**Subpart J - CRI / Class Rating Instructor**

***AMC 1.*  FCL. 930. CRI CRI — Training Course**

 *GENERAL*

a ) The aim of the CRI Training Course is to train aircraft licence holders to the level of competence defined in FCL. 920 and adequate to a CRI ;

b ) The Training Course should be designed to give adequate training to the applicant in theoretical knowledge instruction, flight instruction and FSTD instruction to instruct for any Class or Type Rating for non-complex non-high performance SP aeroplanes for which the applicant is qualified ;

c ) The Flight Training should be aimed at ensuring that the applicant is able to teach the air exercises safely and efficiently to students undergoing a course of training for the issue of a Class or Type Rating for non-complex non-high performance SP aeroplanes. The flight training may take place on the aeroplane or an FFS ;

d ) It is to be noted that airmanship is a vital ingredient of all flight operations. Therefore, in the following air exercises the relevant aspects of airmanship are to be stressed at the appropriate times during each flight ;

e ) The student - instructor should learn how to identify common errors and how to correct them properly, which should be emphasized at all times.

 *CONTENT*

f ) The Training Course *consists of* ***3*** *( three ) Parts* :

1 ) ***Part 1*** : teaching and learning that should follow the content of AMC 1. FCL. 920 ;

2 ) ***Part 2*** : technical theoretical knowledge instruction ( technical training ) ;

3 ) ***Part 3*** : flight instruction.

 **Part 1.**

The content of the teaching and learning part of the FI training course, as established in AMC 1. FCL. 930. FI, should be used as guidance to develop the course syllabus.

 **Part 2.**

This syllabus is concerned only with the training on ME aeroplanes. Therefore, other knowledge areas, common to both SE and ME aeroplanes, should be revised as necessary to cover the handling and operating of the aeroplane with all engines operative, using the applicable sections of the ground subjects syllabus for the FI course. Additionally, the ground training should include 25 hours of classroom work to develop the applicant’s ability to teach a student the knowledge and understanding required for the air exercise section of the ME training course. This part will include the long briefings for the air exercises.

 *THEORETICAL KNOWLEDGE INSTRUCTION SYLLABUS*

 **Suggested Breakdown of Course Classroom Hours :**

|  |
| --- |
|  |
| **N0** | **Tuition Hours** | **Practice**  **in**  **Class** |  **Topic** |  **Internal Progress**  **Test** |
| **1.** | 1 : 00 |  |  Aviation Legislation | 1 : 00 |
| **2.** | 2 : 00 |  | Performance, all engines operating including mass and balance |  |
| **3.** | 2 : 00 |  |  Asymmetric flight Principles of flight |  |
| **4.** | 2 : 00 |   2 : 00 |  Control in asymmetric flight Minimum control and safety speeds Feathering and un - feathering |  |
| **5.** | 2 : 00 |  |  Performance in asymmetric flight | 1 : 00 |
| **6.** | 2 : 00 |  |  Specific type of aeroplane – operation of systems Airframe and engine limitations | 1 : 00 |
| **7.** | 4 : 00 | 5 : 00 |  Briefings for air exercises progress |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |
|  **15 : 00** |  **7 : 00** |  | **3 : 00** |
|  |  |  |  |
|  **25 : 00** |  **Course Total** *( including Progress Test )* |
|  |

 *GENERAL SUBJECTS*

a ) Air Legislation :

1 ) aeroplane performance group definitions ;

2 ) methods of factoring gross performance.

b ) Asymmetric Power Flight ;

c ) Principles of Flight ;

d ) The Problems :

1 ) asymmetry ;

2 ) control ;

3 ) performance ;

e ) The Forces and Couples :

1 ) offset thrust line ;

2 ) asymmetric blade effect ;

3 ) offset drag line ;

4 ) failed engine propeller drag ;

5 ) total drag increase ;

6 ) asymmetry of lift ;

7 ) uneven propeller slipstream effect ;

8 ) effect of yaw in level and turning flight ;

9 ) thrust and rudder side force couples ;

10 ) effect on moment arms.

f ) Control in Asymmetric Power Flight :

1 ) use, misuse and limits of :

( i ) rudder ;

( ii ) aileron ;

( iii ) elevators.

