **VHF NAV 2** panel ..... - Select **116.00**.
This is the frequency of **VOR LAL** and there's no need to enter a CRS value.

The result of this action can be seen on the RMI DME 2 indication as well as the double needle. As you can see on the screenshot, **VOR LAL** is approximately **178NM** away from you.

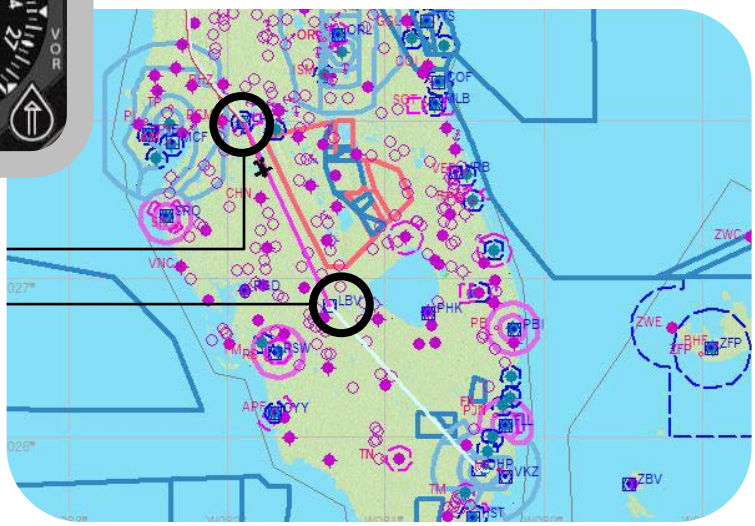
Passing VOR **OTK**
On **VHF NAV 1** panel ..... - Select **110.40**.
This is the frequency of VOR **LBV**.
Again there's no need to enter a CRS value.

On the RMI you can see that there's **no** VOR LBV reception because the RMI shows a flag and no DME indication. This is because the DME station is too far out and thus there's no indication.

Approximately 19NM passed VOR **LAL**

Current flight situation:
- VHF **NAV 1** tuned for VOR **LBV** (110.40)
- VHF **NAV 2** tuned for VOR **LAL** (116.00)
- VOR **LAL** 19.4NM behind us (**double** needle)
- VOR **LBV** 58.5NM in front of us (**single** needle)

See the screenshot below that reflects the above. At approximately 60NM before VOR LBV, the VOR/DME indication on the RMI becomes alive.



At approximately 50NM for VOR **LBV**
On **VHF NAV 2** panel

- Select **115.40**.
  This is the frequency of **VOR PHK** (Pahokee).

On the co-pilot instrument panel we see:
- VHF NAV 2 set frequency VOR PHK (115.40).
- RMI double needle points to **VOR PHK**.
- RMI single needle points to **VOR LBV**.
- Flying in NAV mode (flight plan guidance). This is confirmed by the FMA (NAV CAP). See also the ND magenta line towards VOR LBV.

At approximately **11NM** before VOR **LBV**

On **VHF NAV 1** panel ..... - Select VOR PBI (Palm Beach) **115.70**.

The result of this action can be seen on the RMI **DME 1** indication as well as the **single needle**.
First of all; the distance to VOR **PBI** equals **77.8NM**.
Second; the needle is pointing in a 106° direction.

Caution: Your RMI values could be different depending on the moment you read out the RMI DME 1 and the direction single needle position.

On the **Side Panel** ..... - Set the mode selector to **ROSE**.
The ND indication changes from MAP to ROSE.

On the **FGCP** and **VHF NAV 1** panel ..... - Dial a **CRS** of **106°** as found on the RMI screenshot or your single needle value.
- Click twice the **VOR LOC** button.
The result of this action can be seen on the FMA screenshot. Furthermore, we're no longer in NAV mode. We changed to VOR guidance.

On the **FMA** ..... - You'll see the disappearance of **NAV** **NAV CAP** and as a result of the VOR LOC button, the appearance of **VOR** **VOR CAP**

On the **FGCP**

- Set a HDG of **106°** or any other value that equals your configuration.
On the separate ND screenshot you can see that the **HDG** bug is now in-line with the selected CDI (Course Deviation Indicator).
Notice also the presence of **DME 1** (VOR PBI) and **DME 2** (VOR PHK) indication.

Overview of Lake Pahokee, Southern Florida USA

Deviation of the CDI

It's not unusual that the Course Deviation Indicator (CDI) deviates from the middle position of the Course Pointer.
See the two screenshots below.

On the **FGCP**

- If the CDI moves away in either direction, turn the CRS knob till the CDI is back in-line with the Course Pointer.

- Although here we've chosen the ND ROSE mode, you could also select the **ARC** mode. The ARC shows only a part of the ROSE mode, but is as accurate as the ROSE mode.
  See an example of the ARC mode below.

Descent Profile

Wings level heading for VOR **PBI**

On the **FGCP** .....

Make the following settings:
- Click the **VERT SPD** button.
- Set a V/S of **-2200**.
- Enter your first descent altitude of **18,000** feet.
- Click the **ALT knob** to activate a V/S of -2200.
- Click the **SPD** text on the panel. The SPD window will change into IAS indication.
- Enter an IAS of **280** knots.
- Click the **SPD SEL** button.

Caution: Because of the selected vertical speed, you may need to use the speed brakes to slow the aircraft. Use of the speedbrakes will help to keep the IAS within limits.

On the **FMA** .....

Monitor the correct **indications** as you can see on the screenshot below.

Note: VOR CAP means that VOR PBI is first captured, while afterwards the indication changes into VOR TRK (track).

On the **TRP**[13] .....

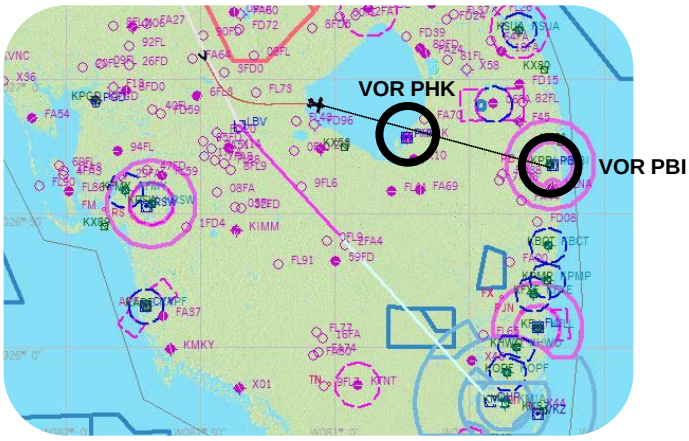
- Click the **CL** (climb) thrust EPR button.

[13] TRP - Thrust Rating Panel

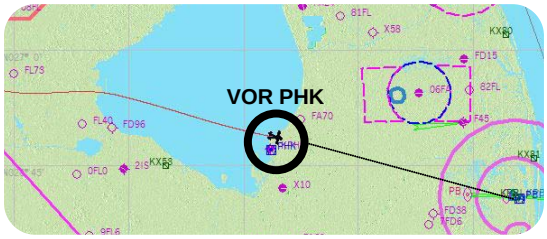
Approximately 54NM from VOR PBI
On the **Navigation Display**

While heading for VOR Palm Beach (PBI), it clearly can be seen on the MAP view on the original flight plan our detour to Palm Beach. Since you're flying in VOR mode, the aircraft follows the VOR signal from VOR PBI.

Find an example of the **ND** at **54.3NM** out of **PBI**.



Overfly VOR PHK (VHF NAV 2)
On the **RMI**



This MAP view and RMI shows you on your way to VOR PBI. Here you're overflying VOR Pahokee (**PHK**) as selected On **VHF NAV 2** panel. As you can see on the RMI screenshot, the double needle is moving from TO to FROM.

Passing thru FL200
On the **FGCP**

- Set a new altitude of **12,000'** (FL120).
  Since you're still descending with a VS of -2200, there's no need to click the VERT SPD or ALT button/text on the FGCP.

Passing thru 18,000' (FL180)
On the **Captains Instrument** panel

- Press **B** on your keyboard.
  This will sets the current barometric pressure correctly to local conditions on your MSFS environmental conditions.

At approximately **30NM** before VOR **PBI**
On **VHF NAV 2** panel

- Set VOR VKZ **117.10** (VOR Virginia Key). The output of this can be seen on the RMI via the double needle as well as the DME indication.

Leveling off at 12,000' (FL120)

Approximately **15NM before VOR PBI** you should level off at 12,000' (FL120). Since you've received approval for further descending, set a new altitude of 8000' on the FGCP.

