

PIAGGIO PD-808



Flight Operations Manual & Checklist

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This flight manual is ONLY for use with the Flight Simulator 2004 \ FS-X model available at the website reported above.

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Section I: Getting ready for the flight:

Flight Envelope:

Refer to section V of this manual for Engine and Airspeed limitations to be respected during the entire flight

Flight Planning:

Determine the needed fuel quantities, throttle settings, speeds etc. needed to accomplish the given flight plan, using the Performance data available as an appendix on this flight manual.

Takeoff & Landing Data table:

Before every flight, write all the data calculated in the flight planning to the takeoff and landing table. Appendix 1 includes all the information needed on how to compile this table. Plus the checklist includes all the takeoff & landing speeds in tables.

Weight & Gravity centre data:

Establish loading data and weight at takeoff. With this data estimate the weight and Centre of gravity position on landing. Weight and Centre of gravity limitations are reported on Section V of this manual.

Section II: Checklists

This section reports in a detailed and complete manner all the procedures and checks. A synthetic pocket version is available to the pilot as the dynamic checklist on this version. The pilot is responsible for the proper use of this checklist. He must make sure that this checklist is used as a direct reference during all the phases both on ground and in flight. During Takeoff, climb, landing, or emergency procedures, the pilot can check this manual to check proper execution of all the needed operations.

Inter-Flight Inspections:

When the aircraft - during the same day and with the same flight crew - must perform a flight including intermediate stops, only the elements with an (*) on this list need to be performed during the planned intermediate stops. Other checks are at discretion of the pilot.

PRE-FLIGHT CHECKLIST

Visual checks must be performed in the following order: *Before external inspection; external inspection; internal inspection*. The pilot is responsible for these visual checks.

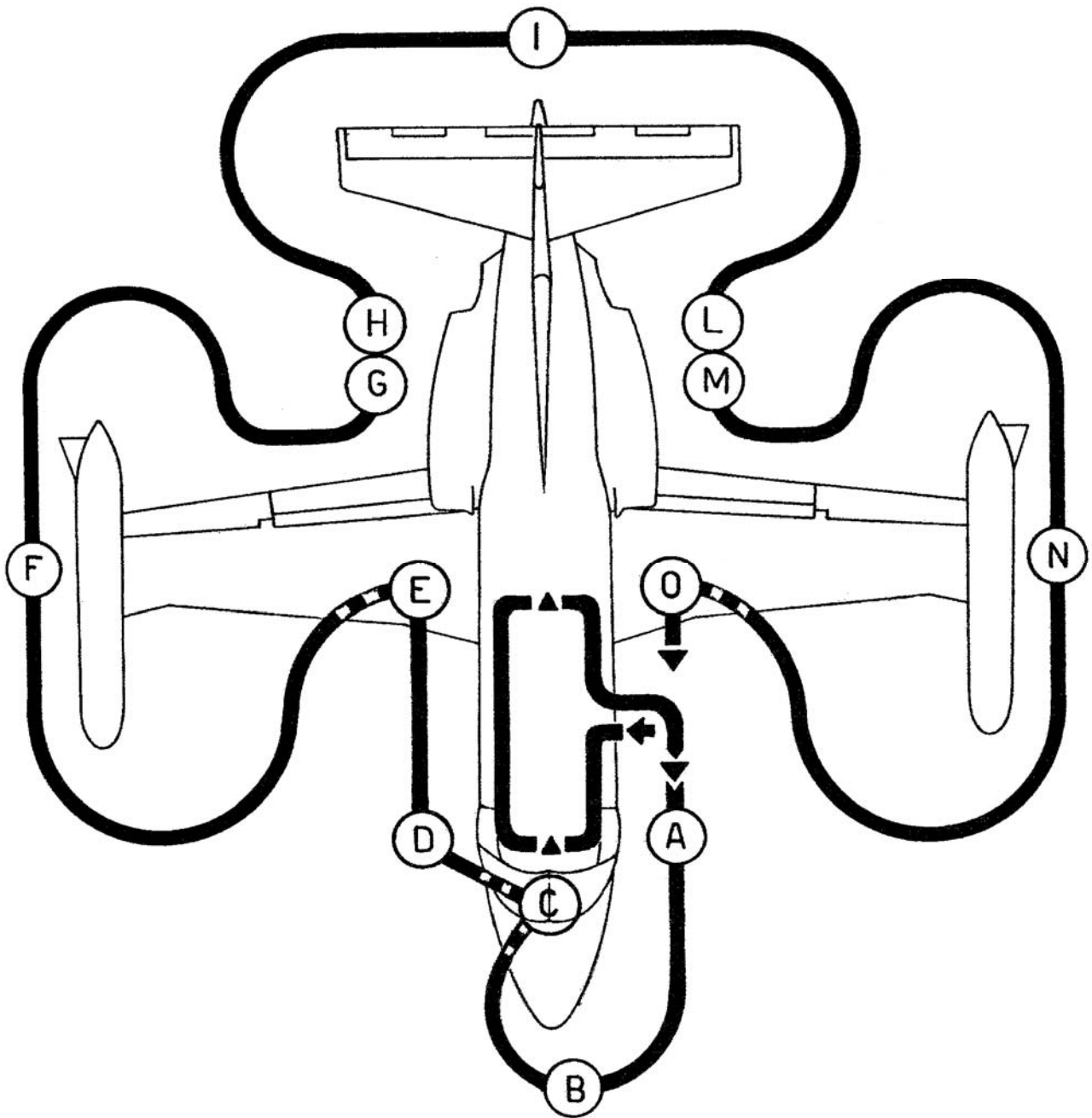
BEFORE EXTERNAL INSPECTION

Before proceeding with the external inspection, perform the following preliminary checks.

1. Check that all documents and manuals are onboard the aircraft
2. GUST LOSKS handle - retracted to free up flight controls
3. FLIGHT CONTROLS - check full authority
4. LANDING GEAR lever - check down
5. PARKING BRAKE - check inserted
6. OXYGEN BOTTLE - check pressure
7. PORTABLE OXYGEN BOTTLE - check onboard and pressure
8. AUXILIARY EQUIPMENT - check onboard and efficient. Check also emergency medical box in proper order.
9. EMERGENCY EXITS: - secured.

EXTERNAL INSPECTION:

Make a visual check of the aircraft status as reported below.



INTERNAL INSPECTION:

Perform the internal inspection as described below.

Passenger Cabin:

- | | |
|----------------------------|-----------------------------|
| 1. (*) ACCESS DOOR | - Closed and locked |
| 2. ALL CHOCKS AND COVERS | - check on board |
| 3. BAGGAGE | - check onboard and secured |
| 4. PASSENGER INSTRUCTIONS | - safety instructions |
| 5. FUSES AND AUTO BREAKERS | - check ON |

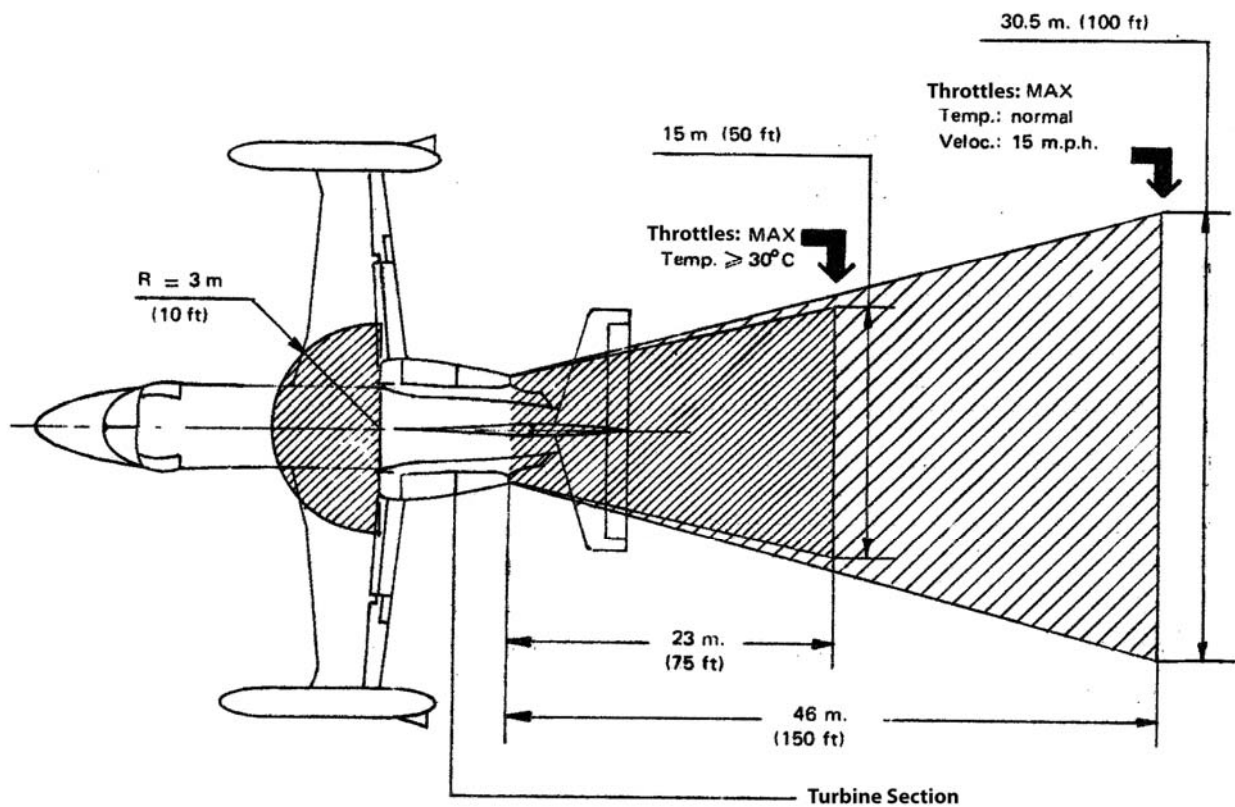
Cockpit:

- | | |
|------------------------------------|------------------------|
| 1. (*) SEATBELTS, RUDDER PEDALS | - SET |
| 2. (*) GUST LOCKS handle | - check UNLOCKED |
| 3. (*) PARKING BRAKE | - check INSERTED |
| 4. (*) AUTO ELECTRIC BREAKERS | - check ON |
| 5. (*) BATTERY | - check ON |
| 6. (*) DIRECT VIEW WINDOW | - check CLOSED |
| 7. CABIN FAN | - ON, if needed |
| 8. (*) PRESSURIZATION SELECTOR | - RAM |
| 9. OXYGEN QUADRANT | - check status |
| 10. CREW OXYGEN MASKS | - check status |
| 11. (*) AUDIO PANEL | - as desired |
| 12. (*) CABIN SPEAKER | - as desired |
| 13. EMERGENCY PRESSURIZATION | - check OFF |
| 14. (*) CABIN PRESS FAIL | - PRESS to test |
| 15. (*) PRESSURIZATION QUADRANT | - check SET |
| 16. (*) MARKER BEACON | - PRESS to test |
| 17. (*) AUTOPILOT MODES lights | - PRESS to test |
| 18. FLIGHT CONTROL TRIMS | - check FULL AUTHORITY |
| 19. LANDING GEAR LIGHTS | - PRESS to test |
| 20. (*) MAIN, SBY & EMER INVERTERS | - check ON |
| 21. (*) ICE CONDITION | - PRESS to test |
| 22. (*) TEST REAR BEARING | - PRESS to test |

| | |
|-------------------------------------|-----------------------------|
| 23. (*) TEST OIL TEMP | - PRESS to test |
| 24. (*) TEST ANNUNC. PANEL | - PRESS to test |
| 25. (*) FUEL QUANTITY gauges | - check level |
| 26. (*) TEST FUEL QUANT. | - PRESS to test (L & R) |
| 27. (*) FUEL TOT RESET | - PRESS to reset |
| 28. (*) J.P.T.L. switches | - TAKE-OFF |
| 29. (*) CABIN TEMPERATURE CONTROL | - AUTO, set potentiometer |
| 30. WING CROSS FEED | - check CLOSED |
| 31. LH & RH FIRE WALL SHUTOFF | - check OPEN |
| 32. ELEVATOR TRIM | - RESET TO 0 |
| 33. (*) THROTTLE LEVERS | - OFF |
| 34. GROUND SPOILERS | - RETRACTED |
| 35. FLAPS LEVER | - UP |
| 36. EMER LG. LEVER | - RETRACTED |
| 37. ZERO HYDR PRESS | - RETRACTED |
| 38. AUTOPILOT POWER | - OFF |
| 39. AP EMERGENCY DISCONNECT | - ENGAGE |
| 40. DRAG CHUTE handle | - check RETRACTED |
| 41. EMERGENCY cabin lights | - ON to test, then back OFF |
| 42. LIGHTS knobs | - as desired |
| 43. WINDSHIELD WIPERS | - check OFF |
| 44. HEATER, STARTER & DE-ICE SYSTEM | - check all switches OFF |
| 45. ALTERNATORS | - OFF |
| 46. POWER BUS SYSTEM panel | - check status |
| 47. DC GENERATORS | - OFF |
| 48. VOLTS SELECTOR | - BATT |
| 49. AC SELECTOR | - MAIN INV. |

BEFORE ENGINE STARTING:

Before starting engines, make sure the aircraft is oriented against the wind, and that the ground personnel has all the firefighting equipment ready. Plus make sure that the dangerous zones are clear from personnel or objects.



ENGINE STARTING

Engine starting can be done with an external power source or with the onboard battery. The required power is 900A with 28V.

NOTE: This simulation is able to perform only the engine starting with onboard batteries due to some limitations of Flight Simulator. Another Flight Simulator limitation is battery life, that is way too short. This often leads to the battery dying before being able to start up the engines. To get around the inconvenience you may first learn to perform the preliminary checks with the simulation paused. However, Pete Dowson's FSUIPC (<http://schiratti.com/dowson.html>) add-on module (registered version) can solve this issue by increasing battery life.

WARNING:

If the external temperature is lower than -26°C (-14.8°F), engines need to be pre-heated before start-up.

ENGINE STARTING WITH ONBOARD BATTERIES

The following procedure is the starting sequence for one engine. Repeat from point 4 for the second engine.

