JAR PPL(A)
Theory Training Program

JAR PPL (A) Theory Training Program

This theory training program is in accordance with JAR-FCL 1.125 (1.12.2006) and its national additional pages, JAR-FCL 1.125 appendix 1 (1.12.2006), AMC FCL 1.125 (1.12.2006) and national regulations TRG M1-1 (11.12.1999), TRG M1-11 (19.11.2007), TRG T1-17 (11.12.1992) and PEL M2-92 (19.11.2007).

Aim of this training program

After this theory course student shall have good knowledge and understanding of aviation theory subjects on the level that is required from a Private Pilot License holder. Teachers shall give students the best possible tools and guidance for self studying and absorbing the required knowledge and airmanship.

Contents of the training program

This training program contains the following subjects and amounts of lessons.
One lesson is 50 minutes long. Each subject has 1 lesson exam and 1 lesson feedback or in smaller subjects only 1 lesson of combined exam and feedback included in the number of lessons. FCAA examinatios are not part of this training program.

Subject	Number of lessons	
010 Air law	15+1+1	= 17
020 Aircraft General Knowledge	18+1+1	= 20
030 Flight Planning and Performance	8+1+1	= 10
040 Human Performance and Limitations	5+1	= 6
050 Meteorology	13+1+1	= 15
060 Navigation	18+1+1	= 20
070 Operational Procedures	8+1+1	= 10
080 Principles of Flight	13+1+1	= 15
090 Communications	10+1+1	= 12
Basic instrument flying	4+1	= 5
Aircraft type theory	4+1	= 5
Total amount of lessons		= 135 lessons = 112h 30min

Theory training rules and limitations

This theory training syllabys should be completed before any flight training is commenced.

After each subject an exam is held to test the level of students knowledge and understanding.

Before taking an exam student shall have completed all theory lessons of that subject and compensated possible absences.

In case student fails a re-exam he/she must have at least 2 lessons of rehersal training before next re-exam.

To pass the exam student must answer correct at least 75% of the questions in the exams. In each exam there shall be at least 20 questions, so that one wrong answer doesn't degrade the result of the exam more than 5 %. In case the number of questions in an exam is such that none of the possible results gives a result of exactly 75%, then the amount of correct answers that gives more than 75% is the lowest one to pass the exam.

Teachers must fill up documentation of all theory training immediately after training.

Credit given for previous flight experience

In case student has a valid pilots license or previous certified theory studies they can be credited according to JAR FCL 1.050 (1.12.2006) and JAR FCL 1.050 Appendix 1 (1.12.2006).

Additional training/absence compensation

100% attendance is required for all theory training. In case student is absent from theory lessons, they have to be, either held separately or to be studied with another theory course.

All extra lessons must be documented by the teacher.

010 Air Law **15 lessons + exam + feedback**

In this subject in addition to the items listed below following subjects shall be added:

- Finnish aviation regulations
- Regulations concerning private aviation, private aviation insurances, availability of aerodromes for different operations
- Regulations concerning international flights (customs, passport control, international airports)
- Aircraft refuelling regulations

Legislation

1 The Convention on International Civil Aviation

2 The International Civil Aviation Organisation

3 Articles of the Convention

1 Sovereignty
2 Territory
5 Flight over territory of Contracting States
10 Landing at customs airports
11 Applicability of air regulations
12 Rules of the air
13 Entry and clearance regulations of Contracting States
16 Search of aircraft
22 Facilitation of formalities
23 Customs and immigration procedures
24 Customs duty
29 Documents to be carried in aircraft
30 Use of aircraft radio equipment
31 Certificate of airworthiness
32 Licences of personnel
33 Recognition of certificates and licences
34 Journey log books
35 Cargo restrictions
36 Restrictions on use of photographic equipment
37 Adoption of international standards and procedures
39 Endorsement of certificates and licences
40 Validity of endorsed certificates and licences

4 Annexes to the Convention ('ICAO Annexes')

Annex 7 Aircraft nationality and registration marks
– definitions
– aircraft registration marks
– certificate of registration
– identification plate

Annex 8 Airworthiness of aircraft
- definitions
- certificate of airworthiness
- continuing airworthiness
- validity of certificate of airworthiness
- instruments and equipment
- aircraft limitations and information

