

Chapter 1

Airspace and Airport Operations 1

Graphic overview of <u>airspace</u>	2
<u>Class A & B</u> Airspace	3
Class <u>C</u>	4
Class <u>D</u> Airspace	5
Class <u>E</u> Airspace	6
Surface based Class E	6
Class <u>G</u>	7
<u>Transition area</u>	8
VFR in Class E Airspace	8
<u>TRSA</u>	8
Airport Advisory Area	8
<u>Basic VFR weather</u> minimums	9
<u>Prohibited</u> , Restricted, Alert areas, etc.	10
Class F airspace	10
<u>Aerobatic</u> flight	11
Normal, Commuter, Utility & Acrobatic category	11
<u>ADIZ</u> , DEWIZ, mountainous areas	12
Intercept procedures	13
Flap setting in Class G airspace	14
Land And Hold Short Operations (<u>LAHSO</u>)	14
<u>Turns</u> at airports w/o an operating control tower	15
<u>Traffic pattern</u> entry	16, 17
Traffic pattern altitude & glide slope	18, 19
Airport beacons	19
Runway markings	20, 21
Airport signs, markings	22
Runway weight bearing capacity	22
Holding position markings: <u>ILS critical area</u>	23
<u>Runway lights</u>	24, 25
Runway Status Lights / Entrance Lights	26
Airport elevation & reference point	27
Airport Surface Detection Equipment-Model X.....	27
<u>Braking action</u> / runway friction reports	27
Exiting the runway after landing	27
<u>Formation flight</u>	28

Chapter 2

Flight Rules & Approach Procedures 29

<u>Is the AIRPLANE Legal?</u>	30
Is the <u>PILOT</u> Legal?	31
<u>ADS-B</u>	32
<u>RNAV</u> , <u>RNP</u>	33
<u>Preflight action</u> , flight plan	34
Preferred routes, Coded Departure Routes	34
EDCT, Tower En Route Control	34

Do you <u>need</u> an <u>ALTERNATE</u> ?	35
Alternate airport weather	35
Part 91 Alternate decision tree	36
Fuel supply	36, 37
Void time, IFR Destination weather, taxiing	38
<u>Takeoff briefing</u> & TOLD card	39
Wake turbulence	40
Climb gradient	41
Pilotage / Dead reckoning	41
RCO, RTR, GCO, Climb/Descend via SID/STAR....	42
<u>Departure Procedures</u> (DP)	43
VFR-On-Top, VFR-Over-The-Top	44
<u>VFR flight following</u>	44
Pop-up IFR clearance	44
Non-radar position reporting	45
Additional reports, pilot's discretion	45
<u>VOR</u>	46
Class I & Class II navigation	46
Federal (<u>Victor</u>) <u>airways</u>	47
Colored airways	47
<u>Jet routes</u>	47
Crossing restrictions	47
<u>Standard Terminal Arrival (STAR)</u>	48
Timed approaches	48
Cruise clearance	49
Cruise climb	49
Radar service terminated	49
NACO (NOS) approach plate revision date	49
D-ATIS	49
<u>Approach Briefing</u>	50
TOLD card — approach side	51
<u>Cleared for approach</u>	52
Continuous Descent Final Approach	52
Minimum Vectoring Altitude — MVA.....	52
RADAR	53
<u>Procedure turn</u>	54
DME arc	54
Approach categories	55
Full scale deflection	55
Pilot controlled runway lights	55
Final Approach Fix	56
GlideSlope Intercept Altitude (GSIA)	56
False GlideSlopes	56
Final Approach Point	57
Final Approach Segment	57
<u>ILS critical area</u>	57
CAT I, II, III ILS minimums	57
<u>Precision approach</u>	58
<u>Nonprecision</u> approach	58
<u>Precision-like</u> approach	58
<u>ILS</u>	59
Marker beacon	59
Localizer antenna	59
Glideslope antenna	59
<u>Traffic pattern</u> altitude & glideslope	60
Localizer approach	61
Localizer backcourse approach	61
ASR approach, PAR, DME arc procedures	61
Contact, Option, and Low approaches	61

