

gat's notes

Mostly Stolen from various sources

? if it's got a question mark, I haven't looked it up or I'm not sure
 → Techniques or notes I haven't found in book
 Obviously the real book is the best place to look
 Work in progress

Aircraft General

36' 2" between main gear
 25' a/c nose to nose gear
 153' turn with body gear steering
 170' turn w/o body gear steering

Rotation
 → 10.5 Nose Up = 24" tail clearance
 → 12.3 Nose Up = tail strike

Ch. 21 Air conditioning and Pressurization

Cabin pressurization

- 8.5 psi normal
- 9.4 psi nor max
- 9.25psi overpressure
- 9.7psi PRESS REL overpressure, 2 sensors with tell tale doors
- .11psi max neg pressure (-220')
- 10,000' intermittent aural warning horn
- 10,100' altitude limit feature
- 14,000' pacs O2 drop and lights come on
- packs off takeoff <=2000' above field 44°C or less
- If you loose #1 Bus, go manual for cabin pressurization
- Automatically controlled & protected if in auto, man-l, man-r



Maximum cabin altitude override

- armed when cabin exceeds 10,000'
- signals outflow valves closed to maintain 10,250' to 14,000'
- disables automatic controller

MAN deactivates the maximum differential pressure limiter, rate limit control, and maximum cabin override protective features

Differential Pressure Limiter

Limits diff. To 8.5

Rate Limit Feature **Rate Fail**

- Automatic control removed, and rate limiter sys is in control
- Takes control
- 3100 fpm climb
- 2000 fmp descent
- removes a/c pwr from outflow valves
- closes d/c valves till rate of change is 0 within 1500' of cabin alt. When activated
- deactivated above 10,000' cabin and when placed in Manual
- Power interruptions of over 15 seconds can activate when power is restored
- sensitive to electronic interference

Rate control Knob

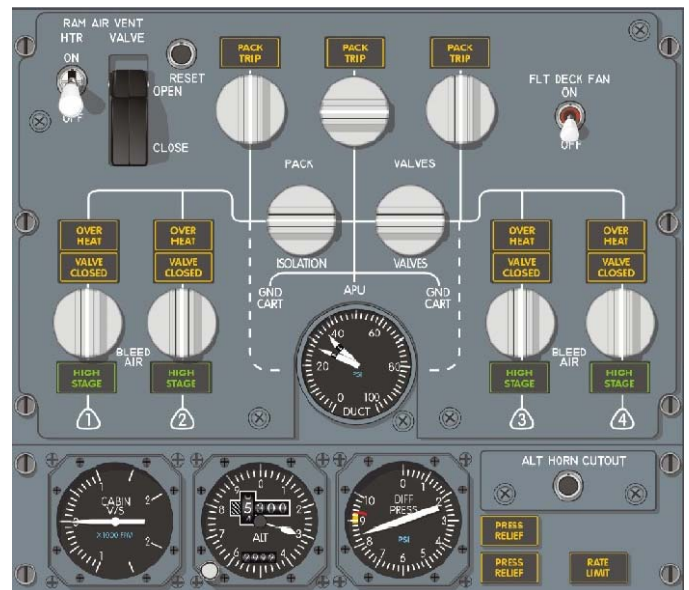
Approx 50 to 2000 fpm Index @
 → Climb 500 fpm (150 to 2500)
 → Descent 300 fpm (85 to 1500)

Pressure relief above left wing root
 → 2 @ 9.25 psi (use same static source)
 → 2 @ 9.75 psi (separate sources)
 → tattle tail doors show on outside

- each valve shows **PRESS RELIEF** light
 - on 3 pack a/c # 2 trips
- ### NEGATIVE PRESSURE RELIEF VALVES
- 2 each on cargo doors (6 total)
 - open mechanically
 - neg .11 psi
 - open mechanically when doors are opened

Air Conditioning

- zone 1 cockpit
- upper deck zone
- zone 2 & 3 upper deck
- Zone temp control
 - Automatically limited to 2C to 57C,
 - Zone and upper deck overheat 85C, can reset below 71C
 - Automatically drives trim valve to full cool with overheat
 - All in manual all packs go to 2C Manually keep between 2 and 57 C
 - Zone temp with the coolest requirement will control pack ACM output temp(trim for that zone is full cold)



pack valves

- electronically controlled, pneumatically operated
- electrical power required to keep closed
- 12 psi to open (no light if it goes back below 12)?
- One in auto controls all packs
- Doors should automatically reposition for flight/ground
- Electrical power required to close

Condition	Bypass valve	Inlet	Outlet	
Ground	□	\	\	mid cool cool
Auto flight	/	\	□	TP tree
Out seq	\	/	/	Cool, heat, heat
Warm	1	2	3	(swing right, warm)
Cool	3	2	1	(Swing left, cool)

→

	Cool	Heat
Bypass valve	Closed	Open
Inlet door	Open	Closed
Exit door	Open	Closed

PACK TRIP

- Compressor discharge $\geq 218C$
 - Turn warmer
- ACM outlet $\geq 85C$
 - Turn cooler
- Pressure relief open => # 2 pack trips (3 pack a/c)
- Out of sequence
 - BV $\geq 70\%$ cool & Doors $\geq 60\%$ heat

AFT and FWD cargo heat



Cargo heat 18-29C, overheat at 43C

- Cycles normally
- Override valve
 - Controlled by NORMAL/OFF switch and thermal switch
 - Increasing thru 43C closes valve and turns on **OVER HEAT**
 - **OVER HEAT** Normal to illuminate on ground and remain on thru climb
- Control valve
 - Decr 18C open control valve
 - Inc 29C close
- TEST - opens both override and control
- Can't have overheat and on light on at same time

Main Equipment Center sys

- Flight deck, Norm and alt blower (all on on grnd)
- Alt shut off in flight

Smoke Mode

- activated by
 - separate airflow detectors or
 - Common smoke detector
 - valve control switch selected to smoke
- Flight deck dump valve opens
- Only flight deck blower stops (in flight only)
- Flow control valve opens
 - Normally operates by cabin diff, 0 open 2.5 psi clsd
 - Opens automatically for smoke or loss of airflow
 - Closes in ditch
- Cargo heat valve closes
- 537 goes to smoke mode with activation of cargo fire???
- Ram Air valve and heater
-

Ch. 22 Autoflight

Autopilots for autoland

- 1st autopilot
- **A/P** warning light flashes amber until
- 2nd autopilot – DUAL arm in FMA
- glideslope caputer and approx 1000' **DUAL** & FLARE arm
- 53' on radar alt **FLARE**

Back Beam

Flight director mode only, use manual flight controls or autopilot in MAN/CWS

Without back beam switch turn flight director off and use HSI Autothrottles

At 80 knots **THR HLD** and throttles will not adjust FFRATS provides

- • Minimum airspeed protection (ALPHA).
- • Flap placard protection (FLAP LIM).
- • Engine over-boost protection.

Ch. 23 Communications

Ch. 24 Electrical (not checked yet)

4 engine driven AC gens w/ load cap of 54 KW

Step-down transformers reduce 115v AC to 28v AC

Transformer rectifiers supply 28v DC

28v battery

Static inverter converts 28v DC to 115v AC for critical flight items when ESS AC not available

3 light trip = bus tie, (8-10 sec) gen field, gen breaker; BTB might auto reset (bus fault)

2 light trip = gen field and BTB

CB's one reset after 2 minutes FHB 3.09.08

- Green ground mx
- Yellow EP's
- Red bad

Power off on gen panel – **GEN OPEN** and **CSD PRESS** lights

Check tr's together then batt's

Fire detect – batt bus

BUS TIE RELAY CONTROL SWITCH

- CLOSE – connects AC bus to the sync bus
- TRIP – disconnects AC bus from sync bus for isolated gen or bus ops

BUS TIE OPEN LIGHT

- BTR connects assoc. gen and AC bus to sync bus
- Indicates bus tie relay is tripped and associated AC bus is isolated from the sync bus
- Trips automatically if:
 - Sync bus fault
 - AC bus fault

- Over/under voltage (excitation) faults
- Diff in phase current or gen load

MAIN GEN RELAY CONTROL SWITCH

- CLOSE – connects gen to its AC bus
- Must sense dead bus or autoparallel conditions
- First MGR switch closed trips the APU, AGR and field relar or ext pwr relay
- TRIP – disconnects gen from its AC bus

GEN OPEN MAIN GEN RELAY LIGHT “generator breaker”

- MGR connects gen to respective AC bus
- Indicates that MGR is tripped and gen is discon from the AC bus
- Reset if GCU senses gen on speed w/volt normal and either autoparallel or dead bus conditions
- Will trip automatically if:
 - Field relay is tripped
 - CSD is underspeed
 - CSD disconnect switch actuated

GEN FIELD RELAY CONTROL SWITCH

- CLOSE – resets tripped gen field relay to restore gen output
- TRIP – opens gen field relay to disable gen output
- Does not disable PMG

All gen control units are also powered directly by resp PMG as an alternate power source.

All relays require power to trip and close

FIELD OFF GEN FIELD RELAY LIGHT

- GFR turns a gen on and off electrically by controlling the excitation current from GCU
- Indicates that gen field relay is tripped and gen output zero
- PMG voltage not affected
- Field relay trips automatically if:
 - Over/under voltage (excitation)
 - Open phase fault
 - AC bus fault
 - Gen over freq
 - Engine fire switch pulled
 - Gen feeder fault

GEN BRG FAILURE LIGHT

Indicates vertical movement of gen main bearing

Go to checklist and decouple

OPEN SPLIT SYS BREAKER LIGHT

- Indicates that sync bus is split
- Auto split if:

- Sync bus fault
 - Both EXT PWR relay switches closed
- SPLIT SYSTEM BREAKER CONTROL SWITCH
- CLOSE – connects both halves of sync bus to parallel ops, Dead bus or autoparallel conditions required
 - TRIP – isolates

EXT PWR receptacles

Right side aft of nose wheel

- 1 is aft, 2 is forward
- lights, normal on-off-on-on outside – pwr avail, inside pwr in use
- Main deck cargo handling bus is powered from EXT PWR 2 (or APU gen 2) **only**
- Loose if close #2 APU gen to main bus
- Lower cargo handling busses are powered from EXT PWR 1 (or APU gen 2) **only**.

EXT PWR 1 SWITCH

- OFF – ext pwr 1 on grnd handling busses only
- GRD SERV – ground handling (lower cargo handling) and ground service busses powered
- CLOSE – External pwr 1 is connected to sync bus. If split breaker and all bus ties are closed, and ess pwr switch is in normal, the entire elec sys will be powered

EXT PWR 2 SWITCH

- OFF – ext pwr 2 will be on main deck cargo handling bus only
 - CLOSE
 - Ext pwr 2 is disconnected from main deck cargo hand bus and connected to sync bus
 - Split sys breaker will trip if ext pwr 1 is also on sync bus
- AC CONN EXT PWR CONNECTED LIGHT (white)
- BCU senses correct voltage and freq
 - Ext pwr connected to airplane
 - Ground handling busses (lower cargo handling) will be powered by ext pwr 1 only

PWR ON BUS EXTERNAL POWER ON BUS LIGHT

- Light powered by BCU
- Ext pwr breaker closed
- power on sync bus

CSD OIL light

- Press or temp bad

CSD OIL TEMP INDICATOR AND SEL SWITCH

- Normally between 70C-80C
- NORMAL- CSD oil outlet temp, max 145C
- HELD IN – difference between outlet and inlet oil temp
- Normally 8-10C limit is 20C

CSD DISCONNECT CONTROL SWITCH

- Disconnects the CSD from the engine drive
- Requires mechanical reset at the CSD to reconnect
- Engine must be at idle or above
- Press and monitor CSD, verify RPM < 5000, PMG <=25v, CSD Oil temp will spike

SPLIT SYSTEM BREAKER (SSB)

- Opens automatically if both EXT PWR switches are closed
- Sync bus fault occurs

With single EXT PWR BCU allows the SSB to close if it senses that the other half has no power

- Open after engine start and must be manually closed if
 - Autoparallel conditions are proper or
 - One half the sync bus is unpowered

CB's for panel lighting are under ash trays, aft pedestal (VHF control heads) and under F/E table

APU Power

Two AC gen

Ground handling bus powered on

Rated at 90 KVA due to greater cooling supply

Paralleling is prevented by SSB fault lights on APU gen fault annun pan

AC METERS

Normally voltage and freq

When gen test switch is held

- Voltmeter is PMG (permanent magnet generator) voltage
- PMG 85 +/-10v
- Freq. is CSD RPM - Zero for EXT pwr and APU
- Normal RPM 8000
-
-



GENERATORS



Four 54 KW (60 KVA) generators

8000 RPM's through CSD

identical to APU gen's

PMG (control power) and three phase electro-magnetic gen

Cooled by engine fan air

Voltage problem

- Bust tie relay
- Field and main gen relays trips
- Bus tie relay auto recloses to protect AC bus
- If ac bus short all relays will trip and remain open

CONSTANT SPEED DRIVE

CSD Oil Temp normally 70 to 80 deg C

Normal increase is 10 deg C

MAIN AND APU GEN FAULT ANNUN LIGHTS

On only when READ switch is pressed after a fault has occurred

ESSENTIAL AC BUS



Essential bus

light on forward panel and engineers

Cockpit **get's dark** (main panel background incandescent still work)

- Fire detection
- Standby A/C (will be take over by standby inverter with loss ESS)
- Flap controls
- Alt land gear

→ Press auto controller

→ Cockpit lighting

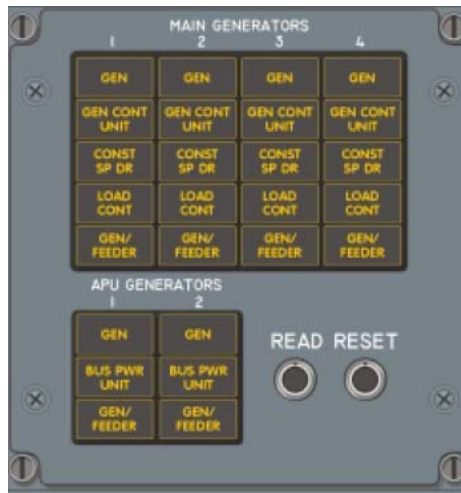
Loss noted by #1 INS Batt light

Normally powered from AC bus 4

Directly from gen 1,2,3

Used in order 3,1,2 to save F/O instruments

In other than 4 trips DC isolation relay to split bus



DC BUSSES 1,2,3 ESS

CB's on P12

Powered through 75 amp TR

Voltage indication means TR is supplying power

Zero amps would indicate inop TR

Voltage reading is taken at bus, if paralleled, won't see inop TR
Isolate to read individual TR's



DC ISOLATION CONTROL SWITCHES

Isolates when open

To prevent overloading of ESS TR, the no 3 DC isolation relay opens when ESS ac is selected to an operating gen, isolates 1,2 from 3 and ESS

BATT BUS

Normally powered by ESS DC BUS

Main battery provides secondary source of power for BATT BUS with loss ESS DC and BATT SWITCH on

HOT BATT BUS

Contains emergency circuits and powered directly from battery regardless of battery switch position

STANDBY BUSSES

Normally by ESS AC/DC

If no ESS AC, ESS DC powers standby AC through static inverter when standby power switch in normal or manual on

If no ESS DC, main batt powers standby DC bus directly and standby AC through static inverter when standby power switch in normal or manual on

APU

GEN – over/under voltage trip of APU gen

BUS POWER UNIT – over/under excitation of APU gen or a fault bus control unit

GEN/FEEDER – short in the APU gen, feeder lines or **sync bus**

GROUND HANDLING BUS

→ Powered on ground only ?

→ AC powered #4 hyd

→ Lower cargo

→ Refueling valves

MAIN DECK CARGO HANDLING

→ APU #2 Gen PWR or EXT PWR

→ Doors

→ Lights

→ PDU's (power drive units)

GROUND SERVICE

→ Cabin lights

→ APU boost pump, batt charger, ...

→ Fuel gages

→ Hydraulic servicing (gage)

Twins don't play well together

→ EXT PWR 1 & APU 1

→ EXT PWR 2 & APU 2

→ EXT has priority

Ch 26 Fire protection

Master fire warning lights

→ Push to extinguish lights, silence bell and reset warning circuits

→ Engine nacelles w/bell

→ Main landing gear wheel wells

→ APU w/bell

→ Main deck cargo area

→ Lower for/aft cargo

Electrically operated squibs fire explosive charges to rupture a diaphragm

Engine and APU fire warnings have bells

Testing squibs test integrity of circuit

DC POWER



DC PWR

→ 25 – 32v Battery and TR

→ 25 – 36v APU batt

→ 28 +/-2v TR

→ 22-24v cold battery

→ 22v no TR / battery only

→ max TR loads

• 75 amps continuous

• 93 amps 30 min

• 113 amps 5 min

Primary from 115v AC through Transformer rectifier (TR) units

Four TR's 1,2,3, and essential

Fifth to ground handling bus from APU or EXT 1

Essential DC bus is primary source to battery bus

When ESS DC not powered, BATT bus automatically transfers to hot

BATT bus is battery switch is on

Battery normally connected to the main charger and hot battery bus

Battery charger is powered by service bus

Gages – read individual amps, but volts off bus

When all AC busses powered, associated TR units power DC busses

→ DC power from main battery and four TR's to main DC CB panel on aft P6, then to four DC busses on P12

Batteries

Main and APU batteries are identical

Main batt and charger on cockpit floor, outboard of F/E station

APU batt in tail and charger in rack above L5 door

28v 36 ampere-hour nickel cadmium

Thermal switch disconnects charger if batt overheats

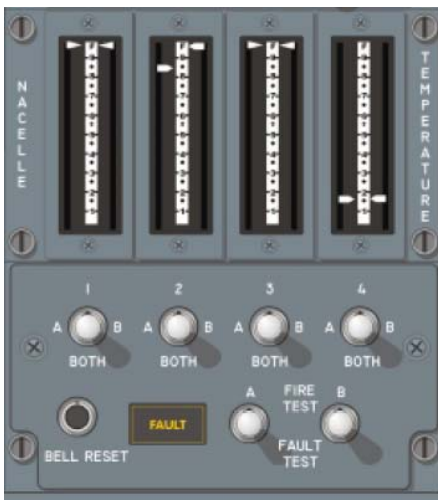
Main batt is not connected to batt bus unless ESS DC is unpowered

Battery charging is indicated by a negative indication on the ammeter

With batt switch on both batteries are available for starting APU

→ main – operating the fuel valve and DC fuel pump

APU batt has electric heater blanket and thermostatic control to keep above freezing



Engine

Engine fire detect

- Both a and b loops must detect a fire
- One loop failure lights fault light
- Simultaneous fault and fire condition lights both fault and fire indicators

Graviner fire detection

- Fire condition can be indicated as a fault
- Fault indications on both loops must be treated as fire
- If dispatching with one loop, fault must be treated as fire

Engine fire switches

- Arms fire extinguisher
- Closes fuel shutoff valve
- Depressurizes EDP and shuts off hyd fluid supply
- Trips gen field after a time delay
- Closes bleed air valve

Two fire extinguishers per wing between the engines

- Red indicators on right side of each inboard strut for thermal discharge

Nacelle temp indicators

- 0-4 normal
- 4-8 overheat
- 8-10 fire
- bottom indicates open circuit
- top indicates short circuit

Nacelle tests

- FIRE switch light
- Fire warning bell
- Nacelle temp 8-10 range

FAULT

- FAULT LIGHTS
- Nacelle temp 8-10

With a detector open there will be no response to either FIRE TEST or the FAULT TESTS

APU fire warning

- "Or" system indicates fire with either loop
- Causes APU to shut down auto except during fire test
- APU red thermal blowout disk on lower left near tail
- Control panel in wheel well



Lower cargo fire detection are smoke detectors

- Two in the forward ceiling
- Four in the aft ceiling
- Lower cargo detector test switch Simulates a fire condition



Main cargo deck

- Both a and b required for fire warning
- Test a and b together simulates a fire condition for all detectors

DETECTOR LIGHTS

- First loop to detect smoke illuminates detector light, second activates fire,

Illumination of one detector without subsequent fire indication indicates malfunction, go to single loop mode

Main cargo deck

- Dual loop smoke detector along left side of a/c
- Both loops must indicate a smoke condition in dual loop mode, first detector to sense smoke illuminates its amber detector light

Lower cargo extinguishers **506 537**

One large bottle and one small bottle

Ground Safety relay

Ground position when one left gear truck and one right gear truck are in the not tilted position by either pri or alt control circuit

- If Failed – don't arm speedbrakes till gear down, will get full gnd spoilers??