- | | |
|--|--|
| 1. ALL ELECTRICAL DEVICES | - OFF |
| 2. BATTERY | - ON, check voltage |
| 3. ANTICOL lights | - ON |
| 4. THROTTLE | - IDLE |
| 5. ENGINE MASTER & FUEL BOOST | - ON |
| 6. FUEL PRESSURE | - check green range |
| 7. MAIN, SBY & EMERG INVERTERS | - OFF after fuel press. check |
| 8. RELIGHT switch | - ON |
| 9. STARTER | - PRESS |
| 10. STARTUP TIME | - 15 sec. starter resets automatically |
| 11. EXHAUST TEMPERATURE | - check |
| <i>- Exhaust temperature during start-up should be:</i> | |
| <i>800°C: maximum momentarily</i> | |
| <i>511°C: normal</i> | |
| <i>645°C: maximum, IDLE</i> | |
| 12. ENGINE RPM | - check |
| <i>- RPM after start-up should be 40% (+1%, -0%), ISA conditions @SL</i> | |
| 13. OIL PRESSURE | - check between 7 & 25 PSI |
| 14. HYDRAULIC PRESSURE | - check |
| 15. DC GENERATOR | - ON |

AFTER ENGINE START-UP:

1. MAIN, SBY & EMERG. INVERTERS - ON

Note:

*For the automatic inverter controller to work,
it is necessary to switch ON all 3 inverters*

2. ALTERNATORS - ON
3. HYDRAULIC PRESSURE - 2600 to 3100 PSI
4. ANNUNCIATOR PANEL lights - ALL OFF
5. INVERTERS voltage - check

To check the inverters, proceed as follows:

- a) *switch OFF MAIN INVERTER and the AC voltmeter selector to S/BY INV. Check the indication MAIN INV OFF in the annunciator panel and the value indicated by the voltmeter.*
- b) *Switch OFF MAIN & SBY inverters and position the AC voltmeter selector to EMERG INV. Check the indication of MAIN INV OFF & SBY INVERTER OFF in the annunciator panel and the value indicated by the voltmeter.*
- c) *Switch OFF S/BY & EMERG Inverters and position the AC voltmeter selector to MAIN INV. Check the indication of SBY INVERTER OFF in the annunciator panel and the value indicated by the voltmeter.*

6. MAIN, SBY & EMERG. INVERTERS - ON
7. ALTERNATORS - check voltage

Check load and voltage with both alternators ON, then:

- a) *Switch OFF LH ALTERNATOR, and the voltmeter selector on RH ALTERNATOR. Check load, voltage and annunciator panel light LH ALTER OFF.*
- b) *Switch back LH ALTERNATOR to ON*
- c) *Switch OFF RH ALTERNATOR, and the voltmeter selector on LH ALTERNATOR. Check load, voltage and annunciator panel light RH ALTER OFF.*
- d) *Switch back RH ALTERNATOR to ON*

8. DC GENERATORS - check

Check ,load & voltage with both DC generator ON, then:

- a) *switch OFF LH DC GENERATOR, and VOLTS SELECTOR to RH GEN. check load and voltage of RH DC GENERATOR and annunciator panel light LH DC GEN OFF.*
- b) *Switch back LH DC GENERATOR to ON.*
- c) *switch OFF RH DC GENERATOR, and VOLTS SELECTOR to LH GEN. check load and voltage of LH DC GENERATOR and annunciator panel light RH DC GEN OFF.*
- d) *Switch back RH DC GENERATOR to ON.*

9. ELECTRICAL DEVICES - as needed

BEFORE COMMENCING ROLL:

1. FASTEN SEATBELTS & NO SMOKING - ON
2. INSTRUMENT & COCKPIT LIGHTS - as desired
3. ENGINE ANTI-ICE - ON with 60% RPM

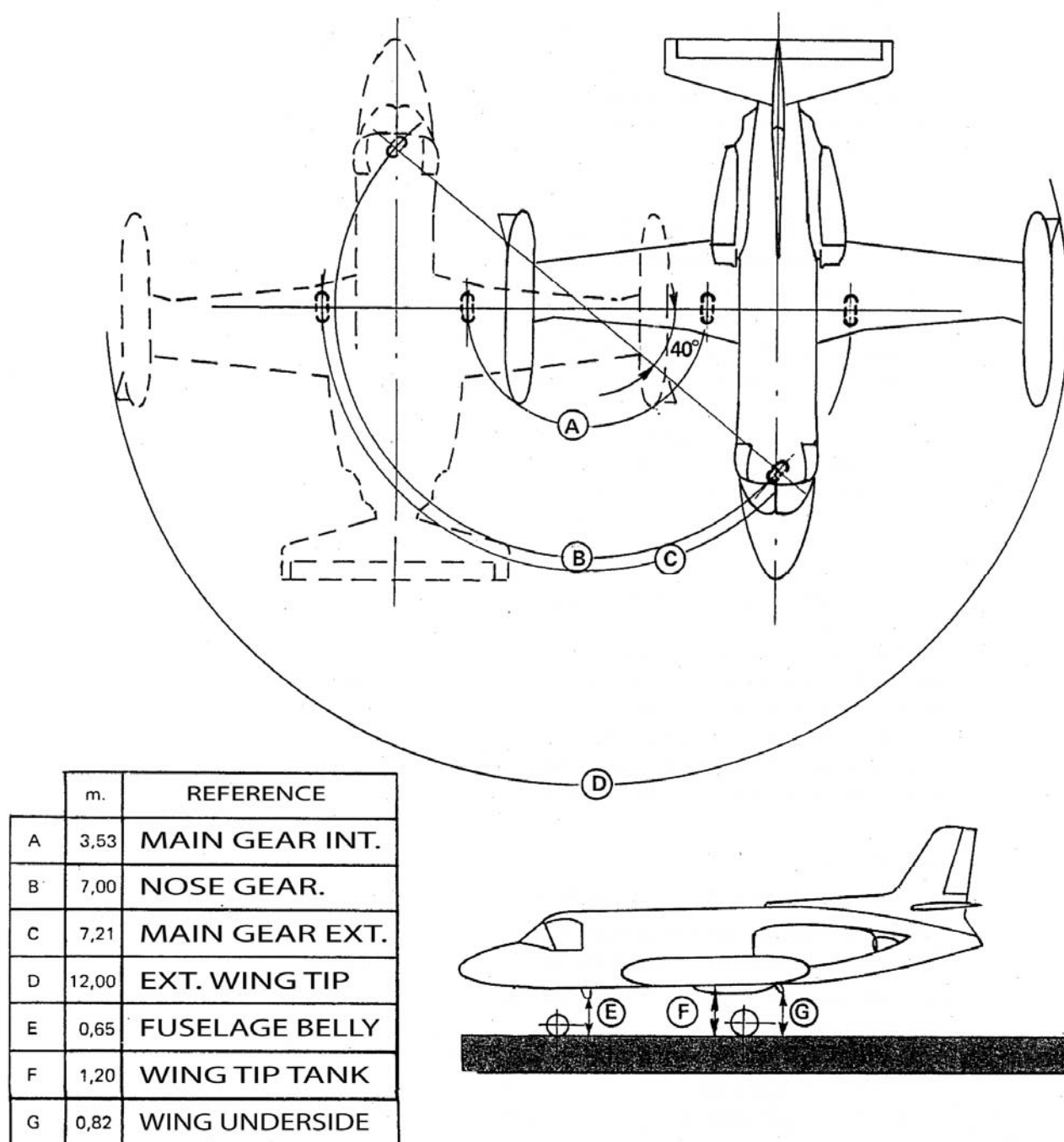
Note:

At this point, LH (RH) ANTI-ICE ON lights should light up in the annunciator panel

4. ENGINE ANTI-ICE - OFF
5. VHF radios (COMM, NAV) - check
Tune one COMM to tower frequency and call tower. Ask rolling clearance and information and set altimeter and clock.
6. IFF apparatus - standby
7. AIRBRAKES & GROUND SPOILERS - EXTRACT
Check SPD BK OPEN & SPOILER EXT lights on the annunciator panel, then:
- RETRACT
8. AP POWER switch - ON
9. AP ENGAGE button - PRESS
The DISENGAGE red light should come ON.
10. MANUAL TURN knob - LEFT then RIGHT
Check correct yoke movement
11. AP ALT switch - ON
12. AP PITCH command - UP then DOWN
Check correct yoke movement
13. AP EMERGENCY DISCONNECT - DISENGAGE
Check autopilot disengaged (red light off) then:
- ENGAGE
14. AP POWER switch - OFF
15. CABIN ALT - SET
The CABIN ALT must be set so that the lower quadrant indicating the maximum altitude shows an altitude 1'000 ft higher than the planned cruise altitude.
16. WHEEL CHOCKS - removed
17. PARKING BRAKE - RELEASE

ROLLING:

Before starting roll, check that all surroundings are clear. For steering radii and ground clearances, refer to the picture below:



Normally IDLE power is enough to get the aircraft rolling, but applying 65-70% RPM (or more in cold weather) can help in getting the aircraft start moving. During the rolling phase flight controls must be continuously checked to avoid them defecting to the extremes. While rolling on gravel, sand or another disconnected surface, use the minimum power possible to avoid projection of dangerous particles.

Warning:
*Under possible ice forming
conditions, set ENGINE ANTI-ICE ON*

The average fuel consumption during the roll phase is about 15 lb/min. with both engines running.

1. WHEEL BRAKES - check
Immediately after the aircraft starts moving, check the brakes. Apply a gentle pressure to avoid a sudden stop.

2. STEERING - check
Maximum steering wheel deflection is 40°.

Warning:
*Avoid crossing humps sideways
to avoid damage to the fender*

Note:
*If steering is employed, avoid as
much as possible differential braking,
to avoid loading the nose gear laterally.*

3. TURN COORDINATORS - check
4. GYRO & COMPASS - check
Check synchronized, and correct indication with respect to plane heading.

BEFORE TAKEOFF

1. TAKEOFF DATA - check

Before takeoff, the pilot must review and check all the following data:

- a- takeoff weight and gravity centre position
- b- elevator trim position
- c- acceleration time to 90 KIAS
- d- important speeds: V_1 , V_R , V_2 , V_3 .
- e- minimum runway length
- f- takeoff distance

The pilot must also communicate to the co-pilot all necessary instructions regarding the type of takeoff involved, all the takeoff data and the aborted takeoff emergency procedure.

2. WINDSHIELD HEAT - FRONT or FRONT & SIDE
3. ELEVATOR TRIM - SET for takeoff
4. FLAPS - T/O
Check that the flap position indicator marks 50%
5. annunciator lights & MASTER CAUTION - OFF
The NO SMOKING & FASTEN SEATBELTS lights on the annunciator will remain ON
6. J.P.T.L. switches - TAKE-OFF, check
7. Pressurization selector - RAM, check
8. CABIN FAN - OFF
9. FLIGHT CONTROLS - check full authority & free
10. LH PITOT STILL & RH PITOT & STATIC - ON

Warning:

In case of possible ice formations, run engines at 93,5% RPM with ENGINE ANTI-ICE ON for at least a minute, and then turn off ENGINE ANTI ICE before takeoff. Keep IGNITER ON for all the takeoff phase. Switch ENGINE ANTI-ICE ON after takeoff if ICE CONDITION light is still on.

TAKEOFF

1. THROTTLES - 100%
*Or derated takeoff if possible, avoid engines running faster than 103%.
Overspeeding limit is 103% for 20 sec.*
2. ENGINE ANTI-ICE - OFF
3. AUTOPILOT - OFF

Warning

Use of autopilot is FORBIDDEN during the Takeoff phase and below 200 ft. Is also FORBIDDEN the use of pressurization (other than RAM) and ENGINE ANTI-ICE.

AFTER TAKEOFF - CLIMB

- | | |
|----------------------------|--|
| 1. WHEEL BRAKES | - APPLY for a few seconds |
| 2. LANDING GEAR | - UP @ V_2 |
| 3. FLAPS | - UP @ V_3 |
| 4. PRESSURIZATION selector | - BOTH ENG |
| 5. Transition | - Accelerate to V_4 & climb 1500 ft. |
| 6. THROTTLES | - 96,5% RPM or 680°C MAX. |
| 7. SPEED | - accelerate to ideal climb speed |
| 8. FASTEN SEATBELTS | - OFF |

CRUISE

- | | |
|---------------------|-----------------------|
| 1. THROTTLES | - SET to cruise power |
| 2. PRESSURIZATION | - Check |
| 3. AIR CONDITIONING | - SET as needed |

DESCENT

- | | |
|--|----------------|
| 1. WINDSHIELD HEAT | - FRONT & SIDE |
| 2. LH PITOT & STALL, RH PITOT & STATIC | - ON, check |
| 3. AIRBRAKES\SPOILERS | - as needed |
| 4. L.P.T.L. switches | - TAKE-OFF |
| 5. THROTTLES | - IDLE |

WARNING:

In case of possible ice formation, proceed as follows:

- | | |
|---------------------------|-------------|
| 1. ENGINE ANTI-ICE | - ON |
| 2. RELIGHT switches | - ON |
| 3. WING SPRAYMAT | - ON |
| 4. WING & EMPENNAGE BOOTS | - as needed |
| 5. AIRBRAKES\SPOILERS | - DOWN |
| 6. RPM | - as needed |

DURING DESCENT

- | | |
|----------------------------|-------|
| 1. PRESSURIZATION QUADRANT | - SET |
|----------------------------|-------|
- Set RATE to 500 ft/min & CABIN ALT to a value 100 ft higher than the arrival airport's pressure altitude.*

BEFORE LANDING

Just before entering the landing pattern, perform the following checks:

- | | |
|----------------------------------|---------|
| 1. FASTEN SEATBELTS & NO SMOKING | - ON |
| 2. Hydraulic pressure | - check |
| 3. PRESSURIZATION SELECTOR | - RAM |
| 4. CABIN FAN | - ON |

LANDING

VFR direct straight approach landing :

a) Approach

- | | |
|---|-----------------------|
| 1. SPEED | - 200 KIAS |
| 2. LANDING GEAR | - DOWN & locked |
| 3. FLAPS | - T\O |
| <i>Check that the flap position indicator marks 50%</i> | |
| 4. AIRBRAKES | - as needed |
| 5. MANOEUVRING SPEED | - 1.4 V _{S1} |
| 6. BRAKES | - checked |

b) Final

- | | |
|-----------------|-----------------------|
| 1. LANDING GEAR | - check DOWN |
| 2. FLAPS | - LDG (DOWN) |
| 3. SPEED | - 1.3 V _{S0} |
| 4. AIRBRAKES | - as needed |

c) Before ground contact

- | | |
|------------------------------|------------------------|
| 1. THROTTLES | - IDLE |
| 2. SPEED | - 1.25 V _{S0} |
| 3. GROUND SPOILERS\AIRBRAKES | - RETRACTED |

d) After ground contact

- | | |
|--|--------------------|
| 1. GROUND SPOILERS\AIRBRAKES | - EXTEND |
| <i>Check the lights SPOILER EXT & SPEED BK OPEN are ON in the annunciator.</i> | |
| 2. DRAG CHUTE | - DEPLOY if needed |
| 3. BRAKES | - as needed |

NOTE: use steering only at speeds lower than 80 KIAS.

