SECTION V - ALL WEATHER OPERATIONS

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LIST OF FIGURES

GENERAL

This section gives specific information and procedures for C-295 aircraft all-weather operating.

TURBULENCE AND THUNDERSTORMS

The aircraft must not be operated under severe turbulence conditions. When airborne, Weather Radar helps to both detect and avoid turbulence and or thunderstorms areas. If these cannot be avoided, recommended speed for severe turbulence is given at "Operating Limitations" section.

When operating at turbulence and or thunderstorm areas, secure or stow all loose objects and equipment and make sure all seat-belts are fastened. Both crew and passenger's movement must be restricted to a minimum in order to reduce personnel injuries risk.

Flight crew must keep monitoring instruments as normally, with emphasis on both EADI and power settings.

Attitude must be maintained rather than altitude or speed. Particular attention must be paid to ICE FORM caution annunciator. If such annunciator comes on, both anti-icing and de-icing systems must be connected. If ice formation conditions are detected, anti-icing systems must be switched-on immediately.

When operating both at night and in thunderstorm areas, turn-on every aircraft internal light: overhead, instruments, and cockpit consoles. Cargo cabin should be lighted by means of all overhead white lights.

COLD WEATHER OPERATION

ICING CONDITIONS

Icing conditions are always to be considered if indicated outside temperature is 5ºC or below, and any moisture form is visible (clouds, fog with one mile, or less, visibility, rain, snow, sleet and ice crystals).

Icing conditions do also exist when ground outside temperature for takeoff purposes, is 5ºC or below. When operating on ramps, taxiways or runways, surface snow, ice, standing water, or slush may be engine-ingested or ease ice accretion on engines, nacelles or engine sensor probes.

ENGINE AIR INLET DE-ICING

Engine air inlet de-icing system must be turned on at every ground/airborne operation when icing conditions do exist or are envisaged.

Do not rely solely on airframe visual icing or ice detector information to turn engine air inlet de-icing on. Use both temperature and visual moisture criteria as above specified at "Icing Conditions" section.

SURFACE DE-ICING

Both wing and tail leading edges pneumatic de-icing boots must be activated at first sign of ice accretion, no matters the exact location, or when ICE FORM caution annunciator comes on, whichever occurs first. The system must be operated in automatic or manual mode as required, to minimize airframe ice accretion effects.

Both wing and tail leading edge pneumatic de-icing boot system may be deactivated only after an entire de-icing cycle is completed and once leaving icing conditions.

SEVERE ICING CONDITIONS

WARNING

Severe icing may result from environmental conditions besides those for which the aircraft is certificated. Flight in freezing rain, freezing drizzle, and mixed icing conditions (supercooled liquid water and ice crystals) may result in ice accretion on protected surfaces exceeding ice protection system capabilities. Ice protection systems usage avoids ice accretion effects that might seriously degrade both aircraft performances and controllability.

While airborne, severe icing conditions exceeding those for which the aircraft is certificated, shall be determined by the following indications. If one or more do exist, immediately request ATC priority to get both new route and altitude in order to avoid severe icing conditions.

– Ice accretion on wings upper surface protected areas.

– Ice accretion on airframe areas where ice does not usually form.

– Unusually heavy ice accretion on propeller spinner.

– Unusual control wheel deflections with automatic pilot engaged.

– Heavy wing tendency with unusual lateral trim requirements (e.g. trim requirements not due to fuel unbalance) and or jerky control wheel.

Since automatic pilot may mask tactile indications concerning severe ice accretion, automatic pilot operation is prohibited under severe icing conditions.

All icing detection lights must be operative prior to flight at night under icing conditions.

PREFLIGHT INSPECTION

EXTERNAL SAFETY INSPECTION

Any ice, snow or slush accretion on aircraft surface shall be checked. If any is observed, notify both C/M-1 and ground crew in order to arrange both de-icing and anti-icing operations. Refer to BEFORE TAKEOFF to see general considerations for de-icing operations.