Controls

- Opens all pack cooling air inlet and exit doors
- Allows equip cooling alternate blower operation if switch is selected to normal
- Opens cabin pressure outflow valves
- Turns on GRD SAF RELAY ON light
- Energizes circuits to runway turnoff lights
- Allows horn to sound for equipment cooling blower failure
- Opens APU door fully if APU master switch is on
- Reduces the voltage to the nav and beacon lights
- Enables test function of yaw dampers
- Allows cockpit voice recorder erasure when parking brake set
- Allows horn to sound for ground crew call
- Enables the ground handling buss relays
- Reduces voltage of drain mast heaters 115v AC to 28v DC
- Enables the APU fire warning horn circuit
- Unlocks flight detent of speed brake levers
- Allows flight recorder to be turned off
- Disables crossfeed manifold low pressure warning
- Signals wing anti ice valves to close
- Deactivates TAT probe heaters
- Enables body gear steering
- Enables thrust reverser sequence mechanism operation

Stall Warning

Airflow sensor, computer, stall-warning panel, stick shaker
0-flap stick shaker operates after minor initial buffet, well in advance of a stall

All other flap settings, prior to initial buffet

Vane on left side of nose

Left inboard flap

Power off light

- Indicates vane heater fail

- Sys power fail
- Vane sensor fail
- On w/ AUX power
- Goes out when gen power bus

Stall Warning switch

TEST

- Bypasses air/ground relay
- Spinner - Checks AOA vane and flap pos. trans. Circuits
- Valid is stick shaker, rotating ind., power off light out

NORM

- Power for stall warning computer and vane heater using gen pwr

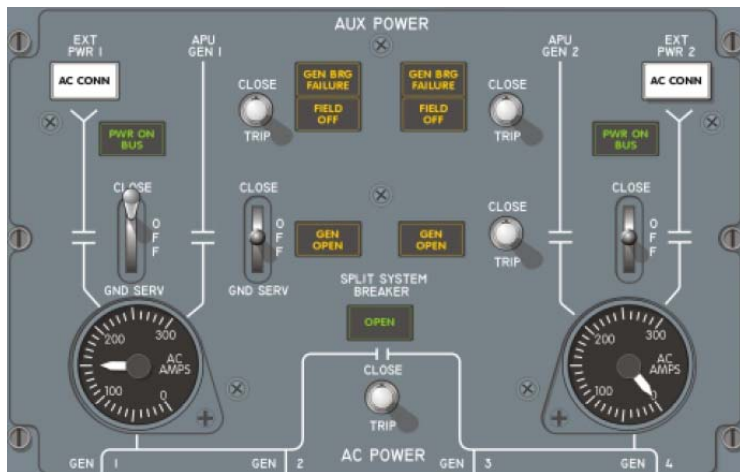
HTR OFF

- Turns off vane heater when on gen pwr

AOA VANE HEATER

- Deactivated when APU or ext. pwr is in use

Auxiliary Power Unit



New Note about restarting APU w/in 1 hour of shutdown, start and shut down immed. And restart in 5 minutes 2.04.11

Constant speed engine that provides pwr and bleed air during grnd ops
Single spool jet engine, two AC gens, bleed air supply valve, elec turbine control unit

Fan driven by APU accessory drives cools gen and oil cooler

APU inlet door on right side of tail

APU battery and firebottle ahead of firewall

Fire bottle blow out disk on lower left side in front of clamshell

Surge bleed valve

Dumps excess air overboard

Cooling air shutoff valve

Delta P (pressure) switch across ice screen

Anti ice

- Bleed air switch on
- +4C to -7C
- will get EGT rise when bleed turned on and no load

Hot batt bus for fire and shutdown

Uses both batteries for start

"OR" fire system

- pull battery charging CB if power on a/c to test main batt

4 qt. Oil in tanke, drops one on start

oil cooler in air stream

bleed valve 45psi, closed at 47psi

normally 550C w/2 packs and 2 gens

375-450C w/gen only

EGT pulses 2 ½ sec, up right harness bad

APU gen bearing light – can run for 15 hours

pre flight panel

Safe check

Check both batteries

Fire switch in, bottle discharge out, squib test ok,

A&B test

- APU fire light and bell
- APU fire light on Upper panel
- 2 X master fire lights
- light and horn in wheel well

A&B to fault test

#2 fuel press light out if AC available

2 ½ qts oil to start, 1 for eng start only

see APU master control switch for start sequence

Manual shutdown

<400C

STOP

No APU fault light if

- Main batt switch off
- Fire signal detected

Auxiliary Power Unit Panel

APU INDICATOR LIGHT PANEL

FUEL VALVE (blue)

- Light on, APU fuel valve in transit
- Light off, fuel valve full open or close

DC DUMP ON (green)

- Light on, APU DC fuel pump operating (#2 main tank)

APU FAULT LIGHT (amber) Light ON --

- w/APU master switch on, auto shutdown has occurred,
- W/ APU master switch to stop, light will be on till shutdown is complete

APU DOOR (blue) Light ON --

- w/APU master sw on, door is in **transit** to open
- W/APU master sw to stop, door is in **transit** to close

APU MASTER CONTROL SWITCH

ON

- Opens APU door (light until open)
- Opens fuel valve (momentary light)
- Operates AC or DC fuel pump

START – hold momentarily, start motor begins to crank engine

- APU batter voltage drops to 10v, 60 to 80 amps
- >7% ignition & fuel
- 15% or 20 sec with no EGT = abort start
- 50% starter deactivated (voltage increases)
- 95% ignition circuit deenergized, cooling air shutoff valve opens
- close both gen fields and check freq and volts
- close #1 gen breaker to power sync bus
- closing # 2 gen breaker will take pwr off handling bus
- check amps < 250 amps

STOP

- Simulates overspeed to shutdown RPM = 110%
- Closes **FUEL VALVE** (blue) illuminates in transit
- **APU FAULT** LIGHT (amber) should illuminate
- 50% air inlet door is signaled to close, **APU DOOR** light until door is closed
- APU FIRE SWITCH or handle in wheel well can be used as an alternate shutdown

APU BLEED AIR CONTROL SWITCH

OPEN - If APU RPM above 95%,

- Opens APU bleed valve (load valve) and APU isolation valve
- AC power available - opens the APU isolation valve

CLOSE closes --

- APU isolation valve
- APU bleed air valve

Automatic shutdown

- Low oil pressure > 10 sec
- EGT overtemp on start
- Failure to reach 50% in 90 sec ?
- High oil temp
- Engine overspeed
- APU Engine fire
- APU bleed air duct leak
- Overtemp
- Loss of pressure
- Cooling valves fail to open @ 95%
- High delta P (ice or contamination)
- Loss of inputs to ECU
- Several other types of faults
- Illuminates APU FAULT light

Pitot Static

- Pitot – top is capt/fo, bottom is aux
- Static – aux crosses from other side
- Aux static switch is actually a valve lever
- Which alt is right, use section 3 chart 3.21 and cabin alt.
- CADC failure flag in mach, stby on alt, temp? on #2???

Lights

Lighted switches – amber or white indicates system status, blue illuminates label

Lav light on continuously on ground

All lights can be dimmed except INS comparator lights and press-to-test lights

NO SMOKING, RETURN TO SEAT AND FASTEN SEAT BELT signs come on automatically if oxygen manifold is pressurized

GRND CREW CALL SWITCH

Push button sounds a horn in nose wheel well

Ground crew calls – illuminates for 30 sec and sounds

MAIN PANEL BACKGROUND

12 variable incandescent lights under glare shield
full bright turns on 4 fluorescent lights

- full counter clockwise turns penny and giles full bright
- failure of AC BUS 1, or CB – STBY LIGHTS relay illuminates 3 incandescent lights
- will not work if rheostat past detent
- pwr by BAT BUS
- Loss of ESS PWR gets dark
- Loss of generators gets bright

STORM LIGHTS

max. illumination of pilots and F/E panels
PWR from HOT BATT BUS?

Overrides

- Fluorescent backgrounds lights
- Incandescent backgrounds lights
- Cockpit dome lights

RUNWAY TURNOFF LIGHTS

2 lights on nose gear

Ground safety relay prevents use in flight

DOMELIGHTS

Can be overridden by storm light switch

Loss of AC BUS 1 - will be powered by BAT BUS

EMERGENCY LIGHTS

Battery powered, charged by ESS DC BUS

Charged continuously but can't keep up if left on

When armed comes on with loss of ESS DC BUS

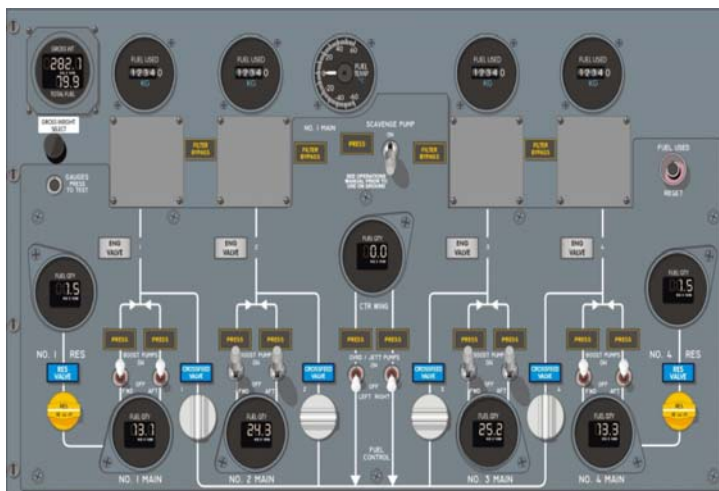
Cargo compartment doors

Potable water system

- 110 gallon

warning horns and visual warnings – FHB 6.04.07

Fuel



Takeoff

"H" configuration

Sample 4 minutes of fuel in TO configuration

- Switches on fuel panel door turn fuel panel on if fully open

Fuel temp from # 1 tank

if fuel get's within 3 deg of freeze point, make logbook entry

- change altitude and increase mach

Fuel Valves controlled by

- Fire switches
- Start levers
- Switch on FE panel (some a/c)

Flashing fuel **PRESS** light- crossfeeds closed and pumps off

Fuel gages

- blank screen (no kg's) gage fault, with kg's zero fuel
- fault will show -A or -b

Fuel balance between sides – 450 Kg's

Refueling controls on left wing, some aircraft have panel on FE that will override it

Operation with less than 900kgs in any main

- All x-feeds open
- Limit to 8deg pitch

Engine Valve Firewall Fuel Shutoff Valve

- Dim- clsd
- Bright – transit
- Off - open

Stand pipe fuel in mains – 3.2 K per main, 12.8 total, - 45 minutes

(found in section 3, 2 fuel boost pumps inop checklist)

Fuel pump pressure

- Jettison and center override approx twice mains
- 17 psi – mains
-



→ Jettison

- 2370 kgs/min 6 pumps

- 15604

- 760 2

- When figuring jettison times, multiply center wing fuel by 3 (because mains will also be jett at same time) and multiply by 6 eng rate in chart (contains corrections for fuel burn while jett) rest of the fuel by 4 eng rate
- When refueling, don't let them pull c/b that prevents overflowing to "get all the fuel on"
- When dumping, know what level to take each tank to, so you'll know when to stop
- Rough wag for jettison time, amt in tons to loose divided by 2 plus 1 min.

EMERGENCY EQUIPMENT

Oxygen

- 2 bottles each for crew and pacs
- green thermal discharge disc on right side fuselage
- O2 shutoff valve controls 5 crew masks

Oxygen qty gage

- White crew
- Orange Pacs

Cabin Pressure (see air conditioning)

- 10,000' cabin aural warning
- 12,500' closes outflow valves
- 14,000' flow controls open up and drop pac masks

MEEC hatch (E&E) compartment has manual shutoff/reset

Loss of crew oxygen

- Captain uses portable O2

- No interphone
- Land near suitable
- Consider descent
- Review smoke and rapid dec. procedures

Windows

- Single layer of acrylic will hold full cabin pressure
- Window heat not required for bird strike protection
- Window heat provides anti ice protection and defogging

Ditching – F/O grabs ELT

Primary exit – crew service door

Secondary exits

- Cockpit escape hatch and 8 reels above F/E panel
- Main deck L1 door escape rope
- Last resort – L5 door rope or MEEC door/ladder

PBE

- O2, smoke and heat protection
- Cabin must be pressurized to use
- Must have one on board for dispatch
- 2 seals and visual servc indicator
- 10 year life limit
- button not popped out (if it is, check for good blue humidity ind)

Life vests at each crew seat

2X 9 or 10 man rafts

2X ELT's (24 months)

First Aid Kit – contents on inside cover and FHB 10.04.06 Includes wire tie handcuffs

2X crash axes (must have both, grounding item)

- in front L1
- upper deck stub partition

L1 & L5 are only operational main deck doors



→

Hydraulics



Pressure relief **3500** psi
 Normal **3,000** psi
 ADP on **2,600** psi
 ADP OFF **2,800** psi and 10-15 sec delay
 → brake precharge **750** psi
 Quantity gage test – goes to **0**

Single source hydraulics

	1	2	3	4
gear	Inboard Nose gear & Body gear steering			Outboard Wing gear
brakes	Secondary brakes	Reserve brakes		Primary brakes Outboard TE flaps
TE Flaps spoil	Inboard TE flaps	Spoil 2,3,10,11	Spoil 1,4,9,12	
elev	L obd elev			Rt. Obd elev
A/P quan min	AP 'C' 60 gal 7.5	AP 'B' 34 gal 4.5	AP 'A' 33 gal	51 gal 7.5

Retraction of landing gear lower qty in # 4 by 2 ½ gal.
 Hydraulic fluid Cooled in respective main fuel tank
 Case drain (not under pressure)-> ovht light->cooler-> resevoir
 Resevoir located in aft fairing of each engine pylon
 All filled from left body gear wheel well
 Resevoir are pressurized to prevent pump

- LOW QTY** light -- needle at 6 o'clock on gage
- If abort start on #4, check electric pump -- ADP's aren't running yet
- ADP gets fluid from very bottom or resevoir, below standpipe -- Will work after EDP runs out of fluid (briefly)

- 105C
- System **HYD SYS PRESS** LIGHT
- 1,200 psi

- when both pumps have low output
- not affected by elec pump 4

ADP **RUN** LIGHT

- Air valve for ADP is open

RESERVOIR **LOW PRESS** lights

- Insufficient air pressure in reservoir

EDP engine driven pump

- NORMAL
- DEPR stops pump output but still cools (1 gal min) and lubricates
- SUPPLY OFF Burns up pump, limited to 5 min., and must write up

ADP air driven pump

- Back up and supplements EDP at high flow rates
- Turbine Overspeed can only be reset on ground
- AUTO kicks in at 2600 psi and off at 2800 after 10 to 15 sec
- CONTINUOUS runs all the time (opens air valve)
- OFF prevents operation

Electrically driven pump on 4

- Low flow capability primarily to provide brake pressure during towing
- Monitored on sys 4 and NORMAL BRAKE ACCUMULATOR gage
- Power from EXT PWR 1 OR APU GEN 1 only
- Magnetically held switch kicked off by sys 4 EDP or ADP or pwr change

Abnormal

2 hyd inop = do each side single first

1 or 4 inop, lower gear first

all flaps 30 limited to 160 knts

- with all flaps, go around retraction is manual, tendency to get nonexistent "split" flaps

gear may have to be dropped at 230-250 Kts

1&4 inop

- manual brakes & speed brakes
- flare capability reduced

2&3 inop

- no AP 3
- no stab trim => jammed stabilizer
- elev feel inop

ALT GEAR EXTEND hold 4-5 sec, then monitor for 45 sec for gear down ?

Pneumatics

Supplies

- cabin pressure
- wing anti-ice
- pneumatic drives for LE flaps
- air driven hyd pumps
- lower cargo heat
- main deck cargo smoke detector
- potable water tank pressurization
- supplied from engine, APU, ground air cart
- bleed manifold duct pressure sensed outboard of wing isolation valves

Start switches

- Starter valve open
- High closed (check light)
- Bleed valve open and overrides check valve

BLEED VALVES

Electrically controlled, pneumatically operated

Located in pylone (can be manually operated)

Fails open w/ loss of elec power

Pylon and start valve on one CB

Opens with starter on, closed when off, opens again when pressure greater than manifold (check valve)

High stage valve failed closed

- 1 light off, 3 on >70%

Low on, high automatic

Auto off if temp too high (no overheat lig)

5 functions

- Check valve except during ground start
- Pressure regulator approx. 45 psi, closed at 47 psi
- Temp limiting, backs up precooler

Overheat sensor downstream of bleed valve

wing isolation valves

OVERHEAT

- Malfunction in precooler
- Bleed valve failed to close automatically

Flight Controls

No trim tabs

No manual reversion

Programmed to airplane responds the same regardless of weight, cg, or speed

Position indicators

- Outboard elevators
- Upper and lower rudder
- Outboard ailerons
- Spoilers 4 and 12 (only one moves with flight spoilers)

Ailerons

Outboards locked if outboard TE flaps full up

Flaps

LE

- Normally air driven
- Alt elec

TE

- Normally hydraulic
- Alt elec

Steady warning horn if landing flaps and gear not down

LE Flaps

- 0-1 flaps = even 2 & 4

- 1-5 flaps = odd 1 & 3

- numbered outboard in

w/loss ESS AC, needles stop in position

Alternate flap switches

- LE arm and select position

- Move switches before flap lever

- arm just arms switches

- move swithes disconnects pneumatics and moves elec.

-

-

- 90sec

-

-

- TE

- arm removes hyd press and provides elec to switches

- 5.5 min

- No asy protection or load relief

Auto spoilers

AUTO SPOILERS light

- Fault in auto spoiler control or woper
- Loss of poer to circuits
- Auto spoiler motor not in agreement with spoiler lever when it is the down position

Will go to armed if

- 2 or 4 reverse lever is lifted

armed to out

- on ground
- 1 & 3 are closed
- delayed momentarily

auto retract if

- 1 or 3 advanced > 50% for go around
- or leaves ground
- may be manually overridden

Spoilers

- 1-5, 8-12 augment lateral control
- All spoilers but 6 & 7 augment lateral control
- flight spoilers 6 and 7 go full up at flight detent, rest are proportional
- on gnd, warning horn when 3 advanced and lever not down

Elevators

- Outboards controlled by opposite inboard position
- Elevator feel from hyd 2 and/or 3
- **ELEV FEEL** difference in output pressures from feel computer

Stabilizer Trim

Single jackscrew operated by ind. Hydraulic motors sys 2 & 3

With one sys inop, half rate movement

Autopilot only uses one hyd sys

Stabilizer trim cutout **switches** operate valves to cut hyd press

Rate is slower at higher speeds

BRAKE REL light when both arming and directional control valves are open

Manual trim levers

- Override all electrical functions of stab trim
- One operates arming valve, other control valve
- Electric trim switches
- On operates arming valve, other control vavle

Green band warning light

- selected band does not agree with CG(measured at nose gear)
- Flaps not in landing configuration

- On ground Green band out of center position
- Warning lights do not affect to warning horn
-

Rudder

Upper and lower independent

Upper 1 & 3

Lower 2 & 4

Rudder trim – 16 deg by trim wheel

Rudder Ratio Changers controls rudder movement as a function of airspeed, inversely

RUDDER RATIO LIGHT

- Diff. Between two units
- Loss of elc pwr to comparator
- Open or shorted circuit
- Signal failure withing comparator unit

Rudder ratio test checks warning light circuits

Yaw Damper - Two sys compensate for dutch roll

Engine

Accessories on N2 drive

- Csd and gen
- Edp
- Engine fuel pmp and fuel control
- N2 tach gen

Start levers – 2 valves, fire shutoff and fuel control

→

Landing gear



Gear down – all gear are down and locked

We use same tires for nose and mains ?

Numbered left to right and front to back on trucks

5 primary and 5 alternate sensors

down and safe if either green sensor

all 5 in either set for green on pilots light

one bad sensor, both red and green

landing gear tilt FHB 32.03.13

Gear Lever Lock

- Tilt
- Not centered
- Gnd relay

Landing Gear Numbering (Mains)

		nose		
1 2	5 6	9 10	13 14	
3 4	7 8	11 12	15 16	

GEAR

Gear in transit or doesn't agree with gear lever

Gear lever not in completely when selected down

Thrust lever retarded to idle and gear not down

1 or more indicator not indicating down

Book-Gear is unlocked or gear lever is out of down on ground

- With handle down, with light, tap lever into place

GEAR DOWN

All Gear down and locked

All 5 indicators in alt or prim?

TILT

Gear not tilted

DOOR OPEN

All gear doors not closed and locked (limited to 270 knots by checklist)

Landing gear lever

→ UP retracts all gear and applies in-flight brakes

→ OFF – removes all hydraulic pressure from system, releases in-flight brakes

Alternate gear extension switches

→ Electrically powers moter to release gear and door locks

Warning horn

→ Any throttle to idle

→ all gear not down and locked

→ IAS < 250 knts

→ Can't be silenced

- Flaps 25 to 30
- On gnd, handle out of detent

Antiskid light electrical problem

Brake tool allows for in flight brakes

Grnd safety relay light

-

Landing gear lever latch

Nose gear squat switch

Steering

Stall warning

Tat probe heaters

Brakes



When using reserve brakes hyd 2, parking brakes will not hold if

depressurized – no accumulator

Brake low pressure light (pilots)

→ Selected brake system pressure is low

→ Out with electric hyd 4

Accumulator is air charged to 750 psi

Brake overheat light

→ Detects any overheat with none selected

Autobrakes at max GW landing

→ Min 4 ft/sec 6,700'

→ Med 6 ft/sec 4,600

→ Max 3,000 psi 3,000

Break wear indicators

→ Brakes set, ind. Should stick out some

Can be flown with 1 or 2 deactivated

→ Leave gear down 2 min to stop rotation

Autobrakes

→ Inop with reserve brakes (SYS 2)

Autobrakes trip off if:

→ Toe brakes

→ Anti skid off or fault

→ Gear tilt not in agreement

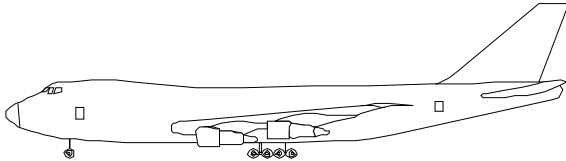
→ Testing panel lights

→ Loss of electrical power

Autobrakes on

- Wheel spinup to 80 knots
- 1&3 thrust levers closed
- rejected takoff
- >85 nots
- 1&3 thrust levers idle
- (some a/c 1&3 to revers interlock)
- No brake pedal application
- Anti-skid on / no faults
- No autobrake faults exists
- Antiskid lights on FE panel
- Deactivated when gear is up
- On when any one gear is down
- Antiskid by axle on reserve brakes
- No autobrakes on reserve brakes
-
- Parking break

Simulator Notes and Profiles



Max Bank 15 deg till V2 + 10 and LOA Lt. Weight, accel straight to V2 + 80	
80 Knots → V1 → Vr – target att. → V2	Check
V2+10	Speed mode - IAS
800' or level off Ht from RPM	Alt. Hold (@700)
V2+20	Flaps 10
→ V2+40	Flaps 5 Set speed V2+80
→ V2+60 (Remain below flap speed)	Flaps 1 Speed mode – IAS, (Hvy Wt) Call the green light (Hvy Wt)
“green light”	Alt hold
▶ V2+80 (15 deg bank until V2+100)	Flaps Up
Flaps up	Set max. cont. thrust
OCA (min 1500' AFE) from RPM	Set speed V2+100 Boxed items/checklists
▶ V2+100	Speed mode – IAS

Takeoff and Landing Profiles

Distant community	PF
80 Knots ⇒ V1 → Vr – target att. → V2 (max bank 15 deg till V2 + 10)	Check
Positive Climb	Gear Up
V2+10	Speed mode - IAS
1000' accel to	Speed mode – vert. Speed +500 (approx pitch in half)
V2+20	Flaps 10
→ V2+40	Flaps 5, Climb thrust command bug V2+100
→ V2+60 (hold until flaps 1, green light)	Flaps 1, speed mode – IAS, call the green light
“green light”	Speed mode – vert. Speed +500
→ V2+80 (15 deg bank until V2+100)	Flaps Up, (after TO checks -sim only)
▶ V2+100	Speed mode – IAS

No noise abatement required in severe icing or in emergency

Close-in community	PF
80 Knots → V1 → Vr – target att. → V2 (<15deg bank till V2+10)	Check
Positive Climb	Gear up
V2+10	Speed mode – IAS
1000' accel to V2 + 20	Flaps 10
1500'	Climb thrust
3000'	Speed mode – Vert. Speed +500
→ V2+40	Flaps 5
→ V2+60 (hold until flaps 1, green light)	Speed mode – IAS, Flaps 1, call the green light
“green light”	Speed mode – Vert. Speed +500
→ V2+80 (15 deg bank until V2+100)	Flaps Up, (after TO checks -sim only)
▶ V2+100	Speed mode – IAS
10,000'	

Engines	Performance	KIAS
2	Best angle/rate	V2+100
3	Best angle takeoff	V2
	Min radius t/o flaps	V2+10
	Best angle	V2+80
	Best rate	V2+100
4	Best angle	Vref + 100 (110 @ 20k)
	Best rate	Vref + 130 to 150 M.82 to M.83
	Best economy	Vref + 160/170(300) M.83 to M.84(300)
	Turb penetration	290 to 310 M .83 to M.84 260 below 15,000 & landing weight

Landing

Bugs	285.7	Flaps
→ LDG Bug + 80	250	Flaps 0 (min speed bug)
→ LDG Bug + 60	230	Flaps 1
→ LDG Bug + 40	210	Flaps 5
LDG Bug + 20	190	Flaps 10
LDG Bug + 10	170	Flaps 20
LDG Bug + 5	162	Flaps 25
▶ Command airspeed bug	157	Flaps 30, speed 157, landing check LDG Bug + 1/2 steady state headwind component + full gust value to 20 knots, (min +5 flaps 25)
→ LDG Bug		Vref + 5 or abnormal add
→ Vref	152	
3 eng pattern	~210	Flaps 5
4 eng pattern	~190	Flaps 10

Vref □ minimum speed at 50' in normal landing
Steady state wind correction should be **bled** off in flare
 Gust correction should be retained until touchdown.

