PREFACE

During the course of training, the pilot will demonstrate rote knowledge of the Immediate Action items in all emergency procedures in the L-1011 Operating Manual. Further, he will demonstrate general knowledge of the Secondary Action items in the emergency procedures and the abnormal procedures.

Only Immediate Action items will be completed from memory. Secondary Action items will always be completed as soon as time permits, by reference to the checklist.

ABORTED TAKEOFF

A decision to abort or continue the takeoff is the responsibility of the captain. It is essential that his hand remain on the throttles until \( V_1 \). At \( V_1 \), the captain may remove his hand from the throttles and rotate two-handed, or maintain contact with the throttles and rotate one-handed, as he desires. If the copilot is making the takeoff from the right seat, he will advance the throttles to approximate takeoff EPR values, and the captain will then assume control of, and keep his hand on, the throttles until \( V_1 \) speed has been attained. Regardless of who is making the takeoff, the captain will initiate the abort procedure, if one is necessary.

ENGINE FAILURE BEFORE \( V_1 \)

<table>
<thead>
<tr>
<th>CAPTAIN</th>
<th>COPilot</th>
<th>FLIGHT ENGINEER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any abnormal conditions which would indicate the desirability of aborting the takeoff should be given immediate attention. Once the decision to abort has been made, it is mandatory that the abort procedure be strictly adhered to without delay.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Close throttles and apply brakes.</td>
<td>2. Check brake pressures.</td>
<td></td>
</tr>
<tr>
<td>3. Maintain directional control with rudder and brakes. Do NOT modulate brake pressure to prevent anti-skid releases.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The anti-skid system will operate to provide minimum stopping distance for the existing runway conditions when maintaining continuous maximum brake pedal pressure. If anti-skid is inoperative, apply brakes in a manner to prevent locking wheels.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Apply full reverse thrust. Ground spoilers should deploy automatically. If spoilers fail to deploy automatically, pull the speed brake handle to the full aft position.</td>
<td></td>
<td>3. Cross check that spoilers have deployed; if not, pull speed brake handle full aft.</td>
</tr>
</tbody>
</table>
5. After coming to a stop, perform Emergency Engine Failure or Engine Fire checklist items, as appropriate.

Note: When the copilot is executing a takeoff and an engine failure, or other incident occurs which necessitates abandoning the takeoff, the captain will immediately take over physical control of the aircraft and execute the rejected takeoff. The copilot will thereafter perform copilot duties as required by the circumstances at hand.

2. Read appropriate checklist. Check brake temperatures. Refer to Brake Energy Chart before subsequent takeoff.

ENGINE FAILURE AFTER $V_1$

Prior to starting all takeoffs, the possibility of engine failure should be considered. This will preclude any indecision during takeoff, should engine failure occur.

The following is the sequential order of procedures, should engine failure occur:

- Stay on centerline, using rudder.
- Rotate smoothly at $V_R$. Do not rotate prematurely. Early rotation will only compound the control problem and extend the takeoff roll.
- There is a tendency to rotate early and too rapidly with an engine failure. In spite of the reduced takeoff acceleration with an engine failed, a normal rotation rate is required to obtain $V_2$ at the end of the first climb segment.
- During rotation, hold the rudder pedal displacement constant and wings level. With correct rudder applied, little or no lateral control displacement will be required. Don’t oscillate the rudder or control wheel. If changes are required, strive to make them smooth and well coordinated.
- Retract the landing gear after positive rate of climb indication. The rate-of-climb indicator and altimeter may not show a positive climb until the airplane is about 35 feet above the runway.
- When stabilized, rudder trim may be used to reduce the pedal force required while pedal displacement remains the same.
• For obstacle clearance, hold $V_2$ to $V_2 + 10$ knots during second segment climb. $V_2$ is close to the best angle of climb with takeoff flaps. As temperature or altitude increases, the two-engine best angle of climb speed changes very little for a constant weight. Maintain not less than $V_2$, and never above $V_2 + 10$ knots during first and second segment climb. $V_2$ is equal to, or greater than, $1.1V_{MCA}$ or $1.2V_S$.

• At 400 feet, or clear of obstacles, increase speed and make flap retraction on speed schedule with maximum of $15^\circ$ bank and near level flight.

• Accelerate to $V_2 + 70$ knots for ENGINE OUT best angle of climb speed.

• Complete the Engine Failure checklist.

• Complete the After Takeoff checklist.

• Notify ATC of failure and desired plan. After the initial rudder pedal displacement, little or no change in rudder pedal position will be required to hold a straight takeoff path, providing no power change is made.

Discussion

If the pilot is intent on keeping the takeoff path on, or parallel to, the runway centerline, the correct rudder input will be applied naturally as the thrust is reduced on the failed engine and as the speed changes. The wings will be held in a level condition with lateral control. After the initial rudder pedal displacement, only small changes in rudder pedal position will be required to hold a straight takeoff path, as long as power and speed remain unchanged.

