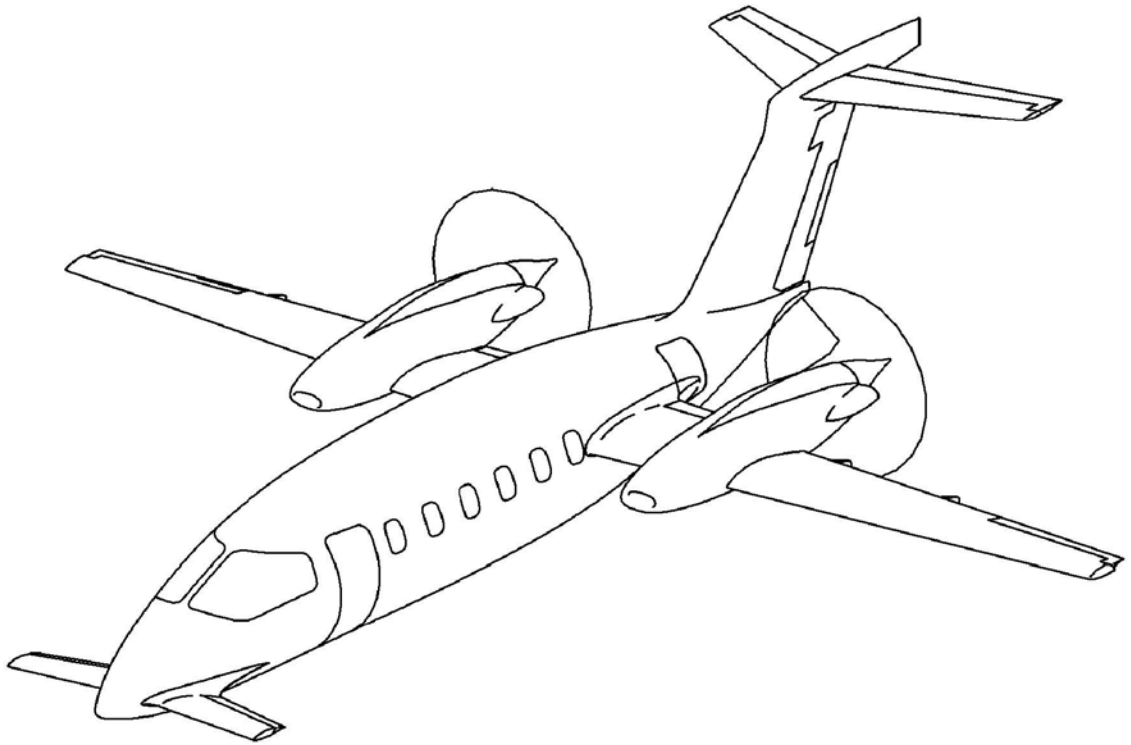




Piaggio P-180 Avanti V3.0

Operating Handbook & Flight Manual



Not for real-world operations!

This manual is intended ONLY for the Microsoft Flight Simulator aircraft package available at www.glubby.net/mariopilot.

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1.1: ENGINES

| | |
|-----------------------------|--|
| a. Number of Engines: | 2 |
| b. Engine Manufacturer: | Pratt & Whitney Canada |
| c. Engine Model Number: | PT6A-66 |
| d. Rated Horsepower: | 850 |
| e. Propeller Speed(rpm): | Takeoff and climb: 2000; Cruise: 1800/2000 |
| f. Engine Type: | Free Turbine, Reverse Flow, 2-Shaft |
| Compressor stages and type: | 4 axial stages, 1 centrifugal stage |
| Turbine stages and type: | 1 stage compressor, 2 stages power |
| Combustion chamber type: | annular |

1.2: PROPELLERS

| | |
|---------------------------------------|--|
| a. Number of Propellers: | 2 |
| b. Propeller Manufacturer: | Hartzell |
| c. Blade Models | |
| Left (CW Rotating, inner tip down): | HE 8218 |
| Right (CCW Rotating, inner tip down): | LE 8218 |
| d. Number of Blades: | 5 |
| e. Hub Models | |
| Left (CW Rotating): | HC-E5N-3 or HC-E5N-3A |
| Right (CCW Rotating): | HC-E5N-3L or HC-E5N-3AL |
| f. Propeller Diameter: | 85 in. (2.16 m.) |
| g. Propeller Type: | Hydraulically Operated, Single Acting, Constant Speed, Full Feathering, Reversible |



1.3: FUEL

- a. Total Capacity: 421.9 U.S. Gal. (1597 LTS)
- b. Usable Fuel: 392.6 U.S. Gal. (1486 LTS)

1.4: OIL

- a. Total Oil Capacity (each engine): 3.35 U.S. Gal. (12.7 LTS)
- b. Usable Oil Quantity (each engine): 1.25 U.S. Gal. (4.7 LTS)

1.5: MAXIMUM WEIGHTS

- a. Maximum Ramp Weight: 11,600 LBS (5262 Kg.)
- b. Maximum Takeoff Weight: 11,550 LBS (5239 Kg.)
- c. Maximum Landing Weight: 10,945 LBS (4965 Kg.)
- d. Maximum Zero Fuel Weight: 9800 LBS (4445 Kg.)
- e. Maximum Weight in Baggage Compartment: 400 LBS (181 Kg.)

1.6: AIRPLANE WEIGHTS

- a. Typical Equipped Empty Weight: 7,500 LBS (3266 Kg)
- b. Maximum Useful Load: 4,230 LBS (1919 Kg)

SECTION 2: LIMITATIONS

2.0: AIRSPEED LIMITATIONS

| SPEED | KCAS | KIAS |
|--|------|------|
| DESIGN MANEUVERING SPEED – V_A | | |
| Do not make full or abrupt control movements above this speed. | | |
| 11,550 lb. | 198 | 199 |
| 7,700 lb. | 176 | 177 |

NOTE: Linear interpolation may be used for intermediate gross weights.

MAXIMUM FLAP OPERATING SPEED – V_{FO}

Do not extend or retract flap at the given setting above this speed.

| | | |
|-----------|-----|-----|
| UP to MID | 169 | 170 |
| MID to DN | 149 | 150 |

MAXIMUM FLAP EXTENDED SPEED – V_{FE}

Do not exceed this speed at the given flap setting.

| | | |
|----------|-----|-----|
| Flap MID | 179 | 180 |
| Flap DN | 173 | 175 |

MAXIMUM LANDING GEAR OPERATING SPEED – V_{LO}

| | | |
|---|-----|-----|
| Do not extend or retract landing gear above this speed. | 179 | 180 |
|---|-----|-----|

MAXIMUM LANDING GEAR EXTENDED SPEED – V_{LE}

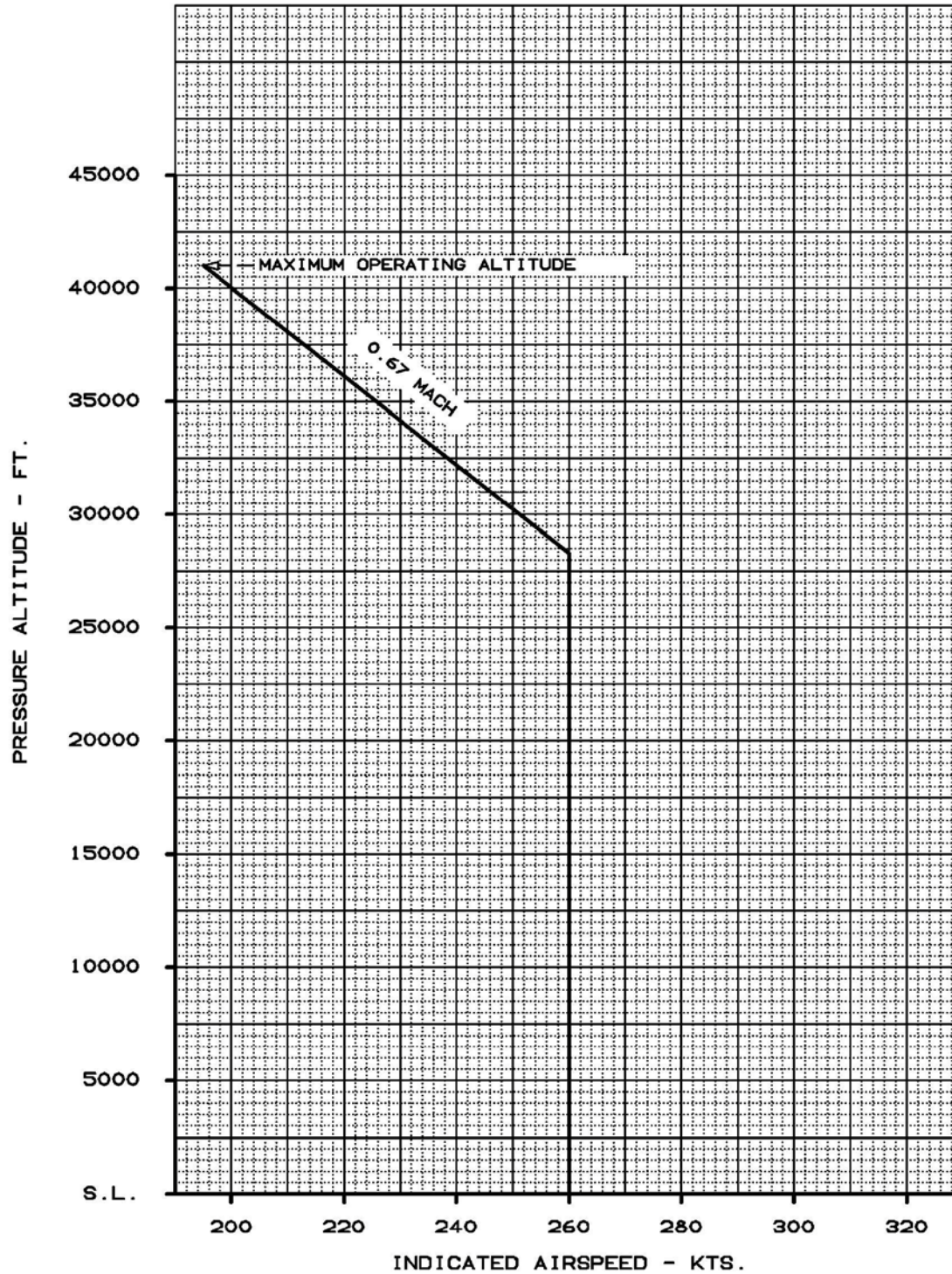
| | | |
|--|-----|-----|
| Do not exceed this speed with landing gear extended. | 184 | 185 |
|--|-----|-----|

MAXIMUM LANDING LIGHT EXTENDED SPEED – V_{LLE}

| | | |
|---|-----|-----|
| Do not exceed this speed with landing light extended. | 159 | 160 |
|---|-----|-----|



MAXIMUM OPERATING SPEED VS. PRESSURE ALTITUDE





| | | |
|-------|------|------|
| SPEED | KCAS | KIAS |
|-------|------|------|

AIR MINIMUM CONTROL SPEED – V_{MCA}

This is the minimum flight speed at which the airplane is directionally and laterally controllable, determined in accordance with the Federal Aviation Regulations and Regulamento Tecnico R.A.I.

| | | |
|--|-----|-----|
| Autofeather system operative (propeller feathered) | 99 | 100 |
| Propeller windmilling | 127 | 128 |

MAXIMUM OPERATING SPEED LIMIT – V_{MO}/M_{MO}

| | | |
|--|-----------|----------|
| Do not exceed this airspeed in any operation | 258/M.665 | 260/M.67 |
|--|-----------|----------|

2.1: AIRSPEED INDICATOR MARKINGS

| MARKING | SIGNIFICANCE | KIAS |
|-------------------------------|---|-----------|
| Red Line | Maximum Operating Speed | 260 |
| Red and White Stripes Pointer | Maximum Operating Mach Number | .67 |
| Red Line | Air Minimum Control Speed | 100 |
| White Arc | Full flap operating range | 98 to 150 |
| | Lower limit is maximum weight stalling speed in landing configuration. Upper limit is maximum speed permissible for operating flaps in landing configuration. | |
| Blue Line | One Engine Inoperative Best Rate of Climb Speed | 140 |

2.2: POWER PLANT LIMITATIONS

- a. Number of Engines: 2
- b. Engine Manufacturer: Pratt & Whitney Canada
- c. Engine Model Number: PT6A-66
- d. Engine operating limits:

| OPERATING CONDITION (1) | | OPERATING LIMITS | | | | | | | |
|--------------------------------------|-------------------|---------------------|----------------|----------------|-------------------------------|-------------------------|-----------------------|-----------------------------|--|
| POWER SETTING | SHP | TORQUE (2) LB-FT | | | MAXIMUM OBSERVED ITT °C | N _G % (7) | N _P RPM | OIL PRESSURE PSIG (3) | OIL TEMPERATURE °C (10) |
| | | 2000 RPM | 1900 RPM | 1800 RPM | | | | | |
| TAKEOFF | 850 | 2230 | - | - | 830 (8) | 104.1 | 2000 | 90 to 135 | 0 to 110 |
| MAX CONTINUOUS | 850 | 2230 | - | - | 830 (8) | 104.1 | 2000 | 90 to 135 | 0 to 110 |
| MAX CLIMB | 806 | - | 2230 | - | | | | | |
| MAX CRUISE | 762 | - | - | 2230 | | | | | |
| NORMAL CLIMB AND NORMAL CRUISE | 850 806 762 | 2230 - - | - 2230 - | - - 2230 | 830 (8) | 104.1 | 2000 | 90 to 135 | Climb 0 to 110 Cruise 20 to 110 |
| MIN IDLE | | - | - | - | 750 (6) | 51 | - | 60 (MIN) | -40 to 110 |
| STARTING | | - | - | - | 1000 (4) | - | - | 200 (MAX) | -40 (MIN) |
| TRANSIENT | | 2750 (5) | 2750 (5) | 2750 (5) | 870 (5) | 104.1 | 2205 (9) | 40 to 200 (5) | 0 to 110 |
| MAX REVERSE | | - | - | - | 760 | - | 1900 | 90 to 135 | 0 to 110 |

- Engine inlet condition limits for engine operation: Altitude: – 1,000 to 41,000 feet.
- Torque limit applies within a range of 1600 to 2000 propeller rpm; below 1600 rpm torque is limited to 1100 lb·ft.

Torquemeter - Power Calculations

$$\text{SHP} = \text{RPM (N}_P\text{)} \times \text{torque (lb·ft)} \times K$$

Where: N_P = propeller RPM

$$K = 0.00019$$

- Normal oil pressure is 90 to 135 psig at gas generator speeds above 72% and with a normal oil temperature of 60 to 70°C (140 to 158°F). Oil pressures under 90 psig are undesirable. Under emergency conditions, to complete a flight, a lower oil pressure limit of 60 psig is permissible at reduced power settings not exceeding 1100 lb·ft torque. Oil pressures below 60 psig are unsafe

and require that either the engine be shutdown or land as soon as practical using the minimum power required to sustain flight.

4. This value is time limited to 5 seconds.
5. These values are time limited to 20 seconds.
6. Applies to a speed range between 54% and 61% Ng.
7. 100% gas generator speed corresponds to 37,468 rpm.
100% power turbine speed corresponds to 33,235 rpm.
8. The temperatures shown are the maximum ITTs permissible under the Certification limitations. However, lower temperatures (785°C for Takeoff Maximum Continuous climb and Maximum Cruise) will produce rated horsepower (ISA) when the engine is new and result in longer engine life. Power management during takeoff, climb and cruise as shown in the power setting tables of Section 5 should be observed for warranted engine life.
9. May be used in emergency conditions to complete the flight.
10. Oil temperature above 104°C or below 20°C must only be tolerated in accordance with the procedure contained in this manual.

g. propeller speed (RPM)

WARNING

1. Stabilized ground operation below 900 RPM is prohibited, except when feathered operation at or below 600 RPM.
2. Stabilized ground operation between 1300 and 1600 RPM is prohibited.

CAUTION

Feather operation for training purposes should be limited to speeds below 150 KIAS.

Sustained ground operation (more than 30 minutes), especially at power settings higher than Ground Idle or with frequent application of power should be avoided.

Static operation at torque settings higher than 500 lb·ft must not last for more than 2 minutes, after that a cooling period of 20 minutes at Ground Idle or 10 minutes with engines OFF must be observed.



h. Autofeather System limits

WARNING

No takeoff authorized with autofeather inoperative

1. The autofeather system must be pre flight checked operational prior to takeoff
2. The autofeather system must be used for takeoff and landing operations. It is recommended to disengage the autofeather system at speeds above 150 KIAS.

2.3: MAXIMUM FUEL IMBALANCE

Maximum allowable fuel imbalance between wing fuel systems is 200 lbs.

2.4: MANEUVER LIMITS

This is a Normal Category Airplane, no acrobatic maneuvers, including spins, allowed.

2.5: FLIGHT LOAD FACTOR LIMITS (MANEUVERING)

- | | |
|--------------------------------------|---------|
| a. Positive Load Factor (Flaps Up) | 3.22 g |
| b. Negative Load Factor (Flaps Up) | -1.29 g |
| c. Positive Load Factor (Flaps Down) | 2.00 g |

2.6: FLIGHT CREW LIMITS

| | |
|--------------------------|-----------|
| Minimum crew (left seat) | One Pilot |
|--------------------------|-----------|

2.7: FUEL QUANTITY LIMITATIONS

| | |
|------------------------|--------------------------------|
| 1. Total Fuel Capacity | 421.9 U.S. Gallons (1597 LTS) |
| 2. Usable Fuel | |
| Total Fuel System: | 418.2 U.S. Gallons (1583 LTS) |
| Each Side Fuel System: | 209.1 U.S. Gallons (791.5 LTS) |
| 3. Unusable Fuel | |
| Total Fuel System | 3.7 U.S. Gallons (14 LTS) |
| Each Side Fuel System | 1.85 U.S. Gallons (7 LTS) |

2.8: MAXIMUM OPERATING ALTITUDE LIMITS

| | |
|-------------------------|-----------|
| 1. Enroute | 41,000 FT |
| 2. Take off and Landing | 10,000 FT |

2.9: OUTSIDE AIR TEMPERATURE LIMITS

| | |
|---|---------------|
| 1. Minimum (Sea Level) | -40°C (-40°F) |
| 2. Minimum Temperature for Engine Starting: | |
| a. Engine Oil | -40°C (-40°F) |
| b. JP4, JET B Fuel | -54°C (-65°F) |
| c. JP8, JET A, JET A1 Fuel | -34°C (-29°F) |
| 3. Minimum Temperature for Takeoff | -30°C (-22°F) |
| 4. Maximum Sea level to 12000 ft pressure altd. | ISA +35°C |
| Above 12000 ft pressure altd. | ISA +21°C |

2.10: CABIN PRESSURIZATION LIMITS

Maximum Normal Cabin Differential Pressure 9.0 PSI

Maximum Cabin Differential Pressure 9.7 PSI

Do not land when airplane cabin is pressurized

2.11: SYSTEMS AND EQUIPMENT LIMITS

2.11.1: Nickel-cadmium battery limitation

No battery engine starting must be attempted if the bus voltage is lower than 23.0 VDC or battery temperature is over 120°F (BAT TEMP caution light ON). No takeoffs authorized with temperature indication over 150°F (BAT OVHT warning light ON).

2.11.2: Flap system limitation

No takeoff authorized without flaps or with non symmetrical flap configuration or annunciated flap asymmetry.

Maximum operating altitude 20,000 ft.

2.11.3: Hydraulic pump

Operate continuously only with at least one engine running. Hydraulic pump must be on and operating and nosewheel steering on and operating for single engine taxiing.

2.11.4: Steering system limitation

Steering in TAXI position only for ground taxi. Maximum Speed (in T.O. mode) 60 KTS Steering engagement during landing is prohibited.

2.11.5: Fuel system limitation

Crossfeed operation is not approved for takeoff or landing.

2.11.6: Cold weather operation

If ambient temperature is below -25°C, it is necessary to operate the main wing anti-ice and the engine ice vane systems before applying full power to ensure that the autofeather is armed.

2.11.7: Operation in icing conditions

Landing must be performed with the flaps in MID position.

Minimum Ambient Temperature for operation of engine deicing boots -40°C

No takeoff authorized with frost, snow or ice adhering to the propellers, windshields, powerplant installation and pitot/static ports, or with snow or ice adhering to the wings, vertical and horizontal stabilizer or control surfaces.

SECTION 3: EMERGENCY PROCEDURES

3.0: GENERAL

The recommended procedures for coping with various types of emergencies or critical situations are provided in this section. These procedures are suggested as a course of action for coping with the particular condition described, but are not a substitute for sound judgment and common sense.

3.1: AIRSPEEDS FOR EMERGENCY OPERATIONS

| | |
|--|----------|
| One Engine Air Minimum Control Speed (Propeller feathered) | 100 KIAS |
| One Engine Air Minimum Control Speed (Propeller Windmilling) | 128 KIAS |
| One Engine Best Rate of Climb Speed (Flaps UP,L/GUP) | 140 KIAS |
| One Engine Best Angle of Climb Speed (Flaps UP, L/G UP) | 132 KIAS |

3.2: EMERGENCY PROCEDURES CHECKLIST

3.2.1: Engine failures

ENGINE SECURING

1. Power lever _____ IDLE
2. Condition lever _____ CUT OFF
3. Ignition switch _____ CHECK NORM
4. Fuel firewall shut-off valve _____ CLOSED
5. Fuel pump switch _____ OFF
6. Generator _____ OFF
7. Bleed _____ OFF
8. Crossfeed _____ AS REQUIRED
9. Autofeather _____ OFF

ENGINE TORCHING

1. Condition lever (affected engine) _____ CUT OFF
2. Starter switch _____ KEEP to START position as necessary

CAUTION

Have maintenance personnel check engine and propeller.

ENGINE FAILURE DURING TAKEOFF BEFORE ROTATION

1. Directional control _____ MAINTAIN
2. Power levers _____ IDLE
3. Brakes _____ AS REQUIRED
4. Power levers _____ REVERSE as required
5. Stop straight ahead.