Rules of the air

Annex 2 Rules of the air
- definitions
- applicability
- general rules
- visual flight rules
- signals (Appendix 1)
- interception of civil aircraft (Appendix 2)

Air traffic regulations and air traffic services

Annex 11 Air traffic regulations and air traffic services
- definitions
- objectives of air traffic services
- classification of airspace
- flight information regions, control areas and control zones
- air traffic control services
- flight information services
- alerting service
- visual meteorological conditions
- instrument meteorological conditions
- in-flight contingencies

Annex 14 Aerodrome data
- definitions
- conditions of the movement area and related facilities
- Visual aids for navigation
- indicators and signalling devices
- markings
- lights
- signs
- markers
- signal area
- Visual aids for denoting obstacles
- marking of objects
- lighting of objects
- Visual aids for denoting restricted use of areas
- Emergency and other services
- fire and rescue service
- apron management service
- Aerodrome ground lights and surface marking colours
- colours for aeronautical ground lights
- colours for surface markings

5 ICAO Document 4444 – Rules of the air and air traffic services

General provisions
- definitions
- ATS operating practices
- flight plan clearance and information
- control of air traffic flow
- altimeter setting procedures
- wake turbulence information
- meteorological information
- air reports (AIREP)

Area control service
- separation of controlled traffic in the various classes of airspace
- pilots, responsibility to maintain separation in VMC
- emergency and communications failure procedures by the pilot
- interception of civil aircraft

Approach control service
- departing and arriving aircraft procedures in VMC

Aerodrome control service
- function of aerodrome control towers
- VFR operations
- traffic and circuit procedures
- information to aircraft
- control of aerodrome traffic

Flight information and alerting service
- air traffic advisory service
- objectives and basic principles

JAA regulations

6 Joint Aviation Authorities (JAA) Regulations (JAR)

JAR–FCL Subpart A – General requirements
- 1.025 – Validity of licences and ratings
- 1.035 – Medical fitness
- 1.040 – Decrease in medical fitness
- 1.050 – Crediting of flight time
- 1.065 – State of Licence issue

JAR–FCL Subpart B – Student pilot
- 1.085 – Requirements
- 1.090 – Minimum Age
- 1.095 – Medical fitness

JAR–FCL Subpart C – Private pilot licence
- 1.100 – Minimum Age
- 1.105 – Medical fitness
- 1.110 – Privileges and conditions
- 1.115 – Ratings for special purposes
- 1.120 – Experience and Crediting
- 1.125 – Training course
- 1.130 – Theoretical knowledge examination
- 1.135 – Skill test

JAR–FCL Subpart E – Instrument rating
- 1.175 – Circumstances in which an instrument rating is required

JAR–FCL Subpart F – Type and Class Ratings
- 1.215 – Division of Class Ratings
- 1.225 – Circumstances in which type or class ratings are required
- 1.245 – Validity, revalidation and renewal

JAR–FCL Subpart H – Instructor ratings
- 1.300 – Instruction – general

020 Aircraft General Knowledge 18 lessons + exam + feedback

In this subject in addition to the items listed below following subjects shall be added:

- Basic knowledge of hydraulic systems
- Main components
- Hydraulic systems of the aircraft type used in training

- Basic knowledge of anti- and deicing system (rubber boots, bleed air systems, alcohol based systems, electrically heated systems)

Airframe

7 Airframe structure
- components
- fuselage, wings, tailplane, fin
- primary flying controls
- trim and flap/slat systems
- landing gear
- nose wheel, including steering
- tyres, condition
- braking systems and precautions in use
- retraction systems

8 Airframe loads
- static strength
- safety factor
- control locks and use
- ground/flight precautions

Powerplant

9 Engines – general
- principles of the four stroke internal combustion engine
- basic construction
- causes of pre-ignition and detonation
- power output as a function of RPM

10 Engine cooling
- air cooling
- cowling design and cylinder baffles
- design and use of cowl flaps
- cylinder head temperature gauge

11 Engine lubrication
- function and methods of lubrication
- lubrication systems
- methods of oil circulation
- oil pump and filter requirements
- qualities and grades of oil
- oil temperature and pressure control
- oil cooling methods
- recognition of oil system malfunctions