VFR landing with landing pattern

a) Downwind

- Before 180° turning point:

1. FLAPS - T/O
Check that the flap position indicator marks 50%
2. LANDING GEAR - DOWN
3. SPEED - $1.4 V_{S1} + 20 \text{ KIAS}$

- At 180° turning point

1. FLAPS - DOWN
Check that the flap position indicator marks down
2. LANDING GEAR - check DOWN & locked
3. BRAKES - check

b) Final

1. SPEED - $1.25 V_{S0}$
2. GROUND SPOILERS\AIRBRAKES - RETRACTED

c) Before ground contact

1. THROTTLES - IDLE
2. SPEED - $1.25 V_{S0}$
3. GROUND SPOILERS\AIRBRAKES - RETRACTED

d) After ground contact

1. GROUND SPOILERS\AIRBRAKES - EXTEND
Check the lights SPOILER EXT & SPEED BK OPEN are ON in the annunciator.
2. DRAG CHUTE - DEPLOY if needed
3. BRAKES - as needed

NOTE: use steering only at speeds lower than 80 KIAS.

AFTER LANDING

After leaving the runway, perform the following checks:

1. LH PITOT & STALL, RH PITOT & STATIC - OFF
2. FLAPS - UP
3. GROUND SPOILERS\AIRBRAKES - RETRACT

ENGINE SHUT-DOWN

After parking the aircraft, shut-down the engines with the following procedure:

1. PARKING BRAKE - ON
Before activating the parking brake, make sure brakes are not too hot. Otherwise, wait for them to cool down.
2. FASTEN SEATBELTS & NO SMOKING - OFF
3. THROTTLES - 60%
Wait for temperature to stabilize, then: - OFF

On this simulation, the throttles are switched to OFF when switching OFF the ENGINE MASTER & FUEL BOOST or vice-versa. In the 2-D panel you can only switch OFF the ENGINE MASTER & FUEL BOOST, while on the virtual cockpit you can also switch OFF the throttles by clicking on the idle detents

NOTE: if the engine has given signs of malfunction during the flight, check spool down time, that must not be lower than 45 sec. Listen to any possible abnormal sound.

4. ALL ELECTRICAL DEVICES - OFF
5. J.P.T.L. switches - OFF
6. ALTERNATORS & GENERATORS - OFF
7. ENGINE MASTER & FUEL BOOST - OFF

BEFORE LEAVING THE AIRCRAFT

1. GUST LOCKS - PULL & LOCK
2. ZERO HYDR. PRESSURE - PULL
3. INVERTERS, BATTERY - OFF
4. ALL ELECTRICAL SWITCHES - OFF

Section III: Piloting instructions

TAXIING

Normally IDLE power is enough to get the aircraft rolling, but applying 65-70% RPM (or more in cold weather) can help in getting the aircraft start moving. During the rolling phase flight controls must be continuously checked to avoid them defecting to the extremes. While rolling on gravel, sand or another disconnected surface, use the minimum power possible to avoid projection of dangerous particles.

Generally, after the aircraft starts moving, reducing power to IDLE will leave it rolling at a slowly increasing speed. Apply brakes softly to stay on speed when needed.

There are several ways to steer the aircraft. Using the rudder pedals, or activating the yoke steering control located in the left side console of the cockpit (Refer to section IV on this manual for detailed cockpit instructions). This function however is operative only at speeds lower than 30 KIAS, then it disengages automatically. This basically means you can switch it ON when you commence rolling, and then it will turn off automatically during the takeoff roll. However it is suggested to turn the yoke steering control before commencing the take-off roll to have full aileron control from the start. Activating the yoke steering control links yoke aileron movement with rudder and steering wheel.

TAKEOFF

a) Normal Takeoff

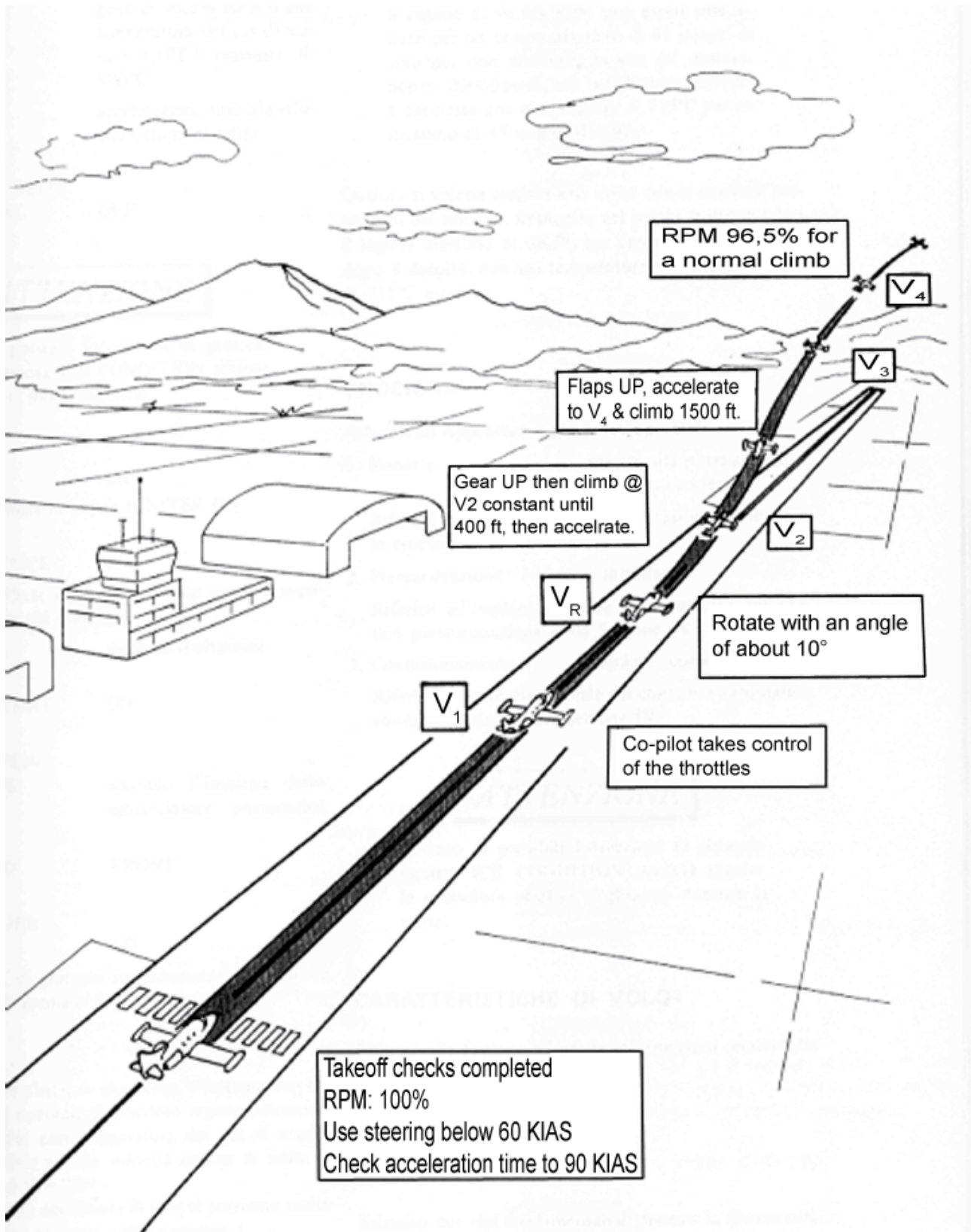
As Normal Takeoff is intended the manoeuvre performed from a dry, paved runway of sufficient length, using flaps in T/O setting. During the takeoff roll, keep directional control of the aircraft by using steering until sufficient speed builds up for rudder control (50-60 KIAS). Once lined up with the runway, apply full brakes. Slowly advance throttles to about 40% and check engine behaviour. Slowly release the brakes and apply 100% throttles (or derated if possible). Check Exhaust temperature is lower than 735°C with J.P.T.L. in takeoff mode. Attempting to takeoff with J.P.T.L. OFF will result in engines quickly overheating, so be sure to check J.P.T.L. is in takeoff mode (*in this simulation engines overheat and damage until catastrophic failure if mistreated. This may mean them catching fire or simply shutting down*). Also check that all engine gauges are within standard safety values. Any out-of-scale value will be reported in the annunciator panel, MASTER CAUTION may turn ON if this happens.

Check acceleration time to 90 KIAS. This time depends on several factors, like temperature, altitude, barometric pressure... indicatively, for a 3500 ft pressure altitude field, at 18°C, a weight of 15500 lbs, a headwind of 12 KIAS, and a runway slope of -1% (descending) it is about 17 sec. During the takeoff roll, apply a bit of forward pressure to the yoke for better steering control. At V_1 the co-pilot takes control of the throttles. At V_R perform the rotation with an horizon angle of about 10°. The co-pilot then announces reaching V_2 . At V_2 an horizon angle of about 20° will be needed to hold on speed. At V_3 retract flaps. After liftoff check engine RPM to avoid over-revving. Over 102% engines start damaging.

Warning

Use of autopilot is FORBIDDEN during the Takeoff phase and below 200 ft. Is also FORBIDDEN the use of pressurization (other than RAM) and ENGINE ANTI-ICE.

NORMAL TAKEOFF WITH 2 ENGINES



b) Cross-wind Takeoff

The maximum cross-wind component allowed is 22 KIAS. Runway direction and wing levelling can be achieved with few rudder and aileron input.

CLIMB

Climbing is done with a maximum power of 96,5% RPM and a maximum exhaust temperature of 680 °C. Optimal speed is 240 Kts (CAS). Note that a 96,5% RPM can be held for a maximum of 45 min of flight. To perform a climb with the maximum aircraft performance, climb for the first 5 min, with a power setting of 98,5% and a maximum exhaust temperature of 715°C.

DESCENT

There are mainly two types of descent. The optimal descent and the fast descent.

The pilot will choose what kind of descent - or combination of descent types - to perform, depending on atmospheric conditions, traffic, mission requested, etc.

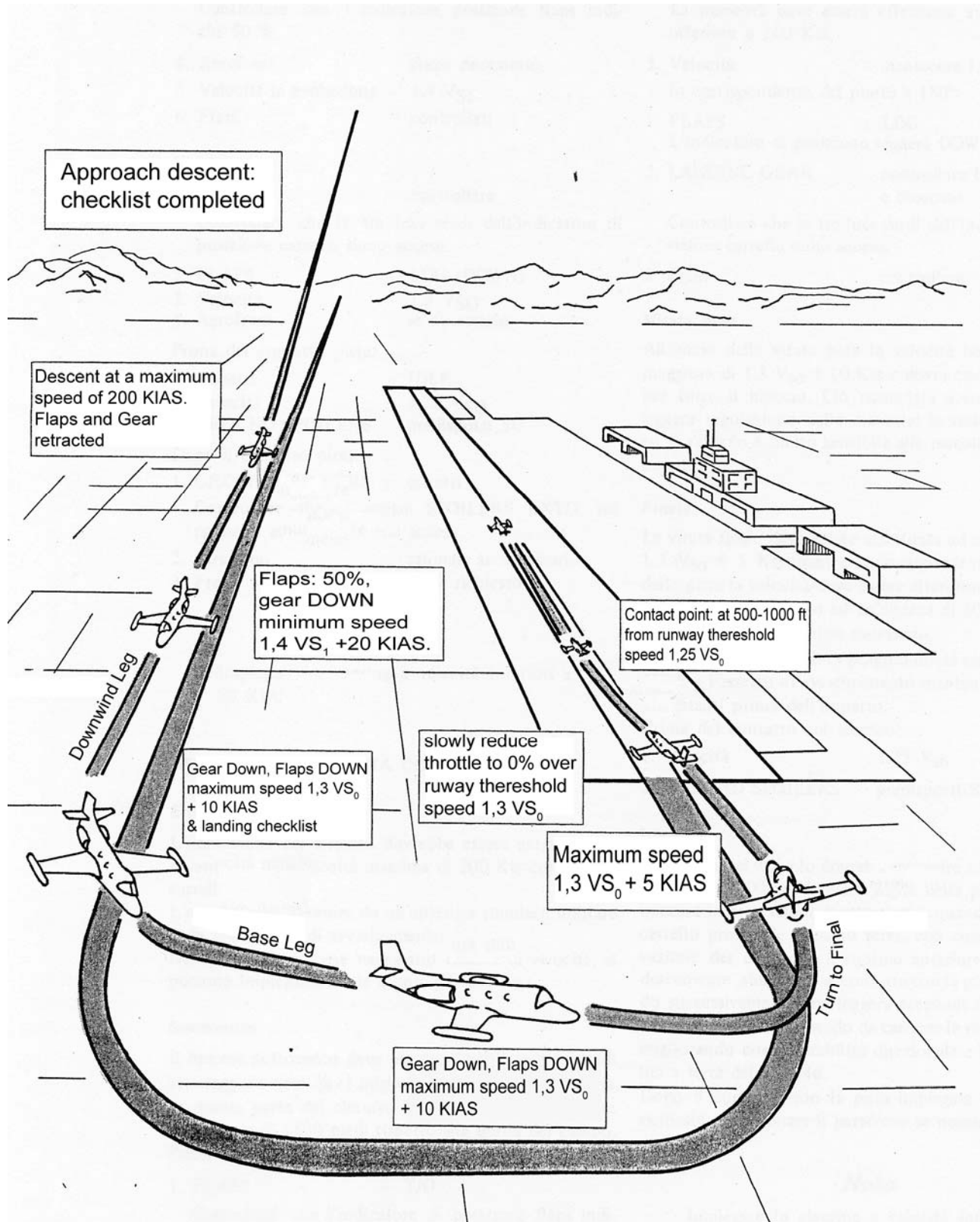
The ideal speed for an optimal descent is 250 Kts (CAS) with airbrakes retracted. Mild variations of trim and attitude can be introduced to hold on speed. The ideal speed for a fast descent is 300 Kts (CAS) – 0,7 Mach with Idle engines and airbrakes extended (*in this simulation extending airbrakes will also extend the spoilers, so this manoeuvre will result in a very fast descent*).

