Boeing 737 Captain / First Officer Quick Reference Card (QRC) # 1 February 7, 2005

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• INTRODUCTION

WARNING!
The QRC ("**Q**uick **R**eference **C**ard") is a best effort summary of many need to know Continental Airlines 737 Flight Manual and Operations Manual items (certainly **not** everything, and **not** perfect)! If you see needed corrections, please let me know!
The QRC is for **training** purposes only, and as always, the company flight and operation manuals are the absolute **final** word. QRC'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 (periodically **check for latest date** at web site below)! The QRC is **not** sanctioned by CAL nor the FAA.

REPRINTS:
The QRC is **free** as a service to my fellow Continental 737 pilots! Email comments/updates to: **brucesprague@mac.com**

You can download the latest QRC from this web site:
http://homepage.mac.com/brucesprague

I also recommend Bill Bulfer's excellent **737 Cockpit Companion** (and his **FMC User's Guide**). You can contact Bill at (281) 358-7252 **or** email him at: bbulfer@firstnethou.com. **or** at his web site: www.fmcguide.com

Have a **safe** flight, and a good simulator MV / LOE
Bruce Sprague Capt 737 IAH

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• CHECKRIDE HINTS:

- **VVM**: Verbalize, Verify, Monitor
- Use CRM! Call for QRH! On LOE: brief FA's, fill out logbook
- Carry Section 1 (Limitations) and Section 5 (P&P)
- Go slow, rotate slow (TO and MA), configure early
- Tip: "nail" the ADI pitch, and constantly check it.
- FMC Setup: before each takeoff, update:
  - **Perf Page**: ZFW, Temp, etc. - **Route Page**: KIAH to KIAH
- WBBBI: Wx, Build, Bugs, Brief, Inrange

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• PREFLIGHT

ALTERNATES: see Ops Man Sec 2
- Need destination alternate if: Forecast ±1 hr ETA, destination **below** 2000' **or** 3 miles (gouge "123").
- Need 2 alternates if: Destination **and** 1st alternate are "marginal" (**Dest**: <400'/1mi **Alt**: <600'/2mi)
- Alternate Minimums: HAT/HAA plus 400' **and** Cat I + 1 mile (**or** if 2 Rwys/2 Approaches: +200' and +1/2 mile)
- IF diverting to alternate, then **regular** landing minimums apply, **and** no alternate for the alternate is required
- IF stronger headwinds cause you to fly into your Alt / Res fuel, you do **not** have to make an unscheduled fuel stop This is "Dispatch" requirement **only**.
- IF enroute & destination weather goes down that would require an alternate, you may **continue** on if **both** Captain and Dispatcher consider it safe.
- Call **dispatcher** enroute if need to **divert**; he has "now time" data on weather, airports, and traffic situation

CHECKS / INSPECTIONS:
- **Cockpit** Safety Check: "**B**e **H**appy, **G**o **R**egular" (**B**att Sw "on" & 23v; **H**yd off; **G**ear dn, 3 green; **R**adar off)
- **Exterior** Check (walk around):
  - brakes **set**, fuel / hyd **on**, WW lights **on**
- "**Receiving** A/C" Check: (Radar should be in "Test"!)
  - **1st checks** signed off : O2 mask; Stby Pwr; Inst Comparator; Radio Altimeter; Fire tests; Acars link; Cockpit Voice Rec.

PERF & PLANNING (P&P): FltMan Sec 5 / Ops Man Sec 10
- **Accuload**: if pax count not within **variance** then get new "**trim**"
- Automated **Runway Analysis** Data:
  - **always** shows data with bleeds **off**; if going with bleeds **on**, you must **add** the weight penalty!
    -300, -500, -700 = 4000#; -800 = 5100#; -900 = 5000#
  - to figure an assumed temp, enter with **actual** GTOW (add weight penalty if bleeds are **on**).