If insufficient runway remains for a safe stop:

6. Condition levers _____ CUT OFF
7. Generators _____ OFF
8. Fuel firewall shut-off valves _____ CLOSED
9. Battery switch (when the airplane has stopped) _____ OFF

WARNING

No attempt should be made to continue the takeoff if the engine failure occurs prior to becoming airborne.

ENGINE FAILURE DURING TAKEOFF AT OR AFTER ROTATION

If sufficient runway remains for a safe stop:

1. Directional control _____ MAINTAIN
2. Power levers _____ IDLE
3. Land straight ahead
4. Brakes _____ AS REQUIRED
5. Power levers _____ REVERSE as required

If insufficient runway remains or if the decision is made to continue the takeoff:

1. Directional control _____ MAINTAIN (Bank 5° max. twrds op. eng)
2. Power levers _____ TAKEOFF
3. Landing gear (after climb established) _____ UP
4. Airspeed _____ ACCEL. TO "1 ENG 50 FT HEIGHT SPEED"
5. Procedure Airspeed _____ INCREASE TO 125 KIAS MINIMUM
6. Flaps _____ UP (max rmp 132KIAS or max clmb 140)
7. Obstacles _____ CLEAR
8. Inoperative engine _____ PERFORM ENGINE SECURING Procedure
9. Taxi/Landing lights (if applicable) _____ OFF
10. Airspeed _____ INCREASE as required
11. Land at nearest suitable airport, performing the SINGLE ENGINE APPROACH AND LANDING Procedure

WARNING

The decision to continue a takeoff, single engine is primarily predicated upon, but not necessarily limited to, the aircraft's ability to climb on a single engine with the gear extended and flaps in the takeoff position. Prior to flight, review airfield requirements and determine that adequate single engine climb performance exists, considering aircraft weight, ambient conditions, and pilot proficiency, to safely complete the takeoff should an engine fail at or after rotation.

ENGINE FAILURE IN FLIGHT BELOW V_{MCA}

| | |
|--------------------------------------|-----------------------------------|
| Power lever (operative engine) _____ | REDUCE power to maintain control |
| Airspeed _____ | INCREASE above V_{MCA} |
| Power lever (operative engine) _____ | AS REQUIRED |
| Inoperative engine _____ | SECURE as per ENG. SEC. Procedure |

ENGINE FIRE (GROUND) (L OR R FIRE LIGHT ON)

Affected Engine:

- | | |
|--|-------------------------------------|
| 1. Condition lever _____ | CUT OFF |
| 2. Fuel firewall shut-off valve _____ | CLOSED |
| 3. Fuel pump switch _____ | OFF |
| 4. Ignition switch _____ | CHECK NORM |
| 5. Fire extinguisher button _____ | PUSH (if installed) |
| 6. Radio _____ | CALL FOR ASSISTANCE |
| 7. AIRPLANE EVACUATION Procedure _____ | PERFORM (when airplane has stopped) |
| 8. External Fire Extinguisher _____ | USE |

NOTE

If engine fire has spread to the ground, it may be possible to taxi clear of fire zone. If fire continues, shut down both engines and evacuate.

ENGINE FAILURE OR FIRE IN FLIGHT (L OR R FIRE LIGHT ON)

1. Directional control _____ MAINTAIN (Bank 5° max twrds op. eng)

Affected Engine:

2. Power lever _____ IDLE
3. Condition lever _____ CUT OFF
4. Firewall shut-off valve _____ CLOSED
5. Fuel pump switch _____ OFF
6. Ignition switch _____ CHECK NORM
7. Generator _____ OFF
8. Bleed air _____ OFF
9. Fire extinguisher button (if ENG FIRE light illuminates) _ PUSH (if installed)
10. Electrical load _____ MONITOR
11. Fuel crossfeed _____ CONSIDER
12. Land as soon as practical.

NOTE

The engine fire extinguisher is a single shot system with one cylinder for each engine.

CAUTION

When conducting a practice run through these procedures, do not close fuel firewall shut-off valves and do not actuate engine fire extinguishers. Fire extinguisher capability has not been evaluated by Airworthiness Authority.

NOTE

Operation in icing conditions above 14000 ft. is limited to 5 minutes, due to a possible lack of efficiency of the engine inlet de-ice boot system.

3.2.2: Air start

CAUTION

The pilot should determine the reason for engine failure before attempting an air start.
 Do not attempt a relight if the N_G tachometer indicates zero percent.

NORMAL AIR START

1. Fuel firewall shut-off valve (inoperative engine) _____ OPEN
2. Fuel pump switch (inoperative engine) _____ MAIN (FUEL PRESS light - OFF)
3. Engine start switch _____ START
4. Condition lever _____ GROUND IDLE (at 12% NG)
5. Engine oil press _____ CHECK
6. ITT and NG _____ CHECK
7. Engine start switch _____ CHECK OFF
8. Condition lever _____ AS REQUIRED
9. Power lever _____ AS REQUIRED
10. Generator _____ ON
11. Bleed air _____ ON

NOTE

In case of an unsuccessful start, pull the condition lever to CUT OFF and power lever to IDLE. Slow down the airplane to 140 KIAS and after approximately one minute, repeat the NORMAL AIR START Procedure, using manual ignition (IGN) switch, which must be set to NORM after N_G reaches 54%.

AIR START WITHOUT STARTER ASSIST

1. Fuel firewall shut-off valve (inoperative engine) _____ OPEN
2. Fuel pump switch (inoperative engine) _____ MAIN (FUEL PRESS light - OFF)
3. N_G (inoperative engine) _____ 12% MIN.
4. Ignition switch (inoperative engine) _____ IGN
5. Condition lever (inoperative engine) _____ GROUND IDLE
6. ITT, Oil Pressure _____ MONITOR
7. Ignition switch _____ NORM (N_G min 54%)
8. Condition lever _____ AS REQUIRED
9. Power lever _____ AS REQUIRED
10. Generator _____ ON
11. Bleed air _____ ON

3.2.3: Emergency descent

1. Power levers _____ IDLE
2. Condition levers _____ MAX RPM
3. Seat belts and no smoking signs _____ ON
4. Airplane attitude _____ NOSE DOWN (reach V_{MO}/M_{MO})

MAXIMUM GLIDE

1. Airspeed _____ per Max. Glide Speed Chart (see below)
2. Gear _____ UP
3. Flaps _____ UP
4. Condition levers _____ CUT OFF

Maximum Glide Speed Chart

| Weight - Lbs | Speed - KIAS |
|--------------|--------------|
| 11550 | 155 |
| 11000 | 151 |
| 10000 | 144 |
| 9000 | 137 |
| 8000 | 129 |

Glide Ratio _____ 2.3 NM/1000 ft

NOTE

When operating in sustained icing condition, the Glide Ratio may be reduced up to 50% approximately.

3.2.4: Landing Emergencies

LANDING WITHOUT ENGINE

CAUTION

Power With both generators inoperative only essential, battery and hot battery busses are fed, for approximately 30 minutes depending on loads and battery charge.

1. Airplane configured _____ Per MAX GLIDE (if altitude permits)

When landing site assured:

2. Approach Speed _____ INCREASE flaps DN apch spd by 20 KIAS
3. Condition levers _____ CUT OFF
4. Fuel firewall shut-off valves _____ CLOSED
5. Fuel pumps switches _____ OFF

If gear is to be extended:

NOTE

For particular terrain conditions it may be required to land with gear up.

1. Gear _____ DN (PER EMER GEAR EXT Procedure)
2. Emergency gear selector _____ PUSH
3. Hydraulic pump switch _____ HYD
4. Landing distance _____ INCR. flaps DN land. dist. by 125%

NOTE

When operating in sustained icing condition, assume the same procedure except approach speed which, as compared with the flaps MID approach speed, must be increased by 15 KIAS. The landing distance, as compared with the flaps MID landing distance, must be increased approximately by 90%.

SINGLE ENGINE APPROACH AND LANDING

WARNING

Do not exceed maximum fuel imbalance (200 lbs).

1. Inoperative engine _____ COMPLETE ENG. SECURING Procedure
2. Condition lever (operating engine) _____ MAX RPM
3. Flaps _____ MID
4. Airspeed _____ 129 KIAS MIN.
5. Landing gear (when landing assured) _____ DN

When it is certain there is no possibility of go-around:

6. Flaps _____ DN
7. Approach speed _____ AS PER SECTION 5
8. Power lever _____ AS REQUIRED

After touchdown:

Brakes and reverse _____ AS REQUIRED
 Landing distance _____ INCREASE flaps DN land dist By:
 30% if reverse thrust is not applied, or
 25% if reverse thrust is applied

NOTE

When operating in sustained icing condition assume the same procedure except: flap position must be MID, and approach speed, as compared with the flaps MID approach speed, must be increased by 6 KIAS. The flaps MID landing distance must be increased approximately by 30% if reverse thrust is not applied and by 25% if reverse thrust is applied.

SINGLE ENGINE GO-AROUND

1. Power _____ TAKE OFF
2. Airspeed _____ Minimum 120 KIAS
3. Flaps _____ MID
4. Landing gear _____ UP
5. Airspeed _____ INCREASE TO 125 KIAS MINIMUM
6. Flaps _____ UP
7. Taxi/Landing lights (if applicable) _____ OFF
8. Airspeed _____ INCREASE as required

WARNING

When operating in sustained icing conditions, insufficient performance may exist to successfully carry out a single engine go-around.

GEAR UP LANDING

When normal and emergency gear extension procedures have failed:

1. Select a suitable landing area
2. Ground personnel _____ INFORM
3. Passengers _____ BRIEF on use of emergency exit;
CHECK properly fastened with seat belts
4. Fuel _____ BURN OFF EXCESS, if condition permits
5. Hydraulic pump switch _____ HYD
6. Gear selector _____ UP
7. Flaps _____ DN
8. Make a normal approach.

When landing is assured:

9. Cabin Pressurization _____ DUMP
10. Generators _____ OFF
11. Condition levers _____ CUT OFF
12. Fuel pumps _____ OFF
13. Fuel firewall shut-off valves _____ CLOSED
14. Battery switch _____ OFF
15. Evacuate as per AIRPLANE EVACUATION Procedure when the airplane comes to a stop.

NOTE

When operating in sustained icing condition assume the same procedure except: flap position must be MID, and approach speed, as compared with the flaps MID approach speed, must be increased by 6 KIAS.

NOSE GEAR UP OR UNLOCKED LANDING

1. Final approach according with normal procedure
2. Touch down in nose up attitude
3. Maintain nose up to the lowest practicable speed
4. After the nose touch down use maximum brake and reverse
5. Evacuate as per AIRPLANE EVACUATION Procedure when the airplane comes to a stop.

NOTE

When operating in sustained icing condition assume the same procedure except: flap position must be MID, and approach speed, as compared with the flaps MID approach speed (Fig 5-76), must be increased by 6 KIAS.

MAIN GEAR UNLOCKED LANDING

When normal and emergency gear extension procedures have failed:

1. Hydraulic pump switch _____ HYD

If both main landing gear legs are extended:

1. Final approach according with normal procedure
2. Touch down in nose up attitude
3. After touch down apply reverse and brakes cautiously
4. Evacuate as per AIRPLANE EVACUATION Procedure when the airplane comes to a stop.

If one main landing gear leg remains retracted:

1. Perform GEAR UP LANDING Procedure

NOTE

When operating in sustained icing condition assume the same procedure except: flap position must be MID, and approach speed, as compared with the flaps MID approach speed (Fig 5-76), must be increased by 6 KIAS.

ASYMMETRIC FLAP LANDING (FLAP SYNC LIGHT ON)

1. FLAP SYSTEM MALFUNCTION Procedure _____ COMPLETE
2. Condition levers _____ MAX RPM
3. Power levers _____ AS REQUIRED
4. Landing gear _____ DN
5. Approach speed _____ INCREASE the flaps DN apch speed as indicated in the table below
6. Brakes and reverse _____ AS REQUIRED
7. Landing distance _____ if the reverse thrust is not applied
INCREASE the flaps DN landing distance approximately as indicated in the table below



| Outboard Flap Position | Speed Increase | Landing Distance Increase |
|------------------------|----------------|---------------------------|
| DN | 5 KIAS | 10% |
| MID | 15 KIAS | 40% |
| UP | 20 KIAS | 65% |

NOTE

When operating in sustained icing conditions assume the same procedure except approach speed which, as compared with the flaps MID approach speed, must be increased as indicated in the table below:

| Outboard Flap Position | Speed Increase | Landing Distance Increase |
|------------------------|----------------|---------------------------|
| DN | 10 KIAS | 20% |
| MID | 15 KIAS | 40% |

LANDING WITH FLAPS RETRACTED

1. Approach Speed _____ INCREASE flaps DN apch spd by 20 KIAS
2. Condition levers _____ MAX RPM
3. Power levers _____ AS REQUIRED
4. Landing gear _____ DN

After touchdown

1. Reverse _____ AS REQUIRED
2. Landing distance _____ INCREASE flaps DN land dist by approx:
65% if reverse thrust is not applied, or
55% if reverse thrust is applied

NOTE

When operating in sustained icing conditions assume the same procedure except approach speed which, as compared with the flaps MID approach speed, must be increased by 15 KIAS. The landing distance, as compared with the flaps MID landing distance, must be increased approximately by 40% if reverse thrust is not applied or by 30% if reverse thrust is applied.

3.2.5: System Emergencies

ENGINE SYSTEM FAILURE

Low Oil Pressure

Between 60 and 90 PSI (yellow arc):

1. Power _____ REDUCE below 1100 LB-FT torque

Below 60 PSI and L or R OIL PRESS red light on

1. ENGINE SECURING Procedure _____ PERFORM
2. Land as soon as practical, performing the SINGLE ENGINE APPROACH AND LANDING Procedure

High Oil Pressure

Between 135 PSI and 150 PSI

1. Power _____ REDUCE
2. Land as soon as practical.

Above 150 PSI

1. ENGINE SECURING Procedure _____ PERFORM
2. Land as soon as practical, performing the SINGLE ENGINE APPROACH AND LANDING Procedure

High Oil Temperature (More Than 104° C)

1. OIL COOL switch - CHECK L and R position (on the ground only)
2. Airspeed - INCREASE as required
3. Power - REDUCE as required

If the temperature exceeds the limit (110°C):

1. ENGINE SECURING Procedure _____ PERFORM
2. Land as soon as practical, performing the SINGLE ENGINE APPROACH AND LANDING Procedure

PROPELLER SYSTEM FAILURE

Overspeeding Propeller

If prop exceeds 2020 RPM steady state remaining below 2200 RPM

1. Condition lever _____ REDUCE RPM
2. Power lever _____ REDUCE as practical
3. Airspeed _____ REDUCE TO LOWEST PRACTICAL

If prop exceeds 2205 RPM:

1. Power lever _____ IDLE
2. Condition lever _____ CUT OFF
3. ENGINE SECURING Procedure _____ COMPLETE
4. Land as soon as practical, performing the SINGLE ENGINE APPROACH AND LANDING Procedure.

FUEL SYSTEM FAILURE

Fuel Pump Failure (L or R FUEL PUMP light ON)

1. FUEL PRESS light _____ CHECK
2. Fuel pump switch _____ CHECK MAIN

If FUEL PRESS light is not illuminated, the Main fuel pump has failed but the Standby fuel pump is working properly.

3. Fuel pump switch _____ STAND BY

Low Fuel Press (L or R FUEL PRESS light ON)

1. Fuel pump switch _____ CHECK MAIN
2. Fuel pump switch _____ STAND BY
3. Power (affected engine) _____ REDUCE as practical
4. Fuel quantity gauges _____ COMPARE with other side

If rate of change is equal:

5. Continue the flight

If rate of change is higher (on the affected side):

6. ENGINE SECURING Procedure _____ PERFORM
7. Land as soon as practical, performing the SINGLE ENGINE APPROACH AND LANDING Procedure

Fuel Filter Obstructed (L or R FUEL FILTER light ON)

1. FUEL PRESS light _____ CHECK
- If not illuminated:
2. CONTINUE the flight and have a maintenance check
- If illuminated:
3. Power (affected engine) _____ REDUCE as practical
 4. Land as soon as practical

Fuel Firewall Shutoff Valve Failed In Transit (L or R F/WV INTRAN light ON)

On the ground have a maintenance check. Takeoff is not authorized.

If failure occurs during flight, land as soon as practical.

Wing Fuel Balancing Procedure

NOTE

1. The following procedure can be performed only before takeoff or during cruise.
2. At high fuel flow rate, the L/R FUEL PRESS amber light may illuminate.

1. CROSSFEED knob _____ TURN HORIZONTAL
2. Fuel pump (low fuel level side) _____ OFF
3. Fuel quantity _____ MONITOR

ELECTRICAL SYSTEM FAILURE

Single Generator Failure (GEN Light ON)

1. Generator switch _____ OFF
2. Operating Generator _____ DO NOT EXCEED 400 Amps LOAD

NOTE

With only one generator operating all busses are fed.

Electrical Overload (WARN Legend Flashing On Multifunction Display)

1. Multifunction display _____ MONITOR
2. Electrical load _____ REDUCE

Dual Generator Failure (L GEN, R GEN and BUS DISC lights ON)

CAUTION

With both generators inoperative only essential, battery and hot battery busses are fed, for approximately 10 minutes depending on loads and battery charge. On this simulation, battery life is determined by Flight simulator. It is generally too short. FSUIPC can solve this.

1. Generators switches _____ OFF
2. Bus Connecting Switch _____ EMER if necessary

NOTE

With bus connecting switch in EMER position, L/R DUAL FEED BUSSES are powered: limit this operation to prevent further reduction of battery life time.

3. Land as soon as practical (normal gear extension and flap operation are not possible), extending the gear as per EMERGENCY GEAR EXTENSION Procedure and performing the LANDING WITH FLAPS RETRACTED Procedure.

Battery overtemperature condition (BAT TEMP light ON) (BAT OVHT light ON)

NOTE

In This simulation, BAT TEMP is influenced by cabin temperature. If BAT TEMP is unusually high or low, check the status of the environmental control system.

On the Ground

4. Multifunction display _____ MONITOR BAT TEMP With BAT TEMP light illuminated (at or above 120°F)
5. DO NOT TAKE OFF IF TEMPERATURE TREND IS INCREASING With BAT OVHT light illuminated (at or above 150°F)
6. Battery switch _____ OFF
7. DO NOT TAKE OFF

During Flight

If BAT TEMP light is illuminated (120°F)

1. Battery temperature _____ MONITOR

If BAT OVHT light is illuminated (150°F):

1. Battery switch _____ OFF
2. Land as soon as possible at nearest suitable airport

CAUTION

If Battery Temperature reached 150°F, either during start or in flight, battery must be removed for bench test and inspection prior to the next flight.

Primary Inverter Failure (PRI INV light ON)

1. Avionics _____ CHECK for disabled equipment

NOTE

In the event of primary inverter failure the primary inverter bus automatically connects to the secondary inverter while the secondary inverter bus disengages and related loads are lost.

Secondary Inverter Failure (SEC INV Light ON)

1. Secondary inverter switch _____ OFF then SEC

If power is not restored:

2. Avionics _____ CHECK for disabled equipment

HYDRAULIC SYSTEM FAILURE (HYD PRESS LIGHT ON)

CAUTION

With the hydraulic pressure at 3000 PSI it is possible to operate the system but hydraulic pump motor must operate for not more than 1 minute. Do not operate the parking brake with the hydraulic pressure above 1200 PSI. With the hydraulic pressure above normal value the steering will be more sensitive. With the hydraulic pump off the steering is inoperative and the brakes are less effective.

If landing gear is down:

1. Hyd pump switch _____ CHECK HYD
2. HYDR PRESS WRN _____ CHECK
3. Hyd pressure _____ CHECK

If out of range (700 ÷ 1300 PSI) then:

4. Hyd pump switch _____ OFF

If landing gear is up:

1. Hyd pump switch _____ OFF

Immediately before landing gear extension:

2. Hyd pump switch _____ HYD

Emergency Gear Extension

1. Gear selector _____ DN
2. Hyd pump switch _____ OFF
3. Hand pump _____ OPERATE (until the 3 green lights)

FLAP SYSTEM MALFUNCTIONS

Flap Syncro Failure (FLAP SYNC Light ON)

NOTE

During flap deployment or retraction, any significant asymmetric condition results in abnormal control forces which could be detected by the pilot earlier than the FLAP SYNC light becomes illuminated.

