Attachment 4

to Operations Group Chairman's Factual Report

DCA06FA058

wind direction and velocity. Exceeding 1.1 EPR below 10 knots may result in inlet airflow separation.

WIND ADDITIVE ON APPROACH

Adjust V_{APP} for wind. V_{APP} is V_{REF} plus a wind additive. Maximum wind additive is 20 knots. Wind additive is the greater of:

- 5 knots.
- 1/2 the steady wind in excess of 20 knots.
- Gust factor.

TAKEOFF/LANDING WIND LIMITS

MD-11/MD-10 WIND LIMITS (knots)

CONDITIONS	MD-11	MD-10
Max Rolling TKO/LND Xwind (See TAKEOFF above)	31 Knots	31 Knots
Max TKO/LND Tailwind	10	10
Max TKO/LND Crosswind with Rwy Braking Action (or equivalent) Poor	10	10
Autoland Crosswind	15	15
Autoland Headwind	25	25
CAT II/III Crosswind	10	10

SYSTEM LIMITATIONS

POWER PLANTS

Takeoff performance is based on setting Takeoff Power (GE - N_1 or PW - EPR) by 80 KIAS. After 80 KIAS, do not adjust the throttles except to prevent exceeding engine limits.

STANDARD TAKEOFF THRUST LIMITS

MD-11GE limitations in this section apply to the General Electric CF6-80C2D1F engines.

MD-11PW limitations in this section apply to the Pratt and Whitney PW4462 engines.

MD-10-30 limitations in this section apply to the CF6-50C2 engine.

MD-10-10 limitations in this section apply to the CF6-6D engine.

Standard Takeoff Thrust shall be used routinely to reduce engine operating temperatures, thus prolonging engine life. However, Standard Takeoff Thrust procedures are **NOT** authorized if any of the following conditions exist.

Noise abatement procedures require the use of Maximum Takeoff Thrust.

The Performance Computer defaults to Maximum Takeoff Power for takeoff for the following items, when entered:

- Anti-skid inoperative.

NOTE

FedEx DOES NOT permit dispatch for revenue operations with Anti-Skid System inoperative.

- Engine anti-ice on at airport pressure altitudes above 6,000 feet.
- A wet, cluttered or icy runway.
- Windshear.
- Any wheelbrake(s) inoperative.

STAGE III NOISE CERTIFICATION

The MD-11/MD-10 noise levels comply with standards of ICAO Annex 16, Aircraft Noise.

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CHAPTER 3-9-0

APPROACH

AMPLIFIED APPROACH CHECKLIST

The PF calls for "Approach Checklist" no earlier than adjusting all altimeters to local pressure setting, no later than flaps 15°, and normally when:

- Below Transition Level.
- Approach briefing complete (normally completed prior to descent).
- Approach navaid tuned and identified.

The PM completes the checklist.

Briefing C **Complete**

See Chp. 7. The approach briefing should be completed prior to calling for the Approach Checklist.

Altimeters CF ________

Check all altimeters are set to local pressure and announce the altimeter setting.

Minimums CF ________RA/BARO

Ensure RA/BARO minimums are set for the desired approach.

Announce approach minimums (e.g. "100 RA" or "532 BARO").

Navaids PM **Checked**

- Ensure navaids, if required for the approach, are tuned (manually or automatically) and identified (primary method using identifier letters on PFD/ND, or alternatively via audio control panel).
- Ensure the proper VOR/ADF needles, if required for the approach, are selected.
- Ensure "GI NAV" displayed on ND, if conducting a RNAV (GPS) approach.

NOTE

Subsequent NAV mode or system degradation may result in an "UNABLE RNP" alert. With RNP properly designated, the absence of an "UNABLE RNP" alert is positive indication that Actual Navigation Performance (ANP) is suitable for the approach.

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Takeoff (Continued)

With a contaminated runway, the following procedure should be accomplished. Align the aircraft with the runway centerline and ensure that the nosewheel is straight before applying power for takeoff. On slippery surfaces, ensure that the parking brakes are released prior to setting takeoff power to preclude a takeoff with the parking brakes set. Advance the throttles to approximately 70% power N1. Verify symmetrical thrust and continue with normal takeoff procedures. Asymmetrical thrust can adversely affect directional control on slippery runways. Throttle alignment at partial power may not assure alignment at takeoff power. Be alert to asymmetric spool-up rates. Check all engine instruments for proper indications during the early part of the takeoff roll.

