



Bombardier
CHALLENGER 350



AIRCRAFT SYSTEMS
TRAINING MANUAL



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FOREWORD

Welcome to LOFT.

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LIST OF EFFECTIVE PAGES

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For printing purposes only, any revised pages will be noted at the footer with the current revision number.

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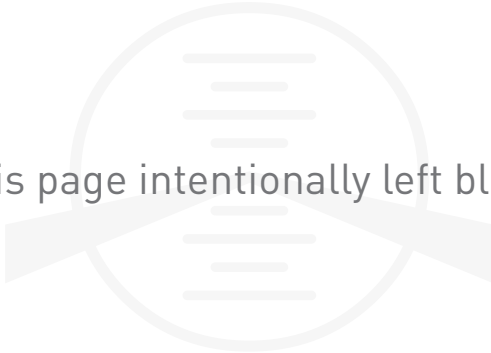
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TRAINING OBJECTIVES

The ground and flight training programs prepare the candidate for the FAA type rating emphasizing aircraft systems knowledge, crew coordination, operational utility, and overall flight safety. The candidate will be held to ATP type rating standards. Please review the full Airman Certification Standards (ACS) at: https://www.faa.gov/training_testing/testing/acs/media/atp_acs.pdf

An abbreviated PTS list is described below:

Task	Airspeed	Heading/Course/Glidepath	Altitude
Takeoffs	+/- 5 kts	+/- 5°	
Arrival Procedures	+/- 10 kts	+/- 10°	+/- 100 ft.
Approaches Prior to FAF	+/- 10 kts	+/- 5°	+/- 100 ft.
Final Approach Segment	+/- 5 kts	CDI deflection: < ¼ scale deflection (either < vertical or lateral for Precision Approach)	MDA +50/-0 feet for Non-precision Approach)
Circling Approach	+/- 5 kts	+/- 5°	+100/-0 feet until descending below the MDA.
Go-Around/Missed Approach	+/- 5 kts	+/- 5°	+/- 100 feet during the procedure
Landing	+/- 5 kts	Touchdown with the runway centerline between the main landing gear at the runway aiming point markings -250/+500 feet	
Inflight Maneuvers	+/- 10 kts	+/- 10° / Bank: +/- 5°	+/- 100 ft.

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CHALLENGER 350 LIMITATIONS AND IMMEDIATE ACTION ITEMS

SPEED LIMITATIONS

MMO Above 29,475 ft	0.83 Mach
---------------------	-----------

VMO 8,001' – 29,475 ft	320 KIAS
------------------------	----------

VMO below 8,000 ft	300 KIAS
--------------------	----------

VRA (Rough Air)	265 KIAS / 0.75 Mach
-----------------	----------------------

FLAPS

Flaps Takeoff and Approach (10°)	210 KIAS
----------------------------------	----------

Flaps Land (20°)	210 KIAS
------------------	----------

Flaps Full (30°)	175 KIAS
------------------	----------

LANDING GEAR

Landing Gear Retracting (VLO)	200 KIAS
-------------------------------	----------

Landing Gear Extending (VLO)	250 KIAS
------------------------------	----------

Landing Gear Extended (VLE)	250 KIAS
-----------------------------	----------

Max Tire Ground Speed	182 KTS
-----------------------	---------

Min Operating Speed – Stick shaker onset prohibited	
---	--

WEIGHT LIMITATIONS

Max Ramp	40,750 lbs
Max Takeoff	40,600 lbs
Max Landing	34,150 lbs
Max Zero Fuel	28,200 lbs
Min Flight Weight	24,800 lbs
Steep Approach Max Landing	31,600 lbs

ENVIRONMENTAL

Maximum Operating Altitude	45,000 ft
Max T/O & Land	10,000 ft
Maximum Tailwind Component	10 Knots
Minimum Ambient Temperature	-54°C

RUNWAY SLOPES

Uphill	+2%
Downhill	-2%



ELECTRICS

GENERATOR LOAD

Two/Three generators	400 amps continuous
One generator (ground)	400 amps continuous
One generator (flight)	500 amps continuous
Transient (5 minutes)	600 amps

BATTERY

Battery Temperature	Prohibited T/O <-20°C
---------------------	-----------------------

ENGINE LIMITATIONS		
PARAMETER	LIMIT	NOTES
Engine Type		AS907-2-1A turbofan (HTF7350)
N1 LIMITS		
Max N1 (TO/APR)	96.8%	—
Max N1 (CLB)	96.5%	—
Max N1 (REV)	70.7%	—
ITT LIMITS		
Max ITT (TO)	955°C	—
Max ITT (MAX CONT)	950°C	—
Max ITT START (GROUND)	650°C	—
Max ITT START (AIR)	800°C	—
OIL LIMITS		
Oil Temp	-40°C min	—
Oil Press	28 psi min	—
Oil conforming to		Honeywell EMS 53110, Type II
POWER LIMITATIONS		
Takeoff Power	Limited to 5 minutes	5 MIN
APR Power (OEI)	Limited to 10 minutes	10 MIN
Reverse Thrust Above Idle	Prohibited below 40 KIAS	—

**FUEL LIMITATIONS****MAX FUEL IMBALANCE**

>13,700 lbs total fuel	250 lbs max
13,700-10,000 lbs total	315 lbs max
10,000-4,700 lbs total	450 lbs max
<4,700 lbs total fuel	600 lbs max

FUEL CAPACITY

Min Fuel for Go-Around	500 lbs per side
Max Usable (pressure)	14,150 lbs
Max Usable (gravity)	13,000 lbs

TEMPERATURE & SPECIAL FUELS

Min/Max Temp (JET fuel)	-37°C to +50°C
Russian/Ukrainian fuels (>30°C)	37,000 ft max
JP-4/JET B fuels	16,000 ft max

VNAV LIMITATIONS**VNAV PROHIBITED when:**

- Barometric altitude corrected to QFE
- VFLC during climb in Mach reference
- MCRZ selection from VNAV CRUISE
- Following go-around during missed approach

APU LIMITATIONS	
APU Type	Honeywell 36-150BD
Max Operating Altitude	37,000 ft
APU Generator	30,000 ft max
Bleed for Engine Start	20,000 ft max
Bleed for ECS	20,000 ft max
Max Start Altitude	30,000 ft
Max Start Alt (ground)	14,000 ft
Max RPM	108%
Max EGT (start)	973°C
Max EGT (normal)	718°C
Max speed for start	285 KIAS
MAX GEN LOAD	
Ground	400 amps
< 30,000 ft	400 amps
> 30,000 ft	Not authorized
Do not operate APU: During de-icing/anti-icing	

**FLIGHT CONTROLS**

Flaps	Prohibited above 18,000 ft
Landing Gear	Prohibited above 18,000 ft
Flight Spoilers	Prohibited below 500 ft AGL
Exception	(except steep approach)
Flight Spoilers	Prohibited below Vapp + 8 KIAS
Spoilers to EMER	Emergency conditions only or by procedure

AUTOPILOT/AUTOFLIGHT

Min Engage Height	700 ft AGL
MIN USE HEIGHT	
Precision $\leq 3.5^\circ$	80 ft AGL
Precision 3.5-4.5°	160 ft AGL
Visual/Non-precision	200 ft AGL
Max Alt w/Yaw Damper OFF	31,000 ft

