HANDY HINTS FOR INSTRUCTOR PILOTS

Familiarity breeds complacency. Always approach your flying duties with caution and respect. Remain alert continually. Expect the unexpected. Past experience dictates these simple rules:

1. Outline each training period in writing before each flight and brief thoroughly. Plan the training session so each maneuver leads smoothly into the next maneuver.

2. Obtain a weather briefing and file a flight plan.

3. Recheck the computed takeoff data.

4. Utilize the non-flying pilot as a traffic watch.

5. Be ready to take over the brakes during all taxiing.

6. Guard the throttles at all times to prevent or correct any misapplication. However, do not “ride” the throttles.

7. Have positive control of all three axes prior to giving the command, “I have control."

8. High sink rates during approach to landing are not permitted below 500 feet.

9. Low, flat approaches should be avoided.

10. Return all controls, switches, and circuit breakers to their normal position at the completion of each maneuver before proceeding to the next one.

11. Keep the tower and your crew advised of your intentions during touch and go landings.

12. Do not allow the pilot to exceed aircraft limitations or tolerances. If necessary, take control of the aircraft.

13. After all full stop landings, perform the Taxi and Before Takeoff checklist before the next takeoff.

14. In the event of an actual emergency situation, the instructor must take control immediately and land as soon as possible. An abnormal situation should be evaluated, and corrective action taken by the instructor pilot, as necessary.

15. Observe the minimum altitude restrictions for airwork maneuvers.

16. Utilize radar facilities for traffic advisories and keep them advised of your intentions.

17. Remain outside the boundaries of the Federal airways while performing airwork maneuvers, whenever possible.

18. Remember that the instructor pilot is the pilot-in-command of training and check flights, and is always responsible for the safety of the flight.
WEATHER MINIMUMS

1. All airwork will be conducted under VFR conditions.
2. Airport traffic patterns will be flown at circling minimums or better.
3. Practice instrument approaches will be flown at field minimums or better.

Standard Fuel Load - 120,000 lb (55,000 kg)

OPERATING WEIGHTS

1. Average Empty Operating Weight - 236,000 lb (107,000 kg)
2. Ramp Weight, using Standard Fuel Loading - 356,000 lb (162,000 kg)

CENTER OF GRAVITY AND TRIM SETTING

1. CG (%mac) - 26% (Ballast should be used.)
2. Takeoff Stabilizer Setting - 3-3/4 units

AREA DEPARTURE

A pilot should anticipate use of area departure procedures during IFR departures from busy airports.

STRAIGHT OUT DEPARTURE

After retracting flaps, accelerate to area departure speed $V_2 + 70$. Since this speed is a function of aircraft gross weight, aircraft characteristics remain relatively constant. It gives a very high climb gradient at a speed that permits maneuvering within a reasonably tight airways system. It also affords adequate margins in the event of engine failure. Due to the high rate of climb achieved at this speed, the pilot should anticipate the level-out altitude; otherwise, altitude overshoot is very likely.

Additionally, due to the acceleration features of the L-1011 at training weights, immediate thrust reduction must be made on leveling out to retain desired airspeed.

TURN AFTER TAKEOFF

If a reversal is required after takeoff, for traffic control purposes, it should be accomplished with takeoff flaps, $V_2 - 10$ knots, and bank angle not to exceed $15^\circ$ until maneuvering speed is reached. Caution the pilot to observe the maneuvering speed of $V_2 + 60$ prior to retraction of the final flap increment. The pilot should call for MCT or climb power when passing through 2000 feet, and should maintain accurate speed control.

HOLDING

Holding will normally be practiced in the clean configuration at altitudes above 10,000 feet at $V_{REF} + 90$. Below 10,000 feet, holding will normally be carried out with $4^\circ$ flap and speed of 190 knots. However, individual airport or area requirements may require different airspeeds.

Clean holding is based on a speed near maximum endurance.
When holding clean at high altitude, it is accepted that a slight loss of airspeed will occur during the 180° reversals. Pilots should not try to recover the speed loss during this section of the holding pattern.

If the holding delay can be anticipated and the approach time is known, it is most economical to make a long drift-down descent from cruise altitude at maximum endurance speed.

Do not exceed holding speeds as set forth in FAR unless prior ATC approval is received.

Fuel flow should be monitored carefully, but even if slightly higher flows than book figures occur while maintaining airspeed, they must be tolerated. The airplane is so close to the back side of the drag curve that attempts to fly slowly will require higher fuel flows and will degrade maximum endurance capability.

**TURNS**

**CLIMBING TURNS**

After takeoff, with airspeed stabilized, have the pilot climb to 10,000 to 15,000 feet. During the climb, normal turns with 20° to 30° bank can be practiced.

**LEVEL TURNS**

The normal bank angle is 25°, with a recommended maximum of 30°.

Very little thrust increase is required for 25° bank turns. However, appreciable thrust must be added for 45° bank turns.

The turn should be entered smoothly. Once the desired bank angle has been established, it should be maintained steadily throughout the turn. When rolling out of the turn, lead the heading by approximately one-third of the bank angle.

The pilot should practice 45° bank turns, which give him the best practice in controlling pitch and power while holding steady bank angle, airspeed, and altitude. The Flight Director should be turned off, the thrust should be symmetrical, and trim may be used during the maneuver.