12 Ignition systems

– principles of magneto ignition
– construction and function
– purpose and principle of impulse coupling
– serviceability checks, recognition of malfunctions
– operational procedures to avoid spark plug fouling

13 Carburation

– principles of float type carburettor
– construction and function
– methods to maintain correct mixture ratio
– operation of metering jets and accelerator pump
– effect of altitude
– manual mixture control
– maintenance of correct mixture ratio
– limitation on use at high power
– avoidance of detonation
– idle cut-off valve
– operation and use of primary controls
– air induction system
– alternate induction systems
– carburettor icing, use of hot air
– injection systems, principles and operation

14 Aero engine fuel

– classification of fuels
– grades and identification by colour
– quality requirements
– inspection for contamination
– use of fuel strainers and drains

15 Fuel systems

– fuel tanks and supply lines
– venting system
– mechanical and electrical pumps
– gravity feed
– tank selection
– system management

16 Propellers

– propeller nomenclature
– conversion of engine power to thrust
– design and construction of fixed pitch propeller
– forces acting on propeller blade
– variation of RPM with change of airspeed
– thrust efficiency with change of speed
– design and construction of variable pitch propeller
– constant speed unit operation
– effect of blade pitch changes
– windmilling effect

17 Engine handling
- starting procedures and precautions
- recognition of malfunctions
- use of pre heating at winter time
- warming up, power and system checks
- oil temperature and pressure limitations
- cylinder head temperature limitations
- ignition and other system checks
- power limitations
- avoidance of rapid power changes
- use of mixture control

Systems

18 Electrical system
- installation and operation of alternators/generators
- direct current supply
- batteries, capacity and charging
- voltmeters and ammeters
- circuit breakers and fuses
- electrically operated services and instruments
- recognition of malfunctions
- procedure in the event of malfunctions

19 Vacuum system
- components
- pumps
- regulator and gauge
- filter system
- recognition of malfunction
- procedures in the event of malfunctions

Instruments

20 Pitot/static system
- pitot tube, function
- pitot tube, principles and construction
- static source
- alternate static source
- position error
- system drains
- heating element
- errors caused by blockage or leakage

21 Airspeed indicator
- principles of operation and construction
- relationship between pitot and static pressure
- definitions of indicated, calibrated and true airspeed
- instrument errors
- airspeed indications, colour coding
- pilot's serviceability checks

22 Altimeter
- – principles of operation and construction
- – function of the sub-scale
- – effects of atmospheric density
- – pressure altitude
- – true altitude
- – international standard atmosphere
- – flight level
- – presentation (three needle)
- – instrument errors
- – pilot's service ability checks

23 Vertical speed indicator
- – principles of operation and construction
- – function
- – inherent lag
- – instantaneous VSI
- – presentation
- – pilot's serviceability checks

24 Gyroscopes
- – principles
- – rigidity
- – precession

25 Turn indicator
- – rate gyro
- – purpose and function
- – effect of speed
- – presentation
- – turn co-ordinator
- – limited rate of turn indications
- – power source
- – balance indicator
- – principle
- – presentation
- – pilot's serviceability checks

26 Attitude indicator
- – earth gyro
- – purpose and function
- – presentations
- – interpretation
- – operating limitations
- – power source
- – pilot's serviceability checks

27 Heading indicator
- – directional gyro
- – purpose and function
- – presentation
- – use with magnetic compass
- – setting mechanism
- – apparent drift
- – operating limitations
- – power source
- – pilot's serviceability checks
- – Remote indicating compasses and basics of their operation and use

28 Magnetic compass
- – construction and function
- – earth's magnetic field
- – variation and deviation
- – turning, acceleration errors
- – precautions when carrying magnetic items
- – pilot's service ability checks

29 Engine instruments
- – principles, presentation and operational use of:
- – oil temperature gauge
- – oil pressure gauge
- – cylinder head temperature gauge
- – exhaust gas meter
- – manifold pressure gauge
- – fuel pressure gauge
- – fuel flow gauge
- – fuel quantity gauge(s)
- – tachometer
- – induction air temperature / mixture temperature

30 Other instruments
- – principles, presentation and operational use of:
- – vacuum gauge
- – voltmeter and ammeter
- – warning indicators
- – others relevant to aeroplane type