1. Maintain control using primary and secondary flight control systems
2. Flap selector lever and flap position indicator _____ CHECK POSITION

If any flap is not in the correct position (asymmetry):

3. Analyse the malfunction on the flap position indicator and, if necessary, reconfigure the remaining flap systems to minimize the asymmetry.
4. Land performing ASYMMETRIC FLAP LANDING Procedure

If all flaps are in the correct position:

5. Do not move the flap selector lever and land assuming ASYMMETRIC FLAP LANDING Procedure from step 2.

PRESSURIZATION AND ENVIRONMENTAL SYSTEM MALFUNCTION

Rapid Or Explosive Decompression (CAB PRESS Light ON)

1. Crew and passenger oxygen _____ MANUAL MASK RELEASE/DON MASKS
2. Emergency bleed air switch _____ EMER EMERGENCY DESCENT
3. Procedure _____ PERFORM down to 12000 ft.
4. Emergency bleed air switch _____ OFF

Cabin Altitude Above 9,500 Feet (CAB PRESS Light ON)

1. Crew and passenger oxygen _____ MANUAL MASK RELEASE/DON MASK
2. Bleed air switches _____ VERIFY L and R position
3. Cab Sel/Auto sched switch _____ MAN
4. Manual controller switch _____ DN
5. Rate control knob _____ AS DESIRED

If cabin altitude continues to increase:

6. Emergency bleed air switch _____ EMER
7. EMERGENCY DESCENT Procedure _____ PERFORM IF REQUIRED dn to 12000 ft.
8. Emergency bleed air switch _____ OFF

Cabin Differential Pressure Above 9.4 PSID (CAB PRESS Light ON)

1. Bleed air switches _____ OFF
2. Crew oxygen _____ AUTO NORMAL/DON MASK

When differential pressure reaches 8 psid

3. Bleed air switches _____ L and R position
4. CABIN PRESS AUTO MODE FAILURE _____ PERFORM

If the cabin pressure differential cannot be controlled:

5. CABIN DEPRESSURIZATION (DUMP) Procedure _____ PERFORM if necessary
6. EMERGENCY DESCENT Procedure _____ PERFORM



Cabin Press Auto Mode Failure

1. Cabin press switch _____ MAN
2. Manual controller _____ AS REQUIRED
3. Rate control knob _____ AS REQUIRED
4. Cabin altitude / Δp _____ CHECK
5. Cabin rate _____ CHECK

Door Seal Failure (DOOR SEAL Light ON)

1. Flying altitude _____ DESCEND or limit alt to 30000 ft max
2. Cabin altitude/ Δp _____ CHECK
3. Cabin rate _____ CHECK

If cabin pressure variation is rapid:

4. EMERGENCY DESCENT _____ CONSIDER
5. Crew and passenger oxygen _____ AS REQUIRED

Cabin Depressurization (DUMP) Procedure

1. Crew and passenger oxygen _____ MANUAL MASK RELEASE
2. Masks _____ DON if necessary
3. Dump switch _____ DUMP

Bleed Air Overtemperature (L/R BLEED TEMP Light ON)

1. Affected engine _____ REDUCE N_G

If light persists illuminated

2. Affected side bleed air switch _____ OFF

Environmental Auto Control Failure (Or DUCT TEMP Light ON)

1. Auto/Man switch(es) (as applicable) _____ MAN
2. Man heat/Cool switch(es) (as applicable) _____ AS REQUIRED

If the DUCT TEMP light is ON and persists for further 15 seconds then:

3. Bleed air switches _____ OFF
4. Emergency bleed air switch _____ EMER
5. Flying altitude _____ REDUCE down to 9500 ft
6. Emergency bleed air switch _____ OFF

ICE PROTECTION SYSTEMS FAILURE

Ice Detector Failure (ICE Light OFF)

1. ENG ICE VANE/OIL COOLER INTK switches _____ CHECK to L and R position
2. Determine ice forming condition by visual inspection
- Heavy ice conditions:
 3. BOOTS DE ICE switch _____ TIMER
- Light ice conditions:
 4. BOOTS DE ICE switch _____ CYCLE TIMER/OFF (every 6 min approx)

Engine Air intake Boots (LE Or RE BOOTS DE ICE Light OFF)

1. ENG ICE VANE/OIL COOLER INTK switches _____ CHECK to L and R position
- If the system is operating in AUTO mode:
2. Determine ice accretion by visual inspection
 - Heavy ice conditions:
 3. BOOTS DE ICE switch _____ TIMER
 - Light ice conditions:
 4. BOOTS DE ICE switch _____ CYCLE TIMER/OFF (every 6 min approx)
- If light persists off (or on):
5. Leave ice condition as soon as possible

Main Wing Overheat (L Or R MN WG OVHT Light ON)

1. Affected side main wing anti-ice switch _____ OFF
 2. Leave ice condition as soon as practical
- If light extinguishes:
3. Affected side main wing anti-ice switch _____ MANUAL, check MN WG OVHT light.

Forward Wing Overheat (L Or R FD WG OVHT Light ON)

1. Affected side FWD WING switch _____ SET to OFF position
2. Leave ice condition as soon as practical

Windshield Zone Overheat (L\R WSHLD ZONE Lights ON)

1. WSHLD HEAT PRI switch _____ SET to LO position
- If the affected zone light does not extinguish:
2. Affected zone switch _____ CYCLE LO/OFF when necessary

Cabin Door Annunciator Illuminated (CAB DOOR Light ON)

WARNING

Do not attempt to check the security of the cabin door in flight. Remain as far from the door as possible with seat belts securely fastened until the airplane has landed.

If the CAB DOOR red light is illuminated or if an unlatched cabin door is suspected:

1. All occupants _____ SEATED WITH SEAT BELTS FASTENED
2. Seat belts and no smoking switch _____ NO SMOKING FAST BELT
3. Cabin Differential Pressure _____ LOWEST PRACTICAL: use MAN or DUMP
4. Oxygen _____ AS REQUIRED

CAUTION

If the light remains illuminated, land as soon as practical.

Baggage Door Annunciator Illuminated (BAG DOOR Light ON)

1. Perform the ENGINE SECURING Procedure on the LEFT ENGINE
2. Land as soon as practical performing the SINGLE ENGINE APPROACH AND LANDING Procedure

Airplane Evacuation

1. Perform ENGINE SHUT-DOWN Procedure
2. Battery switch _____ OFF
3. Passengers Door _____ OPEN

SECTION 4: NORMAL PROCEDURES

4.0: GENERAL

This section describes the recommended procedures for the conduct of normal operations for P 180 Avanti airplanes. These procedures are provided as a source of reference and review and to supply information on procedures. Pilots should familiarize themselves with the procedures given in this section in order to become proficient in the normal operations of the airplane. The first portion of this section is a short form checklist which supplies an action sequence for normal procedures with little emphasis on the operation of the systems. The checklist should be used for expeditious reference or response. In addition, a discussion of normal systems operation, stall characteristics, VMC demonstration, intentional single engine operations, is presented.

4.1: AIRSPEEDS FOR NORMAL OPERATION

The following airspeeds are those which are significant to the operation of the airplane. These figures are for standard airplanes flown at maximum takeoff weight (or otherwise specified) under normal condition at sea level. For additional airspeed information see Section 2.

| SPEED | KIAS |
|---|------|
| a. Two engines Recommended Climb Speed up to 30000 ft. _____ Reduce speed 1 KIAS for each 1000 ft. above 30000 ft. | 160 |
| b. Two engines Best Angle of Climb Speed _____ | 133 |
| c. Two engines Best Rate of Climb Speed _____ | 154 |
| d. Two engines Approach Speed at Maximum Landing Weight | |
| Flap MID _____ | 129 |
| Flap DN _____ | 121 |
| e. Balked Landing Climb Speed | |
| Flap MID _____ | 130 |
| Flap DN _____ | 115 |
| f. Maximum Demonstrated Crosswind Velocity _____ | 25 |
| g. Maximum Operating Mach Number _____ | .67 |
| h. Maximum Operating Speed (See VMO/MMO chart in Section 2) _____ | 260 |
| i. Design Maneuvering Speed | |
| At 11550 lb _____ | 199 |
| At 7700 lb _____ | 177 |
| j. Maximum Flap Operating Speed | |
| UP to MID _____ | 170 |
| MID to DN _____ | 150 |
| k. Maximum Flap Extended Speed | |
| Flap MID _____ | 180 |
| Flap DN _____ | 175 |
| l. Maximum Landing Gear Operating Speed _____ | 180 |
| m. Maximum Landing Gear Extended Speed _____ | 185 |
| n. Maximum Landing Light Operating/Extended Speed _____ | 160 |
| o. Rough Air Penetration Speed at or below 25000 ft. Reduce speed 5 KIAS for each 5000 ft above 25000 ft. _____ | 195 |

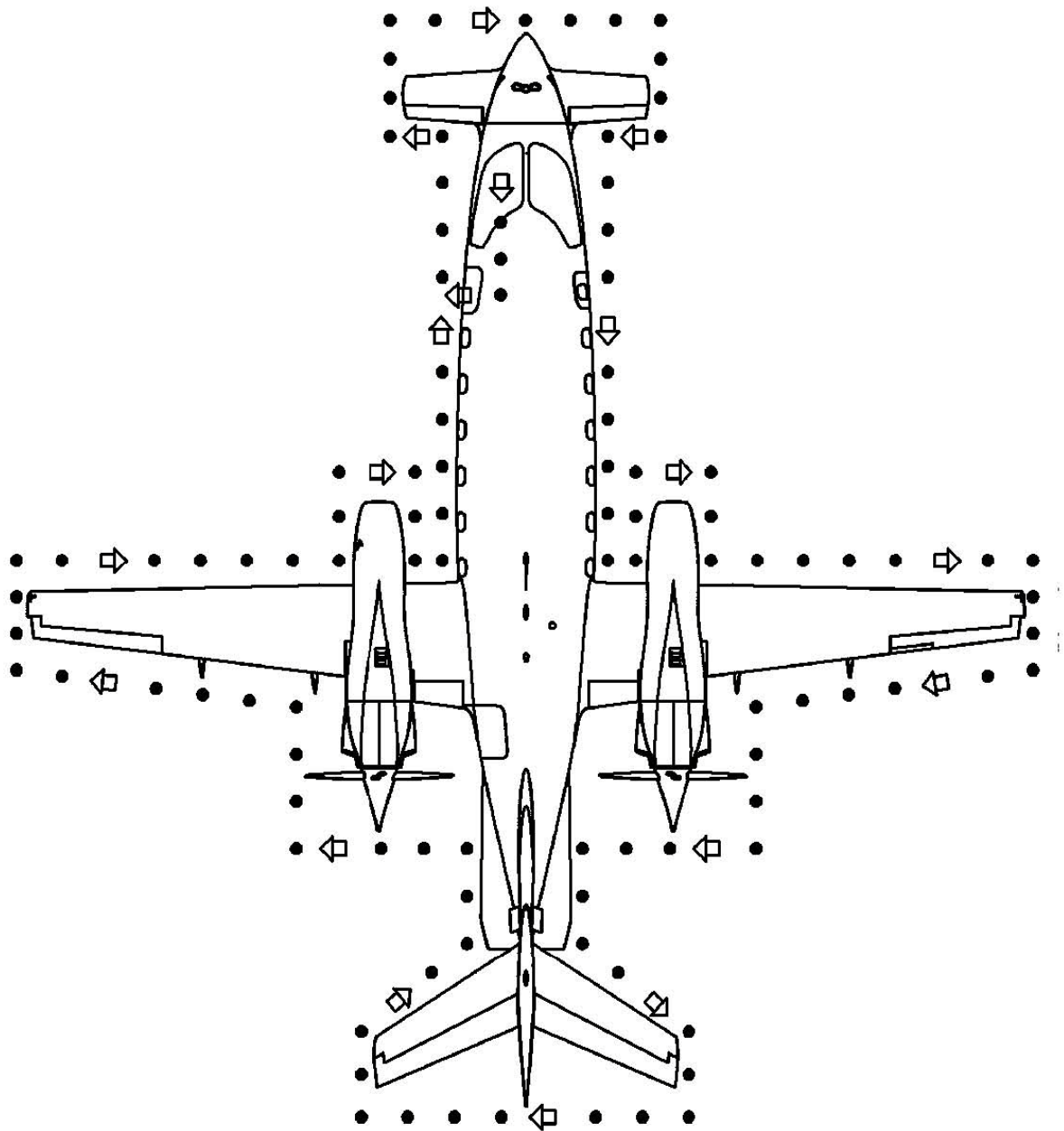


Figure 4-1: Walkaround

4.2: NORMAL PROCEDURES CHECKLIST

4.2.1: Preflight Check

1. Parking brake _____ SET LOCKED
2. Flight controls _____ CHECK FREE
3. Electrical switches _____ OFF
4. Gear handle _____ DN
5. Battery switch _____ BAT
6. Bus voltage _____ CHECK

CAUTION

If bus voltage is less than 21.5 VDC, the battery must be serviced or replaced before flight. If bus voltage is between 21.5 and 23.0 VDC, allow 15 minutes of ground power unit battery recharging.

7. CAB DOOR warning light _____ CHECK ON (with door open)
8. Battery temperature _____ TEST
9. Annunciator panel _____ TEST
10. Engine fire detector _____ TEST
11. Fuel quantity system _____ TEST AND CHECK QUANTITY
12. Gear lights _____ CHECK THREE GREEN AND TEST
13. Engine instrument panel _____ TEST
14. Fuel crossfeed valve _____ CHECK OFF
15. Trim surfaces _____ NEUTRAL
16. Battery switch _____ OFF
17. Oxygen pressure _____ CHECK
18. Oxygen masks _____ CHECK

Further Checks

Before first flight of the day:

1. Condition levers _____ CUT OFF
2. Battery switch _____ BAT
3. L/R fuel firewall shutoff valves _____ TEST, THEN CHECK OPEN
4. Crossfeed _____ TEST, THEN CHECK OFF

WARNING

Takeoff is not authorized if during the tests of fuel firewall valves and crossfeed valve the corresponding INTRAN lights remain illuminated.

1. L/R fuel pump switches _____ MAIN
2. L/R fuel filters _____ DRAIN
3. L/R fuel pump switches _____ OFF
4. External lights _____ CHECK (Prior to night flight)
5. Battery switch _____ OFF

4.2.2: Before Engine Starting

1. Entrance door _____ SECURE handles and check indicators

WARNING

Assurance that the door is locked is by correct alignment of all visual indicator marks.

2. Emergency exit handle _____ PROPERLY POSITIONED;
 Handle lock pin _____ REMOVED
3. Crew/passenger briefing _____ COMPLETE
4. Belt _____ SECURE
5. Seats _____ ADJUST
6. Rudder pedals _____ ADJUST
7. Switches _____ CHECK OFF

CAUTION

Failure to select AVIONICS master switch to the OFF or COM1 ONLY position during the engine start up or shutdown may result in equipment failure.

8. Engine control lever friction _____ ADJUST
9. Emergency gear selector _____ PROPERLY POSITIONED
10. Battery switch _____ BAT
11. Voltage _____ CHECK

NOTE

If bus voltage is between 23.0 - 23.5 VDC, it is recommended to connect a ground power unit before attempting engine start.

12. Battery temperature _____ CHECK

CAUTION

No battery engine starting must be attempted if battery temperature is over 120°F (BAT TEMP caution light ON).

13. Fuel quantity _____ CHECK
14. Parking brake _____ CHECK LOCKED
15. Seat belts and no smoking signs _____ ON
16. Avionics master switch _____ COM1 ONLY if start clearance required

NOTE

If engine start up clearance requires prolonged period of time, battery charge can be saved switching the MASTER switch from NORMAL to BUS DISC. Select NORMAL just before engine start.

4.2.3: Engine Starting

WARNING

During ground operation with engine at low N_G , depending on ambient temperature and/or altitude, check ITT and advance condition lever to maintain ITT under 750°C.

Normal Start

CAUTION

Whenever the gas generator fails to light up within 10 sec. after moving the condition lever, shut fuel off by retarding the condition lever and setting the starter switch to OFF. Allow a 30 sec. fuel draining period followed by a 15 sec. dry motoring run before attempting another start. If, for any reason, a starting attempt is discontinued, allow the engine to come to a complete stop and then accomplish a dry motoring run.

1. Anti Coln light _____ GND
2. Power lever _____ IDLE
3. Condition lever _____ CUT OFF
4. Firewall shut off valve _____ CHECK OPEN
5. Fuel pump _____ TEST AND CHECK MAIN
6. Fuel pressure light _____ CHECK OFF
7. Bleed air switches _____ CHECK OFF
8. Ignition switch _____ CHECK NORM
9. Propeller _____ CLEAR
10. Engine start switch _____ START
11. Condition lever _____ (at 12% N_G) GROUND IDLE
12. ITT _____ MONITOR (1000°C Max. 5 sec.)
13. Oil pressure _____ CHECK INCREASING
14. N_G RPM _____ CHECK INCREASING
15. Engine start switch _____ CHECK OFF

NOTE

At first starting of the day a starting cycle time exceeding 30 seconds may be observed on some engines. In this event, an alternate ground starting procedure is suggested, rearranging the above steps from 10 to 15 as follows:

- Engine start switch _____ START
- Condition lever _____ (at 12% N_G) FLIGHT IDLE
- ITT _____ MONITOR (1000°C Max. 5 sec.)
- Oil pressure _____ CHECK INCREASING
- N_G RPM _____ CHECK INCREASING
- Engine start switch _____ CHECK OFF
- Condition lever _____ GROUND IDLE



With engine at ground idle setting check the following conditions:

- a. ITT _____ 750°C Max.
 - b. Oil pressure _____ 60 psi Min.
 - c. Oil temperature _____ 110°C Max.
 - d. N_G RPM _____ 60% MIN
 - e. N_P RPM _____ 900 RPM MIN.
16. Condition lever _____ ADVANCE TO FLIGHT IDLE
 17. GPU (unless needed for second engine start) _____ DISCONNECT
 18. Generator (if GPU is not used or disconnected) _____ ON
 19. Ammeter _____ CHECK
 20. Hydraulic pump switch _____ HYD (Pressure - CHECK; light OFF)

Engine Dry Run (Motoring)

1. Power lever _____ IDLE
2. Condition lever _____ CUT OFF
3. Fuel pump _____ OFF
4. Engine start switch _____ START
5. Engine start switch (after 15 sec.) _____ OFF

Cross-Start Procedure (One Engine Operating)

CAUTION

Whenever the gas generator fails to light up within 10 sec. after moving the condition lever, shut fuel off by retarding the condition lever and setting the starter switch to OFF. Allow a 30 sec. fuel draining period followed by a 15 sec. dry motoring run before attempting another start. If, for any reason, a starting attempt is discontinued, allow the engine to come to a complete stop and then accomplish a dry motoring run.

1. Condition lever (operative engine) _____ FLIGHT IDLE
2. Generator (operative engine) _____ CHECK ON
3. Ammeter _____ CHECK below 160 Amp
4. Firewall shutoff valves _____ CHECK OPEN
5. Power lever (inoperative engine) _____ IDLE
6. Condition lever (inoperative engine) _____ CUT OFF
7. Fuel pumps _____ MAIN
8. Fuel pressure light _____ CHECK OFF
9. Bleed air _____ OFF
10. Ignition switch _____ CHECK NORM
11. Propeller _____ CLEAR
12. Engine start switch _____ START
13. Condition lever (inoperative engine) _____ (at 12% N_G) GROUND IDLE
14. ITT _____ MONITOR (1000°C Max. 5 sec)
15. Oil pressure _____ CHECK INCREASING
16. N_G RPM _____ CHECK INCREASING
17. Engine start switch _____ CHECK OFF



NOTE

At first starting of the day a starting cycle time exceeding 30 seconds may be observed on some engines. In this event, an alternate ground starting procedure is suggested, rearranging the above steps from 12 to 17 as follows:

- Engine start switch _____ START
- Condition lever _____ (at 12% N_G) FLIGHT IDLE
- ITT _____ MONITOR (1000°C Max. 5 sec.)
- Oil pressure _____ CHECK INCREASING
- N_G RPM _____ CHECK INCREASING
- Engine start switch _____ CHECK OFF
- Condition lever _____ GROUND IDLE

With engine at ground idle setting check the following conditions:

- a. ITT _____ 750°C Max.
- b. Oil pressure _____ 60 psi Min.
- c. Oil temperature _____ 110°C Max.
- d. N_G RPM _____ 60% MIN
- e. N_P RPM _____ 900 RPM MIN.
- 18. Condition lever _____ BOTH GROUND IDLE
- 19. Generator _____ ON
- 20. Ammeter _____ CHECK

CAUTION

Avoid GROUND IDLE setting with electrical load above 200 A.

4.2.4: Before Taxi

1. Inverters _____ SELECT PRI and SEC
2. Avionics switch _____ ON
3. Environmental temperature _____ AUTO AND TEMP SELECT AS NECESSARY
4. Cockpit blower _____ AS REQUIRED
5. Bleed air switches _____ SET to L and R positions
6. Pressurization Auto/Man switch _____ AUTO

CAUTION

No flight should be initiated in the automatic mode if the FAULT light fails to extinguish.

7. Auto Sched/Cab sel switch _____ AUTO SCHED
8. Landing altitude _____ SET
9. Barometric correction _____ SET
10. Rate selection _____ SET
11. Air Heat Switch _____ HEAT
12. Cooling Switch _____ COOL
13. Engine oil coolers _____ AS REQUIRED
14. Gyros _____ CHECK
15. Radios _____ SET and CHECK
16. Air Data Computer _____ TEST
17. Overspeed warning _____ TEST
18. Hydraulic system _____ TEST
19. Steering system _____ TEST
20. Steering _____ TAXI
21. Pitot/stall/static heat _____ CHECK
22. Stall warning _____ TEST
23. Flap system _____ TEST

WARNING

No takeoff authorized with non symmetrical flap configuration or annunciated failure.

24. Flaps _____ MID
25. Trim systems _____ TEST and set for take-off

CAUTION

Failure to set the correct trim for take-off may result in high rotation forces, delayed rotation and a substantial increase in take-off distance.

26. Ice detector _____ TEST
27. WSHLD heat _____ CHECK
28. Engine ice vane/oil cooler intake _____ CHECK
29. Engine inlet de-ice boots _____ CHECK

WARNING

Do not operate engine inlet de-ice boots below -40°C . No takeoff authorized with frost, snow or ice adhering to propellers, windshields, powerplant installation and pitot/static ports, or with snow or ice adhering to the wings, vertical and horizontal stabilizer or control surfaces.

NOTE

Perform Main and Fwd wing anti ice tests if ice conditions are known or expected.

- | | |
|--|-----------|
| 30. Anti ice Main wing _____ | TEST |
| 31. Anti ice Fwd wing _____ | TEST |
| 32. EFIS _____ | TEST |
| 33. Autopilot _____ | TEST |
| 34. Radio altimeter _____ | TEST |
| 35. Annunciator panel _____ | TEST |
| 36. BAG DOOR AND CAB DOOR warning lights _____ | CHECK OFF |
| 37. Parking brake _____ | RELEASE |

4.2.5: Taxiing

- | | |
|-----------------------------|--|
| 1. Brakes _____ | CHECK (avoid excessive use) |
| 2. Airplane _____ | CHECK no tendency to yaw left or right |
| 3. Steering system _____ | TAXI |
| 4. Prop reverse _____ | CHECK |
| 5. Prop feathering _____ | CHECK |
| 6. Flight instruments _____ | CHECK |

4.2.6: Engine Run-Up

- | | |
|------------------------------|----------------------|
| 1. Parking brake _____ | SET LOCKED |
| 2. Condition levers _____ | MAX RPM |
| 3. Power levers _____ | Advance to 2000 RPM |
| 4. Propeller Overspeed _____ | TEST |
| 5. Propeller governing _____ | CHECK to minimum RPM |
| 6. Autofeather System _____ | TEST |

WARNING

No takeoff authorized with autofeather inoperative.

