**ATTACHMENT I**

**Excerpts from the FedEx B-727 Flight Manual, Volume 3**

**(11 pages)**

Callouts Approach

| Altitude or Position (feet) | Visual | Nonprecision | Monitored NonPrecision | CAT I (unmonitored) | CAT I/II/III (monitored) |
|---|---|---|---|---|---|
| Indicator Movement | | PNF - "Localizer alive"<br>PNF - "VOR alive" | C - "Localizer alive"<br>C - "VOR alive" | PNF - "Localizer alive"<br>PNF - "Glideslope alive" | C - "Localizer alive"<br>C - "Glideslope alive" |
| 1000'[1] | | PNF - "stable" or "unstable go-around " | C - "stable" or "unstable go around" | PNF - "stable" or "unstable go-around" | C - "stable, Category I/II/III " or "unstable go-around" |
| 500'[1] | PNF - "stable" or "unstable go-around" | | | | |
| 100' above Minimums | | PNF - "Approaching Minimums" | C - "Approaching minimums" | PNF - "Approaching Minimums" | C - "Approaching Minimums, going heads up"<br>C - "I have the airplane" |
| Minimums | | PNF -"Minimums" | PNF - "Minimums" | PNF - "Minimums"<br>or<br>PNF - "Minimums, go around" | F - "Minimums"<br>or<br>F - "Minimums, going around" [2] |
| 15 sec or ½ mile prior to VDP | | PNF - "Approaching VDP" | PNF - "Approaching VDP"<br>If runway in sight,<br>C - "I have the airplane" [3] | | |
| VDP | | PNF - "VDP"[4]<br>If runway in sight,<br>PF - "Leaving MDA" | PNF - "VDP"[3,4]<br>If runway in sight,<br>C - "Leaving MDA" | | |
| Below Minimums | | PNF - "____" Altitude in 100' increments referencing TDZE, airspeed referenced to Bug, sink rate | F - "____" Altitude in 100' increments referencing TDZE, airspeed referenced to Bug, sink rate. | *If the aircraft is below minimums and no minimums call was announced, the SO will announce "Below Minimums"* | *If the aircraft is below minimums and no minimums call was announced, the SO will announce "Below Minimums"* |
| Missed Approach Point | | PF - "Missed Approach Going Around" | PF - "Missed Approach Going Around" | | |
| Go-around | A go around must be called out if it is initiated. | | | | |
| Advisory Callouts | Any deviation listed below requires a callout.<br>• PF/PNF - Visual cues should be called as they appear (as appropriate).<br>• PNF - "Airspeed +/- ____" (deviations in excess of 5 knots below 1000 ft.)<br>• PNF - "Sink rate" (descent in excess of 1000 FPM below 1000 ft.).<br>• PNF - "Glideslope" (deviations in excess of 1/2 dot on raw data).<br>• PNF - "Localizer" (deviations in excess of 1/3 dot on raw data). | | | | |

1. Designated crewmember must make the 1000' or 500' callout if the GPWS is inoperative.
2. If the Captain has assumed control of the aircraft and subsequently makes the decision to go-around, the Captain will announce "Going around".
3. Captain will assume control of the aircraft no earlier than "Going Heads Up" and no later than leaving DH.
4. VDP callouts are mandatory when a VDP is published or calculated by the flight crew. In some situations it is not possible to calculate a VDP. In these cases, the callout is not required.

ea, the following note will appear in the notes section on the APLC takeoff page: "RWY SAFETY AREA IN EFFECT". The note is for informational purposes only.

**Standard Power** - A precomputed power setting representing Max Takeoff EPR reduced by a maximum of 5%. This setting is computed by the APLC.

**Target Power Settings** - (Fuel Flow = Airspeed) Target Fuel Flow Power Settings are computed based on an aircraft gross weight of 142.5 (-100) or 166.0 (-200). These Target Power Settings are intended as an initial target power setting only. Pilots are expected to adjust these settings for given flight conditions. Level Flight, Clean Wing fuel flow settings for airspeeds down to L/D MAX, can be approximated by multiplying the IAS X 10. The result provides a fuel flow per engine. (Example: 250 KIAS = 2500 LBS per engine. Add 500 LBS for a -200).

For a complete listing of power settings see the information contained in "Flight with Unreliable Airspeed" in chapter 2-12.

