FOKKER 28 MK 100

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This document is not official, and has the purpose just for knowledge.

"CREW COORDINATION"

(Flight Techniques. AOM 7.01.01)

- The main task of "PF" is control the aircraft in the execution of his/her flight plan.

- The main task of "PM" is to monitor the performance of "PF" and the aircraft.

- It is both pilots' function:
  1- The mutual monitoring and the crossed check.
  2- Change of information and knowledge.
  3- Distribution of the work load.
  4- Readings of "Check-list."
  5- It should be reported immediately to the other, the deviations of standard procedures or mistakes of judgements.

- As "PF" remembers that the administration of the flight is under his/her responsibility, as to requests of "Check list" and "Take Action", “MFDS ACTIONS”, administration of the fuel, pressurization, speeds, etc... .

- The transfer of control among the pilots should always be of knowledge of both.

- During all phases of the aircraft all modifications in FMS via "CDU (Control Display Unit)" will be made by "PM."

- LDG selections and flaps should be made by "PM" commanded by the "PF."

- Before commanding the requested selection it is function of "PM" to assure that the SPEEDS limits and flight procedures allow the requested change. If not "PM" should inform "PF."

- Operation in congested areas requests a politics of "Heads up" and to facilitate this and in the order of "seeing and to be seen" the following guidelines should be following below 10.000':

  1- Use "AP and ATS."
  2- Limit to programming "FMS" to the minimum necessary.
  3- Avoid the completion of papers and communication with Company
  4- Use the external lights.

- In case of any failure during the flight, the function of "PM" is to cancel "Master Warning or Caution" and to read the title of the failure.

- As "PM", in moments of high workload in the cabin, first it accomplishes the requests of "PF", and after that the ATC .

Example: Manual flight in VECTOR approach

In the exact moment in that “PM” is copying a message of the ATC, PF asks for flaps / speed. The procedure of “PM” will be, first to command the request of "PF (Flaps / speed)" and after, in case it has not copied MSG, request to the ATC to confirm the MSG.

IT SHOULD BE ALWAYS HAD IN MIND. CRM

- HE/SHE WILL BE CALM, AND PEACEFULNESS.

- Not to be anxious.

- In all of the stages of the flight, mainly in the adverse situations, always maintain a posture of seriousness and serenity. Don't play with the situation. (You can be badly interpreted).

- To think before commanding any function in flight.

- To always repress his/her own automatism.

- To be always ahead, as their tasks.

- To organize, always seeking the easiest way to do the things.

- To maintain his/her mind always in operation during all phases of the flight.

- To be concentrated in the COMM.

- To avoid execution of two tasks at the same time.

- Always, when in Copilot's function; to request authorization when executing tasks that were not requested or brified.

SYSTEMS

APU. AUTO SHUTDOWN

1- Fire.
2- Loss of signals of the temperature or speed
3- Over speed.
4- Excessive start time.
**
5- High EGT.
6- High Oil Temperature .
7- Low Oil Pressure.
8- Over current (Voltaje).
* Items of 1 up to 4 in flight or groundl.
** Items of 5 up to 8 in the just on the ground.

AUTO PACK TRIP

1- High Temperature in the "Pack outlet."
2- High temperature in the circulation of internal air. (Check Cabin Temp)
3- Leak in the compartment of conditioned air.(Check Bleed Press)

AUTOLAND LIGHTS FLASHING

1- When the capacity of "Autoland" is DEGRADED OR LOST.
2- If applicable, very high speed above 500 FT RA
- Push for reset MODE LOC / GS.

AUTOMATIC ECON FLOW

1- "Firewall" Thrust, until thrust reduced.
2- Engine Start in flight.
3- In a TO mode, in takeoff thrust, until 60 sec after the "liftoff."
4- In a GA MODE, up to 60 sec. after the TOGA.

AUTO SHUTOFF of both PACKS

1- On ground:- a - when Start engines.
b - when in Reverse thrust.
2- In flight: - Eng Fails below 13.500 ft and thrust levers above the min T.OFF.

AUTO THROTTLE AUTO ENGAGEMENT

1- VMA-5
2- VMO
3- When TOGA triggers SELECTED in flight.

AVIONICS COOLINGS VALVE OPEN

1- Aircraft ON the GROUND and,
2- At least one engine a motor is not running and ,

3- The "Suction fan" exhaust temperature is excessive.

BATTERY CHARGER DISCONNECT

1- APU start.
2- Battery power only (emergency power).
3- Intenal Battery temp too high.
4- Fault in the feeding of load of the Battery.

DUAL DC BUS FAULT, GETS LOST:

1- Automatic Lift dumpers.
2- Anti-skid.
3- Rudder limiter.
4- Speed brake.

ENGINE ANTI-ICE FAULT

1- Switch is ON, and Low pressure downstreamof engine ani ice valve.

ENGINE FAILURE WARNING

1- Alert level 3.
2- Message in MFDU: ENG FAIL #1 or 2.
3- FUEL LEVER Light ON
4- Master Warning light "ENG 1 or 2 OUT" in SAP.(If SAP be worked in backup).
A- The anti-ice valves close.
B- Auto Shut off both Packs, in flight below 13.500 ft.
C- With the LDG up, Landing / Taxi lights retract automaticaly

ENGINE FIRE HANDLE

1- Arm "Fire Bottle."
2- Closes "Fuel Shutoff Valve."
3- Closes the "Dual hyd. Valve."
4- Close "Pneumatic Pressure Overpressure Valve."

ENGINE FUEL SELECTOR UP

1- Fuel "ON."
2- Ignition "ON."
3- CVR "ON."
4- Horizon Stby "ON" if the battery is not "ON."

ENGINE START SWITCH "ON"

1- Arm the "start system."
2- Arms the ignition circuit.
3- Appears Secondary Eeng. Ind. in right MFDU.
4- The amount of Oil disappears in MFDU.
5- "Reduces to zero" used fuel.

ENGINE START SELECTOR

1- Opens the Start valve.
2- Packs Shutoff.
3- Hydraulic pump #1 goes to low output/bypass mode (output pressure is reduced to aprox 500psi).

FMA - FLIGHT MODE ANN. (left to right)

1- Thrust.
2- Speed.
3- "Vertical path."
4- "Lateral path."
5- Status of the engaged systems.(FD, AP, ATS)

FUEL LEVER LIGHT ON

1- Fire in the ENGINE.
2- Eng failure.
3- Eng Overheat.
4- Exceeded the red limits in the engine.
5- High Oil Temperature.
6- Low Oil Pressure
7- N1 Indicator INOP

GS WARN INHIBIT RESET

1- Above 1000' in climb.
2- Below 30ft Ft RA
3- Larger Flaps than 23 degrees.
4- Any thrust lever below min TOFF.

HORIZONTAL STAB. MODES

1- Auto trim. when AP is engaged.
2- Normal Trim: Active with AP Off. Switch inputs are routed through FAC to stabilazer
3- Manual trim: only active when AP is not engaged.
4- Mach trim. when above 0.75 mach and AP is not engaged.
5- Alternate Trim: Active with AP OFF, and NO HYD pressure

HYDRAULIC SYSTEM 1

1- Horizontal stab trim.
2- Elevator.
3- Aileron.
4- Rudder, Standby Hyd Actuator.
5- Thrust Reverses.
6- Speed brakes.
(- Priority valve -)
7- Lift dumpers.
8- Nose wheel steering.

9- Alternate brakes.
10- Flaps.
11- Landing gear.

HYDRAULIC SYSTEM 2

1- Horizontal stab trim.
2- Elevator.
3- Aileron. Right.
4- Rudder, Primary Actuator.
5- Normal brakes.

LANDING GEAR WARNINGS

Level 2

1- Divergence between the LDG selector and the position of the LDG or the LDG DOORS.

Level 3

1- LDG is not in down and locked.
   - below 1000' Ft. RA.
   - Larger Flap than 23 degrees.
   - Any thrust lever below the min. TOFF.

LIFT DUMPER EXTENSION. Landing

1- LIFTD Switch armed.
2- On GROUND, WITH "spin-up." OF THE MAIN LDG
3- With both THRUST LEVERS in "Idle Reverse."
   *(If the system is not armed, dumpers deploy when idle reverse is selected, and they retract when thrust lever reverse is moved out of idle reverse, and ground-shift senses weight on wheels).

LIFT DUMPER AUTO EXTENSION. Take-Off

1- LFTD Switch of the pedestal armed.
2- Air speed above 50 kt.
3- Both THRUST LEVERS in "idle."

LIFT DUMPERS DESARMED

1- AT Lift off.
2- In flight: - a - any thrust lever advanced to MAX.
   b - selecting TOGA.

MASTER WARNINGS. NOT CANCELABLE

1- TOFF Configuration.
2- To Low Gear.
3- Overspeed.

OXIGEN

1- 10.000 ft , warning "cabin altitude."
2- 12.000 ft closes the "outflow valve."
3- 14.000 ft , O2 compartment doors automatically open, and DROP PASENGER CABIN O2 masks.
4- The compartments are also controlled manually when the "override switch" (guarded) in the overhead panel is switched on.
5- Pulling down on masks, begins O2 genereтion, they supply the pax. for 12 mins.
6- Sign "NO SMOKING" is ON automatically with the SW POSITION in automatic or manual.
7- Closing the compartment of mask in Fliight deck + resest switch, makes possible the "boom microphone."

PRESSURIZATION RESET TO DEPARTURE AIRPORT

1- Descend mor than 1000 ft inside 10 min after the "lift-off."
2- Descends before reaching 6000 ft.

SPEED BRAKE AUTO RETRACT

1- TOGA.
2- LDG UP with thrust lever above the minimum TO.
3- LDG RETRACTED during manual GA.

STALL PROTECTION

1- Alpha Floor (VMA -5kt auto throttles on).
2- Top of the "barber pole" = Stick shaker veloc. Vss (1.1Vs).
In the beginning of the stall (Vs): Stick pusher.

TAIL ANTI-ICE FAULT

1- Leak in the tail compartment.
2- High temp. in the vertical stabilizer.
3- Fault when opening "Modulating and shutoff valve."

WING AND TAIL ANTI-ICE. AUTO CLOSE

1- TOGA.
2- Landing.
3- THRUST "Fire wall."

WING ANTI-ICE FAULT. AUTO SHUTOFF

1- Leak in the fuselage (High temp. in the root of the wing).
2- Very high pressure.
3- FAULT when opening of "Modulating and shutoff valve."

SOME MODES AND FLIGHT CONFIGURATIONS:

TOGA TRIGGERS Activation ON GROUND.
(AOM. F / TECH. - 7.03.01).

1- Activates the "Take-Off" MODE (See in AFCAS -1.18.02 pg.07).
2- ARM THE T OFF CONFIG WARNING .
3- Engages ATS and the automatic selection of the takeoff (TOGA / FLEX) THRUST.
4- Sincronization of the "Bug Heading" for the current hdg.
5- FMS - position Updating for the lat / long. of the rwy for takeoff.
6- FD. it shows the "pitch initial up" of 08 to 10 degrees.
7- It limits the roll inclinations up to 400ft.
8- If in NAV & PROF.
    A- It engages NAV to 30ft,
    B- It engages PROF at (TRA) thrust reduction altitude.

TOGA TRIGGERS Activation IN FLIGHT.
(AOM. FLT. TECH. 7.07.01 PG.01)

GO-AROUND MODE. (AFCAS. 1.18.02 pg.06)

1- "Go-Around mode." ENGAGES
    a- AP and FD will limit the RATE OF CLIMB in 2000' and a speed of 200kt.
    b- FMA. Shows GA - GA
    c- will appear F speed (Flap).
    d- FD. it will be shown automatically even if OFF or FPV.
2- Engages "ATS" .
3- Engages the second "AP"
4- "SPEED BRAKE" retractcs and "LIFT - DUMPER" disarms.
5- Inhibit "Wing and Tail anti-ice" for 60seg.
6- "Air Conditioning" goes to economical flow.

ENGINE OUT DRIFT. DOWN
(AOM .FMS -1.17.03 pg.64)

If an aircraft is above "ENG OUT" maximum altitude, and this condition is confirmed in FMS, FMC eventually will guide the aircraft to enter in the operation mode"Drift Down" if (D/D) the altitude at FMP is or it is adjusted at an altitude below the altitude of the aircraft.

When the aircraft is in climb, in a MCT ENG OUT condition and the vertical speed is reduced than 50ft/min, FMC will make the transition of CLB or CRZ, for a descent "Drift Down" in (D/D) seleting MCT and VFTO + 5kt. (VFTO=Green Dot) The title D/D ENG OUT will present in FMS.

In the page of F-PLN it will show a "prompt IMM DES.". IF select IMM DES in the FPLN page, it begun the descent at 1000 ppm, it cancels D/D descent mode and the title ENG OUT DES appears in FMS

FLEX TAKE OFF
(AOM. Flight Techniques. 7.03.01 and/or Limitations 2.06.01 pg.02).

Whenever possible it uses reduced THRUST for takeoff using certain temperature in agreement with the runway analysis and QRH ("Quick Reference Book").
- Max. Reduction= 25% (EPR min. = 1.55 at Sea Level).

ATTENTION:
Don't take off with FLEX in the following conditions:

1- Anti SKID inoperative.
2- Unfavorable braking action condition (wet RWY).
3- Possibility of "Wind Shear."
4- "Lift Dumper inoperative "
5- Wing Tail "Anti-ice" system inoperative
6- Tail wind.
7- - 5ºC OAT if ATS be not coupled.
8- - 25ºC OAT or less and coupled ATS.

TAKE-OFF MODE
(AOM AFCAS. 1.18.02 pg.07)

Lateral Control
1- Before takeoff, TOGA triggers, heading "bug" enslaved with current heading and the FD are centered.
2- AP engaged after takeoff, aircraft will maintain the existent HDG, or,
3- NAV MODE armed before takeoff, the NAV MODE engages at 30ft and it follows the FMS flight plan.
4- HDG changes, follow with use of "HDG Select (FMP)."
5- Maximum roll angle TO and GA is of 5º below 50ft and 15 between 50 and 400ft, it does not depend on the selection of the "bank" selector.

