INTRODUCTION

DISCLAIMER: These QRN “notes” are for “training” purposes only, and are not sanctioned by the FAA, and are not official training documents for any training school! They are a best effort personal summary of most course objectives (to pass the rating check ride), covering most of the course manuals and handouts (Boeing Vol. 1, QRH, Flight Crew Training Manual, Call Outs, instructor briefings, simulator syllabus training, etc.). THE SCHOOL MANUALS always take precedence over these notes. Your future airline job will have different and more in-depth procedures. This QRN is only for the 737 NG (there are no references on “Classic” differences).

QRN’s with older print dates (see date above) may have erroneous information, and should be destroyed. You are responsible to insure that you have the latest version (see web site below). This document may not be perfect. If you have any comments or suggestions, please let me know….email me at: brucesprague@mac.com

You can download the latest QRN at:
http://www.brucesprague.com/

Recommended is Bill Bulfer’s excellent 737 Cockpit Companion and his equivalent CC iPad app. You can contact Bill at: billbulfer@comcast.net
http://www.cockpitcompanion.com/
http://airlinerapps.com

Also, go to the iPad App Store, and get Eric Cannon’s B737 Interactive System Diagrams (Electric, Fuel, Bleed Air and Hydraulic).
Get all four for about $25.

Have a successful Oral and Simulator rating ride!
Bruce Sprague

ORAL & CHECKRIDE HINTS

• know basic SYSTEMS, and function of all switches, instruments, dials and lights. Questions may be “scenarios” (ex: T/O configuration horn, Stby Power items, Hydraulic items, Flight controls, etc.). Study Light and Switch Guide.)
• know all the CHECKLISTS and flows
• know LIMITATIONS, IMMEDIATE ACTIONS and CALL OUTS!
• review the 737 "walk around” inspection document
• most lights, warnings, problems = “call” for QRH!
• VVM: Verbalize, Verify, Monitor. Use CRM! Use autopilot!
• “rotate” slowly (takeoff, V1 cut & missed), configure early
• Tip: “nail” the ADI pitch, and constantly check it.
• FMC: setup and update before each takeoff; WBBBB ✓
Weather, Build, Bug, Brakes, Brief, Descent/Approach ✓ lists
• "FAT SOB" Flaps/Fit Dir, Auto Throttles/Brakes, Trim, Speedbrake, Overhead, Bugs, Boxes, Bitches (malfunctions), and Brief
• Bring to sim: iPad (EFB: Elec Flt Bag), pen & paper, flashlight

FLOWS and CHECKLISTS

General sequence of flows and checklists and additional items:

GOLF MAPS CB’s Logbook
Goggles (x2), O2 masks (x3), Life preservers (x3), Fire extinguisher, Med kit, Ax, PBE, Straps (x2), check CB’s and Logbook, then:

Initial Electrical POWERUP (“dark”) (BAT ON)
(VOL 1, Supplementary Procedures, Elec., Ch 3, Sec 7, pg. 3-35)
Bat, Stby Pwr, Alt Flaps, Wipers, Elec Hyd, Ldg Gear, External power, Fire checks 5/11/3, APU online (“remove external power”), wheel well fire check, then:

Preliminary PREFLIGHT (ALIGN)
(VOL 1, Normal Procedures, Ch 2, Sec 2, pg. 2-9, CA or FO)
IRS Nav, Voice Rec, Fluids (O2, Hyd, Oil), PSEU, Svc Int, Engine, Pass O2, Gear lights, Manual gear door, parking brake, then:

• Get “ATIS, IFR Clearance” first, then:
CDU PREFLIGHT
(VOL 1, Normal Procedures, Ch 2, Sec 2, pg. 2-18, CA does this)
CA on “TAKEOFF REF” page, V2 set, FO on “LEGS” page, then:

Exterior Inspection (“walkaround”)
“Test lights” ("FO overhead, CA forward and pedestal"), then flows:
(fuel pump on for APU, Trim Air ON, ISO OPEN)
(VOL 1, Normal Procedures, Ch 2, Sec 2, pg. 2-18), then:
/// “PREFLIGHT Checklist” ///

