CL-350



CL-350 SUPPLEMENTAL MANUAL

AIRWORK & MANEUVERS 01

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AIRWORK and MANEUVERS

I. INTRODUCTION

The Challenger 350 is a remarkable aircraft; fast, capable, and sophisticated, and mastering its full envelope of performance is one of the most rewarding pursuits in professional aviation. This chapter presents the airwork and maneuvers required to demonstrate proficiency for ATP, Type Rating, and Part 135 practical tests as defined by the FAA Airman Certification Standards (ACS). But meeting the standard is only the beginning. Our goal extends beyond the checkride to building the kind of deep, intuitive command of the aircraft that defines truly skilled aviators.

From steep turns that demand precise coordination of pitch, power, and bank, to approach-to-stall maneuvers that sharpen your recognition of the aircraft's low-speed handling characteristics, each procedure in this section is designed to develop not just competence but confidence. Whether you are new to the Challenger 350 or returning for recurrent training, the work ahead offers an opportunity to hone your skills, refine your crew coordination, and deepen your understanding of an aircraft built for professional excellence. The standards are demanding; and that is precisely what makes achieving them so satisfying.

About the ROPAT

The Recommended Operational Procedures and Techniques (ROPAT) is a comprehensive guidance document developed by Bombardier to support safe and efficient operation of the Challenger 350. While the Airplane Flight Manual (AFM) establishes mandatory limitations and procedures, the ROPAT goes further—offering practical recommendations, preferred techniques, and operational insights refined through extensive flight testing and real-world experience. It covers the full spectrum of flight operations, from normal procedures and crew coordination to instrument approaches, non-normal situations, and training maneuvers.

The Challenger 350 is a sophisticated aircraft with highly integrated systems, and there are often multiple acceptable ways to accomplish a given task. The ROPAT identifies the preferred methods while highlighting where alternatives exist. Importantly, the ROPAT is not intended to replace your company's Standard Operating Procedures, nor does it supersede the AFM—if any conflict arises, the AFM always takes precedence. What the ROPAT provides is expert guidance grounded in sound airmanship, helping crews operate this remarkable aircraft with confidence, consistency, and professionalism.

Foundation for This Training Manual

The procedures, airspeeds, power settings, and techniques presented throughout this chapter are drawn directly from the ROPAT and adapted for training purposes. When you see a recommended entry speed for a maneuver, a target N1 setting, or a specific sequence for configuring the aircraft, that guidance traces back to Bombardier's published recommendations. We have organized and presented this material in a format designed to support both initial and recurrent training, but the underlying content reflects the manufacturer's expert knowledge of how the Challenger 350 performs and how it should be flown.

By grounding our training in the ROPAT, we ensure that every pilot develops habits and techniques consistent with industry best practices and the manufacturer's intent. This alignment matters— not just for passing a checkride, but for building the kind of procedural discipline that keeps crews safe throughout their careers. As you work through the maneuvers and procedures in this chapter, know that you're learning techniques vetted by the engineers and test pilots who know this aircraft best.

Training Objectives

Our ground and flight training programs are designed to prepare you for the FAA type rating with an emphasis on four key areas: aircraft systems knowledge, crew coordination, operational utility, and overall flight safety. You will be held to ATP type rating standards throughout your training— the same standards you'll demonstrate on your checkride.

The table below summarizes the practical test standards for each phase of flight. These tolerances aren't just numbers to memorize for the exam—they represent the precision expected of professional pilots operating high-performance aircraft. As you train, you'll find that consistently flying within these standards becomes second nature, a reflection of the disciplined technique that defines competent crew operations.

For the complete and most current Airman Certification Standards, visit:
www.faa.gov/training_testing/testing/acs

ATP Practical Test Standards

Task	Airspeed	Heading / Course / Glidepath	Altitude
DEPARTURE			
Takeoffs	± 5 kts	± 5°	—
ENROUTE			
Inflight Maneuvers	± 10 kts	± 10° / Bank: ± 5°	± 100 ft
ARRIVAL & APPROACH			
Arrival Procedures	± 10 kts	± 10°	± 100 ft
Approaches Prior to FAF	± 10 kts	± 5°	± 100 ft
Final Approach Segment (Precision)	± 5 kts	CDI: ⩽ ¼ scale deflection (vertical or lateral)	—
Final Approach Segment (Non-Precision)	± 5 kts	CDI: ⩽ ¼ scale deflection	MDA +50 / –0 ft
Circling Approach	± 5 kts	± 5°	+100 / –0 ft (until descending below MDA)
GO-AROUND & LANDING			
Go-Around / Missed Approach	± 5 kts	± 5°	± 100 ft (during procedure)
Landing	± 5 kts	Touchdown with runway centerline between main gear at aiming point markings: –250 / +500 ft	

II. AIRSPEEDS AND POWER SETTINGS

Example power settings for 34,000 lb airplane in ISA conditions. Training targets only.

Flight Phase	Airspeed	N1
TAKEOFF AND CLIMB		
Takeoff/Rotate	V_R	TO detent
Flaps 0 (from Flaps 10)	V_2 + 15	CLB detent
Flaps 0 (from Flaps 20)	V_2 + 25	CLB detent
Climb (Class D)	200 KIAS	CLB detent
NORMAL CLIMB		
3,000 - 10,000 ft	250 KIAS	CLB detent
10,000 - Cruise	250/0.75 to 250/310/0.82	CLB detent
CRUISE		
Below 10,000 ft (slow)	200 KIAS	~52%
Below 10,000 ft (fast)	250 KIAS	~59%
10,000 to FL250	250 KIAS	~70%
FL410 Normal Cruise	0.80 Mach	~84%
STEEP TURNS		
15,000 ft (45° Bank)	250 KIAS	~68%
SLOW FLIGHT		
Flaps 0° - Gear Up	1.23 V_S .8 AOA	~48%
Flaps 20° - Gear Up	1.23 V_S .8 AOA	~52%
Flaps 20° - Gear Down	1.23 V_S .8 AOA	~56%
Flaps 30° - Gear Down	V_{REF}	~59%
APPROACH TO STALLS		
Clean	-1 kt per second	IDLE
Takeoff and Approach	-1 kt per second	50% - 55%
Landing	-1 kt per second	50% - 55%
HOLDING		
14,000 ft and below (1 min legs)	180 KIAS	~50%
Above 14,000 ft (1.5 min legs)	200 KIAS	~59%

Example power settings for 34,000 lb airplane in ISA conditions. Training targets only.

Flight Phase	Airspeed	N1
APPROACHES		
Flaps 0° - Gear Up	200 - 180 KIAS	~51%
Flaps 10° - Gear Up	160 KIAS	~54%
Flaps 20° - Gear Down	140 KIAS	~62%
Flaps 30° - Gear Down	V_{REF}	~59%
DESCENT TO LANDING		
On Glideslope	V_{REF}	~46%
Level Flight - MDA	V_{REF}	~59%
Level Flight - Circling	V_{REF} + 10	~60%
LANDING		
Final for Landing	V_{REF} + 1/2 Gust (max 10)	As required
50 ft above Runway	V_{REF}	Idle

III. ROPAT RECOMMENDED COCKPIT CONFIGURATION

PFD Setup	PF	PM
Format	ROSE*/PPOS	ROSE*/PPOS
Nav Source	FMS 1	FMS 2
Pointers	AS REQ'D	AS REQ'D
Traffic (TCAS)	OVERLAY SELECTED	OVERLAY SELECTED
Terrain	SELECTED	SELECTED
Weather	NOT SELECTED	NOT SELECTED
Range	10 NM OR AS REQ'D	10 NM OR AS REQ'D

MFD Setup	PF	PM
Upper Window	EICAS	SUMMARY
Lower Window	PPOS	PPOS
MFD Data Windows	VNAV	ON
Pointers	AS REQ'D	AS REQ'D
Traffic (TCAS)	OVERLAY SELECTED	OVERLAY SELECTED
Terrain	NOT SELECTED	NOT SELECTED
Weather	SELECTED	SELECTED

FMS Setup	PF	PM
FMS Page	LEGS PAGE	TUNE PAGE

* means preferred

For departures typically the speed bug is set to 200kts based on the 3-2-1 rule of controlled airspace:

- 3 = within 3000'
- 2 = maximum 200 kts
- 1 = within 10 nm of an airport

IV. CHAPTER OVERVIEW

This chapter introduces the core airwork and maneuvers that form the foundation of your training in the Bombardier Challenger 350. These maneuvers are more than training events—they are your first opportunities to experience the aircraft's performance, handling qualities, and design philosophy. Each maneuver is presented with a concise description, step-by-step execution guidance, and the standardized crew callouts and actions used in the cockpit. All procedures follow Bombardier's Recommended Operating Procedures and Techniques (ROPAT). Developing a strong understanding of the proper sequence of events and callouts will build confidence, sharpen crew coordination, and allow you to fully appreciate the precision and capability of the Challenger 350.

AIRWORK MANEUVERS

V. APPROACH TO STALL

A. INTRODUCTION

This section provides comprehensive guidance on approach to stall recognition, prevention, and recovery procedures. In addition to evaluating normal operational skills, certain training and testing maneuvers are required to pass ATP, Type Rating, and Part 135 practical tests. The following sections focus on maneuvers required by the FAA Airman Certification Standards (ACS) and industry best practices for stall awareness and recovery.

With smooth technique, the pilot can easily control the aircraft flight path and rate of change in speed during the maneuver entry and recovery from the stall warning regime. Recovery is normally initiated at the first indication of low speed or stall. Understanding the warning system indications and applying proper recovery techniques are essential skills for safe flight operations.

B. STALL WARNING INDICATIONS

The warning system provides multiple indications of an impending stall. Pilots must recognize and respond to these cues promptly. Warning indications include but are not limited to:

- Nose-high attitude
- Slow speed indication
- Rapidly decreasing speed trend vector
- Sloppiness or reduced effectiveness of flight controls
- Stick shaker activation
- Stick pusher activation
- Aural warnings

C. USE OF ANGLE OF ATTACK (AOA) INDICATORS

The AOA indicator and the “donut” displayed on the airspeed indicator are valuable tools in all phases of flight, particularly during stall recognition and recovery. An indication of 0.6 on the AOA indicator corresponds to approximately 1.3 times the stall speed reference. The stick shaker will typically activate at approximately 0.8 AOA, while a full aerodynamic stall occurs at 1.0 AOA, a condition to be avoided.

For training purposes, stall recognition is considered initiated at stick shaker activation. However, good airmanship requires pilots to maintain an active watch on aircraft performance to recognize the warning signs well before stick shaker activation. A stick shaker event indicates an impending stall, not an actual stall, but should still prompt immediate stall recovery procedures.

D. RECOVERY PHILOSOPHY

The AFM recovery procedures must be used in all stall recovery situations. Recovery should be maintained until the aircraft is above the minimum safe speed for the current configuration. Normally, the aircraft is recovered to 180 KIAS at the same altitude where the maneuver began.

IMPORTANT: While altitude loss is a consideration, it is not the primary focus during stall recovery. Reducing the angle of attack by reducing pitch attitude should be the pilot’s main goal, not maintaining an arbitrary cleared altitude. The emphasis must be on recovering the airplane from the stall, regardless of altitude loss. Maintaining a cleared altitude is irrelevant in stall recovery. However, this is not a license to lose an unreasonable amount of altitude, and principles of good airmanship always apply.

E. LOW ALTITUDE CONSIDERATIONS

At low altitude (past the FAF on approach), terrain proximity is a significant factor that must be considered. A proper balance between altitude loss and stall recovery technique must be exercised with sound judgment. A trade-off must occur between what is required versus what is acceptable and pilots should use all available margin when circumstances demand it.

F. TRAINING ENVIRONMENT AND CONDITIONS

Because training is conducted in a flight simulator, altitude and cloud clearance requirements do not apply. Your instructor will determine the maneuver conditions based on training needs. For example, landing configuration stall demonstrations may be conducted at the MDA, and departure configuration stalls may be conducted immediately after takeoff.

G. AIRMAN CERTIFICATION STANDARDS (ACS) REQUIREMENTS

Per AC 120-109A and current ACS guidance, the following requirements apply to stall prevention training:

- One stall must be induced while in a turn with a bank angle of 15-30 degrees
- One stall should be induced with the autopilot engaged
- An impending stall means the same as the first indication of a stall, occurring when angle of attack causes a stall warning from inherent aerodynamics (buffet) or an acceptable stall warning device (stick shaker)
- Evaluation criteria must not mandate a predetermined value for altitude loss and must not mandate maintaining altitude during recovery
- When accomplished in an FSTD, entries should be consistent with the expected operational environment with no minimum entry altitude defined

H. USE OF AUTOMATION

The autopilot and/or flight director/flight path vector (FPV) may be used on any of the approach-tostall maneuvers. If the autopilot is used, a distraction scenario may be employed to make the stall warning activation and aircraft recovery more realistic. The use of the flight director, FPV and autopilot remains at the discretion of the instructor or examiner based on the training objective.

A stall recovery maneuver used to demonstrate aircraft low-speed handling characteristics may be flown without the use of the flight director, FPV or autopilot. However, when demonstrating a stall recovery, allowing the autopilot to trim to the stall warning can be beneficial for understanding aircraft behavior. Throughout training, a pilot will experience stall recovery maneuvers both with and without aircraft automation.

I. PRE-MANEUVER SPEED CALCULATIONS

When training in a flight simulator or training device, stall warning speeds do not need to be calculated in advance. If conducting a departure-based stall recovery, V2 and flap retract speed should be posted on the airspeed tape. If conducting an approach-based stall recovery, VREF and VGA should be posted.

The following approach-to-stall profiles and recovery procedures are covered:

- Approach to Stall — Clean Configuration (Flaps 0)
- Approach to Stall — Takeoff or Approach Configuration (10°/20°)
- Approach to Stall — Landing Configuration

- Demonstration of the Stick Pusher
- High Altitude Stalls

These profiles are examples, and strict adherence to their choreography is not required as long as all three baseline profiles (clean, approach/takeoff, and landing) are performed. Proper recoveries per AFM procedures must be followed in all cases.

VI. AFM STALL RECOVERY PROCEDURE

The following procedure represents the AFM-approved stall recovery technique. This procedure must be executed at the first indication of an impending stall (stick shaker activation).

A. IMMEDIATE ACTION ITEMS

1. **Autopilot** — DISCONNECT
2. **Lower Pitch Attitude** — REDUCE AOA
3. **Thrust Levers** — APR (Automatic Power Reserve)
4. **Spoilers** — RETRACT
5. **Roll** — WINGS LEVEL (or reduce bank if necessary)

B. RECOVERY COMPLETION

After AOA Recovery:

- Verify stall warning cessation
- Return to desired flight path
- Adjust thrust as required
- Reconfigure aircraft as appropriate

C. KEY RECOVERY PRINCIPLES

STALL RECOVERY PRINCIPLES

Principle	Application
Reduce AOA	Primary recovery action — always first priority
Apply Max Thrust	APR for energy recovery and acceleration
Level Wings	Reduces load factor and aids recovery
Accept Altitude Loss	Recovery from stall takes priority over altitude
Avoid Secondary Stalls	Do not pull up prematurely

VII. APPROACH TO STALL — CLEAN (FLAPS 0°)

A. ENTRY PROCEDURE

Initial Setup:

- Establish level flight at entry altitude
- Stabilize at 180 KIAS / 65% N_1
- No V-speeds selected on airspeed tape

Maneuver Entry:

- Reduce thrust to idle
- Increase pitch to approximately 5° above horizon
- Maintain altitude until stall warning
- Allow aircraft to decelerate smoothly

B. RECOVERY PROCEDURE

1. **Autopilot** — DISCONNECT
2. **Lower Pitch Attitude** — REDUCE AOA
3. **Thrust Levers** — APR
4. **Roll** — WINGS LEVEL
5. **Recover to Level Flight** — 180 KIAS
6. **Reduce Thrust** — MAINTAIN 180 KIAS

C. CREW COORDINATION

APPROACH TO STALL - CLEAN CONFIGURATION

Entry: 180 KIAS, Flaps 0°, Gear UP. Reduce thrust to IDLE, maintain altitude until stick shaker.

PF (Pilot Flying)	PM (Pilot Monitoring)
At first indication of impending stall **Call:** "STALL, STALL, STALL"	**Call:** "STALL, STALL, STALL"
Action: Disconnect A/P, reduce AOA, set APR thrust, wings level	**Action:** Monitor recovery, airspeed trend **Call:** "Confirm APR THRUST" **Call:** "Airspeed increasing"
Recovery **Action:** Recover to 180 KIAS **Call:** "Recovered"	**Action:** Confirm normal flight parameters

VIII. APPROACH TO STALL — TAKEOFF/APPROACH (FLAPS 10°/20°)

A. ENTRY PROCEDURE

Initial Setup:

- Establish level flight at entry altitude
- Set V_2 on airspeed tape
- Configure flaps to 10° or 20°
- Landing gear UP

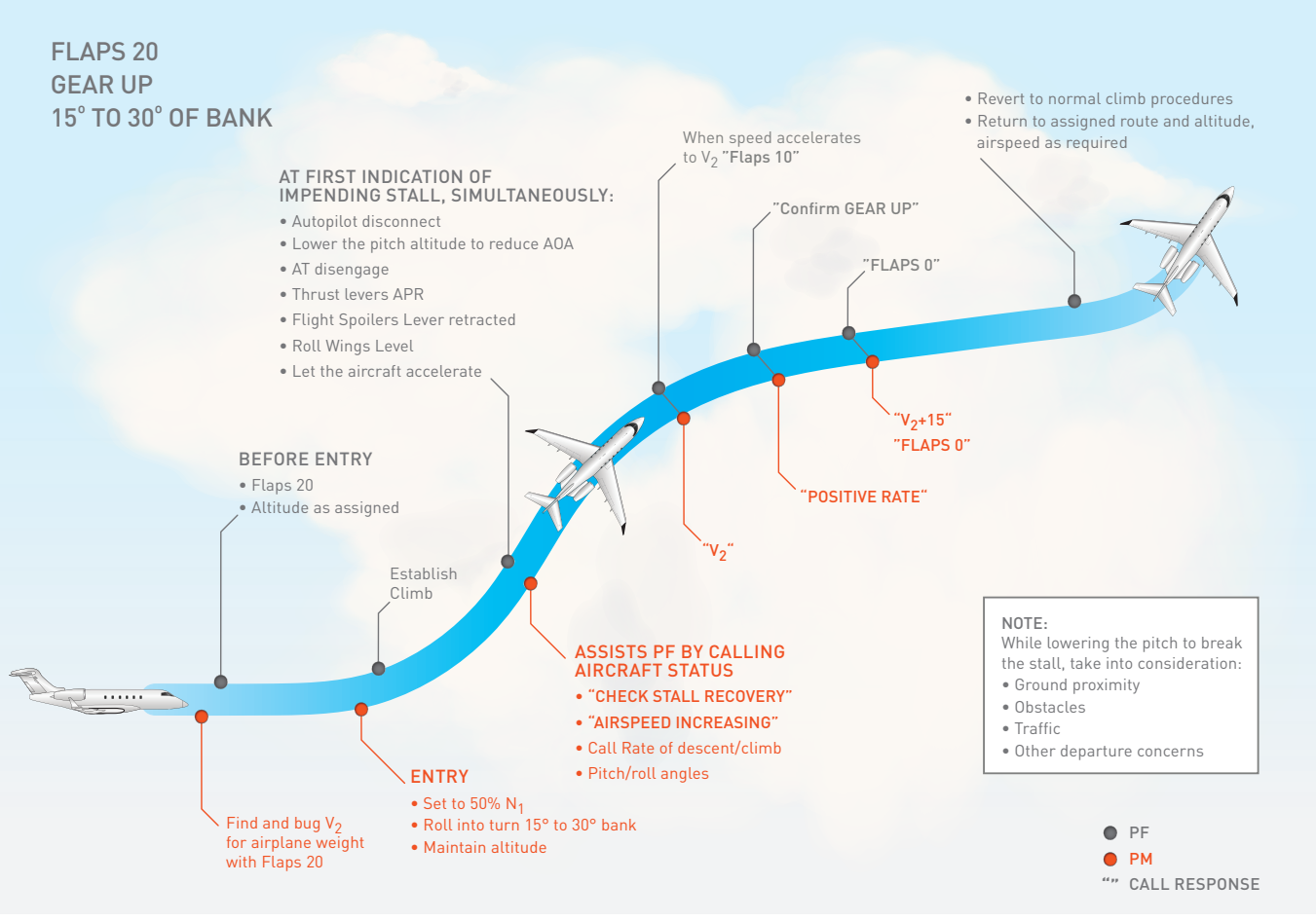
Maneuver Entry:

- Establish 15-30° bank turn (ACS requirement)
- Reduce thrust to idle
- Pitch to maintain altitude
- Allow deceleration to stall warning

B. RECOVERY PROCEDURE

1. **Autopilot** — DISCONNECT
2. **Lower Pitch Attitude** — REDUCE AOA
3. **Thrust Levers** — APR
4. **Roll** — WINGS LEVEL
5. **Flaps (above V_2)** — RETRACT TO 0°
6. **Recover to Level Flight** — 180 KIAS
7. **Reduce Thrust** — MAINTAIN 180 KIAS

APPROACH TO STALL - TAKEOFF CONFIGURATION



C. CREW COORDINATION

APPROACH TO STALL — TAKEOFF/APPROACH CONFIGURATION (FLAPS 10°/20°)

Entry: Establish level flight, V_2 on tape, Flaps 10° or 20°, Gear UP. 15-30° bank, 50-55% N1, maintain altitude, decelerate to stick shaker.

