

# Flugdurchführung & Procedures

Vorlesung 8

Blockseminar A320 Operationelle Systembedienung  
Universität Würzburg / Informatik VIII

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# Übersicht

- 1. Vorbemerkung**
2. Inbetriebnahme
3. Checks
4. Triebwerksstart
5. Rollvorgang
6. Flug
7. Landung

# Vorbemerkungen

1. Verfahren sind in Anlehnung an Original-Airbus Verfahren mit Berücksichtigung der lokalen Umstände des Simulators an der Universität Würzburg erstellt.
2. Die Verfahren sind nicht vollständig und stark vereinfacht.
3. Ein Großteil der Systemchecks wurde ausgelassen, da von einem Funktionieren der Systeme ausgegangen wird.
4. Arbeitsteilung wird grundsätzlich gemäß CCC praktiziert, wobei bestimmte Kontrollen entfallen.

# Vorbemerkungen – Typische Fehler

## 1. **Behind sein**

PF und PM sollten zu jeder Zeit „vor dem Flugzeug“ sein, d.h. die nächsten Schritte des Verfahrens oder des Manövers kennen, um die Ausführung überwachen zu können.

## 2. **Sportlicher Ehrgeiz**

Im Betrieb von Verkehrsflugzeugen haben die Limits und die sichere Flugdurchführung immer Priorität über Wirtschaftlichkeit, Pünktlichkeit und Rationalisierung/Optimierung. Limits sind dabei harte Limits und keine Zielwerte!

## 3. **Target Fixation**

Kann ein Ziel nicht innerhalb der Limits erreicht werden, muss es frühzeitig aufgegeben werden, z.B. durch Call-Out des PM

## 4. **Fehler nicht ansprechen**

Auffälligkeiten, Abweichungen, Überschreitungen von Limits müssen angesprochen werden.

## 5. **Overcontrolling**

Das Flugzeug fliegt prinzipiell stabil und ist im Normal Law aktiv stabilisiert. Bei stark schwankenden Werten / wechselseitigen Abweichungen („pilot induced oscillations“) weniger Input geben oder Stick kurzfristig loslassen.

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# Inbetriebnahme

## AIRCRAFT POWER UP

ENG Master 1 & 2

OFF

ENG Start Sel

NORM

L/G Lever

DOWN

Batteries

ON

EXT PWR (if avail)