• Flight Attendants Brief (ex): “greetings, flight to BOS 1 hour, smooth flight, SOP, any questions?”
• Takeoff Brief (ex): “L seat takeoff, Flaps 5, Red/Max Pwr. Taxi from gate 30 to KT, left on A or B, and right on KD or KE, hold short of 31L. On takeoff, we will reject for most problems up to 80k. If that happens, you call tower, and I will talk to passengers, then we will run the reject checklist. After 80k, we will only reject for engine failure or fire, or something catastrophic where the airplane will not fly. After V1, if lose engine, ask for runway heading. Today we will do the Kennedy 3 departure to 5000’. Standard calls. Any questions?”
• “Ground crew, hydraulics coming on”; Door lights out?
• “Before start flow” (Fuel pumps ON, Elec hyd pumps ON, packs OFF, Beacon ON), then:
/// “BEFORE START Checklist” ///
• Call ramp for “Push and Start”, then advise ground crew “tail left; brakes off/set, etc”
• Start engines, “clear off ground crew; show pin”
• “Flaps 5, Flight Control Checks (SYS)” (FO callouts); then After Start flow: (VOL 1, Normal Procedures, Ch 2, pg. 2-41)
Gens ON, Probe heat ON, Anti ice?, Packs & ISO AUTO, APU Bleed OFF, APU OFF, Engine Switches AUTO, Idle Detent, Recall, RTO, Transponder STBY, then:
/// “BEFORE Taxi Checklist” ///

You can now arm LNAV VNAV or just VNAV (see below)
Taxi: Call for “taxi”; taxi chart out, taxi light, “clear left / right”, 10k max in turns center tanks OFF below 5000#
/// “BEFORE TAKEOFF Checklist” ///
“cleared for takeoff” flow: strobes, lights, TA/RA

After takeoff flow: gear OFF, RTO OFF, packs, verify PSI, then:
/// “AFTER TAKEOFF Checklist” ///
be sure to set altimeters to “STD” at FL180

flow: ATIS, Brief, Recall, Brakes, (center fuel OFF <3000#) then:
/// “DESCENT/APPROACH Checklist” ///
At flaps 30, Arm Speedbrakes, then:

"LANDING Checklist"

After Landing flow: Transponder STBY, Flaps, Speedbrakes, Auto brakes OFF, Lights, APU ON, Probe heat OFF

After Engines OFF flow: (3 mins cool) (ground power?) 
Seat Belt Sign OFF, APU or GND PWR, Beacon OFF, 
Fuel pumps OFF, Probe OFF, Hydraulics, Flaps, Parking Brake, 
Levers in CUTOFF, Radar OFF, then:

"SHUTDOWN Checklist"

Open Flows: 
IRS OFF, Exit lights OFF, Window Heat OFF, Packs OFF, then: 
"SECURE Checklist"

----------

PREFLIGHT

FMC SETUP: ("next" page, "Activate", "EXEC")
IDENT: "confirm" POS INIT: KJFK ROUTE: destination, Rnwy 
DEP ARR: select Sd, Rnwy LEGS: setup 
FIX: build radials/arcs/rings ("place/bearing/distance")
Fix ex: "CRI176/5" Distance Ring ex: (2 mi. arc for CRI = "/2.0")
PERF INIT: ex: ZFW 90.0. CG 16%, Fuel 20.0, FL240 
COST INDEX: 0-500 (higher number = faster, more fuel cost)
N1 LIMIT: ex: SEL 50 TAKEOFF REF: Flaps 5, "trim", V Speeds

ENGINE START:
• see flows and checklist sequence above 
• hand on start switch (2# first); cutout at 56% N2 
• Key start events: starter valve "OPEN", N2, N1, 20-25% N2 go to 
"IDLE", FF, EGT (within 10 secs, hot = 725°), starter (2 mins max) 
"cutout", observe normal oil psi by idle

ABORTED ENGINE START

Engine Start Lever..............................................CUTOFF 
Note: "call" for QRH. If NO starter valve open light, see START 
VALUE INOP checklist

APU FIRE

APU Fire Handle ............................................PULL & ROTATE
APU Switch ........................................................OFF 
Note: Rotate and Hold for "discharge" light, "call" for QRH

COLD WEATHER PROCEDURES:

