WORKING METHOD Vs 3.0

1.0 Introduction

Safe & accurate flight execution requires efficient flight planning, flight management and strong flying competences.

- Efficient flight planning & management require being organized & methodical.
- Precise flying competences require knowledge, methodology and practice.
- An efficient working method is crucial in complex, demanding environments. It's your working backbone, providing trustable guideline, certainly if you don't fly regularly or didn't fly for a long period of time.

COAA applies well established Airline Working Methods under the form of Golden Rules, Standard Operating Procedures (SOP), Good Operating Procedures (GOP), Concepts and Techniques that facilitate and improve the flight execution.

Basic Crew Resource Management (CRM) will be introduced under the form of Checklist tasks, Crew Briefings and Crew Coordination (Exercise & Procedural Next step). You are required to know and apply them in order to acquire a safe, precise, organized and efficient flight planning & management.

Along your career, you should adapt the given working method to your needs: aircraft + type of operation and your specific (recurrent) mistakes.

1.1 Definitions

- Working Method: The structured way of planning, managing and executing all flying tasks with the objective of obtaining the safest, most efficient and precise flight execution.
- Golden Rules: The essential guidelines for the safe and efficient conduct of the flight.
- SOP: Standard Operating Procedures are company specific procedures. They must be applied in normal conditions as they are proved and do cover a wide range of situations. Deviation from SOP is possible in Normal Procedures (although not desirable) at the condition that it increases SA/Safety. (i.e.: Early configuration due to ATC maintaining the a/c too high). In Non Normal situations, the PIC may use of Captain emergency authority to deviation from SOP if the situation dictates it. (i.e.: In case of an uncontrollable fire, the crew may decide to go below the ILS DA in IMC). In all cases of SOP deviations, crew coordination is required.
- GOP: Good Operating Procedures are recommended procedures; established and promoted by multiple operators and are widely accepted by the aviation community.
- Concept is a principle / philosophy to apply.
- Techniques are practices in order to facilitate the execution of a task.

1.2 Golden Rules

1°) SAFETY FIRST

SAFETY is paramount and must never be endangered!
Decision-making must always give priority to Safety: “Better safe then sorry”
There must be NO doubt & NO assumptions.

In case of uncertainty (about decision, performance, situation or clearance), double check, challenge and inform about your intentions; you must regain certainty.
There must be NO complacency about the flight planning, flight management, situation, a/c status, clearance and options.

SAFETY is based on [SA] (Situational Awareness)

You must have constant awareness of:
- Your position & Trajectory versus terrain & airspaces,
- Traffic position
- ATC clearance
- Available options

=> **THERE IS NO [SA]FEFY WITHOUT [SA]**

2°) SET PRIORITIES

Prioritize Pilot Tasks:

1° FLY: “Aviate” - Correct attitude (Manually or through AP) + Power

=> DO NOT STALL
GOOD BASIC IF/GF: ATTITUDE FLYING

2° NAV: “Navigate” - Bearing + Distance (Conventional + GPS)
=> DO NOT GET LOST / CFIT
GOOD SA + PROCEDURAL IF/GF

3° COM: “Communicate” - Coordinated flight
- Inside: CREW [Next exercise/step]
- Outside: ATC / CY [Clearance / Request]
=> DO NOT MIDAIR
GOOD R/T

4° MAN: “Manage” - Managed flight
- Flt Processing & Sequencing (Long Term NAV)
- C/L
- Briefings
- A/C system operation
=> DO NOT RUSH – BE ORGANIZED
GOOD FLIGHT MAMAGEMENT

3°) <u>BE ORGANIZED:</u>

High complexity & multi-tasking require the pilot to apply an efficient working method. Correct understanding of flight sequencing is essential.

4°) <u>BE AHEAD OF THE A/C:</u>

High complexity & multi-tasking requires efficient Workload Control/Time Management.

- Apply constant Prediction / Anticipation / Update
  - > Predict the manoeuvres to perform = Plan ahead (Strategy)
  - > Anticipate every single task to perform = Next step
  - > Update ASAP the planning / execution = Obtain ATIS ASAP and amend planning / execution.

- Think before you act or talk:
  - > STEP OPERATIONS:
    - Step Zero: Situation awareness
    - Step One: Preparation phase
    - Step Two: Execution phase

  - > Preset COM / NAV / CRS / bugs;
    Buffer time between thinking & acting (e.g.: pre-set bugs & turn) provides crosscheck time.

REQUIRED PILOT SKILLS FOR SAFE & EFFICIENT FLIGHT EXECUTION:

Flight execution is function of:

SA x Basic IF x Procedural IF x R/T x Flight Management

Weakness on any of these areas = Poor flight execution

2 Flight Planning

2.1 Introduction

Efficient flight planning greatly facilitates the flight execution and is crucial to avoid getting caught unprepared:

"Fail to prepare = Prepare to fail"

- Predict as much as possible all phases of the flight (procedures) in order to prepare and sequence tasks in advance, based on priority and time.
- Study all predicted procedures in advance (especially if not familiar) in order to define an execution strategy. (NAV SET-UP + EXECUTION => BRIEFING)
- Know aircraft/personal limitations and options in order to avoid unpleasant, tricky situations.
- SA for proper TASKING

2.2 Flight Planning (Prediction)

PREDICT (PREVIEW your whole flight from GATE OUT to GATE IN):

- What to expect for the departure phase
  - Weather
  - NOTAM
  - Departure RWY
  - Taxi routing (Time permitting)
  - Departure procedure
  - Safety altitudes
  - Engine failure procedure
  - Departure alternates (As required)

  => Define limitations: - A/C (Performance / Discrepancies…)
  - APT (NOTAM, NO RADAR & TERRAIN…)
- What to expect during the cruise:
  - Safety altitudes
  - Enroute alternates (every 30')
- What to expect for the arrival phase (Destination):
  - Weather
  - NOTAM
  - Landing RWY
  - Taxi routing (Time permitting)
  - IAP (If several, define most predictable+ LAT / VERT profiles & difficulties)
  - STAR (Start & Termination + LAT / VERT profiles & difficulties
  - Predict descent: Analyze geometry and anticipate short cuts and/or straight-in APP
  - Predict plan B / reversions: Parallel RWY / Secondary RWY and/or APP.

  => Define Limitations: - A/C + CREW (AWO / Performance / Discrepancies…)
  - APT (NOTAM, NO RADAR & TERRAIN…)

NOTE:

Make your arrival prediction based on:

- WX (Wind + Visibility & Ceiling)
- NOTAM
- Preferential RWY System (PRS)
- All Weather Operation (AWO)
- If unsure about prediction; prepare:
    - Prepare most difficult approach (i.e: NPA iso ILS)
    - Prepare the shortest approach (i.e: Straight-in APP iso Opposite APP)

- What to expect for the diversion:
    - Weather
    - NOTAM
    - Landing RWY
    - IAP (If no RDR, to define most predictable + LAT / VERT profiles & difficulties)
    - STAR (If no RDR, to define Start & Termination + LAT / VERT profiles & difficulties)
    - Predict descent: Analyze geometry and anticipate short cuts and/or straight-in APP
    - Predict plan B / reversions: Parallel RWY / Secondary RWY and/or APP.

      => Define Limitations: - A/C + CREW (AWO / Performance / Discrepancies…)
      - APT (NOTAM, NO RDR & TERRAIN…)

<u>STUDY:</u>

- What are your options available based on WX / NOTAM / FUEL / CHARTS / BUGS
    - Fuel
    - Alternates (Departure + Enroute [Every 30'] + Destination)
    - Need for extra fuel, based on WX /NOTAM & predicted TRAFFIC
    - Need for additional APT Jeppessen plates
- All unfamiliar / complex items:
    - Departure (SID) + Arrival (STAR + IAP) procedure + Define a Descent & APP strategy

<u>CONTINUOUS PREDICTION IN FLIGHT:</u>

- Predict the upcoming sequences during low workload phases
- Use Next Step concept:
    - "Next step" to initiate the analysis of the next relevant LAT / VERT / ACTION plan
    - Constantly control [ACTUAL] & predict NEXT / FURTHER / MAJOR STEPS

3 Flight Management

3.1 Introduction

Safe and efficient IFR flight requires the pilot to have following competences:

- Situational Awareness (SA): Be aware about your actual situation
- Basic IF: The ability to execute a precise and stable flight using the instrument references.
- Procedural IF: The ability to correctly execute IFR procedures.
- Flight Management: The ability to correctly execute the Flying Tasks.

Flight management is about mentally sequencing tasks by priority and time awareness.

Good Flight Management skills are required in order to obtain a Good Flight execution!

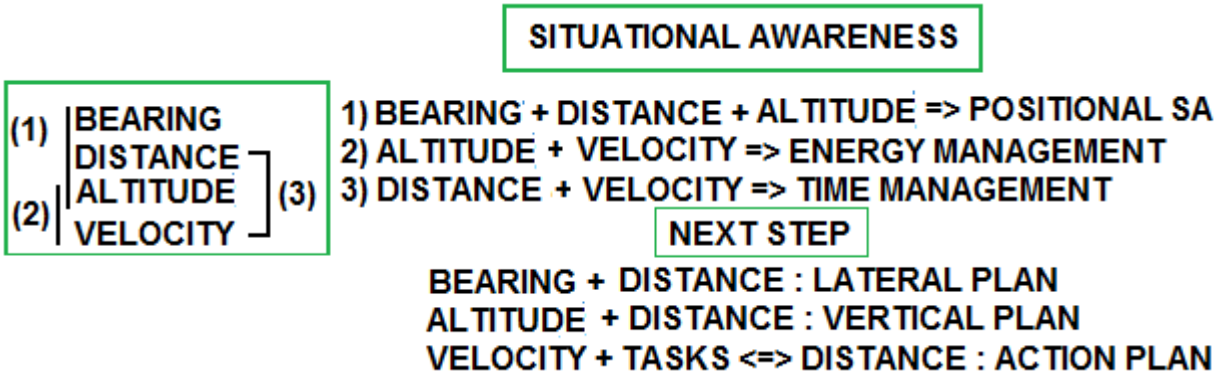
Flight execution = SA x Basic IF x Procedural IF x Flight Management
Weakness on any of these areas = Poor flight execution

3.2 Situational Awareness

SA requires you to have full awareness of your Actual Position (3D) versus your Objective (IAF/ Airport), your actual clearance (Crew + ATC), your actual flying environment (Terrain, Airspace, Traffic, Weather) and your available options (A/C status, Fuel & Airports)

Methodology:

• Position:	"Where am I?"	Bearing + Distance + Altitude [3D]
• Objective:	"Where do I go to?"	Actual / Next / Further / Major steps [3D]
• Coordination:	"Do they know?"	Crew, ATC + (Passengers, Company,…)
• Clearance:	"Am I cleared?"	ATC
• Terrain:	"Am I above terrain?"	Charts (MSA/MEA/MGA) + MFD
• Airspace:	"In which airspace?"	ATC (IFR) + Charts & MFD (IFR + VFR)
• Traffic:	"Where are the others?"	ATC
• Weather:	"Weather conditions?"	Visual, ATC, WX radar
• Aircraft status	Restrictions?	MEL, Failures
• Weather	Restrictions?	Forecast, ATIS, VOLMET, WX radar, …
• Notams	Restrictions?	RWY closed, ILS INOP, Flight Planning, …
• Fuel	Options?	Fuel range, diversion fuel, holding fuel



The above scheme can act as a memo technique that defines your Situational Awareness in 4D. Define tasking based on your 4D SA (Offset between your Actual & Objective 4D SA) and sequence your tasks by order of priority and time (Preview actions).

Updating SA defines pilot's NEXT STEP on the 4D

- Lateral Plan: Position vs Objective (Proper navigation & Interception of final app)

- Vertical Plan: Position vs Obstacles + Objective (TOD + actual slope + stabilized approach)

- Action Plan: Sequence Tasks Vs Phase of Flight : Briefing + C/L + deceleration + configuration

NOTE:
Energy Management = Management of Descent + Deceleration + Configuration

Low Performance a/c : Deceleration & TW component = 5TM
High Performance a/c : Deceleration & TW component = Real data (Ref ACPP)

3.3 Cockpit Management

Cockpit Organization

A clean cockpit is an efficient cockpit.

Clean Cockpit:

Organise the cockpit in such a way that all items required for the flight are well stowed in a consistent and steady location.

Sequence the charts in the order of use and per flight phase; based on prediction. Standard charts set-up is departure airport taxiways, SID and emergency return.

In order to take notes during flight (e.g.: clearances), set a blank paper on your kneepad, after your charts and side shift charts / blank paper for rapid access and easy writing.

For short flights (less then 1H), already prepare and sequence destination airport arrival, approach and landing charts. Unfold the area + en-route charts and stow them in the side storage compartment for a quick access. Store your route book in the side storage compartment for an easy access.

Do not put kneeboards or headsets on the glare shield since they will scratch the canopy.

Clean ND:

Optimize your cockpit set-up by setting / removing indications.

Always optimize the COM - NAV - GPS set-up + PFD & MFD (pre)selections in order to have the cleanest ND and the best visual picture for given situation.

E.g.: Remove bearing two if not used and creating confusion.
Use CRS to visualize ADF tracking if VOR is not used; consider set ghost freq (NO CDI)

Use of data:

When receiving data, set the data:

- Receiving ATIS: set the QNH (Main + STDBY ON-GND) – (STDBY only IN-FLT)
- Receiving ATC clearance: set ALT (G1000 + AP) and SQWK (Even before start-up)
- Always optimize the COM/NAV set-up based on Prediction/Anticipation/update concept (Refer to FLT MAN chapter)

Barometric settings

The Local altimeter setting is used as much as possible when flying and descending in the lower levels, this in order to have due protection versus terrain. Above terrain safe altitude, standard reference is to be used to provide correct vertical separation between aircraft.