- Click the **VERT SPD** button.
- Set a VS of **-1800**.
- Set an altitude of **8000'**.
- Click the **ALT knob**.

Passing thru 10,000' (FL100)
On the **Captains Glareshield** panel

- Set the WING LDG LTS switches **ON**.

At approximately **5NM** before VOR **PBI**

On the **FGCP**

- Confirm that the **CRS** and **HDG** windows have the **same value**. See the screenshots.
- Set a HDG of **170**.
- Click the **HDG** knob.
- Click the **VOR LOC** button.
  This will bring you in the HDG SEL mode.
  FMA **HDG SEL** output is confirmed.
- Set a speed of **250**.

Note: Since there's no ATC implemented, there's no guidance. By flying HDG SEL, we assume that there's no drifting.
To eliminate any drifting, you could decide to select "Clear Skies" from the "World - Weather" FSX menu.

On the **FMS CDU**

It's also time to check for our landing speeds.
Perform these steps:

- Click the **TOFF APR** button on the keyboard.
- Click LSK 1L **<CALC/SET APPR SPDS**.
- Note the necessary speeds for landing:
  SLATS extend 181 knots
  VF11 (flaps 11) 159 knots
  VF15 (flaps 15) 154 knots
  VF28 (flaps 28) 148 knots
  GEAR DOWN 148 knots
  VF40 (flaps 40) 138 knots

Caution: Your speeds could differ from these!

Approach Profile

At approximately **25NM** from VOR **PBI** .....

On the **FGCP** set:
- If needed, click the **VERT SPD** button.
  This is only needed if the V/S window is blank.
- Set a V/S of -**1000**.
- Set an altitude of **3000'**.
- Click the **ALT** knob to active the selected V/S.
- Reduce the speed to **220**.

Check the **FMA** for correct indications.

Approximately **50NM** from VOR **PBI** .....

On the **VHF NAV 1** set:
- Set the ILS 26L frequency of **109.10**
- Set the LOC course of **272**.

On the **FGCP** (not shown):
- Click once on the **HDG SEL** knob. This disables the HGD SEL mode.
- Click the **ILS** button. This will arm and if already applicable, engage the LOC signal.
- If needed, click once on the **ALT** knob.
- For correct FMA indications,
  see the screenshot below.

Approximately **50NM** from VOR **PBI** (con't) ··

Results are found on:
- LOC and LOC CAP on the **FMA**.
- Single needle with DME indication on the **RMI**.
- LOC and G/S indication on **PFD**.
- CDI and CP attached to the LOC on the **ND**.

Capturing **LOC** ILS 26L ·····

Caution: While capturing the localizer, the FMA ALT CAPG could change into **G/S TRKI**. This leads to a sudden altitude decrease. To prevent this, click the **ALT** knob on the FGCP. See the enlarge FMA screenshot to the left.

On the **glare-shield** panel ..... - Set the NOSE LTS switch **ON**.
- Select the WING /NACL light switch **ON**.
- Select the GRD light switches to **ON**.

Wings level heading for ILS 26L .....

On the **FGCP** (not shown):
- Set a speed of **181** (see page 48 for speeds).
- Click on the **ALT** knob. This will set the G/S capture, but it maintains our set altitude of 3000'. See FMA screenshot to the left.

On the **pedestal**:
- Set the SLAT/FLAP handle to **0/0**.
- **ARM** the **ground spoilers** (not shown) Select keyboard command "Shift+/".

On the **Radio Control** panel:
- Set the AUTO BRAKE selector to **MID**.

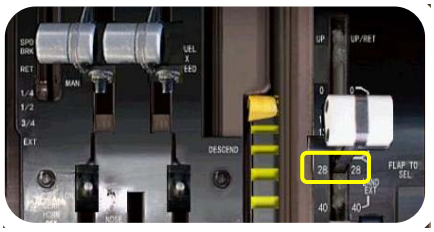
Approximately **18 NM DME** localizer ..... On the **FGCP**:
- Set VF11 (flaps 11°) speed **159**.

On the **pedestal**:
- Set the SLAT/FLAP handle **11/11**.

Approximately **16 NM DME** localizer ..... On the **FGCP**:
- Set VF15 (flaps 15°) speed **154**.

On the **pedestal**:
- Set the SLAT/FLAP handle **15/15**.

Approximately **15 NM LOC** signal



On the **FGCP**:
- Set VF28 (flaps 28°) speed **148**.

On the **pedestal**:
- Set the SLAT/FLAP handle **28/28**.

At **G/S capture** (≈ 11NM DME) ILS 26L

On the **Captains Instrument** panel:
- Select landing gear **DOWN**.
  Monitor gear position by the three green lights.

On the **FGCP**:
- Set VF40 (flaps 40°) speed **138**.

On the **pedestal** (not shown):
- Set the pedestal SLAT/FLAP handle **40/40**.

Final Approach

At approximately **400' RA** .....

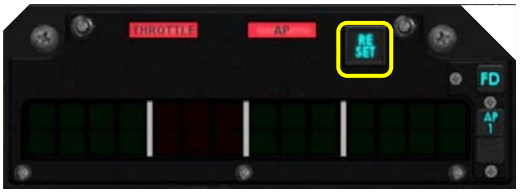
On the **PFD** and **ND**:
- Monitor the correct operation of the ILS system. On the **PFD** you can see that the PITCH and ROLL bars as well as ILS scales, are aligned.
- On the **ND** the LOC (CDI) is in-line with the pointer.

At approximately **200' RA** .....

On the **PFD**:
- Monitor the yellow **M**. It represents the middle marker beacon.

On the **FGCP**:
- Disconnected the **AP**.
- Disconnect the **AUTO THROT**.

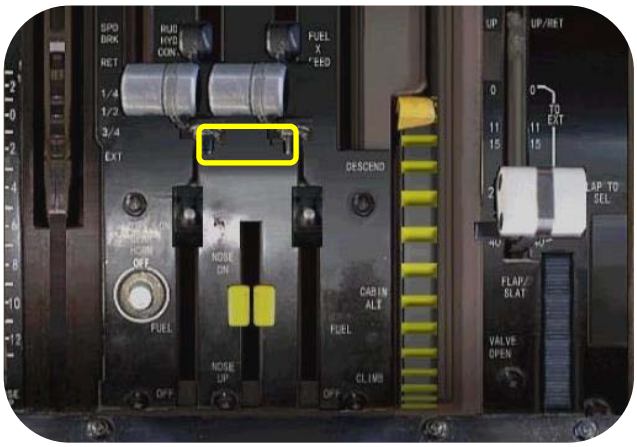
On the **FMA**:
- The **THROTTLE** and **AP** lights confirm the disconnection of the Flight Guidance system. All the annunciation windows are blank as well.
- Extinguish the lights by clicking the **RESET** button on the FMA.



Touchdown and taxi

On the **pedestal** .....

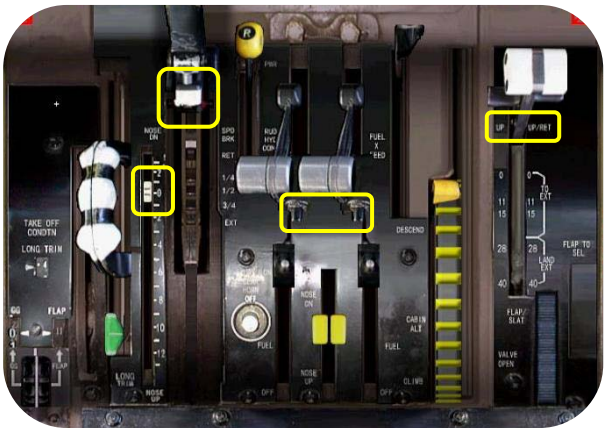
- Select ENGINE **REV THR**
  During bucket doors transit, the **REVERSE UNLOCK** lights illuminate, fitted on the **Engine Module** panel.
  Once the bucket doors are fully deployed, the **REVERSE THRUST** lights illuminate as well.
  These REVERSE THRUST lights indicate that the crew can apply engine reverse thrust.