**STEEP TURNS**

The normal maximum bank angle is thirty degrees. Only during training flights should bank angles exceed thirty degrees. Steep turns are normally performed with forty-five degrees of bank and at two-hundred fifty knots. Steep turns will improve pilot knowledge of aircraft performance, feel, technique, and instrument scan.

Prior to entering a steep turn, the aircraft should be stabilized on speed and altitude. Entry should be smooth, with a constant roll rate, adding power as necessary to maintain entry speed. The Attitude Director Indicator (ADI) gives the best indication for both pitch and roll during the entry. During the steep turn, the Vertical Speed Indicator (VSI), along with the ADI, will become the best supporting instrument for good pitch control. Bank angle should remain constant throughout the turn; not only does this make the turn more precise, but a constant bank angle is the best aid for good pitch control. Recovery should be started at approximately 15° prior to the desired heading.
STALL RECOVERY

STALL RECOVERY AT LOWER ALTITUDES

Normally, approaches to stalls are performed at approximately 15,000 feet to familiarize the pilot with the airplane’s stall warnings and the correct recovery technique.

The pilot’s performance is judged on his ability to recognize aircraft buffet/stick shaker stall warnings, his prompt action in initiating recovery, and a smooth, positive recovery with minimum loss of altitude.

For all stalls, the Bug should be set at $V_{REF}$.

Clean, Bugs Set at $V_{REF}$

Perform the entry maneuver by allowing the airspeed to decay while maintaining altitude or a slight rate of ascent. Set thrust at 60% $N_1$. As the airspeed decreases, trim the stabilizer until reaching $V_{REF} + 60$ knots, then cease trimming. Control airplane attitude and altitude by increasing back pressure until initial buffet is felt. Buffet will occur before stick shaker in the clean configuration.

At buffet, lower the nose approximately $5^\circ$, simultaneously advancing the throttles. When the buffet has ceased and airspeed has increased to $V_{REF} + 60$ knots, return the airplane to level flight smoothly, adjusting thrust and trim as required. Avoid entering secondary or accelerated buffet, which is usually more severe than the initial buffet.

Maintain lateral control throughout with ailerons. Do not use excessive rudder.

Keep the wings level, regardless of wheel deflection required.

On the recovery, advancing the throttles smoothly facilitates steady engine acceleration. Thrust application during recovery minimizes altitude loss.

Except at extremely high body angles and light weights, thrust has little effect on buffet and stall speeds. The additional pitchup caused by thrust during recovery can cause entry into secondary buffet. Care must be exercised to prevent nose pitchup as the engines are accelerating.

20\(^\circ\) Bank, Flaps 10\(^\circ\), Bugs Set At $V_{REF}$

Set thrust at 60% $N_1$. Establish a 20\(^\circ\) bank. Maintain altitude during entry. Do not trim below $V_{REF} + 30$ knots. When stick shaker or initial buffet is felt, smoothly lower nose to slightly above the horizon, simultaneously leveling the wings with the ailerons and advancing the throttles to max continuous thrust. When the airspeed has increased to $V_{REF}$, rotate the airplane to stop the descent. Accelerate to $V_{REF} + 30$ knots and stabilize in level flight.

Landing Configuration (flaps 42\(^\circ\), gear down) Bugs Set At $V_{REF}$

Set thrust at 60% $N_1$, trim to $V_{REF}$, and maintain near level flight until stick shaker is felt. Smoothly lower nose to the horizon, simultaneously advancing throttles to max continuous thrust. When the airspeed has increased to $V_{REF}$, rotate the airplane to stop the descent. Maintain $V_{REF}$ and stabilize in level flight.
STICK SHAKER SPEEDS

Scarfed Pitot

1 KNOT/SEC DECELERATION WINGS LEVEL
15,000 FT IDLE POWER

\[ \text{SHAKER SPEED} = V_{\text{SHAKER}} + V_{\text{CG}} \]

GEAR UP

\[ \begin{array}{c}
V_{\text{SHAKER}} - \text{KIAS} \\
140 \\
130 \\
120 \\
110 \\
100 \\
\end{array} \]

\[ \begin{array}{c}
\text{AIRCRAFT WEIGHT} - 1000 \text{ LB} \\
240 \\
280 \\
320 \\
360 \\
400 \\
\end{array} \]

\[ \begin{array}{c}
\text{FLAPS 4} \\
\text{FLAPS 10} \\
\text{FLAPS 18} \\
\text{FLAPS 22} \\
\text{FLAPS 27} \\
\end{array} \]

C.G. % M.A.C.

\[ \begin{array}{c}
35 \\
30 \\
25 \\
20 \\
15 \\
12 \\
\end{array} \]

\[ \begin{array}{c}
\Delta V_{\text{CG}} - \text{KIAS} \\
4 \\
2 \\
0 \\
2 \\
4 \\
\end{array} \]

ADD

GEAR DOWN

\[ \begin{array}{c}
V_{\text{SHAKER}} - \text{KIAS} \\
130 \\
120 \\
110 \\
100 \\
\end{array} \]

\[ \begin{array}{c}
\text{AIRCRAFT WEIGHT} - 1000 \text{ LB} \\
240 \\
280 \\
320 \\
360 \\
400 \\
\end{array} \]

\[ \begin{array}{c}
\text{DLC ON} \\
\text{FLAPS 33} \\
\text{FLAPS 42} \\
\end{array} \]

\[ \begin{array}{c}
\text{DLC OFF} \\
\text{FLAPS 33} \\
\text{FLAPS 42} \\
\end{array} \]

\[ \begin{array}{c}
35 \\
30 \\
25 \\
20 \\
15 \\
12 \\
\end{array} \]

\[ \begin{array}{c}
\Delta V_{\text{CG}} - \text{KIAS} \\
4 \\
2 \\
0 \\
2 \\
4 \\
\end{array} \]

ADD

NOTE: TOLERANCE ± 4 KTS
APPROACH TO STALL AT HIGH ALTITUDE

Clean, Bugs Set at $V_{REF}$

At an altitude above 20,000 feet, set all engines at 60% $N_1$ and trim the aircraft to $V_{REF} + 90$ knots.