ANTI-ICE GROUND OPERATION

Pitot/Static	2 minutes max
ENGINE ANTI-ICE REQUIRED	
$\leq 10^\circ\text{C}$ with visible moisture	Required
$\leq 10^\circ\text{C}$ on contaminated ramps/taxiways/runways	Required
WING ANTI-ICE REQUIRED	
$\leq 5^\circ\text{C}$ with visible moisture	Required
$\leq 5^\circ\text{C}$ on contaminated ramps/taxiways/runways	Required

ANTI-ICE IN-FLIGHT OPERATION**ENGINE ANTI-ICE REQUIRED**

10°C to -40°C with visible moisture	Required
-------------------------------------	----------

WING ANTI-ICE REQUIRED

10°C to -40°C w/visible moisture below 210KIAS	Required
--	----------

Wing & Engine Anti-Ice must be ON anytime ICE DETECTED CAS message is displayed

PRESSURIZATION**MAX DIFFERENTIAL PRESSURE**

Ground (taxi)	0.1 psi
---------------	---------

Landing	1.0 psi
---------	---------

A/C 20501-20886	+9.4/-0.5 psi
-----------------	---------------

A/C 20887-22999	+10.1/-0.5 psi
-----------------	----------------

STEEP APPROACH

Glidepath Angles	4.5° to 5.5° only
------------------	-------------------

Configuration	Flaps 30, Gear Down, Spoilers Max
---------------	-----------------------------------

Landing Decision Point	200 ft AGL
------------------------	------------

Autopilot	Prohibited
-----------	------------

Autothrottle	Prohibited below 200 ft
--------------	-------------------------

Crosswind	20 kts max
-----------	------------

Tailwind	0 kts (prohibited)
----------	--------------------



ENGINE OPERATING LIMITS

Limit	Ground Start	Air Start 7	Idle	Max Reverse	Maximum Continuous (CLB) 1	Normal Takeoff (TO) 2	APR (Max Power) 3
N ₁	—	—	—	70.7% 4	96.5%	96.8%	96.8%
N ₂	—	—	46.0% min.	—	98.0%	98.0%	98.6%
ITT	650°C	800°C 5	—	955°C	950°C	955°C	955°C
Oil Temp	-40°C min.	—	9	—	138°C max.	138°C max. 27°C max. 6	138°C max.
Oil Press	—	—	28 psi min.	8	8	8	8

- 1 Climb (CLB) equals maximum continuous thrust (MCT).
- 2 Normal Takeoff power is limited to 5 minutes.
- 3 APR power (one engine inoperative) is limited to 10 minutes.
- 4 Maximum reverse thrust is automatically reduced (ramped) commencing at 85 KIAS.
- 5 Maximum ITT limit varies with N₂ speed (400 °C when N₂ <18% and ITT at start initiation <250 °C).
- 6 Minimum oil temperature must be achieved before commencing takeoff. Below -30 °C (-22 °F) the minimum oil temperature limit is 15 °C provided a fuel system icing inhibitor is used and the Cold Weather Operations procedures in FCOM, Vol. 1 are followed.
- 7 The in flight re-start envelope is defined in figure in chapter 05-32 of this manual.
- 8 Minimum oil pressure varies with engine speed. Maximum allowable oil pressure increases with engine speed and with low oil temperature.
- 9 A minimum oil temperature of 5 °C is required to operate engines above ground idle power. Between 5 and 14 °C, the engines may be operated from idle up to but not including CLB power.

Quick Reference Card Challenger 350/3500

-RETURN QRC AFTER USE-

① APU

APU FIRE

1. APU FIRE FIRE push
2. FIRE EXT 2 ARMED push

Proceed to APU 01-1

APU OVERTEMP

1. APU OFF

Proceed to APU 01-2

② AVIONICS

AP STAB TRIM FAIL

1. Airspeed STABILIZE
and return to speed when AP STAB TRIM FAIL posted or
when AP HOLDING message goes out.

Proceed to AVNC 02-1

PULL UP (TAWS Aural)

1. Autopilot Disconnect
2. Autothrottle (if installed) Disengage
3. Thrust levers APR
4. FLIGHT SPOILERS RETRACT
5. Climb at maximum practical rate.
6. LANDING GEAR UP

Proceed to AVNC 02-64

WINDSHEAR (TAWS Aural)

1. Autopilot Disconnect
2. Autothrottle (if installed) Disengage
3. Thrust levers APR
4. FLIGHT SPOILERS RETRACT
5. Rotate smoothly to the takeoff/go around pitch
attitude, allowing airspeed to decrease if necessary.
Maintain wings level. Do not retract flaps or landing gear.

Proceed to AVNC 02-65

Unreliable airspeed

CAUTION: Respect stall warning / stick shaker and stick pusher.

1. Autothrottle (if installed) Disengage
2. Autopilot Disconnect
3. FDS Deselect
4. Airplane Altitude Maintain a safe altitude
5. Pitch / N1 15 degrees / TO from
SL to 15,000 ft
10 degrees / CLB
Above 15,000 ft
6. Airplane Configuration Flaps 10 / Gear Up
For Go-Around
Flaps 0 / Gear Up
Once climbing

Proceed to AVNC 02-23

② AVIONICS (Con't)

ROAAS In-Air Warning

1. Go-around INITIATE

Proceed to AVNC 02-21

ROAAS On-Ground Warning

1. Brakes APPLY
maximum braking
2. Thrust reversers APPLY
maximum reverse thrust to a stop

Proceed to AVNC 02-22

④ ELECTRICAL

L (R) BATT OVERHEAT

1. Affected BATT OFF

Proceed to ELEC 04-1

⑤ ENGINE

Dual Engine Flameout

1. Crew oxygen masks (if above 14,000 feet) DON
2. Pilot and Copilot O2 MASK / NORM O2 MASK
3. Airspeed Establish 185 KIAS

Proceed to ENG 05-15

L (R) ENGINE EXCEEDANCE

1. Autothrottle (if installed) Disengage

Affected Engine:

2. Thrust lever Retard

Proceed to ENG 05-2

L (R) ENGINE FIRE (Below V₁)

3. Autothrottle (if installed) Disengage
4. Thrust levers IDLE
5. Brakes Maximum or as required
6. Thrust reversers MAX REV or as required

After Stopping:

7. PARK/EMER BRAKE SET
8. Affected ENG FIRE FIRE push
9. FIRE EXT 1 and 2 ARMED push
10. EMER DEPRESS ON
11. Non-affected ENG and APU FIRE Push
12. Evacuation Command
13. Controlling agency Notify
14. STBY INST OFF
15. L and R BATT OFF

Proceed to ENG 05-3

L (R) ENGINE FIRE (Above V₁)

18. Rotate at V_R
19. Pitch attitude Adjust as required to achieve V₂
20. LANDING GEAR UP after positive rate of climb
21. Autothrottle (if installed) Disengage
22. Affected engine thrust lever IDLE unless a critical
thrust situation exists
23. Affected ENG FIRE FIRE push

After 10 seconds if L (R) ENGINE FIRE CAS persists or

there are other indications of fire:

24. FIRE EXT 1 ARMED push
25. FIRE EXT 2 ARMED push

Proceed to ENG 05-4

**⑤ ENGINE (Con't)****L (R) ENGINE FIRE (In Flight)**

38. Autothrottle (if installed)Disengage

Affected Engine:

39. Thrust leverIDLE unless a critical thrust situation exists

40. Affected ENG FIREFIRE PUSH

After 10 seconds if L (R) ENGINE FIRE CAS persists or there are other indications of fire:

41. FIRE EXT 1ARMED push

After 30 seconds if L (R) ENGINE FIRE CAS persists or there are other indications of fire:

42. FIRE EXT 2ARMED push

Proceed to ENG 05-5

L (R) REVERSER UNSAFE (Below V₁)

3. Autothrottle (if installed)Disengage

4. Thrust levers.....IDLE

5. BrakesMAXIMUM or as required

6. Thrust reversersMAX REV or as required

End of procedure.