VOL 1, Supplementary Procedures, Adv. Wx., Ch 3, Sec 13, pg. 3-83 
• refer to Supplementary Procedure during this process:
• need if ≤10°C OAT (ground) or TAT (flight) AND visible moisture or 
ice, snow, sleet or standing water on ramp, taxiways, runways 
• do exterior inspection; probe heat ON after Preflight Checklist flows 
• engine start differences; Engine and Wing A/I procedures 
• before Taxi procedures (flaps up if contamination) 
• if OAT <3°C, and Eng A/I is on: 70% N1 for 30 secs (every 30 mins) 
• deicing and anti-icing procedures 
• takeoff procedures (remember flaps!); flight and landing procedures 
• shutdown and secure procedures

ARMING LNAV VNAV PROCEDURES:
• After completion of the Before Taxi Checklist LNAV VNAV or VNAV 
only CAN Be Armed for Departure. LNAV VNAV combination is 
commonly used for FMC Based Departure Procedures. Aiming VNAV 
only is normally used for Runway heading departures; make sure that 
Runway heading is indicated in the MCP. Flight Simulator 955 & 561 
(Atwater NG) has this option. PanAm NG simulators do NOT have the 
option to Arm LNAV/VNAV on the ground. LNAV or HDG SEL must be 
commanded at 400 feet AGL and VNAV at 1000 feet AGL.

----------

TAKEOFF

ORDER OF TAKEOFF BUGS (Flaps 5):
• V1 [V1] green (Go / No Go, call "V1" at 5k before bug 
("the maximum speed in the takeoff at which the pilot must take the first action (e.g., 
apply brakes, reduce thrust, deploy speed brakes) to stop the airplane within the 
accelerate-stop distance. V1 also means the minimum speed in the takeoff, following 
a failure of the critical engine at VEF, at which the pilot can continue the takeoff and 
achieve the required height (35') above the takeoff surface within the takeoff distance.
• VR [r] green ("ROTATE"); normally double bug) 
• V2 [ ] magenta bug: as manually set on MCP speed window 
(takeoff safety speed: can climb on one engine) 
• V1 + 15 [ ] "white" pointer box 
• VM Flaps 1* [1] green 
• VM Flaps 0° [UP] green ("clean maneuvering speed bug")

FLAP MANEUVERING SPEEDS:
• when flying below VM Flaps 0°, flaps should be used 
• flaps 2°, 10° and 40° normally not used 
• ["symbols"] are for 737NG FMC values

Flaps UP: [UP] green VM 0 (VREF 40 + 70) 
Flaps 1°: [ 1 ] green VM 1 (VREF 40 + 50) 
Flaps 5°: [ 5 ] green VM 5 (VREF 40 + 30) 
Flaps 15°: [ 15 ] green VM 15 (VREF 40 + 20) 
Flaps 30°: [ REF ] green, use VREF 30

TAKEOFF: (VOL 1, Normal Procedures, Ch 2, Sec 2, pg. 2-43) 
(Flight Manual, Chapter 3)
• Captain on TO REF page; First Officer on LEGS page 
• use radar altimeter for 400' and 1000' calls 
• F15 = shorter takeoff roll, F1 = least tail clearance at rotation! 
• TAKEOFFS; usually use flaps 5 (sometimes F15). Rolling 
(normal), 
Standing (IFR, Xwind), or Static (brakes to 70%N1: Engine A/I) 
• call for "Before Takeoff Checklist" 
• check for T/O Configuration Horn (move 1 throttle quickly forward) 
• spool N1 35-45%, then "TOGA" (PF), forward yoke, throttles set by 60k 
• call "80 KNOTS" (PFN), "CHECKED" (PF) ("THR HOLD" on FMA) 
Note: concentrate on "80k" call (now reject only for "Engine 
Failure, Fire Warning, etc"), and "V1" call (now committed); 
then do "V1 cut" if "Engine Failure". 
• "V1/5 knots before), ROTATE" (PFN); hands off throttles 
• rotate slowly at 3°/sec, up to 15'-18", do not use flight director 
Note: rotate slowly by visually looking at end of runway, if V1cut, 
this will help guide you to keep runway heading 
• maintain V2 + 15k to 25k (use Flight Director now) 
• "POSITIVE RATE" (PFN), "POSITIVE RATE, GEAR UP" (PF) 
• "400 FT" (PFN), "Verify" HDG SEL or LNAV in FMA (PF) 
• turn on autopilot 
• "1000 FT" (PFN), "Verify" CLB/CLB Thrust, VNAV PATH or ALT 
Note: to set climb thrust reduction acceleration altitude for VNAV 
operations it must be set on the FMC Takeoff Page 2, the default 
altitude is 1500' AGL, this needs to be modified to 1000' AGL, 
Engine Out E/O setting is defaulted to 1000' AGL.
• May have to use "set 210k, Level Change"
• follow on *PFD* (Primary Flight Display with ADI and tapes): 10 sec green Speed Trend Vector line
• at V2+15k minimum: "FLAPS 1" (PF)
• accelerating thru F1 speed, "FLAPS UP, AFTER TAKEOFF CHECKLIST" (PF)
  