Control airplane attitude and altitude by increasing back-pressure until initial buffet is felt. Initial buffet will always occur before stick shaker with flaps up.

When initial buffet is encountered, lower the nose smoothly to an attitude slightly below the horizon, simultaneously advancing the throttles to maximum continuous thrust, and allow the airspeed to increase to 240 kts before attempting to stop the sink rate. Secondary buffet is easily encountered at high altitudes and is usually more severe than initial buffet. Smoothness during the recovery is of the utmost importance to avoid entering a secondary stall. The trainee should recognize the difference between a high speed Mach buffet and a stall buffet.

MACH TUCK

Control forces required to counteract Mach tuck are well within a pilot's capability. However, control by the pilot should not be necessary, since the nose-down tendency is countered automatically by the Mach trim system, which is designed to maintain longitudinal speed stability above the airplane's critical Mach number. The effect of Mach trim inoperative is demonstrated first; then the demonstration is repeated with Mach trim operative.

MACH TRIM INOPERATIVE

Ensure that the pilot has an understanding of Mach trim inoperative limitations. The maneuver should be started at an altitude of at least 35,000 ft to achieve positive results. The tuck-under effects occur at relatively high speed and are not very pronounced.

Turn Mach trim off.

From stabilized flight at about Mach 0.78, increase thrust to MCT and lower nose to establish a 1500 ft per minute rate of descent. Use stabilizer trim to maintain zero trim loads at this rate of descent.

Initially, as the speed increases, it will be necessary to trim nose-down. Stop trimming at Mach 0.82.

At this time, use stabilizer to establish a 1500 ft per minute rate of descent. Observe that at about Mach 0.86, the tuck-under range is encountered, necessitating an increasing pull force on the control column as speed increases up to MMO.

When the overspeed warning sounds, recover from the maneuver. The recovery should be made by first raising the nose and starting to retrim before closing throttles. Do not exceed MMO.

MACH TRIM OPERATIVE

Initiation of this exercise is undertaken by the instructor.

The function of the Mach trim system is to correct for the Mach tuck effect and to provide longitudinal stability at high speeds.

Fly the training maneuver as described under Mach Trim Inoperative. That is, stabilize at 1500 ft per minute descent with Mach trim turned off, trimming the stabilizer to obtain zero elevator control force up to Mach 0.82. At this speed, hand over to the pilot and turn Mach trim on. The pilot will now
observe and feel that to maintain 1000 ft per minimum rate of descent, with increasing speed, a push elevator force is required and the stabilizer wheels moves back automatically to correct for the compressibility effects being experienced. Continue until the overspeed warning sounds.

Recover as before, but emphasize to the pilot that with Mach trim engaged, the stabilizer trim wheel continues to correct automatically during the deceleration.

EMERGENCY DESCENT

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. In training, this maneuver should be practiced from above 30,000 ft. Practice entries can be performed at lower altitudes, but recoveries must be completed no lower than 8,000 feet above ground level.

Before practicing the full emergency descent, the pilot should be given the opportunity to practice entries for the purpose of developing the coordination required. Discontinue each maneuver after minimum altitude loss.

The flight engineer can aid in simulating the need for commencing an emergency descent by announcing, "Cabin altitude rising uncontrollably."

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 crew members 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 770°, 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 feet above selected altitude.
- Descent should be made to an altitude which permits maintaining cabin altitude below 10,000 feet.

- Establish long range cruise.

**HIGH SINK RATE MANEUVER**

This maneuver should be initiated no lower than 12,000 feet AGL.

Establish gear down and landing flaps with idle thrust at $V_{REF}$, until the descent rate is stable, then set maximum continuous thrust. Note altitude when commencing to apply power and again when sink rate has been arrested. While the spin-up time of the Rolls Royce engine is impressively short, considerable altitude is required to arrest the sink rate; therefore, this maneuver must never be attempted at low altitudes.

**HIGH SINK RATE MANEUVER**
ENGINE SHUTDOWN AND RESTART

The pilot should shut down and restart an engine in flight under normal, VFR, level flight conditions. The shutdown should be performed at idle thrust by selecting the Fuel and Ignition switch to OFF. The restart should be performed by using the Windmill Airstart procedures to minimize starter wear above 10,000 feet MSL.

Note that all abnormal or emergency training requiring an engine cut will be performed with the engine(s) set at idle thrust.