During rotation, hold the rudder pedal displacement constant and wings level. With correct rudder applied, little or no lateral control wheel displacement will be required. Do not oscillate the rudder or control wheel. If changes are required, make them smooth and well coordinated. Keep the ball centered. Rudder trim may be used to reduce the pedal force, while pedal displacement remains the same.

For obstacle clearance, hold $V_2$ during second segment climb. $V_2$ is close to the best angle of climb speed with takeoff flaps. As temperature or altitude increases, the two-engine best angle of climb speed changes very little for a constant weight. Maintain not less than $V_2$, and never above $V_2 + 10$ knots, during first and second segment climbs.

The $15^\circ$ Bank Turn

The climb gradient decrement in a $15^\circ$ bank turn is approximately 120 feet per minute loss in rate of climb. However, a $15^\circ$ bank is not regarded as a turning condition for performance purposes. Therefore, the speed schedule for the wings-level condition can be applied.
ENGINE FAILURE AFTER $V_1$

**FLAP RETRACT SCHEDULE**

- $22^\circ$ OR $18^\circ$ TO $10^\circ$: $V_2 + 10$ KTS
- $10^\circ$ TO $4^\circ$: $V_2 + 20$ KTS
- $4^\circ$ TO $0^\circ$: $V_2 + 60$ KTS

**Set takeoff thrust 40 TO 80 KTS**

**$V_R$: Rotate smoothly to target attitude**

**Positive rate of climb gear up**

**Maintain $V_2$ to $V_2 + 10$ KTS**

**At 1500 feet, set climb thrust (takeoff thrust max. 5 minutes)**

**Minimum control speeds, RB. 211-22B**

**Applicable to any flap position**

![Diagram showing minimum control speeds](image-url)
**TAKEOFF PATH PROFILE, ENGINE INOPERATIVE**

<table>
<thead>
<tr>
<th></th>
<th>LANDING GEAR UP</th>
<th>BEGIN TRANSITION TO ENROUTE CONFIGURATION</th>
<th>ENROUTE CONFIGURATION</th>
<th>ENROUTE CONFIGURATION AND AT LEAST 1500' ABOVE TAKEOFF SURFACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRITICAL ENGINE</td>
<td>INOPERATIVE</td>
<td>INOPERATIVE</td>
<td>INOPERATIVE</td>
<td>INOPERATIVE</td>
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<tr>
<td>OPERATING ENGINES</td>
<td>MAXIMUM TAKEOFF</td>
<td>MAXIMUM TAKEOFF</td>
<td>MAXIMUM TAKEOFF OR MAXIMUM CONTINUOUS</td>
<td>MAXIMUM CONTINUOUS</td>
</tr>
<tr>
<td>LANDING GEAR</td>
<td>TRANSITIONING EXTENDED TO RETRACTED</td>
<td>RETRACTED</td>
<td>RETRACTED</td>
<td>RETRACTED</td>
</tr>
<tr>
<td>WING FLAPS</td>
<td>TAKEOFF</td>
<td>TAKEOFF</td>
<td>RETRACTING</td>
<td>RETRACTED</td>
</tr>
<tr>
<td>SPEED</td>
<td>ACCELERATING $V_{LOF}$ TO $V_2$</td>
<td>$V_2$</td>
<td>ACCELERATING $V_2$ TO 1.25$V_S$</td>
<td>$\geq 1.25V_S$</td>
</tr>
</tbody>
</table>

**Diagram Description**
- **Start of Takeoff Flight Path**: Speed $V_2$, Height 35 Meters
- **Landing Gear Up**: Climb First Segment
- **Height Above Takeoff Surface**: 35 Meters
- **Start of Takeoff Path**: $V_1$, $V_{MU}$, $V_R$, $V_{LOF}$
- **Climb Second Segment**: $V_2$, Height 400 Meters
- **Climb Third Segment**: $\geq 1500$ Meters
- **Actual Takeoff Flight Path**: Net Takeoff Flight Path (Actual Climb Gradient Reduced by .9%)
- **Clearway**: Takeoff Surface (Runway Plus Stopway)
- **Obstacle**:
PITCH ATTITUDE FLYING

In the event that the CADCs and the standby pitot-static instruments are rendered inoperative by a loss of the radome or damage to or icing of all pitot-static probes, the airplane may still be flown safely to a landing by proper coordination of pitch attitude and thrust. The target pitch attitude and approximate EPR values required for varying weights and altitudes are found in Pitch Attitude Flying chart. Although the procedure is seldom practiced in flight, the pilots should be made aware of the capability.