  if using Flaps 15, at V2 + 15, "FLAPS 5" (PF), accelerating thru F5 speed: "FLAPS 1", accelerating thru F1 speed: "FLAPS UP, AFTER TAKEOFF CHECK"

  • Note: If staying in the local radar pattern for approaches, use VNAV "speed intervene" (SPD INTV). Flaps Up speed is recommended for the radar pattern.

**REJECTED TAKEOFF:**

• Below 80k (any abnormality should be announced):
  failures, configuration, doors, fire/smoke, wind shear, etc.)
• After 80k only for Engine Fire, Engine Failure, OR any condition rendering the aircraft unsafe or unable to fly.
• Captain calls "CONTINUE or REJECT": If Reject: close thrust levers, disconnect autopilot, use RTO autobrakes (if available), raise speedbrake lever, and apply maximum Reverse Thrust, stay on runway? call for QRH!
• call Tower, and PA to "remain seated", reject checklist
• consider engine fire, evacuation, brake cooling?

**ENGINE FAILURE AFTER V1 ("V1 CUT"):**

• get airplane parallel to runway first, then slowly rotate
• maintain track (rudder = "step on good engine’….look at end of runway!), slowly pitch up to 13°-15°. Failure in turn: level wings first then add rudder.
• silence bell, V2 [ ] magenta bug to V2+15/20k…follow Fills Dir
• "POSITIVE RATE" (PNF), "POSITIVE RATE, GEAR UP" (PF)
• "400 FT" (PNF), "Verify" HDG SEL or LNAV in FMA (PF)
• "500 FT" (PNF), "AUTOThROTTLE DISCONNECTED" (PF)
  
  • Note: maintain heading, place 5 units of rudder trim towards good engine
• "1000 FT" (PNF), "Verify" VNAV PATH or ALT in FMA, "CONFIRM THE PROBLEM" (PF)
  
  • Note: lower to 10° pitch up, then start to follow flight director, autopilot on (no A/Ts), declare emergency, get "runway hdg"
  
  • Note: use "speed to follow" on MCP
  
  • Note: autopilot does NOT control rudder! Keep foot on rudder!  
• V2 + 15k min: "FLAPS 1" (PF) [ ] "white" pointer box
• BANK: <15° V2 to V2+15k (>15° if V2+25k)
• accelerating thru F1, "FLAPS UP, SET MAX CONTINUOUS THRUST, ENGINE FAILURE or FIRE CHECKLIST" (PF)

  • Note: for MCT: FMC, N1 Limit page, select "CON", then manually adjust thrust to the MCT N1 limit.
• if using Flaps 15, at V2 + 15, "FLAPS 5" (PF), accelerating thru F5 speed, "FLAPS 1", accelerating thru F1 speed, "FLAPS UP, SET MAX CONT. THRUST, ENG FAILURE/FIRE LIST"
• Note: then run After Takeoff Checklist, restart ?, then
• Descent and Approach checks, then
• One Engine Inop Approach and Landing Checklist
• "Declare EMERGENCY" squawk 7700, balance fuel ("ILMIL” = QRH), advise FA, FO accomplish WSBEBB
• Trim: "step on good engine”, "step on bottom yoke" (to center it)
  "Dead Foot, Dead Engine"
• Trim gauge: Fuel Flow = trim degrees (about 4°-5°)
• Balance Fuel: XFEED OPEN, pumps OFF on lowest tank ("pick on the little guy") Гouge: "always turn something ON, before turning something OFF"  
• Have FO brief and set up approach (VREF 15, ILS to 4R)
• Request runway heading for missed approach