L (R) REVERSER UNSAFE (above V₁)

8. Rotate at V_R

9. Pitch attitude..... Adjust as required to achieve V₂

10. LANDING GEARUP after positive rate of climb

11. Autothrottle (if installed)Disengage

12. Affected engine thrust leverIDLE

Proceed to ENG 05-5

Engine Failure (below V₁)

3. Autothrottle (if installed)Disengage

4. Thrust levers.....IDLE

5. BrakesMaximum or as required

6. Thrust reversersMAX REV or as required

End of procedure.

Engine Failure (above V₁)

8. Rotate at V_R

9. Pitch attitude..... Adjust as required to achieve V₂

10. LANDING GEARUP after positive rate of climb

Proceed to ENG 05-22

⑥ ENVIRONMENTAL / BLEED AIR**CABIN ALTITUDE**

1. Crew Oxygen MasksDON

2. Pilot and Copilot O₂ MASK / NORM.....O₂ MASK

3. Autothrottle (if installed)Disengage

4. Thrust levers.....IDLE

5. Autopilot Disconnect

6. FLIGHT SPOILERS EMER

7. Descend at M_{MO} / V_{MO}, not below min safe altitude

Proceed to ENVR 06-1

L (R) BLEED LEAK

1. XBLEEDCLOSED

2. Indicated BLEEDOFF

R BLEED LEAK is on:

3. L BLEED..... ON

4. APU BLEEDOFF

End of procedure.

⑥ ENVIRONMENTAL / BLEED AIR (Con't)**L (R) PYLON BLEED LEAK**

1. Autothrottle (if installed)Disengage

Affected Engine:

2. Thrust leverIDLE

Proceed to ENVR 06-4

PACK LEAK

1. AIR SOURCE TRIM AIR ONLY

Proceed to ENVR 06-5

TRIM AIR LEAK

1. AIR SOURCEPACK ONLY

Proceed to ENVR 06-5

⑦ FLIGHT CONTROLS**Overspeed**

1. Autothrottle (if installed)Disengage

2. Thrust levers.....IDLE

3. Autopilot Disconnect

4. FLIGHT SPOILERS EMER

5. Level wings, then pitch up.

Proceed to FCTL 07-20

Pitch Axis Uncommanded Motion/Trim Clacker Tone

1. Master disconnect (MSW)PRESS AND HOLD

Proceed to FCTL 07-21

**Pitch Axis Uncommanded Motion/Trim Clacker Tone
(EASA airplanes only)**

1. Master disconnect (MSW)PRESS AND HOLD

2. STALL PUSHEROFF

Proceed to FCTL 07-22

Pitch Control Jam

1. PITCH DISCPULL and TURN

2. Determine and transfer control to pilot without jam.

Proceed to FCTL 07-23

Roll Control Jam

1. ROLL DISC PULL TO ACTUATE

2. Determine and transfer control to pilot without jam.

Proceed to FCTL 07-25

Roll or Yaw Axis Uncommanded Motion

1. Master disconnect (MSW)PRESS AND HOLD

Proceed to FCTL 07-27

⑧ FORCED LDG / EVACUATION**Emergency Evacuation**

1. PARK / EMER BRAKESET

2. EMER DEPRESS ON

3. L and R ENG, and APU FIREPUSH

4. Evacuation.....COMMAND

5. Controlling agencyNOTIFY

6. STBY INSTOFF

7. L and R BATT.....OFF

Proceed to F-LDG 08-2

⑩ GEAR / BRAKES**GEAR BAY OVHT**

1. AIRSPEEDMAX 250 KIAS
2. LANDING GEARDN

Proceed to GEAR 10-1

NORM BRAKES FAIL

1. Normal actual landing distanceMultiply by:
1.65 without TR **or** 1.50 with TR

After landing:

2. FLIGHT SPOILERS EMER
3. PARK / EMER BRAKE PULL SMOOTHLY

End of procedure.

⑫ ICE PROTECTION**WING ANTI-ICE LEAK**

1. WING ANTI-ICEOFF

Proceed to ICE 12-1

L (R) WING OVERHEAT

1. WING ANTI-ICEOFF

Proceed to ICE 12-2

⑬ OTHER**Rejected Takeoff**

1. Autothrottle (if installed)Disengage
2. Thrust leversIDLE
3. Brakes MAXIMUM or as required
4. Thrust reversers MAX REV or as required

End of procedure.

STALL on PFD

1. Autopilot Disconnect
2. Lower the pitch attitude to reduce angle-of-attack.
3. Autothrottle (if installed)Disengage
4. Thrust levers APR
5. FLIGHT SPOILERSRETRACT
6. Level the wings.

Proceed to OTHER 13-4

⑭ SMOKE / FIRE**Cabin / Cockpit Fire, Smoke or Fumes**

1. Crew oxygen masks DON, SELECT EMERGENCY
2. Smoke gogglesDON
3. Pilot and copilot O2 MASK / NORMO2 MASK

Proceed to SMK 14-1



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DEFINITIONS, ABBREVIATIONS AND ACRONYMS

The following definitions, abbreviations and acronyms may be used in cockpit displays, the flight management system or in other descriptions throughout this manual. Abbreviations may be further explained in the chapters where they are used.

Symbols

% - Percent

& - And

°C - Degrees Centigrade/Celsius

°F - Degrees Fahrenheit

A

A/C - Air Conditioning, Aircraft

A/I - Anti-Ice

A/ICE - Anti-Ice

A/P - Autopilot

A/S - Air Speed

A/SKID - Anti-skid

AC - Alternating Current

ACARS - Aircraft Communication Addressing and Reporting System / Aircraft Communications Addressing and Reporting System

ACM - Air Cycle Machine

ACP - Audio Control Panel

ACPC - Alternating Current Power Center

ACU - Air Conditioning Unit

ACV - Air Control Valve

ADC - Air Data Computer

ADDR - Address

ADF - Automatic Direction Finder

ADI - Attitude Director Indicator

ADS - (1) Air Data System (2) Automatic Dependent Surveillance

ADS-B - Automatic Dependent Surveillance–Broadcast

ADS-C - Automatic Dependent Surveillance–Contract

AFCS - Automatic Flight Control System

AFD - Adaptive Flight Display

AFM - Airplane Flight Manual

AFN - ATS Facilities Notification

AGL - Above Ground Level

AHC - Attitude Heading Computer

AHRS - Attitude Heading Reference System

AIL - Aileron

AIRMET - Airman's Meteorological Information

ALD - Actual Landing Distance

ALIGN - Aligning, Alignment

ALT - Altitude, Altimeter

ALT CAP - Altitude Capture (PDF/FD)

ALT HOLD - Altitude Hold (PDF/FD)

ALTN - Alternate

AMPS - Amperes

ANNUN - Annunciation

ANT - Antenna

AOA - Angle of Attack

AOC - Airline Operational Communications

AP - Autopilot

APM - Aircraft Personality Module

APPR - Approach Mode

APPR, APCH - Approach

APR - Automatic Power Reserve

APU - Auxiliary Power Unit

ARF - Above Runway Field



ASCB - Avionics Standard Communications Bus / Avionics Standard Communication Bus

