Boeing 737 CAP/FO Quick Review Cards (QRC) December 17, 2018

• INTRODUCTION

DISCLAIMER:

UAL nor the FAA endorse the QRC.

The QRC ("**Q**uick **R**eview **C**ards") are a best effort summary of many need to know United Flight Manual and Operations Manual items (certainly **not** everything, and **not** perfect)! The QRC's are for **review** purposes only and as always, the United FM and FOM are the absolute **final** word.

Recommend Bill Bulfer's excellent **737 Cockpit Companion** and his **FMC User's Guide**. You can contact Bill at: **billbulfer@comcast.net** or: **www.cockpitcompanion.com**

Comments or Suggestions qrc737@gmail.com

Good Luck with your training.

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• CHECKRIDE HINTS

• **VVM**: Verbalize, Verify, Monitor
• Use CRM! Call for QRH! On LOE: brief FAs, fill out logbook
• Carry updated Ipad, minimum charge 67%; 10% of Flight rounded up+10% reserve (FOM17.20)
• Go slow, rotate slow (TO and MA), configure early on approaches
• "nail" the ADI pitch, and constantly check it.
• WBBBBA: Weather, Build, Bug, Brake, Brief, Descent Checklist

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• PREFLIGHT

DEPARTURE BRIEFING (Use Briefing Card)

ALTERNATES (FOM 4.30 or QRG 10.3)

• **Need destination alternate if**: Forecast ±1 hr. ETA, destination **below** 2000' **or** 3 miles (gouge "123").
Exemption 8653: for lower 48 and return from Extended Domestic:
1-1-3 CAT I Aircraft: RWY Avail and Legal
1-1-2 CAT II/III Aircraft: RWY Avail and Legal
***Both no TS (PROB or Temp) +/-1 hr ETA
• **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.
• Reserve fuel for flight planning only. In flight, reserve fuel may be used for unanticipated delays with no legal consequences. (FOM4.40.6)
• IF dispatched w/o alternate and after departure, Destination WX degrades that would require an alternate, you may **continue**; however if landing minimums are threatened a new course of action is required (adding alternate/fuel stop) (FOM 4.30.1)
• Call **dispatcher** enroute if need to **divert**; they have "now time" data on weather, airports, and traffic situation
• **OpSpec C067** (FOM 4.30.4) Flight may be dispatched w/o alternate if: Destination forecast wx @ ETA to be at or above landing mins and two hour fuel reserve added.

CHECKS / INSPECTIONS: (FM Chap. 3)
• **INITIAL PREFLIGHT PROCEDURE** (p.3.20.1)
• **EXTERIOR INSPECTION** (p.3.20.5)
• **PREFLIGHT FLOWS & CHECKS** (3.20.12)
First flight **or** *crew change items: Fire Tests, CVR, Boeing Door, WX radar/PWS, O2 Mask.* (FM 0.20.1)
• **PREFLIGHT CHECKLIST** (FM 3.20.36)

Take Off PERFORMANCE: (FM 5.20)
• **Sabre Flight Plan Manager:** Final Weight Manifest is automatically sent to the ACARS printer along with the PERF INIT uplink when weights are finalized. Sabre applies MEL/CDL penalties, WX, Runway Clutter, Bleed configuration, and uses unbalanced field length for calculations. (Defaults are: Dry runway, Bleeds On, these defaults must be manually changed by the pilot requesting data.)
• Sabre uses actual conditions to calculate engine failure (EO) acceleration heights. Small changes in variables can affect the EO accel height s publish on the 10-7 page or the ACARS Takeoff Data message. Use the uplinked FMC accel height, unless it is superseded by a 10-7 page or Ops alert. (FM3.80.4)
•Anti-ice data is required when engine anti-ice will be used for T.O. or used prior to EO accel height. (FM5.20.12)
•Possible T.O. Flap Settings: 1, 5, 10, 15, or 25 (FM5.20.13)
•Request new T.O Data (FM5.20.14)
-Using Max Thrust & actual OAT is greater than TEMP.
-Using reduced thrust and actual OAT is greater than ASSMD TMP.
-Altimeter decreases by 1hPa or .03".