- | | |
|-----------------------------|---------|
| 7. Autofeather switch _____ | ARM |
| 8. Parking brake _____ | RELEASE |

**4.2.7: Before Takeoff**

1. Anti coln lights _____ AIR
2. Windshield heat _____ AS REQUIRED
3. Pitot/Stall/Static heat _____ ON
4. Seat belts and no smoking signs _____ ON
5. Flight instruments _____ SET and CHECK
6. Engine gauges _____ CHECK
7. Warning and caution lights _____ CHECK OFF
8. Transponder _____ SET
9. Bleed air switches _____ CHECK to L and R positions

NOTE

When operating from high altitude airports with high OAT, it may be necessary to switch off both bleed air to reduce engine ITT.

10. Fuel pumps _____ CHECK MAIN
11. Condition levers _____ CHECK MAX RPM
12. Flaps _____ CHECK MID
13. Longitudinal trim _____ CHECK TAKEOFF SET
14. Aileron trim _____ CHECK NEUTRAL
15. Rudder trim _____ CHECK NEUTRAL
16. Flight controls _____ CHECK FREE
17. Steering _____ TAKEOFF
18. Oil cool _____ OFF
19. Taxi/landing lights _____ AS REQUIRED
20. Navigation lights _____ AS REQUIRED
21. Ice protection systems _____ AS REQUIRED

4.2.8: Takeoff

1. Power levers _____ ADVANCE to MAX TAKE-OFF power

WARNING

Before applying full power, be sure that the condition levers are set to MAX RPM: takeoff distance given in Sec. 5 may not be assured.

2. Autofeather _____ CHECK ARMED (green lights ON)

WARNING

If ambient temperature is below -25°C , it is necessary to operate the main wing anti-ice and the engine ice vane systems before applying full power to ensure that the autofeather is armed. When takeoff is completed and autofeather disengaged, the ice protection can be switched OFF.

3. Engine gauges _____ WITHIN LIMITS
4. Steering (not over 60 KIAS) _____ OFF
5. Rotation _____ REFER to Sec. 5 of this Manual
6. Airspeed _____ Accelerate to 120 KIAS until above 50 ft.
7. Taxi/landing lights (below 160 KIAS) _____ OFF
8. Gear (below 180 KIAS) _____ UP
9. Autofeather (above 150 KIAS) _____ OFF
10. Flaps (below 170 KIAS) _____ UP

4.2.9: Climb

1. Climb power _____ SET
2. Airspeed _____ REFER to Section 5 of this Manual
3. Seat belts and no smoking signs _____ AS REQUIRED
4. Pressurization _____ CHECK
5. Windshield heat _____ LO or HI as necessary

4.2.10: Cruise

1. Cruise power _____ SET
2. Airspeed _____ REFER to Section 5 of this Manual
3. Engine instruments _____ CHECK
4. Pressurization _____ CHECK
5. Environmental control system _____ CHECK

4.2.11: Descent

1. Windshield heat _____ AS REQUIRED
2. Pressurization _____ CHECK
3. Environmental control system _____ CHECK

4.2.12: Before Landing

1. Seat belts and no smoking signs _____ ON
2. Condition levers _____ MAX RPM
3. Gear (below 180 KIAS) _____ DN; CHECK 3 GREEN
4. Flaps (below 170 KIAS) _____ MID
5. Autofeather (below 150 KIAS) _____ ARM, CHECK LIGHT
6. Landing lights (below 160 KIAS) _____ AS REQUIRED
7. Flaps on final (below 150 KIAS) _____ DN

CAUTION

When operating in icing conditions, the landing procedure must be performed with flaps MID and the approach speed, as compared with the flaps MID approach speed, must be increased by 6 KIAS.

8. Autopilot/Steering _____ OFF
9. Cabin pressure barometric condition _____ CHECK

4.2.13: Landing

Prior to reaching 50 ft. above landing surface:

1. Landing gear _____ CHECK DN (3 green lights)
2. Flaps _____ CHECK DN

CAUTION

Steering engagement during landing is prohibited.

3. Approach speed _____ REFER to Section 5 of this Manual
4. Power _____ AS REQUIRED
5. Condition levers _____ CHECK MAX RPM

After touchdown:

1. Brakes _____ AS REQUIRED
2. Reverse _____ AS REQUIRED

NOTE

When landing at aft C.G. initiate flaps retraction before actuating reverse power.

3. Reverse _____ AVOID USE below 40 KIAS

At landing completed:

4. Condition levers _____ GROUND IDLE
5. Steering _____ ENGAGE TAKE OFF (if necessary)

4.2.14: Balked Landing

1. Power levers _____ MAX POWER
2. Engine gauges _____ WITHIN LIMITS
3. Airspeed _____ 115 KIAS
4. Flaps (below 150 KIAS) _____ MID

CAUTION

When operating in icing conditions, the balked landing procedure must be performed with flaps MID and the airspeed must be 130 KIAS.

5. Gear (after climb established) _____ UP
6. Flaps (below 170 KIAS) _____ UP
7. Airspeed _____ 160 KIAS

4.2.15: After Landing

8. Power levers _____ IDLE
9. Steering _____ TAXI (if necessary)
10. Flaps _____ UP
11. Anticollision lights _____ GROUND
12. Taxi/landing lights _____ AS REQUIRED
13. Ice protection equipment heat _____ OFF (if applicable)
14. Autofeather _____ OFF

NOTE

In the event of landing with severe brake use an adequate brakes cooling time is required before a successive takeoff.

4.2.16: Shutdown

1. Parking brake _____ SET

NOTE

If brakes are very hot, do not set parking brake.

2. Avionics switch _____ OFF

CAUTION

Failure to select AVIONICS master switch to the OFF position during the engine shutdown may result in equipment failure.

3. Inverters _____ OFF
4. Bleed air _____ OFF
5. Power lever _____ CHECK IDLE
6. Condition lever _____ CHECK GROUND IDLE

NOTE

Allow the engine to stabilize for a minimum of one minute at minimum obtainable ITT.

7. Hydraulic pump _____ OFF

WARNING

If there is any evidence of fire within the engine after shutdown, proceed immediately as described under "ENGINE DRY RUN" Procedure.

8. Condition lever _____ CUT OFF
9. Fuel pump switches _____ OFF
10. All electrical switches _____ OFF
11. Battery switch _____ OFF

NOTE

During the shutdown ensure that the compressor decelerates freely.

4.2.17: After Shutdown

1. Engine oil level _____ CHECK (after the last flight of the day)
3. Propellers blades _____ CLEAN and CHECK
4. Control locks _____ INSTALL
5. Emergency exit handle lock pin _____ INSTALL
6. Wheels chocks _____ PLACE
7. Covers _____ INSTALL
8. Propeller restrainers _____ ATTACH
9. Tie-down ropes _____ AS REQUIRED

**4.2.18: Operation In Icing Conditions**

1. ENG ICE VANE/OIL COOLER INTK switches _____ SET to L and R positions
2. BOOTS DE ICE switch _____ AUTO

NOTE

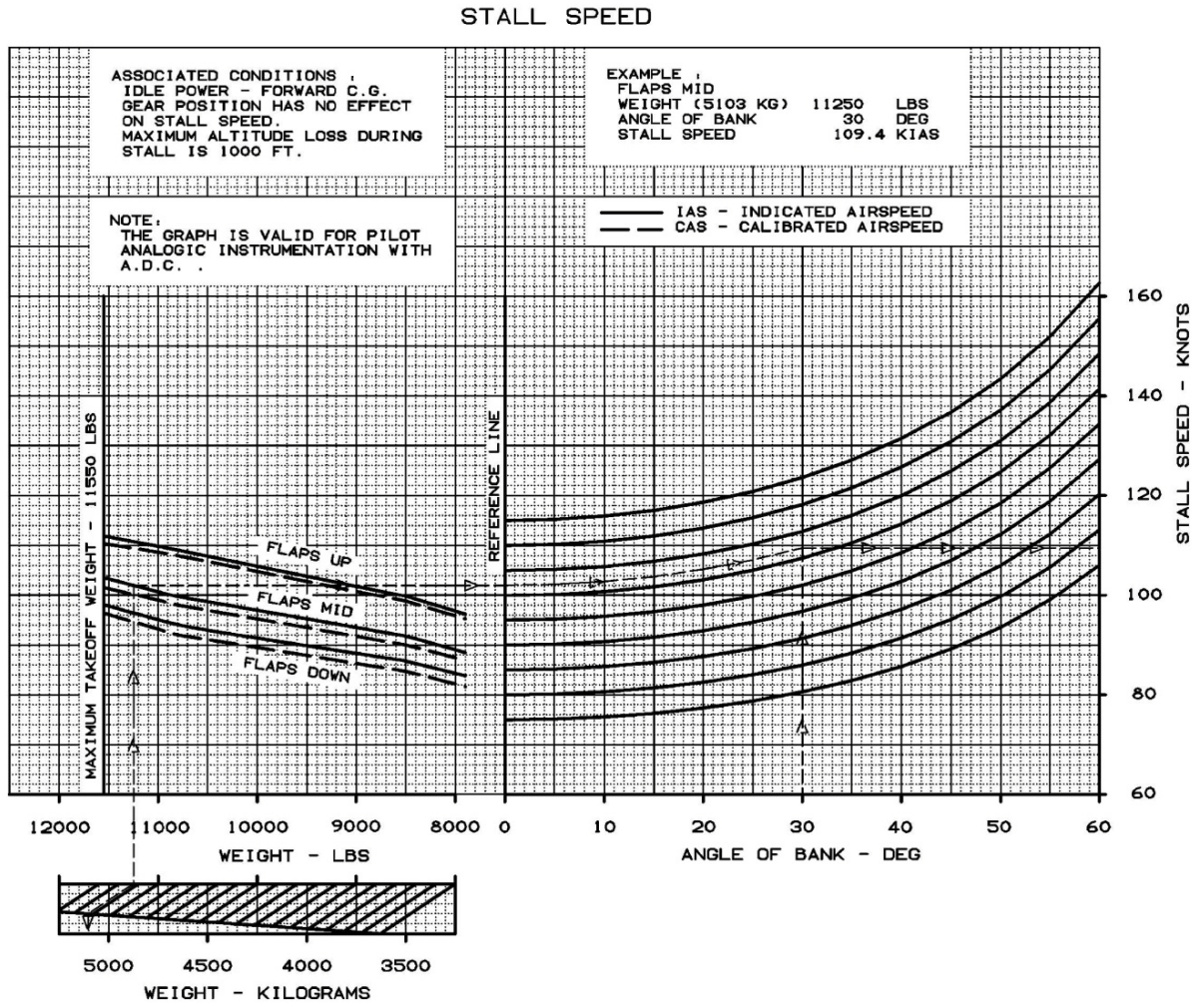
The surface ice protection systems must be activated approximately 30 seconds after the actuation of engine ice protection systems to avoid a quick increase of engine ITT.

3. L and R MAIN WING switches _____ AUTO
4. FWD WING switches _____ SET to L and R position
5. WSHLD HEAT PRI and SEC switches _____ CHECK LO
6. N_P RPM _____ MAINTAIN 2000 RPM.
7. Ice protection systems advisory lights _____ CHECK occasionally