Apply slight nose down elevator to improve nose wheel traction and directional control until rudder control becomes effective for steering the aircraft.

CAUTION

On a slippery runway, maintain the heading during rolling takeoff, by using small rudder pedal steering inputs.

Nose gear steering of 3° or more may cause the nose gear slip on the icy (wet) runway.

Do not use differential thrust.

NOTE

After takeoff in slush or wet snow and when clear of obstacles, extending and retracting landing gear may reduce the possibility of gear door freeze up.

During a rejected takeoff, especially under crosswind conditions, both nose wheel steering and differential braking effectiveness are reduced on slippery runways. While the use of reverse thrust on slippery runways is recommended to reduce the stopping distance, its use may reduce the directional control capability of the aircraft. Consequently, reverse thrust should be applied gradually and symmetrically commensurate with the ability to maintain directional control under the existing conditions.

Using high levels of reverse thrust at low ground speeds on a contaminated runway, could lead to flameout of the wing-mounted engines due to ingestion of large amounts of water spray, slush and snow.

INFLIGHT

Wing, tail and engine anti-ice should be on whenever an ICE DETECTED alert is displayed or when icing conditions are expected.

In moderate to severe icing conditions with prolonged periods of N1 settings less than 70% N1, every 10 minutes, verify IGN OVRD is selected and (one engine at a time) throttles reduced toward idle, then advanced to a minimum of 70% N1 for 10 to 30 seconds.

NOTE

During this procedure, ENGINE OUT PAGE may appear on the MCDU.

LANDING

A landing on, or dispatch to a runway with poor braking action is undesirable, and should not be planned.

(CONTINUED)

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Landing (Continued)

The flight crew must be aware of the condition of the runway with respect to snow, ice, slush or precipitation. The most favorable runway in relation to surface condition, wind and weather should be used. The appropriate landing distances should be obtained from the Performance Computer. Maximum flap extension is recommended when landing on runways with reduced braking conditions.

If a landing is planned on a runway contaminated with snow, slush, standing water or during heavy rain, the following factors must be considered: available runway length, visibility of runway markers and lights; snow banks and drifts along the runway; wind direction and velocity; crosswind effect on directional control; braking action; awareness of the effect on aircraft from slush and water spray (engine ingestion, damage to flaps, gear doors, etc.); and the possibility of hydroplaning and the resultant increase in stopping distances.

Braking action will be degraded following the application of a chemical de-acre on an icy runway. When first applied, the chemicals form a watery film over snow and ice that results in extremely poor braking. When in doubt about the type of runway de-icing, ask the tower specifically if chemical de-icers were used.

Blowing or drifting snow can create optical illusions or depth perception problems during landing or taxi-in. Crosswind conditions may create a false impression of aircraft movement over the ground. It is thus possible to have an impression of no drift when, in fact, a considerable drift may exist. When landing under these conditions, runway markers or runway lights can help supply the necessary visual references.

When it has been established that a safe landing can be made, the aircraft must be flown with the objective of minimizing the landing distance. The approach must be stabilized early. Precise control over drift and approach speeds is mandatory. Execute a missed approach if zero-drift condition cannot be established prior to touchdown.

The aircraft should be flown to a positive touchdown on the runway. Be prepared to deploy the spoilers manually since automatic deployment may not occur, due to delayed wheel spin-up.

On touchdown, take positive action to lower the nose gear to the runway and maintain slight forward pressure on control column to assist in directional control. Maintain centerline tracking, ensure spoiler deployment and simultaneously apply brakes smoothly and symmetrically. On contaminated surfaces, full braking should be used to realize optimum anti-skid operation. Autobrakes should be used in the maximum setting. Reverse thrust should be applied smoothly and symmetrically to maximum allowable as soon as possible since reverse thrust effectiveness is greatest at higher speeds. Do not use differential reverse thrust for directional control, as this may further aggravate the effects of weathervaning. The use of reverse thrust may cause a visibility problem from blowing snow forward as ground speed decreases. Using high levels of reverse thrust at low ground speeds on a contaminated runway, could lead to flameout of the wing-mounted engines due to ingestion of large amounts of water spray, slush or snow. Take action as appropriate to the braking action and runway length available. Avoid rapid return to forward thrust when engine RPM is high, the resultant forward thrust may be high enough to cause the aircraft to accelerate.

