APPENDIX B TO CAAP 5.23-2(0)

MULTI-ENGINE AEROPLANE GROUND AND FLIGHT TRAINING SYLLABUS

AIM

The aim of this document is to describe in detail the course of ground and flight training that candidates seeking their first multi-engine endorsement (rating) should undertake. The syllabus is also applicable to subsequent endorsements.

COURSE OBJECTIVE

The objective of the course is to give the candidate a sound theoretical knowledge of multi-engine aircraft operation on which to base endorsements, and to teach the piloting skills necessary for the safe and competent operation of such aircraft.

COURSE STRUCTURE

The course will comprise 7 hours of ground training in the form of lectures or briefings, and 7 hours of flight training. The content of the ground training starts at page 63 of this CAAP; and the content of the flight training, which should include 3½ hours of asymmetric training and 1 hour of instrument flying (for instrument rated pilots), starts at page 73. The ground and flight training should be integrated and coordinated so that the candidate gains the maximum benefit from time spent in the air. During the course of the endorsement (rating) the 'endorser' should certify, on the assessment form, the successful completion of each required sequence. On completion of this training, the Chief Flying Instructor/Chief Pilot (CFI/CP) of the training organisation concerned should certify that the candidate has completed the course satisfactorily. All requirements stated in this syllabus are to be regarded as minimum.

CONVERSION TRAINING FOR OTHER THAN INITIAL MULTI-ENGINE ENDORSEMENT

Candidates for subsequent endorsements, on aircraft specified in part 2, 3, 4 or part 5 of Appendix I of Civil Aviation Order (CAO) 40.1.0 or a class endorsement specified in part 3, 4, 5 or 6 of Appendix IA of CAO 40.1.0 are required to complete the flight training as detailed therein. Candidates for all other multi-engine endorsements are not required to complete the syllabus as detailed, however all applicable items on the endorsement application form should be satisfactorily completed. The candidate may be subject to an assessment flight covering but not limited to the heavily boxed items.

TURBO-JET AIRCRAFT

An applicant who wishes to add a turbo-jet aircraft, as the first multi-engine aircraft in their licence should undergo the same course as described above, except that jet-engine theory and handling is substituted for the piston engine teaching. If, however, the applicant already has a multi-engine propeller aircraft on their licence, the course may be reduced to 4 hours of ground, and 3 hours of flight (5 hours for those aircraft affected by Appendices III and V of CAO 40.1.0), integrated training. The flight training may be carried out either in an aeroplane or in an approved flight simulator under the supervision of a person approved by the Civil Aviation Safety Authority (CASA) to give such instruction. The content of this abridged turbo-jet course is given at page 81 of this CAAP.

TURBO-PROP AIRCRAFT

An applicant wishing to add a turbo-prop aircraft as the first multi-engine aircraft in his/her licence should undergo the same course as described above, except that jet engine theory and practice is substituted for that of piston engines.

INSTRUCTION

A flight instructor or other approved person shall conduct flight instruction for multi-engine aeroplanes. The ground instruction is most desirably given in the form of long briefings by the same flying instructor, but may take the form of lectures by a competent ground school instructor.

FINAL FLIGHT ASSESSMENT

On completion of the course for the endorsement of the first multi-engine aeroplane in their license, the candidate may be required to undertake an assessment flight either with a CASA Flying Operations Inspector (FOI) or with a suitably approved person. For each additional multi-engine category i.e. turbo propeller or turbo-jet, an assessment flight may be required.

Candidates seeking an additional endorsement but in the same category as their initial endorsement, e.g. another multi-engine piston type, are not required to undergo the full syllabus of training but may be required to demonstrate their ability at all appropriate sequences on the flight assessment form.

NIGHT FLYING

Flying instructors conducting the course should note that the full flight assessment includes a night element. If a candidate has limited night experience, an additional flight is advised to familiarise them with normal night circuits. However, flight with an engine simulated inoperative and engine failures after take-off must not be practiced (conditions in Aviation Information Publication En-route (AIP ENR) 1.1 Paragraph 81.3 to apply). This flight is included in the detailed syllabus at page 82 of this CAAP.

Note 1: If the candidate does not hold an instrument rating or a Night Visual Flight Rules (NVFR) rating, the night element should be incorporated in the day element such that the overall 'hours' requirement remains unchanged.