SECTION 5: PERFORMANCE

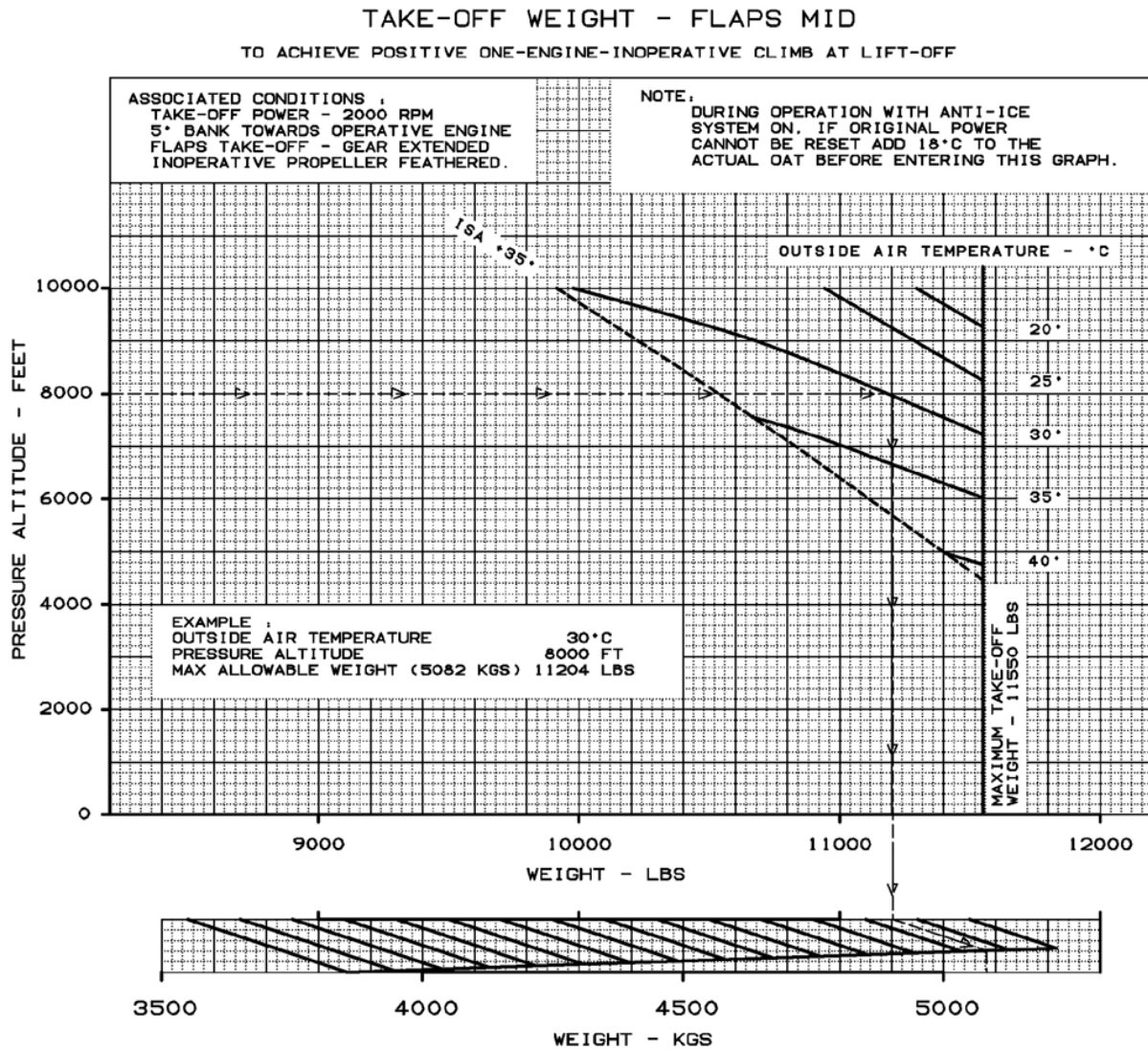
5.0: STALL SPEED

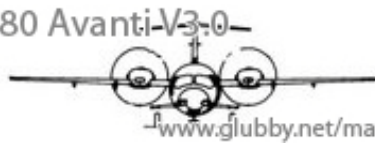




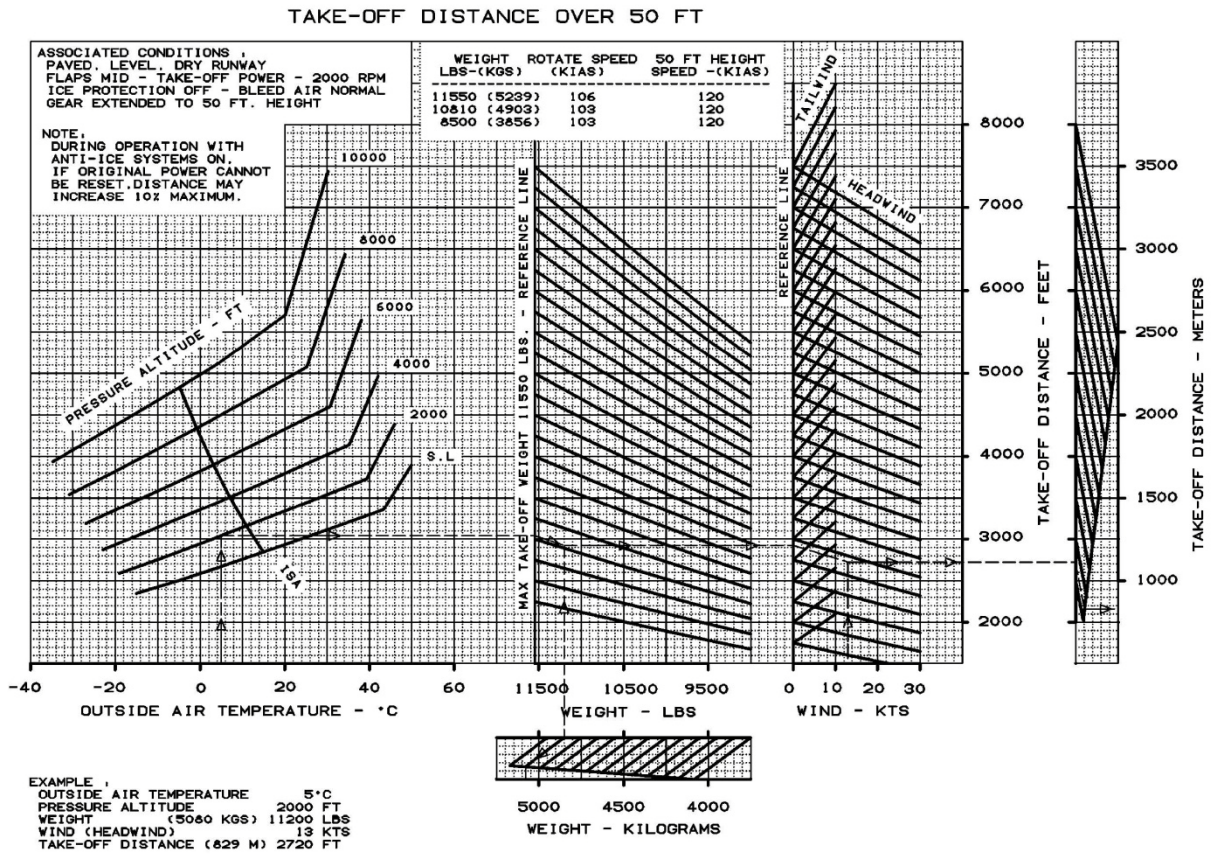
5.1: TAKEOFF

5.1.1: Flaps Mid





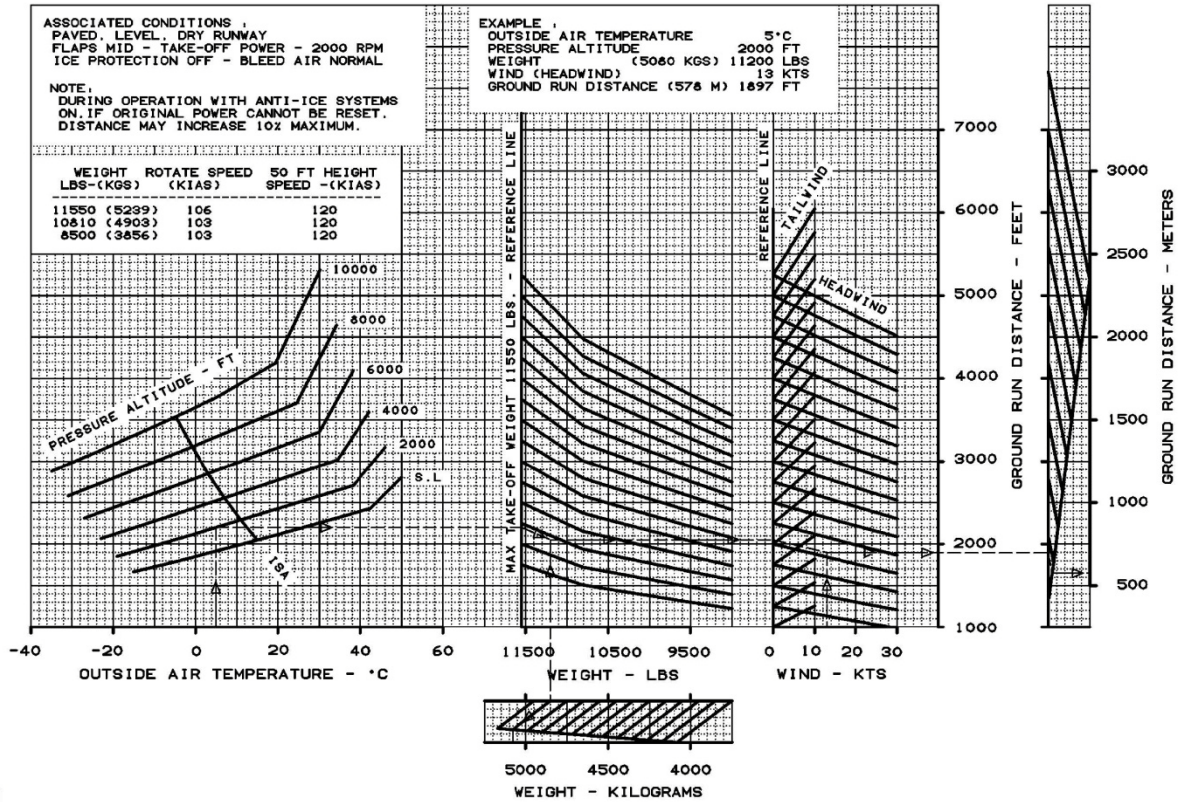
5.1.2: Distance Over 50ft





5.1.3: Ground Run

TAKE-OFF GROUND RUN

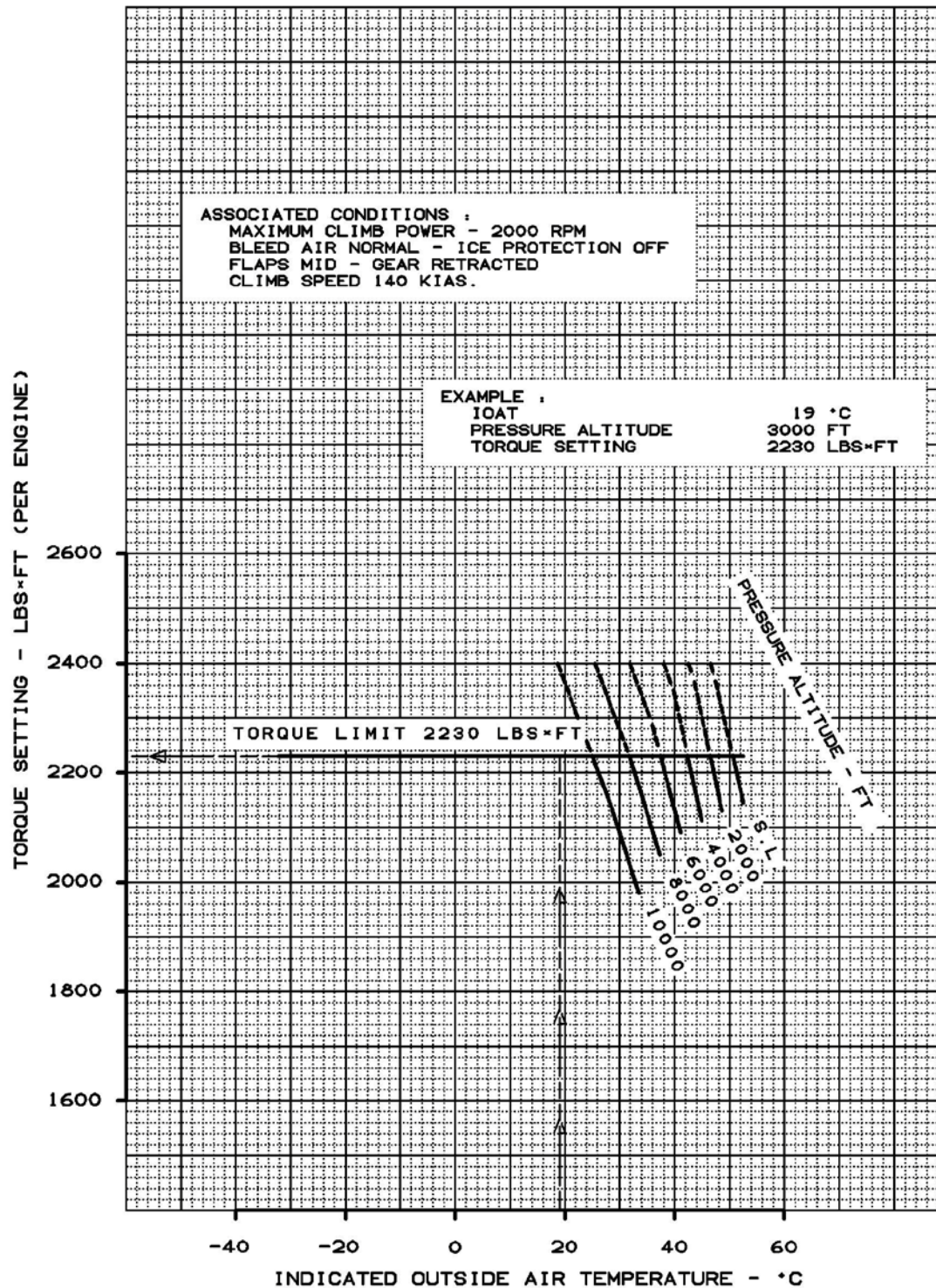




5.2: CLIMB

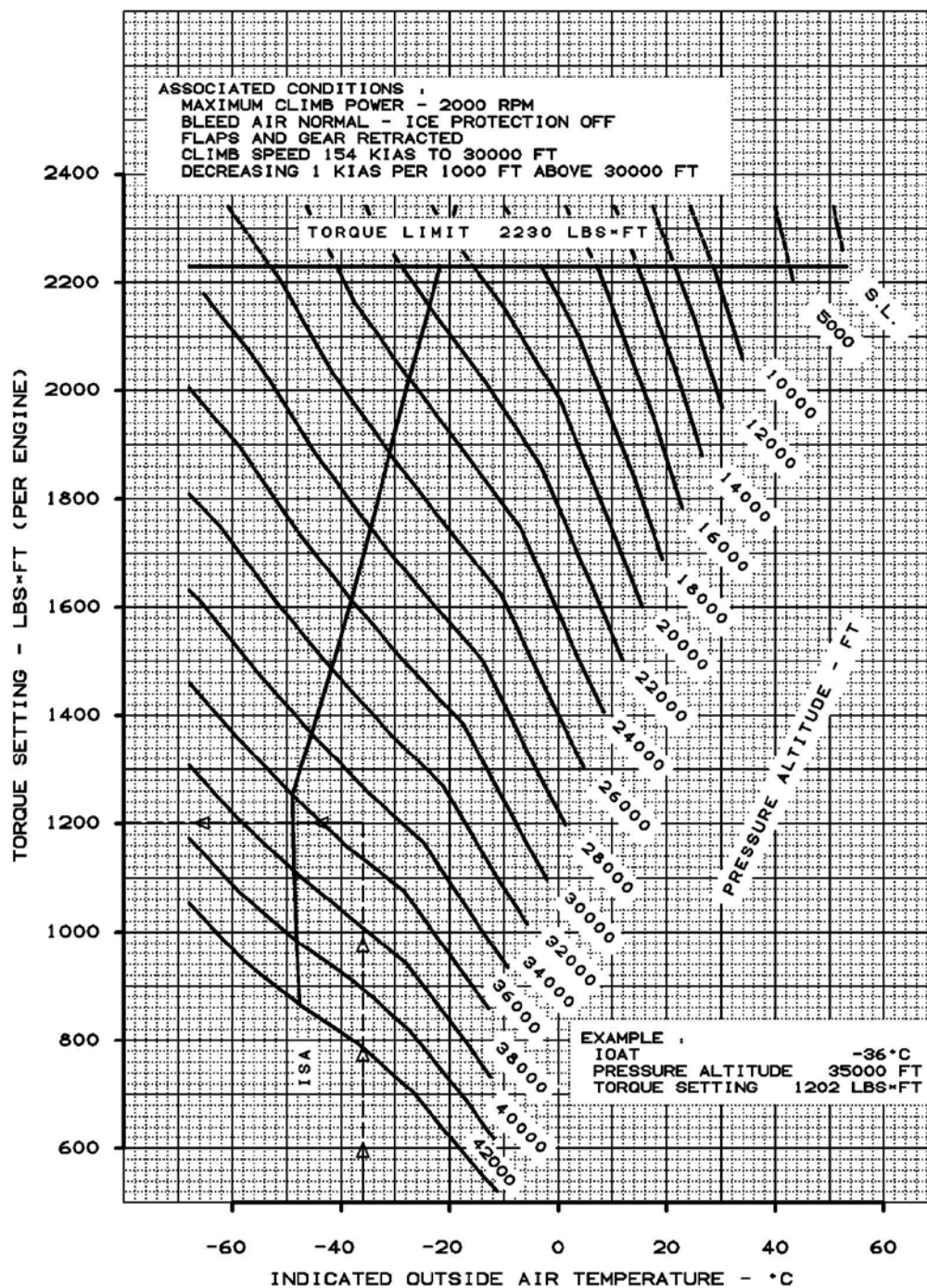
5.2.1: Twin Engine Climb Torque - Flaps Mid

TWIN ENGINE CLIMB TORQUE - FLAPS MID





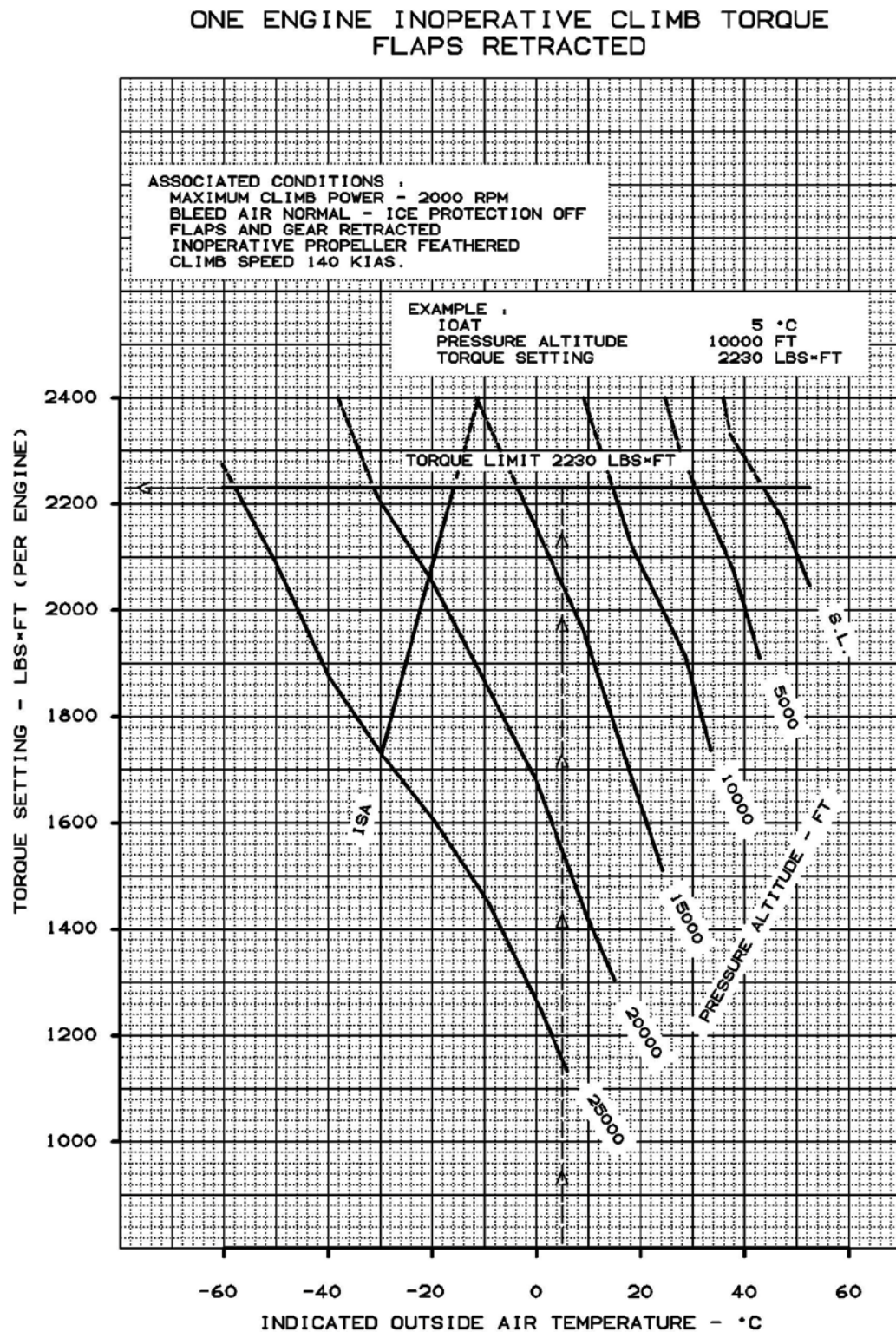
5.2.2: Twin Engine Climb Torque - Flaps Retracted

TWIN ENGINE CLIMB TORQUE
FLAPS RETRACTED



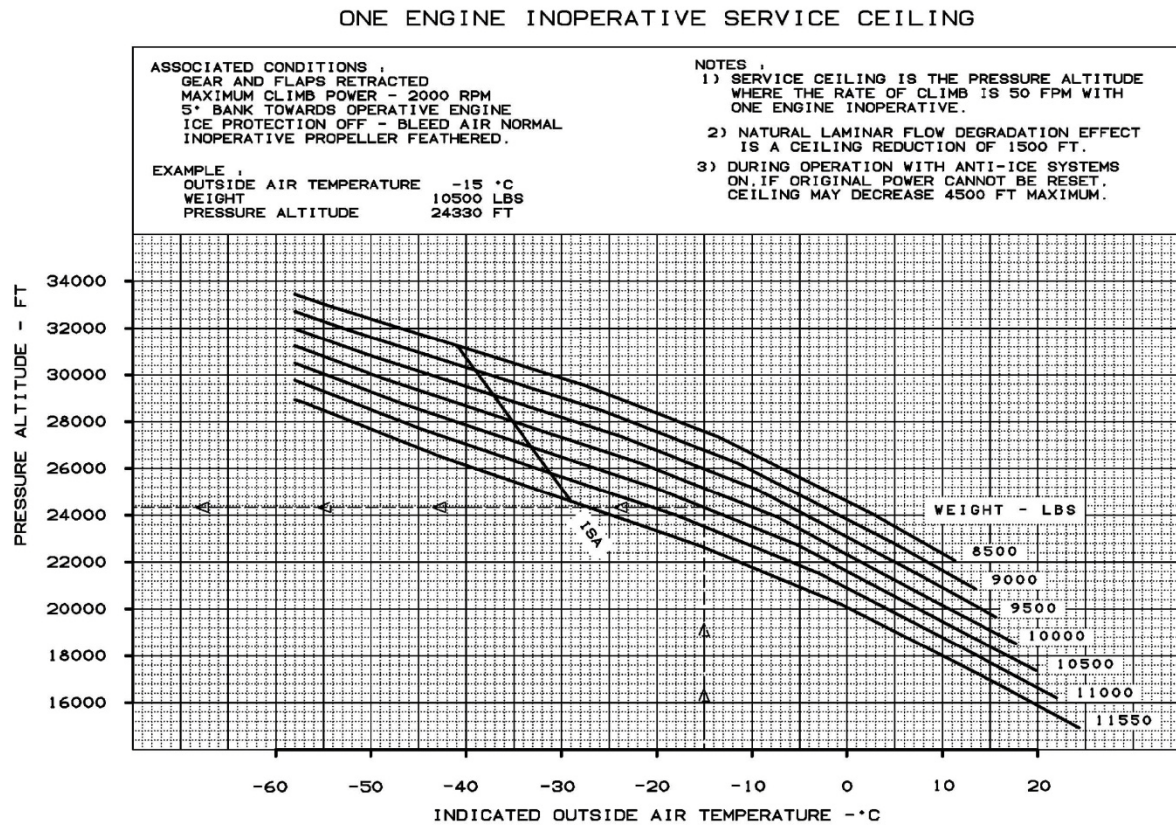
5.3: SINGLE ENGINE OPERATIONS

5.3.1: One Engine Inoperative Climb Torque - Flaps Retracted



5.3.2: One Engine Inoperative Service Ceiling

FM_5_36





5.4: MAXIMUM CRUISE POWER

5.4.1: 2000RPM; ISA -20°C

| PRESSURE ALTITUDE | IOAT | | ENGINE TORQUE | FUEL FLOW PER ENG. | TOTAL FUEL FLOW | AIRSPEED KNOTS | | | | | |
|----------------------|------|-----|------------------|-----------------------|--------------------|----------------|-----|-----------|-----|-----------|-----|
| | | | | | | 11000 LBS | | 10000 LBS | | 9000 LBS | |
| | | | | | | (4990 KG) | | (4536 KG) | | (4082 KG) | |
| FEET | °C | °F | LB · FT | LBS/HR | LBS/HR | TAS | IAS | TAS | IAS | TAS | IAS |
| 0 | 1 | 34 | 1478 | 454 | 908 | 249 | 260 | 249 | 260 | 249 | 260 |
| 5000 | -8 | 17 | 1589 | 425 | 850 | 267 | 260 | 267 | 260 | 267 | 260 |
| 10000 | -17 | 2 | 1694 | 401 | 802 | 286 | 260 | 286 | 260 | 286 | 260 |
| 15000 | -26 | -14 | 1797 | 382 | 764 | 308 | 260 | 308 | 260 | 308 | 260 |
| 20000 | -34 | -29 | 1890 | 370 | 740 | 332 | 260 | 332 | 260 | 332 | 260 |
| 23000 | -39 | -38 | 1961 | 370 | 740 | 348 | 260 | 348 | 260 | 348 | 260 |
| 25000 | -42 | -44 | 2020 | 372 | 744 | 358 | 260 | 358 | 260 | 358 | 260 |
| 27000 | -45 | -50 | 2088 | 379 | 758 | 370 | 260 | 370 | 260 | 370 | 260 |
| 28000 | -47 | -53 | 2126 | 384 | 768 | 375 | 260 | 375 | 260 | 375 | 260 |
| 29000 | -49 | -56 | 2084 | 377 | 754 | 376 | 256 | 376 | 256 | 376 | 256 |
| 31000 | -53 | -64 | 1936 | 353 | 706 | 373 | 245 | 373 | 245 | 373 | 245 |
| 33000 | -57 | -71 | 1798 | 331 | 662 | 369 | 234 | 369 | 234 | 369 | 234 |
| 35000 | -62 | -79 | 1672 | 311 | 622 | 365 | 223 | 365 | 223 | 365 | 223 |
| 37000 | -64 | -83 | 1563 | 293 | 586 | 363 | 213 | 363 | 213 | 363 | 213 |
| 39000 | -64 | -83 | 1471 | 279 | 558 | 363 | 203 | 363 | 203 | 363 | 203 |
| 41000 | -65 | -84 | 1267 | 246 | 492 | 351 | 187 | 357 | 190 | 363 | 194 |

NOTE 1

Natural Laminar Flow Degradation effect is a speed reduction of 5%, maintaining torque as indicated in the Table.

NOTE 2

During operation with Anti Icing systems on, torque may decrease 20%, true airspeed 30 knots and fuel flow 10%, approximately.

If original power is reset, fuel flow may increase approximately 30 LB/H/ENGINE, and speed remains unchanged.



5.4.2: 2000RPM; ISA

| PRESSURE ALTITUDE | IOAT | | ENGINE TORQUE | FUEL FLOW PER ENG. | TOTAL FUEL FLOW | AIRSPEED KNOTS | | | | | |
|----------------------|------|-----|------------------|-----------------------|--------------------|----------------|-----|-----------|-----|-----------|-----|
| | | | | | | 11000 LBS | | 10000 LBS | | 9000 LBS | |
| | | | | | | (4990 KG) | | (4536 KG) | | (4082 KG) | |
| FEET | °C | °F | LB • FT | LBS/HR | LBS/HR | TAS | IAS | TAS | IAS | TAS | IAS |
| 0 | 21 | 70 | 1532 | 468 | 936 | 258 | 260 | 258 | 260 | 258 | 260 |
| 5000 | 12 | 54 | 1649 | 442 | 884 | 277 | 260 | 277 | 260 | 277 | 260 |
| 10000 | 4 | 39 | 1761 | 419 | 838 | 298 | 260 | 298 | 260 | 298 | 260 |
| 15000 | -5 | 23 | 1870 | 401 | 802 | 321 | 260 | 321 | 260 | 321 | 260 |
| 20000 | -13 | 8 | 1971 | 391 | 782 | 346 | 260 | 346 | 260 | 346 | 260 |
| 23000 | -18 | 0 | 2047 | 391 | 782 | 363 | 260 | 363 | 260 | 363 | 260 |
| 25000 | -21 | -6 | 2110 | 394 | 788 | 374 | 260 | 374 | 260 | 374 | 260 |
| 27000 | -24 | -12 | 2183 | 401 | 802 | 386 | 260 | 386 | 260 | 386 | 260 |
| 28000 | -26 | -15 | 2112 | 390 | 780 | 386 | 255 | 389 | 257 | 392 | 259 |
| 29000 | -28 | -19 | 2019 | 374 | 748 | 383 | 249 | 386 | 251 | 390 | 253 |
| 31000 | -33 | -27 | 1843 | 345 | 690 | 377 | 236 | 382 | 239 | 385 | 241 |
| 33000 | -37 | -35 | 1670 | 318 | 636 | 370 | 223 | 375 | 226 | 380 | 230 |
| 35000 | -42 | -43 | 1509 | 291 | 582 | 363 | 211 | 368 | 214 | 374 | 217 |
| 37000 | -45 | -48 | 1320 | 260 | 520 | 351 | 195 | 357 | 199 | 363 | 202 |
| 39000 | -46 | -50 | 1127 | 228 | 456 | 335 | 177 | 343 | 181 | 350 | 186 |
| 41000 | -47 | -53 | 948 | 199 | 398 | — | — | — | — | 335 | 168 |

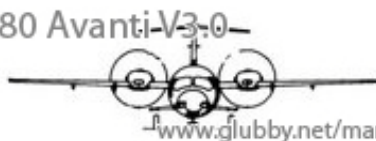
NOTE 1

Natural Laminar Flow Degradation effect is a speed reduction of 5%, maintaining torque as indicated in the Table.

NOTE 2

During operation with Anti Icing systems on, torque may decrease 20%, true airspeed 30 knots and fuel flow 10%, approximately.

If original power is reset, fuel flow may increase approximately 30 LB/H/ENGINE, and speed remains unchanged.



