

Subject to change without notice. It is not endorsed by any airline. Please let me know of any mistakes.
 www.firstnethou.com/fmcman/737/profiles.pdf
 Bill Bulfer, 2031 River Falls, Kingwood, TX 77339
 Last change made: Apr 16, 1999 (Flap Speeds)

ILS APPROACH MONITORED PROCEDURE

PF = Pilot Flying / PM = Pilot Monitoring

B737 PROFILES

Tolerances on final approach segment:
 (published glideslope intercept altitude intersects the glideslope)
 A/S: -5/+10 of target
 LOC: ± 1 Dot
 G/S: ± 1 Dot

Tolerances in Decision Regime (500' above TDZE):
 A/S: ± 5 kts of target
 LOC: ± 1/3 Dot
 G/S: ± 1 Dot
 Max V/S of 1,000 fpm
 Max stabilized crab 10°
 No new warning lights or flaps
 Raw data must match computed data
 No GPWS activation

Check weather, brief transition and approach, especially stepdowns. Vertical part of the maneuver is more difficult than the lateral. Complete **IN RANGE CHECK** Use autothrottle and autopilot.

Downwind:
 PF: **FLAPS 1, SPEED* APPROACH CHECK**

On base leg:
 PF: **FLAPS 5 SPEED***



- Cleared for approach: Arm APP **
- Finish Approach checklist.
- Transition to the ADI.

1 1/2 dots below GS,
 PF: **GEAR DOWN FLAPS 15, SPEED* LANDING CHECK**

GS capture,
 PF: **FLAPS 30 / 40 TARGET***
 Set M/A altitude
 Check FMA and N1 cursor to GA limit.

Press "TOGA" (Once for reduced, twice for max if A/T on). Push throttles to cursors if A/T off, otherwise just follow. Rotate to 15°. (Two engines)
 PF: **FLAPS 15, CHECK POWER ... POSITIVE RATE, GEAR UP CHECK MISSED APPROACH ALTITUDE**
 A/P disengages if only one was engaged. A/T advances to GA/N1 thrust if ON. GA/N1 is annunciated. Speed cursor leads flap handle. FD initially commands 15° pitch and a bank to maintain existing ground track. Terminate TOGA by selecting another AFDS pitch mode.

1000' AFE and V_{REF} 30 + 15
 PF: **FLAPS 5 CLIMB POWER LEVEL CHANGE SET TOP BUG**
 At V_M 5
 PF: **FLAPS 1**
 At V_M 1
 PF: **FLAPS UP AFTER T/O CHECK**
 Climb to 3000 ft AFE at V_M 0
 3000 AFE: **VNAV or SET 250**

- Established on inbound track when within 1 dot either side. (half of the full scale deflection - 1.25°)
- LOC Capture, set rwy hdg.



400'
 PF: **HDG SEL or LNAV**
 Tell tower of Missed and intentions.

At DH (H)
 PF: **MINIMUMS, GOING AROUND**

V_{REF} 30 + 15 (bug)

FLAP MANEUVER SPEEDS (-300/500)	
Until Rudder Pressure Reducer (RPR) is installed	
V _M 0	220 "Top Bug"
V _M 1	200
V _M 5	190
V _M 10	170
V _M 15	150

The Captain will make the following calls above TDZE:

1000 ft ... 500 ... 400 ...

At 100 above DA(H) -

APPROACHING MINIMUMS, I'M GOING HEADS UP

If decision is to pass the DA (H), **I HAVE THE AIRCRAFT.**

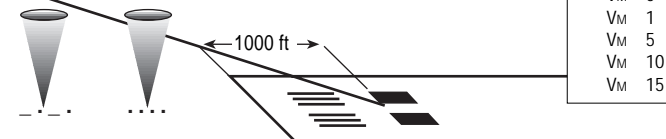
The FO will then make the following calls in a/c w/o Mode 6

aural alerts: **100 ... 50 ... 30 ... 20 ... 10**

If engine fails in landing configuration:

- A/T DISENGAGE
- A/P DISCONNECT
- **FLAPS 15**
- V_{REF} 30 + 15 (bug)
- GPWS FLAP INHIBIT
- If G/A is necessary:
 V_{REF} 30/40 + 15 ***

FLAPS 1, CHECK POWER... POSITIVE RATE, GEAR UP CHECK MISSED APPROACH ALTITUDE



- Basic ILS minimums are 4000 RVR (3/4 mi.)
- Approach lights bring it down to 2400 RVR.
- Add TDZ and CL lights, the minimum is brought down to 1800 RVR, not less than 200 ft.

* Don't take hand off spd knob until you see flap movement.
 ** Caution: Consider altitude restrictions/clearance and false GS signals.
 *** V_{REF} 30/40 + 15 is approximately equal to V2 for F1.

BOLD ITEMS - Req'd call

Subject to change without notice. It is not endorsed by any airline. Please let me know of any mistakes.
 www.firstnethou.com/fmcman/737/profiles.pdf
 Bill Bulfer, 2031 River Falls, Kingwood, TX 77339
 Last change made: Apr 16, 1999 (Flap Speeds)

ILS APPROACH NOTES

PF = Pilot Flying / PM = Pilot Monitoring

B737 PROFILES

CAT I NOTES:

- If weather conditions are below 4000 RVR or 3/4 mile visibility, a FD must be used or a coupled approach must be made.
- If RVR is at or below 2400', an auto-coupled, monitored approach is required.
- If RVR is 2000 ft or less, the crew must brief (and fly) the category of approach having the lowest minimum applicable to facility, aircraft, and crew.
- Autoland is discretionary to a CAT I facility.
- If the autopilot is inop, the monitored approach procedure should still be used with the FO flying an uncoupled FD approach down to the lowest CAT I minimums.
- CAT I or Non-precision approach, PM will call "Approach lights in sight", and/or "Runway in sight". This is informative, not directive.
- When conducting non-precision or CAT I ILS approach, you may descend to 100' above TDZE with approach lights in sight.
- The pilot may not descend below 100' above the TDZE unless visual reference to the runway is established.
- Decision Altitude (DA) is used for barometrically determined altitude minima (MSL)

CAT II NOTES:

- CAT II approach requires autoland if the aircraft and crew are autoland capable.
- In the event a single channel autopilot fails the Monitored Approach method may be used.
- An auto-coupler is required for less than 1800 RVR (CAT II).
- Exemption 5549D exempts crew from Low-Time-In-Type Restrictions if:
 - aircraft and crew are qualified for CAT III or CAT II autoland,
 - Captain has minimum of 300 hrs as a pilot in turbojet aircraft,
 - FO has minimum of 100 hrs in type.
- First Officers, think of taking it to the DH then taking it to a MA.
- Decision Height (DH) is used for CAT II ops except where procedures have "Radio Altitude Not Authorized (RA NA)", for example due to irregular underlying terrain, typically use the first indication of arrival at the inner marker as a means to establish DA(H).
- CAT II/Autoland and CAT IIIA procedures are the same except for the decision height.
- For CAT II, TDZ, MID, and ROLLOUT RVR should be provided for any runway over 8000 ft.; TDZ and ROLLOUT for runways less than 8000 ft.

GENERAL NOTES:

- Cold temperature (down to -22°F/-30°C) obstacle protection is built into the instrument procedure (MEAs, initial, and intermediate approach segments).
- Review Monitored Approach Briefing in back of QRH.
- Recommend: Flaps 40° slightly more sight over nose (Check App / Clb Limit)
 - Landing lights off, cockpit lights low
 - Max Seat height (consider sighting of FMA)
- If RA NOT AUTHORIZED, approach plate may call for use of inner marker.
- ATC is required to have approach/runway lights on step 5.
- Non-EFIS CAT II ops, both Captain and First Officer must position HSI switch to VOR/ILS prior to commencing the approach.
- EFIS (3-4-5): This step not required for (7-8) Press nav switch to MANUAL to display ILS data on ADI.
- For approaches to an RVR of less than 1200, braking action must be fair or better.
- Without autoland, may use autopilot until 50' and autothrottle to the ground.
- Surface Movement Guidance and Control System (SMGCS) goes into effect when RVR is less than 1200.

All US Cat I operating minimums below 1/2 statute mile (RVR2400) and all Cat II and III operating minimums are based on RVR.

- ** Controlling RVR must be at or above minimums prior to final approach segment.
- *** Controlling RVR must be at or above minimums prior to final approach segment and prior to descent below DH.

Visibility	RVR
1	5000
3/4	4000
1/2	2400
1/4	1600

CAT IIIA NOTES:

- CAT IIIA approach requires autoland.
- Three operational differences between CAT II Autoland and CAT IIIA approach:
 - Status annunciator will show CAT IIIA
 - RVR minimums for CAT IIIA approach have specific transmissometer requirements. (See chart at bottom)
 - CAT IIIA approach incorporates a DH of 50 ft above TDZE. (Not a DA)
- During the approach briefing, set the RA to 50 ft and the barometric altimeter to 50 ft above TDZE.
- Captain makes an additional callout: "200" at 200 ft above TDZE.