**Target Power Settings in lbs/Engine**

| AIRSPEED CONDITION | -100 | -200 |
|---|---|---|
| Level Flight, Clean 250 KIAS. | 2500 | 3000 |
| Level Flight, Gear Down, Flaps 2 MMS. | 2800 | 3300 |
| Level Flight, Gear Down, Flaps 5 MMS. | 3000 | 3500 |
| Level Flight, Gear Down, Flaps 15 MMS. | 3000 | 3500 |
| Level Flight, Gear Down, Flaps 25 MMS. | 4200 | 4800 |
| Level Flight, Gear Down, Flaps 30 MMS. | 4500 | 5000 |
| NON-PRECISION APPROACH | | |
| Final Descent, Gear, Flaps 30, Bug | 2500 | 3000 |
| PRECISION APPROACH | | |
| On Glideslope, Gear, Flaps 30, Bug | 3000 | 3500 |

**Turbulence**

**Turbulence Definitions**

| Intensity | Aircraft Reaction | Reaction Inside the Aircraft |
|---|---|---|
| Light Turbulence | Turbulence that momentarily causes slight, erratic changes in altitude. | Occupants may feel a slight strain against seat belts or shoulder straps. Unsecured objects may be displaced slightly. Food service by be conducted and little or no difficulty is encountered in walking. |
| Moderate Turbulence | Turbulence that causes changes in altitude and/or attitude, but with the aircraft remaining in positive control at all times. It usually causes variations in indicated airspeed. | Occupants feel definite strains against seat belts or shoulder straps. Unsecured objects are dislodged. Food service and walking are difficult. |
| Moderate Chop | Turbulence that causes rapid bumps or jolts without appreciable changes in aircraft altitude or attitude. | |
| Severe Turbulence | Turbulence that causes large, abrupt changes in altitude and/or attitude. It usually causes large variations in indicated airspeed. Aircraft may be momentarily out of control. | Occupants are forced violently against seat belts or shoulder straps. Food service and walking are impossible. |
| Extreme Turbulence | Turbulence in which the aircraft is violently tossed about and is practically impossible to control. It may cause structural damage. | |

**V1** - Decision Speed. The airspeed listed on the B-727 Takeoff Data Card. This speed is computed by the APLC. It is the greater of V1 Min. or V1 computed for a 3000' Stopping Margin. V1 will never exceed Vr or V1 Max.

**V1 Max** - Decision Speed. The maximum speed the aircraft can accelerate to, lose a critical engine, and stop in the confines of the runway.

**V1 Min.** - Decision Speed. The lowest speed that the aircraft can accelerate to, lose a critical engine, contin-

# CHAPTER 7-1-5

# DESCENT

## APPROACH PLANNING

### DESCRIPTION

This section describes procedures and techniques used when planning for the approach to a specified airport.

### PROCEDURE

#### Landing Performance Calculations

The Second Officer will initiate descent preparations approximately 30 minutes prior to arrival. This includes obtaining ATIS, completing the Landing Data Card, and accomplishing the silent items of the In Range checklist.

Compute the landing weight. Once the landing weight is computed and ATIS information obtained, use the APLC to compute landing data using procedures described in Chapter 5, Performance, of this flight manual. Usually it can be accomplished in cruise flight just before descent. In some instances, descent will begin before the ATIS information can be received.

VREF and MMS speeds may be determined from the APLC or SO's tabletop. Fill in the landing distances on the card for MIN BRKG and MED BRKG.

**NOTE**

If landing on a particular runway requires maximum breaking, enter this distance in the remarks section and brief it as part of the IN RANGE checklist. Consideration should be given to using a different runway or airport rather than landing on a runway requiring maximum braking.

**NOTE**

VREF is the reference speed for approach and landing based on a flaps 30° position. In this manual the terms VREF and VREF 30° are identical and may be used interchangeably. VREF speeds are 1.3 VSO.

Bug speed is normally 25° MMS. VREF provides at least 1.3 G protection based on 30° bank angle. MMS speeds provide 1.4 G protection.

If the APLC is inoperative, determine landing data from GOC, if possible. Refer to the APLC INOPERATIVE FOR LANDING procedure in Section 2-15 of the B-727 Quick Reference Handbook.

#### Arrival Route and Approach Briefing

When the approach is known, each crew member shall review the approach. Once all crew members have reviewed the approach, the pilot flying will give an approach briefing. If more than one approach is in progress and it is not obvious which one the flight will be assigned, brief the most likely approach or approaches. Brief the transition level when other than FL 180.

The approach briefing should be completed prior to entering the approach environment.