The Transition Altitude, which differs from area to area, is to be used in climb to switch from local to standard barometric setting. It is not allowed to set standard barometric setting before the TA, even if cleared to a FL.

When cleared from a given FL to a given altitude, the local barometric setting MUST be set immediately when starting the descent. Even if being above the TA/TL.

REMEMBER:
The pilot will switch to standard as late as possible (climbing through TA) and will switch to local as soon as cleared to an altitude (whatever his actual altitude/FL is).

SOP:
Whenever the pilot obtained the destination local altimeter setting (ATIS or RT) he should set it on his standby altimeter as an additional safety measure to display altitude with the local barometric setting when descending towards terrain. If the pilot should forget to switch the barometric setting on his main altimeter while descending at low altitude, he will notice the difference between the main and the standby altimeters reading.

NOTE:
In case of flying at low altitude outside CTR / TMA, the regional barometric setting will be used. It is the lowest local barometric setting reading of the area concerned.

Checklist

Checklists are used to verify that critical items, sometimes referred as “killing items”, have been performed. Checklist titles and footers “*Title* checklist completed” must be called-out aloud. Perform checklists before or after periods of high workload (workload control).

Avoid to leave “open items” in a C/L. If operationally required, state: “holding at…”, and execute the item whenever applicable, then call-out the completed state : “C/L completed”.

No Checklist is to be done on a runway, with exception to the evacuation checklist. Every item needs to be performed, followed by a check of that action (e.g. Generator online – check light and/or voltage).

There are different types of checklists and corresponding execution.

Normal checklist:

Applies to routine normal procedures. Single pilot IFR operations. Are read-and-verify checklists.

Normal checklists must be:
- Linked to flight phases / actions (for easy & correct flight / checklist sequencing)
- Preceded by the appropriate scan / set-up
- Read aloud
  - By reference to paper checklist (ground ops)
  - By reference to cockpit placards (flight ops)
- Verify aloud C/L item

Supplementary normal checklist:

- Applies to non-routine normal procedures.
- Are read and do checklists (e.g.: GPU Start)

Non-Normal checklist:

- Applies to abnormal & emergency procedures.
- Are read and do checklists, except for few items that require immediate action.
- These items are called recall items –or memory items- and are done by memory.

Navigation

DA42 SOP combined CONVENTIONAL / GPS NAV:

- Regulation:

	TERMINAL AREA	ENROUTE
PRIMARY NAV	CONVENTIONAL	GPS
BACK-UP NAV	GPS	CONVENTIONAL

NAVAIDS IDENTIFICATION:

EFIS offers several possible selections (CRS / DME / Bearings). These selections must be checked thoroughly since the wrong selection can create hazardous situations. Thus their name: “Killer switches”

Always verify the information source and monitor map, especially in case of conflicting information.

MEMOTECHNIC: TISD
- **T**une
- **I**dentify
- **S**et
- **D**ME

Always use bearing as reliable information and the CDI as interception and tracking facilitator. Indeed, if frequency is correct, the bearing indication is always correct; the CDI could still be set incorrectly and give strange / wrong indication (additional potential error).

Be vigilant when performing an instrument procedure which uses multiple stations VOR/DME/ADF on the Instrument Chart (especially if closely located / performing a NPA). Turning / climbing / descending on these wrong reference will lead to deviation, air-miss or loss of Obstacle Clearance and potential CFIT.

DA42 Standard NAV set-up

Standard NAVAIDS SET-UP decreases the risk for positional error:

	TERMINAL	ENROUTE
CDI :	VOR/LOC	GPS
DME:	NAV1	NAV1
BRG1:	NAV1	NAV1
BRG2:	ADF / NAV2	ADF / NAV2

- TERMINAL Navigation:
  - ✓ Standard set-up [Conventional Navigation]:
    - Primary Navigation Instruments:
      - Tracking: CDI + Bearing 1: NAV1 + Bearing 2: ADF/NAV2*
      - Distance: DME: NAV1
    - Back-up Navigation Instrument
      - Tracking & Distance: MDF + NAV STS BAR: GPS

- ENROUTE Navigation:
  - ✓ Standard set-up [GPS Navigation]
    - Primary Navigation Instrument:
      - Tracking & Distance: CDI : GPS + MFD + NAV STS BAR: GPS
    - Back-up Navigation Instrument:
      - Tracking: Bearing 1: NAV1 + Bearing 2: ADF/NAV2*
      - Distance: DME: NAV1

NOTE:

CDI is fixed NAV1 for CONVENTIONAL NAV & GPS for GPS NAV (AP NAV MASTER).
The preset of next course via CDI on NAV2 is not used.

Bearing 1 is STD Nav1

Bearing 2: ADF/NAV2* STD setting is ADF if used / STD on NAV2 if ADF is not used

DME can be set on HOLD or NAV2 if required, but must be briefed “N-STD”

Pilots may use Non-standard set-up if required for navigation or it increases SA / Safety but must announce it and should return to standard set-up as soon as possible.

REMEMBER:

“Change of clearance = Change of Set-up”

Whenever you have a clearance change, think about updating the COM/NAV setup.

Update the 4 COM / 4 NAV / 2ADF / 1 FMS + 1 AP in accordance with the new clearance
Use following visual scan to verify that the set-up is efficient

Typical Navigation set-up (Departure phase)		
	ACT	**STBY (Consolidate SA)**
NAV1	ACTUAL STEP	NEXT STEP
NAV2	DEPARTING APT VOR	DEPARTING APT VOR
CRS	NAV 1	
DME	NAV1	
ADF	ACTUAL STEP / DEP RWY LOM	DESTINATION RWY LOM
GPS	PREDICTED ROUTING FOR FLIGHT ≤ 60’: INSERT DESTINATION RWY / IAP / STAR	

Typical Navigation set-up (Arrival phase)		
	ACT	**STBY**
NAV1	ACTUAL STEP	NEXT STEP
NAV2	DESTINATION APT VOR	LDG RWY ILS
CRS	NAV 1	
DME	NAV1	
ADF	ACTUAL STEP	NEXT STEP / LOM
GPS	PREDICTED ROUTING : UPDATE DESTINATION RWY / IAP / STAR	

NAVAIDS SET-UP METHODOLOGY:

Complex Procedure: Apply [Understand / Set / Verify] => Briefing & Execution

Complex SID => 3 x Silent Reading

(1) Read complete text and verify plan view [UNDERSTANDING]
(2) Read text step by step and set NAVAIDS accordingly [SETTING]
(3) Read complete text and verify NAVAIDS compatibility [VERIFICATION]

Correct nav-aid strategy & set-up is of the utmost importance for safe & efficient NAVIGATION

FMS Management (DA42 SOP)

Extensive and effecient use of the FMS is required.
FMS is to be used at all times for GPS primary or GPS overlay navigation

CONVENTIONAL vs GPS NAV:
- Departure & Arrival on conventional NAV
- Enroute on GPS NAV
- Switching modes:
  - Not earlier than 5NM after departure + stable on course, switch to GPS
  - Not latest than 5 NM before IAF / Interception of final (Vectoring), Switch to conventional.

GPS overlay APP:
- Use GPS leg length as turn-in reference in order to remain FMS sequenced
- Use of the OBS is required in order to suspend sequencing of FPLN in holding
- De-SUSP the FMS after GA (Not earlier than 400' AGL)

FMS SCALE:
- Always have active TO WYPT in view
- Best procedure view: FMS scale PFD L-Inset
- Best SA (Terrain / Tracking): FMS scale MFD

FMS ENTRIES:
- GND OPS
  - INITIALIZE:
    - ✓ Validity
    - ✓ Active Profile (Units + Database + CDI Selected AUTO / ILS CDI capture MANUAL)
  - ENTRIES via MFD:
    - ✓ Departure RWY
    - ✓ Predicted SID
    - ✓ ENROUTE waypoints
    - ✓ Predicted STAR
    - ✓ Predicted APP
    - ✓ Predicted LDG RWY
  - VERIFICATIONS:
    - ✓ Verify all waypoints until END of Enroute (STAR entry point)
    - ✓ Short Flight and/or Time permitting, verify all FPLN waypoints

NOTE:
Always enter full procedures even if short-cuts / straight-in approaches are predicted.
FPLN corrections will be executed in flight based on actual clearances

- IN FLT OPS:

Update the FPLN asap based on latest / real conditions information (ATIS / RT)

- CORRECT ENTRIES via PFD R-Inset or MFD:
  - ✓ Confirmed / Cleared STAR
  - ✓ Confirmed / Cleared APP
  - ✓ Active LDG RWY
- VERIFICATIONS:
  - ✓ Verify all waypoints that changed
- HOLDING
  - ✓ FMS racetrack: Press SUSP to avoid auto-sequencing until cleared for APP
  - ✓ NO FMS racetrack: Select OBS inbound CRS until cleared for APP
- CLEARED APP:
  - ✓ Verify APP is activated
- AFTER GA:
  - ✓ Above 400' AGL, remove SUSP in order to allow auto-sequencing

PREPARING THE RETURN FLT:

- ENTRIES via MFD:
  - ✓ FIRST WAYPOINT

NOTE:
The first waypoint will be used in DIRECT TO in order to provide SA for the first lateral track on departure in case no VOR reception due to low altitude flying.

- FMS entry verification required after any entry
- FMS FPLN must be displayed at all times when operating on FMS
- Entries are to be done via:
  - MFD for all ground ops
  - PFD RH-Inset or MFD for in flight ops (NOTE: PFD R-Inset has reduced FMS functions)

CAUTION: Expect FI/FE to request to fly NO FMS in order to demonstrate your flying skills

GPS additional information:

- GPS special features:
- GPS Tips:
  - ✓ Segment Color: Magenta is the active segment / white is n-active segment
  - ✓ Segment width: thin white is DEP / APP / ARR n-activated during FPL loading
  - ✓ OBS: Used in conjunction to GPS CRS to set desired LOP (Final Axis…)
  - ✓ NRST: Bearing & Distance to APT (NO DME)
  - ✓ TM to destination: Adding GPS segments to APT (NO DME)
  - ✓ Cursor ON: Large Knob: Change Field / Small Knob: Entry
  - ✓ Cursor OFF: Large Knob: Select Page Group / Small Knob: Selects Page
  - ✓ Loading: Adds waypoints on MFD / Activating: Auto GPS CDI
  - ✓ Large Knob: Change Field / Small Knob: Entry
  - ✓ JOYSTICK: Identify airspace + Scroll the map for better view (Re-center / Expand)
  - ✓ SUSP: Upon passing MAP auto-sequencing is suspended until pressing SUSP
  - ✓ More Info available on file "G1000System_CockpitReferenceGuide_DA42"

Autopilot Management

Extensive and efficient use of the AS is required.

- Engage the AP whenever high workload is expected, specially holding / APP preparation .
- Apply the "SET – XCHECK – MONITOR" concept
  - Set applicable AP MODE (Silent)
  - Cross-check the correct FMA indication + Call aloud ALL new FMA modes
    I.e: "AP ON, NAV, VS, ALT ARM, 6000'"

- Monitor the correct a/c performance

▪ Always use the most advanced AP MODE
- NAV on CONVENT/GPS iso HDG will provide capture and tracking

Cleared ILS > Select NAV until LOC capture, then select APP
CAUTIONS:
- The climb / descent modes are NOT speed protected. Select a reduced ROC/D in order to prevent being below desired speed.
- A/c trajectory must be stable before AP engagement, specially in climb / descent as the AP will apply the V/S at time of engagement by default.
- Interrupt long tasks (I.e: Briefings) to monitor AP operation
- Verify that AP executes the transitions (I.e: Level-off) + call FMA changes (I;e: ALT)

▪ AP limitations:
- Engagement ≥ 1.000' AGL by SOP
- Disengagement ≥ (M)DA if in coupled approach; if not ≥ 1.000' AGL
- AP use is not allowed in OEI by POH

CAUTION: Expect FI/FE to request to disengage the AP in order to demonstrate your flying skills

Call-outs

Standardized call-outs provide memo-technical tool (I.e: Speed checked… Flaps) to ensure that all important items / checks are identified / completed.
Thus, even during single-pilot environment, the use of standardized call-outs is essential as it provides improved flight Safety, Efficiency and increased Situational Awareness. Note that although training for Single-pilot ratings, your actual training configuration (SP + FI/FE) is to be considered a multi-crew environment for what concerns briefings and inter-crew communication.
List of standardized call-outs:

▪ Configuration changes: "Speed check… Flaps__"
=> Initiates the loop to verify speed is adequate before executing the configuration change

▪ Changes in altitude window: "3000 feet set"

▪ Change of Baro Reference must be announced
- ✓ Climbing through TA : "PASSING TA; STANDARD SET & CROSS-CHECKED"
- ✓ Cleared below TL: "XXXX FEET SET; QNH ___ SET & CROSS-CHECKED"

=> Initiates the loop to set new Baro Reference on Main + Stand-by altimeter

▪ Altitude window must be called in function of baro setting (6000' on QNH / FL060 on 1013).

▪ Changes in active COM / NAV: "ANT set NAV1 active"
NOTE:
At pilot discretion changes of stdby can also be announced if not saturating cockpit com.

▪ Use of Non Standard NAV set-up must be announced
"Non-Standard, DME SET on NAV2" or "Non-Standard, Bearing 2 OFF"

▪ **CHECKLISTS**
"Checklist titles" and footers "*Title* checklist completed" must be called-out aloud.