ASEL - Altitude Preselect Mode

ASYM - Asymmetrical

AT - Autothrottle

ATC - Air Traffic Control

ATN - Aeronautical Telecommunications Network

ATS - Air Turbine Start, Air Traffic Services

ATT - Attitude

AUTH - Authority

AUTO - Automatic

AUX - Auxiliary

AV - Avionics

AVAIL - Available

B

B/C - Back Course

B/CRS - Back Course

BARO - Barometric

BAT - Battery

BATT - Battery

BC - Back Course

BCN - Beacon

BCU - Brake Control Unit

BIT - Built-in-Test

BITE - Built-in-test equipment

BLTS - Belts

BNK - Bank

BOOM - Headset Microphone

BRK - Brake

BRKR(S) - Breaker(s)

BRT - Bright

BTL - Bottle

BTMS - Brake Temperature Monitoring System

C

C - Center, Caution, Cabin

CAA - Civil Aviation Authority (UK)

CAB - Cabin

CAI - Cowl Anti-Ice

CAIV - Cowl Anti-ice Valve

CAL - Calibrate

CAP - Capture

CAS - (1) Calibrated Airspeed (2) Crew Alerting System (3) Computed Airspeed

CAT - Category

CAT 2 - Category 2

CB - Circuit Breaker

CBP - Circuit Breaker Panel

CBV - Cross Bleed Valve

CBW - Cross-Bleed Wing

CCBP - Cockpit Circuit Breaker Panel

CCP - Cursor Control Panel

CDI - Course Deviation Indicator

CDL - Configuration Deviation List

CDU - Control Display Unit

CG - Centre of Gravity

CH - Chapter, Channel

CHGR - Charger

CIS - Commonwealth of Independent States

CKPT - Cockpit

CKT - Circuit



CLB - Climb

CLK - Clock

CLSD - Closed

cm - Centimeter(s)

CMD - Command

CMPS - Compass

CMPTR - Computer

CMU - Communications Management Unit

CO2 - Carbon Dioxide

COM - Communication (Radio)

COMM - Communication

COMP - Compressor, Comparator

COMPUTR - Computer

COND - Condition, Continued

CONFIG - Configuration

CONN - Connection

CONT - Control, Continuous, Contactor, Controller

CONT'D - Continued

COOL - Cooling, cooler

CPCP - Cabin Pressure Control Panel

CPCS - Cabin Pressure Control System

CPDLC - Controller Pilot Data Link Communications / Controller–Pilot Data Link Communications

CPLT - Copilot

CRM - Crew Resource Management

CRS - Course

CRZ - Cruise

CSU - Configuration Strapping Unit

CTA - Centro Tecnico Aeroespacial (Brazil)

CTP - Control Tuning Panel

CTR - Center

CTRL - Control

CVR - Cockpit Voice Recorder

D

DA - Drift Angle, or Decision Altitude

DB - Database

dB - decibel

DBU - Data Base Unit

DC - Direct Current

DCMP - DC Motor Pump

DCP - Display Control Panel

DCPC - Direct Current Power Center

DCU - Data Concentration Unit / Data Concentrator Unit

DECEL - Decelerate

DECR - Decrease

DEFL - Defuel

DEG - Degree

DEGRAD - Degraded / Degrade

Delta P - Differential Pressure

DEPR - Depressurize

DEPRESS - Depressurization

DEPT - Depart

DEST - Destination

DET - Detection, Detector

DEV - Deviation

DFDR - Digital Flight Data Recorder

DG - Directional Gyro

DH - Decision Height

DIFF - Differential



DIM - Dimming

DIR - Direct

DIS - Distance (to waypoint), Disconnect

DISC - Disconnect

DISCH - Discharge

DISP - Dispatch, Display

DIST - Distance

DL - (1) Data Link (2) Downlink

DLCA - Data Link Communication Application

DMC - DCU Module Cabinet

DME - Distance Measuring Equipment

DN - Down

DOT - Department of Transport (Canada) / Department of Transport

DR - (1) Dead Reckoning (2) Door

DSK - Data Select Knob

DSM - Digital Switching Module

DSP - Datalink Service Provider

DSPL - Display

DSPY - Display

DU - Display Unit

E

EASA - European Aviation Safety Agency

EAS - Equivalent Airspeed

ECH - Electronic Charts

ECS - Environmental Control System

ECU - (1) Environmental Control Unit (2) Electronic Control Unit (3) External Compensation Unit

ED - Electronic Display

EDP - Engine Driven Pump/Engine Primary Hydraulic Pump / Engine Driven Pump, Engine Driven Pump/Engine Primary Hydraulic Pump

EEC - Electronic Engine Controller

EFIS - Electronic Flight Instrument System

EFVS - Enhanced Flight Vision System

EGPWS - Enhanced Ground Proximity Warning System (including windshear)

EGNOS - European Geostationary Navigation Overlay Service

EGT - Exhaust Gas Temperature

EI - Engine Instrument

EICAS - Engine Indication and Crew Alerting System

EIS - Engine Indicating System

EL - Elevation

ELEC - Electrical

ELEV - Elevator, Elevation / Elevator or Elevation

ELT - Emergency Locator Transmitter

EMER - Emergency

EMER(G) - Emergency

EMS - Electrical Management System

ENG - Engine

ENGAGE - Engagement

EPC - External Power Contractor

EPR - Engine Pressure Ratio

EPU - Estimated Position Uncertainty

EQUIP - Equipment

ERP - Eye Reference Position (datum)

ESS - Essential

ET - Elapsed Time

ETA - Estimated Time of Arrival

ETP - Equal Time Point

EVAC - Evacuation

EVMS - Engine Vibration Monitor System

EVMU - Engine Vibration Monitor Unit



EVS - Enhanced Vision System

EXH - Exhaust

EXT - External

EXT PWR - External Power

EXTIN - Extinguish(ed)

F

F/CTL - Flight Controls / Flight Control

F/D - Flight Director

FAA - Federal Aviation Administration (USA)

FADEC - Full Authority Digital Engine Control

FAF - Final Approach Fix

FAIL - Failure

FANS - Future Air Navigation System

FAP - Final Approach Point

FCC - Flight Control Computer

FCOM - Flight Crew Operating Manual

FCU - Flight Control Unit

FD - Flight Director

FDR - Flight Data Recorder

FDU - Flux Detector Unit

FECU - Flap Electronic Control Unit

FEED - Feeder

FF - Fuel Flow

F/F - Fuel Flow

FGC - Flight Guidance Computer

FGP - Flight Guidance Panel

FIDEEX - Fire Detection and Extinguishing System

FIRE BTL - Fire Bottle

FIREX - Fire Extinguisher

FL - Flight Level

FLC - Flight Level Change (airspeed hold mode)