PF (Pilot Flying)	PM (Pilot Monitoring)
At First Indication of Impending Stall	
Call: "STALL, STALL, STALL"	**Call:** "STALL, STALL, STALL"
Action: Sets APR Thrust	**Action:** Assists PF by calling aircraft status: **Call:** "Confirm APR THRUST" **Call:** "CHECK STALL RECOVERY" **Call:** "AIRSPEED INCREASING" • Calls rate of climb or descent • Advises pitch/roll angles
	When Speed Accelerates to V2 **Call:** "V2"
Call: "Flaps 10"	
	Positive Rate of Climb **Call:** "POSITIVE RATE"
Call: "Confirm GEAR UP"	
	V2 + 15 **Call:** "V2 + 15"
Call: "Flaps 0"	
	Call: "Flaps 0" **Call:** "Indicating 0"
Recovery **Action:** Recover to 180 KIAS **Call:** "Recovered"	**Action:** Confirm normal flight parameters

CAUTION: Do not change A/C configuration below V_2. Flap retraction should only occur once accelerating above V_2 to prevent secondary stall.

IX. APPROACH TO STALL — LANDING CONFIGURATION

A. ENTRY PROCEDURE

Initial Setup:

- Establish level flight at entry altitude
- Set VREF and VGA on airspeed tape
- Configure flaps to FULL
- Landing gear DOWN

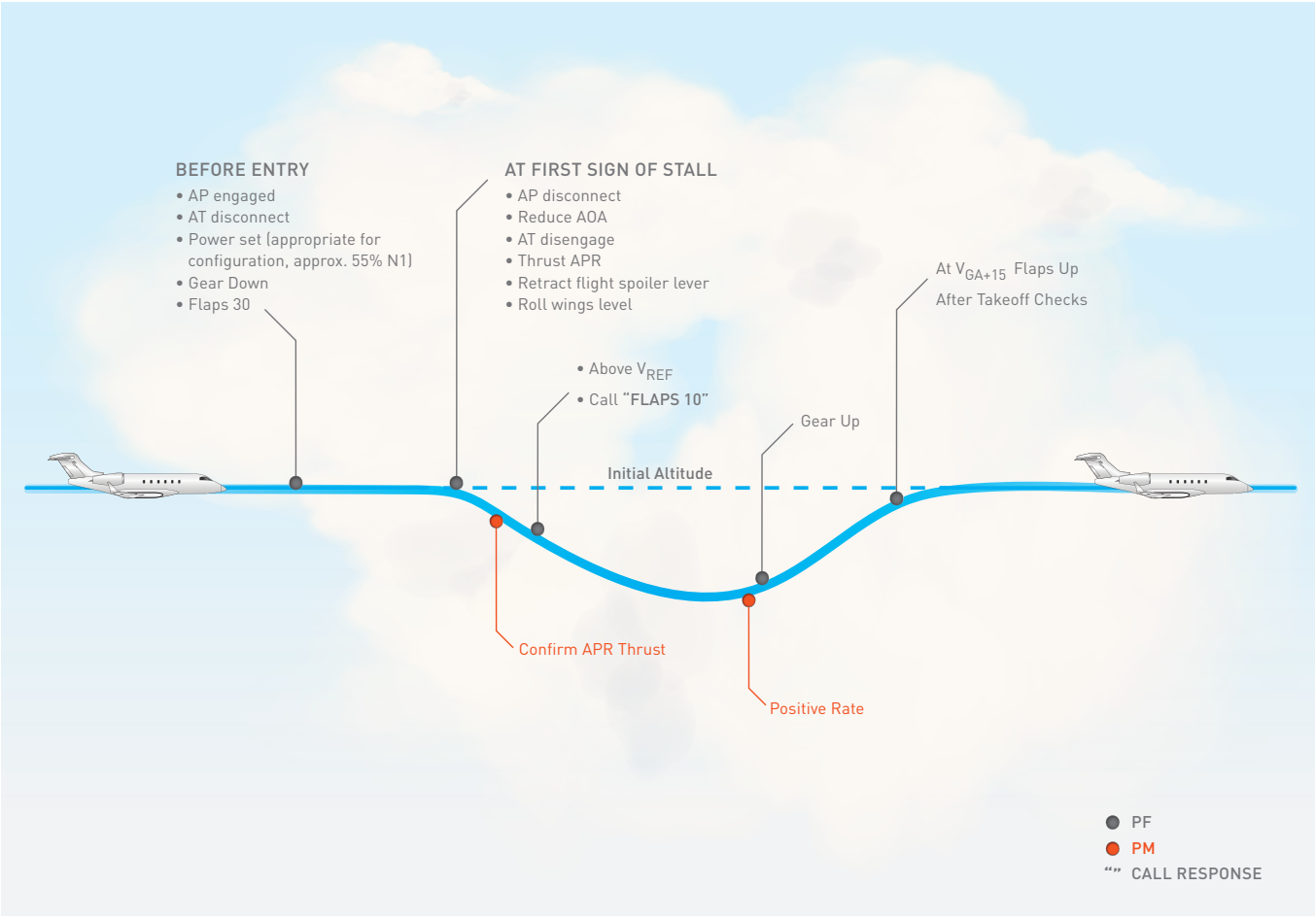
Maneuver Entry:

- Reduce thrust to idle
- Maintain altitude with increasing pitch
- Allow deceleration to stall warning

B. RECOVERY PROCEDURE

1. **Autopilot** — DISCONNECT
2. **Lower Pitch Attitude** — REDUCE AOA (on or below horizon)
3. **Thrust Levers** — APR
4. **Flaps** — 20° (at positive rate of climb)
5. **Landing Gear** — UP
6. **Complete Go-Around** — PER CHECKLIST

APPROACH TO STALL - LANDING CONFIGURATION



C. CREW COORDINATION

APPROACH TO STALL — LANDING CONFIGURATION

Before Entry: AP engage, Power set (appropriate for configuration, approx. 55% N1), Gear Down, Flaps 30

PF (Pilot Flying)	PM (Pilot Monitoring)
At First Indication of Impending Stall	
Call: "STALL, STALL, STALL"	Call: "STALL, STALL, STALL"
Action: A/P disconnect, Reduce AOA, AT disconnect, Thrust APR, Flight Spoiler Lever Retract, Roll Wings Level	**Action:** Monitor recovery
Above V_{REF}	Call: "Confirm APR Thrust"
Call: "Flaps 10"	Call: "Flaps 10"
	Call: "Indicating 10"
Call: "Gear up"	Call: "Positive rate"
	Call: "Gear up"
	Call: "Gear indicating up"
At V_{GA} + 15	
Call: "Flaps up, After Takeoff Checks"	Call: "Flaps up"
	Call: "Indicating up"
	Call: "After Takeoff Checks"
Recovery	
Action: Recover to 180 KIAS	
Call: "Recovered"	**Action:** Confirm normal flight parameters

NOTE: Think "Go-Around" procedure. This recovery mirrors a missed approach with stall recovery as the initial action. DO NOT use TO/GA.

X. DEMONSTRATION OF THE STICK PUSHER

WARNING: This maneuver is conducted in a flight simulator or training device ONLY. Stalls to pusher in the actual airplane are NOT authorized and are prohibited by AFM limitation.

A. PURPOSE

- Demonstrate operation of stick pusher system
- Familiarize pilot with pusher activation characteristics
- Teach proper technique for recovery from full pusher event

B. PUSHER ACTIVATION SEQUENCE

1. **Aircraft slows** — through low-speed warning cue
2. **Stick shaker** — activates
3. **Autopilot** — disconnects automatically
4. **Hand-fly** — while continuing to reduce speed
5. **Stick pusher** — activates
6. **Allow pusher** — to take yoke
7. **Pusher releases** — at normal AOA

C. CRITICAL RECOVERY TECHNIQUE

CRITICAL TECHNIQUE: Forward pressure MUST be maintained during initial stall recovery. The aircraft will tend to pitch nose-up and may cause secondary shaker and/or pusher activation. Then complete AFM stall recovery procedure as normal.

Key Points:

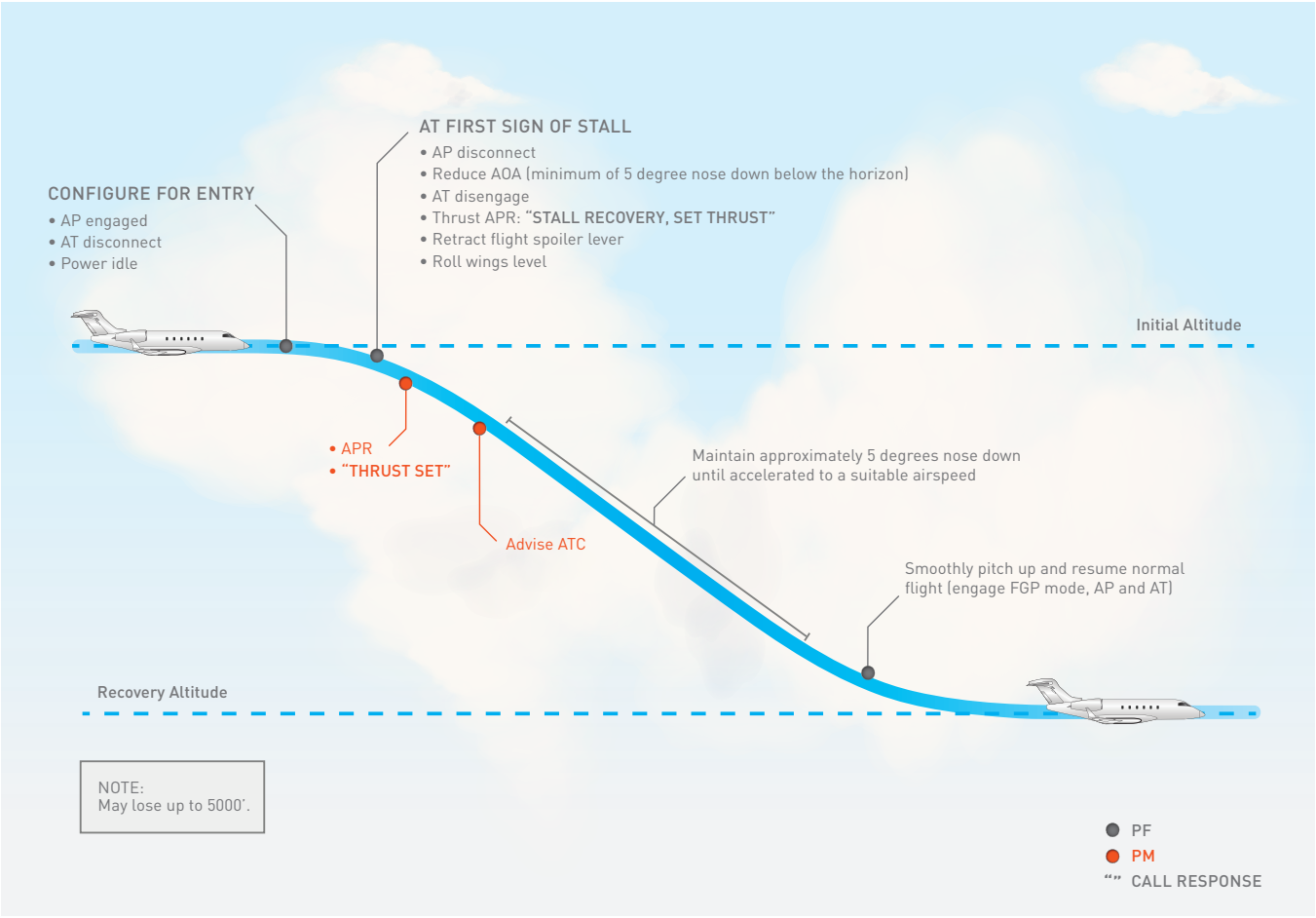
- Allow pusher to take yoke out of your hands
- Maintain forward pressure after pusher releases
- Exit low energy regime completely before resuming normal flight
- Do not attempt to arrest altitude loss prematurely

XI. HIGH ALTITUDE STALLS

A. RECOVERY PROCEDURE

1. **Autothrottle (if installed)** — DISENGAGE
2. **Autopilot** — DISCONNECT
3. **Lower Pitch Attitude** — TARGET -5° BELOW HORIZON
4. **Thrust Levers** — APR
5. **Spoilers** — RETRACT
6. **Roll** — WINGS LEVEL

APPROACH TO STALL - HIGH ALTITUDE



C. RECOVERY TARGETS

HIGH ALTITUDE STALL RECOVERY TARGETS

Parameter	Target
Pitch Attitude	-5° below horizon
Minimum Recovery Speed	0.72 Mach
Expected Altitude Loss	Up to 5,000 feet or more

CAUTION: Any recovery to level flight BEFORE 0.72M is attained can leave you on the wrong side of the power curve and may lead to secondary stalls. ATC and crew communications cannot be over-emphasized.

D. CREW COORDINATION

HIGH ALTITUDE STALLS

Setup: FL450, Cruise Flight, AP Engaged, Idle Thrust, allow deceleration to stick shaker

Key Differences: Less power available from engines at altitude. Exchange of altitude for speed required. Engine spool-up time and speed increase can be very slow from idle. Target pitch: -5° below horizon. Minimum recovery speed: 0.72 Mach. Expected altitude loss: Up to 5,000 feet or more.

PF (Pilot Flying)	PM (Pilot Monitoring)
Stall Recognition **Call:** "STALL RECOVERY, SET THRUST"	**Call:** "APR THRUST SET"
Action: Pitch to -5° below horizon	PM Responsibilities • Advise ATC of situation • Monitor performance parameters • Voice energy (speed) returning • Report altitude losses progressively until recovered

CAUTION: Any recovery to level flight BEFORE 0.72M is attained can leave you on the wrong side of the power curve and may lead to secondary stalls. ATC and crew communications cannot be over-emphasized.

STALL SUMMARY

STALL SUMMARY

Configuration	Key Points
Clean (Flaps 0°)	No V-speeds selected; simulates cruise/maneuvering stall; pitch to ~5° above horizon
Takeoff/Approach	Set V2; 15-30° bank required; do not change config below V2
Landing	Set VREF/VGA; think Go-Around procedure; pitch on or below horizon
Stick Pusher	Maintain forward pressure after release; avoid secondary activation
High Altitude	Pitch -5° below horizon; recover to 0.72M; expect ~5,000 ft loss

Universal Recovery Principles

- **Reduce AOA** — Always the primary recovery action
- **Apply Maximum Thrust** — APR for energy recovery
- **Level the Wings** — Reduces load factor
- **Accept Altitude Loss** — Stall recovery takes priority
- **Avoid Secondary Stalls** — Do not pull up prematurely

XII. STEEP TURNS

A. INTRODUCTION

The steep turn is a fundamental instrument maneuver that demonstrates precise aircraft control and coordination of pitch, power, and bank. This exercise tests the pilot's ability to maintain altitude, airspeed, and bank angle while executing a coordinated turn at high bank angles. The maneuver develops skills essential for maneuvering flight and enhances situational awareness of the aircraft's energy state and performance characteristics.

For this maneuver, the flight director and Flight Path Vector can be ON or OFF. Altitude and speed selection is at the discretion of the instructor/examiner. The normal maneuvering speed for this exercise is 250 KIAS at 15,000 feet. The maneuver is accomplished at 45° of bank, turning in both directions with heading changes of 180°. A constant speed and altitude is maintained throughout the maneuver.