1. Wheel Chocks.....SET

   Make sure wheel chocks are in place, in order to minimize skidding risk. Keep chocks at main landing gear, if required.

EXTERNAL INSPECTION

Cleaning of surfaces degraded by snow, ice or frost accretion is a maintenance operation. C/Ms should be fully alert, while performing preflight inspections, to check locations where ice could be formed and thus affect normal system operation.

1. Aircraft External Surface..... Ice, Snow, Frost and Slush Free Conditions

   All aircraft surfaces (wing, vertical and horizontal stabilizers and its control surfaces, and flaps) must be cleared of snow, ice and frost before takeoff.

Thin frost is permitted on external surfaces provided ADC (Air Data Computer) static heads are cleared. Thin frost is defined as a uniform white fine crystal-texture deposit through which surface features such as paint lines, markings or letters can be distinguished. Thin ice must not be confused with rime ice that may form under freezing-fog conditions and which is not acceptable.

All snow, even thin layers of it, must be cleared from both nose radome and fuselage. Any snow presence is likely to melt on windshield and obscure vision during takeoff.

Any anti-icing fluid on cockpit windows must be cleared before takeoff as this can affect windshield wipers operation.

2. Pitot Tubes and Static Heads ..... Snow and Ice Free Conditions

   Although both Pitot tubes and Static Heads are electrically heated, their frontal areas must be inspected. Snow and ice must be completely wiped-out from an area of up to 1m in front of them. Any snow or ice accretion distorts airflow and leads to erratic ADC indications.

3. Wheels and Brakes ..... CHECK

   Check brakes are ice-free and tyres are not stuck to the ground. Check correct inflation of tyres. Do not move the aircraft until wheels are free cleared.

4. Landing Gear Assemblies ..... Ice, Snow and Slush Free Conditions

   Check nose and main landing gear are free of ice, snow and slush.

   Check landing gear legs and doors are free of ice, snow and slush.

5. Engine and Engine Inlets ..... Snow and Ice Free Conditions

   Check both engines and engine inlets are free of snow and ice accretions.

   Check birdcatcher outlet is completely ice-free.

NOTE

Glycol heated to 38ºC may be used to clear any ice accretion at birdcatcher outlet.

6. Avionics compartments NACA Intakes ..... Snow and Ice Free Conditions
7. Air Conditioning Inlet and Outlet ..... Snow and Ice Free Conditions
8. Fuel Tank Vents ..... Snow and Ice Free Conditions

COCKPIT PREPARATION

1. [ICE PROTECTION panel ..... Check / Off] 1

   Perform diverse anti-icing and de-icing systems checks as specified at "Taxiing" of "Normal Procedures" section.

ENGINE STARTING

GENERAL

Snow or ice ingestion into engine may lead to flameout. Therefore, before starting, remove accumulated snow or ice from engine intake, and delay covers removal just shortly before start procedure.

Engine start can be difficult due to increased viscosity of engine oil at low temperature. Use GPU or battery pack for optimum starter motor performance.

The engine anti-icing system is provided by the oil heat exchanger. However, effective engine anti-icing operation occurs only when the engine oil temperature exceeds 45ºC (white triangle on the scale). In icing conditions, do not unfeather propellers on the ground until the oil temperature is at or above this value.

The engine air-inlet de-icing is effected through the inflation of the corresponding air inlet boot.

Whether icing conditions are present or not, the pitot and AOA vane heating systems, as well as the ice detector, must be turned on.

Engine inlet de-icing system effect on performances is shown in the Performance Data Manual.

When icing conditions are known before flight, perform a ground check on the Ice Protection system with the engines running, as follows:

PROPELLER DE-ICING SYSTEM CHECK

1. L de-ice pushbutton .....CHECK / OFF 1

   Press-in the pushbutton, checking FAIL light comes on momentarily and that the corresponding P/D-ICE warning is shortly IEDS-displayed. The warning should then go off and the ON light comes on.