FLD - Field

FLT - Flight

FLT DIR - Flight Director

FLUOR - Fluorescent

FMC - Flight Management Computer

FMS - Flight Management System

FOD - Foreign Object Damage

FOLD - Factored Operational Landing Distance

FPA - Flight Path Angle

FPG - Flight Guidance Panel

FPM - Feet Per Minute

FPU - Flap Power Unit

FPV - Flight Path Vector

FQGC - Fuel Quantity Gauging Computer

FQGS - Fuel Quantity Gauging System

FREQ - Frequency

FRMT - Format

FRTT - Fuel Return To Tank

FSA - File Server Application

FSU - File Server Unit

FT - Feet, Foot

FUSE - Fuselage

FW - Fire Wall

FWC - Fault Warning Computer

FWD - Forward

G

G - Receiver Gain



GA - Go-Around

GAL - Gallon

GALY - Galley

GBAS - Ground Based Augmentation System

GCU - Generator Control Unit

GCS - Ground Clutter Suppression

GEN - Generator

GLC - Generator Line Contactor

GLD - Ground Lift Dump / Ground Lift Dumping

GMT - Greenwich Mean Time

GND - Ground

GNSS - Global Navigation Satellite System

GP - Guidance Panel

GPM - Gallons Per Minute

GPS - Global Positioning System

GPWS - Ground Proximity Warning System

GR - Gear

GEAR - Landing Gear

GRAV - Gravity

GRF - Global Reporting Format

GS - Ground Speed

GTC - Generator Transfer Contactor

GUIDE - Guidance

GW - Gross Weight

GWX - Graphical Weather

H

HDD - Head Down Display

HDG - Heading

HDG HOLD - Heading Hold

HDG SEL - Heading Select

HDPH - Headphone

HEAT - Heater

HF - High Frequency (3 – 30 mHz) / High Frequency (3–30 MHz)

Hg - Mercury / Inches of Mercury

HI - High

HLDR - Holder

HOR - Horizontal

HORIZ - Horizontal

HOT - Hot Oil Temperature

HP - High Pressure

hPA - HectoPascals / Hecto Pascal

HPSOV - High Pressure Shut Off Valve

HSI - Horizontal Situation Indicator

HSTA - Horizontal Stabilizer Trim Actuator

HSTCU - Horizontal Stabilizer Trim Control Unit

HT - Heater

HTR - Heater

HUD - Head-up Display / Heads-up display

HW - Hardware

HYD - Hydraulic

Hz – Hertz

I

I/B - Inboard

I/O - Input/Output

IAC - Integrated Avionics Computer

IAF - Initial Approach Fix

IAPS - Integrated Avionics Processors System

IAS - Indicated Air Speed / Indicated Airspeed (knots), Integrated Air System



ICAO - International Civil Aviation Organization

ICC - Integrated Card Cage

ICS - Idle Corrected Speed, Inter-Communications System

ID - Identification

IDENT - Identification

IEC - IAPS Environment Controller

IFR - Instrument Flight Rules

IFIS - Integrated Flight Information System

IGN - Ignition

IGV - Inlet Guide Vanes

ILS - Instrument Landing System

IM - ILS Inner Marker

IMC - Instrument Meteorological Conditions

IMP - Imperial

IMS - Information Management System

IN - Inch, Inches

INBD - Inboard

INCR - Increase

IND - Indication, Indicator

INFLT - In Flight

INHB - Inhibit

INHIB - Inhibit

inHG - Inches of Mercury

INIT - Initialize

IN Hg - Inches of Mercury

INOP - Inoperative

INPH - Interphone

INSP - Inspection

INST(S) - Instrument(s)

INSTR - Instrument(s)

INT - Internal, Integral, Intersection

INTEG - Integral

INTERCOMM - Intercommunication

Intercom - Intercommunication

INVAL - Invalid

IOC - Input/Output Concentrator

IOP - Input/Output Processor

IPC - Integrated Processing Cabinet

IRS - Inertial Reference System

IRU - Inertial Reference Unit

ISA - International Standard Atmosphere

ISI - Integrated Standby Instrument

ISO - International Standards Organization / International Standard Organization

ISOL - Isolation, Isolated

ITT - Inter Turbine Temperature (°C), Engine / Interstage Turbine Temperature (°C)

J

JAA - Joint Aviation Authorities

K

K - Knots

kg - Kilogram

kHz - KiloHertz / Kilo Hertz

KIAS - Knots Indicated Airspeed

kPa - KiloPascals / Kilo Pascal

KTAS - Knots True Airspeed

KTS - Knots

kts - Knots

kt - Knots

kVA - KiloVolt-Ampere / KiloVolt-Ampere



kW - KiloWatt(s) / Kilo Watts

L

L - Left, Landing

LAPUC - Left APU Contactor

LAT - Latitude

LAT/LONG - Latitude/Longitude

LAV - Lavatory

LB - Pound

Lb - Pound

lb - pounds

LCN - Load Classification Number

LCV - Load Control Valve

LDG - Landing

LDG GR - Landing Gear

LDS - Lightning Detection System

LDU - Lamp Driver Unit

LE - Leading Edge

LEV - Level

LFE - Landing Field Evaluation

LFL - Landing Field Length

LG - Landing Gear

LG ECU - Landing Gear Electronic Control Unit

LGLC - Left Generator Line Contactor

LGW - Landing Gross Weight

LH - Left Hand

LIM - Limit

LK - Leak

LMS - Load Management System

LN - Left Nose

LNAV - Lateral Navigation

LNDG ALT - Landing Altitude

LO - Low

LOC - ILS Localizer / Localizer, ILS Localizer

LOGO - Logo Graphics

LOI - Loss of Integrity

LOM - Compass Locator at Outer Marker

LOP - Low Oil Pressure

LP - Low Pressure

LPM - Liter Per Minute

LPT - Low Pressure Turbine

LPV - Localizer Performance with Vertical guidance

LR - Long Range / Left Rear, Long Range

LRC - Long Range Cruise

LRN - Long Range Navigation

LRU - Line Replaceable Unit

LSB - Lower Side Band

LSC - Low Speed Cue

LSK - Line Select Key

LSS - Lighting Sensor System

LTG(s) - Light(s)

LTS - Lights

LW - Left Wing

LWD - Left Wing Down

LWR - Lower

LX - Lightning

M

M - Mach Number

m - Meter

mB - Millibars



MAA - Maximum Authorized IFR Altitude, Missed Approach Altitude

MAC - Mean Aerodynamic Chord

MAG - Magnetic

MAINT - Maintenance

MALF - Malfunction

MAN - Manual

MAP - Ground map (WXR)

MAZ - MLS Azimuth

MCA - Minimum Crossing Altitude

MCL - Maximum Climb Thrust

MCR - Maximum Cruise

MCT - Maximum Continuous Thrust

MDA - Minimum Descent Altitude

MDC - Maintenance Diagnostic Computer

MEA - Minimum Enroute IFR Altitude

MECH - Mechanic

MED - Medium

MEL - Minimum Equipment List

METAR - Meteorological Report – Aviation Routine

MF - Multi Function

MFD - Multi Function Display

MFS - Multi Function Spoilers

MFW - Multifunction Window

MFZW - Maximum Zero Fuel Weight

MGP - MLS Glideslope

MHz - MegaHertz / Mega Hertz (freq range)

MI - Miles / Mach indicated

mi - Miles

MIC - Microphone

MID ATF - Middle Aft ward

MID FWD - Middle Forward

MILS - .001 of an inch / 0.001 of an inch

MIN - Minimum

MISC - Miscellaneous

MISCMP - Miscompare

MISMTCH - Mismatch

MKP - Multifunctional Keyboard Panel

MKR - Marker

MLG - Main Landing Gear

MLS - Microwave Landing System

MLW - Maximum Landing Weight

MM - Middle Marker

MMEL - Master Minimum Equipment List

MMO - Maximum Operating Speed in Mach Number / Maximum operating Speed in Mach Numbers