Usual flow

- Supposedly we fly FRA for PT, SFO for PC
- FAA wants to see engineer check pressure after turning on starter and check pylon valve closing after start??
- setup with engine start malfunctions and the associated immediate action items
- call “stop start”,
- personally, stop start, start lever cutoff, continue motoring
- run aborted start checklist for FHB 3.70.29

Engine Loss	PF
-------------	----

- Dense fogging (vaporized fuel) from the tailpipe prior to start lever movement.
- Instantaneous light off when start lever is placed to IDLE.
- No EGT rise within 25 seconds (45 seconds in flight) after start lever movement.
- Fuel shutoff valve light does not extinguish.
- If N2 is sluggish and/or EGT climbing rapidly approaching 750°C.
- Check DDPG for restrictions (anti ice problems)
- anti ice on starts and runup before takeoff 60% for 30 seconds (every 30 minutes during taxi also)
- Takeoff (instrument – bad wx – takeoff alternate—It wt – 500x3)
- Takeoff alternate 2 hours on 3 engines with normal alternate weather required???
- Centerline lights and markings
- Required rvr's see FOM c078
- Area work stalls and steep turns and or
- Return for door open, wheel fire, cargo fire
- Cat II -- missed
- Land
- Takeoff
- LOC/NDB/VOR one missed to another
- If flying SFO hard turn off 19L to heading 060 for holding at bridge <200KIAS
- Flap problem on missed
- Abort 20 knt's below V1 is may be part of the PC profile, may happen anywhere "reject – I have the aircraft" (speedbrakes)
- V1 cut
- ILS missed (FO's may just land)
- 2 engine visual
-

Assorted intermittent ep's

- TCAS resolution advisory, fly VVI to green band, recover to previous alt as soon as possible and notify atc
- Loss of hydraulic sys 4 while taxiing
- Switch to sys 2 (capt)
- You can still taxi, but might bleed off fluid if you follow checklist and switch to sys 1
- asymmetric flaps on approach?
- May look like split flaps due to needles splitting, causing inboards or outboards to stop and other to keep going
- Asymmetric ==> L&R needles on one gage split
- Split ==> L&R needles on gages agree, gages different
- When adding 25 knots to landing bug, move all the bugs up, you may already be slow for your flap setting?

X bleed start Clear with

- Ground crew
- Ground control
- Dispatch
- Check panel lights when releasing brakes

After engine loss at OCA (1500' AFE min)

FHB ch 3 says delay shutting engine down until gear is up and V2+80 min

- Engine failure checklist or
- Engine fire/severe damage/separation checklist
- frozen engine is severe damage
- After takeoff checklist
- Restart (if applicable)
- WX decision
- Dump fuel, (with 2 eng loss dump right away)
- F/O set up for approach and tune/identify, bugs

F/O fly, slow and flaps 5/10

- Capt set up for approach and tune/identify, bugs
- Capt brief
- Med autobrakes
- Trim out before landing [Personally I take it out at FAF]
- Symetric reverse thrust

Capt take a/c

- "Descent and Approach check"
- "Before Landing Check"

3 engine sim

- personally, try not to move rudder, just set for condition and hold, approx 3 to 4 deg trim, trim out after FAF
- V1 cut with new flaps 20 make sure to set attitude when rotating, otherwise the sim will just bounce down the runway

Missed approach

- "Flaps 20 -- go around thrust"
- 12/14 deg pitch (3eng/4eng)(8 on runway)
- LDG bug + 10

- "Positive climb – gear up"
- "Nav Mode Heading – Alt Select"
- Call missed
- 1000' clean up
- leave flaps 5 on 3 engine missed 205 knots, flaps 10 for holding speed if needed on 4 eng missed
- if you happen to lose a second engine, but are still getting power, better to wait to shut it down till 3000' at SFO due to high terrain and very low climb rates on 2 engines

2 engine

Brief approach

- Med autobrakes
- Trim out before landing Personally I take it out at FAF
- idle reverse thrust
- flaps 25 landing bugs

Visual descent profile

Turn a couple of miles past abeam bridge

6 miles	1800'
5	1500'
4	1200'
3	900'
2	600'
1	300'

→ 3000' end of appch lights 250-300'

1000' White cross bar	150-200'
Runway threshold	50-100'

- again try not to move rudders too much, on 2 engine sim will rumble and make noise if you don't have enough in
- 2 eng appch checklist in fhb 3
- before gear down, confirm landing clearance (fold out)-committed
- Glide slope intercept – gear down
- Landing committed when gear is down
- 500-800 flaps 20
- Approx 300" landing assured – flaps 25

Rejected takeoff

FHB 3.70.03 Generally, loss of thrust or mechanical failure is indicated by two or more instruments so that individual instrument failures can usually be isolated from engine failures.

FHB 3.27.24 After takeoff thrust has been set and takeoff roll has been established, rejecting the takeoff due to a RUDDER RATIO light illuminating is not recommended.

FHB 3.52.1 Once thrust is set and takeoff roll has been started, rejecting the takeoff for any door annunciator light is not recommended.

FHB 2.11.4 Prior to 80 knots, the takeoff should be rejected for system failure(s), unusual noise or vibration, tire failure, abnormally slow acceleration, engine failure, engine fire, unsafe takeoff configuration warning; or, if the aircraft is unsafe or unable to fly.

Above 80 knots, reject for engine failure, engine fire; or, if the aircraft is unsafe or unable to fly.

During the takeoff, any crewmember noting a major malfunction will briefly, clearly, and precisely state the observation. For example "Engine Failure".

Capt

- Max braking "Reject I have the aircraft"
- Don't let off the brakes in the sim to roll to the end, max braking till stopped
- Idle power
- Autothrottle disengage
- Max reverse thrust on symmetric engines
- Speed brakes up

F/O

- Verify autothrottles off
- Call tower
- expect hot brakes and do appropriate procedure
- Brake overheat FHB 3.22.4 after rejected takeoff if any brake reaches red, **write up and mx inspection before takeoff after any abort ?**

Cat II

Flaps 30 for visibility/braking

Test radar alt.

Check TCH

captain outside around 300'

call "No Flare" at 53' if not green

after landing AP and AT off

if 1 or 2 ins DMI'd can't use autopilot (hardwired) → no cat II

Camout

Checklist FHB 3.22.1

Steady red autopilot warning light (see table FHB 22.02.3)

- Below 800' in IMC → go around
 Before flare arm with no fail flags in view-
- Nav mode – ILS (1 AP (maybe both) drops off)
 - Nav mode – land
 - Reengage 2nd AP
 - If it doesn't work, heading mode and reset

Non Prec sim

- Configure way early, plan to be configured a couple of miles before FAF
- Descend at FAF at 1500' per minute (1000 fpm at 1000')
- Figure PDP (HAT/3) (time to MAP – 10%HAT) and call
- Timing to PDP Time – HAT(minus last digit) ????
- Always hack at FAF and call it in cockpit, call tower
- line up with runway as soon as possible
- they want you to ask to turn up the lights on the runway
- use the drift rate off the ins
- only "minimums" call at MDA, minimums no runway at MAP?

LOC Back Course

Set published front course in ILS
 If no B/B backbeam switch, **turn FD off**

NDB

Pick a wind corrected heading and use it
 Head falls tail rises
 ADF must be monitored during entire appch

Lost comm.

1 min on vectors
 15 sec on final ASR
 5 sec on final PAR

FAF

- Hack clock
- Call FAF to tower and crew
- Set up missed altitude

In San Francisco

- Expect to do port 3 departure to early level off for cargo fire/wheel well fire, back to cat II ils, normal trick is to fail capt vor on the intercept to point reyes?
- On vor 19L start lining up once you see the runway (without descent), make sure to pick the one on the left, you'll barely make it if you wait till vdp to lineup
- Missed approach is major left turn, use 060 or 070 in order to intercept 101 prior to bridge for holding, don't forget gear in the rush
- You *will* hit the mountains if you don't follow engine loss procedure on 28

INS procedures

- Capt Hdg/DA
- F/O Tk/GS
- F/E Wind

MED autobrakes

- Wet or slippery runways.
- Severe crosswind.
- Engine out.
- Low visibility (less than 3/4 mile or RVR less than 4,000/1200 m).
- Runways 8,000 feet or less.
- Landing distance affected by abnormal landing configuration.

Stalls

- Hold pitch attitude in sim, firewall thrust
- Clean – buffet
- Dirty – stick shaker

The PF will:

- Disengage the autopilot and autothrottles.
- Aggressively advance the thrust levers to the mechanical stops and call "Firewall Thrust".
- Simultaneously roll wings level and adjust pitch to minimize altitude loss.
- If the vertical flight path or altitude loss is still unacceptable, smoothly increase pitch attitude in small increments (2 degrees) until an acceptable flight path has been achieved.
- • Respect stick shaker. Use intermittent stick shaker as the upper pitch limit.
- Maintain gear and flap position until stall condition is no longer a factor.
- Accelerate to maneuvering speed, call for climb thrust and resume normal procedures.

NOTE Do not use flight director commands.

The PNF will:

- Ensure speedbrakes are down.

The FE will:

- Ensure firewall thrust is set.
- Set climb thrust when called for

Misc. Notes

Emphasis lately is supposedly limitations and immediate action items
IMMEDIATE ACTION

When the Pilot Flying is informed of or detects an impending emergency or abnormal condition the primary concern is to FLY THE AIRCRAFT.

The **Captain** will:

- Evaluate the situation
- Call for the appropriate checklist

On command of the Captain, the Flight Engineer will read in sequence each checklist item and response. Crew coordination and confirmation between two crewmembers is required to ensure that critical items, such as those affecting engine thrust, are completed correctly (e.g. thrust lever, start lever, engine fire switch).

IMMEDIATE RECALL

Several procedures in this section are marked "accomplish by immediate recall". These procedures or step(s) must be accomplished from memory or by referring to the QRH. The Flight Engineer will follow up by referring to the entire checklist

For higher than standard cat II, must have the same published height mins on the approach plate
 controlling RVR, ie all lights instrument questions, read the charts on the cat II checklist

Tracks—use heading bug and correct for drift indicated on INS, can't use track on ins—it's in true

Pwr Off light on stick shaker, off during test, off after first aircraft gen online

How to put power on dark aircraft from apu, use the left switch to avoid losing power on main deck

An **upset** can generally be defined as unintentionally exceeding the following conditions:

- Pitch attitude greater than 25 degrees nose up, or
- Pitch attitude greater than 10 degrees nose down, or
- Bank angle greater than 45 degrees, or
- Within the above parameters but flying at airspeeds inappropriate for the conditions.

Nose High

- Disconnect Autopilot and Autothrottle
- Apply as much full nose down elevator as required.
- Apply appropriate nose down stabilizer trim
- Reduce thrust
- * Roll (adjust bank angle) to obtain nose down pitch
- rate
- Complete the recovery:
 - When approaching the horizon, roll wing to level
 - Check airspeed and adjust thrust
 - Establish pitch attitude

Nose Low

- Disconnect Autopilot and Autothrottle
- Recover from stall, if required
- Roll in the shortest direction to wings level (unload and roll if bank angle is more than 90 degrees)
- Recover to level flight:
- Apply nose up elevator
- * Apply nose up trim, if required
- Adjust thrust and drag as required

Apparently everybody knows but nobody writes that we use MSA instead of Obstacle clearance altitude for engine losses

We now practice a constant descent approach in sim, vague description in FHB

Aborted start – pull out ddpq anti ice restrictions

Engine fire switches

- Arms fire extinguisher
- Closes fuel shutoff valve
- Depressurizes EDP and shuts off hyd fluid supply
- Trips gen field after a time delay
- Closes bleed air valve

Fire bell for APU & engine fire only

Immediate shutdown

- Tailpipe fire

- Start valve stuck open
- Landing with high speeds, split flaps etc., check RPM for landing with 20 knots tailwind, etc.

Graviner fire detect, 2nd fault is treated as fire

2 flashing lights on forward annunciator

- low N1
- autobrakes

10,000 Kgs = 3 knots of approach speed

The only time you don't have alt. Sel engaged is for missed appch

No parking brake when using reserve sys 2 hyd.

Loss of ESS PWR gets dark (#1 INS Batt light)

Loss of generators gets bright

Autopilot annunciator panel FAT – fit dir, autopilot, throttles

- Power reestablishment
- Battery
- Standby power
- Essential power
- No 2 – INS and co's instrument
- No 1 – cockpit lighting
- Lowest load is no 3

Radar

- 3 deg radar beam
- dist (NM) x 100 = Ft./degrees
- Fires
- 1. oxygen masks and regulators
- 2. smoke goggles on
- 3. communications establish
- smoke barrier door closed
- smoke in cockpit
 - inside – move it out
 - outside upper and main deck smoke evac checklist to land
 - can't land cargo fire checklist

Takoff Warning Horn

don't troubleshoot, just reject early

- TE flaps not in TO position 10/20
- LE flaps not fully extended
- Stabilizer Trim not in green band selected
- Speed brake not down
- Parking brakes set
- Body gear not centered
-
- 2 HYD INOP
- Do single loss checklist
- 20 add to vref, don't add 5 for flaps 25
-
- Loss sys 4
- Might have **gnd saf really**, one gear out of tilt on either side on either sys
- Might have takeoff warning horn (same as alt warning)
- Go to check
- Pull warning c/b
-
- Alt te flap ext 5.5 minutes
- No asy protection or load relief
-
- **Green band warning light**
- selected band does not agree with CG(measured at nose gear)
- Flaps not in landing configuration
- On ground
- Green band out of center position
-
- **Rudder ration light, do not abort t/o**
- Don't reject for light during roll
- Don't takeoff

Memory Aides

HAINES1

- Capt HSI
- Capt ADI
- Ignition (standby)
- N-1 , N2 with p&j ??
- EGT
- Standby att
- #1 VHF- nav/com

Central instrument warning system HANGR

- Heading flag in his
- ADI gyro flag
- Nav flag in hsi
- GS flag in hsi (after gs capture)
- Radar Alt flag in Radar alt (below 1500' agl)

Warn -- flag or comparison warning
HDG -- 6 deg between hsi's in radio

MON -- pwr lost to CIWS

ATT -- 4 deg pitch/roll on loc, 6 deg other times

Main Gear Tilt (see aircraft general)

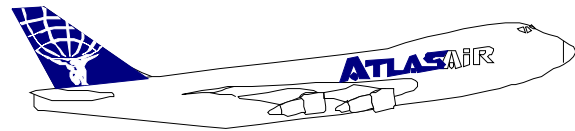
- Auto speed brakes
- Takeoff warning horn
- Auto brakes
- Thrust reversers
- Flight idle mode
- Body gear steering
- Wing antiice
- Cabin pressurization
- Misc. lights and mast heat
- Nose gear prox switch
- Rudder pedal steering
- Stall warning
- TAT heaters

Nose Gear Proximity switch

- Nose gear rudder pedal steering
- Stall warning (stick shaker)
- TAT heaters

Inflight starter limit 45 sec

Operational Notes



Airplane Quirks

APU

drops Power when turning on bleed air → bleed air leak
new procedures → see DDPG

N506MC

White light in A/P A P/RST button
Pull and reset pitch C/B

N508MC

Up/lt check, go to land first, read in diff manual for indications, go to head when finished

N808MC

Loud squeal after engine start or #1 gen online, turn fit/serv interphone switch on F/E's interphone panel off
Serv amp C/B for same thing

N534MC

Must unplug o2 mask mic connector or you will transmit with both mics at the same time and be unreadable
10 deg bank autopilot

Accident / Incident Actions FOM 11.3.4

See FOM for definitons and which occurances require reports.
CVR is to be deactivated after the Parking Checklist. Enter in log – request removal of CVR for shipment to the Director of Maintenance.

AIM's Shortcuts (save as favorites)

Home <https://aims.atlasair.com/wtouch/fltinfo.exe/home>
Login <https://aims.atlasair.com/wtouch/wtouch.exe/index>
Flights

Airport classification 8.3.1

Airport	Disp from	Disp to	Pick up	Off load
Regular	X	X	X	X
Refueling	X	X		
Provisional	X	X	X	X
Alternate	X			X

- Provisional – regular airport not available or bad wx
- Alternate – landing at intended becomes inadvisable
- Regular and refueling can also be alternates

Alternate Airport Landing Weather Minima

FOM 11.4.2

Alternate weather minima apply only for dispatch and are not limiting for landing. Upon diversion to an alternate, landing minima are the same as if the airport was the original destination.

Anti Ice/De-Ice FHB 2-27-1 Deicing Checklist FHB

2.23.3/6

- Icing conditions
- OAT on grnd, TAT in-flight is 10deg C or below and visible moisture (<1 mile, clouds, rain snow, sleet, or ice crystals) or standing water/snow etc may be injected into engines
- Temp is 10C or below and dew pt spread is less than 3 deg

Anti-ice on after each engine is started

De-ice type I heated

Anti ice type II cold

Fails first on leading and trailing edges

Deice Tip to root of wing

Use generic tables for all now

- Report see intams

Holdover time

- One step begins at start
- Two step begins at start of final step

Anti-ice/De-ice in Blocks (checklist FHB 2.23.3)

- A/c packs off and APU/engine bleed valves closed
- Manually close outflow valves
- Full nose down trim (use 2&3 ADP's to move trim nose down)

Off gate procedures

- A/c packs off and APU/engine bleed valves closed
- May shutdown engines
- Manually close outflow valves

At threshold

- Same except engines will remain running
- Leave flaps down but hold taxi checklist until down

New icing rules bull 35

If there's precip, do a check,

if you exceed holdover, do it within 5 minutes of takeoff

check is from main deck windows over wings or crew escape hatch or L1

surfaces are clear and present a smooth shiny surface (free of contaminants)

Takeoff is prohibited if any surface contamination is detected

More info in ch 7

Deicing manual and new forms on aircraft

Takeoff

- Pre-takeoff runup 60% for 30 sec every 30 min
- "colder than normal" <-39C with reduced thrust settings do takeoff warning check before takeoff, advance #3 to check no horn
- Scandinavian countries, deicing spot based on width between main gear

Arrival Message FOM 4.3.4

FO transmits a

- Call Sign/Fit. #
- Arrival Station
- On
- Block In
- Landing Fuel
- Block fuel Gage/kilograms
- Aircraft Status (Maint.)

Backbeam

For back course localizer approaches, set the published front course in the course selector window. The term "front course" means the final approach inbound course on the localizer.

When flying the back course the CDI is directional only with the published front course in the course selector window. The command bars of a flight director are not directional unless the Back Beam switch is selected.

Bomb Threat FOM 11.2.5

- 'Bravo whiskey direct' bomb aboard or specific flight mentioned
- 'Bravo whiskey indirect' normal procedures recommended-- not specified toward your flight

BRNAV

Basic area navigation

- European RNP-5
- +/- 5NM for 95% time
- Automatic DME updating must be utilized
- No updating, 2 hours from going to NAV

Braking action

FOM 5.3.6

Briefing

Captain brief(at each base)

- Establish effective communications between flightcrew members (guidelines for use of P.A. and interphone)

- Items that may be of concern during flight (i.e. turbulence or security issues)
- Each person on board is familiar with
- Runways with <4000' RVR or ¼ mile are considered wet, requires an additional 15% runway over field length requirement.
- Captain required to announce to all on board flight is about to takeoff.

First officer will collect non-rev ticket coupon and file in trip papers, signed copy will be filed with station folder

Seat belt sign remains on until passing 10K ft and clear of terminal air traffic

Maximum persons on board is 8

Upper deck occupants briefing FOM 4.5.5

ACM/Jumpseat briefing FOM 3.2.5

Smoking – not allowed

Use of seat belts

Location and operation of emergency exits

Use of oxygen and emergency equipment

For extended over water flights – location of rafts, location of life preservers or vest and a demo of how to don the equip

Use of electronic equip

Call Outs FHB 2.01.01

Captain only flying(takeoff & landing) FHB 2.23.1

- Braking action less than good
- vis <1/2 mile or RVR <1800'/550m(changed from ¾)
- crosswind component exceeds 20 knots
- 8,000' or less FOM 8.3.4
- Guatemala City day or night all approaches and landings bull 100
- VCP all except day/VMC landings utilizing runway 15 ILS
- BOG all except day/VMC landings
- for **special airports** FO must have 100 hours in type before making takeoff or landings FOM 2.4.4 & 4.1.2
- **FO less than 100** in seat/type captain must make all T/O and Land if
- <3/4 mile vis
- <4000 rvr
- Runway contaminated with water, snow etc
- < good braking action
- X wind >15
- Windshear
- Prudent
-
-

Catt 2 Procedures/Restrictions FOMC-059-1/2

Uk diff procedures if goes below mins?

<800' go around for flags etc

flare at 53'

disconnect autopilot and auto throttles at touchdown

300' capt includes outside ref's in scan

100 above and Minimums call for fo

Circuit Breakers

Mach warning – 5 rows down, 2 from left

P&G bus fault bit failure warning message – EIDU cb's x 4 on P-6

Windshield wiper pilot overhead near top in middle

APU inop 2.5A CONT C/B not 15.0A START to right of FE

FHB3.01.1 FOM 4.2.4

Crewmembers should check circuit breakers and test lights when appropriate. Checking circuit breakers and testing lights are normal crew reactions and are not listed in the procedures unless there is a specific requirement. If a procedure requires opening a circuit breaker, the circuit breaker will have an orange collar installed.

There is a latent danger in resetting a circuit breaker tripped for an unknown cause because the tripped condition is a signal that something may be wrong in the related circuit. Until it is determined what caused the circuit breaker to trip, there is no way of knowing the consequences of resetting the circuit breaker. Reset of circuit breakers is not recommended unless, in the judgment of the Captain, the tripped circuit breaker has a significant adverse effect on safety. **If a circuit breaker must be reset, it may be reset only once, and then only after a cooling period of 2 minutes.**

WARNING

Resetting a tripped fuel pump circuit breaker or fuel pump control circuit breaker is prohibited. A circuit breaker opened as part of an abnormal procedure may be reset. A ground reset of a tripped circuit breaker by the Flight Crew should only be accomplished after maintenance has determined that it is safe to do so.

Climb Rates

Our airplanes meet these category mins?

Climb To Alt. Rest.

0-10,000 300'/NM
10k to 20k 200'/NM
20k on 100'/NM

Continuing approach FAR 121.651

May not begin the final approach segment, or continue past the FAF unless approved source reports visibility equal to/greater than that req'd for the approach. **Except:** may begin if arpt has operative ILS & PAR and both are used. ?

If visibility below minimums after final approach segment begun, may continue to DH/MDA. Thereafter, can continue to 100' w/approach lights. Below 100 must have red terminating bars/side bars or other lights/rwy markings. ?

Conversions and Tables FOM ch 12

Notam codes
Kilo:Lbs .4536:1
Lbs:Kilos 2.205:1
Lbs:Gal 8.336:1
Kilos:Gal 3.781:1

Command FOM 4.3.1

Captain assumes command of airplane when the first engine is started or all cabin doors and main deck cargo door have been closed, whichever occurs first. FOM 4.3.3 Captain relinquishes command either when securing the last engine or when the first cabin door has been opened, whichever occurs last.