AUTOLAND NOTES:

- Status annunciator will be either CAT IIIA (nor NG 737) or CAT II (all a/c).
- Dual autopilot required – criteria for engagement are:
 - valid ILS frequency in both nav radios,
 - same inbound course in both course windows,
 - APP armed.
- When cleared for the approach, arm APP and engage second A/P. Single channel remains engaged until pitch monitor test is completed (approx. 1300 ft RA). FLARE is then annunciated.
- PM calls "500", PF responds "Flare Armed".
- Max crosswind for autoland with RVR greater than 2400 is 20 kts.
- After touchdown, Captain must disconnect A/P because there is no automatic tracking of centerline.
- On a missed approach, at 1000 ft AGL, when LVL CHG is selected, "A" A/P disconnects and "B" becomes the master.
- If wx is better than 800/2 and you plan a "coupled/autoland", ask Approach and Tower for "Beam Protection for autoland". Signal is not protected from airborne interference until RVR goes below 2000.

APPROACH TYPE	BARO SET TO	RA SET TO
CAT I	Published DA	Optional
CAT II	Published DA	Published RA
CAT IIIA	TDZE + 50 ft	50 ft RA
NPA	MDA	Optional

DH is:	IF TDZ RVR is:
Not less than 200	Down to but not less than 1800
Not less than 100	Down to but not less than 1600
Not less than 100	Down to but not less than 1200
Not less than 50	Down to but not less than 700

RVR/CAT	TDZ	MID	ROLLOUT	NOTES	LIGHTS	RVR
CAT I	Required Controlling	Not req'd Advisory	Not req'd Advisory	MID can sub for TDZ if inop	TDZ and CL	**
CAT II	Required Controlling	Not req'd Advisory	Not req'd Advisory	No Substitutions		**
CAT II	Required Controlling	Not req'd Advisory	Required Advisory	MID can sub for ROLLOUT if inop		**
CAT IIIA	Required Controlling	Required Controlling	Required Advisory	If only two, both control.		***

Subject to change without notice. It is not endorsed by any airline. Please let me know of any mistakes.
 www.firstnethou.com/fmcman/737/profiles.pdf
 Bill Bulfer, 2031 River Falls, Kingwood, TX 77339
 Last change made: Apr 16, 1999 (Flap Speeds)

NON PRECISION APPROACHES

B737 PROFILES

PF = Pilot Flying / PM = Pilot Monitoring

VOR, LOC

TOLERANCES:
 A/S: -5/+10
 MDA: +50,-0

Build the runway wpt.
 Ref: p. 15
 Brief approach.
 Complete **IN RANGE CHECKLIST**
 Use autothrottle and autopilot.

Downwind:
 PF: **FLAPS 1 SPEED***
APPROACH CHECK
 Accomplish an intercept to the runway waypoint.

On base leg:
 PF: **FLAPS 5, SPEED***

Cleared for approach:
 VOR or LOC approaches:
 Arm VOR LOC.
 LOC / BC approach:
 Use LNAV or HDG SEL.
 Finish Approach check.

Approx. 4 mi. from FAF:
 PF: **GEAR DOWN
 FLAPS 15, SPEED*
 LANDING CHECK**

Approx. 2 miles from FAF:
 PF: **FLAPS 30 / 40**
 TARGET***

Ref: Procedure A, B, or C, page 13.

Set M/A hdg. when possible

At 100' above MDA:
 PM: **APPROACHING MINIMUMS**
 At MDA:
 PM: **MINIMUMS**

Press "TOGA" (Once for reduced, twice for max if A/T on). Push throttles to cursors if A/T off, otherwise just follow. Rotate to 15°. (Two engines)
 PF: **FLAPS 15, CHECK POWER ...
 POSITIVE RATE, GEAR UP
 CHECK MISSED APPROACH ALTITUDE**
 A/P disengages if only one was engaged.
 A/T advances to GA/N1 thrust if ON. GA/N1 is annunciated. Speed cursor leads flap handle.
 FD initially commands 15° pitch and a bank to maintain existing ground track.
 Terminate TOGA by selecting another AFDS pitch mode.

400'
 PF: **HDG SEL** or **LNAV*****
 Tell tower of Missed and intentions.

1000' AFE and V_{REF} 30 + 15
 PF: **FLAPS 5
 CLIMB POWER
 LEVEL CHANGE
 SET TOP BUG**

At V_M 5
 PF: **FLAPS 1**
 At V_M 1
 PF: **FLAPS UP
 AFTER T/O CHECK**
 Climb to 3000 ft AFE at V_M 0
 3000 AFE: **VNAV** or **SET 250**

FLAP MANEUVER SPEEDS (-300/500)	
Until Rudder Pressure Reducer (RPR) is installed	
V _M 0	220 "Top Bug"
V _M 1	200
V _M 5	190
V _M 10	170
V _M 15	150

- * Don't take hand off spd knob until you see flap movement.
- ** Extension of flaps from 15 to landing flap setting can be delayed at pilot's option if ceiling and visibility are relatively high.
- *** If entire Missed Approach has been programmed.

- Established on inbound track for:
 VOR is one half full scale deflection - one dot - 5°
 LOC is one half full scale deflection - one dot
- Non-EFIS, use the track indicator (orange diamond).

- Do not descend prior to VDP.
- When at MDA and ALT HOLD annunciated, set M/A alt.
- Do not start descent prior to 2.8 - 3° slope.

At MDA and MA point:
 PF: **GOING AROUND**

NOTES:

- Procedure turn: Unless otherwise stated, fly either the 45°/180° or an 80°/260° course reversal. Consider track, not heading.
- Use V/S, not LVL CHG. At 1,000 ft AFE max V/S is 1,000 fpm.
- At each ALT HOLD, set next altitude and stay ahead of the airplane. The vertical work is the most difficult task of the NPA.
- At VDP with approach lights in sight, start down to 100' above TDZE. You may not descend below 100' above the TDZE unless visual reference to the runway is established.
- Disconnect AP at or prior to the MDA minus 50'.
- On the LOC (Back Crs), localizer is extremely sensitive due to the close proximity of the transmitter.
- For LOC or VOR approaches, use VOR/LOC, (EXP or FULL). The ground based navaid is preferred as opposed to LNAV and keeps things simple; two differing DME displays such as the slant range DME vs the RNAV DME on the VOR DME 15L approach to IAH can be confusing, disrupting concentration on step downs. Monitoring Pilot can be in Map mode for situational awareness.
- RA technique: Set to 250' AGL. This is the altitude the TERPS guarantees terrain clearance on final approach segment.
- 4 ways to compute Visual Descent Point (VDP) described on p. 13.
- If your LEGS page has RNP / ANP, check the ANP is less than the RNP. A low ANP (.5 or less) indicates a pretty accurate FMC position.

After intercept-leg to runway waypoint

ACT 290 KT SPD DES 1/1	
E/D ALT 2000	AT NIXIN 122 / 2000
TGT SPD .740 / 300	TO NIXIN 1429.0z / 7NM
SPD REST 190 / 10000	WPT / ALT RW201 / 150
	FPA V/B V/S 0.0 3.0 750
	PATH >
< FORECAST	RTA >

NON PRECISION APPROACH - 1 ENGINE INOP

- Disconnect A/T prior to approach,
 - 1-1 1/2 miles from FAF,
**GEAR DOWN, FLAPS 15, TARGET*
 LANDING CHECK**
 - Reduce to V_{REF} 15 + wind additive.
 - Review SE missed approach procedures.
- If overweight, may delay gear and landing flaps until landing is assured.

1 EXAMPLE: MDA = 750'

At FAF:
 ALT SEL SET 800'
 V/S Thumbwheel . . . 1000-1500 fpm Down
 After ALT HOLD at 800':
 Set Missed Approach altitude. (Arms V/S)
 If still in IMC:
 V/S Thumbwheel 500' Down
 At 750' press ALT HOLD (Lead 20').
 At the VDP with field in sight:
 V/S thumbwheel . 750' down to set FD bars
 A/P . . . DISENGAGE (50' below MDA min)
 Command bars may be used as reference or deselected.

BOLD ITEMS - Req'd call

Subject to change without notice. It is not endorsed by any airline. Please let me know of any mistakes.
 www.firstnethou.com/fmcman/737/profiles.pdf
 Bill Bulfer, 2031 River Falls, Kingwood, TX 77339
 Last change made: Apr 16, 1999 (Flap Speeds)

NON PRECISION APPROACHES

B737 PROFILES

PF = Pilot Flying / PM = Pilot Monitoring

NDB, LOC (Back Crs)

TOLERANCES:

A/S: -5/+10
 MDA: +50,-0

Build the runway wpt.
 Ref: p. 15
 Brief approach.
Complete IN RANGE CHECKLIST
 Use autothrottle and autopilot.

Downwind:
 PF: **FLAPS 1 SPEED* APPROACH CHECK**

On base leg:
 PF: **FLAPS 5, SPEED***

Cleared for approach:
 PF: Engage LNAV or use HDG SEL if LNAV does not agree with RDMI.

Approx. 4 mi. from FAF:
 PF: **GEAR DOWN FLAPS 15, SPEED* LANDING CHECK**

Approx. 2 miles from FAF:
 PF: **FLAPS 30 / 40** TARGET***

Ref: Procedure A, B, or C, page 13.