Note 2: If an approved type simulator is available, then the night sequences should be conducted in the simulator notwithstanding Note 1 above.

DOCUMENT STATUS

This Civil Aviation Advisory Publication (CAAP) 5.23-2 (0)) provides a training syllabus for use by approved organisations or persons offering courses for the initial issue of a multi-engine aircraft type endorsement (rating). It amplifies the requirements of CAO 40.1.0, in particular the requirements of subsection 4 Notes 1 and 2 and it represents industry 'best practice' with regard to the minimum acceptable level of training.

SOURCE MATERIAL

A list of source material for use on the course is at page 1, of this CAAP, however the recommended reference is 'FLYING TRAINING Multi-engine Rating' by R.D. Campbell. This reference was written to complement the United Kingdom Civil Aviation Authority (UK CAA) syllabus on which this CAAP is based.

GROUND TRAINING

The training for the multi-engine course comprises a total of 7 hours of ground lectures/long briefings on subjects associated with the operation of multi-engine propeller or turbo-jet aircraft. It includes elements which are related to the type of aeroplane to be used on the course. The training should be integrated with the flight training so that the maximum benefit is gained from time spent in the air.

The outline syllabus is as follows:

Long Briefing (LB)	*Subject Duration*	
LB1	Aircraft Systems	1½ hrs
LB2 (P)	Variable Pitch (VP) Propellers and Feathering	1 hr
LB3	Principle of Multi-Engine Flight	1 hr
LB4	Minimum Control & Safety Speed	1 hr
LB5	Weight & Balance	½ hr
LB6	Effect of Engine Failure on Systems & Performance	1 hr
LB7	Weight & Performance	1 hr

If the rating required is for a turbo-jet aeroplane, Long Briefing 2 changed to:

LB2 (TJ)	Turbo-Jet Engine Theory & Handling	1 hr

If the rating required is for a turbo-prop aeroplane, an additional briefing is to be given in conjunction with LB2 (P):

LB2 (TP)	Turbo-Prop Engine Theory & Handling	1 hr

The flying instructor conducting the course should give the long briefings; however, a suitably qualified ground instructor may give them in the form of lectures. Before commencing flying training the candidates should have satisfactorily completed the Engineering Data and Performance questionnaire (see Appendices D and E of this CAAP), and in the case of a turbo-jet or turbo-prop, Basic Gas Turbine theory. Knowledge level should be a minimum of Commercial Pilot Licence (CPL) ground examination standard.

The detailed content of each Long Briefing as set out in the following pages should be used as a guide. The Bibliography at page 1 should provide the reference material for general theory and principles; the Flight Manual should be used for type specific data.

LONG BRIEFING: LB1 – AEROPLANES AND ENGINE SYSTEMS

Duration: 1½ hours

Aim: To give the candidate a thorough understanding of all systems relevant to the aeroplane type.

Briefing content:

- Aeroplane systems (normal operation):
  - Fuel;
  - Electrical;
  - Flight control (primary and secondary);
  - Hydraulic;
  - Flight instruments;
  - Avionics;
  - Braking;
  - De-icing;
  - Oxygen;
  - Cabin air conditioning and pressurisation; and
  - Others.
- Engine systems (normal operation):
  - Fuel;
  - Oil;
  - Starter (including air start for turbo-jets);
  - Ignition;
  - Propeller – piston engine only;
  - Mixture – piston engine only; and
  - Turbochargers.
- Limitations:
  - Airframe:
    - Load factors; and
    - Speeds.
  - Engine:
    - Revolutions per minute (RPM), temperatures and pressures.
- Emergency Procedures:
  - Refer to the flight manual for the specific aeroplane type

Knowledge Standard: The candidate should have a sound knowledge of airframe and engine systems and their operation in normal and emergency conditions at a standard to pass the Engineering Data and Performance Type Endorsement written questionnaire.

LONG BRIEFING: LB2 (P) – VARIABLE PITCH PROPELLERS

Duration: 1 hour

Aim: To revise the principles of variable pitch propellers and propeller feathering mechanisms.

Briefing Content:

- Variable pitch propellers:
  - Principles;
  - Constant speed units;
  - Synchronisation;
  - Full authority digital engine control (FADEC) and
  - Handling (type related).
- Feathering:
  - Principles and purpose;
  - Feathering mechanisms; and
  - Handling and limitations (type related).