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•Engine Start:

• **Starter duty cycle:** On: 2 min (NG)/3 min (MAX): min 10 seconds **OFF** between start attempts. (FM1.30.12)
• Key start **events**: starter valve OPEN, N2, N1, OIL PSI rising, FF, EGT (within 15 sec.; hot 725°C), starter cutout 56% NG (63% MAX), OIL PSI by Idle.
Engine is stable at idle when EGT start limit redline is no longer shown. (FM3.50.2)
•**High altitude starts above 8400'**: An indication of N1 rotation, plus max motoring and a minimum of 20% N2 are required prior to introducing fuel to the engine. (QRH 160.9)
•**Engine Start-First Flight of Day (above 2000'):** If temperature is below 5° C/41° F. Ignition select switch to both (QRH Sup.)
• 3 min for engine warm up before advancing thrust lever to high power. 5 min if not flown in past 5 hours. (FM3.50.2)

MEL/CDL Applicapility :
For items discovered ***before* flight, maintenance must be notified and a new MRD received prior to take off. (FOM 5.20.2)
**Equipment that becomes inoperative during flight is *not* subject to MEL/CDL until after flight. (FOM 5.20.2)
• **MEL**: Minimum Equipment List: certain systems or components are inoperative (FOM5.10.2)
- 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

• **CDL**: Configuration Deviation List: Additional limitations with secondary airframe and engine parts missing. (FOM 5.10.2)

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•TAXI

•SMGCS: In effect when RVR below 1,200 ft., SMGCS or foreign equivalent chart required for RVR<600. RVR is not controlling for taxi operations. (FOM 6.10.3-4)
• Hold Short ILS Critical Area <800/2 Miles
•20 kt max for nose wheel steering (FM3.90.8)
•Normal straight taxi speed should not exceed 30 kts. (FM3.70.6)

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• TAKEOFF

RUNWAY ALIGNMENT: When lined up on the departure runway, both pilots will verify the AC symbol on the ND/MAP display is on the assigned RW and the aircraft and RW heading agree. This check meets the requirement of the FMC accuracy Check. (FM 3.90.1)

LOW VIS TAKEOFFS / ALTERNATE: (QRG)
• See LOW VIS takeoff minimums on Jepp plate 10-9A
• No lower than 500 RVR
• Need T/O Alternate: IF Departure field **below** landing mins. Must be within 400 Mile. (FOM 4.30.2)
•Minimum for T.O. alternate = **same** as regular alternate
•FO Takeoff Limitation: T.D. Zone RVR 1000', Rollout 1,000', Mid can substitute for an unavailable T/D or rollout. (FOM 14.10.6)

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NO REDUCED THRUST WHEN: (FM 5.20.11)
1. Gusty winds and strong crosswinds
2. Reported or suspected windshear
3. Snow, slush standing water penalty applied
4. MEL/CDL restriction prohibits use
5. MRD displays message stating MAX THRUST TAKEOFF DUE.
(When using "assumed" temp, throttles are set to reduced thrust; the bugs will **always** show maximum thrust)

ORDER OF TAKEOFF BUGS: (FM 3.80.5)
5 bugs displayed by FMC
- V1 **[1]** (Go / No Go, call "**V1**" at 5K **prior**
- VR **[R]** ("**ROTATE**")
- V2 Command Speed (Magenta Bug)
- V2 + 15 **[white bug]**
- Flap Maneuver Speed

•VNAV shall not be armed on the ground:
-If the engine failure procedure requires: Completion of a turn to a specific heading or established on a defined lateral course before accelerating. (FM 3.80.5)

•***Note:*** *L2 entries, and/or the selection of VNAV, cannot be made until all entries are made into the* **PERF INIT** *page.*

•*REF Page 2/2 – Use uplinked EO height. Standard acceleration height is 800 feet AFE.* (FM 4.40.15)

• **Max tailwind**: Up to 15k provided actual tailwind component does not exceed value authorized by ACARS TAKEOFF DATA MESSAGE. (FM 1.20.3)
• **Max recommended crosswind:** Takeoff:
*R/W Condition Code 6: "Dry": 34/33 kts
*R/W Condition Code 5: "Good": 25/25 kts
R/W Condition Codes 0-4: Look up in FM.
(FM 1.20.5-6)
• Exterior lights ON when cleared to **"line up and wait**".
• Stabilize N1 approximately 40%, than manually advance the thrust levers toward the takeoff thrust setting; when satisfied engine acceleration is normal (near vertical position) engage TOGA.
•**"Check Thrust", THRUST SET xx %**"(N1)
• "**100 kts"**, now reject **only** for "Engine Failure, Fire Warning or unsafe to fly"
•**"V1",** committed to Take off, hands off Throttles until "Gear up Call" (FOM3.90.2)
• **"Rotate"** at 2-2.5°/sec, 15° pitch, **maintain** V2+20k (FM3.90.3)
- Rotate S – L – O – W and **visually** look at end of runway for correct rudder correction.
- limit bank to 15° until V2+15 (White Bug).
-Hand back on the throttles: PF hands and feet on aircraft controls below 2500' agl. (FOM 3.60.5)

• **At 400ft**
Heading engages if VNAV was selected on the ground and LNAV was not used for the departure procedure.
- try to delay turns until 400' AGL (50' minimum for obstacles, engine out, noise abatement, adverse conditions)
• **At Acceleration Altitude** (Stanard is 800'), approx. 10° pitch, call **VNAV** (if not selected on the ground) **OR**, if VNAV is not available **or** not desired: "**LVL CHG, Set Clean Maneuvering Speed**, **Flaps____."** Retract Flaps on Schedule.
•"**Flaps UP: After Takeoff Check**", climb at VM 0 until 3,000' AFE
-A/P may be turned on **above** 800' AFE
• At 10,000ft or when cleared by ATC select "ECON CLIMB" when ready to accelerate (assuming L3 climb set).