Taxi to the gate of your choice

On the **pedestal** ..... Taxi to a gate of your choice however, during taxi make the following settings:

- Select SLATS/FLAPS to **UP/RETRACT**
- Disarm the SPEED BRAKES.
- Return the thrust reversers to **FWD IDLE**
- Return the **Horizontal Stabilizer** to **0**



On the **Glareshield** panel ..... - Select the WING LDG LTS switches **OFF**
- Select the POS/STROBE switch to **POS**

On the **FGCP** ..... - Disconnect either **FD** (Flight Director) switch

Arriving at the gate including cockpit termination

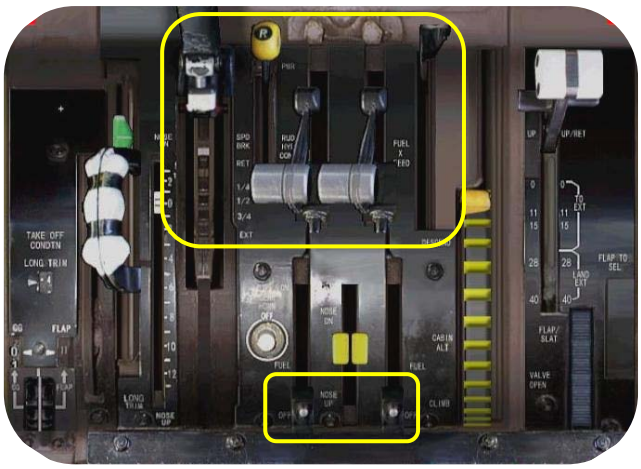
On the **Side Panel** .....

- Verify that the PARKING BRAKE is SET. Confirm this by the red FSX message
  PARKING BRAKE - Press PERIOD to release

On the **Pedestal** .....

Set the following switches, levers, handles and others in accordance with the figure below:

- Throttles in IDLE
- Fuel levers (2) in the OFF position
- FUEL CONTROL switches in CUTOFF position
- Speed brake handle in RET position
- FUEL X-FEED in the CLOSE position
- RUDDER PWR handle in the ON position



On the **Co-Pilot Glareshield** panel ..... Set the following switches, levers, handles and others in accordance with the figure below:

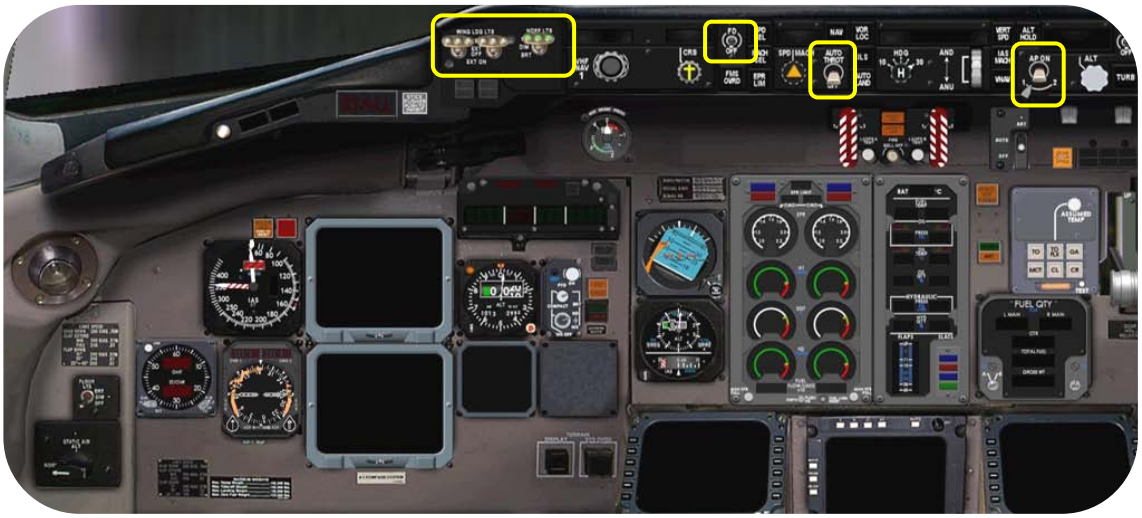
- L and R GRD light switches **OFF**
- WING/NACL light switch **OFF**
- ANTI COLLISION light switch **OFF**
- POS/STROBE light switch **OFF**

On the **Captain Glareshield** panel ..... Set or verify that the following switches in accordance with the figure below:

- WING LDG LTS switches **OFF**
- NOSE LTS switch **OFF**

On the **FGCP** ..... Set or verify that the following switches are in accordance with the figure below:

- FD (Flight Director) switches (2) **OFF**
- AUTO THROT switch **OFF**
- **AP** (Auto Pilot) **OFF**, irrespective of the selected AP 1 or 2 system.



On the **MID Overhead** panel .....

Note: All knobs (selectors) on the overhead panel are movable via the operation of the mouse buttons.
LH mouse button - counter clockwise
RH mouse button - clockwise

Set the following switches, selector, knobs and others, in accordance with the figure below:

- CADC switch **NORM**
- FD CMD switch **NORM**
- EFIS switch **NORM**
- L GEN | APU | R GEN switches **NORM**
- APU L and R BUS switches **OFF**
- EXT PWR L and R BUS switches **OFF**
- GALLEY switch **OFF**
- AC BUS X TIE switch **AUTO**
- DC BUS X TIE switch **AUTO**
- AC System Selector switch **APU**
- APU FIRE AGENT no.1 & 2 switches **OFF**
- APU AIR and MASTER switch **OFF**
- APU FIRE CONT switch **NORM**
- EMER PWR switch **OFF**
- BAT switch **OFF**
- IRS Mode Selectors **OFF**
- AIRCO RECIRC FAN switch **OFF**
- ENG SYNC switch **OFF**
- CKT BKR and STBY COMP switches **OFF**
- THNDSTRM and CKPT FLOOD switches **OFF**
- OVHD CONSOLE LTS switches **OFF**
- ANTI-SKID- and LOGO light switches **OFF**
- STALL TEST switch **OFF**
- RADIO NAV switch **NORM**

On the MID **Overhead** panel (con't) ·····

Set the following switches, selector, knobs and others, in accordance with the figure below:

- MACH TRIM COMP switch **NORM**
- YAW DAMPER switch **OFF**
- ANTI SKID TEST CRT switch **OFF**
- TEMP Selector **CABIN**
- RADIO RACK switch **VENTURI**
- CKPT and CABIN TEMP Selectors **AUTO**
- SUPPLY switches **AUTO**
- CABIN PRESS switch **PRIMARY**
- AIR COND SHUTOFF switch **AUTO**
- RAM AIR switch **OFF**
- WINDSHIELD WIPER **OFF**
- START PUMP switch **OFF**
- FUEL HEAT switches (2) **OFF**
- IGN switch **OFF**
- START switches (2) **GUARDED**
- FUEL PUMP switches (6) **OFF**
- EMER LTS switch **OFF**
- NO SMOK and SEAT BELT switches (2) **OFF**
- PROB HEAT METER Selector **OFF**
- AIR FOIL L (R) SYS switches (2) **OFF**
- WINDSHIELD HEATING switch **OFF**
- ENG ANTI ICE switches (2) **OFF**

On the **AFT Overhead** panel ·····

Set the following switches, selector, knobs and others, in accordance with the figure below:

- PILOT SEAT HEATING switches (2) **OFF**
- GROUND SERVICE APU PWR switch **OFF**
- GROUND SERVICE EXT PWR switch **OFF**
- MAINTENANCE INTERPHONE switch **OFF**
- FLT RCDR switch **GUARDED**
- L ENG | APU | R ENG LOOP switches **BOTH**
- ELT switch **NORM**
- ELEC SIGNAL switch **OFF**

On the **LWR** (EOAP[14]) **Overhead** panel ·····

Verify that all lights are extinguished.