Knowledge Standard: The candidate should have sound understanding of variable pitch (VP) propellers feathering systems, and know the handling and feathering limitations for the aeroplane type.

LONG BRIEFING: LB2 (TJ) – TURBO-JET ENGINES – THEORY AND HANDLING

Duration: 1 hour

Aim: To give the candidate a sound theoretical knowledge of the principles of the turbo-jet engine, and the handling procedures and techniques relevant to the aeroplane type.

Briefing Content:

- Turbo-jet engine theory:
  - General principles;
  - Factors affecting thrust;
    - Altitude;
    - True air speed (TAS);
    - Density;
    - Spool-up time;
    - Temperature; and
    - Pressure.
  - Performance factors:
    - Rate of climb – best climb speed;
    - Specific fuel consumption;
    - Range speed (including effect of altitude etc.); and
    - Endurance speed (including effect of altitude etc.).
  - Twin spool engines.
- Theory of high speed flight:
  - Compressibility effects; and
  - Swept wing;
    - Effect on handling.

Knowledge Standard: The candidate should gain a sound (commercial pilot license (CPL) equivalent) knowledge of turbo-jet engine principles and handling related to the aeroplane type, including the difference between piston and turbo-jet engines in performance considerations

LONG BRIEFING: LB2 (TP) – TURBO-PROP ENGINES – THEORY AND HANDLING

Duration: 1 hour

Aim: To teach the candidate a sound theoretical knowledge of the principles of the turbo-propeller jet engines and the handling procedures and the techniques relevant to the engine/propeller/aeroplane type.

Briefing Content:

- Variable pitch propeller:
  - Principles;
  - Constant speed units;
  - Feathering and reversing/braking propellers;
  - Synchronisation; and
  - Pilot handling (type related).
- Engine theory:
  - General principles;
  - Factors affecting thrust:
    - Altitude;
    - True Air Speed (TAS);
    - Density;
    - Spool-up time;
    - Temperature; and
    - Pressure.
  - Performance factors:
    - Rate of Climb – best climb speed;
    - Specific fuel consumption;
    - Range speed; and
    - Endurance speed.
- Engine Handling:
  - Thrust indicator (torque, RPM, interstage turbine temperature [ITT] and gas generator speed [N_1%)]);
  - Limitations (type related);
  - Reaction (spool up) time;
  - Emergencies (type related); and
  - Air start systems (windmill/starter assist) type related;
- Theory of high altitude flight:
  - Performance Limitations.

Knowledge Standard: The candidate should gain knowledge (CPL equivalent) of propeller systems together with jet engine principles and handling including performance considerations of aeroplane type.

LONG BRIEFING: LB3 – PRINCIPLES OF MULTI-ENGINE FLIGHT

Duration: 1 hour

Aim: To give to the candidate a sound knowledge of the aerodynamic principles involved in multi-engine flight in normal and asymmetric conditions.

Briefing Contents:

- The multi-engine environment:
  - Rationale for 2 or more engines; and
  - Configurations of multi-engine aeroplanes.
- The multi-engine problem:
  - Engine failure situation, leading to:
    - Asymmetry;
    - Control capability reduction; and
    - Performance reduction – LB7.
  - Aerodynamics of asymmetry:
  - Thrust:
    - Offset thrust line; and
    - Asymmetric blade effect.
  - Drag:
    - Offset drag line;
    - Failed engine drag; and
    - Total drag.
  - Lift:
    - Asymmetry; and
    - Slipstream effect.
  - Unbalanced flight:
    - Effect of yaw; and
    - Sideslip/side forces.
  - Thrust/drag, side force couples.
- Controllability in asymmetric flight:
  - Rudder, Aileron and Elevator:
    - Effectiveness; and
    - Limitations.
  - Balanced/unbalanced flight;
  - Effect of bank/sideslip:
    - Fin strength, and stall;
    - Residual unbalance – effect on controls;
    - Out of balance control loads; and
    - Trimming.
  - IAS/thrust relationship.

Knowledge Standard: CPL equivalent.

LONG BRIEFING: LB4 – MINIMUM CONTROL AND SAFETY SPEEDS

Duration: 1 hour

Aim: To ensure the candidate has a full understanding of the principles involved in, and the factors affecting, critical/minimum control and safety speeds.