• **NADP-1 Noise Abatement:** Need to check THR reduction and Accel HT on FMC Takeoff Ref page 2/2. Should uplink (FM 3.90.24)
1500': Thrust Reduction
3000': Accel HT: Aircraft accelerates
CALL: AFTER TAKE-OFF CHECKLIST
* Abandon NADP-1 procedure and fly appropriate profile for Emergency (FM 3.90.15)

REJECTED TAKEOFF:
• **Below** 100k (any abnormality should be announced: e.g., system failures, configuration, fire or smoke, wind shear, etc.)
• **After** 100k reject only for **Engine Fire**, **Engine Failure** OR any condition rendering the aircraft unsafe or unable to fly.
• **Captain** calls "**REJECT**"; and:
1. Closes thrust levers,
2. Disconnect A/T,
3. Use RTO autobrakes (if available),
4. Raise speed brake lever,
5. Apply maximum Reverse Thrust.
• Stay on runway, **hold** brakes
• **F/O** call **Tower**, **and PA** to "**remain seated, remain seated"**
• Captain call's for "**REJECTED TAKEOFF Checklist"**:
• consider brake cooling/engine fire/evacuation.

ENGINE FAILURE/Fire AFTER V1: (2.70.17)
• **ENGINE FAILURE**, maintain track (rudder), slow pitch up to 7-11°, positive rate, gear up, silence bell, V2 (orange bug) to V2+20k…
• **At 400'**: "**HDG SEL**", Fly appropriate ground track (add approx. 5 units of rudder trim towards good engine.
(If **FIRE**, may run **ENGINE FIRE CHECKLIST no earlier than 400' agl**) (FM 2.70.26)

• **At Acceleration Altitude**: VNAV will accelerate: if VNAV was not used **"SET CLEAN MANEUVERING SPEED"**
- **Retract flaps on schedule,**
• **"Flaps up" (next call *after* Vmo is reached)**
• **"SET MAX CONTINIOUS THRUST**, **ENGINE FAILURE Checklist."** (15° bank until V2+15)
-**Declare EMERGENCY**, sq. 7700
- **Failure in turn:** YOKE first, then RUDDER.
- **No turns below 1500' AFE, unless ATC can provide terrain and obstacle clearance.** (FM 2.70.26)

WINDSHEAR: (FM 4.10.44 – 4.10.47)
When the words "microburst," or "shears of 30 kts" or **>** are being broadcast, T.O. and descents below 1000' AGL for the affected runway are prohibited. Execute a M.A. if below 1000' AGL. (FM 4.10.44)
Committed to takeoff, and windshear is encountered prior to the actual gross weight (GW) VR: Accelerate to the actual GW VR, but do not delay rotation beyond 2000' usable runway remaining. (FM 4.10.46)
(Ref: last 3,000" R/W centerline lights alt red/white, 2000' R/W edge lights amber, last 1000ft centerline lights all red. (Use these lights as reference in windshear conditions)

•FM revision 5-18 29 June 18 removed the VNAV restriction for arming VNAV on the ground in windshear conditions.

• Enhancements / Reactive = "windshear" on Grnd. Prox. test
• Predictive = "W/S ahead" on radar test
•Use **longest runway**, flaps 5, full thrust, Flight Directors **on**, use higher VR MAX on ACARS T.O. DATA (FM 4.10.45)

•**Windshear ahead** = avoid, go around (**trim** and **clean** up)

•**In Windshear: No Config changes, perform Escape Maneuver**

• **Windshear Escape Maneuver:** (FM 4.10.51)
"**MAX THRUST, STOW SPEEDBRAKE**",

•**With A/P and A/T engaged**: Press TO/GA, verify: TO/GA on FMA, GA thrust set, retract speed brakes, and monitor A/C perf.
• **Manual Flight**: Press TO/GA, aggressively apply Max Thrust (Mech. stops), disconnect A/T, simultaneously roll wings level and rotate toward an initial pitch of 15°, retract speed brake, follow F/D TO/GA (if available).
-Do not change trim or configuration until w/s is no longer a factor. -Monitor vertical speed and altitude - Do not attempt to regain lost airspeed until W/S is no longer a factor.