ENGINE CUTS AND TWO-ENGINE MANEUVERING

The one-engine-out simulation is accomplished at a minimum altitude of 5000 feet above terrain, with takeoff flaps and gear up at a speed of $V_2 + 10$ knots. The instructor will set No. 2 engine to approximately 75 to 80% $N_1$, and with MCT on one wing engine, reduce the other wing engine to IDLE. Keep the nose of the airplane straight ahead during these simulated engine failures. By maintaining directional control with whatever rudder control force necessary, the pilot will automatically and properly compensate for the engine failure condition.

It is important to apply sufficient rudder in engine-out conditions so that excessive yaw angles are avoided. Any time a swept-wing airplane is yawed, a strong rolling or banking tendency develops, which must be compensated for by opposite aileron control.

When sufficient rudder is applied during engine-out conditions, there is practically no requirement for aileron control application, except at airspeeds near the minimum control speeds. This fact can be used as a means of judging whether sufficient rudder has been applied during engine-out operation. The amount of rudder required under these conditions varies only slightly with airspeed and thrust on the other engine. There is little need to vary the rudder angle when rolling into or maintaining a turn, particularly when it is done smoothly. The rudder should be kept near one position unless thrust or airspeed changes. The ball is an indication of sideslip or yaw and should be cross checked against the aileron requirement in engine-out conditions.

While operating on two engines, level turns will be accomplished, maintaining airspeed as selected by the instructor for a given configuration.

SIMULATED SINGLE-ENGINE APPROACHES AND GO-AROUNDS

One-engine approaches and go-arounds should be simulated during the airwork phase of training at a minimum altitude of 5000 feet above terrain. The instructor will give the pilot a simulated field elevation and advise him when to start the pullout.

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 $22^\circ$, and establish the initial climb at $V_{REF}$. Retract the gear when a positive rate of climb is indicated. Climb at $V_{REF}$ to 400 feet AGL. Accelerate to $V_{REF} + 10$ and retract flaps to $10^\circ$. Continue accelerating to $V_{REF} + 20$ and retract the flaps to $4^\circ$. Accelerate to $V_{REF} + 60$ before retracting flaps to up.
MISSED APPROACH PROCEDURE, 2 OR 3 ENGINES

GEAR DOWN
FLAPS 33° OR 42°
$V_{REF} + \frac{1}{2}$ WIND + GUST
NORMAL SLOT (15 KT MAX)

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

<table>
<thead>
<tr>
<th>Angles</th>
<th>$V_{REF}$ Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>22° TO 10°</td>
<td>$V_{REF} + 10$ KTS</td>
</tr>
<tr>
<td>10° TO 4°</td>
<td>$V_{REF} + 20$ KTS</td>
</tr>
<tr>
<td>4° TO 0°</td>
<td>$V_{REF} + 60$ KTS</td>
</tr>
</tbody>
</table>

LANDING, 2 OR 3 ENGINES

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

FLAPS 10
$V_{REF} + 30$ KTS MIN

FLAPS 4
$V_{REF} + 40$ KTS MIN

CLEAN:
$V_{REF} + 60$ KT

INTERCEPTING APPROACH SLOT
FLAPS 33° OR 42°
$V_{REF} + \frac{1}{2}$ WIND + GUST
(15 KT MAX)

AT 500 FEET,
STABILIZE IN SLOT

AT A MINIMUM OF 400 FT,
ACCELERATE & RETRACT
FLAPS ON SCHEDULE
WHILE CLIMBING TO
1500 FT OR MEA
NORMAL, 3-ENGINE LANDING

Initially, the instructor flies a demonstration circuit or uses the autopilot to a full-stop landing, explaining his actions throughout.

Approaching the downwind leg, the Descent-in-Range checklist should be completed. Slow the airplane so that the flaps may be positioned to 10° and speed $V_{REF} + 30$ knots abeam the approach end of the runway. Call for gear down when turning base leg and position the flaps to 22°. Slow the airplane to $V_{REF} + 20$ knots and start 800 feet per minute descent (approximately). Plan to turn final at 800 to 1000 feet, and call for flaps 33° or 42° as soon as the airplane is established in the slot. (There is no requirement to wait until the airplane is on final before selecting flaps 33° or 42°.) After flaps are set to 33° or 42°, complete the Landing Final checklist, and slow the airplane to $V_{REF}$ plus the wind-gust correction, up to 15 knots.

A normal slot should result in a sink rate of approximately 600 to 800 feet per minute; the vertical speed indicator should be used as a reference if no glideslope is available.

On the first attempts by the pilot to carry out pattern work, the instructor should verbally guide him through the procedure as it is being flown. It is useful, initially, to allow the use of the ILS glidepath and radar altitude for early appreciation of approach path angle, but these should be withdrawn as soon as possible.

Landing

The normal attitude on final approach will be about 7.5 degrees nose-up, with the gear down and DLC operative. The landing flare requires only 1-1/2 to 2-degrees pitch change from the normal approach attitude. This is adequate to arrest sink rates of up to 1000 feet per minute. Normal touchdown should be achieved with a 9- to 10-degree attitude, which will provide a tailskid clearance of approximately 3-1/2 feet. The tailskid will contact the runway between 12-1/2 to 13-1/2 degree body angle, depending on rate of descent (strut compression).

Speed control and constant rate-of-descent, on the glidepath prior to flare, are fundamental considerations for avoiding tailskid strikes on landing. The aircraft should be aimed so as to touch down approximately 1000-1500 feet beyond the threshold. If the rate of sink exceeds 1000 ft/min below 200 feet altitude, or if the airspeed is less than $V_{REF}$ below 100 feet altitude and prior to flare, a missed approach should be executed.