B. SETUP

Initial Configuration:

- Altitude: 14,000 – 15,000 feet (or as assigned)
- Airspeed: Stabilize at 250 KIAS
- Configuration: Clean (Flaps 0°, Gear Up)
- Flight Director: OFF
- Autopilot: OFF
- Power: Approximately 66% N_1

C. ENTRY PROCEDURE

1. **Stabilize** — at assigned speed and altitude
2. **Note heading** — for rollout reference
3. **Begin roll** — smoothly into 45° bank
4. **Increase power** — approximately 2-4% N_1 as bank increases
5. **Increase back pressure** — to maintain altitude
6. **Trim** — as desired to reduce yoke pressure

D. MANEUVER EXECUTION

During the Turn:

- Maintain 45° bank angle (sky pointer on 45° triangle)
- Maintain entry altitude ±100 feet
- Maintain entry airspeed ±10 knots
- Keep the ball centered (coordinated flight)
- Cross-check instruments continuously

E. COURSE REVERSAL

At the 180° point, execute immediate reversal to the opposite direction:

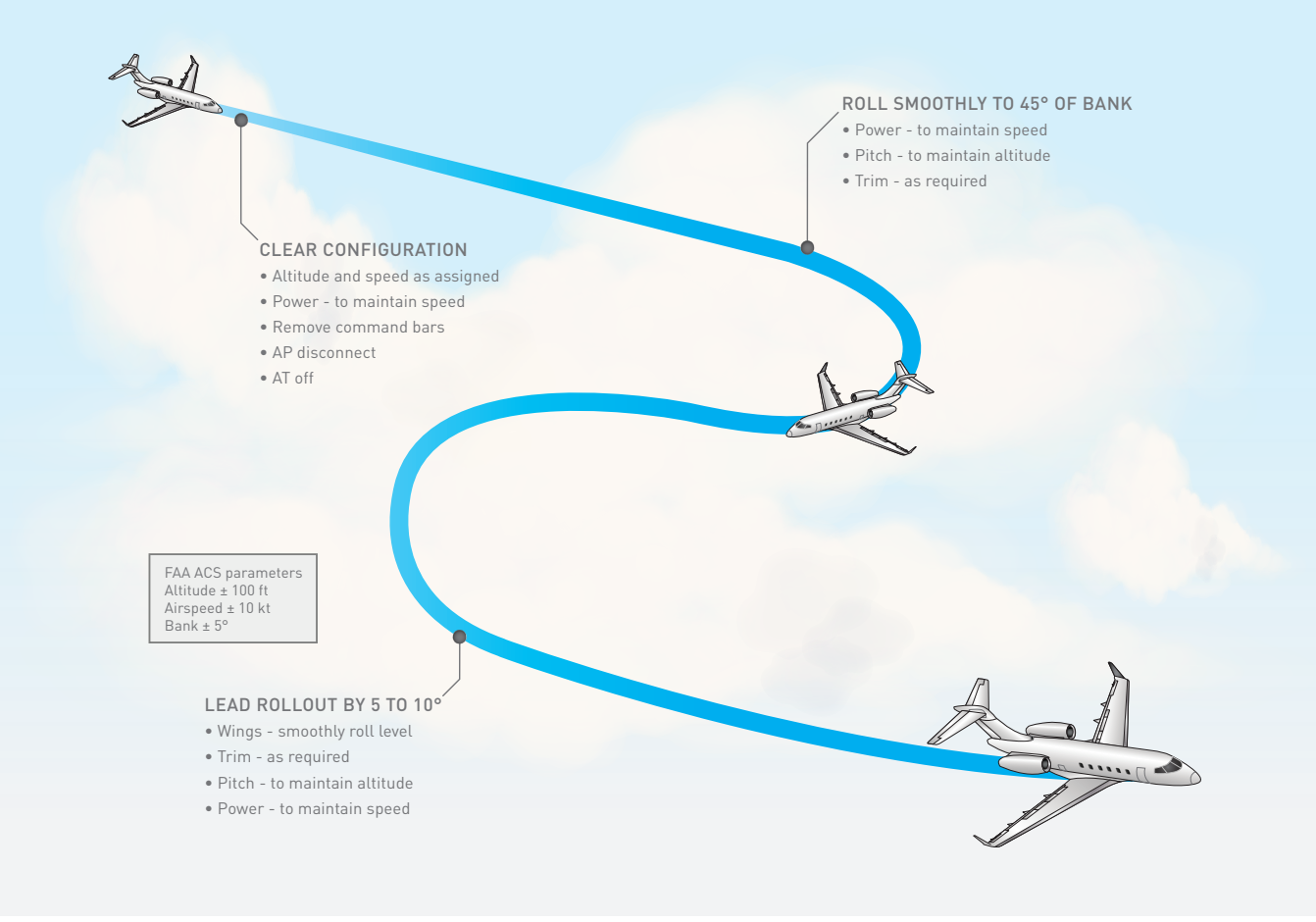
1. **Lead rollout** — approximately 10° prior to desired heading
2. **Roll through wings level** — immediately into opposite direction turn
3. **Adjust pitch down slightly** — to avoid ballooning during transition
4. **Bank to 45° AOB** — opposite direction (sky pointer on 45° triangle)
5. **Maintain altitude and airspeed** — throughout reversal

No pause is necessary or desired when changing the direction of turn. Very little trim correction is required when transitioning quickly from one direction to the other.

F. EXIT PROCEDURE

1. **Lead rollout** — 10-20° depending on roll rate
2. **Begin pitch reduction** — as you roll through ~30° AOB
3. **Reduce pitch** — approximately 2° (to ~0.5° nose up)
4. **Reduce power** — approximately 3% N1
5. **Level wings** — on original heading
6. **Select FD modes** — as appropriate
7. **Autopilot** — ON when stable

STEEP BANK TURNS



G. CREW COORDINATION

STEEP TURNS

Setup: Altitude: 15,000 feet. Airspeed: 250 KIAS. Configuration: Clean. FD: ON/OFF. FPV ON/OFF. Autopilot: OFF. Power: ~66% N1. Execute 45° bank turns, 180° in each direction with immediate reversal

PF (Pilot Flying)	PM (Pilot Monitoring)
Setup **Action:** Configure Flaps 0, Gear UP, 250 KIAS, note heading **Call:** "Steep turn left/right"	Silent — no callouts during maneuver
Entry **Action:** Roll smoothly to 45° bank, add back pressure and 2% power	—
Maintain **Action:** Trim as needed, scan attitude/altitude/bank	—
Rollout **Action:** Lead ~15° before heading, reduce back pressure/power, level wings	—

NOTE: PM remains silent during steep turn maneuvers. This is a single-pilot demonstration of aircraft control per the ACS.

H. COMPLETION STANDARDS

- Altitude: ±100 feet
- Airspeed: ±10 knots
- Bank angle: ±5° of 45°
- Heading: ±10° on rollout
- Coordinated flight throughout (ball centered)
- Smooth, continuous turn with immediate reversal

XIII. UNUSUAL ATTITUDE RECOVERY

A. INTRODUCTION

It is critical to maintain positive control of the aircraft by recognizing the airplane flight condition. During a sudden or unknown change to an unusual attitude, verify the aircraft attitude using all available indicators. Use these references to make the proper recovery.

Aircraft upsets and unusual attitudes can be caused by a number of factors including failure of attitude information, clear air turbulence, windshear, wake turbulence, engine failure, flight control problems, aircraft mishandling, or pilot inattention.

The first step in any upset recovery is to centralize the controls to avoid exacerbating the situation. Then conduct an expeditious analysis of the aircraft pitch attitude, angle of bank, current airspeed, airspeed trend, rate of descent, and altitude. Make use of primary flight and performance instruments (PFD) when analyzing the situation; however, should their reliability be in doubt, immediate reference must be made to the standby instruments.

B. RECOGNITION AND CONFIRMATION

Before conducting an unusual attitude recovery, confirm that an unusual attitude exists:

- Does the opposite PFD indicate an unusual attitude?
- Do airspeed and altitude changes confirm an unusual attitude?
- Are the standby instruments consistent with the PFD indications?

C. PFD UNUSUAL ATTITUDE INDICATIONS

Excessive Pitch Attitude Chevrons:

- Red chevrons appear at +23 degrees nose up
- Red chevrons appear at -13 degrees nose down
- Full chevrons visible at +27 degrees and -18 degrees

Display Declutter Mode Activation:

- Triggers at pitch >30° up or >20° down
- Triggers at roll angle >65 degrees
- Removes non-essential information
- Returns to normal at pitch ⩽25° up or ⩽15° down
- Returns to normal at roll angle ⩽60 degrees

D. NOSE HIGH RECOVERY

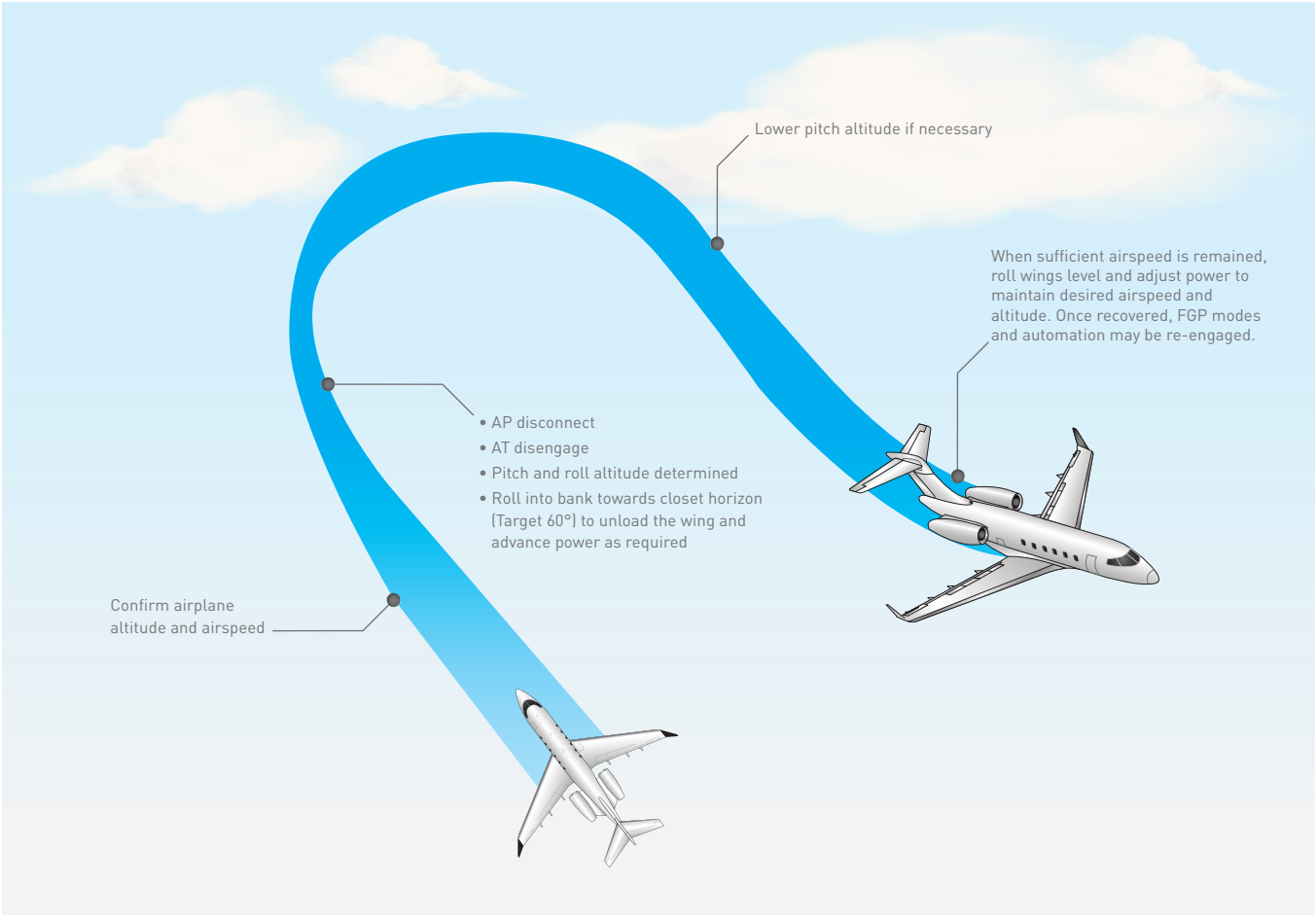
1. **Recognition Cues:**
    - Pitch attitude unusually high (above horizon)
    - Airspeed decreasing rapidly
    - Altitude increasing initially, then potentially decreasing
    - VSI showing climb, then descent
    - Red nose-up chevrons on PFD

2. **Recovery Procedure:**
    1. **Autopilot** — Disconnect
    2. **Throttles** — APR
    3. **Pitch Attitude** — Reduce

        Roll in the shortest direction towards the horizon. This aids in allowing the nose to come down. It is preferable not to exceed 60° bank.
    4. **Return to previous altitude** — As the nose approaches the horizon, level off while leveling the wings
    5. **Reduce power** — When a safe airspeed is attained

CAUTION: If normal pitch control and roll control is ineffective, careful rudder input in the direction of the desired roll may be required to induce a rolling maneuver for recovery. Only a small amount of rudder is needed. Too much rudder applied too quickly or held too long may result in loss of lateral and directional control. Because of the low energy condition, pilots should exercise caution when applying rudder.

UNUSUAL ATTITUDE RECOVERY - NOSE HIGH



3. **Crew Coordination:**

UNUSUAL ATTITUDE RECOVERY — NOSE HIGH

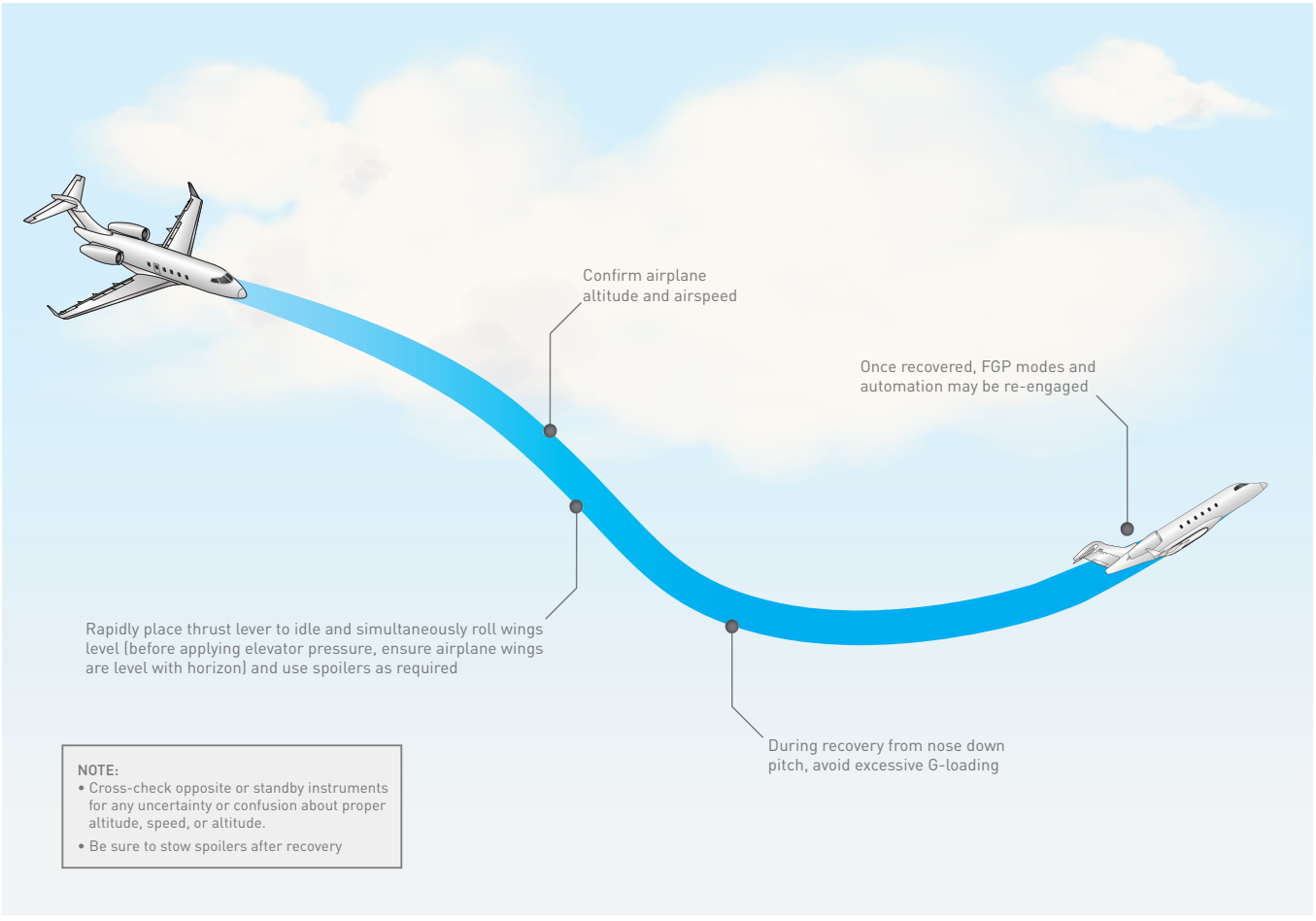
Recognition: Confirm unusual attitude exists by cross-checking both PFDs, verifying airspeed and altitude changes are consistent with the unusual attitude indication, and referencing standby instruments if reliability is in doubt.

PF (Pilot Flying)	PM (Pilot Monitoring)
Recognition	
Call: "UNUSUAL ATTITUDE "	**Call:** "UNUSUAL ATTITUDE"
Action: Takes control if not already flying	
Recovery	
Call: "Autopilot disconnect, setting thrust, reducing pitch"	**Action:** Confirms autopilot disconnect
Action: Roll into bank towards closest horizon (Target 60°) to unload wing and advance power as required.	**Action:** Monitors attitude, airspeed, altitude
	Call: Airspeed trend and altitude
Recovery Complete	
Call: "Recovered, level flight"	**Action:** Confirms normal parameters

E. NOSE LOW RECOVERY

1. **Recognition Cues:**
    - Pitch attitude unusually low (below horizon)
    - Airspeed increasing rapidly
    - Altitude decreasing
    - VSI showing high rate of descent
    - Red nose-down chevrons on PFD
2. **Recovery Procedure:**
    1. **Autopilot** — Disconnect
    2. **Throttles** — Idle
    3. **Roll** — Wings Level
    4. **Pitch Attitude** — Risse the nose to stop the descent and climb
    5. **Spoilers** — Extend as necessary to control airspeed
    6. **Return to previous altitude** — Add power and retract spoilers to maintain safe airspeed

UNUSUAL ATTITUDE RECOVERY - NOSE LOW



F. CREW COORDINATION

UNUSUAL ATTITUDE RECOVERY — NOSE LOW

Recognition: Confirm unusual attitude exists by cross-checking both PFDs, verifying airspeed and altitude changes are consistent with the unusual attitude indication, and referencing standby instruments if reliability is in doubt.

PF (Pilot Flying)	PM (Pilot Monitoring)
Recognition **Call:** "UNUSUAL ATTITUDE" **Action:** Takes control if not already flying	**Call:** "UNUSUAL ATTITUDE"
Recovery **Call:** "Autopilot disconnect, idle, rolling wings level" **Action:** Roll wings level FIRST, then raise nose	**Action:** Confirms autopilot disconnect **Action:** Monitors attitude, airspeed, altitude **Call:** Airspeed and descent rate
Recovery Complete **Call:** "Recovered, level flight"	**Action:** Confirms normal parameters

CAUTION: Level wings BEFORE raising the nose to prevent asymmetric G-loading.

G. COMPLETION STANDARDS

- Correct recognition of unusual attitude type
- Proper recovery technique applied
- Aircraft returned to controlled, level flight
- No excessive airspeed or G-loading during recovery
- Altitude and heading stabilized

XIV. NORMAL TAKEOFF

A. INTRODUCTION

The normal takeoff demonstrates the pilot's ability to safely transition the aircraft from the ground to initial climb while maintaining precise directional control, proper rotation technique, and appropriate climb profile. This procedure establishes the foundation for all departure operations and must be executed with consistency and precision.

