A320 Family Handbook

This SOP is valid for all aircraft types within the A320 family.

1. Introduction

1.1 Purpose

This handbook provides a structured introduction and operational guidance for the Airbus A320 family within our virtual airline.

It is designed to:

- Support new pilots during initial training
- Provide standardized procedures for daily operations
- Ensure consistent and realistic flight execution

The document combines simplified theoretical explanations with operational procedures tailored for flight simulation.

1.2 Applicability

This handbook applies to the following aircraft types:

- Airbus A318
- Airbus A319
- Airbus A320
- Airbus A321

All procedures are based on common Airbus philosophy and may be applied across the entire A320 family unless stated otherwise.

1.3 Philosophy

The Airbus A320 family is designed around automation and pilot monitoring.

Key principles include:

- **Automation is a tool, not a replacement for pilot awareness**
- **Pilots must understand system behavior, not just operate it**
- **Standardization is essential for safe and efficient operations**

Within this virtual airline, emphasis is placed on:

- Structured workflows
- Clear procedures
- Realistic, but accessible simulation

1.4 Training Concept

This handbook is used as the primary training document for obtaining the **virtual Airbus A320 Type Rating** within BlueLake Airways.

It provides all required knowledge and procedures for:

- Aircraft familiarization
- Standard Operating Procedures (SOPs)
- Flight handling and automation management
- Normal and abnormal operations

Pilots may operate the A320 family within the airline once they have:

- Completed the required training
- Demonstrated sufficient understanding of this handbook
- Successfully passed any required evaluation or check flight

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Philosophy

Training is focused on:

- Standardization
- Practical application
- Safe and consistent operation

There is no fixed rank progression within the airline.
Qualification is based solely on aircraft type proficiency.

Core Rule

“Qualification is earned through competence, not rank.”

1.5 Use of this Handbook

This handbook is intended to be used:

- During ground training
- As a reference during flight preparation
- As a standard for all operations within the airline

It is not intended to replace real-world manuals, but to provide a practical and simulation-focused adaptation.

2. Aircraft Overview

2.1 General Description

The Airbus A320 family is a series of narrow-body, twin-engine jet airliners designed for short- to medium-haul operations.

It includes:

- A318 (smallest variant)
- A319
- A320 (baseline model)
- A321 (largest variant)

All aircraft share a common cockpit design, allowing pilots to operate multiple variants with minimal additional training.

2.2 Key Characteristics

The A320 family introduced several innovations that define modern airliner operations:

Fly-By-Wire System

The aircraft is controlled electronically rather than mechanically.

Pilot inputs via the sidestick are interpreted by flight control computers, which:

- Enhance stability
- Prevent excessive maneuvers
- Protect the aircraft from exceeding limits

Sidestick Control

Instead of a traditional control column, the A320 uses a sidestick.

Characteristics:

- Located on the side of each pilot
- Not mechanically linked between pilots
- Inputs are processed electronically

ECAM (Electronic Centralized Aircraft Monitoring)

The ECAM system provides:

- System status information
- Automatic failure detection
- Step-by-step guidance in abnormal situations

This reduces pilot workload and improves situational awareness.

2.3 Cockpit Philosophy

The Airbus cockpit is designed around the concept of:

“Manage the flight path, monitor the automation.”

Key ideas:

- Automation handles routine tasks
- Pilots supervise and intervene when necessary
- Clear system feedback is always available

2.4 Differences within the A320 Family

While cockpit operation remains largely identical, there are operational differences:

- **A318 / A319**
  - Shorter fuselage
  - Lower passenger capacity
  - Better performance on shorter runways
- **A320**
  - Standard reference model
  - Balanced performance and capacity
- **A321**
  - Longer fuselage
  - Higher passenger capacity
  - Different handling characteristics (especially during takeoff and landing

2.5 Typical Operations

The A320 family is commonly used for:

- Short-haul routes
- Medium-haul routes
- High-frequency operations

Typical cruise altitude:

- FL320 – FL390

Typical cruise speed:

- Mach 0.76 – 0.80

2.6 Summary

The Airbus A320 family combines:

- Advanced automation
- High commonality across variants
- Efficient and reliable performance

Understanding its philosophy is essential before applying operational procedures.

3. Cockpit Layout

3.1 General Layout

The Airbus A320 cockpit is designed for efficiency, clarity, and automation management.

It is divided into three main areas:

- **Overhead Panel** (systems control)
- **Main Instrument Panel** (flight information & automation)
- **Pedestal** (thrust, navigation input, communication)

This standardized layout is identical across the A320 family.

3.2 Overhead Panel

The overhead panel is used to control and monitor aircraft systems.

Main sections include:

- Electrical system
- Fuel system
- Hydraulic system
- Air conditioning and pressurization
- Anti-ice systems

Design principle:

- “Dark cockpit philosophy”
  → In normal operation, no lights should be illuminated
  → Lights indicate abnormal or non-standard conditions

3.3 Main Instrument Panel

This is the primary area for flight control and monitoring.

Primary Flight Display (PFD)

Displays essential flight data:

- Attitude (pitch & bank)
- Airspeed
- Altitude
- Vertical speed

Navigation Display (ND)

Shows:

- Flight plan route
- Weather radar (if active)
- Navigation aids
- Terrain (if enabled)

ECAM Displays

The ECAM system consists of two screens:

- **Upper ECAM (E/WD):**
  - Engine parameters
  - Warning and status messages
- **Lower ECAM (SD):**
  - System pages (e.g. HYD, FUEL, ELEC)

Purpose:
To provide automatic system monitoring and assist pilots in abnormal situations.

3.4 Flight Control Unit (FCU)

The FCU is located on the glare shield and is used to control the autopilot.

Functions include:

- Speed selection
- Heading selection
- Altitude selection
- Vertical modes (climb/descent)

Key concept:

- **Managed Mode** → aircraft follows flight plan
- **Selected Mode** → pilot manually sets values

3.5 Pedestal

The pedestal contains systems used during active flight management.

