

PERSONNEL LICENSING DEVELOPMENTS

*New Clues
for
Investigators*

Brief Outline

- ICAO Expert Panel for Annex 1
- PEL Developments in Australia
- PEL Developments in New Zealand
 - Flight Testing
 - Theory Examinations
- Example Applications
- Future Possibilities

Acknowledgements

- CAANZ
- CASA
- ICAO
- ASL
- Short paper in proceedings



Regulatory control of competency



Almost as old as aviation

✋ First powered flight in 1903

✋ First pilot licences issued in 1909

✋ First international licensing Standards in 1919

Flight Training



- Smith-Barry Syllabus
- War period
- CFS
- Regulatory Requirements
- Stagnation

Are the training requirements outdated?



- Licensing Standards are inventories of knowledge, skill and experience as they were in 1944
- Annex 6 training requirements are also an inventories of knowledge, skill and experience
- National regulations, including the most recent such as JAR, are following the same pattern

Flight Crew Problems

- ICAO Annex 1 is too old
- New Training methodologies
- Not meeting airline requirements
- Negative training
- Too slow
- Pilot shortage

Informal Meeting in Madrid

- Airlines
 - KLM, Lufthansa, SAS, Cathay, & Delta
- Regulators
 - FAA, JAA, TC, SACAA, CAAS, CASA, CAANZ
- Trainers
 - Flight Safety, Embry-Riddle, BAe Flight Training, Massey,
- Organisations
 - IFALPA, IATA, EuroControl, ACNZ, ASL

Current status (following the themes)

- The current ICAO training / licensing standards are an obstacle to the use of the industries best practise
 - only few synthetic training allowed
 - PIC hours required in piston driven small A/C
- New Training methods are not recognised sufficiently
 - Instructional System Development (ISD)
- Developments of SIM and CBT have revolutionised but can not be used to it´s full extend

Current status (cont.)

- Knowledge and skill training is developed that is not relevant for the competence which has to be achieved
 - training aircraft are used that are not relevant for the goal
- Although Crew Co-ordination has been the focus point for the last two decades recruits are trained in single crew aircraft with substantially limited Crew Co-ordination training capacity

Air Navigation Commission

- On 18 October 2001, the ICAO Air Navigation Commission confirmed its earlier decision in principle to conduct an in-depth review of the Personnel Licensing Standards of ICAO and agreed to the establishment of a Panel of experts (the Flight Crew Licensing and Training (FCLT) Panel) to pursue the task. It also agreed on the list of States and International Organizations which will be invited to nominate a member to the FCLT and on its work programme.
- Informal meeting Sept 2002 in Montreal
- First formal meeting of the panel will be in 2003

Expert Panel Members

- Australia, Brazil, Canada, Chile, Egypt, France, Germany, Japan, Mexico, Netherlands, Russian Federation, Singapore, South Africa, United Kingdom, United States,
- International Council of Aircraft Owner and Pilot Associations (IAOPA),
- International Air Transport Association (IATA),
- International Business Aviation Council (IBAC),
- International Federation of Air Line Pilots Associations (IFALPA).

Developments in Australia

- **FLIGHT TESTING**
- **Units of Competency for Aeroplane Pilots**
 - **Private Pilot — Day VFR**
 - **Commercial Pilot —Day VFR**
- Based on Aust. Qualifications Framework
- Helicopter standards underway also.

UNIT: 4. TAKE OFF AEROPLANE (PPL)

Field: Private Pilot Fixed Wing

Description:

Skills and knowledge to complete pre-take-off checks, take-off aeroplane and perform after take-off checks.

Elements	Performance Criteria
<p>4.1 Carry out pre-take-off procedures</p>	<p>Pre take-off checks are completed in accordance with <u>approved checklist</u>.</p> <p>Aeroplane is lined up in the centre of the runway in take off direction and <u>line up checks</u> are carried out in accordance with <u>approved checklist</u>.</p>
<p>4.2 Take-off aeroplane</p>	<ul style="list-style-type: none"> • Take off power is applied, aeroplane is maintained aligned with centre of runway with wings maintained level and rotated at manufacturers recommended speed to achieve planned climb performance. • Aeroplane is configured for nominated climb profile and tracking on centreline of runway is maintained.
<p>4.3 Carry out after take-off procedures</p>	<ul style="list-style-type: none"> • After take-off checks are performed from memory in accordance with <u>approved checklist</u>.