Due to the insidious nature of icing formation, any significant deviation from a normal attitude and/or thrust setting to maintain a desired airspeed should alert a pilot to possible problems. Exact indications cannot be accurately forecast. The probability of erroneous airspeed indications on both pilots' instruments is remote, but the possibility does exist if all anti-ice systems malfunction.

Refer to table on page 3-89.

EMERGENCY DESCENT

CLOSE THROTTLES
EXTEND SPEED BRAKES

INITIATE TURN
30° NORMAL, 46° MAXIMUM BANK ANGLE
LOWER NOSE
TARGET ATTITUDE 10° NOSE-DOWN

TARGET SPEED $V_{mo}$ OR 0.85 MACH
ROLL WINGS LEVEL WHEN ACCELERATING TOWARD TARGET SPEED

200 FT ABOVE DESIRED ALTITUDE, SMOOTHLY REDUCE DESCENT RATE

1000 FT ABOVE DESIRED ALTITUDE, RETRACT SPEED BRAKES

LEVEL OFF AT 14,000 OR MEA SPEED BRAKES RETRACTED CREW OXYGEN AS REQUIRED
## PITCH ATTITUDE FLYING

<table>
<thead>
<tr>
<th>CRUISE Approximate speed: 300 kts up to FL 300; 280 kts (M 0.82) at FL 350</th>
<th>GROSS WEIGHT X 1000</th>
<th>TARGET PITCH ATTITUDE (DEG)</th>
<th>APPROXIMATE EPR REQUIRED</th>
<th>FL 200</th>
<th>FL 250</th>
<th>FL 300</th>
<th>FL 350</th>
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<tr>
<td>420/190</td>
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<td>340</td>
<td>420</td>
<td>500</td>
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<td></td>
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<tr>
<td>400/180</td>
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<td>330</td>
<td>410</td>
<td>480</td>
<td>590</td>
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<tr>
<td>350/160</td>
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<td>320</td>
<td>380</td>
<td>450</td>
<td>530</td>
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<td></td>
</tr>
<tr>
<td>350/140</td>
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<td>300</td>
<td>350</td>
<td>420</td>
<td>490</td>
<td></td>
<td></td>
</tr>
<tr>
<td>250/120</td>
<td>2.0</td>
<td>290</td>
<td>330</td>
<td>400</td>
<td>450</td>
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<table>
<thead>
<tr>
<th>DESCENT Fly to pitch attitude.</th>
<th>FLAPS (deg)</th>
<th>GROSS WEIGHT (lb/kg) X 1000</th>
<th>TARGET PITCH ATTITUDE (DEG)</th>
<th>APPROX EPR REQUIRED</th>
<th>APPROX SPEED (kts)</th>
<th>APPROX ROD (ft/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>400/180</td>
<td>0.5</td>
<td>Idle</td>
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<td>2490</td>
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<td>350/160</td>
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<td>250/120</td>
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<td>170</td>
<td>3290</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>HOLDING 10,000 ft. Adjust power to maintain pitch attitude, level flight.</th>
<th>0</th>
<th>400/180</th>
<th>8.0</th>
<th>240</th>
<th>210</th>
</tr>
</thead>
<tbody>
<tr>
<td>350/160</td>
<td>7.0</td>
<td>200</td>
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</tr>
<tr>
<td>300/140</td>
<td>6.0</td>
<td>170</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>250/120</td>
<td>5.0</td>
<td>150</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INTERMEDIATE APPROACH Adjust power to maintain pitch attitude, level flight.</th>
<th>0</th>
<th>400/180</th>
<th>8.5</th>
<th>160</th>
<th>V_{REF+}</th>
</tr>
</thead>
<tbody>
<tr>
<td>350/160</td>
<td>8.0</td>
<td>140</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>300/140</td>
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<td>120</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>250/120</td>
<td>7.0</td>
<td>090</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10</th>
<th>400/180</th>
<th>8.0</th>
<th>210</th>
<th>V_{REF+}</th>
</tr>
</thead>
<tbody>
<tr>
<td>350/160</td>
<td>7.5</td>
<td>190</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300/140</td>
<td>7.0</td>
<td>160</td>
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</tr>
<tr>
<td>250/120</td>
<td>6.5</td>
<td>120</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>22</th>
<th>400/180</th>
<th>6.5</th>
<th>240</th>
<th>V_{REF+}</th>
</tr>
</thead>
<tbody>
<tr>
<td>350/160</td>
<td>6.0</td>
<td>210</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300/140</td>
<td>5.5</td>
<td>180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>250/120</td>
<td>5.0</td>
<td>140</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FINAL APPROACH, 3° GS Adjust power to maintain pitch attitude. Fly to GS or, if not available, to ROD</th>
<th>42</th>
<th>400/180</th>
<th>5.5</th>
<th>240</th>
<th>V_{REF+}</th>
</tr>
</thead>
<tbody>
<tr>
<td>350/160</td>
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<td>220</td>
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</tr>
<tr>
<td>300/140</td>
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</tr>
<tr>
<td>250/120</td>
<td>4.0</td>
<td>150</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** IN THE FINAL APPROACH CONFIGURATION, SMALL SPEED CHANGES MAY BE ACCOMPLISHED AT THE RATE OF 8 KTS PER 1° CHANGE IN ATTITUDE.
EMERGENCY DESCENT