Thrust Levers

- Control engine thrust
- Include detents:
  - IDLE
  - CL (Climb)
  - FLX/MCT
  - TOGA

MCDU (Multipurpose Control and Display Unit)

Used to interact with the Flight Management System (FMS).

Main functions:

- Route planning
- Performance calculations
- Navigation management

Radio and Communication Panels

Used for:

- ATC communication
- Navigation frequency tuning

3.6 Sidestick

Each pilot controls the aircraft using a sidestick.

Characteristics:

- Independent for each pilot
- No physical linkage between sides
- Inputs are processed by flight control computers

3.7 Summary

The A320 cockpit is designed around:

- Automation
- Clear information display
- Efficient pilot interaction

Pilots are expected to:

- Understand where systems are located
- Use automation effectively
- Monitor all systems continuously

A solid understanding of the cockpit layout is essential before performing operational procedures.

4. Standard Operating Procedures (SOPs)

4.1 Cockpit Preparation

Objective

To ensure the aircraft is correctly configured, powered, and programmed prior to engine start.

Crew Concept

- **PF (Pilot Flying):**
    - Reviews flight plan
    - Performs MCDU setup
    - Cross-checks entries
- **PM (Pilot Monitoring):**
    - Performs cockpit setup
    - Powers aircraft systems
    - Executes checklists

Initial Cockpit Setup

PM:

1. BAT 1 + BAT 2 → ON
2. External Power → ON (if available)

Check:

- ECAM displays active
- No abnormal warnings

Overhead Panel Setup (PM)

- Fuel Pumps → ON
- Hydraulic Panel → CHECK
- Electrical Panel → CHECK
- Air Conditioning → SET

ADIRS:

- Set all IR selectors → NAV

Cockpit Lighting (PM)

- Set as required for conditions

MCDU Initialization (PF)

INIT A Page:

- FROM / TO → Set departure & arrival airport
- Flight Number → INSERT
- Cost Index → SET
- Cruise Level → SET

Flight Plan Page:

- Insert route (airways / waypoints)
- Check for discontinuities
- Insert SID (Standard Instrument Departure)
- Verify routing

INIT B Page:

- Block Fuel → INSERT
- Zero Fuel Weight → INSERT

Performance Setup:

- V1 / VR / V2 → CALCULATE & INSERT
- FLEX Temperature → SET (if applicable)
- Thrust Reduction / Acceleration Altitude → SET

FMGS Crosscheck

PM cross-checks all entries:

- Route correctness
- Fuel values
- Performance data

Flight Instruments Setup

Both pilots:

- Set Barometric Reference
- Set Initial Altitude
- Set Vertical Display Selector on Above

Takeoff Briefing (PF)

Must include:

- Runway
- SID
- Initial altitude
- Expected routing
- Threats & considerations

Before Start Checklist

Performed when all preparation is complete.

Key Principles

- Always verify MCDU entries
- Cross-check between PF and PM
- Avoid rushing the setup

Philosophy

A correct cockpit preparation ensures:

- Reduced workload during taxi and takeoff
- Fewer errors in flight
- Better situational awareness

A rushed or incomplete setup increases risk significantly.

4.2 Engine Start

Objective

To safely start the engines while ensuring proper coordination with ground crew and maintaining full control of the aircraft during pushback or stand departure.

General Principle

Engine start must only be performed when:

- Aircraft is correctly configured
- Area around aircraft is clear
- Ground crew confirms readiness

Mandatory Condition

Engine start is only permitted after “CLEAR TO START” from ground crew

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Engine Start WITH Pushback

Preconditions

- Pushback clearance received
- Ground crew connected (headset)
- Beacon → ON
- APU BLEED → ON

- Fuel Pumps → ON

Procedure

PF:

- “Request pushback and start”

PM:

- Communicates with ground

Pushback Initiation

- Parking Brake → RELEASE (on instruction)
- Pushback begins

Engine Start Sequence

After **“CLEAR TO START”**:

PF: “Start Engine 1”
PM: “Starting Engine 1”

PM:

- ENG MODE Selector → IGN/START
- ENG 1 MASTER → ON

ECAM Monitoring (PM)

- N2 rotation
- Fuel Flow at ~20% N2

- EGT rise
- Stable parameters

Callouts

- “N2 increasing”
- “Fuel Flow”
- “EGT rising”
- “Engine 1 stabilized”

- Repeat for Engine 2

During Pushback

- Monitor aircraft movement
- Maintain communication with ground crew
- Avoid distractions during engine start

After Pushback

- Parking Brake → SET (on instruction)
- Ground crew disconnect confirmed

Engine Start WITHOUT Pushback (Self Maneuvering Stand)

Preconditions

- Area around aircraft visually confirmed clear
- No ground crew in hazard area
- Beacon → ON
- APU BLEED → ON
- Fuel Pumps → ON

Procedure

PF:

- Confirms: “Area clear”

Engine Start

PF: “Start Engine 1”
PM: “Starting Engine 1”

PM:

- ENG MODE Selector → IGN/START
- ENG 1 MASTER → ON

ECAM Monitoring

- N2 rotation
- Fuel Flow
- EGT rise
- Stabilization

- Repeat for Engine 2

Key Difference

- No pushback coordination required
- PF responsible for visual clearance

After Start Actions (Both Cases)

PM Flow:

- ENG MODE Selector → NORM
- APU BLEED → OFF
- APU → OFF (if not required)
- Anti-Ice → AS REQUIRED
- Flaps → SET
- Pitch Trim → SET

Key Principles

- Engine start is a controlled and monitored process
- Ground crew safety has priority
- Standard sequence must always be followed

Core Rule

“No clear area – no engine start.”

Outcome

- Engines started safely
- Aircraft ready for taxi
- Full coordination between cockpit and ground

Single Engine Taxi Policy

To improve fuel efficiency and reduce engine wear, single engine taxi should be used when operationally feasible.

Application

Single engine taxi is required when:

- Expected taxi time exceeds **10 minutes**

Applicable airports are defined in the respective **airport briefing**.