Airworthiness

31 Airworthiness
- – certificate to be in force
- – compliance with requirements
- – periodic maintenance inspections
- – compliance with flight manual (or equivalent), instructions, limitations, placards
- – flight manual supplements
- – provision and maintenance of documents
- – aeroplane, engine and propeller log books
- – recording of defects
- – permitted maintenance by pilots

030 Flight Planning and Performance 8 lessons + exam + feedback

Mass and balance

32 Mass and balance
- limitations on maximum mass
- forward and aft limitations of centre of gravity, normal and utility operation
- mass and centre of gravity calculations – aeroplane manual and balance sheet

Performance

33 Take-off
- take-off run and distance available
- take-off and initial climb
- effects of mass, wind and density altitude
- effects of ground surface and gradient
- use of flaps

34 Landing
- effects of mass, wind, density altitude and approach speed
- use of flaps
- ground surface and gradient

35 In flight
- relationship between power required and power available
- performance diagram
- maximum rate and maximum angle of climb
- range and endurance
- effects of configuration, mass, temperature and altitude
- reduction of performance during climbing turns
- gliding
- adverse effects
- icing, rain
- condition of the airframe
- effect of flap

040 Human Performance and Limitations 5 lessons + exam

Basic physiology

36 Concepts
- composition of the atmosphere
- the gas laws
- respiration and blood circulation

37 Effects of partial pressure
- effect of increasing altitude
- gas transfer
- hypoxia
- symptoms
- prevention
- cabin pressurisation
- effects of rapid decompression
- time of useful consciousness
- the use of oxygen masks and rapid descent
- hyperventilation
- symptoms
- avoidance
- effects of accelerations

38 Vision
- physiology of vision
- limitations of the visual system
- vision defects
- optical illusions
- spatial disorientation
- avoidance of disorientation

39 Hearing
- physiology of hearing
- inner ear sensations
- effects of altitude change
- noise and hearing loss
- protection of hearing
- spatial disorientation
- conflicts between ears and eyes
- prevention of disorientation

40 Motion sickness
- causes
- symptoms
- prevention

41 Flying and health
- – medical requirements
- – effect of common ailments and cures
- – colds
- – stomach upsets
- – drugs, medicines, and side effects
- – alcohol
- – fatigue
- – personal fitness
- – passenger care
- – scuba diving – precautions before flying

42 Toxic hazards
- – dangerous goods
- – carbon monoxide from heaters

Basic psychology

43 The information process
- – concepts of sensation
- – cognitive perception
- – expectancy
- – anticipation
- – habits

44 The central decision channel
- – mental workload, limitations
- – information sources
- – stimuli and attention
- – verbal communication
- – memory and its limitations
- – causes of misinterpretation

45 Stress
- – causes and effects
- – concepts of arousal
- – effects on performance
- – identifying and reducing stress

46 Judgement and decision making
- – concepts of pilots' judgement
- – psychological attitudes
- – behavioural aspects
- – risk assessment
- – development of situational awareness

050 Meteorology 13 lessons + exam + feedback

47 The atmosphere
- composition and structure
- vertical divisions

48 Pressure, density and temperature
- barometric pressure, isobars
- changes of pressure, density and temperature with altitude
- altimetry terminology
- solar and terrestrial energy radiation, temperature
- diurnal variation of temperature
- adiabatic process
- temperature lapse rate
- stability and instability
- effects of radiation, advection subsidence and convergence

49 Humidity and precipitation
- water vapour in the atmosphere
- vapour pressure
- dew point and relative humidity
- condensation and vaporisation
- precipitation

50 Pressure and wind
- high and low pressure areas
- motion of the atmosphere, pressure gradient
- vertical and horizontal motion, convergence, divergence
- surface and geostrophic wind
- effect of wind gradient and windshear on take-off and landing
- relationship between isobars and wind, Buys Ballot's law
- turbulence and gustiness
- local winds, föhn, land and sea breezes

51 Cloud formation
- cooling by advection, radiation and adiabatic expansion
- cloud types
- convection clouds
- orographic clouds
- stratiform and cumulus clouds
- flying conditions in each cloud type