• When 1 dot below glide slope: “GEAR DOWN, FLAPS 15”
  (make sure fuel pumps back on and XFeed closed)
• When on final glide slope: hold about 65-75% N1
• Get ready for missed approach: “TOGA, FLAPS 1”
  (add rudder with throttle)

**---------------------------**

**ENROUTE**

**FMC / CDU:**

• for MCP settings, always verify values on forward panels
• see preflight FMC notes on "FIX"
• DIR INTC: "DIR INTC", then waypoint to R6 (NG: waypoint to L1, then enter "INTC CRS")
• INTC CRS always type inbound course, not radial
• DNTKFX: use FIX page; can define either way: IAH/15 or IAH/-15
• ENTERING SPEED AND ALTITUDE:
  - can define speed and altitude (ex: 250/100)
  - can define speed only (ex: 250)
  - can define altitude only (ex: 100)
  - can define "at or above" all (ex: 100A)
  - can define "at or below" all (ex: 100B)
• FPGA, V/B, V/S, VERT DEV (on Descent Page):
  - FPGA = actual flight path angle (should be = or steeper than V/B)
  - V/B = computed angle (vertical bearing to meet 3R crossing)
  - V/S = required vertical speed to achieve the displayed V/B
  - VERT DEV = present deviation from computed vertical path (For EFIS / NG aircraft: LNAV must be engaged for this to be correct)

**HOLDING NOTES:**

• FMC: "HOLD" set up
• "Hold East on 090 radial/inbound course" ("Standard" = Right turns)
• Must start to slow down within 3 min. of fix (should receive holding instructions within 5 minutes)
• Speeds: MHA thru 600’ = 200k max; > 600’ thru 14M = 230k (210k where published); >14M = 265k
• Inbound times: (adjust outbound leg to get inbound time) 14,000’ or less = 1 min; over 14,000’ = 1 1/2 min
• small box with number is published time in minutes for pattern.
• Call: "Position, Time (Z) and Altitude" upon entering…
• If no pattern charted and no instructions, hold standard pattern on inbound course to fix, at last assigned altitude.
• Be sure to figure "bingo fuel" to start diversion!
  BAR: Burn Alternate Reserve
• if coming out of holding to start an approach, hit "Exit Hold"
• at KJFK: ask approach if you can fly faster than standard 200k

**STEEP TURNS:**

(Flight Crew Training Manual, Chapter 7, page 7.27)
• A/P and A/T on, 250 kts, cardinal heading, get trimmed up
• A/P, A/T, and Flight Directors OFF
• use FPV? (Flight Path Vector on EFIS control panel)
• note entry pitch and FF, A/P, A/T and ALT HOLD off
• Turn (use NO trim, use arresterms):
  - > 25° bank, increase pitch by 1° (to about 5 1/2° at 45°)
  - increase power slightly to maintain airspeed
• monitor: altimeter, ADI, airspeed (VSI slight climb)
• lead rollout by about 20° (PNF call out), return to entry pitch and FF
• A/P and A/T on; speed to VM Flaps 0 (to set up for stalls)
STALLS:
(Flight Crew Training Manual, Chapter 7, page 7.32)
- impending stall indications:
  - AoA, “buffet alert”, feather, white red speed indicator
  - FMC: N1 LIMIT: set go around N1
  - FMC: INIT REF, INDEX, APPROACH REF: set VREF (select flaps)
  - CLEAN STALL: Flaps 0, Vman 0, then idle
  - DEPARTURE / TURNING STALL:
    - Flaps 5, Vman 5, then idle, then 15°-20° bank
      (could use GF15, Vman 15)
  - LANDING STALL:
    - Flaps 30, gear down, Vman 30 (+target), then idle
    - note pitch and FF, then A/P and A/T off, set throttles to Idle
    - Have V speeds established (not sliding thru a/s) before pulling back to idle
    - maintain altitude or slight climb; trim out during maneuver

STALL RECOVERY:
- full throttles or as needed, level wings; maintain altitude!
- for high altitude stall:
  - lower nose to 2000 fpm dive, then when out of amber "warning" speeds, slowly bring in throttles
  - push nose for pitch up, retrim, return to entry pitch angle (2-5°)
  - recover to "Safe" zone: 5° up on ADI and about 60%N1
  - do not get a secondary stall!
  - return to initial MCP set speed (pull back throttles!); stabilize!
  - A/P & A/T on to set up for next stall
  - when done: do a "go around" to clean up