Procedure

- Start **Engine 1 only** during engine start phase
- Keep **Engine 2 OFF**

Considerations

- Maintain sufficient thrust for taxi
- Monitor aircraft handling (asymmetric thrust)
- Use additional thrust carefully if required

4.3 Taxi

Objective

To safely maneuver the aircraft from stand to runway while maintaining full control, situational awareness and ground crew safety.

Taxi Phase Definition

The taxi phase begins when:

- Pushback is completed
  OR
- Aircraft starts moving under its own power (self-maneuvering stand)

Taxi Clearance

PF: Requests taxi clearance
PM: Handles ATC communication

Taxi Procedure

PF:

- Releases parking brake
- Applies **minimum thrust required** to initiate movement

Thrust Management

- Use **IDLE thrust whenever possible**
- Apply thrust only to start movement
- Avoid continuous thrust application

Steering

- Nose wheel steering via tiller (PF)
- Rudder pedals for small corrections
- Use smooth and controlled inputs

Speed Control

- Standard taxi speed: **~20 kt**
- Outside apron: **max 30 kt**
- Tight turns: **max 15 kt**

Brake Usage

- Apply brakes smoothly
- Avoid aggressive braking
- Maintain passenger comfort

Self Maneuvering / 180° Turns

At stands where no pushback is used and a **self-turn (e.g. 180°)** is required:

Procedure

PF:

- Release parking brake
- Use **minimum thrust only**
- Initiate slow, controlled turn

Speed & Control

- Maintain very low speed
- Avoid tight or aggressive steering
- Aircraft should roll smoothly through the turn

Lighting Policy (Ground Safety)

During initial movement (nose still facing stand/apron):

- Taxi Lights → OFF
- Runway Turnoff Lights → OFF

Once aligned with taxi direction:

- Taxi Lights → TAXI
- Runway Turnoff Lights → ON

Purpose

- Prevent blinding ground personnel
- Increase apron safety
- Ensure professional operation

Taxi Lights Configuration

During normal taxi:

- Taxi Lights → TAXI
- Runway Turnoff Lights → ON
- Landing Lights → OFF

Monitoring (PM)

- Brake temperature
- Taxi route
- External traffic
- Clearance compliance

Flight Control Check

Performed during taxi:

PF: “Flight Controls Check”

PM monitors ECAM:

- Full and free movement
- Correct deflection

Before Takeoff Preparation

- Complete Before Takeoff Checklist
- Verify aircraft configuration

Key Principles

- Maintain situational awareness at all times

- Taxi with low energy and high precision
- Protect ground crew through proper light usage

Core Rule

“Taxi is a low-energy phase – precision over speed.”

Outcome

A correct taxi ensures:

- Safe ground operations
- Reduced workload before takeoff
- Proper aircraft positioning

Second Engine Start (Single Engine Taxi Operations)

Objective

To ensure both engines are available and stabilized prior to takeoff.

Timing

□□ The second engine must be started:

- **At latest 5 minutes before expected takeoff**

Procedure

- Start remaining engine according to **Engine Start SOP (4.2)**
- Ensure full stabilization before runway entry

Monitoring

- Confirm engine parameters stable
- Verify no abnormal indications
- Complete required after start flow

Operational Note

- Plan engine start early enough to avoid:
    - Time pressure
    - Delays at holding point

Core Rule

“Be ready before the runway – not on it.”

4.4 Takeoff

Line-Up

PF:

- Align aircraft with runway centerline

PM:

- Confirms runway and clearance

Takeoff Clearance

PM: Confirms ATC clearance
PF: “Takeoff”

Thrust Application

1. Thrust Levers → ~50% N1 (stabilization)
2. Then → FLEX/MCT or TOGA

Standard Callouts (PM)

- “MAN FLEX / MAN TOGA”
- “Thrust Set”

Takeoff Roll

PM Callouts:

- “100 knots”

- “V1”
- “Rotate”

Rotation

PF:

- Smooth pitch input (~2–3°/sec)
- Target pitch ~15°

Liftoff

PM:

- “Positive Climb”

PF:

- “Gear Up”

Initial Climb

- Maintain runway track
- Follow FD (Flight Director)

After Takeoff

- At acceleration altitude:
  - Pitch down
  - Flaps retract according to schedule

Climb Thrust

- Thrust Levers → CL detent

Autopilot Engagement

The autopilot may only be engaged when the aircraft is properly stabilized and following the Flight Director.

Conditions for Autopilot Engagement:

- Aircraft is in a stable climb
- No excessive pitch or bank
- **Flight Director crossbars are aligned (aircraft follows FD commands)**
- No abnormal flight parameters

Recommendation:

- Typical engagement above 500–1000 ft AGL

Key Principle

“Follow the Flight Director first – then engage the autopilot.”

Engaging the autopilot while not aligned with the Flight Director may result in:

- Abrupt aircraft movements
- Unstable flight path
- Loss of situational awareness

Philosophy

A stabilized and disciplined takeoff ensures:

- Safe departure
- Proper energy management
- Smooth transition into climb phase

4.5 Climb

Objective

To establish a stable and efficient climb profile after takeoff.

After Takeoff Flow

At acceleration altitude:

PF:

- Reduce pitch attitude
- Select climb profile

PM:

- Monitor speed increase

Flap Retraction

- Retract flaps according to speed schedule
- Ensure aircraft is clean (Flaps 0)

Thrust Setting

- Thrust Levers → CL detent

Autopilot

- Engage when conditions are met (see 4.4)

Standard Procedure

- **Climb Mode → MANAGED**
- **Speed → MANAGED**

The aircraft shall follow:

- FMGS vertical profile
- SID constraints
- Pre-programmed speed schedule

Exceptions

Selected modes may only be used if:

- **ATC explicitly assigns:**
  - A specific speed
  - A specific vertical rate or altitude constraint
- **Operational reasons require intervention**, such as:
  - Avoiding traffic
  - Weather deviations
  - Energy management corrections

Monitoring (PM)

- Both pilots must ensure:
  - The aircraft follows the intended vertical profile
  - Speed constraints are respected
  - No unintended mode changes occur

Passing Transition Altitude

- Set Standard Pressure (STD)

During Climb

- As soon as its safe: Turn off the seat belt sign
- When passing FL250: Set Vertical Display Selector on Below

Key Principles

- “Managed by default – Selected only when required.”
- Maintain situational awareness
- Monitor automation continuously
- Anticipate level-off

4.6 Cruise

Objective

To maintain a stable and efficient flight at cruise altitude.