5.4.3: 2000RPM; ISA +20°C

| PRESSURE ALTITUDE | IOAT | | ENGINE TORQUE | FUEL FLOW PER ENG. | TOTAL FUEL FLOW | AIRSPEED KNOTS | | | | | |
|----------------------|------|-----|------------------|-----------------------|--------------------|----------------|-----|-----------|-----|-----------|-----|
| | | | | | | 11000 LBS | | 10000 LBS | | 9000 LBS | |
| | | | | | | (4990 KG) | | (4536 KG) | | (4082 KG) | |
| FEET | °C | °F | LB • FT | LBS/HR | LBS/HR | TAS | IAS | TAS | IAS | TAS | IAS |
| 0 | 42 | 107 | 1584 | 489 | 978 | 267 | 260 | 267 | 260 | 267 | 260 |
| 5000 | 33 | 91 | 1707 | 464 | 928 | 287 | 260 | 287 | 260 | 287 | 260 |
| 10000 | 24 | 76 | 1825 | 441 | 882 | 309 | 260 | 309 | 260 | 309 | 260 |
| 15000 | 16 | 61 | 1941 | 423 | 846 | 333 | 260 | 333 | 260 | 333 | 260 |
| 20000 | 8 | 46 | 2048 | 411 | 822 | 360 | 260 | 360 | 260 | 360 | 260 |
| 23000 | 3 | 37 | 2118 | 408 | 816 | 377 | 259 | 377 | 260 | 377 | 260 |
| 25000 | -1 | 30 | 1961 | 378 | 756 | 374 | 248 | 377 | 250 | 379 | 252 |
| 27000 | -5 | 22 | 1795 | 350 | 700 | 370 | 237 | 373 | 239 | 376 | 241 |
| 28000 | -8 | 18 | 1715 | 336 | 672 | 367 | 231 | 370 | 233 | 374 | 236 |
| 29000 | -10 | 15 | 1635 | 323 | 646 | 365 | 225 | 368 | 228 | 371 | 230 |
| 31000 | -14 | 6 | 1478 | 296 | 592 | 357 | 212 | 362 | 216 | 366 | 218 |
| 33000 | -19 | -2 | 1323 | 270 | 540 | 347 | 199 | 353 | 203 | 359 | 206 |
| 35000 | -24 | -10 | 1186 | 247 | 494 | 336 | 185 | 344 | 190 | 351 | 194 |
| 37000 | -27 | -16 | 1042 | 221 | 442 | 319 | 168 | 331 | 174 | 340 | 180 |
| 39000 | -28 | -19 | 866 | 192 | 384 | — | — | — | — | 317 | 159 |
| 41000 | — | — | — | — | — | — | — | — | — | — | — |

NOTE 1

Natural Laminar Flow Degradation effect is a speed reduction of 5%, maintaining torque as indicated in the Table.

NOTE 2

During operation with Anti Icing systems on, torque may decrease 20%, true airspeed 30 knots and fuel flow 10%, approximately.

If original power is reset, fuel flow may increase approximately 30 LB/H/ENGINE, and speed remains unchanged.



5.5: RECOMMENDED CRUISE POWER

5.5.1: 1800RPM; ISA -20°C

| PRESSURE ALTITUDE | IOAT | | ENGINE TORQUE | FUEL FLOW PER ENG | TOTAL FUEL FLOW | AIRSPEED KNOTS | | | | | |
|----------------------|------|-----|------------------|----------------------|--------------------|----------------|-----|-----------|-----|-----------|-----|
| | | | | | | 11000 LBS | | 10000 LBS | | 9000 LBS | |
| | | | | | | (4990 KG) | | (4536 KG) | | (4082 KG) | |
| FEET | °C | °F | LB • FT | LBS/HR | LBS/HR | TAS | IAS | TAS | IAS | TAS | IAS |
| 0 | 1 | 34 | 1652 | 449 | 898 | 249 | 260 | 249 | 260 | 249 | 260 |
| 5000 | -8 | 17 | 1786 | 422 | 844 | 267 | 260 | 267 | 260 | 267 | 260 |
| 10000 | -17 | 2 | 1896 | 398 | 796 | 286 | 260 | 286 | 260 | 286 | 260 |
| 15000 | -26 | -14 | 1995 | 379 | 758 | 308 | 260 | 308 | 260 | 308 | 260 |
| 20000 | -34 | -29 | 2094 | 368 | 736 | 332 | 260 | 332 | 260 | 332 | 260 |
| 23000 | -39 | -38 | 2177 | 369 | 738 | 348 | 260 | 348 | 260 | 348 | 260 |
| 25000 | -42 | -44 | 2230 | 371 | 742 | 357 | 259 | 358 | 260 | 358 | 260 |
| 27000 | -46 | -50 | 2230 | 368 | 736 | 364 | 255 | 367 | 257 | 370 | 260 |
| 28000 | -48 | -54 | 2230 | 368 | 736 | 367 | 253 | 370 | 256 | 373 | 258 |
| 29000 | -49 | -57 | 2230 | 367 | 734 | 370 | 251 | 373 | 254 | 376 | 256 |
| 31000 | -53 | -64 | 2155 | 356 | 712 | 373 | 245 | 373 | 245 | 373 | 245 |
| 33000 | -57 | -71 | 1979 | 330 | 660 | 369 | 234 | 369 | 234 | 369 | 234 |
| 35000 | -62 | -79 | 1817 | 306 | 612 | 365 | 223 | 365 | 223 | 365 | 223 |
| 37000 | -64 | -83 | 1676 | 285 | 570 | 363 | 213 | 363 | 213 | 363 | 213 |
| 39000 | -64 | -83 | 1543 | 267 | 534 | 362 | 202 | 363 | 203 | 363 | 203 |
| 41000 | -65 | -86 | 1317 | 234 | 468 | 342 | 182 | 352 | 187 | 358 | 191 |

NOTE 1

Natural Laminar Flow Degradation effect is a speed reduction of 5%, maintaining torque as indicated in the Table.

NOTE 2

During operation with Anti Icing systems on, torque may decrease 20%, true airspeed 30 knots and fuel flow 10%, approximately.

If original power is reset, fuel flow may increase approximately 30 LB/H/ENGINE, and speed remains unchanged.



5.5.2: 1800RPM; ISA

| PRESSURE ALTITUDE | IOAT | | ENGINE TORQUE | FUEL FLOW PER ENG | TOTAL FUEL FLOW | AIRSPEED KNOTS | | | | | |
|----------------------|------|-----|------------------|----------------------|--------------------|----------------|-----|-----------|-----|-----------|-----|
| | | | | | | 11000 LBS | | 10000 LBS | | 9000 LBS | |
| | | | | | | (4990 KG) | | (4536 KG) | | (4082 KG) | |
| FEET | °C | °F | LB • FT | LBS/HR | LBS/HR | TAS | IAS | TAS | IAS | TAS | IAS |
| 0 | 21 | 70 | 1712 | 462 | 924 | 258 | 260 | 258 | 260 | 258 | 260 |
| 5000 | 12 | 54 | 1854 | 439 | 878 | 277 | 260 | 277 | 260 | 277 | 260 |
| 10000 | 4 | 39 | 1971 | 417 | 834 | 298 | 260 | 298 | 260 | 298 | 260 |
| 15000 | -5 | 23 | 2077 | 399 | 798 | 321 | 260 | 321 | 260 | 321 | 260 |
| 20000 | -13 | 8 | 2183 | 389 | 778 | 346 | 260 | 346 | 260 | 346 | 260 |
| 23000 | -18 | -1 | 2230 | 386 | 772 | 360 | 258 | 363 | 260 | 363 | 260 |
| 25000 | -22 | -7 | 2230 | 380 | 760 | 367 | 254 | 370 | 257 | 373 | 258 |
| 27000 | -25 | -13 | 2230 | 377 | 754 | 374 | 251 | 377 | 253 | 381 | 256 |
| 28000 | -27 | -17 | 2196 | 371 | 742 | 375 | 247 | 379 | 250 | 383 | 253 |
| 29000 | -29 | -20 | 2100 | 357 | 714 | 373 | 241 | 377 | 244 | 381 | 247 |
| 31000 | -33 | -28 | 1915 | 329 | 658 | 367 | 229 | 371 | 232 | 376 | 235 |
| 33000 | -38 | -36 | 1737 | 303 | 606 | 360 | 216 | 365 | 220 | 370 | 223 |
| 35000 | -43 | -45 | 1566 | 277 | 554 | 351 | 203 | 358 | 207 | 364 | 211 |
| 37000 | -46 | -50 | 1370 | 248 | 496 | 336 | 186 | 346 | 192 | 353 | 196 |
| 39000 | -47 | -53 | 1166 | 217 | 434 | 312 | 164 | 326 | 172 | 338 | 178 |
| 41000 | -49 | -57 | 972 | 188 | 376 | — | — | — | — | 316 | 158 |

NOTE 1

Natural Laminar Flow Degradation effect is a speed reduction of 5%, maintaining torque as indicated in the Table.

NOTE 2

During operation with Anti Icing systems on, torque may decrease 20%, true airspeed 30 knots and fuel flow 10%, approximately.

If original power is reset, fuel flow may increase approximately 30 LB/H/ENGINE, and speed remains unchanged.



5.5.3: 1800RPM; ISA +20°C

| PRESSURE ALTITUDE | IOAT | | ENGINE TORQUE | FUEL FLOW PER ENG | TOTAL FUEL FLOW | AIRSPEED KNOTS | | | | | |
|----------------------|------|-----|------------------|----------------------|--------------------|----------------|-----|-----------|-----|-----------|-----|
| | | | | | | 11000 LBS | | 10000 LBS | | 9000 LBS | |
| | | | | | | (4990 KG) | | (4536 KG) | | (4082 KG) | |
| FEET | °C | °F | LB · FT | LBS/HR | LBS/HR | TAS | IAS | TAS | IAS | TAS | IAS |
| 0 | 42 | 107 | 1771 | 484 | 968 | 267 | 260 | 267 | 260 | 267 | 260 |
| 5000 | 33 | 91 | 1920 | 462 | 924 | 287 | 260 | 287 | 260 | 287 | 260 |
| 10000 | 24 | 76 | 2043 | 440 | 880 | 309 | 260 | 309 | 260 | 309 | 260 |
| 15000 | 16 | 61 | 2156 | 421 | 842 | 333 | 260 | 333 | 260 | 333 | 260 |
| 20000 | 8 | 46 | 2230 | 405 | 810 | 358 | 258 | 359 | 259 | 360 | 260 |
| 23000 | 2 | 36 | 2221 | 393 | 786 | 369 | 253 | 372 | 256 | 373 | 257 |
| 25000 | -2 | 29 | 2055 | 364 | 728 | 366 | 243 | 369 | 245 | 372 | 247 |
| 27000 | -6 | 21 | 1881 | 337 | 674 | 361 | 231 | 364 | 233 | 368 | 236 |
| 28000 | -8 | 17 | 1797 | 324 | 648 | 358 | 225 | 362 | 228 | 366 | 230 |
| 29000 | -10 | 13 | 1713 | 311 | 622 | 355 | 219 | 359 | 222 | 363 | 225 |
| 31000 | -15 | 5 | 1545 | 285 | 570 | 345 | 205 | 353 | 210 | 357 | 213 |
| 33000 | -20 | -4 | 1377 | 259 | 518 | 332 | 190 | 342 | 196 | 350 | 201 |
| 35000 | -25 | -12 | 1242 | 237 | 474 | 318 | 175 | 330 | 182 | 341 | 188 |
| 37000 | -28 | -19 | 1087 | 212 | 424 | 295 | 155 | 313 | 165 | 327 | 172 |
| 39000 | -31 | -23 | 886 | 182 | 364 | — | — | — | — | 299 | 150 |
| 41000 | — | — | — | — | — | — | — | — | — | — | — |

NOTE 1

Natural Laminar Flow Degradation effect is a speed reduction of 5%, maintaining torque as indicated in the Table.

NOTE 2

During operation with Anti Icing systems on, torque may decrease 20%, true airspeed 30 knots and fuel flow 10%, approximately.

If original power is reset, fuel flow may increase approximately 30 LB/H/ENGINE, and speed remains unchanged.



5.6: MAXIMUM RANGE POWER

5.6.1: 2000RPM; ISA

| PRESSURE ALTITUDE | IOAT | | 11000 LBS (4990 KG) | | | | 10000 LBS (4536 KG) | | | | 9000 LBS (4082 KG) | | | |
|----------------------|------|-----|---------------------|-------------------------------|---------------|-----|---------------------|-------------------------------|---------------|-----|--------------------|-------------------------------|---------------|-----|
| | | | ENGINE TORQUE | FUEL FLOW PER ENGINE | AIR- SPEED | | ENGINE TORQUE | FUEL FLOW PER ENGINE | AIR- SPEED | | ENGINE TORQUE | FUEL FLOW PER ENGINE | AIR- SPEED | |
| | | | | | TAS | IAS | | | TAS | IAS | | | TAS | IAS |
| FEET | °C | °F | LB · FT | LBS/HR | KTS | KTS | LB · FT | LBS/HR | KTS | KTS | LB · FT | LBS/HR | KTS | KTS |
| 0 | 20 | 68 | 1181 | 416 | 234 | 235 | 1098 | 404 | 230 | 231 | 1015 | 391 | 226 | 228 |
| 5000 | 10 | 51 | 1160 | 374 | 242 | 226 | 1080 | 363 | 238 | 222 | 1001 | 352 | 234 | 219 |
| 10000 | 1 | 33 | 1134 | 335 | 250 | 217 | 1052 | 324 | 246 | 213 | 977 | 315 | 241 | 210 |
| 15000 | -9 | 16 | 1107 | 301 | 259 | 208 | 1028 | 291 | 254 | 204 | 949 | 280 | 250 | 201 |
| 20000 | -18 | -1 | 1063 | 270 | 268 | 199 | 991 | 260 | 263 | 195 | 919 | 251 | 258 | 192 |
| 23000 | -24 | -11 | 1050 | 256 | 274 | 194 | 963 | 244 | 269 | 190 | 894 | 235 | 264 | 186 |
| 25000 | -28 | -18 | 1042 | 246 | 279 | 190 | 957 | 235 | 273 | 187 | 876 | 224 | 268 | 183 |
| 27000 | -31 | -25 | 1029 | 238 | 283 | 187 | 949 | 227 | 277 | 183 | 866 | 216 | 272 | 179 |
| 28000 | -33 | -28 | 1021 | 234 | 285 | 185 | 943 | 223 | 279 | 181 | 863 | 212 | 274 | 177 |
| 29000 | -35 | -31 | 1015 | 230 | 287 | 183 | 936 | 219 | 281 | 179 | 858 | 208 | 276 | 176 |
| 31000 | -39 | -38 | 1019 | 225 | 292 | 180 | 921 | 211 | 286 | 176 | 845 | 201 | 280 | 172 |
| 33000 | -43 | -45 | 1017 | 220 | 296 | 176 | 924 | 207 | 290 | 172 | 829 | 193 | 284 | 168 |
| 35000 | -46 | -51 | 1011 | 215 | 301 | 173 | 922 | 202 | 294 | 169 | 830 | 189 | 288 | 165 |
| 37000 | -48 | -55 | 1006 | 211 | 307 | 169 | 919 | 198 | 300 | 165 | 831 | 185 | 294 | 161 |
| 39000 | -48 | -54 | 1004 | 209 | 315 | 165 | 918 | 195 | 308 | 162 | 832 | 182 | 301 | 158 |
| 41000 | -47 | -53 | — | — | — | — | — | — | — | — | 830 | 180 | 308 | 154 |

NOTE 1

Natural Laminar Flow Degradation effect is a speed reduction of 5%, maintaining torque as indicated in the Table.

NOTE 2

During operation with Anti Icing systems on torque will decrease.

In order to maintain maximum range configuration do not reset power to original setting.

Fuel flow will remain about the same, but true airspeed may decrease approximately 6 knots.



5.6.2: 1800RPM; ISA

| PRESSURE ALTITUDE | IOAT | | 11000 LBS (4990 KG) | | | | 10000 LBS (4536 KG) | | | | 9000 LBS (4082 KG) | | | |
|----------------------|------|-----|---------------------|-------------------------------|---------------|-----|---------------------|-------------------------------|---------------|-----|--------------------|-------------------------------|---------------|-----|
| | | | ENGINE TORQUE | FUEL FLOW PER ENGINE | AIR- SPEED | | ENGINE TORQUE | FUEL FLOW PER ENGINE | AIR- SPEED | | ENGINE TORQUE | FUEL FLOW PER ENGINE | AIR- SPEED | |
| | | | | | TAS | IAS | | | TAS | IAS | | | TAS | IAS |
| FEET | °C | °F | LB · FT | LBS/HR | KTS | KTS | LB · FT | LBS/HR | KTS | KTS | LB · FT | LBS/HR | KTS | KTS |
| 0 | 20 | 68 | 1321 | 410 | 234 | 235 | 1230 | 397 | 231 | 232 | 1138 | 385 | 228 | 229 |
| 5000 | 10 | 51 | 1302 | 370 | 241 | 225 | 1215 | 358 | 238 | 222 | 1127 | 347 | 234 | 219 |
| 10000 | 1 | 33 | 1267 | 331 | 248 | 216 | 1186 | 322 | 245 | 212 | 1103 | 312 | 241 | 209 |
| 15000 | -9 | 16 | 1212 | 295 | 256 | 206 | 1139 | 287 | 252 | 203 | 1065 | 278 | 248 | 199 |
| 20000 | -18 | -1 | 1146 | 263 | 264 | 196 | 1079 | 255 | 260 | 193 | 1011 | 247 | 256 | 190 |
| 23000 | -24 | -11 | 1129 | 248 | 269 | 190 | 1038 | 237 | 265 | 187 | 974 | 230 | 260 | 184 |
| 25000 | -28 | -18 | 1118 | 239 | 272 | 186 | 1031 | 228 | 268 | 183 | 948 | 218 | 264 | 180 |
| 27000 | -32 | -25 | 1102 | 231 | 276 | 182 | 1020 | 220 | 271 | 179 | 934 | 210 | 267 | 176 |
| 28000 | -34 | -28 | 1092 | 227 | 278 | 180 | 1013 | 217 | 273 | 177 | 930 | 206 | 269 | 174 |
| 29000 | -35 | -32 | 1085 | 223 | 280 | 178 | 1004 | 213 | 275 | 175 | 924 | 203 | 270 | 172 |
| 31000 | -39 | -39 | 1093 | 219 | 283 | 174 | 986 | 205 | 278 | 171 | 908 | 195 | 274 | 168 |
| 33000 | -43 | -45 | 1100 | 216 | 287 | 170 | 993 | 201 | 282 | 167 | 889 | 188 | 277 | 164 |
| 35000 | -47 | -52 | 1104 | 212 | 291 | 167 | 998 | 198 | 286 | 163 | 893 | 184 | 281 | 160 |
| 37000 | -49 | -56 | 1111 | 210 | 296 | 163 | 1005 | 195 | 291 | 160 | 901 | 181 | 285 | 156 |
| 39000 | -48 | -55 | 1118 | 210 | 303 | 159 | 1014 | 195 | 297 | 156 | 910 | 180 | 291 | 153 |
| 41000 | -48 | -54 | — | — | — | — | — | — | — | — | 917 | 179 | 297 | 149 |

NOTE 1

Natural Laminar Flow Degradation effect is a speed reduction of 5%, maintaining torque as indicated in the Table.

NOTE 2

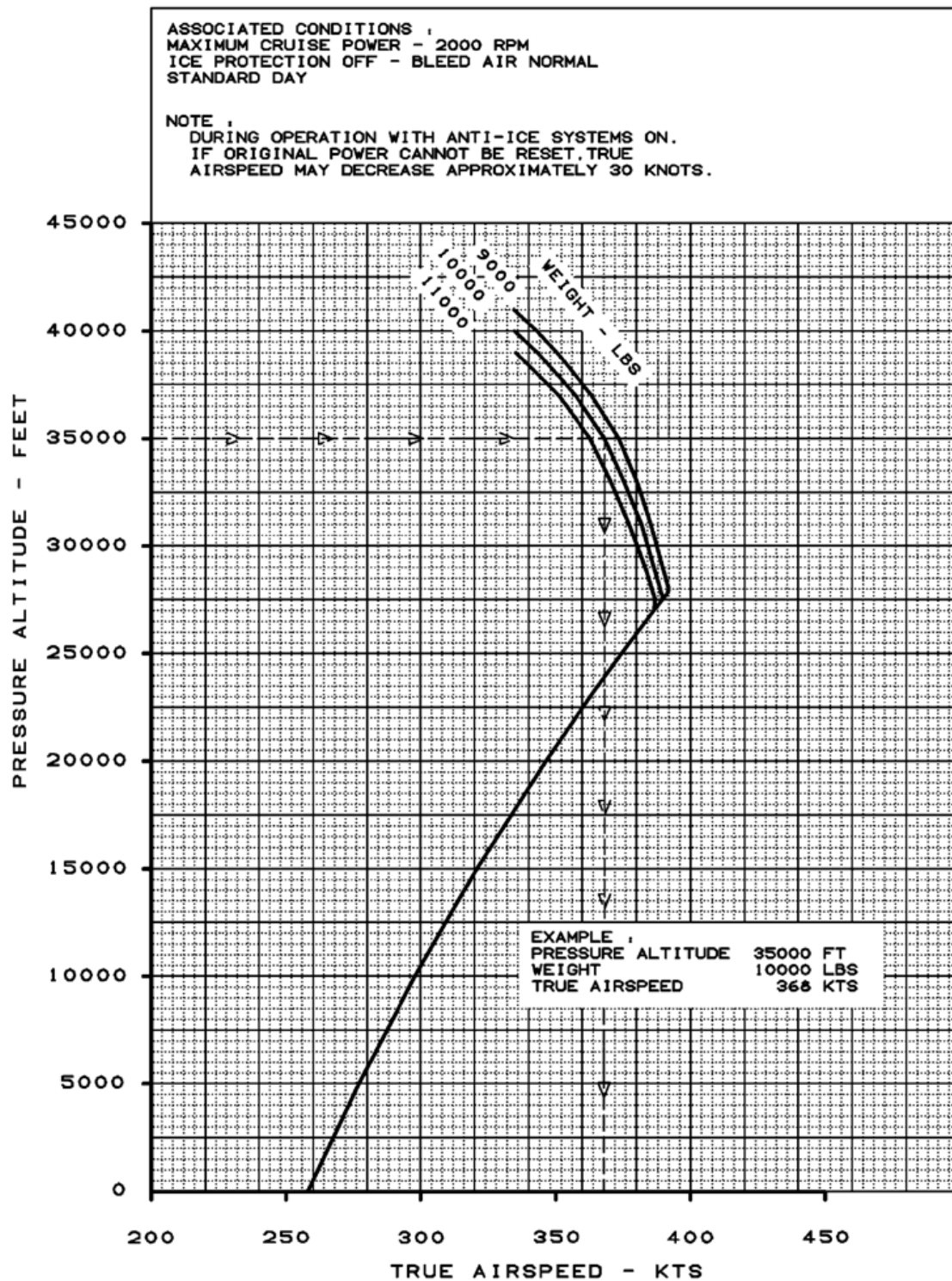
During operation with Anti Icing systems on torque will decrease.