Maintain directional control primarily with rudder pedals. Be alert for drift towards downwind side of the runway. The rudder required in strong crosswinds may cause the nose gear to turn to an angle which could induce skidding. Therefore, it may be necessary to hold the nose wheel centered and control steering with rudder and brakes to maintain tracking.

If a skid develops, especially in crosswind conditions, reverse thrust will increase the sideward movement of the aircraft. In this case, modulate brake pressure and reduce reverse thrust to reverse idle, and if necessary, forward idle. Apply rudder as necessary to realign the aircraft with the runway and reapply braking and reversing to complete the landing roll. Use of nose gear steering wheel inputs to try to correct a skid at high speed is extremely hazardous. It may lift one nose tire completely off the runway and cause the other to lose most or all of its traction. Use as much runway as necessary to slow the aircraft and do not attempt to turn off a slippery runway until speed is reduced sufficiently to turn without skidding.

TAXIING

If the approach was made through icing conditions or if the runway was covered by slush or snow, do not retract flaps to less than 28 degrees (MD-11) or 22 degrees (MD-10). Damage to the flaps/slats could occur if ice is present and flaps/slats are fully retracted.

Inspection after parking will show whether the necessity to de-ice the flaps exists. After inspection, flaps and slats should be moved to UP/RET.

Slush in puddles or runway low spots may be deeper than the 1/2 inch maximum and cause damage to

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Approach Callouts Summary

ALTITUDE or POSITION	VISUAL	NON-PRECISION	MONITORED NON-PRECISION	CAT I ILS
Indicator Movement		PM - "LOC Alive" PM - "VOR Alive"	C - "LOC Alive" C - "VOR Alive"	PM - "LOC Alive" PM - "G/S Alive"
Final Approach Fix[1]		PM - "FAF Name"	C - "FAF Name"	
1000' agl[2]	PM - "Stable" or "Not Stable (identify condition)"	PM - "Stable" or "Not Stable (identify condition)"	C - "Stable" or "Not Stable (identify condition)"	PM - "Stable" or "Not Stable (identify condition)"
500' agl [2]	PM - "Cleared to land RWY XX" PM - Specific deviations as observed	PM - "Cleared to Land RWY XX" PM - Specific deviations as observed	C - "Cleared to land RWY XX" C - Specific deviations as observed	PM - "Cleared to Land RWY XX" PM - Specific deviations as observed
200' Above[1,3]		PM - "Approaching minimums"	C - "Approaching minimums, going heads up"	PM - "Approaching minimums"
RWY Environment in sight			C - "I have the airplane"	
Minimums or Alert Height[1]		PM - "Minimums" PF - "Leaving MDA"	F/O - "Minimums" C - "Leaving MDA"	PM - "Minimums"
Descent Below DA/MDA[1, 2]		PM - Every 100 feet above the TDZE HAT Sink Rate Airspeed[4]	F/O - Every 100 feet above the TDZE HAT Sink Rate Airspeed[4]	PM - Specific deviations as observed (autoland)
Rollout	PM - "80/60 Knots PM - "Autobrakes Off"	PM - "80/60 Knots PM - "Autobrakes Off"	F/O - "80/60 Knots F/O - "Autobrakes Off"	PM - "80/60 Knots" PM - "Autobrakes Off" PM - "Steer ___ (Left/Right)" (if req.) (autoland)
Go-around	"Go-around"	"Go-around"	"Go-around"	"Go-around"

1. Visual cues (e.g."approach lights") should be called as they appear by PF/PM (as defined by FOM and FAR).
2. If the CAWS is inoperative, the PM will make the altitude calls.
3. The Approaching Minimums callout needs to be made at 200' above minimums on PROF TO MDA approaches to provide the pilot with the ability to determine runway environment before the autopilot enters altitude hold at MDA. Due to the steep angle of many non-precision approaches, and the high approach speed of the MD-11/MD-10, the autopilot may enter altitude capture mode as early as 160' prior to MDA. For standardization and recollection, the Approaching Minimums/Alert height callout is the same for all MD-11/MD-10 approach types.
4. "Airspeed ±____" (deviations in excess of 5 knots below 1000').