MNPS - Minimal Navigational Performance Standards

MOCA - Minimum Obstruction Clearance Altitude

MOD - Module

MON - Monitor

MPH - Miles Per Hour

MRA - Minimum Reception Altitude

MRS - Manual Release System

MRW - Maximum Ramp Weight

MSG - Message

MSL - Mean Sea Level

MSW - Master Wheel Disconnect

MTG - Miles To Go

MTO - Maximum Take-off

MTOW - Maximum Take-off Weight / Maximum Take Off Weight

MX - Maximum



MZFW - Maximum Zero Fuel Weight

N

N/A - Not applicable / Not Applicable

N/W - Nose Wheel

N1 - Low Pressure Rotor / Fan Speed

N2 - High Pressure Rotor / High Pressure Rotor RPM

NAD83 - North American Datum 1983

NAT - North Atlantic Tracks

NAV - Navigation

NAVAID - Navigational Aid

NAVSRC - Navigation Source

NCD - No Computed Data

ND - Nose Down

NDN - Nose Down

NDB (ADF) - Non directional Beacon (Automatic Direction Finder)

NDU - Navigational Display Unit

NEG - Negative

NEUT - Neutral

NL - Nose Left

NLG - Nose Landing Gear / N LDG - Nose Landing Gear

NM - Nautical Miles / Nautical Mile

No. - Number

NOPT - No Procedure Turn Required

NORM - Normal

NOSE - Nose Wheel

NR - Nose Right

NU - Nose Up

NUP - Nose Up

NWS - Nose Wheel Steering

O

O/S - Overspeed

OAT - Outside Air Temperature

OB - Outboard

OBS - Observer

OCM - Option Control Module

OEI - One Engine Inoperative

OEW - Operating Empty Weight

OK - Okay

OLD - Operational Landing Distance

OM - Outer Marker

OMNI - Omnidirectional

OT - Other Traffic

OUTBD - Outboard

OVBD - Overboard

OVHT - Overheat

OVLD - Overload

OVRD - Override

OVTEMP - Over Temperature

OXY - Oxygen

O2 - Oxygen

OZC - Ozone Converter

P

P - Pressure, Pressurization

PA - Passenger Announcement

PACK - Air-Conditioning Unit

PAL - Phase Alternating Line

PASS - Passenger

PAX - Passenger

PBE - Protective Breathing Equipment (Smoke Hood)



PCU - Power Control Unit

PF - Pilot Flying

PFD - Primary Flight Display

PFS - Pitch Feel System

PIT - Pitch

PITOT - Pitot-Static

PLA - Power Lever Angle

PLT - Pilot

PNF - Pilot Not Flying

POS - Position

PPH - Pounds Per Hour

PRAIM - Predictive Receiver Autonomous Integrity Monitoring

PRESS - Pressure, Pressurization

PRI - Primary

PRIM - Primary

PROC - Procedure

PROTECT - Protection

PROT - Protection

PROX - Proximity

PRV - Pressure Regulating Valve

PSE - Passenger Service Unit

PSEU - Proximity Sensor Electronics Unit

PSI - Pounds Per Square Inch

PSID - Pounds Per Square Inch Differential

PSIG - Pounds Per Square Inch Gauge

PSS - Proximity Sensor System

PTCT - Protect

PTT - Push To Talk

PV - Priority Valve

PWR - Power

Q

QAK - Quick Access Keys
QAR - Quick Access Recorder
QEC - Quick Engine Change
QFE - Local Station Pressure
QNE - ISA, Barometric Pressure
QNH - Altimeter Setting
QTY - Quantity

R

R - Right
R/D - Refuel/Defuel
R/T - Receiver-Transmitter
RA - Radar Altitude, Resolution Advisory / Resolution Advisory (TCAS) / Radio Altitude
RADALT - Radio Altitude
RAI - Registro Aeronautico Italiano (Italy)
RAIM - Receiver Autonomous Integrity Monitoring
RAT - Ram Air Turbine
RCC - Runway Condition Code
RCCB - Remote Controlled Circuit Breaker
RCDR - Recorder
RCVR - Receiver
RDC - Remote Data Concentrator
RDCP - Refuel/Defuel Control Panel
RDR - Radar
REC - Receiver, Recorder
RECIRC - Recirculation
RECOG - Recognition
REF(s) - Reference(s)
REFL - Refuel



RET - Retract

REV - Reverse / Reverser, Reverse or Reversion

RF - Russian Federation

RH - Right Hand

RIU - Radio Interface Unit

RMD - ROAAS Model Distance

RMI - Radio Magnetic Indicator

RMU - Radio Management Unit

RNP - Required Navigation Performance

RNP AR - Required Navigation Performance Approval Required

ROAAS - Runway Overrun Awareness and Alerting System

ROL - Roll

ROT - Rotation

ROTR - Record of Temporary Revisions

rpm - Revolutions per Minute

RPM - Revolutions Per Minute

RSB - Radio System Bus

RSP - Reversion Switch Panel

RTA - Required Time of Arrival / Receiver-transmitter Antenna (WXR)

RTE - Route

RTO - Rejected Take-off / Rejected Take Off

Rt - Receiver-Transmitter

RUD - Rudder

RVR - Runway Visual Range

RVSM - Reduced Vertical Separation Minimum

RVSR - Reverser

RWD - Right Wing Down

RWY - Runway

S

S - Status

SAAU - State Aviation Administration of Ukraine

SAT - Static Air Temperature

SAV - Starter Air Valve

SB - Service Bulletin

SBAS - Space Based Augmentation System / Space/ Satellite Based Augmentation System

SBY - Standby

SCAV - Scavenge

SCHED - Schedule

SCR - Selector (Nav source)

SCU - Steering Control Unit

SCV - Surge Control Valve

SEC - Secondary

SEL - Select, Selector

SELCAL - Selective Calling

SENS - Sensitivity, Sensor

SERV - Service

SG - Signal Generator

SID - Standard Instrument Departure

SIGMET - Significant Meteorological Observation

SLD - Super-cooled Large Droplet

SMKG - Smoking

SOV - Shut-off Valve / Shut-Off Valve

SP - Speed

SPC - Stall Protection Computer

SPD - Speed

SPDA - Secondary Power Distribution Assembly

SPKR - Speaker



SPLR(S) - Spoiler(s)

SPS - Stall Protection System

SQ - Squelch

SSB - Single Side Band

STA - Station

STAB - Stabilizer

STAT - Status

STBY - Standby

STD - Standard

STEER - Steering

SUPPL - Supply

SVC - Synthetic Vision Computer

SVCM - Synthetic Vision Configuration Module

SVCE - Service

SVO - Servo

SVS - Synthetic Vision System

SW - Switch / Software

SYN - Synchronize

SYNC - Synchronization / Synchronization, Synchronous

SYS - System

SYST - System

T

T/C - Top of climb

T/D - Top of descent

T/R - Thrust Reverser

T2 - Temperature, inlet duct sensor

TA - Traffic Advisory (TCAS)

TACAN - UHF Tactical Air Navigation Aid

TAE - Track Angle Error

TAF - Terminal Airport Forecast

TAS - True Air Speed

TAT - Total Air Temperature

TAWS - Terrain Awareness Warning System

TCAS - Traffic Alert and Collision Avoidance System

TCS - Touch Control Steering

TD - Traffic Display

TDR - Transponder

TE - Trailing Edge

TEMP - Temperature

TFC - Traffic (TCAS)

