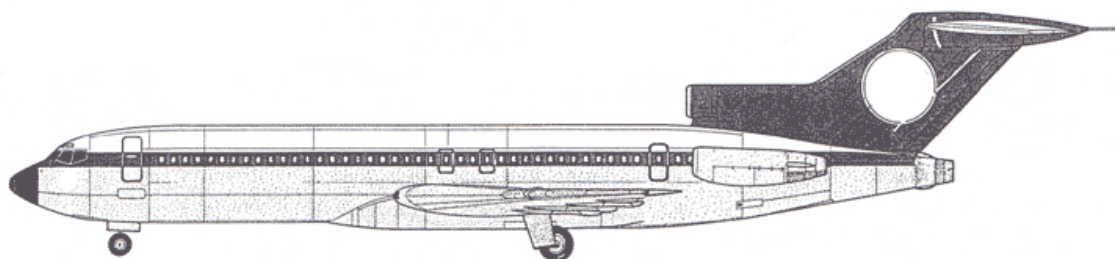


Legendary 727



Flight and Training Manual Part II – OPERATIONS MANUAL

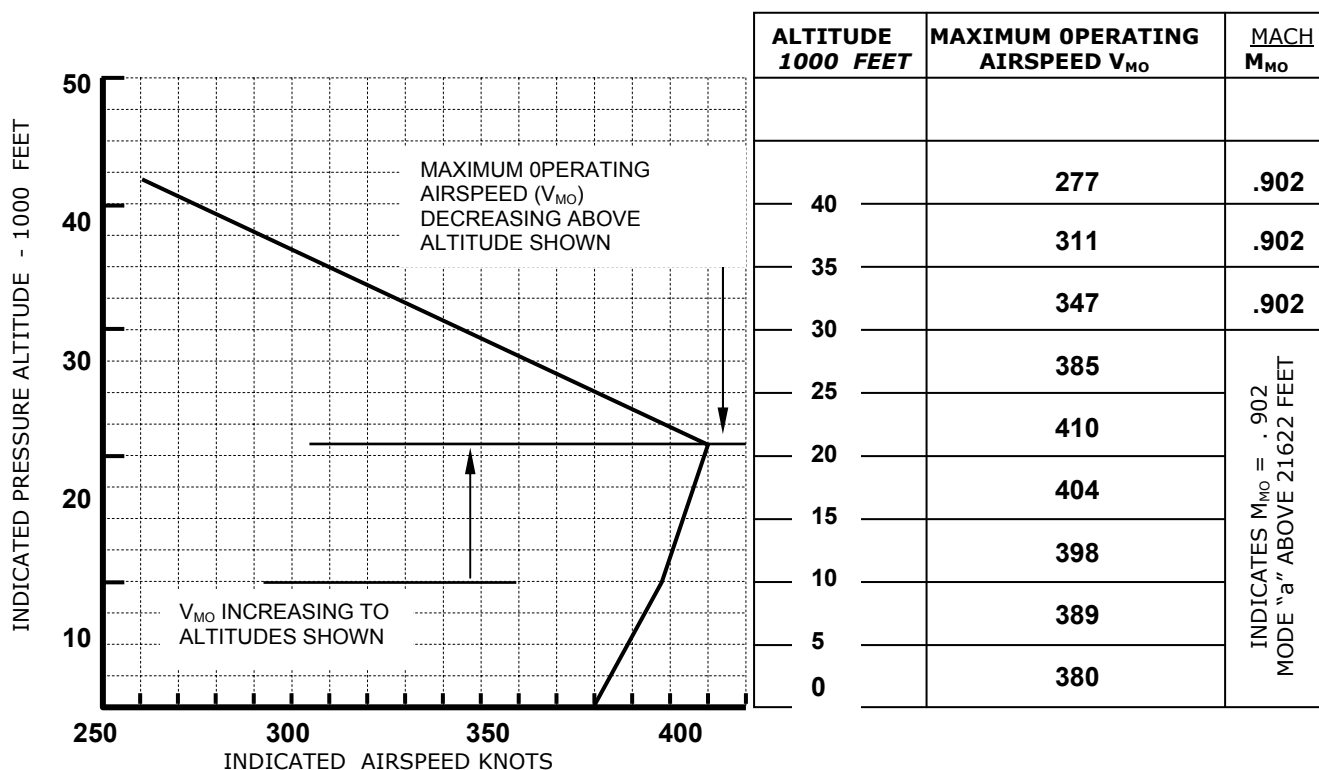
FOR FLIGHT SIMULATION USE ONLY



AIRPLANE LIMITS

OPERATIONAL

1. Max operating altitude: 42, 000 ft.
2. Max T/O altitude: 8, 300 ft.
3. Max T/O slope: $\pm 2\%$
4. Max T/O, landing tailwind: 10 knots
5. Max crosswind T/O, lading: 25 knots
6. Max speed: M_{MO} / V_{MO}



V_{MO} – MAXIMUM OPERATING AIRSPEED CHART

GROSS

1. Max taxi weight: 161,000 (B727-100); 172,000 (B727-200); 210,000 (B727-Advanced) lbs.
2. Max T / O weight at brake release: 161,000 (B727-100); 172,000 (B727-200); 210,000 (B727-Advanced) lbs.
3. Max inflight weight, flaps 30 : 151,000 lbs.
4. Max landing weight, flaps 30 : 150,000 lbs.
5. Max zero fuel weight: 136,000 – 156,000 lbs.
6. Max 1 / 2" water or shush, or 5" dry snow on runway for takeoff.
7. Max 1" water or shush, or 6" dry snow on runway for landing.

SYSTEM LIMITS

AIR CONDITIONING / PRESSURIZATION / PNEUMATICS

- Duct pressure for start: 30 – 48 lbs.
1. Max continuous duct pressure: 72 lbs.
 2. Max altitude when dispatching with one pack: 25, 000 ft.
 3. Unpressurized flight: No more than 1 pack.
 4. Max differential pressure for T / O & landing: . 125 PSI
 5. Normal operating pressure: $8.5 \pm .15$ PSI
 6. Max system safety differential pressure: 9.6 PSI
 7. # 2 engine cannot be used to supply a pack for takeoff.

ANTI-ICING

1. Minimum altitude for turning on wing T.A.I. : 800 ft.
2. Engine anti-ice must be on when icing conditions are anticipated or at any time the outside air temperature is below 8° C (46° F), and either moisture is visible or the outside air temperature and dewpoint are within 3° C (5° F) of each other. (Fog is considered visible moisture when it limits visibility to one mile or less).
3. Minimum N₁ settings:
 - a. Penetrating icing conditions: 55% N₁ RPM
 - b. Heavy icing: 70% N₁ RPM
 - c. One engine supplying wing T. A. I. : 75% N₁ RPM
4. Unless visible moisture is present, do not operate anti-ice system at high engine power at OAT above 8° C during flight. Window heat prior to T / O: 10 minutes.
5. Max speed, window heat inop: 250 kts. Below 10,000 feet.
6. Takeoff in standing water or slush: Chine tires on nose wheel and spray deflectors on main gear. Operate static port heaters when ambient temperature is 35° F or lower.
7. Rain removal:
 - a. Do not operate wipers on dry glass.
 - b. Do not apply repellent on dry glass.

APU

1. Ground use only.
 2. Max continuous temperature : 620° C.
 3. Max EGT: 710° C.
 4. On start, operate unloaded pneumatically: 1 minute.
 5. On shutdown, operate unloaded pneumatically: 1 minute.
 6. Starter duty cycle: 1 minute on, 4 minute off.
 7. Max continuous generator load: 165 AMPS.
- NOTE:** Do not turn air conditioning pack on if amperage is above 120 AMPS.
8. Light off: 15 seconds.
 9. Stabilize on frequency: 30 seconds frequency range 400 ± 20 CPS.
 10. Fire test (Max): 60 seconds.

AUTOPILOT

1. Max speed: V_{MO} / M_{MO}.
2. Altitude
 - a. ILS approach (coupled)
 - 1 IFR conditions: 100 ft.
 - 2 VFR conditions: 100 ft.
 - b. All other approaches: 50 ft. below minimum descent altitude authorized for facility.
 - c. Enroute (including climb or descent) : 1100 feet.

ELECTRICAL

1. AC volts: 115 ± 5 volts.
2. AC frequents : 400 ± 8 CPS.
3. Max generator load
 - a. 3 gens paralleled : 102.5 KW
 - b. 2 gens paralleled : 54 KW
 - c. 1 gen: 36 KW
4. Electrical load difference (parallel operations) : 7 KW. Or 3 KVAR.
5. Battery (minimum): 23.5 volts.
6. Max TR load: 50 AMPS.
7. Max external generator load: 200 AMPS.
8. CSD "IN" temp caution range: 2 minutes
9. CSD "RISE" temp caution range: 30 seconds.
10. Standby power available for 30 minutes if battery fully charged.

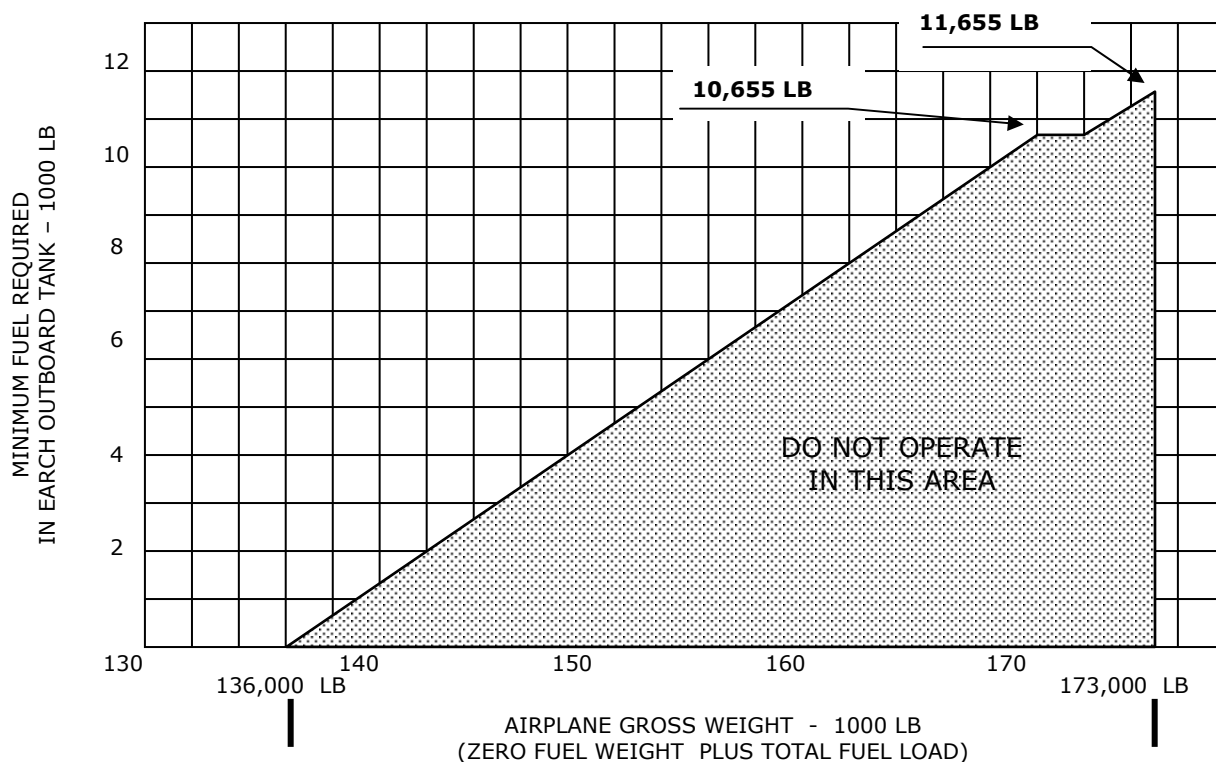
FLIGHT CONTROLS

1. Max flap extended altitude: 20,000 feet.
2. Do not use speed brakes in flight with wing flaps extended.
3. Flap extension / retraction (in – flight): Flaps lever must remain in the 2° detent until symmetrical leading edge device position is verified.
4. Alternate flaps duty cycle:
 - a. Flight: 1 full cycle, 25 minutes off.
 - b. Ground: 10 minutes operating, 25 minutes off.
5. L. E. D.'s (only) extended: 240 kts. max.
6. Rudder: On ground, do not operate pedals full throw when either rudder is not powered.

7. Stabilizer:
 - a. Main electric trim (ground): 2 minutes operating time per 15 min.
8. Speed brakes will not be used below 2,000 feet or 200 kts.
9. Flaps operating or extended speeds:
 - a. 2° 230 KTS
 - b. 5° 215 KTS
 - c. 15° 205 KTS
 - d. 25° 185 KTS
 - e. 30° 185 KTS

FUEL

1. Max usable fuel quantity tank #1 & #3: 12,013 lbs.
 2. Max usable fuel quantity tank #2: 27,430 lbs (727-ADV: 30,485 lbs.)
 3. Fuel imbalance:
 - a. Tanks #1 & #3: 1000 lbs. For taxi, T / O, cruise, descent & landing.
 - b. Tanks #1 or #3 should never exceed tank #2 by more than 2,000 lbs.
 - c. For takeoff, flight and landing, the minimum fuel in each outboard tank must not be less than the quantities shown on the chart below.
 4. Fuel crossfeed should not be conducted below 10,000 feet unless necessary.
 5. Maximum fuel tank temperature: + 49° C.
 6. FUEL Type Substitution
- Jet A, A-1, and JP5 are considered normal fuel for this aircraft.