2 ) effect of bank or sideslip and balance ;

3 ) decrease of aileron and rudder effectiveness ;

4 ) fin stall possibility ;

5 ) effect of IAS and thrust relationship ;

6 ) effect of residual unbalanced forces ;

7 ) foot loads and trimming.

g ) Minimum Control and Safety Speeds :

1 ) minimum control speed ( V mc ) ;

2 ) definition ;

3 ) origin ;

4 ) factors affecting ( V mc ) :

( i ) thrust ;

( ii ) mass and centre of gravity position ;

( iii ) altitude ;

( iv ) landing gear ;

( v ) flaps ;

( vi ) cowl flaps or cooling gills ;

( vii ) turbulence or gusts;

( viii ) pilot reaction or competence ;

( ix ) banking towards the operating engine ;

( x ) drag ;

( xi ) feathering ;

( xii ) critical engine.

5 ) take-off safety speed ;

6 ) definition or origin of V **2** ;

7 ) other relevant V codes ;

h ) Aeroplane Performance : One Engine Inoperative / OEI :

1 ) effect on excess power available ;

2 ) SE ceiling ;

3 ) cruising, range and endurance ;

4 ) acceleration and deceleration ;

5 ) zero thrust, definition and purpose ;

i ) Propellers :

(1) variable pitch : general principles ;

(2) feathering and un-feathering mechanism and limitations *( for example minimum RPM )* ;

j ) Specific Aeroplane Type ;

k ) Aeroplane and Engine Systems :

1 ) operation normal ;

2 ) operation abnormal ;

3 ) emergency procedures.

l ) Limitations : Airframe :

1 ) load factors ;

2 ) landing gear and flap limiting speeds ( V lo and V fe ) ;

3 ) rough air speed ( V ra ) ;

4 ) maximum speeds ( V no and V ne ).

m ) Limitations : Engine :

1 ) RPM and manifold pressure ;

2 ) oil temperature and pressure ;

3 ) emergency procedures.

n ) Mass and Balance : *( to be covered in conjunction with the flight manual or equivalent document ( for example owner’s manual or pilot’s operating handbook ) ).*

1 ) mass and balance documentation for aeroplane type ;

2 ) revision of basic principles ;

3 ) calculations for specific aeroplane type.

o ) Mass and Performance : *( to be covered in conjunction with the flight manual or equivalent document ( for example owner’s manual or pilot’s operating handbook ))*

1 ) calculations for specific aeroplane type *( all engines operating ) ;*

2 ) take-off run ;

3 ) take-off distance ;

4 ) accelerate and stop distance ;

5 ) landing distance ;

6 ) landing run ;

7 ) take-off or climb out flight path ;

8 ) calculations for specific aeroplane type *( one engine operating )* ;

9 ) climb out flight path ;

10 ) landing distance ;

11 ) landing run.

 **Part 3.** *FLIGHT INSTRUCTION SYLLABUS : NORMAL FLIGHT*

***a )*** This Part is similar to the air exercise sections of the SE FI course, including “ Introduction to Instrument Flying “ except that the objectives, airmanship considerations and common errors are related to the operation of an ME aeroplane ;

***b )*** *The purpose* of this Part is to acquaint the applicant with the teaching aspects of the operational procedures and handling of an ME aeroplane with all engines functioning ;

***c )*** The following items should be covered :

1 ) aeroplane familiarization ;

2 ) pre - flight preparation and aeroplane inspection ;

3 ) engine starting procedures ;

4 ) taxiing ;

5 ) pre Take - off procedures ;

6 ) the Take - off and initial climb :

*( i ) into wind ;*

*( ii ) crosswind ;*

*( iii ) short field.*

7 ) climbing ;

8 ) straight and level flight ;

9 ) descending *( including emergency descent procedures )* ;

10 ) turning ;

11 ) slow flight ;

12 ) stalling and recoveries ;

13 ) instrument flight : basic ;

14 ) emergency drills *( not including engine failure )* ;

15 ) circuit, approach and landing :

*( i ) into wind ;*

*( ii ) crosswind ;*

*( iii ) short field ;*

16 ) miss-landing and going round again ;

17 ) actions after flight.

 *AIR EXERCISES*

***d )*** The following air exercises are developments of the basic SE syllabus which are to be related to the handling of ME types to ensure that the student learns the significance and use of controls and techniques which may be strange to the student in all normal, abnormal and emergency situations, except that engine failure and flight on asymmetric power are dealt with separately in the air exercises in Part 2.

