ALL WEATHER OPERATION

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INTRODUCTION

Except for repetition necessary for emphasis or continuity of thought, this section contains only those procedures which differ from or are in addition to the normal procedures supplied in Section II.

INSTRUMENT FLIGHT PROCEDURES

These aircraft handle well during all phases of instrument flight when operated in accordance with procedures specified in the following paragraphs. As with all high performance jet aircraft, constant attention to flight instruments is required. Normal jet instrument techniques are satisfactory for operation during instrument conditions. Navigational aids include an Inertial Navigation System, TACAN, ILS and ADF. IFF is also installed, as are the directional and ranging features of the ARC/50 radio.

The ships pitot static system is the primary speed and altitude reference during takeoff, penetration, approach and landing. Speeds given here are knots indicated airspeed (KIAS). Equivalent airspeeds (KEAS) and altitude information from the air data computer system (TDI instrument) can be used; however, TDI response may not be as rapid as the ship system indications during transient airspeed situations.

The stall warning indication is referenced to pitot total pressure and to the attitude probe in the Rosemount pitot-static boom. It is independent of pitot-static pressures sensed by the ship and air data computer systems to that extent. Pitot heat should be sufficient to keep both the pitot head and the attitude probe operating during icing conditions.

NOTE

Keep pitot heat on during all subsonic instrument flight operations.

BEFORE INSTRUMENT TAKEOFF

After aligning the aircraft with the centerline of the runway, check synchronization of the FRS compass, check the INS mode selector in FRS position, and set the attitude indicator so that the miniature airplane is level with the horizon line. The BDHI No. 1 needle selector switch is placed in the TACAN position to display TACAN bearing information on the No. 1 needle of the BDHI.

NOTE

The FRS compass will be used for heading reference during all takeoffs and instrument departures.

INSTRUMENT TAKEOFF

Maximum thrust will be used for instrument takeoffs, using procedures identical to those contained in Section II. The following procedures supplement those given in Section II:

a. Rotation - Begin at computed rotation speed. Apply smooth, constant back pressure to establish an indication of + 10 to + 12 degrees on the attitude indicator in about five seconds. The aircraft will fly off the runway at normal airspeeds.

b. Maintain 10 to 12 degree pitch attitude indication while accelerating to desired climb speed. The altimeter and vertical velocity indicator should show a definite climb indication before retracting the landing gear. Care must be exercised to insure that a positive rate of climb is maintained during acceleration to climb speed in order to prevent the aircraft from settling back to the runway surface.

NOTE

Initial indications of the altimeter and vertical speed indicator may be that of a slight descent.

c. Landing gear lever - UP when definitely airborne.

d. Throttles - Minimum afterburning after gear up is indicated. Military thrust may be set as 300 KIAS is approached when a Military power climb is used for instrument departure.

NOTE

Use Indicated Airspeed during takeoff and climb until proper climb speed schedule is reached on the TDI.

INSTRUMENT CLIMB

Instrument climbs using the normal airspeed and afterburner schedules can be made safely. It may be desirable to maintain maximum afterburning after takeoff at heavy weights, but allowances must be made for the more rapid acceleration and steeper than normal climb attitude. It is highly recommended that the normal afterburning schedule be used after takeoff. This minimizes the possibility of exceeding the desired climb speed schedule. It also provides more time for EGT control if this is required. Maximum thrust may be resumed if desired after stabilizing at the proper climb speed.

NOTE

- Reduce climb speed if rough air is encountered as described in Operation in Turbulence, this section.
- The TDI and ship system pitot-static flight instruments should be cross checked periodically during instrument flight to confirm proper operation.

Restrict all turning maneuvers to 30° maximum bank angle during low altitude instrument flight.

MILITARY THRUST CLIMBS

The optimum VFR Military thrust schedule is suitable for instrument climbs to intermediate altitudes. As soon as the climb schedule is intercepted, the TDI becomes the primary pitch control instrument for the remainder of the climb.

INSTRUMENT CRUISING FLIGHT

Establish cruising airspeed at the desired altitude and retrim the aircraft. After Instrument Departure Instructions have been accomplished, the BDHI may be switched to display INS navigation information as required for mission completion. Readjust the horizon bar on the attitude indicator to indicate level flight attitude when the aircraft is in level flight at cruising airspeed. These aircraft have excellent handling characteristics throughout their normal flight speed range if properly trimmed and flown by reference to the flight instruments.