Set M/A hdg. when possible

Press "TOGA" (Once for reduced, twice for max if A/T on). Push throttles to cursors if A/T off, otherwise just follow. Rotate to 15°. (Two engines)
 PF: **FLAPS 15, CHECK POWER ... POSITIVE RATE, GEAR UP CHECK MISSED APPROACH ALTITUDE**
 A/P disengages if only one was engaged. A/T advances to GA/N1 thrust if ON. GA/N1 is annunciated. Speed cursor leads flap handle. FD initially commands 15° pitch and a bank to maintain existing ground track. Terminate TOGA by selecting another AFDS pitch mode.

400'
 PF: **HDG SEL or LNAV*****
 Tell tower of Missed and intentions.

1000' AFE and V_{REF} 30 + 15
 PF: **FLAPS 5 CLIMB POWER LEVEL CHANGE SET TOP BUG**
 At V_M 5
 PF: **FLAPS 1**
 At V_M 1
 PF: **FLAPS UP AFTER T/O CHECK**
 Climb to 3000 ft AFE at V_M 0
 3000 AFE: **VNAV or SET 250**

FLAP MANEUVER SPEEDS (-300/500)	
Until Rudder Pressure Reducer (RPR) is installed	
V _M 0	220 "Top Bug"
V _M 1	200
V _M 5	190
V _M 10	170
V _M 15	150

- * Don't take hand off spd knob until you see flap movement.
- ** Extension of flaps from 15 to landing flap setting can be delayed at pilot's option if ceiling and visibility are relatively high.
- *** If entire Missed Approach has been programmed.

At 100 above MDA:
 PM: **APPROACHING MINIMUMS**
 At MDA:
 PM: **MINIMUMS**

- Do not descend prior to VDP.
- When at MDA and ALT HOLD annunciated, set M/A alt.
- Do not start descent prior to 2.8 - 3° slope.

At MDA and MA point:
 PF: **GOING AROUND**

NOTES:

1. Procedure turn: Unless otherwise stated, fly either the 45°/180° or an 80°/260° course reversal. Consider track, not heading.
2. For NDB and LOC (Back Crs) approaches, use LNAV or HDG SEL to maintain final approach course track. If using LNAV, you're shooting an "overlay" approach; raw data must be monitored and is controlling.
3. MP must monitor ID during NDB approach.
4. Use V/S, not LVL CHG for descents. At 1,000 ft AFE max V/S is 1,000 fpm.
5. At each ALT HOLD, set the next altitude, and stay ahead of the airplane. The vertical work is the most difficult task of the NPA.
6. At VDP with approach lights in sight, start down to 100' above TDZE. You may not descend below 100' above the TDZE unless visual reference to the runway is established.
7. Disconnect AP at MDA minus 50'.
8. RA technique: Set to 250' AGL. This is the altitude the TERPS guarantees terrain clearance on final approach segment.
9. 4 ways to compute Visual Descent Point (VDP) described on page 13.
10. If your LEGS page has RNP / ANP, check the ANP is less than the RNP. A low ANP (.5 or less) indicates a pretty accurate FMC position.

After manual entry of RW201/0150 in 4R

E/D ALT	ACT RTE	LEGS	1/1
2000	122	2000	
TGT SPD	TO NIXIN		
.740 / 300	1429.0Z / 7NM		
SPD REST	WPT / ALT		
190 / 10000	RW201 / 150		
	FPA V/B V/S		
	0.0 3.0 750		
	PATH >		
	RTA >		
< FORECAST			

Navigating by LNAV to NIXIN

265°	ACT RTE	LEGS	1/1
NIXIN	5 NM	150 / 2000	
RW201	5.6 NM	150 / 0190	
RW26	0.1 NM	/ 149	

RNP / ACTUAL		RTE DATA >	
0.50 / 0.25			

NON PRECISION APPROACH - 1 ENGINE INOP

- Disconnect A/T prior to approach,
 - 1-1 1/2 miles from FAF,
GEAR DOWN, FLAPS 15, TARGET* LANDING CHECK
 - Reduce to V_{REF} 15 + wind additive.
 - Review SE missed approach procedures.
- If overweight, may delay gear and landing flaps until landing is assured.

1 EXAMPLE: MDA = 750'

At FAF:
 ALT SEL SET 800'
 V/S Thumbwheel . . . 1000-1500 fpm Down
 After ALT HOLD at 800':
 Set Missed Approach altitude. (Arms V/S)
 If still in IMC:
 V/S Thumbwheel 500' Down
 At 750' press ALT HOLD (Lead 20').
 At the VDP with field in sight:
 V/S thumbwheel . 750' down to set FD bars
 A/P DISENGAGE (50' below MDA min)
 Command bars may be used as reference or deselected.

Subject to change without notice. It is not endorsed by any airline. Please let me know of any mistakes.
 www.firstnethou.com/fmcman/737/profiles.pdf
 Bill Bulfer, 2031 River Falls, Kingwood, TX 77339
 Last change made: Apr 16, 1999 (Flap Speeds)

NORMAL TAKEOFF

B737 PROFILES

TAKEOFF ALTERNATE:

- If departure weather is below landing minimums (can't use CAT II) you need a takeoff alternate within one hour (still air - 300 nm).
- Takeoff alternate needs same weather as destination.

TAKEOFF MINIMUMS: 2 ENGINE

Standard / Reduced	TDZ	MID	ROLLOUT	LIGHTING	NOTES
Standard 1 mile 5000	Not Req'd	Not Req'd	Not Req'd		
Reduced to 1/4 mile or 1600	Controlling if available	Not Req'd	Not Req'd	HIRL, CL, RCLM or other rwy marking.	MID can sub for inop TDZ
Reduced to and Rollout 1200 1000	Required Controlling	Not Req'd	Required Controlling	CL	MID can sub for TDZ or ROLLOUT if inop
Reduced to 600 600 600	Required Controlling	Controlling If installed.	Required Controlling	CL, RCLM	If one is inop other two are controlling

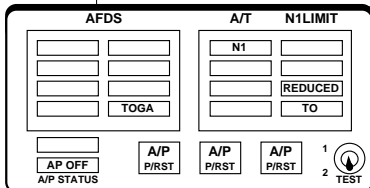
NOTES:

1. In extreme headwind A/T may not reach full T/O.
2. If full thrust is desired during reduced power T/O, manually position levers to max thrust limit as indicated by cursors on N1 ga. (5 min. limit).
3. AP can be used above 1000'
4. CLB page has Engine Out speed (L/D Max).
5. Pitch attitude for tail strike, extended oleos, 737-300 is 13°. Flaps 1 takeoff yields the least tail clearance.
7. Any takeoff requiring a penalty for runway clutter will be accomplished by the Captain.
8. Crosswind takeoff: Spoiler deflection begins at 1.6 units control wheel steering for -300/500 and 1.2 units for -700

Review of Speeds:	
MAX ANGLE	Approx top bug + 10 kts
L/D MAX	Green Donut - Best Maneuvering or Flaps Up Best L/D or TGT SPD on Eng Out page.

FLAP MANEUVER SPEEDS (-300/500)	
Until Rudder Pressure Reducer (RPR) is installed	
V _M 0	220 "Top Bug"
V _M 1	200
V _M 5	190
V _M 10	170
V _M 15	150

- Non EFIS and EFIS FMAs immediately after TOGA.
- FCC commands 10° nose down.
- Approx. 60 kts F/D commands 15° up.
- Non EFIS-64 kts / EFIS-80 kts. N1 changes to , THR HOLD, after which throttles can be positioned manually.
- TOGA will not be displayed if FD(s) are off.
- After you press TOGA, check FMA for proper annunciation.



N1 | TOGA | | FD

THR HOLD remains engaged for approximately 18 sec after liftoff and an RA of 400'; then annunciates ARM and thrust will remain at TO setting. A/T mode can only be changed after the ARM annunciation.

Maintain takeoff flaps for close in turn:
 V₂ - max bank angle 15°
 V₂+15 - up to 30° (airspeed bug).

At 400' AFE:
 PF: **HDG SEL** or **LNAV**
 This is the min. alt. to start a turn unless:
 Obstruction
 Noise Abatement
 Adverse conditions
 Req'd for engine out

PF: Stabilize thrust 40 ± 5 % N1, Push to approximate takeoff power, Press TOGA, **CHECK POWER**
 PM: **POWER SET** ___% N1... **100 kts.**
 Check all engine instruments.
 FF at full power approx: 8500 pph
 Check FMA - TOGA, N1, TO.
 Check airspeed alive using drum.

RUNWAY LIGHTING
 Alternate red-white CL 3000'-1000'.
 Amber HIRL/MIRL (rwy edge lighting) last 2000' or 1/2 rwy, whichever is less.
 All red CL last 1000'.

5 knots prior to V₁:
V₁, ROTATE
 Rotate to 15°-18° at 3° per sec.
 All engine liftoff attitude is 9 - 10°

Stabilize at V₂ + 20 (V₂ + 25 if light)
 Transition to FD

After positive rate of climb is sensed on both the IVSI and the altimeter:
 Either pilot: **POSITIVE RATE**
 PF: **GEAR UP**
 IAS and VS are primary instruments.