Uncontrollable loss of cabin pressurization may be caused by a malfunctioning pressurization system or structural damage. In either case, don oxygen masks, establish communication, then attempt to ascertain whether the cabin pressure is controllable before initiating the rapid descent. When structural integrity is in doubt, limit configuration changes and speed changes as much as possible, preferably at or below the speed existing at the time the problem occurs. Determine the extent of damage from cabin crewmembers, if possible.

These procedures are used for sudden loss of cabin pressure. They are designed to facilitate a descent to a safe operating altitude in minimum time, with the least passenger discomfort. The emergency descent is the most rapid means of descending from altitude.

The required actions are as listed in the Emergency Procedures section, but the following aspects are stressed:

- Oxygen masks must be donned immediately.
- Communication on interphone between crewmembers is essential.
- Initiate the emergency descent, assuming structural damage. If it is determined that there is no structural damage, the dive speed may be increased.
- Make sure pitchup caused by speedbrake extension is fully compensated for.
- Watch for lateral overcontrolling. 45° is maximum bank angle.
- There should be minimum negative G.
- The wings should be leveled immediately after descent angle is established.
- Keep the airplane in trim.
- Confirm passenger oxygen mask deployment.
- Passenger SEAT BELT and NO SMOKING ordinance lights should be on.
- Pilot should be aware of the necessity to advise ATC of the emergency descent, set code 7700, and request an altimeter setting and altitude assignment.
- Rate of descent should be decreased 2000 ft above selected altitude. (Normally, 14,000 feet or MEA, whichever is higher.)
- Speed brakes should be slowly retracted 1000 ft above selected altitude.
- Descent should be made to an altitude which permits maintaining cabin altitude below 10,000 feet.
- Establish long range cruise.
### EMERGENCY DESCENT

**CAPTAIN**

Descent should be accomplished, limiting airspeed and maneuvering loads as much as possible until structural integrity is determined.

1. Don oxygen mask.
2. Close the throttles and disengage the autopilot.
3. Roll the aircraft 30° - 45° bank, lower the nose to target attitude of 10° nose-down, and extend the spoilers. (This prevents negative forces from being applied to the airframe in the event there is structural damage, and aids in leaving the airway.) If turbulence is encountered, reduce to turbulence penetration speed.
4. Command the copilot to set the Altitude Select system to aid in leveling off.
5. Set altimeter to QNH.

**COPILOT**

1. Don oxygen mask.
2. Contact ATC; advise them of the situation and your intentions. Request an altitude below 14,000 or MEA and get the local QNH altimeter setting.
3. Set altimeter to local QNH.
4. Set Altitude Select system to assigned level-off altitude.
5. SEAT BELT/NO SMOKING signs on.

**FLIGHT ENGINEER**

1. Don oxygen mask.
2. Determine structural integrity; if outflow valves are open, it indicates pressure control failure. If outflow valves are closed, it indicates an abnormal opening in the fuselage. In this case, recommend a slow speed descent.
3. Read the Emergency Descent checklist. (This may be read aloud and all items confirmed by the F/E; then advise the captain that the Rapid Decompression and Emergency Descent checklist are complete.

### MISSED APPROACH

Initiate a missed approach if the field is not in sight upon reaching minimums. Simultaneously apply go-around thrust, rotate the aircraft, call for flaps 22°, and establish the initial climb at V\textsubscript{REF}. Retract the gear when a positive rate of climb is indicated. Climb at V\textsubscript{REF} to 400 feet AGL. Accelerate to V\textsubscript{REF} + 10 and retract flaps to 10°. Continue accelerating to V\textsubscript{REF} + 20 and retract the flaps to 4°. Accelerate to V\textsubscript{REF} + 60 before retracting flaps to up.

### TWO-ENGINE LANDING

During the approach, the rudder is the primary control used to correct for asymmetric thrust. Use the rudder to maintain directional control with near zero yaw and wings level. With correct use of rudder, the control wheel will be centered. With a displaced control wheel, the spoilers are partially raised, increasing drag and reducing lateral control.