[14] EOAP - Electronic Overhead Annunciation Panel

On the **Radio Control** panel

Set the following switches, levers, handles and others in accordance with the figure below:

- PANEL light switch **OFF**
- DIGITAL rheostat knob **OFF**
- FLOOD light switch **OFF**
- ATC/TCAS selector switch **STBY**
- VHF COMM windows **disabled**
- ADF windows **disabled**

- RUDDER TRIM indicator at **0**
- AILERON TRIM at **0**
- AUTO BRAKE switch in **DISARM**
  The ABS (Auto Brake System) light on the glare-shield should become white.
- AUTO BRAKE selector in **OFF**

Microsoft Flight Simulator Flight Plan

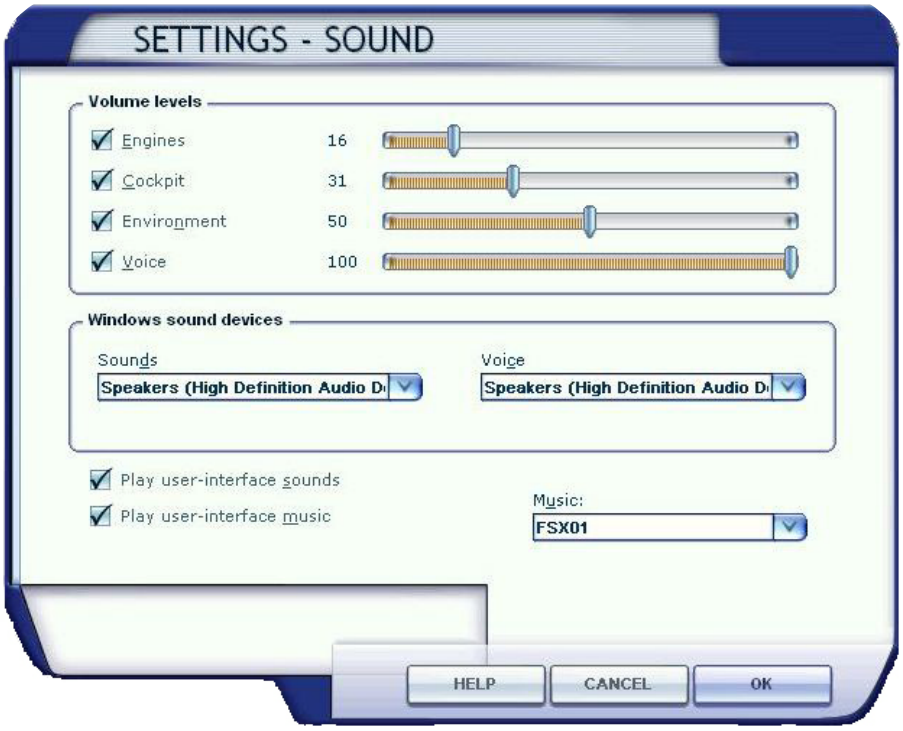
Hartsfield - Jackson Atlanta I -> Miami Intl

Distance: 980.9 km
Estimated fuel burn: 3115.7 l / 2501.7 kg
Estimated time en route: 1:12

Waypoints	Route	Alt (ft)	Hdg	Distance	GS (kts)	Fuel (l/kg)	Time off
				Leg		26463.3	0:00
KATL				Rem	Est	Est	ETE
				980.9	Act	Act	ATE
ATL (116.90) (VOR)	-D->	1373	169	1.6	437	5.0 / 4.0	0:00
				979.3		/	
SOONE (waypoint)	J89	15390	165	64.9	437	206.3 / 165.6	0:04
				914.3		/	
ICBOD (waypoint)	J89	31000	165	213.0	437	676.9 / 543.5	0:15
				701.3		/	
OTK (114.80) (VOR)	J89	31000	166	56.8	437	179.8 / 144.3	0:04
				644.6		/	
NECOS (waypoint)	J89	31000	161	34.6	437	109.6 / 88.0	0:02
				609.9		/	
FAGAN (waypoint)	J89	31000	161	128.8	437	409.7 / 329.0	0:09
				481.1		/	
HITTR (waypoint)	J89	31000	162	40.2	437	127.5 / 102.4	0:02
				440.9		/	
KRNEL (waypoint)	J75	31000	181	75.9	437	240.7 / 193.2	0:05
				365.1		/	
LAL (116.00) (VOR)	J73	31000	146	60.6	437	192.7 / 154.7	0:04
				304.4		/	
LBV (110.40) (VOR)	J73	31000	159	142.6	437	453.4 / 364.0	0:10
				161.8		/	
WINCO (waypoint)	J73	21603	143	61.8	437	196.3 / 157.6	0:04
				100.0		/	
DHP (113.90) (VOR)	J73	1614	143	92.6	437	294.4 / 236.4	0:06
				7.4		/	
KMIA (airport)	-D->	8	106	7.4	437	23.6 / 19.0	0:00
				0.0		/	

Sound Settings

Recommended **sound settings** for the MD80 Series are:



Note: Some machines will experience digital “tunneling” or may freeze when certain sounds are played, due slower processors, lower amounts of RAM, and the large size of the sound files. If you experience either of these problems, we recommend that you set sound quality to medium or low.

Frequently Asked Questions

Question **Sometimes the nose bobs, plane is overly sensitive to pitch, or slow response to pitch. What's wrong?**

Answer *Adjust your trim to takeoff position, typically about 7 degrees. You can see the trim position next to the trim wheel*.

Question **When I deploy the spoilers, the plane doesn't seem to slow down as fast. I also seem to drop altitude. Is that normal?**

Answer *Yes. The MD-80 spoilers are moderately effective. In addition, pilots have commented that using spoilers should result in an additional -500 FPM in altitude dump.*

Question **The engines don't seem overly powerful. Is this right?**

Answer *Based on the experience of MD-80 pilots, the Flight Dynamics was designed to meet the following targets:*

- *Takes quite a bit of power to get rolling 40-43%N1, especially when heavy, but once rolling, will coast at idle.*
- *Takeoff N1 is typically 88%N1 – 92% N1.*
- *Max climb N1 is 92%N1 – 102%N1.*
- *Do not exceed/Max Climb EPR=1.9*
- *Cruise EGT = 440 - 400 C*
- *Cruise N1 at M.76= 80%N1*
- *Cruise N1 at M.78= 88-89% N1*
- *Do not exceed EGT = 550 degrees C*
- *Approach N1 speed is 80%N1, level flight, gear down, flaps full.*
- *Approach N1 speed is 66% N1, decent -750 to -850 FPM, final approach, gear down, flaps full.*

Question **Sometimes on landing, I do not see the auto spoilers pop-up. What's wrong?**

Answer *In order to activate the roll spoilers on the visual model, in the FD, if the ailerons are triggered during the landing, it will cause the pop-up spoilers to go down on landing. The function is contained in the FD, but may vary on your landing, depending on your amount of aileron input.*

Question **Sometimes the strobes are unsynchronized. How do I sync them?**

Answer *The strobes are designed to mimic the McDonnell Douglas style flash (flash, 1 second pause, flash, 1 second pause, flash). Sometimes over long distances, or due to load on the CPU, the strobes will not be synchronized. Simply toggle the strobe switch twice, or merely press "o" twice.*

Question **Sometimes my battery dies, or I see jerkiness on the instant reply. What's wrong?**

Answer *The battery dying is a flight simulator problem. Download the newest FSUIPC and check "battery life infinite". Also, some jerkiness in the replay can be due to heavy load on your PC CPU.*

Question **How much fuel do I need? How do I properly fuel plan?**

Answer *The MD-80 only consumes about 3000 pounds per hour per engine, or about 6000 pounds of fuel total per hour. Assume an average ground speed of 450 knots (no wind), 500 knots (eastbound), or 400 knots (westbound).*

Let's take the example of a flight between Tokyo-Haneda airport and New Chitose. Total trip distance is 511 miles. Typical cruise altitude for an MD-80 would be in the area of 24,000 ft to about 33,000-35,000 ft.
To calculate the required amount of fuel:
511 miles / 500 knot average GS (westbound) = 1.022 hrs
*1.022 hrs * 6000 lbs per hour = 6132 lbs for required fuel.*

So to calculate total trip fuel amount:
6132 lbs required fuel
+ 2000 lbs taxi fuel
+ 10,000 lbs reserve/alternate fuel
==========
18,132 lbs fuel for trip

Take this 18,132 lbs and split the amount into both the left and right tanks (9066 per tank). As you can see, you only need 47% fuel in the left and right tanks, and 0% fuel in the remaining center tanks. That's it. You should be able to takeoff, cruise and land with about 10,000 lbs fuel remaining in your tanks at New Chitose. Typically for a domestic trip in Japan, you need only 50% fuel in the left and right tanks, 0% fuel in the center tanks. This is enough for trips such as Haneda to New Chitose, or Haneda and Naha.
Your target landing weight should be ZFW + 10,000 lbs fuel (about 117,000 lbs). Your target landing speed should be about 125 knots (flaps 28).