Flaps 5 takeoff: (normal)
 1000' AFE and V₂ + 15
 PF: **FLAPS 1**
VNAV, or
CLIMB POWER
LEVEL CHANGE
SET TOP BUG
 At V_M1
 PF: **FLAPS UP**
AFTER T/O CHECK

OR
Flaps 1 takeoff: (na-500)
 1000' AFE and V₂ + 15
 PF: **VNAV**, or
CLIMB POWER
LEVEL CHANGE
SET TOP BUG
 At V_M1
 PF: **FLAPS UP**
AFTER T/O CHECK

OR
Flaps 15 takeoff:
 1000' AFE and V₂ + 15
 PF: **FLAPS 5**
VNAV, or
CLIMB POWER
LEVEL CHANGE
SET TOP BUG
 At V_M5
 PF: **FLAPS 1**
 At V_M1
 PF: **FLAPS UP**
AFTER T/O CHECK

As the RA and V/S increase, the FD will command pitch to maintain V₂+20, allowing the pilot to transition to the FD. FD commands wing level until HDG is called.

BOLD ITEMS - Req'd call

Subject to change without notice. It is not endorsed by any airline. Please let me know of any mistakes.
 www.firstnethou.com/fmcman/737/profiles.pdf
 Bill Bulfer, 2031 River Falls, Kingwood, TX 77339
 Last change made: Apr 16, 1999 (Flap Speeds)

PF = Pilot Flying
 PM = Pilot Monitoring

WINDSHEAR TAKEOFF / with Landing Notes

First Rule: AVOID WINDSHEAR
MICROBURST WINDSHEAR PROBABILITY GUIDELINES
 H = HIGH M = MEDIUM L = LOW
 Presence of Convective Weather Near Intended Flight Path

- With localized strong winds (blowing dust) **H**
- With heavy precipitation **H**
- Onboard windshear detection system alert **H**
- With Rainshower or Lightning **M**
- With Virga (cooling air plunging earthward) **M**
- With Moderate or greater turbulence **M**
- With temp / dewpoint spread between 30 - 50°F **M**

PIREP of Airspeed Loss or Gain

- 15 kts or greater **H**
- Less than 15 kts **M**

LLWAS Alert / Wind Velocity Change

- 20 kts or greater **H**
- Less than 20 kts **M**
- Forecast of convective weather **L**

Takeoff Notes:

1. Select longest suitable runway available that avoids suspected areas of windshear.
2. Flaps 1 offers better performance in airborne windshear but Flaps 5 results in better performance on the runway and is recommended as it covers a larger range of conditions.
3. Use max rated takeoff thrust.
4. Use FD only if aircraft has Reactive Windshear Recovery Enhancement.
5. Use increased rotation speed when available. Determine runway limit weight. Then determine V_R for that weight (field length limit V_R). If the field length limit V_R is greater than the actual gross wt V_R , use the higher. Do not reset the airspeed bugs.

Without Terminal Doppler Weather Radar:
 If conditions exist and PIREPS indicate that a windshear in excess of 15 kts is possible and may be *building*, delay departure 30 min. If review of the conditions indicates that the windshear is 15 kts or less and *subsiding*, delay departure 15 min. Use good judgement.

With Terminal Doppler Weather Radar:
 If a WINDSHEAR ALERT accompanied by a reported *gain* of airspeed is issued, you may take off but be alert for sudden airspeed increase.
 If a WINDSHEAR ALERT accompanied by a reported *loss* of airspeed, or a MICROBURST ALERT is received, a takeoff should not be attempted. If either alert is received during takeoff prior to 100 kts the takeoff should be rejected. If either alert is received after 100 kts the takeoff may be rejected or continued at Captain's discretion after considering runway available, gross weight and related meteorological conditions.

Do not change flaps, gear or trim position until terrain contact is no longer a factor.
 Focus attention on pitch attitude, and flying the airplane.
 MP: Monitor attitude, IVSI, and altimeter.
 Inform PF of impending and negative vertical speeds by a callout of **SINK RATE**.

Landing Notes:
 Below 1000' AGL, if uncontrolled changes from normal steady flight conditions exceed the following tolerances, initiate the Windshear Recovery Procedure.
 Exact parameters cannot be established.

- ± 15 kts
- ± 500 FPM V/S deviation from normal.
- ± 5° pitch attitude change.
- ± 1 dot glideslope displacement
- Unusual throttle position for a significant period of time.

A reported airspeed loss should be added to V_{REF} and if this value is in excess of target, increase and maintain this speed. The target bug should remain set based on the surface wind additive only, so autothrottles cannot be used in this case.
 If the additive to V_{REF} (due to either surface wind or reported loss) results in an adjustment in excess of $V_{REF} + 20$, the approach should not be continued.

With no W/S Recovery Enhancement, turn FD off .
 PF: Stabilize thrust $40 \pm 5\%$ N1, Push to approximate takeoff power, Press TOGA, **CHECK POWER**
 PM: **POWER SET ___% N1 . . . 100 kts.**
 Check all engine instruments.
 Check FMA - TOGA, N1, TO.
 Check airspeed alive using drum.
 FD commands 10° down.

RUNWAY LIGHTING
 Alternate red-white CL 3000'-1000'.
 Amber HIRL/MIRL (rwy edge lighting) last 2000' or 1/2 rwy, whichever is less.
 All red CL last 1000'.

ALERT is enabled at rotation and remains enabled up to 1500'

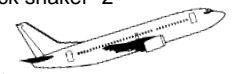
TOGA cannot be selected above 2000'

After recovery is complete, use standard departure procedures.

	Predictive only	Reactive only	Both
Round Dial	301-333		334-358
EFIS 300		380-386	
500		601-667	
700		701-708	709-735*
800		210-219	220-237*

* TERR switch enabled

Optimum pitch is stick shaker -2°



Windshear Recovery Procedure

Reject if below V_1 with unacceptable airspeed variations or windshear alert.

Firewall the throttles.
 Either pilot: **MAX THROTTLE**
 PM: **V1, ROTATE**
 Rotate at least 2000' before end of runway - amber edge lighting.
 Aft body contact may be unavoidable.

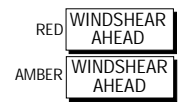
PREDICTIVE Windshear System

- Radar TEST says "WINDSHEAR AHEAD"
- provides detection of windshear a minimum of 10 sec prior to penetration
- automatically below 1500' AGL, one engine running, and tpx not in OFF or STBY
- operates in alternate scan if radar is on

3 Levels of Alerts

- Level 1: Advisory. Icon
- Level 2: Alert. Icon, chimes, and amber light
- Level 3: Warning Alert.

Takeoff: "WINDSHEAR AHEAD" with red light
 Landing: "GO-AROUND, WINDSHEAR AHEAD" with red lights



REACTIVE Windshear System

- mode of GPWS. GPWS test says "WINDSHEAR" 3 times
- provides alert after penetration

You'll get "WINDSHEAR" (thrice) with lites.
 Engage TOGA and follow the FD.
 Apply max power: **MAX THROTTLE**

With no **REACTIVE Windshear System**
 Apply max power: **MAX THROTTLE**
 Rotate initially towards 15°. Disregard or turn off FD.
 Monitor IVSI, attitude and altimeter.
 If still sinking, rotate to stick shaker.
 Use intermittent stick shaker as upper limit for pitch.

BOLD ITEMS - Req'd call

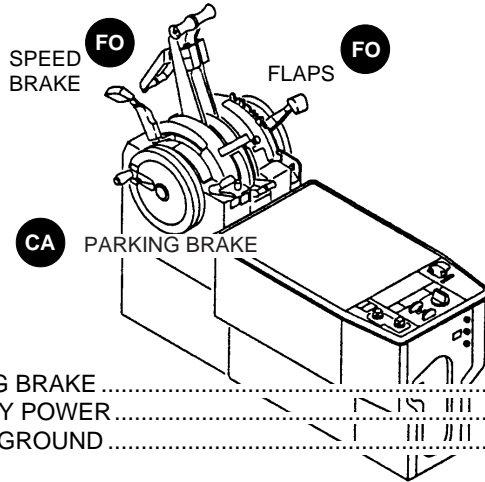
Subject to change without notice. It is not endorsed by any airline. Please let me know of any mistakes.
 www.firstnethou.com/fmcman/737/profiles.pdf
 Bill Bulfer, 2031 River Falls, Kingwood, TX 77339
 Last change made: Apr 16, 1999 (Flap Speeds)

REJECTED TAKEOFF

B737 PROFILES

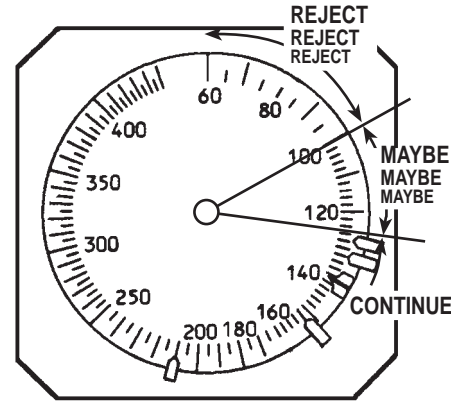
PF = Pilot Flying
PM = Pilot Monitoring

EMERGENCY EVACUATION



- CA PARKING BRAKE SET
- CA STANDBY POWER BAT
- TOWER/GROUND CONTACT
- FLAPS 40°
- FO SPEED BRAKE LEVER FULL FORWARD
- FO PRESSURIZATION MAN DC / MAN & OPEN

IF EVACUATION IS NECESSARY:
 START LEVERS CUTOFF
 PASSENGER EVACUATION EASY VICTOR, EASY VICTOR
 EMERGENCY EXIT LIGHTS ON
 ENGINE AND APU FIRE HANDLES OVERRIDE AND PULL



NOTES:

1. RTO feature will apply max braking when both thrust levers are placed to idle and groundspeed is 90 kts or greater. Equivalent to full manual braking.
2. Speed brakes will deploy automatically with reverse thrust and over 60 kts.
3. Below 100 kts reject for engine failure, fire, OVHT, cabin smoke, system failures, unusual noise or vibrations, tire failure, abnormal acceleration, configuration problems, windshear or microburst.
4. Over 100 kts only reject for engine power loss (not just a fire light) or catastrophic failure whereby plane would be unsafe or unable to fly.

