AMC1 FCL.710 - Guidance on differences training

The following should be used as guidance when conducting differences training on types or variants within single pilot class or type ratings. Difference training in accordance with FCL.710 does not require approval by the Authority. For training on different types of aircraft within a single-pilot class rating, the following general considerations should be taken into account when determining the scope of the differences training required.

- Flight instrumentation;
- EFIS & navigation systems;
- Autopilot and trim system including pre-flight checks;
- Other aircraft systems including pneumatic, vacuum and hydraulic;
- Aerodynamic controls & handling characteristics;
- Engine handling;
- Flaps & lift/drag augmentation;
- Other systems particular to type;
- Emergency procedures.

(a) Definitions

For the purposes of this guidance material the following definitions are used:

Cabin pressurisation: a system controlled by the pilot capable of maintaining the altitude of the pilot and passenger cabin below the altitude of the aeroplane in flight.

Differences training: training to enable safe operation of a new variant or type within an existing type or class rating consisting of ground instruction and practical training using an aircraft or appropriate training device.

Different Type: an aeroplane that has been given a separate type designation by the manufacturer or certificating Authority.

Electronic Flight Instrument System: the electronic display of flight instruments used by the pilot as the primary reference for control of the aircraft in flight.

Familiarisation: the acquisition of additional knowledge to ensure safe operation of an aircraft within an existing type or class rating where difference training is not required.

Retractable landing gear: a system where the landing gear position can be selected by the pilot as extended, for take-off, landing and taxiing, or retracted during flight.

Single engine piston: generically, an aeroplane powered by a single, normally aspirated piston engine with a fixed pitch propellor, a fixed tricycle undercarriage and without cabin pressurisation.

Single Power Lever control: a single lever automated power control that combines electronically the functions of all engine and propellor controls.

Tailwheel: a landing gear configuration designed to enable ground manoeuvring of an aircraft where the centre of gravity is aft of the main landing gear during normal operation.

Variable Pitch Propellor: a system where the propellor blade pitch/engine RPM are directly and independently controlled by the pilot.

Variant: an aeroplane that has been identified by an OSD as one that can be included within a single type rating without the need for a separate or specific ATO course.

(b) Recommended Training Syllabus

Specific training is necessary when operating aircraft within the single-engine class ratings with additional features as identified in the List of Class of Aeroplane. This training should include the following considerations:

(1) Cabin Pressurisation (P) and Oxygen Systems

- Principle and effect on performance;
- Construction;
- System function including associated environmental heating and air conditioning systems;
- Oxygen system - storage capacity, pre-flight checks, system function (passengers & crew);
- Systems Limitations;
- Human Limitations including hypoxia and period of useful consciousness.

Operations at high altitude including:

- Airspace classification;
- Licence & rating privileges;
- Rules of the Air;
- Weather;
- Air Navigation.

Normal operation including pre-flight checks, setting & monitoring during:

- Take-off & climb;
- Cruise;
- Descent;
- Approach & Landing.

In-flight failures and emergency handling including:

- Use of oxygen;
- Emergency descent including terrain & ATC considerations;
- Single Engine Stabilising Altitude (ME only);
- In-flight failures and emergency handling;

(2) Retractable Undercarriage (RU)

Differences Training completed, for this section, on a SEP aeroplane, does not provide equivalent qualification on MEP Aeroplanes:

- Principle and effect on performance;

- System construction & function;
- Limitations - raising, lowering & extended.

Operation including pre-flight checks and normal handling:
- After take-off;
- On approach/go-around & landing.

In-flight system failures and emergency lowering.

Operation of undercarriage during:
- Engine failure after take-off/go-around
- (Emergency raising - as applicable to type);
- Engine failure during other phases of flight, including approach and landing.

Effect on glide performance.

Considerations for MEP Aeroplanes:
- Effect on performance - one or more engines inoperative.
- Handling during approach and landing/go-around with one or more engines inoperative.
- Effect on engine out allowance & landing committal height.

(3) Electronic Flight Instrument Systems (EFIS)

Increasingly, aircraft are being fitted with digital electronic flight instruments (glass Instruments) and integrated digital avionics displays (Integrated Avionics). These present a significant change in the way the information is presented and the interpretation of these systems requires a thorough understanding by the pilot.
For glass instruments, this training may be done in the aeroplane or an appropriate training device. For Differences Training in integrated avionics displays, it is recommended that this training be carried out with an appropriate Part Task Trainer or FNPT. Training in the use of these systems demands considerable attention of both instructor and pilot, at the expense of lookout and flight safety. For flight safety reasons, therefore, training in the use of these systems in the air is not recommended, except for the final familiarisation following a course of training in an appropriate Part Task Trainer or FNPT.

The primary reference for any Differences Training should be the Manufacturers' and/or Aircraft Flight Manual. When considering what to include in the training, Instructors must consider the experience of the student. It remains the instructor's responsibility to create a training programme, which is suitable for the particular pilot's experience, qualifications and the equipment to be used.