Question **The MD80 has the roll rate similar to a fighter jet, the controls are sensitive, and it doesn't climb well above 35,000 feet. Is this correct?**

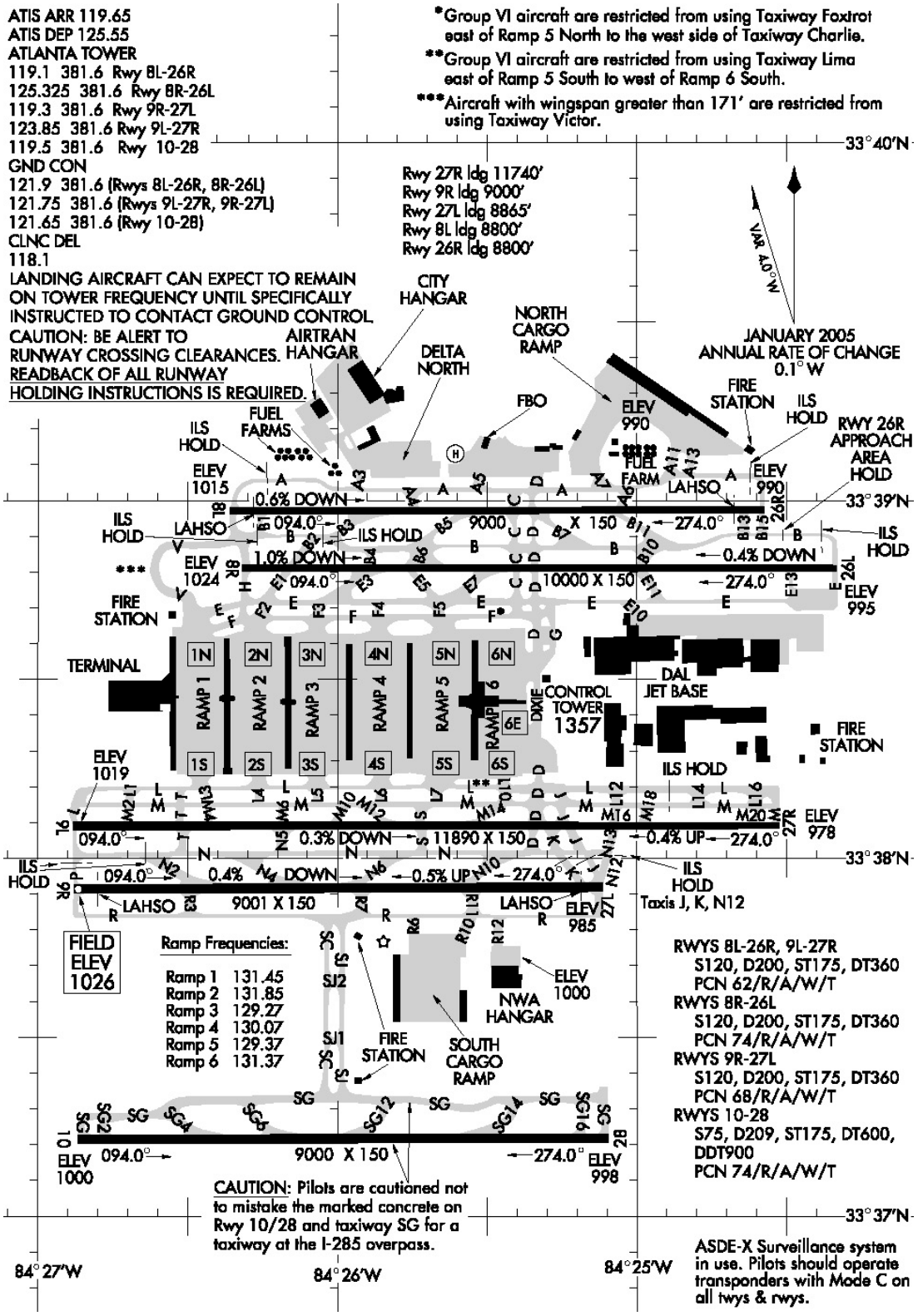
Answer *Yes, when the original DC9 was introduced, pilots had to be re-trained because the airplane is extremely responsive. Many flew the DC9 like a fighter and many passengers became sick. Pilots have said the DC9 and MD80 are very responsive, like a large fighter jet for manual flight, you should be able to go from level to 35 degrees in only 2- 3 seconds.*

As for climb, you should be able to climb at 6000 ft down low, but because of the tiny wing, the MD80 bleeds out over 30,000 feet. This is why typically the flights are made in the mid-20,000s to about 33,000 feet. You rarely fly higher than 35,000 feett, the airplane does tire out.

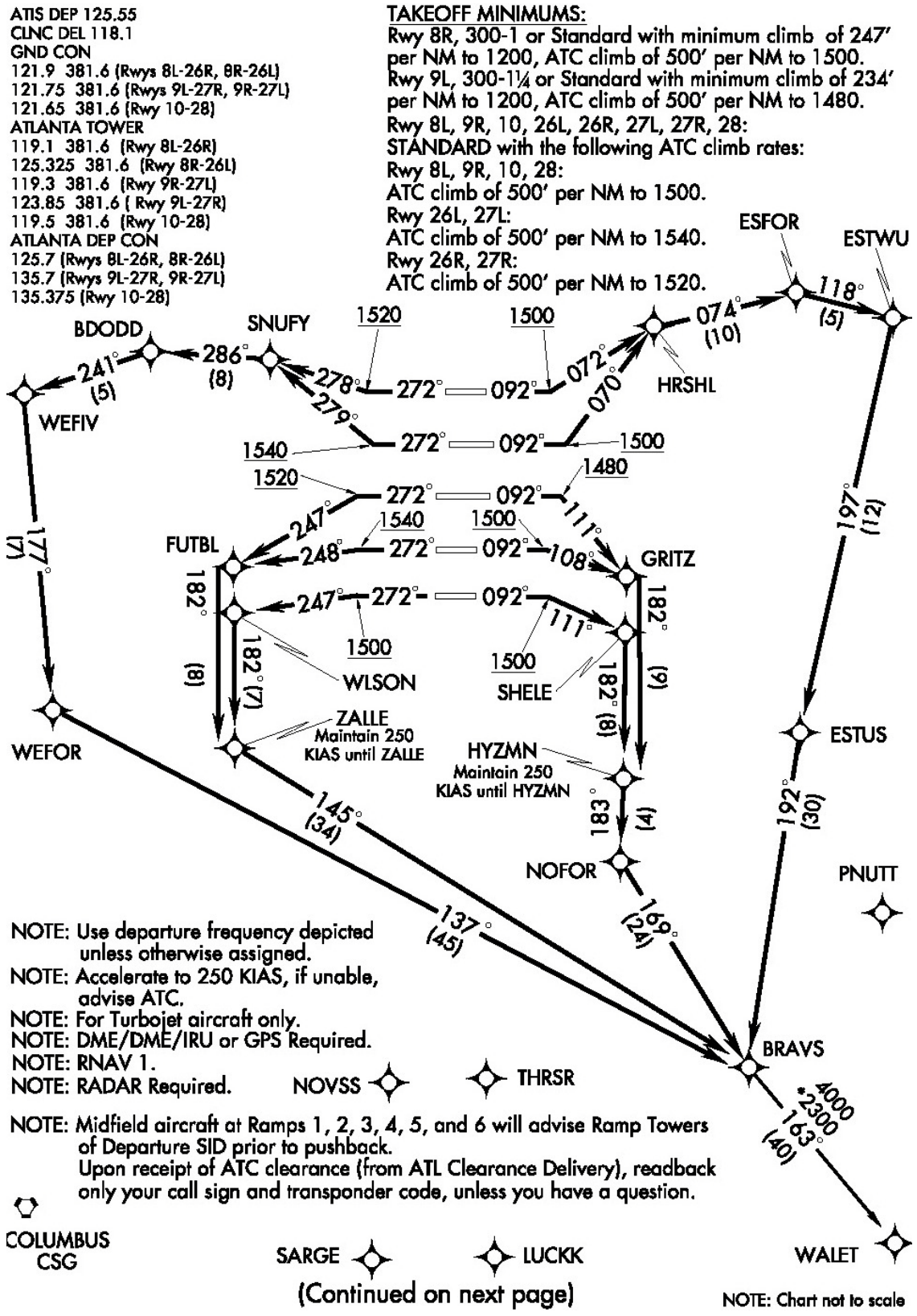
You must to be smooth on the airplane, but it handles very well.