NOTE: under cold weather, it is preferable to execute the descent with 60% RPM to provide enough power to ANTI-ICE and heating systems . If needed, use airbrakes.



LANDING

Landing pattern chart



Straight approach landing

During approach, lower the landing gear. Check 3 green lights. Set flaps to 50%. Hold a speed of $1,4 VS_1$. During final slow down to $1,4 VS_0$ and set flaps to 100%.

Short final & flaring

Use airbrakes if needed. Over the runway threshold reduce slowly throttles to 0%. Execute the flaring manoeuvre. The aircraft should touch down at about $1,25 VS_0$. Approaching at a lower speed may result in a fast descent and a consequent hard landing. Any faster and a bounce is likely to occur. After runway contact, extend airbrakes and spoilers. If needed, use brakes and deploy the drag chute. Below 60 KIAS the drag chute will automatically jettison (*Note: in this simulation the drag chute works only if engines are running*). Apply brakes only after the nose gear has touched down to avoid a violent pitch down effect that will likely destroy the nose gear. After the nose gear has touched down, apply a light forward force on the yoke for better ground control. Employ steering at speeds lower than 80 KIAS



ALL WEATHER PROCEDURES

a) Before rolling

In case of possible ice formations (ICE CONDITION ON or ambient temperature lower or equal than 0°C), switch ON ENGINE ANTI-ICE for at least a minute with a power setting of 60% RPM on both engines. Perform this operation with parking brake engaged.

b) Rolling

In case of possible ice formations (ICE CONDITION ON or ambient temperature lower or equal than 0°C) roll with ENGINE ANTI-ICE ON. Perform also wing & empennage de-icing by switching WING SPRAYMAT ON, and EMPENNAGE BOOTS to LIGHT ICE. WINDSHIELD HEAT must be set to FRONT & SIDE. Use windshield wipers if needed.

In hot temperatures, WINDSHIELD HEAT may overheat. If this happens an alert is displayed on the annunciator panel. Switch OFF windshield heat to keep the circuit from melting. WINDSHIELD HEAT can be switched back ON at a certain altitude, depending on weather conditions.

c) Takeoff

In case of possible ice formations (ICE CONDITION ON or ambient temperature lower or equal than 0°C) perform the takeoff roll with the WING SPRAYMAT ON. Switch OFF ENGINE ANTI-ICE, it's use is forbidden during the takeoff roll. In case of rain, switch on RELIGHT for both engines, as eventual water sprites from the nose gear may cause engines to drawn in extreme conditions. Also keep ON WINDSHIELD HEAT to FRONT & SIDE to avoid cracking or windshield icing (*both windshield icing and engine starvation are simulated*). Do not use WING & EMPENNAGE BOOTS during the takeoff roll as the pneumatic boots reduce takeoff performance by disrupting optimal airfoil aerodynamics. After liftoff it is suggested to turn back ON ENGINE ANTI-ICE if the ICE CONDITION light is ON. Engine fluctuations during takeoff may be indicative of severe icing and/or rain conditions. These fluctuations are likely to shut off the engine if RELIGHT is not switched to ON. In case of an engine shutting down after takeoff, check if the relative RELIGHT and ENGINE ANTI-ICE switches are ON. Then, if the engine does not relight automatically (the RELIGHT switch does not start the engine back if RPM gets too low, where combustion is not possible) attempt pushing the starter switch.

d) Climb - Cruise

During the climb or cruise phase, if ICE CONDITION is ON, is better to have ENGINE ANTI-ICE ON. Also switch WING & EMPENNAGE BOOTS to LIGH ICE or HEAVY ICE depending on the situation. WINDHIELD HEAT must be set to FRONT & SIDE under rain conditions to avoid windshield icing. In case of windshield icing, turning WINDSHIELD HEAT to FRONT & SIDE will de-ice the windshield & side windows. WINDHIELD HEAT on FRONT mode only heats front windshields. This can be useful in cases of high current loads when one alternator is failed or inoperative, as it reduces the current drawn by the heating system.

e) Descent & Landing

In case of possible ice formations (ICE CONDITION ON or ambient temperature lower or equal than 0°C) the descent must be performed with ENGINE ANTI-ICE ON, RELIGHT ON, WING SPRAYMAT ON. WING & EMPENNAGE BOOTS as needed. If needed use airbrakes. Before landing make sure WING & EMPENNAGE BOOTS are OFF, and switch RELIGHT to ON under rain or precipitation. WINDSHIELD HEAT must be set to FRONT & SIDE.

In hot weather, at low altitudes WINDSHIELD HEAT may overheat. It is best to switch it OFF during particular hot days.

EMERGENCY PROCEDURES

a) Single Engine failure

If an engine fails during take-off, there are 2 possible cases:

- 1) If the failure occurs before V_1 , then an aborted take-off must be executed. Immediately cut throttle to 0%, rise spoilers and airbrakes, and brake as necessary. The drag chute may be used as well. Braking strength must be appropriate to the remaining runway length. If possible avoid further damage to the aircraft by performing full-strength braking. In the worst scenario, pull the PARKING BRAKE that serves also as emergency brake, and deploy the drag chute (NOTE: civilian versions don't come with a drag chute).
- 2) If the failure occurs at or beyond V_1 , it is mandatory to proceed with the takeoff manoeuvre. The aircraft has anyway enough power to fly on one single engine with an initial climb rate of 1200 ft/min. After takeoff attempt re-starting the engine (If it didn't fail due to overheating or similar catastrophic reasons). Switch RELIGHT ON and if the engine spooled down also pull the starter. Make sure that ENGINE ANTI-ICE is in the proper setting for the current weather conditions. If the engine fails to restart after a couple of attempts, it is assumed to be definitely failed. Even assuming the engine re-started, it is better to abort the flight and land as soon as possible, made the exception if the engine failed due to improper ANTI-ICE usage. In this case the engine is likely to be OK, check proper configuration and re-start. After re-start, check that all engine parameters are within proper range.

Switch OFF the corresponding DC GENERATOR & ALTERNATOR. In case of an overheating, it is mandatory to switch OFF some of the systems to avoid failure. Switching OFF the inoperative DC GENERATOR will disconnect the auxiliary DC bus preventing the remaining DC GENERATOR from excessive load.

b) Engine fire

In case of one engine catching fire, it is MANDATORY to press the ENG# FIRE button located near the MASTER CAUTION light. This will activate the fire extinguisher. The engine will shut down, and will not be able to restart again. An engine left in FIRE will shortly fail. Note that even if the engine fails, the fire is unlikely to die off by its own. Leaving an engine fire may cause catastrophic damage to the rear section of the aircraft (*this is properly simulated*). Activating the fire extinguisher will also shut the fuel cut-off levers on the pedestal panel.

c) Total hydraulic loss

In case of a total hydraulic failure, Landing gear, flaps & spoilers will not be operative. The aircraft control surfaces are cable actuated, so there will still be full control of the aircraft. Before landing, set the landing gear lever to DOWN, and pull the EMER LG handle on the pedestal panel. This unlocks the landing gear mechanism to allow gravity extension. However, the main gear ports will fall down and won't close after the gear is down. After landing it is necessary to close them back or replace them with spares if they were damaged (*on this simulation the only way is to reload the aircraft*). Due to the flaps malfunction and to the inoperative spoilers, prepare for a long landing roll. Immediately deploy the drag chute (*if present*) and apply the PARKING BRAKE (that also serves as emergency brake) after the nose gear has touched down.

d) Dual engine failure

In the unfortunate case of a dual engine failure, assuming all re-starting attempts have failed, there will be too a total hydraulic loss. Start a steep glide to keep on speed (180-200 KIAS) and look for the nearest landing field, or available surface. Deploy the landing gear as late as possible, by setting the gear level to DOWN and pulling EMER LG. Remember that flaps & spoilers will not extend so prepare to deploy the drag chute (*if present*) and apply the PARKING BRAKE (that also serves as emergency brake) after the nose gear has touched down.

e) Landing gear issues & Belly landing

In case of landing gear not properly extending, first check the gear lights by pressing the test button. If one of the lights appears to be failed, make sure of the situation by flying low near the control tower to let them see if the landing gear is in fact properly extended. In case of improper extension, attempt pulling the EMER LG lever. If this gives 3 greens then the landing gear is now properly extended. Vice versa, you may again attempt to check the situation with the help of the control tower.

If the nose gear is the issue, then attempt a landing and slowly put down the nose as late as possible. In case of a main gear failed extension, attempt landing & put down the wing tip on the ground as softly as possible. This tank may be full of fuel.

With a total failure of the landing gear extension, a belly landing is possible. The procedure calls for a higher speed approach, to reduce the final angle of arrival. The attempt is to scrape the aircraft on the gear blisters. Avoid as much as possible a tail impact as it may be catastrophic.

f) Water ditching

In the case of an unavoidable water ditching, perform a similar manoeuvre to a belly landing. Do not extend the landing gear to slow down the sinking. After water impact, evacuate as fast as possible from the emergency exits located at the two rearmost windows. Do not open the main door as this may cause the aircraft so sink quickly.



Section IV: Panel instructions

MAIN PANEL



1. ATTITUDE INDICATOR

It features indications for glide slope, horizontal NAV status, planned speed needle & Decision height. It also indicates failures or unavailability of these functions by means of red placards. On the upper left, the MDA (or minimum design altitude) light. On the upper right, the TO\GA light. =On the lower right, a TEST button allows to test all indications. Note that this gauge is connected to the inverters circuit.

2. AIRSPEED\MACH INDICATOR

The airspeed indicator has a central disk marking the current Mach number. On the lower right a knob sets a reference speed used by the attitude indicator's speed needle. Note however, that even if such a system is fitted, this aircraft does not feature an auto throttle.

3. ALTIMETER

Conventional barometric altimeter. Baro Setting knob on the lower left

4. Horizontal situation indicator (HSI)

A standard HSI, connected to the inverters circuit. Left knob sets HDG, right knob sets CRS. The two digital readouts on top indicate, from left to right, DME1 and DME2 distances. A yellow light to the upper right indicates if GPS mode is ON.

5. VERTICAL SPEED INDICATOR

6. DUAL NEEDLE RMI (ADF & TACAN)

7. ANGLE OF ATTACK INDICATOR

8. TURN COORDINATOR

9. TRIM TAB POSITION INDICATOR

10. FLAP POSITION INDICATOR

11. HYDRAULIC SYSTEM GAUGES

The main gauge indicates current hydraulic pressure. The 2 indicators below it indicate engine pump activity.

12. PARKING BRAKE LEVER

13. LANDING GEAR POSITION LIGHTS

3 green lights indicate if gear are properly extended. The red light indicates that the gear is unsafe or in transition. The gray button serves to test the lights.

14. LANDING GEAR LEVER

15. AUTOPILOT STATUS LIGHTS & TEST BUTTON

The Autopilot status lights turn ON when a given function of the autopilot is used. In order from left to right: AUTOPILOT ON, ALTITUDE HOLD, HEADING HOLD, NAV HOLD, APPROACH MODE. Press the gray button to the left to test the lights.

16. NAV\GPS switch

17. OMI (approach) lights

Standard OMI beacon lights. the switch to the left is a test switch. Alternatively, the lights can be tested singularly by pressing them.

18. CABIN ALTIMETER AND PRESSURE DIFFERENTIAL

The small needle indicates equivalent cabin altitude in feet. The large needle indicates pressure differential in PSI sustained by the cabin.

19. CABIN ALTITUDE SETTING QUADRANT

The needle indicates target cabin altitude. It can be selected with the knob to the lower right. The numbers at the bottom show maximum safe altitude that can be reached for a given cabin altitude. This must be set to 1'000 ft higher than the planned cruise altitude. The knob to the lower left sets the target cabin climb rate.

20. CABIN VARIOMETER

21. EMERGENCY PRESSURIZATION & CABIN PRESS FAIL LIGHT

The EMER PRESS switch activates a pressurization mode that automatically tunes cabin pressure to the maximum pressure differential available. Use in case of emergency if you need extra oxygen. The CABIN PRESS FAIL light indicates if there has been a failure with the pressurization system. You can press the light to test it.

22. ADF RADIO

23. COMM1 RADIO

24. NAV1 RADIO

25. V\UHF RADIO (COMM2)

26. ENGINE RPM INDICATORS

27. ENGINE EXH TEMPERATURE INDICATORS

28. ENGINE FUEL FLOW INDICATOR

29. DUAL OIL PSI INDICATOR

30. DUAL FUEL PSI INDICATOR

31. FUEL QUANTITY INDICATORS

Indicate the summation of wing and tip tank quantities expressed in pounds. The test switch below them has two positions: left & right. It serves to test the fuel quantity gauges.

32. FUEL USED INDICATOR

Indicates quantity of fuel used. The button to the right resets the indicator to 0.

33. ANNUNCIATOR PANEL

(In this simulation you can mouse over the annunciator panel lights for a tooltip)

| | | |
|-------------------|-------------------|-------------------|
| LH FUEL LEVEL | LH FUEL LEVEL | RH FUEL LEVEL |
| LH FUEL PRESS | LH FUEL PRESS | RH FUEL PRESS |
| LH FUEL TEMP | LH FUEL TEMP | RH FUEL TEMP |
| RH OIL TEMP | RH OIL TEMP | RH OIL TEMP |
| LH OIL PRESS | LH OIL PRESS | RH OIL PRESS |
| LH BEARING HOT | LH BEARING HOT | RH BEARING HOT |
| LH ENG HOT | LH ENG HOT | RH ENG HOT |
| LH DC GEN OFF | LH DC GEN OFF | RH DC GEN OFF |
| LH ALTERNATOR OFF | LH ALTERNATOR OFF | RH ALTERNATOR OFF |
| MAIN INVERTER OFF | MAIN INVERTER OFF | SBY INVERTER OFF |
| LH DC GEN HOT | LH DC GEN HOT | RH DC GEN HOT |
| LH ALTERNATOR HOT | LH ALTERNATOR HOT | RH ALTERNATOR HOT |
| LH WINDSHIELD HOT | LH WINDSHIELD HOT | RH WINDSHIELD HOT |
| CABIN OXYGEN | CABIN OXYGEN | SPOILER EXT |
| PRESSURIZ. UNSAFE | PRESSURIZ. UNSAFE | AIRBRAKE EXT |
| LH ANTI-ICE ON | LH ANTI-ICE ON | RH ANTI-ICE ON |
| CROSS-FEED | CROSS-FEED | WING DE-ICE ON |
| NO SMOKING | NO SMOKING | FASTEN SEATBELTS |

34. MASTER CAUTION LIGHT

Press the master caution light to test it

35. LH & RH ENGINE FIRE ALERT & FIRE EXTINGUISHERS

The ENG# FIRE lights turn on if an engine catches fire, generally because excessive overheating. If an engine catches fire, it must be immediately extinguished to avoid massive damage to the aircraft (in this simulation, both engine fires and subsequent aircraft damage are properly simulated). To discharge the fire extinguisher on an engine, press the relative ENG# FIRE light. WARNING: these lights are not to be pressed for testing, this will trigger the extinguisher and irremediably kill the engine.