**EXERCISE 1 : *FAMILIARISATION with the AEROPLANE***

***a )*** *Long Briefing objectives :*

1) introduction to the aeroplane ;

2 ) explanation of the cockpit layout ;

3 ) systems and controls ;

4 ) aeroplane power plant ;

5 ) checklists and drills ;

6 ) differences when occupying the instructor’s seat ;
7 ) emergency drills :

( i ) action in event of fire in the air and on the ground ;

( ii ) escape drills : location of exits and use of emergency equipment *( for example fire extinguishers, etc... ).*

8 ) pre-flight preparation and aeroplane inspection :

( i ) aeroplane documentation ;

( ii ) external checks ;

( iii ) internal checks ;

( iv ) harness, seat or rudder pedal adjustment ;

9 ) engine starting procedures :

( i ) use of checklists ;

( ii ) checks before starting ;

( iii ) checks after starting.

***b )*** *Air Exercise :*

1 ) external features ;

2 ) cockpit layout ;

3 ) aeroplane systems ;

4 ) checklists and drills ;

5 ) action, if fire in the air and on the ground :

( i ) engine ;

( ii ) cabin ;

( iii ) electrical.

6 ) systems failure *( as applicable to type )* ;

7 ) escape drills ( location and use of emergency equipment and exits ) ;

8 ) preparation for and action after flight :

( i ) flight authorization and aeroplane acceptance ;

( ii ) technical log or certificate of maintenance release ;

( iii ) mass and balance and performance considerations ;

( iv ) external checks ;

( v ) internal checks, adjustment of harness or rudder pedals ;

( vi ) starting and warming up engines ;

( vii ) checks after starting ;

( viii ) radio navigation and communication checks ;

( ix ) altimeter checks and setting procedures ;

( x ) power checks ;

( xi ) running down and switching off engines ;

( xii ) completion of authorization sheet and aeroplane serviceability documents.

**EXERCISE 2 : *TAXIING***

***a )*** *Long Briefing objectives :*

1 ) pre-taxiing area precautions *( greater mass : greater inertia )* ;

2 ) effect of differential power ;

3 ) precautions on narrow taxiways ;

4 ) pre take-off procedures :

( i ) use of checklist ;

( ii ) engine power checks ;

( iii ) pre take-off checks ;

( iv ) instructor’s briefing to cover the procedure to be followed should an emergency occur during take-off, for example engine failure.

5 ) the take-off and initial climb :

( i ) ATC considerations ;

( ii ) factors affecting the length of the take-off run or distance ;

( iii ) correct lift-off speed ;

( iv ) importance of safety speed ;

( v ) crosswind take-off, considerations and procedures ;

( vi ) short field take-off, considerations and procedures ;

( vii ) engine handling after take-off : throttle, pitch and engine synchronization.

6 ) climbing :

( i ) pre-climbing checks ;

( ii ) engine considerations *( use of throttle or pitch controls )* ;

( iii ) maximum rate of climb speed ;

( iv ) maximum angle of climb speed ;

( v ) synchronizing the engines.

***b )*** *Air Exercise :*

1 ) pre - taxing checks ;

2 ) starting, control of speed and stopping ;

3 ) control of direction and turning ;

4 ) turning in confined spaces ;

5 ) leaving the parking area ;

6 ) freedom of rudder movement *( importance of pilot ability to use full rudder travel )* ;

7 ) instrument checks ;

8 ) emergencies *( brake or steering failure )* ;

9 ) pre take-off procedures :

( i ) use of checklist ;

( ii ) engine power and system checks ;

( iii ) pre take-off checks ;

( iv ) instructor’s briefing if emergencies during take-off.

10 ) the take-off and initial climb :

( i ) ATC considerations ;

( ii ) directional control and use of power ;

( iii ) lift - off speed ;

( iv ) crosswind effects and procedure ;

( v ) short field take-off and procedure ;

( vi ) procedures after take-off *( at an appropriate stage of the course ) :*

(A) landing gear retraction ;

(B) flap retraction *( as applicable )* ;

(C) selection of manifold pressure and RPM ;

(D) engine synchronization ;

(E) other procedures *( as applicable ).*

11 ) climbing :

( i ) pre-climbing checks ;

( ii ) power selection for normal and maximum rate climb ;

( iii ) engine and RPM limitations ;

( iv ) effect of altitude on manifold pressure, full throttle ;

( v ) leveling off : power selection ;

( vi ) climbing with flaps down ;

( vii ) recovery to normal climb ;

( viii ) en-route climb *( cruise climb )* ;

( ix ) maximum angle of climb ;

( x ) altimeter setting procedures ;

( xi ) prolonged climb and use of cowl flaps or cooling gills ;

( xii ) instrument appreciation.