LNAV, VNAV, LP, LPV, LNAV+V, WAAS	62
GBAS	63
NDB/VOR approach & holding	64, 65
Holding Pattern Speeds	65
LDA	66
SDF	66
Straight-in approach	67
Circling approach	67
Terminal arrival area, GPS approaches	68, 69
Landing under IFR	70
Missed approach	70
Standard rate turns	71
No-gyro approach	71
Missed approach prior to MAP	71
RVR	72
Braking Action	72
Exiting the runway after landing	72
Approach lighting	73-74
VASI	75
PAPI	75
Visual approach	76
Low altitude alert	76
Visual Descent Point (VDP)	77
Planned Descent Point (PDP)	77
Vertical Descent Angle (VDA)	77
Charted Visual Flight Procedure (CVFP)	77
FMS — Flight Management System — 101	78
ILS PRM approaches	79
Simultaneous converging instrument approaches	80
Side-step maneuver	80
Canceling IFR	81
Exiting the runway after landing	81
Communications failure	82
Communications with tower when radio inop	83
ATC light gun signals	83
Temporary control towers, Class G airports	83
Instruments & equipment required	84
Safety belts	84
Clock	85
Aircraft lights	85
Interference with crewmembers	86
Dropping objects	86
Right-of-way rules	86
Overhead approach maneuver	87
Solar Superstorms	88

Chapter 3

Navigation & Radios	89
Compass stuff	90
VOR	91
VOR check	91
VOT	91
Class I & Class II navigation	92
DME	93

Portable electronic devices	93
GPS	94, 95
Wide Area Augmentation System (WAAS)	96
Local Area Augmentation System (LAAS)	96
Ground Based Augmentation System (GBAS)	96
Antennas	97-99
Transponder codes	100
Frequencies	100
NDB	101
Attitude Heading Reference System	101
UNICOM	102
Automated UNICOM	102
EFAS / Flight Watch / FSS — frequencies	102
ADS-B	103
High Frequency (HF) Radio	104
Telecommunication terms — Datalinks	105

Chapter 4

Speed, Altitude & Jet Operations.....107

Speed limits	108-110
Holding pattern speeds	109
Aircraft approach categories	110
Speed limits—cross-reference	110
Crossing restrictions	111
How to meet a crossing restriction	111
V-speeds	112, 113
Airspeed errors, types & colors	114
Speed of sound & Mach	115
Flight regimes	116
Troposphere, Tropopause, Stratosphere	116
Temp lapse rate	116
ISA — International Standard Atmosphere	117
Altitude types (Pressure, Density, Indicated, etc.)	118
Kollsman window	118
Altimeter setting	119
Altitude temperature correction chart	119
Pressure/temperature & altimetry	120, 121
Density altitude	122-125
Decompression sickness after scuba diving	123
LOW & HIGH altimeter setting restrictions	126
Transponder—Mode C	127
IFR altitudes—minimum altitudes for IFR	128
GlideSlope Intercept Altitude (GSIA)	128
Min/max & mandatory altitudes	128
Minimum Safe Altitudes (MSA)	129
Minimum Vectoring Altitude (MVA)	129
Minimum Safe/Sector Altitude (MSA)	129
Changing altitudes	129
Pilot's discretion	129
Traffic pattern altitude — Class B, C, or D	130
GlideSlope in Class B, C, or D airspace	130
Traffic pattern altitude @ uncontrolled airports	131