Diagrams

Airport KATL (Hartsfield - Jackson Atlanta International Airport)



BRAVS FIVE DEPARTURE (BRAVS5.BRAVS) I – KATL



BRAVS FIVE DEPARTURE (BRAVS5.BRAVS) II – KATL

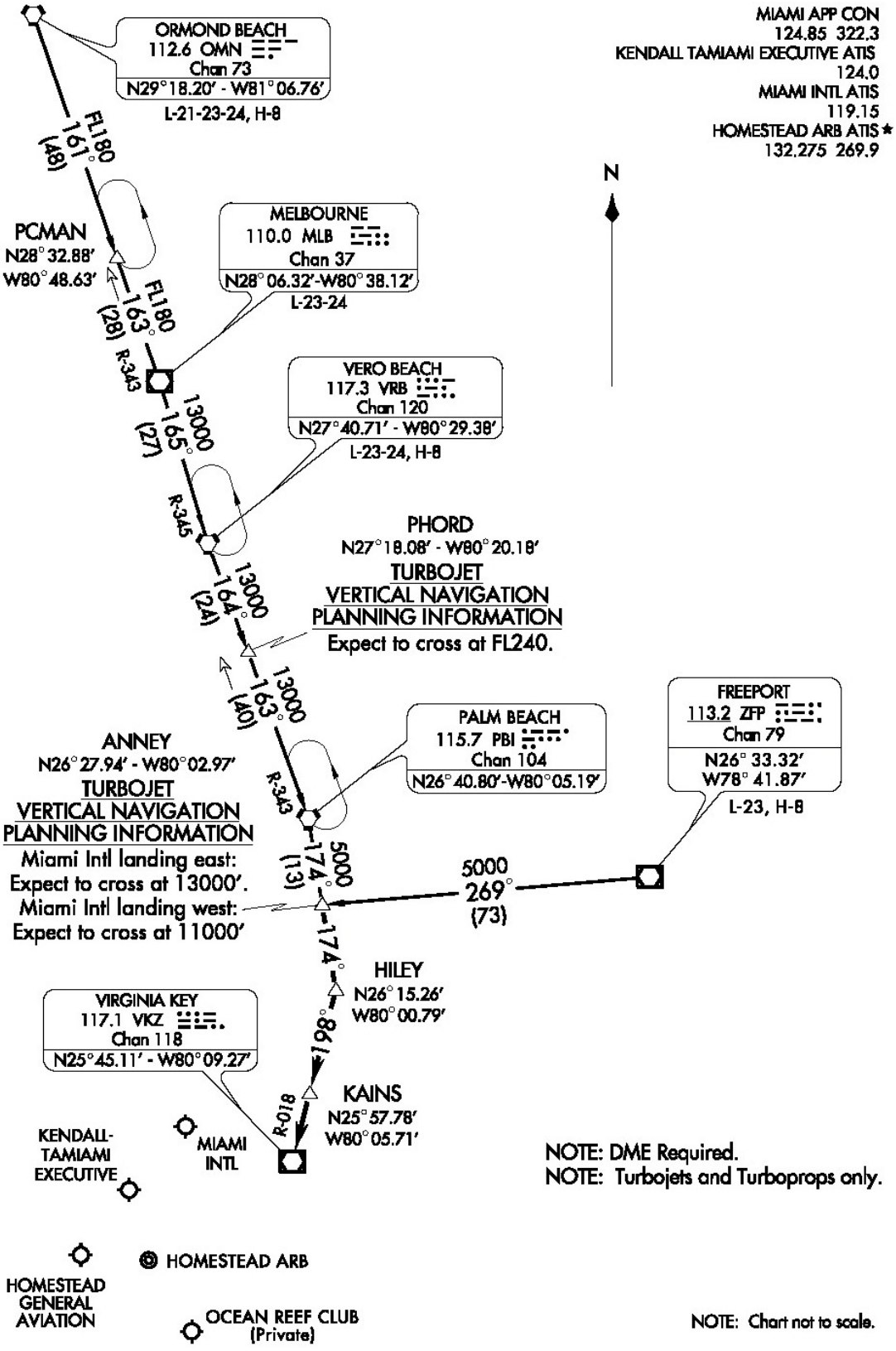
DEPARTURE ROUTE DESCRIPTION

TAKE-OFF RWY 8L: Climb heading 092° to at or above 1500, then on 072° course to HRSHL, then via depicted route to BRAVS, thence....
TAKE-OFF RWY 8R: Climb heading 092° to at or above 1500, then on 070° course to HRSHL, then via depicted route to BRAVS, thence....
TAKE-OFF RWY 9L: Climb heading 092° to at or above 1480, then on 111° course to GRITZ, then via depicted route to BRAVS, maintain 250 KIAS until HYZMN, thence....
TAKE-OFF RWY 9R: Climb heading 092° to at or above 1500, then on 108° course to GRITZ, then via depicted route to BRAVS, maintain 250 KIAS until HYZMN, thence....
TAKE-OFF RWY 10: Climb heading 092° to at or above 1500, then on 111° course to SHELE , then via depicted route to BRAVS, maintain 250 KIAS until HYZMN, thence....
TAKE-OFF RWY 26L: Climb heading 272° to at or above 1540, then on 279° course to SNUFY, then via depicted route to BRAVS, thence....
TAKE-OFF RWY 26R: Climb heading 272° to at or above 1520, then on 278° course to SNUFY, then via depicted route to BRAVS, thence....
TAKE-OFF RWY 27L: Climb heading 272° to at or above 1540, then on 248° course to FUTBL, then via depicted route to BRAVS, maintain 250 KIAS until ZALLE, thence....
TAKE-OFF RWY 27R: Climb heading 272° to at or above 1520, then on 247° course to FUTBL, then via depicted route to BRAVS, maintain 250 KIAS until ZALLE, thence....
TAKE-OFF RWY 28: Climb heading 272° to at or above 1500, then on 247° course to WLSON, then via depicted route to BRAVS, maintain 250 KIAS until ZALLE, thence....
....maintain 10,000 (or requested altitude, if lower), expect clearance to filed altiude ten minutes after departure.

WALET TRANSITION (BRAVS5.WALET):

NOTE: Rwy 8L: Multiple trees beginning 930' from DER, 533' left of centerline, up to 58' AGL/1048' MSL. Bldg 2705' from DER, 1061' left of centerline, 72' AGL/1068' MSL.
NOTE: Rwy 8R: Antenna on tower 4816' from DER, 1637' right of centerline, 153' AGL/1148' MSL. Tower 4804' from DER, 1666' right of centerline, 148' AGL/1145' MSL. Stack on Bldg 1734' from DER, 945' left of centerline, 47' AGL/1043' MSL.
NOTE: Rwy 9L: Rod on pole 5306' from DER, 1731' left of centerline, 187' AGL/1137' MSL. Bush 101' from DER, 453' left of centerline, 3' AGL/981' MSL.
NOTE: Rwy 10: Tower 4223' from DER, 400' left of centerline, 216' AGL/1135' MSL. Antenna on Tower 4240' from DER, 407' left of centerline, 217' AGL/1134' MSL. Pole 59' from DER, 467' right of centerline, 51' AGL/1016' MSL. Pole 198' from DER, 520' right of centerline, 43' AGL/1011' MSL.
NOTE: Rwy 26L: Tree 1370' from DER, 186' left of centerline, 53' AGL/1060' MSL. Tree 2832' from DER, 564' left of centerline, 50' AGL/1097' MSL. Rod on Bldg 1249' from DER, 752' left of centerline, 52' AGL/1059' MSL. Bldg 1138' from DER, 636' left of centerline, 43' AGL/1057' MSL.
NOTE: Rwy 26R: Multiple trees beginning 1786' from DER, 110' right of centerline, up to 83' AGL/ 1135' MSL. Multiple trees beginning 1988' from DER, 143' left of centerline, up to 100' AGL/ 1112' MSL. Pole 3196' from DER, 997' right of centerline, 49' AGL/1101' MSL. Antenna on tower 3382' from DER, 1024' right of centerline, 76' AGL/1128' MSL. Antenna 3814' from DER, 1069' right of centerline, 69' AGL/1121'MSL.
NOTE: Rwy 27L: Hopper 3936' from DER, 1255' right of centerline, 96' AGL/1131' MSL.
NOTE: Rwy 27R: Tree 4396' from DER, 1005' right of centerline, 92' AGL/1137' MSL. Antenna on hopper 3568' from DER, 862' right of centerline, 68' AGL/1113' MSL. Light pole 1012' from DER, 729' right of centerline, 28' AGL/1046' MSL. Multiple hoppers beginning 3680' from DER, 201' right of centerline up to 96' AGL/1131' MSL. Elevator 4001' from DER, 207' right of centerline, 103' AGL/1125' MSL.
NOTE: Rwy 28: Catenary 2001' from DER, 771' left of centerline, 60' AGL/1051' MSL.