**EXERCISE 3 : *STRAIGHT and LEVEL FLIGHT***

***a )*** *Long Briefing objectives :*

1 ) selection of power : throttle or pitch controls ;

2 ) engine synchronization ;

3 ) fuel consumption aspects ;

4 ) use of trimming controls : elevator and rudder *( aileron as applicable )* ;

5 ) operation of flaps :

( i ) effect on pitch attitude ;

( ii ) effect on air speed.

6 ) operation of landing gear :

( i ) effect on pitch attitude ;

( ii ) effect on air speed.

7 ) use of mixture controls ;

8 ) use of alternate air or carburettor heat controls ;

9 ) operation of cowl flaps or cooling gills ;

10 ) use of cabin ventilation and heating systems ;

11 ) operation and use of the other systems *( as applicable to type )* ;

12 ) descending :

( i ) pre-descent checks ;

( ii ) normal descent ;

( iii ) selection of throttle or pitch controls ;

( iv ) engine cooling considerations ;

( v ) emergency descent procedure.

13 ) turning :

( i ) medium turns ;

( ii ) climbing and descending turns ;

( iii ) steep turns *( 45 ° of bank or more ).*

***b )*** *Air Exercise :*

1 ) at normal cruising power :

( i ) selection of cruise power ;

( ii ) manifold pressure or RPM ;

( iii ) engine synchronization ;

( iv ) use of trimming controls ;

( v ) performance considerations : range or endurance.

2 ) instrument appreciation ;

3 ) operation of flaps *( in stages )* :

( i ) air speed below V fe ;

( ii ) effect on pitch attitude ;

( iii ) effect on air speed.

4 ) operation of landing gear :

( i ) air speed below V lo / V le ;

( ii ) effect on pitch attitude ;

( iii ) effect on air speed.

5 ) use of mixture controls ;

6 ) use of alternate air or carburettor control ;

7 ) operation of cowl flaps or cooling gills ;

8 ) operation of cabin ventilation or heating systems ;

9 ) operation and use of other systems *( as applicable to type )* ;

10 ) descending ;

( i ) pre-descent checks ;

( ii ) power selection : manifold pressure or RPM ;

( iii ) powered descent *( cruise descent )* ;

( iv ) engine cooling considerations : use of cowl flaps or cooling gills ;

( v ) leveling off ;

( vi ) descending with flaps down ;

( vii ) descending with landing gear down ;

( viii ) altimeter setting procedure ;

( ix ) instrument appreciation ;

( x ) emergency descent :

(A) as applicable to type ;

(B) limitations in turbulence V no.

11 ) turning :

( i ) medium turns ;

( ii ) climbing and descending turns ;

( iii ) steep turns : 45 ° of ban ;

( iv ) instrument appreciation.

**EXERCISE 4 : *SLOW FLIGHT***

***a )*** *Long Briefing objectives :*

1 ) aeroplane handling characteristics during slow flight : flight at V s1 and V so + 5 knots ;

2 ) simulated go-around from slow flight :

( i ) at V sse with flaps down ;

( ii ) note pitch trim change.

3 ) stalling :

( i ) power selection ;

( ii ) symptoms approaching the stall ;

( iii ) full stall characteristics ;

( iv ) recovery from the full stall ;

( v ) recovery at the incipient stall ;

( vi ) stalling and recovery in the landing configuration ;

( vii ) recovery at the incipient stage in the landing configuration.

4 ) instrument flight *( basic )* :

( i ) straight and level ;

( ii ) climbing ;

( iii ) turning ;

( iv ) descending.

5 ) emergency drills *( not including engine failure ),* as applicable to type ;

6 ) circuit approach and landing :

 ( i ) downwind leg :

(A) air speed below V fe ;

(B) use of flaps ( as applicable ) ;

(C) pre-landing checks ;

(D) position to turn onto base leg.