B. TAKEOFF BRIEFING

A thorough takeoff briefing should be accomplished before requesting the Starting Engines checklist to avoid interfering with last-minute takeoff preparations. The briefing should include:

- Takeoff runway and SID
- SID details: altitude/speed restrictions, gradients
- Calculated takeoff distance vs. runway available
- Taxi plan and hotspots
- V-speeds: V1, VR, V2
- Engine failure procedures (before and after V1)
- Abort criteria
- Initial altitude and heading

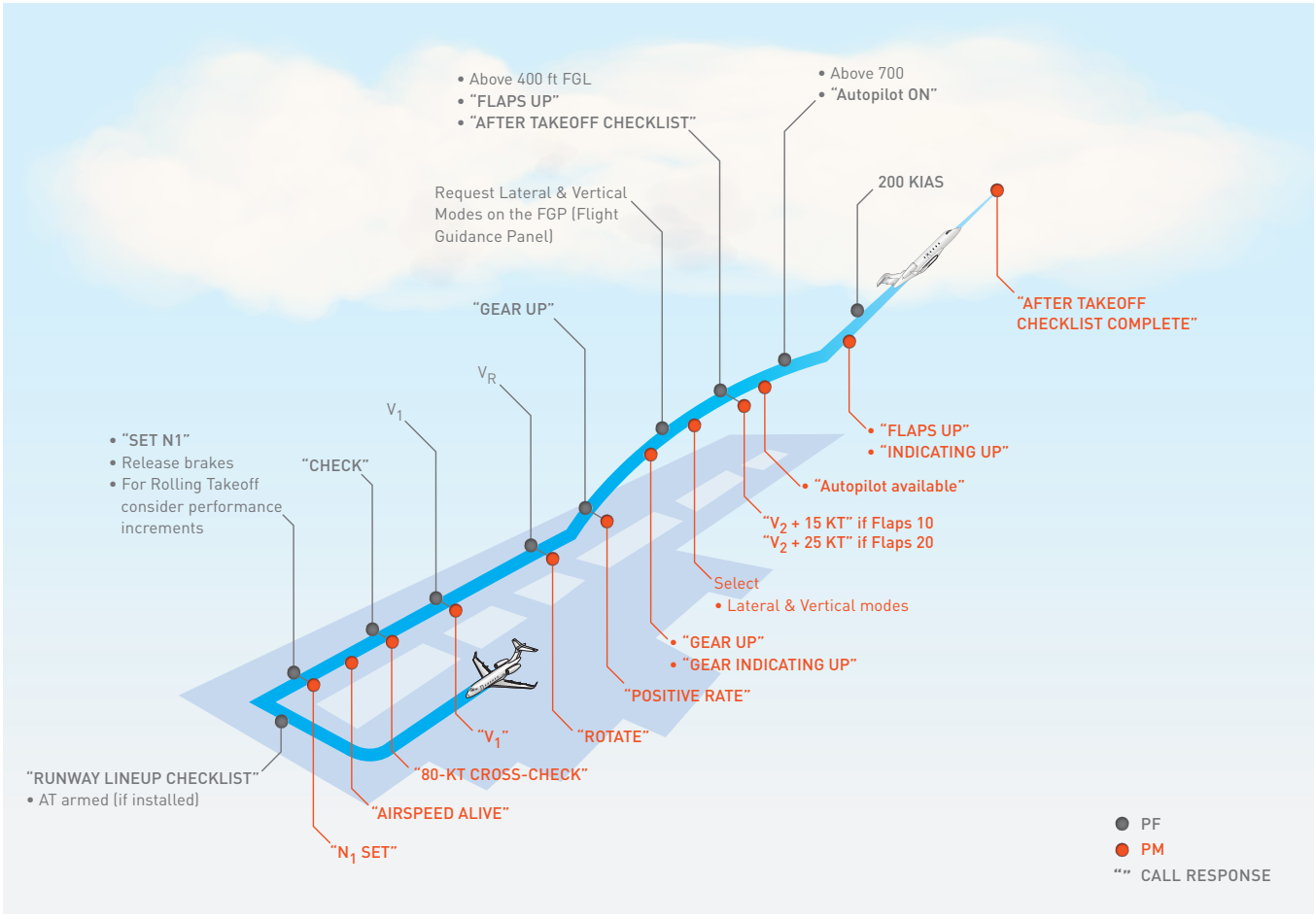
C. SETUP AND CONFIGURATION

- Before Takeoff checklist: COMPLETE
- Flaps: SET for takeoff (10° or 20° as briefed)
- Trim: SET
- V-speeds: POSTED on PFD
- Flight director: ON, takeoff mode
- Transponder: ON/ALT
- Lights: AS REQUIRED

D. TAKEOFF PROCEDURE

1. **Line up on centerline** — and verify heading
2. **Hold brakes** — and advance throttles to approximately 60% N1
3. **Verify engine instruments** — normal
4. **Release brakes** — and advance throttles to TAKEOFF detent
5. **Maintain centerline** — with rudder
6. **At VR** — smoothly rotate to approximately 10° pitch
7. **At positive rate** — call "GEAR UP"
8. **Maintain V2 + 15** — until acceleration altitude
9. **At V2 + 15** — call "FLAPS 0"
10. **Accelerate to climb speed** — 200 KIAS (Class D)
11. **Complete After Takeoff checklist**

NORMAL TAKEOFF



E. CREW COORDINATION

NORMAL TAKEOFF

PF (Pilot Flying)	PM (Pilot Monitoring)
Call: "Runway Lineup checklist"	
	Action: Complete Runway Lineup checklist
	Call: "Runway Lineup checklist complete"
Action: Place hand on thrust levers. Move up two clicks to the TO detent.	
Call: "Set N1"	
Action: Verify Thrust levers in the TO detent	
	Call: "N1 set"

NORMAL TAKEOFF

PF (Pilot Flying)	PM (Pilot Monitoring)
	Action: At first sign of airspeed **Call:** "Airspeed alive"
Call: "Check"	**Action:** At 80 KIAS **Call:** "80 knots...crosscheck"
Action: Move hand from thrust levers to control wheel	**Call:** "V1" **Call:** "Rotate"
Action: Rotate to takeoff attitude	**Action:** When the VSI is showing positive climb and the indicated altitude is increasing **Call:** "Positive rate"
Call: "Gear up"	**Call:** "Gear up" **Action:** When all gear lights extinguished: **Call:** "Gear indicating up"
	Call: "V2+15 (Flaps 10) or V2+25 (Flaps 20)"
Action: Above 400 ft AGL and clear of obstacles: **Call:** "Flaps up"	**Call:** "Flaps up" **Action:** Verify flap position indication up **Call:** "Indicating up"
Call: "Autopilot On"	Above 700 ft **Call:** "Autopilot is available"
Call: "After Takeoff checklist"	**Action:** After contacting departure control or the next radar center, do the After Takeoff checklist. **Call:** "After Takeoff checklist complete"
Call: "CLIMB Check"	**Action:** Pressurization check every 10,000 ft **Call:** "Climb Check complete"

F. COMPLETION STANDARDS

- Smooth, coordinated takeoff roll on centerline
- Rotation at VR with proper pitch attitude
- Airspeed: ±5 knots of target
- Heading/Track: ±5°
- Proper configuration sequence
- Appropriate crew coordination and callouts

XV. REJECTED TAKEOFF

A. INTRODUCTION

A rejected takeoff (RTO) is a profile initiated during a takeoff roll to expeditiously stop the airplane on the runway. As the airplane accelerates, energy increases rapidly. At low speeds, up to approximately 80 KIAS, the energy developed is not sufficient to cause difficulty in stopping the airplane. As the speed approaches V1, on a balanced field, the effort to stop the airplane in the event of a rejected takeoff approaches maximum.

IMPORTANT: The decision to reject the takeoff must be made so that the RTO can be initiated no later than V1. During the takeoff run, making a decision to reject takeoff after V1 may result in the airplane not being able to stop safely on the remaining runway.

B. DECISION CRITERIA

Below 80 Knots:

Takeoff will be rejected prior to 80 knots for any abnormality.

Between 80 Knots and V1:

Reject only for the following:

- Master warnings
- Directional control problems
- Safety of flight issues

C. RTO PROCEDURE

When triggered by circumstances warranting a discontinuance of the takeoff, an RTO is to be initiated immediately and without reference to a checklist procedure. When the decision is made to reject a takeoff, either pilot may announce:

- "ABORT, ABORT, ABORT"
- "REJECT, REJECT, REJECT"
- "STOP, STOP, STOP"

Immediate Actions:

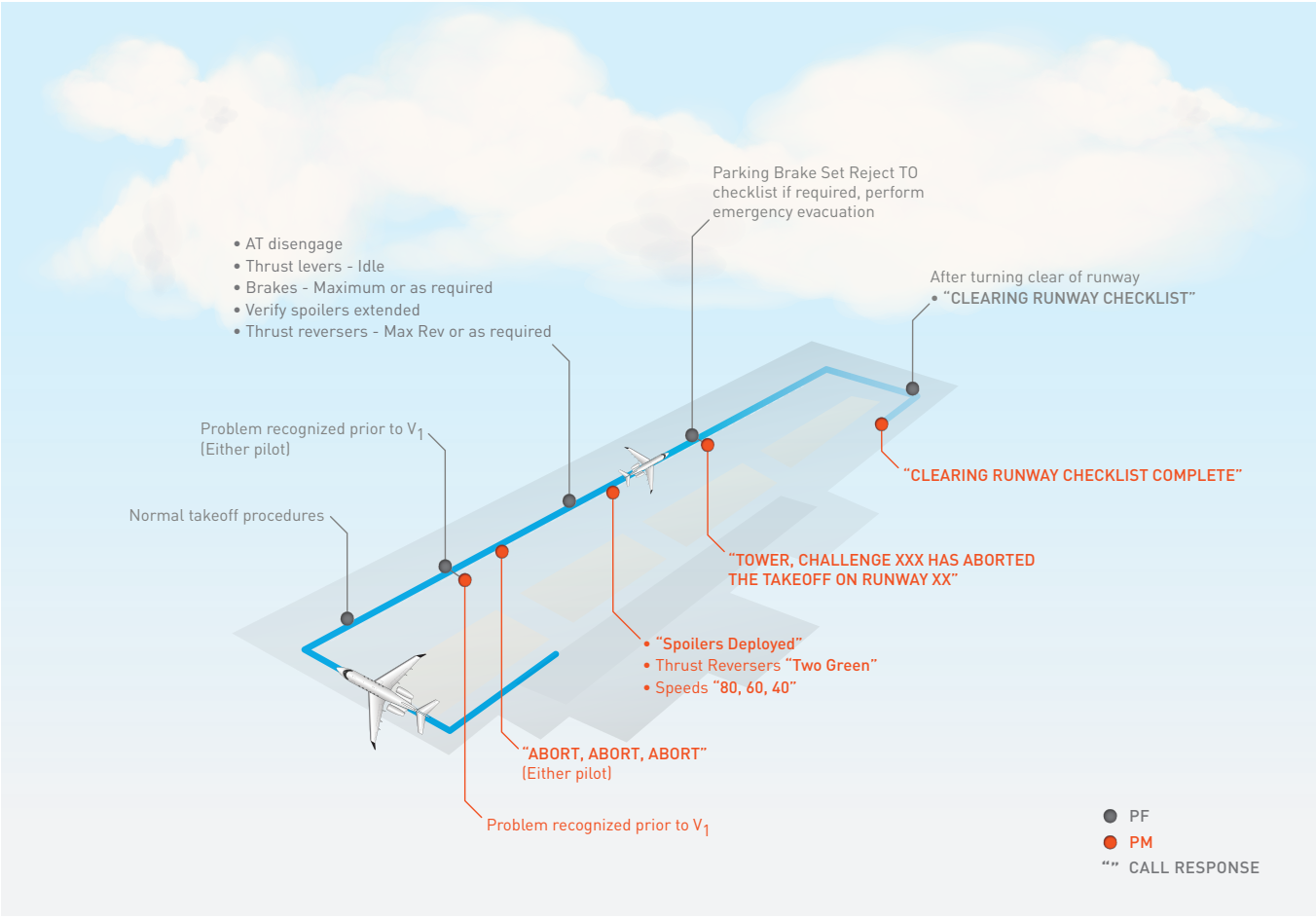
1. **Thrust levers** — Idle
2. **Brakes** — Maximum or as required
3. **Thrust reverser(s)** — Max Reverse or as required

D. POST-RTO ACTIONS

When the airplane has rolled to a full stop and the park brake is ON:

- Assess the situation
- Perform additional emergency procedures if required
- Clear runway or request emergency evacuation if required
- Communicate with passengers
- PM commences Rejected Takeoff checklist as commanded by the PF

ABORTED OR REJECTED TAKEOFF BELOW



E. CREW COORDINATION

REJECTED TAKEOFF

Below 80 kts: Reject for any abnormality. **80 kts to V1:** Reject only for master warnings, loss of directional control, or safety of flight issues.

PF (Pilot Flying)	PM (Pilot Monitoring)
Decision Made to Abort	
Call: "ABORT, ABORT, ABORT" (or "REJECT" / "STOP")	**Call:** "ABORT, ABORT, ABORT" (or "REJECT" / "STOP")
RTO Execution	
Action: Throttles IDLE, MAX braking	**Call:** "Spoilers extended"
Action: Deploys thrust reversers	**Call:** "TRs deployed"
	Call: "80, 60, 40" (speed calls)
Aircraft Stopped	
Action: Sets park brake	**Action:** Notifies Tower / Requests assistance
Action: Assesses situation	
After Stopping	
Call: "Rejected Takeoff checklist"	**Action:** Completes Rejected Takeoff checklist
Action: Communicates with passengers	**Call:** "Rejected Takeoff checklist complete"

NOTE: Any of these terms (ABORT, REJECT, STOP) are acceptable as long as all crew members are clear on the call, its meaning, and consistent with the SOPs. The word STOP is becoming more widely used, especially for international procedures.

NOTE: It may take a few seconds to deploy the thrust reversers. Do not delay braking while thrust reverser deployment takes place.

CAUTION: Consider brake energy prior to subsequent operation of the aircraft. Refer to AFM brake cooling performance section for additional guidance.

F. COMPLETION STANDARDS

- Prompt recognition of reject criteria
- Proper reject callout
- Immediate and coordinated RTO procedure
- Aircraft stopped on runway
- Appropriate post-RTO actions completed

XVI. ENGINE FAILURE ABOVE V1

A. INTRODUCTION

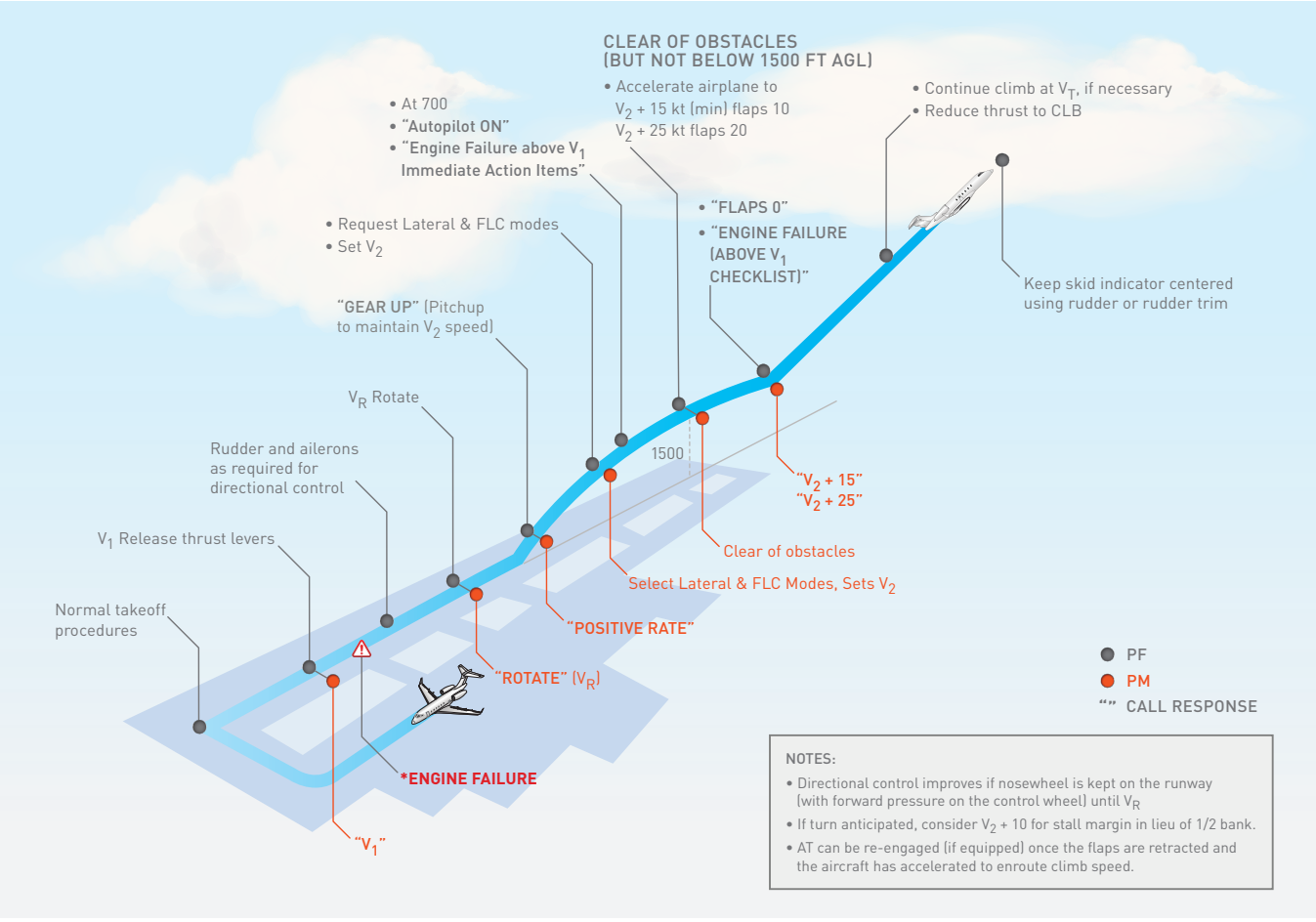
Engine failure at or above V1 requires continuation of the takeoff. The aircraft is designed and certificated to safely take off and climb with one engine inoperative when proper technique is applied. This maneuver, often called a "V1 cut," demonstrates the pilot's ability to maintain directional control, complete a safe departure, and properly configure the aircraft for singleengine flight.

B. RECOGNITION

Engine failure indications may include:

- Yaw toward the failed engine
- Asymmetric thrust sensation
- EICAS warnings/cautions
- Engine instrument anomalies
- Aural warnings

ENGINE FAILURE ABOVE V1



C. V1 CUT PROCEDURE

If an engine fails at or above V1 and the TLA is in the TO Detent, APR thrust will be commanded by the FADEC.