ON

Parking BRK

ON

## APU START

APU Master

ON

APU Start

ON

*when APU is on*

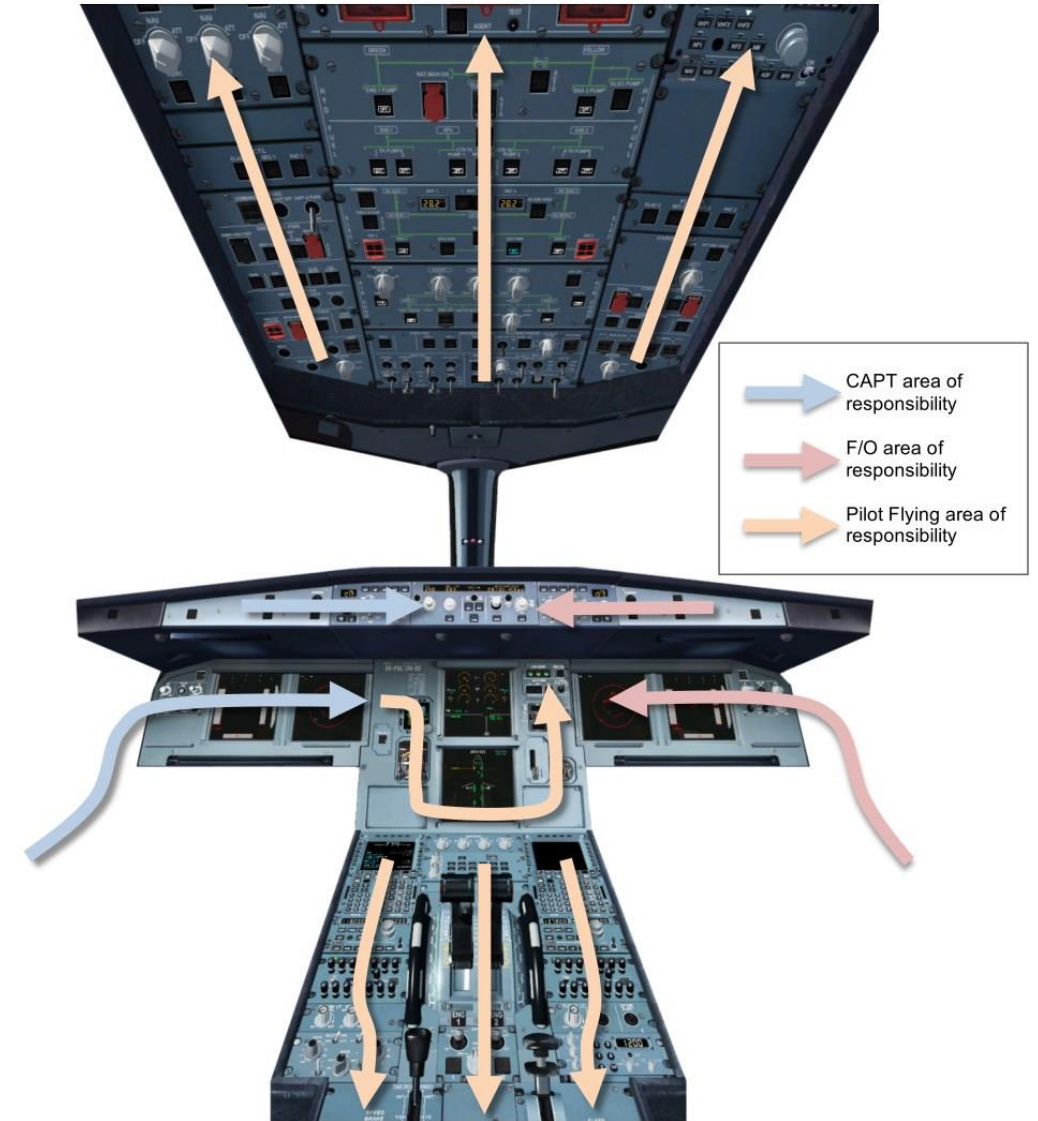
APU BLEED

ON

## COCKPIT PREPARATION OVHD

Overhead Panel

All white lights out



# Inbetriebnahme

## COCKPIT PREPARATION OVHD (cont'd)

|                           |         |
|---------------------------|---------|
| ADIRS                     | NAV     |
| Strobe                    | AUTO    |
| BEACON                    | OFF     |
| Remaining Exterior Lights | As RQRD |
| Signs                     | ON/AUTO |
| EMER EXIT Lights          | Armed   |
| LDG ELEV                  | Auto    |
| Pack Flow                 | Norm    |

## COCKPIT PREPARATION PEDESTAL

|               |            |
|---------------|------------|
| Weather Radar | OFF        |
| PWS           | OFF        |
| Gain          | Cal        |
| All Switches  | Check Norm |

|           |        |
|-----------|--------|
| THR LVR   | IDLE   |
| ATC       | OFF    |
| ALT RPTG  | ON     |
| ATC SYS 1 | Select |
| RMP       | ON     |

## FMS INITIALIZATION

### - On INIT A Page -

|                       |        |
|-----------------------|--------|
| Enter FRAFRA1         | LSK 1L |
|                       | - Or - |
| Enter „EDDF/EDDF“     | LSK 1R |
| Enter FLT NBR „UNI1“  | LSK 3L |
| Enter Cost Index „30“ | LSK 5L |
| Enter CRZ LVL         | LSK 6L |

# Inbetriebnahme

## FMS INITIALIZATION (cont'd)

### - On Init B – (arrow to the right)

ENTER ZFW und ZFW CG LSK 3R

ENTER Block Fuel LSK 1L

### - On FPL Page –

Select Departure Runway LSK 1L

- 25C / No SID / INSERT

Select Arrival Runway LSK 6L

- 25L / ILS Z 25L / INSERT (no STAR, no VIA)

