INSTRUMENT FLIGHT PROCEDURES

SPATIAL DISORIENTATION

Spatial disorientation is possible if the pilot is not concentrating on attitude instruments, particularly if a true visual horizon is not available. During constant acceleration there is susceptibility to a phenomenon known as somatogravic illusion. This illusion causes the crewmember to falsely perceive increasing pitch attitude when the aircraft is in a constant flight path acceleration, or to falsely perceive decreasing pitch attitude when the aircraft is in a constant flight path deceleration. The magnitude of this illusion is exacerbated by the high rates and durations of acceleration and deceleration within the capabilities of the SR-71. The instinctive response, without reference to flight instruments, would normally be opposite to the actions required to recover to the desired attitude. The effects of this illusion can be minimized by vigilant monitoring of attitude instruments when a true visual horizon is not available.

PITOT-STATIC SYSTEMS

The pitot-static operated flight instruments are used for subsonic flight. The TDI should be used for acceleration to, during, and for deceleration from supersonic flight. Equivalent airspeeds (KEAS) and altitude information from the TDI can be used when subsonic, however, TDI response may not be as rapid as the ship system indication.

Angle of Attack Indication

The angle of attack indication is referenced to pitot total pressure and to the attitude probe on the Rosemount pitot-static boom. It is independent of static pressure. Pitot heat should be sufficient to keep both the pitot-static head and the angle of attack probe operating during icing conditions. If the pitot tube is completely blocked, both airspeed systems are unreliable and angle of attack may also be unreliable. Check for reasonable angle of attack indication by cross reference to the attitude gyros during turns.

BEFORE INSTRUMENT TAKEOFF

Set the pilot's ATT REF SELECT switch to INS, the DISPLAY MODE SEL switch as desired, and the ADI from 3 to 5 degrees nose low.

INSTRUMENT TAKEOFF AND CLIMB

Takeoff and climb under instrument conditions are identical to normal Takeoff and Climb procedures in Section II.

STEEP TURNS

Any bank angle 35° or greater is considered a steep turn. The aircraft is easily controlled on instruments in banks up to 60°; however, due to structural load restrictions, avoid bank angles in excess of 45°.

HOLDING

Holding patterns and descents between holding levels should be flown at 275 KIAS. Approximately 6400 rpm is required at FL 200 with normal conditions and 15,000 pounds of fuel remaining.

JET PENETRATION

Penetrations are flown at 275 KIAS with power set at approximately 5500 rpm. Initial rate of descent will be 3000 to 4000 fpm.

The landing gear may be used for additional drag during the penetration. Landing gear should be extended prior to the final approach fix. At normal approach gross weights, maintain 230 to 250 KIAS until final approach.