Touchdown zone safety margin and threshold height are substantially reduced if ILS glidepath is less than 2-1/2 degrees or glideslope ground intercept point is less than 1000 feet from the runway threshold.

Since the L-1011 has exceptional over-the-nose visibility, the vision restriction cues apparent on other aircraft are absent. Therefore, be alert to avoid over-rotated and prolonged landing flares. The flare should be initiated no later than 30 feet radio altitude. If the flare is accomplished too high, or if the aircraft is held off in an effort to achieve a smoother landing, the tailskid will probably strike the runway.

Some pilots have a tendency to drop below the glidepath during the final stages of approach, and to flare and touch down short of the desired reference point.

Smooth landings will be achieved by completing the flare, then closing the throttles. A very subtle relaxation of the control column back-pressure, just as the wheels touch, will further refine the touchdown.
The ground spoilers will deploy automatically, but good practice dictates that the pilot consciously confirm and be aware that this action has taken place. Brakes can be applied and throttles should be set to reverse idle detent immediately after main wheel touchdown.

Normally, the nosewheel will tend to land itself firmly unless the pilot lowers it gently. Hard, immediate braking on a dry runway will result in a very pronounced nose-down tendency, which can be controlled smoothly. Conversely, heavy reversing at very aft CG results in a moderate pitchup tendency. Brakes are very effective in controlling this tendency.

Primary directional control during landing rollout is achieved with the rudder (and rudder pedal steering). Rudder pedal steering should be used until turning off the runway, unless wet or icy conditions require aerodynamic rudder only.

Maximum asymmetric reverse thrust can be controlled by aerodynamic means, down to approximately 60 knots on a dry runway and 70 knots on a wet runway.

There is a pronounced nose-up moment with only No. 2 engine in maximum reverse. This should be anticipated by applying forward pressure on the control column.

Reverse thrust should be reduced so as to be at reverse idle by 70 knots. Forward idle should not be selected until N1 is less than 33%. Forward idle may be delayed on No. 2 engine (only) to assist in controlling taxi speed, if desired.

After cancelling reverse thrust, the throttles must not be advanced in an attempt to increase forward thrust above 33% N1 until the REVERSE PRESSURE light has gone out.

**Touchdown Limits on Runway**

Desired touchdown distance from the runway threshold is 1000 to 1500 feet. During training, 1000 feet to 3000 feet is acceptable. At completion of training, acceptable limits are 1000 feet to 2000 feet from the end of the runway.

**Short Touchdowns**

Observation of many approaches by jet aircraft shows that there is a tendency for them to drop below the glideslope during the final stages of approach, and to flare and touch down well short of the desired reference point. This tendency is particularly marked in instrument conditions, commencing a breakthrough to visual reference, but is also noticeable under completely VFR conditions. This procedure gives a sharply increased rate of descent during the latter stages of the approach and, consequently, a tendency to touch down short of the runway. The airplane must be held on the glideslope with a constant rate of descent to the flare, a few feet above ground. The aircraft must be aimed to touch down 1500 feet beyond the threshold of the runway.

**Approach Speed Settings**

Make sure the pilot is thoroughly familiar with the concept of VREF calculations and the application of increments for wind effects (half the wind plus all the gust factor, not to exceed 15 knots).

**Hand on Throttles**

The throttles must be thought of as primary flight control. Keep one hand on the throttles from base leg down. This results in automatic reaction to small thrust requirements, and no large changes should be necessary, except in the event of a go-around.
Initially, many pilots tend to overcontrol laterally, most often when using both hands on the wheel. If the airplane is wallowing on final, center the control wheel and momentarily release it. The roll oscillation will usually stop. This demonstrates the natural stability of the L-1011 and convinces the pilot that the roll was pilot induced.

**Approach Path Corrections**

Maintain stabilized correct approach path. Be flexible and make corrections, as required, just as on any other airplane. What you are aiming for is a correct slot setting before reaching 500 feet, with no adjustments below 200 feet, and a stable platform to the flare. Vertical speed varies with ground speed, being normally somewhere between 600-800 ft/min.

**Common Pilot Errors**

- Poor pattern planning.
- Airspeed control weak on final approach, usually resulting from weak speed control around the pattern.
- Approach path too flat or too steep.
- Does not correct approach path errors early enough.
- Dives at end of runway and then overflares, attempting to stop high rate of descent, but lands hard and short.
- Does not line up on runway centerline.
- Aims for threshold of runway instead of 1500-foot point.
- Allows nose to drop with flap extension and thrust reduction.
- Does not trim for zero stabilizer forces.
- Flies final approach with both hands on control wheel.
- Lateral overcontrol on final approach.
- Overflares and floats excessively.
- Too slow with after-landing coordination.
- Holds nose up after touchdown.
- Does not initiate reverse until after nose gear touchdown.
- Releases control wheel and reaches for nose steering immediately after touchdown.
- Returns throttles to forward thrust too quickly from high reverse thrust.
- Poor directional control after touchdown.
TOUCH-AND-GO-LANDINGS

Prior to carrying out touch-and-go landings, discuss the procedure with the pilot. Advise him you will reset the flaps and stabilizer trim, and that you will tell him when to open the throttles. Tell him you will monitor the throttles with him and will call, “Rotate,” at the appropriate speed.