Command & Management FOM 4.1.1

The proper execution of any flight operations plan demands constant vigilance, cross-checking, and sharing of information. Each flight crewmember is to bring any significant operational development to the attention of the rest of the flightcrew immediately.

Company position report

Flight, position, time, FL, fuel remaining, ETA next position / destination, remarks

Contaminated Runway PHB 1.01.2

A runway is considered contaminated when more than 25% of the required field length, within the width being used, is covered by standing water or slush more than 1/8 inch (3.2mm) deep, or has an accumulation of ice or snow.

Standing Water: Measurable water caused by heavy rainfall and / or insufficient runway drainage.

Slush: Partially melted snow with high water content, will splash when a vehicle is run through it or when stamped with a foot.

Wet Runway FOM 8.3.4 ?????

Standing Slush or Water FHB Ch. 1

- Takeoff 1/2 "
- Landing 1"

Standing Water, Slush, Snow or Ice

- Takeoff 15 Knot Crosswind Component Peak Gust
- Landing 10 Knot Crosswind Component Peak Gust

Customs

<http://www.customs.gov/travel/crew.htm>

- one open liter of alcoholic beverage and 300 cigarettes, or 50 cigars, or 2 kilograms of smoking tobacco, or a proportionate amount of each;
- merchandise not exceeding \$200 in value, which may include gifts the crew member has purchased for persons in the United States, free of duty.

Decompression

Oxygen requirements FHB 10.04.09

Delays FOM 4.3.1 see intams

Late if

- Block out 15 later than scheduled
- Military taxi w/in 20 minutes of sched block out
- Will not block out more than 20 minutes early without specific permission of GCC
- Arrival 15 minutes later than sched
- Takeoff delay if more than 20 minutes between block out and take off, note reason in departure message

Departure Message FOM 4.3.3

Flt # Block fuel
Departure Station Takeoff Fuel
Out Fuel Added
Off Payload
Destination and ETA

Differences

Differences are in FHB Vol II 20.04.1

Discrepancies FOM 4.6.2/8.2.9 BULL 77

Flight is considered to have departed when it moves under its own power for purposes of flight. After this time, any discrepancy, which arises, still must be handled according to the MEL/CDL in the DDPG. If a discrepancy occurs after takeoff, the requirements of the MEL or CDL may not apply.

After push, and prior to takeoff, any mx action or inspection requires a return to blocks FOM 8.2.9

Restricted climb and crz speed see FOM 8.4.4

Starts at 0z on next z day

Must be valid till landing

- A – specified
- B – 3 days
- C – 10 days
- D – 120 days
- For DDPG purposes we are 10 door aircraft (for pressurization limitations) when in doubt, look on the outside and count after blockout 4.6.2

Diseases

<http://www.cdc.gov/travel/blusheet.htm>

Dispatch

General FOM 8.1.3

Increase of > 10,000 Kg must have amendment to flight plan from dispatch, verbal ok FOM 8.4.6

Release for domestic flight can contain several stops if ground time between stops is < 1 hr.

Release for international flights can contain several stops if ground time is < 6 hr.

Required Information FOM 8.1.3

- Acft identification
- Flight number
- Dept. arpt, intermediate stops, destination arpt, alternate arpts
- Type of operation (IFR / VFR)
- Minimum fuel supply

Release FOM 8.2.10

Remains effective until the specified void time or until the captain or dispatcher becomes aware of any change to the required contents or other information that makes any term of the Dispatch Release invalid. After departure (airborne), the flight is considered enroute.

Flight Plan Codes

S standard
H HF
D DME
X MMPS
W RVSM
R RNP
I INS
Y 8.33 freq radios
/C 4096 alt reporting transponder
/Q for faa use only (not on flight plan) mav and rvsm???

Diversion

FOM ch 11

Alt. Mins are not req, treat it as orig dest for wx

FHB 4.31.03 diversion chart

- add 1k (chart assumes arriving w/6k)
- 320/.82 climb, LRC, .84/290 descent

sample data, 250k zero fuel wt, arriving with 7k

Distance	Altitude	Fuel
100	15	10
200	25	13
400	35	17.5
600	37	21
800	37	27

DME Updating

Must be annotated on flight plan for RNP-10, BRNAV airspace

Driftdown (see cheatsheet)

you'll notice that the 2 engine driftdown speed is close to and sometimes below the 1.3 g speeds

Duty Manager Job Description FOM 2.1.14

"If the decision will impact revenue, service, or the schedule, the Duty Manager has the final responsibility on the course of action to be taken. If the Decision will impact safety of flight or the application of a regulation, the Captain and the Flight Dispatcher are jointly responsible."

Duty rqmts

Domestic

- 8 hours between required rest periods

- 30/7 consecutive days
- 100/calendar month
- 1000/calendar year

Rest

→ Non-local trans to or from work cannot be considered rest

during 24 hours ending at last landing		May be reduced to	Must be given x hours w/in 24
Rest	Flt. Time		
9	<8	8	10
10	>=8<9	8	11
11	>=9	9	12

Flag 121.487

- 12/24 hours
- 120/30 days
- 300/90 days
- 1000/12 calendar months

Flag Rest

- 18 off if flown >20 in 48 or 24 in 72
- 24 hours rest in any 7 consecutive days
- Sec. 121.483 Flight time limitations: Two pilots and one additional flight crewmember.
- (a) No certificate holder conducting flag operations may schedule a pilot to fly, in an airplane that has a crew of two pilots and at least one additional flight crewmember, for a total of more than 12 hours during any 24 consecutive hours.
- (b) If a pilot has flown 20 or more hours during any 48 consecutive hours or 24 or more hours during any 72 consecutive hours, he must be given at least 18 hours of rest before being assigned to any duty with the air carrier. In any case, he must be given at least 24 consecutive hours of rest during any seven consecutive days.
- (c) No pilot may fly as a flight crewmember more than--
 - 120 hours during any 30 consecutive days;
 - (2) 300 hours during any 90 consecutive days; or
 - (3) 1,000 hours during any 12-calendar-month period.
- Sec. 121.491 Flight time limitations: Deadhead transportation. Time spent in deadhead transportation to or from duty assignment is not considered to be a part of a rest period.

Heavy Crew

- 350/90 days
- 1000/12 months

Supplemental

- 12 in any 24
- 120 hours / 30 consecutive Days
- 300 hours / 90 consecutive Days
- 1000 hrs calendar year

Rest

- 18 off if flown >20 in 48 or 24 in 72
- 24 hours of in any 7 consecutive days
- May be scheduled for 8 hours of less during any 24 with no rest
- If > 24 hours report to release, must be given 16 off after last duty event
- Can't sched 30 continuous hours w/out 10 on grnd, report to release
- If deadhead >4, must count half towards duty until 10 off
- 350 hours / 90 consecutive days
- heavy crew double time off at home station if **sched** >12 in 24
- we have exemption not to get time off if not **flown** >12

FOM Duty XV sec B

"Duty time limits - Standard crew 747 – 200 (three crewmembers) When the duty period consists solely of an operating flight or flights the maximum planned crew duty period is 16 consecutive hours. The Director of Operations, Flight Operations Duty Officer or the Chief Pilot will discuss with the crew and must approve any projected duty period in excess of 16 hours.

When the duty period consists of a deadhead followed by an operating flight (deadhead to duty) the maximum planned crew duty period is 16 hours. The Director of operations, Flight Operations Duty Officer or the Chief Pilot will discuss with the crew and must approve any projected duty period in excess of 16 hours.

When the duty period consists of an operating flight or flights followed by deadhead, the maximum planned crew duty period is 20 consecutive hours. The Director of Operations, Flight Operations Duty Officer or the Chief Pilot must approve any projected duty periods in excess of 20 hours if the duty period is mid-pattern. The crewmember at his or her discretion may elect to extend a duty period consisting of operating flight followed by deadhead beyond 20 hours at the end of a pattern.

Duty periods that consist entirely of deadheading or commercial travel for positioning or de-positioning of crews will be planned not to exceed 24 hours. At the end of a 24-hour deadhead a crewmember must have a minimum of 12 hours free of duty before operating a flight or series of flights.

Duty time limits - augmented crew 747 – 200 (five crewmembers) When the crew duty period consists solely of an operating flight or flights, the maximum planned crew duty period is 20 consecutive hours. The Director of Operations, Flight Operations Duty Officer or the Chief Pilot will discuss with the crew and must approve any projected duty period in excess of 20 hours.

When the duty period consists of deadhead followed by an operating flight (deadhead to duty), the maximum planned crew duty period is 20 consecutive hours. The Director of Operations, Flight Operations Duty Officer or the Chief Pilot must approve any projected duty period in excess of 20 hours.

When the duty period consists of an operating flight or flights followed by deadhead, the maximum planned crew duty period is 20 consecutive hours. The Director of Operations, Flight Operations Duty Officer or Chief Pilot must approve projected duty periods in excess of 22 hours if the duty day is mid-pattern. The crewmember at his or her discretion may elect to extend a duty period consisting of operating flight followed by deadhead beyond 22 hours at the end of a pattern. Duty periods that consist entirely of deadheading or commercial travel for positioning or de-positioning of crews will be planned not to exceed 24 hours. At the end of a 24-hour deadhead period a crewmember must have a minimum of 12 hours free of duty before operating a flight or series of flights."

Emergency situations

Captain's authority 8.2.2

Flight crew incapacitation FOM 11.5.3

Hijack 11.2.5-6

- 'trip' in callsign
- Squawk 7500
- Pointy talkies in FOM

O2 continuous at 12,000'

After 30 min @ 10,000' to 12,000'

Fires

- Type A solids (water extinguisher)
- Type B liquid
- Type C electric
- Type D metals (can't carry)?

Water Extinguisher

- 20' for 20 seconds
- do not invert
- base of fire and sweep away
- rotate handle clockwise to discharge CO2 bottle

Fire gloves bottom of P6 panel

Min extinguishers for dispatch, 4, can miss one water on main deck?

Emergency Authority FOM 11.1.1

See Required Reports in FOM 11, FAR121.557(a) and in this section

Equipment Failures FOM 5.1.1

Report to ATC loss of

- VOR, DME, ADF or low freq nav receiver
- ILS
- INS where needed

Evacuation FOM 11.1.1

Each member should accomplish assigned duties from memory.

FAA

[Link to FAA Publications](#)

[Link to FAR's](#)

[Landings: Search Federal Aviation Regulations](#)

FAA Reportable events 121.703

Safety Number 800-255-1111

Replacement Certificate/medical 405-954-3261

Observation ride

- Bring copy of all training records
- Check credentials
- FAA Badge
- Authorization
- Passport/required visas
- Brief on
- Sterile cockpit below 10k
- Oxygen procedures(emphasize checking o2 and goggles)
- Evacuation duties and procedures
- Review driftdown, oxygen, smoke goggles

Flight Documentation/Flight Plans

The Captain will ensure the following are onboard: see list on checklist Fuel receipts, gen decs, cargo paperwork, notoc, logbook, Reanalysis FOM 8.2.7

Foaming Runways FOM 11.3.1

Not recommended by Atlas Air.

Fuel

Intern'l	Dest.	10% dest	Alt.	30 min hold @ 1500' over alt.
Domest	Dest.		Alt.	45 min reserve at normal cruise
Int'l no alt.	Dest			2 hrs at normal crz

Trip Fuel FHB 4.10.9,

landing fuel is equal to or greater than higher of

- Reserve + Hold + alternate
- Alternate + 7.0 (usually gives min of 10.5) higher on prd and short flight plans – dispatch may not catch it
- 10.5

Min req'd at destination FHB 2.07.04, FOM 2.3.5?

IF **tankering**, must land 3k below max land wt. FOM 8.5.5

Minimum **planned landing fuel** at alternate is 7000 kgs FOM (Dispatch computes HOLD + Reserve = 7.0)

No flight should plan to land with less than 5500 kgs FOM 8.5.5

Ballast fuel required Loading Manual 5.2

Min PRD pad is now 1000 Kg

- 1100 min at touchdown
- +1800 max gauge error mains)
- +2600 min at go-around
- 5500

Taxi fuel FOM 8.5.5

Standard 1200 kgs. (start + 15 mins. block to airborne)

1600 for busy times at big airports

Additional 60 kgs. / min.

Enroute fuel

Step climb if cruising ten minutes at higher altitude prior to descent FHB 4.10.03

Computer picks initial altitude based on min. costs

Xtra time for fuel burn at 200 kgs/min

Max end for holding, 20,000 4.31.4 holding chart

FHB 4.31.3 **diversions** chart

- Fuel Dump Kg. to dump/2 + 5 = minutes to dump
- CF6 96 to 98% N1, able to climb 4K

Sec. 121.647 - Factors for computing fuel required.

Each person computing fuel required for the purposes of this subpart shall consider the following:

- (a) Wind and other weather conditions forecast.
- (b) Anticipated traffic delays.
- (c) One instrument approach and possible missed approach at destination.
- (d) Any other conditions that may delay landing of the aircraft.

Glideslope

guam accident – make sure glideslope gradually captures, one maintenance mode allows no flags and always centered indication

Hand signals FOM 4.3.1

May be used between cockpit and ground crew provided the captain and ground crew have coordinated the signals, directions of aircraft movement, and any other relevant information prior to engine start.

Hazmat

Http://hazmat.dot.gov/pubs/

We can't ship our own hazmat COMAT (company material?)

Put copy in flight folder

Yellow/orange for **ground**, also has first aid though

Red book for **flight** pg. 46 to find drill down codes, see codes on pink pages

Dry ice 2000/500/500 mil exempt to 6400

Military flights

- with no notoc, must have exemption letter on board
- Takeoff notify control tower of class of explosives
- Notify prior to entry to airport traffic area
- Notify approach to avoid populated areas
- Required crew and mission essential only

Headset FOM 2.3.5

Required below 18,000'

Required when using hf?

High Minimums

Captian - FOM 7.2.1

First officer FOM 2.4.4

If FO has less than 100 hours in type, and captain not check airman, captain must make all takeoffs and landings when:

- All special airports
- Any of the following
 - Prevailing vis = ¼ mile
 - RVR = 4000'

- Runway has water, snow, slush, or similar conditions
- Braking action reported less than good
- Crosswind component > 15 knots
- Whindshear is reported in vicinity
- Any other condition which captain determines it to be prudent

Hijacking FOM 11.2.1

Transponder 7500, use "Trip" in call sign

If ATC initiates use of "Trip", they are asking if clear communications are possible. Respond with "trip" and ATC will limit communications to essential air traffic information.

Hijacker with no destination, or clearly impossible destination, might be considering suicide and should be treated as a high-risk.

Hijacker with firm, reasonable destination probably creates less immediate risk.

Holding

Flaps Up – Vref + 80 below 15,000'

- Min drag speed above 15,000'

Flaps 1 – Vref + 60 kts

Altitude	USA	ICAO
0-6000'	200	230
>6000-14000	230 210 where published	
>14000' - FL 200	265	240
>FL 200 - FL 340		265 / .83 M

At and below 14,000' one minute

Above 14,000' 1 ½ minute

Speeds, FHB 4.31.04

IATA In-flight Broadcasts Jepp Pg. SA-27

- Freq. 126.95
- All stations, this is GTI 056, FL 310, southbound Bogota to Rio De Janero via UA 315, (position) at 1212z, estimation (position) at 1313z, GTI 056, FL 310, southbound
- Monitor 10 minutes prior to entry
- 10 minutes prior reporting point, 10 prior crossing or joining ATS route
- 20 intervals between distant reporting points
- 2 to 5 minutes before change FL
- at time of changing FL
- (generally do not change FL)

Immediate Action Items FHB 4.04.36

Incidents

FOM reportable events 11.3.4

Format 11.5.1

Deactivate CVR 11.3.4

No comments to media

Don't give docs/records to gov. agencies

Report deviations within 10 days

InRange Call FOM 4.3.2

- ETA at Blocks
- Inflight Maintenance message
- Est. fuel remaining at Blocks (Kgs.)
- Requests for specific services

Inflight Engine Stoppage (shutdown) FOM 11.4.5

Pilot in command may proceed to an airport that he selects if, after considering the following, he decides that proceeding to that airport is as safe as landing at the nearest suitable airport (FAR 121.565(b)).

- Nature of malfunction and possible mechanical difficulties that may occur if the flight continues.
- Altitude, weight, and usable fuel at the time of engine stoppage.
- Weather conditions enroute and at possible airports.
- Air traffic congestion.
- Terrain.
- Captain's familiarity with the airport to be used.

If flight is continued to an airport other than the nearest suitable, a report is required.

INS

To see calculated errors, press hold, pos, up 3

drift rate writeups FHB 2.22.3

Check at startup 92-04-13 & AAWH/S

Instrument Approach Authorizations FOM ch 7

747 is category 'D' aircraft

circling approaches IMC to no less than 100/3 to visual VMC and clear of clouds fom 6.8.4

Non-precision 300ft unless higher specified

Cat II captain 300 hrs in turbojet and 100 hrs in type (not IOE time)

100 hour restrictions FOM 7.2.1

<1/2 captain only see "captain only"

Landing

< 3.4 mile or 4000RVR (1200m)

→ increase landing runway by 15%

→ precision instrument runway markings or runway centerline lights

Landing with visibility **locally** reduced to ½ mile or RVR 2400

7.2.2

→ ceiling not less than 100'

→ airplane aligned with runway before entering conditions

→ runway plainly visible, see line of forward motion at all times

visual approach

→ approach in vmc at all times

contact approach (us)

→ with approved instr. Approach

→ pilots request when operation clear of clouds , 1 mile vis

→ no descent below MDA unless threshold in sight at all times

Takeoff limits

>=Minima on approach chart

Takoff alt required when field below landing mins, withing 2 hours

normal crz, still air, 3 engine FOM 8.3.2

Standard is ½ mile for 3 or 4 eng airplanes

¼ mile or RVR 1600 (specified on appch plate)

→ must have one of HIRL, CL, RCLM

→ **or** continuous visuall reference to the line of forward motion during takeoff run

→ **and** touchdown RVR must be 1600 regardless of others

→ **or** ¼ mile vis

¼ mile or RVR 1200 (specified on appch plate)

→ centerline lights are required and must be operation,

→ 2 transmissometers including touchdown zone with RVR 1200 and rollout zone with RVR 1000

RVR 600 (175m) (specified on appch plate)

→ Operating centerline lights and runway centerline markings

→ 2 transmissometers with touchdown and rollout atleast 600

→ 3 transmissometers, with one not working any 2 at 600, or all 3 at 600

→ in meters 25m increments use 175m, 50m – 200m

see 7.3.2 for more restrictions

approach minima see cat II foldout

→ may not pass FAF or final app segment unless reported vis is

=>minimum for the appch

→ once past, may continue to DH or MDA

→ in UK & UAE <1000' RVR can not continue ???

use higher minimums of appch, captain mins, downgraded equip mins

to continue past MDA or DH

→ continuously in a position to use normal descent rate and landing in touchdown zone

→ at least one distinctly visible and identifiable cat ii

• approach lights (to go below 100' must have red termination bars or red side row bars)

• threshold

• threshold markings

• threshold lights

• touchdown zone or markings

• touchdown zone lights

• cat I (cat ii above or)

• runway end identifier lights

• visuall approach slope indicator

• runway or runway markings

• runway lights

Alternate minima where alternate weather mins are prohibited

Approach	Ceiling	Visibility
Precision	600 ft	2 stat. Miles
Non – precision	800 ft	2 stat. Miles

Alternate airport minima

Approach	Ceiling	Vis
One straight in	Cat I HAT +400'	CAT I + 1SM
Two op. Nav aids providing straight in prec. Or straight in non-prec to diff. Rwy	Higher CAT I min + 200'	Higher CAT I min + ½ SM

8.3.2 more info

Alternate not required FOM 8.3.3

FAR 121.621

domestic 3 – 2 – 1 = 0

FAR 121.619

vis => 3, ceiling => 2000, ETA □ 1 hr.

flag

6 – 3 – 2 – 1 = 0

FAR 121.621

→ (1) destination not more than 6 hrs

• vis => 3 (2 above lowest published vis minima)

• ceiling => 2000 (1500 above lowest IAP minima)

• ETA □ 1 hr

→ (2) approved route without available alternate & airplane has 2 hrs fuel

Jumpseaters FOM 4.5.1, 3.2.3

To sign up for jumpseat

→ 800-462-2012 , 6, 3, 2

→ SITA HDQOM5Y

Check for Visa's, passport, Immigration Form I-94 if not US citizen and returning to US.

List of allowed foreign carriers, FOM 4.5.3&4

www.passrider.com

www.airwise.com

pay site for cheap fares www.expertflyer.com

Landing Gross Weight Limitations FOM 4.3.3

Must not exceed the lowest of following

Maximum structural LGW

LGW limited by climb

LGW limited by field length (RVR < 4000 or ¼ mile vis is considered wet)

→ Landing climb 4 eng. Flaps 30, gear, 3.2%

→ Approach climb 3 eng, gear, 2.7%

Landing Distance

Flaps 25 GW x 26

Flaps 30 GW x 24

Wet Runway X 1.15

Landing restrictions with FO less than 100 hours

FOM 4.1.2

Litton 92

→ update STS, DWN, EXP, ENT

→ insert route, clr or A-N, then –r enter

→ delete multiple points, wpt page, CLR or A-N, -D, enter

→ accuracy check, sts page up 5 times , exp

→ rapid realign, STS up 4, ENT, put in present position, and manally delete waypoints

Loading

Ballas see fuel

Cargo Nets 2.06.26

→ No damage allowed 2.06.26?