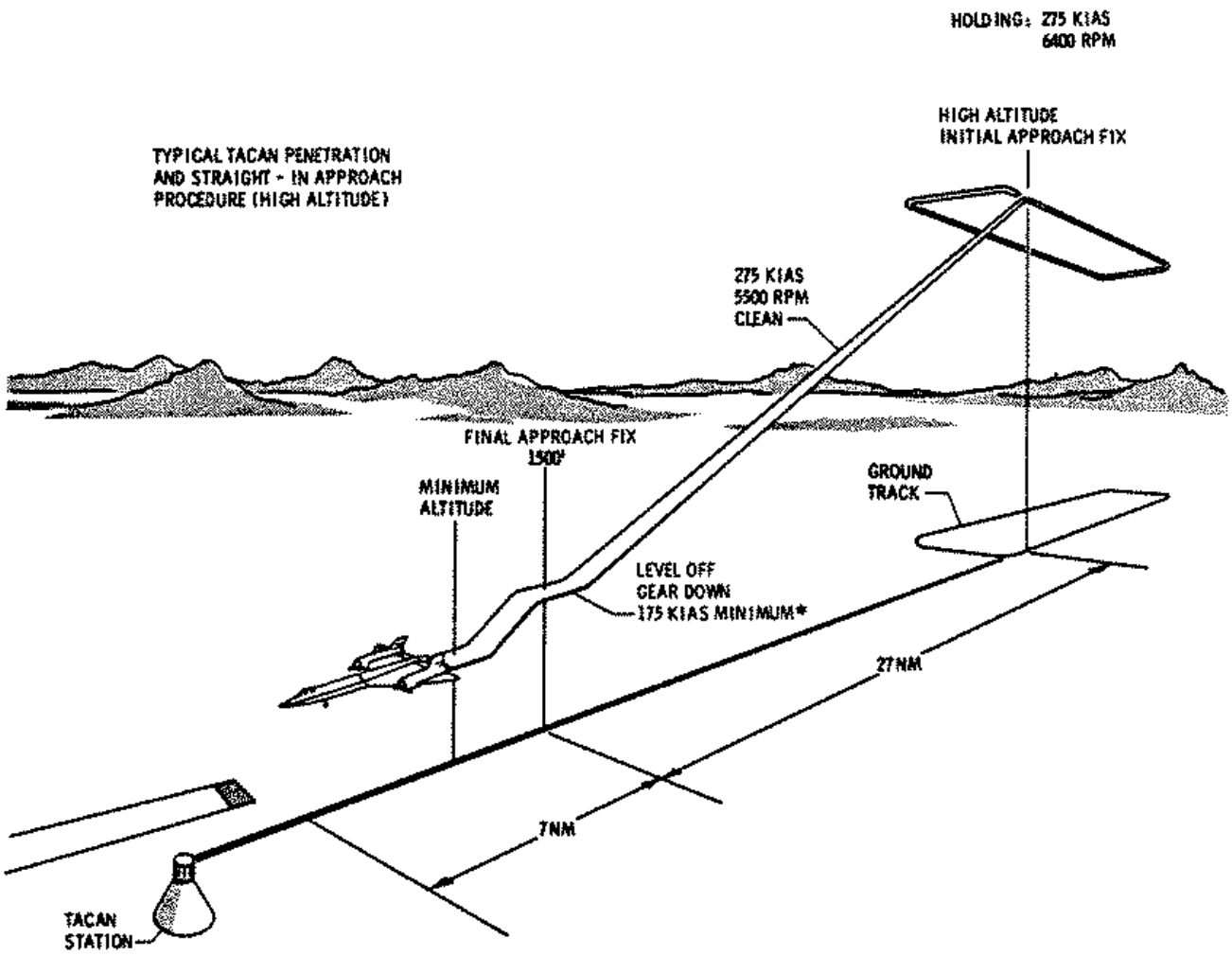
NOTE

Fuel required for a typical jet penetration is 1000 to 1700 pounds.

INSTRUMENT APPROACHES

Use normal traffic pattern airspeeds; refer to Section II, Before Landing.