KEY COMPETENCIES

Collect, analyse & organise information	Communicate ideas & information	Plan & organise activities	Work with others and in teams	Use mathematical ideas & techniques	Solve problems	Use technology
2	1	2	1	1	1	2

RANGE OF VARIABLES

Variable	Scope
<p>1. Workplace environment may include</p>	<p>Day Visual Flight Rules operations below 10,000 feet AMSL. Variable weather conditions. Aeroplane with or without mechanical or electric starter, fixed or variable pitch propeller, brakes, flaps, slats or retractable undercarriage, or Approved flight simulator. Crosswind, head or tailwind within the limits of the aeroplane type. Classes of airspace as designated by the regulator. Sealed, gravel or grass runway. Limitations imposed by local noise abatement requirements and curfews.</p>
<p>2. Sources of information may include</p>	<p>CAR/CASR, CAO, AIP, CAAP, Take-off Reference Charts, Operations Manual, Flight Manual/POH, <u>Approved checklist</u>.</p>
<p>3. Regulations/legislation may include but are not limited to</p>	<p>CAR/CASR, CAO.</p>
<p>4. Consistency of performance</p>	<p>When manipulating flight controls during the process of correcting errors, specified flight tolerances may temporarily be exceeded if <u>controlled corrective action</u> is in progress as those tolerances are exceeded. Actions are performed in accordance with relevant legislative requirements, Flight Manual/POH, operations manual, <u>approved checklist</u> or ATC directions. Aeroplane is flown from ground at planned climb speed (+ 5 - 0 kts). Climb is established at planned climb speed (± 5 knots). Climb power is set (± 50 RPM, $\pm 1.0^\circ$MAP). Heading is adjusted to maintain track along extended runway centre line ($\pm 10^\circ$).</p>

EVIDENCE GUIDE



1. Critical aspects of evidence	Assessment must confirm the ability to: compensate for the secondary effects of controls; perform various functions simultaneously as required; interpret windsock indications; comply with air traffic instructions; maintain awareness of the circuit traffic situation, and manage emergencies.
2. Interdependent assessment of units	This unit of competency may be assessed in conjunction with other units that form part of a job role or function. Competence in all elements of all units relevant to a particular qualification must be demonstrated.
3. Underpinning knowledge and skills	A knowledge of, or the ability to apply knowledge of (determined by questioning or observation of performance or application): all pre take-off and after take-off checks; air traffic requirements; factors affecting take off distance and initial climb performance; use of take off performance charts; factors affecting directional control of the aeroplane; and aeroplane systems.
4. Context of assessment	Assessment should confirm that control of the aeroplane or situation is maintained at all times and in such a manner that if the successful outcome of a procedure or manoeuvre is in doubt, corrective action is taken. Competency should be assessed under operating conditions, except where flight observation is insufficient or impractical. In these cases, approved synthetic flight trainers may be used. Evidence should include determination of underpinning knowledge and skills with regard to the application of the required aeronautical knowledge and applicable legislation.

ASSESSMENT GUIDE



During assessment the pilot should be observed to perform the following checks and actions as evidence of ability to meet the licensing standards.

The checks and actions detailed in this guide are advisory. Checks and actions in approved checklists, placards, Flight Manual/POHs, Pilot Operating Handbooks have precedence and must be complied with.

Element	Evidence
.1 Carry out pre-take-off procedures	Safety briefing is performed. Pre take off checks are completed in accordance with <u>approved checklist</u> . ATS instructions are complied with. Aeroplane is aligned with centre line in take off direction. Aeroplane is positioned as close to the start of the runway as possible. <u>Line up checks</u> are performed in accordance with <u>approved checklist</u> .
4.2 Take-off aeroplane	Brakes are released. Take off power is smoothly and fully applied. Aeroplane direction is maintained on runway. Excessive pressure on nose wheel is avoided. Yaw is controlled. Flight and engine instruments are checked and reacted to during take off roll. Aeroplane is rotated at recommended speed (+ 5 -0 kts). At a <u>safe</u> height undercarriage is retracted (if applicable). Aeroplane is accelerated to nominated climb speed appropriate to obstacle clearance requirements. Flaps are retracted at <u>safe</u> height if applicable. Climb is established at nominated speed (\pm 5 knots).