If a published arrival procedure is to be used, the Pilot Flying will brief the arrival route which, as a minimum, shall consist of:

- Name of arrival
- Page number and date of the arrival chart
- Altitude restrictions
- Airspeed restrictions
- Notes

The approach briefing shall consist of, as a minimum:

- Approach chart page, date, and rwy.
- Approach frequency.
- Final approach course.

- Final Approach Fix crossing altitude.
- Approach minimums.
- Touchdown Zone Elevation.
- Notes.
- Approach light configuration.
- Missed approach procedures.
- Anticipated use of autobrakes/autospoilers.
- Landing distance if Max Braking is required. (Consideration should be given to using another runway.)
- Any special procedures.

If windshear is expected, refer to Chapter 7-1 for landing with windshear.

The Second Officer will review the Approach Chart for all approaches and note the following in writing:

- Approach frequency and inbound course.
- ILS Outer Marker MSL crossing altitude/Final Approach Fix MSL altitude.
- Approach timing (if applicable), minima (i.e. DH, MDA, VDP etc.) for the approach to be flown as well as any backup or alternate approach.

## PROCEDURE

Approach speeds and configurations for all normal approaches, landings, and go-arounds are shown on each flight profile illustration. Set the airspeed bug and MMS markers as described in the Company Flight Manual Chapter 3 or the Quick Reference Handbook. Normally this will occur during cruise prior to the descent and verified in the In Range Checklist.

Arriving in the airport area, slow the aircraft to near the MMS for 0° flaps. This will eliminate flap buffet and reduce LED fatigue. Crews should maintain no less than the MMS for the selected flap setting.

While configuring, if the airspeed is allowed to decelerate below the appropriate MMS, the bank angle must be restricted to 15°. However, prolonged flight below the selected flap MMS should be avoided.

If extensive vectoring is required in the terminal area at ATC-assigned speeds, delay flap extension as long as possible to save fuel. If rapid deceleration is required, use speed brakes or landing gear rather than extending flaps at their maximum allowable speed limit.

When appropriate, and at no less than the MMS for the existing flap position, select the next flap setting and allow the speed to decrease to no less than the next lower MMS.

For stabilized approach criteria, refer to the FOM. For approach thrust settings and standard callouts, see the Approach Callout Chart.

### Airspeeds For Autopilot Use

When maneuvering using the autopilot in the approach environment, maintain 10 to 15 knots of airspeed above MMS for the flap configuration in use. This enhances the ability of the autopilot to control the roll axis during turns.

### Approach Instrument Configuration and Verification

The Pilot Not Flying and the Second Officer will verify that altimeter bugs are set to DH or MDA on all appropriate altimeters. If making a CAT II or CAT IIIa approach, verify radio altimeter DH bugs are set to RA value shown on the approach chart if applicable. Setting radio altimeter bugs on visual, non-precision, and CAT I ILS is optional.

## CAUTION

For CAT I approaches, do not use the radio altimeter to determine DH/MDA.

The PNF and Second Officer will cross check frequency selections, inbound course selectors, and VOR/ ADF RMI selectors.

Ensure that all LCD ADIs and HSIs (if installed) are in the NORMAL mode when operating into actual Cat II or Cat III weather conditions.

The Second Officer will call deviation of ±100 ft. from the Outer Marker crossing altitude.

If making a visual approach use the best available navigation aids for runway/airport identification. Use ILS glideslope or VASI for descent guidance where available.

### Wind Additives - Approach

For windy or gusty conditions the approach may be flown faster than Vapp (Bug).

For the approach, add one-half the steady state headwind component and all the gust factor to Vref (on approaches with all leading and trailing edge flaps extended). The resultant speed or Vapp, which ever is greater will be flown. The maximum additive is Vref + 20.