JET PENETRATION



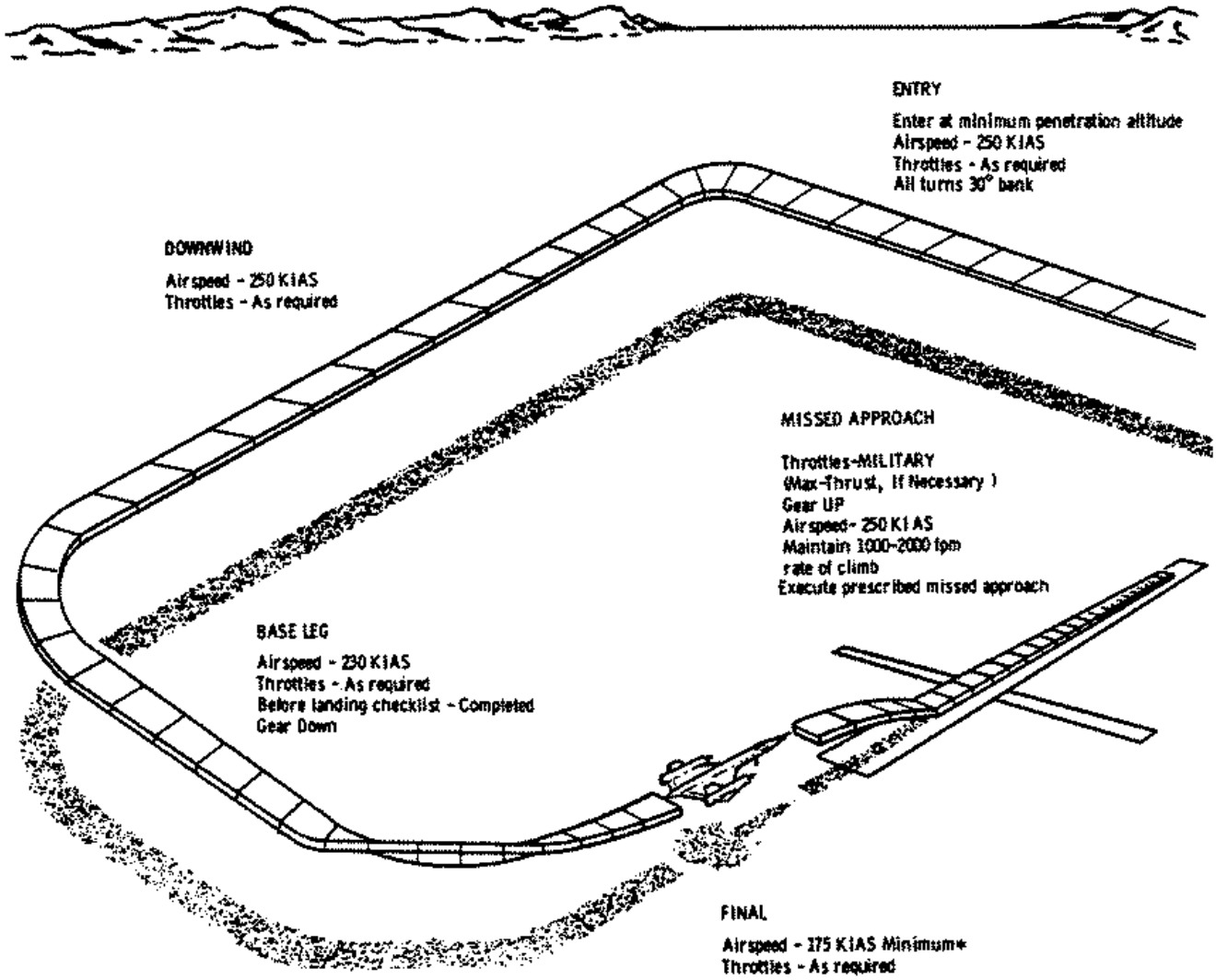
NOTE

* Increase final approach speed 1 knot for each 1000 lbs. over 10,000 lbs. fuel remaining.

P203-3H(c)

Figure 7-1

PRECISION RADAR APPROACH



NOTE

* Increase final approach speed 1 knot for each 1000 lbs. over 10,000 lbs. fuel remaining.

For aircraft over 100,000 lbs. (over 40,000 lbs. fuel remaining), maintain 275 KIAS on downwind leg and 250 KIAS on base leg. Use approximately 10.5 degrees angle of attack for final approach and landing.

F203-32(c)

Figure 7-2

NOTE

Altimeter position error corrections at instrument approach speeds are negligible.

For an ILS approach, set UHF radio power to 4 or lower. Set the inbound localizer course in the HSI, select ILS on the DISPLAY MODE SEL switch until the aircraft is established on the localizer, then select ILS APPROACH. The ADI bank and pitch steering bars (front-course ILS only), and the HSI course deviation bar will provide correct steering directions.

WARNING

ILS reception can be affected by UHF transmission at high power settings.