<p>4.2 Take-off aeroplane</p>	<p>Brakes are released. Take off power is smoothly and fully applied. Aeroplane direction is maintained on runway. Excessive pressure on nose wheel is avoided. Yaw is controlled. Flight and engine instruments are checked and reacted to during take off roll. Aeroplane is rotated at recommended speed (+ 5 -0 kts). At a <u>safe</u> height undercarriage is retracted (if applicable). Aeroplane is accelerated to nominated climb speed appropriate to obstacle clearance requirements. Flaps are retracted at <u>safe</u> height if applicable. Climb is established at nominated speed (± 5 knots). Climb power is set (± 50 RPM, ± 1.0" MAP). Heading is adjusted to maintain track along extended runway centre line. <i>Perform crosswind take off</i> Applicable checks are performed in accordance with aeroplane checklist. Aeroplane is lined up on centre line of runway. Aeroplane is positioned as close to the start of the runway as possible. Into wind aileron is raised. <u>Line up checks</u> are performed. Brakes are released. Take off power is smoothly applied. Aeroplane direction is maintained on runway. Light pressure is maintained on nose wheel. Wings are maintained level with aileron as speed increases. Yaw is controlled. Flight and engine instruments are checked and reacted to on take off roll. Aeroplane is positively rotated at recommended speed (+5 –0 kts). Drift is countered by adjusting heading and aeroplane is tracked along runway centre line. Aeroplane is balanced. Undercarriage and flaps are retracted at a safe height if applicable. Aeroplane is accelerated to nominated climb speed (± 5 kts) appropriate to obstacle clearance requirements. Climb power is set (± 50 RPM ± 1.0" MAP). After take off checks are performed. <u>Elements of Airmanship:</u> Local and published noise abatement requirements and curfews are observed.</p>
<p>4.3 Carry out after take-off procedures</p>	<p>After take off checks are completed at a safe altitude from memory in accordance with <u>approved checklist</u>. <u>Elements of Airmanship:</u> Lookout is maintained using a systematic scan technique at a rate determined by traffic density, visibility or terrain. Awareness of all circuit traffic is maintained. Different aeroplane types are recognised. R/T listening watch is maintained and instructions complied with. Local and published noise abatement requirements and curfews are observed.</p>

Theoretical Knowledge

- ASL
- Internet Delivery
- Central Database
- Knowledge Deficiency Reports

Developments in New Zealand

- Different Philosophy
- Scale assessment of competency measures
- Word pictures for behavioural identifiers
- Under development

ASSESSMENT CRITERIA

Task:

Maximum rate turns

Objective:

To determine that the candidate;

1. (a) Enters, maintains, and exits from turning manoeuvres with smooth (critical element) and coordinated control applications, maintaining altitude ± 50 feet and balance within $\frac{1}{4}$ ball.
2. (b) Increases power at bank angles in excess of 30 degrees (critical element).
3. (c) Adopts the correct entry technique in relation to the aircraft's maximum manoeuvring speed (V_a) for the aircraft's weight (critical element) and speed.
4. (d) Maintains situational awareness and orientation through lookout and the selection of a readily identifiable reference point (critical element).

Action Items

- **The Examiner will:**
- (a) Place emphasis on the candidate's lookout.
- (b) Place emphasis on the candidate's coordination during entry and roll out.
- (c) Require the candidate to demonstrate a balanced maximum rate turn through 360° both left and right.
- (d) Place emphasis on the candidate's entry procedure in relation to the aircraft's V_a , weight and airspeed.
- (e) Place emphasis on the candidate's procedure for clearing the flight path ahead of the aircraft.
- (f) Observe the candidate's performance and determine that it meets the objectives.