T/O CALL OUTS

[PF] **"POWER CHECK"**	CALL
"SPEED CHECKED"	CALL
"75 KTS, ROTATE"	CALL

TOUCH & GO CALL-OUTS

[PF] **"FLAPS UP"**	CALL
[PM] FLAPS	UP
[PM] **"ALL SET"**	CALL

[PF] PWR	FULL
[PF] **“POWER CHECK”**	CALL
“SPEED CHECKED”	CALL
“75 KTS, ROTATE”	CALL

GO AROUND CALL-OUTS
“GO AROUND, FLAPS APP”

System annunciations:
Each AP / G1000 normal (FMA / Altitude alert) and non-normal (alert / caution / warning) must be verified for consistency and acknowledged aloud before cancelling (as applicable).
G1000 system uses visual cues (i.e: flashing captions; color coded message boxes) combined to audio cues (shime); function of the severity of the N-Normal situation.
Crew must be trained to correctly detect and react on such annunciation/captions.
- “Title + Normal”: For a normal indication (I.e: Pitot heater fault on the ground)
- “Title + Failure related”: If related to a failure (I.e: OIL LO PRESS due to engine failure)

Briefings

Briefing preparations require the PF to study the procedure in order to define procedure strategy (NAV set-up + sequence of actions).
Briefing formats are memo-technical tools designed to collect and highlight the key points of the environment, procedure, set-ups and considerations for predicted course of events.
Note that the T/O briefings do also contain the action plan for non normal situation.

In a Single Pilot environment, the briefing ensures that the pilot is ready for the procedure.
In a Multi Crew environment, the briefing further ensures that both pilots are aware and do agree with the course of action.
The use of SOP memo-technical briefing format is recommended at it covers all the function and facilitates the other pilot briefing comprehension.

Briefings should be as short and precise as circumstances allows.
Briefing should only cover specify areas of complexity, restrictions and deviations (e.g: NPA: 2° study / Bad weather: lighting / Short/Narrow/Special RWY: Restrictions / Specials: Single engine app / SOP deviations: N-Standard procedural & set-up…)

In order to make the briefing consistent and fluent, the briefings should be preceded by:
1) Early study of the procedure to identify tricky parts. (Recommended before departure)
2) Preparation phase where the PF collects and sets the elements using the briefing format.
3) Mental review that briefing cover all data (Route / Altitude / RadioAids / Specials)

Briefing attention getters:
- Must be initiated by “Ready for Briefing?” to guaranty that the crewmate is able to listen.
- Must be ended by “Any questions?” to provide opportunity for remarks.
- Must be terminated by “Briefing completed”.

Briefing should be done in low workload situation.
Cockpit set-up and Briefings preparation SHOULD be started early enough, based on Prediction / Anticipation and SHOULD be terminated before high workload phase:
- The APP Briefing, SHOULD be started at ALT x 10 (60’ to destination) based on prediction
- The APP Briefing SHOULD be completed by TOD.
- The APP briefing MUST be completed by IAF, if not:
  - Delay the approach, by requesting to hold or long vectoring.
  - Perform the IAP using the next step briefing format.
  - Discontinue the approach.

CAUTION:
- Briefing is a Management task, thus least priority !
  => Interrupt your briefing in order to verify that FLY / NAV / COM tasks are under control.

- Always have SA in order to prioritize Tasks. Identify your TOD before preparing your briefing.

=> Don’t forget your TOD !!!

NOTE: Performing an IAP using the next step briefing format requires experience and is only advisable for an easy IAP (ILS), if familiar with the IAP and in good weather.

Take off briefing:

- T/O
- I FLY,
- DA42,
- T/O MAX,
- FLAPS UP,
- In case of EMERGENCY before rotation, I call “STOP”, carry out the stop actions and advice ATC.
- In case of ENGINE FAILURE after rotation:
  > if sufficient landing distance, idle, gear down, flaps down, advice ATC & land.
  > if not, all forward, gear up, flaps up, blue line, recall items and advice ATC
- EFP: Straight ahead_____ft, L/R visual circuit <or> vectoring for _____.

Departure briefing

- Read SID plate as a flow [TOP to BOTTOM]:
  - SID Name, RWY, AIRPORT, Page, Date
  - Header highlights (Applicable notes: ATC Freq [Noise procedure not applicable])
  - Scan Plan View for Caution, Warning, Speed restriction, Required Gradient…
  - Plain Text procedure.
  - Mentally verify that your briefing covered the follow items (R-A-R-S)
    - ✓ Route (Tracks)
    - ✓ Altitude (Step climb, Climb gradient…)
    - ✓ Radio-Aids (Conventional & GPS)
    - ✓ Specials (Speeds / Restrictions …)

- Review NAVAIDS & FMS:
  - Read all NAVAIDS as positioned on the panel.

  NAV 1: ACT + CRS & STBY
  NAV 2: ACT & STBY
  EHSI: CDI: _____,
  DME: _____,
  BEARING 1: _____,
  BEARING 2: _____,

  ADF: ACT & STBY
  FPL: GPS ROUTING

- Combined Sequenced Review of Normal & Safety altitudes:

  NORMAL:
  - Threshold ____’
  - Reduction/Acceleration ____’ (THR + 1.000’)
  - Initial ____’ ; Transition ____’ <OR> Transition ____’; Initial FL ____
  - Final ____’ <OR> FL ____

  N-NORMAL:
  - MSA ____’
  - Highest MGA En-route ____

Approach Briefing

Approach Briefing Format:

<table>
<tr><th colspan="3">APPROACH BRIEFING FORMAT</th></tr>
<tr><td rowspan="7">GENERIC</td><td colspan="2">WEATHER: Review of restrictive items -or- “Fine”</td></tr>
<tr><td colspan="2">NOTAM: Review of applicable items -or- “Nothing special”</td></tr>
<tr><td colspan="2">FUEL: Define fuel on board (e.g: 30 Gls)</td></tr>
<tr><td colspan="2">CHARTS: Name the applicable charts by order: STAR – IAP – Airport layout</td></tr>
<tr><td colspan="2">BUGS: Define minima (+ Set: as applicable)</td></tr>
<tr><td colspan="2">(RADIOAIDS)</td></tr>
<tr><td colspan="2">BRIEFING:</td></tr>
<tr><td rowspan="5">1° STUDY (ALL IAP)</td><td>FULL APPROACH</td><td>VECTORED APPROACH</td></tr>
<tr><td colspan="2">CHART (Top to bottom)</td></tr>
<tr><td colspan="2">NAME + DATE</td></tr>
<tr><td colspan="2">HEADER highlights</td></tr>
<tr><td>3D briefing of actions as sequenced by PF
• Lateral plan
• Vertical Plan
• Action plan
Present Position to Descent /APP /GA flow
=Continuous integrated briefing in the 3 plans=</td><td>Briefing strip
• Frequency
• Course
• Minima
• GA</td></tr>
<tr><td rowspan="2">2° STUDY (NPA)</td><td colspan="2">HQCB:
• High Marker ..(As applicable)
• QNH ……Verify
• Chrono……...Prepare
• Bright……...Lights (As required)</td></tr>
<tr><td colspan="2">Study of Vertical Plan, define:
• FAF
• ROD
• Mandatory altitudes
• Recommended altitudes
• VDP
• MAPt</td></tr>
<tr><td>RWY</td><td colspan="2">A) Restrictive items (e.g: Lighting for bad WX / Length for short RWY…)
1) Offset (If ≥ 5°) + Parallel RWY / Taxi (NPA ONLY)
2) Lighting (If bad WX)
3) PAPI (Always brief it)
4) RWY Length (If short [≤ 800M])
5) Vacating side & intersection (Optional)
B) Special items
E.g: Displaced threshold
WIP</td></tr>
<tr><td>SPECIAL (As Required)</td><td colspan="2">A) Highlight keypoints of actual a/c failure on procedure / SOP (As applicable):
E.g: in case of OEI condition:
- Delay GD extension to Final descent
- Configuration: FAPP for APP & LDG
- GA: Flaps UP
- Ground contact unlikely: Gear UP
- Fly Blue Line
B) Highlight keypoints due to actual Procedure / Airport restrictions (As applicable)</td></tr>
</table>

REVIEW	• **LOUD & CLEAR**: REVIEW OF NAVAIDS (as positioned on the panel) NAV 1: ACT + STBY NAV 2: ACT & STBY EHSI: CRS: _____ & , DME: _____, BEARING 1: _____, BEARING 2: _____, ADF: ACT & STBY FPL: GPS ROUTING
	• **MENTAL SILENT**: Verify that briefing covered the follow items **=> Review**: R-A-R-S ✓ Route (Tracks) ✓ Altitude (Step descent, GA climb gradient restrictions…) ✓ Radio-Aids (Conventional & GPS) ✓ Specials (Scan plate for Caution, Warning, Speed restriction …)

CAUTION:
APP Briefing is performed in 3 steps:
1) Pre-Preparation Phase => Distance : Altitude x 10 (≈ equal to 60' before landing)
2) Preparation Phase => Distance : Altitude x 5
3° Execution Phase => As soon as ready

1) Pre-Preparation phase - Based on Workload Control & Prediction:

- Build-up of SA for proper Flight Management (Prioritize tasks)
  - Present Position versus Objective (procedure entry):
    - IAF if full approach
    - FAF if vectored approach
  - Bearing => Direct approach <or> Need for maneuvering space (Holding)
  - Distance => Sufficient time for required Tasks <or> Decelerate / Holding
  - Altitude => Define TOD / Sufficient distance <or> Holding / Vectoring
  - Velocity => Versus Flying Phase (120 Kts in terminal area)
- Perform cockpit set-up
  - Charts: Paper & Electronic
  - COM: - COM2 for Terminal Informations
  - NAV: - Conventional
    - GPS
- Define the procedure strategy:
  - TOD
  - Required actions in 3D plan (Lateral Plan / Vertical Plan / Action Plan)
  - Sequence the required actions by priority, time and workload control
- Mentally prepare the APP Briefing using the standardized format.

2) Preparation phase

- Collect APP Briefing items
- Apply changes to Pre-Preparation as applicable

- **WX**: Collect data for Dest & Alternate (Alternate if Single RWY or Marginal Wx)
  Set QNH on standby altimeter
- **NOTAMS:** Collect data for Destination & Alternate
- **FUEL**: Quantity + Endurance
- **CHARTS**: Set STAR, IAC, APT charts (RWY / TWY / Parking / Regulation)
- **BUGS**: Define & set minima bug (Impossible to be set on the SIM)
- **RADIO-AIDS**: Set GPS & conventional NAVAIDS
- **BRIEFING:** Mental review of changes

3) Execution Phase:

- **WX**: Info___, IAP & RWY in use + Specials for Destination (Alternate) if any
- **NOTAMS:** Specific for Destination (Alternate) if any
- **FUEL**: Quantity + Endurance
- **CHARTS**: Announce the STAR, IAC, APT charts (RWY / TWY / Parking / Regulation)
- **BUGS**: Minima ___ set
- **RADIO-AIDS**: Announce the GPS set-up
- **BRIEFING:** In accordance to BRIEFING FORMAT

NOTES:
A briefing is mandatory for every approach.
Reduced briefing can be used for:

1) Repetitive approaches:
- Preparation:
Repeat rapidly memo technique to verify that all items are set (I.e: APP is activated).
NO need to collect WX, NOTAM, FUEL if they were satisfactory (I;e: WX well above minima)
- Execution: Call aloud “WX, NOTAM, Fuel: No change; same APP, any questions?”

2) Familiar and /or easy approaches in good weather conditions (I.e: Home base ILS)
"Standard ILS 29, minima 240. In case of MAP, straight ahead 1500’ then left turn ANT 2000’. Any questions?" As procedure has been repeated several times, thus presenting NO difficulties, it will be flown using the Next Step concept. As the missed approach has rarely been flown, it requires full briefing.
NOTE: Good Flight Management requires that the pilot is ready for his first approach, unless unpredictable RWY/APP change occurred. In which case he should enter a publish holding / request long vectoring in order to prepare the approach.

3) In flight departure Briefing: The pilot must have coordinated with ATC and briefed the VFR/IFR departure before executing the last approach. To consider briefing the approach and departure before starting the last approach (I.e: while in the holding).

3.4 Time management

Efficient time management is essential for the good conduct of the flight.
Increasing workload (number of tasks per unit of time) decreases the available thinking time (rush), increases the pilot pressure, the risk for error and endangers the flight in case of pilot task saturation.

Efficient time management requires the pilot to constantly predict, anticipate and update the routes & events in order to efficiently organize its cockpit; anticipate, plan and sequence all the required flying tasks.

> PREDICT (Based on good Flight Planning & In-flight Update)
(1) ROUTING => Predict further routing including the arrival phase
  - Use: WX, NOTAM, Preferential RWY System (PRS), All WX Ops (AWO)
  - Defined backwards: RWY / IAP / STAR / ENROUTE
(2) TASK EXECUTION =>
  - Study the procedures (Define procedure Execution & Briefing)
  - Identify the Hot Spots (Area of special attention)
  - Sequence tasks for order of priority & time for optimum task management.
  - Predict 3D Position in the future (ALT & IAS into TM)

> ANTICIPATE (Based on Variables [WX & Traffic]):
(1) CHANGES
  - Short-cuts (Based on route geometry)
  - Re-routing / GA / Diversion
  - Difficult descent / approach due to geometry / altitude / IAS / wx / traffic

- Holding / Extended vectoring if not ready for APP / TOO HIGH/FAST/OFFSET.

(2) EXECUTION

- Preset COM / NAV & BUGS (Decrease Workload + Buffer Thinking ⇔ Acting)
- Coordination with ATC (Holding) & FI/FE (Exercises)
- Apply NEXT STEP concept

> UPDATE:

(1) SA

- Obtain maximum information's (Listen to R/T for indirect information's)
- Obtain latest information's (ATIS…)

(2) PLAN

- Revise your predicted / anticipated plan to fit real situation / clearance

Prediction is a key factor for good flight operation as it allows the pilot to think ahead during low workload phases. The pilot should always execute the tasks at the earliest / best time for best workload control. Not using prediction, results in loosing valuable time, thus increases the workload.