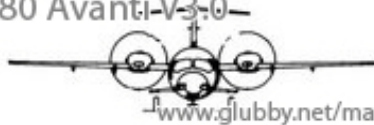
In order to maintain maximum range configuration do not reset power to original setting.

Fuel flow will remain about the same, but true airspeed may decrease approximately 6 knots.

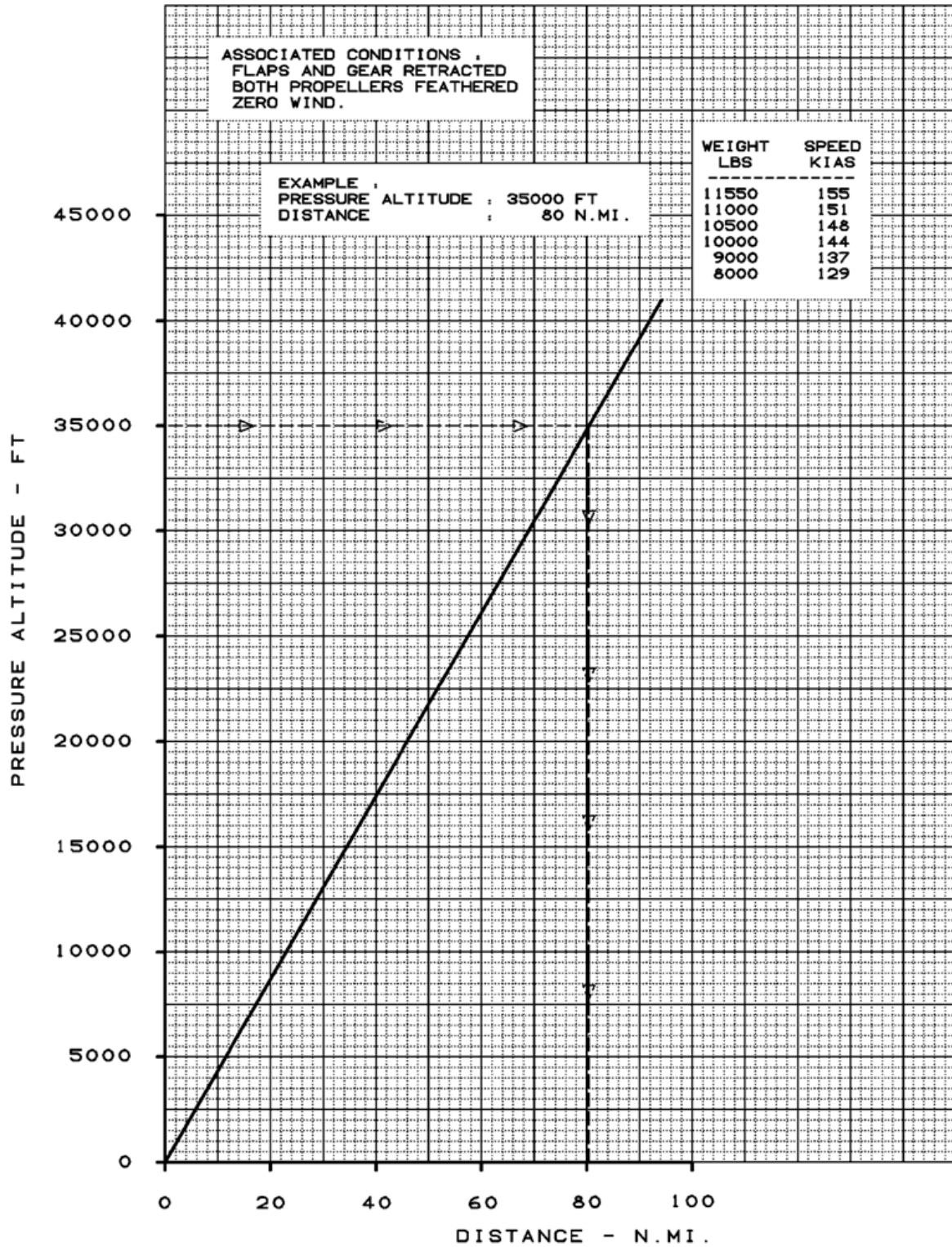


5.7: SPEED VS. ALTITUDE

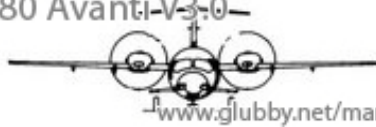




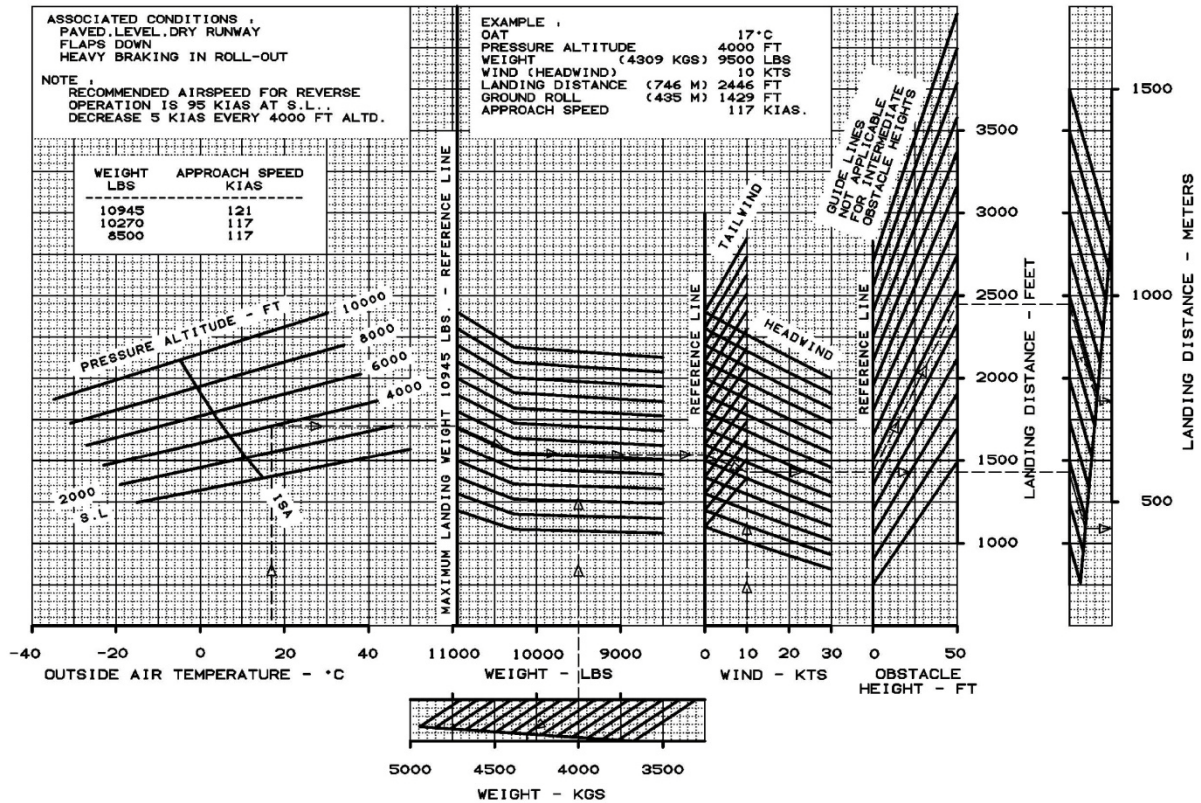
5.8: BEST GLIDE DISTANCE



FM_5_69



5.9: LANDING DISTANCE OVER 50FT





SECTION 6: DESCRIPTION & OPERATION

6.0: INSTRUMENT PANEL



NOTE:

The Cockpit & cabin lighting, and the oxygen system controls are located on the left side cockpit wall. On the 2D panel, 3-position switches are controlled via +\/- click spots. On the 3D virtual cockpit, they require dragging. The Navigational Display, Annunciator Panel & MFD (GPS) can be clicked for a zoomed in view. The 2D cockpit is available in Widescreen (16/9) and standard (4/3) aspect ratios. The 3D virtual cockpit is available with and without DX10 cockpit shadow mapping (FS-X only). Refer to the readme.txt or to SECTION 7 of this manual on how to select this different options.



6.0.1: Primary Flight Display:

Powered By: AC inverter system and the Essential Avionics circuit.

Indications for autopilot status and mode are provided. The left side incorporates an airspeed indicator and a speed deviation pointer. *This airspeed indicator is not meant to be used as the primary airspeed indicator!* Target speed is indicated in the lower left corner: it will indicate target Mach when autothrottle is in Mach Hold Mode. The rightmost region will indicate deviation from target altitude with an "A" pointer, or Glide slope deviation with an "<<" pointer. The lower right corner indicates decision height and radar altitude. When below decision height, a yellow "DH" indication is shown near the center of the display. The lower region also displays a NAV/LOC Deviation Pointer when active.

A turn coordination ball is installed in the bottom of the instrument.

- A. Stand-By Attitude indicator
- B. Copilot Attitude Indicator

6.0.2: Navigational Display:

Powered By: AC inverter system, Essential Avionics circuit & R BUS.

The main Navigational Display (EFIS) displays current heading, and pointer\deviation needles for VOR\LOC-1 & GS1. VOR\LOC2, ADF1 & ADF2 have pointer needles only. The pointer needle for any given radio beacon will show only when the tuned radio is receiving a valid signal.

- VOR\LOC1: Green, single line with TO\FROM indication arrow, arrow-head
- VOR\LOC2: Cyan, double line, arrow-head
- ADF1: magenta, single line, cross-head
- ADF2: cyan, double line, cross-head

The top left part of the screen shows green text for HDG SEL & VOR\LOC1 CRS values. Just below, and indication of LNAV mode: NAV1 when the NAV1 radio has a valid VOR signal, LOC1 when the NAV1 has a valid ILS\LOC signal, and GPS1 when GPS navigation is selected.

The lower corners indicate IDENT, frequency & DME distance for VOR1 (on the left) and VOR2 (on the right), or IDENT, frequency and bearing for ADF1 (on the left) and ADF2 (on the right).

The top right corner displays data for the next GPS waypoint, when valid.

The main area also displays a flight plan map, display options located on a control panel on the pedestal console.

A. EFIS modal switches & CRS\HDG knobs

The EFIS controls the display in the Navigational Display via 4 switches:

- Top-Left: ARC\ROSE mode:
Select either full-circle rose mode or zoomed forward-only arc mode
- Top-Right: ILS Mode:
A de-cluttered ARC mode ideal for ILS approaches. Activates ILS pointers on the PFD
- Bottom-Left: VOR1\ADF1 display
3-pos switch, selects VOR1\ADF1\OFF for the VOR1\ADF1 data display on the ND.
- Bottom-Right: VOR2\ADF2 display
3-pos switch, selects VOR2\ADF2\OFF for the VOR2\ADF2 data display on the ND.

Additionally, the HDG & CRS tuning knobs are located on the bottom right. On the top right, warning lights indicate an avionics fan failure.

B. Copilot ND

6.0.3: Altimeter

A standard mechanical altimeter. BARO knob on the lower right. A button on the lower left allows selection of BARO units (InHg or mmHg)

6.0.4: Airspeed Indicator

A standard mechanical airspeed indicator. The target airspeed knob is to be used to select Mach as well when the autothrottle is in MACH mode.

6.0.5: Vertical Speed Indicator

A standard mechanical VSI. Use the knob to tune target vertical speed (when the autopilot vertical mode is set to VS)

6.0.6: Radio Magnetic Indicator

A dual Needle RMI. Can indicate VOR or ADF (1 & 2) bearings by selecting the source radio with the buttons on the lower corners.

6.0.7: Audio Panel & Window Display\Hide



The 2 top-most rows of buttons toggle audio for the relevant radio. The green SFX button toggles audio effects for the simulation. SFX volume can be tuned via the adjacent black knob. The lower row of buttons toggle window display. ATC window, Map Window, Throttle (pedestal), dynamic checklist, other controls, and FS kneeboard.

6.0.8: Clock

6.0.9: Altitude Selector & Alerter

Selects altitude for autopilot functions. An acoustic signal alerts the pilot when the aircraft is within 1000 ft of the intended target altitude, or within 200 ft. (Upper area of knob: +/- 1000 ft, lower area of knob: +/- 100 ft)






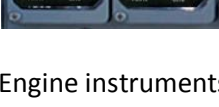
6.0.10: Multi-Function Indicator

A rotating knob selects display for:

- Left Generator Ammeter
- Right Generator Ammeter
- BUS Volts
- OAT °C
- OAT °F
- Battery Temperature (°F)

If an abnormal situation with the electrical system occurs, the display will blink with a red "WARN" alert. In this simulation, battery temperature under no load is equal to cabin temperature. This can be used to monitor cabin temperature in normal flight conditions.

6.0.11: Engine Instruments

| LH | RH | |
|---|----|---|
|  | | TORQUE (Ft/Lbs): Maximum normal torque is 2232 Ft/lbs. |
|  | | ITT (°C): Maximum continuous ITT is 800 °C |
|  | | Propeller RPM: Normal operating range is 1600÷2000 RPM. Stable operation on yellow regions prohibited. |
|  | | N_G RPM %: Avoid overspeeding |
|  | | Fuel Flow (PPH): Check for asymmetric conditions |
|  | | Oil pressure (PSI, Left) & Temperature (°C, right) Check for asymmetric & out of range (green) conditions |

Engine instruments are powered by their respective side engine DC bus.

6.0.12: Annunciator Panel

| | | Description | |
|-----------------------|-----------------------|-----------------------------------|------------------------------------|
| L FIRE | R FIRE | L/R Engine Fire | |
| L OIL PRESS | R OIL PRESS | L/R Eng oil pressure out of range | |
| L BLEED TEMP | R BLEED TEMP | Engine Bleed air overtemperature | |
| L MN WG OVHT | R MN WG OVHT | Main wing anti-ice overheating | |
| L FD WG OVHT | R FD WG OVHT | Forward wing anti-ice overheating | |
| L WSHLD ZONE | R WSHLD ZONE | Windshield heating overheating | |
| BAG DOOR | CAB DOOR | Bag door open | Main door open |
| DUCT TEMP | STEER FAIL | Cabin Air duct overheat | Steering system failure |
| CAB PRESS | BAT OVHT | Cabin pressurization failure | Battery overheating |
| ----- | ----- | | |
| L F/W V INTRAN | R F/W V INTRAN | Engine Firewall valve in transit | |
| L F/W V CLOSED | R F/W V CLOSED | Engine Firewall valve closed | |
| L FUEL PUMP | R FUEL PUMP | Engine main fuel pump inoperative | |
| L FUEL PRESS | R FUEL PRESS | Engine Fuel pressure Low | |
| L FUEL FILTER | R FUEL FILTER | Engine fuel filter clogging | |
| FUEL XFEED | XFEED INTRAN | XFEED valve open | XFEED Valve in transit |
| L LOW FUEL | R OW FUEL | Fuel Low alert | |
| BAT TEMP | BUS DISC | Hot Battery | L/R busses isolated |
| L GEN | R GEN | Generators inoperative | |
| PRI INV | SEC INV | Inverters inoperative | |
| AVCS FAN FAIL | HYD PRESS | Avionics fan failure | Hydraulic pressure out of range |
| ADC FAIL | FLAP SYNC | Air Data Computer failure | Flaps malfunctioning |
| STALL FAIL | OIL COOLING | Stall probe failed | Forced engine oil coling operating |
| L PROP PITCH | R PROP PITCH | Propeller pitch\speed alert | |
| AUTOFEATHER | DOOR SEAL | Autofeather OFF | Main door seal leaking |
| L AUTOFEATHER | R AUTOFEATHER | Autofeather Armed | |
| L FD WG A/ICE | R FD WG A/ICE | Forward Wing Anti-ice ON | |
| L MN WG A/ICE | R MN WG A/ICE | Main Wing Anti-Ice ON | |
| L ENG OIL A/I | R ENG OIL A/I | Engine Oil Anti-ice ON | |
| EXT POWER | LTS DOOR OPEN | External Power connected | Nose lights door open |

All red indications trigger the MASTER CAUTION light and aural warning and require immediate attention. They indicate potentially dangerous situations.

Amber lights trigger the MASTER WARNING light. They indicate a potentially unsafe condition.

All the Green lights are advisories indicating that a given system is operating.

6.0.13: Radios



All radios are tuned by clicking on the stand-by frequency display (red) and swapping the stand-by frequency to the active frequency (green) via the spring-loaded switch on the right of the display screen. Only the ATC transponder does not feature a stand-by frequency.

6.0.14: Multi-Function Display



This unit operates in the same manner as the FS9 GPS (when in GPS mode), except that the cursor knob is divided in 4 clickspots arranged in quarters (top & bottom left for "-" and top & bottom right for "+"). The buttons on the left toggle additional data windows in two different units selectable via the "UNITS" button. (Fuel Flow, Remaining Fuel, Used Fuel, Fuel Time to Empty, Aircraft weight) . The lower left corner (GPS Icon) toggles a zoomed display window of the unit.



By using the three buttons on the lower panel, it is possible to select (from left to right) the three operating modes:

- WX: displays basic weather information
- GPS: works as standard FS9 GPS
- TFC: TCAS display:



In TCAS mode, the main screen has 4 clickspots, one at each corner (close to the green text labels) Left click to decrease and right click to increase:

- Top Left: Mode: TEST, Standby, XPNDR, TA, TA/RA
- Top Right: Range: 6, 12, 18, 24, 40.
- Bottom Left: Vertical Mode: Above, Normal, Below
- Bottom Right: Altitude Display mode: Absolute, Relative

The TCAS Unit can be quickly set-up by right-clicking on the mode (top left corner) until TA/RA Mode. For details, refer to the ILH TCAS manual. Note That TCAS Mode does not work on zoomed MFD window. If toggling from 2D to virtual cockpit view, switch to another mode than TCAS in the 2D cockpit to avoid TCAS mode being stuck ON in the virtual cockpit view.



6.0.15: Autopilot



The Autopilot is operated by selecting the desired mode and entering the target value in the relevant instrument setting bug. When the autopilot is turned on but no additional mode is selected, it will level the wings and maintain current pitch attitude. The pitch attitude can be altered by applying pressure on the control yoke in the desired direction.

From Left to Right, modes:

- **HDG:** heading select hold.
- **1/20:** This button synchronizes the flight director target pitch with current aircraft pitch.
- **NAV:** captures VOR1 radials or follows GPS navigation input.
- **APR:** arms or engages Approach hold mode. The autopilot will maintain current operating mode until the localizer is alive, then it will turn to capture the localizer beam (when the signal is valid and deviation pointer moves away from the extreme position). Then, when the glide slope comes alive it will initiate an automated coupled approach until manually disengaged. It is very important to capture first the localizer and then the glideslope. This is responsibility of the pilot: if the glideslope comes alive before the localizer, initiate a descent in order to remain below glideslope path. DO NOT engage APR mode when LNAV (GPS) is elected.
- **BC:** Back course mode
- **LVL:** Wing Leveler mode. Engages by default when turning the autopilot ON
- **YD ENG:** Yaw Damper
- **FD:** Flight Director Display
- **AP ENG:** Main Autopilot Power Button
- **ALT:** levels off at current altitude, at 100 ft intervals
- **ALS:** maintains current pitch mode (Attitude or VS) , until reaching target altitude, then levels off.
- **SPD:** toggles autothrottle between IAS/Mach and OFF (press more than once if needed).
- **CLM:** configures the autopilot for an optimal climb profile. The aircraft will adjust to optimal speeds and climb rates based on altitude. Upon reaching target altitude, this mode disengages. Changing the automatically set parameters will disengage this mode.
- **DSC:** configures the autopilot for an optimal descent. Upon reaching target altitude, this mode disengages.
- **VS:** Vertical Speed hold mode. The autopilot will hold to selected target vertical speed. This mode will not level off at the target altitude unless ALS is selected as well.

The "TEST" button located between the "AP ENG" and "ALT" buttons tests all autopilot indicator lights. The lights indicate only if a given mode is operative (green) or armed (amber). All autopilot target parameters are to be set via the relevant instrument setting bugs.

6.0.16: Radio Altimeter & DH Setting

Indicates radio altitude (if less than 2500 ft) and allows for tuning of the Decision Height via the knob on the right. For ease of use, DH can also be tuned by clicking on its indicated value on the pilot's PFD.

6.0.17: Engine Fire Warning Light & Extinguisher Bottle discharge button

- A. Left
- B. Right

6.0.18: Terrain Awareness Warning System (TAWS)



Buttons:

- TOGA mode: inhibits TAWS functions to avoid excessive alerts during take-off or go-around
- TEST: illuminates all TAWS indicators and plays "PULL UP" test audio advisory
- TERR INHB: Inhibits TAWS completely.

Indications

- PULL UP: aural "WHOOOP WHOOOP PULL UP" alert operative. Excessive descent rate and/or terrain proximity
- TERR: aural "TERRAIN, TERRAIN" advisory. Possibly dangerous terrain proximity situation, or below Glideslope.
- Red LED: TAWS test in progress
- TERR N/A & SNSR: TAWS malfunction
- TOGA MODE: TOGA mode selected (automatically or manually)
- TERR INHB: TAWS inhibited

6.0.19: Master Warning, Caution & Ice condition lights

A MASTER WARNING condition is accompanied by an aural warning.

Pressing on the MASTER WARNING button will reset it. It will stay off until a new warning condition presents.

Pressing on the MASTER CAUTION button will reset it. It will stay off until a new warning condition presents.

The ICE light can be pressed for testing. Turning anti-ice equipment ON will not extinguish the light.

6.0.20: STALL, AUTO TRIM and OUT OF TRIM lights

A stall condition will trigger the STALL light and the stall aural warning.

