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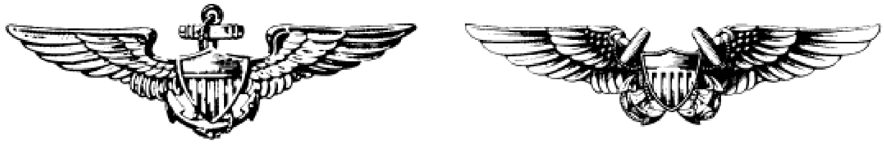
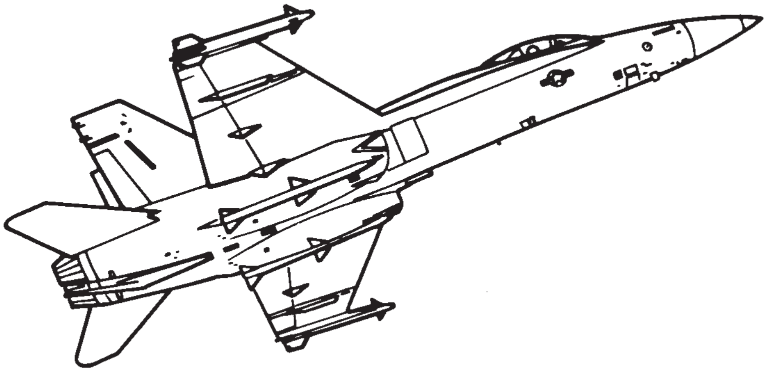


NATOPS FLIGHT MANUAL NAVY MODEL F/A-18A/B/C/D 161353 AND UP AIRCRAFT

THIS PUBLICATION SUPERSEDES A1-F18AC-NFM-000 DATED 1 AUGUST 2006 CHANGED 15 JUNE 2007

THIS PUBLICATION IS INCOMPLETE WITHOUT A1-F18AC-NFM-200 and A1-F18AC-NFM-210



7.3 LANDING

7.3.1 Descent/Penetration. Before descent, preheat the windshield by increasing defog air flow (DEFOG-HIGH) and, if necessary windshield anti-ice/rain air flow (WINDSHIELD ANTI-ICE/RAIN). Since rapid descents cannot always be anticipated, the maximum comfortable cockpit interior temperature should be maintained to aid in defrosting the windshield. Normal instrument penetration is 250 knots and 4,000 to 6,000 feet per minute descent. Refer to Part XI, for optimum descent profiles. Before starting descent, perform the following:

1. ENG ANTI ICE switch - AS DESIRED
2. PITOT ANTI ICE switch - AUTO
3. DEFOG handle - HIGH
4. WINDSHIELD switch - AS DESIRED
5. Altimeter setting - CHECK
6. Radar altimeter - SET AND CHECK

7. HUD - SELECT NAV MASTER MODE, COMPARE WITH STANDBY FLIGHT INSTRUMENTS AND STANDBY COMPASS

8. Navaids - CROSSCHECK

9. ARA-63 (ILS) - ON AND CHANNEL SET

10. IFF - AS DIRECTED

11. Weapons/sensors - AS REQUIRED

7.3.2 Approach. See figure 7-2. Enter the pattern as prescribed by local course rules. At the break, reduce thrust and extend the speedbrake (if required). As the airspeed decreases through 250 knots, lower the landing gear and place the FLAP switch to FULL and ensure that speedbrake is retracted. Retract speedbrake, if extended. Decelerate to on-speed, and compare airspeed and angle of attack. Complete the landing checklist. Roll into the base leg and establish a rate of descent, maintaining on-speed AOA. On-speed without external stores and 2,000 pounds of internal fuel is about 125 knots. Add about 2.5 knots for each 1,000 pounds increase in fuel and stores. Rate of descent can be established using the velocity vector on the HUD to set the glide-slope. Avoid overcontrolling the throttles as thrust response is immediate. Compensate for crosswind by crabbing the aircraft into the wind on final approach.