MISSED APPROACH AND GO-AROUND

Apply Military thrust as soon as it is determined that a go-around is necessary. Use afterburner if necessary. Raise the landing gear after a climb has been established, and climb to the missed approach altitude at 250 KIAS. When a positive rate of climb has been established, adjust power as necessary to maintain 250 KIAS and approximately 1000 to 2000 feet per minute rate of climb.

NOTE

Fuel required for a missed approach and instrument go-around (typical GCA pattern) is approximately 3000 pounds. A closed pattern go-around requires approximately 1000 pounds.

SINGLE-ENGINE OPERATION

Refer to Section III, Single-Engine Penetration and Landing. Hold gear extension until final approach and maintain a minimum final approach speed of 200 KIAS. For single-engine missed approach, follow the Single Engine Go-Around procedures in Section III and observe the single-engine minimum control speed.

ICE AND RAIN

Flight in areas where moderate or heavy icing is present or forecast is prohibited. Extended flight in any icing is also prohibited. Ice will build up on the spikes at penetration and approach speeds and enter the engine as it breaks off. Engine damage due to ice ingestion is not normally severe enough to cause engine shutdown and can be minimized by reducing rpm.

Extended flight in heavy rain is prohibited. If heavy rain is encountered while subsonic, maintain below 350 KEAS. When climbing at supersonic speeds, reduce to 400 KEAS. If the climb can not be continued, decelerate at 350 KEAS.

If icing or heavy rain at near freezing temperatures is encountered, make an entry in Form 781 so that the engines will be examined for damage.

WINDSHIELD ICING

Without hot air deicing, forward visibility is unsatisfactory under all icing conditions. Ice build up occurs very rapidly and dissipates very slowly, even after descent to lower, warmer altitudes. Hot air flow on the windshield is satisfactory for inhibiting ice build up if used prior to encountering icing conditions.

VISIBILITY IN RAIN

In rain, forward visibility is obscured by a water film which extends over almost all of the windshield area. Hot air deicing is useful for improving visibility through the left windshield while taxiing or flying in rain. Use of windshield hot air deicing or the rain remover liquid (before S/B R-2674) during light and moderate rain conditions improves visibility to a usable condition at approach speeds; however, windshield deicing should not be used simultaneously with rain remover fluid. Visibility is momentarily obscured as the rain remover liquid is applied, then the windshield clears and beads of water form which stream across the glass. Rain remover application is

needed at ten to fifteen second intervals for best effectiveness. Approximately 30 applications of the rain remover fluid are available. The rain remover system is not effective with very heavy rain conditions and although hot air deicing provides very slight improvement, visibility remains obscured. After S/B R-2674, the rain removal system is deactivated.

Rain Removal

NOTE

Reduce speed below 250 KIAS before applying rain remover fluid.

CAUTION

Do not apply rain repellent on a dry windshield. Prolonged obscuration may result.

Residual rain remover fluid can be baked in the spray bars during high speed (hot flight), causing subsequent stoppage of fluid flow. Therefore, the rain removal system should not be used prior to hot flight unless essential. After S/B R-2674, the rain removal system is deactivated.

1. Windshield deicing switch - RAIN REMOVAL ARM ON.

2. Rain removal button - PUSH.

NOTE

Momentary cloudiness will occur.

CAUTION

Do not apply removal liquid after passing approach minimums.

3. Repeat as required when visibility deteriorates.

NOTE

Make an entry in Form 781 if the rain removal system has been used.

HIGH HUMIDITY CONDITIONS

If condensation forms on the inner or outer windshield glass:

1. Cockpit defog switch - Set.

   Hold the defog switch OPEN, then select HOLD or CLOSED as required to keep the inner windshield canopy glass clear.

2. Windshield deicing switch - ON DE-ICE.

   Selection of the ON DE-ICE position directs hot air to the left windshield outer panel and causes the WINDSHIELD DE-ICE ON caution light on the pilot's annunciator panel to illuminate.