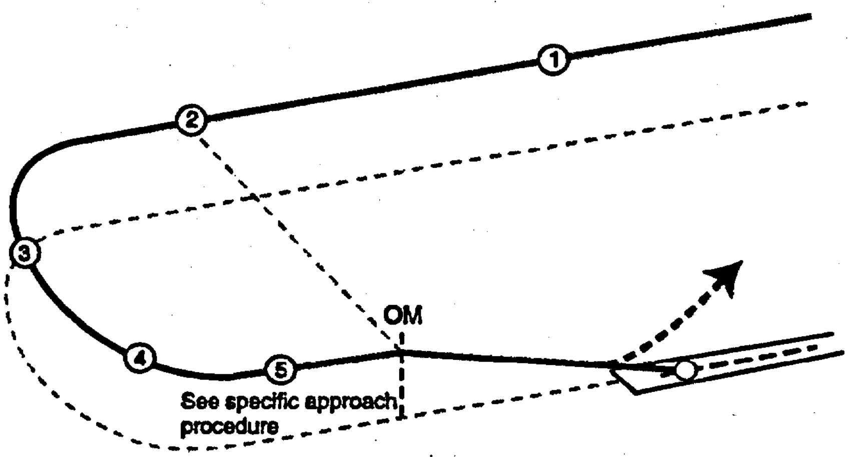
## TECHNIQUE

A well-planned and executed area arrival should place the aircraft within 10 miles of the Final Approach Fix decelerating towards flaps 0° MMS. Maneuvering for an approach is best accomplished with a speed buffer of approximately 10 knots above the MMS for the existing configuration. The flaps 15° configuration is recommended for autopilot localizer capture and tracking because the outboard ailerons are fully unlocked at flaps 15°.

Initial stabilization with engines spooled up and flaps 15° should occur 2 to 3 miles from the final approach fix or at glideslope alive.

Consideration should be given to the use of windshield wipers.

**Radar Pattern**




1. **Enter Radar Pattern**
   Configuration - 0° flaps
   Speed - 0° MMS + 10
2. **Abeam the OM**
   Configuration - Flaps 2°
   Speed - 2° MMS + 10
3. **Base Leg**
   Configuration - Flaps 5°
   Speed - 5° MMS + 10
4. **Dogleg to final**
   Configuration - Flaps 15
   Speed - 15° MMS + 10
5. **Established on final**
   See specific approach procedure

**Fuel Conservation - Approach**

Early flap extension uses 20 pounds of additional fuel per minute. Avoid a long level flight segment with the flaps down and the resulting high fuel flow. Prudent use of the speed brakes in lieu of the flaps to descent or to reduce speed may prevent this in many cases.

## ACCEPTABLE PERFORMANCE GUIDELINES

- Altitude: ±100 feet during initial approach.
- Airspeed: ±10 KIAS of target airspeed but not less than MMS.
- Proper planning and control of altitude, airspeed, and configuration prior to the FAF.
- Compliance with ATC instructions.
- Stabilize the aircraft prior to:
  - 500' AFE — Visual Approach
  - 1000' AFE — Instrument Approach

## COMMON ERRORS

- Improper airspeed.
- Early/late configuration.
- Poor orientation.
- Airspeed/heading and altitude control.
- Failure to maintain visual watch while in VMC.

# CHAPTER 7-1-7

# NON-PRECISION APPROACH

## VISUAL APPROACH

### DESCRIPTION

This section provides procedures and techniques used to accomplish visual approaches.

Final approach and landing practice will develop the pilot's ability to discern a 2.5° to 3° glidepath. An upslope in either the runway or approach zone creates an "above glidepath" illusion when the actual height is lower than it appears. Under conditions of haze, smoke, dust, glare or darkness, expect to appear higher than the aircraft actually is. Bright runway lights appear closer while dim runway lights appear further away. Wider than normal runways create an illusion of being lower than you actually are. Be alert for depth perception problems on snow-covered runways or when color blends with that of surrounding terrain. Illusions and their effects can be minimized by verifying the approach glidepath with cockpit instrumentation, cross-checks with other crew members and perhaps most important, knowledge and awareness of the special problems associated with these approaches. Abnormal or emergency conditions requiring landings at other than flaps 30° will result in higher than normal pitch attitudes for a given glideslope angle.

Airplane body attitude, rate of descent, and thrust required, can be used along with exterior visual cues to establish or verify a correct final approach visual glidepath. A typical rate of descent for a 3° visual glidepath is about 700 feet per minute (no wind). Realize, however, that rate of descent is a function of ground speed and glidepath angle. Multiplying the ground speed by five will result in the required rate of descent for a 3° glidepath.

A flat approach (below 2.5° visual glidepath angle) is indicated by an increase in thrust required, lower than normal rate of descent, and a higher body attitude. A steep approach (above 3.5° visual glidepath angle) is indicated by a lower thrust setting, higher than normal rate of descent and a lower body attitude. These cues are only true for stable conditions (thrust, body attitude, and airspeed steady).

### PROCEDURE

Complete the descent and approach procedures prior to entering the airport traffic area so the flight crew may devote their full attention to aircraft control and traffic avoidance. All radio aids should be used to identify the proper runway. Electronic and visual glideslopes will be used when available. Use of the radio altimeter is optional.