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• TAXI

ENGINE START:
- cutout at 46% N2 (56% N2 for NG)
- starter **duty cycle**:
  2 mins **on**, 20 seconds **off**, 2 mins **on**, 3 mins **off**
  do not **engage** starter if N2 **above** 20%
- Key start **events**: starter valve open, N2, N1, oil psi rising, FF, EGT (within 10 secs; hot 725°C), starter cutout, "fire" (see QRH inside), fire **light** (see QRH back cover), hung start, oil psi by idle.
- **Start malfunctions: (except** for start valve)
  - call for QRH
  - **before** start **lever** to "Idle": start switch **OFF**
  - **after** start **lever** to "Idle":
    before starter **cutout**: **"cutoff"**, motor for 60 secs
    after starter **cutout**: **"cutoff"**, N2 **below** 20%, motor for 60 secs
- When you are **ready** to taxi = taxi light flash once
- 2 mins for engine to **stabilize** before takeoff

EQUIP MALFUNCTION AFTER BLOCK OUT:
- Refer to MEL and CDL (see Ops Man Sec 2)
  - **MEL**: Minimum Equipment List
    - P code = performance penalty
    - M code = Maintenance procedure; crew may position CB's or switches
    - O code = Operation procedure
    - use "system" number to find in MEL (**ex:** GPWS = 34-26)
  - **CDL**: Configuration Deviation List
    - additional limitations with secondary airframe and engine parts missing; penalties are cumulative

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• TAKEOFF

WINDSHEAR:
- Enhancements/Reactive = "windshear" on Grd. Prox. test
- Predictive = "windshear ahead" on radar test
- **Setup**: delay 30 mins (>15k & **increasing**); delay 15 mins (<15k & **decreasing**), use longest runway, flaps 5, full power, Flight Directors **on**, use higher VR of RLL weight (see Flt Man Sec 3)
- **Shear**: "**Max Power, Stow Speedbrake**", TOGA (do below 2000' RA); follow FD pitch; **no** trim, **no** config. changes; call radar alt **"500 climbing / descending".**
  - if "Alt Acquire", TOGA will go off, you must select again!
- **Windshear Gouge**:
  - **windshear ahead (alerts)** = avoid, go around (**trim** and **clean** up)
  - **IN windshear** = recovery (**no** trim or config. change)

LO VIZ TAKEOFFS / ALTERNATE: Ops Man Sec 2
- See Lo Viz takeoff minimums on Jepp plate 10-9A
- No lower than 500 RVR (see Ops Man Sec 2)
- Need T/O Alternate IF:
  - Departure field **below** CAT I landing minimums. Based on "**tower**" report of vis. or RVR.
  - must be within **1 hour** at normal cruise speed in **still air** with one **engine inop**: distance equals 390nm. Mins for alt **same** as regular alt.

NO REDUCED POWER IF: see Flt Man Sec 3
• anti skid inop, runway contaminates, anti ice on, windshear, improved climb, wet runway, ALTN EEC mode, PMC **or** FMC inop, or tailwind > 10k
• when using "assumed" temp, throttles are set to reduced power
• the bugs will **always** show maximum power

ORDER OF TAKEOFF BUGS:
5 bugs: from accuload **or** QRH **or [FMC]** (-7, -8, -900)
- V1 **[1]** (Go / No Go, call "**V1**" at 5K **before** bug; normally double bug)
- VR **[R]** ("**Rotate**"; normally double bug)
- V2 (Orange Bug)
- V2 + 15 **[white bug]**
- VM Flaps 0° **[UP]** ("top bug", 220)

• for "Improved Climb Performance", V1, VR, and V2 are **increased** and you **set** them on bugs
- **not** authorized IF:
  contaminated rnwy **or**, anti skid inop **or** red. thrust

• when flying **below** 220k, flaps should be used, with the following "recommended" **fixed flap maneuvering speeds (* above** 117,000 GW) **OR [FMC** -7, -8, -9]:

- Flaps 0	210k/220k*	**[UP]**
- Flaps 1	190k/200k*	**[1]**
- Flaps 5	180k/190k*	**[5]**
- Flaps 10	170k/180*	**[10]**
- Flaps 15	150k/160k*	**[15]**
- Flaps 25	140k/150k*	**[25]**

TAKEOFF BRIEFING: (see Briefing card)
- **First leg of trip, then as needed**: weather and takeoff alternate; runway conditions & required lighting; SID (setup, freq, courses, altitudes), Reject TO / Evac; Engine out; Air return; Non-normals / MEL; Terrain (TERR); Transition Altitude; 10-7, 10-9 pages
- **Additional brief items**: noise abatement profile, Jepp notes, P&P problems, different V1 and Rotate speeds?, anti ice, will 800' level off (after V1 cut) clear obstacles?, etc.