→ No broken ropes in bottom 2 diamonds

→ No 2 in any one diamond

→ No single lockdowns

→ Can have lockdowns missing on one side of 16/20'

Locks missing,

→ Aircraft loading manual ch 13

Logbook FOM 4.6.1

Long Range Navigation

In General read the side panels of the charts for most of the info you'll need especially about getting oceanic clearance, may have to get it on the ground

Extended Over water Operations definition is greater than 50 nm from nearest shoreline FAR Part 01, MEL 2.21.37.1

DME updating, annotate on flight plan for RNP-10, BRNAV

Plotting chart required when route leg between service vol exceeds 725nm FHB 2.16.7

Preflight

→ Note TMI number and that you have the whole message, note that flight crosses 30West w/in times on message

→ Note ETP and airports

→ Note reduced altitude capability from flight plan

→ Have a plan for where to do Acc check and GNE, comes quick when your close to coast out

Litton 92 Waypoints QRG 1.1.9 >100 deg, letter in middle

5055N is 50N/55W

50N55 is 50N/155W

N □ NW

- E NE
- W SW
- S SE

Enroute

- Cecking in with Oceanic
- Est. position time, req. FL, mach, altitude capable
- On readback give TMI number
- Request relay to Atlas Air, New York, cell call check
- Steering INS to Pos, non steering to XTK, TKE and D/T , other to data
- Select one VOR/ILS/INS sw. to INS after passing radio aid that defines the start of INS flight.
- FD pitch trim full up (so you'll notice if Alt Hold kicks off)
- Transponder: last assigned for 30 min; then 2000
- Climb / Descent - report reaching new altitude
- maintain assigned Mach during step-climb
- Monitor 121.5, 123.45

Accuracy Check

Prior to entry into BRNAV, MNPS, NOPAC, RNP, Polar airspace
Easiest if north or south of navaid

- Put variation in course window W/+ and E/- (east is least)
- Press hold on all three INS's and write down DME when crossing course
- In order to determine the exact time of crossing, look at lat or long on steering ins, and compare to station location, ie north south check look at west coordinates, when crossing station depends on direction of flight
- When in HOLD
- WPT is raw data position (waypoint selector in 1-9)
- POS is triple mix position
- Write all three coord in wypt, and steering ins triple mix from pos on plotting chart, time, station, radial/dme
- **We don't have to figure drift errors now if currently DME updating**
- Find actual position on north/south check by adding/subtracting actual range from station from latitude, if close to station, this formula will give more accurate results
- $DME^2 - (altitude/6000)^2 = \text{range from station}$
- Figure Longitude error from ratio's in FHB and on cheatsheet
- Figure drift rate from steering ins triple mix position and error , (this makes no sense to me since this position is updated and therefore gives no indication of drift, but it's in the book)
- Position error / (Current time - time in nav)
- Non RNP flights update if > 5NM
- Notify ATC FHB 2.16.4
- RNP-10 1.6 NM per hour (FOM 5.1.2 states max rate of .77 nm/hr)
- BRNAV 2.5 NM per hour (RNP - 5)
-

Longitude/Mileage Ratio

Lat.	Ratio	Lat.	Ratio	Lat.	Ratio	Lat.	Ratio
0	1	46	.69	56	.56	66	.41
5	1	47	.68	57	.54	67	.39
10	.98	48	.67	58	.53	68	.37
15	.97	49	.66	59	.52	69	.36
20	.94	50	.64	60	.50	70	.34
25	.91	51	.63	61	.48	75	.26
30	.87	52	.62	62	.47	80	.17
35	.82	53	.6	63	.45	85	.09
40	.77	54	.59	64	.44	90	0
45	.71	55	.57	65	.42		

GNE check (w/in 10 minutes of starting INS portion of flight)

- If off flight plan plot, take 2 checks (first to determin track line) or plot lat long from ins and compare to radial/dme
- Plot radial dme on chart and note navaid and time
- Plot a barb for mag north from variation, and then plot with jepp plotter
- Could possibly use radials from several navaid's?

Approaching waypoint

Both pilots check next 2 positions, and slash circle

At waypoint

- MNPS - write alt's on plotting chart (each hour)
- On flight plan enter time, est to next point, fuel, temp and winds if not on NAT's, finish X on position number circle
- At 30 west you will change from Gander to Shanwick, get cell call check and relay to atlas air new york
- Position report
- Call sign, position/time, Flight level, estimating pos/time, next pos/time, fuel, temp/winds, (midpt pos, temp, winds - if on random routes they need Lat/Long to put into computer for winds, 2 digits is enough if close)

At 2 degree GNE check

- Plot coordinates from steering INS and write coord and time on plotting chart
- Check XTK, TKE and D/T on all three INS's

Before Coast in

- Coast in to NA - North American routes ie N414 on filed plan are in AT pages of enroute section of jepps in case you are assigned a different one
- Check WX on HF before coast in (freqs and times are on front page of AT 1/2 chart)

NOPAC & CEPAC P-15

RNP-10 Required navigation performance - 10

NORPAC

- Each route has the same letters all the way through
- N-O-P-A-C from North to South
- On position reports pos, estimate compulsory, next non compulsory
- (Non-compulsory reporting points on NOPAC are considered mid-points and are already plotted on chart, however a 2 degree /10 min plot after passing those mid-points is required.)
- use wx radar for mapping and checking position
- for wx diversions see chart and P-27 for more specific info about off track/altitude stuff
- Northbound- get GNE check off NOPAC charts
- Southbound- check position off shimia

BRNAV -- 5nm 95% of the time (European RNP-5 ops)

92's good for 2.5 hours unaided or unlimited if continuously updated
FOM 5.1.2
max deviation 2.5 nm/hr (5nm / 2hr) FHB 2.16.4

MNPS - Minimum Navigation Performance Standard

North atlantic

- FL 285 to FL 420
 - 27 deg North to pole
- between FIR's in north atlantic
Equip req'd 2 LRNS w/"11-24" program, desirable that the steering system be coupled to the autopilot

RVSM FHB 2.15.1 Contingency FOM 5.1.5

- limit climb/descent rate to 1000 fpm w/in 1000' of altitude
- limit over/undershoot to 150 ft.

Confirm that all altimeters are set to 29.92 IN or 1013 hPa.
Check that the primary altimeters are within 200 feet of each other.

The following equipment must be operative:

- Two primary altimeters (altimeters operating in standby mode or using the alternate static source do not qualify).
- Autopilot altitude hold.
- Altitude alerting system.
- Transponder with Altitude Reporting.

RVSM: record all altimeter's readings at

- initial entry or level off
- altitude change

NATS - North Atlantic Track System (MNPS

airspace)

FL285 - 420

Daytime, westbound 1130 - 1800 @ 30°W

Nighttime, eastbound 0100 - 0800 @ 30°W

avoid: westbound @ 30°W after 0000 / eastbound @ 30°W aft 1030

Emergencies

Rapid descent -- unable to maintain assigned altitude due to weather/acft performance/pressurization
Get revised clnc prior to initiating any action; broadcast intentions on 121.5 if unable to get clnc
Leave assigned track by turning 90°

HF Radio Stations

North America	Latin & South America	Europe & Middle East
1. ARINC (P) 2. Cedar Rapids Radio (A) 3. Miami Radio (A) 4. Houston Radio (A)	1. Cedar Rapids Radio (P) 2. Lima Radio (A) 3. Miami Radio (A) 4. Houston Radio (A)	1. Stockholm Radio (P) 2. Berna Radio (A) 3. Speedbird Radio (A)
North Pacific (Oakland & Anchorage FIR'S)	North Pacific (Japan & Taiwan FIR'S)	China South to The Philippine's
1. San Francisco ARINC (P) 2. Tokyo Radio (A)	1. Tokyo Radio (P) 2. San Francisco ARINC (A)	1. Hong Kong Radio (P) 2. Tokyo Radio (A) 3. San Francisco ARINC (A)
Myanmar South to Indonesia	Australia	Indian Sub-Continent
1. Singapore Radio (P) 2. Kuala Lumpur Radio (A) 3. Jakarta Radio (A)	1. Perth Radio (West) (P) 2. Sydney Radio (East) (A)	1. Kolkata Radio (P) 2. Mumbai Radio (P) 3. Chennai Radio (P) 4. Delhi Radio (P) 5. Stockholm Radio (P)
Africa	North Atlantic (West of 30W)	North Atlantic (East of 30W)
1. Stockholm Radio (P) 2. Springbok Radio (A)	1. Gander Radio (P) 2. New York ARINC (P)	1. Shanwick Radio (P) 2. Santa Maria (P) 3. Stockholm Radio (A)

(P) primary (A) Alternate
 India Radios with no HF FOM 8.7.4
 → Mumbai 126.9
 → Kolkata (Calcutta) 127.3
 → Chennai (Madras) Radio 124.1
 → Delhi 127.1

Low Duct Pressure FHB 3.70.32

Margins for Jepp size printing

.3 / .2 / 2.2 / 1.9 0 / footer 2.8

Mach FOM 8.4.3

.84 w/in 2000' of optimum altitude for gross weight, LRC at other times increase by .001 for each 10 knots of headwind, opposite for tailwind
 → VMO=MMO @ 25,000' (altitude for highest TAS)[Boeing book]

Max Power Takeoff and Autoland

Every 15 days FHB 2.04.03, FOM 4.3.3

Meals

Check Ground servicing manual on a/c, >=8 hours – 2 hots and sandwich tray
 >=4 hot meal

Minimum Fuel FOM 11.4.1

Minimum fuel for a diversion includes fuel burn from point of diversion to landing at the diversion airport plus fuel for 30 minutes holding at 1500' at standard temperature. (5540kg at max landing weight, from FHB 4.31.04)

Nacelle Anti Ice See Limitations

Nav Equipment FHB 5.1.1

Overweight Landing FOM 11.4.2, FHB 4.60.03

May exceed the maximum LGW if, in the Captain's judgment, it would be safer than dumping fuel or otherwise meeting the LGW limitation. Atlas Air policy is that overweight landing is safer, if follow these guidelines:

- Autoflight can be used for approach, but autoland will not be used for landing.
- Dumping is not required, provided the LGW Limited by Runway chart & LGW Limited by Climb chart criteria are met.
- If Chart criteria cannot be met and dumping is feasible, dump to maximum allowable landing weight for the runway of intended use.
- Normal landing sink rate averages 60 – 120 fpm.
- See FOM Required Reports section 11.5.1

Oxygen usage FOM 4.2.3

Used by each crewmember if > 10,000' cabin pressure
 Above FL250 used if one pilot leaves his station
 Above FL410 one pilot must wear
 For smoke in the upper deck, do not deploy masks unless the cabin is above 14,000' FOM 11.1.6

PAR/ASR (from training guide)

Captain only in weather?
 FO may fly ASR?
 200' company minimums
 Attempt to contact if no contact
 → one minute being vectored to final
 → 15 seconds on final ASR
 → 5 seconds on final PAR

PBS ShortCuts (cut and past into address line, then save as a favorite)

PBS Login Page <https://aims.atlasair.com/wtouch/wtouch.exe/index>
 PBS Main Menu <https://aims.atlasair.com/wtouch/fltinfo.exe/home>

Penny and Gules Instruments

On Tai Birds, switching to digital after engine start switch is pressed will recycle switch off.

Permit to Proceed FOM 4.3.1

An application to U.S. Customs to permit crew/cargo to pass through a U.S. Port of Entry without formally entering the country and continue to another Port of Entry for the formal entry process. Placed on acft at last international airport where cargo is loaded prior to entering the U.S. It is the responsibility of the customer airline to provide the form.

Physical

Fax to training records before 20th of month due\ 786-265-8175? (in Miami now)

Pretty Neat Stuff Bags

888-722-1792
www.luggageworksonline.com

Pushback FHB 2.07.6

The Captain will:
 •Confirm all cargo and cabin doors are closed with all door lights out.
 •Confirm electric pump is operating. If not, establish an alternate source of brake pressure.
 •Command the Flight Engineer to turn on No. 1 ADP (for pushback operation only).
 •Ensure ATC ground control clearance has been received, if required.
 •Ensure anti-collision beacon ON, prior to aircraft moving or engines being started.

QFE (bulletin 15)

TDZE □ chart = conversion factor
 QFE setting + conversion factor = QNH (round up)
 Meters □ feet (chart)
 TDZE + feet = altitude

Radar

Altitude	Tilt Setting
Takeoff	+4°
Mountainous Terrain	+5°
10,000' MSL	+3°
15,000' MSL	+2°
FL 200	+1°
FL 250	0°
FL 300	-1°
FL 350	-2°

Clearance from Thunderstorms FOM 7.6.1

- 20,000' 5 miles
- 25,000' 10 miles
- 30,000' 20 miles

Radio and Communications

Se cheatsheets

Redispatch

Min PRD pad is 1500 Kg FOM 8.5.4

Redispatch Weather

Open	>3000'/ 5m
Operational	>1000'/ 3m
Instrument	>600'/ 1m
IFR	<600'/ 1m

Reduced Thrust Restrictions

Reduced thrust takeoffs prohibited if
 Anti-skid
 Brake deactivated
 Contaminated runway
 Extra pod mounted
 Ferry on 3 engines
 Gear extended ferry
 Windshear forecasted
 PHB 7.02.4

Required Reports FOM 11.5.1

Required Pubs and Equipment

FOM 2.3.5 also bulletin 87
 1. All flight crewmembers: Flashlight
 2. Captain: Classic No requirements
 3. First Officer: All Plotter, Current Performance Handbook (PHB)

Runway Restrictions FOM 8.3.4

8,000' or less

- all thrust reversers operative
- tankering prohibited
- precision approach for high mins captain
- active runway must have VASI, PAPI etc
- 30 flaps
- med autobrakes
- awareness of visual illusions
- awareness of landing in touchdown zone, don't float
- captain must make landings
- dispatcher briefing with captain required prior to departure 8.3.4
- wet runway FOM 8.3.4 for dry dispatch restrictions

Schedules

<http://www.skyguideonline.com>

Seating Guide

<http://travel.americanexpress.com/travel/personal/resources/skyguide/plane.asp>

Shirts (Van Huesen Direct)

Aviator (what we were issued) Tallman
 Short 53-554 Long 53-555
 Pilot (pleated pockets) Tallman
 Short 53-440 long 53-362
 1-800-999-0146
 fax 1-908-231-6642

Shortwave Radio Freq's

[BBC](#) [North American List](#) [NPR](#) [VOA](#) [General worldwide](#)

Sterile cockpit

Taxi, takeoff to 10,000 AFE, 10,000' AFE and descent

Standardization FOM 4.1.1

The precise level of standardization Atlas Air hopes to maintain is high enough to discourage unsafe practices, carelessness, and the development of individualized procedures, but not so high that operational flexibility, good judgment, and professionalism are discouraged.

Stopover Store (MSP) 800-627-1372

www.stopoverstore.com

Takeoff

Gross Weight Limitations FOM 4.3.2 Weight at start of takeoff roll must be below

- Maximum structural TOGW
- TOGW limited by takeoff performance
- TOGW that will permit landing at or below the max LGW, based on anticipated fuel burn.
- Short runway, light weight, limited by shaded area at actual temp.

Telephone Stuff

Audix Shortcuts

*8 then 6400# to exit to main menu so you can talk to sched's after checking mail without redialing.

1	Rewind 2 ABC	Play/Pause 3 DEF
Louder 4 GHI	Back Up 5 JKL	Advance 6 MNO
Softer 7 PRS	Slower 8 TUV	Faster 9 WXY
*	Listen/Repla y 0 Oper	Skip #

Activity Menu	
Record and Send Messages (record,edit,address,deliver)	1
Get & Respond to Messages (Retrieve,sort/save,respond)	2
Create Personal Greetings (record,edit,activate)	3
Check Outgoing Messages (retrieve,sort/save,./modify,resent)	4

)	
Change Password (create,review/modify,scan)	5
Scan Messages Quickly (and/or headers)	6
Basic Commands	
Help	*4
Restart at activity menu	*7
Wait	*9
Transfer to an extension	*8
Look up name/extension	**6
Exit system	**9
Transfer call to operator	*0
Delete	*3
Hold message in category	**4
Relog in	**7
Skip call answer greeting	1
Use while addressing	
Alternate addressing (switch between name/extension)	*2
Use mailing list	*5

Volcanoes and Ash Clouds

General information

Starting Point [Links to different graphics and warning sites](#)
[Ash warning messages and graphics for north and central America](#)
[Forecast by flight level](#)

Imagery of the Ecuadorian volcanoes

Volcanic Activity

- Red – eruption in progress, plume > FL250
- Orange – eruption in progress, plume <= FL250
- Yellow – active from time-to-time, has increased significantly recently, exercise caution
- Green – activity ceased, normal state

GO – NOGO CRITERIA ?

- Enroute, w/in 100nm of ash cloud Day/VFR only
- Enroute, > 100nm from ash cloud Day or Night/IMC
- Terminal, w/in 20nm of arpt Day/VFR
- Terminal > 20nm Day or Night/IMC
- Dispatch will update crew 1 – 1 ½ hr prior to ETA

<http://www.ssd.noaa.gov/VAAC/washington.html>

Weather see also instruments and redispatch

Must have "atlas air weather briefing" for each departing flight

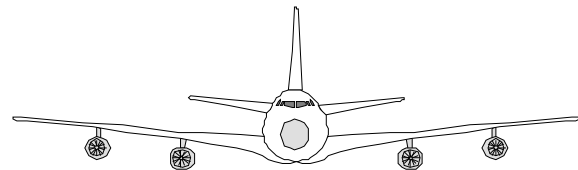
Satellite Weather Images

Satellite pics of all the bad things

Weight and Balance FOM 9.3.2

Computer Flight Plans on fuel stops

- Use ZFW AND MACZFW to back into chart to get starting index
- Don't use LIZFW (doesn't match our index on form)



Airfield and Hotel Notes

ANC Anchorage

- Beer battered Hallibut at F street inn

Icy runway readings at ANC

ANC uses a Tapley machine to take runway friction measurements, however the machine is calibrated to yield a MU, pronounced "myew") reading. Confusion has arisen from how several ATC personnel in ANC have been reporting the readings. In discussions with the ANC tower supervisor and D.O.T. personnel, ANC is attempting to convey that while using a Tapley machine, a reading of .## was taken (where .## is a decimal number). However, be advised, that recently, crewmembers have been given reports such as:
 - Tapley reading of ## (where ## was a whole number)
 - Tapley reading of .## (where .## was a two digit decimal number).
 Obviously, such phrasing can be confusing and misleading. We have

notified the ANC tower supervisor of the disparity of reports provided to crewmembers. He is passing the word to his people. Additionally, we will continue to address this through the formal mechanisms in place at ANC. **In the meantime, keep in mind that the measurements in ANC should be delineated as a □ value and presented in a decimal form.** If you hear anything different from this, clarify the information with the controller.

ATL Atlanta

Spondivits, across overpass, nice atmosphere and seafood

AUH – Abu Dhabi, U.A.E

Airport Arrival

- Hang on to gen deck with blue stamps on it, they want that one to exit
- Will be met, long taxi to Sheraton

Sheraton Abu Dhabi

Nice beach under remodeling right now 1-01

BOG Bogota Columbia

Arrival

- Get wx from Baranquia
- From north Delta 3 they will send you MQU to Utica(31) to DELTA (14) and direct to BOG whenever they're ready for you
- From south expect Techo 2, but may send you past marte to AMB for spacing
- 50nm-280kts, 30-250, 15-230, BOG-180

General -- Expect late landing clearances, there will often be an aircraft lifting off ahead of you. If you have to go missed, they will assign you direct R direct TEH direct Marte direct ABL (marte is direct line between them.)

Landing on 31 is visual like Quito, lots of very big mountains very close

After Landing

- Taxi in -- Expect to give registration # and departure point.
- Expect the handler to immediately request the max payload. When asking for clearance be prepared to give tail, taxi time and requested flight level

Level of Height and Obstacle clearance heights are different and are listed in RPM.

Push and Start -- Unlike other international airports you can obtain the ATC clearance ahead of time. Call approximately 30 minutes ahead of time with call sign, destination and cruise altitude. Expect to give registration # and estimated taxi time. When ready for push call ground for push and start clearance

→

Budapest

Stay at Marriott in "Pest" on the Danube--Right downtown, great views Mac'ds and BK right around corner. Nice maps in the free mag's in room, or you can get a big one from conciere, You can buy a "Budapest card" in hotel gift shop that get's you on all trains, buses, subway, and most museums for 48 hours, and ask for the assoc. guide that has descriptions and maps. Guys with red armbands will check your tickets randomly getting off public trans. Waling street is 1 block from hotel, lots of shops. Right across river in "Buda" is royal palace, castle hill. Local scam is to meet tourist on the street and take them to "their favorite pub" and charge huge prices

Buenos Aires – EZE

Commercial in – fill out atlas form see guide—not sure if it's still on globalnet

operate in & commercial out – get letter and gendec from rep

- Sunday afternoons antiques market about a mile away
- All you can eat grilling – Siga la Vaca near river – 8\$

Campinas

- Push and start -- ATC clearance during taxi
- Arrival – expect Sao Paulo to had you over before approach to tower who has limited English, listen carefully to the other aircraft arriving and holding
- Departure – clearance directions to contact Sao Paulo passing 5 for 6K. lost contact cleared to FPR alt after 15 Miles sqwack 7600, usually sorocaba one departure
- Simphonia not so good anymore #74
- ATM iis bra? Towards church on right, just past tall blue building
- Food court is good in very tall blue building on the way towards the church, left at the church is Mac'd(very good ice cream)
- Bottle Bar, right out door, up hill, first right on right

Chao? Resturaunt up from supermarket

Dixie blues bar

Curitiba CWB

Curfew 0300-0900z

Dover DOV

Betsy Ross Pizza 302-678-8122

Dubai DXB

Dep/arrival

From north, call radar in iran 100 miles prior

From dxb to north, call theran 10 minutes prior, right after takoff Bahrain weather 128.15?

One stamped copy of gen dec for each crewmember

Hotel is Sheraton

Gold suks are about a mile, left out the door, long walk ½ to ¾ mile then right after huge building with short fat white columns, up the street

Check price of gold, 31.1 grams to the ounce, about 9 to 10 us per gram

Mall with macD's, straight across street from hotel(street to the left side), then about 4 blocks on right (lots of construction)

Depart, pick up paperwork according to guide, after going up escalator to duty free, about 30 yards on left to meet bus

Crew room on level "M", just above pool area, free Internet and computer

Dulles

air and space museum well worth the trip, imax theater also for was wasting time

support on flight line was minimal

FRA

Noise complaint for early turn 18

Basler Ech, in Frankfurt, Germany, has received a threat curfew is 12-5 L , 1 -4 L for Luft.??see 10-4 pages

Door 5 for bus outside

B-50-59 for inside, dial on phone x70483

GUA

Captain only airport?? see bulletins

Guatemala turn not later than 5.5 dme to stay within 7 dme on arrival to 01

180 on runway, right turn directly into R and parking

did not open till 11z, not sure if permanent, had to wait for ups to leave first

take flight plans with from miami

GYE

- Ask for beef sanwiches

Hong Kong – VHHH – HKG

When commercialing in may have to have round trip tickets purchased in order to check in, or try a different agent, I just showed crew id at immigration and it wasn't a problem with them

Ground gives you a red or blue pushback clearance to pass to tug driver

mac'ds about 5 blocks straight out the door in the middle of shopping center near main street

<http://hongkong.usconsulate.gov/consular/acs/supplement.htm>

LAX

New hotel is Hilton for now, close to airport, 15 dollar lunch buffet is good, fast food a block away

If flying charter for lan chile, freq is 129.07

Noise complaint for early turn runway 25L on 28L ?

LIM Lima, Peru

They do not allow laptops past customs, well, maybe with coaxing and writing down the serial numbers.

If you're going to be there long enough, you can ask for roast beef sandwiches, actually better than vcp's.

Luxembourg – ELLX – LUX

arpt closed 2300L – 0600L (2200-0500Z / 2100-0400 summer)

can get 1hr extension for takeoff if using CargoLux call sign train from ams takes about 6 hours, leaves at 11:41 L thru brussels Inter-Continental

- Take taxi to hotel, halfway to town
- Will give rides on hotel bus downtown, last one 6:30
- pub with sandwiches (#21) down the hill under condos in middle
- Downtown
- Mousel brewery, schweinhoxen ? large roasted ham hock down in the valey
- There is an elevator from valley to main city center, glass structure in large open area on top, tunnel on bottom

The next time you're in Luxembourg at the Hilton you may just want to share some time with the bar-keep at the Hilton. He is Anthony Veit. Not only is he the beverage manager and attendant at the Mezo (that

place you go for those crew beers) but also president of the Luxembourg Barman Association. I got to know a bit about Anthony while recently visiting there. Began our conversation by speaking about my developing interest (I always wondered why they charged an arm and a leg at the ANC Humpy's) of the "Trappist" and "Abbey" beers. The beer of beers!