---

IMMEDIATE ACTIONS ///////////////////////////////////////////////////////////////////
- know all of them; you do not have to say them “verbatim”
- on ALL problems, always “call” for QRH and what to look up
- IF possible: CA fly on A/P; FO read and resolve problem.
- Declare an emergency IF: Engine loss, standby power approach, priority handling required, if about to break an FAR, etc.
- Give: Reason, Fuel (in minutes), Souls Onboard, Squ. 7700, brief FA of emergency, contact Company
- there are some Notes for a few Actions on this QRN
- know how to find things in the QRH with TOC and Index
- QRH procedures; be very familiar with: Reject Takeoff, Emergency Evacuation, Engine Fire/Failure, Inflight Engine Start, One Engine Inop Approach and Land, TE asymmetry flaps OR other flight control problems
- once start a checklist, do not stop (or have to start all over)

CABIN ALT WARN / RAPID DECOMP //////////////////////////////////////////////////////////////////////////////////
Note: do memory items, “call” for QRH
- IF Emergency Descent (damage? smooth air?)
- PA “O2, RAPID DESCENT”, call ATC
- always use A/P for speed and structural protections
- Descent gouge: "CONT, Spin, Spin, Pull, Pull”:
  - Ignition CONT, spin MCP to 10,000’ or MEA, spin IAS to barber poll (then LVL CHG), pull throttles, pull speed brakes

TWO ENGINE FLAMEOUT //////////////////////////////////////////////////////////////////////////////////
Note: do memory items, “call” for QRH
- EGT decrease 3-5 secs
- Really have dual engine flameout?...OR loss of 2 Generators?
  - N1 and EGT gauges spool down, "Low Oil PSI" lights on
  - If in doubt, push thrust levers up to see if you get response!

---

APPROACH

APPROACH

ARRIVAL BRIEFING:
- FMC: DEP ARR: select Star, Approach
- FMC: INIT REF, INDEX, APPROACH REF: get VREF (select)
- Maneuvering Speeds: see schedule above
- Pilot Flying Briefs (other pilot flies), gives WBBB:
  - Weather, Build (in the FMC “box”), Bug, Brake, Brief, Checklists (use Jepp “briefing strip”)
- Descent/Approach checklists
- follow on “NO” (Nav Display with map): 30 sec “noodle” trend line
- follow on “PFD” (Primary Flight Display with ADI and tapes):
  - 10 sec green Speed Trend Vector line
- Captain on APPROACH REF page; FO on LEGS page

CALL OUTS:
- "you have airplane: 210k, 320 hdg, FL240, CMD-A"
- LOC, GS: “alive, capture”
- “100’ above” (DH), “approaching mins” MDA, “approach lights, runway”
- “heading” to follow and “speed” to follow
- “landing gear down” = ARM Speedbrakes

ORDER OF LANDING BUGS:
- flaps 2°, 10° and 40° normally not used
- VM Flaps 0° = [UP] green (“clean maneuvering speed”)
- VM Flaps 1° = [1] green
- VM Flaps 5° = [8] green
- VM Flaps 15° = [15] green
- VREF + 20k = [□] “white” pointer box (for flaps 30 or 40)
  - VREF+15k is "go around" speed with both engines
- TARGET = VREF + additive [□] magenta bug
  (+5k to +20k, set by MCP speed)
  - normally VREF +5 1/2 steady state headwind component + full gust value, not to exceed 20 knots or flap placard minus 5 knots (whichever is lower)
  - IF using A/T (throughout auto land approach and landing), add only +5 (regardless of winds; A/T compensates)
  - this is your "go around" speed with a single engine
- VREF = [REF] green bug for landing flaps (see APP REF page)
  - Normally VREF 30; single engine is VREF 15

FINAL APPROACH SEGMENT (FAS):
- FAS = Final Approach Segment (FAR is Final Approach Fix)
- ILS = at "published" Glide Slope Intercept Altitude (GSIA)
  (or at glide slope intercept if lower than the GSIA)
- NP = at FAF (if no FAF, then at point where PT intercepts the inbound course.
  - If prior to FAS, must have approach minimums to start approach. NO "look see" option!
  - If after FAS, and visibility goes below minimums, may continue to DA / DDA / MDA (and land IF visibility OK).