TAKEOFF:
- max tailwind 10k; max crosswind 35k dry runway
- delay exterior lights until "**cleared**" for takeoff
- stabilize to 40% ±5% N1, **then** 70% and TOGA (set power) "**check power", "power set xx %N1**"
- call "**100 kts, V1** (call 5kts before)**, Rotate, Pos Rate, Gear Up**"
  - concentrate on "100 knot" call (reject now **only** for "power loss"), **and** "V1" call (committed; do V1 cut if "power loss").
  - rotate at 3°/sec, 15° pitch, **maintain** V2 +20k (25k if light)
  - rotate (slow!) by **visually** looking at end of runway (if V1 cut, this will help guide you to keep runway heading!)
  - 30° bank if V2 + 15 (bug) **or greater**
  - if reduced power, push up throttles to bugs for more power
- **at 400'**, call "**Heading Select**" or "**LNAV**"
  - try to delay turns until 400' AGL (50' minimum for: obstacles, eng. out, noise abatement, adverse conditions)
- **at 1000'**, 10° pitch, V2 + 15 and accelerating:
  - call " **VNAV, Flaps 1 (or 5)"**
    - do **not** use blo 3000' if special noise abatement procedures; ie: SNA
    - must preset 220k in "Tgt Spd" Climb page, L2
    - select "Econ" when ready to accelerate

  OR, if VNAV is not available **or** not desired:
  - " **Lvl Chg, Set Top Bug**, **Flaps 1 (or 5)"**
  - next flap retractions at the fixed man speeds
  - call "**Flaps up; After Takeoff Check**", climb **at** 220k/[UP], turn A/P on (**above** 1000')
  - for flaps 1 takeoff, retract at fixed speeds and accelerating
  - hold VM Flaps 0 to 3000 AFE
- **at 3000'**, call "**V NAV**" **or** stay in LVL CHG at 250k
- go to **L NAV** when appropriate (as early as 400'), **after** confirming: FMC accuracy (vs. raw data)
- **ICAO-A / Noise Abatement:** at **1500**': "**LVL CHG**"; at **3000**': " **Set Top Bug, Flaps 1 or 5**"

REJECTED TAKEOFF:
- **below** 100k (fires, smoke, failures, configuration, windshear, etc)
- **after** 100k only for "**Pwr Loss**" OR "unsafe for flight"
- **Capt** calls "**Continue or Reject**"; and **accomplishes**:
  - throttles idle, AT off, (FO "Speedbrakes"?), thrust reversers, RTO (or max brakes)
- stay on runway, **hold** brakes (unless evacuation, then **set** brakes), run checklists
- **F/O** call "**tower**", **and** PA to "**remain seated**"
- **call** for Reject checklist (brake cooling?), eng. fire?, evacuation (see signals)?, fill out irregularity report

ENG FAILURE "AFTER" V1:
- "**Power Loss**", maintain **track** (rudder), slow **pitch** up to 13°, **gear** up, silence **bell**, **V2** (Orange Bug) **to V2 +20k**
- **at 400'**: "**HDG SEL**", maintain heading, radio call, **ask** for 5 units of rudder trim towards good engine
- **at 800'**: decrease climb, "**set top bug, flaps up, set MCThrust**", call for "**Eng Fail/Fire Checklist**" (if **fire**, run after "top bug", and bring flaps up)
- declare emergency, sqk 7700, fuel balance, give FA "TEST", call company, get Wx, call for "**1 Eng Inop/Appr & Ldg**" checklist, consider restarting failed eng
- **Failure in turn:**
  yoke **first**, then rudder (to bottom yoke), go to 800', etc.