36. ICE CONDITION LIGHT

This indication comes ON when icing conditions are severe enough outside. If this alert is ON proper action must be taken to avoid dangerous situations. Press the light to test.

37. IFF\TRANSPONDER

IFF of "Identifier friend or foe". The last 4 numbers are for mode 3/A used by civil aviation transponder identification. The first two numbers are for mode 1 used for military identification. Military identification is OFF unless you switch to ON both the switches at the far left of the IFF. The leftmost green light will start to blink indicating that the IFF is sending identification signals. The other 4 switches serve to test mode 4/A entires. Pressing them will test the relative entire and the rightmost green light will light up indicating a successful test. Use mode 4/A to identify in a civilian airspace. Whatever you enter on mode 1 will not affect mode 4/A identification.

ANNUNCIATOR PANEL TEST SWITCHES

In the 2-D cockpit it can be called by pressing the icon 



TEST REAR BEARING switch: it tests only the circuit for engine rear bearing temperature sensors.

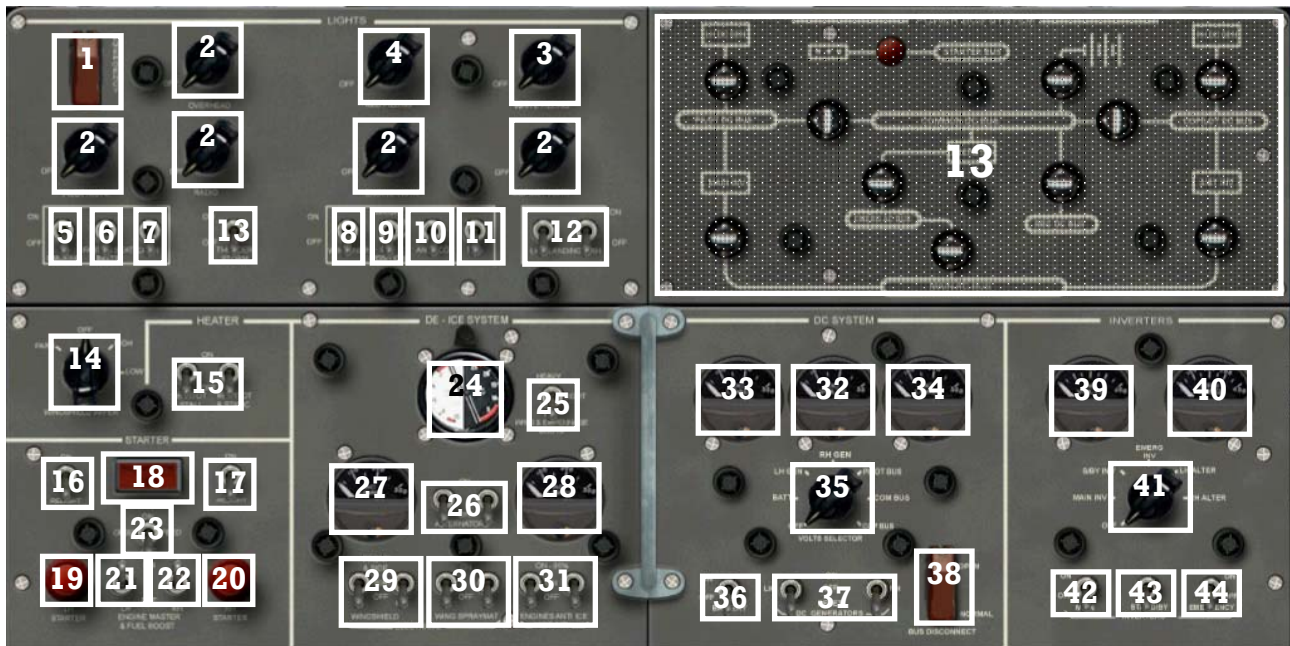
TEST OIL TEMP switch: same as above, but for the oil temperature sensors circuit.

TEST ANNUNC PANEL: tests all annunciator panel lights, plus MASTER CAUTION, ENG#FIRE, & ICE CONDITION lights.

Annunciator panel brightness level. It enables a higher brightness lighting for the annunciator panel if turned ON (*function not simulated*)

OVERHEAD PANEL

In the 2-D cockpit it can be called by pressing the icon 



1. EMERGENCY CABIN LIGHTS
2. INSTRUMENT PANEL BACKLIGHTING
(In this simulation, all the panel backlighting knobs work at unison)
3. COCKPIT FLOODLIGHT: WHITE
4. COCKPIT FLOODLIGHT: RED
5. CABIN NO SMOKING SIGNS
6. CABIN FASTEN SEATBELTS SIGN
7. CABIN LAIGHTS MASTER
8. WING INSPECTION LIGHTS
9. POSITION LIGHTS
The switch has 2 different positions: DIM & BRIGHT. Select the most appropriate light intensity. Example: use DIM on ground & BRIGHT in-flight.
10. ANTICOLLISION LIGHTS
11. TAXI LIGHTS
12. LANDING LIGHTS
13. POWER BUS SYSTEMQUADRANT
This panel indicates the current configuration of the POWER BUS SYSTEM.
14. WINDSHIELD WIPERS KNOB
The windshield wipers have 2 speed settings: FAST & SLOW. After switching them OFF, move the knob to PARK position. After the wipers park, the knob automatically resets to OFF position

15. LH PITOT & STALL, RH PITOT & STATIC

Heat systems for the pitot tubes, stall probe & static probe.

16. LH ENGINE RELIGHT SWITCH

Relight switches activate the igniters and prevent the engine from shutting down under bad weather conditions

17. RH ENGINE RELIGHT SWITCH

18. IGNITER ON LIGHT

The light comes on when RELIGHT switches are on or when starters are operative.

19. LH STARTER

When pressed, the starter button lights up. Pull down the lever and the starter will keep going until the engine ignites.

20. LH STARTER

21. LH ENGINE MASTER & FUEL BOOST

This switch activates engine circuits & fuel pump. When OFF, the engine cannot run.

22. RH ENGINE MASTER & FUEL BOOST

23. FUEL CROSS FEED SWITCH

24. VACCUM PRESSURE & WING & EMPENNAGE BOOTS PRESSURE

Indicates vacuum pressure for Gyro systems and air pressure for the anti-ice boots.

25. WING & EMPENNAGE BOOTS SWITCH

Pneumatic de-icing switch. Has two positions, LIGHT ICE & HEAVY ICE.

26. LH & RH ALTERNATORS

27. LH ALTERNATOR AMMETER

28. RH ALTERNATOR AMMETER

29. LH & RH WHINDHIOELD HEAT

Has 2 positions: FRONT & FRONT & SIDE.

30. WING SPRAYMAT SWITCHES

31. LH & RH ENGINE ANTI-ICE SWITCHES

32. DC SYSTEM VOLTMETER

33. LH DC GENERATOR AMMETER

34. RH DC GENERATOR AMMETER

35. DC SYSTEM VOLTMETER SOURCE KNOB

36. BATTERY SWITCH

37. LH & RH DC GENERATOR SWITCHES

38. EMERGENCY BUS DISCONNECT

Warning: this safety-cover sealed switch will disconnect all electrical supplies! It can be anyway closed back, but you then need to switch back ON all the power sources.

39. AC SYSTEM VOLTMETER

40. AC SYSTEM CYCLES

Note: for all the inverters it should indicate 400 Hz. The alternators instead will indicate a variable value with a maximum of 400 Hz when engines are running at 100% power.

41. AC SYSTEM SOURCE KNOB FOR VOLTMETER & CYCLES

42. MAIN INVERTER SWITCH

The MAIN INVERTER is operative only if at least one DC GENERATOR is running.


43. SBY INVERTER SWITCH

The STANDBY inverter is operative only if at least one DC GENERATOR is running and if the MAIN INVERTER is inoperative.

44. EMERGENCY INVERTER SWITCH

The emergency inverter is operative only if BOTH MAIN & STANDBY inverters are inoperative. It runs also on battery power.


QUICK DYNAMIC CHECKLIST

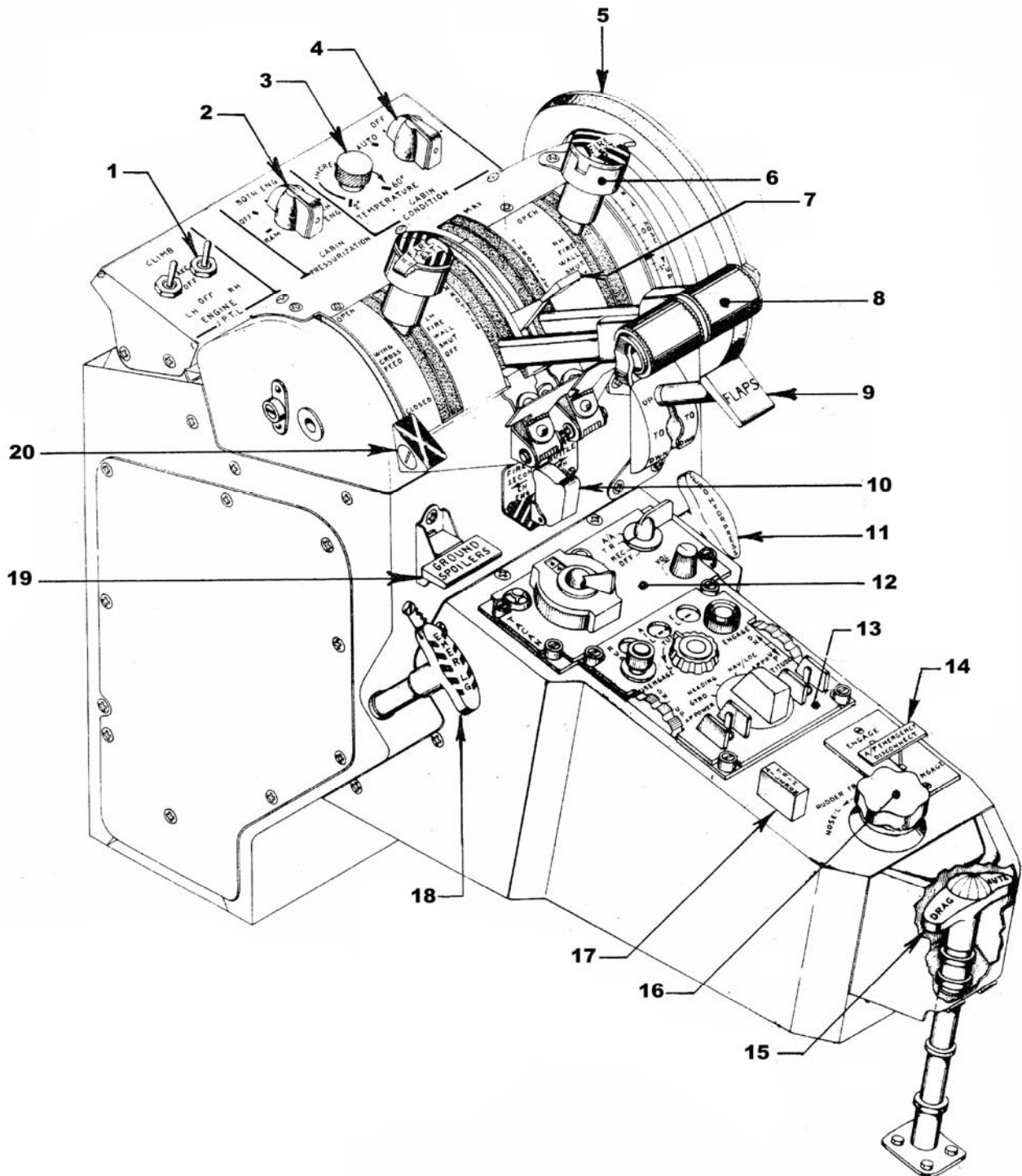
In the 2-D and 3-D cockpit it can be called by pressing the icon 

| PRE - FLIGHT CHECK LIST | | |
|---|----------------------|-------------------------------------|
| - GUST LOCKERS: | UNLOCKED AND IN | <input type="checkbox"/> |
| - FLIGHT CONTROLS: | CHECK FULL AUTHORITY | <input type="checkbox"/> |
| - LANDING GEAR LEVER: | DOWN | <input checked="" type="checkbox"/> |
| - PARKING BRAKE: | ON | <input type="checkbox"/> |
| - OXYGEN BOTTLE: | CHECK PRESSURE | <input checked="" type="checkbox"/> |
| - MAIN ENTERANCE: | CLOSED & LOCKED | <input checked="" type="checkbox"/> |
| - AUTO ELECTRIC BREAKERS: | ON | <input type="checkbox"/> |
| - BATTERY: | ON | <input type="checkbox"/> |
| - DIRECT VIEW WINDOW: | CLOSED | <input checked="" type="checkbox"/> |
| - CABIN FAN: | ON (IF NEEDED) | <input type="checkbox"/> |
| - PRESSURIZATION SELECTOR VALVE: | RAM | <input type="checkbox"/> |
| - EMER. PRESS SWITCH: | OFF | <input checked="" type="checkbox"/> |
| - MAIN, SBY, EMER. INVERTERS: | ON | <input type="checkbox"/> |
| - J.P.T.L SWITCHES: | TAKE-OFF | <input type="checkbox"/> |
| - WING CROSS FEED LEVER: | CLOSED | <input checked="" type="checkbox"/> |
| - LH & RH FIRE WALL SHUTOFF: | OPEN | <input type="checkbox"/> |
| - ELEVATOR TRIM: | CHECK & RESET 0° | <input checked="" type="checkbox"/> |
| - THROTTLE LEVERS: | OFF | <input type="checkbox"/> |
| - GROUND SPOILERS: | RETRACTED | <input checked="" type="checkbox"/> |
| - FLAPS LEVER: | UP | <input checked="" type="checkbox"/> |
| - EMER LG HANDLE: | RETRACTED | <input checked="" type="checkbox"/> |
| - ZERO HYDR PRESS HANDLE: | RETRACTED | <input type="checkbox"/> |
| - AUTOPILOT: | OFF | <input checked="" type="checkbox"/> |
| - AP EMERGENCY DISCONNECT: | ENGAGE | <input type="checkbox"/> |
| - WINDSHIELD WIPERS: | OFF | <input checked="" type="checkbox"/> |
| - HEATERS, STARTERS, & DE-ICE SWITCHES: | OFF | <input checked="" type="checkbox"/> |
| - ALTERNATORS: | OFF | <input checked="" type="checkbox"/> |
| - DC GENERATORS: | OFF | <input checked="" type="checkbox"/> |
| - VOLTS SELECTOR: | BATT | <input type="checkbox"/> |
| - AC INDICATORS SELECTOR: | MAIN INV | <input type="checkbox"/> |

Use The tabs to the right to select the checklist for your phase of flight. Note that it is not needed to have all the boxes checked. Perform the checks in the given order. This is anyway a QUICK checklist and the complete procedures are listed in section II of this flight manual. In a normal situation, with calm weather and with the aircraft in perfect operative conditions, this checklist's procedures should let you quickly configure the aircraft for take-off.