Anticipation is an essential factor for good flight operation as it provides to the pilot a buffer between thinking and acting. This buffer allows cross-check of pilot intended task in order to avoid the inherent error of acting before thinking.

Always be aware of time available for given task(s); convert TM to your objective into time.
For DA42 TM / 2 is a easy rule of thumb; nevertheless, TM / 2,5 is a more conservative rule of thumb (Mental computation: Time = TM x 4 / 10; e.g: 20 TM = 20 x 4 /10 = 8').
If more time is required; take action: reduce speed and / or request ATC to proceed for a holding, delaying vectors or a longer final.

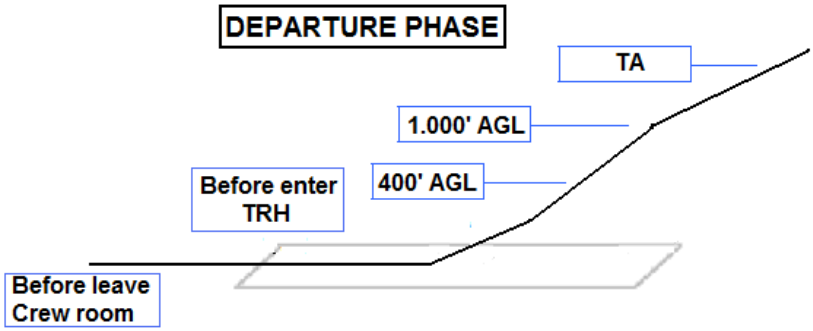
3.5 Task Management

Effective Task Management requires the pilot to correctly sequence and execute all tasks.
Every flight is different nevertheless:

- Basic task priority is common and defined as FLY / NAV / COM / MAN
- All flights have common due to:
  - Common Structure
  - Common 4 flight phases (GND OPS / DEPARTURE / ENROUTE / ARRIVAL)
  - Common Hot Spots (Areas of special attention)
- Every single flight differs due to:
  - Different procedures (SID / STAR : IAP)
  - Different variables (WX / ATC / TRAFFIC)

1) Common Structure:
All IFR flight, have common phases with associated Common tasks & gates

A) Departure phase



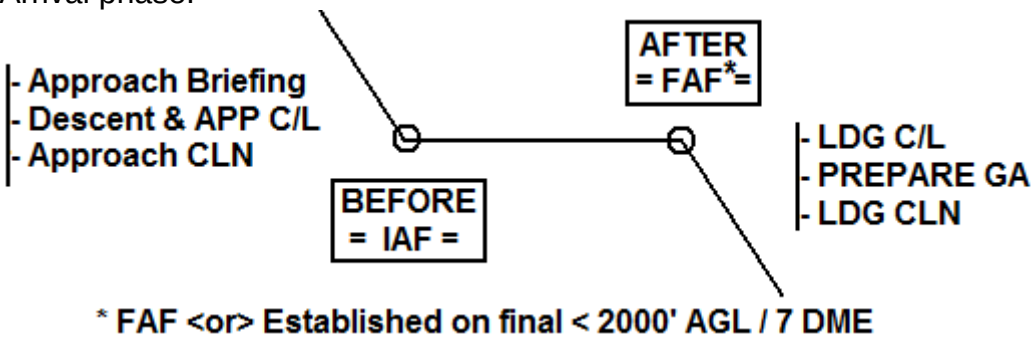
- Leave crew room [FM GATE]: Flight Planning completed
- Enter the RWY [FM GATE]: All ground C/L completed
- Until 400' AGL: FLY RWY track
- At 1.000' AGL [FM GATE]: Reduction / Acceleration + After T/O C/L

- Transition Altitude: Set STD

B) Enroute phase:

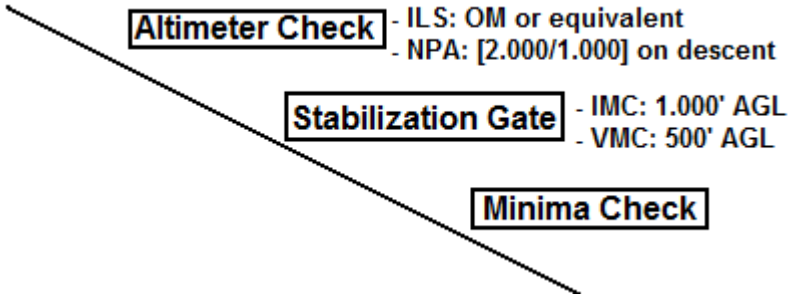
- Monitor NAV log
- Monitor a/c parameters
- Monitor en-route alternates
- Prepare ARRIVAL function of distance:
  - ALT x 10 [FM GATE]: Pre-preparation
  - ALT x 5 [FM GATE]: Preparation & Briefing
  - TOD [FM GATE]: Start descent (Terminate briefing)

C) Arrival phase:



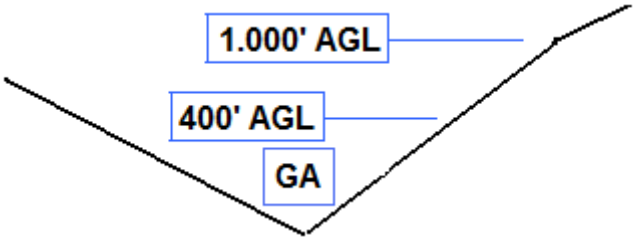
- Energy Management (Monitor energy versus Track Miles)
- Descending altitude: Set QNH
- IAF [FM GATE]: APP Briefing / APP C/L / APP CLN
- Correct 3D [LAT / VERT / ACTION] OFFSETS before FAF

D) Final phase:



- FAF [FM GATE]: LDG C/L / PREPARE GA / LDG CLN
- Altimeter check
- Stabilized (IMC: 1.000’ AGL / VMC: 500’ AGL)
- Minima [FM GATE]

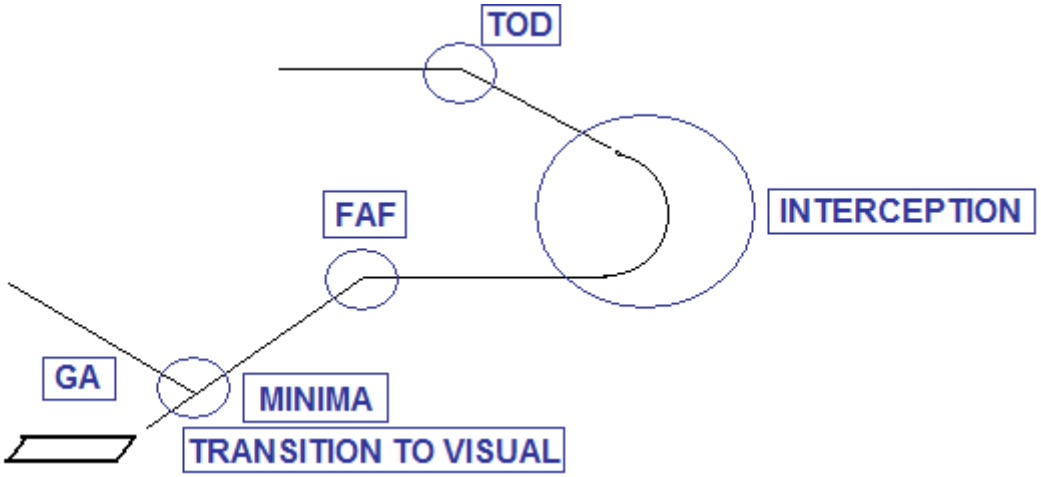
E) GA phase (Similar to Departure phase):



- GA actions
- Until 400’ AGL: FLY RWY track (Unless described in MAP / Circling app)

- At 1.000’ AGL [FM GATE]: Reduction / Acceleration + After T/O C/L

2) Common Hot Spots:
All IFR flight, have common Hot Spots (area of special attentions) as they are difficult phases for complexity and/or high workload phases and errors in Hot Spots will greatly increase the workload and/or endanger the safety of the flight.



A) Departure phase
- T/O performance computation
- ATC CLN involving the active RWY (cross / Enter / Line up / T/O)
- Entering the RWY (Most dangerous area for pilots)
- Before T/O clear knowledge of first steps for Normal & N-Normal T/O
- Until leaving terminal area (High traffic density)

B) Enroute phase:
- ALT x 5 (Start ARRIVAL preparation)
- ALT x 3 (Energy management [VERTICAL PLAN])

C) Arrival phase:
- Upon entering terminal area (High traffic density)
- IAF [GATE]: APP Briefing / APP C/L / APP CLN
- INTERCEPTION: (LATERAL / VERTICAL PLAN)
- FAF [GATE]: LDG C/L / PREPARE GA / LDG CLN

D) Final phase:
- Minima

E) GA phase:
- GA action
- Initial LAT & VERT steps

3) Different procedures:
Even if familiar with the flight sectors; most IFR flight have different procedures due to different departing / arriving RWY, SID, STAR, and IAP. The pilot must adapt flight management to the specific procedures

4) Different variables:
Two identical flights still differ due to weather, traffic, ATC clearances variables.
Caution not to be trapped by routine, ending up doing errors on a well known sector.

SUMMARY:
In order to greatly facilitate the IFR Flight Management; it is recommended that pilot:
- Applies the Common Structure to your actual IFR flight.
- Adjusts Common Structure for specific procedures
- Integrates the variables

- Focus on Common Hot Spots

3.6 Multitasking

Flying requires 4 basic tasks that are well defined (in normal ops) by order of priority:

FLY: Maintain correct attitude & PWR (Attitude flying) for required performance

NAV: Maintain correct lateral & vertical trajectory for short & medium term navigation.
Set correct NAVAIDS set-up (Best use of all NAVAIDS for a clear ND / MFD)
Proceed on Actual / Next / Further / Major steps
Apply 3D Flying (Lateral / Vertical / Action)
Obtain Bearing / Distance / Altitude awareness towards objective (IAF; FAF; APT)

COM: Anticipate & coordinate suitable clearances
No coordination = Less chances to obtain what you request = Be unprepared!
Don't let the ATC drive you if unsafe / not suitable
Query / Request more suitable clearance

MAN: Perform C/L + Briefings
Monitor & operate a/c system (Monitor ENG / SYST / FUEL page every 15')
Process the flight at long term (Predict & Anticipate Routing & Actions)

ACTION PLAN:
In high workload phases, you may be required to perform several tasks in a short time period. Multitasking is not asking for simultaneous executing of all required tasks. It requires the prediction and sequencing in priority and time of all future steps; this in turn allows proper timely execution and optimum workload control.
High workload phases (e.g: Descent & Approach phases) should be predicted (e.g: Destination RWY, IAP, STAR) / anticipated (e.g: Possible RWY change in multiple RWY environment / Straight-in approach) and should prepared during low workload phases of flight (e.g: ETA – 60').

Multitasking execution can be split in time:
- Anticipated execution (E;G/
- On time execution
- Delayed execution

> Example for VOR procedure turn:
(1) 1 NM (or 30") before inbound turn: set inbound course [New objective]
(2) 0,5 NM (or 15") before inbound turn: set hdg bug to intercept hdg [New Stop Bar]
(3) At inbound turn: start turn + descent (if required) on ADI [Simplified task]

> Example for complex interception phase:
(1) Anticipated descent / deceleration / configuration (Get rid of excess of energy)
(2) On time execution of the interception (Highest priority & workload)
(3) Delayed execution of the landing checklist

3.7 Good Operating Practices (GOP)

Next step concept:
In all circumstances, the pilot must be ahead of the a/c.
During complex situations and/or procedures (e.g: NPA), the workload can rapidly increase.
Remaining ahead of the a/c during high workload requires good Flight Management and CRM.

The next step concept is the last tool of an effective Flight Management chain.
The PF must call aloud the anticipated next procedural step in 3D (Lateral / Vertical / Action)

NEXT STEP for Pilot & A/C:

- PILOT=> Verify crew being aware & ready for next step:
  - Next LATERAL : Routing
  - Next VERTICAL: Altitude
  - Next ACTION: R/T - Deceleration/Configuration
- A/C => Verify A/C being ready for next step
  - COM / NAV / BUGS / TIMER being (pre)set as required.
  - IAS in accordance to Next Step (Decelerated / Configurated on time for FAF/P)

Next step call-out forces the PF to execute flight processing and sequencing of tasks.
For clarity, only one step at the time should be called; except if steps are shortly sequenced.
Even in SPIFR the Next Step concept MUST be used as it enhances the Flight Management by forcing the PF to think ahead.

NOTE:
For T/O and GA, the pilot needs to know by heart the first 3D steps in order to remain ahead of the a/c during these high demanding procedures.

Crew coordination

- Perform extensive initial briefing via AD-HOC BRIEFING (DEP / HOLDING / APP)
- Call-out all changes ("ALT/FL ___ Set" – "ANT Set" – "ILS 29 Set")
- Call-out configuration changes "Speed Check … Flaps Approach")
- Call-out Checklist completed ("After T/O C/L completed")
- Call-out all G1000 / AP annunciations & FMA ("1.000 to go" - "Active AP mode…"

Associated actions:

The aim of this concept is to reduce the chance of error by associating actions / tasks in the cockpit in a logical way so that executing one automatically leads to Canother action that otherwise could be forgotten.