STEP 1

Stop the airplane by accomplishing these items simultaneously for a high speed reject:

Captain: **REJECT** – note ground speed.

- Move throttles to idle,
- Disconnect autothrottles,
- Deploy speedbrakes manually.
- Apply brakes as required – RTO will apply max braking with throttles idle and over 90 kts.
- Apply reverse thrust - Go-around N1 consistent with conditions - approx. equal to T/O N1.

FO: Don't relinquish control or aircraft until Captain confirms he has control.
 Note reject speed, apply slight nose down elevator and applicable aileron control if crosswind is present.

- Notify ATC of the rejected takeoff.
- **REMAIN SEATED, REMAIN SEATED**

STEP 2

When the aircraft comes to a complete stop, the Captain will call:

REJECTED TAKEOFF CHECKLIST

Remain on runway until Rejected Takeoff Checklist is completed if reject was over 100 kts.

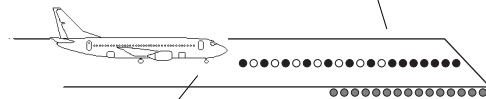
Rejected Takeoff Checklist leads to Emergency Evacuation **OR** After Landing checklist and Brake Cooling Chart.

Don't taxi until FA verify all exits closed and passengers are seated.

CREW EVACUATION DUTIES:

CAPT: Direct and assist passenger evacuation. Ensure all passengers and crew have evacuated the aircraft.

FO: Assist FA as necessary to ensure forward door(s) open and escape slide activated. Take a megaphone and proceed to ground without delay. Circle exterior of aircraft as necessary to coordinate and assist with evac. Direct passengers to assembly point - up wind and off the concrete.



Malfunction / Failure
 Pilot recognizing problem:
POWER LOSS, ENGINE FIRE,
 or whatever the unsafe condition.
 If no REJECT called, continue to fly the airplane.

RUNWAY LIGHTING
 Alternate red-white CL 3000'-1000'.
 Amber HIRL/MIRL (rwy edge lighting)
 last 2000' or 1/2 rwy, whichever is less.
 All red CL last 1000'.

EFFECT OF LOSS OF BOTH GENS BEFORE LIFTOFF

OPERATIVE

- Reversers
- Anti-skid outbd
- All N1s and EGTs
- Left IRS
- PA

INOPERATIVE

- Autobrakes - DC Bus 2
- Anti-skid inbd
- Auto spoilers
- Right IRS
- # 2 Nav/Comm

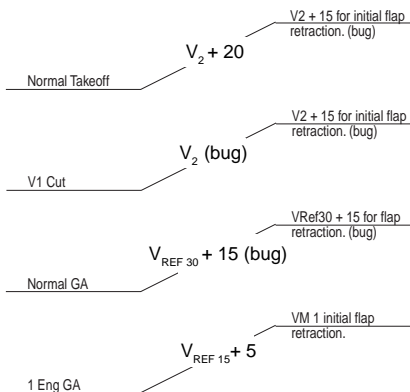
On the ground, move STBY PWR to BATT for comm.
 (No overhead speakers)

Note: -600 / 700 / 800 auto-transfers on the ground.

Subject to change without notice. It is not endorsed by any airline. Please let me know of any mistakes.
 www.firstnethou.com/fmcman/737/profiles.pdf
 Bill Bulfer, 2031 River Falls, Kingwood, TX 77339
 Last change made: Apr 16, 1999 (Flap Speeds)

V1 CUT

B737 PROFILES



- NOTES:**
1. Tell tower of Emergency and intentions.
 2. Stay on runway heading (Straight out to 800' AGL or terrain clearance).
 3. With autothrottle ON and in N1 mode, failed engine throttle advances 8°. This is the range of N1 equalization control.
 4. With autothrottle ON and in SPD mode, both thrust levers advance together to maintain the target speed.
 5. Turn autothrottle OFF for approach segment.
 6. Take extra time if necessary.
 7. As the FP, use your teammate to operate the MCP at your command.

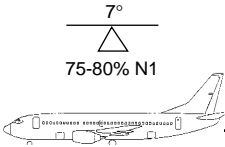
- Brief FA. (TEST)
 - Get WX
 - Brief approach
- PF: ONE ENG INOP APPROACH AND LANDING CHECK**
 (Includes In Range, Approach, and Landing Checks.)

"TEST"

T Type of emergency.
E Evacuation necessary?
S Signal for brace and evacuation.
T Time available for preparation.

NOTE: 4 bells is emergency.

Watch speed - flap limits.
 ($\pm 78\%$ N1)
 Autopilot is OK for maneuvering but no input to rudder.
 Fuel balance - use center tank fuel; otherwise, Xfeed open and pump out of heavier wing tank (monitor).



Press "TOGA". Push throttles to Go-Around thrust. Smoothly apply rudder (lots) to parallel rwy centerline, then dig your heel into the floorboard to lock in that rudder position. Rotate to initial go-around altitude of 13°. Higher than normal pitch force required for rotation because of failed engine (decrease in power provides less pitch-up).
 PF: **FLAPS 1, CHECK POWER ...**
POSITIVE RATE, GEAR UP
CHECK MISSED APPROACH ALTITUDE
 Maintain visual reference to runway to maintain directional control until runway disappears under the nose. Apply small rudder application with ankle movement to maintain constant heading and to keep control wheel centered. Trim pitch after established on V2. Climb at V2 for failure at V1 or if obstacle is present; otherwise, climb at V2 to V2 + 20, depending on when engine failed. Transition to FD. Straight out, keep heading within 5°.

PF: Stabilize thrust $40 \pm 5\%$ N1, Push to approximate takeoff power, Press TOGA, **CHECK POWER**
 PM: Checks all engine instruments. Check airspeed alive using drum. Check FMA - TOGA, N1, TO. FD commands 10° down. **POWER SET ___% N1 ... 100 kts.**

Maintain takeoff flaps for close in turn:
 V2 - max bank angle 15°
 V2+15 - up to 30° (airspeed bug).

Climb at L/D Max (EFIS-green donut. Non-EFIS, check Eng Out page) Consider in-flight engine start. Keep yoke centered with feet and rudder trim.

At V2 + 15 (bug)
 PF: **FLAPS 1**
 At VM 1
 PF: **FLAPS UP SET MCT ENG FAIL / FIRE CHECK**
 Press CON on N1 LIMIT page. (After Takeoff is included in Eng Fail/Fire Check)

At 800 ft AFE or published obstruction clearance altitude for specific runway (10-7 page.)
 PF: **SET TOP BUG**
 Accelerate in slight climb - 100 to 200 fmp.

FLAP MANEUVER SPEEDS
 (-300/500)
 Until Rudder Pressure Reducer (RPR) is installed

VM 0	220 "Top Bug"
VM 1	200
VM 5	190
VM 10	170
VM 15	150

Climb at V2 to V2 + 20

400'
 PF: **HDG SEL** or **LNAV**
 Declare an emergency.

PM: **V1, ROTATE**
 Rotate towards 13° pitch at 3° per sec. All engine liftoff attitude is 9 - 10°

Anyone may call **POWER LOSS**
 Check max power.

- If an engine fire occurs prior to 800' AFE or obstacle clearance altitude, at flap retraction altitude call **SET TOP BUG, ENGINE FAIL / FIRE CHECK** and complete through discharging the fire bottles.
- If fire light extinguishes, test fire detection system.