2. R de-ice pushbutton.....CHECK / OFF 1

   Press-in the pushbutton, checking FAIL light comes on momentarily and that the corresponding P/D-ICE warning is shortly IEDS-displayed. The warning should then go off and the ON light comes on.

CAUTION

Keep the test time below 2 minutes above 15ºC. Extended operation of the propeller de-icing system when above that temperature may damage the de-icer and or blades.

WING AND TAIL DE-ICING CHECK

Set the de-icing monitoring switch to TEST and check that the four manual de-icing pushbuttons come ON. Then set the switch to LAMPS MON and the mode selector knob to Light ICE and check that the OW, CTR, INR and TAIL pushbuttons come ON for about six seconds, and then go out in that order, at which time return the knob to MAN and the switch to OFF, then press SHIFT on any SWRS panel to turn off the ON light.

ENGINE AIR INLET ANTI-ICING CHECK

1. L ENG de-icing pushbutton.....CHECK / OFF 1

   Check that the ON light on the pushbutton comes on.

2. R ENG de-icing pushbutton.....CHECK / OFF 1

   Check that the ON light on the pushbutton comes on.

TAXIING & TAKEOFF

GENERAL

Taxiing on compacted snow, slush or ice is dangerous, particularly when close to another aircraft, vehicles or snow drifts. Whenever possible, taxi slowly making wide turns.

When taxiing under rain or damp conditions, use windshield wipers to improve visibility.

If the aircraft is going to taxi-or wait behind another aircraft, a greater separation must be observed. Exhaust gases from preceding aircraft may remove protective fluid from wings and engine inlets leading edges.

ANTI-ICING CHECKS

Engine anti-icing system is provided by oil heat exchanger. However, effective engine anti-icing operation takes place only when engine oil temperature exceeds 45ºC (white triangle on the scale). Under icing conditions, do not takeoff until oil temperature is at or above, this value.

Engine air-inlet de-icing is effected through the corresponding air inlet boot inflating.

Whether icing conditions are present or not, both Pitot and AOA vane heating systems, as well as ice detector, must be turned on.

Engine inlet de-icing system effects on performances are given on Performance Data Manual.

When icing conditions are known before flight, perform an engine-running Ice Protection System ground check as follows:

PROPELLER DE-ICING SYSTEM CHECK

1. L de-icing Pushbutton.....CHECK / OFF 1

   Press-in the pushbutton, checking FAIL light comes on momentarily and that the corresponding P/D-ICE warning is shortly IEDS-displayed. The warning should then go off and the ON light comes on.

2. R de-icing Pushbutton.....CHECK / OFF 1

   Press-in the pushbutton, checking FAIL light comes on momentarily and that the corresponding P/D-ICE warning is shortly IEDS-displayed. The warning should then go off and the ON light comes on.

CAUTION

Keep test time below 2 minutes above 15ºC. Propeller de-icing system extended operation above that temperature may damage both de-icer and or blades.

WING AND TAIL DE-ICING CHECK

Set de-icing monitoring switch to TEST and check all four manual de-icing pushbuttons come ON. Set switch to LAMPS MON and mode selector knob to Light ICE and check all OW, CTR, INR and TAIL pushbuttons come on for about six seconds, and then go off in that order at which time return knob to MAN and switch to OFF, then press SHIFT on any SWRS panel to turn off ON light.

ENGINE AIR INLET ANTI-ICING CHECK

1. L ENG Engine Air Inlet De-Icing Pushbutton ..... Press-in 1

   Check pushbutton ON light comes on. Press-out to show OFF.

2. R ENG Engine Air Inlet De-Icing Pushbutton ..... Press-in 1

   Check pushbutton ON light comes on. Press-out to show OFF.

TAXIING

Do not use power above FI until oil temperature exceeds 45ºC. Ground operation with lower oil temperature is acceptable.