1. **Maintain directional control** — with rudder
2. **Keep nosewheel on runway** — until VR
3. **Track centerline** — using rudder
4. **At VR** — rotate and continue to apply rudder to maintain track
5. **Bank into good engine** — approximately 5° to maintain coordinated flight
6. **Verify slip/skid indicator** — centered
7. **Climb at V2** — until safe altitude
8. **At positive rate** — GEAR UP
9. **Complete engine failure procedures** — per QRH

D. INITIAL CLIMB AND CONFIGURATION

At V2 + 15 (Flaps 10°) or V2 + 25 (Flaps 20°) (Clear of Obstacles (but NOT below 1500 ft AGL)):

- Flaps: RETRACT to 0°
- Accelerate to VENR (single-engine enroute climb speed)
- Complete appropriate checklists

E. CREW COORDINATION

ENGINE FAILURE ABOVE V_1 SPEED

Takeoff Continued: Engine failure at or above V_1 — continue the takeoff

PF (Pilot Flying)	PM (Pilot Monitoring)
Engine Failure Recognition	Call: "V_1"
Action: Maintains directional control with rudder	[Engine Fails]
Action: Keeps nosewheel on runway until V_R	Call: "ENGINE FAILURE" (if PF doesn't recognize)
Rotation and Liftoff	Call: "Rotate"
Action: Rotate at V_R, Pitch to maintain V_2	
Action: Rudder and ailerons as required for directional control	Call: "Positive rate"
Call: "Gear up"	
Action: Request Lateral & FLC Modes	Call: "Gear up"
Call: "Set V_2"	Call: "Gear indicating up"
	Action: Selects requested Lateral & FLC modes, Sets V_2

ENGINE FAILURE ABOVE V_1 SPEED

Takeoff Continued: Engine failure at or above V_1 — continue the takeoff

PF (Pilot Flying)	PM (Pilot Monitoring)
	At 700 ft AGL **Call:** "Autopilot available"
Call: "Autopilot ON" **Call:** "Engine Failure above V_1 Immediate Action Items"	**Action:** Completes Engine Failure above V_1 Immediate Action Items QRC
Clear of Obstacles (but not below 1500 ft AGL) **Action:** Accelerate airplane to V_2 + 15 kt (min) Flaps 10 or V_2 + 25 kt Flaps 20	**Call:** "V_2 + 15" or **Call:** "V_2 + 25"
Call: "Flaps 0, Engine Failure above V_1 checklist" **Action:** Maintain V_T	**Call:** "Flaps 0" **Call:** "Indicating 0" **Action:** Completes Engine Failure Above V_1 checklist
Climb **Action:** Continue climb at V_T (if necessary) **Action:** Reduce Thrust to CLB **Action:** Keep skid indicator centered using rudder or rudder trim	

NOTES:

- Directional control improves if nosewheel is kept on the runway (with forward pressure on the control wheel) until VR.
- If turns anticipated, consider V_2 + 10 for stall margin in lieu of ½ bank.
- AT can be re-engaged (if equipped) once the flaps are retracted and the aircraft has accelerated to enroute climb speed.

F. COMPLETION STANDARDS

- Directional control maintained throughout
- Proper rotation at VR
- V2 maintained ±5 knots
- Proper bank angle into operating engine
- Slip/skid indicator centered
- Proper configuration sequence
- Appropriate checklist completion

XVII. VISUAL APPROACH AND LANDING

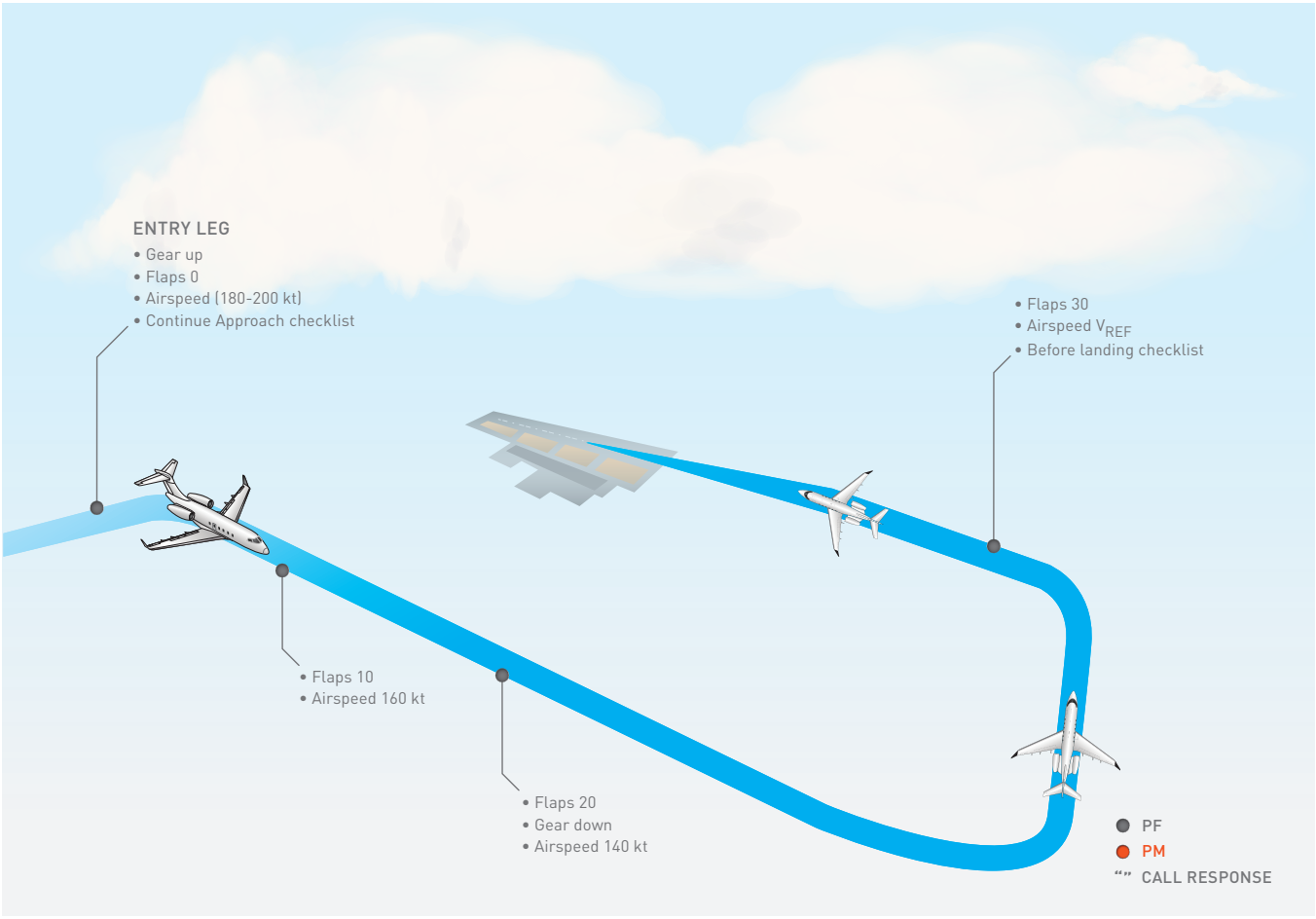
A. INTRODUCTION

A visual approach is an approach conducted under IFR when the pilot has the airport or preceding aircraft in sight and ATC has authorized the approach. While less structured than an instrument approach, the visual approach requires precise airmanship, proper traffic pattern procedures, and consistent technique to ensure a stabilized approach to landing.

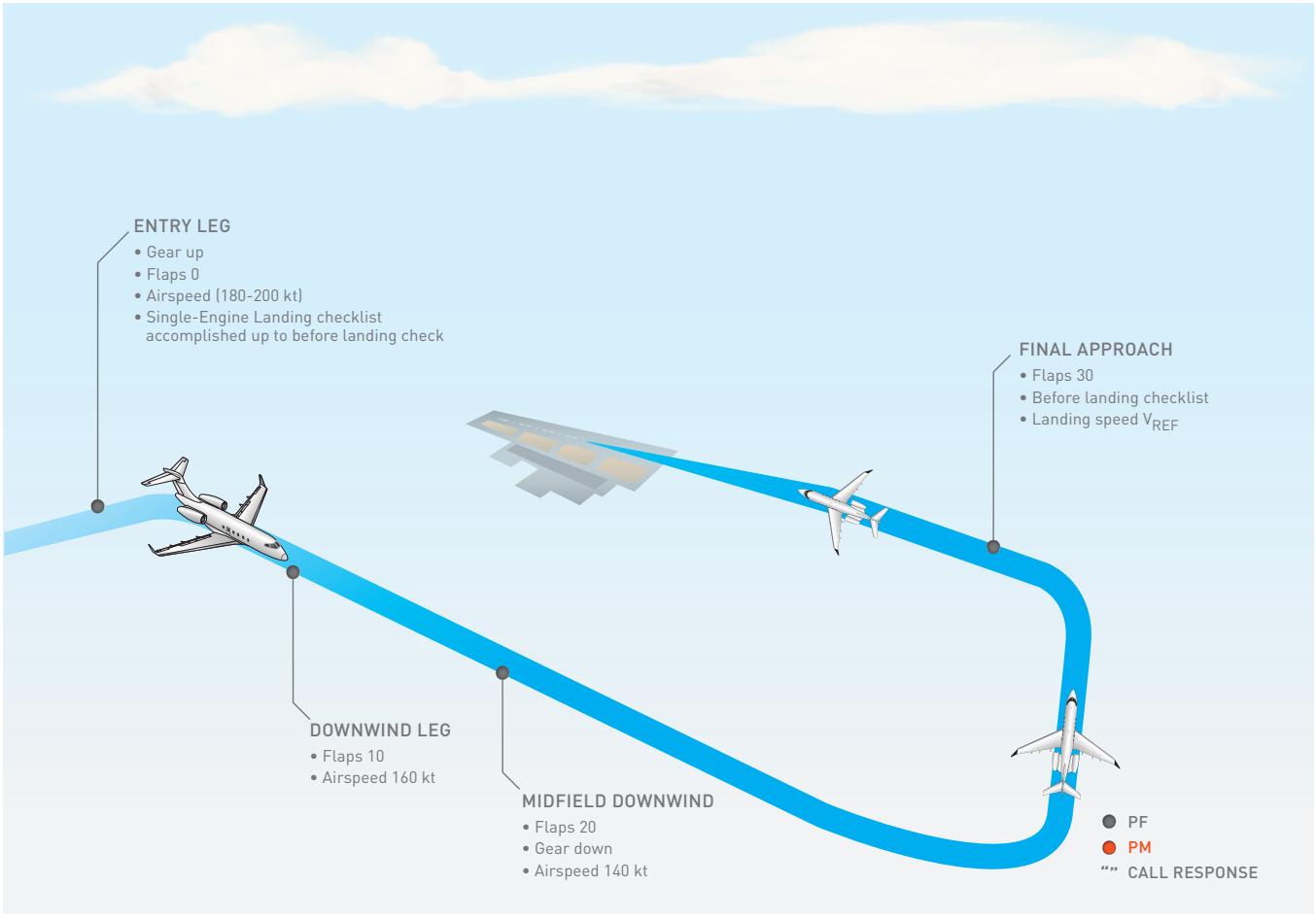
B. NORMAL VISUAL APPROACH

1. **Setup**
    - Approach checklist: COMPLETE
    - Weather conditions verified (ceiling and visibility adequate)
    - Airport environment in sight
    - Traffic: IDENTIFIED or REPORTED IN SIGHT
    - Airspeed: Reduce to 200 KIAS or below in terminal area
2. **Procedure**
    1. **Descend to pattern altitude** — as cleared
    2. **Enter traffic pattern** — downwind, base, or straight-in as appropriate
    3. **Flaps 10°** — on downwind or when speed permits
    4. **Airspeed** — 160 KIAS on downwind
    5. **Approach checklist** — if not complete
    6. **Abeam touchdown point** — Flaps 20°, Gear DOWN
    7. **Before Landing checklist** — complete to flaps item
    8. **Base turn** — Flaps 30°, slow to VREF
    9. **Final approach** — stabilized by 500 ft AGL
    10. Before Landing checklist — COMPLETE

NORMAL VFR LANDING - TWO ENGINES



LANDING - SINGLE ENGINE



3. Crew Coordination

VISUAL APPROACH

Prerequisites: Approach checklist complete. Weather conditions verified. Airport environment in sight. Traffic identified or reported in sight.

PF (Pilot Flying)	PM (Pilot Monitoring)
Entering Pattern	
Call: "Approach checklist"	**Action:** Completes Approach checklist **Call:** "Approach checklist complete"
Downwind	
Call: "Flaps 10"	**Call:** "Speed check" **Call:** "Flaps 10, indicating 10"
Abeam Touchdown Point	
Call: "Flaps 20, Gear Down"	**Call:** "Flaps 20, indicating 20" **Call:** "Gear down, three green"
Base Turn	
Call: "Flaps 30, Before Landing checklist"	**Call:** "Flaps 30, indicating 30" **Action:** Completes Before Landing checklist **Call:** "Before Landing checklist complete"
Final Approach	**Call:** "500 feet, stabilized"
Call: "Check"	**Action:** Speed and sink rate calls
Call: "Landing"	
After Touchdown	**Call:** "Spoilers extended, TRs deployed" **Call:** "80, 60, 40"

C. FLAPS INOPERATIVE LANDING

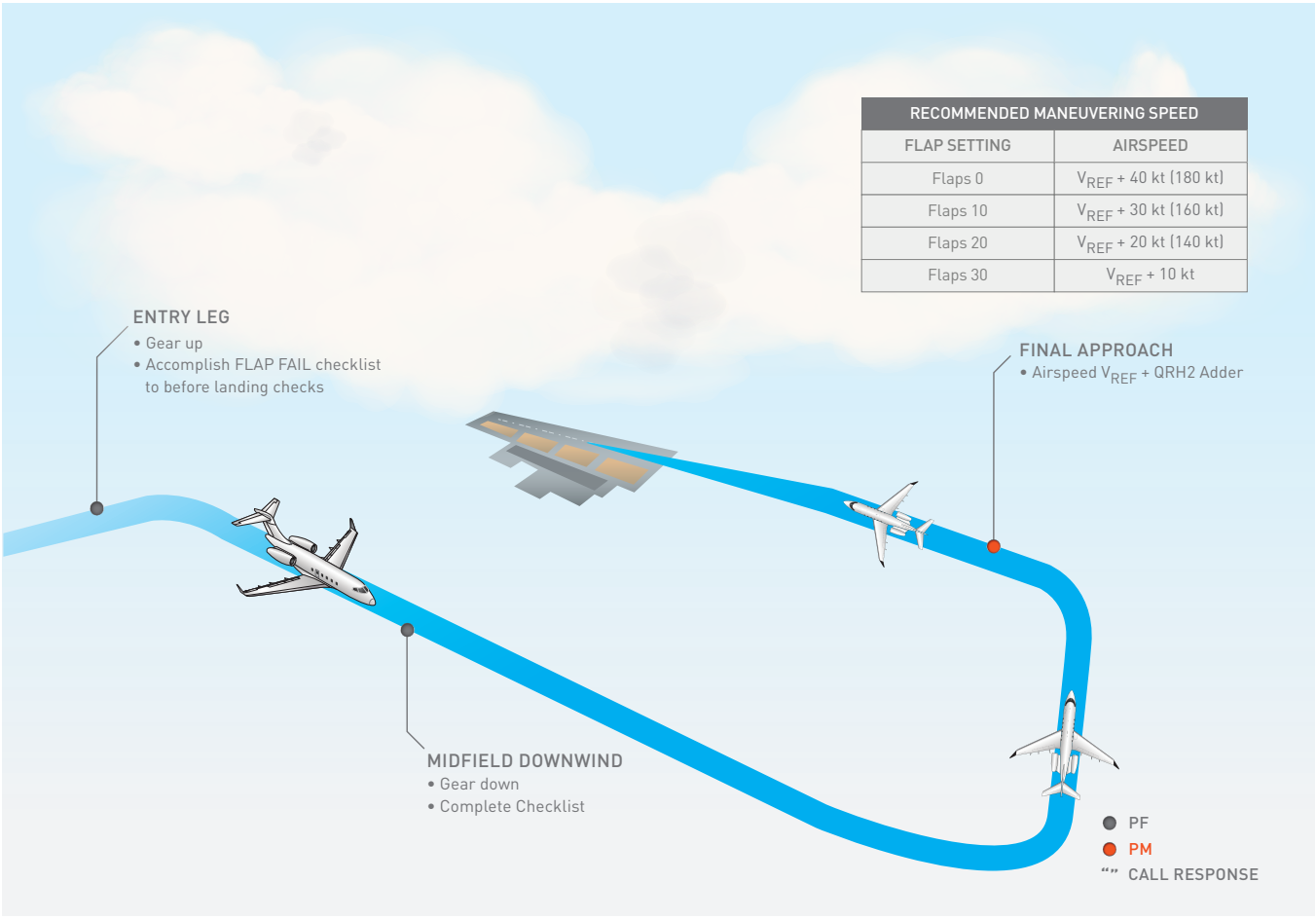
1. **Setup**
    - Flaps inoperative condition confirmed
    - Approach speeds calculated for zero-flap landing
    - Longer runway selected if available
    - VREF (flaps 0) calculated and posted

RECOMMENDED MANEUVERING SPEEDS

Flap Setting	Airspeed
Flaps 0	V_{REF} + 40 kt (180 kt)
Flaps 10	V_{REF} + 30 kt (160 kt)
Flaps 20	V_{REF} + 20 kt (140 kt)
Flaps 30	V_{REF} + 10 kt

2. **Procedure**
    1. **Maintain higher pattern altitude** — if necessary for extended final
    2. **Plan longer final approach** — to allow speed stabilization
    3. **Gear DOWN** — early (provides drag)
    4. **Airspeed** — VREF (flaps 0) + gust factor
    5. **Approach angle** — shallower due to higher speeds
    6. **Landing distance** — significantly increased

FLAP FAILURE LANDING - TWO ENGINES



3. **Crew Coordination**

FLAP FAILURE LANDING

PF (Pilot Flying)	PM (Pilot Monitoring)
Entry Leg	
Call: "Gear up"	**Call:** "Gear up" **Action:** Accomplish FLAP FAIL checklist to Before Landing Checks
Midfield Downwind	
Call: "Gear down"	**Call:** "Gear down" **Call:** "Gear indicating down" **Action:** Complete checklist
After Touchdown	
Action: Maintain airspeed VREF + QRH2 adder	**Action:** Monitor airspeed and approach

D. COMPLETION STANDARDS

- Stabilized approach by 500 ft AGL
- Airspeed: ±5 knots of VREF
- Proper glidepath and alignment
- Touchdown within normal zone
- Proper crew coordination throughout

XVIII. NORMAL VFR LANDING

See XVII. VISUAL APPROACH AND LANDING

XIX. CROSSWIND LANDING

C. INTRODUCTION

Crosswind landings are similar to those in other aircraft. Adequate aircraft control in a crosswind velocity (measured at a 10 m height) of 28 kt during takeoff and 24 kt during landing was demonstrated during certification tests.

B. TECHNIQUE

1. **Use crab approach** — to track centerline on final
2. **Transition to wing low —** slipped drift correction prior to touchdown
3. **Hold upwind aileron —** into the wind through touchdown
4. **Track centerline** — on the rollout

5. **Spoilers deploy automatically** — reducing lift, making brakes more effective
6. **Maintain roll control** — into the wind through rollout

C. CREW COORDINATION

CROSSWIND LANDING

NOTE: In extreme crosswind conditions, an airspeed slightly higher than VREF is warranted. As a general rule, an increase of one-half the gust factor up to a maximum of 10 kt over VREF may be appropriate on final approach.

CAUTION: Do not allow the aircraft to float with power off prior to touchdown. Fly the aircraft to touchdown with a mild flare. Upon touchdown, keep the aircraft on the surface.

PF (Pilot Flying)	PM (Pilot Monitoring)
Final Approach **Action:** Establishes crab angle	**Call:** "Wind [direction] at [speed], gusting [gust]" **Call:** "V_{REF} + [additive]"
Short Final **Action:** Transitions to sideslip (wing low)	**Call:** "50, 40, 30, 20, 10"
Touchdown **Action:** Touches down upwind wheel first **Action:** Maintains roll control into wind	**Call:** "Spoilers deployed"

D. COMPLETION STANDARDS

- Crosswind correction maintained throughout approach
- Touchdown on centerline
- No excessive drift at touchdown
- Directional control maintained throughout rollout
- Wind correction maintained until taxi speed

XX. SHORT-FIELD LANDING

A. INTRODUCTION

Short field approaches and landings should be made at VREF as much as possible, accounting for winds and increased distances as required. The primary objective is to touch down at the designated point and stop in the minimum distance while maintaining safety margins.

