Part III—Engine and Aircraft Handling

Chapter 3—Circuit and Landing Procedures

List of Contents

1 Joining the circuit

Before joining the circuit, carry out the pre-descent checks. Checks before landing should be completed on the downwind leg. The aircraft handles comfortably at threshold speed plus 30 knots on the downwind leg.

2 Visual approach

(*a*) Although visual circuits are possible in conditions of poor visibility, the restricted view from the cockpit, particularly during the line-up phase, does not lend itself to this procedure ; whenever possible make an instrument approach in these circumstances.

(*b*) Make the final turn onto the approach at threshold speed plus 30 knots, extending airbrakes as required during the turn, and when lined-up with the runway, reduce speed to the approach speed (See Table 1). During the later stages of the approach, select HIGH DRAG airbrake (if not already selected) and reduce speed so as to cross the runway threshold, with power on, at the correct speed for the AUW.

AUW (*lb*)	*Approach speed* (*knots*)	*Threshold speed* (*knots*)
110,000 and below	140	125
120,000	145	130
130,000	150	135
140,000	155	140
160,000	165	150
170,000	170	155
180,000	175	160

Table 1

(*c*) The moderate nose-up attitude in the later stages of the approach does not markedly affect forward visibility, which is fairly good. Speed should not be reduced too early on the approach, as at speeds less than about 15 knots above threshold speed, speed control becomes much more difficult. If the speed is allowed to become too slow, a high rate of sink will result which can only be checked with a large increase in thrust. However, if an excessive approach speed is used, the high residual thrust of the engines may make it difficult to achieve the correct threshold speed.

3 Instrument approaches

(*a*) It is recommended that, at low level, an oval orbit pattern is flown. With suitable modifications a similar procedure may be adopted when letting down from medium altitudes using a Bomber Command standard let-down pattern. At the beginning of the outbound-leg, reduce speed to below 220 knots and carry out the checks before landing. Speed should be maintained at threshold speed for the AUW plus 30 knots until the turn onto the approach is completed.

This turn should normally be completed by at least 7 miles from the touchdown point. As the intersection with the glidepath is approached, reduce speed to the recommended approach speed. On reaching the glide-path, reduce power and extend airbrakes as required to maintain the desired rate of descent and the recommended approach speeds. In the later stages of the approach, select HIGH DRAG airbrake (if not already selected) and reduce speed so as to cross the runway threshold, with power on, at the correct speed for the AUW.

NOTE: If conditions make the use of the engine anti-icing system necessary, engine RPM should be maintained above 55% until the final stages of the approach, and the anti-icing system switched OFF as soon as it is safe to do so after RPM have been reduced below this figure.

(*b*) The procedure for auto-ILS approaches is detailed in Part 1, Chap. 14, para. 12. The procedure for ILS approaches is in AP 129, Vol. 1, Part 2, Section 4, Chapter 2 ; for Zero-reader—ILS in Chapter 3. The procedure for GCA is in AP 129, Vol. 1, Part 3, Section 1, Chapter 2. The Aircraft Approach Limitations using these aids are shown in Part II, Chapter 2, para 8 of this publication.

4 Landing

(a) During the later stages of the approach, or at break-off height on an instrument approach, reduce speed so as to cross the threshold, with power on, at the recommended speed. If the speed has been too high on the approach, there is a tendency to close the throttles completely before crossing the threshold. Due to the aerodynamic characteristics of the aircraft, the latter practice can cause it to sink onto the runway more heavily than necessary, unless an unduly flat approach has been made.

(*b*) At normal weights, it is unnecessary to stream the braking parachute when landing at sea level, with a headwind component, on a dry 9,000-foot runway. Under these circumstances, after touch-down, raise the nose progressively as speed is lost until the control column is fully back. The wheel brakes must not be tested unless the front bogies are firmly on the ground. Before the speed has fallen to 75 knots lower the nosewheel onto the runway and apply sufficient brake to bring the aircraft to a stop within the remaining length of the runway. Aerodyamic braking must not be continued below 75 knots, neither may this technique be used when the headwind component exceeds 25 knots, otherwise there is a possibility that the tail will be scraped.

(*c*) When circumstances make it necessary to use the parachute to reduce the landing run, it should be selected immediately after touchdown. Lower the nosewheel onto the runway whilst the parachute is developing (approx 4-5 seconds) and apply the brakes sufficiently to bring the aircraft to a stop within the remaining length of the runway. The maximum parachute streaming speed is 135 knots. Normally, the parachute should be jettisoned when the speed has fallen to about 50 knots in order to achieve a clean breakaway, otherwise the falling shackle may damage the aircraft skin. The AEO should report to the pilot both when the parachute streams and jettisons.