Vertical Control
1- Before the takeoff the "pitch" is 0. Activating TOGA TRIGGERS, "pitch-up" to 10º
2- At "rotation" and initial clima after AP engaged, command elevador to pitch-up of 18º or V2 + 10kt, what happen first.
3- Selecting the LVLCH or when capture PROF, cancels the Take-Off Mode. Take-Off Mode is also canceled capturing the altitude selected or selecting V/S.

TAKE OFF CONFIGURATION WARNING
(AOM. FLIGHT CONTROLS - 1.14.06 pg. 01)
(AOM. SYSTEM OPERATION. 5. 05.01 pg. 01)

1- Flap out of the takeoff position or in the alternate (Electric)
2- Stabilizer out of the "green" scale.
3- "Parking Brake applied."
4- "Speed Brake out (not retracted)."
5- "Lift. Dumper unlocked."
6- Flight Controls locks in the locked position.
7- An "Elevator" not pressurized.

Obs:
- "TO Configuration" alert cannot be canceled pressing "MWL."

- After the TOGA activation, the system stays armed even after "Lift-off." Consequently, the activation of the WARNING alert will happen, after TOGA activation and the THRUST LEVERS advanced out of "Idle Position" above MIN TO.

POWR PLANT - START
(AOM - System Operation - 5.14.01, pg01).

They are four:
1- "Normal": to seek in "System Operation". 5.14.01,
2- "Conditional": to seek in "System Operation". 5.14.02,
3- "Abnormal": to seek in "Abnormal Procedures". 4.13.10,
4- "Emergency": to seek in "Emergency Proced." . 3.02.02.

Before START check:
1- PARK BRAKE .
2- FLIGHT Controls.
3- Zone Free for APU and engine starts.
4- Position of the thrust and fuel levers.
5- "Engine Panel". Positions of "P/Bs." and Ignition Selector.

Important observations:
N2 MÍNIMUM for FUEL shut off lever open is of 15%. (AOM-System Operation. 5.14.01).

FUEL shut off lever OPENED ("UP")
A- Ignition "ON."
B- CVR "ON."

For ENGINES "WARM-UP", "Oil temp > 40º C await for 2 minutes before to begin the takeoff. Being to 1st departure of the day, await for 4 minutes, to begin the takeoff, heatings of "Oil and Fuel." (AOM - System Operation - 5.14.01, pg 02)

STARTER DUTY CYCLES:

- 04 attempts with at the most 02 minutes of duration;
- Wait 30 seconds among each attempt;
- After to 4th attempt it awaits again 15 minutes to use "Starter";

ABNORMAL STARTS:

1- If,during starting there is a tendency of a hot start, fuel shut off lever close inmediately, wait for 30 seg. turn off the p/b "engine start" and request on this time, of "Hot Start Check List."

2- If during starting, “Start Control Valve" fails to auto close (apx. 43% N2), should close Eng Star p/b OFF and both "Air Bleed Valve" and APU BEED for the switchs, located in the panel "AIR CONDITIONING."

3- If "Start Control Valve" fails when closing with the use of an external source of air; disconnect the external source of air.

IGNITION SELECTOR

1- Normal: The ignition system 1 is activated when fuel shut off is opened for starting or if EFSU sense and eng failure with the fuel shut off levers opened. **Both igniters operate when a "Engine-out" condition is detected via EMUX with the fuel shut off levers opened.**

2- Cont.1: Operate the ignitor Nr 1 with fuel shut off lever open. "Ignition on" MSG in MFDU.

3- Cont.2: Operate the ignitor Nr 2 with the fuel shut off lever open. "Ignition on" MSG in MFDU.

4- Relight: Both igniters in both engines operate continuoslly and independently of the position of the “Start” p/b and the fuel shut off lever.

SYSTEMS / SEVERAL:

APU - Auxiliary Power Unit.

(AOM. 1.04.01)

Starting
In the groundl:
- If the batteries are not available, this can be made through a Ground DC supply.

AVAILABILITY (AOM - Sys. Opr. . 5.12.01).
- With the light "Available", on ground, APU will be available immediately just as electric source and after 2 minutes, as pneumatica air source.

APU R
Maxim electric charge: 15.000ft = 100%
25.000ft = 65%

If during the flight, ground shut down fault is sensed, it will shutdown 60 seconds after landing. If APU is the only source of electrical power airborne, the only ground shutdown item left out is overvoltage.

"APU restart" is not assured above 31.000ft.

- Starter Limits: three starts with the interval of 2 minutes among them (switch needs to be taken to "OFF" before trying a new start to assure the slowing down). (AOM - Sys. Opr. . 5.12.01)

"SHUTDOWN"
- Wait for 70 sec before turning off the battery; unless a external AC power source is being used. (AOM - Sys. Opr. . 5.12.01).

LIGHT "AVAIL" (AOM. 1.14.01)"
- Volts and Frequency - OK.
- Pneumatic air after 2 minutes.

APU RUNING (AOM. Sys. Opr - 5.12.01).
- Turning off the batteries leaves the APU without FIRE protection.

APU FIRE (AOM. Fire Protection. 1.18.02)
- "AUTO Shut down",
- DOORS close in 5 Sec,
- Discharge the agent extinguisher.
- On ground, sound a horn in the nose gear compartment, as a warning to the ground personnel. (AOM .Fire Protection - 1.08.02)

"RESTART" (AOM - Sys. Opr. . 5.12.01 and 1.04.01).
- If Failure was sensed in the 1st start; before a new start, the start selector should be switched OFF. After this selection the "restarting" will be inhibited by 30seg. If "Fault" goes because an “Overspeed", should not be "restarting."
- Not more than three consecutive start and allow 2 minutes, before new attempt.

"APU MAINTENANCE REQUIRED MSG" (AOM - Sys. Opr. . 5.12.01 pg 01)
- This message can be ignored by the flight crew.

AFCAS AND FMP:
(AOM. AFCAS. 1.18.01)

SPEED MANUAL SELECTION
Mantain 200kts until 3000FT AGL, THEN selects 250kt and, when passing 10.000FTS AGL, selects 280kt. When reaching 280kt, select "Speed Hold" by pushing the speed know, press the SEL button IAS/M for 0.70M and see FMA “M” blue armed. At croos over altitude make sure tat Mach goes green (captured). At cruise altitude selected FMS FPLN cruise Mach speed calculated.
In the descent inverts the process, select mach .70, when reaching select “Speed Hold" and then select IAS 280 via “SEL IAS/M” button. Check IAS blue (armed) and when passing croos over altitude check IAS green (capture). At 10.000ft AGL, select 250kt. Check always in FMA the selections made at FMP.

V/S. "DASHS" WHEN COMMANDING IT

- If when commanding V/S, it presents "Dashs", it will be in the "Altitude Captures Phase." Check "FMA." To remove it, and takes V/S control again, select new altitude in the "Altitude Selector." In "Altitude Captures Phase" V/S doesn't work.
During descents in a step approach (non pesition) does not select in FMP the MDA. Use only V/S to reach it and the select “ALT HOLD” by pushing “ALT” KNOB TWICE 150FT BEFORE MDA. Also below 2000ft AGL use V/S instead LVLCH.

. SELECTING PROF WHILE IN DESCENT

- In a descent when PROF was not selected after began it, when selected he will only arm (check FMA). The capture will only take palce when crossing the PROFILE CALCULATED BY FMS. (Check FMA).

- Not to use PROF mode if any IRS is in ATT.

- Operational recommendation: cancel "PROF" MODE if “NAV” MODE is not using during descents.

FMP
- Below 500' selections in "FMP" are inhibited.
- It is prohibited to select in FMP smaller altitude than MDA.
- Selections:

V/S = +4000 / -8000ft.
Maximum altitude = FL 400.
Speed = of 100kt up to 400kt.

HDG
- Use the "HDG" MODE when you want to intercept a VOR TRACK. It can select a bank angle of 5º, 15º or 25º when using HDG MODE.
-

BASIC MODES (AOM FLT TEC. 7.03.01).

- When "FD" is not selected "AP" cannot be engaged below 500ft AGL. If "AP" is engaged with "FD" not selected, "AP" engages in HDG HOLD and V/S BASIC MODES.

NAV - V/L – LVLCH - LAND
"LVLCH":

- When in "LVLCH", the RATE of descent is in function of the selected speed. To reduce the rate of descent without disabling LVLCH, ADVANCE the thrust levers overriding the "Autothrotle" (follow that procedures if you have to keep the speed), or reducing the selected speed. To increase the rate of descent, practice the inverse. See FMA, it appears OVRD. To return the control of ATS to “LL” selects LVLCH again at FMP.

Don't use LVLCH for descents below the altitude at the beginning of the instrumental procedure IAL. Use V/S.

"LAND"

- Selecting “LAND", both AP engages automatically between 1500 and 1000ft AGL with LOC and G/S captured (if one AP was engaged first) AND “LAND 2” appears at FMA. If ATC gives other orientation, "HDG Select", “Alt Hold”, and any others modes, will be inoperative. To leave “LAND 2”, the only way will be to desengage "AP" or selecting “TOGA Triggers.
- "LAND 2” MODE will not engage if the “G/S” capture occurs below 1000.'

If you need to display at PFD, the ILS/DME (distance demarcation required by a SID in "FMS"), to have DME (distance demarcation) via ILS / DME, adjust the ILS frequency manually, in the Radio VOR/DME. (AOM. FLT TEC 7.03.01)

AUTOLAND

- “LAND 2” 1.500 ft – 1000 ft AGL
- "Aligned". 150.'
- "Flare ". 50.'
- “Roll out”
- "Auto Pilot OFF". Before 60kt.
- The WARNING "AUTOLAND" light becomes "ON", when at 500ft, the speed goes larger than 15kt above the envelope.

V/L:
If the 1st Official is flying the aircaraft, and in an VOR approach, with “AP#2” engaged (both FD ON) and it DECIDES to make a manual flight, the CONTROL RETURNS TO FCC1 & VOR1. (SIDE IN CONROL). To take control again, FD#1 must be switched OFF

If the Capitan is flying, and in a VOR approach with “AP#2” engaged, and the "Push buttom VOR" at the right EFIS control panel it is selected, (Selector in ARC or ROSE) when VOR 2 capture occur, Capitan loses the "Flight Director" COMMANDS BARS. To recover them, he must select at “Source Selector Panel” the “FCC P/B” to “ALTN”.
If for any reason, the "Push buttom VOR" at the right EFIS control panel it is deselected, or the selector is changed to MAP, V/L MODE will be desengaged. (SIDE IN CONTROL)

AFCAS FLIGHT ENVELOPE PROTECTION
(AOM AFCAS SYSTEM - 1-18.04).

Protection for

1. MINIMUM SPEED PROTECTION BELOW VMA
2. MAXIMUM SPEED PROTECTION VMO, MMO, VLE, VFE
3. EXCCESIVE V/S
4. FLIGHT PATH ANGLE
5. AUTOMATIC GUST CORRECTION
6. ALTITUDE ALERTING

MINIMUM SPEED PROTECTION

VMA PROTECTION

Do not allow a selection under Vma

- Approach speed Vref+ 5kt, Vref is Vma
- The top of the Amber scale in takeoff is 1,2 Stall. (V2, Vma)
- The top of the Amber scale in landing is 1,3 Stall.(Vref, Vma)
- In the case of "Wind Shear" the top of the red stripes scale ("Barber pole") is 1,1 vel. Stall.
- It will be inhibited below 400ft RA for takeoff, and in the landing and Go Around below 50ft RA.

Activation: When speed is controlled by elevator (IASe, Me at FMA) AP control and/or FD pitch commands to prevent deceleration below VMA. When speed is controlled by thrust (lASt or Mt at FMA) ATS adds thrust to prevent deceleration below VMA.

ALPHA MODE

VMA PROTECTION won't be available when:

1- AP coupled in "ALT Hold or V/S climb", not engaged ATS and in "Idle Thrust",
2- In manual flight with "FD OFF and “ATS" not engaged
3- When the “FD” commands bars are not followed, descending in "LVLCH", during the manual flight
4- The Vma protection will be inadequate in conditions of severe turbulence or during approaches of fast desaceleration.

IN THIS THOSE CASES WILL WORK THE ALPHA PROTCTION

Activation: (Warning: Lock the thrust levers)

-5kt below VMA, "ATS" engages automatically (Displayed in the "p/b" at FMP and in FMA Satatus), and Thrust limit in TRP is selected to TOGA. ATTENTION: p/b at FAC must be ON

Protection Behavior

1. If in ALT HOLD, V/S, FPV or MANUAL FLIGHT WITH FD OFF, adds thrust until reach Vma or the selected speed
2. If in MANUAL FLIGHT, IN LVLCH CLIMB, FD ON and the command bars are not followed:
    a. First, announces AFCAS TARGET below 15 kt of the selected speed
    b. Second, if you don't correct this situaction, and the speed reaches gos down to Vma-5, the Alpha mode is activated and ATS selects TOGA thrust
3. If in MANUAL FLIGHT, ATS ON, IN LVLCH DESCENT (LLTHRUST), FD ON and the commands bars are not followed, you could not be aware that the speed control doesn't exist, (because the speed in this scenario is controlled by pitch) for eg. in an visual approach (or in the transition for visual). The speed fall below

Vma, AFCAS changes LVLCH for V/S and the speed passes now to be controlled by el ATS

The alpha mode is disabled when reach Vma+5, or manually selecting AT OFF at FAC

MAXIMUM SPEED PROTECTION

It doesn't allow a selection above Vmo / Mmo, Vfe, Vle. You can select in FMP. AFCAS Speed a vel. Between 100 and 399, but, PFD Blue speed are limited to Vmo / Mmo, Vle Vfe. So when you reach Vmo, Vle Vfe, with ATS engaged or disengagegd, this protection selects AT automatically and reduce thrust, not allowing traspassing the maximum configuration speed.