NOTE

Windshield deicing can be used with other normal procedures for management of the environmental control system; however, this diversion of air may reduce the supply to the cockpits and bay areas when operating at low engine rpm. Windshield deicing should not be used simultaneously with rain removal.

If fog emanates from the cockpit air distribution ducts:

3. Cockpit temperature control rheostat - Increase as required.

   Light to moderate cockpit fogging can be eliminated immediately by moving the cockpit temperature control and override switch to manual WARM. In automatic operation, moving the cockpit temperature control rheostat to a warmer setting (clockwise) also eliminates fog.

If fogging persists:

4. Use the Cockpit Fog emergency procedure.

STRUCTURAL CAPABILITY IN GUSTS

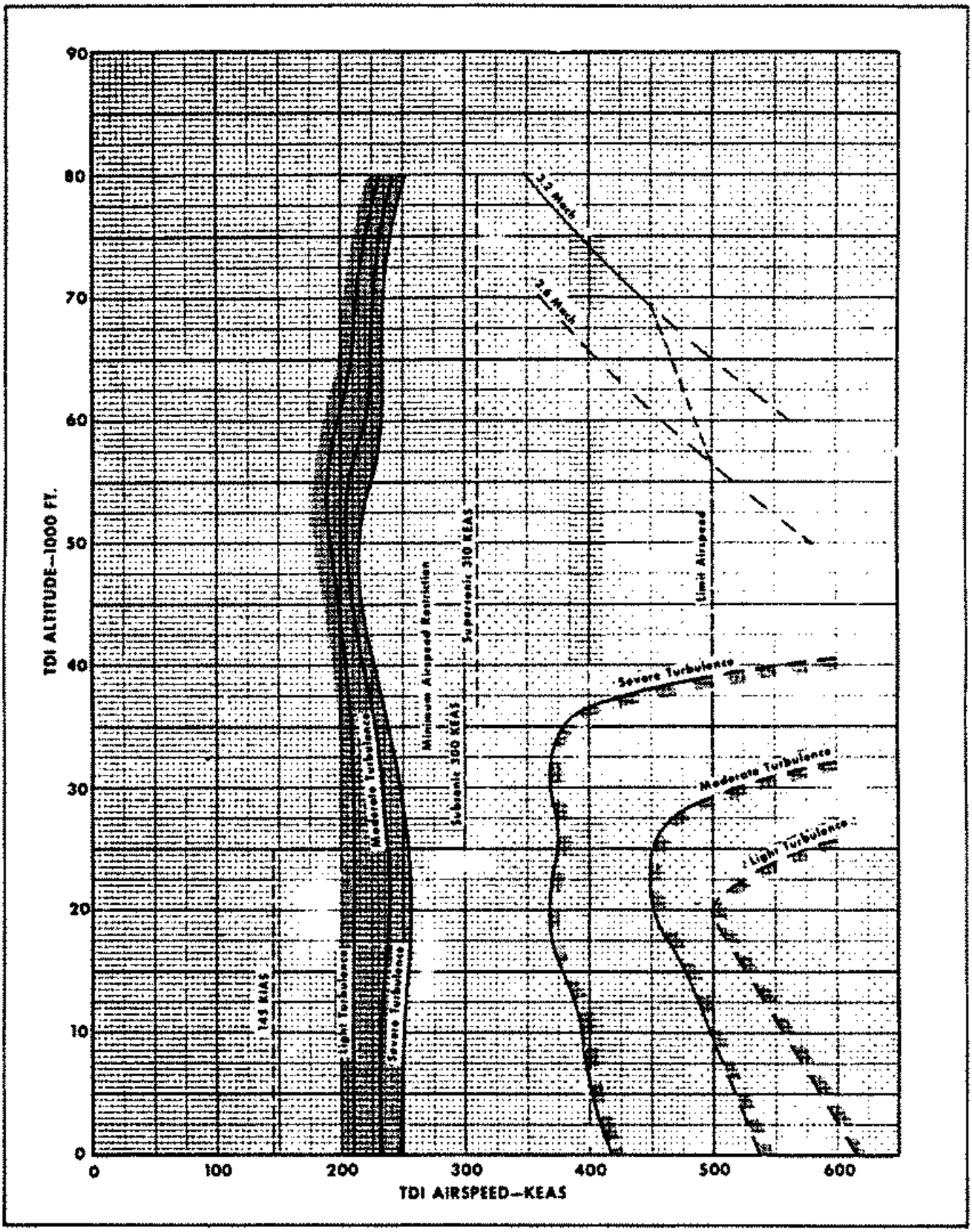


Figure 7-3

Before the cockpit air handle is returned to the open position, the cockpit temperature control and override switch should be moved to manual WARM long enough to assure that fog will not recur.

TURBULENCE AND THUNDERSTORMS

Flight should not be scheduled through areas where moderate or severe turbulence is forecast. If such conditions are encountered while subsonic, maintain 300 to 350 KEAS. When climbing at supersonic speeds, reduce to 400 KEAS. If the climb can not be continued, decelerate at 350 KEAS. Refer to the Structural Capability in Gusts chart, Figure 7-3.

OPERATION IN TURBULENCE

The inlets may not operate normally if severe turbulence is encountered at high speed: flameout may occur.

Stick shaker can occur while in turbulence; however, the APW pusher/shaker switch should not be turned OFF unless a definite malfunction of the APW system is identified. Reduce load factor and increase KEAS, if practicable, to avoid shaker operation.

Jet Penetration

The normal penetration speed of 275 KIAS is compatible with operation in turbulence.

Landing Approach

The normal turn to final approach speed may be increased to 250 KIAS to avoid control difficulty.

COLD AND HOT WEATHER PROCEDURES

Detailed cold and hot weather procedures have not been established. The pilot must be aware of the effects of nonstandard temperatures on takeoff and landing distances and minimum single-engine control speeds. The pilot should also be aware of the effects of wet, icy, and slush covered runways on takeoff and landing distances and on ground handling characteristics.