B. TECHNIQUE

1. **Maintain VREF** — on final approach
2. **Do not attempt to "grease it on"** — or flare as much as normal landing
3. **Touch down firmly** — at the designated point
4. **Lower nosewheel promptly** — to activate wheel brakes effectively
5. **Apply maximum braking** — primary means of stopping
6. **Deploy thrust reversers** — to assist deceleration

C. CREW COORDINATION

SHORT-FIELD LANDING

IMPORTANT: The wheel brakes are the primary means of stopping the aircraft and help achieve the calculated landing distance. Brake efficiency is reduced if the tires are not firmly on the runway surface.

PF (Pilot Flying)	PM (Pilot Monitoring)
Final Approach	Call: "On speed, on glidepath"
	Call: "500 feet, stabilized"
Call: "Landing"	
Touchdown	
Action: Firm touchdown at aiming point	Call: "Spoilers deployed"
Action: Maximum braking	
Deceleration	Call: "Two deployed"
Action: Maximum reverse	Call: "80, 60, 40"

D. COMPLETION STANDARDS

- Airspeed: ±5 knots of VREF
- Touchdown at or near aiming point
- Minimal float after touchdown
- Prompt application of maximum braking
- Aircraft stopped within calculated landing distance

XXI. TOUCH-AND-GO

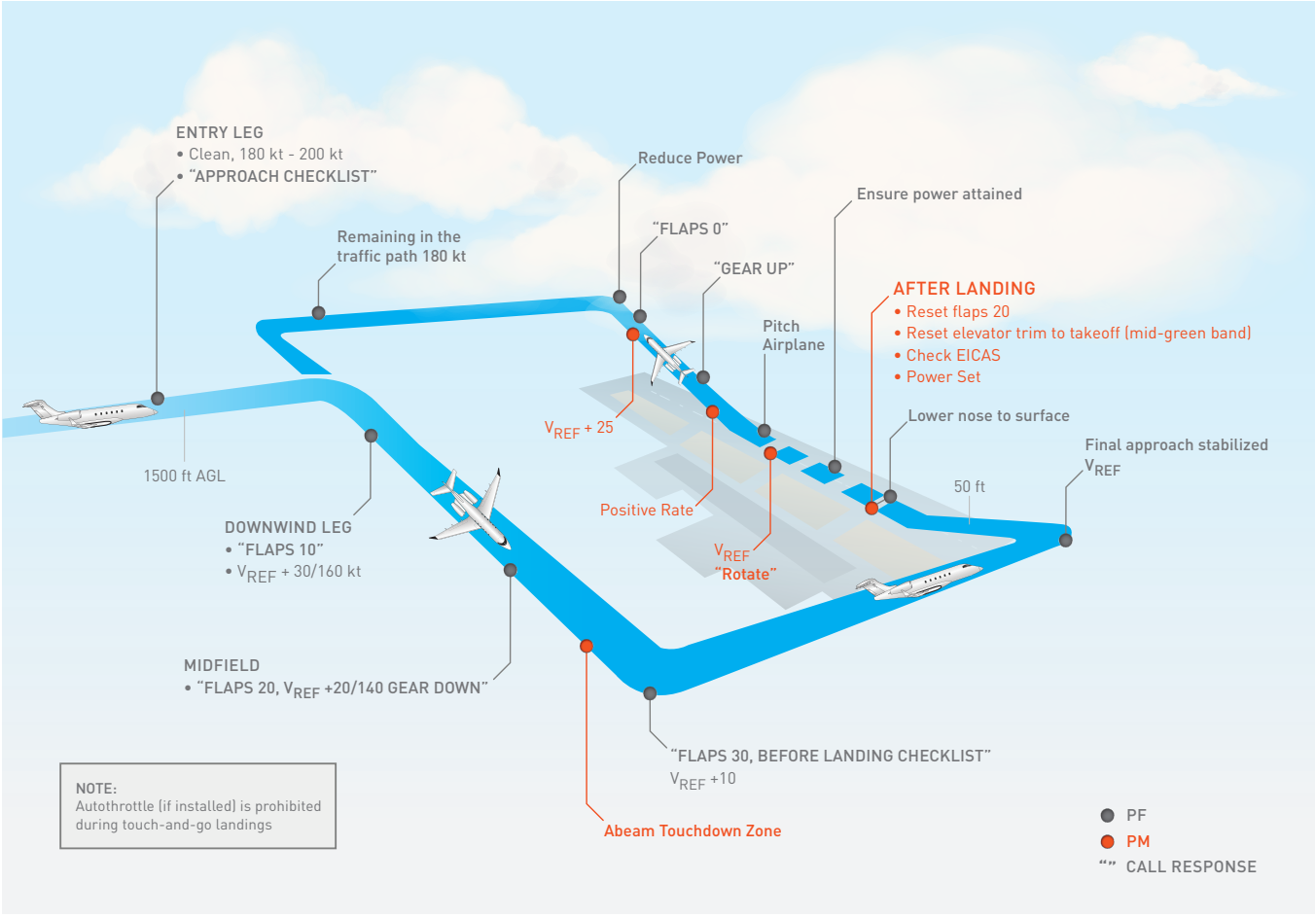
A. INTRODUCTION

A touch-and-go is a training maneuver that combines the landing and takeoff phases into a single operation. After touchdown, the aircraft is reconfigured for takeoff and the takeoff is initiated without coming to a full stop. This maneuver is used to practice multiple landings in a shorter time and is commonly used during training.

B. PROCEDURE

1. **Execute normal landing** — touchdown on centerline at aiming point
2. **Lower nosewheel** — to runway
3. **Retract spoilers** — if deployed
4. **Set flaps** — to takeoff position (10° or 20°)
5. **Verify trim** — set for takeoff
6. **Advance throttles** — to TAKEOFF detent
7. **Maintain centerline** — with rudder
8. **At VR** — rotate to approximately 10° pitch
9. **Execute normal climbout** — gear up at positive rate

TOUCH AND GO LANDING



C. CREW COORDINATION

TOUCH-AND-GO

PF (Pilot Flying)	PM (Pilot Monitoring)
After touchdown **Action:** Lower nosewheel	**Call:** "Spoilers deployed"
Call: "Flaps 10"	**Call:** "Flaps 10" **Call:** "Indicating 10"
Call: "Set takeoff thrust" **Action:** Advance to TO detent	**Call:** "N1 set"
Action: Rotate at VR	**Call:** "Rotate" **Action:** When VSI showing positive climb **Call:** "Positive rate"
Call: "Gear up"	**Call:** "Gear up" **Call:** "Gear indicating up"

CAUTION: Ensure adequate runway length is available for the touch-and-go. Consider aircraft weight, density altitude, runway condition, and any applicable limitations before executing.

NOTE: Do not deploy thrust reversers during a touch-and-go. Ensure the crew clearly understands the intent before touchdown.

D. COMPLETION STANDARDS

- Normal landing touchdown
- Proper reconfiguration for takeoff
- Centerline maintained throughout
- Normal rotation and climbout
- Proper crew coordination and callouts

XXII. PRECISION APPROACH (ILS/LPV)

A. INTRODUCTION

A precision approach provides both lateral and vertical guidance to the runway. The ILS (Instrument Landing System) and LPV (Localizer Performance with Vertical guidance) are the most common precision approaches. These approaches require precise tracking of the localizer/course and glideslope/glidepath to decision altitude (DA), where the pilot must have adequate visual references to continue to landing.

B. APPROACH PLANNING AND BRIEFING

Prior to 31 nm from destination or below FL180, accomplish approach planning and briefing during the cruise or initial descent, if possible, or at least when called for in the Approach Checklist.

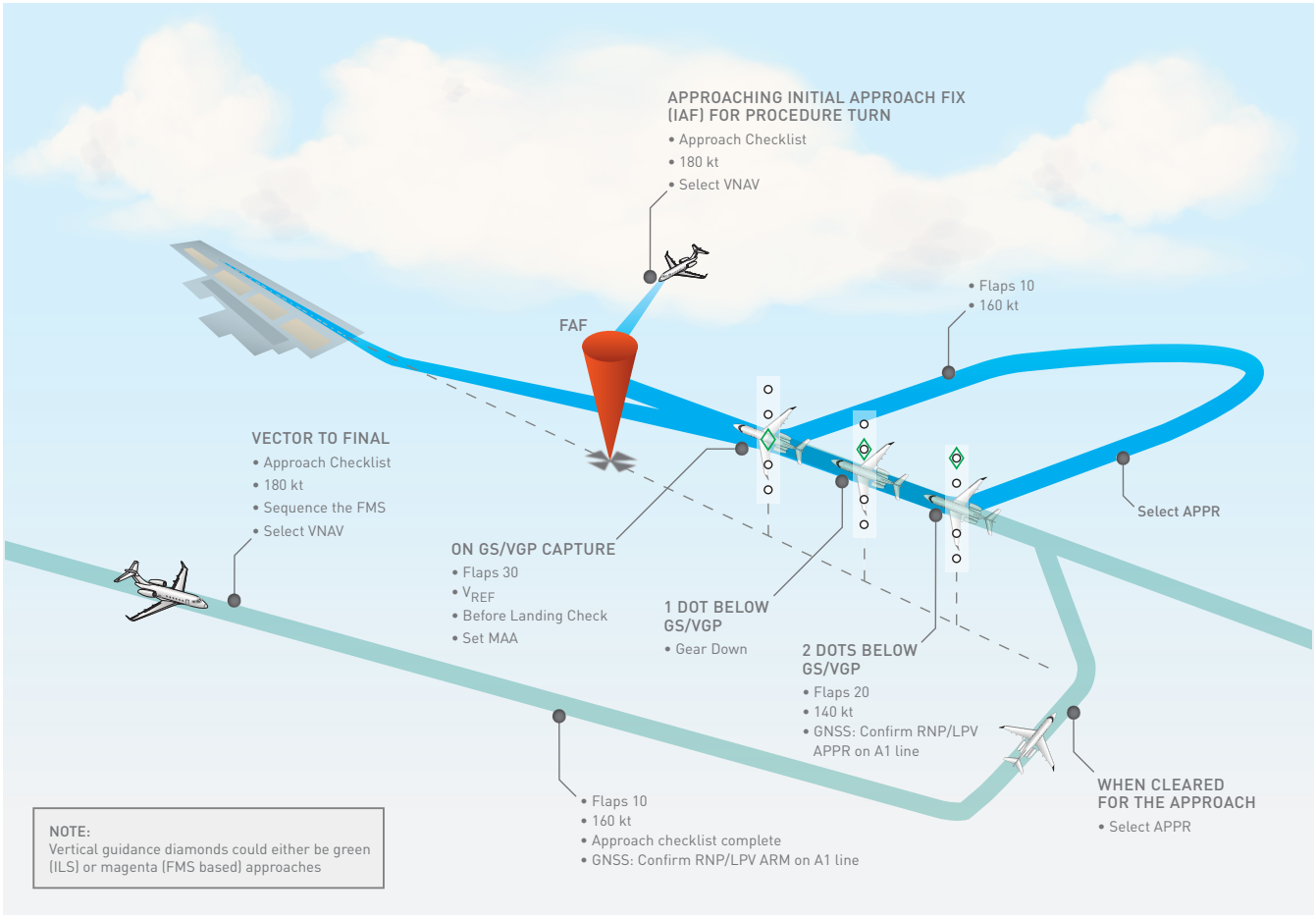
Briefing should include:

- Approach type and runway
- Frequencies (NAV, COM)
- Initial approach altitude
- FAF altitude and distance
- Decision altitude (DA)
- Missed approach procedure
- Approach lighting and runway environment

C. TWO ENGINE PRECISION APPROACH

1. **Setup**
    - Approach checklist: COMPLETE
    - NAV source: Verified
    - Course: SET
    - Altitude preselect: FAF altitude (initially)
    - Minimums: SET (DA on PFD)
2. **Procedure**
    1. **Within 10 NM of FAF** — slow to 160 KIAS, Flaps 10°
    2. **Localizer alive** — verify capture
    3. **Glideslope alive** — prepare for intercept
    4. **One dot below glideslope** — Flaps 20°, Gear DOWN
    5. **Before Landing checklist** — complete to flaps item
    6. **Glideslope intercept** — Flaps 30°, slow to VREF
    7. **Set missed approach altitude** — when established on glideslope
    8. **Before Landing checklist** — COMPLETE
    9. **Monitor approach** — CDI within ¼ scale, airspeed ±5 knots
    10. **At DA** — visual references and Landing or Go-Around/Missed Approach

APPROACH WITH VERTICAL GUIDANCE



3. Crew Coordination

PRECISION APPROACH (ILS/LPV) — TWO ENGINE

Prior to Beginning the Precision Approach (ILS/LPV)

Prior to 31 nm from destination or below FL180: Accomplish approach planning and briefing during the cruise or initial descent, if possible, or at least when called for in the Approach Checklist.

Entering the terminal area (31nm): Select within the FMS an approach. If performing an LPV approach, verify the PFD A1 line is showing "LPV ARM" and 1 nm scaling.

NOTE: Once on vectors, sequence the FMS. Recall the 3-2-1 Rule: Within controlled airspace of 3 = 3000', 2 = maximum 200 kts, and 1 = within 10 nm. For LOC based approaches, if the PFD is selected to ROSE format a dotted cyan preview of the HSI inbound course is displayed and superimposed on the active Magenta HSI. Verification of the LOC frequency should also be done. Within the airport environment and the course deviation indicator of the approach captured, verify the PFD A1 line for "LPV ARM" and the FMA vertical GP is armed. This confirms VNAV is engaged if required.

PF (Pilot Flying)	PM (Pilot Monitoring)
Call: "Approach checklist"	
	Action: Complete the Approach checklist
	Call: "Approach checklist complete"
Call: "Flaps 10 (Slow to 160 kts)"	**Call:** "Speed check; flaps 10"
	Call: "Indicating 10"
Call: "Localizer/Course alive"	**Call:** "Localizer/Course alive"
Call: "Glideslope/Glidepath alive"	**Call:** "Glideslope/Glidepath alive"
Call: "Flaps 20 (Slow to 140 kts)"	
	Call: "Speed check; flaps 20"
	Call: "Indicating 20"
1 DOT below Glideslope/glidepath	
Call: "Gear down"	
	Call: "Gear down, three green"
Call: "Gear down, three green"	

PRECISION APPROACH (ILS/LPV) — CONTINUED

PF (Pilot Flying)	PM (Pilot Monitoring)
Call: "Flaps 30, Before Landing checklist (Slow to Vref)"	
	Call: "Speed check; Flaps 30...Indicating 30"
	Call: "Before Landing complete"

NOTE: Verify the PFD A1 line for "LPV APPR" message and not "NO APPR"

PF (Pilot Flying)	PM (Pilot Monitoring)
Call: "Glideslope/Glidepath captured"	
	Call: "Check"
Call: "Set missed approach altitude"	
	Call: "Missed approach altitude set"
At 1,000 ft above DH	**Call:** "1,000 above minimums"
If IMC, should be stable at 1000' above minimums If VMC, should be stable at 500' above minimums	
Call: "Check/Stable (IMC)"	
At 500 ft above DH	**Call:** "500 above minimums"
Call: "Check/Stable (VMC)"	
No flags	
At 100 ft above DH	**Call:** "Approaching minimums"
Call: "Check"	
At Minimums or when runway environment is in sight	**Call:** "Minimums"
	Or
Call: "Visual Landing"	**Call:** "Runway (or visual references) _____ o'clock (lead-in lights)"
Call: "Autopilot disconnect"	
	Call: "Check"

PRECISION APPROACH (ILS/LPV) — CONTINUED

PF (Pilot Flying)	PM (Pilot Monitoring)
After touchdown	
Action: Brakes applied and thrust reversers as required	**Call:** "Spoilers extended; TRs deployed" **Call:** "Airspeeds: 80, 60, 40 kts"

NOTE: Spoilers automatically extend after touchdown. Monitor both thrust reversers and spoilers.

PF (Pilot Flying)	PM (Pilot Monitoring)
After clearing the active runway	
Call: "After Landing/Clearing Runway checklist"	**Action:** Complete After Landing/Clearing Runway checklist **Call:** "After Landing/Clearing Runway checklist complete"

D. SINGLE ENGINE PRECISION APPROACH (OEI)

1. **Setup**
   - Single Engine Landing checklist
   - Approach speed: VREF
   - Expect higher power setting on operating engine
   - Plan for asymmetric thrust effects

2. **Procedure Modifications**

   The single engine precision approach follows the same procedure as the two-engine approach with the following modifications:
   - Be prepared for go-around with single engine

3. **Crew Coordination**

   The single engine approach and landing procedure is the same as with both engines running.

E. Completion Standards

- Localizer: ⩽¼ scale deflection
- Glideslope: ⩽¼ scale deflection
- Airspeed: ±5 knots of VREF/VAPP
- Proper callouts at appropriate points
- Go-around initiated if not visual at DA

XXIII. NON-PRECISION APPROACH (LNAV/VOR/NDB)

A. INTRODUCTION

Non-precision approaches provide lateral guidance only, requiring the pilot to manage the descent profile to the Minimum Descent Altitude (MDA). The Continuous Descent Final Approach (CDFA) technique is recommended to maintain a stabilized approach profile similar to a precision approach.

B. CDFA/SCDA PHILOSOPHY

The Stabilized Constant Descent Angle (SCDA) or Continuous Descent Final Approach (CDFA) technique involves a continuous descent from FAF to runway threshold at a constant angle, typically 3°. This technique:

- Reduces pilot workload
- Improves situational awareness
- Provides a stabilized approach profile
- Reduces CFIT risk

C. TWO ENGINE NON-PRECISION APPROACH

1. **Setup**
    - Approach checklist: COMPLETE
    - Timing or distance for descent calculated
    - MDA: SET on altitude preselect (initially)
    - Missed approach altitude: SET when level at MDA
2. **Procedure**
    1. **Within 10 NM of FAF** — slow to 160 KIAS, Flaps 10°
    2. **Inbound to IAF** — 170 KIAS, Flaps 10°, Approach checklist
    3. **3 NM prior to FAF** — Flaps 20°, Gear DOWN
    4. **Before Landing checklist** — complete to flaps item
    5. **At FAF** — begin descent, Flaps 30°, slow to VREF
    6. **Descent rate** — approximately 1000 fpm for 3° path
    7. **At MDA** — set missed approach altitude
    8. **VDP (if published)** — runway in sight, descend to land
    9. **At MAP** — visual references or Go-Around

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3. Crew Coordination

NON-PRECISION APPROACH (LNAV/VOR/NDB) — TWO ENGINE

CDFA Technique: Continuous descent from FAF to runway threshold at constant angle (~3°). Reduces pilot workload, improves situational awareness, provides stabilized approach profile, and reduces CFIT risk.

NOTE: For non-precision approaches with no published VDP, calculate a "time to see" point: Divide the HAT/HAA by 10. The result is the number of seconds the runway should be seen before arriving at the MAP.