1. Speed and Directional Control ..... Hold 1/2

   Use minimum power for both departure and taxiing, and hold a low speed (< 5 kt).

   Bear in mind any possible damage to personnel and equipment due to snow/ice as expelled while engines accelerate.

   It is not recommended to brake at ice-or icing, temperatures due to both wheels locking and aircraft skidding risk. Under these conditions, use reverse thrust and differential power to decelerate and turn the aircraft. With lower temperature ice/snow/slush, brakes are more effective than in previous case.

   Nosewheel steering must be operated smoothly. On compact snow nosewheel may move rather differently from aircraft direction. If this happens, the aircraft must be gently stopped, nosewheel shall be straightened and taxiing resumed.

2. Flaps ..... Retracted 2

   Leave flaps retracted for as long as possible before moving to takeoff position. This is to prevent ice snow slush accretions between flaps and wings.

3. Flight Controls ..... Check 1/2

   Surfaces must be snow/ice cleared before checking flight controls. If abnormal resistance is detected, the system must be de-iced again.

   A full displacement of every flight control must be made throughout their entire range of movement. Flaps must then be set takeoff position.

   Wait until flight control checks and flap selection have been completed before reading the Taxiing Checklist.

BEFORE TAKEOFF

Bear in mind weather conditions, taxiing conditions, taxiing time, waiting time and other relevant factors. If C/M in command has any doubts as to whether the aircraft is aerodynamically clean, he must carry out a visual inspection or return to the ramp.

To avoid fluids ingestion into the engine during aircraft de-icing and anti-icing operations:

– Keep engines at GI, and disconnect bleeds to avoid cabin air contamination.

– If a de-icing gantry is used, shut down both engines.

– During propeller de-icing, shut down both engines and check that no propeller blade is in front of the air intake.

– Clean the engine intake area of excess de-icing fluid.

TAKEOFF

If taking-off from a skidding runway, always bear in mind that nosewheel may skid and do envisage possible corrective actions. C/M-1 must keep his left hand on nosewheel steering wheel.

Do not anticipate rotation to raise nosewheel out of slush.

WARNING

Do not takeoff with frost, ice or snow on wings profiles, tail surfaces, control surfaces, propellers or engine air inlets.

CLIMB & CRUISE

FLIGHT UNDER ICING CONDITIONS

When icing conditions are encountered, proceed as follows.

Ensure both engine air inlet de-icing system and ice detector, are turned on. While on ground, propeller de-icing system must also be turned on.

NOTE

AC GEN annunciator will come on whenever propeller is feathered and engine air inlet de-icing system is turned on. This annunciator should be disregarded.

In-flight icing warning is given by evidence of windshield wiper ice accretion or if ICE FORM annunciator comes on. While flying at night, use a hand torch to light glareshield edge.

After icing warning is received at outside temperatures above -10ºC, turn propeller de-icing switch to LT ICE position immediately. If both noise change and vibration, accompanied by possible loss of performance (as detected by decreasing airspeed or rate of climb, with no power or configuration changes) is later encountered at power plant, set engine speed to 100% NP. If conditions still persist, set propeller de-icing switch to HVY ICE position. At indicated outside temperatures below -10ºC set propeller de-icing switch to HVY ICE position without delay.

Do monitor ice accretions on wings. Except while taking-off, turn airframe de-icing mode selector to LT ICE position when ice accretion is first detected. This will force SWRS to come on automatically. Then, turn selector to HVY ICE mode or leave it at LT ICE, as appropriate.

With known or suspected airframe ice accretion, keep airspeed above the value shown on graph Figure 5-1.

If any unusual control wheel deflection is observed while in automatic flight, firmly hold the control column and disengage the auto pilot.

NOTE

Before de-icing system is disconnected, make sure a full system cycle has been completed.