The standard procedure is as follows:

- At touchdown, place the flap lever in the takeoff detent and retrim the stabilizer as necessary.

- Open the throttles, initially, to the vertical position. This allows the engines to accelerate evenly while the flaps are retracting. The throttles may be advanced before resetting flaps and trim, when using short runways.

- As soon as the flaps have reached takeoff position, quickly cross check speed brakes, stabilizer trim, indicator, and the flap gauges. Then open the throttles to go-around thrust EPR. WAT limitations may be simulated by selecting lower EPR values.

Bear in mind the runway length used on a touch-and-go landing. Delay in implementing the procedure after touchdown can greatly increase the ground run.

As a rule of thumb, it is recommended that if less than 4000 feet of runway is remaining when throttle movement is commenced, the instructor should not wait for the flaps to reach takeoff position before applying takeoff thrust. The warning horn will then probably sound for several seconds, but is to be ignored if takeoff configuration is normal. The pilot must be quickly advised of this fact.

If an engine failure on takeoff is simulated after a touch-and-go landing, wait until complete thrust stabilization before closing a throttle. Always close the throttle after calling, “Rotate.” You may have a
student who will reject a takeoff by slamming shut all the throttles if he feels he is below \( V_1 \). An engine failure after a touch-and-go landing will increase the field length required, but no difficulty should be experienced if the touchdown point was acceptable.

CLOSE-IN CIRCLING APPROACH AND LANDING
(600 feet, 2 miles)

A close-in circling approach may be made after descent to authorized landing minima on an instrument letdown when the approach runway is not suitable for landing. It can be practiced as a complete pattern after takeoff.

Circling Approach

The configuration for circling approach is gear down, flaps \( 22^\circ \), at \( V_{REF} + 20 \) knots in level flight. Maximum bank angle is \( 30^\circ \).

When practicing circling approaches, leave gear down after takeoff and select flaps \( 22^\circ \) when turning crosswind leg. Turn to position the airplane 1-1/2 to 2 miles from the field on downwind leg at 600 feet. Consult the FAA controller about noise abatement procedures prior to this maneuver.

Additional Preflight Briefing

Thirty degrees is the maximum bank throughout, and great care must be taken not exceed this angle, particularly when turning on final approach. Altitude loss associated with excessive bank angle can be dangerous at low levels. The landing flap selection is made when intercepting the normal approach slot.

Wind drift allowance must be made throughout or final alignment will be virtually impossible.

The sequence is not to be flown with the head inside the cockpit. Primarily, the pilot must keep the field in sight at all times, while still monitoring his airspeed and altitude.

Common Errors

- Neglects compensation for drift on downwind leg.
- Allows airplane to climb to a height where visual contact would be lost in the cloud deck, or allows descent to a height where runway reference is lost.
- Gives poor attention to airspeed and altitude trends.
- Exceeds bank angles, particularly when turning final.
- Is still trying to achieve stabilization of approach below 200 feet.
- Allows airspeed to remain too high at runway threshold.

LATERAL OFFSET APPROACHES

Laterally displaced approaches give the pilot confidence in his ability to realign with the runway at relatively low altitudes.

At all times, the aim is to have the airplane completely aligned, with airspeed and trim stabilized, at a minimum altitude of 300 feet AGL. Turns below 300 feet AGL are not permitted and an approach requiring them is not acceptable.
During bad weather pattern training, the pilot will usually get practice at handling bank angles on the order of 30°, at low altitudes, and will develop appreciation of corrective techniques to achieve runway alignment.

ADF and VOR letdowns may be used for the practice of lateral offsets later in the training.

Common Pilot Errors

- Allows a vertical offset to occur while correcting for a lateral offset.
- Overcontrols laterally.
- Fails to stabilize the approach by 200 feet.
- Allows nose to drop while banking, causing a high rate of sink.
- Does not allow for drift when aligning.

REJECTED LANDINGS

The L-1011 has the capability of executing a rejected landing on three engines until well after touchdown. During training, this maneuver will be performed during manual and autopilot approaches after the airplane has flared (approximately 50 feet) and just before initial touchdown. The instructor should stress the importance of a positive rotation. The most common error is to allow the airspeed to increase before starting the climb. The recommended procedure is to simultaneously rotate the airplane, advance the throttles, and call for flaps 22°. When a positive rate of climb is indicated, retract the gear. Then continue with the climbout, using the same procedures as outlined under Missed Approach, 2 or 3 Engines. Upon autopilot disengagement, the airplane will tend to pitch up, due to pitch trim bias and power application.

FROZEN PITCH TRIM LANDING/GO-AROUND

If the pitch trim appears to be stuck or “frozen” in flight, attempt to free the trim by displacement of the mechanical trim wheel. Up to thirty-five pounds force applied at the wheel rim, or at least a quarter turn of the trim wheel, may be required to dislodge a frozen trim unit.

In the event that the pitch trim cannot be freed, adequate pitch control will be available even under the most adverse conditions. Column forces as high as 75 pounds (steady state), with maneuvering increments of ±15 pounds, can be experienced during an approach and landing with pitch trim stuck in the cruise range. It is recommended that the captain and copilot (instructor pilot) share the flying task so that fatigue will be minimized during the final approach and landing phase. Normal landing configuration and an approach speed of \( V_{REF} + 10 \) knots is recommended. The added speed will not reduce column forces significantly, but will improve controllability and ease the pilot work load.