The V\textsubscript{REF} and flap extension speeds are the same as with a three engine approach and landing. Fly a normal approach, centering the trim at approximately 500 feet AGL. Perform a normal landing.
MISSED APPROACH PROCEDURE, 2 OR 3 ENGINES

GEAR DOWN
FLAPS 33° OR 42°
V_{REF} + \frac{1}{3} \text{ WIND} + \text{GUST}
NORMAL SLOT

AT A MINIMUM OF 400 FT, ACCELERATE & RETRACT FLAPS ON SCHEDULE WHILE CLIMBING TO 1500 FT OR MEA

GO-AROUND THRUST
ROTATE TO CLimb ATTITUDE
FLAPS 22°
POSITIVE RATE OF CLIMB
GEAR UP

CLIMB TO 400 FT MINIMUM MAINTAIN V_{REF} + 10

FLAP RETRACTION SCHEDULE

22° TO 10°
10° TO 4°
4° TO 0°

V_{REF} + 10 KTS
V_{REF} + 20 KTS
V_{REF} + 60 KTS

LANDING, 2 OR 3 ENGINES

GEAR DOWN
FLAPS 22
V_{REF} + 20 KTS MIN
DESCEND AS REQUIRED

INTERCEPTING APPROACH SLOT
FLAPS 33° OR 42°
V_{REF} + \frac{1}{3} \text{ WIND} + \text{GUST}
(15 KT MAX)

FLAPS 10
V_{REF} + 30 KTS MIN

FLAPS 4
V_{REF} + 40 KTS MIN

CLEAN:
V_{REF} + 60 KTS

AT 500 FEET, STABILIZE IN SLOT

3-92
SINGLE-ENGINE LANDING

RUDDER FORCES

Rudder forces will be higher than normal. Rudder trim may be used, if considered necessary, but trim is to be zeroed before landing.

APPROACH ANGLE

A slightly larger circuit pattern for this sequence is recommended to give the same approach angle as for normal 3-engine pattern. Rate of descent will be higher due to the higher approach speed.

OVERSHOOTING TURNS

Overshooting the turns to final approach may occur with the higher pattern speed.

SPEED CONTROL

Accurate speed control during the pattern is necessary if the threshold speed, thrust setting, and altitude are to be correct. High airspeed at the commit point often traps the pilot into pulling off too much thrust, only to find that the airspeed is needed later.

SINGLE-ENGINE LANDING PATTERN

- Dump fuel to lowest practical weight.
- Utilize APU for generator and bleed air.
- Deploy the RAT.
- Open all fuel crossfeeds.
- Turn off all packs.
- Turn on hydraulic system C ATM prior to approach.
- Select ± 30° on mechanical rudder limiter.
- Set Bug to threshold speed (V_{REF} + 20 knots).

Approaching the downwind leg, the Single-Engine Landing checklist should be called for and the airplane should be decelerated to Bug + 40 minimum, maintaining a clean configuration. The downwind leg should be wider than normal to allow for the increased airspeed on the base leg. Turning base leg or on final, position flaps to 4° (Bug +20 minimum). Beginning descent, select flaps 10° (Bug +10 minimum), extend the landing gear, and complete the landing checklist. Maintain Bug + 10 minimum until commit point, and fly a normal glideslope. A normal slot should result in a sink rate of approximately 700-900 feet per minute, due to the increased airspeed. Upon reaching the commit point (minimum 1000 feet above the field), allow the airspeed to bleed off so as to cross the threshold at Bug plus the wind-gust correction. The airplane is committed to land at 1000 feet above the runway. After landing, ground spoilers must be extended manually.

STABILIZER TRIMMING

Maintain longitudinal trim throughout the approach.

RUDDER AND THRUST

The pilot should realize he flies on one engine with the control wheel centered, just as on the two-engine sequence. Once the combination of thrust and rudder is found that permits hands-off level flight, the rudder should not be moved unless thrust or airspeed is changed. Thrust required for a single-engine traffic pattern is not excessive with the flaps up. Flaps may be set at 4° when turning onto the localizer or runway centerline.
SINGLE ENGINE LANDING

BEFORE APPROACH
DUMP TO LOWEST PRACTICAL WEIGHT
UTILIZE APU GEN AND BLEED AIR
DEPLOY RAT
OPEN ALL FUEL CROSSFEEDS
TURN OFF ALL PACKS
HYD SYST C ATM ON
RUDDER MECHANICAL LIMITER – SET MNL/±30°
WHEN NEAR FIELD REDUCE LOAD ON MNL/ENGINE BY CLOSING BLEEDS
SET BUG V_{REF} + 20 KTS

FLAPS 4°
BUG + 20 KTS MIN

GLIDESLOPE 1 DOT
FLAPS 10°
BUG + 10 MIN
GLIDESLOPE INTERCEPT

LANDING ASSURED COMMIT POINT
1000 FT AGL GEAR DOWN/FLAPS 10°

GO-AROUND – ALTITUDE 1000 FT AGL
OR HIGHER

CLEAN:
BUG + 40 KTS MIN

FLARE AND LANDING
GEAR DOWN/FLAPS 10°
BUG MIN

GRADUALLY REDUCE SPEED
SO AS TO BE AT BUG + ½ WIND + GUSTS
AT FLARE

3-94
SINGLE-ENGINE MISSED APPROACH

If at any time before reaching the commit point it is determined that the airplane cannot be safely landed, a missed approach should be commenced immediately. The procedure is as follows:

- Apply max thrust (GA EPR).
- Call for gear up and flaps to 4°.
- Altitude must be exchanged for airspeed during the go-around. Push the nose down, accelerating to 180 knots. The pitch attitude will require a push to 5° to 7° below the horizon to gain airspeed.
- Retract the flaps at Bug + 40 kts (180 knots).
- Accelerate to 200 knots initial climb speed.
- Climb at 200 to 210 kts.

SINGLE-ENGINE MISSED APPROACH

- 1000 FT ABOVE THE RUNWAY OR HIGHER
- BUG + 10 KTS
- MAXIMUM POWER (GO-AROUND EPR)
- GEAR UP
- FLAPS 4°
- PUSH NOSE DOWN WITHOUT DELAY

Note: ALTITUDE MUST BE EXCHANGED FOR AIRSPEED DURING FIRST PART OF GO-AROUND.

NO FLAP/NO SLAT APPROACH AND LANDING

A no flap/no slat landing would be required in case of multiple hydraulic system failures, or, possibly, flap torque tube failure or jamming. Obviously, this combination is unlikely. Nevertheless, no-flap/no slat landings present no real problems once the factors involved are understood.

PATTERN AND APPROACH TECHNIQUE

The airspeed Bug is set at \( V_{REF} + 50 \) knots and pattern maneuvering carried out at minimum of Bug + 10 knots. Gear is extended at the normal pattern position. The rudder limiter is selected to ±30°. Strict airspeed control should be emphasized throughout. Autothrottle may be used during the approach.

Due to the high airspeeds involved, the downwind leg should be extended to give more time to accomplish the turn onto final approach and to achieve runway alignment.
After turning onto final, the speed is reduced to bug setting and a normal approach is established. In order to accomplish this, the turn onto final should be made far enough out to allow the airplane to fly into the slot in level flight.

Once in the proper slot, the sink rate will be approximately 900 to 1000 feet per minute due to the higher than normal airspeed.

A very small change in attitude is needed for flare and landing. The pilot must guard against holding the airplane off, as the attitude may become too nose high.

A well-executed zero flap approach requires precise control of airspeed and glidepath. With little drag, it is difficult to slow down. When this is combined with ground effect, it is possible to float several thousand feet down the runway.

No flap/no flat landing ground speeds are obviously high, so fuel dumping may be necessary to reduce the Bug speed. Gust and wind gradient increments may also be required. Extending the landing gear in the pattern permits improved speed stabilization.

AFTER LANDING

With no flaps or slats, automatic ground spoilers will not be operative. The pilot should be briefed to extend speed brakes manually. In addition to creating aerodynamic drag, ground spoilers decrease field length requirements by placing the weight of the airplane on the wheels, increasing braking effectiveness.

NO FLAP/NO SLAT LANDING

TURNING BASE:
DESCEND AS REQUIRED
BUG + 10 KTS MIN

DOWNWIND:
GEAR DOWN
MAINTAIN ALTITUDE

CLEAN:
BUG + 10 KTS MIN

ROLL OUT ON FINAL
REDUCE SPEED TO BUG + ½
WIND + GUSTS
(15 KT MAX)

FINAL APPROACH:
STABILIZE IN SLOT
LIMIT BANK ANGLE
TO 20°

BEFORE APPROACH
DUMP FUEL AS REQUIRED
SELECT RUDDER LIMITER TO MNL/±30°
SET BUG VREF + 50 KTS
USE WIDE EXTENDED PATTERMAN

MISSED APPROACH:
GO-AROUND POWER
ROTATE
ACCELERATE TO BUG + 10 KTS
GEAR UP AT POSITIVE RATE
OF CLIMB.
The pilot should realize that placing the nose gear on the runway increases brake effectiveness by reducing the lift, thereby putting more weight on the wheels. This applies to all types of landings, but is most critical during no flap/no slat landings. The pilot should be advised to land as near the 1500 foot point as possible and to lower the nose gear as soon as he can.

Reverse thrust is most effective at high speeds. It is very important that the engines be selected to reverse as quickly as possible after main gear touchdown. A strong pitchup tendency will occur during reversing, which must be counteracted by forward yoke and moderate braking.

**PARTIAL FLAP LANDING**

The aircraft angle-of-attack on landing with partial flaps will be slightly higher than that for the normal landing configuration. It is, therefore, important that the speed not be allowed to bleed off below that recommended, due to the possibility of striking the tailskid on the runway.