ANNEY 1 ARRIVAL (ANNEY.ANNEY1) I – KMIA



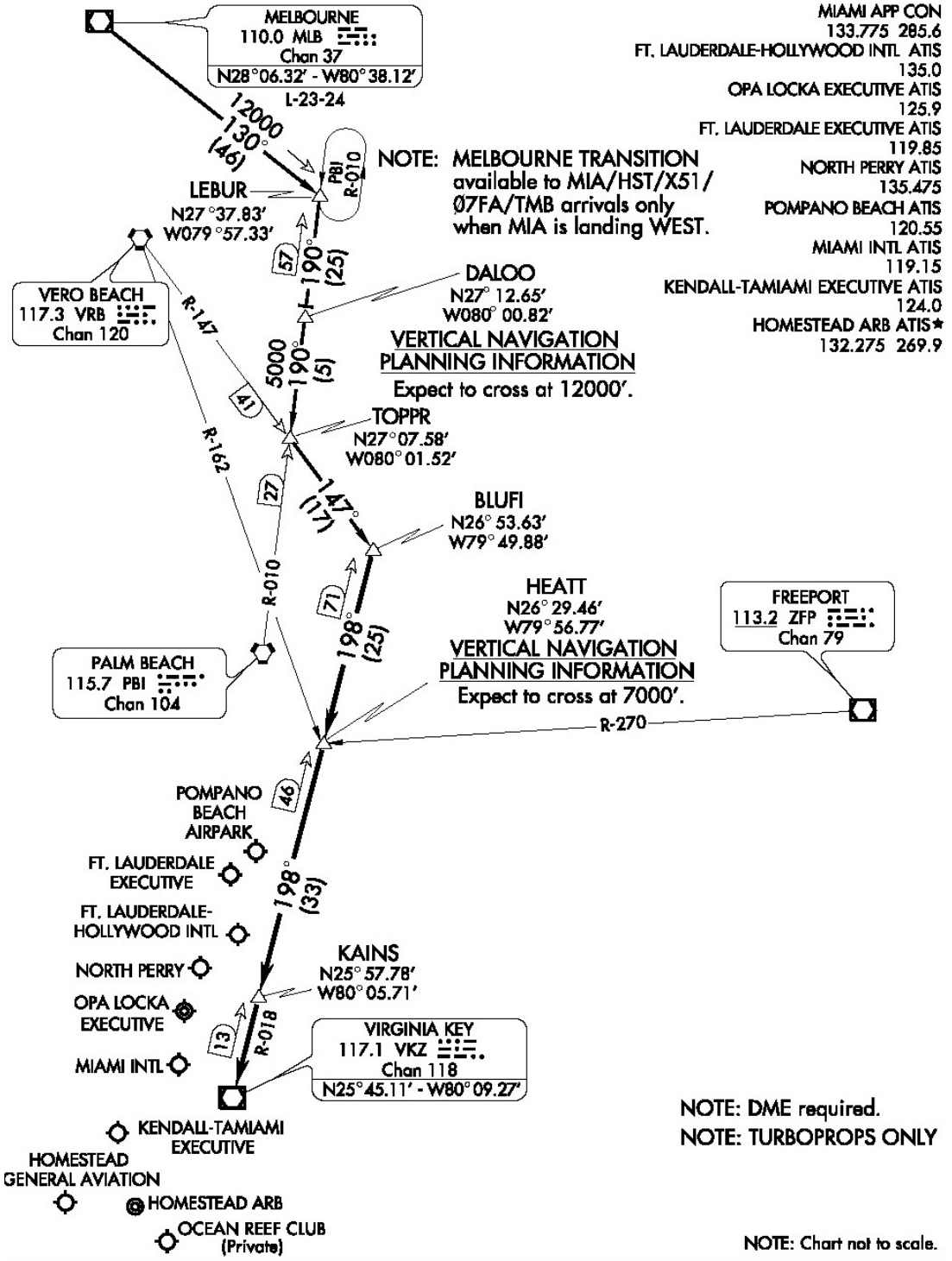
ANNEY 1 ARRIVAL (ANNEY.ANNEY1) II – KMIA

ARRIVAL ROUTE DESCRIPTION

FREEPORT TRANSITION (ZFP.ANNEY1): From over ZFP VOR/DME via ZFP R-269 to ANNEY INT. Thence . . . .
MELBOURNE TRANSITION (MLB.ANNEY1): From over MLB VOR/DME via MLB R-165 to VRB VORTAC, then via VRB R-164 to PHORD INT, then via PBI R-343 to PBI VORTAC, then via PBI R-174 to ANNEY INT. Thence . . . .
ORMOND BEACH TRANSITION (OMN.ANNEY1): From over OMN VORTAC via OMN R-161 to PCMAN INT, then via MLB R-343 to MLB VORTAC then via VRB R-165 to VRB VORTAC, then via VRB R-164 to PHORD INT, then via PBI R-343 to PBI VORTAC, then via PBI R-174 to ANNEY INT. Thence . . . .
VERO BEACH TRANSITION (VRB.ANNEY1): From over VRB VORTAC via VRB R-164 to PHORD INT, then via PBI R-343 to PBI VORTAC, then via PBI R-174 to ANNEY INT. Thence . . . .

. . . From over ANNEY, then via PBI R-174 to HILEY, then via VKZ R-018 to VKZ VOR/DME. Expect radar vectors to final approach course after KAINS.