NOTE

Below Flight Level 180, the altimeter must be set to station pressure and used to maintain assigned altitude.

TURNS

A constant 30° angle of bank may be used for all turns except rate turns when required or desired.

STEEP TURNS

Any angle of bank exceeding 30° is considered a steep turn. The aircraft is easily controlled on instruments in banks up to 60°; however, due to structural load restrictions, bank angles in excess of 45° should be avoided.

HOLDING

Holding patterns and descents between holding levels should be flown at 275 KIAS at altitudes from 35,000 ft to 20,000 feet. (KEAS ranges between 260 and 270 knots at these altitudes.) Approximately 6200 rpm will be required. At normal weights, average fuel flow while turning varies from approximately 5500 pph per engine at the higher altitudes to approximately 6500 pph

JET PENETRATION AND TACAN APPROACH (Typical)

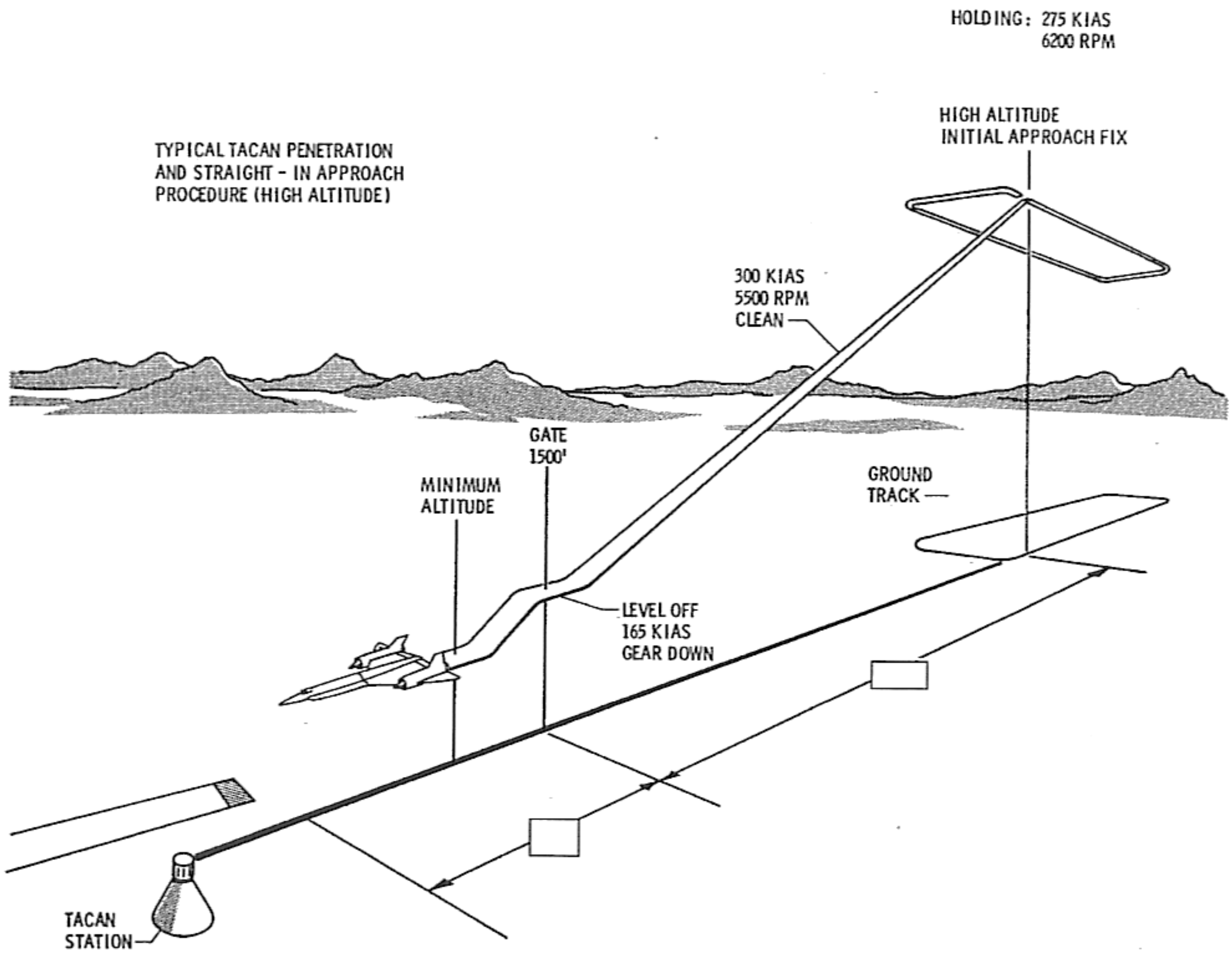

Figure 9-1

at 20,000 feet. The rate decreases about 500 pph per engine during straight legs. Somewhat lower airspeeds can be used, if desired, if there is little or no turbulence. To descend between holding levels, reduce power until 500 to 1000 feet above the desired altitude. Refer to Appendix for loiter performance.

NOTE

- The INS mode selector must be placed in the FRS position prior to initial station passage and entry into the holding pattern.
- Check the FRS compass for synchronization and that the BDHI No. 1 needle selector switch is in the desired TACAN or ADF position.
- When the BDHI No. 1 needle selector switch is placed in the TACAN or ADF position and the INS mode selector switch is placed in the FRS position, the No. 1 needle of the BDHI will display magnetic bearing to the selected ADF or TACAN station provided the AN/ARC-50 function switch is not in the ADF position. For the same conditions except with INS mode selected, true heading will be displayed.