 ( ii ) base leg :

(A) selection of power *( throttle or pitch ),* flaps and trimming controls ;

(B) maintenance of correct air speed.

 ( iii ) final approach :

(A) power adjustments *( early reaction to undershooting )* ;

(B) use of additional flaps *( as required )* ;

(C) confirmation of landing gear down ;

(D) selection “ touch - down “ point ;

(E) air speed reduction to V at ;

(F) maintenance of approach path.

 ( iv ) landing :

(A) greater sink rate ;

(B) longer landing distance and run ;

(C) crosswind approach and landing ;

(D) crosswind considerations ;

(E) short field approach and landing ;

(F) short field procedure : considerations.

***b )*** *Air Exercise :*

1 ) safety checks ;

2 ) setting up and maintaining *( flaps up )* ;

( i ) V s1 + 5 knots ;

( ii ) note aeroplane handling characteristics.

3 ) setting up and maintaining ( flaps down ) :

( i ) V so + 5 knots ;

( ii ) note aeroplane handling characteristics.

4 ) simulated go-around from a slow flight with flaps :

( i ) down and air speed not below V sse, for example air speed at V sse *or*

 V mca + 10 kt ;

( ii ) increase to full power and enter a climb ;

( iii ) note pitch change.

5 ) resume normal flight ;

6 ) stalling ;

( i ) selection of RPM ;

( ii ) stall symptoms;

( iii ) full stall characteristics ;

( iv ) recovery from t he full stall : care in application of power ;

( v ) recovery at the incipient stage ;

( vi ) stalling and recovery in landing configuration ;

( vii ) stall recovery at the incipient stage in the landing configuration.

7 ) instrument flight *( basic )* :

( i ) straight and level ;

( ii ) climbing ;

( iii ) turning ;

( iv ) descending.

8 ) emergency drills *( not including engine failure ),* as applicable to type ;

9 ) circuit, approach and landing :

 ( i ) downwind leg :

(A) control of speed ( below V fe ) ;

(B) flaps as applicable ;

(C) pre-landing checks ;

(D) control of speed and height ;

(E) base leg turn.

( ii ) base leg :

(A) power selection ;

(B) use of flap and trimming controls ;

(C) maintenance of correct air speed.

( iii ) final approach :

(A) use of additional flap ( as required ) ;

(B) confirmation of landing gear down ;

(C) selection of touchdown point ;

(D) air speed reduction to V at ;

(E) maintaining correct approach path : use of power.

( iv ) landing :

(A) control of sink rate during flare ;

(B) crosswind considerations ;

(C) longer landing roll ;

(D) short or soft field approach and landing ;

(E) considerations and precautions.

 10 ) Asymmetric Power Flight.

During this Part, special emphasis is to be placed on the :

( i ) circumstances in which actual feathering and un-feathering practice will be done, for example safe altitude ; compliance with regulations about minimum altitude or height for feathering practice, weather conditions, distance from nearest available aerodrome ;

( ii ) procedure to use for instructor and student co-operation, for example the correct use of touch drills and the prevention of misunderstandings, especially during feathering and un- feathering practice and when zero thrust is being used for asymmetric circuits. This procedure is to include positive agreement as to which engine is being shut down or re-started or set at zero thrust and identifying each control and naming the engine it is going to affect ;

( iii ) consideration to be given to avoid over-working the operating engine, and the degraded performance when operating the aeroplane during asymmetric flight ;

( iv ) need to use the specific checklist for the aeroplane type.

**EXERCISE 5 : *FLIGHT on ASYMMETRIC POWER***

***a )*** *Long Briefing objectives :*

1 ) introduction to asymmetric flight :

2 ) feathering the propeller : method of operation ;

3 ) effects on aeroplane handling at cruising speed ;

4 ) introduction to effects upon aeroplane performance ;

5 ) note foot load to maintain a constant heading *( no rudder trim )* ;

6 ) un-feathering the propeller ;

7 ) return to normal flight finding the zero thrust setting ;

8 ) comparison of foot load when feathered and with zero thrust set.

9 ) effects and recognition of engine failure in level flight ;

10 ) forces and the effects of yaw ;

11 ) types of failure :

( i ) sudden or gradual ;

( ii ) complete or partial.