1. LAND checklist - COMPLETE

7.3.3 Touchdown.

Maintain approach attitude and thrust setting to touchdown using the lens or make a firm touchdown at least 500 feet past the runway threshold. At touchdown, place the throttles to IDLE. The aircraft tends to align itself with the runway. Small rudder corrections (NWS) may be required to keep the aircraft tracking straight. Using a flared minimum descent rate landing, the WOW switch may not actuate immediately. In this case, the throttles cannot be reduced to ground idle and may be inadvertently left in the flight idle position, thereby reducing the deceleration rate and extending the length of the landing rollout. Track down the runway centerline using rudder pedals to steer the aircraft. Aerodynamic braking is not recommended. Getting the nosewheel on the ground and use of aft stick (programmed in by light braking and slowly pulling the stick aft after touchdown so only the minimum required distance to command full aft stabilator deflection by 100 knots) provides faster deceleration from the stabilators and more directional control with use of the NWS.

WARNING

Commanding full aft stick deflection with the ejection seat within 1.75 inches of the top limit can cause the lower ejection handle to snag on the air-to-air weapon select switch and result in inadvertent ejection. In particular, during stabilator braking after a full stop landing the control stick should be pulled back only the minimum required distance to command full stabilator authority. Inadvertent ejections have occurred after stabilator braking when the pilot has released full aft stick.

7.3.4 Nosewheel Steering. The nosewheel steering (NWS) is the most effective means of directionally controlling the aircraft during landing rollout. Aerodynamic control surface inputs become ineffective below an airspeed of 75-85 knots. Differential braking requires special attention and technique to control the aircraft below this speed. NWS is activated automatically in the low mode (16° limit) by weight on the nose and at least one main gear. NWS inputs are commanded through force sensors behind the minimum displacement rudder pedals allowing for precise directional control. The NWS does not receive commands through the rolling surface to rudder interconnect (RSRI).

NOTE

Rudder and vertical tail effectiveness is significantly reduced if the speedbrake is extended during the landing rollout and degrades directional control during crosswind landings. Aircraft directional stability is further reduced on a wet runway.

The aircraft can be safely landed with the nosewheel steering failed (castering) in crosswinds up to 25 knots. The aircraft tends to drift more to the downwind side of the runway and corrections are more difficult. With the anti-skid on, directional control with differential brakes require pumping of the upwind brake or releasing pressure from the downwind brake. To reduce the risk of blowing the tires, landing without anti-skid on when heavy braking is anticipated is not recommended.

CAUTION

Engaging the high gain mode of NWS while maintaining a rudder pedal input causes a large nosewheel transient and may cause loss of directional control.

NOTE

Using the high gain mode of nosewheel steering (NWS HI) during the landing rollout is not recommended and may lead to directional pilot induced oscillations due to the increased sensitivity of the NWS to rudder pedal inputs.

7.3.5 Landing Rollout. Track down the runway centerline using rudder pedals to steer the aircraft directionally. Aerodynamic braking is not recommended. Use wheel braking only after the aircraft main wheels are firmly on the runway.

7.3.6 Braking Technique. Under normal circumstances, the best results are attained by applying moderate to heavy braking with one smooth application of increasing braking pressure as airspeed decelerates towards taxi speed. Anti-skid is effective down to approximately 40 KGS. Below 40 KGS, heavy brake pedal pressure should be relaxed to prevent tire skid. Below 35 KGS, steady but firm brake pedal pressure should be applied. Steady, light brake applications should be avoided, as they increase brake heating, do not significantly contribute to deceleration, and ultimately reduce braking effectiveness. If desired, selecting aft stick (up to full) below 100 KCAS will increase TEU stabilator deflection and aid in deceleration. Full aft stick increases down force on the main landing gear, as well as significantly increasing drag due to large stabilator size.

CAUTION

Recommended braking speeds are based on tests conducted at sea level. Ground speed may be significantly higher than calibrated airspeed at airfields above sea level. Aircrew should consider available runway length and field elevation to evaluate wheel brake usage and landing rollout distance to avoid excessive brake heat build-up and subsequent tire deflation or wheel assembly fire when landing at airfields above sea level.

Maximum braking performance is attained by applying full brake pedal pressure (approximately 125 lb) immediately after touchdown. Anti-skid must be on to attain maximum braking performance and to reduce the risk of a blown tire. Longitudinal pulsing may be felt as the anti-skid cycles. Approaching 40 KCAS, full brake pedal pressure should be relaxed to prevent tire skid.