Training should cover at least the following:
- Power supplies and controls;
- Malfunctions and remedial actions;
- Display visual settings control;
- Significance of colours used in the displays;
- Instrument scanning techniques;
- Importance of attitude selection and monitoring;
- Flight information selection and display;

- Trend indications, if appropriate;
- Navigation information selection and display;
- Interface with communications equipment, if appropriate;
- Standby instruments;

(4) Single Lever Power Control (SLPC)

Some aeroplanes are fitted with a single lever, controlling both a VP propeller and the engine – sometimes known as Full Authority Digital Engine Control (FADEC). Some of these types are also fitted with turbochargers or superchargers and auto-feather systems.

Differences training should include:

- System operation:
- Controls and indications;
- Engine starting and shutting down;
- Aerodynamic effects in flight at different power settings;
- Engine failure and other emergencies;

(5) Tailwheel (TW)

The major differences with a tail wheel aircraft are encountered during ground manoeuvring, take-off and landing and training should highlight:

- Visibility when taxying;
- Asymmetric blade effect on take-off;
- Effect of fin and rudder shielding on the ground;
- Crosswind effect and take-off/landing techniques:
- Use of asymmetric thrust for directional control (ME aeroplanes);
- Three-point and mainwheel landings;
- Danger of ground looping:

(6) Turbo/Supercharged Engine (T)

Differences Training completed, for this section, on a SEP aeroplane, does not provide equivalent qualification on MEP Aeroplanes:

- Principle and effect on performance, including cruise altitude;
- System construction & function;
- Engine limitations and instrumentation.

Engine handling including pre-flight checks and normal operation during:-

- Start up and taxying;
- Take-off & climb;
- Cruise at various power settings & speeds;
- Low speed handling and stall/spin recovery;
- Approach and go-around;
- Landing & shut down.
- In-flight failures and emergency handling;
- Single-Engine Stabilising Altitude (ME only).

(7) Variable Pitch (VP) Propellers

These systems make a significant difference to performance in all phases of flight. Mostly, the instruction in this section will be given to pilots converting from SEP aeroplanes with fixed pitch propellers to SEP or MEP aeroplanes with VP propellers and constant speed units (CSU). The system on some older types may not include a CSU and instructors must ensure that all of the system differences and handling techniques, introduced by the new type, are properly covered in the training given.

Differences Training completed, for this section, on a SEP aeroplane, does not provide equivalent qualification on MEP aeroplanes.

(8) Multi-engine centreline thrust aeroplane (push-pull)

A) Syllabus of theoretical knowledge.

1. Systems and equipment of aeroplane, operation and limitations:

    a) Dimensions ;

    b) Engine ;

    c) Propeller;

    d) Fuel system and fuel tank management;

    e) Landing gear, aerodynamic effects;

    f) Flight controls, flaps, slats as applicable ;

    g) Electric power;

    h) Hydraulic, electric and pneumatic circuits, depending on the type of aircraft;

2. Performances, mass and balance;

B) Practical training to normal, abnormal and emergency procedures

1) Normal procedures:

    a) Aeroplane inspection and servicing;

    b) Engine starting: normal and abnormal procedure;

    c) Taxiing ;

    d) Engine run-up before take-off; rear engine management;

e) Take-off procedure;

f) Control of the aeroplane by external visual reference, including straight and level, climb, descent and lookout;

g) Turns, including turns in landing configuration. Steep turns 45°;

h) Flight at critically low airspeeds including recognition of and recovery from incipient and full stalls ;

i) Arrival procedure ;

j) Normal landing;

k) Go around.

2) Abnormal and emergency procedures:

a) Simulated engine failure during take-off (at a safe altitude);

b) Equipment malfunctions including alternative landing gear extension, electrical and brake failure;

c) Engine shutdown and restart;

d) Approach, go around, landing with on engine simulated inoperative.

(9) All Aeroplanes

Principle of operation and effect on performance;
System construction & function;
Propeller system limitations;
Engine limitations and instrumentation.

Operation of throttle, mixture and propeller controls, including pre-flight checks and normal handling during:

- Start up and taxying;
- Take-off & climb;
- Cruise at various power settings & speeds;
- Low speed handling and stall/spin recovery;
- Approach and go-around;
- Landing & shut down.

In-flight failures, within the propeller system, including:

- Loss of oil pressure;
- Loss of governor control;
- Overspeed;
- Underspeed.

Emergency handling, during:

- Engine failure after take-off/go-around;
- Engine failure during other phases of flight, including approach and landing;
- Effect of engine failure on glide performance.

Emergency Handling Considerations for Multi-Engine Aeroplanes

- Engine failures after take-off including propeller feathering and effect of wind-mill
- drag;
- Circuit and approach with one or more engines inoperative;
- Go-around with one or more engines inoperative;
- Landing with one or more engines inoperative.