12 ) yaw, direction and further effects of yaw ;

13 ) flight instrument indications ;

14 ) identification of failed engine ;

15 ) the couples and residual out of balance forces : resultant flight attitude ;

16 ) use of rudder to counteract yaw ;

17 ) use of aileron : dangers of misuse ;

18 ) use of elevator to maintain level flight ;

19 ) use of power to maintain a safe air speed and altitude ;

20 ) supplementary recovery to straight and level flight : simultaneous increase of speed and reduction in power ;

21 ) identification of failed engine : idle leg = idle engine ;

22 ) use of engine instruments for identification :

( i ) fuel pressure or flow ;

( ii ) RPM gauge response effect of CSU action at lower and higher air speed ;

( iii ) engine temperature gauges.

23 ) confirmation of identification : close the throttle of identified failed engine ;

24 ) effects and recognition of engine failure in turns ;

25 ) identification and control ;

26 ) side forces and effects of yaw ;

27 ) during turning flight :

( i ) effect of “ inside “ engine failure : effect sudden and pronounced ;

( ii ) effect of “ outside “ engine failure : effect less sudden and pronounced ;

( iii ) the possibility of confusion in identification *( particularly at low power )* :

(A) correct use of rudder ;

(B) possible need to return to lateral level flight to confirm correct identification.

( iv ) visual and flight instrument indications ;

( v ) effect of varying speed and power ;

( vi ) speed and thrust relationship ;

( vii ) at normal cruising speed and cruising power : engine failure clearly recognized ;

( viii ) at low safe speed and climb power : engine failure most positively recognized ;

( ix ) high speed descent and low power : possible failure to notice asymmetry *( engine failure ).*

28 ) minimum control speeds :

 ( i ) ASI colour coding : red radial line.

***Note :*** *this exercise is concerned with the ultimate boundaries of controllability in various conditions that a student can reach in a steady asymmetric power state, approached by a gradual speed reduction. Sudden and complete failure should not be given at the Flight Manual V mca. The purpose of the exercise is to continue the gradual introduction of a student to control an aeroplane in asymmetric power flight during extreme or critical situations. It is not a demonstration of V mca.*

( ii ) techniques for assessing critical speeds with wings level and recovery : dangers involved when minimum control speed and the stalling speed are very close : use of V sse ;

( iii ) establish a minimum control speed for each asymmetrically disposed engine to establish critical engine *( if applicable )* ;

( iv ) effects on minimum control speeds of :

(A) bank ;

(B) zero thrust setting ;

(C) take-off configuration :

( a ) landing gear down and take-off flap set ;

( b ) landing gear up and take-off flap set.

***Note :*** *it is important to appreciate that the use of 5 ° of bank towards the operating engine produces a lower V mca and also a better performance than that obtained with the wings held level. It is now normal for manufacturers to use 5 ° of bank in this manner when determining the V mca for the specific type. Thus, the V mca quoted in the aeroplane manual will have been obtained using the technique.*

 29 ) Feathering and un-feathering :

( i ) minimum heights for practicing feathering or un-feathering drills ;

( ii ) engine handling : precautions *( overheating, icing conditions, priming, warm-up, method of simulating engine failure : reference to aircraft engine manual and service instructions and bulletins ).*

30 ) Engine failure procedure :

( i ) once the maintenance of control has been achieved, the order in which the procedures are carried out will be determined by the phase of operation and the aircraft type ;

( ii ) flight phase :

(A) in cruising flight ;

(B) critical phase such as immediately after take-off or during the approach to landing or during a go-around.

31 ) Aircraft type :

Variations will inevitably occur in the order of certain drills and checks due to differences between aeroplane types and perhaps between models of the same type, and the flight manual or equivalent document *( for example owner’s manual or pilot’s operating handbook )* is to be consulted to establish the exact order of these procedures.

For example, one flight manual or equivalent document *( for example owner’s manual or pilot’s operating handbook )* may call for the raising of flaps and landing gear before feathering, whilst another may recommend feathering as a first step. The reason for this latter procedure could be due to the fact that some engines cannot be feathered if the RPM drops below a certain figure.

Again, in some aeroplanes, the raising of the landing gear may create more drag during retraction due to the transient position of the landing gear doors and as a result of this retraction would best be left until feathering has been accomplished and propeller drag reduced. Therefore, the order in which the drills and checks are shown in this syllabus under “ immediate actions ” and “ subsequent actions “ are to be used as a general guide only and the exact order of precedence is determined by reference to the flight manual or equivalent document *( for example owner’s manual or pilot’s operating handbook )* for the specific aeroplane type being used on the course.