HYDRAULICS

1. Pressures:
 - a. Normal: 3,000 PSI
 - b. Minimum: 2,800 PSI
 - c. The aircraft may be dispatched with a single system "B" pump delivering pressure as low as 2400 PSI with system "B" flight control switches ON, ground interconnect valve closed, and pumps operating independently provided:
 - (1) With both pumps operating, system pressure is 2800 to 3100 PSI.
 - (2) Mx. Control is notified of the condition.
 - (3) Aircraft is repaired at next convenient maintenance station as determined by maintenance control

2. Accumulators preload:
 - a. "A" & "B" system: 2,000 PSI
 - b. Brake: 1,000 PSI
3. Fuel Cooling:
 - a. "A" system: 2,000 lbs. tank #3
 - b. "B" system: 1,700 lbs. tank #1
4. Maximum "A" pump operating time with fluid shutoff valve (s) closed: 5 minutes.
5. "B" pumps should not be turned ON more than 5 times in any five – minute period.
6. Landing gear max speeds:
 - a. Extending: 270 KTS. , or .83 m.
 - b. Extending: 320 KTS. , or .83 m.
 - c. Retracting: 235 KTS.
8. Tire maximum speed: 183 Knots
9. Pneumatic brake pressure: 1200 psi (1100 psi minimum)
7. Minimum quantities for dispatch:
 - a. "A" : 3 gallons
 - b. "B" : full
 - c. Standby: .28 gallon

POWER PLANT

1. EGT / Time limits:
 - a. Takeoff: 590°C / 5 minutes
 - b. Maximum continuous: 545°C / continuous
 - c. Maximum cruise: 525°C / continuous
 - d. Idle (No bleed): 420°C / continuous (Bleed On): 480°C / continuous
 - e. Starting (59°F & Below) : 350°C / momentary (60°F & Above) : 420°C / momentary
 - f. Acceleration: 590°C / 2 minutes
2. Oil:
 - a. Normal pressure: 40 – 55 PSI
 - b. Normal maximum temperature: 120°C
 - c. Maximum for 15 minutes: 121°C / 157°C
3. Ignition:
 - a. On for takeoff and landing
 - b. Normal: 10 minutes on / 20 minutes off.
 - c. Adverse flight conditions: Ign 1 / Ign 2 (alternately) 10 minutes on / 10 minutes off
4. Starter:
 - a. Normal: 30 second on / 60 second off
 - b. Slow start: 60 second on / 60 second off.

NOTE: Either of the above may be repeated, then 5 minutes off

 - c. Motoring: 2 minutes on / 5 minutes off
5. Reverse thrust:
 - a. Ground operation only.
 - b. Max thrust GO-AROUND EPR or max N₁ speed: 100,1 % RPM
 - c. Max thrust for powerback: 80% N₂ or 1,7 EPR.
6. Rotor speeds:
 - a. N₁ maximum: 101 %
 - b. N₂ maximum: 100 %

MISCELLANEOUS

1. Navigation lights: Do not use DC (battery position) inflight.
2. Landing and runway turnoff lights (static): 5 minutes on / 5 minutes off
3. Escape slides: The retention bar of all door mounted escape slides must be installed in the floor brackets for taxi, takeoff & landing whenever passengers are carried.
4. Brake wear indication: Minimum indicator extension:
 - a. Brakes set: 3 / 16"
 - b. Brakes off: 5 / 16"

- (10)** APU EXHAUST GAS TEMPERATURE INDICATOR.MONITOR
- (11)** Check for stabilized speed by observing APU generator frequency (approximately 400 CPS)
- (12)** ALL BUS TIE BREAKERS. CLOSED
- (13)** VOLTAGE, FREQUENCY. CHECK WITHIN LIMITS
- (14)** APU GENERATOR BREAKER SWITCHCLOSE
Closing the APU GENERATOR BREAKER switch will trip the EXTERNAL POWER switch or the engine-driven generator's GEN BREAKERS, if either were supplying the bus.
- (15)** ESSENTIAL POWER SELECTOR.APU; CHECK ESSENTIAL POWER LIGHT OUT
The # 3 BUS TIE BREAKER must be CLOSED.
- (16)** VOLTAGE, FREQUENCY, AND AMPS. CHECK UNDER LOAD
Electrical power during pre-flight throughout engine start is normally furnished by the APU. External power may be connected through the external power receptacle as an alternate source of electrical power.
Normal ground or flight operation is with the busses in parallel (BUS TIA BREAKERS CLOSED, lights out) and operating as a synchronous bus.

COCKPIT CHECK LIST

Pilots		S / O	
F / O CHALLENGE – CAPT. RESPOND	Receiving Aircraft	F / O CHALLENGE – S / O RESPOND	
GEAR LEVER & LIGHT. DOWN & 3 GREEN RADIOS. CHECKED FLIGHT CONTROL SWITCHES. . . . 9 CAPPED YAW DAMPERS. 2 CAPPED ANTI – SKID. CAPPED, LIGHTS OUT STALL WARNING. TEST & NORMAL FLIGHT RECORDER. TEST VOICE RECORDER. TEST EMERGENCY EXIT LIGHTS. CAPPED START SWITCHES. OFF ALTERNATE FLAPS. CAPPED & 2 OFF *NO SMOKE / SEAT BELT. ON GROUND PROX. TEST, CAPPED *WINDOW HEAT. TEST & ON **ANTI – ICE. CKD & 3 OFF EXTERIOR LIGHTS. AS REQUIRED **FIRE CONTROL PANEL. CHECKED MACH WARNING. TEST EMERGENCY BRAKE & PRESS. . . . OFF & CKD *FLT INSTRUMENTS. CHECKED *ALTIMETERS & CLOCKS. SET STATIC SOURCES. NORMAL WARNING & OPERATING LIGHTS. . . TEST RADAR. TEST / STBY SPEED BRAKE. FULL FORWARD THROTTLES. FREE & CLOSED FLAP LEVER. WITH GAUGES STABILIZER & CRUISE TRIM. CKD & ON START LEVERS (Ctrl+Shift+F1) . . . CUT - OFF AUTOPILOT. DISENGAGE SYS "A" *TRIM TABS. CKD & ZERO *PARKING BRAKE. SET * THROUGH – STOP STATIONS ** FIRST FLIGHT OF DAY (LOG BOOK NOTE) * AIR MIC ONLY		*CIRCUIT BREAKERS. CHECKED CREW & PASS OXYGEN. CKD & NORMAL STANDBY POWER. CHECKED **BATTERY CONDITION. CHECKED GALLEY POWER. ON BATTERY SWITCH. ON DC POWER. CHECKED GEN DRIVE TEMP SW. IN GEN. CHECKED *FUEL QUANTITY. TEST & AMT ENG FUEL VALVES. OPEN *X-FEEDS. AS REQUIRED "A" PUMPS. ON *HYD QUANTITY. 3 CHECKED GROUND INTERCONNECT. CLOSED HYD SHUT – OFFS. CAPPED BRAKE INTERCONNECT. CAPPED *OIL QUANTITY. TESTED & CKD *CABIN PRESS. SET TEMP CONTROLS. SET ENG BLEEDS. 4 OPEN PACKS. AS REQUIRED COOLING DOORS. AS REQUIRED FUEL DUMP. DOOR CLOSED *FLIGHT RECORDER. SET A / P GROUND TEST. NORMAL **APU FIRE CONTROL PANEL. CHECKED LEADING EDGE LIGHTS. TEST & OFF ELEC FAULT ANNUNCIATOR. TEST CABIN AIR LEVER. AS REQUIRED FIRE DETECTION FAULT LIGHTS. . . . CHECKED *"B" PUMPS. 1 ON	
F / O CHALLENGE – CAPT. RESPOND	Before Start	F / O CHALLENGE – S / O RESPOND	
FUEL QUANTITY. CHECKED BEACON. ON PARKING BRAKE. AS REQUIRED DOOR LIGHTS. CHECKED		PACKS. OFF GALLERY POWER. OFF BOOST PUMPS. AS REQUIRED PNEUMATIC PRESSURE. MINIMUM FOR START	
F / O CHALLENGE – CAPT. RESPOND	After Start	S/O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED	
START LEVERS. IDLE TRANSPONDER. STANDBY S / O PANEL & DOOR LIGHTS. . . . CHECKED ENG ANTI-ICE. AS REQUIRED STERILE COCKPIT LIGHT. ON		GALLERY POWER. ON ELEC PANEL. CHECKED FUEL PANEL. SET HYD SYSTEMS. CHECKED ENG BLEED SWITCHES & PACKS. . . . AS REQUIRED COCKPIT DOOR. LOCKED	

F / O CHALLENGE – CAPT. RESPOND		Delayed Engine Start	F / O CHALLENGE – S / O RESPOND
<p><u>AFTER ENGINE STARTED</u></p> <p>START LEVER. IDLE S / O PANEL. CHECKED</p>		<p><u>NOTE:</u> APU WILL BE USED FOR DELAYED ENGINE START.</p> <p>PACKS. OFF ENG BLEEDS. 4 OPEN PNEUMATIC PRESSURE. MINIMUM FOR START</p> <p><u>AFTER ENGINE STARTED</u></p> <p>S/O ACCOMPLISH AND ADVISE CAPTAIN WHEN COMPLETED</p> <p>ELEC PANEL. CHECKED ENG BLEEDS SWITCH & PACKS. AS REQUIRED PDCS. CHECKED & SET</p>	
S / O CHALLENGE – F / O RESPOND		Taxi Check	S / O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED
<p>FLAP LEVER. SET FLT DIR. FLAGS – RMIs. CHECKED YAW DAMPERS. CHECKED CONTROLS. CHECKED SPEED BRAKE. CKD, FULL FWD FLAPS. $\frac{\circ}{\circ}$, $\frac{\circ}{\circ}$, GREEN LT STABILIZER TRIM. SET, SW ON T. O. DATA & BAGS. CKD - SET</p>			<p>FLT / GND SWITCH. FLT CABIN PRESS & TEMP. SET ENG BLEED SWITCHES. #1 & #3 OPEN #2 L & R PACKS. CLOSED FLIGHT RECORDER. 2 ON APU MASTER SW. REPEAT APU LIGHT. OFF OUT</p>
S / O CHALLENGE – F / O RESPOND		Before Takeoff	S / O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED
<u>NOTE:</u> CAPT. WILL CALL FOR BEFORE T / O CHECKLIST WHEN T / O CLEARANCE HAS BEEN RECEIVED OR IS IMMINENT.			
<p>STROBE LIGHTS. ON PITOT HEAT. ON TRANSPONDER & DME. ON & NORM</p>			<p>T / O ANNOUNCEMENT. COMPLETED FUEL PANEL. SET BOOST PUMPS. ON CSD OIL COOLER. GROUND OFF</p>
S / O CHALLENGE – PILOT NOT FLYING RESPOND		After Takeoff	S / O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED
<p>NO SMOKE. OFF GEAR. OFF, LTS, OUT FLAPS. UP, LTS, OUT</p> <p><u>NOTE:</u> CAPTAIN WILL ASCERTAIN PROPER TIME TO TURN STERILE COCKPIT LIGHT OFF (NORMALLY 10,000')</p>			<p>AUTO PACK TRIP. CUTOUT FUEL PANEL. SET TAILSKID. RETRACTED CABIN PRESS & TEMP. SET</p>
S / O CHALLENGE – PILOT NOT FLYING RESPOND		In Range	S / O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED
<p>SEAT BELT. ON ANTI – ICE. AS REQUIRED ALTIMETERS & AIRSPEEDS. SET & CKD REFERENCE SPEEDS. CKD & SET</p> <p><u>NOTE:</u> CAPTAIN WILL ASCERTAIN PROPER TIME TO TURN STERILE COCKPIT LIGHT ON (NORMALLY 10,000')</p>			<p>FUEL PANEL. SET HYD SYSTEMS. CHECKED CABIN PRESSURE. SET COOLING DOORS. AS REQUIRED</p>

S / O CHALLENGE – PILOT NOT FLYING RESPOND		Approach	
RADIOS.	CKD & IDENTIFIED		
COURSE ARROW.	INBOUND COURSE		
MODE SELECTOR.	SET		
ALTIMETER BUGS.	SET		
ADF – VOR SWITCHES.	AS REQUIRED		
MARKER SWITCHES.	ON & LOW		
WARNING FLAGS.	CHECKED		
MISSED APPROACH PROCEDURE. . .	REVIEWED		
S / O CHALLENGE – PILOT NOT FLYING RESPOND		Landing	S / O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED
GEAR.	DOWN, 3 GREEN	HYD PRESSURES.	CHECKED
NO SMOKE.	ON	START SWITCHES.	FLIGHT START
ANTI – SKID.	2 REL / 5 REL		
SPEED BRAKE.	FULL FORWARD		
FLAPS.	___°, GREEN LIGHT		
S / O CHALLENGE – F / O RESPOND		After Landing	S / O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED
NOTE: INITIATED ON CAPTAIN'S COMMANDS WHEN CLEAR OF ACTIVE RUNWAY			
ANTI – ICE.	ALL OFF	AC METERS SELECTOR SW.	APU
RADAR / TRANSPONDER / DME. .	STANDBY	ELECTRICAL LOAD.	REDUCE
SPEED BRAKE.	FULL FWD	AIR CONDITIONING.	AS REQUIRED
FLAPS.	UP	APU.	START
STAB TRIM.	5 UNITS	ESSENTIAL POWER.	APU
STROBE LIGHTS.	OFF		
F / O CHALLENGE – CAPT. RESPOND		Parking	S / O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED
PARKING BRAKE.	SET	APU / EXTERNAL POWER.	ON BUS
STERILE COCKPIT LIGHT.	OFF	GALLERY POWER.	ON
SEAT BELT.	OFF	BOOST PUMPS.	OFF
#EMER EXIT LIGHTS.	AS REQUIRED	"B" PUMPS.	OFF
#FLIGHT RECORDER.	TEST	ENG BLEEDS.	4 OPEN
#VOICE RECORDER.	TEST	PARKS.	AS REQUIRED
#RADAR & TRANSPONDER.	OFF		
START LEVERS (Ctrl+Shift+F1)	CUTOFF		
BEACON.	OFF		