JET PENETRATION

The ships pitot-static instruments are the primary flight instruments during a penetration procedure descent. These penetrations are flown at 300 KIAS with power set at 5500 rpm. Initial rate of descent will be 3000 to 4000 fpm. Approximately 4000 pph per engine fuel flow can be expected for normal weights when starting from 20,000 feet. The initial rpm should be maintained and fuel flow allowed to increase as altitude is lost.

NOTE

Engine speeds below 5000 rpm should be avoided to prevent cycling of the engine start bleed valves. TACAN will be inoperative if left engine rpm is below approximately 4500.

The landing gear may be used for additional drag during the penetration if desired, but should be extended no earlier than middle station passage and no later than the turn to final approach when making a procedure turn to final approach heading. In a normal teardrop penetration or straight in approach the landing gear should be extended prior to the final approach gate. At normal approach gross weights, maintain 230 to 250 KIAS after level off through the turn to final approach. Total fuel flow increases to approximately 13,000 lb/hr with the gear down. Final approach speeds are identical to those for normal traffic patterns and landings and will be adjusted for existing gross weight. For a single engine approach the gear should not be extended until final approach is initiated. Minimum approach speed is 200 KIAS for a single engine approach.

NOTE

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

INSTRUMENT APPROACHES

These aircraft are equipped to make either TACAN, ILS or ADF approaches. Precision Approach Radar (PAR) approaches may also be made. When flown as recommended, aircraft control response is good at all times. The downwind or outbound portions of all approaches are flown at 250 KIAS with the landing gear down. The base