EXCCESIVE V/S PROTECTION

If you have selected vertical speed mode, and the speed began to goes down or up (or up, depending if you are going down or up with V/S). When you reach 15kt down or up your selected speed, the first indication will be AFCAS TARGET. If you ignore that alert, not make any necessary correction, when reach Vma or Vmo/Mmo/Vle/Vfe depending, the protection engages ATS (if it was desengage before) trying to select CLIMB THRUST or IDLE THRUST depending if you are in the climb or in the descent, and V/S mode reverts to LVLCH mode, and then the speed will be corrected by pitch.

FLIGHT PATH ANGLE PROTECTION

In case of high rate of decent near the ground, (below 1000ft RA) WICH MAY OCCIR in the case of a negative (decreasing performance) windshear.
Conditions

- altitude below 1000 feet AGL,
- with flap in 25 or 42,
- Engaged ATS
- Flight path angle in excess of -3.5 degrees

If this condition araise, ATS controls the speed to maintain Vma +8 kt for each degree that flight path angle is sleeper than -3.5 (eg. for -5.5 degrees, it would be Vma+16)

AUTOMATIC GUST CONDITIONS

In conditions of gusty winds, ATS commands to control the speed to Vma + 8kt.

ALTIMETERS / Tolerance

(AOM. CHECKLIST - 6.02.01 pg 3)

Field Elevation vs. Tolerance in the Altitude Indicated		
Fiel Elevation Ft	**Indicated altitude in PFD's**	**In STBY ALTIMETER**
-1000/ +8000	-45 / +45 *	-35 / +80

*In flight the dIference can not to be larger to 200ft.

ANTI-ICING

(Syst. Opr. . 5.08.01)

- Anti-ice should be turned off for start engines.

- Conditions: 5 C with visible humidity, rain, snows, and etc...

- With "Wing and Tail Anti-icing ON" operation will be automatically available after 60 sec after the lift off. (Syst. Opr. . 5.08.01).

- It will be inhibited in "TOGA" or maximum THRUST.

- With one "Bleed" inoperative, the SOV ("shutt-off valve") closes and there is a significant reduction in the air fow. It is forbidden to flight in ice condition. There is an altitude limitation: 25.000.'

- With inoperative ATS and flying above FL200, before select "Anti-ice system", adjust the minimum thrust for 80% of N2. (Syst. Opr. . 5.08.01).

- In the case of late identification of the ice condition in flight; before select "Anti-ice system", select the ignition to "Relight position" and when all the ice have been remove, return to "Normal position." (SYS. OPR. . 5.08.01).

ANTI-SKID

(AOM. LANDING GEAR. 1.13.03)

- Anti-Skid can be tested in flight, since, the landing gear is down and the wheel speed is below 14 kt. The FAULT warning had only been displayed with Landing Gear down.

AUTO PILOT

(AOM. AFCAS. 1.18.02 pg. 01)

- The two "Auto Pilot" will be engaged, if in the approach, the "LAND" mode was engaged. In the takeoff with "T.O" mode engaged.

- Minimum heights: (AOM. Limitations. 2.08.01)
  Cruise. 700ft.
  "Take OFF" with MSG "NO AP BELOW 500 FT" = 500 ft
  "Take OFF" = 35 ft
  GS / LOC = 150 ft
  "LAND 2" = 0 ft

AUTO THROTTLE - ATS

(AOM. AFCAS. 1.18.03 pg. 01)

- Engages automatically when:

1- In the "Alpha mode."
2- If the speed reach VMA
3- If the speed reach Vmo, Mmo, Vle, Vfe

"GAMMA Protection":
"Wind Shear" - only below 1000ft RA, when the nose angle exceeds 3,5 degrees.
With the nose down, commands 8kt above VMA for each 1 degree, that exceed 3,5 degrees of the flight path angle. (Flight Envelope Protection" AOM 1.18.04).

ATS Override (AOM. AFCAS. 1.18.03)
- At any moment it is ALLOWED. When the thrust levers are liberated, ATS returns the previous thrust in all modes, except in "LVLCH descent."
- In "LVLCH descent". If the thrust levers are actuated, FMA had announced OVRD and it will maintain the new selection of "EPR." ATS restores the thrust levers for LL ("low limit"), so soon LVLCH is selected again or reasumes IASt at altitude capture.

ATS during "Take Off" (AOM. AFCAS. 1.18.03 pg.02)
- DECLUTCHES: - "D" ATS is declutched when passing 80 kt.

  RECLUTCHES:
  a- When other thrust (usually "Climb") regime is selected. It is selected manually or automatically when in "PROF mode", reaching TRA.
  b- When capture the altitude selected in FMP.
  c- When V/S is selected

<u>Thrust change in TRP below 400 ft will be inhibited.</u>
(AOM. AFCAS. 1.18.03 pg.02)

ATS during Landing (AOM. AFCAS. 1.18.03 pg.02)"
- During automatic landing, the thrust reduction for "IDLE" will happen to 50 ft. ('Displays" in FMA. RET).

"ATS SWITCHS FAULT". Panel "Augmentation"
((AOM. 1.18.04 / 1.18.03 pg 2 and Ground School Notice pg.7)
- Both Channels - Gets lost the "Alpha Mode".

- A Channel. deteriorated Information, when "Packs .OFF"
  Temperatures sensors is in the Pack inlet, and to avoid EPR desincronisation just the respective channel will be switched off at FAC.

AVIONICS COOLING SYS.

(AOM. FLT / NAV. INSTRUMENTS. 1.16.05).

- The Avionics air cooling is supplied by three blower fans and drained off the system for two exaust fans. The air is spilled in the back area of the fwrd load compartment.
- On the ground without the engines running, if the consumed air is above a pre-certain temperature, the air is drained outside through the "avionics cooling valve."

WARNINGS, ALARMS and TEST SWITCHS .

"AUDIO FAULT" Panel "Avionics" (AOM. COMMUNICATIONS - 1.19.01)
- (L) Left. 2 audio amplifiers (one is alternate).
- (R) Right. Uses the observer system panel and the observer's system panel leaves "INOP."

TEST PANEL
"ANN BUTTON" - Panel of "TEST" (AOM. ACFT. GENERAL 1.01.04 pg. 07)
Tests the Green lights, Blue, White, some Red ones, Amber and the radios digits (8888).
ATTENTION: The lights "LO QTY and OVHT" on HYD panel don't light in this test.

"ANTI-SKID (AOM. LANDING to FROST -1.13.03)"
- It should be done below having predetermined speed (& lt;14kt) and withLDG down

"APU FIRE WARNINGS". Panel "APU FIRE (AOM. 1.18.02 and 5.04.01)"
- Without AC, Batteries Only:
  Displayed on SAP, fire light.
- With AC:
  "Full Alert" level 3
  Left MFDU display “Apu fire” message.
  In "APU FIRE" panel, Shines "FIRE." light

"EFIS EMERGENCY COOLING"
- Cooling just PFD and ND, and the other ones four will enter in "Shut Down", when very hot, (15min of life).

"GS WARNING INIHIBIT". Panel "AVIONICS / GPWS"
- The GS push-buttom Inhibit" should be pressed, when "Glide Slope" is out, and/or still transmitting a false sign.

SEVERAL SYSTEMS
"ENGINE FIRE Panel (FIRE PROTECTION. 1.18.01)"
- FIRE HANDLE: . When fire is detected the LOCK of the fire handle is removed.

- FIRE HANDLE ACTUATED ON GROUND
Gets lost the air conditioning heating or cooling (closing the "SOV") and the air flow from "Bleed" or “APU."

"ENGINE FIRE TEST" (SYS. OPR. 5.04.01 and FIRE PROTECTION. 1.18.01)
- Check first system 2 and then syst.1. Priority of "Check List."
- 2 "FAULT" lights (Loops), fire handle Warning light, "Check list" appears in R MFDU, fuel lever light (if open), 3 bells, left MFDU msg “ENG …FIRE”

"LANDING GEAR NOT DOWN (AOM. LANDING GEAR 1.13.01 pg.2)"
- Below 1000' of R.A.
- Both THRUST levers above Min. T.O.
- Flap ABOVE 23 degrees

"LOOP FAULT": . Panel "ENGINE FIRE"
(FIRE PROTECTION. 1.18.01)
- If a "Loop" fails, we will only have fire detection.

"RUDDER LIMITER AUTO FAULT" (AOM. FLT. CTLS - 1.14.01).
- When "Rudder Limiter Auto" fails, it will losst the auto change with to "LDG Position." In this case it have to be selected "Speed HI or LOW." depending on LDG position

"SMOKE TEST" (SYS. OPR. . 5.04.01 pg.01)

- Alert LEVEL 2
- "Master Caution"
- LH MFDU. "SMOKE ALERTS MSGS" (Lavatory and Cargo compartements)

"WARN ÁUDIO" - Panel of "AVIONICS / GPWS"
(AOM. FWC. 1.03.01 pg. 3 e12)

- When the "Warn Audio" in the "Avionics / GPWS" is pressed all the alarms of FWC will be inhibited except for the TCAS (Traffic Collision Avoidance System) if installed, the GPWS and with SAP "ON" we have "Clacker / Cavalry charge"

"WARN SYSTEM SWITCH" - Panel "TEST"
(AOM. FWC. 1.03.01 pg. 4 and 13)

- Test in 30 seconds
- When we pressed "Warn Sys Switch", we tested the integrity of the system, the FAULT lights and WARNINGS lights
- 1 burned lamp bulb, lamp blinks.
- 2 burned lamp bulbs, all of the lamps light, indicating which is burned.
- Check SAP (displays "Warn Sys" light in the p/b "Back up" in "SAP" panel) and inhibits "FWC" during the test.
- During the test the memo message "WARN SYS IN TEST" is displayed in MFDU

AIR CONDITIONING

(AIR CONDITIONING SYS. - 5.01.01).

3 MODES of operation:

1- "Normal Flow ", 100%

2- "Economy Flow": 70%
On the ground, automatic when:

a- Levers above the minimum TO position.
b- "TOGA Triggers" selection
c- Returns to normal, 1min. after selection.

In flight, automatic when:

a- "TOGA Triggers." Selection
b- In EO condition with high thrust regime and above 13.500.'

The "Econ Mode". In ground reduces TGT (increase the APU useful life) and the fuel consumption.
In Flight: reduces the fuel consumption in 0,5%.
(AOM. SYSTEM OPERATION in APU - 5.12.01 pg.1 and AIR CONDITON - 5.01.01)

3- "Augmented Flow": 140% (2x "Economy Flow").
It is slected automatically when only a "Pack" is working.

"AUTO SHUT OFF":

a- In EO condition with thrust above the min. TO. and below 13.500', it is restored when the thrust regime of the good eng is in "Low." (LL) or below MIN TO or the A/C climbs above 13500ft

b- Eng start ,
c- In reverse thrust.

- When the temperature controls in manual (MNL), "AIR COND SHUTOFF" is not allowed. (AOM - Sys. Oper. 5.01.01)

"RECIRCULATION FANS":
A. General
(1) Efficiency of the air conditioning system
(a) When ambient temperatures are high, the volume of bleed air produced by the engines and the air flow from the packs may be insufficient to cool the airplane (Refer to Fig. 21-00-00-990-100-A00).

(b) The supply temperature indication and the bleed pressure indication can be used to maximize cooling on the F100. The limits on cooling are:
- 50°F The packs are only capable of supplying air 50°F colder than outside air (OAT).
- 38°F The lowest supply temperature the packs can produce is 38°F.
- 35psi To produce air 50°F colder than OAT, the bleed pressure must be greater than or equal to 35psi.
- 1°F The supply temperature will rise about 1°F for every 1psi of bleed pressure below 35psi.

Examples:
- If the temperature on the ramp is 100°F and bleed pressure is 35psi or greater, the packs can supply 50°F air:
100°-50°=50°

- If the temperature on the ramp is 100°F and the APU is OFF, idling engines will produce about 15psi. The supply temperature will be about 70°F:
100°-50°=50°
35psi-15psi=20psi (=+20°)
50°+20°=70°

B. Component Information
(1) Recirculation Fans (Refer to Fig. 21-00-00-990-110-A00)
(a) CABIN
- Controls all four recirculation fans.
- Ducting is routed very near the skin and is affected by outside conditions while aircraft sits on the ramp.
- Heat is also generated by the fans themselves.
- Experience has shown that the net effect of the cabin recirc fans is to raise the overall cabin air temperature by an average of 3°F. Because of this, the cabin recirc fans should be selected OFF when the ambient temperature is above 65°F. (In flight, this effect is gradually reduced as altitude is gained and is actually reversed about 25,000 feet.)

(b) PACKS
- Used to control fans which are on the packs.
- Responsible for 70% of the volume of air provided by the packs.

- Without these fans, the ability to cool the airplane is severely reduced and, for this reason, they are normally left on.

(2) APU Ground Cooling vs. Ground Supplied PCA

(a) In some cases, neither the pack-supplied air nor the PCA is sufficient to cool an F100 on the ramp. When this happens, both are used to make the cabin comfortable. If the procedure is done incorrectly, pack overtemps and auto shutdowns can occur.

(b) The temp probe that sends signals to the pack temp control valve is located very near the PCA entrance. Cold PCA striking this sensor (falsely) tells the control valve to supply warmer air. One or both packs may eventually be driven to an overtemp condition resulting in a pack auto shutdown.

(c) If packs and PCA are both used to cool a parked airplane, turn the Flight Deck and Cabin Temperature selectors to full COLD and select the MAN position of the Temp Ctl Switches.This takes the temp sensor out of the control circuits and forces the packs to supply cold air.

NOTE: The Temp Ctl Switches should be returned to AUTO.

(3) Summary

(a) Pack recirc fans are normally left on at all times.

(b) Cabin recirc fans may be selected OFF for increased cooling of an airplane on the ground.