Cruising altitudes	132
Reduced Vertical Separation Minimums (RVSM)	133
Altimeter setting and the flight levels	134
Mountain flying — the “venturi effect”.....	134
Radar altimeter	134
Altimeter pitot/static check / malfunctions	135
Altitude cross-reference	136-138
Oxygen altitudes	139
Altimetry (QNH , QNE , QFE)	140, 141
Convert inches of mercury to millibars	141
Rapid decompression	142
Altitude chambers	142
Pressurized aircraft basic components	142
Oxygen systems	143
Jet & turbine operations — 101	144
Jet fuel pounds vs. avgas gallons	145
Jet / turbine engines	146, 147
Jet engine starting	148
Jet / turbine engine terminology	149
Electrical terminology	150
Fuel terminology	151
Hydraulic terminology	151
Air conditioning terminology	151
Flight control terminology	151
Avionics terminology	152
TCAS	152
Pressurization	153
Jet takeoff	154
Balanced field length	155
Critical field length	155
Stopway	155
Clearway	155
First segment definition variations	155
Screen height.....	155
Critical engine	155
Takeoff distance	156
Accelerate-STOP distance	156
Accelerate- GO distance	156
Takeoff run	157
Takeoff path.....	158
Net takeoff flight path.....	158
Additional miscellaneous terms	158
Driftdown.....	159
Obstacle-clearance criteria	159
Transport category turbine LANDING criteria	159
TOLD Card	160, 161
Windmill start, airstart	162
Altitude alerting system — turbojets	162
Fire detection and protection	162
Winglets	162
Windshield heat	163
Tires	163
Swept wing	163
Dutch roll	163
Yaw damper	163
RAT — TAT — SAT — OAT (temperature).....	164
Noise standards.....	165
Airman Certification Standards	166

Chapter 5

Pilot Certificates, Log Books, Medical, Drugs & Alcohol .. 167

Pilot certificate — category / class / type	168
Aircraft — category / class	168
Flight review (BFR)	169
Basic “ CURRENCY ” requirements	169
Recent flight experience (6 month)	170
Safety pilot	171
Recent flight experience PIC	172, 173
AFM / Limitations / Markings and Placards	174
Documents on board aircraft	175
Certificates required in pilot's possession	175
Logbooks / logging time	176, 177
Logging SIC — Navajo, King Air, Citation	178, 179
Change of address	180
Replacement of airman certificates	180
Falsification of logbooks or records	181
Lost or stolen logbook	181
SIC qualifications	182
Student pilot	183
Sport Pilot, Recreational pilot	184
Private pilot	185
Instrument rating ; instrument currency	186
Commercial pilot	187
Airline Transport Pilot	188, 189
Flight instructor	190, 191
Flight examiner	192
Status of an examiner	192
Cross-country time means	193
Temporary certificate	193
Type rating	194
Complex endorsement	194
High performance endorsement	194
High altitude endorsement	195
Tailwheel endorsement	195
PIC Proficiency Check for a type rating	196
MEDICAL certificate	197
Operations requiring a medical certificate	197
Operations NOT requiring a medical certificate	197
Prohibitions during medical deficiency	198
BasicMed	198
Duration of a medical certificate	199
Vision requirements	199
SODA	200
Lasik eye surgery	200
Contact lenses	200
Eye (required vision)	200
Ear, Nose, Throat, and Equilibrium	201
Mental	201
Neurologic	201
Cardiovascular	201
Diabetes mellitus, General medical condition	201
Kidney stones	201
Hypertension	201

Sleep apnea	201
Special issuance, discretionary issuance	201
Drugs or alcohol	202, 203
Motor vehicle action	202
Speeding tickets	203
Over-The-Counter medications	203
Pulse Oximeter	204

Chapter 6

Weather & NOTAMS 205

<u>Windshear</u> , microburst	206
<u>Thunderstorm</u> avoidance / penetration	207
Extreme turbulence	207
ICE	208, 209
Carburetor icing	210
Frost	211
Rime ice	211
Clear ice	211
Freezing rain	211
Ice pellets	211
Trace, light, moderate, severe icing	211
Ground icing conditions	212
Freezing Point Depressants, de-ice/anti-ice fluids....	212
Holdover times	212
Braking action	213
Contaminated runways	213
"Iced-over" sparkplug electrodes	213
Jet stream	214
Clear Air Turbulence (CAT)	215
Cloud Types, Weather Balloons, Wind chill	216
AWOS vs ASOS	217
METAR vs TAF	218
Ceiling, Virga	218
LAMP vs MOS	218
Limited Aviation Weather Reporting Station	218
METAR identifiers	218
METAR/TAF explanations	219
Wind direction — <u>true</u> north vs <u>magnetic</u>	220
METAR/TAF & flight plan CHEAT-SHEETS	221
Color codes	221
ICAO Flight Plan Form and tables	222
ICAO Flight Plan instructions	223
Standard briefing	223
Abbreviated briefing	223
Outlook briefing	223
Inflight briefing	223
Turbulence reporting criteria	224
AIRMET (WA)	224
SIGMET (WS)	224
Convective SIGMET (WST)	224
Severe weather forecast alerts (AWW).....	224
Center Weather Advisories (CWA)	224
Inflight Weather Advisory Broadcast	224
Pilot reports (PIREP)(UA)(UUA)	225