Briefing Content:

- Minimum control speed (V_{MC}):
  - Definition;
  - Derivation; and
  - Factors affecting:
    - Power;
    - Weight/centre of gravity (CG);
    - Altitude;
    - Drag (e.g. undercarriage, flaps, etc.; feathering);
    - Turbulence; and
    - Critical engine (if applicable.)
  - Pilot handling:
    - Skill/strength;
    - Reaction time; and
    - Effect of bank.
- Take-off safety speed (V_{TOSS}) (V_2):
  - Definition; and
  - Derivation.
- V_{MC}, V_2 and other V coded speeds (type related).

Knowledge Standard: The candidate should show a complete understanding of the principles and factors affecting minimum control and safety speeds, and should know the value of these and other V speeds for the aeroplane type.

LONG BRIEFING: LB5 – WEIGHT AND BALANCE

Duration: ½ hour

Aim: To familiarise the candidate with the weight and balance calculations for the aeroplane type.

Briefing Content:

- Revision of weight and balance principles
- Application of principles to aeroplane type calculation
- Practice sample calculations using Flight Manual data; and
- Use of the aircraft's Load Data Sheet and Approved Loading System.

Knowledge Standard: The candidate should be able to perform correctly weight and balance calculations for the aeroplane type.

LONG BRIEFING: LB6 – EFFECTS OF ENGINE FAILURE ON SYSTEMS AND PERFORMANCE

Duration: 1 hour

Aim: To give the candidate a sound knowledge of the effects on performance in flight caused by one inoperative engine.

Briefing Content:

- Effect on Systems:
  - Electrics;
  - Hydraulic;
  - Fuel;
  - Air conditioning and pressurisation; and
  - Others (type related).
- Effect on power:
  - Excess power available; and
  - Optimum speeds.
- Effect on cruise:
  - Range; and
  - Endurance.
- Acceleration/deceleration; and
- Zero thrust:
  - Definition;
  - Purpose; and
  - Determination.

Note: This content should be varied appropriately for relevance to the turbo-jet and turbo-prop aeroplane.

Knowledge Standard: The candidate should demonstrate a sound theoretical knowledge (CPL equivalent) of the effects on performance of one engine inoperative.

LONG BRIEFING: LB7 – WEIGHT AND PERFORMANCE

Duration: 1 hour

Aim: To familiarise the candidate with weight and performance calculations.

Briefing Content:

- Revision of Civil Aviation Regulations and Orders.
- Revision of principles of weight and performance calculations, use of graphs and tables.
- Practice calculations for the aeroplane type, using Flight Manual Data:
  - Weight at take-off (WAT);
  - Take-off;
  - Accelerate/stop;
  - Climb out – flight paths;
  - En-route ceiling, range, endurance;
  - Descent; and
  - Landing.

To include, as appropriate, the one engine inoperative case.

Knowledge Standard: The candidate should be able to perform correctly all weight and performance calculations relevant to the aeroplane type.

Flight training

The Flight Training element of the Initial Multi Engine course consists of 7 hours of dual instruction that should include 3½ hours of asymmetric training and a one-hour flight covering instrument flying (where the candidate holds an instrument rating), particularly the asymmetric flight condition. The syllabus also covers type conversion training for the aeroplane used on the course.

The outline syllabus is as follows:

Flight Number	*Description Duration*	
F1	Initial Type Conversion	1 hr
F2	General Handling & Circuits	1 hr
F3	Introduction to Asymmetric flight	1 hr
F4	Critical & Safety Speeds	1 hr
F5	Asymmetric Circuits	1 hr
F6	Asymmetric Performance & Circuits	1 hr
F7	Instrument Flying	1 hr

Details of each flight exercise are given starting on page 74 of this CAAP. Asterisked items refer to piston-engine aircraft; the equivalent item should be substituted for turbo-jet or turbo-prop aircraft.

On satisfactory completion of the flight training set out above, the candidate should satisfactorily complete the final assessment flight with an approved person or a CASA Flying Operations Inspector. This assessment includes a night element and it is recommended that a candidate with limited night flying experience should be given a further dual flight at night.

If the candidate does not hold an instrument rating, F7 should be omitted; however the balance of flight hours should remain unchanged. In the event that the candidate does not hold a night visual flight rules (NVFR) rating, then night elements should be treated in a similar manner.

Guidance on asymmetric flight training is available in the reference texts at page 77 of this CAAP .