The aircraft may be landed with airframe ice accretion with flaps at 23º at a speed of 1.23 Vs + 15 KIAS or V_{MCL}+5 KIAS, whichever greater, providing crosswind does not exceed 20 Knots. Gross landing distance will increase 20% with respect to that with flaps at 23º.

SEVERE ICING CONDITIONS

NOTE

The following weather conditions may result in severe icing conditions:

- Visible Rain at ambient air temperatures below 0ºC.
- Splashing splattering water droplets at outside air temperatures below 0ºC.

PROCEDURES FOR LEAVING SEVERE ICING CONDITIONS

Procedures are applicable to all flight phases from takeoff to landing. Monitor outside air temperature. While severe icing may form at temperatures as cold as -18ºC, increased monitoring is warranted at temperatures around freezing with visible moisture present. If indications referred at "Cold Weather Operation" (Operation Under Icing Conditions) to identify severe icing conditions are observed, proceed as follows:

- Immediately request ATC priority for new heading/altitude to exit severe icing conditions in order to avoid extended exposure to flight conditions exceeding those for which the aircraft has been certificated.
- Avoid abrupt or excessive manoeuvring that might intensify control difficulties.
- If fitted, do not engage autopilot.
- If auto pilot is engaged, hold control column firmly and disengage autopilot.
- Ensure that airspeed complies with the corresponding value on Figure 5-1.
- Do not extend flaps for long while operating under severe icing conditions. Operating with flaps extended may result in AOA decreasing, thus easing greater ice accretions on wings upper surfaces and possibly behind protected areas. If flaps are extended, do not retract them until airframe is ice-free. In case of airframe significant ice accretion, land at 1.23 Vs +15 KIAS or V_{MCL} + 5 KIAS, whichever higher, with flaps at 23º.
- Notify ATC.