Radar weather reports (SD)	225
Graphical Forecasts for Aviation (GFA)	225
Winds and temperatures aloft forecast (FD)	225
Convective outlook (AC)	225
Stability chart	225
Radar summary chart	225
Severe weather outlook chart	225
NOTAMs	226, 227
Fog	228
Leidos AFSS	229
Weather Fronts	230

Chapter 7

An Overview of Commercial Operations 231

Commercial Operator aka <u>common carrier</u>	232
Private carriage	232
Commuter	233
On-Demand	233
Domestic	234
Flag	234
Supplemental	234
Scheduled	235
Domestic, Flag, Supplemental, Part 121	235
Part 125	235
Wet Lease vs Dry Lease	236
Part 135 or Part 121 does not apply to	236
Business names	237
Common carriage	237
Noncommon carriage	237
Aircraft requirements	237
Operational control	237
Certificate-Holding District Office (CHDO)	237
Direct air carrier	237
Part 91 vs Part 121 vs Part 135	238, 239
PIC qualifications	240
SIC qualifications	241
SIC required	241
Training, testing & checking—a quick synopsis	242
Passengers during cargo only operations	243
Load manifest (W&B)	243
Load manifest, W&B, recordkeeping	244
Justifiable aircraft equipment	244
Maximum payload capacity	244
Standard average passenger weights	244
Cargo floor limits	244
Weight / Balance and Center of Gravity	245
Pilot recordkeeping—W&B—load manifest	246
COMAT	246
Effects of <u>forward</u> / <u>aft CG</u>	247
Reporting mechanical irregularities	247
Airworthiness check	247
Cargo compartment classification	248
Sterile cockpit	249

Manipulation of controls	249
Admission to flight deck	249
PIC/SIC designation required	249
Fuel supply	250, 251
Destination & alternate airport weather	252, 253
Do you need an alternate?	254
Alternate airport weather minimums	255
People Express Exemption (3585 aka 17347)	256, 257
Takeoff minimums	258, 259
Approach weather required	260
Descent below DH or MDA	260
Approach weather NOT required for Part 91	260
Landing under IFR	261
RVR	261
Approach lighting	262
High minimums captain	263
Special Exemption 5549	263
Arrival at airports with no weather reporting	264
Departing airports with no weather reporting	265
Flight Time & Duty	266-275
Flight locating procedures	276
Regular airport	276
Provisional airports	276
Runway lighting	276
International flights to Mexico or Canada	277
Small & large Aircraft	278
Type rating required	278
Accelerate-STOP Distance	278
Accelerate-GO Distance	278
Landing limitations — 60%, 70%, 80%	279
Effective runway length	279
Large & turbine-powered multiengine	280
Autopilot — minimum altitudes for use	281
Alcoholic beverages	282
Stowage of food, beverage	282
Exit seating	282
Smoking prohibitions	283
Subpart K of Part 91	284, 285
Effect of Subpart K on Part 135	286
Ground Proximity Warning Systems (GPWS)	294
Initial, Transition & Upgrade GROUND training	295
Recurrent training	295
Group I & Group II airplanes	296
Training—Initial, Transition, Upgrade, etc.)	296
Grace month	296
EMERGENCY training	297
Fire extinguishers	297
HAZMAT	298, 299
Company flight instructors	300
Authorized instructor means	300
Check airman	301
CHECKRIDES / TRAINING	302-307
Initial Operating Experience (IOE)	308
Flight attendants	308
Weapons	308
Aircraft tests & inspections	309
100 hour inspection	309
Progressive inspection program	309
Continuous Airworthiness Inspection Program	309
Approved Aircraft Inspection Program (AAIP)	309
Annual inspection	309
VOR check	309
Carriage of firearms / prisoners	309
Service difficulty reports	310
Safety Management System (SMS)	311
Time in service	311
Mechanical interruption summary report	312
Approved Aircraft Inspection Program (AAIP)	312
Operation after maintenance	312
Maintenance required (owner, operator)	312
Operable condition	312
Mechanical irregularity	312
Instruments & equipment required	313
Safety belts	313
Equipment/Performance— extended overwater	314
Extended overwater weather	315
Airborne weather radar	315
TCAS	315
Flashlight	315
Aircraft airworthiness	316
Reporting mechanical irregularities	316
Flight crewmembers at stations	316
Seat belts & shoulder harness	316
Airplane Flight Manual (AFM)	317
Pilot Operating Handbook (POH)	317
Limitations / Markings / Placards	317
Minimum Equipment List (MEL)	318-321
Configuration Deviation List (CDL)	320
Inoperative means	320
Ferry permit (special flight permit)	322, 323
Pilot Records Database / Pilot record sharing	324
Access investigation check (airport badge)	325
Closing & locking of flightcrew door	325
Aircraft dispatcher	326
Age	327
Alternate Decision Tree	328