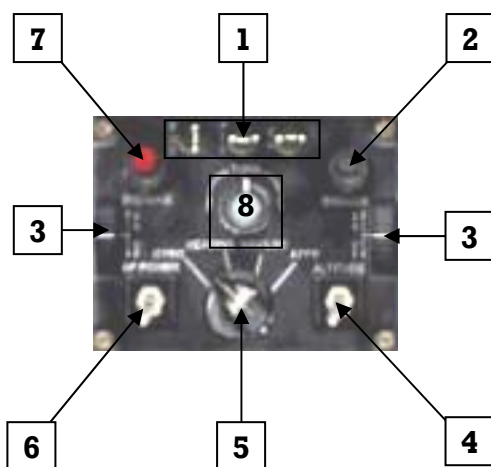
THROTTLE QUADRANT

In the 2-D cockpit it can be called by pressing the icon 



1. J.P.T.L SWITCHES
Positions: OFF, Take-off, climb
2. PRESSURIZATION SOURCE SELECTOR
Positions: RAM, OFF ,BOTH ENG, LH ENG, RH ENG. Use single engine modes when an engine is failed.
3. CABIN TEMPERATURE KNOB
Sets cabin temperature provided temperature control is activated.
4. CABIN TEMPERATURE CONTROL MODE KNOB
Positions: AUTO, OFF, MAN. Selects the operating mode of the temperature controller. Auto will self-tune to the temperature set in "3". OFF will cut off the air conditioner, and MAN will use "3" as a potentiometer.
5. ELEVATOR TRIM WHEEL
6. LH & RH ENGINE FIRE WALL SHUT-OFF
7. FRICTION LOCKERS
8. THROTTLES
9. FLAP LEVERS
10. IDLE DENTENTS
11. ZERO HYDR. PRESS. LEVER
12. TACAN (VOR2) QUADRANT
13. AUTOPILOT QUADRANT
14. AUTOPILOT EMERGENCY DISCONNECT
15. DRAG CHUTE LEVER
16. RUDDER TRIM KNOB
17. AILERON TRIM LEVER
Move lever left\right to operate.
18. EMERGENCY LANDING GEAR EXTEND
In case of an emergency, before pulling this lever, also set landing gear lever to DOWN.
19. SPOILERS\AIRBRAKES SWITCH.
Spoilers\Airbrakes cannot be deployed to a halfway position. They are either deployed or retracted.
20. FUEL CROSS FEED LEVER

AUTOPILOT USAGE




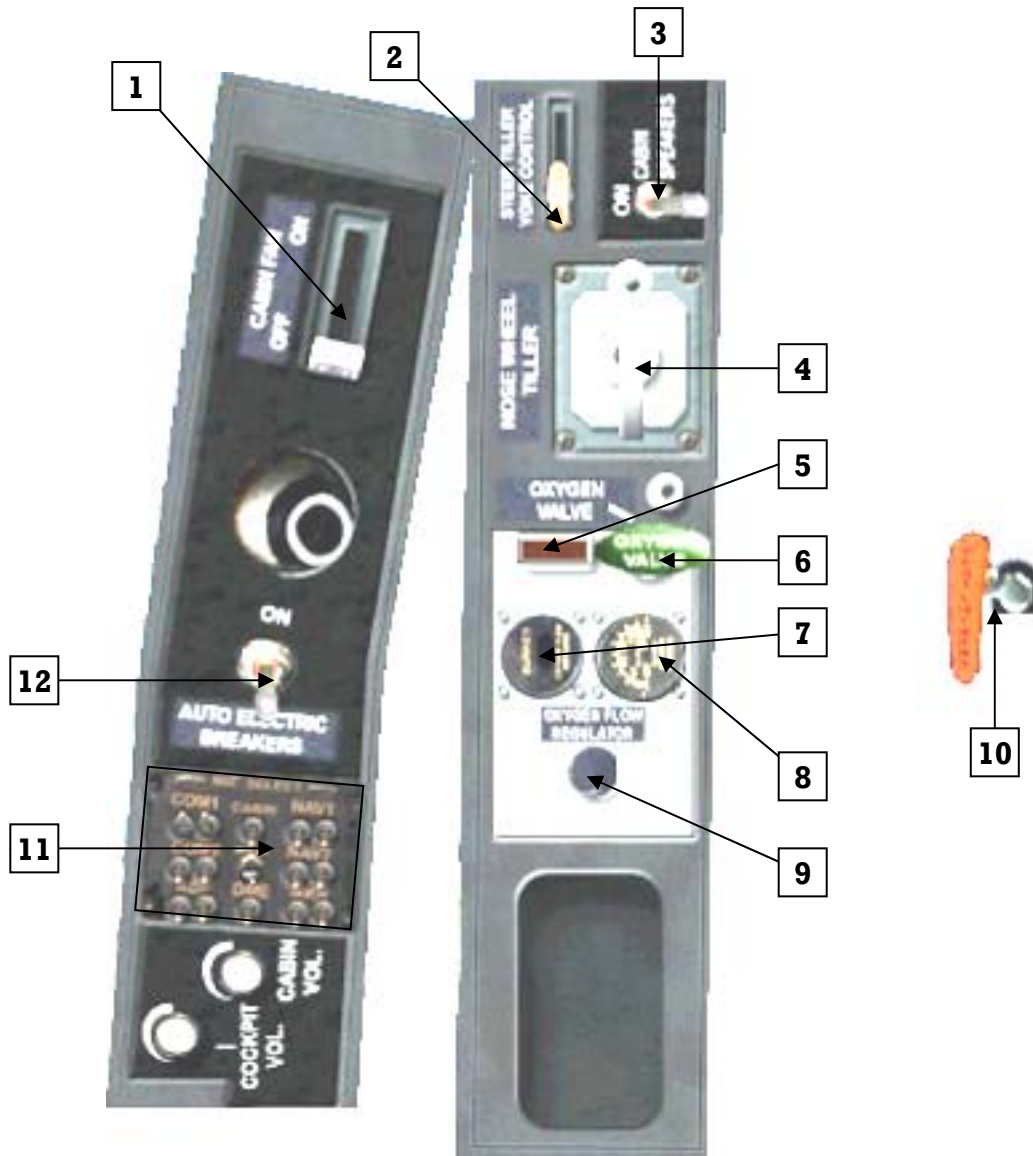
1. CONTROL SURFACE POSITION INDICATORS
2. ENGAGE BUTTON
3. VERTICAL SPEED SELECTION KNOBS
4. ALTITUDE MODE ENGAGE SWITCH
5. MODAL SWITCH
Positions: GYRO, HDG HOLD, NAV HOLD, APPR
6. AP POWER SWITCH
7. DISENGAGE BUTTON & AP OPERATING LIGHT
8. MANUAL TURN KNOB

To turn on the autopilot, first make sure the AUTOPILOT EMERGENCY DISCONNECT is engaged. Then switch ON the AP POWER switch (6). Check that the MODAL SWITCH (5) is on GYRO position to keep the autopilot from entering an unwanted turn. Press the ENGAGE button. The red light over the DISENGAGE button comes ON. The autopilot will now maintain current heading and attitude. Set the desired climb rate on the VERTICAL SPEED selection knobs (3) and switch to ON the ALTITUDE switch (4). You may now use the MANUAL TURN knob (8) to bank the aircraft to a maximum of 25° to start a turn. To exit the turn, reset to 0° the MANUAL TURN knob (8).

If you move the MODAL switch to HDG HOLD, the aircraft will turn to the heading set in the pilot's HSI. NAV mode follows VOR1, and cannot follow the TACAN. APPR mode follows ILS approaches provided they are well within range, otherwise the autopilot disengages control over inactive ILS channels (e.g.: if APPR is engaged but ILS is not within range, the autopilot will revert over manual control of the roll axis, provided that ALT mode is ON). Once engaged, it will turn to intercept the current ILS path, and when Glide Slope mode activates, ALT mode is automatically switched OFF. Until the glide slope mode is not working, ALT mode is kept ON. DO NOT use APPR mode to land the plane, it is not capable of flaring the aircraft. Autopilot use is forbidden below 200 ft.

OTHER CONTROLS

In the 2-D cockpit it can be called by pressing the icon 



1. CABIN FAN SWITCH
2. STEER TILLER YOKE CONTROL
Enables steering wheel control with aileron yoke movement. Use only during taxiing. Disengages automatically after 30 KIAS.
3. CABIN LOUDSPEAKER SWITCH
4. STEER TILLER
(In this simulation the steer tiller is controlled by rudder input, or aileron input if you activate STEER TILLER YOKE CONTROL)
5. OXYGEN LEVEL ALERT LIGHT
6. OXYGEN VALVE
7. OXYGEN FLOW INDICATOR
8. OXYGEN BOTTLE PRESSURE INDICATOR
9. OXYGEN FLOW REGULATOR
10. GUST LOCKERS
Do not activate gust lockers in-flight.
11. AUDIO PANEL
12. AUTO ELECTRIC BREAKERS SWITCH

Usage of emergency oxygen system

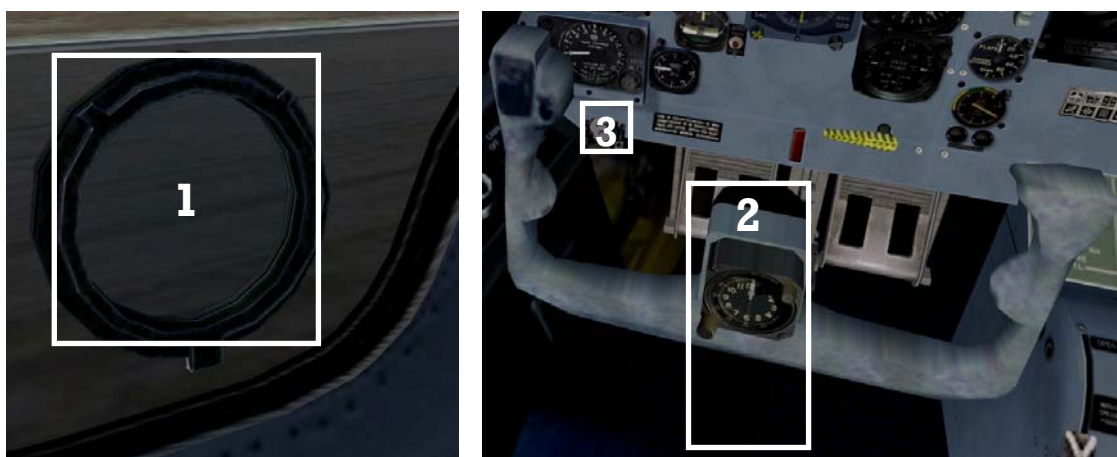
In case of a pressurization loss or cabin oxygen depletion (all situations where the CABIN OXYGEN light is ON in the annunciator panel), it is URGENT to activate the emergency oxygen supply system. This will deploy the oxygen masks (*In this simulation, oxygen masks can be hidden by clicking on them*). Pull the green oxygen valve, and regulate the oxygen flow until the CABIN OXYGEN alert on the annunciator panel is OFF. Start immediately a fast descent to lower than 15'000 ft where outside air is enough. Note that the needed oxygen flow is proportional to altitude, so over 40'000 ft 100% will be needed. At lower altitudes it can be decreased. Decreasing the flow can serve to increase oxygen bottle duration.