When the full course is to be conducted on a turbo-jet aeroplane, the same flight training should be followed, except that engine shut-down and air start drills should be substituted for feathering and unfeathering exercises. Items that are applicable to piston engine aeroplanes only are indicated in the Flight Number briefs by an asterisk; the alternative turbo-jet exercise is shown in brackets where appropriate.

On completion of the training, the candidate should be capable of handling the aeroplane safely and confidently under both the normal and asymmetric condition.

FLIGHT NUMBER F1 – INITIAL TYPE CONVERSION

Duration: 1 hour

Aim: To familiarise the candidate with the handling characteristics of the aeroplane in normal flight.

Air Exercise:

- Pre-flight preparation and aircraft inspection.
- Start-up and taxiing:
  - Cockpit familiarisation;
  - Checklist procedures;
  - Engine start;
  - Engine fire on the ground;
  - Taxiing:
    - Use of brakes; and
    - Use of throttles.
- Take-off and climb:
  - Check list procedures;
  - Normal take-off/cross-wind take-off;
  - After take-off checks;
  - Normal climb, climbing turns;
  - Throttle and VP propeller (engine limitations)*; and
  - Pressurisation (as appropriate).
- Cruise:
  - Level off;
  - Use of trim;
  - Effect of flaps, undercarriage;
  - Normal turns; and
  - Cruise checks.
- Engine handling:
  - Engine temperatures and pressures; and
  - Use of:
    - Mixture control*; and
    - Carburettor de-icing and engine anti-icing (as appropriate)*.
- In flight emergencies (other than engine fire/failure):
  - Hydraulic;
  - Electric;
  - Airframe and engine icing;
  - Pressurisation; and
  - Others as per Flight Manual.
- Steep turns:

- Descending:
  - Descent checks;
  - Normal descent and descending turns;
  - Mixture control; and
  - Carburettor de-icing (as appropriate)*.
- Demonstration normal circuit:
  - Checklist procedures;
  - Approach; and
  - Normal landing.

Skill Standard: The candidate should know the normal and emergency checklist procedures, and be able to handle the aeroplane competently.

FLIGHT NUMBER F2 – GENERAL HANDLING AND CIRCUITS

Duration: 1 hour

Aim: To revise aeroplane and engine handling, and practice circuit procedures.

Air Exercise:

- Start-up and Taxi;
- Normal Take-off and Climb;
- Stalling:
  - Checks;
  - Clean configuration – power off;
  - Approach configuration – power off;
  - Approach configuration – power on; and
  - Landing configuration – power on and power off.
- Circuit Procedures – Both Engines Operative:
  - Normal configuration;
  - Flapless approach and landing;
  - Performance landing; and
  - Go-around.
- Undercarriage Emergency Procedures.

Skill Standard: The candidate should demonstrate his/her ability to handle all aspects of aeroplane operation with all engines operative.

FLIGHT NUMBER F3 – INTRODUCTION TO ASYMMETRIC FLIGHT

Duration: 1 hour

Aim: To teach the candidate basic aeroplane handling in the event of engine failure.

Air Exercise:

- Normal Take-Off and Climb;
- Single-Engine Flight:
  - Demonstrate full feathering drill* (engine shut-down:
    - Checklist procedures.
  - Aeroplane handling with one engine inoperative:
    - Power required;
    - Trim position for balanced flight; and
    - Flight controls positions for balanced flight.
  - Demonstrate fuel cross-feed;
  - Demonstrate unfeather drill* (air start):
    - Checklist procedures.
  - Demonstrate zero thrust condition:
    - Determination of 'zero thrust' settings.
- Simulated Engine Failure:
  - Effect of engine failure:
    - Visual;
    - Instrument; and
    - Performance.
  - Control after engine failure:
    - Yaw;
    - Roll; and
    - Pitch.
  - Identification of failed engine:
    - Dead leg, dead engine; and
    - Instrument indications.
  - Engine failure in turns:
    - Identification; and
    - Control.
  - Alternative method of control.
- Airspeed/power relationship:
  - Effect on control of:
    - Varying speed at constant power; and
    - Varying power at constant speed.
  - Practice handling in asymmetric flight.

Skill Standard: The candidate should be able to handle the aeroplane confidently in asymmetric flight, and to understand engine failure, feathering and unfeathering drills* (engine shut down and air start drills).