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• ENROUTE

FMC/CDU:
- **DIR INTC**: "DIR INTC", then waypoint to R6 (NG: waypoint to L1, then enter "INTC CRS")
- "**INTC CRS**" always put **inbound** course, **not** radial
- **DNTKFX**: set up on FIX page; non EFIS **only** works **this** side of fix; EFIS 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/below**" alt (**ex:** 100**A or B**)
- **FPA, V/B, V/S, VERT DEV** (on Descent Page):
  - **FPA** = **actual** flt path angle (should be **= or steeper** than V/B)
  - **V/B** = **computed** angle (vertical bearing to **meet** 3R crossing)
  - **V/S** = **required** vert speed to **achieve** the displayed V/B
  - **VERT DEV** = **present** dev from computed vert path
    (for EFIS / NG aircraft: LNAV **must** be engaged for this to be correct!)

MISC:
- **C° to F°:** double C° minus 10% +32° (if above 0°) **or**
  - 32° (if below 0°) **ex**: 18°C = 36 - 4 + 32 = 64°F
- **Crew Oxygen**:
  - **over** FL250 to 410: one pilot **wear** unless 2 pilots in seat
  - "**cabin** altitude" **over** 10,000': **both** pilots wear
- **IFR Altitudes RVSM:**
  - **West** = "Even" +2k = 180, 200, 220……320, 340, 360, etc.
  - **East** = "Odd" + 2k = 190, 210, 230……330, 350, 370, etc.
- **Find Nearest Airport for Diversions:**
  Select "Index", then "Offset" on **both** FMCs; then enter "20L" on **left** FMC; then **simultaneously** press "Erase" on **both** FMCs; then you will see airport list.

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• EMERGENCIES

GENERAL: see Flt Man Sec 2 **and** Ops Man Sec 1
- IF possible: F/O **fly** on A/P, Capt **resolve** problem.
- Declare an emergency **IF**: Engine loss, standby power appr., priority handling required, if about to break a FAR, etc. (**Give**: Reason, Fuel, Souls Onboard) Sqk 7700
- Notify company **and** FA of emergency (PA: "folks, had problem...Linda to the cockpit") see Emer Signals below.
- Irregularity Report:see Ops Man Sec 1 and 10
- On all problems, always call for "QRH"

"DOOR, DOOR, DOOR": ////////////////////////////////
- **HARD LOCK SWITCH... PUSH** (within 30 seconds!)

TWO ENGINE FLAMEOUT: ////////////////////////////
- **FLT, CUTOFF** (EGT ↓ 3-5 secs), **IDLE**
- **Really** have dual eng flameout, **OR** loss of 2 Gens?
  - N1 **and** EGT gauges **spool down**, "Low Oil PSI" lite
  - If in **doubt**, push up throttles to see if you get **response**!

LOSE PSI / DECOMP / DESCENT: ////////////////
- **ON/100%, CREW COMM, SEAT/SMOKE**
- **IF** Emergency Descent (damage?, smooth air?):
  - PA "**O2, Rapid Descent**", call ATC
  - descent gouge: "**PA**, **FLT, Spin, Spin, Pull, Pull"** (ignition **FLT**, **spin** MCP to 10M' or MEA, V/S **spin**, **pull** throttles, **pull** speedbrakes, **LVL CHG** at barber pole)

UNCOMMANDED YAW / ROLL / RUD: ////////
- **A/P & A/T - DISENGAGE** (control A/C, reduce pitch, increase airspeed, sacrifice altitude)
- **Symmetrical Thrust - VERIFY**

Boeing 737 Captain / First Officer Quick Reference Card (QRC) # 2 February 7, 2005

EMERGENCY SIGNALS:
- 4 or more chimes (from pilot **or** FA) = **an emergency!** (pilot does **not** leave cockpit)
- Give FA "TEST": **T**ype of emer, **E**vacuation?, **S**ignals, **T**ime to land. Also, select ABA's.
- Brace signal +30 secs: "**Brace for Impact**" (2 times)
- Evacuation signal (use slides): "**Easy Victor**" (2 times)
- PA "**This is the Captain: Easy Victor, Easy Victor**" (Flight Attendants will specify which exits to use)
- PA "**Remain seated**" (2 times) = Do **not** evacuate!