COPILLOT PANEL



1. OUTSIDE AIR TEMPERATURE
2. VOR1 & TACAN DME
3. ACCELEROMETER
4. OIL TEMPERATURE INDICATOR

VIRTUAL COCKPIT EXTRAS



In the 3-D virtual cockpit you can open\close the direct view window (1). You can also hide\show the yokes by clicking on their column (2) or on the valve to the lower left of the main panel (3). Note that in the virtual cockpit view the ZERO HYDR PRESS lever is hardly accessible. You can reach it by calling the throttle quadrant pop-up panel by using the icon 

Section V: Limitations

ENGINE LIMITS (Bristol Siddeley Viper Mk. 526)

| | |
|---|----------------|
| Take-off static thrust, standard day sea level | (100%) 3330 lb |
| Maximum continuous thrust, standard day sea level (98.5%) | 3100 lb |
| Maximum permissible engine rotor operating speed | 100% 13760 RPM |
| Maximum overspeed (20 second limit) | 103% |
| Ground Idling | 40 - 41% |
| Maximum permissible turbine outlet gas temperature: | |
| Take-off (5 minute limit) | 740°C |
| Maximum continuous | 715°C |
| Starting (5 second limit) | 800°C |
| Ground idling | 645°C |
| Maximum permissible oil inlet temperature: | |
| Continuous operation | 125°C |
| Maximum permissible air bleed extraction | 7.5% |

AIRSPEED LIMITS (KIAS)

| | |
|--|----------------|
| V _{MO} (Maximum operating) | |
| Sea level | 340 kts |
| 19500 feet | 352 kts |
| M _{MO} (Maximum operating) | |
| 19500 feet and above | M = 0.75 (IMN) |
| V _A (Manoeuvring) | |
| 18300 lb gross weight | 280 kts |
| 15500 lb gross weight | 250 kts |
| 13000 lb gross weight | 230 kts |
| V _{FE} (Flap Speed) | |
| 20° down | 220 kts |
| 40° down | 185 kts |
| V _{LE} (Landing gear extended speed) | 220 kts |
| V _{LO} (Landing gear operating speed) | 200 kts |

| | |
|---|-------------------|
| V _{MCG} (Minimum control speed, ground) sea level ISA - 50°C | 89 kts |
| V _{MCA} (Minimum control speed air) | below stall speed |
| Tire limit ground speed (Nose landing gear) (Take-off) | 157 kts |

C.G. RANGE (GEAR EXTENDED)

Datum Fuselage station "0", 38 inches forward of cut for sliding nose.

| WEIGHT (Pounds) | FORWARD | | AFT | |
|--------------------|---------|---------|-------|---------|
| | % MAC | Inches | % MAC | Inches |
| 18,300 | 21.0 | +232.16 | 24.5 | +234.78 |
| 16,000 | 22.0 | +232.91 | - | - |
| 14,500 | - | - | 27.5 | +237.00 |
| 13,000 | - | - | 27.5 | +237.00 |
| 12,500 | 17.5 | +229.55 | - | - |
| 11,000 | 17.5 | +229.55 | - | - |
| 10,000 | 19.4 | +231.00 | 24.8 | +235.00 |

Straight line variation between points given

Leveling Means Longitudinally - Fuselage right side between station 336.50 inches to 351.0 inches.

Laterally - Fuselage station 321.4 inches.

Maximum Weight

| | |
|--------------------------|-----------|
| Ramp | 18,300 lb |
| Take-off (brake release) | 18,000 lb |
| Landing | 16,000 lb |
| Zero Fuel | 13,000 lb |

Minimum Crew

Two Pilot and Co-pilot

Maximum Passengers

Nine

Maximum Baggage

| | Weight lb. | Arm Inches |
|---|------------|------------|
| (5 passengers version) Forward compartment: | 140 | 128.74 |
| Rear compartment: | 100 | 274.31 |

Maximum Baggage

| | | |
|---|-----|--------|
| (9 passengers version) Forward compartment: | 140 | 143.31 |
|---|-----|--------|

Fuel Capacity

Usable fuel (See NOTE 1 for unusable fuel)

| Location | Volume U.S. Gals. | Arm Inches |
|--|----------------------|------------|
| Right or left tank (wing plus tip) (each) | 485 | - |
| Wing (right or left) (each) | 248 | 245.78 |
| Tip (right or left) (each) | 237 | 226.56 |

Oil Capacity

Maximum oil system capacity (See NOTE 1 for unusable oil)

| Location | Volume U.S. Gals. | Arm Inches |
|----------|----------------------|------------|
| No. 1 | 1.94 | 308.14 |
| No. 2 | 1.94 | 308.14 |

Control Surface Movements

| <u>Surface</u> | <u>Travel</u> | <u>Tolerance</u> |
|---------------------------------------|---------------------------------|------------------|
| Aileron | Up 16° Down 16° | ± 1° |
| Aileron tabs (trim on left side only) | | |
| Left side | Up 32° Down 36° | ± 2° |
| Right side | Up 20° Down 20° | ± 2° |
| Rudder | Left 27° Right 27° | ± 1° |
| Rudder trim tabs | Left 25° Right 25° | ± 1° |
| Elevator | Up 20° Down 10° | ± 1° |
| Elevator trim tab | Up 22° (Electrical) Down 27° | ± 2° |
| Elevator trim tab | Up 8° (Mechanical) Down 12° | ± 2° |
| Flaps | Down 40° | ± 2° |
| Speed brakes | Down 45° | ± 2° |
| Spoilers | Up 60° | ± 2° |

Maximum operating altitude

40,000 feet

NOTE 1

(a) A current Weight and Balance Report including list of equipment included in certificated empty weight, and loading instructions, must be in each aircraft at the time of original certification and at all times thereafter.

(b) The airplane must be loaded so that the C.G. is within the specified limits at all times.

(c) The weight of system fuel and oil as defined below and hydraulic fluid must be included in the empty weight of the airplane.

| <u>System Fuel</u> | <u>U.S. Gals.</u> | <u>Arm inches</u> |
|---|-------------------|-------------------|
| Unusable fuel | 16 | 260.00 |
| Undrainable fuel (trapped in tanks & lines) | 4 | 260.00 |

| <u>System Oil</u> | <u>U.S. Gals.</u> | <u>Arm inches</u> |
|-----------------------------|-------------------|-------------------|
| Unusable oil (both engines) | 1.8 | 308.14 |
| Undrainable oil | Negligible | |

Appendix 1: Speed & Performance Data

Landing Reference Speeds (KIAS)

| Lb | V _{ref} | V _{so} | V _{sl} | Fuel weight (Lbs) |
|-------|------------------|-----------------|-----------------|---------------------------|
| 13000 | 119 | 92 | 101 | 1500 |
| 14000 | 121 | 93 | 103 | 2500 |
| 15000 | 123 | 95 | 106 | 3500 |
| 16000 | 129 | 99 | 109 | 4500 |
| 17000 | 132 | 102 | 112 | 5500 |
| 18000 | 138 | 106 | 116 | 6300 (Max Fuel). |

V_r & V₂ (KIAS)

WEIGHT: 13000 Lbs

| OUTSIDE AIR. EMPERATURE | FIELD PRESSURE. ALTITUDE | V _r | V ₂ |
|----------------------------|-----------------------------|----------------|----------------|
| 10°C | 3000 ft | 112 | 122 |
| 10°C | 5000 ft | 110 | 120 |
| 15°C | 0 ft | 114 | 126 |
| 15°C | 2000 ft | 112 | 124 |
| 20°C | 2000 ft | 111 | 122 |
| 20°C | 4000 ft | 110 | 119 |
| 25°C | 4000 ft | 109 | 118 |
| 25°C | 6000 ft | 108 | 115 |

WEIGHT: 15000 Lbs

| | | | |
|-------------|----------------|------------|------------|
| 10°C | 3000 ft | 117 | 126 |
| 10°C | 5000 ft | 115 | 123 |
| 15°C | 0 ft | 118 | 129 |
| 15°C | 2000 ft | 117 | 126 |
| 20°C | 2000 ft | 116 | 125 |
| 20°C | 4000 ft | 115 | 122 |
| 25°C | 4000 ft | 114 | 121 |
| 25°C | 6000 ft | 113 | 119 |

WEIGHT: 17000 Lbs

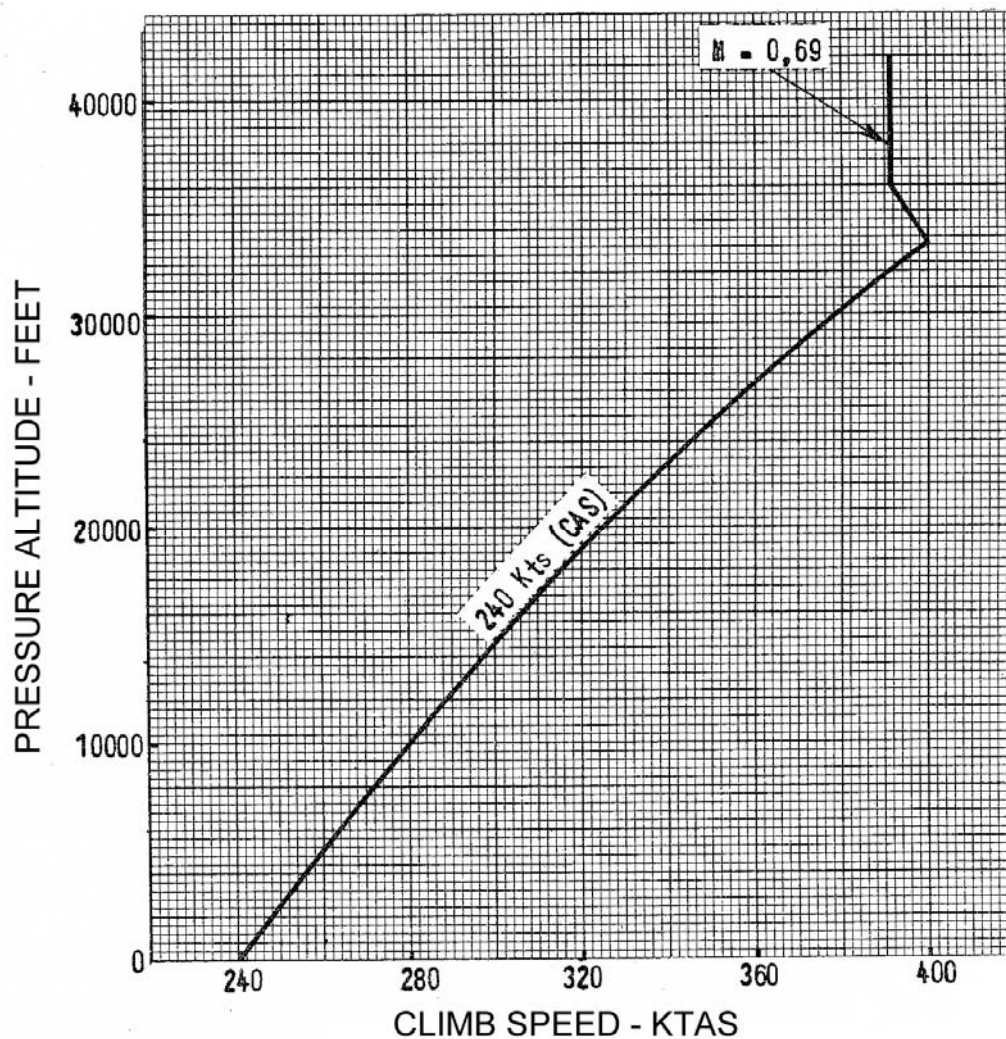
| | | | |
|-------------|----------------|------------|------------|
| 10°C | 3000 ft | 122 | 128 |
| 10°C | 5000 ft | 121 | 126 |
| 15°C | 0 ft | 123 | 132 |
| 15°C | 2000 ft | 122 | 129 |
| 20°C | 2000 ft | 121 | 128 |
| 20°C | 4000 ft | 121 | 126 |
| 25°C | 4000 ft | 122 | 126 |
| 25°C | 6000 ft | 123 | 126 |

FLAP RETRATCION SPEEDS (V3)

| WEIGHT (Lbs) | SPEED (V3) |
|---------------------|-------------------|
| 13000 | 139 Kts |
| 14000 | 143 Kts |
| 15000 | 147 Kts |
| 16000 | 151 Kts |
| 17000 | 155 Kts |
| 18000 | 159 Kts |

Climb performance

| Height (Feet) | 18000 lb | | | 17000 lb | | | 16000 lb | | | 15000 lb | | | 14000 lb | | | 13000 lb | | |
|------------------|----------------|------------------|----------------------|----------------|------------------|----------------------|----------------|------------------|----------------------|----------------|------------------|----------------------|----------------|------------------|----------------------|----------------|------------------|----------------------|
| | Time (Min.) | Space (N.Mi.) | Fuel Burn (lb) | Time (Min.) | Space (N.Mi.) | Fuel Burn (lb) | Time (Min.) | Space (N.Mi.) | Fuel Burn (lb) | Time (Min.) | Space (N.Mi.) | Fuel Burn (lb) | Time (Min.) | Space (N.Mi.) | Fuel Burn (lb) | Time (Min.) | Space (N.Mi.) | Fuel Burn (lb) |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5000 | 1,3 | 5,5 | 110 | 1,2 | 5,5 | 105 | 1,2 | 5 | 95 | 1,2 | 5 | 90 | 1,1 | 4,5 | 90 | 1 | 4,5 | 85 |
| 10000 | 2,6 | 11,5 | 220 | 2,5 | 10,5 | 210 | 2,4 | 10 | 195 | 2,3 | 9,5 | 185 | 2,2 | 9 | 175 | 2,1 | 9 | 170 |
| 15000 | 4,2 | 19 | 365 | 3,9 | 17,5 | 335 | 3,6 | 16 | 310 | 3,4 | 15 | 290 | 3,2 | 14,5 | 270 | 3 | 14 | 250 |
| 20000 | 6 | 28 | 490 | 5,6 | 26 | 450 | 5,2 | 24 | 410 | 4,7 | 22,5 | 375 | 4,3 | 21 | 350 | 3,9 | 20 | 320 |
| 25000 | 8,2 | 40 | 600 | 7,6 | 37 | 555 | 7 | 34 | 515 | 6,4 | 31,5 | 475 | 5,8 | 29 | 435 | 5,2 | 27 | 400 |
| 29000 | 10,5 | 53 | 720 | 9,5 | 48 | 660 | 8,6 | 44 | 605 | 7,8 | 40 | 555 | 7 | 36,5 | 505 | 6,2 | 32,5 | 460 |
| 31000 | 11,8 | 62 | 780 | 10,8 | 56 | 720 | 9,7 | 51 | 660 | 8,7 | 46 | 600 | 7,9 | 42 | 550 | 6,9 | 37,5 | 495 |
| 33000 | 13,3 | 72 | 850 | 12,1 | 64,5 | 780 | 10,9 | 58 | 715 | 9,7 | 52 | 650 | 8,6 | 47 | 590 | 7,5 | 42,5 | 535 |
| 35000 | 14,8 | 82,5 | 920 | 13,4 | 73,5 | 840 | 12 | 66 | 770 | 10,7 | 59,5 | 700 | 9,4 | 53,5 | 635 | 8,1 | 48,5 | 570 |
| 37000 | 17 | 96 | 1010 | 15,1 | 84 | 910 | 13,4 | 75 | 820 | 11,9 | 67 | 740 | 10,4 | 60 | 670 | 9 | 53,5 | 605 |
| 39000 | 20 | 116 | 1120 | 17,4 | 100 | 990 | 15,3 | 87,5 | 885 | 13,4 | 76 | 790 | 11,6 | 67 | 710 | 10,1 | 58,5 | 640 |
| 40000 | 22,5 | 134,5 | 1190 | 19,2 | 113 | 1045 | 16,6 | 97 | 930 | 14,4 | 82,5 | 825 | 12,4 | 71,5 | 740 | 10,6 | 61 | 665 |
| 41000 | 25 | 153,5 | 1260 | 21 | 126,5 | 1100 | 18 | 106,5 | 975 | 15,4 | 89 | 865 | 13,2 | 75,5 | 770 | 11,2 | 64 | 685 |



