Precision Landings, Phase II
Decision Priorities

Initial Airplane Configuration

- On Final Approach, 200 to 400 feet AGL
- Full flaps & gear extended
- Trimmed for about 5 knots above planned ground-affect entry speed
- Power set for standard approach descent path of 300 feet per mile (about 13 to 15 inches manifold pressure, or 1300 to 1500 RPM)

First Priority Action

Continue to maintain constant speed, using elevator and/or trim tab, right on down to entry into ground affect (at half wing span above runway: about 15 feet above the ground for most single engine GA aircraft). Assuming the landing is properly aimed for touch-down at the desired point, on entering ground affect move throttle to full idle and proceed with Landing Phase III.

Second Action

Assuming touchdown is desired on the runway number make a judgement that you are ***a little*** high or ***a little*** low. If a little high, reduce manifold pressure 2 inches (or 200 RPM) and simultaneously lower the nose slightly with elevator/trim tab to continue maintaining final approach airspeed. If a little short of runway, add 2 inches of manifold pressure (or 200 RPM) and simultaneously raise the nose slightly with elevator/trim tab to continue maintaining final approach airspeed. After reacquiring normal descent path return power to the setting for normal descent path. If the small correction is needed all the way to entry into ground affect, as you enter ground affect, withdraw the correction power for start of Landing Phase III a little slower (or faster, as required) than usual during start of Landing Phase III.

Third Action

If the approach is low and more correction is needed than that described above (Second Action), add power as necessary to maintain altitude (usually to about 20 inches of manifold pressure, or to about 2,000 RPM) with nose up slightly to maintain approach airspeed. Maintain that configuration until reacquiring normal descent path, at which time normal descent power should be re-set and retained until entering ground affect.

If the approach is high and more correction is needed than that described above (Second Action), reduce power to idling, and nose down as required to maintain approach speed plus about 6 or 8 knots as required for a normal power-off landing. Maintain that configuration until reacquiring normal descent path, at which time normal descent power should be re-set and retained until entering ground affect. In the event that it becomes clear that the approach is still too high and that landing at the desired point cannot be achieved, the landing attempt should be aborted. This is accomplished by application of

full climb power and flap deflection reduced to half flap while maintaining some positive climb until normal departure climb configuration can be established. Then reenter the traffic pattern and perform a modified landing approach that utilizes the knowledge acquired in the aborted landing approach sequence.

Fourth Action

Referring to the Third Action where an abort decision may become necessary, if an abort flight path ***is not available,*** action as described above for a high approach should be initiated as soon as possible coupled with performance of a forward slip to create maximum possible drag. The slip should be held until it is clear that control of descent by use of only power changes can be reestablished.

Fifth Action

For the excessively high approach discussed under Third Action, if the condition is identified early enough there is a very useful technique which can help to avoid the need for a slip or a go-around. That is, in the max drag configuration (gear down, full flaps), to go to idle power ***and*** to nose down to hold at max allowable flap speed. That unusual configuration is then held till the airplane is slightly below normal descent path, at which time the nose is pitched up to resume normal descent speed. Small power changes are thereafter used per Second Action to adjust sink rate for the completion of the precision landing