TRANSPONDER:
- Hijack: 7500 (do NOT use 7700)
- Lost Comm: 7600 (stay VFR & land, **or** fly last clearance)
- Emergency: 7700 ("Declare Emergency")

INCIDENTS: see Ops Man Sec 3
- Inflight Disturbance Card: 3 or 4 incident levels, OSIR report
- Monitor 121.5; may have to radio "Mayday"
- **Inflight** Security Coordinator is **Captain**; **Ground** Security Coordinator is **Station** Duty Manager
- **Bombs / Sabotage**: see Ops Man Sec 1
  Least risk bomb location: centered right aft galley door

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• APPROACH

HOLDING ENTRY RULES:
- **use** FMC "Hold Page", otherwise use following method
- **note**: Draw pattern if in doubt, so you'll know what radial, fix, L or R, direction ("hold East, etc"), and outbound hdg

1. **Set Heading Marker (L or R)**: put Heading Marker at 20° above **right** wing (for Standard, **right** hand turns. If **left** turns, above **left** wing)
2. **Set Tail For Outbd Radial:** put Course Arrow (CA) TAIL on **outbound turn** radial (window shows inbd. course)
3. **Turn:**
   - If CA **tail** falls in quadrant from nose to heading mark, then do a **teardrop** (±30° off outbound heading towards **top** of case, for 45 secs) If close call, always choose the teardrop.
   - If CA **tail** falls in quadrant from heading mark to 20° below opposite wing, then enter **direct** (turn to **outbound** heading on published side).
   - If CA **tail** falls in remaining quadrant, then enter **parallel** (turn to **outbound** heading on **non**published side).

HOLDING NOTES:
- "Hold East on 090 radial" ("Standard" = **Right** turns)
- Must start to slow down within 3 mins of fix (should receive holding instructions within 5 minutes)
- **Speeds**: MHA thru 6000' = **200k** max; >6000' 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' = **1½ min**
  - small box with number is pub. time in **mins** for pattern.
- **Call**: "Position, Time (Z) and Altitude" upon entering
- If no pattern charted and no instructions, hold **standard pattern** on **inbd course** to fix, at **last assigned altitude.**
- Be sure to figure "**bingo** fuel" to start diversion!
- Send ACARS "appr. delay" message

STEEP TURNS:
- "Inrange Check", A/P and A/T on; 250 kts
- **note** entry pitch and FF; A/P, A/T and ALT HOLD off
- Turn (use **no** trim, use armrests):
  - > 25° bank, increase pitch by 1° (to about 5 1/2° at 45°)
  - increase power by about 10%
  - use F/S indicator: F = less throttle; S = more throttle
  - centered F/S needle = right thrust to capture speed
- **monitor**: altimeter, ADI, F/S, airspeed (VSI slight climb)
- lead rollout by 15°, return to **entry** pitch and FF
- A/P and A/T on; speed to VM Flaps 0 (to set up for stalls)

STALL SERIES:
- "Inrange Check", A/P and A/T on to set up; set GA N1 (N1 Limit Pg), use the "**recommended**" man. speeds
- **CLEAN:** set 40% N1 at VM Flaps 0
- **DEPARTURE / TURNING:**
  - Flaps **5**, **gear** down, set 50% N1 at VM Flaps 5, **then** 20° bank
- **LANDING:**
  - Flaps **30**, **gear** dn, set 50% N1 at VM Flaps 30 (Target)
- **note** pitch and FF, then A/P and A/T off, **set** N1
  - Have V speeds **established** (**not** sliding thru a/s) **before** pulling back to N1 settings.
- **maintain** altitude or slight climb; **trim** out during maneuver
- **at stall:**
  - **firewall** throttles, call "**Max Power, Stow Speedbrake**"
  - **level** wings; **maintain** altitude!
  - push nose if pitch up, **retrim**, return to **entry** pitch angle
  - return to initial 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