(c) If PCA and packs are both used, manually select full COLD.

BLEED AIR AND PACKS

(AOM. BLEED AIR SYS. -1.09.01 and AIR COND. SYS. 1.10.01)

"HIGH PRESSURE BLEED VALVE"

- In low thrust (80%N2 RPM) regime "High Pressure Bleed Valve" opens supplying air flow.

EXCESSIVE PRESSURE

- With the excessive pressure through the pressure regulator "PRSOV", it will be closing the "Overpressure shut-off valve", to avoid excessive air pressure in the supply "manifold."

EXCESSIVE DUCT TEMPERATURE

- If the DUCT temperature becomes excessive, "High pressure bleed valve" and (HPSOV) the “pressure regulator shut-off valve", (PRSOV) will close automatically. These can be readjusted recycling the "bleed" "switch" TO "OFF" and "ON."

DUCT LEAK

- If a duct leak happens in the "engine stubwing" or in the tail compartment, High pressure bleed valve (HPSOV), Overpressure shut-off valve (OPSOV) and the pressure regulatora shut-off valve (PRSOV), will close automatically. They cannot be readjusted in flight.
- The ground Connection, of air pressure for start engines enters in the "manifold", (piping) between the PRSOV and the OPSOV of the ENGINE 2.

MANUAL TEMPERATURE CONTROL

- In the case of a takeoff with the temperature control in manual, there will be loss of the automatic "Economy" operation (AOM. SYS OPR. . 5.01.01).

" AUTO SHUT " of both PACKS
Occurs for the following conditions
- With EO below 13.500ft, "Packs" automatically SHUT DOWN. To put back "Packs", press the push-button “AIR COND AUTO SHUT DOWN” switch "OFF." or Throttle(s) retarded below MIN TO or aiplane climbs above 13500ft
- Reverse thrust
- Ground engine starting

"AUTO PACKS TRIP"
A- PACK OUTLET TEMP EXCESSIVE
B- AIR CYCLE INLET TEMP HIGH
C- LEAK IN THE COMPARTMENT OF THE AIR CONDITIONED.
They can be RESETED, recycling Packs "OFF" and 2 MINUTES later "ON."

EQUIPMENT COOLING
General
Six fans, four blower fans and two suction fans
- Blower Fan supply continuos air flow for the electronic equipment. Area cooled: Avionics Bays, MFDU’s, and PFD’s and ND’s
- If just a EFIS COOLONG FAN is available, it will supply L PFD, L ND, L MFDU, and L & R FMS CDUs
- If only the "EFIS EMERG COOLING FAN" is operating, it will supply L PFD and L ND, meaning that the batteries are the only SOURCE .
- If in the "Flight Deck Safety" inspection with the Battery switch "ON" the "EFIS EMERG COOL FAN" light be not lit, calls the maintenance.
- "EFIS EMERG COOL FAN" fed by the battery to feed PFD / ND for 30min, This LIGHT with the “AVNCS COOL FAN” MESSAGE, indicates all three normal blower fans have stopped.
- MFDU msg “ AVNCS COOL REDUCED” INDICATES: One blower fan inop, or One or both of the suction fans are inop, or No suction flow sensed
- When "AVNCS COOL VALVE" is shown as message in MFDU the valve is open when it should be closed on the ground.

CVR / FDR

- Besides the position of push-buttom "FDR / CVR"; when opening both fuel levers it began to record and it will continue recording up to 5 minutes after the levers to be positioned in "OFF."

EFIS Panel
(AOM. FLT. /NAVIGATION INSTRUMENTS. 1.16.00).

EFIS CONTROL PANEL FAULT
- The left reverts TO ROSE / ILS and the right reverts for MAP in a 30nm RANGE.

ARC
- Not use this MODE in approaches.

APP
- Selecting the "APP" at EFIS control panel, it is introduced in PFD "ILS Displays" and diamonds if receiving the signs of the tuned frequency.

QNH / STD
- Selecting the button "QNH / STD" won't affect the "Altitude Hold" selected until a new altitude selection.

You screech of selection in the panel of EFIS:
- "MDA Selector/DA": 0 ft to 8.190 ft (Increments of 10 ft).
- "Decision Height": 0 to 600 ft (Increments of 1 ft).
- "Flight Path Angle": 0 to -9.9 or up to +9.9

ELECTRIC

(AOM. ELETRICAL SYS. . 1.05.00).

BATTERY
- 23 to 32v
- Minimum voltage for the Departure of APU: 22 volts.

AC Sources. Three AC Generators
- Voltage = 115v ,400hz, three phase
- Driven by oil cooled constant speed drive. Generator and drive together comprise Integras Drive Generator (IDG)

DC Sources.
Four Trasnformer rectifier units 28v
Two 24v Batteries

MAXIMUM GENERATORS LOAD LIMITS
- Continuous = 100%
- Five minutes = 113%
- Five seconds = 150%.

"Battery Switch ON" ONLY SOURCE:
1- Provides DC power to Emergency DC , and this bus powers the
2- Emergency AC (Through static inverter)
3- Operates for approx. 30 min, including one APU start attempt.

ESS AC BUS
- The priority sources for "ESS AC" are GEN 1 and 2, APU and EXT PWR.

ESS+EMER PWR ONLY switch
- "ESS+EMER PWR ONLY" cuts all electric feeding except "EMER / ESS AC / DC."

DC X TIE
- Manual selection

AC X TIE
- Automatic.

GALLEY BUSSES (AOM. 1.05.02 pg.01)
- If only one generator is operating, the energy for "Galley" is automatically turned off.

EMERG DC FAULT: INOPERATIVE REVERSE.
DUAL DC FAULT: RUDDER LIMITER AND ANTI-SKID INOP., SPEED BRAKE INOP.
ESS. DC FAULT: INOPERATIVE ANTI-SKID, ENG ANTI ICE INOP, AUTOMATIC PRESS INOP

EMERGENCY LIGTHS

- It is selected automatic when loss AC supply, only "Emergency AC / DC" (trought batteries) or when selected manually.

ENGINE SHUTDOWN

(AOM. Sys. Opr. . 5.14.01 pg. 04)

- Allow 1 minute in "Idle thrust" before "Engine Shutdown."
- Amount of oilwill be shown in MFDS, 15 minutes after "Engine Shutdown",

EPR

(AOM. Power Plant. 1.07.04)

FLEX TO cannot be smaller than 25% of the max thrust (APPROXIMATELY 1.55 of EPR at Sea Level).

- "EPR Synchronization": (AOM. AFCAS - 1.18.03 pg.02)
  When both channels are engaged.
  Exception:
  a- During "Take Off" and "Go Around."
  b- EPR below 1,2
  c- With only one channel. (it can be synchronized manually).

FLAPS

(AOM. FLT. CONTROLS. 1.14.02. LIMITATIONS .2.04.01. ABNORMAL PROCED. . 4.05)

SPEED LIMITS / LIMITATIONS:
08 = 250kt / M 0.50
15/25 = 220kt / M 0.45
42 = 180kt / M 0.36

Maximum altitude extension = 20.000ft.
Don't use the flaps during holdings.

FLAP OVERRIDE SWITCH. GPWS panel

- It is used to bypass the normal system. When in landing configuration and Flap are in smaller position than 25 degrees the alarm (GPWS) will inform unless in override.

ELECTRIC FLAP IN FLIGHT

- Disable the HYD. 1 flap lever selection, and there will be loss the asymmetry protection. It cannot have the system come back to hyd. comand in flight.

FLAP ASYMMETRY:

1- Alert 2 and procedure in MFDU.
2- Disables the normal HYDRAULIC selection via flap lever.
3- Stays in the position in that the asymmetry happened.
4- If the position is smaller than 25 degrees use 0 flap procedure.
5- Don't use Flap in the alternate system. (Electric).

FLAPS DISAGREEMENT (wrong Position)

- Use the alternative system.
- Disables normal hydraulic selection via flap lever.
- It is not possible to reactivate the normal hydrulic fla selection in flight.
- If the position is smaller than 25 degrees use 0 flap procedure.

LAND WITH FLAPS LESS THAN 25
To see the procedure in "Flight Technics". 7.09.01 pg.09 or in this Guide in LANDING.

FAC - FLIGHT AUGMANTATION COMPUTER"

(AOM. FLIGHT TECHNICS. 7.09.01 pg. 08)

In an EO condition, FAC adds Rudder automatically, being in the T.O. mode and with the two Automatic Pilots engaged between 400 and 1500 ft. In the "Land" mode below 1500 ft.

"FCC. FLIGHT CONTROL COMPUTER"

(AOM 1.18.02. PG.1067)

- AP Control.
- FD command bars
- Altitude Alerts.
- Calculates the speeds (to see "Flight Envelope Protection" in this Guide)

When it fails:
- Disappears the command bars (FD).
- Flag “FD” ambar in PFD.
- Light "Fault" in P/b "Source Select" in the lateral panel (right or left).

Controls:
- FMP (FD, AP, FPV, mode selection AFCS, disengagement AP Bar).
- "TOGA” Triggers (FD. TOGA MODE, AP - TOGA MODE)."

Indicative:
- FMA (Speed, FD, Altitude, Flags).
- FWC (MFDU).
- "LAND MODE” ("Auto land " Light)

"FD (Flight Director)"

Appears Automatically when:
- "Wind shear"
- TOGA during a GO Around.
- Below VMA.

FMA

(AFCAS SYS. . 1.18.05)

- 5 windows: Thrust, Speeds, Vertical, Horizontal and STATUS.

Green means Flying.
Blue means Selected.
Boxed means FMS mode (NAV & PROF).
Triangle means Capturing.
Amber means Inexecutable.
Attention:
- "NAV" in Amber in FMA:

Assume at FMP, “HDG Select” and “Speed Select”, verify the mistake and return to the “NAV” AND OR "PROF." MODE

FMS
(AOM. FMS. 1.17.00)

- Be sure you have inserted the corrects weights of the aircraft and speeds

- FMS (inertial) not to use above the latitude 70 N or below the latitude 60 S.

- Fuel and weights computed in FMS should not be used as primary information for planning.

FPLN PAGE:
LSK AND RSK
- In the buttons on the right side we will have the Vertical (Performance and Profile) modifications and in the left Lateral (Navigation) modifications.

"WINDS"
- The WIND direction and intensity indicated in ND, in flight and in APP are in relation to the true north. In the landing and takeoff the,with LDG down suitable wind is magnetic. (F. Instruments. 1.16.01 pg.23)

MESSAGES IN FMS:

LOW POS ACCURACY:
- Degradation of the VHF NAV sign quality, when VOR / DME is used to calculate the aircraft position and the estimated position error becomes larger than 4NM in the terminal. The system tests the acquracy quality to every second.

INDEPENDENT OPERATION:
- It happens when present position differs more than 10nm between the data computed by both FMC. Attempt to clear independent operation on the ground by accomplishing a “SELF TEST” in maintenance page (INCLUDES A LONG TERM WARM UP)

IRS ONLY NAVIGATION:
- Position of the aircraft is not updated by VHF NAV for more than 10 minutes in cruise flight or for more 2 minutes in the terminal.

VERIFY A/C POSITION:
- It differentiates of more than 12NM among medium position of IRS and computed them by VHF NAV.

F – PLAN page:
MODIFICATION OF THE ALTERNATIVE IN F-PLAN:
- Go to F / PLAN page, select "END OF PLAN" (via arrow down key), then lateral LSK of the destiny airport and change the alternative in the “new route to” prompt.

"SEC F-PLN" page:
ACTIVATING SECONDARY F-PLN:
- To activate it, pull "HDG Select" in the AFCAS panel and in SEC F-PLN page will appear the prompt "* Active Sec" in the left down side. Select it via LSK

"INIT" page:
"COST ÍNDEX"

- Optimizes the speeds of the aircraft, it represents the TIME COST of operating the aircraft ($/hours) DIVIDED by the FUEL COST of operating the aircraft.
- It can be altered in flight in the page "MODE."
- “0” cost index provides a minimum fuel burn per unit time
- Between “15” and “25” provides long range cruise (lbs option)

“MODE” page:
- ECON: It is the speed that depends on the "Cost Index". It is the speed of Minimum Cost of Operation for mile flown.
- MIN FUEL: It is the speed of "Cost Índex" Zero.
- MIN TIME: It supplies the operation in the highest limit of the flight envelope. Limit the speed, chosen MMO -0.02 MACH or VMO-10 KCAS. For "MIN TIME Mode, "OPTIMUM ALTITUDE" is the altitude that the speed is maximized (usually FL 260).
- MÁX CLIMB: It selects VFTO ("Green Dot" speed), activating the performance of maximum climb angle. In the absence of VFTO it is used 200kt.
- MÁX DESC: Descent at maximum speed limit (.75M/310kt.)

"PROG" page:
- Letters beside the frequencies:
  A. "Automatic (automatic Selection)."
  R. "Remote (Selection eslaved by the pilot in FMS)"
  M. "Manual (Selection in the EFIS, VOR and ARC or Rose)."

"OFF-SET"
- Creat a parallel route, laterally offset by a pilot entered distance, making necessary deviations due to weather for e.g.. When accepted the A/C turns to intercept the parallel course using up to a 45 deegre intercept. The maximum value is 99nm for offset, to the right or to the left, maintaining all of the calculations (positions, updated descents for that deviation, etc).

"REF" page:
"SENSOR STATUS (AOM. FMS 7.17.03 pg 91)"
In this page it presents information that the fault happened in the sensor of "Input data" from FMS. (17 diferent sensors exist, for eg.: There is no indication in "Fuel Flow”, dashes, at MFDU).

- CLOSEST AIRPORTS

Found in REF page. FMS selects the closest airports in a rage from 2 to 2.000nm. See and Chek the landing performance for that airport and make sure is suitable for us.

- "AIDS RNAV"

Found in the page of REF. FMS selects the radios aids, to the closest Navigation in a range distance of 300nm and in an angle from 30deegres to 150 of our route. Displays max 3 of four radio aids.