GENERAL APPROACH GUIDELINES:
- maintain your "situational awareness" (SA)
- All approaches based on visibility, ceiling is advisory.
  - there are different minimums if TDZ, CL, or ALS are inop!
- Use CAT-C approach mins (and CAT-C for Circle)
- Must have visibility to start approach. If visibility goes below minimums after FAS, continue to DA (for NP to MAP).
- RVR: reported only if 6000 or less or prevailing visibility 11/2 mile or less. Otherwise, ask for it.
- all MDA mins add +50 feet (MDA+50)
• Current visibility governs:
  ex: "RVR 2400, variable 1100" = you are OK to land
  If conditions are below 4000 RVR or ¼ mile visibility, Autopilot, or F/D in the approach mode is required.

• Items to brief: Missed approach; eng inop missed; non-normal / inop equip; terrain, transition level; 10-7 and 10-9 pages; mins (bugs), callouts, set next altitudes in MCP, use CRM, etc.; if emergency, consider longer runway, wind, systems.

• Considered "ON" Final Approach Course (to start descents):
  ILS/VOR: within 1 dot
  You should be 200' AGL over end of strips (about 1/2 mile from end of runway), and 50' AGL over threshold.
  Jepp plate DA(H): DA = Decision Altitude

  (H) = HAT height above touchdown
  • at DA(H): "CONTINUE or GO ROUND or LANDING"
  • LOW VISIBILITY APPROACH IF: ≤ 2400 RVR
  • Monitor FMA for capture modes!
  • Be configured by 1000 ft. AGL/FAF
  • when building approach in LEGS, and after "radar vectors to intercept final course inbound, bring up the FAF to the top (L1).
  You can "extend" center line with INTC CRS, put in inbound course, and then into 6R (EXEC).
  • once on final approach: keep your hands on yoke and throttles
  • keep your map "scales" sized appropriately

ILS CAT I (Coupled with one Autopilot) APP
  • BARO set to "DA" (MCP = missed approach altitude after GS)
  • Downwind, "FLAPS 1": base "FLAPS 5"
  • "Cleared" for the approach AND on intercept (use 30° hdg): arm "APP" (prior to 5° of course) (PF)

  • At 2 dots below GS: "GEAR DOWN, FLAPS 15" (PF)

  • At 1 dot below, "FLAPS 30, SET MA ALTITUDE, LANDING CHECKLIST" (PF) Arm speedbrakes
  • verify FAF or OM crossing altitude
  • A/P and A/T's OFF by 50' AGL
  • CAT I: see strobes by DA ("lights"), may go below DA to 100' above TDZE, but then must have visual reference (one of ten items: lights, markngs, etc., or go around.

SINGLE ENGINE: 1 dot below G/S: "GEAR DOWN, FLAPS 15, LANDING CHECKLIST"; Target is VREF 15 + additive; no A/T!

CAT II / IIA CRITERIA: Only on NG Aircraft: -7.8-9 (ER)
  • Coupled "autotail" (with 2 [both] Autopilots)
  • CAT II, you must have visual reference at DH, which is 100' above TDZE
  • CAT II, Ill Auto land:
    • Auto land = use both A/Ps: "A" A/P 1st, "B" after "APP" mode; Go Around = TOGA, call for flaps, gear, monitor.
    On missed, B A/P pops off, A A/P is now the master.

CALL OUTS:
  - "Localizer / Glide Slope Alive"
  - "1000 feet" "500 feet"
  - "Approaching Minimums" (DDA / MDA + 100')
  - "Minimums" (at DDA / MDA)
  - "Missed Approach Point" (approach lights NOT in sight) "Strobe Lights" OR "Runway in Sight"
  - "Continue" "Landing" "Go Around"
  - disengage A/P by 50' below DA / DDA / MDA
  - disengage A/T before 50' AGL...
  - Missed Approach: be sure missed approach altitude is set!
**VISUAL**
- LNAV VNAV
  - L1 5 mi “fix” off end of runway (3.00 FPA)
  - L2 end of runway (ex) RW04R
  - extend centerline off L1: “INTX CRS”
  - “LNAV/VNAV” and MCP = 100