Triggering action	Associated action
(Before) Requesting ATC clearance	Assess MAP and define possible clearance for easy identification (TAWIWAYS; AIRWAYS…) Take writing material if expecting complex clearance.
(After) Receiving ATC instruction **LAA: 1) LISTEN** **2) ANSWER** **3) ACT**	Set the applicable data: - ATIS: Set QNH - ATC CLN: Set ALT CLN + TPX code
Status / Action	Applicable C/L: - Ldg config: Ldg C/L - Set QNH: D/APP C/L
Action (e.g: Gear extension)	- Verify correct response (e.g: 3 Greens)
Lining up on the active runway	- Landing light ON - RWY Checks: Threshold elevation & QFU
End of cruise (ALT X 10) TI: ATIS <or> R/T (ALT X 5)	- (Pre) Prepare APP - APP briefing
Setting QNH (Descent ≤ TL)	- APP checklist
IAF	- Approach briefing - Descent & Approach C/L - APP Clearance
FAF/P	- Landing C/L

	- Prepare GA - Landing Clearance
When changing ACT NAV	Update STBY NAV (As required)
When changing ACT COM	GND: Update STBY COM (As required) AIR: 1° Establishing com (verify correct freq) 2° Update STBY COM (As required)
Increasing GA risk (Weather / Traffic)	Mentally review the Missed APP Procedure
After GA	- After T/O C/L - APP Briefing - DESC & APP C/L

Use of BUG – STOP BAR concept:

Bugs do provide easy visual cues of Lateral & Vertical objectives.

During steady flight, constantly fly the bugs; in transition maneuvers fly towards the bugs.

>> "FLY THE BUGS / TOWARDS THE BUG" <<

In constant trajectory [Steady flight], constantly bug your MEAN HDG (-OR- For a/c GND TRK equipped: RQRD GND TRK) and altitude as it allows a faster & better scan (prevents instrument fixation).

During trajectory changes [Transition flight], always set lateral & vertical STOP-BAR under the form of Roll-out Heading / Track bug / Interception course and Level-off bug .

In order to avoid heading & altitude bursts; stop bars should be preset with following anticipation:

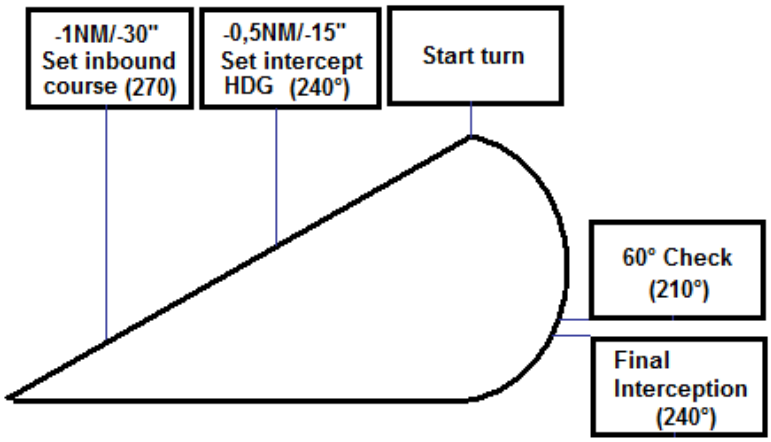
- 1 DME or 30" before transition for next course.
- 0,5 DME or 15" before transition for lateral + vertical bugs.

Presetting bugs allows to <u>think</u> (set bug) <u>+ cross-check</u> (setting) <u>before you act</u> (turn/descend).

CAUTION:

- Do not pre-set bugs too early (excessive anticipation) as you need to first consolidate the actual phase.
- During final descent the altitude bug position is dictated by procedure / a/c type requirements.

NTERCEPTION TURNS (E.g: VOR Base Turn):



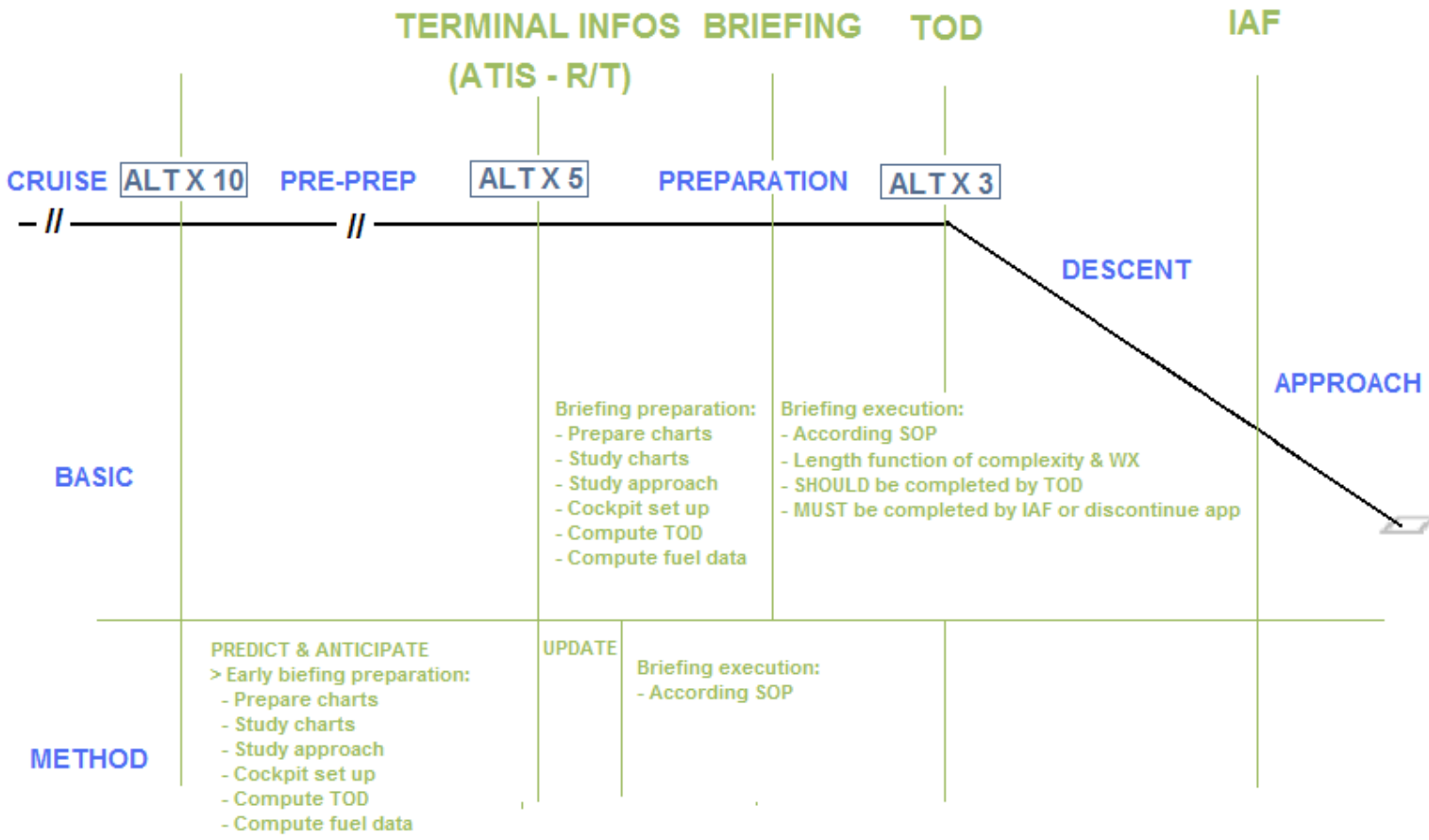
1) SEQUENCE the TASKS: Preset the references as appropriate [CRS & BUGS]
2) NAVIGATE the TURN:
   A) Set Interception BUG: 30° effective intercept angle (Corrected for estimate wind drift)
   B) Start turn (≈ 20° bank)
   C) Visualize lateral offset at 60° Check:
      > Bearing should be between Intercept BUG & CRS (Bearing ≈ 225°)
      > Correct as required:
        - Bearing ≤ 210 (Undershoot): Roll-out at 60° intercept
        - Bearing ≥ 240 (Overshoot): Increase bank (Max 30° bank)
   D) Assess lateral offset on interception BUG:
      > Correct lateral position:
        - VOR: Within 1 dot
        - LOC: LOC alive
        - ADF: ON CRS
      > Correct as required:
        VOR: - If alive before intercept BUG: monitor centering speed & continue turn
             - If NOT alive at intercept BUG: Roll-out
        LOC: - If alive at or before intercept BUG: Increase bank
             - If NOT alive at intercept BUG: Roll-out
        ADF: - If bearing > 270; continue turn
             - If bearing ≤ 270; continue turn
   D) Tracking BUG: Corrected for the wind (Use of GPS data)

GND TRK:
GPS equipped a/c provide following features:
- Wind Data: Wind arrow (direction) and intensity
- TRK Data: Currently flown ground track
CAUTION: Wind Data is ONLY correct when the ball is centered (No asymmetry)

It is GOP to use GPS GND TRK
(DA40: GND TRK diamond – DA42: GND TRK data on NAV BAR),
Once steady tracking, do turn to obtain corresponding GND TRK (GND TRK Diamond / GND TRK value).

3.8 Descent & Approach (Pre) Preparation

Good descent and approach preparation is an essential key for a correct execution.
A good flight prediction & anticipation allows an early cockpit & briefing preparation.
For complex situation (Procedure / WX / Traffic / Unfamiliar), a pre-preparation is GOP.



3.9 Descent Planning

3.9.1 Energy Management method

1) CONVERT **ENERGY** LEVEL into REQUIRED TRACK MILE [RTM]

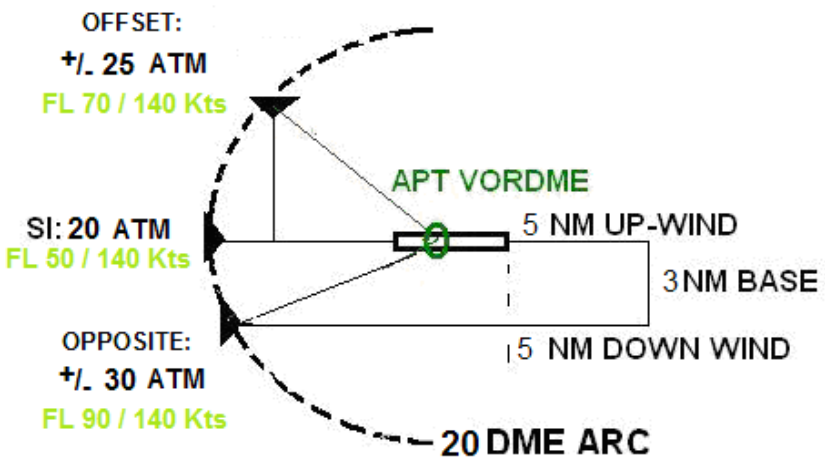
- **RTM = Δ ALT x 3**
  - Standard descent setting: [60% & 140 Kts]
  - Performance ≈ 750 fpm / ≈ 3° Angle of descent (3 NM / 1.000')
- **Extra Buffer = + 5NM** (Deceleration, Tail wind, Low experience)

Required Track Miles = [(Δ ALT x 3) + 5] TM

2) DEFINE TOP OF DESCENT (TOD)

- Full procedure: define TOD by reference to chart published TM
- Vectoring: define TOD based on Available Track Miles following rule of thumb

ATM BASED ON DME + GEOMETRY (LPA)
SI APP: ATM = DME
90° APP: ATM = DME + 5 (DOG LEG CORRECTION)
180° APP: ATM = DME + 10 (DOWN-WIND / BASE / UP-WIND CORRECTION)



- Maintain Situational Awareness: Bearing / Distance / Altitude / Velocity

3.9.2 Descent Plan Corrections:

Constantly MONITOR descent slope for deviations:
> Update SITUATION during descent (Every 2.000 / 4.000')
Altitude & Velocity => ENERGY (RTM)
Bearing & Distance => ATM

Any time your slope greatly defers from the standard 3° slope, apply following corrections:

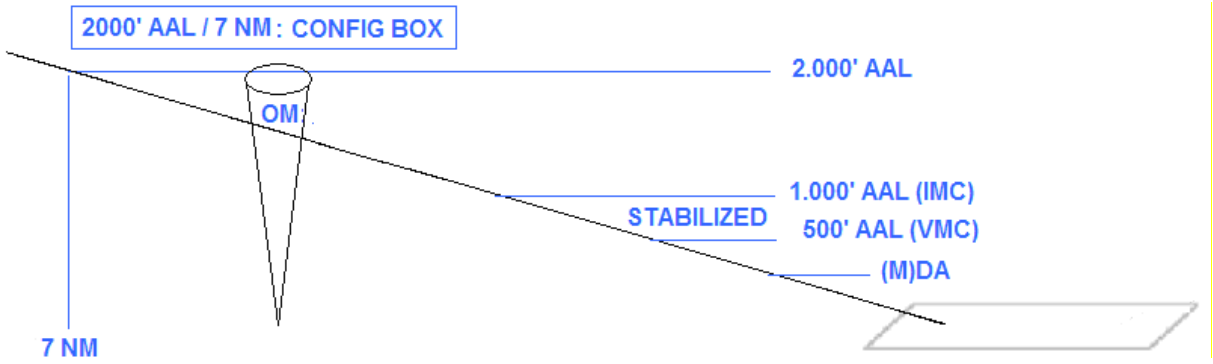
- Below profile : Reduce ROD to 500 fpm / 140 Kts until regaining the standard profile.
- Above profile: Reduce PWR to 50% / 140 Kts (ROD increases to ≈1.000 fpm)
  - New Angle of descent ≈ 4° (2,5 NM / 1.000')
  - Minimum RTM: Δ ALT x 2,5
- Define max altitude at IAF, based on procedure length & altitude at FAF(P)
  e.g: Published IAF at 2.000'; base turn of 6 DME / 2.000' => Max altitude at IAF: 4.000'

- If unable to loose altitude by given objective request early enough to proceed for a holding or to extend the vectoring.
- Apply slope / alt prediction when high on profile or delayed descent (e.g: Latest TOD)

3.9.3 Configuration Box:

In case of high altitude final intercept capture, the configuration will be delayed.
The a/c descends on the final slope at best applicable speed until decelerating for flaps extension.
The configuration box gives reference distance / altitude from threshold to start config change.