The AUTO TRIM light illuminates when the autopilot is in control of the pitch trim motor.

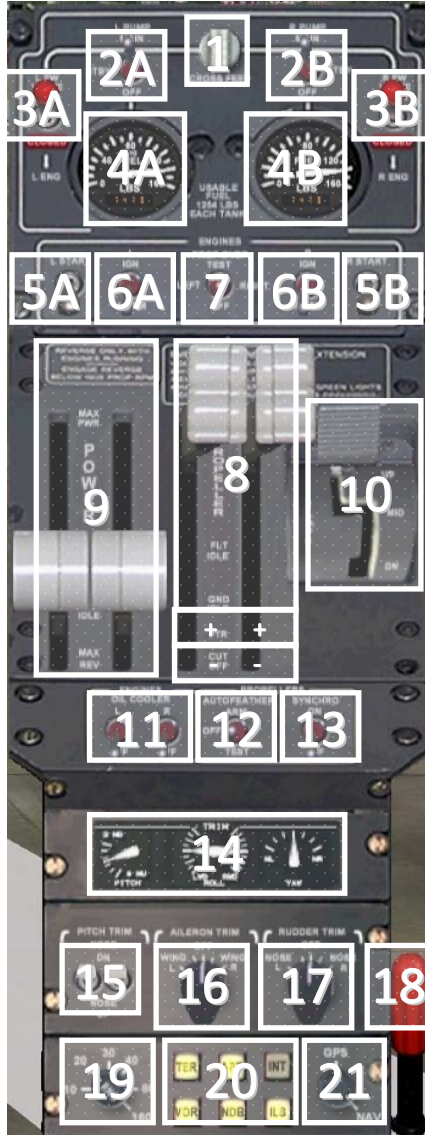
The OUT OF TRIM light indicates that the pitch trim position has moved beyond normal operating range. This condition will automatically disengage the autopilot. As long as the situation is not corrected, the autopilot cannot be engaged again.

6.0.21: Magnetic Compass



6.1: PEDESTAL PANEL

- A. Left Engine
- B. Right Engine



6.1.1: Cross-Feed Knob

To transfer fuel from one side to the other, open the cross-feed valve, and turn OFF the fuel pump on the side where fuel is to be transferred to (only when both engines are running).

6.1.2: Engine Fuel Pump Switches

Positions: OFF, MAIN, STANDBY. Main pumps are powered by their respective engine DC BUS, standby pumps by the essential bus.

6.1.3: Engine Fire-Wall Shut-Off valves

6.1.4: Fuel Level Indicators (MAIN+Aux)

6.1.5: Engine Starters

Not spring loaded, but they automatically disengage after ignition. In case of failed start, disengage manually.

6.1.6: Ignition switches

NORM position is to be selected for normal operations, including starting. In case of extreme weather or air-start, select IGN to force ignition ON.

6.1.7: Propeller Overspeed Test Switch

Spring loaded switch. To test the propeller overspeed protection, move condition levers to MAX RPM, and advance power levers until 2000 RPM are reached. Moving the switch to either side will test the respective side engine overspeed protection at 1800 RPM.

6.1.8: Condition levers

Normal operating range is between 1600 & 2000 RPM. Moving the levers below the low idle stop will cause the propellers to feather. Moving below the feather stop will cut off fuel to the engines.

Use the +/- areas to move the levers past the stops. Condition levers are linked to FS propeller axis. Please do not use any mixture axis as this is automatically controlled by this simulation package.

6.1.9: Power levers (Throttles)

6.1.10: Flap lever

Flaps have 3 positions. Retracted, MID & DN. MID is to be used for take-off and approach, DN for landing, unless the situation requires landing with flaps in MID position.

6.1.11: L & R Engine forced oil cooling switches

This function is not simulated.

6.1.12: Autofeather ARM\TEST switch

Arming the autofeather is mandatory before take-off. To test the feathering mechanism, move the condition levers to MAX RPM and the switch to the TEST position.

6.1.13: Propeller Synchrophaser

6.1.14: Trim Tab position indicator

6.1.15: Manual Pitch Trim command switch

Spring loaded two-position switch

6.1.16: Aileron Trim Setting Knob

6.1.17: Rudder Trim Setting Knob

6.1.18: Emergency landing gear Extension manual hydraulic pump

If the landing gear fails to properly deploy, make sure the gear lever is set to DOWN, and hand pump as necessary.

6.1.19: Navigational Display Map Range selector knob

6.1.20: Navigational Display Map Display Option buttons

- | | | |
|------------------------|------------|-----------------|
| ▪ TERRain (boundaries) | ▪ AirPorTs | ▪ INTersections |
| ▪ VORs | ▪ NDBs | ▪ ILSs |

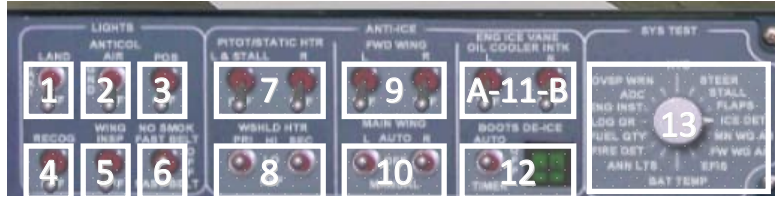
Certain display options are available only for the smaller map ranges.

6.1.21: NAV/GPS mode switch

If a flight plan is loaded into the MFD (GPS) this switch can be used to link autopilot NAV mode to GPS flight plan (LNAV). Make sure this switch is in NAV position if performing an automated ILS approach.



6.2: OTHER CONTROLS: LEFT LOWER PANEL



6.2.1: Landing & Taxi Light Switch

- ☐ LANDING
- ☐ TAXI
- ☐ OFF

6.2.2: Anti Collision Lights

- ☐ AIR (Strobe + Beacon)
- ☐ GND (Beacon only)
- ☐ OFF

6.2.3: Position Lights (NAV)

6.2.4: Recognition Light

6.2.5: Wing Inspection Light (left wing only)

6.2.6: No Smoking & Fasten Seatbelts light

- ☐ NO SMK & FASTEN SEATBELTS
- ☐ OFF
- ☐ FASTEN SEATBELTS

6.2.7: Pitot/Static heat switches

6.2.8: Windshield heat switches

- ☐ High (Defrost)
- ☐ Low (Defog/normal)
- ☐ OFF

6.2.9: Forward Wing anti-ice switches

6.2.10: Main Wing Anti-ice switches

- ☐ Automatic
- ☐ OFF
- ☐ Manual (force ON)

6.2.11: Engine Ice Vane anti-ice

In this simulation, this function operates as engine anti-ice

6.2.12: Engine Boots De-ice

In this simulation, this function operates as propeller de-ice

6.2.13: System Test Knob

Rotate the knob to the desired position to select the system to be tested, then press on the knob to initiate test. The central area of the knob is to be clicked for this. the leftmost and rightmost areas are marked with "-" and "+" cursors respectively to select position.

6.3: OTHER CONTROLS: CENTER LOWER PANEL



6.3.1: Emergency Bus Disconnect

Isolates L & R electrical busses.

- 🕒 EMER: forces re-connect for emergency situations
- 🕒 NORM: normal state: auto-controlled
- 🕒 BUS DISC: forces BUS isolation

The electrical busses are L, R, and ESSENTIAL:

With the switch in NORM position, each bus is powered by the respective generator, and interconnected. In case of a single generator failure, both Busses will be powered by a single generator. If both generators are failed (GEN switches to ON but no power output), only the essential BUS will be powered by the battery, unless the switch is moved to the EMER position.

With the switch in BUS DISC position, the busses are isolated from each other, and powered only by their respective generator. The battery will provide power only to the essential bus.

6.3.2: Battery Switch

6.3.3: L & R Generator Switches

Reset function not simulated.

6.3.4: Avionics Switch

- 🕒 ON: normal operation
- 🕒 COM1 only: used mainly for battery saving during start-up
- 🕒 OFF

Most avionics are fed by the AC inverter system. This is a series master switch. First power the inverters, then the avionics. To shut down, first turn OFF avionics then the inverters.

6.3.5: Primary Inverter

Connected to the essential DC Bus. All equipment that is powered by the primary inverter can also be powered by the secondary inverter.

6.3.6: Secondary Inverter

Connected to the essential DC Bus. All equipment powered by the secondary inverter is lost if the SEC inverter is failed. Additionally, if the primary inverter fails, the secondary inverter replaces it, and all the loads originally connected to the SEC inverters are disconnected.

6.3.7: Parking Brake Handle

6.3.8: Landing Gear Lever & Position Lights

6.3.9: Steering System indicator light & toggle

Steering can be employed in Take-Off mode, controlled by the rudder pedals; or in TAXI mode, controlled by the yoke, for speeds under 35 KIAS. Press the button to toggle between modes.

6.3.10: Hydraulic Pressure indicator

6.3.11: Hydraulic pump switch

The hydraulic system is powered by an electric pump fed by the Right DC Bus. The Hydraulic system powers the landing gear and steering system. The system works "On demand": on ground or with landing gear extended it provides a pressure around 1200 PSI for braking and steering. When the landing gear is in motion, the pressure is increased to about 3000 PSI. In flight, with gear retracted, the pump is automatically turned OFF and pressure drops to 0 until the landing gear is commanded extended.

6.3.12: Flap Position Indicator

Flaps are electrically actuated. The topmost rotating pointers indicate forward wing flap deflection. The leftmost sliding arrow indicates outboard flap position, and the rightmost sliding arrow indicates inboard flap position.

If the positions disagree with the intended flap deflection for a given flap setting, the "FLAP SYNC" light will illuminate in the annunciator panel.



6.4: OTHER CONTROLS: RIGHT LOWER PANEL



6.4.1: Automatic Cockpit+Cabin Temperature Select Knob

Defaults to 22°C. Use Battery Temp in Multi Function Indicator to determine cabin temperature (if battery is not heavily charging or discharging).

6.4.2: Automatic\manual temperature regulation selector

If in AUTO mode, use [1] to select temperature, otherwise use knob [5] and monitor temperature. If this knob is positioned to OFF, the cabin temperature will slowly equal external ambient temperature.

6.4.3: Floor Air Fan switch

All fan switches increase the speed at which cabin temperature is regulated.

6.4.4: Cockpit Blower Fan

6.4.5: Manual cabin temperature regulation knob

See description of [2].

6.4.6: Emergency Bleed Air duct

In case of a loss in cabin pressure, activating this switch can help maintain partial pressurization if enough speed is maintained.

6.4.7: Left & Right Engine Bleed Air switches

6.4.8: Cabin Pressurization Dump Valve

6.4.9: Manual cabin pressurization altitude regulator

- ⬆ UP: cabin CLIMB
- ⬇ OFF: cabin altitude HOLD
- ⬇ DN: cabin descent

6.4.10: Manual cabin rate regulation knob

6.4.11: Cabin pressurization AUTO/Manual

Setting the switch to MANUAL will activate controls [9] and [10], otherwise [13] is used

6.4.12: CAB SEL/AUTOSCHED switch

CAB SEL mode uses [13] to set target cabin altitude & rate, while AUTO SCHED mode activates an automatic altitude & rate mode optimized for passenger comfort.

6.4.13: Pressurization control panel

Operative only if [11] is set to AUTO. Needle indicates target cabin altitude or landing airport elevation.

If [12] is in CAB SEL position:

- Use Knob A to select target cabin altitude
- Use Knob R to select cabin climb rate.
- Use Knob B to set current barometric correction

If [12] is in AUTO SCHED Mode

- Use KNOB A to select landing airport elevation
- Knob R inoperative
- Use Knob B to select current barometric correction.

If the FAULT light is illuminated, attempt using manual cabin pressurization control setting [11] to MAN.

6.4.14: Cabin Altimeter & Pressure Differential

Monitor not to exceed a cabin altitude of 8000 ft and a differential of 9 PSI.

6.4.15: Cabin Variometer

Regulated via the R knob in [13] or automatically if in AUTO SCHED mode.

6.4.16: Air Heat Switch

Air heating system. Essential for cabin temperature regulation

6.4.17: Freon Air conditioning system

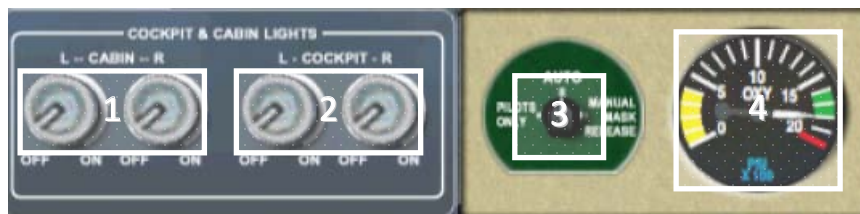
Air conditioning system. Essential for cabin temperature regulation

- 🕒 COOL: air conditioning ON
- 🕒 FAN: air conditioning OFF, FAN only
- 🕒 OFF

6.4.18: Air Conditioner Cockpit Fan

6.4.19: Air Conditioner Cabin Fan

6.5: OTHER CONTROLS: LEFT SIDE COCKPIT WALL



6.5.1: Passenger Cabin Lighting

6.5.2: Cockpit Lighting

Can also be operated via the toggle buttons located on both lower corners of the instrument panel

6.5.3: Oxygen System Knob

In AUTO position, oxygen masks will automatically deploy above a critical cabin altitude.

In PILOTS ONLY position, oxygen masks will automatically deploy only for pilot & copilot.

In MANUAL MASK RELEASE, oxygen masks are forced to deploy.

6.5.4: Oxygen bottle pressure indicator

6.6: QUICK DYNAMIC CHECKLIST

| PRE - FLIGHT & START-UP CHECK LIST | | |
|------------------------------------|-------------------|-------------------------------------|
| - PARKING BRAKE: | ON | <input type="checkbox"/> |
| - GEAR HANDLE: | DOWN | <input checked="" type="checkbox"/> |
| - BATTERY SWITCH: | BAT | <input checked="" type="checkbox"/> |
| - BUS VOLTAGE: | CHECK > 21.5 V | <input checked="" type="checkbox"/> |
| - CAB DOOR WARNING LIGHT: | ON (IF DOOR OPEN) | <input type="checkbox"/> |
| - FUEL CROSS FEED: | OFF | <input checked="" type="checkbox"/> |
| - TRIM SURFACES: | NEUTRAL | <input checked="" type="checkbox"/> |
| - OXYGEN PRESSURE: | CHECK | <input checked="" type="checkbox"/> |
| Before Engine Startup: | | |
| - CAB DOOR WARNING LIGHT: | OFF (DOOR CLOSED) | <input checked="" type="checkbox"/> |
| - AVIONICS: | OFF or COM1 ONLY | <input type="checkbox"/> |
| - BATTERY TEMPERATURE | CHECK < 120 °F | <input checked="" type="checkbox"/> |
| - SEAT BELTS & NO SMOKING | ON | <input type="checkbox"/> |
| Normal Startup: | | |
| - ANTI COLN LIGHTS: | GND | <input type="checkbox"/> |
| - POWER LEVER: | IDLE | <input checked="" type="checkbox"/> |
| - CONDITION LEVER: | CUT OFF | <input type="checkbox"/> |
| - FIRE-WALL SHUT-OFF VALVE | CHECK OPEN | <input checked="" type="checkbox"/> |
| - FUEL PUMP: | MAIN | <input checked="" type="checkbox"/> |
| - FUEL PRESSURE LIGHT: | OFF | <input checked="" type="checkbox"/> |
| - BLEED AIR SWITCHES: | OFF | <input type="checkbox"/> |
| - IGNITION SWITCHES: | NORM | <input checked="" type="checkbox"/> |
| - ENGINE STARTER: | START | <input type="checkbox"/> |
| - CONDITION LEVER (At 12% NG): | GROUND IDLE | <input type="checkbox"/> |
| - ENGINE STARTER: | CHECK OFF | <input checked="" type="checkbox"/> |
| - ITT: | 750°C MAX | <input checked="" type="checkbox"/> |
| - OIL PRESSURE: | 60 PSI MIN | <input checked="" type="checkbox"/> |
| - OIL TEMPERATURE: | 110°C MAX | <input checked="" type="checkbox"/> |
| - NG RPM: | 45% MIN | <input checked="" type="checkbox"/> |
| - Np RPM: | 900 RPM MIN | <input checked="" type="checkbox"/> |
| - CONDITION LEVER: | FLIGHT IDLE | <input type="checkbox"/> |
| - GENERATOR: | ON | <input checked="" type="checkbox"/> |

The Quick Dynamic Checklist can be invoked via the Audio Panel (CHK button) or by pressing SHIFT+8. The checklist is sequential and does not require all marks to be "ticked" as an operation to be performed further down the list may invalidate a previous one. Simply follow the procedures in order, and select the current flight phase via the tabs on the right:

- Start-Up
- Taxi & Take-off
- Climb, Cruise, Descent & Landing
- Shut Down

By default, the aircraft is initialized in an almost-ready to fly state. The "Cold and Dark" orange button can be used to instantly set up the aircraft in a completely off status. Following this quick dynamic checklist is enough to safely configure and start all the aircraft systems, however this manual provides more detailed checklists in SECTION 3 & SECTION 4.

6.7: FLYING THE P-180

6.7.1: Taxiing

The P-180 requires just a small amount of power to taxi. The condition levers are best set at FLIGHT IDLE, and power needs to be applied in order to stay above 900 RPM. With power levers at idle the propellers move into beta range, stabilizing just above 900 RPM when the condition levers are set to LOW IDLE. Increasing power will command minimum pitch to the propellers, and the subsequent generation of thrust will cause a RPM loss to be compensated with the use of the power levers. Taxi by maintaining RPM in the 900 - 1300 RPM range.

6.7.2: Taking Off

Advance condition levers to MAX RPM. Failure to do so may cause a significant increase in takeoff distance. Switch Autofeather to ON. No take-offs are authorized with inoperative autofeather. Lower flaps to MID position, and advance power levers to maximum. Rotation speed is around 106 KIAS. The aircraft will quickly stop from requiring a back pressure to maintain a climbing attitude as it accelerates. Flaps retract slowly, allowing the aircraft to accelerate and thus avoiding the need for significant trim adjustments. Above 160 KIAS switch OFF landing lights, retract flaps before 170 KIAS and landing gear before 180 KIAS (maximum operating speeds).

6.7.3: Climbing

160 KIAS is the ideal climb speed. The autopilot can configure the aircraft for an ideal climb and follow an optimized speed & vertical speed climb profile up to 41000 ft (maximum operating altitude). Simply select cruising altitude in the altitude selector, engage autopilot and select CLM mode. It is possible to climb simply by using attitude hold mode, and tune pitch attitude by applying back or forward pressure on the control yoke as needed, or by using VS (Vertical speed) mode and selecting the target VS via the VSI bug. Note that VS and pitch hold mode will not level off at the selected target altitude unless ALS mode is selected as well. If not using CLM mode, remaining safely within the flight envelope is responsibility of the pilot.

6.7.4: Cruising

The P-180 reaches its maximum ground speed at an altitude of 28000 ft, flying at M0.67. Recommended power setting calls for condition levers at 1800 RPM, and an indicated airspeed of about 253 KIAS.

6.7.5: Descent

The P-180 has no airbrakes. Prior to initiating descent, it is necessary to bleed off some speed if flying near maximum cruise performance (near 250 KIAS or MM_0). The autopilot DSC mode will hold a 200 KIAS, 1800 fpm descent until reaching target altitude.

6.7.6: Approach and landing

Slow down below 160 KIAS to lower flaps to MID position. The landing gear can be lowered below 180 KIAS. At about 140 KIAS, extend flaps to DN position. Perform final approach at about 120 KIAS. Full flaps stall speed is 96 KIAS.

At an altitude of about 20 ft from the runway, throttle back to idle and perform the flaring maneuver. Apply reverse thrust as needed, and brakes below 80 KIAS. avoid use of reverse thrust below 40 KIAS. Do not apply full brakes and reverse thrust until full stop, as the reversed thrust and the sudden release of the front gear suspension when the aircraft stops can cause the front wheel to leave the ground and possibly a tail strike.



SECTION 7: INSTALLATION & OPTIONS

7.0: INSTALLATION

The Piaggio P-180 V3.0 package is provided as a single ZIP file. All that is required is to unzip the archive into your main Flight Simulator folder. It is VERY IMPORTANT not to change the aircraft destination folder or the aircraft folder name, as this will affect the internal sound engine of this aircraft package. Be sure to install the correct version for your Flight Simulator (FS-2004 or FS-X). Neither of the packages will work properly in the wrong simulator version.

Installation of FSUIPC by Pete Dowson is highly suggested but not mandatory. An unregistered version is all that this aircraft requires, download the correct version for your simulator (3.99 for FS-2004, 4.x for FS-X) (download [here](#)).

Additionally, it includes the installation of the excellent ILH TCAS (TCAS II V7) freeware package by Lee Herrington.

You can read the documentation of this excellent package at:

http://people.csail.mit.edu/ilh/fs/ILH_TCAS_doc.

7.1: OPTIONS

7.1.1: 4/3 or Widescreen 2D panel

The 2D cockpit is available in Widescreen (16/9) and standard (4/3) formats. The Wide Screen version is installed by default, and has a resolution of 1920x1080 px. The 4/3 standard resolution panel has a resolution of 1280x960 px.

To use the 4/3 aspect ratio panel:

1. Navigate to your P180 folder within Flight Simulator:
 - a. FS-2004: [FS9 folder]/aircraft/P180_V2011
 - b. FS-X: [FS-X folder]/SimObjects/Airplanes/P180_V2011
2. Rename the *panel* folder into *panel.169* (or something else)
3. Rename the *panel.4-3* folder into *panel*

7.1.2: Virtual cockpit shadows (FS-X only)

By default, the FS-X edition is installed with DX10 Virtual Cockpit shadow mapping active. To deactivate:

1. Navigate to your P180 model folder within Flight Simulator:
[FS-X folder]/SimObjects/Airplanes/P180_V2011/model
2. open model.cfg with notepad (or text editor)
3. replace all the first 3 lines with:

```
[models]
normal=avanti
interior=avanti_interior_NVCS
```

4. Save File