"TAKEOFF / APP" page (AOM - FMS. 1.17.03 pg. 24)
T. OFF.mode
- TO SHIFT: (takeoff from the intercession) Legend and the data line stay blank until RWY entry. With the RWY defined, the "prompt" SELECT is displayed. Pressing this

"RSK" there is a correction of 970 meters take off position shift. After activation "ACTIVE." is displayed

- THR RED: "TRA" is based on the 800ft AGL for default,. It can be altered by the pilot.

- ACCEL: "Acceleration Altitude" is based on the 800ft AGL for default. It can be altered by the pilot. ACCEL cannot be adjusted lower than "EO ACCEL." "Software F3 (953): If the adjusted altitude of ACCEL is smaller than the EO ACCEL, then both altitudes will be changed for a new altitude.

- EO ACCEL: Altitude of "Engine Out Acceleration" is based on the 800ft AGL for default. It can be altered by the pilot. She cannot be adjusted higher than the altitude "ACCEL." Software F3 (953): If the adjusted ACCEL altitude is smaller than the EO ACCEL, then both altitudes will be changed for a new altitude.

- EO THR RED: "Engine Out Thrust Reduction" altitude is based to 800ft AGL for default. It can be altered by the pilot. Software F3 (953): "EO THR RED is removed
- APPROACH : It supplies access to "Approach" page in takeoff flight phase. After the transition for climb phase, the "Approach" page is displayed automatically selecting "TO / APPR" page.

"VFTO or Green Dot" (AOM - FMS. 1.17.03 pg. 25)
- It is the safety's minimum speed to be reached at the end of EO acceleration before CLIMB to EO level off cruise. It is also known as: minimum speed clean configuration, "Green Dot Speed" or final takeoff speed ("Velocity for Final T. Off"). It is also used as the lowest limit of a strategic speed. It is used for several other computations and limits, including:
  a- MAX CLIMB Angle,
  b- EO CLIMB,
  c- EODESCENT,
  d- MAX ENDURANCE ,
  e- "Drift down",

- For computation it uses the current total weight of the aircraft and the altitude; *In the absence of the total weight of the aircraft or flight level, the value used for VFTO will be 200kt.*

FPV

It assures protection against some situations, closest to the ground, like:
1- Excessive rate of descent,
2- Low speed,
3- "Wind Shear."

FUEL

- Both PUMPS inoperative: Fuel flow into collector tanks through one-way flapper valves. Limit altitude to 15.000ft (feeding by gravity). FUEL SUCTION FEED PROCEDURE.
  Fuel no usable = 120kg/240lbs p / tk.
- For weight and balnce pourpouses: maximum of 1.000kg/2200lbs, can be put in the central tank. Increase this weight to "ZFW."

- It is advisable to begin the fuel transfer, using the manual procedure, from central to the main ones, if each main tank has no more than 2.950kg/6500lbs
- Automatic fuel transfer, inflight (not all aircafts) or on ground, with quantity in both tanks es less than 7500lbs/3400kgs or with aan engine Fuel Flow above 1.130kg./2500lbs
- Light X FEED ON in MFDU, valve open. Flow Bar (p/b X FEED) Both valves open.

GND FLT CONTROL (on Take Off)

(AOM - ABNORMAL PROCEDURES. 4.10.01 pg. 02)

- In MFDU after the takeoff, return and land, therefore the following service will be affected:

1- "Cabin Pressurization,
2- "Stall Protection",
3- "Transponder",
4- "Lift Dumpers Auto Disarm After Take-Off",
5- "Wing and Tail Anti-icing",
6- "MFDS (no inhibitions, no checklist display),
7- "EFIS (Vss and Vma not display)."

- Another form of confirmation is consulting FMS, REF page, "Sensor Status / Discrete Inputs" verifying the item "STRUT" and if the indication "Ground" appears, that is the confirmation (with GS >50kt).

GND FLT CONTROL (on LANDING)

(AOM. ABNORMAL PROCEDURES - 4.10.01 pg01)

- When the msg. "GND FLT CONTROL FAULT" appear in MFDU during the approach for landing, a priori don't arm "Lift Dumper." Below 400ft the msg. will disappear, but the fault conditionswill stay.

- Another form of confirmation is consulting FMS, REF page, "Sensor Status / Discrete Inputs" verifying the item "STRUT" and if the indication "Ground" appears, that is the confirmation (with GS >50kt).

HYDRAULIC (AOM. HYDRAULIC SYS. . 1.12)

"ELECTRICAL PUMPS (AOM. SYSTEM OPERATION. 5.07.01)"
- It can be used to pressurize the system. Before the "Engine starts" if the alternate pressure of the brakes is below 1000 psi, select Nr. 1 elect. Pump ON until reaching aproxim. 3000psi.

"PRIORITY VALVE"
- It assures pressure for the flight controls. In EO there is not any Hydraulic change.

BRAKE ACCUMULATOR
- In the System 1. Pressurization Nitrogen 3000psi.
- WE WILL ALWAYS HAVE "ANTI SKID."
- With the systems LOSS we will still have six applications of brakes due to the accumulator.

SYSTEM 1
- Has a larger PUMP, for being the system of larger capacity.
- It contains the: Flight controls, Lift Dumpers, Flap, LDG, STEERING, Alternate brake, REVERSERS, SPEED BRAKE
- Normal pressure. 3000psi (between 2.900 and 3.200psi - Sys. Opr. - 5.07.01).
- Alarm "Low Press". 2.500 psi
- Minimum amount 70% (FOR DISPATCH), MAX. 130%.
- Alarm "LO QTY". 34%
- Capacity. 23 liters (6,23gl)
- LANDING FLAPS 25

SYSTEM 2
- It contains the: "Flight Controls and Normal brake."
- Normal pressure. 3000psi
- Alarm "Low Press". 2500 psi
- Minimum amount 70%, (for dispatch) MAX. 130%.
- Alarm "LO QTY". 22%
- Capacity. 04 liters (1,11gl)
- When this system this inoperative LEFT "Aileron" moves right "Aileron" through cables "Control TAB"

"LIFT DUMPERS"
- With the HYD. systems 1 LOSS we will still have a cycle to open and maybe one to close trought accumulators.

"STAB TRIM"
- With the systems loss, we will still have Trim Elétrico.

EQUALIZATION of the AMOUNT OF HYD QTY RESERVOIRS
- Maintain for 15 seconds the PARKING brake applied and an ENGINE RUNNING.

INSTRUMENTS INDICATIONS

EFIS - (ND)
- BLUE = Selected by the pilot or radio station tuned in.
- GREEN = Computed by FMS, next waypoint.
- MAGENTA = Deviations.
- WHITE = Indicates scales.

MFDU ("POWER PLANT" 1.07.04 pg. 08)
- In the primary page the eng parameters displays the limit marks as follow:

Amber: - Indicates the Maximum Continuous
Red: - Indicates that can just be exceeded momentarily for 2 seconds.
Among both marks - it can be exceeded by 5 minutes.

SAP
- With fail of both FWC and total electric AC supply fault, it is automatically selected

"Standby Attitude"
- With fuel levers open only (15 min) or battery switch ON (30min)

S.E.I.
- When a number "Flashes" are because a limitation was exceeded.

Fuel Totalizer
- It supplies information for FMS, overhead fuel panel and for FWC ("Flight Warning Computer").

LANDING GEAR OPERATION (AOM - Sys. Opr. . 5.09.01).

- Time of RERACTION. 9 seconds.
- Time of EXTENSION. 25 seconds.
- Maximum OPERATING altitude. 25.000ft

LANDING GEAR MSG (AOM. AICRAFT GENERAL 1.01.04 pg. 01)

LANDING GEAR DOOR LOCK SWITCH
- Total of six (two for GEAR).
- One for GEAR can be inoperative and the following functions can be affected. VMAX in EFIS. Wind Shear Guidance. AFCAS MAINT REQD. Check MEL.

MAIN LANDING GEAR DOWN LOCK SWITCH
- Total of four (one can be inoperative). Check MEL in flight, because it can affect GPWS, Transit light, speed brake auto retraction and rudder limit.

NOSE GEAR DOOR LOCK SWITCH
- Check MEL in flight, because it can affect the transit light.

LANDING LIGTHS
- In an EO they retract automatically with LDG UP.

RUDDER (AOM. ABNORMAL PROCEDURES. 4.05.06)

"AUTO RUDDER LIMITER”
- When fails, we lost the auto speed limiter change with LDG down/up. In this case it can be selected manually "HI or LOW."
- Above 200kt the movement is limited.
- Below 200kt the movement is normal.

"LIFT DUMPERS"

- Operation test is automatic accomplished when pressing "Lift Dumper's" switch and if it passes the Blue Light "ARM" in the p/b is displayed.
- On takeoff, it arms automatically above 50kt with thrust levers "IDLE" if LFTD P/b was in "Armed”, or manually when thrust reversers actuated and no LFTD was armed
- Disarms automatically after the "lift off" in the takeoff or when selecting TOGA in a go around procedure.
- "Lifts Dumpers's" Manual extension, only on the ground with both reverse levers actuated. It is not necessary that the reverse open (in the case of locked reverse); only command the levers.
- "Lift Dumper's" switch “ARMED” only after LDG down

OIL QUANTITY (Engine)

- The OIL amount appears in MFDS 15 minutes after eng. Shut unless MFDS selector is recycled "Off / On."

OX2 PAX AND CREW
(AOM. EMERGENCY EQUIPMENT. 1.02.01 and SYS. OPR. . 5.11.01)

MINIMUM CREW OXYGEN for dispatch
- 2 Pilots = 1000 psi.
- 3 Pilots = 1450 psi.

CABIN ALTITUDE
- 10.000' = Alerts level 3.
- 12.500' = Closing of the "Outflow valve"
- 14.500' = PAX Masks auto deployed (12min of Ox2 for Pax.)

CREW MEMBERS OX:
- Normal pressure, CREW, flight deck bottle, 1850 psi.

OXYGEN MASKS:
1- "NORMAL / 100%":
SUPLEMENTAL:
a- Normal (N) = it Supplies the ox mixture. with the ambient air.
b- 100% = Pure oxygen.
c- "Unlock" lever = there will be need to press it to reach the position of 100% .
NOTE: With the cabin altitude to 30.000ft the flow in both modes will be of 100%.

2- Flow selector in EMERGENCY
PREVENTIVE oxygen, PRESENCE OF SMOKES OR FUMES
a- 100% = Pure oxygen.
b- "Emergency", preventing SMOKES OR FUMES PENETRATES the mask or googles (against inhalation). It should be selected in atmosphere of smoke or fumes. In this position there is a considerable increase of consumption. Is selected, rotating the red button of the mask ("Press to test") to the right, since the selection levers N/100% it is in 100%.

The table below display the consumption in minutes of the PREVENTIVE oxygen, for a relationship of the initial pressure of initial bottle and Crew members in the cockpit:

PREVENTIVE OX	**2 CREW**			**3 CREW**	
BOTTLE Pressure	**1850psi**	**1500psi**	**1000psi**	**1850psi**	**1500psi**
Cabin Altit.:					
Sea LEVEL	20	16	11	13	11
8.000'	27	22	15	18	15
25.000'	52	43	29	36	29
35.000'	84	68	45	56	45

"SMOKE GOGGLE VENT VALVE"
When the flow selector is in "Emergency" the "vent valve" opens and consequently, it will clean the glasses of fumes or smoke.

COMMANDS and INDICATIONS:
a- "RESET / TEST" = Tests the oxg flow.
b- Push and hold the levers, Check "Harness Inflation",
c- Check the FLOW Indicator "Yellow CROOS",
d- Check audible Flow at "speakers",
Note: Close the doors and Reset the “Reset/Test” lever to return the communications "head and boom mikes."
e- "Yellow Cross" when the oxg. is flowing for the masks.
f- "HARNESS INFLATION" levers, push and hold to inflate the harness, quik dooning (ready to use) masks. With the stored mask, compressing the leverss, it unlocks the doors of the "container."

OX MASKS ON, COMMUNICATION ESTABLISH
1- AUDIO Panel:
a- "IC" OPEN,
b- Adjust the volume ,
c- Select "SPKR ON."

PFD (AOM. FLT. / NAVIGATION INSTRUMENTS. 1.16.01).

- "Vertical Speed" = numeric display appear, when the reason goes larger than 500.' (1.16.01 pg.11)
- "Radio Altimeter" = numeric display appear, when in the altitude it goes below 2500.' (1.16.01 pg.11).
- If "0 FT" displays in amber after the landing, there is some “DH” selection in the EFIS panel
- V1 and V2 should be available in the PFD for the takeoff.

PRESSURIZATION

DIFFERENTIAL PRESSURE:
Maximum Differential pressure Normal: 7.45 psi
Differential pressure, maximum cabin: 7.75 psi

AUTOMATIC CONTROL
If the pressurization system is being operated in the automatic MODE, and one channel fault, automatically switch to the other control channel. Pressing de p/b "Press Control" twice manually switches to the stby channel.

INDICATION
- Indicators of Cabin Differential and Cabin Altitude is ELECTRIC
- Indicator of Rate of climb/descent is PNEUMATIC.

AUTOMATIC OPERATION
- The valves are controlled electrically and operated pneumatically

MANUAL OPERATION
- The valves are controlled Pneumatically.

RETURN TO THE DEPARTURE AIRPORT
- The pressurization system returns TO elevation of the departure, if it goes down 1000 ft before having reached 6.000 ft.

- During the takeoff with THROTTLES above MIN T.O. cabin altitude goes 200 ft lower than the runway elevation, but if the takeoff is discontinued and levers retarded below MIN T.O the cabin arises for 70 ft lower than the RWY elevation in 60 Seg.