NORMAL PROCEDURES

RECEIVING AIRCRAFT CHECK PILOTS

F / O CHALLENGE – CAPTAIN RESPOND	
GEAR LEVER & LIGHT.	DOWN & 3 GREEN
RADIOS.	CHECKED
FLIGHT CONTROL SWITCHES.	9 CAPPED
YAW DAMPERS.	2 CAPPED
ANTI – SKID.	TEST, CAPPED
STALL WARNING.	TEST & NORMAL
FLIGHT RECORDER.	TEST
VOICE RECORDER.	TEST
EMERGENCY EXIT LIGHTS.	CAPPED
START SWITCHES.	OFF
ALTERNATE FLAPS.	CAPPED & 2 OFF
*NO SMOKE / SEAT BELT.	ON
GROUND PROX.	TEST, CAPPED
*WINDOW HEAT.	TEST & ON
**ANTI – ICE.	CKD & 3 OFF
EXTERIOR LIGHTS.	AS REQUIRED
**FIRE CONTROL PANEL.	CHECKED
MACH WARNING.	TEST
EMERGENCY BRAKE & PRESS.	OFF & CKD
*FLT INSTRUMENTS.	CHECKED
*ALTIMETERS & CLOCKS.	SET
STATIC SOURCES.	NORMAL
WARNING & OPERATING LIGHTS.	TEST
RADAR.	TEST / STBY
SPEED BRAKE.	FULL FORWARD
THROTTLES.	FREE & CLOSED
FLAP LEVER.	WITH GAUGES
STABILIZER & CRUISE TRIM.	CKD & ON
START LEVERS (Ctrl+Shift+F1)	CUT - OFF
AUTOPILOT.	DISENGAGE SYS "A"
*TRIM TABS.	CKD & ZERO
*PARKING BRAKE.	SET
<p>* THROUGH – STOP STATIONS</p> <p>** FIRST FLIGHT OF DAY (LOG BOOK NOTE)</p> <p>* AIR MIC ONLY</p>	

GEAR LEVER & LIGHT. DOWN & 3 GREEN
The GEAR handle is in the DOWN detent and that the downlocks on all 3 gear are engaged.

RADIOS. CHECKED
Navigation and communication radio equipment should be checked and set for takeoff requirements.

FLIGHT CONTROL SWITCHES. 9 CAPPED
Check that the AILERON SYSTEM A & B, SPOILER INBOARD and OUTBOARD, ELEVATOR SYSTEM A & B, and RUDDER SYSTEM B switches are all CAPPED.

YAW DAMPER. 2 CAPPED

STALL WARNING. TEST & NORMAL
Operate STALL WARNING TEST switch, observe the stall warning power failure light goes out (indicating the sensing vane heater will operate) and that the control columns shake and the spinner rotates.

FLIGHT RECORDER. TEST
The flight recorder off light will be illuminated, as the flight recorder will not work. Hold button depressed for testing.

EMERGENCY EXIT LIGHTS. CAPPED

CAP the EMERGENCY EXIT LIGHTS switch. The emergency lights unarmed annunciator will go out. Subsequent loss of either 115V AC or 28V AC essential power will illuminate the emergency exit lights.

ALTERNATE FLAPS.CAPPED & 2 OFF

The ALTERNATE FLAPS switch must be in the CAPPED OFF position for the flaps to operate hydraulically. The INBOARD and OUTBOARD FLAP ALTERNATE CONTROL switches must be in the OFF position.

GROUND PROX. TEST, CAPPED

Check that the G/S INHIBIT and FLAP INHIBIT switches are CAPPED.

Push and hold TEST switch on the overhead GPWS control panel.

- (1) The BELOW G/S lights and the G/S FAIL light shall turn on immediately. The glideslope voice warning will say GLIDESLOPE. The BELOW G/S and the GPWS FAIL light will remain on.
- (2) Approximately one second after pushing the self-test button, a tone warning WHOOP WHOOP – TERRAIN will be heard. The red GPWS lights shall also come on. The WHOOP WHOOP – TERRAIN aural warning will repeat approximately four times.
- (3) At the completion of the self-test cycle, no additional aural warning will be heard. Release the TEST . All light will be out.

*WINDOW HEAT SWITCHES.TEST & ON

For a functional test of the windshield overheat trip system:

- (1) WINDOW HEAT SWITCHES ON
- (2) OVERHEAT TEST SWITCH. PUSH
- (3) OVERHEAT LIGHTS. ON
- (4) WINDOW HEAT SWITCHES OFF/RESET THEN ON

**ANTI – ICE. CKD & 3 OFF

A complete check of the anti-ice systems will be made prior to the first flight of the day and whenever icing conditions are anticipated. Prior to other flights, a check of all agreement lights will be made.

WING ANTI-ICING SYSTEM

- a) ANTI-ICE VALVE POSITION LIGHT SELECTOR. WING VALVE POSITION LIGHTS.. . . . ON
- b) ENGINES #1 & #3 WING ANTI-ICING SWITCHES. GRD TEST & HOLD VALVE POSITION LIGHTS.. . . . OFF, THEN ON
- c) ENGINES #1 & #3 WING ANTI-ICING SWITCHES. RELEASE TO CLOSE VALVE POSITION LIGHTS.. . . . OFF, THEN ON

ENGINE & COWL ANTI-ICING SYSTEM

- a) ENGINE INLET ANTI-ICING SWITCHES (THREE). OPEN
- b) ANTI-ICE VALVE POSITION LIGHT SELECTOR ROTATE TO L, COWL, & R POSITION ENGINE INLET ANTI-ICE VALVE POSITION LIGHTS. ALL 3 ON, IN EACH POSITION
- c) ENGINE INLET ANTI-ICING SWITCHES (THREE). CLOSE ENGINE INLET ANTI-ICE VALVE POSITION LIGHTS. ALL 3 ON, IN EACH POSITION

PITOT AND STATIC HEAT

PITOT AND STATIC HEAT.CHECKED & OFF

- a) PITOT AND STATIC HEAT SWITCHES.ON
Observe HEATER OFF light extinguish.
- b) PITOT STATIC HEAT AMMETER SELECTOR ALL POSITION
Observe equal amperage readings in each position except T PROBE/AUX P where reading may be slightly different.
- c) PITOT HEAT SWITCHES. OFF
Observe HEATER OFF light illuminate.

**FIRE CONTROL PANEL. CHECKED

- 1) FIRE HANDLESS. 3 FULL IN
- 2) BOTTLE TRANSFER SWITCH. LEFT
- 3) ENGINES AND WHEEL WELL FIRE DETECTION SYSTEMS.TEST
 - (a) FIRE TEST SWITCH (**Shift+F**). HOLD IN ENGS & WHEEL WELLS' POSITION
 - Wheel well fire warning light. ON IMMEDIATELY
 - Fire alarm bell. RINGS IMMEDIATELY

While Continuing to Hold the Fire Test Switch:

- (b) FIRE ALARM BELL CUTOUT SWITCH (**Shift+B**) PRESS
 -- Wheel well fire warning light. REMAINS ON
 -- Fire alarm bell. STOP RINGING

Continuing to Hold the Fire Test Switch:

- (c) ENGINE FIRE WARNING LIGHTS. ILLUMINATE
 (d) FIRE ALARM BELL. RINGS AGAIN
 (e) FIRE TEST SWITCH (**Shift+F**) RELEASE IMMEDIATELY
 4) FIREWALLS DETECTION SYSTEM TEST
 FIRE TEST SWITCH (**Shift+F**) . FIREWALLS POSITION AND HOLD ONLY UNTIL LIGHTS ILLUMINATE
 -- ENGINE FIRE WARNING LIGHTS ILLUMINATE
 -- FIRE ALARM BELL. RINGS
 -- FIRE ALARM BELL CUTOUT SWITCH (**Shift+B**) PRESS
 -- FIRE ALARM BELL. STOP RINGING

EMERGENCY BRAKE & PRESSURE. OFF & CHECKED
 Check that the PNEUMATIC BRAKE lever is safeties in the OFF position and pressure available is 1200 PSI (1100 DSI minimum).

*FLT INSTRUMENTS. CHECKED

Compasses

- a) The compass OFF flag should go out sight approximately 2 to 3 minutes after electrical power is supplied to the system.
 b) Synchronize compass system, if required, by observing the sync indicator on the RMDI pushing and turning the sync knob in the direction indicated until the indicator is in the mid position. Electric compasses should agree within 4°.
 c) Observe that the opposite course indicator is indicating same heading and the COMPASS flag is out of sight.
 NOTE: If the sync indicator is deflected either side of the mid position for a prolonged period of time, that compass is out synchronization.
 Deviation of the short duration should be expected during refueling, taxiing, turning and rough air.

Flight Director System

- a) Place MODE SELECTOR is OFF position. Check all warning flags and command bars out of view. Pitch and roll attitude information on the attitude indicator should reflect the aircraft attitude on the ramp.
 b) Rotate MODE SELECTOR to HEADING. Set heading marker under lubber line. Command bars should level. Move heading marker either side of lumber line. Command bars should call for bank toward selected heading.
 c) Vary pitch command knob from 10° down to 15° up. Command bars should follow knob rotation. Select ALTITUDE HOLD. Command bars should move down to the delta.
 Tune in the VOR test station, if available, or any receivable VOR frequency. Set course arrow approx. 20° either side of course to VOR. Rotate MODE SELECTOR to GYRO (Nav/Loc). Observe Nav/Loc arm (amber) light illuminates.
 d) Rotate MODE SELECTOR to APPR and engage GLIDESLOPE MANUAL switch. Green annunciator lights should illuminate on both N/L and glideslope, the miniature runway appears, and ALTITUDE HOLD trips off automatically. The COMPUTER flag normally appears since there is insufficient radio signal strength for proper indications.
 e) Rotate MODE SELECTOR to OFF. Note manual glideslope switch trips off automatically, green annunciator lights extinguish, and command bars and miniature runway move out of view.

*ALTIMETERS & CLOCKS. SET

Electrical Altimeters

Set local barometric correction and check within allowable tolerances.

Standby Altimeters

Set local barometric correction and check within allowable tolerances. Vibrator should be operating.

Altitude Alert

- a) Select an altitude at least 1,000 ft. above field elevation.
 b) Depress and slowly rotate the ALTITUDE SELECTOR in a COUNTERCLOCKWISE direction. The alert lights will come on about 900 feet above the field elevation, and go out about 300 feet above the field elevation.
 c) Slowly rotate the ALTITUDE SELECTOR in a CLOCKWISE direction. The alert lights will come on about 900 feet above the field elevation, and remain on for all altitudes above that point.
 d) Beeper will sound momentarily each time the altitude alert lights illuminate.

- e) Allow the ALTITUDE SELECTOR knob to spring out to its normal position and select the enroute flight plan altitude.

Radio Altimeters

Test; check 250 ± 10 feet, failure flag, and DH lights.

WARNING & OPERATING LIGHTS.TEST

In the TEST position, the following lights should illuminate:

- (1) Autopilot disengage
- (2) DH
- (3) Flight controls
- (4) Autopilot elevator low pressure
- (5) Stabilizer out of trim
- (6) Reverses
- (7) Engine low oil pressure
- (8) Leading edge devices
- (9) Landing gear & doors
- (10) Essential power failure
- (11) Engine fire bottle discharged
- (12) Engine failure detection

Marker beacon lights, approach progress display lights, and the instrument comparator lights must be tested separately.

RADAR.TEST/STBY

WEATHER RADAR TEST

WEATHER RADAR CIRCUIT BREAKER.CHECK CLOSED

- (1) FUNCTION SELECTOR (**Shift+W**)ON
- (2) TEST PATTERN (**Ctrl+W**)CHECK

THROTTLES.FREE & CLOSED

Check throttles for full movement and warning horn.

Horn sound if any of the following conditions are not satisfied:

- (1) Speed brakes full forward
- (2) Flaps – 5 to 25°
- (3) Stab trim – green band

FLAP LEVER.WITH GAUGES

The FLAP lever should be at ZERO with the inboard and outboard flap gauges in agreement.

STABILIZER & CRUISE TRIM.CHECKED & ON

AUTOPILOT.DISENGAGE SYSTEM "A"

This is the check that the AUTOPILOT AILERON and ELEVATOR switches on the autopilot control panel are in the DISENGAGED position and the warning light is not illuminated.

Normally autopilot elevator system "A" is utilized with "B" selected if "A" hydraulic system fails or malfunctions.

NOTE: The reset function of the warning light or one of the autopilot release switches will have to be operated after the engines are started and the S/O puts the engine driven generators on the bus, as this causes the autopilot disengage lights to flash.

*TRIM TABS.CHECKED & ZERO
Check the rudder and aileron trim wheels are free and set zero.