UNUSUAL ATTITUDE RECOVERY:
- call "**Attitude**"; A/P **and** A/T **off**
- "fly to diamond" aileron **first** then rudder
- nose high = **increase** bank to no greater than 90°
- nose low = **reduce** bank **before** adjusting pitch
- **no** back yoke pressure until bank **less** than 10°
- adjust thrust; differential thrust, if **below** crossover point (**add** power to **low** wing)

ORDER OF LANDING BUGS (5):
- **[NG]** line selecting "Ref' will set bugs
- **80 kts**, put bug for "80k" call out
- **VREF [R]** bug for landing flaps (use Appr Ref page)
  - normally VREF 30 or 40; single engine is VREF 15
- **Target** (Orange Bug) +5 min, +20 max; **if** using A/T (**throughout** autoland approach and landing), add **only** +5
  - if ice on tail, will have to **add** +10 to target (add 10k **OR** wind + gust, whichever is **greater**, 20k max)
  - this is your "**go around**" speed with a **single** engine
- **VREF + 15k [white bug]** (for flaps 30 **or** 40)
  - this is your "**go around**" speed with **both** engines
  - this is your eng. failure in landing configuration speed
- **VM Flaps 0 [UP]** ("top bug": 210, 220, or UP)
- **see** takeoff section for "recommended" **fixed** flap man speeds

TARGET SPEEDS:
- **VREF + 5** (1/2 wind + gust, 20 **max**, 15k max for -800,-900)
  - example: "wind 12G20" **use** 6 + 8 = 14
  - **if** using A/T (autoland only) **only** add +5k (regardless of winds; A/T compensates)!
  - Single Engine: do **not** use A/T

FINAL APPR. SEG. (FAS): see Ops Man Sec 2
- FAS = Final Approach **Segment** (FAF = Final Appr **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. Note: **no** "look see" option!
- If **after** FAS, and visibility goes below minimums, **may continue** to DA / DDA / MDA (and land **if** visibility OK).

VISIBILITY: see Ops Man Sec 2
- Use CAT-C (use CAT-D for circle)
- All approaches based on **visibility**, ceiling is advisory.
  - there are **different** mins if TDZ, CL, or ALS are inop!
- Must have visibility to **start** approach. If visibility goes below mins **after** FAS, continue to DA (for NP to MAP).
- RVR: reported only if 6000 or less **or** prevailing visibility 1½ mile or less. Otherwise, ask for it.
- **Current** visibility governs:
  ex: "RVR 2400, variable 1100" = you are OK to land
- For **circle**, must have **prevailing** visibility (avg airport viz)

GENERAL APPROACH GUIDELINES:
- **Approach Briefing** (other pilot flys, you brief): weather / alternate; runway conditions / required lighting; STAR / Approach: setup, freq / courses, altitudes; 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
- **Capt** briefs Monitored Approach; **FO** briefs Jepp plate
- Considered "**on**" Final Appr Course (to **start** descents): ILS/VOR: within **1 dot**
- You should be 200' AGL over end of strobes (about **1/2** mile from end of runway), **and** 50' AGL over threshold.
- Jepp plate DA(H): DA = decision altitude (H) = HAT
- **Monitored Approach IF**: ≤2400 RVR; NP ≤1sm / 5000 RVR
- If RVR is 2400 **or less**, then brief to **lowest** category minimums capable (ie: Cat II, even if Cat I is legal)
- **Use** QRH Approach Briefing matrix to set up, call outs, mins, etc
- Monitor FMA for capture modes! Be configured by OM
- **PAR**: use MCP Hdg and Vert Spd; ATC gives mins; can build in CDU for reference only