RADAR APPROACH PAR/ASR

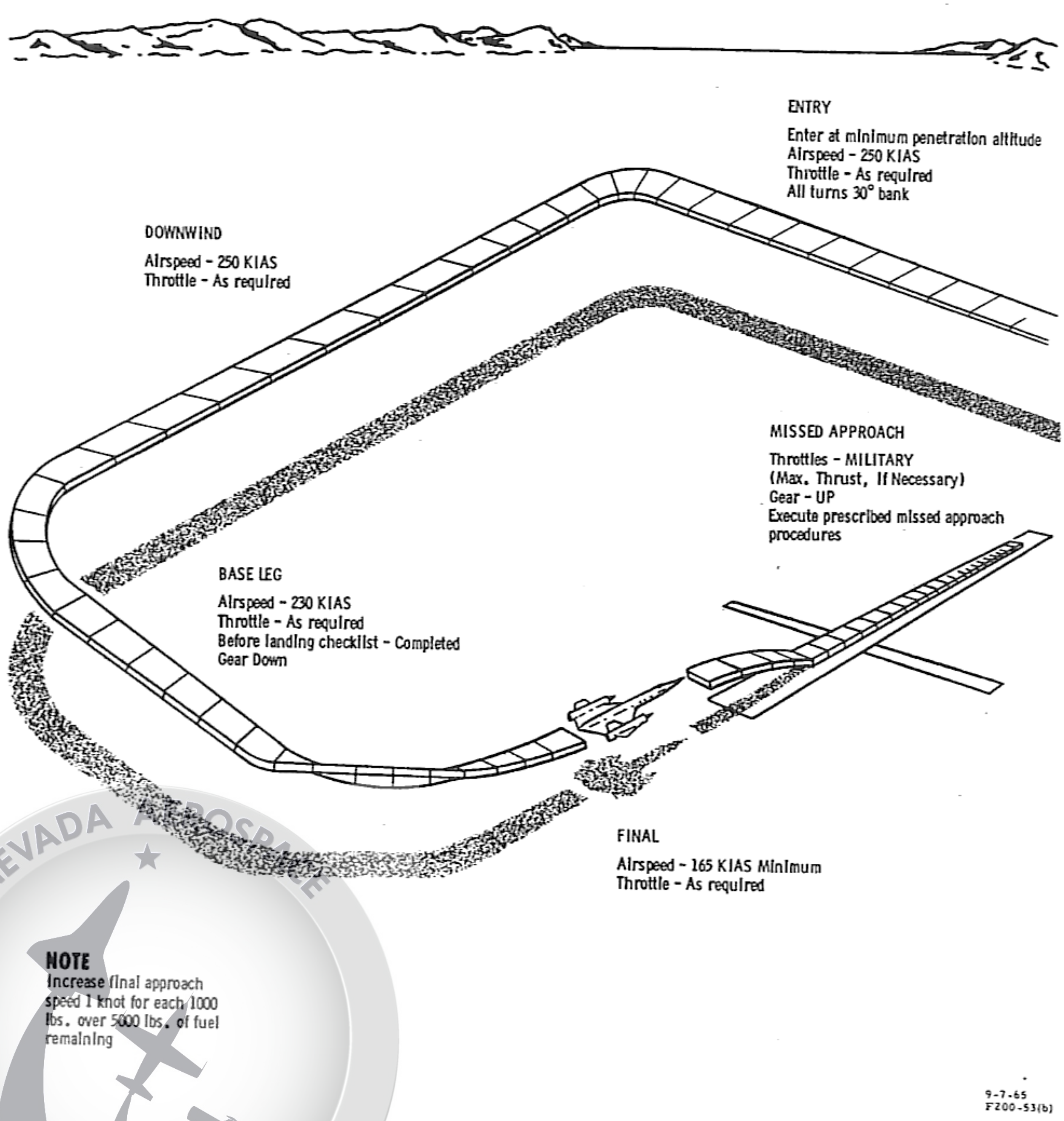

Figure 9-2

leg or procedure turn portions are flown 230 KIAS. The minimum final approach speed is 165 KIAS and should be increased by one knot for each 1000 pounds of fuel remaining over 5000 pounds under normal operating conditions. With one engine inoperative, hold gear extension until the final turn is completed and maintain a minimum final approach speed of 200 KIAS.

NOTE

- When the left engine has failed, the landing gear must be extended using the Emergency Landing Gear Extension procedure. The pilot should be aware of the time required and of the other aircraft systems which are affected by loss of the left engine.
- Altimeter position error corrections are small at instrument approach speeds and may be neglected.
- Use the rain remover and windshield defog and deice systems as needed.

MISSED APPROACH AND GO-AROUND

Apply Military thrust as soon as it is determined that a go-around is necessary. Use afterburning or Maximum thrust if necessary. Raise the landing gear only after a climb has been established, and climb to the missed approach altitude at 250 KIAS. When positive rate of climb has been established adjust power as necessary to maintain 250 KIAS and approximately 1000 to 2000 foot per minute climb. In the event a single engine missed approach is necessary, follow the single engine go-around procedures in Section III and observe the single engine minimum control speed.