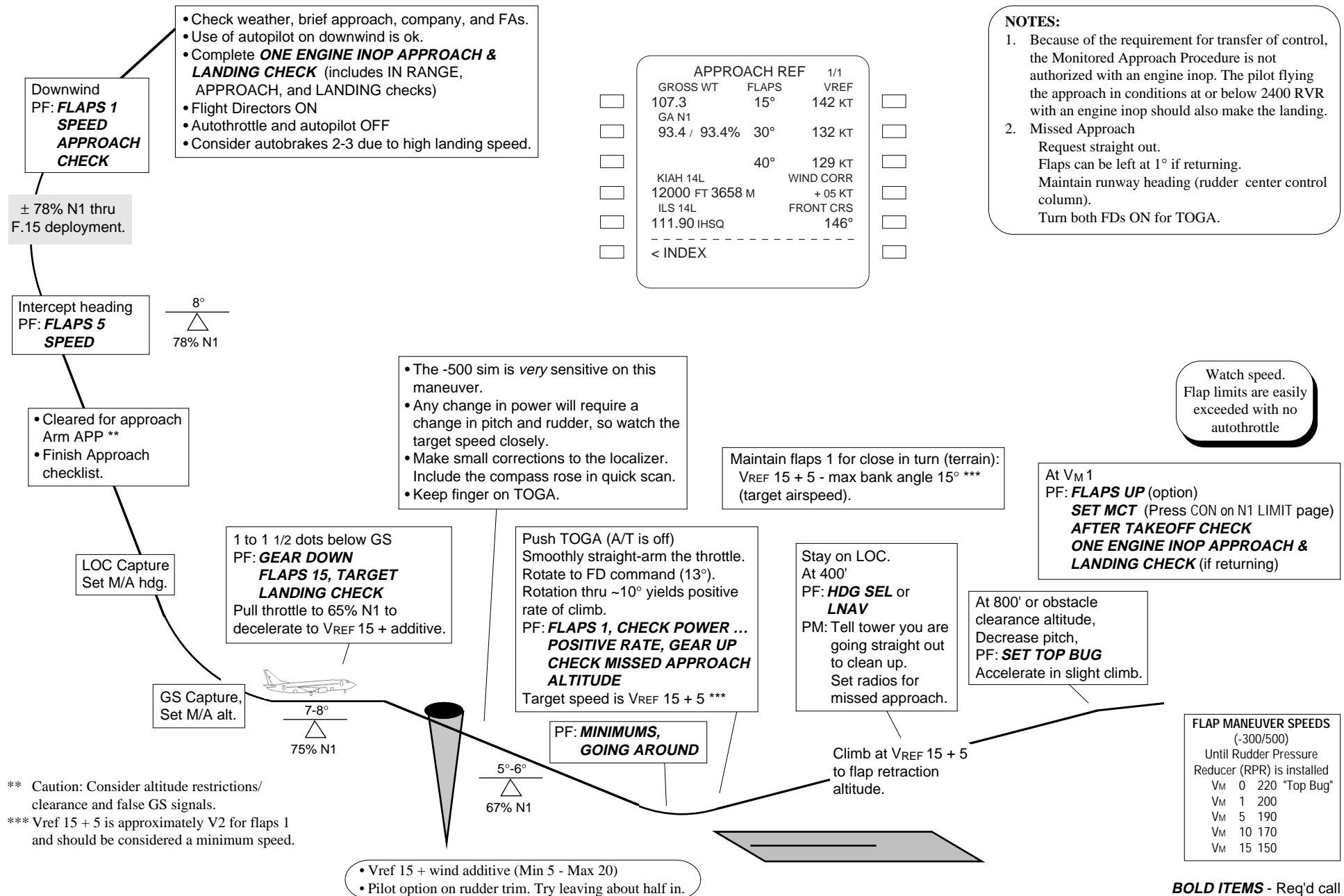
BOLD ITEMS - Req'd call

Subject to change without notice. It is not endorsed by any airline. Please let me know of any mistakes.
 www.firstnethou.com/fmcman/737/profiles.pdf
 Bill Bulfer, 2031 River Falls, Kingwood, TX 77339
 Last change made: Apr 16, 1999 (Flap Speeds)

ONE ENGINE ILS TO A MISSED APPROACH

B737 PROFILES

PF = Pilot Flying
 PM = Pilot Monitoring



NOTES:

- Because of the requirement for transfer of control, the Monitored Approach Procedure is not authorized with an engine inop. The pilot flying the approach in conditions at or below 2400 RVR with an engine inop should also make the landing.
- Misused Approach
 Request straight out.
 Flaps can be left at 1° if returning.
 Maintain runway heading (rudder center control column).
 Turn both FDs ON for TOGA.

** Caution: Consider altitude restrictions/clearance and false GS signals.
 *** Vref 15 + 5 is approximately V2 for flaps 1 and should be considered a minimum speed.

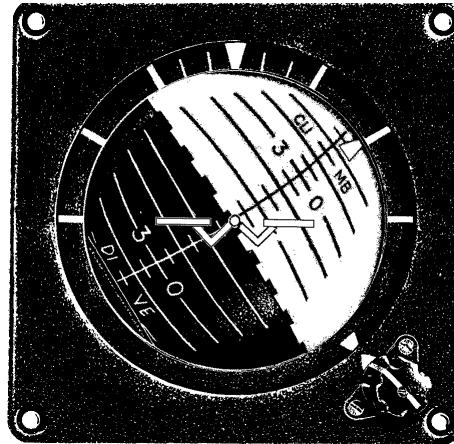
BOLD ITEMS - Req'd call

Subject to change without notice. It is not endorsed by any airline. Please let me know of any mistakes.
 www.firstnethou.com/fmcman/737/profiles.pdf
 Bill Bulfer, 2031 River Falls, Kingwood, TX 77339
 Last change made: Apr 16, 1999 (Flap Speeds)

STEEP TURNS

B737 PROFILES

TOLERANCES:
 ± 100'
 ± 10 kts
 45° bank ± 5°
 Hdg ± 5° of recovery heading.



This ADI comes from *INSTRUMENT FLYING*, Dept of US Air Force, 1960. It depicts a 45° descending turn.

FLAP MANEUVER SPEEDS (-300/500)	
Until Rudder Pressure Reducer (RPR) is installed	
V _M 0	220 "Top Bug"
V _M 1	200
V _M 5	190
V _M 10	170
V _M 15	150

Panel lights on bright to see pitch bars.

IN-RANGE CHECK

On your altitude:

A/P ON **

A/T ON (set spd 250 kts)

Put CDI on nose and de-tune radio.

Note pitch and N1. 41/2°, 62% N1

A/T OFF

Deselect HDG

*Deselect ALT HOLD by spinning MCP

ALT SEL up and canceling the ALT HOLD switch.

Set HDG bug on tail

A/P OFF

Start the turn.

As bank is increased beyond 25°, increase pitch 1/2° and push in power one knob (8% N1).

Non EFIS, use the F/S anticipator.

Pitch attitude control is utilized to maintain or correct back to the altitude; power is employed to maintain the airspeed.

Don't trim.

You'll be 5 ± 1/2° nose up at 45° bank.

Reference:

Control Instruments:

ADI – 5° pitch / 45° bank

Power – 68% N1

Performance Instruments:

Airspeed, (non-EFIS - F/S indicator) and altimeter.

Use light control pressures when making any corrections back to the desired pitch or bank indication.

Ask PM to call the 15° lead.

Rule: Average amount of lead is approximately 1/3 the angle of bank.

Rollout same rate as entry.

Control Instruments:

ADI – Relax back pressure to entry pitch.

Power – Pull throttles back to entry N1

Performance Instruments:

Airspeed, (non-EFIS - F/S indicator) and altimeter.

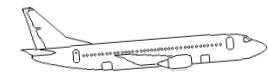
Repeat in other direction.

On your altitude:

A/P ON **

A/T ON (set top bug for next maneuver).

Prepare for stall series.



APPROACH REF			1/1
<input type="checkbox"/>	GROSS WT	FLAPS	VREF
<input type="checkbox"/>	107.3	15°	142 KT
<input type="checkbox"/>	GA N1		
<input type="checkbox"/>	93.4 / 93.4%	30°	132 KT
<input type="checkbox"/>		40°	129 KT
<input type="checkbox"/>	KIAH 14L		WIND CORR
<input type="checkbox"/>	12000 FT 3658 M		+ 05 KT
<input type="checkbox"/>	ILS 14L		FRONT CRS
<input type="checkbox"/>	111.90 IHSQ		146°
<input type="checkbox"/>	< INDEX		

* EFIS aircraft

** 3 STEPS TO ENGAGE A/P

A/P ON (set HDG SEL, press HDG and ALT HOLD)

A/T ON (set speed)

Check FMA

NOTE: Consider pitch changes with power changes. An increase in power pitches the nose up.

BOLD ITEMS - Req'd call

These recovery procedure are for low altitude, minimum altitude loss situations with terrain a factor. If an indication of an impending stall is encountered at cruising altitude, the wing may have to be unloaded. It may be necessary to lower the pitch attitude below the horizon to trade altitude for airspeed.