The "Visual Approach" flight profile on the following page, represents the ideal approach situation. Flap and landing gear extension points were selected to minimize crew workload and thrust changes during final approach. The aircraft must be "stabilized" on final approach in accordance with the FOM.

#### Altitude Callouts

Refer to the Altitude Callouts Chart in this Chapter.

## TECHNIQUE

Plan the deceleration and flap extension so as to arrive at a point abeam the touchdown end of the runway (or approximately 5 nm from the end of the runway if flying a straight-in) stabilized with flaps 15°

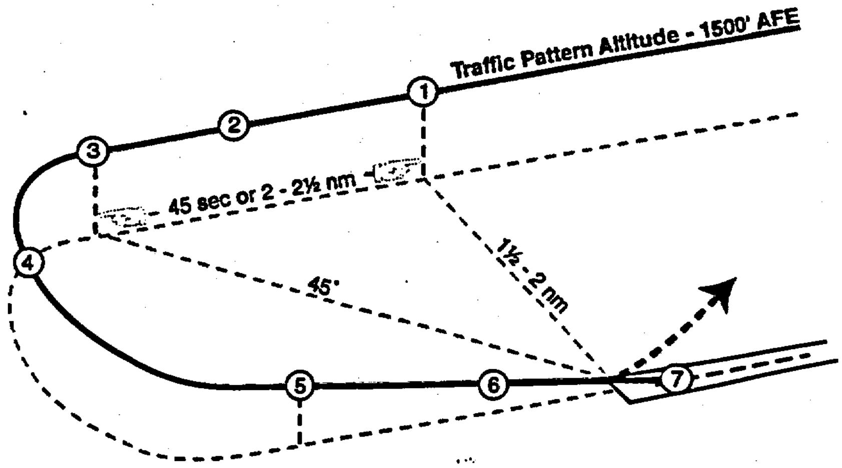
A typical stabilized final approach for a 3° glideslope, in no wind conditions, will be approximately 1° pitch, 700 FPM, Vapp, and 3000-3500 PPH of fuel flow. The runway should be in the center of the windshield with no movement up or down. Upward movement indicates movement below the glidepath. Downward movement indicates movement above the glidepath. Corrections should be made accordingly.

Adjust thrust smoothly in small increments. Large sudden thrust changes are indicative of an unstable approach.

Prior to entering the visual traffic pattern, complete the In Range and Approach checklist in accordance with Chapter 3. Review the approach and go-around procedures. The final approach speed will be Bug or Vref + Wind, whichever is greater.

## Visual Approach




1. **Pattern Entry**

   Configuration - 15° flaps.

   Speed - 15° MMS + 10.

2. **Landing Gear Extension**

   Extend landing gear and complete the Before Landing Checklist.

3. **Base Turn**

   Turn base and begin a 300' - 500' FPM descent.

4. **Base**

   Configuration - 25° flaps.

   Speed - 25° MMS or Vref + Wind (whichever is greater).

5. **Final**

   Complete the turn to final at an altitude that will allow sufficient time to stabilize by 500' AFE.

   Configuration - 30° flaps.

   Speed - Bug or Vref + Wind (whichever is greater).

6. **500' AFE**

   PNF - "Stable" or "Unstable, go-around".

   Speed - Bug or Vref + Wind (whichever is greater).

7. **Touchdown**

   Target - 1000' down runway (Fixed Distance Marker on instrument runway).

   Speed - Vref-3.

## ACCEPTABLE PERFORMANCE GUIDELINES

- Airspeed: ±5 KIAS of target speed on final.
- Rate of descent not to exceed 1000 FPM on final approach.
- Stabilized on final at 500 feet AFE.

## COMMON ERRORS

- Poor airspeed control.
- Poor altitude control.
- Failure to stabilize the aircraft on a proper glidepath.
- Late configuration. (excessive airspeed and altitude too close to the runway)
- Failure to correct to a proper glidepath.

**Manual Computation of Visual Descent Point**

The VDP is a point on the final approach course of a nonprecision straight-in approach procedure from which a normal descent (approximately 3°) from the MDA to the runway touchdown point may be commenced provided visual reference with the runway environment is established. With DME available, the VDP may be calculated based upon a 3 to 1 glidepath. Divide the height above touchdown at the MDA by 300 feet to determine the distance from the VDP to the runway threshold. Allow for the distance from the runway threshold to the DME source if DME is used to define the VDP.