52 Fog, mist and haze
- radiation, advection, frontal, freezing fog
- formation and dispersal
- reduction of visibility due to mist, snow, smoke, dust and sand
- assessment of probability of reduced visibility
- hazards in flight due to low visibility, horizontal and vertical

53 Airmasses
- description of and factors affecting the properties of airmasses
- classification of airmasses, region of origin
- modification of airmasses during their movement
- development of low and high pressure systems
- weather associated with pressure systems

54 Frontology
- formation of cold and warm fronts
- boundaries between airmasses
- development of a warm front
- associated clouds and weather
- weather in the warm sector
- development of a cold front
- associated clouds and weather
- occlusions
- associated clouds and weather
- stationary fronts
- associated clouds and weather

55 Ice accretion
- conditions conducive to ice formation
- effects of hoar frost, rime ice, clear ice
- effects of icing on aeroplane performance
- precautions and avoidance of icing conditions
- powerplant icing
- precautions, prevention and clearance of induction and carburettor icing

56 Thunderstorms
- formation – airmass, frontal, orographic
- conditions required
- development process
- recognition of favourable conditions for formation
- hazards for aeroplanes
- effects of lightning and severe turbulence
- avoidance of flight in the vicinity of thunderstorms

57 Flight over mountainous areas
- hazards
- influence of terrain on atmospheric processes
- mountain waves, windshear, turbulence, vertical movement, rotor effects, valley winds

58 Climatology
- general seasonal circulation in the troposphere over Europe
- local seasonal weather and winds

59 Altimetry
- operational aspects of pressure settings
- pressure altitude, density altitude
- height, altitude, flight level
- ICAO standard atmosphere
- QNH, QFE, standard setting
- transition altitude, layer and level

60 The meteorological organisation
- – aerodrome meteorological offices
- – aeronautical meteorological stations
- – forecasting service
- – meteorological services at aerodromes
- – availability of periodic weather forecasts

61 Weather analysis and forecasting
- – weather charts, symbols, signs
- – significant weather charts
- – prognostic charts for general aviation

62 Weather information for flight planning
- – reports and forecasts for departure, en-route, destination and alternate(s)
- – interpretation of coded information METAR, TAF, GAFOR
- – availability of ground reports for surface wind, windshear, visibility

63 Meteorological broadcasts for aviation
- – VOLMET, ATIS, SIGMET

060 Navigation 18 lessons + exam + feedback

64 Form of the earth
- axis, poles
- meridians of longitude
- parallels of latitude
- great circles, small circles, rhumb lines
- hemispheres, north/south, east/west

65 Mapping
- aeronautical maps and charts (topographical)
- projections and their properties
- conformality
- equivalence
- scale
- great circles and rhumb lines

66 Conformal orthomorphic projection (ICAO 1.500,000 chart)
- main properties
- construction
- convergence of meridians
- presentation of meridians, parallels, great circles and rhumb lines
- scale, standard parallels
- depiction of height

67 Direction
- true north
- earth's magnetic field, variation – annual change
- magnetic north
- vertical and horizontal components
- isogonals, agonic lines

68 Aeroplane magnetism
- magnetic influences within the aeroplane
- compass deviation
- turning, acceleration errors
- avoiding magnetic interference with the compass

69 Distances
- units
- measurement of distance in relation to map projection

70 Charts in practical navigation
- plotting positions
- latitude and longitude
- bearing and distance
- use of navigation protractor
- measurement of tracks and distances

71 Chart reference material/map reading

– map analysis
– topography
– relief
– cultural features
– permanent features (e.g. line features, spot features, unique or special features)
– features subject to change (e.g. water)
– preparation
– folding the map for use
– methods of map reading
– map orientation
– checkpoint features
– anticipation of checkpoints
– with continuous visual contact
– without continuous visual contact
– when uncertain of position
– aeronautical symbols
– aeronautical information
– conversion of units

72 Principles of navigation

– IAS, CAS and TAS
– track, true and magnetic
– wind velocity, heading and groundspeed
– triangle of velocities
– calculation of heading and groundspeed
– drift, wind correction angle
– ETA
– dead reckoning, position, fix

73 The navigation computer

– use of the circular slide rule to determine
– TAS, time and distance
– conversion of units
– fuel required
– pressure, density and true altitude
– time en-route and ETA
– use of the computer to solve triangle of velocities
– application of TAS and wind velocity to track
– determination of heading and ground speed
– drift and wind correction angle