A normal approach should be made, holding threshold speed or slightly higher through the flare. Do not attempt to hold the aircraft off during the flare.

Automatic ground spoilers will be inoperative and spoilers will have to be selected manually after touchdown.

If a go-around becomes necessary, do not attempt to raise the flaps.

**SLAT MALFUNCTION**

If the slats will not extend, the slats should be locked by use of the Slat Lock switch on the slat monitor panel. With no slats, flaps must be limited to a maximum of 22°. The Bug should be set to \( V_{\text{REF}} + 20 \text{ kts} \). A normal approach should be made at \( V_{\text{REF}} + 20 \text{ kts} \) plus 1/2 the wind and all the gusts. Again, automatic ground spoilers will be inoperative and the pilot will have to manually select them after touchdown.

**NO FLAP/FULL SLAT LANDING**

With the leading edge slats extended, a final approach speed of 42° flap \( V_{\text{REF}} + 35 \text{ knots} \) should be used. Landing distance and brake emergency requirements are significantly increased.

1. Reduce weight as much as practical.
2. Flap handle . . . . . . . . . . 4° POSITION
3. Slats fully extended . . . . . . CHECK
4. IAS Bug, 42° flap \( V_{\text{REF}} + 35 \text{ knots} \) . . . SET
   Minimum maneuvering speed is Bug + 20 knots.
5. Make larger than normal patterns. Fly normal glideslope.
6. Rudder limiter . . . . MNL/± 30 DEGREES
7. Reduce speed to bug over threshold.
8. Make normal flare and touchdown.
Do not prolong the flare, as this will increase landing distance.

9. Speed brakes must be extended manually.

10. Apply brakes with delay.

   The pilot should be aware of a mild pitchup tendency upon actuation of speed brakes, and moderate pitchup with application of reverse thrust. This tendency can be counteracted by applying forward control column and light braking before reverse thrust is selected.

11. Use full reverse thrust after braking is initiated.

**NO FLAP-FULL SLAT LANDING**

- **IF ACTUAL FLAP FAILURE:**
  - SET BUG TO $V_{REF} + 35$ KTS
- **IF SIMULATED FLAP FAILURE:**
  - LOCK SLATS OUT
  - SELECT FLAPS UP
  - SET BUG TO $V_{REF} + 35$ KTS

**DOWNWIND:**
- GEAR DOWN
- SELECT FLAPS TO $4^\circ$
- CHECK SLATS FULLY EXTENDED
- SET BUG TO $V_{REF} + 60$ KTS MIN

**TURNING BASE:**
- DESCEND AS REQUIRED
- BUG $+ 20$ KTS MIN

**DO NOT MOVE FLAP SELECTOR THEREAFTER**

**BEFORE APPROACH**
- DUMP FUEL AS REQUIRED
- SELECT RUDDER LIMITER TO MNL/ $\pm 30^\circ$
- SET BUG $V_{REF} + 35$ KTS

**ROLLOUT ON FINAL**
- REDUCE SPEED TO BUG $+ \frac{1}{2}$
- WIND + GUSTS (15 KT MAX)

**FINAL APPROACH:**
- STABILIZE IN SLOT

**MISSED APPROACH:**
- GO-AROUND POWER
- ROTATE
- ACCELERATE TO BUG $+ 10$ KTS
- GEAR UP AT POSITIVE RATE OF CLIMB
PARTIAL FLAP/NO SLAT LANDING

When the slats are inoperative (or at a setting other than fully extended), the final approach should be flown at a minimum speed of 420° flap \( V_{REF} + 20 \) knots. Landing distance and brake emergency requirements are significantly increased. Flaps should not be extended more than 22°, regardless of slat position.

1. Reduce weight as much as practical.
2. Flap handle . . . . . . . . . . 4° POSITION
3. Slats . . . . . . . . . . . . . . . LOCK
4. Bug . . . . . . . . . \( V_{REF} + 20 \) KNOTS

Minimum maneuvering speed is Bug + 20 knots.

5. Make larger than normal pattern. Fly a normal glideslope.
6. Rudder limiter . . . MNL/± 30 DEGREES
7. Flap handle . . . . 22 DEGREES (MAX)
8. Slat malfunction checklist . . COMPLETE
9. Reduce speed to Bug over the threshold.
10. Make normal flare and touchdown.

Do not prolong the flare, as this increases landing distance.

11. Speed brakes must be extended manually.

12. Apply brakes without delay.

The pilot should be aware of a mild pitchup tendency upon actuation of speed brakes, and a strong pitchup with application of reverse thrust. This tendency can be counteracted by applying forward control column and moderate braking before reverse thrust is selected.