APPROACH TO STALL

B737 PROFILES

<p>LANDING CONFIGURATION Flaps 30, Gear down Recovery objective: Maintain altitude and accelerate to Flaps 30 Target</p>	<p>On your altitude: A/P ON ** A/T ON Should have flaps 5, gear down from previous maneuver. Flaps 15, Landing Check, (Set 150). FLAPS 30, (Set target).</p>	<p>Note pitch and N1. A/T OFF A/P OFF Deselect HDG *Deselect ALT HOLD by spinning MCP ALT SEL up and canceling the ALT HOLD switch. Set 50% N1.</p>	<p>Lots of drag. Airplane slows rapidly. Pull up aggressively into the stall. Do not lose any altitude. Note pitch at first indication of stall, Max throttle - push throttles to their mechanical stops Reference: Control Instruments: ADI – Hold pitch attitude. As airspeed starts to increase, push pitch to entry attitude. Adjust pitch to hold altitude. Power – As speed approaches target, pull throttles to entry N1. Performance Instruments: Airspeed and altimeter.</p>	<p>Stabilize at Flaps 30 Target Set Top Bug Clean up as you would in a go-around: Flaps 15, (check power) (Positive rate) Gear Up ... Flaps 5 ... Flaps 1 ... Flaps Up, After TO Check On your altitude: A/T ON A/P ON **</p>
---	--	---	--	---

<p>TURNING CONFIGURATION Flaps 5, Gear down, 20° bank Recovery objective: Maintain altitude and accelerate to Flaps 5 maneuvering</p>	<p>In-Range Check On your altitude: A/P ON A/T ON (set spd V^M_0) FLAPS 1, set V^M_1 FLAPS 5, set V^M_5 Gear down, Landing Check,</p>	<p>Note pitch and N1. $\frac{7-8^\circ}{\triangle}$ A/T OFF 67% N1 A/P OFF Deselect HDG *Deselect ALT HOLD by spinning MCP ALT SEL up and canceling the ALT HOLD switch. Start turn to 20° bank. Set 50% N1</p>	<p>Establish 20° bank. Maintain altitude or sight rate of climb. Be patient until 10°. At 12-13°, pitch is very active. Use trim. Shaker at $\pm 18^\circ$ (if 1 g.) Do not lose any altitude. Note pitch at first indication of stall. MAX THROTTLE - push throttles to their mechanical stops. Reference: Control Instruments: ADI: Level wings, hold pitch attitude. As airspeed starts to increase, push pitch to entry attitude. Adjust pitch to hold altitude. Power – As speed approaches target, pull throttles to entry N1.</p>	<p>Set pitch from Step 2. Return to entry speed of 170 On your altitude: A/T ON (set spd at 170) A/P ON ** Set up for next maneuver.</p>
--	--	---	---	---

<p>CLEAN CONFIGURATION Recovery objective: Accelerate to normal maneuvering speed with no altitude loss</p>	<p>In-Range Check Set seat back so shoulders do not leave the seat when you throw the throttles forward. This will keep the control column hand stationary. On your altitude: A/P ON** A/T ON, set top bug</p>	<p>Note pitch and N1. $\frac{7^\circ}{\triangle}$ A/T OFF 60% N1 A/P OFF Deselect HDG *Deselect ALT HOLD by spinning MCP ALT SEL up and canceling the ALT HOLD switch. Set 40% N1</p>	<p>Scan pitch, altimeter and VSI. Maintain altitude or slight rate of climb. Do not lose any altitude. Use trim. Note pitch at first indication of stall. MAX THROTTLE - push throttles to their mechanical stops, using finger tips if necessary, keeping shoulders in place. Reference: Control Instruments: ADI – Hold pitch attitude. As airspeed starts to increase, push pitch to entry attitude. Adjust pitch to hold altitude. Power – As speed approaches target, pull throttles to entry N1.</p>	<p>Set pitch from step 2. On your altitude: A/T ON, set top bug A/P ON ** Set up for next stall maneuver.</p>
--	---	--	--	---

* EFIS aircraft
** 3 STEPS TO ENGAGE A/P
A/P ON (set HDG SEL, press HDG and ALT HOLD)
A/T ON (set speed)
Check FMA



Entry altitude -----

Subject to change without notice. It is not endorsed by any airline. Please let me know of any mistakes.
 www.firstnethou.com/fmcman/737/profiles.pdf
 Bill Bulfer, 2031 River Falls, Kingwood, TX 77339
 Last change made: Apr 16, 1999 (Flap Speeds)

PATTERN WORK

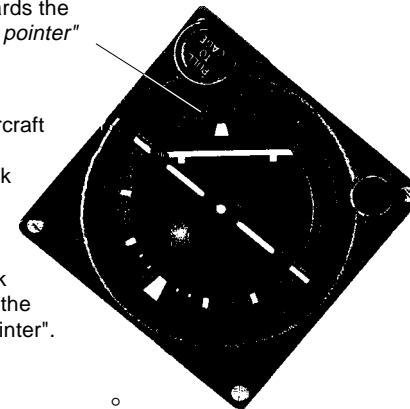
B737 PROFILES

For your personal study

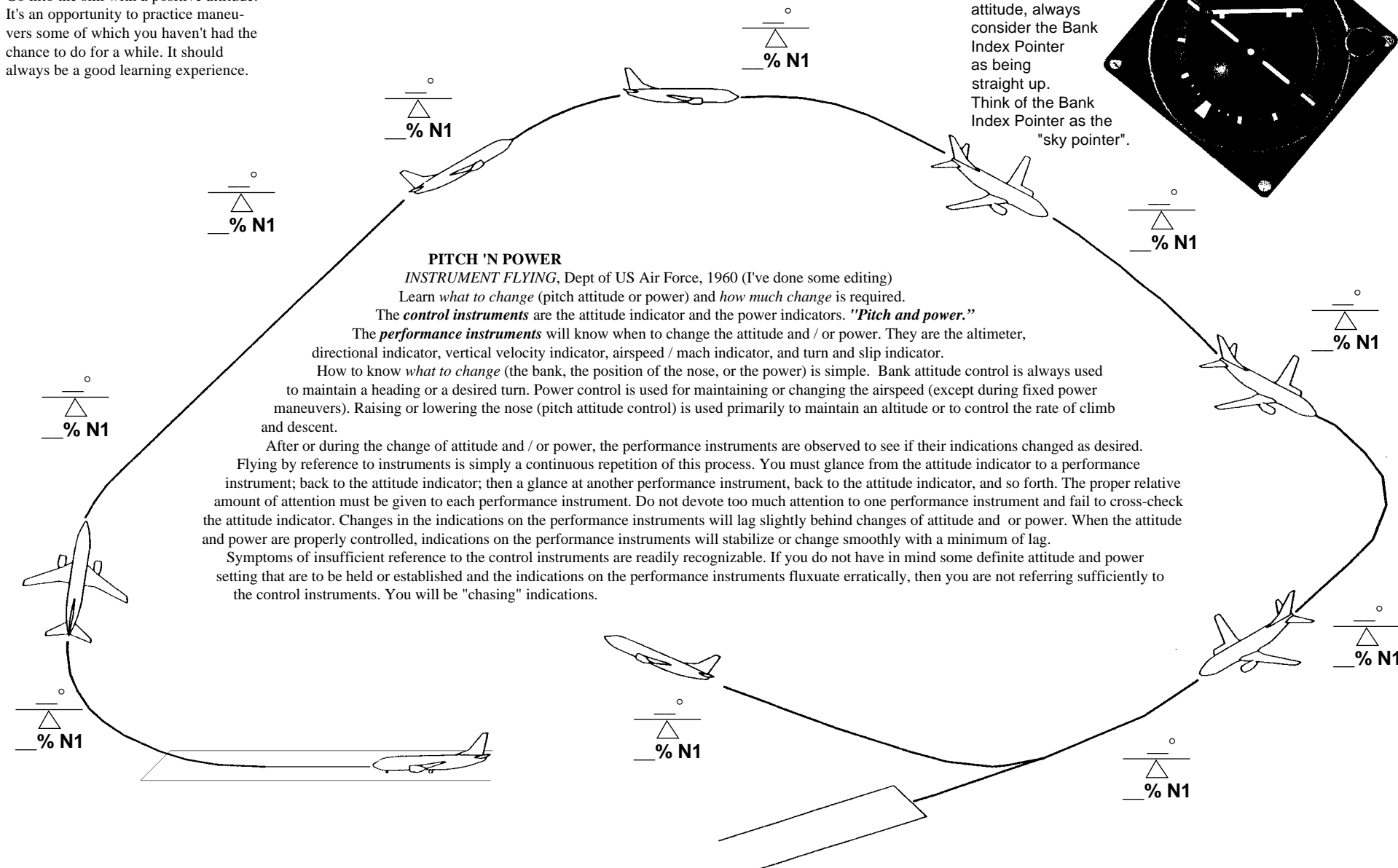
ATTITUDE

Go into the sim with a positive attitude. It's an opportunity to practice maneuvers some of which you haven't had the chance to do for a while. It should always be a good learning experience.

Always roll towards the "sky pointer"



Regardless of aircraft attitude, always consider the Bank Index Pointer as being straight up. Think of the Bank Index Pointer as the "sky pointer".



PITCH 'N POWER

INSTRUMENT FLYING, Dept of US Air Force, 1960 (I've done some editing)

Learn *what to change* (pitch attitude or power) and *how much change* is required.

The *control instruments* are the attitude indicator and the power indicators. "*Pitch and power.*"

The *performance instruments* will know when to change the attitude and / or power. They are the altimeter, directional indicator, vertical velocity indicator, airspeed / mach indicator, and turn and slip indicator.