TFR - Temporary Flight Restriction

TGT - Target, Turbine Gas Temperature

TKE - Track Angle Error

TLA - Thrust Lever Angle

TMS - Thermal Management System

TO - Takeoff

TO/GA - Takeoff / Go Around

TOD - Top of descent

TOFL - Take-off Field Length

TOL - Tolerance

TOLD - Take-off and Landing Data

TR - Terrain

TRB - Turbulence

TRK - Track

TRM - Trim

TRU - Transformer Rectifier Unit

TSS - Traffic Surveillance System

TSSA - Traffic Surveillance System Application



TST - Test

TTR - TCAS II Transmitter / Receiver

TURB - Turbulence

U

UNLKD - Unlocked

UNSCHD - Unscheduled

US - United States

USB - Universal Serial Bus / Universal Serial Bus, Upper Side Band

USG - United States Gallons

UTIL - Utility

V

V - Volt

V₋ - V-Speed

V/L - VOR/Localizer

V/S - Vertical Speed

VA - Design Maneuvering Speed

VATE - Autothrottle automatic engagement speed

VB - Design Speed for Maximum Gust Intensity Design

VC - Cruising Speed, Design Cruising Speed

VD - Design Diving Speed

VDF/MDF - Demonstrated Flight Diving Speed

VDL - VHF Data Link

VEF - Engine Failure Speed

VERT - Vertical

VF - Design Flap Speed

VFC/MFC - Maximum Speed for Stability Characteristics

VFE - Maximum Flaps Extended Speed

VFR - Visual Flight Rules

VFTO - Final take-off climb speed

VG - Vertical Gyro

VGA - Minimum Go Around Speed

VHF - Very High Frequency (30 – 300 mHz) / Very High Frequency (30–300 MHz)

VIB - Vibration

VIU - Video Interface Unit

VLC - Landing Climb Speed

VLE - Maximum Landing Gear Extended Speed

VLO - Maximum Landing Gear Operating Speed

VLOF - Lift-Off Speed

VLV(s) - Valve(s)

VMC - Minimum Control Speed with the Critical Engine Inoperative, Visual Meteorological Conditions

VMCA - Minimum Control Speed Air

VMCG - Minimum Control Speed Ground

VMCL - Minimum Control Speed Landing

VMD - Minimum Drag Speed

VM0/MMO - Maximum Operating Limit Speed / Maximum Operating Limit Speed / Mach Number

VMU - Minimum Unstick Speed

VNAV - Vertical Navigation Mode / Vertical Navigation System, Vertical Navigation Mode

Vol - Volume

VOLT - Voltage

VOR - VHF Omnidirectional Range Station

VORTAC - VOR and TACAN Co-located

VR - Rotation Speed

VRA - Rough Air Penetration speed

VREF - Reference Velocity

VS - Vertical Speed Mode / Stalling Speed or the Minimum Steady Flight Speed at which the Airplane is Controllable, Vertical Speed Mode

VS1 - Stalling Speed or the Minimum Steady Flight Speed Obtained in a Specific Configuration

VSD - Vertical Situation Display



VSI - Vertical Speed Indicator

VSO - Stalling Speed or the Minimum Steady Flight Speed in the Landing Configuration

Vspeeds - Departure and arrival performance

VZF - Minimum zero flaps speed

V1 - Take-off Decision Speed (formerly Denoted as Critical Engine Failure Speed)

V2 - Take-off Safety Speed

V2MIN - Minimum Takeoff Safety Speed

W

W - Warning

W/C - Wind Component

W/S - Wind Shear

W/W - Wheel Well

WAAS - Wide Area Augmentation System

WAI - Wing Anti-Ice

WAIV - Wing Anti-ice Valve

WARN - Warning

WF - Runway Length Limited Weight

Wf - Fuel Flow In Pounds Per Hour

WG - Wing

WGS84 - World Geodetic System 1984

WGT - Weight

WOW - Weight-On-Wheels

WPT(s) - Waypoint(s) / Waypoint

WS - Second Segment Limited Weight

WSHLD - Windshield

WT - Weight

WTC - Windshield Temperature Control

WX - Weather

WXR - Weather Radar

X

XBLEED - Cross Bleed

XDUCER - Transducer

XFEED - Cross Feed

XFER - Transfer

XFLOW - Cross Flow

XMIT - Transmit

XPNDR - Transponder

XTD - Cross Track Distance

XTK - Cross Track

XWC - Cross Wind Component

Y

YD - Yaw Damper

Y/D - Yaw Damper

Z

ZFW - Zero Fuel Weight

AIRSPEEDS

CAS Calibrated airspeed – Indicated airspeed corrected for static source position error.

EAS Equivalent airspeed – Calibrated airspeed corrected for compressibility.

IAS Indicated airspeed – Airspeed indicator reading corrected for instrument error. Values in this manual assume zero instrument error.

M Indicated Mach number – Machmeter reading corrected for instrument error.

M_T True Mach number – Machmeter reading corrected for both instrument and static source position errors.

TAS True airspeed – Equivalent airspeed corrected for density.

V₁ Take-off decision speed (formerly designated as Critical engine failure recognition speed) – The speed used as a reference at which, due to engine failure or other causes, the pilot may elect to stop or continue the take-off.

V_{1MBE} Maximum V₁ for brake energy – The maximum speed on the ground from which a stop can be accomplished within the energy capabilities of the brakes.

- V_{1MCG}** Minimum V₁ limited by control on the ground – The take-off decision speed following an engine failure at V_{MCG}. V₁ may not be less than V_{1MCG}.
- V₂** Take-off safety speed – Target climb speed to be attained at or before a height of 35 feet above the runway during a continued take-off, following an engine failure.
- V_A** Design maneuvering speed – The maximum speed at which application of full available aileron, rudder or elevator will not overstress the airplane.
- V_{AC}** Approach Climb Speed – The target climb speed to be attained after initiation of a Go-Around and selection of the approach climb configuration following an engine failure.
- V_{ATE}** Autothrottle automatic engagement speed – The speed at which the Autothrottle will automatically engage. Corresponds nominally to 1.2 VS and displayed on the Airspeed tape by an amber line located above the low speed cue indication.
- V_{EF}** Critical engine failure speed – The speed at which, if the critical engine fails, the engine failure is recognized at V₁.
- V_{FE}** Maximum flap extended speed – is the highest speed permissible with the wing flaps in a prescribed extended position.
- V_{FTO}** Final take-off climb speed – The speed attained at the end of the flight path acceleration segment during a continued take-off following an engine failure, and is the climb speed scheduled for the final take-off climb.
- V_{LC}** Landing Climb Speed – The target climb speed to be attained after initiation of a Go-Around while in the landing configuration with all engines operating.
- V_{LE}** Maximum landing gear extended speed – The maximum speed at which the airplane can be safely flown with the landing gear extended.
- V_{LO}** Maximum landing gear operating speed – The maximum speed at which the landing gear can be safely extended or retracted.
- V_{MO}/M_{MO}** Maximum Operating Limit Speed / Mach Number – The maximum operating limit speed (airspeed or Mach number) is the speed that may not be deliberately exceeded in any regime of flight (climb, cruise, or descent) unless a higher speed is authorized for flight test or pilot training operations.
- V_{MCA}** Minimum control speed, air – Minimum flight speed at which the airplane is controllable when the critical engine suddenly becomes inoperative, with the remaining engine at maximum take-off thrust.
- V_{MCG}** Minimum control speed, ground – Minimum speed on the ground at which control can be maintained and the take-off continued using aerodynamic controls alone, when the critical engine suddenly becomes inoperative, with the remaining engine at maximum take-off thrust.
- V_{MCL}** Minimum control speed during landing approach – Minimum flight speed at which the airplane is controllable when the critical engine suddenly becomes inoperative, with the remaining engine at maximum take-off thrust.
- V_{MD}** Minimum Drag Speed – The speed that provides the maximum lift/drag ratio.
- V_R** Rotation speed – Speed at which rotation is initiated during take-off.