74 Time

– relationship between universal co-ordinated (standard) (UTC) time and local mean time (LMT)
– definition of sunrise and sunset times

75 Flight planning
- – selection of charts
- – route and aerodrome weather forecasts and reports
- – assessing the weather situation
- – plotting the route
- – considerations of controlled/regulated airspace, airspace restrictions, danger areas, etc.
- – use of AIP and NOTAMS
- – ATC liaison procedures in controlled/regulated airspace
- – fuel considerations
- – en-route safety altitude(s)
- – alternate aerodromes
- – communications and radio/navaid frequencies
- – compilation of flight log
- – compilation of ATC flight plan
- – selection of check points, time and distance marks
- – mass and balance calculations
- – mass and performance calculations

76 Practical navigation
- – compass headings, use of deviation card
- – organisation of in-flight workload
- – departure procedure, log entries, altimeter setting and establishing IAS
- – maintenance of heading and altitude
- – use of visual observations
- – establishing position, checkpoints
- – revisions to heading and ETA
- – arrival procedures, ATC liaison
- – completion of flight log and aeroplane log entries

Radio navigation

77 Ground D/F
- – application
- – principles
- – presentation and interpretation
- – coverage
- – errors and accuracy
- – factors affecting range and accuracy

78 ADF, including associated beacons (NDBs) and use of the RMI
- – application
- – principles
- – presentation and interpretation
- – coverage
- – errors and accuracy
- – factors affecting range and accuracy

79 VOR/DME/ILS
- – application
- – principles
- – presentation and interpretation
- – coverage
- – errors and accuracy
- – factors affecting range and accuracy
- – Operation and use of HSI
- – Marker beacons

80 GPS
- – application
- – principles
- – presentation and interpretation
- – coverage
- – errors and accuracy
- – factors affecting reliability and accuracy

81 Ground radar
- – application
- – principles
- – presentation and interpretation
- – coverage
- – errors and accuracy
- – factors affecting reliability and accuracy

82 Secondary surveillance radar
- – principles (transponders)
- – application
- – presentation and interpretation
- – modes and codes

070 Operational Procedures 8 lessons + exam + feedback

83 ICAO Annex 6, Part II – Operation of aircraft
- – foreword
- – definitions
- – general statement
- – flight preparation and in-flight procedures
- – performance and operating limitations
- – instruments and equipment
- – communications and navigation equipment
- – maintenance
- – flight crew
- – lights to be displayed

84 ICAO Annex 12 – Search and rescue
- – definitions
- – alerting phases
- – procedures for pilot-in-command (para 5.8 and 5.9)
- – search and rescue signals (para 5.9 and Appendix A)

85 ICAO Annex 13 – Aircraft accident investigation
- – definitions
- – national procedures

86 Noise abatement
- – general procedures
- – application to take-off and landing

87 Contravention of aviation regulations
- – offences
- – penalties

General flight safety

107 Aeroplane
- – seat adjustment and security
- – harnesses and seat belts
- – emergency equipment and its use
- – fire extinguisher
- – engine/cabin fires
- – de-icing systems
- – survival equipment, life jackets, life rafts
- – carbon monoxide poisoning
- – refuelling precautions
- – flammable goods/pressurised containers
- – ELT transmitters
- – Reporting of incidents and accidents (GEN M1-4), reporting of technical defects

108 Operational

– wake turbulence
– aquaplaning
– windshear, take-off, approach and landing
[– clearance to cross or enter runway (avoidance of runway incursions)**]**
– passenger briefings
– emergency exits
– evacuation from the aeroplane
– forced landings
– gear-up landing
– ditching

080 Principles of Flight 13 lessons + exam + feedback

88 The atmosphere
- composition and structure
- ICAO standard atmosphere
- atmospheric pressure

89 Airflow around a body, sub-sonic
- air resistance and air density
- boundary layer
- friction forces
- laminar and turbulent flow
- Bernoulli's principle – venturi effect

90 Airflow about a two dimensional aerofoil
- airflow around a flat plate
- airflow around a curved plate (aerofoil)
- description of aerofoil cross section
- lift and drag
- Cl and Cd and their relationship to angle of attack