How to know *what to change* (the bank, the position of the nose, or the power) is simple. Bank attitude control is always used to maintain a heading or a desired turn. Power control is used for maintaining or changing the airspeed (except during fixed power maneuvers). Raising or lowering the nose (pitch attitude control) is used primarily to maintain an altitude or to control the rate of climb and descent.

After or during the change of attitude and / or power, the performance instruments are observed to see if their indications changed as desired.

Flying by reference to instruments is simply a continuous repetition of this process. You must glance from the attitude indicator to a performance instrument; back to the attitude indicator; then a glance at another performance instrument, back to the attitude indicator, and so forth. The proper relative amount of attention must be given to each performance instrument. Do not devote too much attention to one performance instrument and fail to cross-check the attitude indicator. Changes in the indications on the performance instruments will lag slightly behind changes of attitude and or power. When the attitude and power are properly controlled, indications on the performance instruments will stabilize or change smoothly with a minimum of lag.

Symptoms of insufficient reference to the control instruments are readily recognizable. If you do not have in mind some definite attitude and power setting that are to be held or established and the indications on the performance instruments fluxuate erratically, then you are not referring sufficiently to the control instruments. You will be "chasing" indications.

Subject to change without notice. It is not endorsed by any airline. Please let me know of any mistakes.
www.firstnethou.com/fmcman/737/profiles.pdf
Bill Bulfer, 2031 River Falls, Kingwood, TX 77339
Last change made: Apr 16, 1999 (Flap Speeds)

CONSTANT ANGLE

Pilot Procedural Technique (This is not "Vertical Guidance" (VNAV) or an RNAV Approach)

Calculating a VDP

4 ways to compute VDP, ranked by accuracy and ease of use:

VASI - but won't work if visibility is down.

V/B - put runway wpt at 4R of DES page.

Enter the threshold crossing height at the runway waypoint.

Assuming you are level at the MDA, the VDP is reached when the V/B indicates 2.8 to 3°. Ref: Procedures B and C. This takes study and practice.

DME - Rule of Thumb: 300 ft per mile = 2.8° slope. Divide HAT by 300.

Ex: LOC 26 IAH. HAT at MDA is 464 ft. Divide by 300 = 1.5 nm needed to descend from MDA to runway.

VDP is 1.5 nm from runway threshold or D3.2 IJYV. (1.7 + 1.5)

Timing - Rule of Thumb for 130 kt gs: 10 ft per second = 2.8° slope.

[Time from FAF to MAP] minus [10% of HAT]

Ex: NDB 26 IAH. HAT at MDA is 624 ft or 62 seconds.

FAF to MAP is 2:27 at 140 kts. Subtract 62 = 1:25. So, FAF to PDP is 1:25. This is a rough estimate.

For each 10 kts above 130 kt groundspeed, add 10 seconds.

V/S Selection at a 2.8° point such as the OM or the VDP:

Divide the groundspeed by two. Add a zero. Ex: 140 kts / 2 = 700 fpm
This rate of descent will equal a 2.8° angle. Add 50' for 3°. (750 fpm)

CAUTION: As you descend, the ground speed usually decreases,

necessitating a corresponding decrease in the selected vertical speed.

Good rule of thumb when you're up to your knees in alligator ponds at night.

BUILDING A RUNWAY WAYPOINT

EFIS with GP annunciated on LEGS page.

1. No construction required. Angle is present in the database.

EFIS without GP annunciated on LEGS page.

1. Using the Along Track Wpt feature, place the runway in the scratchpad, type **L-1** after it, and place back on top of the runway. A wpt one tenth of a mile inside the threshold will appear, with dashes at its speed/altitude line. Press the LSK next to the speed/altitude dashes. A predicted "invisible altitude" will appear in the scratch pad. Enter this as a hard altitude. This is now your runway waypoint. Note: If you've selected your target speed from the ARRIVALS page, the "invisible altitude" is not down-selectable.

Non EFIS.

1. Must be manually built; two ways choices.

Your teammate must back you up in constructing this wpt.

(a) Retrieve the destination runway's coordinates using the REF NAV DATA page. Write them down then use REF NAV DATA again to build a wpt using these coordinates. Ex: Name it **R26**

(b) The runway wpt can also be built using a Place-Bearing/Distance method from the OM/FAF.

Ex: NDB approach to RW26 at IAH: **NIXIN265/5.7**

2. Assign an altitude that equals the threshold crossing height.

3. Throw the actual runway wpt away.

PROCEDURE A STEP DOWN PROCEDURE

1. Arrive at the FAF fully configured and at target speed.
2. The MDA should be set in the MCP ALT SEL window. V/S is armed.
3. At the FAF, dial 1000 to 1500 fpm descent in the V/S window.
4. At 1000 AGL, reduce V/S to 1000 fpm.
5. At MDA, (ALT HOLD annunciated) set missed approach altitude. V/S is armed.
6. If field is in sight start descent at the VDP, not before or after.
7. If field does not appear before the VDP fly to the missed approach point and accomplish missed approach procedure.

PROCEDURE B WEATHER ABOVE MINIMUMS CONSTANT ANGLE

1. At cruise and before briefing the approach, if the runway does not have a Gradient Path (GP), build a wpt at the runway threshold. GP will be displayed above the runway speed / altitude line if a GP is available. (It's contained in the database for certain runways).
Ref: *Building a Runway Waypoint*.
2. Plan to shoot the VOR or LOC approach with raw data. Use LNAV for an NDB and LOC (Back Crs) approach, but monitor raw data - it is controlling.
3. While being vectored for a VOR or LOC approach, accomplish an intercept-leg-to the runway wpt and select the DES page. If you're shooting the NDB or LOC (Back Crs) approach, don't intercept to the runway; the complete approach must be left in the FMC since you're going to use LNAV for lateral course guidance. Since this approach uses the FMC, a position check should be done; about the time you accomplish the Approach Check works well. A quick technique is to compare the LOC or VOR DME (RDMI) to the RNAV DME (FIX page). (Example: Raw data IGH1 DME (110.9) vs: RNAV IGH1 DME (IGH1 entered in the FIX page.) You need accuracy with the Along Track component; Cross Track accuracy is not as important since the V/B looks directly at the wpt distance.
5. Arrive at the FAF fully configured and at target speed.
6. The MDA should be set in the MCP ALT SEL window. V/S is now armed.
7. At the FAF, note the V/B indication (it will be around 3.0°) and thumbwheel the V/S that is indicated at line 4R. (750 in example)
If you have a FPV, use V/S to keep the FPV at the same angle as the V/B indication on the DES page. (3.0° below the horizon in this example)
8. As you descend, the wind usually changes; the V/S will also change - it is very dynamic. The required V/S is usually higher at the FAF than at lower altitudes. You'll go below your desired angle if your V/S is greater than that displayed at line 4. You'll find the FPV very handy in this situation.
The V/B, right next to the V/S display, shows the angle you are to the threshold. Do not let it get less than your own limit - mine is 2.8°. (2.75° - 3.77° are considered standard)
If you get low, set V/S to zero until the angle is within your desired range.
9. When the field is in sight, continue flying the V/S displayed at line 4R to the MDA, then take over visually. You'll be impressed with the smoothness of this technique.
10. If the field does not come in sight prior to the MDA, level at the MDA, set the missed approach altitude and continue to the missed approach point. Don't dive for the runway after passing the VDP. (Don't rotate through the MDA unless your governing body has approved such a maneuver; the MDA cannot be treated like a DH.)

PROCEDURE C WEATHER AT MINIMUMS USE V/B FOR VDP

Steps 1 through 6 are the same as Procedure B.

(Steps 7, 8, and 9 are the same as steps 3, 4, and 5 of Procedure A.)

7. At the FAF, dial 1,000 to 1,500 fpm descent in the V/S window.
8. At 1000 AGL, reduce V/S to 1000 fpm.
9. At MDA, (ALT HOLD annunciated) set missed approach altitude. V/S is armed.
10. When the field comes in sight, start descent when the V/B indicates 2.8°, not before. Dial the V/S that is displayed at line 4R.
11. If field does not appear before the V/B indicates 3.0°, fly to the missed approach point and accomplish the missed approach procedure.

LEARNING PROCEDURE

To learn how to shoot Procedure B or C approaches by practicing when an ILS is being conducted in visual conditions. You'll learn how to quickly set the FMC up and how the V/B and V/S indications on the DES page operate. This will lead to confidence in the procedure.

Don't wait until you are wading in the alligator pond at night wishing you had these tools.

Constant Angle Notes

The Constant Angle technique is only recommended if you do not have the capability of shooting an RNAV Approach. An RNAV Approach uses LNAV for lateral tracking and VNAV for vertical guidance (path deviation indicator) and is superior to this Constant Angle technique. However, the RNAV Approach must be contained in the database and your aircraft must be capable of such an approach (Non-EFIS 737 currently disconnects VNAV at flaps greater than 15). And your carrier must allow for, and train for, such a procedure - not yet the case but it's being studied.

For non-precision approaches that do not have vertical guidance, the minimum altitude may be specified as a minimum descent altitude - MDA (H). You cannot rotate through the floor of an MDA.

For non-precision approaches that use a VNAV path, the minimum altitude may be specified as a decision altitude - DA (H). You may rotate through the DA in a missed approach.