*PARKING BRAKE.SET

RECEIVING AIRCRAFT CHECK SECOND OFFICER

F / O CHALLENGE – S / O RESPOND	
*CIRCUIT BREAKERS.	CHECKED
CREW & PASS OXYGEN.	CKD & NORMAL
STANDBY POWER.	CHECKED
**BATTERY CONDITION.	CHECKED
GALLEY POWER.	ON
BATTERY SWITCH.	ON
DC POWER.	CHECKED
GEN DRIVE TEMP SW.	IN
GEN.	CHECKED
*FUEL QUANTITY.	TEST & AMT
ENG FUEL VALVES.	OPEN
*X-FEEDS.	AS REQUIRED
"A" PUMPS.	ON
*HYD QUANTITY.	3 CHECKED
GROUND INTERCONNECT.	CLOSED
HYD SHUT – OFFS.	CAPPED
HYD BRAKE INTERCONNECT.	CAPPED
*OIL QUANTITY.	TESTED & CKD
*CABIN PRESS.	SET
TEMP CONTROLS.	SET
ENG BLEEDS.	4 OPEN
PACKS.	AS REQUIRED
COOLING DOORS.	AS REQUIRED
FUEL DUMP.	DOOR CLOSED
*FLIGHT RECORDER.	SET
A / P GROUND TEST.	NORMAL
**APU FIRE CONTROL PANEL.	CHECKED
LEADING EDGE LIGHTS.	TEST & OFF
ELEC FAULT ANNUNCIATOR.	TEST
CABIN AIR LEVER.	AS REQUIRED
FIRE DETECTION FAULT LIGHTS.	CHECKED
*"B" PUMPS.	1 ON

STANDBY POWER.CHECKED

- (1) ESSENTIAL POWER SELECTOR.GEN. 3, 2 OR 1
- (2) AUTO STANDBY POWER TEST SWITCH.TEST

Check For The Following Indications:

- (a) Steady red essential power failure light on S/O panel.
- (b) Captain's GYRO flag not visible.
- (c) Captain's RMDI OFF flag not visible.
- (d) F/O's compass indicator COMPASS flag not visible.
- (e) Standby horizon flag not visible.
- (3) AUTO STANDBY POWER TEST SWITCH.RELEASE
- (4) ESSENTIAL POWER SELECTOR.STANDBY
- Check For The Same Indications As In Step (2)
- (5) ESSENTIAL POWER SELECTOR.APU / EXT

**BATTERY CONDITION.CHECKED

This check is to be accomplished on the first flight of the day only.

- (1) BATTERY CHARGER C/BPULL
 - (2) ESSENTIAL BUS TIE C/B.PULL
 - (3) ESSENTIAL POWER SELECTOR.STANDBY
 - (4) Check that the Captain's GYRO flag not visible
 - (5) DC METERS SELECTOR.BAT
BATTERY VOLTS23.5 MINIMUM
 - (6) BATTERY CHARGER AND ESSENTIAL BUS TIE C/B'S. RESENT
BATTERY AMPS.OBSERVE CHARGING
Charging will be steady on external power, and pulsing on APU.
 - (7) ESSENTIAL POWER SELECTOR.APU / EXT
- BATTERY SWITCHON

- GALLEY POWER.ON
 DC POWER.CHECKED
 (1) DC METERS SELECTOR.CHECK EACH T/R volts: 24.6 to 27.8
 Amps: positive indication (50 max)
 (2) DC METERS SELECTOR.ESS T/R
- GEN DRIVE TEMP SW.IN
 IN indicated temperature of oil at in-point.
- GEN.CHECKED
 Check all generator breaker lights illuminated. Bus tie breaker lights and generator field lights should be out.
- *FUEL QUANTITYTESTED & AMOUNT
 (1) Tree test switches marked FUEL QTY are installed on the Second Officer's panel. Holding the test switch will cause the individual quantity to indicate 0 quantity and ERR. Upon release of the test switch, a self-test of the indicating system will occur: the display will blank, followed by a complete display, blank, indicate a full range of tank quantity blank, and return to normal quantity display.
 (2) Turn forward boost pumps in all tanks on. Check that only the forward boost pumps low pressure lights are out.
 (3) Turn forward boost pumps off and the aft boost pumps on. Check that only the aft boost pumps low pressure lights are out.
 (4) Turn the aft boost pumps off.
- *X-FEEDS.2 OPEN, 1 & 3 CLOSED
 Move each CROSSFEED VALVE switch it OPEN and then to CLOSE. Check that the respective in-transit light illuminates and then goes out as the valve reaches the selected position. The #2 crossfeed valve is left open for start, taxi, takeoff, and landing.
- *HYDRAULIC QUANTITY.3 CHECKED
 (1) System "A" quantity should be approximately 4.4 gallons (full), and 3 gallons minimum.
 (2) System "B" quantity should be approximately 1.8 gallons (full).
 (3) Standby system quantity should be approximately 5.2 gallons (full), and .28 gallons minimum.
- GROUND INTERCONNECT.CLOSED
 Obtain ground clearance prior to opening ground interconnect valve.
- HYDRAULIC SHUT – OFFS.CAPPED
 Both system "A" hydraulic fluid shutoff valves should be capped (open) and safetied.
- HYDRAULIC BRAKE INTERCONNECT.CAPPED
 The hydraulic brake interconnect valve is normally left closed (capped) In this position the green indicator light will not illuminate if the valve is closed.
- CSD OIL COOLER.NORMAL
 Cooler if off in flight and on on the ground.
- *OIL QUANTITY.TESTED & CHECKED
 It is recommended to have at least 5 gts. before starting and at least 3 gals. When engines stabilize at idle RPM.
- *CABIN PRESSURIZATION.SET
- TEMP CONTROLS.SET
 (1) PASSENGER & COCKPIT TEMP SELECTORS.AUTO
 Monitor cabin temperatures and adjust temp selector as required.
 (2) MIX VALVE POSITION INDICATORS.CHECK
 Valve will be full cold if pack is off, and normal if pack is on.
 (3) DUCT OVERHEAT LIGHTS.PUSH-TO-TEST
- ENGINE BLEEDS.4 OPEN
 (1) BLEED AIR OVERHEAT & TRIP OFF LIGHTS.PUSH-TO-TEST

PACKS.AS REQUIRED

USING APU BLEED AIR

(a) RIGHT AIR CONDITIONING PACK SWITCHON
If the APU is providing electrical power, monitor APU ammeter before starting packs. Load must be under 120 amps before starting either first or second pack.

(b) LEFT AIR CONDITIONING PACK SWITCHON

AFTER SELECTING EITHER APU OR EXTERNAL PNEUMATIC:

- (1) AIR TEMP INDICATOR.CHECK
- (2) PACK TRIP OFF LIGHTS.PUSH-TO-TEST
- (3) AUTO PACK TRIP ARM LIGHT.PUSH-TO-TEST
- (4) GASPER FAN.AS REQUIRED
- (5) PACK TEMPERATURE INDICATOR.CHECK

COOLING DOORS.AS REQUIRED

- (1) MANUAL DOORS.OPEN
- (2) AUTOMATIC DOORS.AUTO

FUEL DUMP.DOOR CLOSED

- (1) Door must be opened to check the in-transit lights.
- (2) The door will not close unless all switches are in the CLOSE position.

*FLIGHT RECORDER.SET

The trip number and local date should be set on the flight recorder control panel in anticipation of operating the REPEAT switch to record the information after the generators are on the bus.

A / P GROUND TEST.NORMAL

This switch is left CAPPED (NORMAL) unless a functional check of the autopilot (and yaw dampers) is desired when external or APU power is on the bus.

LEADING EDGE LIGHTS.TEST & OFF

Test the lights on the leading edge device flap annunciator.

ELEC FAULT ANNUNCIATOR.TEST

Test the lights on the electrical systems annunciator.

FIRE DETECTION FAULT LIGHTS.CHECKED

Visually check engine fire detector circuit ground light off, then push-to-test.

*"B" PUMPS.1 ON

NOTE: Prior to turning a "B" pump on, check that the low pressure light for that pump only goes out and that system "B" pressure rises to 3000 PSI (2800 PSI minimum).

CAUTIONS:

- 1. Ensure that the #1 fuel tank, which contains the system "B" heat exchanger, contains at least 1700 lbs. of fuel.
- 2. Do not start any one "B" pump more than 5 times in any five minute period. After five starts, leave pump on for at least 5 minutes or 4 off for 30 minutes.

BEFORE STARTING ENGINES

F / O CHALLENGE – CAPT. RESPOND		Before Start	F / O CHALLENGE – S / O RESPOND
FUEL QUANTITY.	CHECKED	PACKS.	OFF
BEACON.	ON	GALLERY POWER.	OFF
PARKING BRAKE.	AS REQUIRED	BOOST PUMPS.	AS REQUIRED
DOOR LIGHTS.	CHECKED	PNEUMATIC PRESSURE.	MINIMUM FOR STA.

NORMAL ENGINE START

- (1) STARTING SEQUENCE ENGINE – 1 – 2 – 3
- (2) APU RUNNING
- (3) APU GENERATOR FIELD SWITCH CLOSED (LIGHT OFF)
- (4) APU GENERATOR BREAKER SWITCH CLOSED (LIGHT OFF)
- (5) HYDRAULIC SYSTEM "B" PUMP SWITCH ON
- (6) ENGINE 1 BLEED AIR SWITCH. ON
- (7) ENGINE 2 BLEED AIR SWITCHES (BOTH) ON
- (8) ENGINE 3 BLEED AIR SWITCH. ON
- (9) DC METERS SELECTOR BAT
- (10) ESSENTIAL POWER SELECTOR APU
- (11) AC METERS SELECTOR APU
- (12) ENGINE START LEVERS (**Ctrl+Shift+F4**). START
- (13) ENGINE START SWITCH GROUND

NOTE: The pilot must hold the switch in the GROUND position until 35-40% N₂, then release the START switch, closing the starter shutoff valve.

- (14) N₂ RPM ROTATION CHECKED
 - (15) OIL PRESSURE. (S / O) REPORT RISING
 - (16) N₁ RPM ROTATION CHECKED
 - (17) START LEVER (AT 15% MINIMUM, 20% N₂ DESIRABLE). IDLE
 - (18) INITIAL FUEL FLOW APPROX. 900 - 1000 PPH
 - (19) EGT. RISING
 - (20) START SWITCH (AFTER 35% AND BEFORE 40% N₂). RELEASE TO OFF
- NOTE:** Second Officer observes increase in pneumatic pressure and reports START VALVE CLOSED.
- (21) OIL PRESSURE LOW LIGHT. OUT
 - (22) Idle stabilized – observe the following:
 - (a) N₁. 30-32%
 - (b) N₂. 50.5-58%
 - (c) EGT. 380°C OR 480°C MAX
 - (d) FUEL FLOW. 900-1000 PPH
 - (e) OIL PRESSURE. 40-55 PSI
 - (23) Repeat sequence for other engines.

AFTER START

F / O CHALLENGE – CAPT. RESPOND	After Start	S / O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED
START LEVERS. IDLE		GALLERY POWER. ON
TRANSPONDER. STANDBY		ELEC PANEL. CHECKED
S / O PANEL & DOOR LIGHTS. CHECKED		FUEL PANEL. SET
ENG ANTI-ICE. AS REQUIRED		HYD SYSTEMS. CHECKED
STERILE COCKPIT LIGHT. ON		ENG BLEED SWITCHES & PACKS. AS REQUIRED
		COCKPIT DOOR. LOCKED

ENGINE ANTI – ICE

To prevent surging during prolonged periods of ground operation, increase power on each engine to 50% N₁ minimum, every 5 minutes.

Wing anti-ice is used if TAT is +8°C or less and visible moisture is present.

If #1 fuel tank temperature is 0°C or less, operate the fuel filter heaters for 1 minute before takeoff.

ELEC PANEL

The following automatic paralleling sequence is based on an engine start sequence of 1 – 2 – 3:

- (1) AC METERS SELECTOR. GEN 1
- (2) GENERATOR # 1 FREQUENCY SET
- (3) GENERATOR # 1 VOLTAGE. 115 ± 5 VOLTS
- (4) GENERATOR BREAKER # 1. CLOSED

- (5) AC METERS SELECTOR. GEN 2
- (6) SYNCHRONIZING LIGHTS. CHECK
- (7) GENERATOR # 2. CHECK (REPEAT ITEMS 2-3-6)
- (8) GENERATOR BREAKER # 2. CLOSED
- (9) AC METERS SELECTOR. GEN 3
- (10) GENERATOR # 3. CHECK (REPEAT ITEMS 2-3-6)
- (11) GENERATOR BREAKER # 3. CLOSED
- (12) ESSENTIAL POWER selector to Gen #1, #2, #3.
- (13) Check that essential power will hold on each generator.
- (14) DC POWER SWITCH. CHECKED
- After generators on Bus:
- (15) GALLERY POWER. ON
- (16) ELECTRICAL SYSTEM. CHECK
 - (a) All lights – off.
 - (b) KW & KVAR – within tolerance.
 - (c) CSD TEMPERATURE SELECTOR switch – RISE then IN.

FUEL PANEL SET
 Fuel is being supplied tank-to-engine. All boost pumps should be on and the #2 crossfeed valve open.

HYDRAULIC SYSTEMS CHECKED
 Check that both system "A" PUMPS switches are ON, both pump low pressure lights are out and ground interconnect closed. Turn on remaining system B pump and check that its low pressure lights goes out.

ENGINE BLEED SWITCHES AND PACKS. AS REQUIRED

- (1) ENGINE #2 BLEED AIR SWITCHES. CLOSE
- (2) LEFT AIR CONDITIONS PACK SWITCH. ON
- (3) COCKPIT AIR CONDITIONS OUTLET. CHECK FOR AIR FLOW
- (4) LEFT PACK TEMPERATURE INDICATOR MONITOR FOR CHANGE

After APU is SHUTDOWN:

- (5) RIGHT AIR CONDITION PACK SWITCH. ON
- (6) RIGHT PACK TEMPERATURE INDICATOR. MONITOR FOR CHANGE

COCKPIT DOOR LOCKED

TAXI CHECK

S / O CHALLENGE – F / O RESPOND		Taxi Check	S / O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED
FLAP LEVER.	SET	FLT / GND SWITCH.	FLT
FLT DIR. FLAGS – RMIs.	CHECKED	CABIN PRESS & TEMP.	SET
YAW DAMPERS.	CHECKED	ENG BLEED SWITCHES.	#1 & #3 OPEN
CONTROLS.	CHECKED		#2 L & R CLOSED
SPEED BRAKE.	CKD, FULL FWD	PACKS.	2 ON
FLAPS.	0°, 0°, GREEN LT	FLIGHT RECORDER.	REPEAT
STABILIZER TRIM.	SET, SW ON	APU MASTER SW.	OFF
T. O. DATA & BUGS.	CKD - SET	APU LIGHT.	OUT

FLAP LEVER. SET
 Move flap selector lever to desired takeoff flap position.