Establishing Cruise

- Aircraft levels off at cruise altitude
- Thrust reduces automatically

Autopilot & Automation

- Autopilot engaged
- Managed speed (Mach mode typically active)

Cruise Speed Management

During cruise, the aircraft should remain in **Managed Speed Mode** under normal conditions.

Standard Procedure

- **Autopilot → ENGAGED**
- **Speed Mode → MANAGED (Mach mode)**

The aircraft automatically optimizes:

- Fuel efficiency
- Speed profile

Exceptions

Selected speed may only be used if:

- **ATC assigns a specific speed**
- Turbulence requires speed adjustment
- Operational considerations demand deviation

Monitoring Duties

Both pilots:

- Monitor flight progress
- Check fuel consumption
- Verify route

Systems Monitoring (PM)

- ECAM parameters normal
- Monitor Mach number and fuel consumption
- Ensure compliance with ATC instructions
- Detect any unexpected automation behavior

Navigation

- Follow programmed route
- Monitor for deviations

ATC Interaction

- Maintain assigned altitude and speed
- Respond to new clearances

Situational Awareness

- Monitor weather
- Anticipate descent planning

Key Principles

- “Let the aircraft manage efficiency – intervene only when necessary.”
- Stay ahead of the aircraft
- Avoid complacency
- Continuously cross-check systems

4.7 Descent

Objective

To conduct a controlled and passenger-comfort-oriented descent from cruise altitude to approach phase while maintaining compliance with all constraints.

Descent Philosophy (VA Standard)

The descent is primarily flown with a focus on:

- **Passenger comfort (smooth vertical profile)**
- **Pilot control over vertical path**
- **Compliance with ATC and charted constraints**

Descent Preparation

PF:

- Reviews arrival (STAR, constraints, transition)
- Conducts approach briefing

PM:

- Programs arrival and approach into MCDU
- Verifies constraints and routing

Top of Descent (TOD)

- Descent initiated prior to or at TOD
- ATC clearance must be received before descent

Descent Mode (STANDARD VA PROCEDURE)

Vertical Mode:

- **Primary Mode → SELECTED V/S (Vertical Speed)**

The descent is manually controlled to ensure:

- Smooth cabin experience
- Stable and predictable vertical profile

Managed Mode Usage:

- **Managed Descent is NOT the default**
- It is used **only when required to comply with constraints**

Examples:

- Altitude restrictions on STAR
- Complex vertical profiles
- When automation assistance is beneficial

Speed Management

- **Speed Mode → MANAGED (throughout STAR)**

The aircraft shall:

- Follow FMGS speed profile
- Respect all published constraints

After STAR (Approach Phase Transition)

- Speed may be adjusted as required:
  - ATC instructions
  - Approach setup
  - Traffic situation

Exceptions

Selected modes may be used if:

- **ATC assigns specific:**
  - Speed
  - Descent rate
  - Altitude constraints
- **Abnormal situations occur**

Monitoring (PM)

- Vertical path vs constraints
- Speed profile
- ATC compliance
- Energy state (too high / too fast)

Energy Management

If aircraft is high or fast:

- Increase descent rate (V/S adjustment)
- Use Speed Brakes as required

Thrust Management

- Typically idle during descent
- Monitor engine parameters

Transition Level

- Set local QNH when passing transition level

Key Principles

- Smooth descent is priority
- Maintain control over vertical profile
- Use automation selectively, not blindly

Core Rule

“Vertical path is pilot-controlled – speed is aircraft-managed.”

Outcome

A properly managed descent results in:

- Passenger comfort
- Stabilized approach conditions
- Reduced workload in final phase

4.8 Approach

Objective

To establish a stable, controlled and smooth transition from descent into final approach, ensuring a safe and predictable landing.

Approach Philosophy (VA Standard)

The approach continues the descent philosophy:

- **Vertical path → primarily pilot controlled (Selected modes)**
- **Speed → managed by aircraft (Managed mode)**

Focus:

- Passenger comfort
- Stabilized approach
- Controlled energy management

Approach Preparation

PF:

- Conducts full approach briefing:
  - Runway
  - Approach type (ILS / RNAV)
  - Minimums
  - Missed approach procedure

PM:

- Verifies MCDU setup
- Tunes and identifies navigation aids

- Sets minimums

Initial Approach Phase

- Descent continues using:
  - **Selected V/S (preferred)**
  - Managed Descent only if required
- **Speed → MANAGED**

Localizer Capture

- Arm approach mode (APPR) as required
- Monitor LOC capture

Glide Slope Intercept

Configuration Requirement:

□□ **Flaps 2 must be set BEFORE Glide Slope capture**

This ensures:

- Stable aerodynamic configuration
- Smooth GS interception
- Reduced workload during capture

Configuration During Approach

Progressive configuration:

- Flaps 1 → as speed decreases
- **Flaps 2 → BEFORE GS capture (mandatory SOP)**

Final Approach (Stabilization Phase)

Configuration Targets:

By **latest 5 NM Final:**

- Gear → DOWN
- Flaps → FULL (in progress or completed)

Stabilization Requirement:

By **2 NM Final (latest at MINIMUM call):**

The aircraft MUST be:

- Fully configured (**Flaps FULL, Gear DOWN**)
- At **Final Approach Speed (VAPP)**
- On correct vertical and lateral path
- Stable descent rate

Speed Management

- **Managed Speed maintained throughout STAR and approach**

On final:

- Aircraft transitions to **VAPP automatically**
- Manual intervention only if required