Chapter 8

More Commercial Stuff.....287	
Operations Specifications	288
Operations Manual (GOM)	289, 290
Management personnel qualifications	291
Ramp check	292
Checklists	293
Charts	293
Performance data	293
Passenger occupancy of pilot seat	293
Briefing of passengers before takeoff	293
Proving runs	294
Cockpit Voice Recorder (CVR)	294
Flight Data Recorder (FDR)	294

Chapter 9

Emergencies & Legal 329

Compliance with ATC clearances	330
Deviating from a rule due to an <u>emergency</u>	330
Confirm it!	330
Do not mumble	330
EMERGENCY —allowed to immediately <u>deviate</u>	330
EMERGENCY	331
Responsibility and <u>authority</u> of the PIC	331
Engine failure	332, 333
Critical engine	333
Accelerate-STOP / Accelerate-GO	333
Area of decision	333
Single-engine service ceiling.....	333
Single-engine absolute ceiling	333
Driftdown	333
V_{MC}	334
Left engine is critical because	335
How to CRASH an airplane w/ <u>spare engine</u>	336
Common multiengine accident scenarios	336
Emergency equipment	337
Fire extinguisher	337
First aid kits	337
Megaphone	337
Minimum fuel advisory	337
Immediately	337
Emergency	337
Emergency frequencies	337
Priority	337
Mayday	337
Pan-pan	337
Emergency Locator Transmitter (ELT)	338
ELT changes in the works.....	339
NASA reports	340
Aviation safety reporting program	340
Careless or reckless operation	340
Voluntary Disclosure Reporting Program.....	341
Enforcement action.....	342, 343
Accident or incident	344
Major or minor damage	344
Notification of accidents	345
Notification of incidents & overdue aircraft.....	345
NTSB phone numbers.....	345
Preservation of Wreckage; reports	345
AIM — <u>only</u> an <u>advisory?</u> ?	346
Copies of ATC Tower/Center tapes	346
FAA “Hot Line”	346