For some background visit here:

<http://www.belgianstyle.com/mmguide/style/abbey.html>

<http://www.beerhunter.com/documents/19133-000221.html>

Turns out, the price versus experience is an opportunity that should not be missed. Especially while you're there in Luxembourg. Anthony may direct you to the most notorious of LUX mini-pubs of "O'Bar". You won't go wrong. The barkeep will introduce you to the "Orval" the "Duval" and the more common "Leffe". Enjoy, but be careful, these are NOT your typical stateside brews. They are called "strong ales". Take a whiff. You will find the essence of a walnut in your glass. Also note, they are still puffing away there in Europe. Your clothes may smell a bit if you stay too many rounds. As suggested by Anthony (the Hilton barman), the next time I have a completely free day in the area, I'm going to rent a car. Yes, and travel to the abbey of "Chinay" for a beer and lunch served by the monks retreat. You can contact Anthony Veit (the Hilton barman) at luxbartenders@yahoo.fr. He is fluent in english, French and German. And to top it off, Anthony's family owns a commercial vineyard in France that specializes in a very late harvest white grape. A very sweet one, understandably.

MAO Manaus

General -- Expect a tight turn to final near the VOR, keep in mind the FAF altitude is only 1234' AGL and pretty close to the field Unforecast bad weather is common; the alternates are all distance

Mexico City - - MEX

Curfew MUST LAND 0500-1100z

Arrival Enter ramp via C1 or C2 - if JAL 747 parked, use C1

Departure Get clnc prior to pushback

Milan

Train station up the hill, certain trains to Milan are expresses, regular ones take ~1.5 hours

Tram to top of mtn in stressa, dangerous walk, take the boat ride

Pizza across the street is good

Café in boathouse is open when most are closed

New York, Kennedy - KJFK - JFK

Port Authority 122.95 (call for entry/pushback)

Departure

noise abatement is critical - use close-in profile

"Atlas policy is to use 13R for takeoff and not to use 13L except under unusual circumstances (e.g. 13R closed)."

31L - turn south no later than displaced ldg threshold

13R / 04L - turn at departure end

22R - depart straight ahead

ORD

Pickup at shuttle center, follow the red arrows on the floor, it's in the middle of the whole complex, from term 5 you have to take train Mexican restaurant Rosies, right out the door, first street on right, past theater, right, half a block down, can see green awning from road Gibson's, pricey, but for lunch only the prime rib is outstanding and only 14\$

Have to ask for room with high speed LAN

Preswick

Taxi to Glasgow is set up by station rep, takes about an hour.

Out of hotel to left is downtown area, bk on one of the main streets near walking street

Pudong

available at the Pudong Holiday Inn.

Set up a new Dial-up Connection:

Phone number: 9.8888

Login name: 8888

Password: 8888

Quito

Curfew ?

Free food till 10am and 6-8 pm

Mc'd and KFC left at park 2 blocks

KFC sanduche de filet, takes 5 minutes but worth it

2 dollar cab to TGI Fridays and nice mall qui central

cheap grill--right out the doors and left at first road, restaurant on right in corner, good, cheap chicken, porkchops, and ok steaks cooked on open fire

nice steakhouse -

Shorton Grill Steakhouse try Lomo Shorton(1/2 order is decent) & roasted potatoes

El Boske mall on hill above airport

Operational Notes

Check on status of volcanoes if it's not in wx/notam package.

FOM 2.4.7 daytime only landing, may be waived, takeoff anytime

FOM 15.5.1 All brakes and thrust reversers must be operational. (ops says the restriction is for landing only)

OPS computer will normally give you med brakes, may need to check brake charts

?! believe OPS computer has landing data for dipping below GS.?

Check the status of the Volcanoes; if they're active make sure the flight play allows for the appropriate protection, for arrival and departure.

At one time FOM stated it was Day VFR arrival, not really specified

now, most people end up departing at night

Special Qual, captain only airport.

Quito Briefing, transcribed and shortened from CF's Notes

General - Lot's of rocks

High Altitude 9233'

High MSA's 13,000'-18,000'

High PA's give lower performance for the engines and higher true airspeeds (higher turn radius), which gives higher groundspeeds upon landing (hot brakes).

Visual illusions

High ILS minimums - 644' AGL

Displaced threshold which gives 7513' available rollout distance

Cannot transition to PAPI before decision height, you will not have satisfactory ground clearance and will get a GPWS warning (you may get one anyway)

➔ Once at minimums for the approach intercept the PAPI and disable GPWS Glide Slope warning.

Up sloping runway where you can't see the last 3,000' upon landing. High likelihood of clouds across the approach path, and rain showers leading to slick runway

You may be given vectors (pretty good lately) around heavy showers (maintain situational awareness about terrain clearance) leading to tight and high turns to final, be configured.

Carefully review 10-1 and terrain around the airport, it basically sits in a box valley, with very high terrain within close proximity

Don't follow flight director descents in the ILS mode until established on the localizer, you are very close to the ground and in a valley between two peaks at glide slope intercept

ILS to RW 35

Normally fly the entire approach procedure, especially if new to Quito. Cross the VOR at 17,000' and Flaps 1, (note on VOR app has max of 220K)

Descend to 13,200' on the 150 radial to reach 16 DME turnpoint at Flaps 10, and preselect 12,000'

At turn, turn to heading perpendicular to final (no greater than 280) **{ use around 250deg }** at a bank angle of 15deg (make small heading changes to keep bank down on autopilot) to prevent intercepting glideslope too high, set 342 course on FO course selector and set up Capt for ILS and nav mode to LOC. Don't go past max DME of 19.5 When you pass the lead radial **{ use around 310deg with a quick turn once alive in order to intercept loc before gs }** or onto localizer if alive. **Do not follow glideslope till on the localizer path.** Missed approach procedures are critical and you will hit the mountain if you don't turn at 4.4 DME, and the 10,500' restriction is also very important. A good pocket plan is to orbit between zui and qms?? In the valley if you need to.

Visual to RW 17

Pilot controlled lighting freqs on 10-9 page

Normally fly ILS to RW 35, but if winds prevent, you will be asked to break off approach to fly east for a downwind to RW 17. On the downwind leg at 2000' AGL, 11,300', you will appear to be lower than normal due to a ridgeline and houses adjacent to the runway. The turn to final cannot be delayed/extended due to a mountain, and you cannot overshoot centerline due to high terrain to the west. Once you start the final turn, you will appear to be very high due to downsloping terrain under you, and then upsloping terrain near the runway the radar altimeter will not give accurate readings. There is a PAPI 3⁰

Landing

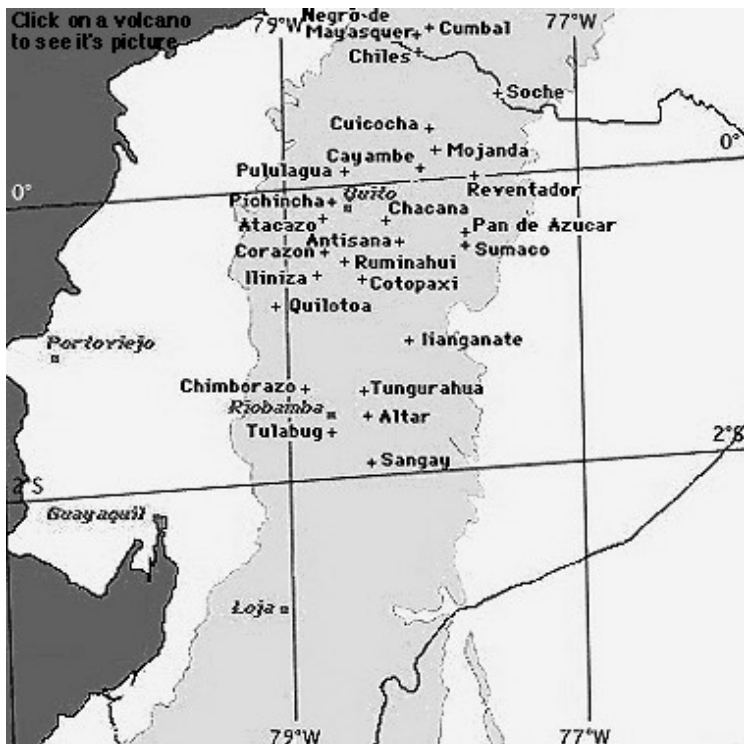
➔ There are multiple visual illusions on landing, high minimums, upsloping terrain, displaced threshold, upsloping runway for the first 2/3rds, and the last third isn't visible. Most of these will give you the illusion that you are high when you aren't, and if you disabled the GPWS you might not be warned of high sink rate.

➔ Normal parking is cargo area just north of passenger area and secondary area is north of that on military ramp. The turns to parking are very narrow with no fillet's? (no rounded corners or overrun) and lots of lights in the corners. Now they tow from the parallel most of the time.

Departure

Most departures require Flaps 20 and packs off, with a refueling in Quayaquil or Panama. Again be careful at the turns and square the corners. Normally Max TOD thrust, watch engines carefully for exceedences. Clearance is give during taxi, usually on RW 35 you'll do the dep 3 that goes to QIT and then to the north to avoid the volcanoes, otherwise plan on the 6 DME arc around QIT and on to chila for a very short trip to guayaquil.

- Use the close in departure and follow the profile closely, and monitor the crossing altitudes closely, you may have to delay cleaning up and or use the entire 5 minutes of takeoff thrust.
- Personally, I wouldn't advise **takeoff on 17** at night, I have received **GPWS terrain warnings** on the hill the ILS flies over while departing



in daylight and clear skies, heavy weight.

Quayaquil

They give pretty good vectors to avoid CB's They have good roast beef sandwiches if you ask for them, as well as cervichi For some reason the OPS computer normal thrust will get you to about 50 ft at the end of the runway with 4 engines.

RMS

131.975 mil ramp ops, also good for command post?

SFO

"If aircraft performance permits please request RWY 10 during the hours of 0100-0600 local."

Scl – Santiago, Chile

Arrival is very steep, be slow and low at the turn

- Sheraton, new bridge right out front, left on Ave Provedencia to El Ladio's (corner w/ magdalena?), the other el Ladio's is in bella vista?, left also for Swazia?
- Food is steep in Sheraton, but 20% discount and 19% tax break if paying with credit card at checkout
- Three red diamond signs are subway, maps at hotel, 200 pecos, 40c a ride
 - fish market at U. de chile ?
 - sheraton subway stop is Los L_____?

Departure – max wt daylight summer, can't make restrictions on elbos 2 departure, maybe with 5 min TOD power and cool temps

Stockholm ARN old

Door for agent between ticket counters 8 and 9, terminal 5 Radison in the airport, free breakfast, very expensive local phone calls, mcdonalds witin 50 ft.

- Train downtown is expensive ~25\$ and even more if you stay over 4 hours, bus is half as much ~13\$ and is very frequent, takes about 45 minutes with several stops
- Royal boat tour is ~12\$ for an hour short loop around the city, in the summer there are more available, walking distance from bus terminal downtown, maps at hotel

TPE – Taipei, Taiwan old

Airport Arival

- Fill out crew shore pass from airplane and don't loose
- Shang Kai Shek hotel is right on airport for short stays,
 - Take bus, go outside, take left, take left, schedule is on wall
 - Wouldn't take direct bill, had to use personal card
 - Someone will meet you and direct to cab, very long taxi
 - Crew lounge is on 3rd floor, bring food and drinks from airplane to stock, has a computer
 - Concierge has cards with directions to various attractions with pointy talky to give to cab driver
 - McD's on main road several blocks behind hotel (split road), to the south(left) .8 miles is KFC, .2 more is Pizza hut
 - Cave's books (on map) has English books near KFC
 - McKain? Hospital has dentist, cheap
 - Local attractions
 - Chang Ki Shek memorial, big buildings, changing of guard, pretty good, right- down road in front of hotel, 1.5 miles
 - Shrimp Fishing – get card from crew room, actually fish with small poles for prawns, grill em yourself
 - Computer market – only real deals are components, motherboards

ALTITUDE CHANGE		STARTING CRUISE ALTITUDE				
		OPTIMUM	2000 FEET BELOW OPTIMUM	4000 FEET BELOW OPTIMUM	6000 FEET BELOW OPTIMUM	8000 FEET BELOW OPTIMUM
		REQUIRED WIND DIFFERENCE FOR SAME RANGE				
2000	CLIMB	—	3	8	11	13
	DESCENT	3	7	11	14	17
4000	CLIMB	—	—	11	19	23
	DESCENT	11	19	24	29	34
6000	CLIMB	—	—	—	21	31
	DESCENT	23	33	41	48	—
8000	CLIMB	—	—	—	—	—
	DESCENT	36	49	60	—	—

→

LIMITATIONS

(FOLD SHEET FOR PRACTICE)

KIND OF AIRCRAFT OPERATION

This aircraft is certified in the Transport Category, FAR Part 25 and FAR Part 36.

The aircraft is approved for the following kinds of flight and operation, both day and night, when the required equipment is installed and approved in accordance with the applicable Federal Aviation Regulations:

.....	Visual (VFR)
.....	Instrument (IFR)
.....	Icing Conditions
.....	Extended Overwater

The aircraft instruments and equipment meet the performance standards of Appendix 1 of AC 120-29 for CAT II operations. (Observe CAT I/CAT II placard on Captain's instrument panel for applicable aircraft status.)

OPERATIONAL LIMITS

Maximum operating altitude is xxxx feet pressure altitude.	45,100
Maximum takeoff and landing altitude is xxx feet pressure altitude.	-1,000 to 10,000
Maximum Runway Slope	± 2%.
Takeoff, landing, and enroute operational temperature and altitude limits are shown on the Operating Envelope chart.	

STANDING SLUSH OR WATER LIMITS

Takeoff.....	1/2 Inch
Landing	1 Inch

WIND LIMITS

Limiting tailwind component is	10 knots.
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CROSSWIND COMPONENT LIMITS (Peak Gust)

Autoland.....	10 Knots
Category II ILS.....	10 Knots
Takeoff: Wet or Dry (Demonstrated) ..	30 Knots
Landing: Dry (Demonstrated)	30 Knots
Landing: Wet.....	25 Knots
Takeoff: Standing water, slush, snow, ice.....	15 Knots
Landing: Standing water, slush, snow, ice	10 Knots

PERFORMANCE OPERATING WEIGHTS

Aircraft takeoff performance weight limits derived from the takeoff gross weight charts are in compliance with the climb gradient requirements specified in FAR Part 25 and FAA Part 36.

The takeoff performance weight limits for conditions on the takeoff gross weight data charts are weights at brake release.

The takeoff gross weight data charts are based on second segment climb performance requirements. No other segment of the takeoff flight path is more limiting within the approved operational range.

Maximum permissible takeoff weight may be less than the structural limiting weight due to some other criteria such as available runway length, maximum V1, brake energy limits, obstacle clearance, etc.

FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Flaps Up	+2.5 g to -1.0 g
Flaps Down.....	+2.0 g to 0.0 g

MINIMUM FLIGHT CREW

Three crewmembers - Captain, First Officer, and Flight Engineer.

CONFIGURATION DEVIATION LIST (CDL)

With certain secondary airframe and engine parts missing, the aircraft must be operated in accordance with the limitations specified in the basic Aircraft Flight Manual, as amended by the CDL section of the Dispatch Deviations Procedures Guide (DDPG).

LOWER LOBE CARGO COMPARTMENT CONTAINERS

Aircraft that are modified to carry only LD-3 containers are prohibited from using LD-1 containers with the following exceptions: two LD-1 containers may be loaded in the two aft most positions of the forward cargo compartment, and two additional LD-1 containers in the two forward most positions of the aft cargo compartment.

UPPER DECK OCCUPANCY

No more than 5 persons, in addition to the 3 flight crewmembers, for a total of 8 upper deck occupants may occupy the upper deck cabin during taxi, takeoff, and landing. These persons, as designated by the operator (if other than flight crew), are authorized provided they follow the procedures in the Flight Operations Manual (FOM) and the following items:

- Briefed by a flight crewmember on the use of the escape means provided prior to each flight.
- Found by the operator to be physically able to use the escape means provided.

AIRSPEEDS

FLAPS (VFE)

Position 1	275 KIAS
Position 5	250/255 KIAS
Position 10	238 KIAS
Position 20	231 KIAS
Position 25	205 KIAS
Position 30	180 KIAS
Alt Drive Position 30	160 KIAS

LANDING GEAR

Extend.....	270 KIAS/.82 M
Retract	250 KIAS/.82 M
Extended.....	320 KIAS/.82 M

MAXIMUM OPERATING SPEEDS

Sea Level.....	VMO	MMO
24,000 feet.....	378 KIAS	-----
Mach/Airspeed Warning.....	392 KIAS	.92 M

The maximum operating limit speed shall not be deliberately exceeded in any regime of flight.
All airspeed markings and placards in the aircraft are shown as indicated (IAS) values and are not corrected for instrument error. VMO is indicated by the limit speed hand (barber pole) on the airspeed indicator.

OPERATIONS IN REDUCED VERTICAL SEPARATION MINIMUM

Operations in Reduced Vertical Separation Minimum (RVSM) airspace.....	MMO 0.90 M
Except Between Flight Levels 290 and 340 and gross weight less than 235,867 kgs..	MMO 0.87 M

TURBULENCE PENETRATION

.....290-310 KIAS .82-.85 M

NOISE

STAGE 3

All Atlas 747 Classic aircraft are powered by GE CF6-50E2 engines and are Stage 3 compliant in any configuration up to Max Takeoff and Landing Structural Weight (except).

Max landing weight is limited at flaps 30 to meet Stage 3 noise limits.

The "Stage 3" placard must be displayed for Stage 3 operations.

AUXILIARY POWER UNIT (APU)

Do not start or shutdown APU during refueling operations.

EGT LIMITS

Start	990°C
Continuous.....	657°C

STARTER LIMITS

0 to 60 seconds max ON time; minimum 5 minutes off between attempts, 3 attempts per hour.

61 to 90 seconds max ON time; minimum 15 minutes off between attempts. Second attempt 0 to 60

seconds max ON time, 2 attempts per hour.

INFLIGHT OPERATION

The APU may be used to supply bleed air to air conditioning pack 2 (if installed) for takeoff, provided the isolation valves remain closed. If an engine failure occurs, do not change air conditioning bleed configuration until minimum height for obstacle clearance has been achieved.

Do not use APU _____ inflight.generator power

Do not operate APU inflight _____ conditions.icing

Do not operate APU above _____ feet pressure altitude.20,000

Operation between 15,000 feet and 20,000 feet pressure altitude is limited to..... "no load" only.

_____ of the APU is not authorized..... Inflight start

AUTOMATIC FLIGHT

AUTOPILOT

Do not use altitude select mode if the rate of descent is greater than5,000 feet per minute.

Autopilot may not be engaged below _____ unless coupled and selected to ILS or LAND mode.1,200 feet AGL

Use of aileron trim with the autopilot engaged is prohibited.

Minimum Threshold Crossing Height (TCH) for autoland..... 47 feet

AUTOTHROTTLE SYSTEM

Do not use the autothrottle system during simulated engine inoperative operations.

Do not re-engage the autothrottle system on approach if it has automatically disengaged.

CABIN PRESSURIZATION

Maximum cabin differential 9.4 psi

Maximum cabin differential

T.O. and landing.....220 feet (.11 psi) below field pressure altitude

Operating with all air conditioning packs off is limited to 2,000 feet or less above takeoff or landing airport when ambient temperature is 44°C or less.

To ensure adequate precooling, operate two or more AC packs prior to taxi.

When takeoff is made with AC packs off, open one pack valve at not less than 800 feet above field elevation but prior to reaching 2,000 feet. If engine failure occurs, turn pack on only after minimum height for obstacle clearance has been reached.

During unpressurized flight:

Only 1 air conditioning pack may be on.

Pallets located in positions "M" through "Q" may not contain combustible or flammable goods.

DOORS

NOSE/SIDE CARGO

Wind limits Nose or Side Cargo doors

Door open..... 65 knots

Door operating..... 40 knots

Prior to flight, the crew will ascertain that the nose/side cargo door handles and indicator lights give a positive indication that the cargo doors are closed and locked.

SMOKE BARRIER DOOR

The smoke barrier door must be _____ during taxi, takeoff, flight, and landing closed

UPPER DECK EMERGENCY DOORS

The emergency evacuation system must be in _____ mode whenever the upper deck is occupied during..... AUTOMATIC taxi, takeoff, and landing. Engagement of each escape slide pack extractor must be verified before taxi, takeoff, and landing by checking that the _____ is visible in the AUTOMATIC viewing port.yellow knob

ELECTRICAL SYSTEM

AC POWER

AC Volts.....	115 ± 5 Volts
AC Frequency.....	400 ± 5 Hz
KW Spread	10 KW
KVAR Spread	20 KVAR
Generator Load:	
Isolated	54 KW
(_____ for _____ minutes).....	81 KW / 5
3 or 4 Generators Paralleled	51 KW
2 Generators Paralleled.....	81 KW Total

DC POWER

DC Volts (Battery & TR)	25 to 32 Volts
DC Volts (APU Battery)	25 to 36 Volts
Max TR Load .. Continuous.....	75 Amps
Amps 30 minutes.....	93
Amps 5 minutes.....	113

AUXILIARY POWER

APU or External	250 Amps
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EMERGENCY EQUIPMENT

ELT LIMITATION

The ELT does not need to be manually activated for test purposes. Manual activation, if required, is limited to the first five minutes of the hour, is to be of very short duration (5-10 seconds) and coordinated with ATC.

OXYGEN REQUIREMENTS FOR UPPER DECK OCCUPANTS

An adequate quantity of oxygen must be provided for each occupant for flight at 25,000 foot cabin altitude to the nearest suitable airport when cargo compartments are loaded as Class E compartments.

UPPER DECK ESCAPE SLIDE

The upper deck escape slide must be in the forward locked position whenever the upper deck is occupied during taxi, takeoff, and landing.

ENGINES

ENGINE THRUST

Takeoff and Maximum Continuous Thrust N1 are presented on the appropriate thrust setting charts. When using TAT/ N1 indicator for takeoff, the value presented must be cross-checked with the appropriate takeoff chart. If values differ, the Takeoff and Maximum Continuous charts shall be used.

Use of maximum takeoff thrust is limited to 5 minutes.

ENGINE RPM & EGT

Max RPM	
N1	118.5 %
N2	109.5 %
Max EGT	
Start	750°C
Acceleration (2 minutes max).....	960°C
Takeoff (5 minutes max).....	945°C
Continuous.....	910°C

ENGINE INSTRUMENT MARKINGS.

Maximum and Minimum Limits ..	Red radial line
Cautionary Limits.....	Yellow arc
Normal Operating Range.....	Green arc

ENGINE FUEL SYSTEM

The fuel designation is GE Specification D50TF2, or as revised.

Fuels conforming to commercial jet fuel specification ASTM-D-1655-65T, Jet A, Jet A1, JetA-50, and Jet B are authorized for unlimited use.

Fuels conforming to MIL-T-5624G, grades JP-4, JP-5, or JP-8 are acceptable alternatives.

The engine will operate satisfactorily with any of the above fuels or any mixture thereof.

ENGINE IGNITION

Ignition must be on:

For takeoff and landing.
For operations in heavy rain.
During severe turbulence.
In volcanic dust.
Upon entering icing conditions.

When standing water or slush exists on the runway.