"SPEED BRAKE" (AOM. FLT. CONTROLS. 1.14.03)

- Lever gives Electric sign to the actuador that operates hidraulically.
- Thrust Levers should be below MIN.T.O.
- Retracts automatically if the TOGA trigger were actuated during a GO AROUND and the LDG was retracted.
- ATTENTION: With the LDG DOWN "Speed Brake" doesn't RETRACT automatically.
- Retracts automatically in manual GO AROUND when selected TOGA
- Its use is obligatory in shorts runways with length smaller than 1600m, and where the touch down point in the runway is fundamental importance.
- Below 200 kt the "speed brake" totally opens.
- USE SPEED BRAKES TO AVOID A LOW THRUST CONDITIONS.

USE OF "SPEED BRAKE", IF ICE IS ENCOUNTER DURING DESCENT

During a descent with Anti-ice “ON", there will be the need of larger thrust for the air demand. With this, the thrust leverss will tend to leave above the minimum T.O., inhibiting "Speed Brake." selection and retracting them. The rate of descent will be smaller than required. For "Speed Brake" performance follow the following procedure:

1- Disconnect "ATS"
2- Adjust the thrust levers to 80% of N1 or above MIN.T.O.
3- Extend "Speed Brake"

STAB TRIM (AOM. Afcas SYS. 1.18.06).

- Automatic compensation with "Auto Pilot ON."
- Manual compensation with "Auto Pilot OFF."
- "MACH Trim" compensation above .75M
- Aural alert is generated when we commanded the “Stab Triim:

a- On the ground: more than 1sec.
b- In flight: more than 3,5 sec. (or 2,5 Sec.).

ALTERNATE "Stab Trim"
- Never use It, if the HYD is operating.

Message "OUT OF TRIM NOSE DOWN / UP":
- It informs the pilot for a POSIBLE RUNAWAY STABILAZER. Chek manual wheel for unusual movements

POSITION DISPLAY (AOM. 1.14.01 pg.06)
- Indicator "OFF" = sign was loss or "AC Supply." Loss. "Stabilizer Position Pointer" will be out of scale in this condition.
- Left side of the scale = demarcation of the position in degrees.
- Right side = Center of gravity in percentage of MAC.
- GRENN SCALE, Take Off setting limits.

"STICK SHAKER and PUSHER" (AOM. FLT. CTL. 1.14.05).

- It will be inhibited in the following situations:

1- Quickly after the takeoff. (in "Lift-Off").
2- "Wind Shear."

Lever: "Disconnect Stick Pusher"

- When ACTUATED isolates the air pressure to the system

THRUST (AOM. Sys.Opr. . 5.14.01 pg.03)

GROUND RUNNING
To avoid " Fan Stress ", it is not allowed the operation on the ground between 62 and 80% of N1 with static aircraft,

APPROACH IDLE THRUST
In the case of GO AROUND, to assure the ENGINES accelerat FAST, when select TOGA thrust, when LDG is down N2 increases automatically to approximately 70%. It is canceled 5 sec. after touchdown approximately

TIRES

PRESSURE
-Main: 148 to 156 psi
-Nose: 94 to 99 psi
MAXIMUM SPEED OF THE TIRES: 182 kt. to 225kt

WARN ÁUDIO

- It is prohibited the operation of "Warn Audio p/b" unless specified in approved procedure.

YAW DUMPER (AOM. Limitations. 2.08.01 pg. 2)

Maximum speed with "Double Channel Fault". 250 kt / M.65

DIFFERENT ATTITUDES AND FLIGHT SITUATIONS:

Airport below Minima for landing.

Being informed that the airport is below the minima:
1- Select in FMS "Min.Fuel" and maintain altitude.
2- Check SPEED reduction.
3- Check FUEL remaining
4- Get in touch with the CO. as for the ideal alternate.
5- After the decision selects the new alternative in FMS.

Aligned and Ready

Always have in mind the emergency procedure before and after V1.

As PM before V1:
1- "Call out" of the ABNORMAL/EMERGENCY condition presented.
2- Cancel "Master Caution/Warning."
3- Inform the ATC that you are making a "Reject Take Off" and need of assistance if required.

As PF before V1:
3- Captain assume control.
3- Inform Pax Cabin
3- Announce “be seated” or “ evacuation…”

As PM after V1:
1- "Call outs":
- "Positive Climb."
- "Landing gear up"
- Announce the situation, abnormal/emergency presented in MFDU.

2- Cancel "Master Warning."
3- AP. ON (if no requested suggests to PF).
4- Action after 400' or above 1000' "clean configuration" awaiting "MFDS Action."

As PF:
1- After "Positive Climb". "Landing GEAR up."
2- After 400'. "AP. ON."
3- After 400' or above 1000' "clean configuration". "MFDS action."

Approaches:

- Landing performance check:
  - Runway
  - Structural
  - Climb

1- Always in FINAL approaches:
- PF should be with in TO / APP or PROG page and PM in the "DIRECT TO or PROG."

- Constant attention in PROG page, see VDEV and distance to thee fix. Mainly when the ATC shortens his/her approach. Being uses LVLCH and/or speed brake if neccesary.

- After the IAF when in a step app, select a new altitude in the "Altitude select" and confirm in FMA using the V/S.

- If in Manual (without AP) flight, flying in "NAV" mode, follow the “FD” COMMAND BARS indications and request to PM all FMP ALTITUDES selections, and SPEEDS.

2- Use the following distances before FAF:
3nm to FAF SELECT Flaps8, 2nm select LDG down, 1nm sselect Flaps25, in an NDB procedure with STRAIGHT IN entrance without RACETRACK.

3- In an ILS procedure when Glide Slope "alive", selects flaps 8, could delay the extension of the LDG (pattern 2dots) to approximately 3nm of the external, informing PM.

4- Always check ADF / VOR "Pointers" and select them in agreement with the procedure.

5- “WALK” the thrust levers, with small touches, always a little ahead ATS, observing the "speed trend" avoiding that the system catches you unaware.

GO AROUND

As PM:

1- "Call 0uts":
"Check FMA “GA / GA" - If there is not confirmation, make appropriate Call out
"Positive Climb."
"Flaps up." Or “Flaps 15”
"Landing gear up."
2- Call ATC, advise Company and Pax. Crew.
3- "AP ON" - (if not requested, suggests to PF, if in manual flight).

As PF:
1- Actuate TOGA Trigger and begin the acceleration surpassing ATS.
2- "Check GA / GA" in FMA at PFD.
3- "Flap up" or “Flaps 15” after confirmation of "Positive Climb"
4- "Landing gear up"
5- Request AP ON - if in manual flight, and command NAV or NAV & PROF.
6- 1000' AGL – command LVLCH, FLAPS UP, and Climb Thrust

ATTENTION IN FMA
- If the GA / GA WILL NOT CAPTURE after TOGA, and if he/she is executing an ILS procedure will lose FD commands; to recover it, select immediately V/S MODE 2000' if twin-engine and 1000' if one engine.

Takeoffs:

Takeoff PERFOMANCE limits:
1- Runway
2- Structural
3- Climb
4- Obstacle

- When there is obstacle in the 2nd segment and runway allow the takeoff “0” flaps it is recommended due to best rate of climb . (PERFOMANCE)

- When the runway is short (below 6000ft), more flap setting allow more climb angle (PERFOMANCE)

- Flex takeoff thrust must not be below 25% of takeoff thrust (MIN EPR 1.55) (PERFOMANCE)

- After Start Engines, always check the Take off flaps selection.

- Into runway position after "Cleared to TO", aligned and ready; CHECK "PFD" as for the :
1- FMA.
2- Speed selected.
3- Selected Flaps.
4- Altimeter adjusts in QNH.
5- Authorized altitude.

- Wait for EPR to stabilize in 1.3, then select "TOGA Triggers." This action is a precaution, that makes possible ATS to reach EPR selected, before "Declutch", (80kt) in takeoffs with strong winds. (AOM. AFCAS. 1.18.03 pg.2).

- In some aircraft if the "TOGA Triggers" are actuated above 1.4 EPR, the NAV & PROF MODES if armed before, wil disarm.

- When commanding LDG UP and THE LEVER gets jammed, await for 400ft AGL, check MFDS for alarms and lights, if appears msg. “:GND FLT CONTROL” in MFDU, maintain LDG down, and return and land, therefore the following service will be affected:
"Cabin Pressurization, "Stall Protection", ”Transponder", "Lift Dumpers Auto Disarm After Take-Off", "Wing and Tail Anti-icing", "MFDS (inhibitions, cheklists display), Vss and Vma not display

Attention: If when taking off notice that Green Dot is 1kt above that calculated in TO / APPR via FMS, and in the same time a V2 speed information is 4kt below VMA (amber scale), certainty, we have one of the following problems, like:
1- CG, wrong balance done.
2- Stab Trim wrong
3- Adjustment of Flaps.
4- Weight excess.
(This calculation is made by FMS, after the takeoff with the information received by the AOA (angle of attack) VANES and rate of climb

Attention: If after takeoff, there was any doubt about the programmed FMS lateral or vertical path, (with NAV & PROF ARMED), immediately select "Rose" and assume "Heading, Speed and Altitude" in the FMP AFCAS panel, following the SID profile .

FMS" - Clues:

Actual takeoff time.

On the ground, to know the schedule (to avoid delay), being known the ETA:.
1- Select the "F-Plan",
2- Escrole until destiny, and select "RSK"
3- In this new page, write the landing schedule GMT (Zulu),
4- Enter time data in lateral "RSK" to the Box * GMT [ ],
5- Return to "F-PLAN" and in the beginning of the page beside takeoff RWY there will be the indication of ETD.
6- Undo the operation returning to the "item 3",
7- Select "CLR GMT'S "RSK" *.

PROF CAPTURE on descent

In a descent and out of the programmed profile by FMS, when in LVLCH descent or V/S descent mode, when PROF MODE ar selected, in FMA appears PROF ARMED BLUE BOXES, THAT MEAN YOU STILL ARE IN LVLCH OR V/S MODE. When appears de green dot in PFD vertical path, "PROF" immediately CAPTURE (GREEN BOXED) the profile and all other vertical modes will be desengages.

360 turns by FMS.

Several 360 turns
1- In AFCAS, select "HDG Select and Speed Select",
2- In the P. F-PLAN selects LSK at T-P or at the current point.
3- In this new page selects LSK , and in this new page select "HOLD",
4- In Hold page select "0.0" and insert in the "Time/Dist" prompt
5- Insert curve for the right (R) or left (L) in lateral LSK of "Turn"
6- "INSERT",
7- Arm the manners "NAV / PROF"
8- If necessary select "TACT" mode page and insert speed.

FAST method
1- Select lateral "LSK" of T-P,
2- In the new page it selects "HOLD",
3- In this page "set" it curves "R" or "L" and select "INSERT"
4- Returning the p. F-PLAN selects "LSK" of "IMM EXIT."

Radial limit requested by the control or an authorization limit in the case of a communication fault, or in VECTORS for the approach

1- In AFCAS, in "HDG Select", select the last authorized HDG.
2- In the page Dir To, INSERT in RSK INTCP FIX/COURSE: BOG/138 (RADIAL 318 INBOUND), and insert RSK 1,
3- Appears yellow dashes with the intercept fix/radial

4- Select again RSK 1, IF YOU ARE BEING VECTORED and authorized to proceed via radial 318 to BOG. In the interception of the radial with HDG will be displayed the new route.

Where do you can see course and distance information?

1- Select the "F-PLAN",
2- Select "NEXT PAG",
3- "Scroll WPT" or destiny wanted to 3rd "LSK"
(The 3rd line from top to bottom, is the one that indicates the course and distances to the next wpt).

How to avoid the calculation of TOC / TOD; avoiding constant "Scroll", when it is inserting a flight plan.

1- Go to "INIT" and remove "CI"
2- Return F-PLAN and continue working
3- Return the pág "INIT" and insert "CI"

How to know the ATD schedule in FMS, in case he/she has forgotten to take the time.

1- Select "HDG Select" in AFCAS
2- Select "SEC F-PLAN."
3- Activate "SEC F-PLAN", in "LSK ACTIVE SEC."
4- Copy the schedule in the lateral of the "RWY."
5- Select the “DIRECT TO."
6- Return to the planned route.
7- Select "NAV / PROF" in AFCAS.

Direct TO.

The "wpt" exists in current F-PLAN:
1- Select "F-PLAN",
2- In this, write the authorized "wpt" in "Scratch Pad Field",
3- Insert it in "LSK" below "LSK" of T-P.
4- Confirm the "NAV." MODE

The "wpt" doesn't exist in current F-PLAN:
1- Select "DIRECT TO",
2- In this, write the authorized "wpt" in "Scratch Pad Field",
3- Insert it, TWICE in LSK 1
4- In the page "F-PLAN", select "LSK" of the authorized "wpt"
5- Write in "Scratch Pad Field" the next "wpt" of the plan, and insert It in lateral LSK to the * New WPT. [ ]

If when selecting the altitude for descent pulling the alt knob, and in "PROF", there is no indication of ramp of descent in "ND" and in "FMA" there is no indication of “DES” Arm.

In the "PROG" page, check the cruise level. If present level is different from the current:

1- In "AFCAS" selects "ALT HOLD" in the altitude selector.
2- PROG page insert the new level displayed by the "Trend" of Altitude of "PFD."
3- Selects the current altitude and pull the altitude selector knob, after that selects the authorized altitude of descent and pull the selector."
4- Check in "AFCAS" the "PROF." Mode engaged.

Clearing “INIT” page after landing.

1- Press "INIT" once. "Status." page
2- Press "INIT" twice. "INIT." page

Why, when selecting the TO/APPR page in a final approach, enters the "GO AROUND" page, just with "Flap Retraction" speed.

This usually happens in Visual procedure, when we removed the discontinuity between the flight plan and the runway and if the MAP is an NDB, when passing it the FMS interprets we were beginning a go around. It also happens when we select "Direct TO" "LSK" to the rwy removing the discontinuity.

For us to return to the "TO / APPR,
1- Select the "F-PLN."
2- Write the airport in "Scratch pad field."
3- Insert it in "LSK" for rwy
4- "CLR" in the rwy in use.
5- Select in "LSK" of the airport, again rwy in use.
6- Remove the discontinuities.
7- Return the "TO / APPR."