 32 ) In-flight engine failure in cruise or other flight phase not including take - off or landing :

 ( i ) immediate actions :

(A) recognition of asymmetric condition and control of the aircraft ;

(B) identification and confirmation of failed engine :

( a ) idle leg = idle engine ;

( b ) closing of throttle for confirmation.

(C) cause and fire check :

( a ) typical reasons for failure ;

( b ) methods of rectification.

(D) feathering decision and procedure :

( a ) reduction of other drag ;

( b ) need for speed but not haste ;

( c ) use of rudder trim.

( ii ) subsequent actions ;

(A) live engine :

( a ) temperature, pressures and power ;

( b ) remaining services ;

( c ) electrical load : assess and reduce as necessary ;

( d ) effect on power source for air driven instruments ;

( e ) landing gear ;

( f ) flaps and other services.

(B) re - plan flight :

( a ) ATC and weather ;

( b ) terrain clearance, SE cruise speed ;

( c ) decision to divert or continue.

(C) fuel management : best use of remaining fuel ;

(D) dangers of re - starting damaged engine ;

(E) action, if unable to maintain altitude : effect of altitude on power available ;

(F) effects on performance ;

(G) effects on power available and power required ;

(H) effects on various airframe configuration and propeller settings ;

(I) use of flight manual or equivalent document *( for example owner’s manual or pilot’s operating handbook ) :*

( a ) cruising ;

( b ) climbing : ASI colour coding *( blue line )* ;

( c ) descending ;

( d ) turning.

(J) “ live “ engine limitations and handling ;

(K) take-off and approach : control and performance.

33 ) Significant factors :

( i ) significance of Take-off safety speed :

(A) effect of landing gear, flap, feathering, take-off, trim setting, systems for operating landing gear and flaps ;

(B) effect on mass, altitude and temperature ( performance ).

( ii ) significance of best SE climb speed ( V yse ) :

(A) acceleration to best engine climb speed and establishing a positive climb ;

(B) relationship of SE climb speed to normal climb speed ;

(C) action, if unable to climb.

( iii ) significance of asymmetric committal height and speed : action, if baulked below

 asymmetric committal height.

34 ) Engine failure during Take - off :

( i ) below V mca or unstick speed :

(A) accelerate or stop distance considerations ;

(B) prior use of flight manual data, if available.

( ii ) above V mca or unstick speed and below safety speed ;

( iii ) immediate re-landing or use of remaining power to achieve forced landing ;

( iv ) considerations :

(A) degree of engine failure ;

(B) speed at the time ;

(C) mass, altitude and temperature *( performance )* ;

(D) configuration ;

(E) length of runway remaining ;

(F) position of any obstacles ahead.

35 ) Engine failure after Take - off :

( i ) simulated at a safe height and at or above Take - off safety speed ;

( ii ) considerations :

(A) need to maintain control ;

(B) use of bank towards operating engine ;

(C) use of available power achieving best SE climb speed ;

(D) mass, altitude, temperature *( performance )* ;

(E) effect of prevailing conditions and circumstances.

36 ) Immediate actions : maintenance of control, including air speed and use of power :

( i ) recognition of asymmetric condition ;

( ii ) identification and confirmation of failed engine ;

( iii ) feathering and removal of drag *( procedure for type )* ;

( iv ) establishing best SE climb speed.

37 ) Subsequent actions : whilst carrying out an asymmetric power climb to the downwind position at SE best rate of climb speed :

( i ) cause and fire check ;

( ii ) live engine, handling considerations ;

( iii ) remaining services ;

( iv ) ATC liaison ;

( v ) fuel management.