PF (Pilot Flying)	PM (Pilot Monitoring)
Inbound to IAF — 170 KIAS	
Call: "Flaps Approach, Approach checklist"	Call: "Selected... indicated"
	Call: "Approach checklist complete"
3 Miles to FAF	
Call: "Gear Down, Before Landing checklist"	Call: "Gear down, three green"
	Call: "Before Landing checklist complete to flaps"
At FAF	
Call: "FLC XXX" or "VS XXX"	Call: "FLC XXX" or "VS XXX set"
Action: Begins descent	
	On Approach
	Call: "500' above MDA"
	Call: "100' above MDA"
At MDA	Call: "MDA"
Call: "Set missed approach altitude"	Call: "Missed approach altitude set"
	Call: "Approaching VDP" (for straight-in)
	Runway/Visual References in Sight
	Call: "Runway (or lights) at ___ o'clock"
Call: "Visual, Landing, Leaving MDA"	
Call: "Flaps Land, Before Landing checklist"	Call: "Flaps Land, selected... indicated"
	Call: "Before Landing checklist complete"
If PM does not call runway or lights in sight by MAP:	
Call: "Minimums – Go Around..."	

D. COMPLETION STANDARDS

- Course: ⩽¼ scale CDI deflection
- Altitude: MDA +50/–0 feet
- Airspeed: ±5 knots
- Stabilized descent profile
- Go-around initiated at MAP if not visual

XXIV. CIRCLING APPROACH

A. INTRODUCTION

A circling approach can be one of the most challenging instrument approach procedures. Turbulence, strong winds, poor visibility, and low maneuvering altitude can add to the challenge. Maintain proficiency and skills practice to minimize the high-risk maneuvering required for executing a circling approach. Advanced approach planning and briefing also add to the success of a circling maneuver.

Airspeed control is extremely important, and the handling characteristics and stability of the aircraft at slower speeds help flight crews reduce the high risks of these procedures. Anticipate the level-off at MDA and set sufficient thrust to maintain altitude and safe maneuvering speed throughout the procedure.

B. CIRCLING CATEGORY AND PROTECTED AIRSPACE

Under normal circumstances, the Challenger 350 falls into Category C for circling approaches, having a circling radius of 1.7 NM from the runway end.

Remember, a circling approach:

- Is an instrument approach procedure with a visual portion
- Must remain clear of clouds while maneuvering
- Must have the airport environment in sight while maneuvering (except when banking)
- Must remain within circling distance to runways for the appropriate category
- Remain at Circling Minimums until in normal landing position to the runway

NOTE: TERPS 8260.3B Change 21 has modified the criteria for circling approaches. A black diamond with a white C in the circle-to-land minimums box indicates the revised criteria.

C. SETUP

- Approach: BRIEF circling maneuver direction and pattern
- Circling MDA: SET
- Airspeed: VREF + 10 for circling
- Visual references: IDENTIFY

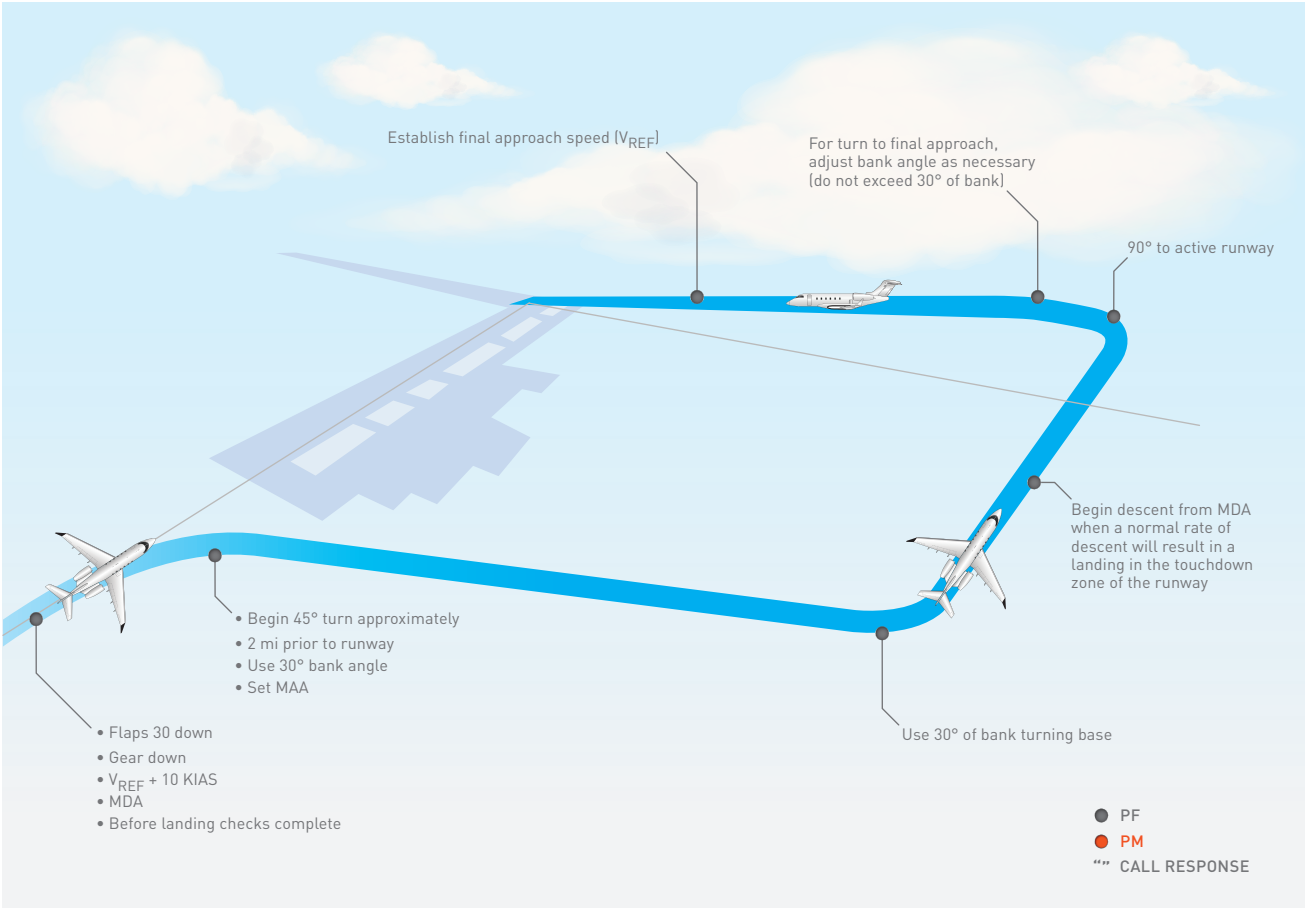
D. PROCEDURE

Since the circling approach is a non-precision approach, all items in the Non-Precision Approach up to MDA are the same.

1. **At MDA** — level off, set missed approach altitude
2. **Acquire airport environment** — visually
3. **Maneuver to landing runway** — shortest path to base or downwind

4. **Remain within circling distance** — 1.7 NM for Category C
5. **Maintain circling MDA** — until in position for normal descent
6. **When landing assured** — Flaps LAND, descend to runway

NONPRECISION CIRCLING APPROACH



E. CIRCLING MANEUVER TECHNIQUE

During the circling, use available automation, including autopilot and autothrottle (if installed) to help reduce pilot workload.

Key Techniques:

- Plan the maneuver before reaching MDA
- Fly shortest path to intercept base or downwind
- Use heading selections for precise ground track
- Keep runway environment in sight (except during bank)

- Lower airspeeds result in decreased turn radius
- Do not descend below MDA until landing is assured

F. CREW COORDINATION

CIRCLING APPROACH

Category C Protected Airspace: 1.7 NM radius from runway end. Must remain clear of clouds, have airport environment in sight (except when banking), remain within circling distance, and maintain Circling Minimums until in normal landing position.

PF (Pilot Flying)	PM (Pilot Monitoring)
	At MDA **Call:** "MDA"
Call: "Set missed approach altitude"	
	Airport/Environment in Sight **Call:** "Airport (Runway or lights) at ___ o'clock"
Call: "I have the airport"	
Circling Maneuver **Call:** "Set heading XXX" **Action**: Maneuvers aircraft in shortest path to base or downwind	**Action:** Monitors altitude, distance from airport
In Position for Normal Landing **Call:** "Flaps Land, Leaving MDA, Continue Before Landing checklist"	**Call:** "Flaps Land selected... indicated" **Call:** "Before Landing checklist complete"
If visual references to airport environment are lost during circling:	
Call: "Go-Around, lost visual" **Action:** Execute missed approach immediately	

CAUTION: It is easy to lose sight of the airport if circling approach speed is too high or bank is too shallow. If visual references to the airport environment are lost during the circling maneuver, immediately execute a missed approach.

G. COMPLETION STANDARDS

- Altitude: +100/–0 feet until descending below MDA
- Airspeed: ±5 knots of VREF + 10
- Heading: ±5°
- Remain within circling protected airspace
- Airport environment in sight during maneuver
- Proper missed approach if visual lost

XXV. GO-AROUND / MISSED APPROACH

A. INTRODUCTION

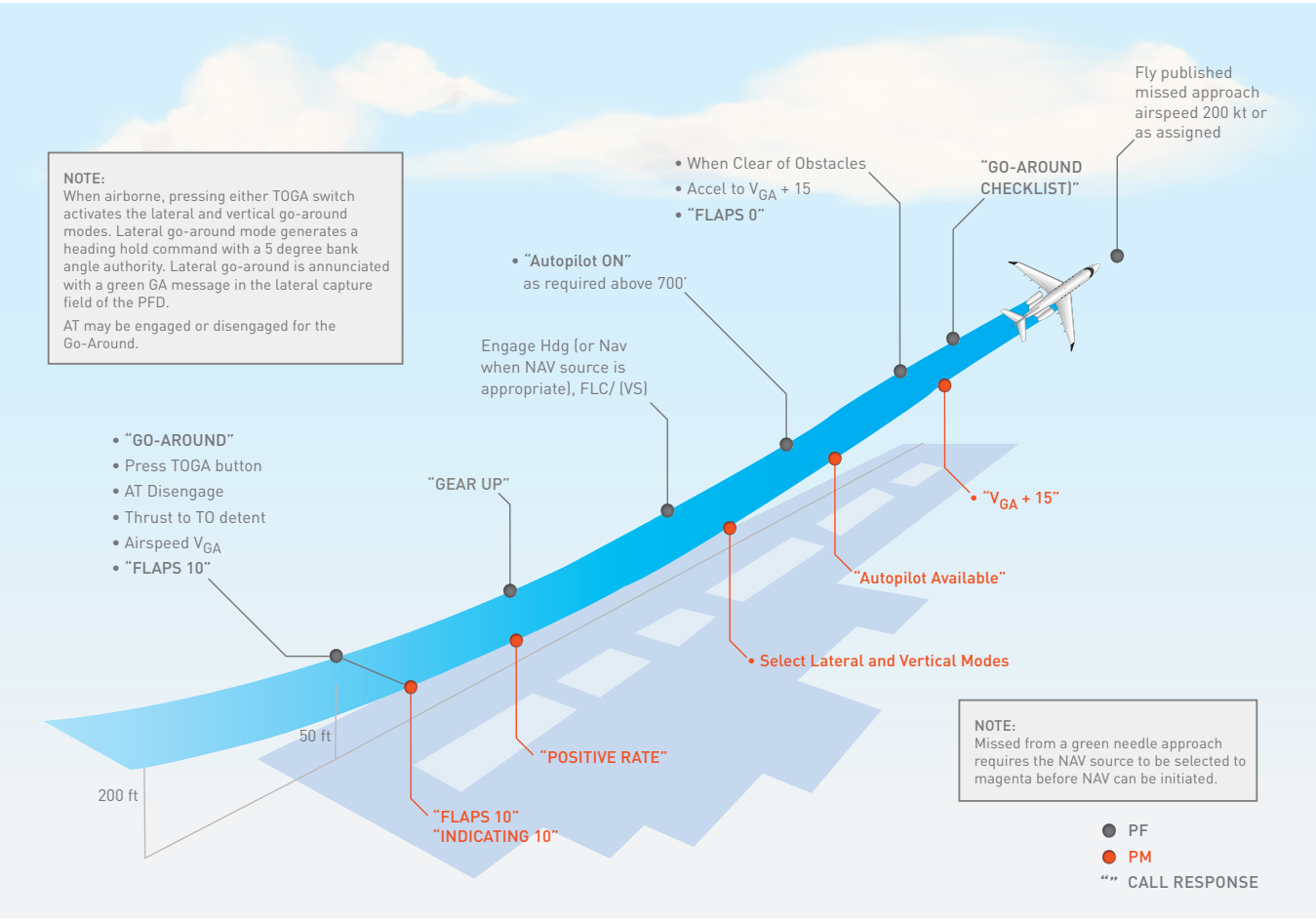
A missed approach is accomplished when at DH/DA or MDA without adequate visual references, when the time period expires, when the set distance is reached, when sight of the intended landing runway is lost, or when in a position from which a normal visual landing approach cannot be accomplished. Other situations could also warrant the initiation of a missed approach.

If a go-around is necessary, either pilot can call for a go-around. The PF acknowledges by calling "Go around, Set N1."

B. TWO ENGINE GO-AROUND

1. **Initiation Criteria**
    - At DA/MDA without required visual references
    - Approach becomes unstabilized
    - Runway environment lost
    - Traffic conflict
    - ATC instruction
    - Any condition precluding safe landing
2. **Procedure**
    1. **Press TO/GA button** —Autpilot disconnects
    2. **Advance thrust** — to TAKEOFF detent
    3. **Pitch up** — to command bars
    4. **Verify spoilers** — RETRACTED
    5. **Flaps 10°** — when speed trend increasing
    6. **At positive rate** — GEAR UP
    7. **Engage HDG (or NAV) & FLC/VS**
    8. **Autopilot on at 700'**
    9. **Climb at VGA**
    10. **Accelerate to VGA + 15** — Flaps 0°
    11. **Accelerate** — to 200 KIAS
    12. **Complete Go-Around checklist**
    13. **Fly published missed approach**

GO AROUND - MISSED APPROACH - TWO ENGINES



3. Crew Coordination

GO-AROUND, MISSED APPROACH — TWO ENGINES

At minimums and no runway environment in sight

PF (Pilot Flying)	PM (Pilot Monitoring)
	Call: " Minimums, Go-Around "
Call: " Go-Around, Set N1 "	**Action:** Verify the N1 setting for go-around
Action: Press the go-around TO/GA button, advance Thrust to Takeoff (TO) detent, Flight Spoilers retract (if extended), Pitch up to the command bars.	**Call:** " N1 Set "

GO-AROUND, MISSED APPROACH — TWO ENGINES — CONTINUED

At minimums and no runway environment in sight

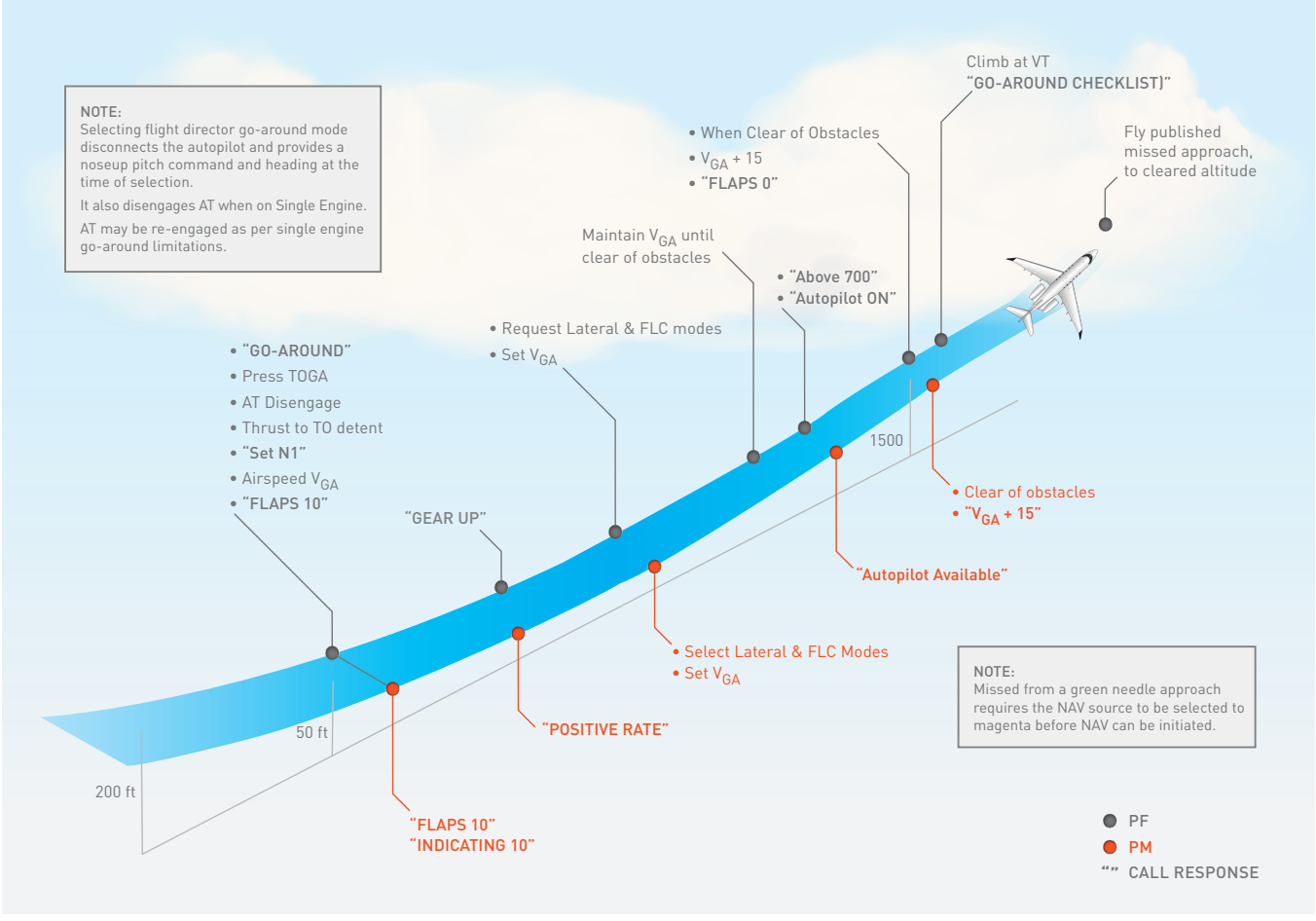
PF (Pilot Flying)	PM (Pilot Monitoring)
Call: " Airspeed V_{GA} " **Call:** " Flaps 10 "	
	Call: " Flaps 10 " **Call:** " Indicating 10 "
	Action: When the VSI is showing positive climb and the indicated altitude is increasing **Call:** " Positive rate "
Call: " Gear up "	
	Call: " Gear up " **Call:** " Indicating up "
Missed approach procedures **Call:** HDG/NAV (as appropriate), FLC/VS	
	Action: Select commanded Lateral and Vertical Modes
At or Above 700' **Call:** Autopilot On	**Call:** Autopilot Available
Clear of obstacles	**Call:** " V_{GA} + 15 KIAS "
Call: " Flaps 0 "	
	Call: " Flaps 0 " **Call:** " Indicating 0 "
Action: Climb at V_T **Call:** " Go-Around checklist "	**Action:** When at safe altitude and time permitting, accomplish the Go-Around checklist **Call:** " Go-Around checklist complete "

NOTE: If an FMS approach was flown, the FMS will auto sequence into the missed approach and only a vertical mode on the FGP is required for navigation purposes. If a LOC based approach is flown, the NAV source must be changed from Green to Magenta source and then the appropriate FGP selections can be made (SNAP).