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MD-11/MD-10 Landing Data Card

MD-11/MD-10 LANDING DATA CARD

ATIS [ ] [ ] Z GATE [ ]

ALTIMETER [ ] IN / HP — INTL TRNS LVL [ ]

FLAPS	RWY	FLAPS	RWY
MIN BRKG	**MED BRKG**	**MIN BRKG**	**MED BRKG**

Approach Briefing

Approach briefings should be "brief" and to the point. Long briefings tend to be counterproductive to crewmember retention and understanding. Brief only items that are pertinent to the conditions and to the approach being conducted.

Brief only the following items that are applicable to the conditions and the approach. For example, do not brief approach and runway lighting if it is day VMC.

- Review of company 10-10 pages.
- Review of company ILS PRM approach procedure if applicable.
- Brief the ILS PRM breakout procedure if applicable.
- ICAO chart, terminal, and approach procedures for international destinations.
- Any special procedures or crew duties (PAR, QFE altimetry, customs, agriculture, etc.).
- Any airplane systems malfunctions that may affect the approach or landing.
- Transition level when other than FL180.
- General terrain features and obstructions in the vicinity of airport.
- CAT status of the airplane.
- Page number and date of the approach chart.
- Type of approach and runway.
- Frequency and final approach course.
- Pertinent altitudes, as necessary.
- Approach specific requirements- Notes, Radar or DME required, Runway suitability, VDP, timing to MAP, Inner Marker will be monitored, TCH, glidepath angle, etc.
- Approach and runway lighting.
- Missed approach procedure(s) for the approach to be flown, i.e., for a visual approach, brief visual missed approach procedures.
- Minimums and Weather required.
- MCDU and ND set up.

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- PF's intended use of:
  - Automation, i.e. intended mode of lateral and vertical NAV
  - Autothrottles
  - Autobrakes
- Flap setting for landing.
- Approach speed final adjustments.

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CHAPTER 7-1-5

APPROACH

DESCRIPTION

The objective of this section is to provide procedures and techniques for operation in the approach environment

FLAP/SLAT DEPLOYMENT

Flaps and slats should not be used as drag devices to slow the aircraft by deploying them as soon as speed permits. This technique adds unnecessary "wear and tear" on the components. Slow first and deploy slats and flaps at a speed less than the maximum speed for the configuration desired.

FMS SPEED LOGIC

Proper usage of FMS SPD during approach will reduce pilot workload by automatically accomplishing airspeed reductions. The reduced pilot workload should increase situational awareness and enhance the safety of flight.

FMS Automatic Speed Logic

FMS SPD logic is based on FMS DTG (distance to go to the runway) and/or aircraft configuration. The FMS DTG profile is optimized for FMS arrivals.

NOTE

> FMS DTG calculations are only valid when the aircraft is navigating via the FMS F-PLN route (a magenta line) and the F-PLN does not contain a F-PLN DISCONTINUITY.

Approaching 10,000 feet, the FMS SPD target (magenta ball) will drop to 245 knots. At approximately 15 miles DTG, the FMS SPD target will drop to 0/RET (clean) foot plus 20 knots. At approximately 11 miles DTG, a hollow magenta FMS SPD target will appear on the foot, indicating that the FMS would like the slats extended. If the pilot selects slats extend, the FMS SPD target will drop to 0/EXT foot plus 20 knots and the hollow magenta ball will disappear. At approximately 7 miles DTG, a hollow magenta ball will appear on the foot, indicating that the FMS would like flaps 15. If the pilot selects flaps 15, the FMS SPD target will drop to 15/EXT foot plus 20 knots and the hollow magenta ball will disappear. At approximately 6 miles DTG, a hollow magenta ball will appear on the foot, indicating that the FMS would like flaps 28 (MD-11) or flaps 22 (MD-10). If the pilot selects flaps 28 (MD-11) or flaps 22 (MD-10), the FMS SPD target will drop to 28/EXT (or 22/EXT) foot plus 5 knots and the hollow magenta ball will disappear. At approximately 5 miles DTG, a hollow magenta speed target will appear on the foot, indicating that the FMS would like flaps 35. If the pilot selects flaps 35, the FMS SPD target will drop to 35/EXT foot plus 5 knots and the hollow magenta ball will disappear. If flaps 50 is selected in the FMS, a flaps 50 hollow magenta ball will appear until flaps 50 is selected.