Selecting New alternative in F-PLN.

1- In the F-PLN, "scroll" until "END OF PLAN", or select down arrow once
2- Select "LSK" of the destiny airport,
3- In the "scratch pad field" writes the new alternative,
4- Insert it in "LSK" to NEW RTE TO,
5- Confirm in the F-PLN or in PROG in FUEL PRED'S "LSK" the new selected alternative

LEVELING:

- Not forget, check the fuel BRND at TOC with flight plan navigation.
- Check cabin temperature.

ABNORMALS/ TECHNICAL (Normal)

"AC Supply (recognition)"

- Lights "AC SUPPLY" and "PITOT HEAT" in Back Up panel, SAP
- Light "EFIS EMER COOL FAN"
- "Stab TRIM" Position indicator with flag.

"AFCAS-FCC FAULT":
On the ground:
1- Pull CBs FCC1 and 2. (13E or 13F and 39E or 39F).
2- Resete them after 2 minutes.
In flight:
1- Turn off both "FDs",
2- Turn off "AP",
If the fault was removed
- Connect both "FDs" and couple "AP",
If the fault was not removed:
1- "FCC for ALTN SOURCE",
2- Connect "FDs",
3- Couple other "AP."

"AIR CABIN PRESS. CTL CHAN":
On the ground:
1- Pull CBs "CABIN PRESS CONTROLLER 1 and CABIN PRESS CONTROLLER 2. (31E or 35B and 48G or 490)
2- Resete them after 2 minutes.

ANTI-ICE VALVE LOCKED IN THE OPEN POSITION
- Dispatch is allowed since the weght limited by "Field or Climb" is reduced in approximately 400kg and maximum EPR of takeoff in 0.01. The thrust loss at take off maybe reach about 12%. For engine start, due to the excessive air bleed trought the valve, it is necessary to aid with an LPU besides the use of APU.

"APU FAULT" (AOM - Abnormal Proced. 4.11.01)
If it is the only source remaining in flight, and if APU is the type "R"; when landing there will be loss of any AC source and consequently with the loss AC, will be without the "Automatic Lift Dumpers" and "Anti-Skid." If APU is "RR", it will still running for only 60 seconds.

"ATS SWITCHS FAULT". FAC Panel (AOM. 1.18.04 / 1.18.03 pg 2)
- Both Channel - Gets lost the "Alpha Mode" protection
- A Channel, deteriorated Information for EPR sincronization.

ATS INOPERATIVE and WING AND TAIL ANTI-ICE "ON" in flight.
- Minimum of 80% in N2.
  If requested during the descent: limit the thrust levers to MIN. TO to allow Speed Brake selection. (AOM - 5.08.01).

"AUDIO FAULT", Avionics panel (AOM. COMMUNICATIONS - 1.19.01)
- (L) Left. 2 audio amplifiers (one is alternate).

- (R) Right. it Uses the system of the observer's panel and leves the observer's system panel "INOP."

EMUX SINGLE CHAN. (on the ground):

1- Pull CBs "EMUX 1 and 2 CHAN A and EMUX 1 and 2 CHAN B." (35B or 34K and 44D or 45A).
2- Reset after 2 minutes.

FAC Panel. ATS FAULT / YD FAULT / STAB TRIM FAULT:

1- Pull CBs FAC CHAN 1 or FAC CHAN 2 (13K or 13J and 39K or 39J).
2- Resete them after 2 minutes.

FLAPS POSITION CMPTR:

On the ground with engines shuts:

1- Connect the HYD #1 electric PUMP (3000psi),
2- Pull "CBs FLP CTL DATES UNIT CHAN , (06G or 07J and 40k).
3- Resete "CBs",
4- Turn off the HYD #1 electric pump

FMC FAIL or UNAVAILABLE:

On the ground:

1- Pull CBs FMC1 and FMC2 (30G or 30L and 38G)
2- Reset after 2 minutes.

In flight:

1- Turn off both "FDs."
2- Couple other AP.
3- Connect both "FDs."
4- Select “NAV and PROF." modes

FMS. INDEPENDENT OPERATION

- Usually FMS in "INDEPENDENT OPERATION" is what is not in command (without A/P).
- On the ground the reset is pulling the cb's:

1- DATA LOAD FMC1 (30E or 30J) or DATA LOAD FMC2 (38E)
2- FMC1 (30F or 30K) or FMC2 (38F)
3- FMC CDU1 (30G or 30L) or FMC CDU2 (38G).

Or another method:

- REF,page select LSK "MAINT" and LSK "SELF TEST"

If the msg.nNot desappears; check in the "INIT" page, the software, dates etc, try to define which it is the most current. After it, executes:

1- In both FMS, select pág REF,
2- In both, select LSK MAINT
3- In scratch pad of both FMS writes the word "ARM" and insert in the RSK promt "TRANSMIT" of the same ones,
4- In most current FMS selects LSK "TRANSMIT" and in the another selects RSK "RECEIVE"
5- After that make a "SELF TEST" in both.

ATTENTION: This procedure is not standard.
It is usually executed by the maintenance for software installation. With this procedure it will be copying the database from a FMS to the other.

JAMMED STABILIZER (for dispatch):
1- If the alert in the "MFDS" resetar by itself,
2- If the control switch on control wheel operates in any direction until "Wooler Sound",
3- If no new alert happens during the movement of the stabilizer.

LANDING GEAR
LDG lever NOT MOVED UP (AOM. revision 43)
- If when taking off, there was MSG in MFDS “GND/FLIGHT CONTROL”. Not arm "Lift Dumper” for landing. (QRH doesn't find this item, but it exists in A.O. Manual in the revision 43).

LIFTD UNSAFE:
On the ground with eng shuts:
1- Connect "hyd#1 electric pump (Press. (3.000psi),
2- In the hydraulics panel "LIFTD P/B ". "BLANK",
3- Check the area of "LIFTD"
4- In MFDS. "SELECT LIFTD OUT",
5- Pressure in the system 3000psi. "LIFTD IN",
6- Check in "MFDS" if there is no msg. of "LFTD UNSAFE",
7- Turn off the electric pump.

MFDS CTL PNL.
Check the EFIS range selector that should be in an intermediate position. If not:
1- Pull "CB" MFDS CTL PNL (29H or 31K and 29G)."
2- Resete theM after 2 minutes.
3- If the panel stays inoperative:
- When coupling the "PROF" MODE for the flight. FMS will administer the whole regime and reductions of thrust, so we can fly without MFDS / TRP PANEL
- Consult MEL.

IN ALAND:
1- Turn off both "FDs",
2- Uncouple "AP"
3- Resete the light "AUTO LAND CAUTION"
4- Couple FDs and "AP"

NO ALERT INHIBITION / STATUS RH MFDS:
On the ground:
1- Make "WARN SYS'S test. TEST" in Overhead Test Pnl."

PITOT HEAT 1 FAULT IN FLIGHT (MEL. ATA 30; Pg. 40)
1- APU ON;
2- Select APU Generator "ON."

REVERSER ENGINE 1 (2):
On the ground WITH ENG SHUTS:
1- Connect the hyd#1 electric pump (3000psi),

2- Turn off LFTD P/B,
3- Check he area of the reversores are free,
4- Check "Reverses deployed",
Removed alert on "MFDS",
5- Check the pressure in the panel "hyd." (3000psi),
6- Guard the levers,
7- Turn off the electric pump.

SEI "ON"

- In any ENG abnormal/emergency condition, SEI ON and "cross check" the parameters

SELECTING "MCT" IN TRP:

- Only select "MCT" when in EO and when REACHES "Green Dot." speed (Flight Teck. 7.09.01).

STAB TRIM:

On the ground:
1- Pull "CBS" FAC CHAN1 and CHAN 2 (13K or 13J and 39K and 39J).
2- Reset them after 2 minutes.

WARN CMPTR CHAN / WARN CMPTR INOP

– "MFDS" alert on the ground:
1- Pull "CBs FWC PWR CHAN A and CHAN B (42H and 31G)",
2- Rsest them after 2 minutes.

YAW SENSOR RATE. Alerts in "MFDS" On the ground:

1- Pull "CB YAW SENSOR RATE UNIT",
2- "Reset theM after 2 minutes."

STALL CMPTR, MEL ATA 27 "QUICK REFERENCE" "FLT CONTROLS"

"Stall Computer Fail Efects"

- If accompanied of "Speed Limit" flag in PFD, will be unavailable:

1- "AFCAS PROF MODE, ALPHA MODE AND SPEED ALERT."
2- In "EFIS" PFD, the speeds Vss, VMA, "F speed", and "Green Dot speed."
3- "Stick Pusher."

ABNORMALS / TECHNICAL (Suspicious)

ANTISKID
"ANTI SKID" INFORMATION WITH THE "GND / FLT CONTROL" MSG IN MFDU:

- "Anti skid" will disappear due to the GND / FLT CTL fault below 400ft also disappear, and there is not a fault in the anti skid system.

BEING CHECKED THE INFORMATION OF ANTISKID IS NOT FALSE
- Due to the proximity of the spinning of "Antiskid" with the window heating, it can happen that with an "Antiskid" fault it disappears if we turn off the window heat.
- When we command the LDG down, the “Anti skid” fault can also disappear.

ALTIMETER (Fault in the QNH / STD)
- Check the "status" in FMS. REF page, Sensor Status, Discrete Inputs, in the first page ALT SEL 1 (if coupled AP1) or 2 (if coupled AP2) if "QNH or STD."
- If QNH = select QNH below transition altitude/level and 2992 abaove transition altitude.

ENG SEVERE DAMAGE, AXIS SEIZURE OF THE TURBINE
Symptoms:
1- Indication of "Engine Failure" in MFDS.
2- "Fuel Lever Light ON"
3- OBS: In primary MFDU the indications will be normal, because "EMUX" doesn't understand that there was a SEIZURE .
Action:
1- SEI ON and check the parameters, if it verifies an increase or “0” N1 and N2 and TGT, it is the confirmation
2- "Fuel Lever" will be locked.
3- Cut the engine via the "Fire Handle."

GND FLT CONTROL
- Doesn't forget to monitor the "status" in FMS in the "REF page, Sensor Status / Discrete Imputs" and look the information at the item "STRUT", it will be AIR or GND.
- AIR = Indication can be false.
- GND = Indication is true.

PITOT BLOCKED
- **It only appear in MFDU "SPEED DISAGREE"**
- There will be an indication of increase of speed in the PFD onside the blocked "pitot."
- Immediately check both PFD with the "Stby" information, for identification of PFD with erroneous indication.
- ATTENTION: In a takeoff this fault can be fatal because there will be an speed false indicarion, larger speed than it really is.
- In route maybe you reach VMO, then OVERSPEED alarm "Clacker" will begin.

TACHOMETER GENERATOR FAULT (Indication mistake).
Symptoms:
1- Indication of "Engine Failure" in MFDS.
2- "Trend of N1 and N2" fall.
3- "Fuel Lever Light ON"

4- "EPR and TGT." Parameters normals. Observe in the scale of TGT if the markers amber (5 min.) and red (850) stays. (In EO the red marker goes down to 740 f and the amber disappears.).

ACTION:

1- SEI ON and check the parameters.
2- Don't cut the engine.

FAULT AC BUS 1 OR 2

3 MSGs in MFDU:

- GEN 1 OR 2,
- AC 1 OR 2,
- AUTO AC X-TIE.

ENG START FAULT

- If ignitor system Nr 1 fault, then

For the Flight: With the ignitor 1 inoperative (MEL / RECORD 74. pg.67)

a- APU. On
b- APU Generator ON.
c- (APU - R. Limited to FL 250).

- The ignitors 1 on both engines are feeding trought the emergency bus by the batteries and the ignitors 2 are feeding by ESS DC trought ESS AC bus.
- With both engines shut down inflight and without APU; there will be just Ignitors 1 available when selecting the ignition selector in "Relight".
- With APU GEN ON asures in the case of both engines flame out, there will be relight in both engines trought both ingnitors (Relight) 1 and 2, so for this reason you must maintain electric feeding for the ignitores 2 of both engines.

LOCKED REVERSERS

- The DISPATCH is allowed with 1 or 2 reversers inop in the closed position and, it is not allowed the landing or the takeoff in contaminated runways, where be "Standing Water." (moderate or severe precipitation on the aerodrome with standing water the runway, being subject the hidroplaning).
- There is no restriction for dry runways, being just recommended the use of maximum thrust for takeoff in short runways (below 1600m/6000ft).
- For wet runways (light rain or any strong rain in the last 10 minutes; being recommended last 20 minutes in runways without good drainage) restriction doesn't exist for landing, only for takeoff where an increase of 33% in the of acceleration and stop distance is required. It is recommended the use of Flap15 and TOGA.

PILOT INCAPACITATION PROCEDURE (RECOGNITION OF THE SITUATION)

During any flight phase, trought the "Call Outs":

If for three times there was not answer assumes the commands.

INMEDIATLY AND IN THAT ORDER

- AP. ON
- FLY the airplane, adhere to SOP’s
- Declare and emergency, call ATC
- Call stewardess, to request doctor and pilot on board.
- Call Company, inform situation and if the F/O is flying, request the mover for aircraft towing after landing.

PROFILES

CIRCLE TO LAND

NORMAL:

1- When reaching MDA:
- 30/40 degrees to the left/right with the RUNWAY hdg.
- Flaps already in 25 degrees.
- LDG already DOWN.
- Vref + 5kt. (check the speed for circulating in the IAL).
- Outband 1min and after that maintain
- Wind Leg .

2- After crossing abeam threshold of the intended landing runway:
- Chronometer: 15 seg. and after
- Turn to Base Leg

3- In the curve to final with "visual glide path" :
- Flaps 42 degrees.
- Speed = Vref 42 + 5 + w/c.
- Final check list.