C. SINGLE ENGINE GO-AROUND (OEI)

1. Procedure
    1. **Press TO/GA button**
    2. **Advance operating engine** — to TAKEOFF detent, rotate to 7.5° nose up, then to command bars
    3. **Flaps** — 10°
    4. **At positive rate** — GEAR UP
    5. **Airspeed** — VGA
    6. **Clear of obstacles (1500' AGL min)** – Accelerate to VT
    7. **At VGA + 15** — retract flaps
    8. **At VT** — Go-Around checklist
    9. **Fly published missed approach to cleared altitude**

GO AROUND - MISSED APPROACH - SINGLE ENGINE



2. Crew Coordination

GO-AROUND, MISSED APPROACH — SINGLE ENGINE

Minimum altitude: 1,500' AGL. Use TAKEOFF detent initially, transition to MCT. Climb at VT. Clear of obstacles before accelerating to VENR.

PF (Pilot Flying)	PM (Pilot Monitoring)
At minimums and no runway environment in sight **Call:** "Go Around, Set N_1" **Action:** Press the go-around TO/GA button, advance Thrust to Takeoff (TO) detent, Flight Spoilers retract (if extended), Pitch for VGA.	**Call:** "Minimums, Go-Around" **Action:** Verify the N1 setting for go-around **Call:** "N1 Set"
Airspeed V_{GA} **Call:** "Flaps 10"	**Call:** "Flaps 10" **Call:** "Indicating 10"
Positive Rate **Call:** "Gear Up"	**Call:** "Positive Rate" **Call:** Gear Up **Call:** "Indicating Up"
Missed approach procedures **Call:** HDG/NAV (as appropriate), FLC/VS, Set V_{GA}	**Action:** Select commanded Lateral and Vertical Modes, Set V_{GA}
At or Above 700' **Call:** Autopilot On	**Call:** Autopilot Available
Clear of Obstacles (1500' AGL minimum) **Action:** Accelerate to V_{GA} +15 **Call:** "Flaps 0"	**Call:** "Flaps 0" **Call:** "Indicating 0"
Climb at V_T **Call:** "Go-Around Checklist" **Action:** Fly published missed approach, to cleared altitude	**Action:** Completes Go-Around Checklist

D. BALKED LANDING / LOW ENERGY GO-AROUND

A low-energy go-around requires special consideration due to the aircraft's proximity to the ground and relatively low airspeed.

A Low-Energy landing regime is defined as a condition where a rejected or balked landing is commenced after a commitment to a landing has been made. In a low-energy landing regime, the aeroplane is in a descent at a height of 50 feet or less above the runway, in the landing configuration with thrust stabilized in the idle range, and airspeed decreasing (up to Vref-10). An attempt to conduct a rejected or balked landing from a low-energy landing regime may result in ground contact. Be prepared for a touchdown; airplane aligned with runway, bank angle minimized.

The engines are usually in, or close to, a low idle thrust setting and require several seconds to accelerate to MAX THRUST (TO). Missed approach obstacle clearance is often not considered from below the missed approach point. A mitigation strategy should be considered especially in obstacle rich environments. If there are any doubts regarding the probability of completing a safe landing, a Go-Around must be initiated.

Procedure:

- Initiate go-around and simultaneously select TOGA and advance thrust levers to TO thrust
- Confirm spoilers retracted
- Maintain landing gear and flap configuration (no configuration changes)
- Initially maintain or slightly increase pitch attitude (similar to a flare)
- Be prepared for a touchdown; airplane aligned with runway, bank angle minimized
- When safely established (speed at or above VAC and airplane climbing), set Flap 20°, raise gear
- Continue with GA profile
- Re-engage automation as desired

XXVI. EMERGENCY DESCENT / RAPID DECOMPRESSION

A. INTRODUCTION

Malfunctions at altitude require the same thought process as those on takeoff. Maintaining aircraft control is the number one priority. Someone should always be flying the aircraft. If an emergency descent is necessary due to rapid decompression, the primary crew concern should be to don the oxygen masks and establish communications.

B. TIME OF USEFUL CONSCIOUSNESS (TUC)

TIME OF USEFUL CONSCIOUSNESS (TUC)

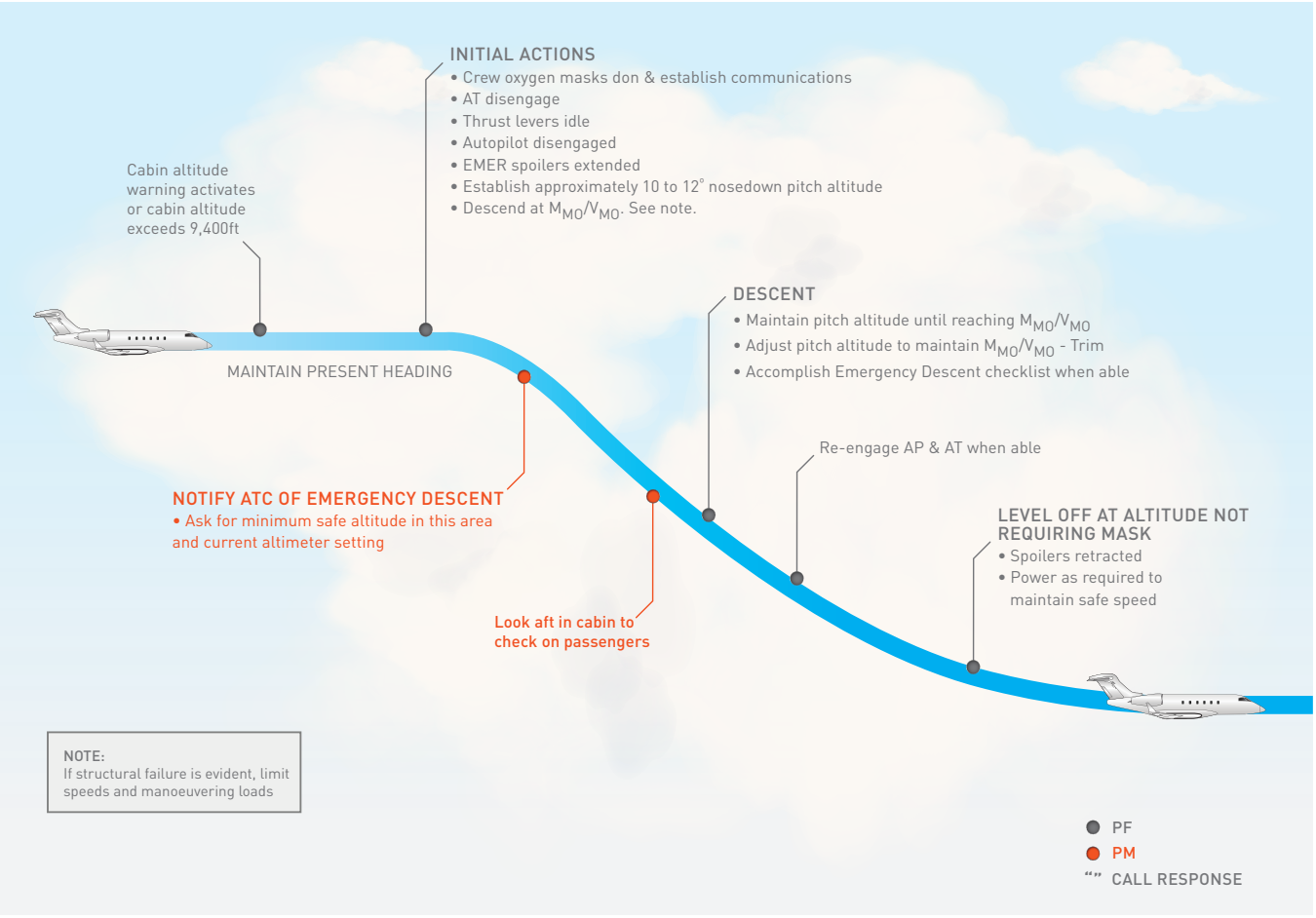
Altitude (measured barometrically)	TUC (rapid decompression)
FL180 (18,000 ft)	10 to 15 minutes
FL220 (22,000 ft)	5 minutes
FL250 (25,000 ft)	1.5 to 3.5 minutes
FL280 (28,000 ft)	1.25 to 1.5 minutes
FL300 (30,000 ft)	30 to 60 seconds
FL350 (35,000 ft)	15 to 30 seconds
FL400 (40,000 ft)	7 to 10 seconds
FL430 (43,000 ft)	5 to 6 seconds
FL500 (50,000 ft)	5 seconds

C. EMERGENCY DESCENT PROCEDURE

Immediate Action Items:

1. **Oxygen masks** — DON, 100%, verify flow
2. **Crew communications** — ESTABLISH
3. **Thrust levers** — IDLE
4. **Autopilot** — DISCONNECT
5. **Spoilers** — EMER (push button on top of handle)
6. **Pitch Down** — 10° to 12°
7. **Descend** — VMO/MMO, Trim
8. **ATC** — Advise, squawk 7700, Get MEA & QNH
9. **Check on Passengers**
10. **Complete Emergency Descent Checklist** — When Able
11. **Re-Engage AP** — When Able

EMERGENCY DESCENT



D. CREW COORDINATION

EMERGENCY DESCENT / RAPID DECOMPRESSION

WARNING: At altitudes above FL 410, the time of useful consciousness (TUC) decreases significantly without supplemental oxygen. Pilots always put on their oxygen masks first, before ensuring that the passengers' masks have dropped.

PF (Pilot Flying)	PM (Pilot Monitoring)
Call: "Emergency descent"	**Call:** "Emergency descent"
Action: Don O_2 mask, 100%, Establish Communications	**Action:** Don O_2 mask, 100%, Establish Communications
Immediate actions	
Action: Thrust IDLE, spoilers EMER, A/P disconnect	**Action:** Advise ATC, squawk 7700, Ask for MSA and current QNH
Action: Pitch down 10° to 12°, descend VMO/MMO to altitude that does not require a mask	**Action:** Passenger signs ON
	Call: "Altitude passing ___"
WHEN ABLE	
Action: Re-Engage the Auto Pilot	
Call: "Emergency Descent checklist"	
	Call: "Emergency Descent checklist complete"

NOTE: To get the spoilers out to the EMER detent requires pushing the button on top of the handle which you normally never do. Also, if you have aft pressure on the handle as you try to push the button, it may hang up. Relax the pressure on the handle momentarily to be able to engage it. Once established in the descent, it may be wise to re-establish the automation.

E. COMPLETION STANDARDS

- Immediate recognition and response
- Oxygen masks donned within seconds
- Airspeed: Not to exceed VMO/MMO
- Proper use of spoilers and bank angle
- Level off at appropriate altitude
- Appropriate crew coordination and ATC notification

XXVII. WINDSHEAR RECOGNITION AND ESCAPE

A. INTRODUCTION

If extreme windshear is encountered, recommendations are the FAA technique of flying the attitude indicator, using APR thrust, and climbing at just above stick shaker (target low speed cue + 10 kts initially) until a safe altitude is reached. Do not rely on pressure instruments until after exiting windshear conditions; reference the radio altimeter.

Be alert for windshear reports and conditions. Study approach weather and wind conditions carefully. Be prepared to use thrust if a sudden sustained airspeed loss on final approach is encountered. During the approach, be cognizant of increased performance windshear and how likely it may be followed by decreased performance windshear.

B. WINDSHEAR RECOGNITION

Marginal aircraft control may be recognized by uncommanded changes in the flight path. These values are guidelines only:

- ±15 KIAS airspeed change
- ±500 ft/min vertical speed change
- ±5° pitch attitude change
- Rapid one dot displacement from glideslope
- Unusual throttle position for a significant period of time

C. TAWS WINDSHEAR ALERTS

Mode 7 of the TAWS provides alerts and warnings if significant windshear is detected below 1500 ft AGL. The system provides "WINDSHEAR" aural warning and PFD annunciation.

D. WINDSHEAR ESCAPE PROCEDURE

Windshear escape should be performed whenever TAWS gives a WINDSHEAR warning or whenever aircraft control becomes marginal below 1000 ft AGL:

1. **Autopilot** — DISCONNECT
2. **Thrust levers** — APR detent
3. **Flight spoilers** — RETRACT (verify)
4. **Rotate smoothly** — to takeoff/go-around pitch attitude (10-15° initial)
5. **Wings level** — maintain
6. **If descent continues** — increase pitch smoothly, trade airspeed for altitude
7. **Target airspeed** — Low speed cue + 10 KIAS (stick shaker is upper limit)
8. **Configuration** — DO NOT change flaps or gear until clear

E. RECOVERY AND CLEANUP

- Once clear of windshear, aircraft accelerates rapidly with APR set
- Once "WINDSHEAR" removed from PFD, resume normal flight
- Check airspeed and adjust thrust/configuration as required
- Advise ATC of windshear and any excursions from cleared altitude or heading

F. CREW COORDINATION

WINDSHEAR ESCAPE

CAUTION: Maximum aircraft performance is achieved with maximum N1 and a pitch attitude that tickles the stick shaker; however, care must be given to avoid overcontrolling and inducing stick pusher activation.

PF (Pilot Flying)	PM (Pilot Monitoring)
Call: "Windshear Recovery, Check N_1"	**Call:** "N1 Set"
Action: Disconnect A/P, thrust APR, retract spoilers, pitch 10-15°, target lsc +10 kts	**Action:** Monitor VSI/RADALT, Call out speeds to PF
If descent continues	**Call:** "Sink or Climb rate"
Action: Increase pitch toward stick shaker, wings level, no config change	**Action:** Monitor radio altimeter
Action: Resume normal flight	
Call: "Clear of windshear"	**Action:** Report to ATC

CAUTION: Do not rely on pressure instruments until after exiting windshear conditions, reference the radio altimeter.

G. COMPLETION STANDARDS

- Immediate recognition and response to windshear
- Proper escape technique (pitch, power, configuration)
- Airspeed managed near low speed cue + 10 KIAS
- Configuration unchanged until clear
- Appropriate crew coordination

XXVIII. TAWS RECOVERY

A. INTRODUCTION

The terrain awareness warning system (TAWS) of the Challenger 350 has seven modes. Modes 1 through 6 are basic TAWS functions while mode 7 includes windshear alerting. TAWS terrain alerting can be split into two areas — Caution and Warning.

B. ALERT TYPES

1. **Caution Area**
    - Penetration into a caution area generates:
    - "CAUTION TERRAIN" aural warning
    - GND PROX annunciation on the PFD
    - Occurs approximately 60 seconds prior to predicted ground impact
2. **Warning Area**
    - Penetration into a warning area generates:
    - "PULL UP" aural warning
    - PULL UP annunciation on the PFD
    - Occurs approximately 30 seconds prior to predicted ground impact

C. TAWS PULL-UP ESCAPE PROCEDURE

1. **Autothrottle (if installed)** — DISENGAGE
2. **Autopilot** — DISCONNECT
3. **Thrust levers** — APR detent
4. **Flight spoilers** — RETRACT (verify)
5. **Climb** — at maximum practical rate (10-15° initial pitch)
6. **Landing gear** — UP
7. **Maintain climb** — until warning ceases
8. **Once clear** — resume normal flight
9. **Check airspeed** — adjust thrust/configuration as required

D. CREW COORDINATION

TAWS RECOVERY

IMPORTANT: If altitude for recovery is critical, maximum aircraft performance can be achieved by applying enough back pressure on the yoke to maintain the edge of (tickle) stick shaker until clear of obstacles or terrain. Target low speed cue + 10 kts initially.

PF (Pilot Flying)	PM (Pilot Monitoring)
TAWS Alert	
Call: "TERRAIN RECOVERY, CHECK THRUST"	
Action: Disengage AP, Thrust to APR, Check spoilers retracted	**Call:** "APR SET"
Escape Maneuver	**Action:** Monitor climb performance
Action: Roll wings level, Pitch-up 10° to 15°, Target low speed cue + 10 kts initially	
Call: "Gear up"	**Call:** "Gear up"
Clear of Terrain	
Action: Maintain climb until TAWS warnings stop	
Call: "Clear of terrain"	
Action: Resume normal flight	**Call:** "Clear of terrain"
	Action: Notify ATC

NOTE: Your PFD terrain indications are a good source indicating peaks in the general area if not visual. Approach callouts from TAWS at "1000 AGL" and "500 AGL" are RADALT calls and not an indication above minimums — they advise proximity to ground and relative position to the approach.

E. COMPLETION STANDARDS

- Immediate response to TAWS warning
- Proper escape procedure (disconnect automation, APR, climb)
- Maximum practical climb rate maintained
- Warning ceased before resuming normal flight
- Appropriate crew coordination

XXIX. TCAS RESOLUTION ADVISORY (RA) PROCEDURES

A. INTRODUCTION

Either pilot can call TCAS traffic as it is noticed on the MFD. When a Resolution Advisory (RA) is issued, the crew must respond immediately by following the RA guidance displayed on the vertical speed indicator. The RA provides the safest vertical path to avoid collision with conflicting traffic.

B. TRAFFIC ADVISORY (TA) RESPONSE

When TCAS traffic is observed:

- PF: Optimize MFD scale so traffic is on outer edge of display
- PF: Direct PM to look outside for traffic
- Turn on all exterior lights (See and be Seen)
- PM: Look for traffic, continue to monitor for changes
- If visual, PM informs PF and continues monitoring

C. RESOLUTION ADVISORY (RA) PROCEDURE

The PF should take whatever Resolution Advisory (RA) attitude is directed by TCAS:

1. **Autothrottle (if installed)** — DISENGAGE
2. **Autopilot** — DISCONNECT
3. **Follow VSI indications** — as indicated by green band
4. **PM advises ATC** — "TCAS RA"
5. **After "CLEAR OF CONFLICT"** — resume normal navigation
6. **Advise ATC** — of RA maneuver and return to assigned altitude

D. TCAS VSI DISPLAY

During a TCAS RA, the vertical speed display shows:

- Red zone: Prohibited vertical speeds (avoid)
- Green zone: Required vertical speeds (fly into)
- Corrective RA: Shows "CLIMB" or "DESCEND" zones
- Preventive RA: Shows "DO NOT CLIMB" or "DO NOT DESCEND" zones
- Zones dynamically adjust based on traffic geometry

VSI DISPLAY DURING TCAS RA

Zone	Meaning	Action
Red Zone	Prohibited vertical speeds	AVOID — do not fly into red
Green Zone	Required vertical speeds	FLY INTO — follow guidance
Corrective RA	CLIMB or DESCEND displayed	Requires immediate maneuver
Preventive RA	DO NOT CLIMB/DESCEND	Maintain current vertical speed

E. CREW COORDINATION

TCAS RESOLUTION ADVISORY (RA)

IMPORTANT: TCAS RA takes precedence over ATC instructions. Follow the VSI green band.

PF (Pilot Flying)	PM (Pilot Monitoring)
Call: "TCAS RA"	**Call:** "TCAS RA"
Action: Disconnect A/P, follow VSI green band	**Action:** Advise ATC: "TCAS RA"
	Action: Attempt visual acquisition
"Clear of Conflict"	**Action:** Advise ATC of RA maneuver
Action: Resume normal navigation	**Action:** Confirm return to assigned altitude
Call: "Clear of conflict, returning to ___"	

F. COMPLETION STANDARDS

- Immediate response to RA
- Autopilot/autothrottle disconnected
- VSI maintained in green band
- ATC notified of RA
- Normal navigation resumed after "Clear of conflict"
- Appropriate crew coordination throughout

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