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• ENROUTE

•FL 180: Fuel Panel Check (FM3.110.2)

•Required Dispatch Reports (FOM 4.50.4).
1. Actual ETA will exceed planned ETA > 15 minutes
2. Cruise altitude varies by 4000' or more from flight plan
3. Lateral deviation from planned route exceeds 100 miles
4. Any enroute failure of a flight deck fuel quantity indicator
5. Apparent all Contingency Fuel will be used
6. Flight encounters weather significantly different than forecast, or any time moderate or severe turbulence is encountered.
7. Flight is assigned enroute or arrival holding.
8. Unplanned or sustained use of deicing/anti-icing systems
9. Assigned a CDR

•Turbulence: When FA are to be seated the command **must** be given over the PA (FOM7.10.2)
•Unexpected: not enough time to return to FA J/S: "FA be seated immediately, be seated immediately". FA stop, drop and hold on.
•Impending: "FA's, take your jumpseats" FA will stop service, move carts to safe location and take their jumpseats.
•FMC: INTC CRS always type **inbound** course, **not** radial.
• **Crew Oxygen**: (FOM3.60.3)
- **Over** FL250 to 410: one pilot must **wear** unless 2 pilots in seat.
- Cabin altitude **over** 10,000': **both** pilots wear
• **DIVERSIONS:** to change destination station.
FMC RTE page / ACT RTE page1/3 - ACARS / INFLIGHT / DIVERSION page –
• Be sure to figure "**bingo** fuel"
B urn **A** lternate **R** eserve

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•Descent

• OFP indicates Bleeds off Landing: bleeds off landing is required unless coordinated with dispatch. APU supply pressurization prior to glide slope Intercept altitude. (FOM 4.10.2)

•Landing distance must be checked: (FM3.130.3-4)
1. Landing at other than planned destination
2. Available R/W > 9,000 ft.
3. Reported Braking action < dry (Code<6)
4. Using autobrakes < 3
5. Non-normal affecting stopping distance,
6. Landing with tailwind
7. Engine inop: for missed approach proc.

ARRIVAL BRIEFING - (See/use Briefing Card)
• WBBBBA: Weather, Build, Bug, Brake, Brief, Descent Checklist.
• ACARS Landing data accounts for MEL/CDL items that have been deferred by Tech Ops. Applicable MEL/CDL items are listed on the Landing Data message. (FM3.130.4)
Normal land flap 30 NG/40 Max (FOM3.130.4)
TARGET SPEEDS: (FM 3.130.5)
• VREF + 5 (1/2 steady state headwind component + full gust , not to exceed 15 knots or flap placard minus 5 knots if lower)
ORDER OF LANDING BUGS (5): (FM 3.130.4)
• **REF** for landing: Normal is VREF 30 NG/40 MAX: *S.E. is VREF 15.*
• **Target** (Command Speed): +5 min, +15 maximum; this is your S.E. go around speed.
- Using A/T for auto land, add **only** +5
- Use VREF+5 knots for any reported tailwind.
• **[White Bug] VREF + 20k** (800/900) **+15** (700)
- This is your "**go around**" speed with **both** engines and your SE landing config. speed.
Reference Airspeed Bugs: (FM5.20.1)
• **VM:** Flaps 0 [UP]=Vref 40+70
Flap 1= Vref40+50
Flap 5=Vref40+30
Flap15=Vref40+20
Flap 25=Vref40+10

FINAL APP. SEG. (FAS): (FOM 6.100)
• FAS = Final Approach **Segment** (FAF = 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 intercept the inbound course.
• M**ust have** approach **minimums** to **start** approach. Note: **no** "look see" option!
• If **after** FAS, visibility goes below minimums, **may continue** to DA / DDA / MDA and land **if** inflight visibility is OK on CAT I & CAT II. CAT III must have required RVR to land.

GENERAL APPROACH GUIDELINES:

• **STANDARD APPRCH CALLOUTS** (FM3.10.1)
- Cleared for the approach no later than Auto/PM "2500" RA – PF: "Visual approach (r/w)_____" or "____(approach),(r/w)_____,(final approach course),____, minimums___BARO/RADIO. PM: "____in/hPa"
- **Auto/PM**: "**1000**" **RA** - **FP**: **"Cleared to Land (runway)" -OR- "No Landing Clearance"**
- AUTO/PM "500" RA - PF "Stable" or "Unstable going around "/ "Flare Armed, stable" (AL)
- **PM** "**Approaching Minimums**" (DDA / MDA + 100')
- **Auto/PM**: "**Minimums" PF "Landing" or "Going Around"**
• **disengage A/P** by 50' below DA / DDA / MDA.
• **disengage A/T** before 50' AGL.