Stabilized Approach Criteria

At:

- **1000 ft (IMC)**
- **500 ft (VMC)**

Aircraft must be:

- On correct flight path
- At correct speed
- Fully configured
- Stable

If NOT stabilized:

Immediate GO-AROUND

Monitoring (PM)

- Localizer / Glide slope deviation
- Speed trend (VAPP control)
- Configuration status
- Callouts

Standard Callouts

- “LOC STAR”
- “GLIDE SLOPE STAR”
- “FLAPS 2”
- “GEAR DOWN”
- “FLAPS FULL”
- “STABLE”

Mode Philosophy

- **Vertical path:**
  - Controlled via GS or pilot input
- **Speed:**
  - Managed by aircraft

Exceptions

Deviation from SOP allowed only if:

- **ATC instructions**
- **Abnormal situations**
- **Safety requires immediate action**

Core Rule

“Stabilize early – never chase the aircraft.”

Outcome

A correct approach results in:

- Fully stabilized final
- Predictable aircraft behavior
- Safe and smooth landing phase

4.9 Landing

Objective

To safely land the aircraft from a stabilized approach and conduct a controlled rollout while maintaining compliance with ATC and ensuring passenger comfort.

Landing Clearance Policy (VA Standard)

Without Landing Clearance:

If **no landing clearance** is received:

▯▯ At **MINIMUM call:**

- **MANDATORY GO-AROUND**

With “Expect Late Landing Clearance”:

If ATC issues:

▯▯ **“Expect Late Landing Clearance”**

Procedure:

- Continue approach below minimums
- Continue until **over the runway threshold**

If still **NO landing clearance:**

- **Initiate GO-AROUND at/over threshold**

Final Approach (Short Final)

- Maintain stabilized approach
- Monitor speed (VAPP)
- Small corrections only

Flare

PF:

- At **~20 ft → initiate flare**
- Smoothly reduce descent rate

Touchdown

- Target:
  - Main gear touchdown first
  - Within touchdown zone

After Touchdown

PF:

- Maintain runway centerline

PM:

- Monitor deceleration

Automatic Systems

- Spoilers → Deploy automatically
- Autobrake → Active
- Reverse Thrust → As required

Deceleration Phase

Autobrake Policy:

- **High-speed exit (rapid vacate):**
  - Autobrake remains active until **80 knots**
- **Normal rollout:**
  - Autobrake remains active until **60 knots**

⚠️ Autobrake must **NOT be disconnected before these speeds**

Manual Braking

- Take over braking after autobrake phase as required

Runway Exit Speeds

High-Speed Turnoff:

- Target: **40 knots**
- Maximum: **50 knots**

Standard / Tight Turns:

- Follow Airbus standard:
  - **Maximum 15 knots**

Reverse Thrust

- Use as required for runway conditions
- Reduce to idle at ~70 knots (typical)

Callouts (Typical)

- “RETARD” (automatic)
- “SPOILERS”
- “REVERSERS GREEN”
- “80 knots”
- “60 knots”

After Landing

- Vacate runway when safe
- Inform ATC
- Begin after landing flow

Key Principles

- Respect landing clearance at all times
- Never continue below minimums without authorization
- Maintain full control during rollout

Core Rule

“No clearance – no landing.”
“Any deviation results in a GO-AROUND – landing is considered a bonus, not a requirement.”

Outcome

A correct landing results in:

- Safe touchdown

- Controlled deceleration
- Efficient runway exit

4.10 Taxi & Shutdown

Objective

To safely taxi from the runway to the gate and perform complete aircraft shutdown while maintaining SOP compliance, passenger comfort, and ground crew safety.

Taxi After Landing

Initial Rollout

PF:

- Maintain runway centerline
- Smoothly decelerate using:
  - Autobrake (until 60–80 kt, siehe Landing SOP)
  - Reverse thrust (as required, idle ~70 kt)

PM:

- Monitor speed and runway clearance
- Call out speed reductions

Runway Exit

- Enter taxiway at appropriate speed:
  - **High-speed exit:** 40 kt target, max 50 kt
  - **Tighter turns / standard turns:** max 15 kt

PF:

- Steer via tiller / rudder pedals

- Maintain smooth control

PM:

- Monitor external traffic
- Verify lights and brake status

Taxi to Gate

- **Taxi speed:** approx. **20 kt**
- Outside apron: up to **30 kt allowed**
- Follow ATC instructions
- Maintain situational awareness

Lights:

- Taxi lights → TAXI
- Landing lights → OFF
- Turnoff lights → ON

Approach to Parking Spot / Stand

PF:

- Align aircraft with stand
- Reduce speed gradually
- Apply brakes smoothly

PM:

- Monitor nose wheel alignment
- Monitor stand guidance (marshaller / VDGS)
- Call out distance and alignment

Ground Crew Safety:

- **ALL front lights (Taxi, Landing, Turnoff) → OFF**
- Ensure visibility hazards minimized for ground personnel

Engine Shutdown Procedure

Engine shutdown is based on **technical requirements**, not ground crew signals.

Cooldown Requirement

After engine operation at higher thrust settings:

□□ A **minimum cooldown period of 60 seconds** must be observed before shutdown.

This applies from:

- The last time engine thrust exceeded approximately **50% N1**

Purpose of Cooldown

The cooldown period ensures:

- Stabilization of engine temperatures
- Protection of internal components
- Prevention of thermal damage

Standard Procedure

After parking brake is set:

1. Maintain engines at **IDLE thrust**
2. Monitor engine parameters
3. Wait **minimum 60 seconds cooldown**

Engine Shutdown

After cooldown is complete:

- ENG MASTER switches → OFF

Important Notes

- Do **NOT** shut down engines immediately after high thrust usage
- Reverse thrust and taxi phases must be considered in cooldown timing
- Ground crew does **NOT** determine shutdown timing

After Engine Shutdown (Turnaround)

Objective

To safely transition the aircraft from engine operation to ground handling during turnaround while ensuring system stability and ground crew safety.