FLIGHT DIRECTOR FLAGS – RMI'S. CHECKED

- (1) Place MODE SELECTOR in OFF position. Use of the v-bar command indicator is not recommended during takeoff.
- (2) All warning flags should be out of view.
- (3) Pitch and roll attitude information on the flight director indicator should reflect the aircraft attitude the ramp, approximately 0° in the pitch and roll axis.
- (4) The compass information displayed beneath the lubber line on the azimuth scale of the course indicators should agree with the opposite RMDI'S. Electric compasses should agree within 4° of each other and within 10° of the standby magnetic compass.
- (5) Set the course arrow and heading marker as required for the departure clearance.

CONTROLS. CHECKED

The captain will make the rudder portion of the control check. The first Officer will make the aileron and elevator portion of the control check.

SPEED BRAKE. CHECKED & FULL FORWARD
To check the flight control warning, the F/O will hold the TEST switch to the SAFETY RELAY BYPASS position while the captain extends the speed brakes. The intermittent warning horn should sound then silence when the SPEED BRAKE lever is returned to the FORWARD DETENT. The F/O then releases the TEST switch to the NEUTRAL position.

FLAPS. °, °, GREEN LT
Check that the flap position, as shown on the data card, agrees with the flap gauges and the green leading edge flap light is illuminated.

T. O. DATA & BUGS CHECKED – SET
V₁, V_R, and V₂ speed are checked for the ambient temperature and gross weight, altitude, runway slope, wind and flap setting to be used.

An external bug will be set on V₁. Manually set the internal bug on V₂. The remaining external bugs will be set on minimum maneuvering speeds as indicated on the data card.

TAXI NOTES

Make all turns at a slow taxi speed.

Steering. When the aircraft is stationary, it is recommended that it be allowed to move forward with the nose wheel straight (centered) a short distance before turning the nose wheel.

Powerback. Powerback is authorized at specified gates at the selected airports.

Do not use brakes when aircraft is in rearward motion. Do not exceed 80% N₂ during Powerback.

Taxi Speed Use of reverse thrust from the #2 engine is permitted to aid to controlling taxi speed, however, only small thrust inputs should be used.

Turns Make all turns with as large a radius as possible, conditions permitting. (The required nose wheel control motion is less then on other type airplanes). When an outboard engine is used to assist in turning , use as little power as possible and do not allow the airplane to stop. The engine are effective on minimum radius turns.

TAKEOFF PROCEDURE

PRE-TAKEOFF BRIEFING

It is recommended that the Captains conduct a pre-takeoff briefing when:

1. Adverse weather conditions exist.
2. At max gross weight for the takeoff runway.
3. Unusual conditions exist.

S / O CHALLENGE – F / O RESPOND	Before Takeoff	S / O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED
NOTE: CAPT. WILL CALL FOR BEFORE T / O CHECKLIST WHEN T / O CLEARANCE HAS BEEN RECEIVED OR IS IMMINENT.		
STROBE LIGHTS. ON	T / O ANNOUNCEMENT. COMPLETED	
PITOT HEAT. ON	FUEL PANEL. SET	
TRANSPONDER & DME. ON & NORM	BOOST PUMPS. ON	
	CSD OIL COOLER. GROUND OFF	



TRIMMER & FLAPS POSITION FOR TAKE-OFF **SEE PICTURE**
(Recommended position for MTOW)

T / O ANNOUNCEMENT. COMPLETED
Second Officer will pick-up handset and make the takeoff announcement using the following phraseology:
" We have been cleared for takeoff. Flight attendants please take their seats".

BOOST PUMPS ON
This is final check to see that all boost pumps are ON, the respective low pressure light are off, the #2 CROSSFEED valve is OPEN, and the fuel heaters are OFF.

THRUST SETTING

- (1) Prior to brake release, or as the airplane is aligned with the runway, the pilot flying will smoothly advance all engine throttles. Insure even spooling of the engines prior to applying takeoff power.
- (2) After brake release and/off with the airplane aligned and rolling, advance the throttles to the TAKEOFF EPR. The pilot not flying will make final adjustments, as required, to obtain takeoff EPR before reaching 60 knots. This normal takeoff procedure will assist in avoiding engine surge at of takeoff. It is therefore recommended for all takeoff conditions to counteract adverse wind conditions, particularly when crosswind, gusts, or tailwinds exist.

TAKEOFF WARNING HORN

When the #3 engine throttle is advance to the vicinity of takeoff thrust, an intermittent horn will sound if the SPEED BRAKE lever is out of ZERO DETENT, the stabilizer trim is not IN THE GREEN, the flaps are not properly positioned for takeoff, or all the leading edge devices are not deployed.

Caution: Should the warning horn sound prior to reaching V_1 speed, the takeoff will be aborted unless the Captain determines an overriding condition exists in which a continuance off the takeoff would be a safer course of action. If takeoff is aborted, the cause of horn activation must be corrected prior to attempting another takeoff. If takeoff is continued, the cause must be determined and corrected or the flight should return to airport of departure, unless a safer course of action is required.

TAKEOFF ROLL

Once the aircraft is aligned on the runway, the pilot flying will hold forward pressure on the control column and maintain directional control with rudder pedal steering.

CROSSWIND TAKEOFF

- (1) The pilot flying should gradually relax forward pressure on control column, so as to arrive at V_R prepared to rotate.
- (2) At V_R , rotate the airplane smoothly to the takeoff attitude of approximately 13° . The rate of rotation should be 2° per second. When the airplane is rotated at the proper rate, liftoff will normally occur at approximately 10° of body angle. The total time to rotate from V_R to the initial climb attitude should be about 7 seconds.
- (3) Excessive rate of rotation must be avoided. If the rate of rotation exceeds the proper values, it is possible to reach an attitude that will cause the tail skid to contact the runway before the airplane can liftoff.

LIFTOFF AND INITIAL CLIMB

- (1) The airplane will attain $V_2 + 10$ approximately 35 feet above the runway.
- (2) Gear retraction will not be initiated until positive rate of climb has been verified on the VSI and altimeter, and CALLED by either pilot. Until ground effect pressure is dissipated, there may be a slight delay for these instruments read correctly.
- (3) Do not apply brakes after becoming airborne.
- (4) Adjust pitch attitude to maintain desired airspeed. Because acceleration continues throughout the takeoff, a false nose-high attitude (up to 4°) could be indicated on the horizon display if the vertical gyro does not have pitch erection cutout.
- (5) Target speed with takeoff flaps (25° , 15° , or 5°) should be $V_2 + 10$ knots. This speed is very close to the maximum angle of climb (maximum altitude in minimum distance) for the takeoff flaps used.
- (6) Initial climb attitude & takeoff profile. The normal Initial climb attitude will vary from 11 to 15° (max – 20°). The attitude that will satisfy the most critical situation will result in an airspeed very near $V_2 + 10$ with all engines operating.

Takeoff to 1000 Feet AGL

- 1 Maintain takeoff power.
- 2 Climb at $V_2 + 10$ (max body angle – 20°)
- 3 Maintain takeoff flap setting until attaining an altitude of 1000 feet.
- 4 If 25° flap used for takeoff, 15° may be selected at 400 ft.

1000 to 3000 Feet AGL

- 1 Lower the nose to approx. 10° .
- 2 Retract flaps to 5° .
- 3 Reduce thrust to climb power.
- 4 Retract flaps on schedule.
- 5 Complete AFTER TAKEOFF checklist.
- 6 Climb to 3000 feet at 0° flap man. speed.

At 3000 Feet AGL

- 1 Accelerate to 250 knots IAS.
- 2 Establish normal enroute climb.
- (7) Close in turn after takeoff.
- (8) A good operating practice is to delay making turns after takeoff until reaching 800 to 1000 feet, unless otherwise instructed.

MANEUVERING SPEED

Maneuvering airspeed is the airspeed which safely allows 30° of bank angle with a safety margin for a 15° overshoot. At speed below maneuvering, limit the bank angle to 15°.

Maneuvering speed for operations below 10,000 ft

GROSS WGT (x1000)		110	120	130	140	150	160	170	172,5
MIN. MAN.	15° FLAPS	129	135	140	145	150	156	161	164
MIN. MAN.	2° FLAPS	160	167	175	182	188	194	201	204
MIN. MAN.	0° FLAPS	168	176	183	190	197	203	210	213

V₂ does not provide normal maneuvering margin during takeoff.

There force, limit bank angle to 15° at V₂.

V₂ + 10 provides minimum maneuvering airspeed at all takeoff flap settings.

Flaps 15° minimum maneuvering + 10 kts. provide minimum maneuvering for flaps 5°.

ABNORMAL TAKEOFF

When the aborted takeoff becomes necessary for any reason, use normal after touchdown technique, i.e., sped brakes, reverse thrust, and brakes. If engine failure is recognized after attaining V₁ speed, the takeoff will be continued. Use rudder as necessary to stay on center line. Rotate the aircraft smoothly to takeoff attitude of approx. 13°.

AFTER TAKEOFF

S / O CHALLENGE – PILOT NOT FLYING RESPOND	After Takeoff	S / O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED
NO SMOKE. OFF GEAR. OFF, LIGHTS, OUT FLAPS. UP, LIGHTS, OUT <u>NOTE:</u> CAPTAIN WILL ASCERTAIN PROPER TIME TO TURN STERILE COCKPIT LIGHT OFF (NORMALLY 10,000')		AUTO PACK TRIP. CUTOUT FUEL PANEL. SET TAILSKID. RETRACTED CABIN PRESS & TEMP. SET

GEAR. OFF, LIGHTS, OUT
The red gear unsafe lights and the gear door light should all be out.

CLIMB, CRUISE & DESCENT

CLIMB

Normally the PDCS or computer flight plan indicated climb speeds will be utilized. In the absence of this information, the following speed schedules should be followed as applicable:
280 kts/ .78 Mach is the turbulence airspeed and the optimum rate of climb.
300 kts/ .78 Mach is normal climb speed.
340 kts/ .78 Mach is optimum NAUTICAL AIR MILES PER POUND OF FUEL speed when climbing into significant headwind.
Turbulent penetration speed is 280 knots below 34,000 feet (approx.) and Mach .80 above 34,000 feet will call 18,000 feet as a reminder to set an altimeter setting of 29.92. Additionally, he will call 1000 feet below assigned altitudes.

CRUISE

The airplane is climbed, leveled off the initial cruise altitude, and accelerated with CLIMB thrust setting to .01 Mach or more above the desired cruise. CRUISE thrust is now set. The airplane will then stabilize at or very near the target Mach number. Adjust the throttles to give the desired Mach. Operating with the autopilot engaged and altitude hold selected allows closer adherence to the desired performance.

EMERGENCY DESCENT

Any situation in the loss of cabin pressure requires an emergency descent to a lower altitude. Prior to beginning the descent, the immediate and secondary action checklist items for the decompression should be accomplished. It should then be determined if control of the cabin is possible. If not, check for factors which main affect the descent maneuver.

While still on autopilot, close the throttles and extend the speed brakes. Then disconnect the autopilot and smoothly initiate a 30° bank turn, letting the nose of the aircraft fall to an approximate 10° nose-low pitch attitude.

AIRWORK

Steep Turns

Steep turns in both directions will be accomplished during normal training, recurrent training, and proficiency checks as an exercise in instrument crosscheck and aircraft control.

(1) Entry

Stabilize and trim at 250 knots on heading and altitude. In order to avoid gaining altitude during roll-out, pitch trim is not used during the turn. As the bank is increased past normal (25-30°) loss of vertical lift requires a pitch adjustment. Maintain 45° of bank.

(2) During turn

Varying the angle of bank while turning makes pitch control more difficult. Excursion from the entry conditions should be corrected by smooth, positive inputs and/or thrust.

(3) Altimeter and VSI

The Altimeter is primary performance instrument during the turn. Be alert to the direction and rate of altimeter needle movement and use smooth elevator control pressure changes for corrections. Due to the location of the static ports, the VSI will indicate a slight rate of the climb even though the aircraft is in level flight.

DESCENT

For purposes of fuel economy, descent from cruise altitude is accomplished at idle power in a clean configuration. If optimum range or turbulent air is consideration, descend at .80 Mach to 34,000 feet, and then descend at a constant airspeed of 280 KIAS.

Speed brakes may be used in the event a high rate of descent or a speed reduction is necessary.

IN RANGE

S / O CHALLENGE – PILOT NOT FLYING RESPOND	In Range	S / O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED
SEAT BELT. ON ANTI – ICE. AS REQUIRED ALTIMETERS & AIRSPEEDS. SET & CKD REFERENCE SPEEDS. CKD & SET		FUEL PANEL. SET HYD SYSTEMS. CHECKED CABIN PRESSURE. SET COOLING DOORS. AS REQUIRED
NOTE: CAPTAIN WILL ASCERTAIN PROPER TIME TO TURN STERILE COCKPIT LIGHT ON (NORMALLY 10,000')		

NOTES

Holding

Planning

Make all turns during entry and while holding at:

- 1 30° bank angle or,
- 2 25° bank angle using the flight director system.

Configurations

Above 14,000 feet: hold clean and used PDCS or chart speed.

At or Below 14,000 feet: extensive holds should be made in the clean configuration.

Maximum Airspeeds

- (a) Sea level – 6,000 ft. MSL = 200 kts. IAS
- (b) Above 6,000 – 14, 000 ft. MSL = 210 kts. IAS
- (c) Above 14, 000 ft. MSL = 230 kts. IAS

Procedure Turn

Unless specified on the approach plate, the point at which the procedure turn is started is left to the discretion of the pilot. It is recommended that the turn to the outbound heading be commenced 1 minute past the final approach fix on a non-precision approach, and 30 second past the final approach fix on an ILS approach. Timing on the outbound leg should be a minimum of 30 second and maximum 1 minute depending on wind conditions. Normally the procedure turn will be accomplished with a 15° flap setting and maneuvering airspeed. When established on the inbound course of the procedure turn and cleared for the approach, an approach check should be accomplished.