Maximum Rate Turns

Rating

0 _____ 7 _____ 10

FAIL

PASS

(1) Fails to complete or maintain an adequate lookout (critical element)	(1) Completes a lookout prior to entering the turn and maintains an adequate lookout throughout	1) Completes an excellent lookout prior to entering the turn and maintains it during, and on exit from, the turn
2) Rough, uncoordinated control applications (critical element)	(2) Uses coordinated control movements most of the time	(2) Uses smooth coordinated control movements at all times
(3) Exceeds (or would exceed) V_a limitations for the aircraft's weight	(3) Checks aircraft's airspeed in relation to V_a prior to turn entry	(3) Notes aircraft speed in relation to V_a for the aircraft's weight before entry
(4) Leads with power when airspeed is above V_a or delays power application when the airspeed is well below V_a or reduces power prematurely on roll out	(4) Leads with roll when airspeed is above V_a ; coordinates power and roll when airspeed is at V_a ; or leads with power when airspeed is well below V_a ; and on exit from the turn reduces power with angle of bank	(4) Smoothly leads with roll if airspeed is above V_a , increasing power as V_a is achieved; or coordinates power and roll at V_a ; or leads with full power if speed is below V_a for the weight; and reduces power at cruise airspeed
(5) Frequently exceeds ± 50 feet of the nominated altitude or exceeds $\frac{1}{4}$ ball	(5) Maintains the nominated altitude ± 50 feet and less than $\frac{1}{4}$ ball	(5) Accurately maintains balance and the nominated reference altitude
(6) Excessively varies the bank angle or back pressure during the turn	(6) Maintains a constant back pressure and angle of bank ± 5 degrees most of the time	(6) Maintains a constant bank angle and back pressure to activate the first note of stall warning (or stall onset)
(7) Is disorientated (critical element)	(7) Selects a solid reference and rolls out of the turn within 20 degrees	(7) Selects a readily identifiable reference point and consistently rolls out on it

Competency Score Sheet

- Individual tasks eg Limited Panel turns
- Subject areas eg Meteorology
- Specific tests eg First BFR after 500 hrs
- Total picture of industry competency