V_{REF} Approach speed – The landing reference speed at a height of 50 feet above the runway threshold in the normal landing configuration.

V_S Stalling speed.

TEMPERATURE

ISA - International Standard Atmosphere.

OAT - Outside air temperature – The free air temperature, obtained either from in-flight temperature indications or ground meteorological sources.

SAT - Static air temperature – Outside air (ambient) temperature as computed by the Air Data Computer and presented on the SAT indicator.

TAT - Total air temperature – Static air temperature plus adiabatic compression (ram) rise.

DISTANCES

Take-off Field Length (Dry and wet runways)

The take-off field length is the longer of: a. The take-off distance (see below). b. The accelerate-stop distance (see below).

Take-off Distance (Dry runways)

The take-off distance on a dry runway is the longer of: a. The distance from the start of the take-off roll to the point where the airplane attains a height of 35 feet above the take-off surface, with a failure of the critical engine at VEF. b. 115% of the distance from the start of the take-off roll to the point at which the airplane attains a height of 35 feet above the take-off surface, with all engines operating.

Take-off Distance (Wet runways)

The take-off distance on a wet runway is the longer of: a. The take-off distance on a dry runway. b. The distance from the start of the take-off roll to the point where the airplane attains a height of 15 feet above the take-off surface, with a failure of the critical engine at VEF. c. 115% of the distance from the start of the take-off roll to the point at which the airplane attains a height of 35 feet above the take-off surface, with all engines operating.

Accelerate – Stop Distance (Dry runways)

The accelerate – stop distance on a dry runway is the longer of subpara a. and subpara b. as defined below:

a. The sum of the distances necessary to:

1. Accelerate the airplane from a standing start to VEF with all engines operating;
2. Accelerate the airplane from VEF to V1 assuming the critical engine fails at VEF; and
3. Come to a full stop from the point reached at the end of the acceleration period prescribed in subpara a. 2) above, assuming that the pilot does not apply any means of retarding the airplane until that point is reached; plus
4. A distance equivalent to 2 seconds at constant V1.

b. The sum of the distances necessary to:

1. Accelerate the airplane from a standing start to V1 with all engines operating;
2. Come to a full stop at the end of the period prescribed in subpara b. 1) above, assuming that the pilot does not apply any means of retarding the airplane until that point is reached; plus
3. A distance equivalent to 2 seconds at constant V1.

**Accelerate – Stop Distance (Wet runways)**

The accelerate – stop distance on a wet runway is the longer of:

- a. The accelerate – stop distance on a dry runway.
- b. The accelerate – stop distance determined as per the accelerate – stop distance on a dry runway, except that the corresponding wet runway values of VEF and V1 are used.

Take-off Run (Dry runways)

The take-off run on a dry runway is the longer of: a. The distance from the start of the take-off roll to the mid point between lift-off and the point at which the airplane attains a height of 35 feet above the take-off surface, with a failure of the critical engine at VEF. b. 115% of the distance from the start of the take-off roll to the mid point between lift-off and the point at which the airplane attains a height of 35 feet above the take-off surface, with all engines operating.

Take-off Run (Wet runways)

The take-off run on a wet runway is equal to the take-off distance on a wet runway.

Clearway

An area beyond the runway, not less than 500 feet wide, centrally located about the extended centerline of the runway, and under the control of the airport authorities. The clearway is expressed in terms of a clearway plane, extending from the end of the runway with an upward slope not exceeding 1.25% above which no object nor any terrain protrudes. However, threshold lights may protrude above the plane if their height above the end of the runway is 26 inches or less and if they are located to each side of the runway.

Stopway

An area beyond the take-off runway at least as wide as the runway and centered upon the extended centerline of the runway, able to support the airplane during an aborted take-off without causing structural damage to the airplane, and designated by the airport authorities for use in decelerating the airplane during an aborted take-off.

Actual Landing Distance

Actual landing distance is the distance from a 50 feet height at VREF with the flaps in the normal landing configuration, to a full stop on a smooth, dry, level, hard-surfaced runway and ISA temperature.

Landing Field Length

The performance charts in this chapter include factors for operational rules which require the use of 60% of the available runway in determining landing field length requirements. The required landing field length on a dry runway is the actual landing distance divided by 0.6. The landing field length required under wet runway conditions is equal to 115% of the dry runway landing field length.

TAKE-OFF PATH**Take-Off Path**

The take-off path begins from a standing start and ends at 1500 feet above the take-off surface or at the point where transition from take-off to enroute configuration is completed, whichever is higher.

Take-Off Flight Path

The take-off flight path begins at the end of the take-off distance and at a height of 35 feet above the take-off surface, and ends at 1500 feet above the take-off surface, or at the point where transition from take-off to enroute configuration is completed, whichever is higher. This is also known as the Gross Take-off Flight Path.

Net Take-Off Flight Path

The net take-off flight path is the gross take-off flight path diminished by 0.8% climb gradient capability (or equivalent reduction in acceleration along that part of the take-off flight path at which the airplane is accelerated in level flight). The net take-off flight path must clear all obstacles in the take-off area by at least 35 feet vertically.

Gross Level-off Height

Actual (gross) geometric height above take-off surface for the flight acceleration segment.

CLIMB GRADIENT

Climb Gradient

The ratio of the change in height, during a portion of a climb, to the horizontal distance traversed in the same time interval.

Gross Gradient

Climb gradient expressed as a percentage ratio, obtained using the following formula: $(\text{Change in height} \div \text{Horizontal distance travelled}) \times 100$ The gradients shown on the charts are based on true (not pressure) rates of climb.

Net Gradient

The gross gradient reduced by the required margins.

First Segment

The first segment starts from the 35 foot height and extends to the point where the landing gear is fully retracted, at a constant V2 speed and flaps in the take-off position.

Second Segment

The second segment starts at the point where the landing gear is fully retracted up to at least 400 feet above the runway, flown at V2 speed and flaps in the take-off position.

Acceleration Segment

The acceleration segment is the part of the take-off flight path that begins at the end of the second segment and extends horizontally over the distance required to retract flaps to zero, and accelerate to the final take-off climb speed.

Final Segment

The final segment starts from the end of the acceleration segment and extends to the end of the take-off flight path, flown at the final segment climb speed, flaps up.

MISCELLANEOUS

Centre of gravity (c.g.)

The point at which the airplane would balance if suspended. The c.g. distance from the reference datum is found by dividing the total moment by the total weight of the airplane.

GW

Gross weight – The maximum weight to which the airplane is certificated.

MLW

Maximum landing weight – The maximum airplane weight approved for the landing touchdown.

Max OWE

Maximum operating weight, empty – The maximum weight for a loaded airplane which includes the flight and cabin crew, galley loading and forward / aft stowage items.

Min OWE

Minimum operating weight, empty – The minimum weight for a loaded airplane which includes minimum crew, no galley loading and no stowage items.

Min FW

Minimum Flight Weight – The minimum flight weight is the minimum weight empty with 45 minutes of fuel reserve.

**MRW**

Maximum ramp weight – The maximum airplane weight approved for taxiing.

MTOW

Maximum take-off weight – The maximum airplane weight approved for the start of take-off.

MZFW

Maximum zero fuel weight – The Max OWE plus passengers and baggage.

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