APPROACH CHECK

S / O CHALLENGE – PILOT NOT FLYING RESPOND	Approach
RADIOS. CKD & IDENTIFIED COURSE ARROW. INBOUND COURSE MODE SELECTOR. SET ALTIMETER BUGS. SET ADF – VOR SWITCHES. AS REQUIRED MARKER SWITCHES. ON & LOW WARNING FLAGS. CHECKED MISSED APPROACH PROCEDURE. REVIEWED	

MODE SELECTOR. SET
Flight director mode selector as desired. Autopilot mode selector to AUTO G/S for coupled approaches.

MISSED APPROACH PROCEDURE REVIEWED
-- INHIBIT glideslope below 1,000 ft. AGL and above 300 ft. AGL if intended flight path does not follow glideslope
-- Pilots will review approach plate and missed approach procedures.
-- Good operating practice would include the use of all available navigation aids for visual approaches.

APPROACH NOTES

- (1) Initial pattern entry will normally be in a clean configuration. Reduce speed to $F0^0$ man prior to entering an airport traffic area.
- (2) Further speed reductions and configuration changes should be planned in order to be of $F15^0$ man just prior to turning base leg or intercepting the glide path. Gear and flaps will be extended at speeds of 10 to 15 knots below placard speed when conditions permit.
- (3) Speed reductions below $F0^0$ minimum maneuvering airspeed will be accomplished by flap extension to conform to the following minimum maneuvering airspeed:

Flaps	Speed
0^0	$F0^0$ Man.
2^0	$F2^0$ Man.
15^0	$F15^0$ Man. + 10 Kts.
25^0	$F15^0$ Man.
30^0	$V_{REF} + 10$ Kts.

- (4) Normally, the landing gear should not be extended until after at least 5 of flaps have been extended.
- (5) When cleared for on approach in IFR conditions, the pilot flying request an approach check.
- (6) Approaching the glideslope on a manually flown or coupled ILS, the pilot flying should call for flaps 25^0 , gear down, flaps 30^0 (when the gear is down and locked, AND LANDING CHECKLIST. This will result in minimal trim and power change requirements.
- (7) On other types of instrument approaches, the facility and minimums may dictate the point at which the final landing flap configuration is established.
- (8) On a visual approach final landing configurations should be established so as to be stabilized no later than 500' AGL.
- (9) Altitude call outs – CAT. I, non precision and visual approaches.
The pilot not flying will:
 - (a) At 1000 feet above touchdown zone elevation (TDZE), call out "1000 feet".
 - (b) At 500 feet above TDZE and at each 100 foot increment thereafter, call out altitude. Deviations from target airspeed, and rate of descent. I.E. "400 feet plus 3, sink 700".
 - (c) Call "Approaching minimums" approximately 100 feet prior to DH or MDA as applicable.
 - (d) Call "runway in sight" when appropriate.
 - (e) On a non – precision approach call " missed approach point" as appropriate.
 - (f) Altitude call outs for non – precision approaches and Category I precision will be made off the barometric altimeters.
 - (g) Refer to the Category II discussion later in this chapter for special call out procedures.

LANDING

S / O CHALLENGE – PILOT NOT FLYING RESPOND	Landing	S / O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED
GEAR. DOWN, 3 GREEN NO SMOKE. ON ANTI – SKID. 2 REL / 5 REL SPEED BRAKE. FULL FORWARD FLAPS. $—^0$, GREEN LIGHT		HYD PRESSURES. CHECKED START SWITCHES. FLIGHT START

NOTE:

The Second Officer will make the P.A.:
"Flight attendants please be seated for landing", when the gear is extended.

LANDING PROCEDURES

MANEUVERING SPEEDS

The normal maneuvering speed for each flap position is shown on the profiles in this manual. These speeds were selected considering bank angle capability, airplane pitch attitude and thrust required. They allow normal maneuvering (30^0 bank) throughout the approach.

APPROACH PATTERN

The illustrated pattern represents the ideal approach situation. Flap and landing gear extension points were selected to minimize crew workload and thrust changes during the approach. Airplane must be stabilized on final approach at least 500 feet above field elevation.

FINAL APPROACH

- (a) Once landing flap have been established, target speeds will be $V_{REF} + 5$ knots. However, the decrease in wind velocity approaching the surface of the earth has the effect of a decrease in airplane velocity. Consequently, caution must be exercised to prevent airspeed bleed off and increased sink rate during the last stage of the approach. Target approach speed is $V_{REF} + 5$ knots for landing in reported winds of zero to light and variable (up to 10 knots). When landing in higher wind conditions, add $\frac{1}{2}$ the steady headwind and the full value of the gust to V_{REF} . The total wind additive should not exceed 20 knots.
- (b) The pilot should aim for a constant angle relationship with the 1,000 ft. mark on the runway, coordinating pitch attitude and power changes. As the end of the runway and then 1,000 ft. mark disappear under the nose, maintain the stabilized attitude, around $2-3^\circ$ nose up, and power setting that have made good this constant angle until the 50 foot level is reached.
- (c) The pilot should restrain himself from the tendency to DIVE at the runway when breaking clear of the clouds allow altitude under instrument conditions, or as the end of the runway disappears under the nose in visual flight conditions. The high rates of sink that develop with this maneuver are not readily apparent on either the airspeed indicator or the vertical speed indicator, and may not be noticed until the flare point at 50 feet. Rapid rotation to stop a high sink rate is relatively ineffective since the induced "G" tends to offset the increase in lift. Thrust must be added to decrease a high sink rate when holding the proper approach speed and using a normal rotation.
- (d) The desired visual final approach condition is airspeed at target ($V_{REF} +$ wind additive) and 3 glide path that will result in main landing gear touchdown at 1,000 feet beyond the threshold. When the desired condition is established, maintain it to flare height. Do not DUCK UNDER an established glide path near the runway threshold to achieve an early touchdown.

FLARE AND LANDING

During visual approach, the main landing gear should cross the runway threshold at 50 feet. Main gear touchdown will occur just beyond 1,000 feet, assuming the glide path angle is 3° . Do not deviated from the glide path in an attempt touchdown sooner.

Flare results in a change in attitude of only $2-3^\circ$. At light weights, the change is hardly noticeable.

As soon as pilot observes response of the airplane to the flare, the throttles should be retarded smoothly to idle, and any back pressure on the control column relaxed.

CROSSWIND LANDING

The CRAB technique will be utilized and permits holding the wings level throughout the approach, touchdown, and landing roll. On final approach, a crab angle is established to hold the airplane on the desired track until just prior to, then remove the crab and align the airplane with the runway centerline. As the rudder is applied, the upwind wing will sweep forward, developing roll. Hold the wings level by simultaneous application of aileron into the wind. The touchdown is made with cross-controls. The aileron can be held nearly constant during touchdown and start of landing roll. Maintain directional control with rudder, and use aileron as necessary to hold the wings level. A slight wing down condition is acceptable.

BOUNCED LANDING

In the event of a bounced landing, hold or re-establish normal landing attitude. Add thrust as necessary to control the sink rate. Do not push over, as this may cause a second bounce and possibly damage the nose gear.

SPEED BRAKES

When landing in adverse weather conditions, rapid lowering of nose after touchdown and immediate application of speed brakes, reverse thrust, and brakes will result in minimum landing roll. During normal weather conditions, the speed brakes can be fully raised after touchdown while the nose wheel is being lowered to the runway with no adverse pitch effects.

The Captain will normally apply the speed brakes. The pilot flying, upon application of speed brakes, call for flaps 25° . If an aileron control deflection exists at this time, the double action from partially raised speed brakes will only be transitory and have a negligible effect on lateral control. The speed brakes spoil the lift over the wing and apply a downward force, which places the airplane weight on the main landing gear, providing excellent brake effectiveness. Unless speed brakes are raised after touchdown, very little weight will be on the wheels and any brake application may cause rapid anti-skid cycling. Braking will be ineffective and landing distances will be considerable increased.

WHEEL BRAKES

Immediately after raising the speed brakes, and with the nose gear on the ground, apply wheel brakes. Make this first brake application with only light braking. Apply just enough brakes to feel their effectiveness and to check

operation. On or normal landing with the touchdown near the 1,000 foot point only the light braking need be used to complete the stop.

THRUST REVERSERS

- (a) After the speed brakes are raised, quickly use alt pressure on thrust levers to check the engines in idle, and at the same time raise the reverse thrust levers rapidly up and back, Thrust reverser operating lights will illuminate when the lockout actuator piston has retracted. If the interlock stop is felt, hold light back pressure. The interlock will release when the clamshell doors are fully closed. The reverse thrust levers should be pulled back rapidly until the spring force buildup becomes limiting and then held in this position until the desired results are achieved. Generally try to achieve about 84 % N_1 RPM. Prompt application of reverse thrust will provide for max deceleration at touchdown speed, when reversing is most effective.
- (b) The Second Officer will monitor reverse and call out only:
 - 1 Engine (s) that fail to spool, or no light.
 - 2 N_1 RPM in excess of 85 %.
 - 3 80 knots (when aircraft decelerates through 80 knots).
- (c) Below 0°F, immediately ease the reverse thrust levers forward to the 70 knots detent. Above 0°F, ease the reverse thrust levers forward to the 70 knots detent at approximately 70 knots, while using moderate wheel braking. The reverse thrust levers may be left in the 70 knots detent until the aircraft is fully stopped without engine surging. Normally, however, the reverse thrust levers are modulated forward with decreasing speed to full forward and down at approximately 10 to 15 knots.
- (d) Rudder control is effective down to approximately 50 knots. This, combined with rudder pedal steering, is usually sufficient for maintaining directional control during the rollout. Maintain the wings level.

DIRECTIONAL CONTROL DURING REVERSING

On dry runway, directional control is easily maintained by nose wheel steering through the rudder pedals. However, when the runway is wet or slippery and the effectiveness of nose wheel steering is reduced, directional control may be difficult. On a wet or slippery runway, use normal on the center engine.

ABNORMAL LANDING

ONE ENGINE INOPERATIVE

Landing with one engine inoperative is the same as a normal landing, except $V_{REF} + 10$ knots is maintained after extension of landing flaps.

TWO ENGINE INOPERATIVE

- (a) landing Pattern preparations and procedure are illustrated on the TWO ENGINE INOPERATIVE LANDING profile in the approach procedures.
- (b) Final Approach
Extend the landing gear when starting decent. (Commit point is gear extension). Extend the flap to 5°. Plan a bleeding airspeed final approach so as to cross the threshold at the two engine inoperative $V_{REF} + \text{wind additive}$. Use of rudder trim during landing is at the option of the pilot.

GO – AROUND PROCEDURES

- (A) If the decision is made to go – around during a circling approach, the missed approach specified for the approach procedure utilized to get to the airport must be followed. To become established on the prescribed missed approach course, make an initial climbing turn toward the landing runway and continue the turn until established on the missed approach course.
- (B) To execute a go – around, SIMULTANEOUSLY apply power, call for flaps 25°, and smoothly rotate the aircraft to a minimum pitch setting of 10° at an approximate rotation rate of 2°/sec. At $V_{REF} + 10$, call for a flap setting of 15°. When either pilot verifies and calls a positive rate of climb, a GEAR UP call is made by the pilot flying.

If during the initial phase of the go – around a positive rate of climb is established prior to $V_{REF} + 10$, the gear may be retracted before retracting the flaps to 15°.

Pitch should be adjusted so as to maintain $V_{REF} + 10$ knots. Unless otherwise specified in the missed approach procedure, a turn should not be made until a minimum of 800 feet AGL is reached.

If a close – in turn to a missed approach course is required, maneuvering at F15° man will result in optimum turn radius and climb performance. Where appropriate, the aircraft should be established on the missed approach course and at missed approach altitude prior to further acceleration and clean up.

AFTER LANDING

S / O CHALLENGE – F / O RESPOND	After Landing	S / O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED
NOTE: INITIATED ON CAPTAIN'S COMMANDS WHEN CLEAR OF ACTIVE RUNWAY		
ANTI – ICE. ALL OFF RADAR / TRANSPONDER / DME. STANDBY SPEED BRAKE. FULL FWD FLAPS. UP STAB TRIM. 5 UNITS STROBE LIGHTS. OFF		AC METERS SELECTOR SW. APU ELECTRICAL LOAD. REDUCE AIR CONDITIONING. AS REQUIRED APU. START ESSENTIAL POWER. APU

NOTE: For fuel conservation, consider shutting down the #3 engine for taxi when conditions permit.
In addition, #1 engine may also be shut down depending on taxi or delay considerations.