ONE ENGINE:

1- When reaching MDA
- 30/40 degrees to the left/right with the RUNWAY hdg.
- Flaps already in 8 degrees.
- LDG already DOWN.
- Vref + 5kt. (check the speed for circulating in the IAL).
- Outband 45 sec and after that maintain
- Wind Leg .

2- After crossing abeam threshold of the intended landing runway:
- Chronometer 15 seg. and after
- Turn to Base Leg

3- In the curve base for to final with "visual glide path" :
- Flaps 25 degrees.
- Speed = Vref 25 + 5kt + w/c.
- Final check list.

VISUAL CIRCUIT FOR LANDING:

NORMAL

1- Entering in the WIND LEG:
- Altitude 1500ft AGL
- Speed = Green Dot + 20kt

2- In the medium point of the length of the landing RWY:
- Flaps 8

- Speed = Green Dot. 10kt.

3- After crossing abeam threshold of the intended landing runway:
- LDG DOWN
- Time = 35seg. (1sec per. /kt of the wind component) and after:
- Flaps 25 degrees turning to
- Base Leg.

To 800':
4- To begin final interception
- Flaps 42
- Speed = Vref 42 + 5 + w/c.
- Final checklist

- To 500' at least to be stabilized in the final approach.

ONE ENGINE

1- Entering in the WIND LEG:
- Altitude 1500FT AGL
- Speed = Green Dot + 20kt

2- In the medium point of the length of the track:
- Flaps 8
- Speed = Green Dot .10kt.

3- After crossing abeam threshold of the intended landing runway
- LDG Down
- Time = 35seg. (1seg. /kt of the wind component) and after:
- Flaps 25 degrees.
- Speed = Vref 25 + 5 + w/c.
- Final checklist
- Turn to Base Leg.

In the final
500ft AGL to be stabilized in the final approach.

VISUAL CIRCUIT FOR LANDING WITH 0 FLAP:

1- Entering in the WIND LEG:
- Altitude 1500ft AGL
- Speed = Green Dot + 20kt

2- After crossing abeam threshold of the intended landing runway:
- Time = 1min and 30seg. (1seg. /kt of the wind component and após:.
- Tur to Base Leg.
- Maintain 1500' AGL
- Speed, maintain Green Dot + 20 kt.

3- In the TURN to final with "visual glide path" :
- LDG DOWN.

- Speed = Vref 0 + 5kt + w/c.
- If necessary use Speed Brake
- "Final check list."

In final:
1000ft AGL to be stabilized in the final approach.

ENGINE START
AVOIDING A HOT START.

Wait for 4% of N1 to open the "Fuel." levers
NOTE:
With weak pressure, 4% of N1 and 20% of N2 is normal.
With normal pressure, 4% of N1 and 22,2% of N2 are normal.

Warning of "AFCAS MAINTENENCE REQUIRED" in MFDU after landing.

Press the brake pedals makes the warning will disappear.

Technique for liberation the brake pedals smoothly, in a Takeoff "From the Brakes."

When aligned and ready:
- Press the brake pedals until its limit.
- Liberate smoothly until feeling like the pedals jumps
- Work "TOGA Triggers."
- Observe the aircraft stays immobile.
- If negative presses smoothly until stopping its movement. (This happens in some aircrafts).
- Check thrust and liberate the pedals.

Technique to Avoid that the NAV/PROF mode (in some aircrafts) DESENGAGE after takeoff.

Avoid to stabilize EPR above 1,4, when selecting the "TOGA Triggers" FOR TAKE OFF

TAKE OFF BRIEFING:
(Standard)

Silence in the cockpit except standard calls.
Bertween cero and 80 kts I reject the tade off for MC, MW or any abnormal condition (such as blown tires, windows cracked, doors open etc),

Between 80kt and V1, I will stop just for MASTER WARNING or flight controls problems or big damage.
(MW that appears in this phase are:
ENG FIRE – ENG OVHT – ENG FAILURE – APU FIRE – CARGO FIRE AND TAKEOFF CONFIGURATION)

I can say STOP or GO

If "STOP", I will apply full brakes and emergency maximum reverse and under 60kts you will inform ATC.

With the aircraft stopped, I will take over the communications, and at my command, we will perform the MFDS items.

If we have an Eng Fire, I set the parking brakes onto the runway, make the MFDS Action, if the Fire continuos, we initiate and advise de Cabin Crew to Evacuate.

If GO, no actions until 400ft AGL, except landing gear up, cancel the audio warning and identification of the malfunction (SEI ON).[we aware of LFTD unsafe and LDG override switch if necessary]

Attn 400ft MFDS Actions for: ENGINE FIRE, SEVERE DAMAGE, ENGINE OVERHEAT OR REVERSE UNLOCKED
.
For any other malfunctions, actions above 1000ft AGL, clean configuration.

Actions to return or to alternate
EO procedure reviewed.

PRIMARY FLIGHT DISPLAY (PFD)

ATTITUDE / HEADING:

ROLL SCALE Marks: 0 in the triangle, 10, 20, 30, 45and 60.

Note:

- If the inclination crosses 65 degrees, the information disappears in PFD, except for the "attitude" information, speed, Mach, altitude and vertical speed.
- The information reappears when inclination is smaller than 47,5

ROLL POINTER..

SLIP INDICATOR.

AIRCRAFT SYMBOL.

CENTER AIRCRAFT SYMBOL (Bore Sight). (AOM. 7.08.01)

PITCH SCALE:

- The SCALE displays from +90 to -90 degrees with reference of 10, 20 and 30.
- If the "pitch" angle passes +30 or -25, the information disappears in PFD, except for the "attitude" information, speed, Mach, altitude and "vertical speed."
- The information reappears when the "pitch" angle is smaller than +22,5 and -15

UNUSUAL ATTITUDE CHEVRONS:(red):

- Indicates the command direction, to return to “0” pitch.
- Appears in case of excessive pitch angle

FLIGHT DIRECTOR: (magenta)

- Displays the "pitch command and roll command bar."
- Note: in the “Roll-out", the pitch bar is removed and the the roll bar supplies the orientation for "Roll-out."

FLIGHT PATH VECTOR - (green):

- It shows the current "drift angle" and roll angle for the current "fligth path" regarding the "aircraft symbol."

FLIGHT PATH TARGET. (blue)

- Displays the descent angle selected in the EFIS control PANEL.

FMS MESSAGE DISPLAY.

- These menssagens are only shown when the "PROF" mode is engaged:
- ALT CHG. it will Be automatically initiate the altitude change.
- ADD DRAG. the descent speed is very high to follow the profile or the aircraft is above the profile calculated by "FMS."
- LESS DRAG. Current Speed is very low ("speed brake" out maybe).
- DECEL. the current speed is in disagreement with the descent angle or ideal descent.

FLAGS IN AMBER IN PFD:

- ATT. Attitude Information is not available and it was removed.
- DCP. EFIS. control panel fault
- FD. Command bars are not available.
- FPV. FPV is not available. The symbols of FPV and FPT are removed.
- HDG. Information is not available. The HDG marks and the "Bug" is removed (blue).
- SPD. Information is not available. Removed all SPEED information. Except "Aispeed Pointer."
- SPD SEL. Information of selected speed is not available.
- SPD LIM. Speed limit Information is not available.

AIRSPEED SCALE:

- Graduate in 10kt to 10kt, with numbers each 20kt and the whole display scale has the length of 80kt.
- Speeds below 30kt are not displayed
- AIRSPEED POINTER (yellow). it Indicates the speed.
- AIRSPEED AIR TREND (magenta). it Indicates the speed trend inside of 10 seconds. Its usually follow when you have the ATS system inop, manual thrust.
- Vfr DISPLAY - " F " (green). it Indicates the Flaps retraction speed.
- V2 DISPLAY. " 2 " (blue). it Indicates safety's speed in a takeoff as adjusted in FMS or FMP.
- V1 DISPLAY. "1 " (blue). it Indicates safety's speed in a takeoff as adjusted in FMS.
- VMA DISPLAY. TOP of Vertical amber bar. Appears 3 seconds after the "lift off."
- Vss DISPLAY. CHECKER BAR (red and black)
  Indicates the “STICK SHAKER” Speed, VMO / MMO, VLE or VFE depends on the aircraft configuration. Appears 3 seconds after "lift off."
- V1 / V2 OFF SCALE DISPLAY
  Numbers + V1 OR V2 (blue):
  - It is DISPLAYED when above and out of the speed scale

  Dashes + V1 OR V2 (blue):
  - Check the V2 selection

  Dashes + V1 OR V2 (amber):
  - The information V2 is not available.
- GREEN DOT SPEED (green):
  - Max climb angle speed, Vfto speed, "Drift down." speed
- VSEL DISPLAY
  Bug (blue):
  - Speed selected in FMP or FMS "target speed" when "PROF" mode is active

  Note: When the Bug is out of the "airspeed scale" the Bug is parked in the end of the scale and the value is displayed with a number
- MACH / DISTANCE DISPLAY
  M Numbers (white):
  Shows the MACH number when above M 0.45.

TERRAIN AVOIDANCE MANUVER

- "TERRAIN, TERRAIN, PULL UP, PULLUP" with no visual ground references around the aircraft:

1- TOGA dvancing the leverss to GA EPR.

2- AP disengage, Pitch 20 deegres UP.

3- Wings levels unless you decide to turn because you know the sourrunding terrain

4- If the alert persists, disconnect ATS and use MAXl thrust.

5- Continue to CLIMB arise until free of the obst.

6- Stick Shaker is the limit of "pitch up" and it should be respected.

7- PM makes "callout" of the speed and altitude using RA.

NOTES:

- ♦ Alerts of short duration should be respected.
- ♦ Increment pitch if the RA is decreasing.
- ♦ Maintain "pitch 20" if the RA is increasing.
- ♦ Decrement "pitch" only in case of "STICK SHAKER" or if you get safe altitude (RA disappear from PFD).
- ♦ Be fast in the attitude. In less than 5 seconds the path should be positively reach or altered.
- ♦ Always know the land that you flies over, respect the minimum altitude and in case of doubt confirms the authorization given by ATC.
- ♦ With LDG DOWN MODE 2 is disabled.

WINDSHEAR

- The windshear detection system is accomplished by FMC that compares the acceleration of the air mass with the aceleration of the aircraft. The detection system is available in landing and takeoff below 1500ft AGL. There is no detection in case of engine out.

- A Windshear that results in perfomance increase will alert by WINDSHEAR CAUTION and it will just be presented in the approach. A Windshear that results in a performance degradation will alert by WINDSHEAR WARNING and it will already be able to be presented in the approach and takeoff.

- The orientation to leave a Windshear is supplied by AFCAS, and it can be made following the FD or with AP engaged.

- The Windshear MODE selection by AFCAS is automatic or selected by the TOGA triggers switch, after “decreasing windshear" detection during a takeoff or landing.

- During an "increasing Windshear", AFCAS doesn't supply the orientation maneuver, selecting TOGA it will just be supplied a normal GOA AOUND in this CONDITION.

- AFCAS reverts for normal TO or GA "mode" when the windshear alert disappears and the aircraft is above 1500 ft AGL or when any other AFCAS MODE is selected above 400 ft AGL

♦ FD supplies evasive maneuver and the commandas bars pop out automatically even if the FD was “OFF" or in FPV. It is displayed after TOGA or with the application of MAX thrust on the approach and automatically in takeoff.

♦ AP can stay coupled.

♦ VMA is removed

♦ Speed Brake retracts.

♦ Alpha Mode is disabled, as well as Stick Pusher.

♦ ATS automatically applies MAX thrust and the alerts of excessive TGT, N1, N2, are inhibited, until the aircraft leaves the windshear condition.

♦ The windshear recovery also displays the AMI at PFD, that indicates the STICK SHAKER activation angle.

♦ It can be reduced the thrust as soon as for GA the aircraft to reach 2000 ft of ascent reason.

♦ To proceed with the maximum of fidelity the orientations of FD, because it is the largest chance of escaping the situation.

♦ To move in the train / flap just when getting a substantial ascent reason.

WINDSHEAR CAUTION

INDICATION: ONLY in Approach
PFD: WINDSHEAR ÂMBAR

Be prepared for a possible alert of "WINDSHEAR WARNING"

WINDSHEAR WARNING

INDICATION
PFD: WINDSHEAR RED
AURAL ALERT “WINDSHEAR” (3X)

♦ During the takeoff:
- Apply MAX thrust,
- Follow the FD and keep takeoff configuration.

♦ During an approach:
- TOGA triggers (VERIFY IF GA THRUST WAS APPLIED).
- Follow the FD the LDG and Flap UP when a substantial positive "Climb" have been reached.

NOTES:

1- ATS automatically selects total thrust except during a takeoff when its declutched.

2- If ATS is inoperative selects MAX thrust manually and reduce for GA after 1500 ft AGL.

3- During a recover maneuver below 150 ft and with coupled AP Stick Shaker can happen momentarily as well as FD exceed AMI (Alpha Margin Indicator).

FLIGHT WITH UNRELIABLE AIRSPEED. 7.09.01

1- Verified the Pitot heats are ON.

2- Request the table that is in FLIGHT TECHNIQUES in case of speed indicators loss

3- Not confuse the talbe with the F70.

4- Try to make a final ILS with a rate of escent about 800ft in landing configuration, reminding that high rate corresponds to high-speed and vice-versa.

5- In final you may engange AP ON / ATS OFF.

- ♦ Descent in "Idle" with 250kt = pitch .2 and rate about 1600ft
- ♦ Green dot + 20 in level flight, stablish in the approach, pitch 5,5 and N1 = 57%.
- ♦ Green dot – 10, with Flap 8 in level flight in the approach = pitch 6 and N1 = 58%.
- ♦ In the final approach path, Flap 25, VAPP, pitch 3 and N1 = 55%.
- ♦ In the final approach path, Flap 42, VAPP, pitch. 3 and N1 = 66%.

- Message “COMPARE SPEED” MAY BE DISPLAYED.