Engine Spool Down Monitoring

After engine shutdown:

- Monitor engine parameters (N1)
- Ensure engines are fully spooled down

Beacon Light Policy

□□ **Beacon must remain ON until engines are fully spooled down**

- Wait until **N1 < 10%** on both engines

Only then:

- Beacon → OFF

Purpose

This ensures:

- Clear indication to ground crew that engines are no longer hazardous
- Prevention of personnel approaching running or spooling engines

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APU Usage During Turnaround

The APU may remain in operation during turnaround depending on environmental conditions.

Standard Practice

- APU → RUNNING (if required)

Typical Use Cases

APU should remain ON when:

- **High outside temperatures (heat)** → cabin cooling required
- **Low outside temperatures (cold)** → cabin heating required
- No external power or air supply available

When APU May Be Turned OFF

- External power is connected and stable
- Environmental conditions allow

Electrical Configuration

- External Power → PREFERRED (if available)
- APU → BACKUP or primary (if needed)

Cabin & Systems

- Seatbelt Signs → OFF
- Fuel Pumps → AS REQUIRED
- Lighting → AS REQUIRED

Key Principles

- Engine shutdown does not end aircraft responsibility
- Systems must remain stable during turnaround
- Passenger comfort must be considered

Core Rule

“Shutdown is a transition – not the end of operation.”

Outcome

- Safe handover to ground operations
- Protected ground crew
- Aircraft ready for next departure

Aircraft Shutdown Procedure

Apply if crew leave the aircraft and no new crew is there to take the aircraft.

Before Shutdown

PM / PF:

- Verify systems powered down safely
- Check fuel, lights, electrical systems

Standard Shutdown Flow

1. **Engines → OFF** (Engine Master switches)
2. **APU → ON** (if ground power needed)
3. **External Power → CONNECTED**
4. **Battery switches → OFF (as required)**
5. **Anti-collision lights → OFF**
6. **Flight Instruments → Parked / Safe**
7. **Parking Brake → SET**

After Shutdown

- Perform walk-around (virtual / checklist)
- Ensure aircraft ready for next flight
- Log flight details if required

Key Principles

- Smooth, controlled taxi to gate
- Maximum taxi speed 20 kt (30 kt outside apron)
- All front lights **OFF** when entering parking stand
- Follow VA philosophy: passenger comfort & ground crew safety first
- Shutdown only after full stop and all systems verified

Outcome

- Aircraft safely at gate
- Engines off, systems secured
- Crew ready for debriefing / next flight

5. Checklists & Flows

5.1 Philosophy

Checklists are used to **verify actions**, not to perform them.

All procedures follow the principle:

FLOW → CHECKLIST

- **Flow:** Memory-based actions performed in a logical sequence
- **Checklist:** Verification that all required items are correctly set

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Core Rule

“The flow sets the aircraft – the checklist verifies it.”

General Rules

- Checklists are performed **by PM**
- PF confirms critical items when required
- No checklist is performed during high workload phases unless required
- Interruptions → checklist must be restarted

5.2 Cockpit Preparation

PM Flow (Overhead → Pedestal → Screens)

- BAT 1 + 2 → ON
- EXT PWR → ON
- Fuel Pumps → ON
- ADIRS (3x) → NAV
- Electrical Panel → CHECK
- Hydraulics → CHECK
- Air Conditioning → SET
- Anti-Ice → OFF
- Probe/Window Heat → AUTO

PF Flow (MCDU + Instruments)

- MCDU INIT A → COMPLETE
- Flight Plan → INSERT + CHECK
- INIT B → INSERT weights/fuel
- PERF TO → SET speeds & FLEX
- FCU:
  - Initial Altitude → SET
  - Heading → SET
- Baro → SET

Cockpit Preparation Checks

- Batteries → ON
- External Power → ON
- ADIRS → NAV
- Fuel Pumps → ON
- MCDU → PROGRAMMED

- ECAM → CHECKED

5.3 Before Start

PM Flow

- Beacon → ON
- Doors → CLOSED
- Fuel Pumps → ON
- APU BLEED → ON

PF Flow

- Confirm pushback clearance
- Brief start sequence

Before Start Checks

- Doors → CLOSED
- Beacon → ON
- APU BLEED → ON
- Fuel Pumps → ON

5.4 After Start

PM Flow

- ENG MODE → NORM
- APU BLEED → OFF
- APU → OFF
- Anti-Ice → AS REQUIRED
- Flaps → SET
- Pitch Trim → SET

PF Flow

- Monitor engine start
- Verify parameters

After Start Checks

- Engine Mode → NORM
- Flaps → SET
- Trim → SET

5.5 Taxi

PM Flow

- Flight Controls → CHECK (ECAM)
- Brake Temp → CHECK
- Taxi Lights → ON
- Takeoff Config → VERIFY

PF Flow

- Parking Brake → RELEASE
- Thrust → IDLE / minimal
- Steering → CONTROLLED

Taxi Checks

- Flight Controls → CHECKED
- Instruments → SET
- Takeoff Briefing → COMPLETE

5.6 Before Takeoff

PM Flow

- Cabin → READY
- ECAM → NORMAL
- Takeoff Config → CHECK

PF Flow

- Line-up briefing
- Final runway verification

Before Takeoff Checks

- Flaps → SET
- Trim → SET
- Cabin → READY

5.7 After Takeoff

PM Flow

- Gear → UP (on command)
- Flaps → RETRACT (on schedule)
- Packs → ON

PF Flow

- Follow FD
- Monitor climb

After Takeoff Checks

- Gear → UP
- Flaps → UP
- Packs → ON

5.8 Approach

PM Flow

- Minimums → SET
- Nav Aids → SET
- ECAM → CHECK

PF Flow

- Approach Briefing
- Mode setup

Approach Checks

- Minimums → SET
- Approach → BRIEFED
- Navigation → SET

5.9 Landing

PM Flow

- Gear → DOWN
- Flaps → FULL
- Speed → CHECK

PF Flow

- Stabilize approach
- Monitor FD

Landing Checks

- Gear → DOWN
- Flaps → FULL
- Speed → CHECKED

5.10 After Landing

🧑‍✈️ PM Flow

- Spoilers → RETRACT
- Flaps → UP
- APU → START

👨‍✈️ PF Flow

- Taxi control
- Vacate runway

✅ After Landing Checks

- Spoilers → RETRACTED
- Flaps → UP
- APU → START

5.11 Shutdown

PM Flow

- Engines → OFF
- Beacon → OFF
- External Power → ON

PF Flow

- Parking Brake → SET
- Confirm shutdown

Shutdown Checks

- Engines → OFF
- Beacon → OFF
- External Power → ON

5.12 Key Principles

- Flows must be consistent
- Checklists must not be skipped
- PF/PM roles must be respected

Core Rule

“Discipline in flows creates safety in flight.”