Chapter 10

Miscellaneous, Definitions, Aerodynamics & Trivia 347

Piper — Numbers & Names.....	348
Aircraft ID plates and N-numbers	348
Beechcraft — Numbers & Names	349
Non-aeronautical use of <u>hangars</u>	349
Hypoxia	350
Hyperventilation	350
Carbon Monoxide	350
Ear block.....	350
Air ambulance flights — “MEDEVAC”	350
Aerodynamics	351-353
Forces acting on an aircraft in flight	351
Angle of attack	351
Angle of incidence	351
Camber	351
Chord or chord line	351
Relative wind	351
Wing planform	351
Aspect ratio.....	351
Lift-Drag ratio — L/D.....	351
Gravity	352
Center of Gravity	352
Bernoulli	352
Center of lift	352
Center of pressure	352
Drag	352
Induced drag	352
Effect of air density on lift and drag	352
Effect of altitude, temperature & humidity	352
Parasite drag	353
Form drag	353
Skin friction drag	353
Interference drag	353
Angle of attack and lift	353
Critical angle of attack	353
Load factor	353
Flaps/Slots/Slats & Boundary layer control ...	354, 355
Plain flap	355
Split flap	355
Slotted flap	355
Fowler flap	355
Aerodynamic twisting caused by flap	355
Fixed slot	355
Automatic slot	355
Boundary layer control	355
Laminar flow	356
Boundary layer	356
Reynolds number	356
Adverse vs. Proverse Yaw	357
Dutch roll	357
Yaw damper	357
Trim tabs.....	357

Service ceiling	358
All engine service ceiling	358
Single-engine service ceiling	358
Certified ceiling	358
Maximum certified ceiling	358
Maximum certified altitude	358
Absolute ceiling	358
Single-engine absolute ceiling	358
Driftdown	358
Fastest and highest flying airplane	358
Contrails	358
Pilot In Command	359
Pilot In Command seating position	359
Helicopter controls	359
Active pilots in the United States	359
Wilco	359
Tango	359
Flight check	359
Manifold pressure / constant speed propeller	360
Supercharged / turbocharged engines	361
Horsepower	362
Wattage vs Kilowatts vs Horsepower	362
Power and weight	362
Brake horsepower	362
Shaft horsepower	362
Major Repair and Alteration, STC, TSO	363
TBO , Time in service, PMA	364
Preventive maintenance	365
Oil — mineral vs. ashless dispersant	366
Oil — viscosity	366
Shock cooling piston engines	366
Magnetics	367
Radar reflectors	367
Notice of Proposed Rule Making (NPRM)	368
Shadows	368
Mountains	368
Empire State building	368
Visibility and the Earth's horizon	368
Charts, radar reflectors, runway length	369
Night — four definitions	370
Aircraft lights	371
Hydroplaning	372
Test to detect contamination of jet fuel	373
Specific Gravity	373
Control towers	373
Aircraft [weight] classes (heavy, large, small)	373
Crosswinds	373
Simulators	374, 375
Unmanned Aircraft Systems (UAS) (aka Drones)	376

Chapter 11

Reference, Rules of Thumb, Conversions..... 377

ICAO airport identifier country prefix	378
Aircraft country registration number codes	378
Airport identifier logic	379
A few interesting identifiers	379
ZULU time	380
Piston engine detonation / preignition	381
Fuel & fluid colors	381
Draining fuel sumps	381
Cutouts (placards)	382
°C to °F (placard)	382
Reciprocals (placard)	382
TAKEOFF mnemonic	382
Flight plan (wallet-sized)	382
Measurements (1/64-1/32-3/64-1/16, etc.)	382
Spin recovery — PARE	382
SHUTDOWN mnemonic	382
Quickie conversions	383
POUNDS to GALLONS	383
POUNDS of Jet A to LITERS	383
CELSIUS to FAHRENHEIT	383
Liquid measures (ounce, cup, pint, quart, etc.)	383
Radio call	383
Acre	383
Reciprocals—22 Rule	383
Fuel weight	384
Conversions, Formulas & Weights	385
Formulas & Rules of Thumb	386-389
Conversion Tables	390-394

Chapter 12

Lengel's Radio Manual 395

Key Words to Avoid	397
Clearance — Large Airports	398-400
Taxi / Takeoff / Departure	401
Enroute	402-404
Approaching your Destination	405-406
Approach & Landing	407-409
IFR arrival at a small uncontrolled airport	408
VFR arrival at a large, Class B or C Airport	409
Emergencies	410-411
Miscellaneous	412

INDEX 413