91 Three dimensional flow about an aerofoil
- aerofoil shapes and wing planforms
- induced drag
- downwash angle, vortex drag, ground effect
- aspect ratio
- parasite (profile) drag
- form, skin friction and interference drag
- lift/drag ratio

92 Distribution of the four forces
- balance and couples
- lift and mass
- thrust and drag
- methods of achieving balance

93 Flying controls
- the three planes
- pitching about the lateral axis
- rolling about the longitudinal axis
- yawing about the normal axis
- effects of the elevators (stabilators), ailerons and rudder
- control in pitch, roll and yaw
- cross coupling, roll and yaw
- mass and aerodynamic balance of control surfaces

94 Trimming controls
- basic trim tab, balance tab and anti-balance tab
- purpose and function
- method of operation

95 Flaps and slats
- – simple, split, slotted and Fowler flaps
- – purpose and function
- – operational use
- – slats, leading edge
- – purpose and function
- – normal/automatic operation

96 The stall
- – stalling angle of attack
- – disruption of smooth airflow
- – reduction of lift, increase of drag
- – movement of centre of pressure
- – symptoms of development
- – aeroplane characteristics at the stall
- – factors affecting stall speed and aeroplane behaviour at the stall
- – stalling from level, climbing, descending and turning flight
- – inherent and artificial stall warnings
- – recovery from the stall

97 Avoidance of spins
- – wing tip stall
- – the development of roll
- – recognition at the incipient stage
- – immediate and positive stall recovery

98 Stability
- – definitions of static and dynamic stability
- – longitudinal stability
- – centre of gravity effect on control in pitch
- – lateral and directional stability
- – interrelationship, lateral and directional stability

99 Load factor and manoeuvres
- – structural considerations
- – manoeuvring and gust envelope
- – limiting load factors, with and without flaps
- – changes in load factor in turns and pull-ups
- – manoeuvring speed limitations
- – in-flight precautions

100 Stress loads on the ground
- – side loads on the landing gear
- – landing
- – Taxiing, precautions during turns

090 Communications 10 lessons + exam + exam

In this subject the items listed below must all be met. JAR-FCL requirements are extended with national requirements based on TRG T1-17 (11.12.1992).

Of this subject there has to be two different examinations.

- Written exam concerning electris, radio equiments, regulations concerning radiotelephony and use of radio equipments.
- Oral RTF exam to test that student is capable of handling normal RTF-communication situations and emergency- and urgency RTF as far as it is required from a PPL (A) holder.

JAR-FCL items

101 Radio telephony and communications
- use of AIP and frequency selection
- microphone technique
- phonetic alphabet
- station/aeroplane callsigns/abbreviations
- transmission technique
- use of standard words and phrases
- listening out
- required 'readback' instructions

102 Departure procedures
- radio checks
- taxi instructions
- holding on ground
- departure clearance

103 En-route procedures
- frequency changing
- position, altitude/flight level reporting
- flight information service
- weather information
- weather reporting
- procedures to obtain bearings, headings, position
- procedural phraseology
- height/range coverage

[– vertical situational awareness (avoidance of controlled flight into terrain).**]**

104 Arrival and traffic pattern procedures
- arrival clearance
- calls and ATC instructions during the:
- circuit
- approach and landing
- vacating runway

105 Communications failure
- – Action to be taken
- – alternate frequency
- – serviceability check, including microphone and headphones
- – in-flight procedures according to type of airspace

106 Distress and urgency procedures
- – distress (Mayday), definition and when to use
- – frequencies to use
- – contents of Mayday message
- – urgency (Pan), definition and when to use
- – frequencies to use
- – relay of messages
- – maintenance of silence when distress/urgency calls heard
- – cancellation of distress/urgency

TRG T1-17 (11.12.1992) items

Levels on which the items are required to be handled by the student are listed below. The required levels are marked after each subject.

A: Student has the very basic knowledge to understand the principles of this subject.
B: Basic level of understanding. Student knows the subjects or procedure.
C: Understanding and ability to operate.Student understands and can apply his/her knowledge to practical action on required level and he/she has passed the exam.
D: Complete knowledge and understanding.Student has passed the exam.