NOTE

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

ICE AND RAIN

Detailed information on flight through icing conditions is not conclusive at this time. Flight to and from terminal areas where heavy icing conditions and/or heavy rain are present is undesirable. Extended flight in any known icing conditions is prohibited. If icing conditions or heavy rain at near freezing conditions is encountered in flight, the engines must be examined for damage during post flight inspection.

WINDSHIELD ICING

Without hot air deicing, forward visibility through the windshield is unsatisfactory under all icing conditions at penetration and approach speeds. Ice buildup occurs very rapidly and dissipates very slowly, particularly with heavy build-up, even after descent to lower, warmer altitudes. Ice will build up on the spikes at penetration and approach speeds and enter the engine as it breaks off upon descent to warmer altitudes. Engine damage due to ice ingestion is not normally severe enough to cause engine shutdown and can be minimized by reducing

STRUCTURAL CAPABILITY IN GUSTS

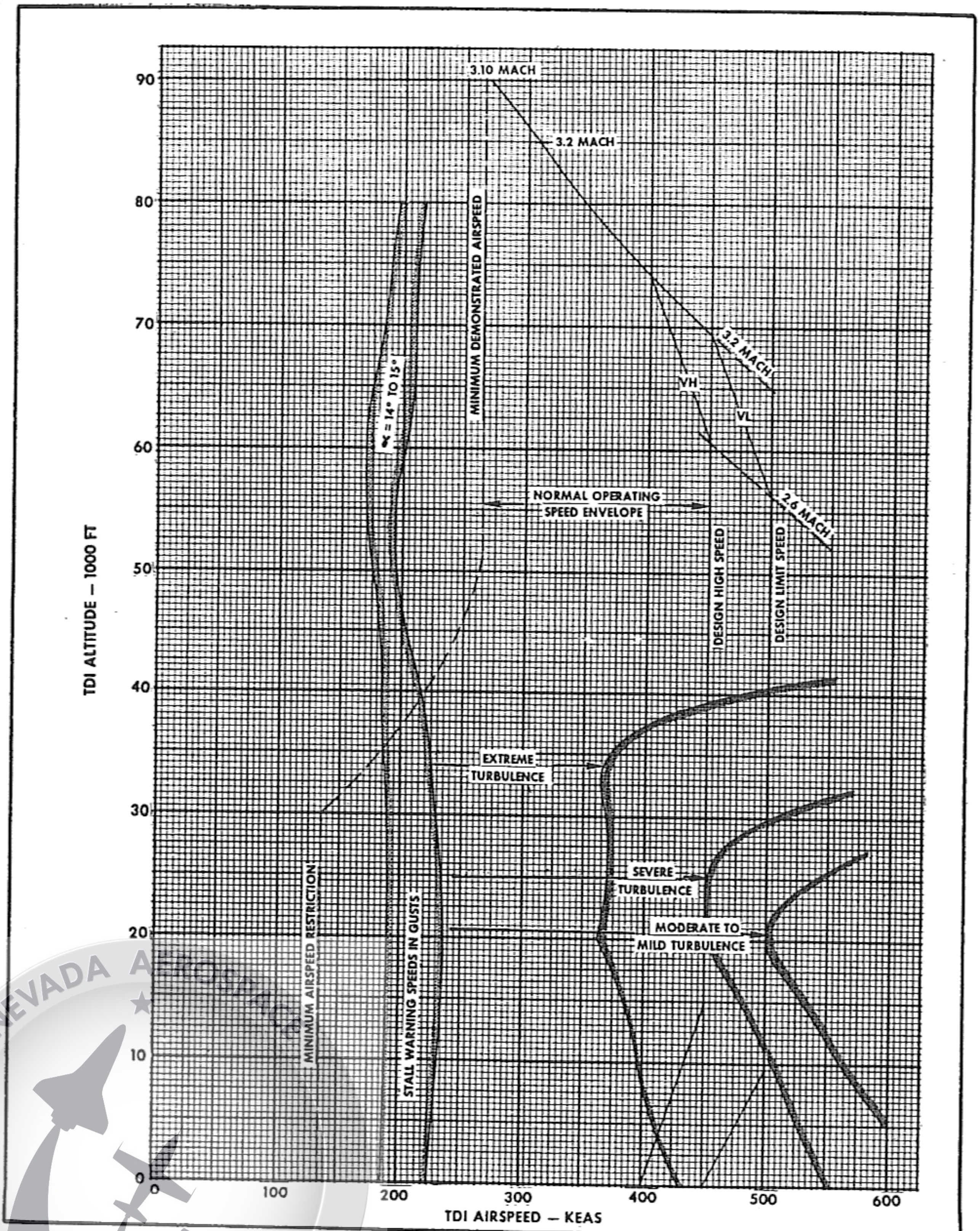

Figure 9-3

rpm. Hot air flow on the windshield is satisfactory for de-icing and inhibiting ice build-up if used prior to the time that icing conditions are encountered. If windshield icing is anticipated or encountered:

1. Windshield deicer switch - R, or L & R, as required.

FLIGHT IN RAIN

In rain, forward visibility is obscured by a water film which extends over almost all of the windshield area. Use of the rain remover liquid during light and moderate rain conditions improves visibility to a usable condition at approach speeds. Visibility is momentarily obscured as the 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. The hot air deicer should not be used in light to moderate rain, as the hot air by itself does not clear the windshield, and the rain remover liquid is apparently blown away before it can become effective. The rain remover system is not effective with very heavy rain conditions, and, although hot air deicing provides very slight improvement, visibility remains obscured.

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.

1. Rain removal button - PUSH.

NOTE

Momentary cloudiness will occur.

2. Repeat as required when visibility deteriorates.

HIGH HUMIDITY CONDITIONS

If fog emanates from cockpit overhead distribution ducts:

1. Q-Bay temp control - INCREASE as required.

If condensation forms on inner or outer glass:

2. Windshield defog switch - INCREASE as required.
3. Windshield deicer switch - ON R, or L & R, as required.

TURBULENCE AND THUNDERSTORMS