### - On PERF Page –

Insert V1/VR/V2 LSK 1-3L

Insert Flex Temp LSK 4R

Insert Config und Trim LSK 3R

## COCKPIT PREPARATION GLARESHIELD / FCU

BARO REF SET QNH

FD ON

LS OFF

ND MODE ARC or NAV

ND-Range 20/40

ALT Set 4000

## BEFORE START CLEARANCE

MCDU Set PF PERF / PM FPLN

EXT PWR Check OFF

BEFORE START CHKLST down to the line

Pushback / Start Up Clearance OBTAIN

NW STRG DISC CHECK for Pushback

Windows/Doors CHECK

Beacon ON

Parking Brake as required

BEFORE START CHKLST below the line COMPLETE



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# Triebwerksstart

## **AUTOMATIC ENG START**

ENG MODE SEL

Start Engine 2

ENG 2 Master sw

- When IDLE is reached (AVAIL indication) –

Check Parameters

*N1: ~19,5% / N2: ~58,5% / EGT: ~390°C / FF: 275 kg/h*

Start Engine 1

ENG 1 Master sw

Check Parameters

## **AFTER START**

ENG MODE SEL

APU Bleed

APU Master

IGN START

Announce

ON

normal

Announce

ON

normal

NORM

OFF

OFF

Ground Spoilers

RUD TRIM

FLAPS

PITCH TRIM

After Start Checklist

Arm

ZERO

Set acc. PERF

Set

Complete

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# Rollvorgang (Taxi)

## TAXI

TAXI Clearance

Obtain

Taxi Routing

Visualize / Clarify

Confirm taxi routing on taxi chart, check for pla

Nose Light

Taxi

Parking Brake

Off

THR

Adjust

Little, if any, power above IDLE will be needed to get the aircraft moving. Aim for Taxi Speed 10-15kts on straight routes, for 5-10 kts in turns

Steering

Use Tiller

- During Taxi, when close to departure Runway –

PWS

ON

TERR ON ND

PM on

Autobrake

MAX

when convective weather present or ar night

RADAR

ON

TO Config pb

PRESS

TO MEMO

Check no blue line

BEFORE TAKEOFF CHKLST down to the line

PERFORM

TCAS Mode Selector

TA/RA, ABV

## BEFORE TAKE OFF

LINE UP / T/O Clearance

Obtain

Approach Path

Check

Pack 1 and 2

As required

Nose Light

T/O

LDG Light

ON

All Tables and Loose Equipment

Stow

BEFORE TAKEOFF CHKLST below the line

PERFORM

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# Flug

## TAKEOFF

|   |  |
|---|--|
| Brakes  | Release  |
| Sidestick (PF)  | half forward                                   |
| Chrono  | Start (PM)                                     |
| THR LEVERS  | FLX or TOGA                                    |
| Advance THR LVR to ~50% N1, wait till both engines stabilize at approx 50% N1, then advance LVRs to FLX/MCT notch |  |
| Directional Control   | Use Rudder                                     |
| FMA   | Announce (PF)                                  |
| Thrust Set  | Announce (PM)                                  |
| Reaching 100kts   | Ann. (PM)/Check (PF)                           |
| At $V_1$  | Announce „Go“ (PM)                             |
| At $V_R$  | Ann. „Rotate“ (PM)                             |
|   | Rotation perform                               |
| Rotate with 3°/s to 15° pitch, maintain pitch until airborne and FD stabilized, then follow SRS command by the FD |  |
|   | - When positive climb (VSI >0 fpm and RA >0) - |
| Positive Climb  | Announce (PM)                                  |

|                |                |
|----------------|----------------|
| Gear Up        | Command (PF)   |
| LDG Gear Lever | Select Up (PM) |
| AP             | as required    |

## AT THRUST REDUCTION ALTITUDE

|              |           |
|--------------|-----------|
| THR LEVERs   | CLB Notch |
| FMA          | Check     |
| Pack 1 and 2 | On        |