7.3.7 Crosswind Landing. The optimum technique for crosswind landing is to fly a crabbed approach, taking out half the crab just before touchdown. For landing in a crosswind greater than 15 knots on a dry runway, the touchdown should be slightly cushioned in order to reduce landing gear trunion loads. The wing-down top-rudder technique is ineffective in crosswinds greater than 20 knots, creates excessive pilot workload, and should not be used. Touchdown in a full crab or with all the crab taken out may cause large directional oscillations which can lead to excessive pilot inputs and subsequent PIO. Taking out half the crab provides the correct amount of pedal force and resultant NWS command to start the aircraft tracking down the runway.

CAUTION

When calculating crosswind components for takeoff or landing, use the full value of any reported gusts in your calculations.

NOTE

Pilot control inputs are not required to counter slightly objectionable directional oscillations which may occur at and immediately following touchdown. Minimize stick and rudder pedal inputs until nose movement is stable. If oscillations continue, execute a go-around.

Subsequent runway centerline tracking requires only small rudder inputs to initiate directional corrections. Although lateral stick is not generally required during the landing roll, judicious inputs may be made to counter the upwind wing rocking up. Landing rollouts in crosswinds up to 30 knots have been accomplished with hands off the control stick with little or no objectionable roll (less than 5°) induced by crosswind or asymmetric stores.

7.3.8 Wet Runway Landing. The aircraft exhibits satisfactory handling characteristics during landing rollouts on wet runways. However, experience indicates that landing in crosswind conditions may increase the pilot tendency to directionally overcontrol the aircraft during the landing rollout. Wet runways can induce hydroplaning throughout the landing rollout. As a result, the aircraft may respond sluggishly to NWS commands and encourage the pilot to use excessively large control inputs. Rudder pedal commands should be kept small, especially if hydroplaning is suspected. Minimum total hydroplaning speed of the main landing gear tires inflated to 250 psi is 140 knots groundspeed and, for nose gear tires inflated to 150 psi, is 110 knots. However, some hydroplaning can occur at much lower speed, depending upon runway conditions. For wet (standing water) runway landings, reduce gross weight to minimum practical. Concentrate on landing ON SPEED or slightly slow with power coming off at touchdown. Maintain a constant attitude and sink rate to touchdown. Ensure the throttles are in ground idle. When comfortable with directional control, use maximum anti-skid braking to minimize landing distance. Go around if a directional control problem occurs and make an arrested landing. Delaying the decision to abort the landing and go around can put the pilot in a situation in which he cannot remain on the runway during the takeoff attempt.

CAUTION

Landing with significant standing water on runway has caused water ingestion which in extreme cases can cause engine stalls, flameouts, A/B blowouts, and/or engine FOD. Avoid standing water in excess of 0.25 inch.

7.3.9 Asymmetric Stores Landing. Landing with asymmetric external stores up to 12,000 foot-pounds of lateral asymmetry requires no special considerations. Above 12,000 foot-pounds of lateral asymmetry, AOA must be kept below 12° to prevent uncommanded sideslip.

The inboard station is 7.3 feet from the aircraft centerline and the outboard station is 11.2 feet from the aircraft centerline. A lateral asymmetry of 12,000 foot-pounds occurs with 1,636 pounds of asymmetry on an inboard station or 1,070 pounds of asymmetry on an outboard station.

Due to landing gear structural limitations, the weight of an asymmetric tip missile and/or internal wing fuel asymmetry must be used in calculating total aircraft asymmetry. Asymmetry due to internal wing fuel imbalance is calculated by multiplying the difference of fuel weight between left hand and right hand wing by 8.0 feet. Fuel weight differences of less than 100 pounds are considered negligible. Wingtip missile asymmetries can be calculated by multiplying missile weight by 19.5 feet (the distance of the wingtip station from aircraft centerline.)

If lateral asymmetry exceeds 12,000 foot-pounds, do not exceed 12° AOA. Recommend fly straight-in approach at optimum approach speed. Do not apply cross controls and make only smooth, coordinated rudder and lateral stick inputs. In a crosswind, fly a crabbed approach to touchdown.

CAUTION

Field landings (flared) with asymmetries between 17,000 and 26,000 foot-pounds are authorized only at touchdown sink rates up to 500 fpm due to structural limitations of the landing gear.