Stabilized APRCH Limits: (FOM 6.80.2)
•By 1500 ft. AGL/RA or the FAF
-Landing gear down
-Airspeed no greater than 180 KIAS
•By 1000 ft. AGL
-Final landing configuration
-Landing checklist complete
-Airspeed +15 to -5 knots of target speed
-On lateral profile
-On vertical profile, or correcting max VS:
*+/- 300 FPM
*+/- 1 degree
*sustained V/S > 1200 fpm
-PM shall announce deviations
•At or below 500 ft. AGL/RA:
-Except for momentary airspeed and descent rate deviations, PM announces "Go around" and reason (i.e. "flaps")

• All approaches based on **RVR/Vis**; unless noted, ceiling is advisory. (There are **different** minimums if TDZ, CL, or ALS are inop!)
• "Basic" RVR governs and overrides tower visibility: ex: "RVR 2400, variable 1100, tower vis ¼"= you are legal to land based on RVR.
• Must have visibility to **initiate** approach. (If visibility goes below minimums **after** FAF, continue to DA/ MAP.) (FOM 6.100.2)
• Use proper Category for Straight in Approach (C/D), all Circling Approaches are Category D. (FM 1.20.1)
• For **Circle to Land Maneuver**: Use the higher of category D minimums or 1000 ft. HAA and 3 sm. (FOM 6.100.4)
• Low visibility approaches: are defined as those approaches with visibility minimums less than CAT I. Autoland approach procedures are required and the approach with the lowest minimums that the aircraft and pilots are authorized to conduct must be briefed. (i.e.: Cat III even if Cat II is legal) (FM3.165.1)
• If conditions are below 4000 RVR or ¾ mile visibility, Autopilot, or F/D in the approach mode is required. (FOM 6.100.1)
•Do not use level change on approach below 1000 ft. AFE. (FM3.150.2)
• Items to brief: Use Briefing Card!!
• Considered "**ON**" Final Approach 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
• Monitor/Verbalize FMA for capture modes!
• **Use** QRH Approach Briefing matrix to set up, review call outs, mins, etc.

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ILS/GLS Approach:
• Downwind, "**FLAPS 1**"; base leg "**FLAPS 5,**
• "**CLEARED**" for the approach **AND** on **intercept HDG** (within 30° hdg): arm "**APP**"
• **At** 11/2 dots below G/S: "**GEAR DN, FLAPS 15**"
• **At** G/S capture: "Set TDZE":
•By 1,000' agl **Flaps "__" Landing Checklist**
• AT 1000' agl "**Set missed approach altitude"** "**Cleared to land /No landing Clearance**"

• CAT I: If you see **strobes**, may continue to 100' **above** TDZE, but **then** must have visual reference to land **or you must go around**.

ILS PRM: Precision Runway Monitor (**use** QRH briefing matrix)
•Brief Jepp page and required Equipment
•#1 VHF on "Tower", #2 VHF on "Monitor";
•TCAS on "TA/RA"
•Hand fly "Breakouts": Do **not** push TOGA, A/P **OFF**, A/T **ON**, configure **after** established on new heading. PM turn FD's off, reset MCP (HDG, ALT, FD's on, LVL CHG, HDG SEL).
CAT II / III Autoland CRITERIA: The Captain is controlling the autopilot during the approach and performing a Coupled autoland.
• **Use** QRH approach briefing matrix.
• CAT II, you must have visual reference **at** DH, which is 100' above TDZE .
• **Autoland** = use **both** A/Ps: "A" A/P 1st, "B" after "APP" mode is armed; Go Around = TOGA, call for flaps, gear, monitor A/P.
•On missed, "**B"** A/P disengages, and "**A"** A/P is now the master.
• Flaps **40°**, seat up, lights off until after touchdown

NON ILS/GLS APPROACHES: :
•**Below 1000/3:** A/P must be used on NPA. **(FOM 6.100.8)**
•**RNAV (RNP) App:** A/P is **mandatory** from IAF to DA **regardless** of WX except:
1. Runway in sight. A/P should be used on RF leg. Fly published Lateral and Vertical path.
2. Parallel runways: A/P can be disconnected when R/W in sight **and** aligned with R/W centerline. **(FOM3.172.1)**