ARRIVAL PROCEDURES

F / O CHALLENGE – CAPT. RESPOND	Parking	S / O ACCOMPLISH & ADVISE CAPT WHEN COMPLETED
PARKING BRAKE. SET STERILE COCKPIT LIGHT. OFF SEAT BELT. OFF #EMERGENCY EXIT LIGHTS. AS REQUIRED #FLIGHT RECORDER. TEST #VOICE RECORDER. TEST #RADAR & TRANSPONDER. OFF START LEVERS (Ctrl+Shift+F1) . CUTOFF BEACON. OFF # CREW CHANGE STATIONS		APU / EXTERNAL POWER. ON BUS GALLERY POWER. ON BOOST PUMPS. OFF "B" PUMPS. OFF ENG BLEEDS. 4 OPEN PARKS. AS REQUIRED

APPENDIX 1

V₁ V_R V₂

<i>FLAPS</i>	GROSS WEIGHT (x 1000 LB)	V₁	V_R	V₂
5	210	165	166	175
	200	161	162	171
	190	156	157	167
	180	151	152	163
	170	146	147	159
	160	140	141	153
	150	135	136	149
	140	129	130	145
	130	124	125	139
	120	119	120	134
15	210	156	157	166
	200	152	153	162
	190	147	148	158
	180	142	143	154
	170	137	138	150
	160	132	133	145
	150	127	128	141
	140	122	123	137
	130	117	118	132
	120	112	113	127
25	210	146	147	157
	200	142	143	153
	190	137	138	149
	180	133	134	145
	170	128	129	141
	160	123	124	137
	150	119	120	133
	140	114	115	129
	130	109	110	124
	120	105	106	120

CLIMB PERFORMANCE
SEE LEVEL ALL ENGINES OPERATING

TAKEOFF GROSS WEIGHT LB.	2ND SEGMENT RATE OF CLIMB @ $V_2 + 10$ FT/MIN	2ND SEGMENT RATE OF CLIMB AT 200 KN* FT/MIN
140,000	2790	3480
150,000	2560	3120
160,000	2340	2850
170,000	2180	2640
180,000	2020	2420
190,000	1880	2190

5000 FT ALL ENGINES OPERATING

TAKEOFF GROSS WEIGHT LB.	2ND SEGMENT RATE OF CLIMB @ $V_2 + 10$ FT/MIN	2ND SEGMENT RATE OF CLIMB AT 200 KN* FT/MIN
140,000	2350	2600
150,000	2100	2300
160,000	1960	2070
170,000	1820	1910
180,000	1610	1740
190,000	1350	1550

*200 kn or minimum maneuver - whichever is higher

NORMAL V_{REF} AND MANEUVERING SPEEDS

GROSS WEIGHT (x1000)		120	125	130	135	140	145	150	155	160	170	180	190
V_{REF}	30° FLAPS	117	120	122	125	127	130	132	135	137	143	147	152
V_{REF}	25° FLAPS	127	130	132	135	137	140	142	145	147	153	157	162
MIN. MAN.	15° FLAPS	135	138	140	143	145	148	150	153	156	161	167	173
MIN. MAN.	5° FLAPS	145	148	150	153	155	158	160	163	166	171	177	183
MIN. MAN.	2° FLAPS	167	172	175	179	182	186	188	192	194	201	209	215
MIN. MAN.	0° FLAPS	176	180	183	187	190	194	197	201	203	210	218	225

NOTE: Minimum V_{ref} = 112 Kts



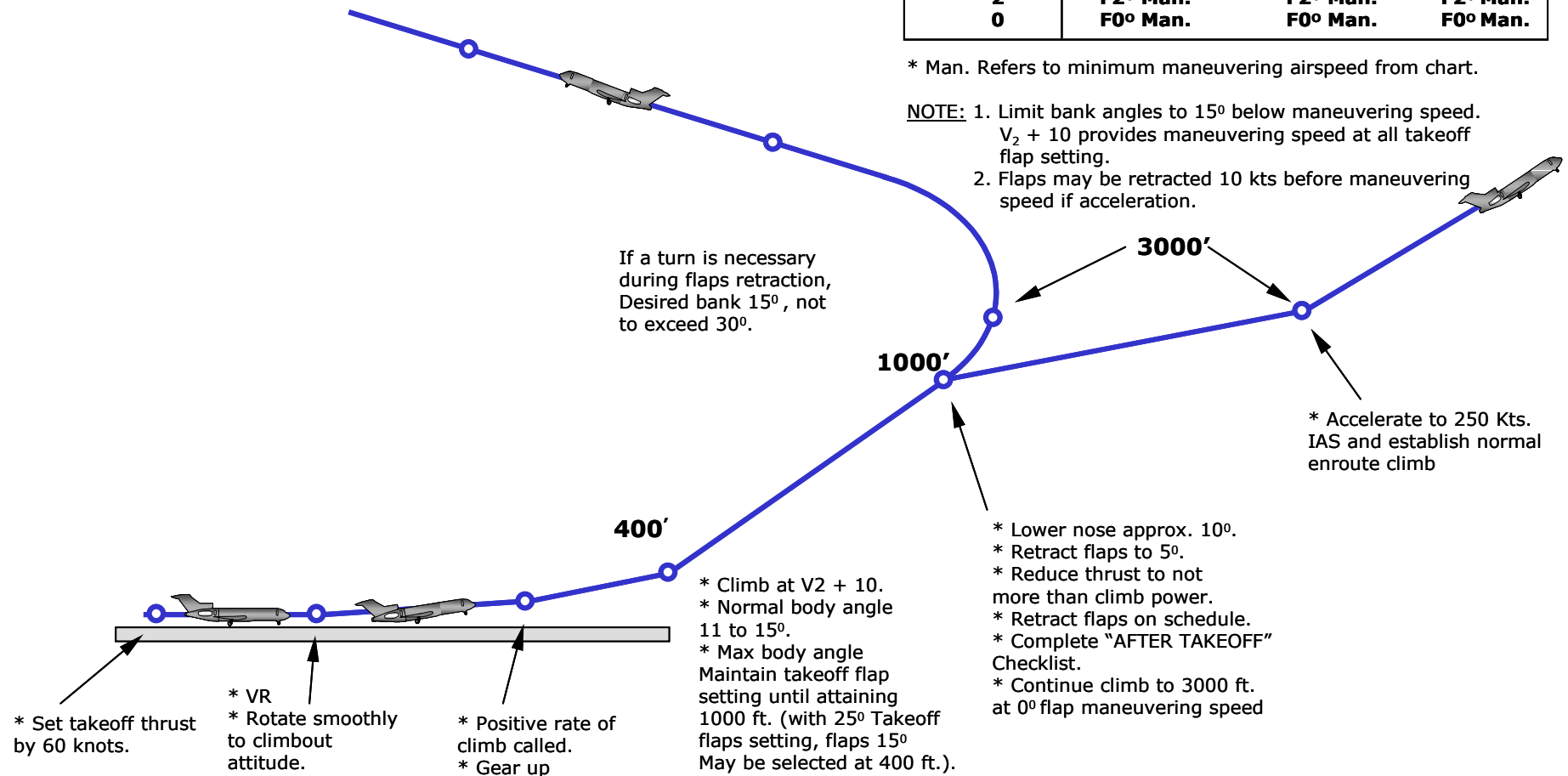
Normal / Noise Abatement Takeoff

TAKEOFF FLAPS RETRACTION/MANEUVERING SCHEDULE			
Flaps 15 at	TAKEOFF FLAP SETTING		
	F25°	F15°	F5°
	V ₂ + 10	V ₂ + 10	
	F15° Man.*+10	F2° Man.	F2° Man.
5	F2° Man.	F0° Man.	F0° Man.
2			
0			

* Man. Refers to minimum maneuvering airspeed from chart.

NOTE: 1. Limit bank angles to 15° below maneuvering speed.
V₂ + 10 provides maneuvering speed at all takeoff flap setting.

2. Flaps may be retracted 10 kts before maneuvering speed if acceleration.





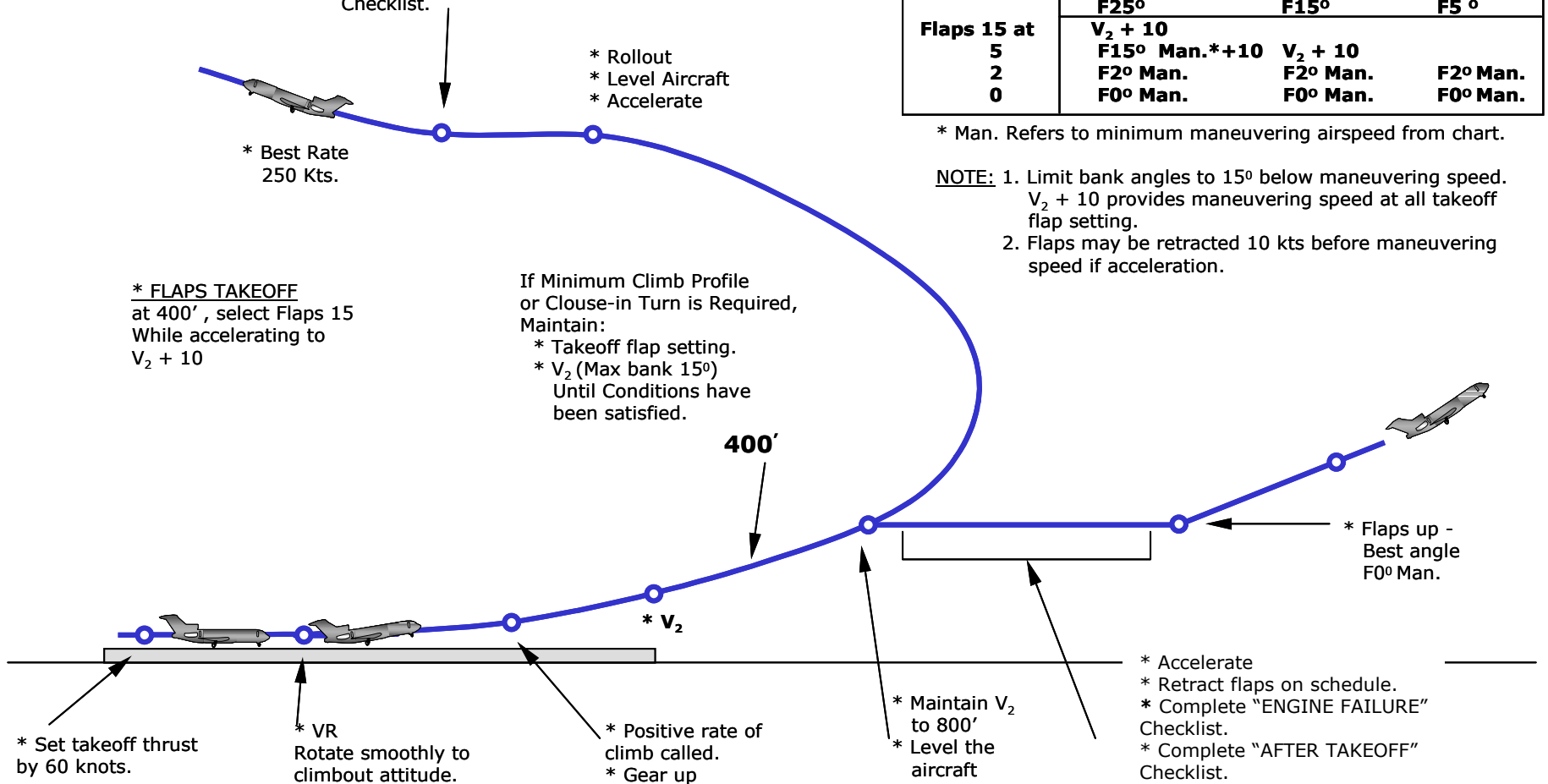
Takeoff – Engine Failure Alter V_1

- * Retract flaps on schedule.
- * Set Max Continuous Thrusts.
- * Complete "ENGINE FAILURE" Checklist.
- * Complete "AFTER TAKEOFF" Checklist.

TAKEOFF FLAPS RETRACTION/MANEUVERING SCHEDULE			
Flaps 15 at	TAKEOFF FLAP SETTING		
	F25°	F15°	F5°
5	$V_2 + 10$	$V_2 + 10$	
2	F15° Man.*+10	F2° Man.	F2° Man.
0	F2° Man.	F0° Man.	F0° Man.

* Man. Refers to minimum maneuvering airspeed from chart.

- NOTE:** 1. Limit bank angles to 15° below maneuvering speed. $V_2 + 10$ provides maneuvering speed at all takeoff flap setting.
2. Flaps may be retracted 10 kts before maneuvering speed if acceleration.





ILS

APPROACH PREPARATION

- Complete "IN RANGE" Checklist.
- Review approach and missed approach procedures
- Set radios and instruments as required.
- Approach Briefing.

On Intercept Heading

- Approach Check

Localizer Inbound

- Approaching glide slope Flaps 25° ($V_{REF} + 10$ Kts).

Intercepting Glide Slope

- Gear Down Landing Check List
- Landing Flaps

- Approximately 30 secs. Past LOM, start procedure turn.

Flaps 15° (F15° Man Speed)

- Clean (F0° Man.)

- Speed: $V_{REF} + \text{wind Additive}$

Missed Approach:

- Go-Around Thrust Attitude (Min. 10°).
- Flaps 25° (Flaps 15° at $V_{ref} + 10$).
- Positive Rate of Climb Called
- Gear up.
- Retract Flaps on Schedule

MISSED APPROACH FLAPS RETRACTION SCHEDULE

At	Select Flaps
V_{REF}	.....25
$V_{REF} + 10$	.....15
F15° Man + 10 Kts	.....5
F2° Man	.....2
F0° Man	.....0

FLAPS MAY BE RETRACTED 10 KTS. BEFORE MANEUVERINGN SPEED IF ACCELERATING.