**CHECKRIDE:**
- know the Immediate Actions (there may be one on ride)
- use good judgment….if you are “flying”, you’re “passing”
  (i.e.: do not crash)
- approaches and events could be different from below
- start with Preliminary Preflight flows, at gate
- engine start problem
- Kennedy departure to 5000'
- heading 180°, 250k, steep turn
- “holding to DPK” (set up in FMC), “how will you enter?”
- turning stall (clean) on the way to hold
- may go to holding, if so “Exit” for approach
- RNAV (GPS) Y Rwy 22L or VOR Rwy 4L, missed
- LOC 4R, circle to 31R (maybe VOR/GPS Rwy 13L/R)
- Rwy 4 or 13 REJECT (eng fails) and V1 CUT (eng fails)
- ILS 4R, “hand fly”, single engine, missed
- ILS 4R, autopilot, single engine, land
- QRH: TE asymmetry flaps (ex: set VREF for flaps 2 = 2/160)
  OR flight control problem, OR other problem
- visual landing (with LNAV / VNAV)
- emergency evacuation (wheel well fire OR gear collapse OR ??)

**MISSED APPROACH**

**GO AROUND:**
- Must go around if: at minimums and cannot land, OR not stabilized OR GPW warning
- “TOGA, FLAPS 15, CHECK THRUST…POSITIVE RATE, GEAR UP, CHECK MA ALTITUDE” (PF)
  - fly VREF + 15 (L2 "white" pointer box is VREF+20k)
  - at “400 FEET”: “Verify” HDG SEL or LNAV in FMA (PF)
    - (autopilot ON) call Tower going missed
  - 15° pitch for V2 + 15 (no Auto Throttles!) “FLAPS 5”
  - at “1000 FEET”: Command VNAV: verify VNAV Path or VNAV ALT in FMA (if needed, say “set 210k, LVL CHG”)
  - VREF + 15… “FLAPS 5” (PF)
  - accelerating thru Flaps 5… “FLAPS 1” (PF)
  - accelerating thru Flaps 1… “FLAPS UP, AFTER T/O CHECK” (PF)
- Rejected landing is same, except do not attempt if thrust reversers were used.

**SINGLE ENGINE MISSED:**
- “TOGA, FLAPS 1, CHK THRUST….POSITIVE RATE, GEAR UP, CHECK MISSED APPROACH ALTITUDE” (PF)
  - slowly add throttle while feeding in rudder
  - call Tower going missed, request runway heading
  - “400 FEET”,…verify LNAV or Command Heading Select
  - (Command heading select when given an alternate missed approach instruction.
    The LNAV functions automatically and is armed during the approach, and will engage the LNAV mode when the the proper altitude is reached. If for example you are given an alternate missed approach instruction of Runway Heading 3000 feet. The missed approach altitude and Runway Heading should be set in the MCP. At 400' AGL the PF will command “Heading Select” to comply with the missed approach instruction of Runway heading in lieu of the published lateral path, HDG SEL should be presented in the FMA)
  - “1000 FEET”… Command Flaps UP speed (PF)
  - accelerating thru Flaps 1 speed… “FLAPS UP, LEVEL CHANGE, AFTER T/O CHECK” (PF)
- QRH: One Engine Inop / Approach / Landing Procedure

**LANDING**
(Flight Crew Training Manual, Chapter 6)
- VASI (3 light) 737 use near 2 lights (far 2 lights for “wide” body)
- start flare at 30'
- make sure speedbrakes have come fully out
- call “SPEED BRAKES UP” (PM)
- start thrust reversers off at 60k, idle detent by taxi speed
- call “60 KNOTS” (PM)
- cool engines for at least 3 minutes before shutdown

**LANDING WITH ENGINE OUT ON FINAL:**
- AP / AT OFF, “FLAPS 15”, Thrust up, (approx. 15%) VREF + 15k, GPWS inhibit OR
- If go around: maintain VREF + 15k, retract to FLAPS 1
- If on short final, consider leaving bad engine (with fire or failure) running, then take care of it after landing…
- Visual single engine glide path: 300’/mi ratio (ex: 6 mi = 1800')