The go-around maneuver may be performed adequately, but it is recommended that both pilots share the task of rotation and climbout.

TWO-ENGINE LANDING

Simulated two-engine landing practice should be commenced soon after a degree of confidence has been achieved on 3 engines.

Failure of a wing-mounted engine should be simulated no later than commencement of downwind leg or inbound to the LOM. Engine failure should be simulated by closing a throttle or calling an engine malfunction which necessitates the pilot to simulate shutdown of the engine.

The pilot is expected to complete initial checklist items from memory and call for reading of the remaining items. Patterns and techniques are the same as for the 3-engine landing.
RUDDER AND LATERAL CONTROL

The pilot should understand that the rudder is the primary control used to correct for asymmetric thrust. When thrust is changed, so should rudder input. The pilot uses 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, spoilers may be partially raised (with associated drag) and less than full lateral control is available. Keep the ball centered. Rudder trim may be used if required, but is not considered necessary during pattern work. Careless use of rudder trim tends to mask the thrust-rudder relationship, which is the training objective. In any event, rudder trim is to be zeroed by 500 feet on final.

APPROACH PATH

Place emphasis on early stabilization of speed and approach path on final approach. Addition of substantial thrust as touchdown is approached is to be avoided, as are large rudder inputs near the ground. Touchdown with asymmetric thrust could result in wing rocking, tire scrubbing, and a rough landing. Plan for touchdown with no thrust asymmetry.

REVERSE THRUST OPERATION

Maximum asymmetric reverse thrust can be controlled aerodynamically to approximately 60 knots. Reverse should be initiated after the main gear touchdown.

COMMON PILOT ERRORS

- Does not call out the checklist memory items.
- Does not increase thrust on operative engines to maintain desired airspeed and flight path.
- Oscillates rudder and lateral controls.
- Uses aileron-spoiler instead of rudder for directional control.
- Does not coordinate rudder with thrust and airspeed changes.
- Forgets to call, “Zero trim” at 500 feet.
- Holds excessive airspeed on final.
- Unknowingly flies final with a slowly-bleeding airspeed.
- Dips below glidepath, requiring increasing thrust to flare point.
- Initiates reverse after nose gear touchdown.

SINGLE-ENGINE LANDING

Single-engine landings are not simulated at pattern altitude until proficiency in two-engine landings has been demonstrated and the techniques have been practiced during the airwork phase of training at higher altitudes and/or in the simulator.

ADDITIONAL PREFLIGHT BRIEFING

Prior to flight, review the limitations relative to control and speed capabilities.

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, but the pilot should quickly correct for this tendency on subsequent exercises.

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

Simulate the two-engine failures independently, as follows:

- 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 ATM prior to approach.
- Select 30° on mechanical rudder limiter.
- Set Bug to threshold speed (VREF + 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 long final position flaps to 40° (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 glide-slope. 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. Stress to the pilot that 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 40° 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

CLEAN:
BUG + 40 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

FLARE AND LANDING
GEAR DOWN/FLAPS 10°
BUG MIN
GRADUALLY REDUCE SPEED
SO AS TO BE AT BUG + ½ WIND + GUSTS
AT FLARE
COMMON PILOT ERRORS

- Uses aileron instead of rudder to maintain directional control.
- Does not coordinate rudder with thrust and airspeed changes.
- Tries to coordinate turns with rudder, thereby losing his zero yaw reference.
- Selects 10° flap too soon, requiring higher power.
- Does not call rudder trim zero before landing.
- Reduces thrust excessively at commit point, resulting in being forced to add thrust to reach runway.
- Does not trim out stabilizer pressures.
- Dives at runway reference point.

SINGLE-ENGINE MISSED APPROACH

A missed approach should be commenced immediately if the airplane cannot be landed safely at any time before reaching the commit point. The procedure is as follows:

- Apply maximum thrust (GA EPR).
- Call for gear up and flaps to 4°
- Push the nose down, accelerating to 180 knots. Altitude must be exchanged for airspeed.
- Retract flaps at 180 knots.
- Continue acceleration to 200 knots.
- At 200 knots, rotate to a climb attitude. Climb at 200 knots.

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 GO-AROUND

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. Never:heless, no-flap/no slat landings present no real problems once the factors involved are understood.

During training, the maneuver is limited to pattern, approach, and go-around, and is carried out to familiarize the pilot with the airplane attitude and speed control required to perform a no-flap/no slat landing. In the following text, the descriptions are given for the exercise to the landing, but during training, the approach is aborted as soon as landing is assured, usually at 50 ft AGL.

PATTERN AND APPROACH TECHNIQUE

The airspeed Bug is set at VREF + 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.

ADDITIONAL PREFLIGHT BRIEFING

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 slat landing ground speeds are obviously high, so fuel dumping may be necessary to reduce the Bug speed. At heavy weights, the landing speed may exceed tire placard. 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, thus increasing braking effectiveness.

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. He should keep in mind, however, that the nose gear must be landed just as the main gear. He should not thump it down.
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.

Normally, the no flap/no slat approach is terminated in a missed approach at 50 feet AGL to reduce tire/brake wear and landing gear loads. Upon request, check captains (and senior instructors of airlines) will perform full stop landings with no flaps and slats extended.