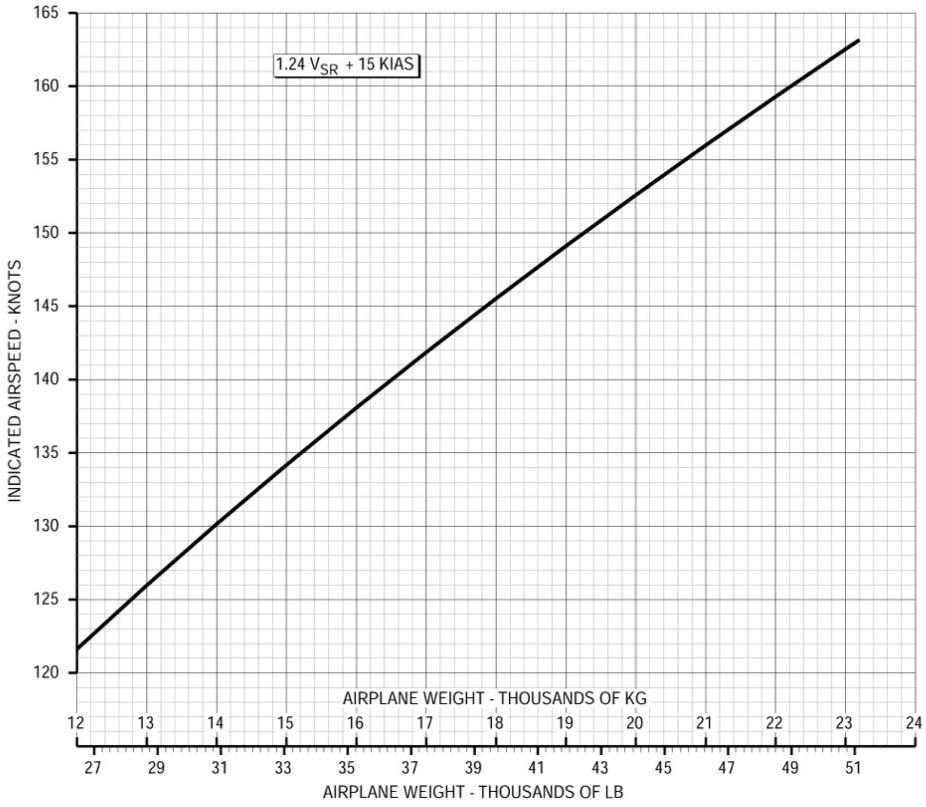

Figure 5-1 Minimum Airspeeds in Ice Formation Conditions

AFTER LEAVING ICING CONDITIONS

Turn off engine inlet de-icing system. However if ice has been encountered, do not press-in SHIFT at SWRS panel (to turn off ON light) until visually confirming the whole aircraft is free of ice. Experience has shown that in headwind, if the gap between wing boots, wingtips frontal corners and propeller spinner are ice-free, the airframe is free of ice as well.

When airframe ice accretion is known or envisaged, the aircraft may be landed with flaps at 23º, 1.23 V_s + 15 KIAS or V_{MCL} + 5 KIAS, whichever higher (for specific calculations of V_{MCL} speed, refer to Performance Data Manual); however, if SWRS panel SHIFT still shows ON light on, crosswind component must not exceed 20 Knots. Gross landing distance will increase 20%. (For landing distance calculations, refer to Performance Data Manual).

DESCENT, CIRCUIT AND LANDING

DESCENT

Get properly informed on runway expected conditions. Snow, ice or slush on the runway will reduce braking efficiency and increase stopping distance.

Keep both anti-icing and de-icing systems connected. This avoids the risk of a required go-around performance under icing conditions without ice protection.

Landing with airframe ice accretion after passing through an icing zone, is performed with flaps at 23º and speed 1.23 V_S +15 KIAS or V_{MCL} + 5 KIAS, whichever higher. Required landing distance is increased 20% with respect to the corresponding value for flaps at 23º.

CIRCUIT

Follow normal procedure according to Section III.

LANDING

1. Nose Wheel Contact ..... Obtain 1

   Down nosewheel to contact ground as soon as possible. Aircraft lower flight position reduces wings lift, thus increasing braking effectiveness. Nosewheel angular force, helps keeping aircraft aligned.

2. Reverse Thrust..... As required 2

   Reverse thrust operation with loose, or drifting, snow involves visibility problems, specially at low speeds.

3. Rudder Control..... Hold 1

   Reverse thrust operation in cross wind, may force the aircraft to drift leewards the runway, even if the aircraft is turned towards wind direction. It is therefore essential to maintain absolute control on aircraft direction. If the aircraft begins to drift off-course, reduce reverse thrust on both engines until direction stabilizes again.

   Increasing reverse thrust significantly reduces rudder effectiveness. This increases differential braking requirement to keep directional control.

4. Brakes ..... As required 1

   On a skidding runway, operate normal braking. Any brake pedals pressure change will reduce braking action.

AFTER LANDING

CAUTION

Either engine stopping or propeller feathering, may alter traction and therefore affect aircraft controllability on icy or skidding surfaces.

1. Flaps..... 15º 2

   If approach was carried-out under icing conditions, or if the runway is snow/slush contaminated, do not retract flaps below 15º. This is intended to avoid airframe ice/slush damage.

2. ICE PROTECTION Panel .....OFF 1

PARKING

The aircraft is to be parked facing the wind, if practicable, particularly in case of snow or rain. Avoid parking on snow covered surface if possible.

Brakes, wheels and tyres heat is enough to melt brakes/wheels snow, ice or slush accretions beneath. Parking area must be cleared directly beneath the wheels. Positioning main landing gear over a thin layer of sand, or even a matt, may help to prevent them from freezing over paved surfaces.

1. Parking Brake..... Set 1

   Leave parking brake on until the aircraft is safely chocked in order to avoid any risk of skidding. Then release the brakes to avoid them freezing in position.

2. Flight Controls, Landing Gear and Engine ..... Inspect

   After parking, a careful inspection should be carried-out on flaps, flight controls, landing gear, wheel housings and engine inlets to detect any possible damage.