ILS CAT I: (single autopilot; **not** coupled)
- downwind, "**Flaps 1, Spd**"; base "**Flaps 5, Spd, Appr. Chk**"
- "**cleared**" for the appr **and** on **intercept** (use 30° hdg): call "**VOR LOC**" (**prior** to 5° of course), "**Appr Check**", at Loc capture, go "**APP ARM**"
- **at** Loc capture and altitude hold, **or** glide slope intercept, **set** missed approach altitude
- **at** 1½ dots below G/S: "**Gear Dn, Flaps 15, Spd, Ldg Chk**"
  - **Single Engine**: at 1 dot below G/S: "Gear Down, Flaps 15, **Target**, Ldg Chk"; Target is VREF 15 + additive
- **at** G/S capture: "**Flaps 30/40, Target**" (set MCP to MA alt)
  - EFIS: **must** have Loc capture **before** you can capture G/S.
  - flaps 40° if low ceiling & vis (**Cat II, IIIA**), short & slick rwy
- CAT I: If see **strobes**, may go **below** DA to100' **above** TDZE, but **then** must have visual reference (**one** of ten items: lights, markings, etc), **or go around**. For Cat II, you must have visual reference **at** DH, which is 100' above TDZE)
- **ILS PRM:** Precision Runway Monitor (**use** QRH briefing matrix)
  - Brief Jepp pg, MEL (ILS, TCAS and/or Transponder, 2 VHF)
  - #1 VHF on "Tower", #2 VHF on "Monitor"; set volume
  - TCAS on "TA"
  - Hand fly "Breakouts": Do **not** push TOGA, A/P **off**, A/T **on**, configure **after** on new heading. PM turn FD's off, reset MCP (Hdg, Alt), FD's on, Lvl Chg, Hdg Sel

CAT II / IIIA CRITERIA: ("coupled" means A/P "flys")
- **use** QRH approach briefing matrix
- Captain set up, configure, give to F/O to fly early
- **Only** do IIIa approaches in the NG aircraft: -7, -8, -9
- flaps **40°**, seat up, lights off until after touchdown
- **CAT II:** use **one** A/P **CAT II, III Autoland:** use **both** A/Ps
- **Autoland** = use both A/Ps: "B" A/P 1st, "A" after "APP" mode; Go Around = TOGA, call for flaps, gear, monitor. On missed, **A** A/P pops off, **B** A/P is now the master.

NON PRECISION APPROACH:
- **follow** NP Approach Setup matrix in QRH!
- approach must show "gradient path" (GP) or can **not** use VNAV
  - if **no** GP, **use** prebriefed VVI rate on MCP (Vert Spd)
- set mins (DA, DDA, MDA) on Baro Altimeter
  - **DDA** = Derived DA = MDA + 50'
  - **may** use "ballflag note" authorizing VNAV DA in lieu of MDA (ie: do **not** add 50' to MDA for DDA, just use the MDA value)
  - radar altimeter set to 250' for terrain warning
- RNAV: **with** VNAV use **DA**; **without** VNAV "MDA" use **DDA**
- **Back Course**: put in published **front** course; **Use** "HDG SEL" or "LNAV". Do **not** use "VOR LOC"!
- downwind, "**Flaps 1, Speed**"
- base or IAF outbound, "**Flaps 5, Speed**"
- when "cleared" for the approach and intercept heading:
  - "**VOR LOC**" **OR** "**L-NAV**"; call for "**Appr Check**".
  - use V/S (**not** LVL CHG) to descend to next altitudes at 1000 to1500 fpm (**no** >1500 fpm, or GPWS will go off!)
    - no greater than 1000 fpm below 1000' AGL
- at Loc capture and alt hold, **set** next altitude for stepdown
- at **FAF altitude** ("ALT HOLD") & **cleared appr**: MCP to **"0"**
  - may have to **configure first** to get down
- **4 mi from FAF**: "**Gear Dn, F15, Speed, Ldg Chk, VNAV**"
  - **Single Engine**: at **1½** mi from FAF, call for "Gear Down, Flaps 15, **Target**, Ldg Chk, VNAV"
- **2 mi from FAF:** Flaps 30 or 40
- if "VNAV SPD" shows, select PATH on Descent page; will revert at GP intercept
- if problems, use Vert Spd with prebriefed rate to follow PDI (path deviation indicator)
- **Call Outs for NP**:
  - "**1000, 500, 400, ...**" (above TDZE from baro. alt.)
  - "**Approaching Minimums**" (DDA / MDA + 100')
  - "**Minimums**" (at DDA / MDA)
  - "**Missed Approach Point**" (approach lights **not** in sight)
  - "**Approach Lights in Sight**" **OR** "**Runway in Sight**"
- **disengage A/P** by 50' below DA / DDA / MDA, **disengage A/T** before 50' AGL
- Missed Approach: be sure to set missed approach altitude!