1.1 Aeroplane radio- and electrical equipments
1.1.1 Basics of electrics and radio technics B
- voltage
- current
- resistance
- power
- frequency
- radio frequencies
- radiowaves
- modulation

1.1.2 Aeroplane electric system C
- fuses
- circuit breakers
- generator and its capasity
- ammeter and voltage indicator
- battery and its capasity
- amounts of current in aeroplane electrical and radio equipments
- wires and wire connections
- switches

1.1.3 Equipment components C

- transmitter
- receiver
- antenna
- powersource
- speakers and headphones
- microphone
- cables and joints
- fuses and circuit breakers
- audiopanel
- intercom

1.1.4 Switches, selectors, adjustments and use of equipments C

- master switch
- frequency selector
- volume
- squelch
- transmit button
- audiopanels
- use of intercom
- use of headphones

1.1.5 Principles of achieving radio contact and factors affecting B

- radio wave propagation
- basic principles
- radio range and factors affecting into it
- antenna type and direction of transmission
- ground reflections

1.1.6 Most common failures and malfunctions B

- Transmitter induced interference to outsiders
- bias transmissions
- receiver interference
- speach distortion
- frequency errors
- tuning errors
- acoustic circulation
- squealing
- jamming of the trasmit button
- transmitter jamming (continues unwanted transmitting)
- loose joints in cables
- failures caused by the electrical system
- failures caused by wrong use of audiopanel

1.1.7 Regulations concerning radio equipments and their use C

- station license
- type certification of radio equipments
- radio equipment checks during aircraft inspection
- international agreements
- radio telephony privilege
- radio telephony secracy and restrictions in use of acquired information
- radiotelephony discipline and importance of it
- frequency bands used in aviation altitudes allowed for the frequencies
- use of other transmitters inside an aircraft (mobile phones etc.)
- requirements of maintaining a radio contact

1.2 Aviation communications

1.2.1 Communication networks A

- solid networks
- mobile networks

1.2.2 Radio telephony management

a) Technique of using radio telephone D

- establishing contact
- maintaining contact
- changing of frequency
- callsigns
- acknowledgements
- Repeating of phrases and correction of phrases
- Procedures when answer to contact is not received
- ending of radio contact

b) Contents of transmission D

- radio check
- before start up
- before taxiing
- after departure
- position reports and contents
- after landing

c) Automatic broadcasts C

- VOLMET- and ATIS-broadcasts
- weather information
- aerodrome information

d) Emergency signals D

- VHF-frequency 121,5 special status as an international emergency frequency
- contents of emergency transmissions
- "mayday" - and "pan pan"-calls and their use
- privilege of using emergency transmissions
- duty to listen emergency transmissions
- actions when hearing a station transmitting an emergency message
- search- and rescue service duties

e) Search- and rescue transmissions B
- emergency radio beacons
- emergency radios
- cowork with maritime and continental radiostations
- Urgency and warnings transmissions
- Frequencies

f) Breakdown of radio contact D
- Actions when facing an urgency situation
- Procedures when radio contact is only one sided
- Procedures when loosing radio contact completely
- Procedures en route according to clearances
- aeroplane (e.g. Military aircrafts) visual signals given without radio contact
- air traffic control light signals

1.2.3 International Civil Aviation Organisations (ICAO) approved radio telephony phrases, abbreviations, alphabetics and numbers D

Basic Instrument Flying 4 lessons + exam

- Flight instrument indications and interpretation
- Control instruments, performance instruments and navigation instruments
- Correct reading technique of flight instruments, keeping up of complete scanning
- Airplane control and control techniques
    - pitch
    - roll
    - airplane trimming
    - maintaining level flight
    - level turns
    - steep turns
    - timing turns
    - turns into preselected headings
    - climbing & descending
    - recovery from unusual flight attitudes
- Spatial disorientation
- Concept of ”Cross-check”

Aircraft Type Theory 4 lessons + exam

In this subject student shall learn the basic and important knowledge of the SEP(land)-class aircraft that will be used for basic training. At least the following item shall be covered:

- General knowledge of the aeroplane
- Structures and systems
- Powerplant and propeller
- Performance & weight calculations
- Pilots operating handbook
- Checklists
- Airplane preflight inspection
- Special features of the aircraft
- Operation of different systems and equipments
- Emergenccy actions and drills
- Normal operating procedures