Flight should not be scheduled through areas where extreme or severe turbulence is forecast. In the event that such conditions are encountered however, airspeed should be maintained between 250 and 350 KEAS as a general rule. Refer to the Structural Capability In Gusts chart, figure 9-3.

OPERATION IN TURBULENCE

Gust conditions are defined in terms of "extreme", "severe", and "moderate to mild" conditions. (Refer USAF AWSM 55-8, 15 June 1965). Aircraft structural capabilities in turbulence air do not penalize normal operating procedures except when below 40,000 feet. In the event of extreme turbulence below 40,000 feet, airspeed should be maintained between 250 and 350 KEAS. Figure 9-3 shows that the aircraft can be operated safely in severe turbulence at the design speed unless in the altitude range between 20,000 and 25,000 feet. A speed reduction to 400 KEAS should be accomplished by reducing power if severe turbulence is encountered while operating at high speed in this area. (The normal Mach 0.9 climb speed in this area is below 400 KEAS.) Normal descent speed, 300 KEAS, approaches the optimum path for rough air penetration.

Transonic Acceleration in Turbulence

The probability of encountering unforecasted severe or extreme turbulence in clear air is relatively small. However, if there is a reasonable possibility that this may occur during the transonic acceleration phase, modify the normal climb procedure. After reaching supersonic conditions, climb at 375 to 400 KEAS instead of 450 KEAS while below 30,000 feet. Increase the climb speed above this altitude so as to reach normal climb speed between 35,000 and 40,000 feet. Be prepared to reduce airspeed to 375 KEAS if severe turbulence is encountered below 40,000 feet.

Jet Penetration and Landing Approach

Normal penetration and approach speeds are compatible with rough air penetration schedules. However, the normal turn to final approach speed may be increased from 230 KIAS to 250 KIAS in order to avoid the possibility of maneuvering difficulty during this phase. Standard rough air penetration techniques apply to this aircraft.

COLD AND HOT WEATHER PROCEDURES

Detailed cold or hot weather procedures are not available. The pilot should always be aware of the effects of non-standard 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. Refer to Section V for cold weather Oil Temperature operating limits.

NIGHT FLYING

Detailed specific night flying procedures are not required; however, the normal precaution of memorizing the positions of switches located in dim or unlighted locations should be accomplished. Lower fire warning light covers to reduce glare in event of illumination.