• **BASIC FMC SET-UP:**
•Verify CRZ ALT was achieved.
•Select procedure and transition.
•Verify (GPx.xx) is available.
•If RNP is controlling, refer to approach plate for appropriate value. Manual entry may be required. (.3 RNP to as low as 0.10 RNP.)
•If temp < -15°C refer to FOM cold temperature altimeter corrections – N/A for RNP approaches.
•Distance rings from FAF, as desired.
•VREF select.
•WIND CORR select (if other than +5 knots).
•Set DA or DDA (MDA+50 feet).
• **RNAV (RNP): QRH Setup**
• Radios: Inhibit all VOR & DME updating from NAV OPTIONS page 2 prior to IAF.
•Notams: If dispatched for approach, verify RAIM prediction in flight papers or via ACARS.
•Altimeters: Set local, +/- 100 feet and verify CA and FO altimeters are within 100' before passing FAF, 2 Radar Altimeters required.
•Verify GPS updating from FMC NAV STATUS page 1 prior to IA. RNP manually set per approach Plate (as low as 0.10 NM)
–RNP >/= 0.15 NM can be hand flown.
- RNP < 0.15 NM **two autopilots** required to begin approach. Navigate on 10NM scale or less (if appropriate). PROG page 4: Monitor
– XTK ERROR not to exceed RNP value left or right of course (IAF Inbound).
– VTK ERROR not to exceed 75' from the PDI inside the FAF. ***Notes:*** *V/S back-up N/A.*
-Execute missed approach if: UNABLE REQD NAV PERF –RNP.
-FMC DISAGREE, or any VERIFY POSITION alert message from IAF inbound or continue visually if runway in sight.
-Loss of LNAV or VNAV path guidance on both displays and runway NOT in sight (FAF inbound).

•Cleared for the Approach (outside IAF) **with LNAV/VNAV (path) engaged** set FAF altitude. Once inside IAF set "TDZE", to nearest 100 feet above in the MCP window.
• **RNAV (GPS, GNSS, VOR/DME, NDB):** Manually set RNP 0.30 NM.
-Navigate on 10 NM scale or less (if appropriate).
- PROG page 4: Monitor XTK ERROR < 0.3 NM (IAF inbound)
• **VOR, LOC, LDA, SDF, NDB:** Raw data, if available, must be monitored.
– LOC BC app. not authorized. (FM1.30.18)
– When unable to monitor raw data on the Final Approach Segment (F.A.S.) of a VOR or NDB approach: VOR & NDB F.A.S procedures as outlined in the FOM must be followed.
• If "VNAV SPD" shows, select PATH on Descent page; VNAV will revert to VNAV PATH at GP intercept.
• Will GP cross at or above step down fix? If not, use VS to cross Restriction. DO NOT add ANY fixes after FAF!
• Approach must show "gradient path" (GP) or **cannot** use VNAV

• **TRAFFIC PATTERN: Non ILS/GLS**
• Downwind, "**FLAPS 1**"
• Base or IAF outbound, "**FLAPS 5**"
• When "cleared" for the approach and on intercept heading (within 30◦)

LAVSFT:
- Lateral: Lateral VOR/LOC or LNAV
- Altitude: TDZE if VNAV Path or FAF/FAP/GP Intercept if not above.
-Vertical: VNAV or verify Crossing Restrictions.
-Speed: Speed intervention (if installed) may be used.
-FMA's: Confirm FMA's match briefed mode
-TDZE: Set TDZE once established on app.
• Approach must show "gradient path" (GP) or **cannot** use VNAV
- If **no** GP, **use** pre-briefed VVI rate on MCP (Vert Spd = VS)
Suggestions when VNAV not available:
- No greater than 1000 fpm below 1000' AGL
- At LOC/LNAV capture and ALT HOLD, **set** next altitude for stepdown.
- **4 mi from FAF**: "**Gear Dn, F15, verify LNAV- or - VOR/LOC is engaged, Verify appropriate altitude on MCP (FAF Altitude if not in ALT Hold or DDA rounded up if in ALT Hold)**
2 mi from FAF: Flaps 30 or 40, Target "Landing Checklist"
• At **FAF** & **cleared app**: verify MCP to DDA rounded up and VS to briefed VS for descent.

- **Single Engine**: at G/S capture: **"GEAR DOWN, FLAPS 15, LANDING CHECKLIST"**; Target is VREF 15 + additive

Engine Failure ON FINAL Approach: (FM 2.70.35)
• AP / AT **OFF,** "**FLAPS 15**", Thrust **up**, (approx. 15%) VREF + 15k (700): VREF +20k (800/900.) "**WHITE BUG"**, GPWS inhibit. If stable may continue to landing **OR** if unstable: Normal single engine go-around will be accomplished.
• Visual single engine glide path: 300'/mi ratio (ex: 6 mi = 1800' AFE)