13. Use full reverse thrust after braking is initiated.

**PARTIAL FLAP/FULL SLAT LANDING**

GEAR DOWN
FLAPS MAXIMUM AVAILABLE
RUDDER LIMITER MNL/ ± 30°
DESCEND AS REQUIRED

UPON DETERMINING FLAP MALFUNCTION:
SELECT PROPER AIRSPEED BUG SETTING

CLEAN: $V_{REF} + 60$ KTS MIN

1500 FT

Airspeed Bug Settings:
FLAPS 4° — $V_{REF} + 25$ KT
FLAPS 10° — $V_{REF} + 20$ KT
FLAPS 22° — $V_{REF} + 15$ KT

5000 FEET:
STABILIZE IN SLOT

MisSED Approach:
GO-AROUND POWER
ROTATE
ACCELERATE TO BUG + 10 KTS
GEAR UP AT POSITIVE RATE OF CLimb

INTERCEPTING APPROACH SLOT:
FLAPS MAXIMUM AVAILABLE
BUG + $\frac{1}{2}$WIND + GUST (15 KT MAX)

Extend spoilers manually

BE AWARE OF MILD PITCHUP AT SPOILER EXTENSION AND REVERSE THRUST ACTUATION
PARTIAL FLAP/FULL SLAT LANDING

In the event the slats are operable, but the flaps become inoperative at an intermediate position, the flap handle should be left at the last selected position.

The airspeed bug should be set at:

- Flaps 4 - \( V_{REF} + 25 \) knots
- Flaps 10 - \( V_{REF} + 20 \) knots
- Flaps 22 - \( V_{REF} + 15 \) knots

If the flaps stop between these settings, select the next higher bug speed setting.

Landing distance and brake energy requirements will be significantly increased.

1. Reduce weight, if required.
2. Flap handle . . . . . LAST SELECTION
3. Bug . . . . . . . . . PER FLAP SETTING
4. Maker larger than normal pattern. Fly a normal g-lideslope.
5. Rudder limiter . . . . . . . MNL/\( \pm 30^\circ \)
6. Reduce speed to Bug over threshold.
7. Make normal flare and touchdown.

Do not prolong the flare, as this increases the landing distance.

8. Speed brakes must be extended manually.
9. Apply brakes without delay.
10. Use full reverse thrust after braking is initiated.

The pilot may experience mild pitchup at speed brake extension and again at reverse thrust actuation. Moderate braking and nose-down stabilizer application controls the pitchup tendency easily.

FLAP/SLAT MALFUNCTION MISSED APPROACHES

Upon deciding to abort the approach, the pilot should simultaneously: announce, “Going-around,” apply go-around power, rotate the aircraft, and climb at Bug plus 10 knots. He should retract the gear, if possible, when a positive rate of climb is indicated. The flap/slat configuration should not be changed until the airplane has been accelerated at or above 400 feet AGL. Normally, the flap/slat configuration is not changed prior to the next approach except in the partial flap/no slat case, where the flaps are retracted from 22\(^\circ\) to 10\(^\circ\) to assist the aircraft’s climb capability.
TWO ENGINE FERRY TAKEOFF

Normally, two-engine ferry takeoffs are performed by designated pilots. Although the takeoff is not particularly difficult, it does require special techniques. Appendix 1 of the Airplane Flight Manual outlines all applicable limitations and procedures.

PRE-TAKEOFF DUTIES

1. Review the AFM procedures.
2. Compute the takeoff data, using 10° flaps only (AFM Appendix 1).
3. Compute the EPR for no bleed.
4. Both ATMs must be operable.
5. Adjust rudder pedals to permit full throw.
6. Complete the Before Start checklist.
7. Complete the amended Taxi & Before Takeoff checklist.
8. Place the inoperative engine throttle full forward to arm the takeoff warning.

WING ENGINE INOPERATIVE TAKEOFF

1. Align the aircraft with the runway.
2. Set the brakes.
3. Set the center engine at takeoff EPR and the wing engine at 70% N₁ for dry runways (or at idle thrust for wet runways).
4. Release the brakes.
5. The copilot will apply firm forward yoke pressure throughout the takeoff roll until the captain assumes control above V_{MCG}.
6. As the airplane accelerates, apply rudder toward the operating outboard engine. Readjust center engine EPR between 40 and 80 knots, if necessary. At approximately 60 knots, full rudder should be achieved and the outboard engine thrust increase underway. Takeoff thrust should be stabilized at approximately V_{MCG}.
7. At V_R, rotate to a liftoff attitude of 12-1/2°.
8. After liftoff, retract the gear and continue rotation to a climb attitude that results in a speed not less than V_2 at a 35 foot height.
9. Climb at V_2 speed to at least 400 feet, accelerate in level flight to flap retraction speed, and retract the flaps. Continue level flight acceleration to the final segment climb speed.

CENTER ENGINE INOPERATIVE TAKEOFF

Normal thrust setting procedures may be used for the center engine inoperative configuration.