   Remove any snow, ice and or slush accretion from landing gear wheel housings.

3. Engine Covers..... Fit

   Fit engine covers and secure the propeller, if operationally feasible, to prevent the ingestion of ice and debris and to prevent power turbine from rotating while unlubricated.

If the aircraft is going to be parked for a long time, every engine and aircraft cover should be fitted. The propeller must be secured to prevent power turbine from rotating while unlubricated.

An aircraft log book entry is required for each flight if ice has been encountered. Engine air inlet must be inspected for ice accretion at the birdcatcher prior to the next flight.

All windows and doors must be shut.

If temperatures below freezing are envisaged, drain every drinking water systems, as well as any toilet and waste tank water, and remove batteries from service locations.

HOT WEATHER / DESERT OPERATION

Hot weather operation, as distinguished from desert operation, generally means operation in hot, humid atmosphere. High humidity usually results in the condensation of moisture throughout the aircraft. Possible results include malfunctioning of electrical equipment, rusting of steel parts, and the growth of fungi in vital areas of the airplane.

Desert operation generally means operation in very hot, dry, dusty, often windy atmosphere. Under such conditions, sand and dust will often be found in vital areas of the aircraft.

PREFLIGHT INSPECTION

Follow normal procedure according to Section III.

ENGINE STARTING

CAUTION

Do not attempt to start engines in a dust storm or sand storm. Dust or sand can damage the engine.

Before Engine Starting

CAUTION

During hot weather starting, make sure that the ITT is within limits (refer to Section I for ITT starting transient temperature limits).

Make sure that the fuel tank temperature is within limits (refer to Section I for Fuel Tank Temperature Limits).

When a ground power unit (GPU) is not available and the batteries are to be used to start the engines, increase the normal time interval between the start of the two engines.

Engine Start

Execute normal engine Start, as outlined in Section III.

After Start

If a dust storm or sand storm is present any time after engine starting, the aircraft should be turned crosswind and the engines shutdown.

TAXIING AND TAKEOFF

Taxiing

Execute normal taxiing, as outlined in Section III.

Use brakes as little as possible, to prevent overheating.

During Taxiing, if conditions permit, prevent movements of PL to high power with bleeds on.

Take-off

Follow normal procedure according to Section III.

Do not attempt to take-off in a dust storm or sand storm. Sand and dust will cause damage to internal engine parts. Turn the aircraft crosswind and shutdown the engines.

The air conditioning system should be switched off for take-off. Whenever possible, take-off using reduced power and using a 'rolling' take-off.

CLIMB AND CRUISE

Follow normal procedures according to Section III.

Avoid flying through dust or sand storms. If conditions permit, set power for less than maximum climb power.

DESCENT, CIRCUIT AND LANDING

Obtain information regarding storms in the vicinity of the landing area.

Follow normal procedures according to Section III.

During landing, if conditions permit, avoid the use of maximum reverse thrust.

PARKING

Prior to engine shutdown operate the engines below FI for at least 2 minutes; this might include low power Taxi operation.

Follow normal procedure according to Section III.

In prolonged parking, all aircraft and engine covers should be installed and, the propellers secured. This is to prevent dust and/or sand ingestion and non-lubricated power turbine rotation.

SALINE ENVIRONMENT OPERATION

PREFLIGHT INSPECTION

Follow normal procedure according to Section III.

ENGINE START-UP

Follow normal procedure according to Section III.

TAXIING AND TAKE-OFF

Follow normal procedures according to Section III.

CLIMB AND CRUISE

Follow normal procedures according to Section III.

DESCENT, CIRCUIT AND LANDING

Follow normal procedures according to Section III.

PARKING

Once in parking position, and before shutting down engines, whenever possible, ask ground/maintenance crew for cleaning salt inside the engines.

Follow normal procedure according to Section III.

During parking, all aircraft and engine covers should be installed.

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