FLIGHT NUMBER F4 – CRITICAL AND SAFETY SPEEDS

Duration: 1 hour

Aim: To investigate the significance of critical speeds and take-off safety speed (V_{TOSS}).

Air Exercise:

- Revise engine failure: control and identification.
- Critical Speeds:
  - Critical speeds – wings level – windmilling engine;
  - Critical speeds – wings 5° bank – windmilling engine; and
  - Critical speeds – wings 5° bank – zero thrust.
- Engine failure during take-off:
  - Engine failure below V_{TOSS};
  - Engine failure at or above V_{TOSS};
  - Full engine failure at take-off (EFATO) drill; and
  - Single engine climb.
- Practice feathering and unfeathering drill* (engine shut-down and air start).
- Aeroplane handling: (turbo-jet and turbo-prop only):
  - High speed; and
  - High altitude.
- Demonstrate asymmetric circuit, go-around and landing.

Skill Standard: The candidate should understand the significance of critical speeds and take-off safety speeds, should be able to handle an engine failure correctly in flight or during take-off, and should be able to carry out the feathering and unfeathering drills (shutdown and air start) correctly.

FLIGHT NUMBER F5 – ASYMMETRIC CIRCUITS

Duration: 1 hour

Aim: To teach the candidate to handle an engine failure after take-off, and to carry out an asymmetric circuit, go-around and landing.

Air Exercise:

- Take-off brief;
- Engine failure after take-off;
- Asymmetric circuit:
  - Power settings and speeds; and
  - Use of flap.
  - Undercarriage and flap operation:
    - Normal; and
    - Emergency.
  - Visual committal height:
    - Consideration.
  - Go-around:
    - Decision; and
    - Actions.
  - Landing:
    - Use of flap;
    - Foot load; and
    - Taxiing.

Skill Standard: The candidate should be able to demonstrate an ability to handle an engine failure after take-off and an asymmetric circuit and land safely and competently at the flight test standard, i.e. maintain selected speeds within ±5 knots and headings within 10° during simulated engine failure operations.

FLIGHT NUMBER F6 – ASYMMETRIC PERFORMANCE AND CIRCUIT

Duration: 1 hour

Aim: To revise the effects of asymmetric operation on aeroplane systems and performance, and to practice asymmetric circuits.

Air Exercise:

- Effect On Aircraft Systems:
  - Engine parameters;
  - Electrical system operation;
  - Hydraulic system operation;
  - Fuel system:
    - Cross feed; and
    - Fuel consumption.
  - Other systems – type related.
- Effect on aeroplane's performance of:
  - Feathering;
  - Configuration (e.g. flaps, undercarriage); and
  - Departure from scheduled speeds.
- Effect on climb/cruise performance:
  - Climb;
  - Range;
  - Endurance; and
  - Descent.
- Asymmetric circuits.

Skill Standard: The candidate should have a thorough understanding of systems operation and aeroplane performance with one engine inoperative.

Note: the case of aircraft meeting the performance requirements of CAO 20.7.1B, or if this sequence is conducted in an approved simulator, the aircraft should be loaded to approximately 90% maximum all up weight (MAUW). If loading the aircraft is not practicable, then the use of a properly developed Training Power setting that approximates the performance of the aircraft at MAUW may be utilised.

***Warning**: Where a training power setting is used, the pilot-in-command (PIC) should not hesitate to resume full power immediately should an actual emergency occur during training.*

FLIGHT NUMBER F7 – INSTRUMENT FLYING

Duration: 1 hour

Aim: To teach the candidate instrument flight on a multi-engine aeroplane in normal and asymmetric conditions.

Air Exercise:

- Normal Flight (all engines operative):
  - Straight and level;
  - Climbing and descending;
  - Turning; and
  - Recovery from unusual attitudes.
- Asymmetric Flight (one engine inoperative):
  - Engine failure: identification and control;
  - Straight and level;
  - Climbing and descending;
  - Turning; and
  - Effect of flap and/or undercarriage.
- Visual asymmetric circuit and landing (or asymmetric instrument approach and circle to landing).

Skill Standard: The candidate should be able to control the aeroplane and its systems in instrument flight conditions with one engine inoperative.