**COMMON PILOT ERRORS**

- Does not reduce to Bug speed far enough out on final, thereby flying the last mile or so at idle thrust.
- Does not stabilize on required approach angle.
- Delays reverser actuation after touchdown.

**NO FLAP/NO SLAT LANDING**

**BEFORE APPROACH**
- Dump fuel as required
- Select rudder limiter to MNL/± 30°
- Set Bug $V_{REF}$ + 50 KTS
- Use wide extended pattern

**FINAL APPROACH:**
- Stabilize in slot
- Limit bank angle to 20°

**ROLL OUT ON FINAL**
- Reduce speed to Bug + $\frac{1}{2}$ wind + gusts (15 KT MAX)

**TURNING BASE:**
- Descend as required
- Bug + 10 KTS MIN

**DOWNWIND:**
- Gear down
- Maintain altitude

**CLEAN:**
- Bug + 10 KTS MIN

**1500 FEET**

**MISSING APPROACH:**
- Go-around power
- Rotate
- Accelerate to Bug + 10 KTS
- Gear up at positive rate of climb.
NO FLAP/FULL SLAT LANDING

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

1. Reduce weight as much as practical.
2. Flap handle . . . . . . . $4^\circ$ POSITION
3. Slats fully extended . . . . . . CHECK
   When simulating the No Flap/Full Slat landing maneuver, lock out the slats and retract the flaps. Confirm slats fully extended and flaps full retracted.
4. IAS Bug at $42^\circ$ flap $V_{REF} + 35$ 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 without 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.

**Note:** If a touch and go landing is performed, do not change the flap/slat configuration until after climbout and when stable on downwind leg. Takeoff rotation should be performed gently, being careful not to over-rotate. The flap handle should be set to $4^\circ$. When the flaps have extended, unlock the slats and proceed normally.

CROSSWIND LANDINGS

During the course of his training, the pilot should be required to demonstrate proficiency in approaches and landings in a crosswind.
If crosswinds are not experienced by the time the remaining items have been completed, the instructor may recommend the pilot for his check, but he should not be released for line duty until these crosswind landings have been completed.

If crosswinds are encountered in the first few hours of the training program, the instructor should realize that they will be of limited value. Under these circumstances, it is recommended that a further session be arranged. Crosswind practice can be undertaken by day or night and combined with other sequences if required. Touch-and-go landings are acceptable, although it is desirable that at least one crosswind landing be made a full stop.

The pilot should have developed a visual consciousness of the wings-level condition, and should demonstrate good lateral stability on touchdown.

Some pilots will be transitioning into the L-1011 from types of airplanes in which it is not permissible to touch down deliberately wing-low to offset drift. This technique is acceptable for the L-1011, and pre-flight briefing should make this clear.

The L-1011 has generally excellent crosswind capability, and recommended techniques are similar to other sweptwing jet transports with high-lift-device flaps.

Increase approach speeds 1/2 the steady wind value plus the full just increment to a total maximum of 20 knots. Maintain runway tracking with a wings-level crab. At approximately 200 to 1000 feet, begin de-crabbing and aligning with the runway centerline, using the rudder. At the same time, compensate for any resulting drift by banking slightly into the wind. The resulting sideslip should be aligned and stabilized well before flare. The flare should be initiated at approximately 30 feet. Normally, only a 1-1/2 to 2 degree pitch change is needed. Smoother landings will be achieved by essentially completing the flare first — then closing or easing back the throttles. The aircraft should then be landed without delay (within 1 to 3 seconds). Prolonged flares tend to aggravate drift. The wings can be leveled just before touchdown; however, it is also permissible for the upwind gear to touch slightly first. Initiate normal stopping sequence while the nosewheel is being lowered. Continue to fly the wings level after lowering the nose and until below 100 knots. The rudder is more effective at higher speeds than nosewheel steering. Maintain directional control with rudder, down to approximately 60 knots.

Overcontrol or undercontrol laterally can cause difficulty. Any downwind lateral control inputs can allow the wind to get under and raise the up-wind wing. Maximum braking is achieved with airplane weight equally distributed on the wheels.

The pilot should be expected to make suitable drift allowance to the effect of crosswind on the turn to final approach.

COMMON PILOT ERRORS

- Makes inadequate allowance for drift in pattern.
- Does not hold steady crab angle on final approach. Tends to allow airplane to drift out.
- Oscillates rudder and aileron after touchdown.
- Does not continue to fly airplane down runway after touchdown.
- Inadvertently removes drift correction after becoming visual on instrument approach.
- Prolongs landing flare.
- Permits speed bleed-off before flare.
MANUAL REVERSION

The L-1011, having multiple hydraulic system redundancy, does not have manual control capability.

DUTCH ROLL

The L-1011 is inherently stable, with no Dutch roll; therefore, Dutch roll recovery is not demonstrated or practiced.

BRAKE COOLING

Brake cooling is approximately 5 times as effective with the landing gear extended as it is retracted. If more than moderate braking is used, full stop landings should not be spaced closer than one each 20 minutes. Touch and go landings may be made between the full stop landings, provided that no wheel braking is used and as much gear-down cooling is used as practical.

If a minimum distance landing is to be made, it should be planned for the last landing of the period. A takeoff should not be attempted if a brake temperature is $400^\circ$ C or above.