ENGINE OIL SYSTEM

Minimum Oil Pressure 10 PSI
Maximum Temperature
Continuous160°C
15 Minutes..... 160-175°C
Maximum Oil Consumption per Hour .. 1/2 Quart

ENGINE STARTER

Max Continuous Operation..... 5 minutes
Max Re-engage30% N2 RPM

PENNY & GILES ENGINE INSTRUMENT DISPLAY SYSTEM

The "compacted" view (reversion mode) is approved for takeoff only when engine digital mode is selected on the other display.
The system requires two fully working Display Units, with no major bit errors occurring.
If any major bit errors occur prior to takeoff, takeoff will not be initiated.
Takeoff will not be initiated if the engine instruments display any engine exceedance. If any blue, yellow, or red exceedance is displayed, notify maintenance.

REVERSE THRUST

Use forground operation only.

FLIGHT CONTROLS

FLAPS

Do not extend flaps above20,000 feet.

FLIGHT CONTROLS

Avoid rapid and large alternate control inputs, especially in combination with large changes in pitch, roll, or yaw (e.g., large side slip angles) as they may result in structural failure at any speed, including below VA.

SPEEDBRAKES

Do not operate speedbrakes inflight withflaps extended.

FIRE DETECTION

CARGO SMOKE

The cargo smoke detector system must be operable in all main deck cargo zones in which cargo is loaded.

FLIGHT INSTRUMENTS

AUTOMATIC ALTITUDE REPORTING SYSTEMS

When it is desired to operate the automatic altitude reporting system in conjunction with either a conventional barometric altimeter or an electrically corrected altimeter in the uncorrected mode, compliance with FAR 91.217(b) must be shown, otherwise, the altitude reporting system must be off.

OPERATIONS IN REDUCED VERTICAL SEPARATION MINIMUM (RVSM)

Use of the alternate static source for primary altimeters does not meet accuracy requirements of RVSM airspace. Standby altimeters do not meet altimeter accuracy requirements of RVSM airspace. Servo-pneumatic altimeters (as installed) with mode switch in STBY do not meet the accuracy requirements of RVSM airspace.

TERRAIN AWARENESS WARNING SYSTEM

The Sandel Terrain Awareness and Warning System TAWS/RMI Pilot Guide document No. 82002-PG-F (or later applicable revision) must be immediately available to the flight crew when operating the ST3400. The TAWS display is intended to serve as a situation awareness tool only. Navigation must not be predicated upon the use of the TAWS. The TAWS database and alerting algorithms do not account for all man-made obstructions. Pilots are authorized to deviate from their current Air Traffic Control (ATC) clearance to the extent necessary to comply with a TAWS warning. To avoid giving unwanted terrain alerts, the TAWS terrain alerts must be inhibited when landing at airports that are not included in the airport database. Data loading and maintenance mode operation are prohibited during normal flight operation.

TRAFFIC ALERT and COLLISION AVOIDANCE SYSTEM (TCAS)

Pilots are authorized to deviate from their current ATC clearance to the extent necessary to comply with TCAS resolution advisories.

FUEL SYSTEM

FUEL LOADING

See Atlas Air Aircraft Fueling Manual. Tanks may be loaded simultaneously and in any sequence. When main tanks 1 and 4 are not full, the required minimum weight of fuel in these tanks must be one half the difference between actual taxi weight and the certified maximum zero fuel weight (MZFW): (Main 1 & 4 + Reserve 1 & 4) = (Taxi Wt - MZFW) / 2 Do not operate HF radios or weather radar within 50 feet of any..... refueling operations.

FUEL LOAD PRIOR TO TAXI FOR TAKEOFF

Each main tank must contain a sufficient fuel quantity for engine start, taxi, takeoff, and landing. Center tank fuel may be loaded only when main tanks and reserve tanks 1 and 4 are full, except when center tank fuel is considered as payload. Load main and reserve tanks so that the resulting fuel load is symmetrical about the aircraft centerline. Check Fuel Density chart, this section.

FUEL USAGE

Fuel configuration to be used for takeoff must be sampled a minimum of ___ minutes at _____ thrust fuelfour / idle

consumption, or at a thrust level which will consume an equivalent amount of fuel, following engine start and prior to takeoff brake release. Use respective main tank to engine fuel feed with all main tank boost pumps ON and No. 1 and No. 4 fuel crossfeed valves open during all landings, except when the fuel quantity in any main tank is 900 kgs or less. When the fuel quantity in any main tank is 900 kgs or less, turn on all main tank boost pumps, open all crossfeed valves and do not exceed 8 degrees nose up body angle.

The maximum tank fuel temperature is 54.5°C, except JP-4, which is 43°C.

Inflight tank fuel temperature must be maintained at least 3°C above the freezing point of the fuel being used.

RESERVE TANKS

Reserve fuel may be transferred when:

All center tank fuel (except scavenge) is used.

Fuel quantity in main tanks 1 & 4 is less than 10,205 kgs per side.

Aircraft gross weight is 318,875 kgs. or less.

OPERATION WITH FUEL BOOST PUMPS INOPERATIVE

With any main tank 2 or main tank 3 boost pump or center tank override/jettison pump inoperative for takeoff, fuel in the center tank in excess of any fuel considered as payload must be less than 4,535 kgs.

Refer to FHB Fuel Alternate Operations section 3.28 and the Dispatch Deviation Procedures Guide (DDPG) for dispatch and operational procedures.

MAXIMUM FUEL TANK QUANTITIES

All weights based on 3.039 kgs/gal.

1 & 4 Reserve Tanks..... 510 gallons 1,550 kgs.

1 & 4 Main Tanks..... 4,319 gallons 13,125 kgs.

2 & 3 Main Tanks..... 12,540 gallons 38,125 kgs.

Center Wing Tank..... 17,164 gallons 52,160 kgs.

HYDRAULIC SYSTEM

Minimum quantity for dispatch:

System 1 & 4 7.5 gallons

System 2 & 3 4.5 gallons

ICE AND RAIN PROTECTION

NACELLE ANTI-ICE

Nacelle Anti-ice must be ON when icing conditions exist or are anticipated.

Temperature Range for Nacelle Anti-ice on with visible moisture (AFM).

Taxi and Takeoff..... 10°C or below

Climb and Cruise 10°C TAT to -40°C SAT

Descent..... 10°C TAT and below

Min N1 RPM for operating in icing conditions, except for landing: 50% N1 RPM at or above 10,000 feet

45% N1 RPM below 10,000 feet

For Nacelle Anti-ice with inoperative engine(s) or bleed(s):

3 engines/bleeds 2 packs ON Maximum

2 engines/bleeds 1 pack ON Maximum

WINDOW HEAT

Window heat must be ON for both the No. 1 windows and both the No. 2 windows for all normal flight conditions.

The window heat may be inoperative on one No. 1 or one No. 2 window provided operation is not predicated on flights into known or forecasted icing, windshield air (anti-fog systems) are operative and remaining No. 1 and No. 2 window heaters are operative.

LANDING GEAR

AUTOMATIC WHEEL BRAKES

The automatic wheel brake system does not adversely affect any other aircraft system. In case of rejected takeoff, manual braking will be used to stop the aircraft. The automatic wheel brake system takeoff option is strictly a backup feature. Compliance with aircraft performance operational limitations of FAR 121 is based upon takeoff and landing performance data using manual wheel braking.

BODY GEAR STEERING

Body gear steering shall be deactivated when the aircraft is aligned with runway for takeoff and prior to advancing the thrust levers. It shall remain deactivated until reaching taxi speed after landing or during a rejected takeoff.

NAVIGATION

INERTIAL NAVIGATION SYSTEM LTN-92

The procedures and information contained in Litton 92 Pilot's Guide must be available whenever operations are predicated on inertial navigation.

Alignment limitations: for flights less than 10 hours duration, alignment is limited to less than 81 degrees 36 minutes North and South latitudes. For flights of more than 10 hours but less than 15 hours duration, alignment is limited to less than 76 degrees 32 minutes North and South latitudes.

Lateral navigation using SID(DP) or STAR waypoints can only be flown if the database name, as viewed on the CDU, contains "AAWH/S". Only "AAWH/S" databases contain SID(DP) and STARs. All SID(DP) or STAR altitude constraints must be manually flown.

SID(DP)s or STARs derived from manual entry of the waypoints or generated from a PC are not approved for RNAV use. Only SID(DP) and STAR procedures in the AAWH/S database, coded by a unique name, and contained in the Jeppesen Manual are approved for RNAV use.

INS cannot be used as the sole source of navigation for STARs unless radio update is obtained 1 hour prior to commencing the STAR. When radio updating is not obtained within 1 hour of execution, radio navigation data

must be monitored for determination of position accuracy during the execution of the STAR.
 All approved SID(DP) and STAR procedures are coded by a unique name and are found contained in the Jeppesen Manual.
 Selection or revision of STAR or SID(DP) procedures must be accomplished at or above 10,000 ft. SID(DP) selection must be accomplished prior to departure. This does not preclude the pilot from executing Direct To or leg changes below 10,000 ft.

WEIGHT AND C.G. LIMITATIONS

Any weight in excess of the maximum landing weight must consist of disposable fuel.
 The maximum weight limits may be restricted by center of gravity and fuel loading limits.
 Refer to C.G. graphs in this chapter for C.G. limits.
 Consult with Aircraft Loading Manual for specific loading coordinates.
 The aft C.G. limit of 26% MAC does not apply if persons in the upper deck are crewmembers, loadmasters or supernumeraries who are briefed on the operation of the inertial reels and harnesses.
 The maximum takeoff weight at brake release and the maximum landing weight are the lesser of maximum structural weight limits, performance limits, or noise limits.

MAXIMUM STRUCTURAL WEIGHTS (KGS)

Max Taxi Weight	379,202 kgs.
Max Takeoff Weight.....	377,842 kgs.
Max Landing Flaps Weight (Inflight).....	294,834 kgs.
Max Landing Weight.....	285,762 kgs.
Max Zero Fuel Weight	267,619 kgs.
Max Fuel Transfer Weight (1 & 4 Reserve).....	318,875 kgs.

MAXIMUM STRUCTURAL WEIGHTS (KGS) (Cont'd)

Tires approved for at least 235 MPH true groundspeed (204 knots) must be installed in order to utilize the maximum structural and performance limited takeoff weights. The main gear tires must be 49 X 19-20 with at least 55,700 pound load (34 ply rating). Basic nose gear tires are the same as the main gear tires, but 49 X 17 tires with at least a 46,700 pound rated load (30 ply rating or greater) 225 MPH speed rated (196 knots), may be used provided the takeoff weight tire limit speeds in the performance section of the AFM are met.

Table B-1. HF SSB LDOCF Frequencies Guarded (kHz)

HF LDOCF Facility	3013	3494	6637	6640	8921	8933	10033	10075	11342	13330	13348	17940	17925	21964	13333
San Francisco		✓		✓					✓		✓		✓	✓	
New York		✓		✓		✓		✓	✓		✓		✓		
Miami (Silvair, Inc.)			✓		✓		✓			✓		✓		✓	
Santa Cruz, Bolivia (Remote)		✓		✓		✓		✓	✓		✓		✓		
Pacific-Guam (Remote)		✓	✓	✓					✓		✓		✓		✓



www.storadio.com

Monitored frequencies (kHz)
 3 494 Night z
 5 541 H24
 8 930 H24
 11 345 H24
 13 342 H24
 17 916 H24
 23 210 Daylight z

All times in UTC (GMT)

PRIMARY AND ALTERNATE HF FLIGHT WATCH STATIONS			
NORTH AMERICA	ARINC (P) Miami Radio	Stockholm Radio (P) Berna Radio Speedbird Radio	EUROPE & MIDDLE EAST
LATIN & SOUTH AMERICA	Miami Radio (P) ARINC Lima Radio	Perth Radio (P) Sydney Radio	AUSTRALIA
NORTH PACIFIC (OAKLAND & ANCHORAGE FIR'S)	San Francisco ARINC (P) Tokyo Radio	Kolkata Radio (P)127.3 Mumbai Radio (P)126.9 Chennai Radio (P)124.1 Delhi Radio (P)127.1 Stockholm Radio (P)	INDIA (HF & VHF)
NORTH PACIFIC (JAPAN & TAIWAN FIR'S)	Tokyo Radio (P) San Francisco ARINC	Stockholm Radio (P) Springbok Radio	AFRICA
SOUTH PACIFIC (CHINA TO PHILIPPINES)	Hong Kong Radio (P) Tokyo Radio San Francisco ARINC	Gander Radio (P) New York ARINC (P)	NORTH ATLANTIC (WEST OF 30W)
SOUTH PACIFIC (MYANMAR TO INDONESIA)	Singapore Radio (P) Kuala Lumpur Radio Jakarta Radio	Shanwick Radio (P) Santa Maria Radio (P) Stockholm Radio	NORTH ATLANTIC (EAST OF 30W)



MIA Parking

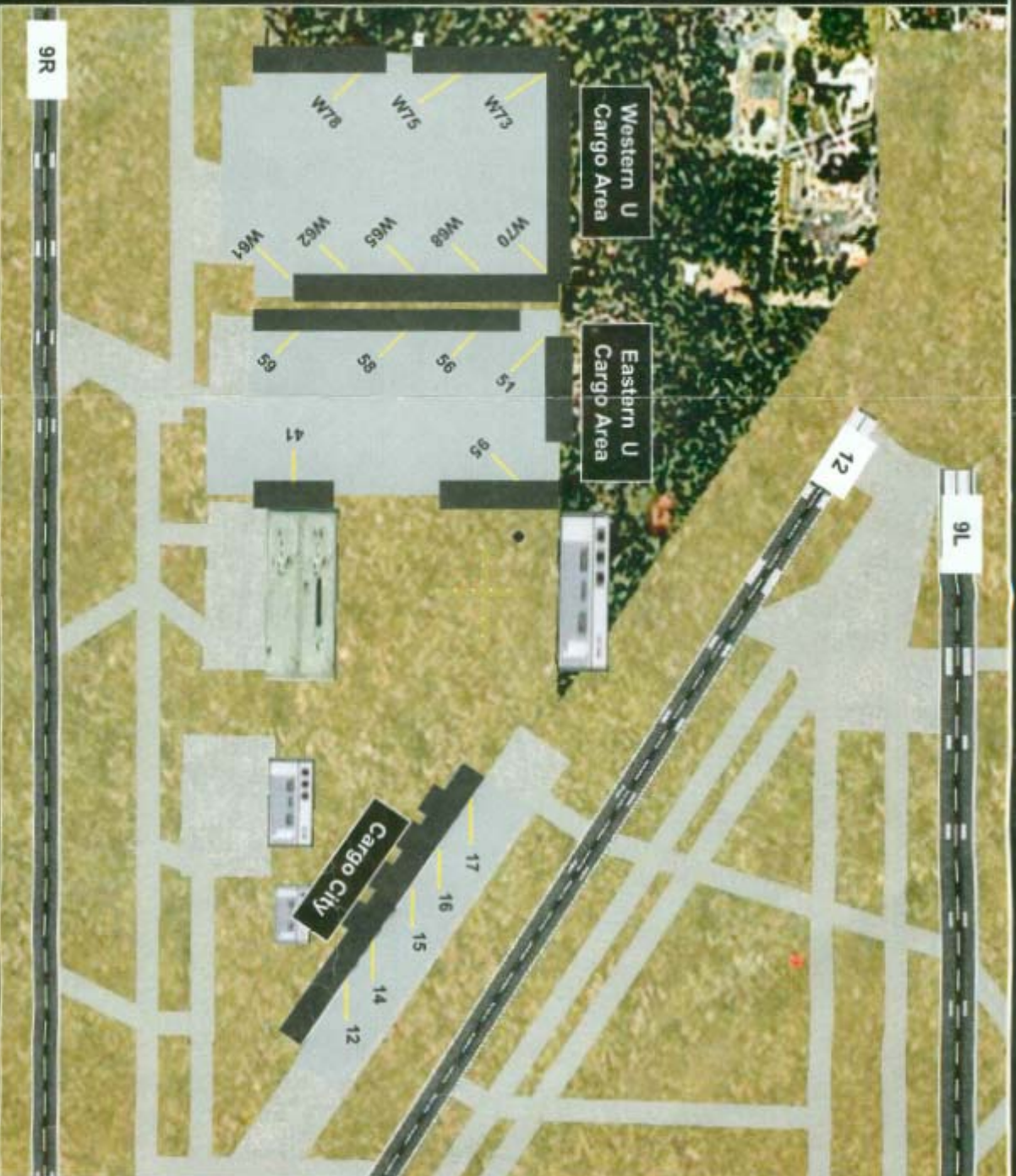


Western U Cargo Area

Spot	Latitude	Longitude
W61	N2547.3	W08018.3
W62	N2547.4	W08018.3
W65	N2547.4	W08018.3
W68	N2547.5	W08018.3
W70	N2547.6	W08018.3
W73	N2547.6	W08018.4
W75	N2547.5	W08018.4
W78	N2547.4	W08018.4

Eastern U Cargo Area

Spot	Latitude	Longitude
41	N2547.4	W08018.0
95	N2547.6	W08018.0
51	N2547.6	W08018.2
56	N2547.5	W08018.2
58	N2547.4	W08018.2
59	N2547.4	W08018.2



Cargo City

Spot	Latitude	Longitude	Spot	Latitude	Longitude
12	N2547.4	W08017.5	16	N2547.6	W08017.7
14	N2547.4	W08017.6	17	N2547.6	W08017.8
15	N2547.5	W08017.7			

POLAR ROUTE COMMUNICATIONS
Aircraft transiting on the Polar Routes can contact SFO ARINC on their LDOC frequencies through the Barrow, Alaska remote site.

PAC
Air-to-Air
123.45

ARINC VOICE
NYC
436623
631-244-2492
SFO
436625
925-371-3920

NOTE: If you are already communicating with ARINC on an ATC frequency, coordinate with the Radio Operator for the proper LDOC frequency to change to for company communications.

SAN FRANCISCO (ARINC)
CWP
2998 4666
6532 8903
11384 13300
17904 21985

SAN FRANCISCO (ARINC)
NP
2932 5628
5667 6655
8915 8951
10048 11330
13273 13339
17946 21925

SAN FRANCISCO (ARINC)
CEP-1
3413 3452
5574 6673
8843 10057
13288 13354

SAN FRANCISCO ARINC PACIFICNET
131.95
Extended Range

SAN FRANCISCO ARINC PACIFICNET
131.95
Extended Range

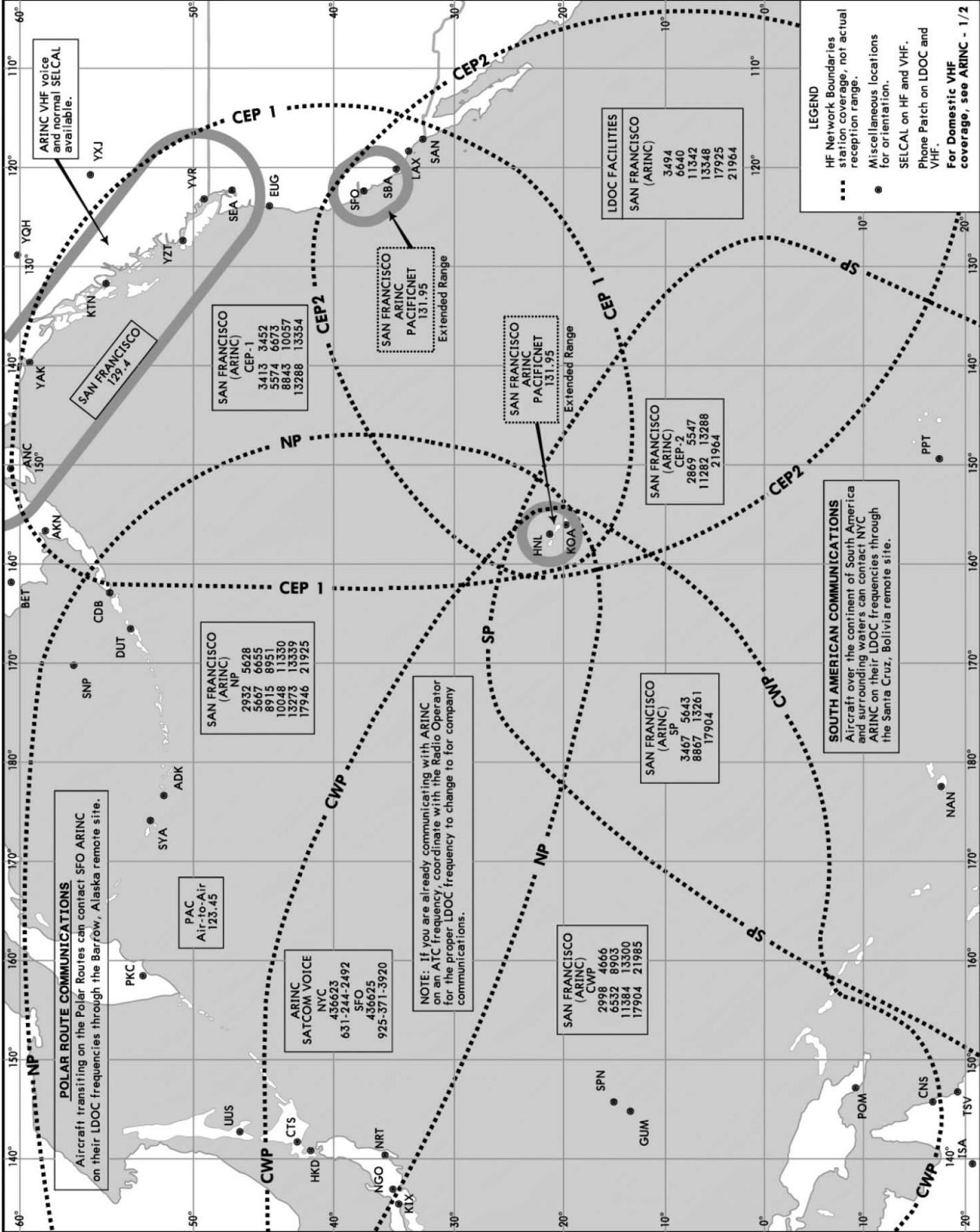
SAN FRANCISCO (ARINC)
SP
3467 5643
8867 13261
17904