Example: HAT = 450 feet 450 feet ÷ 300 feet = 1.5 miles. If the DME transmitter is 0.5 miles beyond the runway threshold, the VDP = 2.0 DME.

If there is no DME source available to use, take the HAT of the MDA, delete the last digit and subtract the remaining number from your time inbound. This method assumes at GS of 120 KIAS.

Example: HAT = 450 feet. Inbound time = 2 minutes and 1 second. 2 minutes and 1 second - 450/10 = 1 minutes and 16 seconds.

**Calculated Visual Descent Point Chart**

| Calculated Visual Descent Point<br>3° Glide Slope-318 Feet Per Mile | | | | | | |
|---|---|---|---|---|---|---|
| HAT at MDA | Distance | Timing-Ground Speed | | | | |
| | | 130 | 140 | 150 | 160 | 170 |
| 600 | 1.9 | :53 | :49 | :46 | :43 | :40 |
| 550 | 1.7 | :48 | :45 | :42 | :39 | :37 |
| 500 | 1.6 | :44 | :40 | :38 | :35 | :33 |
| 450 | 1.4 | :39 | :36 | :34 | :32 | :30 |
| 400 | 1.3 | :35 | :32 | :30 | :28 | :27 |
| | FPM | 700 | 750 | 800 | 850 | 900 |

**Wind Corrections**

It is imperative that the winds be accounted for, during both the IMC and VMC segments of an approach.

## ACCEPTABLE PERFORMANCE GUIDELINES

- Altitude: ±100 feet during the initial approach and +50 to 0 feet at the Minimum Descent Altitude (MDA).
- Airspeed: ±5 KIAS of the target airspeed.
- Fly the approach with sufficient accuracy to effect a safe landing after reaching visual conditions.

## COMMON ERRORS

- Descending below MDA without sufficient visual references.
- Turning the wrong way to correct the course on NDB approaches.
- Failure to use all available navigation equipment.
- Failure to use FDS and Alt HOLD functions.
- Configuring too late.
- Insufficient rate of descent during final approach segment resulting in reaching the MDA too late.
- Poor airspeed control.
- Poor crew coordination in visual conditions.
- Failure to continue standard callouts after visual contact with the runway environment.
- Failure to start MDA timing.
- Early descent from the MDA, causing a dragged in approach.
- Failure to maintain wind correction during the VMC segment of an approach.

# HIGH RATE OF DESCENT DEMONSTRATION

## DESCRIPTION

This section describes the procedures used to demonstrate the altitude loss associated with the recovery from a high rate of descent and the time required for the engines to accelerate from idle to go-around thrust. It is not intended to train a pilot to become proficient in recovering from a high rate of descent to a landing.

### *CAUTION*

Performing this maneuver to an actual landing is prohibited.

Idle thrust approaches and high rates of descent near the ground must be avoided. If this condition should ever occur on short final, initiate an immediate go-around. This maneuver should be conducted near maximum gross landing weight. The landing configuration (landing gear down, flaps 30°) and idle thrust will give the highest possible descent rate at a stabilized airspeed.

## PROCEDURE

Set the airspeed markers the same as a normal approach for the specific aircraft weight. Start at an altitude which will permit a descent of at least 2000 feet. Extend landing gear and flaps on schedule, reduce thrust levers to idle, slow to Bug speed, and start descent. Stabilize on Bug speed and accept the resulting rate of descent (approximately 2000-2500 FPM). Notice the high rate of descent after stabilizing on approach profile. At the selected altitude for level off, simultaneously advance thrust levers to go-around EPR, and make a smooth positive rotation to a 10° pitch attitude. Note time for engine acceleration from idle to go-around EPR. Normal engine spool-up time should be 6-7 seconds. The airspeed will probably decrease to less than Bug with the possibility of a stickshaker/stall warning. Accept the loss of airspeed and actuation of the stickshaker. Altitude loss during recovery should be no more than 200-300 feet if rotation is positive and thrust is applied promptly. When descent is definitely stopped, accelerate to VRef, and retract flaps to 25°. Continue accelerating. At Bug speed, retract flaps to 15°. With a positive rate of climb established, retract the landing gear and flaps on speed schedule.

## ACCEPTABLE PERFORMANCE GUIDELINES

No specific degree of proficiency shall be required other than the pilot's basic understanding and knowledge of the hazards associated with high rates of descent near the ground on the landing approach.

## COMMON ERRORS

This is a demonstration maneuver; common errors are not appropriate as familiarization of the maneuver is the only requirement.

**Recovery from High Rates of Descent**