FMS Pilot Controlled Speed Logic

Most approaches require a more conservative speed reduction schedule. The FMS SPD logic allows the pilot to drive the FMS SPD target with aircraft configuration. Once the 15 mile DTG automatic speed reduction to 0/RET foot plus 20 knots has occurred, selecting slats extend will drive the FMS SPD target to 0/EXT foot plus 20 knots regardless of DTG. Selecting flaps 15 will drive the FMS SPD target to 15/EXT foot plus 20 knots regardless of DTG. Selecting flaps 28 (MD-11) or flaps 22 (MD-10) will drive the FMS SPD target to 28/EXT (or 22/EXT) foot plus 5 knots regardless of DTG. Selecting flaps 35 will drive the FMS SPD target to 35/EXT foot plus 5 knots regardless of DTG.

NOTE

> Selecting slats extend outside of 15 miles DTG will **not** drive the FMS SPD target to 0/EXT foot plus 20 knots. This allows the pilot to use the slats to descend more rapidly. Selecting flaps 15° will resume deceleration schedule.

PROCEDURE

STABILIZED APPROACH

Refer to the Flight Operations Manual for stabilized approach criteria.

Good landings are the result of good approaches. The majority of landing accidents/incidents can be attribut-

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ed to an unstable approach between the FAF and touchdown. Control of the variables that result in a stabilized approach should start prior to the FAF. These variables are configuration, speed, rate of descent, power setting and approach profile.

AIRSPEED SELECTION

Although configuration changes are often driven by speed assignments from ATC, maneuvering should normally be accomplished in the lowest slat/flap configuration possible with consideration of other factors (anti-ice, turbulence, etc.) to maximize fuel conservation and limit wear on the slats/flaps.

Once the aircraft has begun slowing and configuring for an approach pilots should maneuver at the FMS generated airspeed for the selected configuration unless otherwise restricted (ATC, etc.). The minimum maneuvering speed is foot +5 knots.

APPROACHING MINIMUMS/ALERT HEIGHT

The Approaching Minimums/Alert height callout is made at 200´ above minimums. Several factors influenced the selection of 200´ prior to minimums for the callout. The cadence of the approach is improved. As the aircraft approaches minimums, procedures/maneuvers occur quickly and by applying 200´ prior vice 100´, the hurriedness of events is reduced. On PROF TO MDA approaches, 200´ prior provides the pilot with the ability to determine the runway environment before the autopilot enters altitude hold at MDA. Due to the steep angle of many non-precision approaches, and the high approach speed of the MD-11/10, the autopilot may enter altitude capture mode as early as 160´ prior to MDA, thus destabilizing the approach. To standardize the approaching minimums/alert height, all approaches use 200´ above minimums.

WIND ADDITIVE ON APPROACH

$1.3\ V_{SO} = V_{REF}$

V_{REF} + wind additive = V_{APP}

Add wind additive to V_{REF} (not to V_{APP}). Fly at V_{APP} speed when stable on final approach with landing flaps. The FMS automatically applies a standard 5 knot additive to V_{REF}.

With ATS-OFF, the pilot manually maintains V_{APP}. With ATS-ON, the pilot may apply wind additive by any method:

- Edit FMS V_{APP} on MCDU APPROACH page (magenta ball speed target).
- Edit FMS V_{APP} on the FCP (magenta ball speed target).
- SPD SEL (speed select) on the FCP (white "bowtie" speed target).

Wind additive is ½ of the steady state wind greater than 20 kts, or full gust, whichever is greater (max 20 kts). Minimum wind additive is 5 kts. Maximum wind additive is 20 kts.

Wind additive is a standard 5 kts if:

- Steady state wind is 30 kts or less, and
- Gust factor is 5 kts or less.

Examples:

Wind: 20 kts (minimum additive).

- Steady state wind is 30 kts or less.
- Wind additive is standard 5 kts.
- $V_{APP} = V_{REF} + 5$.

Wind: 20 gust 25 kts (minimum additive).

- Steady state wind is 30 kts or less.
- Gust is 5 kts or less.
- Wind additive is standard 5 kts.
- $V_{APP} = V_{REF} + 5$.

Wind: 36 kts (steady additive).

- 36 – 20 = 16, and 16/2 = 8 kts.
- Wind additive is 8 kts.
- $V_{APP} = V_{REF} + 8$.

Wind: 20 gust 35 kts (gust additive).

- Steady state wind is 30 kts or less.
- Gust is 15 kts.
- Wind additive is 15 kts.
- $V_{APP} = V_{REF} + 15$.

Wind: 45 gust 55 kts (steady/gust comparison).