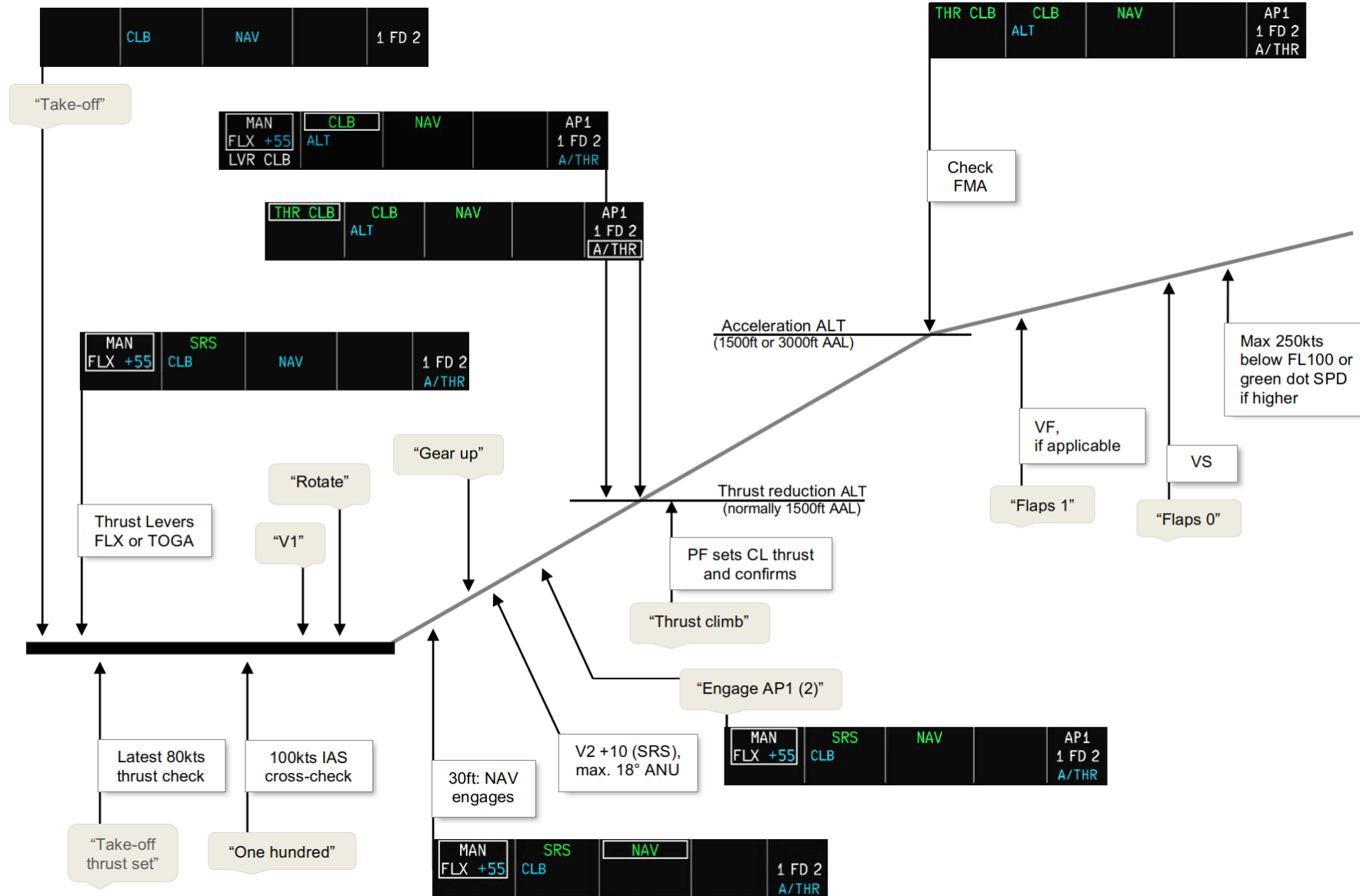
## AT ACCELERATION ALTITUDE

|            |                   |
|------------|-------------------|
| At F-Speed | Flaps one step up |
| At S-Speed | Flaps 0           |

PF commands the setting, e.g. „Flaps 1“, PM checks speed greater than relevant minimum Speed, sets Flap Lever to commanded position and answers „Flaps 1“, as read on the E/WD.

|                             |                    |
|-----------------------------|--------------------|
| GND Spoilers                | disarm             |
| Nose and RWY turn off light | off                |
| Passing Transition Altitude | Altimeter: set STD |

# Flug – Take Off & Initial Climb



# Flug

## AT 10.000 FT

LAND lights

Retract

EFIS option

Select

Select CSTR on one side, ARPT on the other

RAD NAV

CLR

SEC FPLN

Copy Active

SEAT BELTS

as required

(„Clearen, Kopieren, Servieren“)

## CRUISE

ECAM SYS Pages

Check periodically

Flight Progress

Monitor

Check Fuel on Board (FOB), estimated remaining fuel at destination, check sum of fuel used and FOB equals fuel quantity at departure, check actual time over (ATO) at least every 30min.