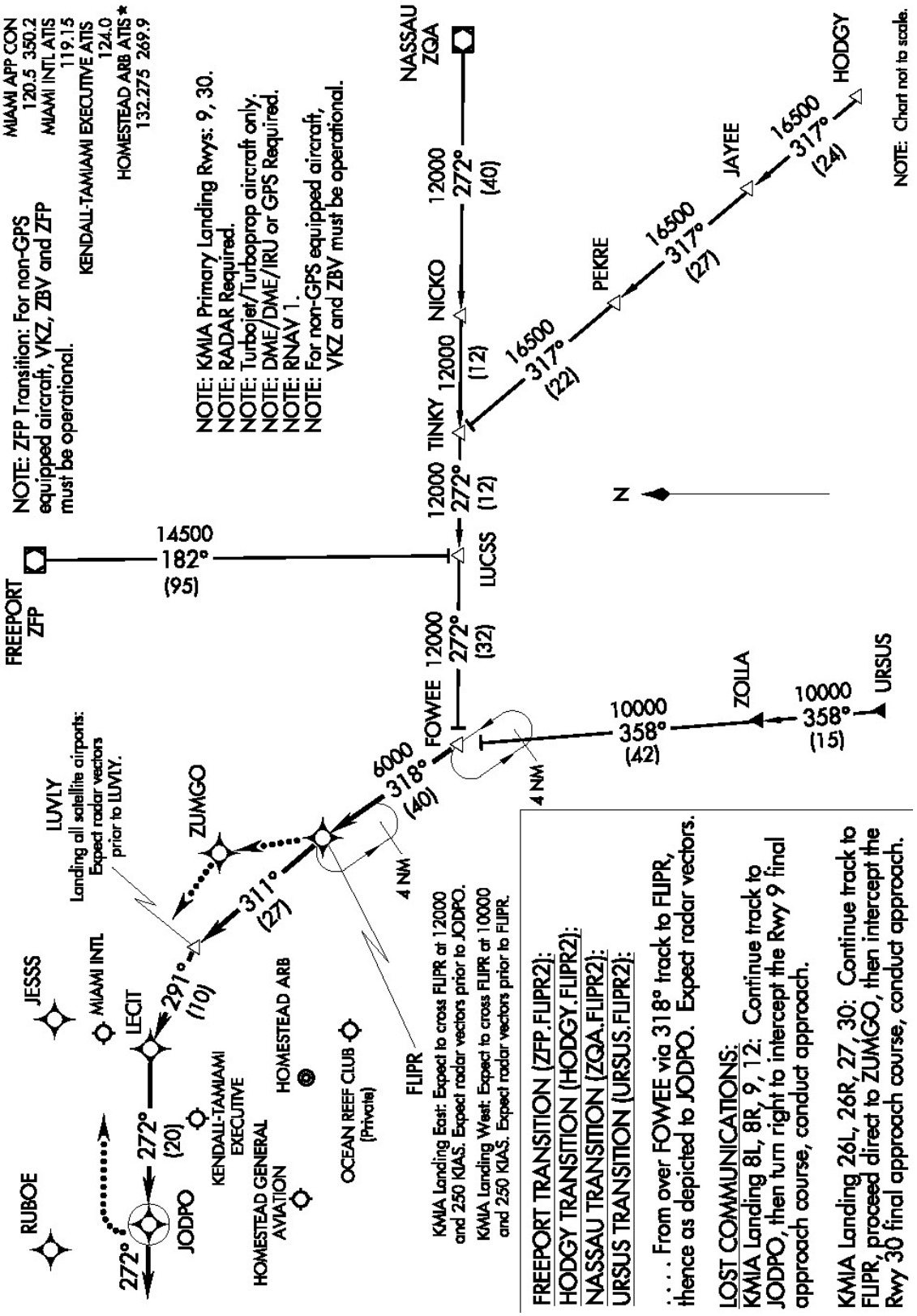
BLUFI 1 ARRIVAL (BLUFI.BLUFI1) – KMIA



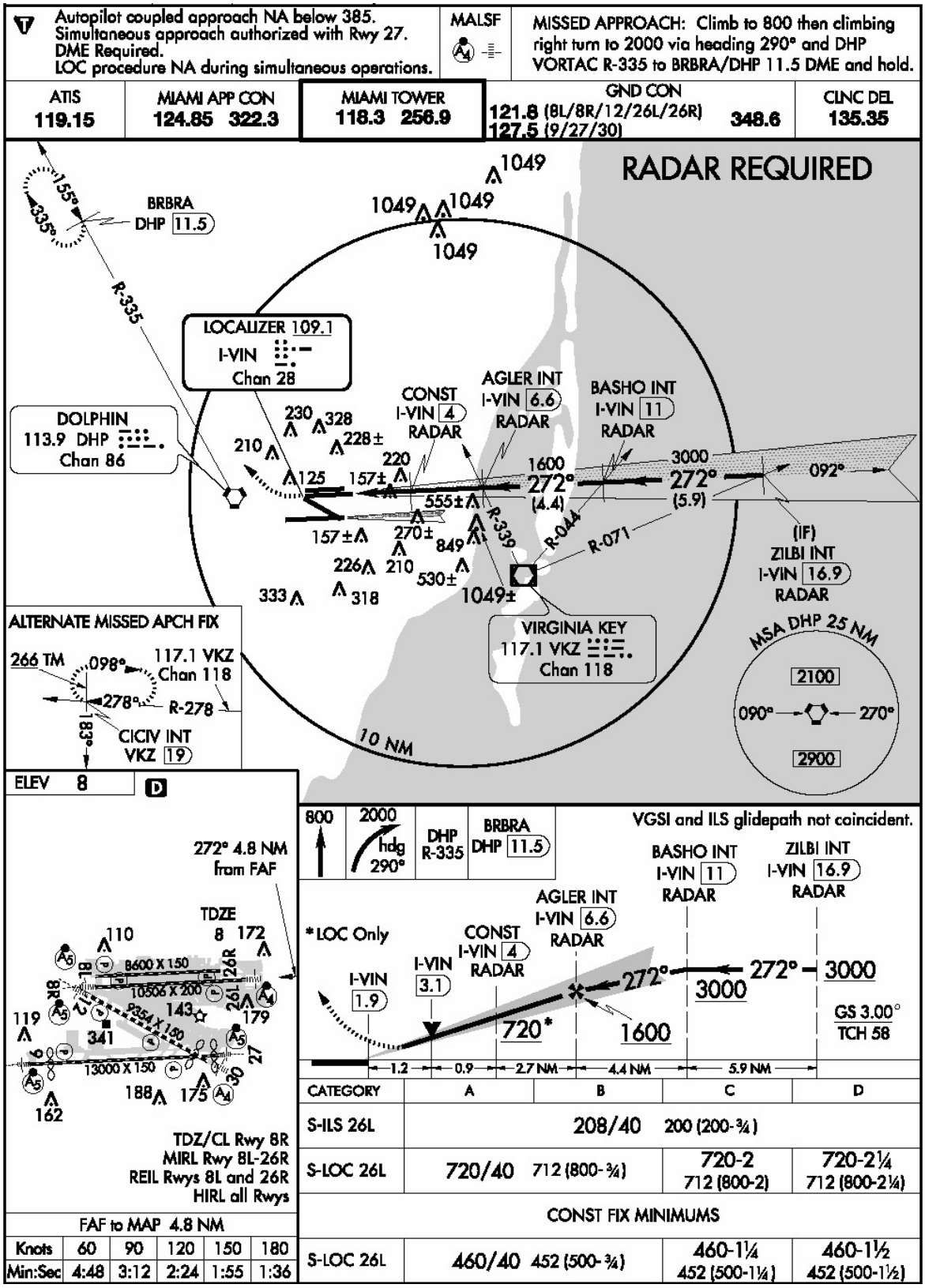
MELBOURNE TRANSITION (MLB.BLUFI1): From over MLB VOR/DME via MLB R-130 to LEBUR INT, then via PBI R-010 to TOPPR INT, then via VRB R-147 to BLUFI INT. Thence . . .

. . . From over BLUFI INT via VKZ R-018 to VKZ VOR/DME. Expect radar vectors to final approach course after KAINS INT.

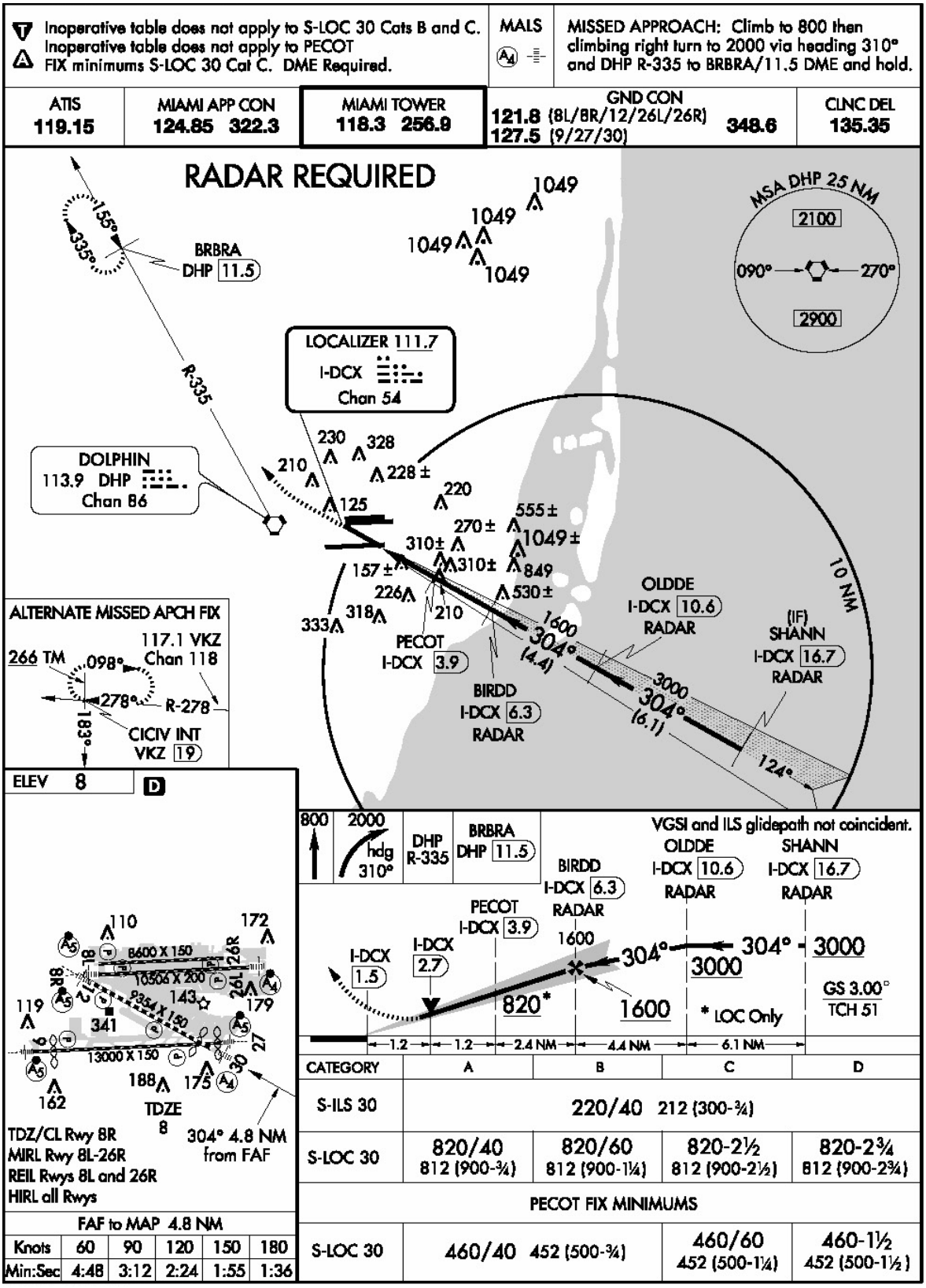
FLIPR 2 ARRIVAL (FLIPR.FLIPR2) – KMIA



ILS 26L - KMIA



ILS 30 - KMIA



Airport KMIA (Miami International)