•MISSED APPROACH
• **Must go around if**: at minimums and cannot land, or at or below 500' AGL outside Stabilized Approach Criteria.
• **GPWS**: Anytime you get a "whoop - whoop pull up, terrain, or configuration" warning you **must** do a go around.
** May disregard GPWS warning if **above** 500' agl day VMC: for all **other** GPWS warnings, you perform escape maneuver until warning stops.
Normal Go Around:
•"**Going Around, Flaps 15, Check Thrust,**
• **"Positive Rate, Gear Up, Set MA Altitude**" **(fly White Bug)**
• **At 400'**: "**HDG SEL**" or "**LNAV**"
• **At 800'**: "**LVL CHG, SET CLEAN MANEUVERING SPEED, FLAPS 5**" (retract flaps on schedule)
•**After T/O Check**"

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(-9ER/MAX) ALT. GO-AROUND: (QRH 160.1)
•Dual Channel A/P approach approved
•Plan Flaps 30 landing with a flaps 5 go-around if required.
•Follow normal go around procedures except, when going around, call "Flaps 5."

- Single Engine Go Around:
• "**FLAPS 1, CHK THRUST,**
•**POSITIVE RATE, GEAR UP, SET MISSED APPROACH ALTITUDE"**
• **At 400'**… "**HDG SEL**"
• **At Obstacle Clearance Altitude (minimum 800'):** "**SET CLEAN MANEUVERING SPEED**"
•"**FLAPS UP**"
• "**SET MAX CONT. THRUST, ABBREVIATED AFTER T/O CHECKLIST**"
(15° bank to White Bug).

•LANDING INFORMATION
FO landing limitation: RVR 1800 or ½ mile visibility. (FOM 14.10.6)
• **Max recommended crosswind: Landing**:
*R/W Condition Code 6: "Dry": 40/37 kts
*R/W Condition Code 5: "Good": 40/37 kts
R/W Condition Codes 0-4: Look up in FM.
(737 FM 1.20.5&6)
• LAHSO (ops spec A027) information on 10-7 page. (FOM 6.60.3)
• Landing prohibited with braking action reported as Nil (FOM7.20.1)
• You may tend to flare too **high** if r/w width is less than 200' due to depth perception.

WINDSHEAR: See W/S Escape Maneuver Takeoff section.
• Target speed for the approach will be based on the surface wind additive or the reported loss, whichever is greater, not to exceed VREF+15. (FM 4.10.39)
• ex: "reported Loss of A/S on final 10k":
- H/W 12G20 = +14 target; Target is +14
- H/W 12 = + 6 target; Target is now +10 for A/S loss

• EMERGENCIES
GENERAL: (FOM 2.10.1)
• IF possible: F/O **flies** on A/P and handle routine ATC comm, Capt. **manage** problem.
• Declare an emergency **IF**:
-Critical system redundancy is lost
-Engine Failure/shut down
-Engine, APU, cargo or wheel well fire
-Persistent smoke or fire on board
-Emergency Descent
-Cabin prepared for evacuation
-Non-normal situation requiring more time in a critical phase of flight.
Give: Reason, Fuel (in minutes, ex.: 17.3 = 173 minutes), SOB, Sq. 7700
• Notify Company **and** FA of emergency
• Irregular Ops Report (**IOR**) (FOM 12.30.1)
• **On any non-normal, always call for "QRH"**

IMMEDIATE ACTION ITEMS: (FM 0.30.10)
• If immediate action items are required, the PM will verbalize and accomplish the immediate action items. The pilot flying will then call for the checklist when:
-The aircraft is stable.
-Aircraft is not in a critical Phase of flight.
-All immediate action items are complete.

AUTOMATIC UNLOCK
(Boeing Flight Deck Door)
• **FLT DK DOOR lock selector ……Rotate to DENY and hold for 1 second**

FLIGHT DECK DOOR EMRG ENTRY ACTIVE
(Jamco Flight Deck Door)
• **Flight Deck Door HARD LOCK Switch …PUSH**

CABIN ALTITUDE WARNING OR RAPID DEPRESSURIZATION / EMERGENCY DESCENT
• **Oxygen Masks & Regulators ……ON, 100%**
• **Crew Communications…… ESTABLISH**
• **Seatbelt Sign …… ON**

• Emergency Descent: If structural integrity in doubt, limit airspeed.
• Descent gouge **"CONT, Spin, LVL CHG, Pull, Pull, Advise"**
-Ignition to **CONT**; **SPIN,** MCP to 10,000' or MEA; Select **LVL CHG**, descend at VMO/MMO; **Pull** Thrust Levers to Min, **Pull** Speed Brake to Flight Detent, **Advise** ATC.

LOSS OF THRUST IN BOTH ENGINES
• **Engine Start Switches (Both) ……FLT**
• **Engine Start Levers (Both) ……CUTOFF**
• **When EGT Decreases:**
Engine Start Levers (Both) …….IDLE DETEND

Notes: (next column)
• **Really** have dual engine flameout?-**OR- loss of 2 Generators!!**
- N1 **and** EGT gauges **spool down**, "Low Oil PSI" lights up…
- If in **doubt**, push Thrust Levers up to see if you get **response**!