COLD DAY GROUND OPERATION

After start during cold weather, the DAFICS Preflight BIT may fail until hydraulic fluid in the servos warms sufficiently to provide normal servo response. Repeat the Preflight BIT until it is successful.

Taxi speeds tend to increase during cold weather. Restrict taxiing to low speeds when on wet or icy surfaces. Braking must be accomplished carefully to avoid skidding when below 12 mph, as antiskid protection is not available. Shut down of the right engine during taxi-in after landing may be necessary to reduce braking requirements; however, taxiing with one engine shut down is not recommended.

Painted Areas

Painted areas are significantly more slippery than unpainted areas when wet. Painted areas serve as condensation surfaces and it is possible to have icy conditions on these areas when the overall surface condition is dry.

HOT DAY GROUND OPERATION

Sunshades over the cockpits are advisable before the crew boards when the aircraft is directly exposed to the sun.

NIGHT FLYING

Interior Light Reflections

The combined reflective qualities of the canopy and cockpit instruments can create reflection problems at night from cockpit lights. A reduction of canopy reflections is realized if the front cockpit sunshades are joined and positioned as an extension of the glare shield. Open the face plate (below 10,000 feet) and/or lower the front windshield vision splitter for night landings to reduce reflections.

Interior Lighting

Except for the pilot's attitude indicator and map projector, lighting balance between individual cockpit instruments is preset. Deficiencies in lighting balance should be reported. A reduction in the interior lighting level to reduce glare and reflections, plus the encumbrance of the pressure suit gloves, requires that crew members have an intimate knowledge of switch positions and functions.

Supersonic Operation

Precise altitude and speed control is more difficult while supersonic at night because of the lack of outside reference. The pilot is dependent on cockpit instrumentation only, for all attitude changes. Vigilantly monitor attitude references and frequently cross-check aircraft performance indications such as Mach, altitude, IAS, and heading.