5 Crosswind landing

A crosswind landing, using the crab technique, presents no special difficulty in crosswind components up to the limitation of 20 knots. The braking parachute may be used ; any swing which develops due to the use of the braking parachute normally occurs when the parachute has streamed and is best controlled by using the brakes and the nosewheel steering. Landings on very wet or icy runways in strong crosswinds should be avoided.

6 Landing without using airbrakes

When landing without airbrakes use the normal procedure, but a longer approach is advisable.

7 Braking

(*a*) The aircraft must be firmly on the ground before the brakes are applied as the maxaret units do not operate until the wheels are rotating. Whilst it is possible to control with elevator the nose-down movement which results if moderate wheel-braking is applied while the nosewheel is clear of the ground, this procedure is not recommended except in emergency. In this case, ensure that both front and rear main wheels are on the ground before brake pressure is applied. Normally the nosewheel should be lowered to the ground before brake pressure is applied.

(*b*) On dry runway surfaces the maxaret units will normally prevent the wheels locking if excessive brake pressure is applied but, unless the shortest possible stopping distance is required, more gentle use of the brakes is recommended. On wet, flooded or icy surfaces drastic reduction of braking efficiency must be expected. Continuous application of brake pressure during a slip or skid can lead to wheel locking and the scuffing and possible bursting of tyres. Under these conditions it is recommended that light intermittent braking action be used and if slipping, skidding or difficulty in keeping straight is experienced, the brakes should be released momentarily. The pressure may be increased and held continuously as soon as there is no tendency to slip or skid. Always treat with extreme caution any surface with pools of water or patches of ice. If heavy braking action is used, it is recommended that the brakes are examined for overheating or fires as soon as possible after stopping the aircraft.

(*c*) Maximum speeds for the use of normal and emergency braking may be found in the Operating Data Manual.

8 Emergencies during landing

(*a*) *Efficiency of brakes in doubt*

In an emergency, if the efficiency of the brakes is in doubt, stream the parachute at the moment of touch-down, raise the nose as high as possible and apply the brakes progressively. In addition, provided the AEO is warned, the two outboard engines may be cut after the parachute has developed.

(*b*) If the parachute fails to stream, and a decision to go round again is made, the parachute switch must be set to JETTISON immediately.

9 Overload and emergency landings

(*a*) The maximum AUW for landing the aircraft is 125,000 lb., but landings at weights above 109,000 lb must be considered overload landings requiring special caution. In emergency, the aircraft may be landed at weights up to 167,000 lb. Overload or emergency landings (185,000 lb. in emergency operational conditions (see Part II Chapter 2 para. 4)), whenever possible, should be made on runways of not less than 9,000 feet.

(*b*) The approach should be made, and the runway threshold crossed with power on at the speeds recommended for the weight. If consistent with safety, the final stages of the approach should be made slightly flatter than normal, thus reducing the change of attitude required at round-out. Every endeavour should be made to make a smooth landing in order to minimise strains on the aircraft structure.

(*c*) At the higher weights the speed at touch-down may be higher than the maximum permissible speed for streaming the brake parachute and the maximum braking speed. In such cases, after touch-down the aircraft nose should be held as high as possible

and aerodynamic braking used until the speed reduces to 135 knots. If the parachute is streamed at speeds higher than this, parachute bursting or breaking away or damage to the rear fuselage may result. At 135 knots, stream the parachute and lower the nosewheel onto the runway whilst the parachute is developing. Once it has developed, provided that the AEO has been warned, the two outboard engines may be shut down, and braking action commenced as required as soon as the speed has reduced below the maximum braking speed.

10 Overshooting

Overshooting from any height presents no difficulties. Open the throttles as necessary and climb away. At light weights, the use of full thrust will result in rapid acceleration and a fairly steep angle of climb. Under normal conditions, an overshoot from ground level followed by a visual circuit and landing will require 1,200—1,500 lb of fuel, and an overshoot from ground level followed by a low level instrument approach and landing will require 2,000—2,500 lb of fuel.

11 Roller landings

(*a*) When making a roller landing, the nosewheel should be held close to the runway. The throttles should be opened as smoothly as possible and the pilot should be prepared for some difference in response from each engine. During acceleration, a high nose-up attitude and any tendency to take-off at too low a speed should be avoided.

(*b*) When making a roller landing after an asymmetric approach, the nosewheel should be lowered on to the runway; all four throttles must be in the idling position and it is essential that RPM are equal before the throttles are opened for take-off.