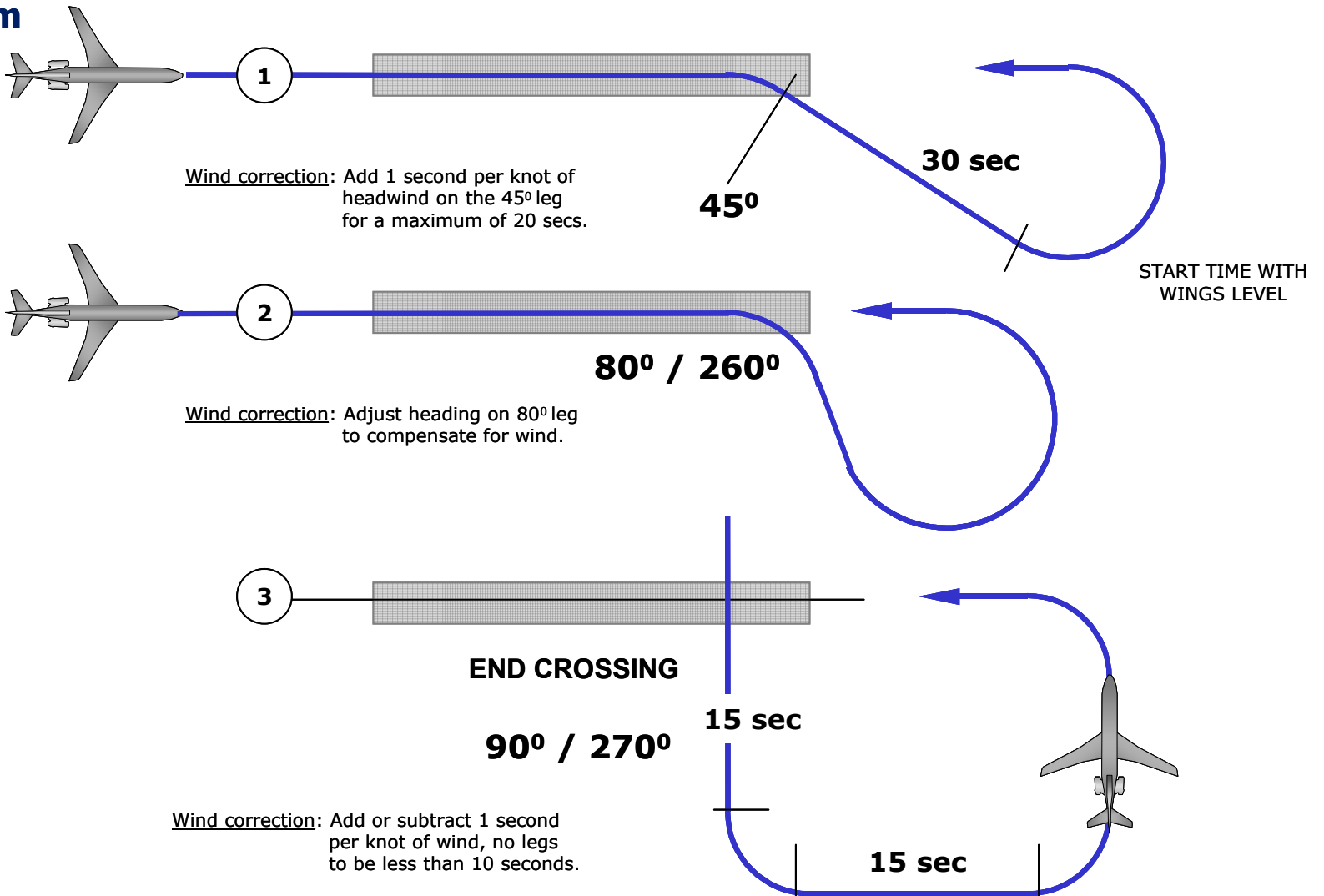
LOM

MM

- Touchdown target ILS Touchdown point

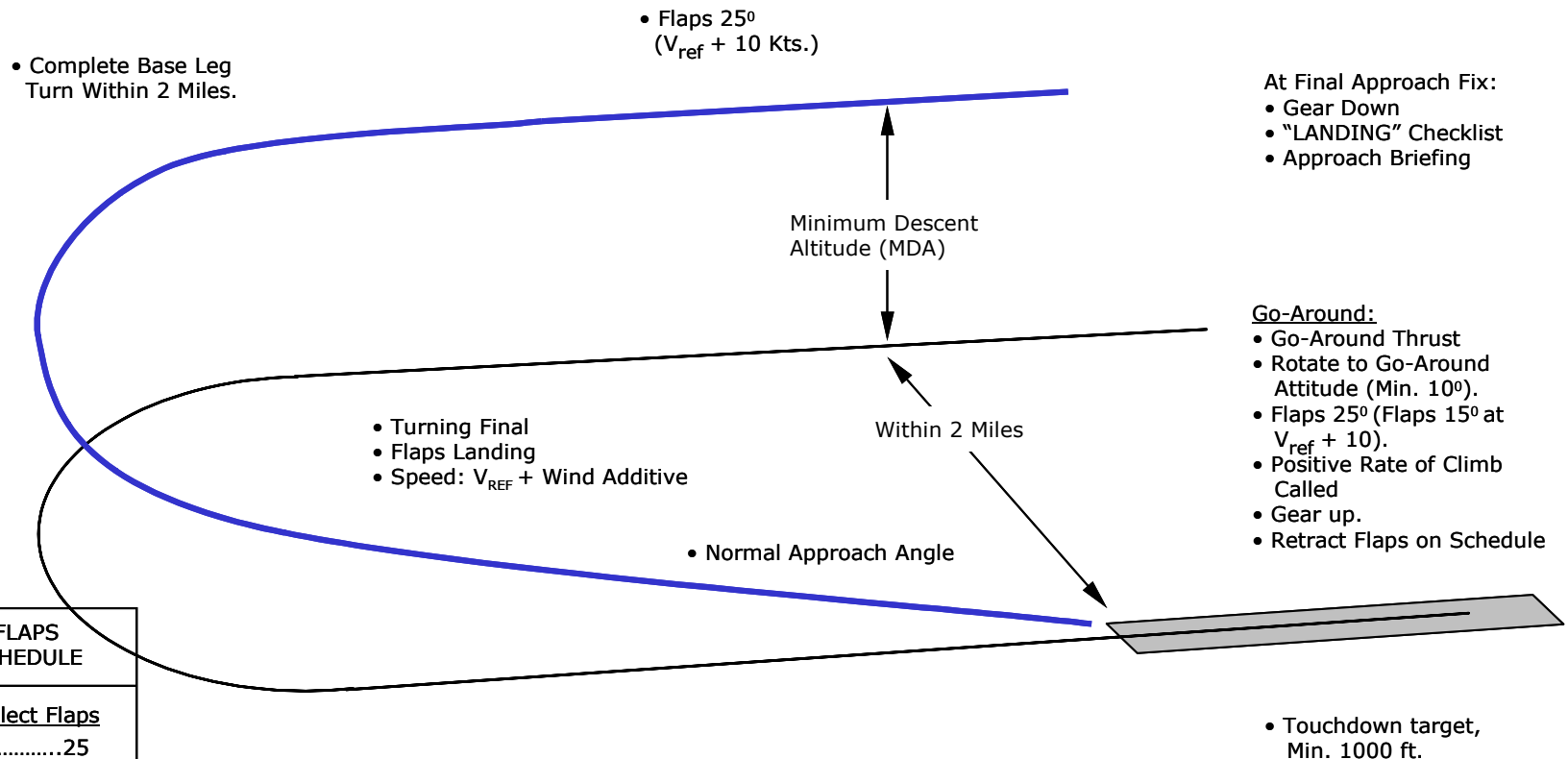


Circling Profiles / Alternate Maneuvers





Circling (Instrument Approach Complete – Maintain Visual Contact)



GO AROUND FLAPS RETRACTION SCHEDULE

At	Select Flaps
V_{REF}	.....25
$V_{REF} + 10$	.....15
F15° Man + 10 Kts	.....5
F2° Man	.....2
F0° Man	.....0

FLAPS MAY BE RETRACTED 10 KTS.
BEFORE MANEUVERING SPEED IF
ACCELERATING.



- Approximately 30 seconds after LOM (depending on wind), start procedure turn.

- On Intercept Heading, "Approach" Checklist

- Intercepting
Glide Slope:
Starting descent:
- Gear Down
 - Flaps 5°
 - "LANDING" Checklist

MISSED APPROACH FLAPS RETRACTION SCHEDULE

At	Select Flaps
F2° Man	2
F0° Man	0

ILS - Two Engines Inoperative

Clean (F0° Man. Speed)

LOM

MM

APPROACH PREPARATION

- Complete "IN RANGE" Checklist.
- Complete "Two Engines Inoperative Approach and Landing" Checklist.
- Review approach and missed approach procedures
- Set radios and instruments as required.
- Approach Briefing.

- Airspeed - Bleed so as to arrive over threshold at Target Speed / Two Eng. Inop. Vref + Wind Additive)

Missed Approach:

- Go-Around Thrust.
- Accept Altitude Loss While Accelerating to F0° Man. Speed.

CAUTION:

DO NOT ATTEMPT A MISSED APPROACH AFTER GEAR EXTENSION.

- Touchdown target - ILS Touchdown point

After Touchdown:

- Speed Brakes up
- Braking as Required
- All Reverses to Interlock - Reverse Operative Engine.



Normal Landing

APPROACH PREPARATION
<ul style="list-style-type: none"> • Complete "IN RANGE" Checklist. • Approach Briefing.

- Turning Base:
- Flaps 25° ($V_{REF} + 10$ Kts.)
 - Gear Down
 - "LANDING" Checklist

Flaps 15°
(F15° Man.
Speed)

Flaps 5°
(F15° Man.
+ 10 Kts.)

Flaps 2°
(F2° Man.
Speed)

Clean
(F0° Man.
Speed)

1500 Ft.

- Final Approach:
- Landing flaps
 - Speed: $V_{REF} + \text{Wind Additive}$

Go-Around:

- Go-Around Thrust
- Rotate to Go-Around Attitude (Min. 10°).
- Flaps 25° (Flaps 15° at $V_{ref} + 10$).
- Positive Rate of Climb Called
- Gear up.
- Retract Flaps on Schedule

1.5-2 Miles

- Touchdown target, Min. 1000 ft.

"AFTER LANDING"
Checklist

After Touchdown:

- Thrust to Idle.
- Speed Brakes up
- Braking as Required
- Reverse Thrust .

- Stabilized in slot

FLAPS MAY BE RETRACTED 10 KTS.
BEFORE MANEUVERING SPEED IF
ACCELERATING.

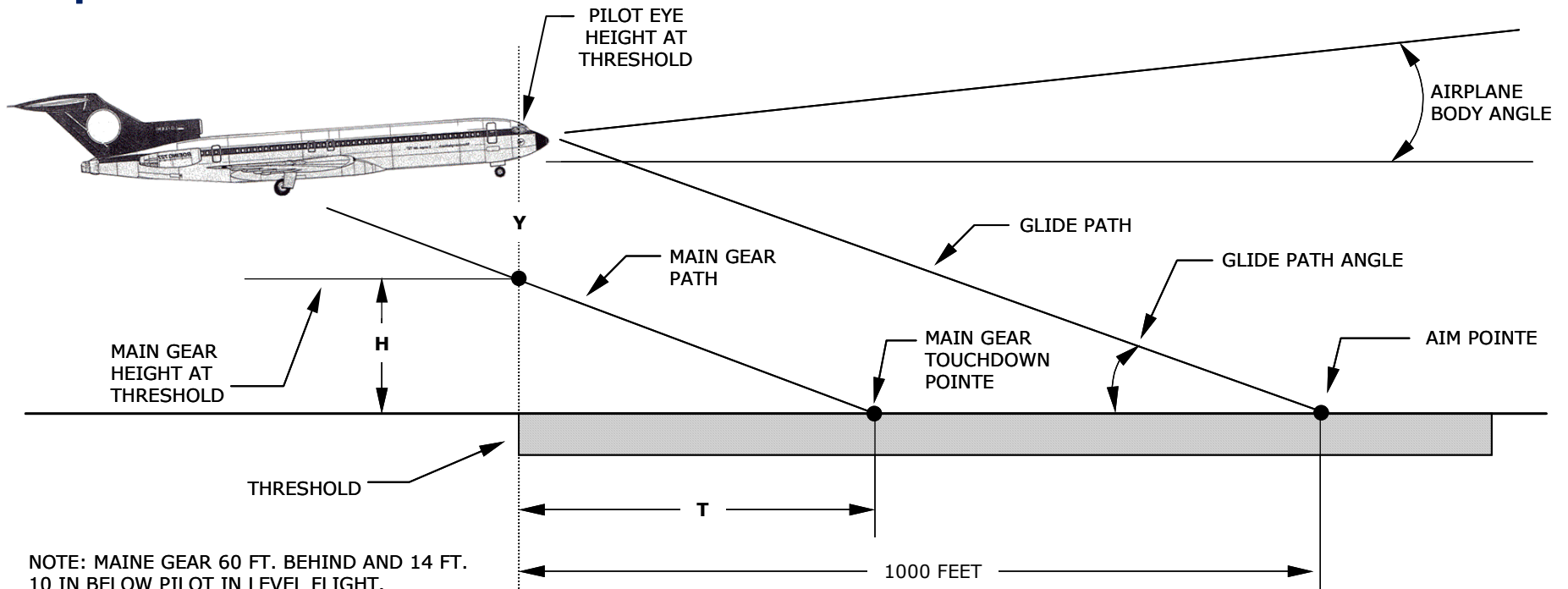
GO AROUND FLAPS RETRACTION SCHEDULE

At	Select Flaps
V_{REF}	.....25
$V_{REF} + 10$	.....15
F15° Man + 10 Kts	.....5
F2° Man	.....2
F0° Man	.....0



Estimated Visual Approach

**ESTIMATED TOUCHDOWN POINT (NO FLARE) ASSUMING A 1000 FT. AIM POINT
(SPEED - ON BUG, FLAPS - 30)**



FLAPS	GLIDE PATH ANGLE (DEGREES)	ESTIMATED BODY ANGLE (DEGREES)	PILOT EYE HEIGHT, Y, AT THRESHOLD FEET	MAIN GEAR HEIGHT, H, AT THRESHOLD FEET	MAIN GEAR TOUCHDOWN POINT, T FEET
30	2.0	4.8	34.92	10.95	313
30	2.6	4.3	43.66	19.20	440
30	2.75	4.0	48.03	23.31	485
30	30.0	3.8	52.41	27.40	623