7.3.10 Waveoff. Do not delay the decision to take a waveoff to the point that control of the landing or rollout is in jeopardy. Takeoff distances at MIL or MAX power are short provided the aircraft has not decelerated to slow speed. Advance the throttles to MIL or MAX as required to either stop the sink rate or takeoff and maintain angle of attack. Raise the landing gear and flaps only after a safe climb has been established.

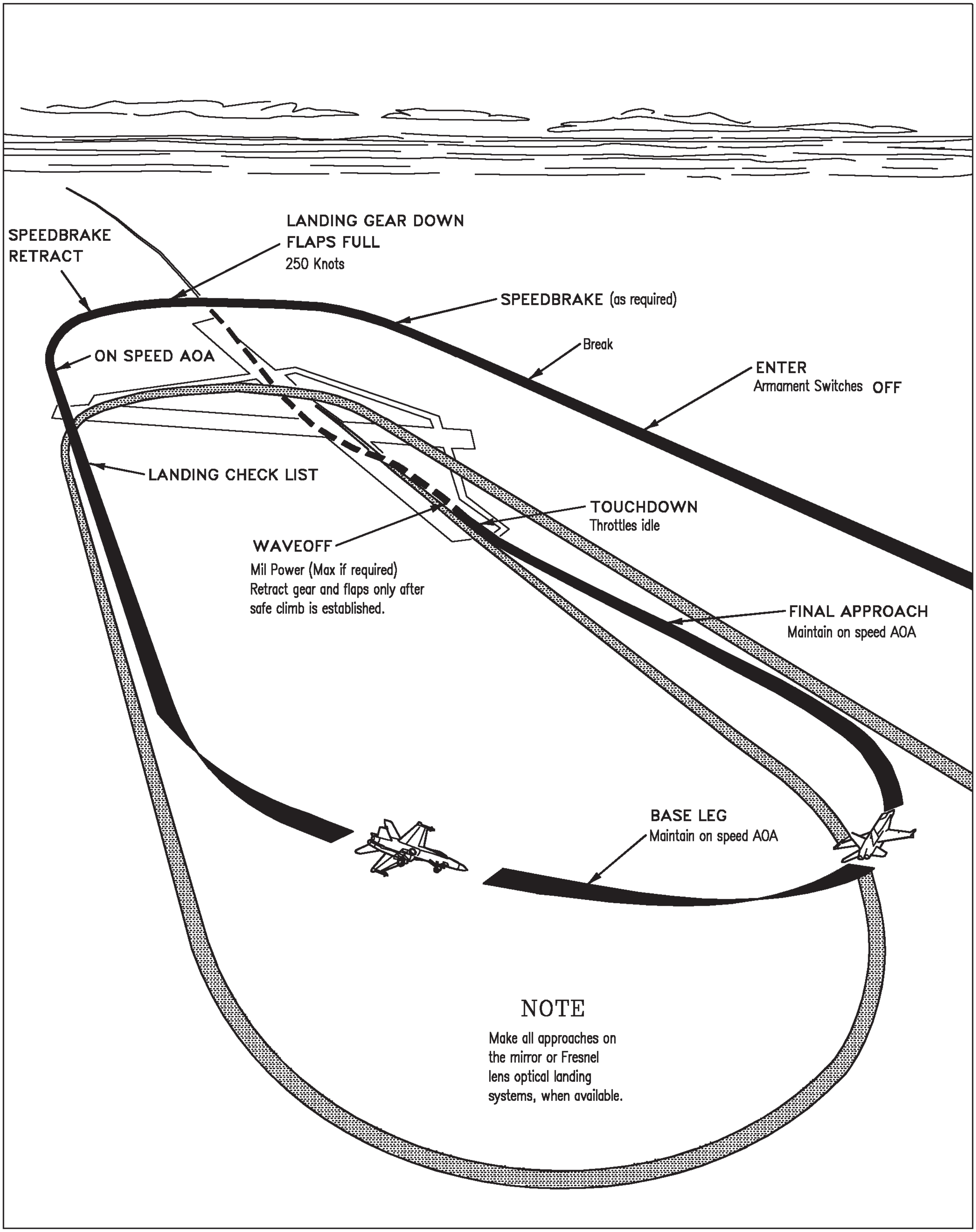


Figure 7-2. Field Landing Pattern Typical