Outcome

- Standardized cockpit workflow
- Reduced workload
- Airline-level operation

6. MCDU / FMS Guide

6.1 Objective

The MCDU (Multipurpose Control and Display Unit) is used to manage:

- Flight planning
- Navigation
- Performance calculations
- Aircraft guidance

Correct setup is essential for safe and efficient flight operations.

General Philosophy

- The FMGS manages the flight **only if correctly programmed**
- Pilots must always **verify inputs**
- Never rely blindly on automation

6.2 INIT A Page

Used for basic flight initialization.

Required Entries:

- FROM / TO → Departure & Destination
- FLT NBR → Flight Number
- COST INDEX → Airline value
- CRZ FL → Planned cruise level

Key Rule

All entries must be cross-checked by PM

6.3 Flight Plan Page

Route Input:

- Insert waypoints / airways
- Select SID and runway
- Insert STAR and approach

Important:

- Remove all discontinuities
- Verify route against briefing
- Check for incorrect turns

Core Rule

“No discontinuities without reason.”

6.4 INIT B Page

Fuel & Weight:

- Block Fuel → INSERT
- Zero Fuel Weight → INSERT

Importance:

Incorrect values will result in:

- Wrong fuel prediction
- Incorrect performance

6.5 Performance Pages

Takeoff (PERF TO)

- V1 / VR / V2 → INSERT
- FLEX Temperature → SET
- Thrust Reduction Altitude → SET
- Acceleration Altitude → SET

Climb (PERF CLB)

- Managed speed profile active
- Monitor climb performance

Cruise (PERF CRZ)

- Mach mode active
- Fuel predictions monitored

Descent (PERF DES)

- Managed descent profile available
- Used mainly for constraints

Approach (PERF APPR)

- VAPP → CHECK / INSERT
- Wind → INSERT

- Minimums → SET

6.6 Key Pilot Tasks and common errors

Key Pilot Tasks

During all phases:

- Monitor flight plan
- Check for route deviations
- Verify altitude and speed constraints

Common Errors

- Missing discontinuities
- Incorrect SID/STAR selection
- Wrong performance data
- Not updating approach

6.7 Crosscheck Concept

Every critical input must be:

1. Entered by PF
2. Verified by PM

Core Rule

“Garbage in → Garbage out.”

Key Principle

The MCDU is a tool:

- It supports the pilot
- It does not replace decision-making

Outcome

A correctly programmed MCDU ensures:

- Accurate navigation
- Efficient flight profile
- Reduced workload

7. Flight Handling & Airbus Philosophy

7.1 Objective and Philosophy

Objective

To understand how to properly control and manage the Airbus A320 using automation, while maintaining full situational awareness.

Core Philosophy

The Airbus is designed around one key concept:

“Manage the flight path, monitor the automation.”

Pilots do NOT “fly the aircraft” in the traditional sense:

- They manage modes
- They supervise systems
- They intervene when necessary

7.2 Managed vs Selected Mode

This is the most important concept in Airbus operations.

Managed Mode

- Aircraft follows FMGS flight plan
- Speed, altitude and path are automated

Used when:

- Normal operations
- Following SID / STAR
- Cruise and climb

Selected Mode

- Pilot manually selects values (speed, heading, vertical speed)

Used when:

- ATC instructions
- Tactical corrections
- Specific energy management

Core Rule

“Managed by default – Selected when required.”

7.3 Flight Director (FD)

The Flight Director provides guidance via crossbars on the PFD.

Key Rule

□□ The aircraft must **follow the FD crossbars**

Autopilot Engagement Rule

The autopilot may only be engaged if:

- Aircraft is stable
- **FD crossbars are aligned**
- Aircraft is already following FD commands

Core Principle

“First fly the FD – then engage the autopilot.”

7.4 Flight Mode Annunciator (FMA)

Located at the top of the PFD.

Importance

The FMA shows:

- Active modes
- Armed modes
- Autothrust status

Key Rule

Always confirm mode changes on the FMA

Standard Call

- “FMA checked”

7.5 Thrust Management

The A320 uses fixed thrust detents:

- IDLE
- CL (Climb)
- FLX/MCT
- TOGA

Key Concept

- Thrust levers are set to detents
- Autothrust manages thrust within limits

Core Rule

“Set thrust – let the system manage it.”

7.6 Energy Management

Energy = Speed + Altitude

Good Energy State

- On profile
- Correct speed
- Minimal corrections required

Bad Energy State

- Too fast / too high
- Too slow / too low

Correction Methods

- Adjust vertical speed
- Use speed brakes
- Select speed if required

7.7 Automation Discipline

Pilots must:

- Understand active modes
- Anticipate aircraft behavior
- Intervene early

Common Mistakes

- Blind trust in automation
- Wrong mode selected
- Late corrections

Core Rule

“If you don’t understand the mode – you are not in control.”

7.8 Manual Flying

Manual flying is required:

- During training
- In abnormal situations
- When automation is not appropriate

Key Principle

- Smooth inputs via sidestick
- Trust flight control laws

7.9 Situational Awareness

Pilots must always know:

- Where the aircraft is going
- What the aircraft is doing
- What will happen next

Core Rule

“Stay ahead of the aircraft.”