- Steady state wind additive is ½ of 45 – 20, or 25/2 = 13 kts.
- Steady wind additive is 13 kts.
- Gust is 10 kts.
- 13 is greater than 10 kts.
- Wind additive is 13 kts.

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- $V_{APP} = V_{REF} + 13$.

Wind: 10 gust 35 kts (maximum additive).

- Steady state wind is 30 kts or less.
- Gust is 35 – 10 = 25 kts.
- Gust wind additive is 25 kts.
- Max additive is 20 kts.
- $V_{APP} = V_{REF} + 20$.

WARNING

Landing distance is calculated based on a standard 5 knot wind additive. Wind additive above standard may increase landing distance, depending on the headwind component. Consider wind additive's effect on landing distance when choosing ABS or manual braking level. Establish touchdown and braking as early as practical.

AIRCRAFT APPROACH CATEGORY

Cat I approach minima (ILS, NPA, etc.) may be limited by the aircraft approach category, as indicated in the IAP minimums block. See Jeppesen INTRO section for additional information. If maneuvering at typical CFM speeds, use the following approach categories:

- Cat C: MD-10-10.
- Cat D: MD-11 and MD-10-30.

GRADIENT CAPABILITY

Some approaches list a minimum climb gradient for the missed approach procedure. These gradient requirements are for all engines operating and are typically established in order to accommodate ATC traffic issues. In all cases, the MD-11/MD-10 complies with these all engine gradient requirements. See Tables below for approximate all engine and engine out gradients.

Approximate Gradient Capability at ISA + 15° (APPR Flaps)

AIRCRAFT	MD-10-10	MD-10-10	MD-10-30	MD-11 GE	MD-11 PW
Max Ldg Wt	363,500	375,000	436,000	481,500	481,500
APPR FLAP	22	22	22	28	28
1 Engine Out 1,000 FT	4.6	4.2	6.8	6.7	6.2

Approximate Gradient Capability at ISA + 15° (Flaps UP)

AIRCRAFT	MD-10-10	MD-10-10	MD-10-30	MD-11 GE	MD-11 PW
Max Ldg Wt	363,500	375,000	436,000	481,500	481,500
All Engines 1,000 FT	11.6	11.0	13.7	15.9	16.4
1 Engine Out 1,000 FT	6.1	5.8	8.4	10.0	8.5
1 Engine Out 5,000 FT	5.2	4.9	7.0	8.5	7.7

TECHNIQUE

CONFIGURING

If the approach requires a 60° turn or more to final within 10 miles of the runway, consider having the aircraft configured on speed at flaps 28 (MD-11) or flaps 22 (MD-10) prior to the turn. This will help prevent overshoot of the desired flight path and being high on the glidepath.

Flaps 15/EXT is the recommended configuration for maneuvering prior to the FAF when conducting a complete instrument approach procedure beginning at the IAF.

APPR/LAND TILE

If cleared for ILS/LOC approach on extended downwind, consider not engaging APPR/LAND until inbound due to the possibility of receiving false (localizer) signals.

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CHAPTER 7-1-6

LANDING

DESCRIPTION

The objective of this section is to provide procedures and techniques used to accomplish a normal landing.

The best landings are a result of well executed approaches. Flaps 35 or 50 are the normal landing configurations. Flaps 35 is recommended for crosswinds greater than 15 knots (when the landing distance is not critical), potential windshear, and noise abatement considerations. Flaps 50 may be appropriate with tailwinds, contaminated runways, low visibility approaches, and marginal computed landing distances. Landing with Flaps 50 will decrease the approach deck angle by one degree and landing distance by up to 500'. A lower deck angle aids pilot acquisition of visual landing cues in low visibility. The aircraft must be flown in a controlled, stabilized manner through touchdown and rollout. Pitch attitude and thrust are keys to a good landing.

NOTE

A Flaps 35 landing creates 10% less aerodynamic loading on the flap structure than a Flaps 50 landing.

PROCEDURE

NORMAL LANDING

Plan to touch down 1500 from the runway threshold. The runway threshold should disappear under the nose at about the same time CAWS announces "100'." Maintain a stabilized flight path through the 50 and 40 foot CAWS callouts (unless sink rate is high). At 30' a smooth 2.5 degree flare should be initiated so as to arrive below 10' in the landing attitude. Do not trim in the flare. Elevator back pressure should be relaxed, and a constant pitch attitude should be maintained from 10' radio altitude to touchdown.