Notes/Comments

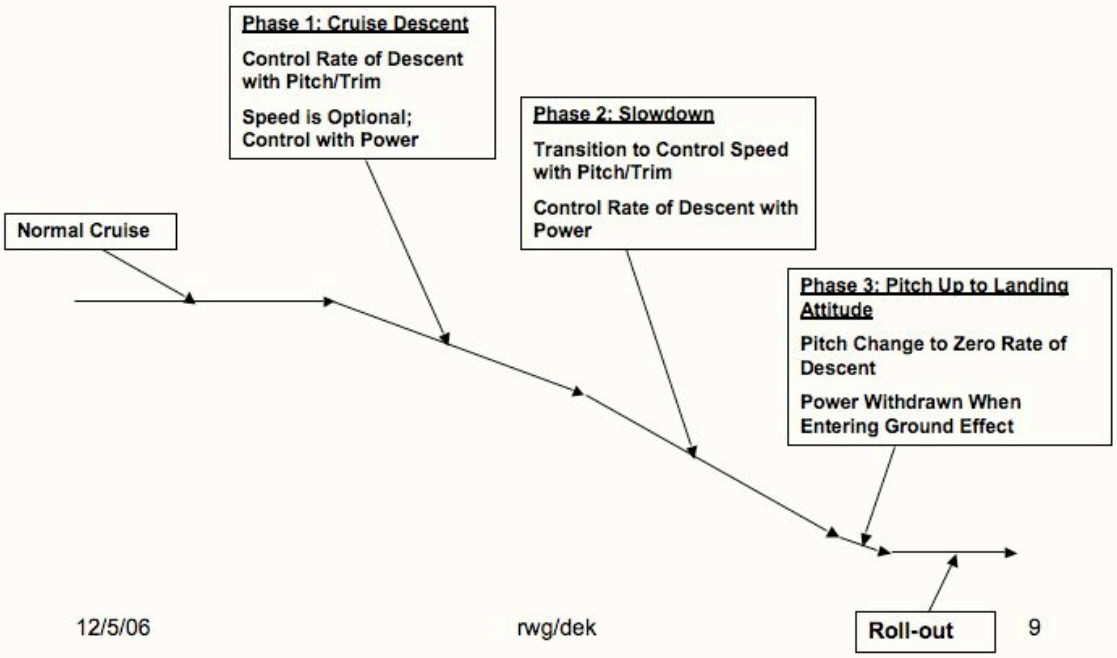
(1) Observe that throughout Landing Phase II control of approach speed is accomplished by use of pitch/trim control. Control of rate of descent is with power adjustments.

(2) In the case of an ILS approach, the consensus view (and autopilot designers) holds that descent on glide path is best accomplished by movements of pitch/trim controls, with airspeed being controlled with power settings. This is equivalent to the visual approach Landing Phase I action, where, at considerable distance from the field, the pilot trims for a selected rate of descent with power controlling airspeed.

(3) For instrument approaches, the transition to landing final approach speed control by pitch/trim (Landing Phase II) usually occurs at the pilot's convenience past the final approach fix.

(4) Note in Fifth Action that precision pitch control temporarily diverts from controlling landing approach speed in order to precision control max allowable airspeed in the full flap configuration.

THREE PHASES OF A LANDING



AIRSPEED
ENTERING GROUND EFFECT

AIRSPEED AT TIME OF ENTERING GROUND EFFECT IS THE MOST IMPORTANT PARAMETER FOR PRECISION LANDINGS

- **FINAL APPROACH AIRSPEED SELECTION CONSIDERS FIVE FACTORS:**
  1. NORMAL OR SHORT FIELD LANDING.
  2. GROSS WEIGHT, HEAVY OR LIGHTER.
  3. FULL OR NO FLAP DEFLECTION.
  4. NORMAL DESCENT POWER, OR POWER WITHDRAWN.
  5. SMOOTH AIR, OR ADD AIRSPEED FOR GUST INCREMENT.
- **EACH OF THE FIVE PARAMETERS PRODUCE 5 TO AS MUCH AS 15 KNOTS CHANGE TO THE OPTIMUM APPROACH SPEEDS.**
- **THE FIVE "DELTA" AIRSPEED CHANGES ADD ALGEBRAICALLY TO PRODUCE THE "OVER THE FENCE" BEST AIRSPEED: SOME ARE ADDED, AND SOME ARE SUBTRACTED.**

OVER-THE-FENCE
PRECISION LANDING SPEED

MODEL	REF. APRCH AIRSPEED	SHORT FIELD	300 LB BELOW GROSS	IDLE POWER	NO FLAPS
SUPER 21 [M20E, '66]	78	-5	-5	+5	+10
MOONEY 201 [M20J, '89]	72	-5	-5	+5	+10
MOONEY 252 [M20K, '87]	75	-5	-5	+5	+8
MOONEY TLS [M20M, '91]	80	-5	-5	+5	+9

NOTE: ADD OR SUBTRACT EACH OF FOUR ITEMS, AS REQUIRED, FROM REF. APCH. AIRSPEED.; GUST INCREMENT MAY ALSO BE NEEDED.

REF. APCH. AIRSPEED = NORMAL LANDING APPROACH @ MAX GW, WITH NORMAL DESCENT POWER, FULL FLAPS, AND SMOOTH AIR.