CAUTION:
- DME distance has to be corrected for offset station to threshold.
- Altitude has to be corrected for airport elevation.
- Use IAP published FAF(P) altitude & distance as configuration box.



3.9.4 Standard approaches

> Objective:
- Minimize PWR & Attitude changes during approach in order to facilitate / increase precision

> Method:
- Start the Final Descent in Landing Configuration at V_{APP}

> Applicability:
- Recommended for all approaches
- Any weather
- May not be authorized by Airport Regulations (Refer to IAC + 10-1)

Note:
Define your glide slope intercept DME reference if performing a straight-in approach under vectoring. This will allow you execute correct deceleration and configuration for standard approach.
The IAC provides glide slope intercept DME reference for standard vectoring altitudes.
If nor printed, use the basic rule: 3° slope = 300’ per NM to define it.
Thus at 3.000’ AAL, expect to intercept the GS at 10 ILS DME.

3.9.5 Stabilized approaches

Deceleration / Configuration: Action & reaction :

- Decelerate 140 to 120 at the latest at 5NM from IAF / 10 NM from FAF (SI APP)
- Set FAPP: Based on procedure / Priority / Workload control
  Anticipate ballooning – No penalty - No increase in PWR
  Speed will decrease to VMIN FAPP
- Set GD: Based on procedure / Energy correction (Altitude and/or Speed)
  High drag: In level flight add PWR – NEVER set GD level in OEI
  While initiation descent; compensate for a/c acceleration

Allows for faster descent / deceleration

- ⇨ ILS: Plan configuration change in function of GS
- ⇨ NPA: Plan configuration change in function of FAF; you may consider anticipating F_{APP} for optimum Workload control in case of complex or N-DME NPA.

3.9.6 Decelerated Approaches (Advanced training)

> Objective:

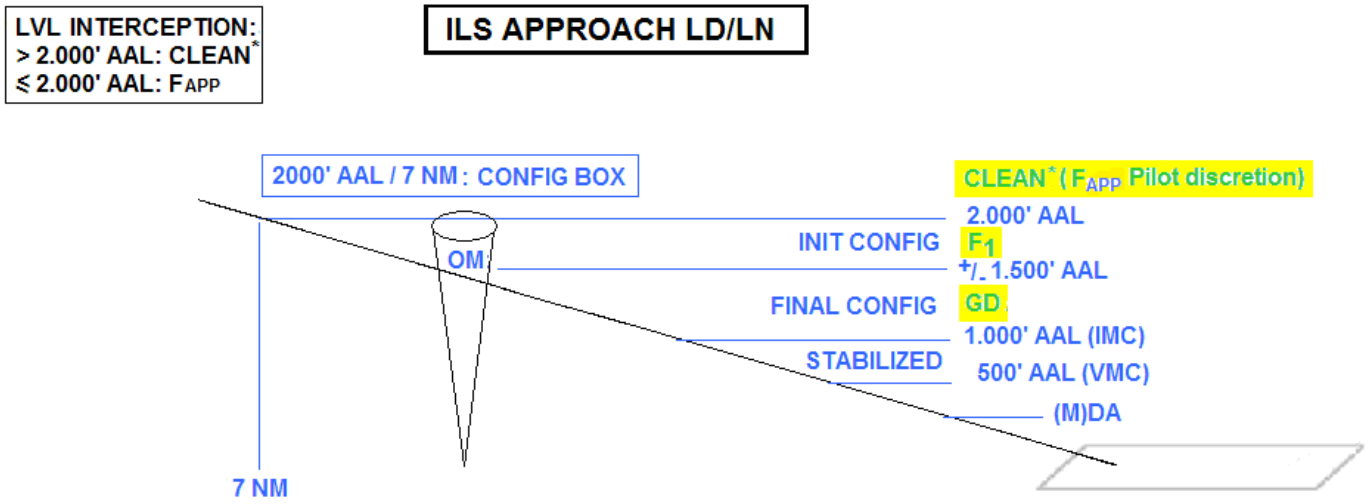
- Allow high speed approach on ATC request / pilot desire
- Increase RWY capacity as all a/c have to fly at the same initial speed until the OM
- Decrease PWR & Noise production (Low Drag / Low Noise Approach)

> Method:

- Maintain clean/partial flaps setting until entering the Configuration Box
- Perform Initial configuration when entering the Configuration Box
- Perform Final deceleration and configuration passing the OM
- Apply attitude & PWR changes to maintain on slope

> Applicability:

- Mandatory for Regulated Airports (Refer to IAC + 10-1)
- Not recommended for Non-ILS approaches in marginal weather



3.9.7 Additional infos on NPA

1) NPA versus CDFA NPA :

In the old days (of poor air & ground equipment), the NPA were flown according to the "Dive & Drive" principle; descend from FAF - or latest step down (if applicable) - to the MDA with an increased ROD, level off at MDA and initiate GA at the latest at MAPt.
That method leads to un-stabilized approaches and is not recommended anymore, as it has been identified as a cause of several incidents and accidents.

NPA procedures are thus gradually being redesigned in accordance with the Continuous Descent Final Approach (CDFA) concept; continuous descend from FAF with the published ROD and initiate GA upon reaching the minima.

COAA BR applies the CDFA NPA concept to all NPA that publish:
- DME based
- CDFA profile (No step down)
- Recommended ROD
- Recommended altitudes

N-CDFA NPA must be flown with increased ROD (published / computed ROD + 100fpm) in order to reach MDA before VDP. MAP may be initiated (at pilot discretion) at VDP and must be initiated at the latest at MAPt.

Procedure:
- Use the GPS data & overlay to cross check navigation accuracy, FAF, VDP and MAPt.
- Use the highest precision info (DME iso time; e.g: remain within 10NM from SNOWL)

GOP:
For N-DME NPA, use the GPS to have an assessment of your slope position.
For a 3° Slope: Increase TDZE by 300' per NM to Threshold
Increase MDA by 300' per NM to VDP

10NM	9 NM	8 NM	7 NM	6 NM	5 NM	4 NM	3 NM	2NM	1NM
3.000'	2.700'	2.400'	2.100'	1.800'	1.500'	1.200'	900'	600'	300'

Example: 2NDB APP RWY 26 at EBOS
For CDFA purpose, aim to cross OO at 250' MSL and GPS distance to OO in order to adjust slope position.

NOTE:
CDFA NPA give MDA or DA minima; in both cases the companies are responsible to increase the published minima by the equivalent of height loss during the initial part of the GA maneuver in order not to descend below OCA.
For facility and due to DA42 performances, COAA BR decided not to raise the NPA minima when applying the CDFA concept.

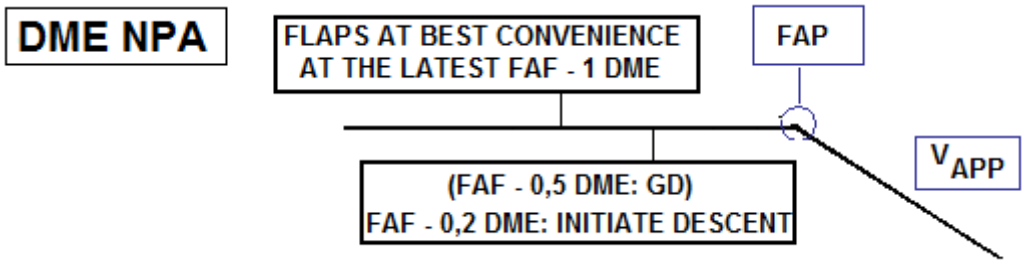
NPA KEY POINTS:
1) NPA requires a thorough analysis of:
- Recommended altitudes vs Mandatory altitudes
- Offsets
- Displaces threshold
- Slopes vs ALT/DIST markings (sometime not equal, making the ROD non constant - VOR29)
- VDP for (N)CDFA – In both cases, use of the VDP will provide a better identification of procedure termination point. This will avoid being too high / too low on final resulting on an unnecessary GA.

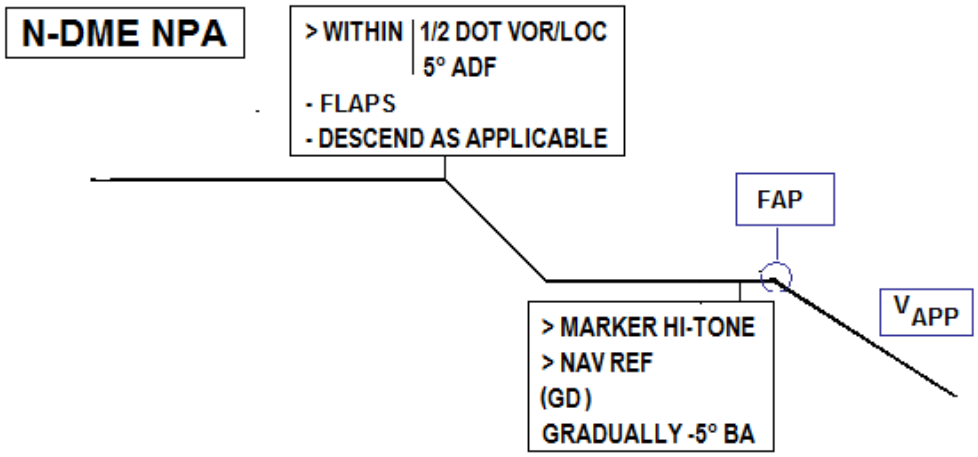
2) NPA requires to be stabilized at FAF and to start the descent at the correct position with the correct ROD.

2) NDB interceptions:
ADF have several errors, among which the dip error.
Dip error amount varies from a/c type; function of equipment, a/c mounting & interferences
For the DA42 the ADF dip error in turn may be as high as 20° of anticipation; requiring following specific for base turn interception technique:
1) Preset heading bug at 30° of effective intercept heading
2) Assess actual QDM versus required QDM in turn
   - If actual QDM ≥ required QDM before reaching heading bug; increase bank as required
   - If actual QDM if ≤ required QDM when reaching heading bug; roll-out on heading bug
3) Fine tune interception & tracking as required

NOTE: For 30° turn, the ADF dip error is marginal.

3) DME NPA vs N-DME NPA
The keypoint of a NPA is to start the final descent at the correct position with the correct ROD.
Furthermore, the a/c has to be at the correct configuration and IAS approaching the FAF.
In order to meet all these criteria, it is recommended to use following guidelines:


DME NPA
FLAPS AT BEST CONVENIENCE
AT THE LATEST FAF - 1 DME
FAP
(FAF - 0,5 DME: GD)
FAF - 0,2 DME: INITIATE DESCENT
V APP


N-DME NPA
> WITHIN 1/2 DOT VOR/LOC
5° ADF
- FLAPS
- DESCEND AS APPLICABLE
FAP
> MARKER HI-TONE
> NAV REF
(GD)
GRADUALLY -5° BA
V APP

4 Non-normal operations

4.1 Introduction

This chapter covers DA42 basic handling and management in abnormal & emergency situation.
As DA42 is a light MEP, not designed to sustain departure nor continued operation on single engine.
Further more, the training will only cover failure initial response, identification, solving and basic safe decision making. Focus will be set on correct workload control, as consecutive to any failures, the pilot will have to face to a brutal and unexpected increase workload & complexity:
- Maintain a/c control with a different handling
- Failure identification
- Failure solving process
- Decision making process
- Different approach & GA configuration & procedure

CAUTION:
During simulator sessions you will handle failures according to SPIFR operation.
The same applies to simulated failures during training/checking flights.
For real failures during training/checking flights, safety dictates that the crew will handle the failure according to MPIFR operation; thus in coordination with your IP/EP.

NOTE:
This chapter will only provide you basic non-normal working method as more complex non-normal management will be trained during MCC & Tyre Rating courses.

Failures during critical phase refer to failures happening below:
1.000' AGL in VMC or MEA / MHA / MSA / MGA in VMC.

4.1.1 Non-normal working method

N-NORMAL Pilot Tasks (For Light MEP**):**

1° FLY:
FLY first ! Always maintain (recover) the a/c control.

Specific for Light MEP EF during critical phase (Below 1000 ft):
Immediately feather prop by recall to maintain a/c control and climb performances

2° NAV:
Once the a/c is under control: make sure that the a/c trajectory remains clear of terrain.
Maintain / Rejoin EFP on Departure – IAP on Approach

3° COM (Floating task for N-NORMAL OPS):
- Once the a/c is under control and NAV assured, consider to advise ATC
- Refer to NITS for compete COM in N-Normal operations
- Must contact ATC before deviating from clearance or when needing assistance (RDR vector)

4° MANAGE:
Once the a/c is under control, NAV assured and:
1) Above 400' AGL: Execute the N-Normal C/L RECALL items only
2) Above Safe Altitude (MSA / MIN 1000' AGL).Apply Management tasks in following order:
   - N-Normal C/L subsequent actions (Engine securing)
   - Normal C/L (E.g: After T/O C/L)
   - Analysis (Refer to FORDIC for complete MAN in N-Normal ops)
   - Decision making (Light MEP: consider terminating your flight at first suitable airfield)

GOLDEN RULES:
1° FLY FIRST !
2° DO NOT RUSH !
3° Decision making: BETTER SAFE THAN SORRY ! (Don't push it for operational reason)

NOTES:
1) Pilots must be aware that checklists are subdivided in three chapters. The Recalls for the actions requiring immediate action (to be done once the a/c is under control and above 400' AGL), the subsequent actions to try to restore the system (to be done once the a/c is under control and above safety altitude) and the status to announce the further actions and implications for the landing and/or GA. Further more, N-Normal C/L cannot be created for all possible combination of failures. They are not intended to replace good judgment, such as checking if C/B did pop out. In some unrelated multiple failure situations pilots may have to combine elements of more than one checklist or exercise judgement to determine the safest course of action.