CIRCLING APPROACH:
- **Use Cat D or** CAL minimums **1000' / 3 miles**, **w/greater**
- Accomplish all **within** 2 miles
- Must have prevailing and / or runway visibility. Ceiling required only if noted (Jepp), but circle may **not** be started unless **visual** reference to runway at MDA
- If missed approach, **turn** toward **landing runway** and continue until established on MA procedure of original approach

MISSED APPROACH:
- **Must go around if**: (at minimums, and can not land, or….)
  - **not** stabilized "in slot" by 1000' AGL: glide path, trim, configuration, AS +15k/-5k, VVI >1500fpm, or < 40% N1
  - **GPWS**: Anytime you get a "whoop whoop pull up, terrain, **or** configuration" warning you **must** do a go around. May disregard if **above** 500' day VMC; for **other** GPWS warnings you pull up **until** the warning goes away).
  - **CFIT / "TERRAIN":** "**Max Power, Stow Speedbrake",** A/T / AP off, roll level, 20° pitch, keep gear and flaps, call out radar altimeter **"500 climbing / descending"**
- "**TOGA**, **Flaps 15, Chk Pwr, Pos Rate, Gear Up, Chk MA Alt**"
  - **Single Engine**: "**Flaps 1, Chk Pwr, Pos. Rate, Gear Up"**
- fly VREF + 15 (white bug); 1 eng: fly target
- **at 400'**: "**HDG SEL**" or "**LNAV**"
- **at 1000'**: "**Lvl Chg, Set top bug, Flaps 5**"; "**Flaps 1, Flaps Up** (optional), **After T/O Check**"
  - **Single Engine at 800' or** obstacle clearance altitude: "**Set top bug**" "**Flaps Up** (optional), **Max Cont Thrust, Abbreviated After TO Checklist**"
- **at 3000'** , call "**VNAV**"
- **rejected landing** is same, except **do not** attempt if thrust reversers were used

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• LANDING

LANDING INFORMATION:
- **VASI** (**3 lite**) 737 / use **near** 2 (**Far** 2 VASI for wide body)
- if given a "land and hold short of runway xx" clearance, you must have special LAHSO Jepp plate.
- braking action: **poor** = **no** room for error! **nil** = do **not** land!
- you may tend to flare too **high** if runway width is 200' due to depth perception; ie: keep it coming down!

LANDING WITH ENGINE OUT ON FINAL:
- AT / AP **off**, "**Flaps 15**", power **up**, 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')

WINDSHEAR:
- see windshear techniques in Takeoff section
- Target bug **set** for **normal surface** wind additive, **not** for A/S loss, but actually **fly** VREF + "A/S loss additive" (no > 20k) **OR** target, whichever is **greater**. Do **not** use A/T.
- ex: "Loss of A/S on final 10k":
  - wind 12G20 = +14 target; do **not** add to this
  - wind 12 = +6 target; fly an **extra** 4k

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Updates:

Nov 16, 2004: Check Ride hints: WBBBI; Reject: "Continue"; V1 cut: Failure in turn; Single Eng Missed Approach: call for Abbreviated After TO Check; Landing with engine out: 300'/mi ratio

Dec 15, 2004: new callouts for windshear, stalls, CFIT: "Max Power, Stow Speedbrake"

Feb 1, 2005: new RVSM flight levels

Feb 7, 2005: No Reduced Power changes