## DESCENT PREPARATION

Weather Info

Acquire

Approach Type

Confirm

Landing Performance

Confirm

Auto Brake

As required

FMS PERF APP Page

Complete

RAD NAV

As required

GPWS Flap 3 Landing Switch

As required

Anti Ice

As required

Switch on Engine Anti Ice when SAT >-40°C and TAT<10°C in clouds or visible moisture/precipitation.

Switch on Wing Anti Ice, when visible ice accretion starts

Approach Briefing

Perform

Briefing shall include: Terrain situation, safe altitudes, remaining fuel and required minimum fuel, weather phenomena, expected approach type with all necessary details (descent point, glidepath, check altitudes, minimum, runway state and length/width, braking method, lighting aids) missed approach procedure, initial taxi direction and other highlights



# Flug

## DESCENT

Descent Initiate

- When cleared to an altitude -

Altimeter Setting Set QNH

Descent Progress Monitor

Check remaining distance and altitude and adopt descent strategy accordingly.

## AT 10.000 FT

LAND lights ON

EFIS option Select

Select CSTR on both sides

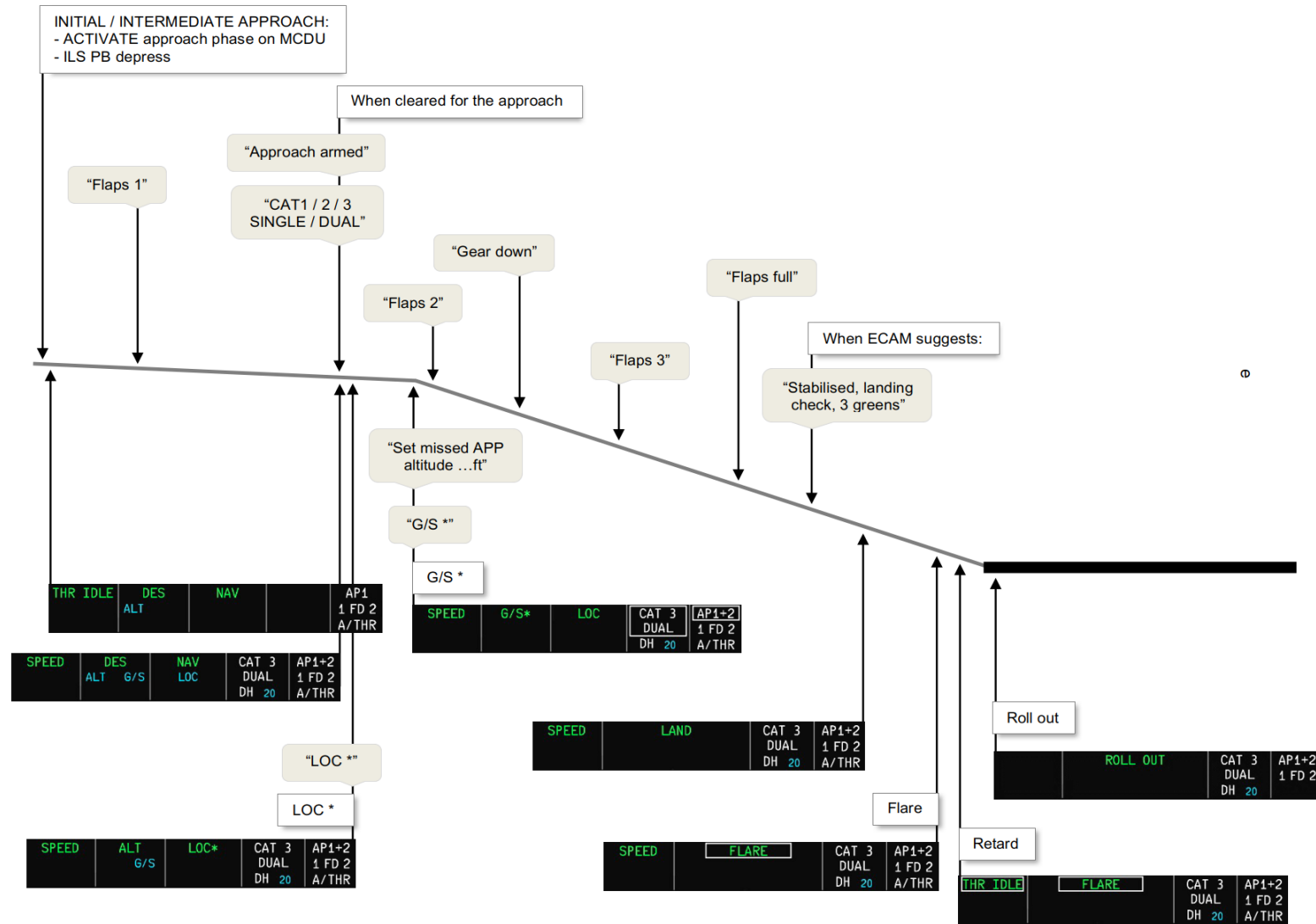
RAD NAV Set/Confirm

SEAT BELTS On

NAV Accuracy Check

Check GPS Primary. If not GPS Primary crosscheck BRG DIST from Prog Page with VOR DME raw data indication on ND.

# Flug - Approach



# Flug

## INTERMEDIATE / FINAL APP

|  |                 |
|--|-----------------|
| APP Phase  | Activate in FMS |
| Managed Speed / Sel Speed  | As required     |
| - When cleared for approach –  |                 |
| APPR pb on FCU   | Press           |
| For ILS, in autoflight   | 2nd AP ON       |
| - When speed at maneuvering speed (GD, S, F) or at least below $V_{FE,next}$ –   |                 |
| Flaps 1  | Command/Set     |
| LOC/ GS Capture  | Monitor         |
| LOC has to be captured (LOC*) before G/S can be captured (G/S*). When above G/S, on FCU dial in altitude > actual altitude and select increased V/S for intercept. Acquisition will start on G/S, not before. <u>Excercise extreme caution during this maneuver!</u> |                 |
| - At minimum 2000ft AGL –  |                 |
| Flaps 2  | Command/Set     |
| Gear Down  | Select          |
| Spoilers   | Arm             |

|  |               |
|--|---------------|
| Exterior Lights  | ON            |
| Flaps 3  | Command/Set   |
| Flaps Full (if planned)  | Command/Set   |