2) Resetting of C/B is to be assessed if required for the flight, as some C/B reset must not be executed (I.e: Fuel pump C/B) or should not be reset (I.e: A/P and Electrical trim)

3) G1000 detects and displays most N-Normal items. Acknowledgement is done orally by reading the annunciation and then pressing the soft key in order to reset the MWS. The G1000 system will then place warnings and cautions in the correct order of importance. Abnormal checklists should be treated in the G1000 given order. Important information and consequences are displayed in the advisory information window.
It is mandatory to acknowledge the advisory/caution/warning message in order to reset the alerting logic; thus allowing further detection.

4) In single-pilot operations it is important to use every resource at your disposal such as A/P, GPS, Moving Map etc (SRM = Single-pilot Resource Management).
If flying with another qualified pilot, flying tasks should be delegated; "I fly / You clear" to confirm to the other pilot that you have controls + communication and to instruct him to clear the N-Normal via the appropriate N-Normal C/L. Refer to Crew Resource Management (CRM) basics.

NITS:
Memotechnic tool to be used for COM (inside / outside) in N-Normal ops
Nature : Nature of the problem
Intentions : Decision
Time : Foreseen landing time
Special : Special landing and/or assistance required

FORDIC:
Memotechnic tool to be used for decision making in N-Normal ops.
Methodology is to analyze in crew all given points (in given sequence)
Facts : Facts of the N-Normal
Options : Options; consider (in given sequence) to Continue / Return / Divert to CY then N-CY.
Risks : Risks and benefits of all retained options (WX, RWY length, perfo…)
Decision : Agree on the decision
Implementation : How will the plan be implemented (How does what, when and how?)
Cross-check: Continuous cross-check that decision is still best applicable (WX / Fuel changed)

4.1.2 Engine failure

ENGINE FAILURE / FIRE BASIC ACTION PLAN (Light MEP)		
TIME REFERENCE	**CRITICAL PHASE**	**N-CRITICAL PHASE**
IMMEDIATE ACTION	**FLY + FEATHER**	**FLY** **IN CASE OF ENG FIRE:** **COMPLETE MEMORY ITEMS**
+ A/C UNDER CTL	**NAV** **CONSIDER TROUBLE SHOOTING**	
+ NAV UNDER CTL **> 400' AGL**	**IN CASE OF ENG FIRE:** **FEATHER + FUEL SELEC OFF**	
BEFORE **CLEARANCE DEVIATION**	**COM** **> INIT CALL: PAN / MAYDAY** **> FURTHER CALL: NITS**	
+ SAFE ALTITUDE **VMC:** **≥ 1.000' AGL** **IMC:** **≥ Safe altitude** **(MEA / MHA / MSA / MGA)**	**MANAGE**	
	1st N-NORMAL C/L (Simulated: Memory / Real: QRH/ AFM)	
	2ND NORMAL CL (Memory + Safety Net)	
	DECISION MAKING: **> FORDIC** **> CONSIDER ENGINE RESTART** **> LAND ASAP**	
IF TIME PERMITS	**N-NORMAL CL by QRH**	

NOTE: For light MEP, don't delay landing for trouble shooting / QRH - AFM review.

Detail action plan for DA42 Engine Failure:

- **FLY** :

1) First immediate action: MAINTAIN A/C CONTROL
   => Immediate & Natural Simultaneous execution of instinctive + mental action:
   INSTINCTIVE ACTION:
   - Immediate Rudder input to stop Yaw (By outside or heading bug reference)
   - Immediate aileron inputs to stop Bank (By outside or ADI reference)

   MENTAL ACTION:
   - Smoothly decrease pitch to EO target TOGA BA (5°) In order to maintain IAS ≥ V_{YSE}
   - Immediate PWR application (as required);
     Full for T/O & GA
     Stretch arm (90%) for approach continuation

2) Second action (No delay): ADJUST CONFIGURATION (As required)
   "ALL FORWARD, GEARxx, FLAPSxx (as required)"
   => Simultaneous execution of:
   - Gear up & flaps up (All cases except for continued final)
   - Flaps retraction to F_{APP} (For continued final)

3) **RECALL (IF DURING CRITICAL PHASE)**: Feather the failed engine (No delay)
   - IDENTIFY the failed engine:
     - ENG PARAMETERS: PWR OUTPUT (Glance look)
     - RUDDER INPUT: "Dead Foot / Dead Engine"
       => "Identify: L/R engine failure"
   - VERIFY the correct identification:
     - PWR: Gradually Idle on identified failed engine; verify NO asymmetry change
       => "Verify: L/R engine failure"
   - FEATHER the failed engine
     - ENG MASTER OFF
       => Simulated: Point out the engine master with one finger
       => Real: Set the engine master OFF

4) Best Performance

- Zero side slip (Best
  1.5° bank towards operating engine + ½ skid index towards operating engine
  "Raise the Dead Engine" <or> "Bank & Ball towards Live Engine"

- **NAV** :
  - ✓ Rapid return to a Safe Track / Escape Routing
    - Return to Departure track or Escape routing (as applicable)

- **COM**:
  - ✓ INFORM ATC as soon as:
    - Deviating from ATC clearance in order to avoid MID-AIR potential
      - SID deviation / Descending due to Cruising > SE Ceiling)
    - Assistance is required:
      - Request vectoring for the approach

    => Declare Emergency:
    - Nature of Problem
    - Intentions

    (E.g.: "Mayday x3: OFA, engine failure, proceeding straight ahead 2.000', request vectoring for ILS 29")

- **MANAGE**:

  1° N-NORMAL C/L:

  ✓ OPTION 1: CONSIDER ENGINE RESTART

  CRITERIAS:

  NO Fire
  NO Visual / Suspected Damage (Bang / Vibration / Smoke)
  ENG Parameters Normal (Before & After Shut-Down)
  SYST Parameters Normal (DA42 specially electrics)

  => TROUBLE SHOOTING

  - Fuel Selector……..X-Feed
  - ALTN Air ……Select
  - ENG MASTER….. ON
  - ECU MAN……..SWAP
  - CB PANEL ……Check

  => CONSIDER ASSISTED START IF PROP DOESN'T UNFEATHER

  - Starter…….Apply
  - Elect system……..Monitor

  ✓ OPTION 2: CONSIDER ENGINE SECURING <OR> AFTER UNSUCCESSFUL START

  - ENG MASTER….. OFF (Inop Engine)
  - Fuel Selector……..OFF (Inop Engine)
  - ALTN……..…OFF (Inop Engine)

  2°NORMAL C/L:

  ✓ After T/O CL (Departure & GA phase)
  ✓ Before landing CL (Approach phase)

  3° **DECISION MAKING**:

  Best course of action: proceed to land As Soon As Possible (ASAP)

  i. Immediate landing possible:
     - VMC: Turn downwind for visual circuit
     - IMC: Request vectoring for best IAP (ILS)

ii. NO immediate landing possible

1. Return / Divert – function of situation
2. Consider POH for N-Normal C/L (Time permitting – Do not delay landing)
3.

- EF action plan: Sequence & Tempo:

✓ Sequence:
- FLY (+ Feather propeller [Light MEP])
- NAV
- RECALL (A/C under control & above 400' AGL)
- COM
- MANAGE:
  - ✓ N-NORMAL: Engine securing
  - ✓ NORMAL: After T/O C/L
- Adapt ATC Call moment & content to best suit the N-Normal situation

=> Respect of Basic Sequence (Fool proved)

✓ Tempo (Critical Phase):
- FLY ……FIRST / IMMEDIATE RESONSE
  - IMMEDIATE & Instinctive regain of a/c ctl.(Return to HDG BUG)
  - Adjust PWR & CONFIG (As required)
  - Feather the propeller (Identify / Verify then Feather propeller)
- NAVIGATE……ASAP restore SAFE track (Use NAVAID of departing RWY)
- RECALL…… AS REQUIRED

WARNING:
- Rushed feathering may result in loss of all engines
- In case of action resulting in EF (e.g: ECU
- manual swap) restore previous setting.

- TROUBLE SHOOTING: OUT OF CRITICAL PHASE & TIME PERMITTING
- SECURING: TIME PERMITTING

COMMON ERRORS

FLY :

DO NOT try to sort-out things (What happened?/ Which engine? Etc…)
DO NOT try to stop yaw with ailerons => Rudder first, then Ailerons second to stop Bank
Use appropriate references to stop Yaw
Outside for VMC – HDG bug for IMC – Body lateral side on seat: rudder side
Insufficient use of references to stop Bank (Outside for VMC / ATT for IMC)
DO NOT fight rudder against aileron inputs: "You Dance : You Die!"
Rudder for Yaw Control & Yoke for Wings Level
NO/SLOW NOSE DOWN: IAS decay below Blue Line [Non instinctive action]

CAUTION:

Delayed Yaw, Roll & Pitch recovery may lead to a/c loss of control
Delayed PWR application will aggravate IAS & PERFO loss
Delayed Reconfigure in EFTO, EFGA & EF-Continued APP lead to speed decay below V_{YSE}

TIPS FLYING OEI:

Minimize PWR changes
Smooth PWR changes
Coordination hands & feet during PWR / IAS change

RECALL :
- RUSHED feathering as it may result in loss of both engines

NAV:
- NOT RETURNING to a RWY axis / Safe Track
- NOT APPLYING Escape Routing

ATC Operation

When receiving several data, memorize the data in following order of priority:
- Dangereous: ALT / FL
- N-Dangereous: RT Frequency
- Easy to remember: WYPT

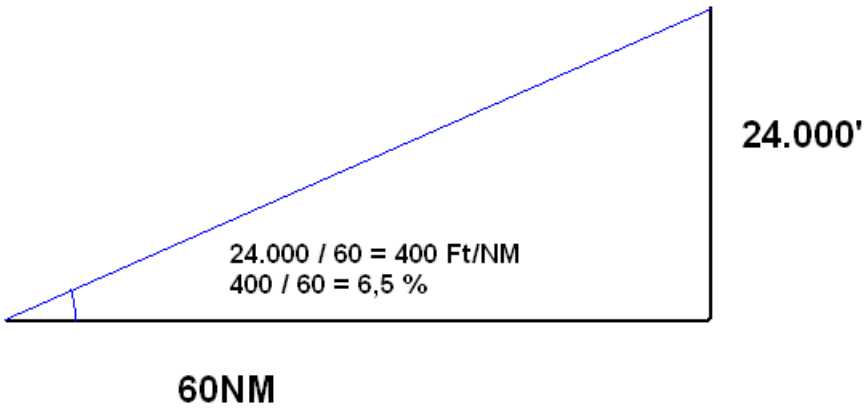
Have prediction of data to be received:
- Study + display chart (Taxi routing names / SID & STAR WYPTS) before calling / answering

Complex data (difficult taxi routing / clearance):
- Prepare to write down data

RULES OF THUMB

Slope:

Std Slope: 3°, 5%, 1/20, 300 ft/NM
Convert Δ ALT in Δ NM in % => 60ft/NM = 1%
Convert slope % in VS => IAS x %
$RO^C/_D$ for given slope (%) at IAS = % x IAS



Be level XXXX feet in YY NM?
(Δ1000' ÷ ΔNM) X Speed Nb = (Feet / NM) X Speed Nb
I.e: 4000' in 10NM => VVI: 800 fpm at 120 Kts

In climb, what altitude can you be in XX NN?
(ΔNM ÷ Speed Nb) X ROC*
ROC*: To consider loss of ROC; 5% per Δ1000' (Light-MEP)
I.e: In 10 NM, present ROC 500fpm at 90 Kts => [(10 ÷ 1,5) X 500] - Loss ROC : +2700'

Temperature:

ISA T: 15° - (2° / 1.000 Δ SL)
SAT = IOAT - 2 x Mach Nb

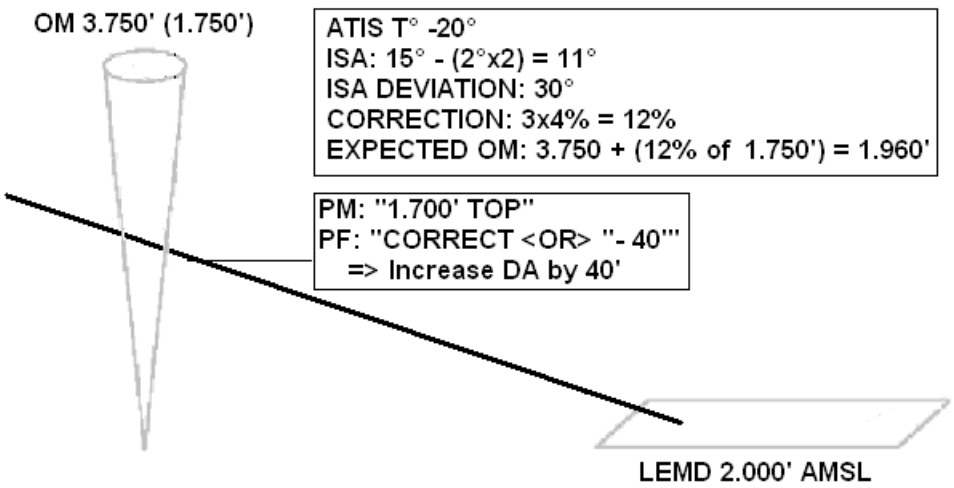
TAT = IOAT + Mach Nb

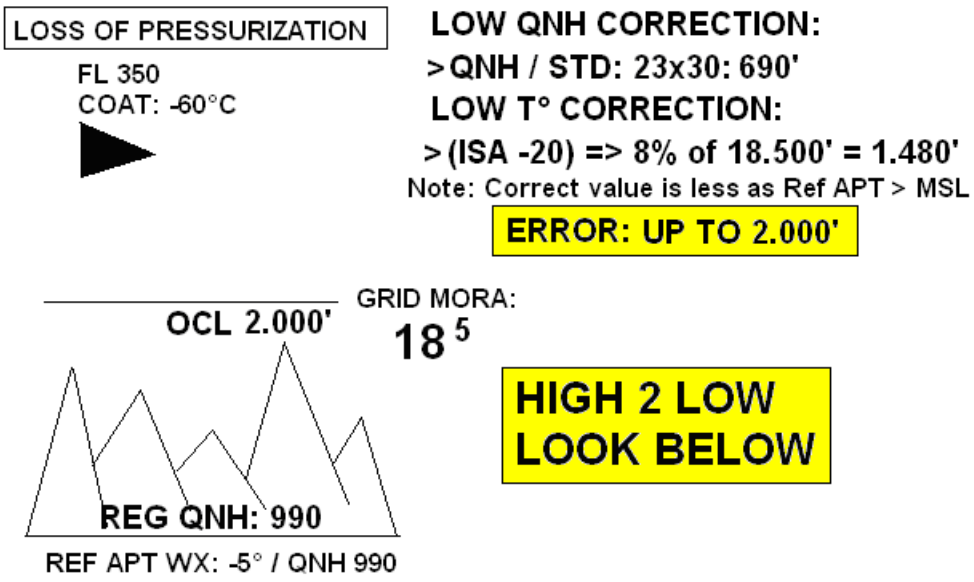
Speeds:

M Nb x 10 = Nb of NM per Min.
TAS/60 = Nb of NM per Min.
TAS = IAS + 2% / 1.000'
TAS = IAS + FL/2
TAS = M x 600

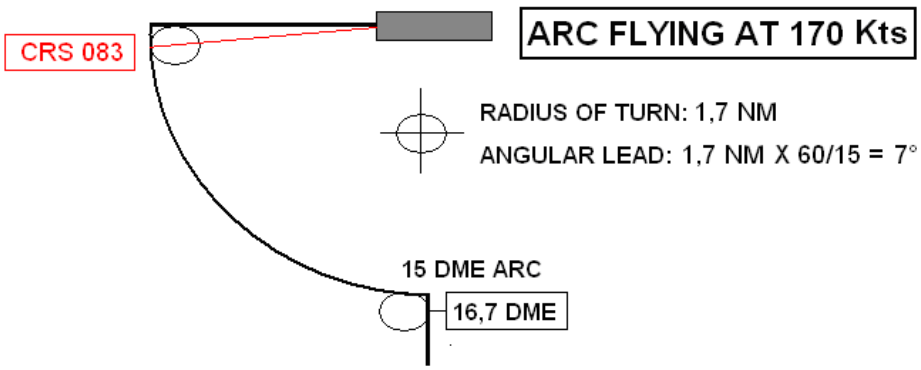
Altimeter:

Correction Δ ISA Temperature: 1 % of Height per 2,5° ISA T deviation.
Correction Δ ISA Pressure: 30' per Hg STD deviation.
Max ALTI Error: 50' at SL, 80' at 5.000', 120' at 10.000'



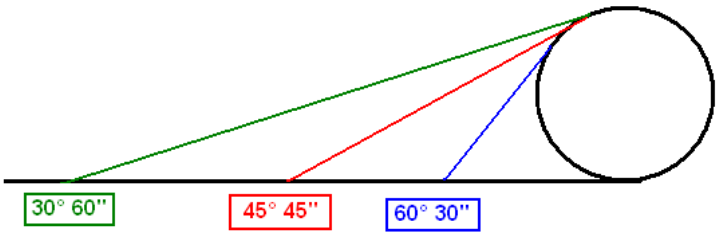


ARC FLYING:

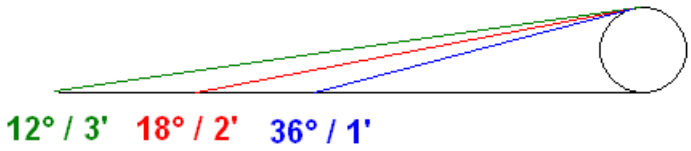


COURSE REVERSAL:

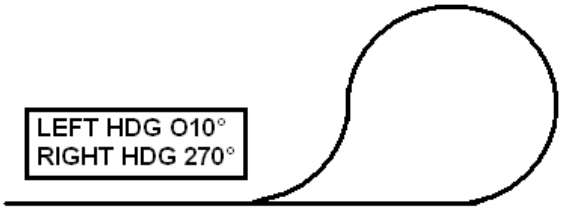
"1/90 Rule" (≤ 1'): 30° OFF for 60" <OR> 45° off for 45" <OR> 60° off for 30"



"1/36 Rule" (≥ 1'): 36° OFF for 1' <OR> 18° OFF for 2' <OR> 12° OFF for 3'



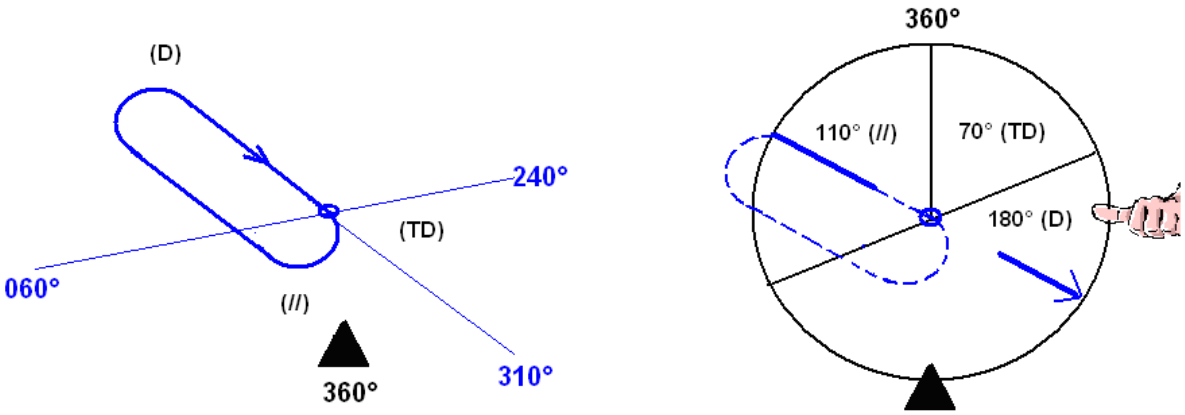
"80/260" **:** 80° / 260° (Recommended for Circling App GA)



HOLDING:

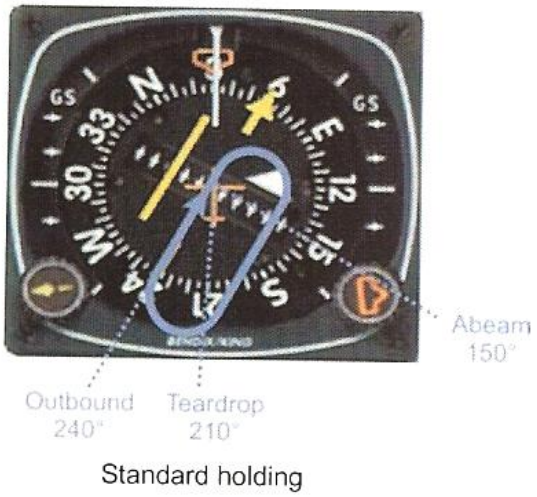
(A) VISUALIZE ENTRY

- **Set Inbound Course in the ND [HOLD RDL 310 RT]**
- **PF must Brief type of entry and first turns.**

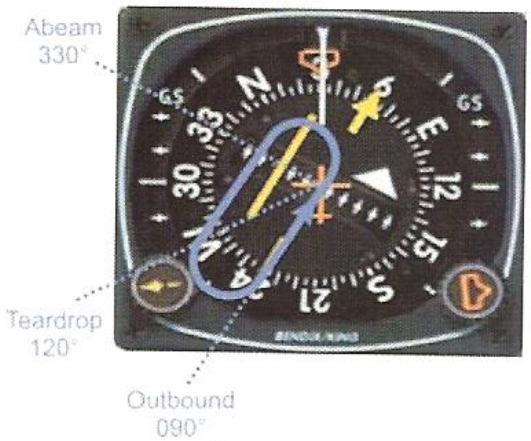


PLAN VIEW	HOLD RDL 310	ND VIEW

Holding on radial 240°



Standard holding

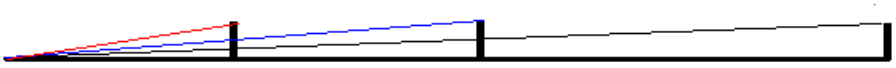


Non standard holding

Aviation Maths

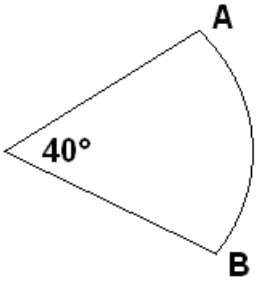
SIMPLIFIED TRIGONOMETRY:

ANGULAR "1/60 RULE": [1NM at 60 NM = 1°]



1 NM at 15 NM = 4° **1NM at 30 NM = 2°** **1 NM at 60 NM = 1°**

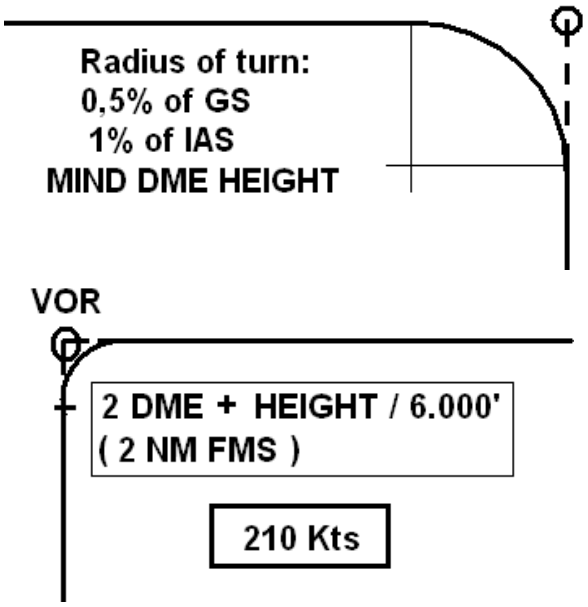
DISTANCE "1/60 RULE": (ANGLE) x (ARC DME / 60)



15 DME ARC
Distance AB :
40 NM divided by (60/15) = 10 NM

LEAD FOR RADIUS OF TURN:

Distance: 1% IAS (E.g. 170 Kts Radius of Turn: 1,7 NM)



RECIPROCALS:

HDG / CRS reciprocal :
[+2 / -2] or [-2 / +2] as applicable
040° => 220°, 140° => 320°, 200 => 020°, 350° => 170°
Error area: 181° to 199° => 361° (001°) to 379° (019°)

Lateral lead at 120 Kts (2 NM/MIN):
- Rate of Turn at 120 Kts; 0,5% GS = 0,6 NM = 5° at 10 NM (1 DOT VOR) =

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Safety layers

400’ / 1000’ / MSA

5 ABBREVIATIONS

AP	Auto Pilot
APT	Airport
AS RQD	As Required
BA	Body Attitude
CDA	Continuous Descent Approach
CDFA	Continuous Descent Final Approach
CDTS	Conditions
CFIT	Controlled Flight in to Terrain
CKD	Checked
C/L	Checklist
CLN	Clearance
CRM	Crew Resource Management
CTL	Control
DA	Decision Altitude
EADI	Electronic Attitude Directional Indicator
EFIS	Electronic Flight Instruments System
EHSI	Electronic Horizontal Situation Indicator
EFP	Engine Failure Procedure
EF-CRUISE	Engine Failure in Cruise
EF-FINAL	Engine Failure on Final
EFGA	Engine Failure on GA
EFTO	Engine Failure on T/O
EO	Engine Out
FD	Flight Director
FMA	Flight Mode Annunciation
FORDIC	Facts/Options/Risk/Decision/Implementation/Check
FSB	Fasten Seat Belts
GA	Go Around
GSPD	Ground Speed
IAC	Instrument Approach Chart
IAP	Instrument Approach Procedure
IAW	In Accordance With
LD/LN	Low Drag / Low Noise APP
LT	Left Turn
LOFT	Line Oriented Flight Training
MCC	Multi Crew Concept
MCP	Mode Control Panel
MCT	Max Continuous Trust
MDA	Minimum Descent Altitude
MEA	Minimum Enroute Altitude
MEL	Minimum Equipment List
MOCA	Minimum Obstacle Clearance Altitude
MORA	Minimum Off-road Altitude
MSA	Minimum Sector Altitude
MWS	Master Warning System
ND	Navigation Display
NITS	Nature / Intentions / Time / Specials
NPA	Non-Precision Approach
NWS	Nose wheel Steering

OFP	Operational Flight Plan
OPS	Operations
PANOPS	Procedures for Air Navigation Services
PF	Pilot Flying
PIC	Pilot in Command
PM	Pilot Monitoring
RD	Raw Data
RDL	Radial (VOR)
RT	Right Turn
SA	Situation Awareness <OR> Straight Ahead
SID	Standard Instrument Departure
SIT	Situation
SOP	Standard Operation Procedures
TBN	To Be Notified
TL	Transition Level
V_{APP}	Approach Speed