Outcome

Correct application of Airbus philosophy results in:

- Smooth, efficient flights
- Proper automation usage
- High level of control and awareness

8. Abnormal Procedures

8.1 Objective and Philosophy

Objective

To provide simplified guidance for handling non-normal situations in a safe and structured manner.

General Philosophy

In all abnormal situations:

□□ **Aviate – Navigate – Communicate**

1. Fly the aircraft
2. Maintain situational awareness
3. Communicate when workload permits

8.2 ECAM Philosophy

The ECAM system provides:

- Automatic failure detection
- System information
- Step-by-step actions

Core Rule

“Follow ECAM – do not memorize procedures.”

8.3 Engine Failure After Takeoff

- Maintain runway track
- Thrust → TOGA
- Positive climb → Gear UP

At safe altitude:

- Engage autopilot
- Follow ECAM actions

8.4 Unstable Approach and Go-Around

Unstable Approach

Go-around if:

- Not stabilized (see SOP criteria)
- Incorrect speed or configuration
- Excessive deviation

Go-Around

- Thrust Levers → TOGA
- Pitch → Follow FD
- Positive climb → Gear UP

Core Rule

“When in doubt – go around.”

8.5 TCAS (RA)

- Follow TCAS commands immediately
- Disconnect autopilot if required

9. Performance & Limits

9.1 Objective

This chapter provides a structured understanding of the Airbus A320 performance fundamentals and operational limits required for safe and efficient flight operations.

It is not intended to replace real-world performance manuals, but to give pilots the necessary knowledge to:

- Understand key speeds
- Operate within safe limits
- Maintain stable and predictable aircraft behavior

9.2 Takeoff Performance

V-Speeds Explained

Before every departure, three critical speeds must be calculated and inserted into the MCDU:

V1 – Decision Speed

- The maximum speed at which a rejected takeoff can be safely initiated
- After passing V1, the takeoff **must be continued**, even in case of failure

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VR – Rotation Speed

- The speed at which the pilot initiates aircraft rotation
- Smooth and controlled pitch input is required

V2 – Takeoff Safety Speed

- Minimum safe climb speed after liftoff
- Ensures sufficient climb performance in case of engine failure

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Operational Importance

Incorrect V-speeds can lead to:

- Unsafe takeoff performance
- Runway overruns
- Insufficient climb capability

Core Rule

“Takeoff performance is calculated – never estimated.”

9.3 Approach & Landing Speeds

VAPP – Final Approach Speed

VAPP is the target speed during final approach.

It includes:

- Reference landing speed (VLS)
- Wind correction
- Safety margin

Stability Requirement

Maintaining VAPP ensures:

- Stable descent
- Predictable aircraft response
- Safe landing performance

Operational Note

Excessive speed leads to:

- Long landing distance
- Unstable flare

Too low speed leads to:

- Reduced lift
- Increased stall risk

Core Rule

“A stable approach requires a stable speed.”

9.4 Flap Configuration & Limits

The Airbus A320 uses multiple flap configurations to adapt to different flight phases.

Flap Settings Overview

- Flaps 1 → Initial configuration
- Flaps 2 → Approach phase (GS intercept SOP)
- Flaps 3 → Intermediate landing config
- Flaps FULL → Final landing configuration

Speed Limits (Typical)

- Flaps 1 → max ~230 kt
- Flaps 2 → max ~200 kt
- Flaps 3 → max ~185 kt
- Flaps FULL → max ~177 kt

Operational Importance

Exceeding flap limits may cause:

- Structural damage
- System warnings
- Loss of control margin

Core Rule

“Configuration must always match speed.”

9.5 Taxi Speed Limits

Taxi speed is critical for:

- Safety
- Passenger comfort
- Ground operations

Standard Taxi Speeds

- Normal taxi → approx. **20 kt**
- Outside apron → max **30 kt**

Special Cases

- High-speed exit → **40 kt (max 50 kt)**
- Tight turns → max **15 kt**

Operational Importance

Excessive taxi speed increases:

- Brake wear
- Risk of runway/taxiway excursions
- Passenger discomfort

Core Rule

"Taxi speed must always match environment."

9.6 Cruise Performance

Typical Cruise Envelope

- Altitude: **FL320 – FL390**
- Speed: **Mach 0.76 – 0.80**

Efficiency Considerations

- Higher altitude → lower fuel burn
- Managed speed → optimal performance

Monitoring Requirements

Pilots must monitor:

- Fuel consumption
- Wind conditions
- Flight progress

Core Rule

“Cruise is about efficiency, not speed.”

9.7 Descent Performance & Energy Management

Descent Characteristics

- Typically flown at idle thrust
- Vertical path controlled manually (VA SOP)
- Speed managed automatically

Energy State Awareness

Pilots must continuously assess:

- Altitude vs distance
- Speed vs configuration

High Energy Situation

- Too fast / too high

Correction methods:

- Increase descent rate
- Use speed brakes

Low Energy Situation

- Too slow / too low

Correction methods:

- Reduce descent rate
- Increase thrust

Core Rule

“Energy must be managed early – not corrected late.”

9.8 Operational Limits

Pilots must always respect:

- Speed limits (including flap limits)
- Aircraft configuration limits
- Stabilized approach criteria
- ATC restrictions

Importance

Limits are not recommendations – they define:

- Structural safety
- Aircraft performance
- Operational boundaries

Core Rule

“Limits are absolute – not optional.”

9.9 Stabilized Approach as Performance Factor

A stabilized approach is the final expression of correct performance management.

Requirements

- Correct speed (VAPP)
- Correct configuration
- Correct descent profile

Outcome

If performance is managed correctly:

- Aircraft arrives stable
- Landing becomes predictable
- Workload is reduced

Core Rule

“A good landing starts with good performance management.”

9.10 Summary

Performance management in the A320 is based on:

- Proper planning
- Correct speed usage
- Respecting aircraft limits
- Continuous monitoring

Final Principle

“Performance defines safety, efficiency and control.”