Abridged Turbo-jet Course

When a candidate who already has a multi-engine propeller aeroplane on his/her licence wishes to add a first turbo-jet multi-engine aeroplane to it, the full course is reduced to a minimum of 4 hours ground school and 3 hours (5 hours in the case of aircraft affected by CAO 40.1.0, Appendices III and V) of flight training. The ground school should normally be conducted by the person giving the flight instruction, but may be given by a suitably qualified ground instructor.

The flight instruction may be given in the aeroplane or in a flight simulator approved for this purpose. In the latter case the training should be given by a person authorised by CASA to give such instruction.

The ground element of the course consists of 5 long briefings which are the same long briefings used on the full course for turbo-jet engine candidates. In view of the candidate's previous multi-engine experience, two of these are reduced in duration as indicated below:

Long Briefing	*Subject Duration*	
LB1	Aircraft Systems	1 hr
LB2 (TJ)	Turbo-jet Engine Theory & Handling	1 hr
LB5	Weight & Balance	½ hr
LB6	Effect of Engine Failure on Systems & Performance	½ hr
LB7	Weight & Performance	1 hr

The content of these long briefings are as given starting at page 64 of this CAAP.

The flight instruction, given in the aeroplane or an approved simulator, shall consist of 3 flights as given below. The exercise content of each flight is shown in detail at the end of this chapter; flights do not correspond with the full course flights, because the candidate is assumed to be competent in handling a multi-engine piston aeroplane.

Flight Number	*Description Duration*	
F1 (TJ)	Type Conversion	1 hr
F2 (TJ)	Critical & Safety Speed	1 hr
F3 (TJ)	Instrument Flying	1 hr

If required an additional flight to give the candidate night circuit experience may be added; the flight content is to be as at Flight Number F8 on page 83 in the flying training section of this CAAP.

On completion of the flight training, a flight assessment is required in accordance with normal practice.

FLIGHT NUMBER F1 (TJ) – TYPE CONVERSION

Duration: 1 hour

Aim: To familiarise the candidate with the handling characteristics of the aeroplane and its systems in normal flight.

Air Exercise:

- Pre-flight Preparation and aircraft inspection.
- Start-up and taxiing:
  - Normal procedures; and
  - Starting emergencies.
- Take-off and climb:
  - Normal procedures.
- Aeroplane handling:
  - High altitude;
  - High speed;
  - Stalling;
  - Steep turns; and
  - Engine handling.
- In Flight Emergencies (other than engine):
  - Hydraulic;
  - Electric;
  - Cabin conditioning and pressurisation;
  - Undercarriage;
  - Others as per flight manual; and
  - Emergency descent.
- Normal Circuits:
  - Circuit procedures;
  - Normal and flapless approaches;
  - Go-around; and
  - Landings and performance landings.

Skill Standard: The candidate should know the normal and emergency procedures and be able to handle the aeroplane safely and competently.

FLIGHT NUMBER F2 (TJ) – CRITICAL AND SAFETY SPEEDS

Duration: 1 hour

Aim: To introduce the candidate to asymmetric flying, critical and safety speeds, and asymmetric circuits.

Air Exercise:

- Normal take-off and climb.
- Asymmetric flight:
  - Engine fire/failure drills;
  - Engine shutdown and air start drills;
  - Fuel cross feed; and
  - Aeroplane handling with one engine inoperative.
- Critical Speeds:
  - Critical speeds – wings level, engine windmilling; and
  - Critical speeds – wings 5° bank, engine windmilling.
- Safety Speeds:
  - Engine failure during take-off:
    - Below decision speed; and
    - Above decision speed.
- Asymmetric Circuits:
  - Power settings and speeds;
  - Use of flap, and undercarriage operation;
  - Visual committal height;
  - Go-around; and
  - Landing.

Skill Standard: The candidate should be able to carry out correctly engine failure drills and to handle the aeroplane competently in the asymmetric configuration.

FLIGHT NUMBER F3 (TJ) – INSTRUMENT FLYING

Duration: 1 hour

Aim: To practice instruments flying in the normal and asymmetric configuration, and to revise asymmetric circuits.

Air Exercise:

- Take-off brief.
- Engine failure after take-off.
- Instrument flying:
  - Normal configuration:
    - Full panel;
    - Limited panel; and
    - Unusual attitudes.
- Asymmetric Instrument approach, go-around and visual landing.

Skill Standard: The candidate should be able to handle the aeroplanes competently under instrument flight conditions, and to fly the aeroplane competently and safely to a standard to pass the final flight assessment.

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