| Landing configuration (Flaps, Gear), adequat speed (target +10/-5), established on path (deviation max 1 dot G/S, 1 dot LOC), power not IDLE has to be reached at 1000ft AGL the latest! |               |
| LDG Memo   | Check no blue |
| Landing CHKLST   | Perform       |
| - At MINIMUM+100ft -   |               |
| „ONE HUNDRED ABOVE“  | Monitor / Ann |
| - At MINIMUM, when visual segment is in sight -  |               |
| „Continue“   | Announce      |
| OR   |               |
| GO-AROUND  | Ann./Perform  |

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## LANDING

- Approx at 30 ft RA –

Flare Perform

THR LVRs IDLE

- At Touchdown –

Derotation Initiate

THR LEVER REV IDLE or more

GND Spoiler Check (PM)

REV Check (PM)

Brakes As required (PF)

Deceleration Check (PM)

- At 70 kts -

THR LVR REV IDLE

- At Taxi Speed -

THR LVR FWD IDLE

Autobrake

OFF

## AFTER LANDING

Land Lights Retract

Strobe AUTO

Exterior Lights As required

Ground Spoilers Disarm

RADAR OFF

PWS OFF

Flaps Set to 0

TCAS SBY

APU Start

Taxi Clearance Obtain

# Flug

## **PARKING**

|                      |             |
|----------------------|-------------|
| Parking Brake        | ON          |
| Brake Pressure       | Check       |
| Anti Ice             | OFF         |
| APU Bleed            | As required |
| ENG MASTER 1 & 2     | OFF         |
| Slide Disarmed       | Check       |
| BEACON               | OFF         |
| Seat belts           | OFF         |
| ATC                  | SBY         |
| Exterior Lights      | OFF /As req |
| Fuel Pumps           | OFF         |
| Fuel QTY             | Check       |
| EXT Power (if avail) | ON          |

## GND Communication

- When Chocks in place -

|                |         |
|----------------|---------|
| Parking Brake  | OFF     |
| Parking CHKLST | PERFORM |

## Establish

## **SECURING THE AIRCRAFT**

|                              |         |
|------------------------------|---------|
| Crew OXY                     | OFF     |
| ADIRS                        | OFF     |
| Exterior Lights              | All OFF |
| Signs                        | OFF     |
| APU Bleed                    | OFF     |
| APU Master                   | OFF     |
| Batteries                    | OFF     |
| EXT PWR                      | OFF     |
| Securing the Aircraft CHKLST | Perform |

Many happy landings!