The autothrottles switch to the retard mode at 50' RA. In the retard mode, the throttles move to idle at a preprogrammed rate without regard to airspeed, vertical velocity, or RA. The PF must maintain the appropriate glide path to touchdown. If a deviation occurs from that glide path, the PF must override the autothrottles to prevent retard.

NOTES

During a visual approach the main landing gear should cross the runway threshold at approximately 50' above the TCH. Do not deviate from the visual glidepath in an attempt to touchdown shorter than normal.

Excessive sink rates, and subsequent tailstrikes, have occurred as the result of an early flare and "feeling" for the runway.

If the airplane is flared early and the autothrottles are allowed to retard, the airspeed will decay, elevator effectiveness will be reduced, and a higher pitch attitude will be required making the pitch up tendency after touchdown more pronounced and more difficult to counteract.

At main wheel touchdown the autospoilers partially deploy, if throttle #2 is at idle. If throttle #2 is above idle at touchdown, AutoSpoilers and AutoBrakes may not activate. Counter any pitch-up tendency associated with spoiler extension. Fly the nose wheel smoothly to the runway. Avoid full elevator down input. If selected, autobraking will begin shortly after spoiler deployment. When the nosewheel is lowered to the runway, the spoilers will fully deploy. After main gear touchdown reverse all three engines as soon as possible. A momentary pause will be encountered at the interlock stop. Engine #2 will provide only idle thrust until nosewheel strut compression. At 80 knots, smoothly move the reverse thrust levers toward the reverse idle detent, so as to be at idle forward thrust by 60 knots. Do not delay lowering the nosewheel to the runway.

NOTE

Fast movement out of reverse will produce a sudden surge of forward thrust that will negate some of the airplane's stopping ability.

The PM monitors spoiler deployment and manually deploys the spoilers if necessary. During landing and

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reversing the PM monitors the engine instruments and calls out "80/60 knots." When applicable, the captain normally initiates transfer of control from the F/O after the "60 knots" callout.

WARNING

After reverse thrust is initiated, a full stop landing must be made. Do not attempt a go-around.

HIGH SINK RATE/BOUNCE RECOVERY

If a high sink rate or low bounce occurs, the PF should establish a 7 1/2° pitch attitude and increase thrust until the sink rate has been arrested and/or a normal landing is accomplished. Avoid rapid pitch rates in establishing a normal landing attitude.

CAUTION

Tail strikes or nosewheel structural damage can occur if large forward or aft control column movements are made prior to touchdown.

If a high bounce occurs, a low-level go-around should be initiated. Low-level go-arounds are dramatically different than normal go-arounds. During low-level go-arounds, main wheel touchdown may be unavoidable. The PF must not exceed 10° of pitch or retract the landing gear until the aircraft is safely airborne with a positive rate of climb.

CROSSWIND LANDING

Crosswind landings are accomplished by flying the final approach in a wings level attitude with a crab into the wind. At approximately 200' agl, align the fuselage with the runway by smoothly applying rudder and maintain runway centerline by lowering the upwind wing. In high crosswinds, consideration should be given to commencing the align maneuver prior to 200'. The align maneuver shall be established by 100' agl.

NOTES

Excessive sink rates and subsequent tailstrikes have occurred as the result of a late or abrupt align maneuver. The align maneuver has an associated increase in drag, and if unchecked with power, will result in an increased sink rate.

AFT FUSELAGE GROUND CLEARANCE (LANDING)

Tailstrikes are not caused by landing with a high sink rate. Tailstrikes occur as the result of attempting to arrest a sink rate or bounce by quickly adding significant up elevator below 10' RA. Up elevator inputs will load the horizontal stab increasing the effective weight of the aircraft and initially increasing the vertical velocity. Increasing the pitch attitude drives the main wheels into the ground and compresses the main gear struts.The aft fuselage will contact the runway at approximately 10 degrees (MD-11), or 13 degrees (MD-10), pitch attitude with the struts compressed. Additionally, there is a direct correlation between an increasing pitch attitude rate at touchdown and an increased pitch up tendency after touchdown. One degree per second of increasing pitch attitude rate at touchdown generates as much pitch up tendency as full spoiler deployment. Therefore, elevator back pressure should be relaxed and a constant pitch attitude should be maintained from 10' RA to touchdown.