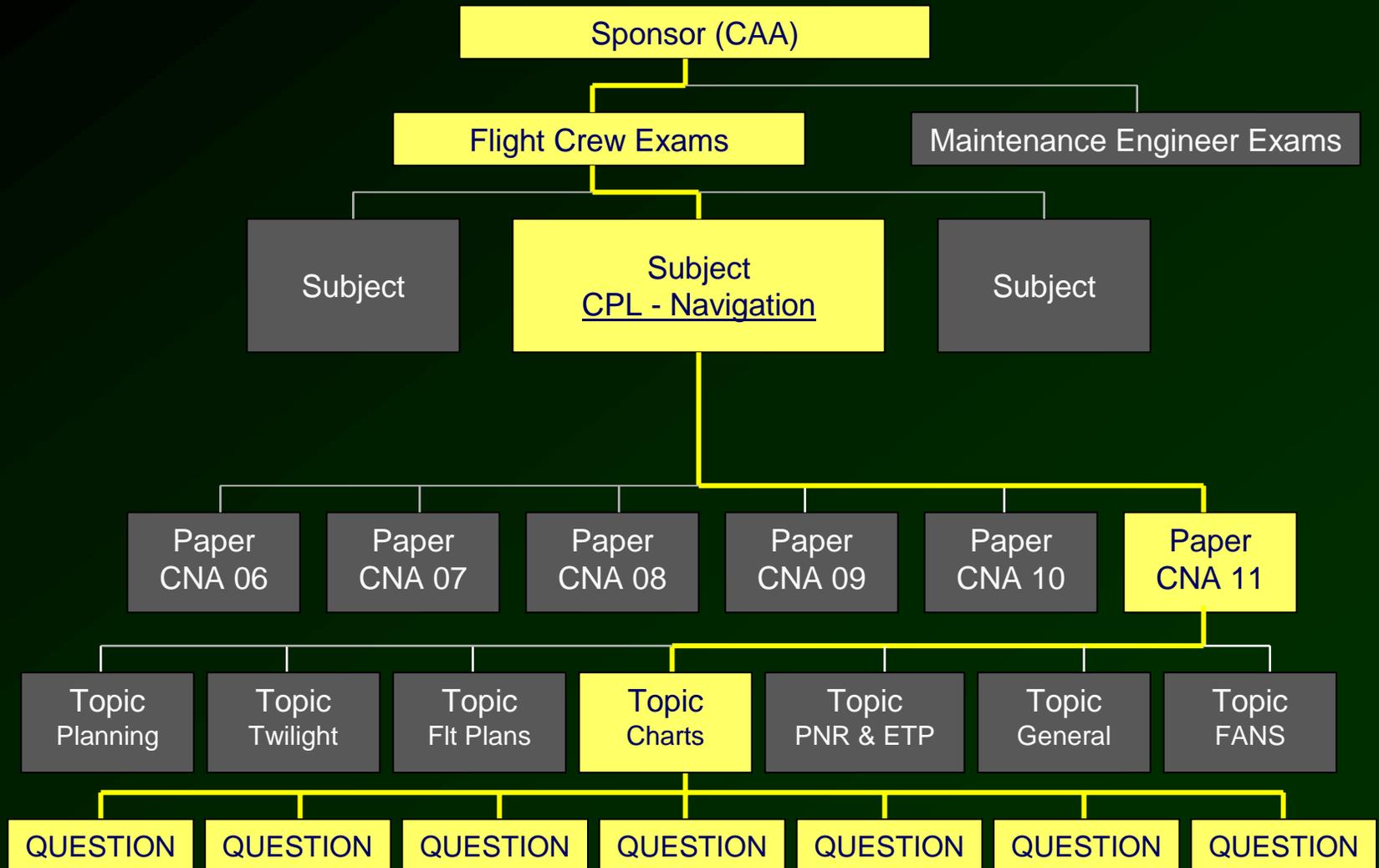
Complete to date

- PPL(A) & PPL(H)
 - CPL(A)
 - Instructor – Cat C, Cat B & Cat A
 - Instrument
-
- Next ATPL and CPL (H)

Knowledge Deficiency Reports

- ASL Papers
- Questions from Sections
- Generation of Reports
- KDRs whether pass or fail

Examination Development



Records and Analysis

- Question Performance
- Paper Performance
- Student Performance
- Examination Performance

Knowledge Deficiency Report - National Results

From Date 1/10/00

To Date 31/10/00

Subject Title CPL Flight Navigation General

<i>Topic Description</i>	<i>Percentage Passed</i>
Aeronautical Charts	84.38%
Flight Planning	72.50%
Flight Plans	92.50%
General	75.77%
PNR and ETP	70.00%
Time	86.25%
Summary for CPL Flight Navigation General (6 Topics)	
Grand Total	78.47%

Knowledge Deficiency Report - Training Organisations

ACME FLYING SCHOOL

From Date 1/10/00

To Date 31/10/00

Subject Title CPL Flight Navigation General

<i>Topic Description</i>	% Passed
Aeronautical Charts	78.57%
Flight Planning	85.71%
Flight Plans	89.80%
General	77.78%
PNR and ETP	71.43%
Time	100.00%
<i>Summary for CPL Flight Navigation General Acme Flying School (6 Topics)</i>	79.95%

Subject Title CPL General Aircraft Technical Knowledge (A)

<i>Topic Description</i>	% Passed
Airframes	62.62%
Direct Reading Compass	82.14%
Electricity and Magnetism	86.52%
Engines	77.17%
General	90.91%
Handling of Piston Engine Aircraft	80.00%
Instruments	58.70%
Weight and Balance	73.38%
<i>Summary for CPL General Aircraft Technical Knowledge (A) Acme Flying School (8 Topics)</i>	73.65%

What is in it for Investigators ?

- More information
 - Trackable individual competency
 - Links upon links in a causal chain
 - At the push of a button
- New style of Recommendations
 - Data driven competency baselines
 - Education
 - Standards Revision

Example Application

- Extract from Accident Report

- Extract from CPL Exam KDR

- Example from ATPL Exam KDR

Future Possibilities

- Routine checks of KDRs
- Review Competency Attainment
- Target areas for further investigation
- Database of FTOs and Instructors

Recommendations

- Data driven changes to Standards
- Education recommendations
- Ability to follow through links
 - I.e. Instructors

Harmonisation

- Aust/NZ Database and exams
- Common Flight Training Standards
- International Accident statistics
- Recommendations for other States

Summary

- Training and Testing isn't up to standard
- Recognition by ICAO
 - Australia, NZ, Universities, others
- Competency Based Testing

Summary cont'd

- Australia defines competencies
- NZ defines levels of competency
- Reports should provide good info for investigators
- Data driven recommendations