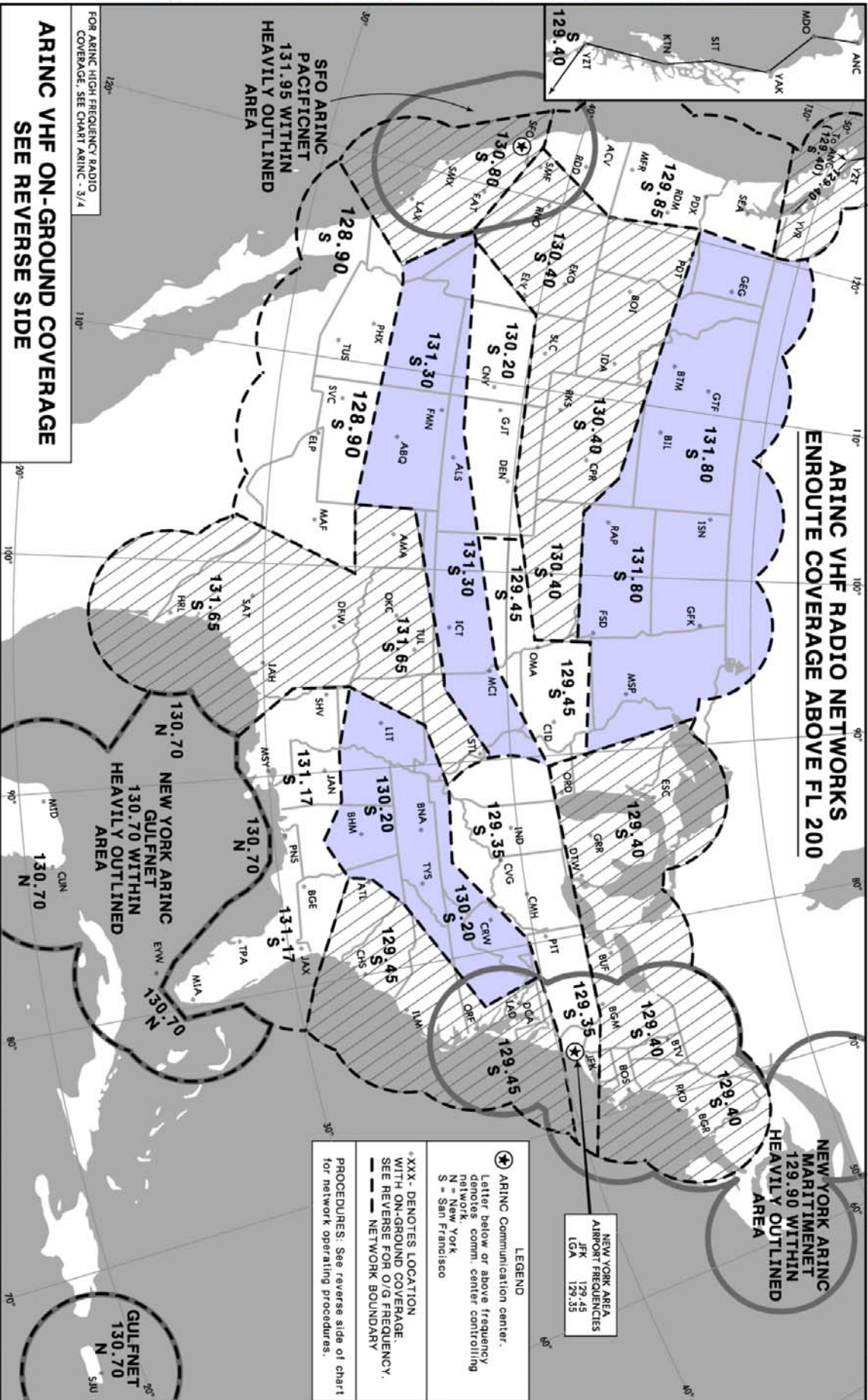
SAN FRANCISCO (ARINC)
CEP-2
2869 5547
11282 13288
21964

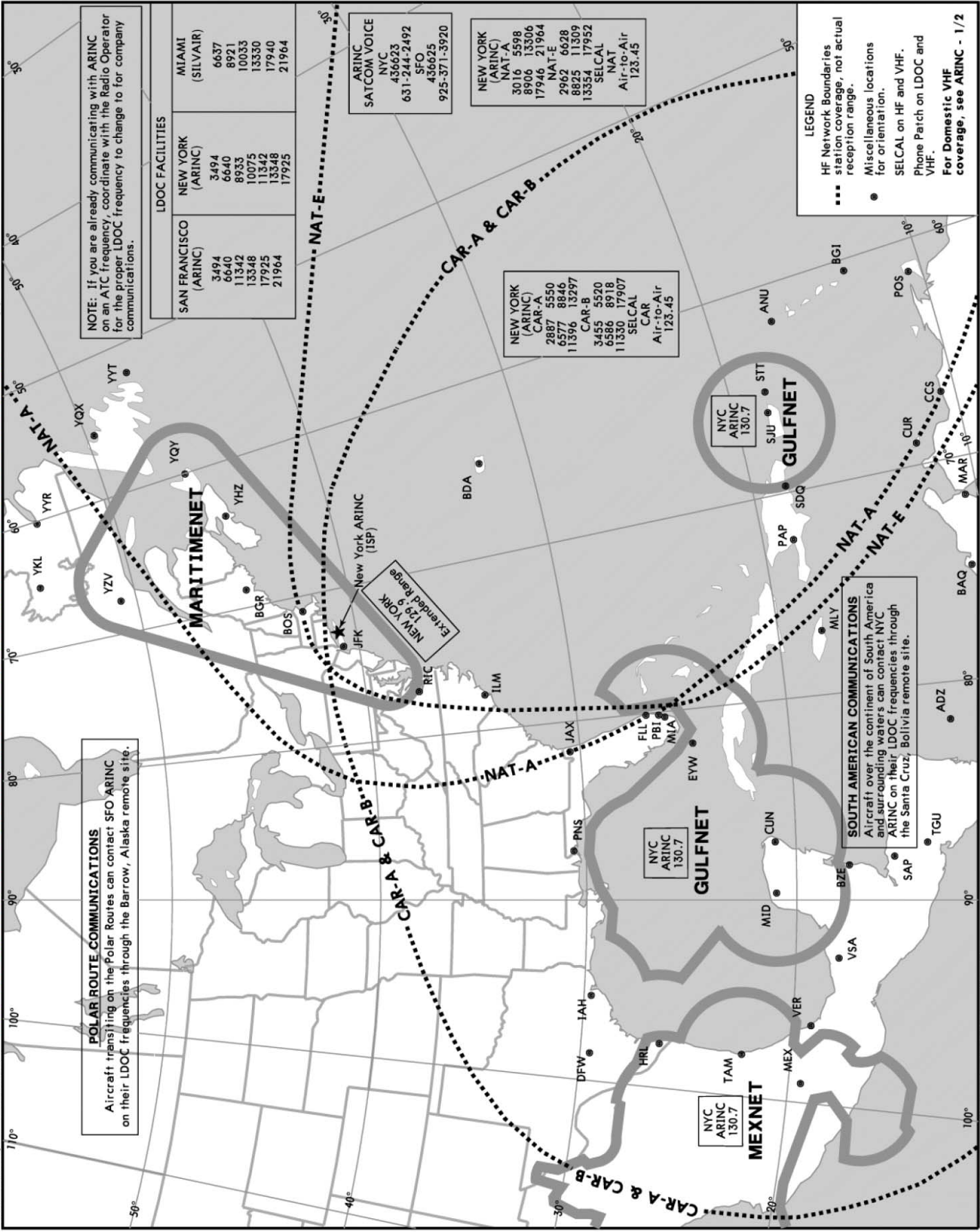
LDOC FACILITIES
SAN FRANCISCO (ARINC)
3494
6640
11342
13348
17925
21964

SOUTH AMERICAN COMMUNICATIONS
Aircraft over the continent of South America and surrounding waters can contact NYC ARINC on their LDOC frequencies through the Santa Cruz, Bolivia remote site.

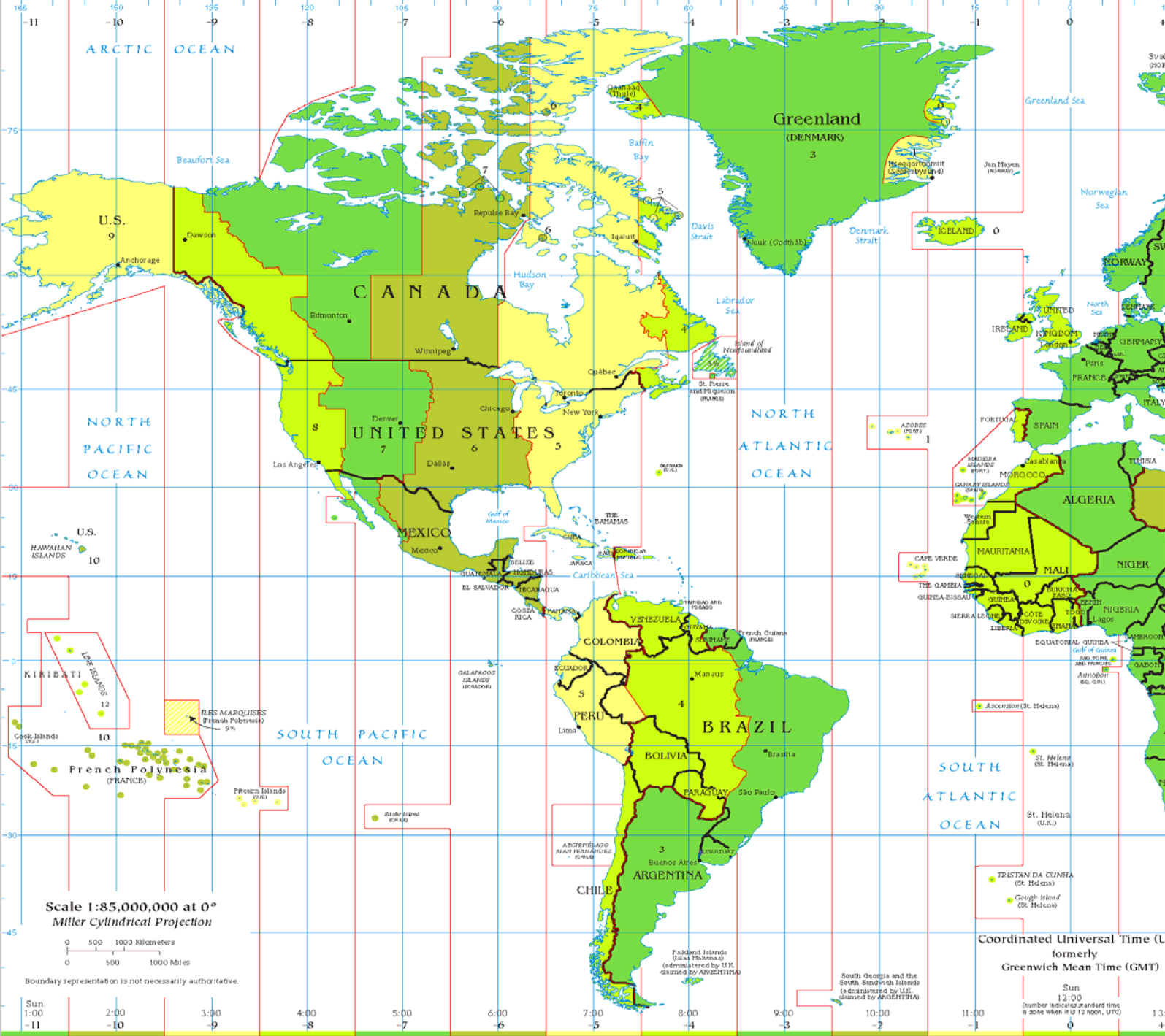
LEGEND
HF Network Boundaries station coverage, not actual reception range.
Miscellaneous locations for orientation.
SELCAL on HF and VHF.
Phone Patch on LDOC and VHF.
For Domestic VHF coverage, see ARINC - 1/2



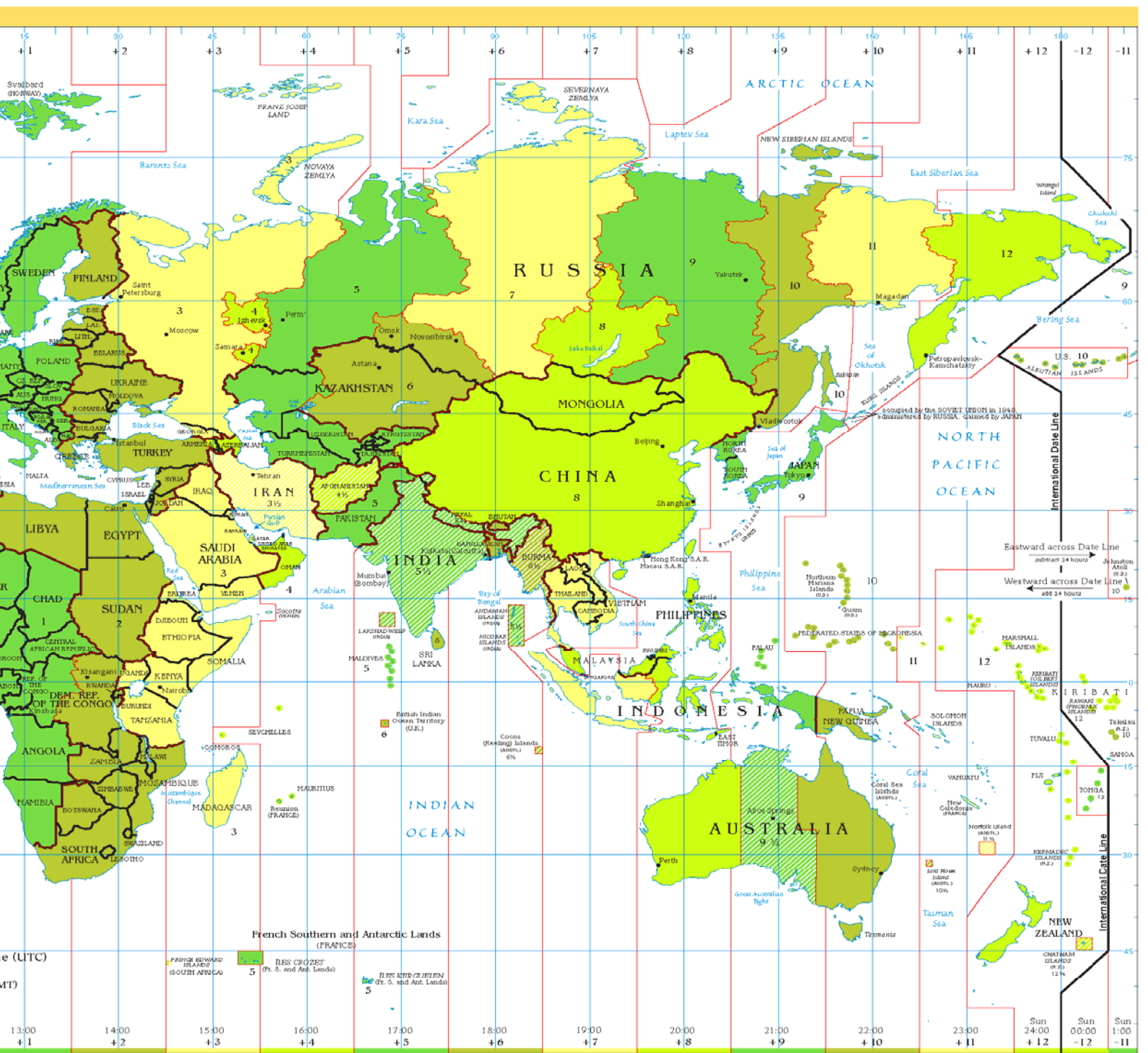




STANDARD TIME ZONES OF THE WORLD



Add time zone number to local time to obtain UTC.
 Subtract time zone number from UTC to obtain local time.



Subtract time zone number from local time to obtain UTC.
 Add time zone number to UTC to obtain local time.

NORTH AMERICA



SOUTH AMERICA



CENTRAL AMERICA AND THE CARIBBEAN



802916A1 (R02108) 6-02

OCEANIA



803264A1 (R02111) 5-07

EUROPE



MIDDLE EAST



ASIA



SOUTHEAST ASIA



gat's notes

			FL 410	FL 400	FL 390	FL 380	FL 370	FL 360	FL 350	FL 340	FL 330	FL 320	FL 310	FL 300	FL 290	FL 270	FL 250	FL 200		
KIAS for .84			250	256	262	268	275	281	287	294	301	307	314	321	328	342	357			
TAT			+10/+20		-14/-3	-15/-3	-15/-3	-14/-3	-12/-1	-10/2	-8/4	-5/6	-3/8	-1/11	1/13	6/17				
Climb 1K			+ 10		256.8 max	233.1	244	255.8	269.4	282.1	295.7	310.3	324.3	340.2	358.3	391.9				
			+ 20		258.7 max	234.1	244.5	255.4	269.4	282.6	295.7	309.8	324.8	334.8	358.3	375.6				
Climb 2K			+ 10		245.3 max	-	233.1	244	255.8	269.4	282.1	295.7	310.3	324.3	340.2	374.7				
			+ 20		247.5 max	-	234.1	244.5	255.4	269.4	282.1	295.7	309.8	319.8	340.2	373.3				
Climb 3K			+ 10			-	-	245	254	254	281	304	308		345					
Climb 4K			+ 10		223.8 max	-	-	-	233.6	244	255.8	269.4	282.1	295.7	310.3	340.2				
			+ 20		226.7 max	-	-	-	234.1	244.5	255.4	269.4	282.1	292.1	309.8	340.2				
Engine Out	Vref Hold	Max FL Opt FL	1.4 G	225	236	248	260	273	287	301	316	331	347	363	370	377	-	-		
			1.3 G	243	255	267	280	294	309	324	340	356	366	377	377	377	-	-		
3 eng alt	Vref	+ 10	Crz Thr Cap	244	257	271	286	301	315	330	343	356	364	372	374	377	377	377		
2 eng alt	>=15K md	MAX FL	ISA TAT/SAT	-26/-56	-26/-56	-26/-56	-26/-56	-26/-56	-23/-54	-23/-54	-20/-51	-19/-50	-17/-48	-14/-46	-12/-44	-10/-42	-5/-38	-1/-35		
2 opt spd	<15K +80	OPT FL	Optimum Wt	206	217	228	240	253	266	279	294	309	325	341	355	370	377	377		
24500	174	FL327 FL298	360,000											292	289	286	282	278	273	
														.788	.766	.743	.705	.664		
														.853	.853	.851	.848	.837	.823	.775
26700	168	FL338 FL311	340,000			Min KIAS						287	284	281	279	277	273	270	265	
						Min Mach						.804	.782	.759	.739	.719	.682	.649		
						LRG						.832	.853	.852	.850	.847	.842	.828	.812	.760
28.7	162	FL352 FL322	320,000						283	279	275	273	270	268	266	263	260	256		
18000									.828	.802	.776	.755	.733	.712	.691	.660	.627			
307									.853	.852	.849	.845	.840	.833	.817	.798	.743			
30,900	157	FL366 FL338	300,000	→	→	→	→		268	265	262	260	258	256.5	255	253	250	247		
20000	285								.792	.768	.743	.724	.704	.685	.665	.636	.609			
297	237								.853	.853	.851	.848	.843	.837	.830	.822	.804	.783	.725	
33000	150	FL381 FL351	280,000				260	257.5	255	252.5	250	249	248	246.5	245	243	241	237		
22000	275						.803	.781	.758	.736	.714	.696	.678	.661	.643	.614	.583			
287	230						.852	.853	.852	.850	.846	.840	.834	.826	.817	.808	.787	.765	.705	
35100	143	FL397 FL367	260,000			253	250	247	245	243	241	239	238	237	235.5	234	233	231		
24000						.818	.791	.765	.744	.723	.703	.683	.666	.649	.632	.615	.588	.563		
						.853	.853	.851	.848	.843	.837	.829	.821	.812	.802	.791	.769	.745	.683	
37000	137	FL414 FL385	240,000	244	243	238	236	234	232	230	229	228	227	226	225	224	223	221	220	
27000	254			.817	.797	.772	.751	.730	.709	.688	.672	.655	.638	.620	.605	.590	.565	.537		
267	217			.853	.853	.852	.849	.845	.839	.832	.823	.814	.804	.794	.783	.771	.747	.722	.660	
38000	130	FL433 FL400	220,000	231	229	225	223	221	220	219	218	217	216	214	213.5	213	212	211		
29000	243			.776	.756	.728	.711	.693	.676	.658	.639	.620	.610	.599	.581	.563	.537	.513		
258	210			.852	.850	.845	.840	.833	.825	.816	.806	.795	.784	.772	.760	.748	.722	.697	.634	
40500	124	FL450 FL420	200,000	218	216	211	210	209	208	207	206	205	205	204	203.5	203	202			
31000	232			.736	.716	.693	.674	.655	.640	.624	.607	.590	.577	.563	.551	.538	.514			
248	204			.846	.840	.833	.825	.816	.806	.795	.783	.772	.759	.747	.734	.721	.695	.669	.607	

1/2 Headwind Component + Full Gust

Timing	Holding Altitude	USA	ICAO
1 min	0-6000'	200	230
	>6000-14000	230, 210 where published	
1 1/2 min	>14000' - FL 200	265	240
	>FL 200 - FL 340		265 / .83 M

DIVERT		
Distance	Altitude	Fuel
100	15	10
200	25	13
400	35	17.5
600	37	21
800	37	27

250k zero fuel wt, arriving with approx 7k fuel

Term	NOTAM	ICAO WX CODE	Friction Mu	Braking Action Tapley	RCR
Good	BRAG	5	.4 to 1.0	57 to 77	19 to 25
Medium to good		4	.36 to .39		
Medium or Fair	BRAF	3	.3 to .35	39 to 56	13 to 18
Poor	BRAP	2	.26 to .29	18 to 38	6 to 12
Nil	BRAN	1	<=.25	6 to 17	2 to 5

RVSM (east is odd) (SA South is Odd)
 WEST 300 320 340 360 380 EAST (odd) 290 310 330 350 370 390
 Normal (below 290 east is odd)
 WEST(north) 310 350 390 EAST(south) 290 330 370 410
 5630N for NW coord.
 DME² - (altitude/6000)² = √range from station

Central and South America		
	128.85	
Miami Radio	6637	21964
	10033	
Lima Flight Support (must say fit sup)	130.7 8885	11306 17937
Caribbean		
	130.7*	10075
New York Atlantic/carib	3494 6640 8933	11342 13330 17925
*In eastern caribbean – dial access stations – key mike 3 times in 5 sec, wait for ident, allow 60 seconds for answer		
San Francisco	131.17	
Miami	128.85	
Rest of the world		
Guam	6532 11384	17904 21985
		11342
Honolulu	3013	13348
Pac rim	6640	17925
		21964
Berna (swiss) n. atl to mid east & n. Africa 06z to 22z	6643 8936 10069	13205 15046 18023 21988 23285d
Stockholm N atl to mid east	3494 (22-2z) 5541(AUH) 8930 (2-22z)	11345 13342 17916 (India 8z) 23210
Rainbow Radio (Newfoundland) n. atl e. Canada	3446 5604 8819	13285 17910
		11342
		13348
San Francisco	3013 6640	17925 21964
Volmets		
Pacific	2868 6679 8828 13282	0-5 Hawaii 5-10 US 10-15 Japan 25-30 AK
Shannon	All SSB 3413n 5505 8957 13264d	00 brussels, frank 5 shannon 10 met pik 15 fcst Madrid 20 milan,met madrid
New York	3485 6604 10051 13270	0-5 ord 10 jfk 15 mia 30 ord 40 met jfk 45 met mia
Gander	3485 6604 100051 13270	50 gander 55 goose

ANC	ATIS OPS Phone	907-248-1131 131.95 907-243-7277
ATLAS	GCC Dispatch Dispatch Idents	914-701-8500 914-701- 914-701- JFKOW5Y, KJFKGTIW, GTI, 5Y
Emergency	HF VHF	3023, 5680 121.5
JFK	Polar atis	130.675? 718-995-8188
LAX	Polar	130.12?
MIA	ATIS AWOS Flight Watch OPS RADIO	305-869-5445 305-870-0235 122.0 131.95 128.85
ORD	POLAR	131.675?
Time	Phone WWV Canada Germany	303-499-7111 5,10,15K 3330, 7335, 14670 4525