ABS DEACTIVATE / DISARM

After landing, PF - Terminate ABS by retracting spoilers or depressing brake pedals.

The PF may smoothly deactivate ABS by stowing ground spoilers at or below 60 kts. The ABS is not disarmed and the ABS DISARM lights will not illuminate, because the ABS is still armed to activate if spoilers are again deployed.

NOTE

Advancing throttle #2 (as during a go-around) automatically stows autospoilers and will also deactivate (but not disarm) ABS.

The PF may disarm ABS (however, this may be abrupt) by manually applying brake pedals (ABS DISARM lights illuminate).

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maintain as low a rate of descent as possible, plan for a long, flat approach. The initial part of the approach should incorporate the use of all visual aids available at the landing site, as well as heavy reliance on visual cues. If the runway has no ILS, the VOR or ADF guidance may aid in alignment at the initial stage of the approach. Radar vectors may also be helpful at the early state, particularly in cases of reduced visibility. Attempt to reach the vicinity of the outer marker (or 5 to 7 miles from touchdown) at approach altitude with the gear extended, aligned with the runway and with the pitch controlled as much as possible. Keep in mind that there is more thrust available at lower altitudes. Jam accelerations followed by rapid throttle chops may be necessary to control pitch without generating additional pitch oscillations as a sustained thrust input would do. If asymmetric thrust is required to keep the wings level, a rolling tendency will occur if both throttles are retarded to idle without maintaining the thrust asymmetry. Also, be aware of any tendency for the engines to accelerate asymmetrically. This is more likely to occur when the throttles are moved from idle than from approach power settings.

Landing

Adjust the touchdown aim point toward the far end of the runway and continue to fly the thrust for speed control and stabilizer trim to maintain the desired attitude/flight path angle. Smooth, deliberate throttle adjustments for speed control while far out on the approach will make the task of trimming the stabilizer easier due to the slower than normal rate-of-trim. Begin the transition from stabilizer trim to thrust for flight path angle on the final part of the approach (about 500 feet AGL). Aggressive power application (i.e., rapid accelerations followed by immediate throttle chops) will allow the small changes in pitch attitude necessary to maintain the touchdown aiming point without significantly changing the speed, assuming the approach is stable in the pitch axis. Throttle adjustments may need to be more aggressive as the aircraft enters ground effect. There should be no attempt to accomplish a smooth landing but simply reduce the sink rate as much as practical without ballooning or skipping

Upon touchdown, apply full brake pedal deflection and, as the nose comes to the runway, initiate reverse thrust on the wing engines. Continue to hold full brake deflection and monitor brake system 2 pressure (powered by hydraulic system 3) noting anti-skid operation. With the enhanced hydraulics, spoiler panel 3 on each wing will be powered and should be deployed at nose gear touchdown. Restricted nose wheel steering is available and should be used for directional control until the aircraft slows to taxi speed.

Go-Around

If the final approach is not stable nearing touchdown, a go-around may be attempted by advancing the power and allowing the aircraft to pitch up. Remember that the power is not controlling speed so only enough thrust should be used to initiate a climb at moderate pitch attitude. Too much pitch could cause the stick shaker to activate and/or the aircraft may stall. Keep in mind that adding power if a power differential was required to keep wings level, will necessitate that the power differential be maintained to avoid the initiation of roll or a heading change during the go-around. Attempt to level off at a safe altitude and re-initiate the approach as before. If the approach is unstable and insufficient fuel exists for another attempted landing, or for other operational reasons a landing is necessary, it may be advisable to continue the approach and trade the original aiming point on the runway for a more stable and controlled touchdown in close proximity to the runway.

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EVACUATION

Couriers . . . . ALERT

Alert couriers as to nature of emergency, time available for preparation and brace signal to be used.

After aircraft has stopped,

Outflow Valve . . . . VERIFY OPEN

PARK BRAKE Handle . . . . PARK

FUEL Levers . . . . .OFF

EVACUATION Command . . . . .INITIATE

ENG FIRE Handles . . . . DOWN/DISCHARGE

APU FIRE Handle . . . . PULL/ROTATE

EMER PWR Selector . . . . .OFF

BAT Switch. . . . . .OFF

COCKPIT DOOR . . . . .UNLOCK

Unlock the cockpit door to allow courier/cabin jumpseaters and/or emergency/security personnel access to the cockpit.

[End of Procedure]

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