APU FIRE
• **APU Fire Switch ……..CONFIRM……PULL, ROTATE & HOLD**
-Rotate to the stop and hold for 1 second
• **APU Switch……OFF**

SMOKE, FIRE OR FUMES
• **Oxygen Masks and Regulators … ON, 100%**
• **Crew Communications ……Establish**

EMERGENCY SIGNALS:
• When a T.E.S.T briefing is required, alert lead F/A via interphone or PA. Once briefed, the lead F/A will relay the briefing to the other F/A's and assign responsibilities

"**T-E-S-T**": **T**ype of emergency, **E**vacuation (if necessary?) **S**pecial Instruction, **T**ime to land.
• Brace signal + 30 secs: "**BRACE! BRACE! BRACE!**"
• PA "**REMAIN SEATED, REMAIN SEATED**" = **Do not evacuate**

EVACUATION COMMAND:
• PA "**RELEASE YOUR SEATBELTS AND GET OUT"** (F/A will specify which exits to use)

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

SECURITY: (FOM 11.10.1)
• Inflight Disturbance: OSIR report any time Law enforcement meets the aircraft.
• **Inflight** Security Coordinator is **Captain**.
• **Ground** Security Coordinator is **Station** Duty Manager.
• **Bombs / Sabotage**: (FOM 11.50.1)
Least risk bomb location: centered right aft galley door (2R)
• **BOMB ON BOARD** (FM 2.05.2)
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• SUPPLEMENTARY
ETOPS:
• Use ETOPS procedures outlined in (FM 3-1)
HOLDING NOTES:
• "Standard" = **Right** turns
• Must start to slow down within 3 min. of fix. VNAV will slow down for you.
(Should receive holding instructions within 5 minutes)
• **Speeds**: MHA thru 6000'' = **200k** max;
> 6000' thru 14000' = **230k** (210k where published);
>14000' = **265k**
• **Inbound times**: 14,000' or **less** = **1 min**; **over** 14,000' = **11/2 mi** (Adjust Outbound time)
- Small box with number is published time in minutes for pattern.
• **Call**: "Position, Time (Z) and Altitude" upon entering hold.
• If no pattern charted and no instructions, hold **standard pattern (Right)** on **inbound course** to fix, at **last assigned altitude.**
• Be sure to figure "**bingo** fuel" to start diversion! (Burn + Alternate + Reserve)
• Send message to Dispatch

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TRAINING: (FM 4.70.)
- CFIT / "TERRAIN: "MAX THRUST, STOW SPEED BRAKE"
AT / AP off, roll level, 20° pitch, keep gear and flaps, call out any trend toward terrain contact**.** When clear of terrain, slowly decrease pitch and accelerate.

UPSET RECOGNITION AND RECOVERY:
Undesired Aircraft State:
-Pitch>25° nose up
-Pitch >10° nose down
-Bank angle >45°
-Less than the above, but flying at an airspeed inappropriate for the conditions.

Recovery Strategy:
"Upset"
Autopilot and Autothrottle disconnect
"Push" - until light in seat
"ROLL" - to orient lift vector
"THRUST" – to manage energy state
"STABILIZE" – to attain control and desired state of flight

Memory Recall Limitations (FM Section 1)

***Max Operating Pressure Altitude**: 41000

***Max Tailwind: T.O. and Landing**: 15 Kts

***Recommended Severe Turbulence Penetration speed:**
-Cruise: Turb. N1 Setting from Cruise page
-Climb & Descent: 280kts/.76 Mach

***Crosswind Limitations:** Blended Winglets/Split Scimitar Winglet:
• **Takeoff:**
*R/W Condition Code 6: "Dry": 34/33 kts
*R/W Condition Code 5: "Good": 25/25 kts
• **Landing:**
*R/W Condition Code 6: "Dry": 40/37 kts
*R/W Condition Code 5: "Good": 40/37 kts

***Ice and Rain Limitation:** (visible moisture)
-OAT 10 degrees or below on ground
-TAT 10 degrees or below in flight

***Autoflight limitation:**
1. Takeoff or missed approach do not engage autopilot below 800' AGL
2. ILS/GLS, no autoland: 50' AGL
3. Non-precision: 50' below MDA/DA

***Auto-land Max winds Flaps 30 and Flaps 40.**
Head wind: 25 Kts
Crosswind: 15 Kts
Tailwind: 10 Kts***

***737-900 Aircraft 401-412 flaps 30 tailwind further restrictions:
10 Kts to 4000'
5 Kts from 4001 to 6000
O Kts above 6000

*Max flap extension Altitude is FL200
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