CLIMB

TIMES (min)

| Weight Lbs | 10000 | 15000 | 20000 | 25000 | 35000 |
|--------------|----------|----------|------------|------------|-------------|
| 13000 | 2 | 3 | 4 | 5 | 8 |
| 15000 | 2 | 3 | 5 | 6 | 10,5 |
| 17000 | 2 | 4 | 5,5 | 7,5 | 13,5 |

CRUISE PERFORMANCE

Nautical miles for 1000 Lbs of fuel / Fuel flow Lbs/h (PPH)

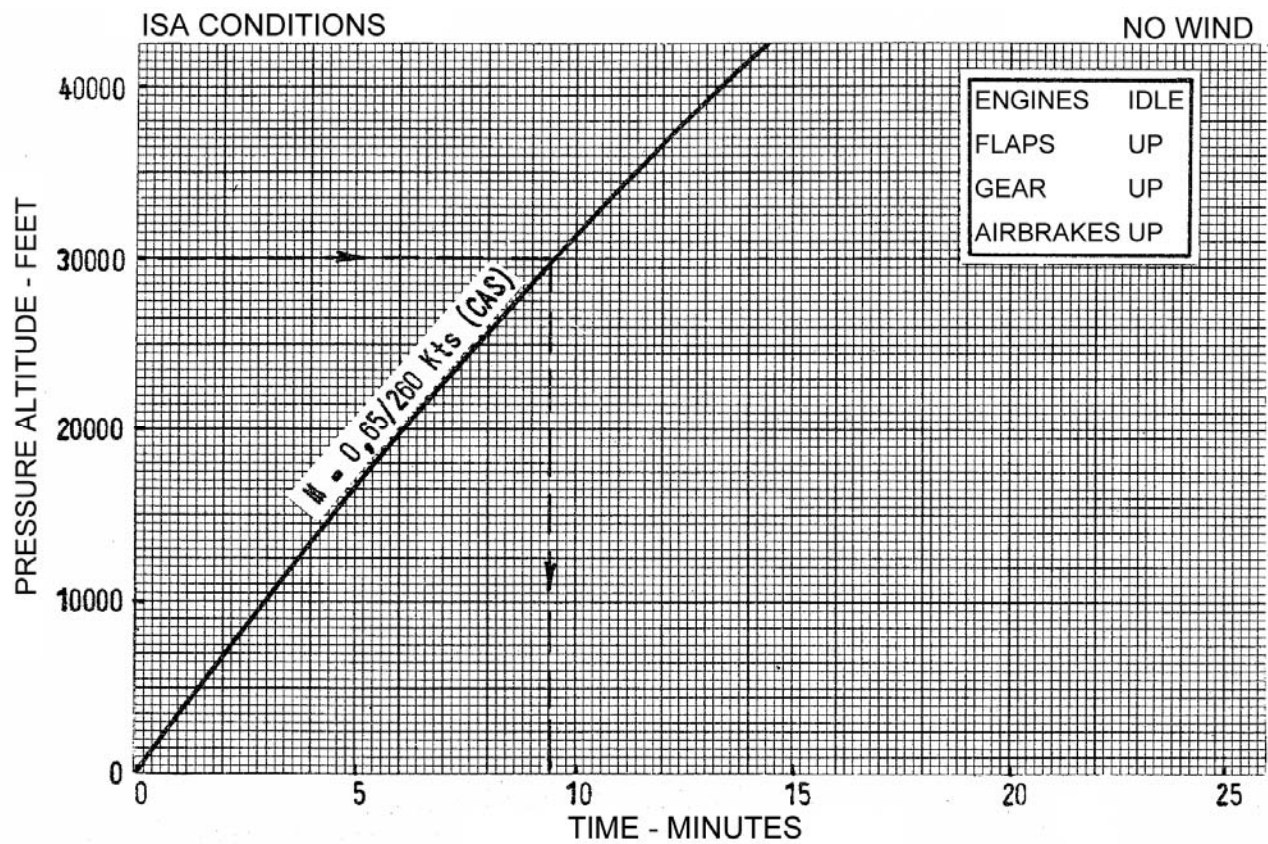
| 10000 ft | TAS | | | | | | |
|----------|------------|------------|------------|------------|------------|------------|------------|
| Weight | 220 | 250 | 270 | 300 | 320 | 350 | 370 |
| 13000 | 128 / 1700 | 135 / 1850 | 137 / 2000 | 136 / 2200 | 133 / 2400 | 126 / 2800 | 121 / 3050 |
| 15000 | 123 / 1800 | 130 / 1900 | 132 / 2050 | 132 / 2250 | 130 / 2450 | 124 / 2850 | 119 / 3100 |
| 17000 | 115 / 1900 | 124 / 2000 | 127 / 2150 | 128 / 2400 | 126 / 2500 | 121 / 2900 | 116 / 3200 |

| 15000 ft | TAS | | | | | | |
|----------|------------|------------|------------|------------|------------|------------|------------|
| Weight | 220 | 250 | 270 | 300 | 320 | 350 | 370 |
| 13000 | 145 / 1550 | 155 / 1600 | 159 / 1700 | 159 / 1900 | 156 / 2050 | 150 / 2300 | 144 / 2600 |
| 15000 | 134 / 1600 | 147 / 1700 | 151 / 1800 | 152 / 2000 | 150 / 2150 | 145 / 2400 | 140 / 2650 |
| 17000 | ----- | 135 / 1850 | 141 / 1900 | 145 / 2100 | 145 / 2200 | 141 / 2500 | 136 / 2700 |

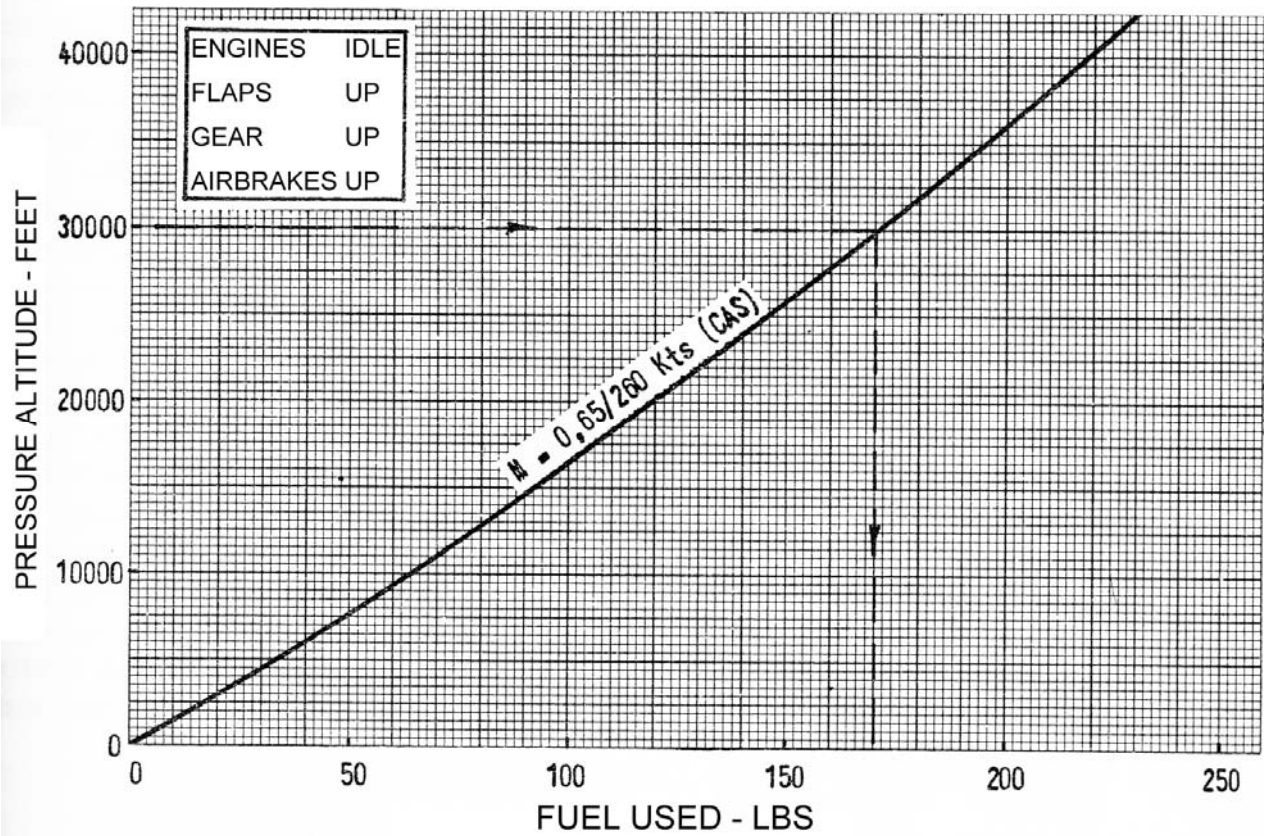
| 20000 ft | TAS | | | | | | |
|----------|------------|------------|------------|------------|------------|------------|------------|
| Weight | 220 | 250 | 270 | 300 | 320 | 350 | 370 |
| 13000 | 162 / 1350 | 177 / 1400 | 182 / 1500 | 184 / 1650 | 183 / 1750 | 177 / 2000 | 170 / 2200 |
| 15000 | ----- | 164 / 1500 | 171 / 1600 | 176 / 1700 | 175 / 1800 | 170 / 2050 | 165 / 2250 |
| 17000 | ----- | 152 / 1650 | 160 / 1700 | 167 / 1800 | 168 / 1900 | 164 / 2100 | 159 / 2300 |

| 25000 ft | TAS | | | | | | |
|----------|-------|------------|------------|------------|------------|------------|------------|
| Weight | 220 | 250 | 270 | 300 | 320 | 350 | 370 |
| 13000 | ----- | 198 / 1250 | 208 / 1300 | 214 / 1400 | 214 / 1500 | 207 / 1700 | 200 / 1850 |
| 15000 | ----- | 178 / 1400 | 190 / 1450 | 199 / 1500 | 200 / 1600 | 197 / 1800 | 190 / 1950 |
| 17000 | ----- | ----- | 173 / 1600 | 185 / 1650 | 188 / 1700 | 187 / 1900 | 182 / 2050 |

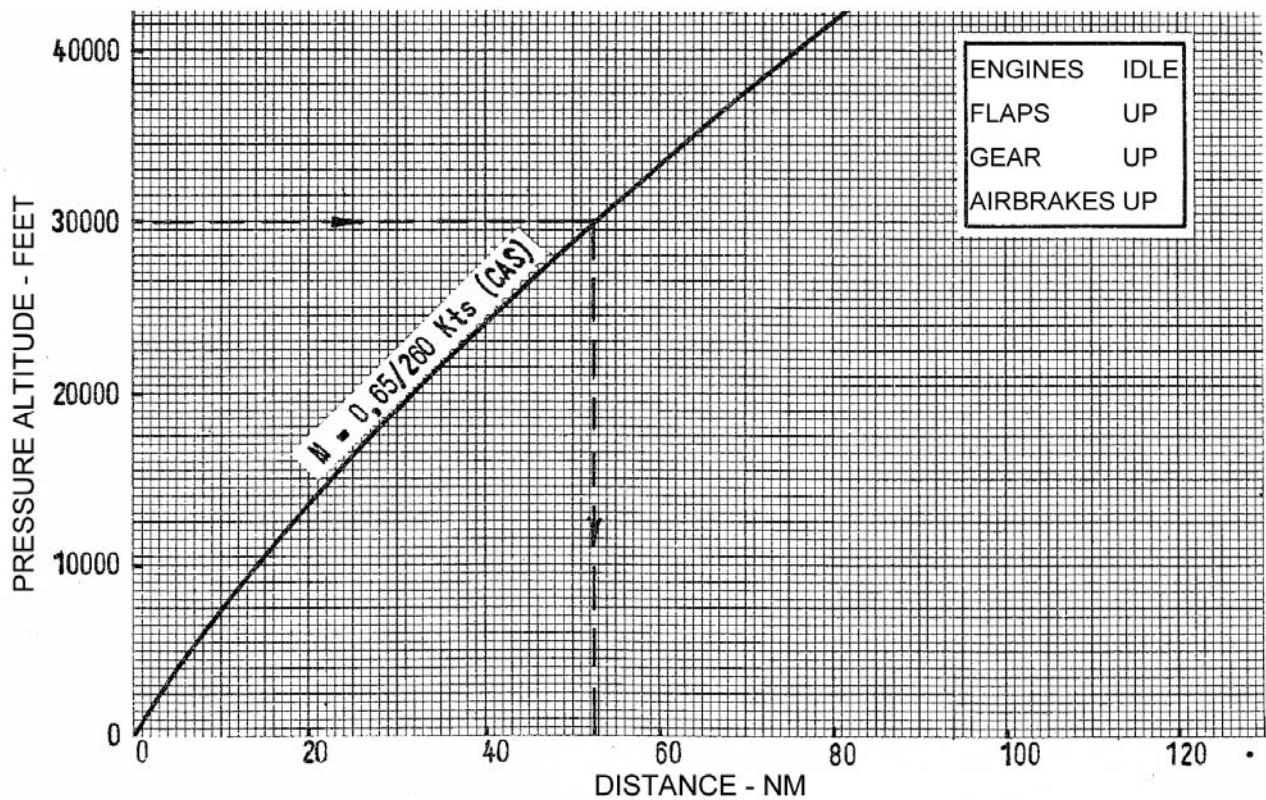
DESCENT TIME (VALID FOR ALL WEIGHTS)



FUEL BURN DURING DESCENT (VALID FOR ALL WEIGHTS)



DESCENT SPACE (VALID FOR ALL WEIGHTS)



MEDIUM FUEL BURNS FOR GIVEN FLIGHT PHASES.

| | |
|--|-----------------|
| Start-up Taxi Take-Off Acceleration | 300 Lbs |
| Landing Taxi | 60 Lbs (2 min.) |
| Taxi | 20 Lbs\min. |

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www.freeflightdesign.com