***Note :*** *these procedures are applicable to aeroplane type and flight situation.*

 38 ) Significance of asymmetric committal height :

( i ) asymmetric committal height is the minimum height needed to establish a positive climb whilst maintaining adequate speed for control and removal of drag during an approach to a landing. Because of the significantly reduced performance of many CS / JAR / FAR - 23 aeroplanes when operating on one engine, consideration is to be given to a minimum height from which it would be safely possible to attempt a go-around procedure, during an approach when the flight path will have to be changed from a descent to a climb with the aeroplane in a high drag configuration. Due to the height loss which will occur during the time that the operating engine is brought up to full power, landing gear and flap retracted, and the aeroplane established in a climb at V yse a minimum height *( often referred to as “ Asymmetric Committal Height “ )* is to be selected, below which the pilot should not attempt to take the aeroplane round again for another circuit. This height will be compatible with the aeroplane type, all up weight, altitude of the aerodrome being used, air temperature, wind, the height of obstructions along the climb out path, and pilot competence ;

( ii ) circuit approach and landing on asymmetric power :

(A) definition and use of asymmetric committal height ;

(B) use of standard pattern and normal procedures ;

(C) action if unable to maintain circuit height ;

(D) speed and power settings required ;

(E) decision to land or go-around at asymmetric committal height : factors to be considered.

( iii ) undershooting importance of maintaining correct air speed *( not below V yse ).*

 39 ) Speed and Heading Control :

( i ) height, speed and power relationship : need for minimum possible drag ;

( ii ) establishing positive climb at best SE rate of climb speed :

(A) effect of availability of systems, power for flap and landing gear ;

(B) operation and rapid clean up.

***Note 1 :*** *the air speed at which the decision is made to commit the aeroplane to a landing or to go-around should normally be the best SE rate of climb speed and in any case not less than the safety speed.*

***Note 2 :*** *on no account should instrument approach “ Decision Height “ and its associated procedures be confused with the selection of minimum height for initiating a go-around in asymmetric power flight.*

40 ) Engine failure during an all engines approach or missed approach :

( i ) use of asymmetric committal height and speed considerations ;

( ii ) speed and heading control ;

( iii ) decision to attempt a landing, go-around or force land as circumstances dictate.

***Note :*** *at least one demonstration and practice of engine failure in this situation should be performed during the course.*

41 ) Instrument flying on asymmetric power :

( i ) considerations relating to aircraft performance during :

(A) straight and level flight ;

(B) climbing and descending ;

(C) standard rate turns ;

(D) level, climbing and descending turns including turns onto pre-selected headings.

( ii ) availability of vacuum operated instruments ;

( iii ) availability of electrical power source.

***b )*** Air Exercise :

This section covers the operation of a SP ME aeroplane when one engine has failed and it is applicable to all such light piston aeroplanes. Checklists should be used as applicable.

1 ) introduction to asymmetric flight :

2 ) close the throttle of one engine ;

3 ) feather its propeller ;

4 ) effects on aeroplane handling at cruising speed ;

5 ) effects on aeroplane performance for example cruising speed and rate of climb ;

6 ) note foot load to maintain a constant heading ;

7 ) un - feather the propeller ;

8 ) return to normal flight finding the zero thrust throttle setting ;

9 ) comparison of foot load when feathered and with zero thrust set ;

10 ) effects and recognition of engine failure in level flight with the aeroplane straight and level at cruise speed :

( i ) slowly close the throttle of one engine ;

( ii ) note yaw, roll and spiral descent.

11 ) return to normal flight :

( i ) close throttle of other engine ;

( ii ) note same effects in opposite direction.

12 ) methods of control and identification of failed engine close one throttle and maintain heading and level flight by use of :

( i ) rudder to control yaw ;

( ii ) aileron to hold wings level ;

( iii ) elevators to maintain level flight ;

( iv ) power *( as required )* to maintain air speed and altitude.

13 ) alternative or supplementary method of control :

( i ) simultaneously ;

( ii ) lower aeroplane nose to increase air speed ;

( iii ) reduce power ;

( iv ) loss of altitude : inevitable.

14 ) identification of failed engine : idle foot = idle engine ;

15 ) use of instruments for identification :

( i ) fuel pressure or fuel flow ;

( ii ) RPM gauge or CSU action may mask identification ;

( iii ) engine temperature gauges.

16 ) confirmation of identification : close the throttle of the identified failed engine ;

 17 ) effects and recognition of engine failure in turns and effects of “ inside “ engine failure :

( i ) more pronounced yaw ;

( ii ) more pronounced roll ;

( iii ) more pronounced pitch down.

18 ) effects of “ outside “ engine failure :

( i ) less pronounced yaw ;

( ii ) less pronounced roll ;

( iii ) less pronounced pitch down.

19 ) possibility of confusion in identification :

( i ) use of correct rudder application ;

( ii ) return to lateral level flight, if necessary.

20 ) flight instrument indications ;

21 ) effect of varying speed and power ;

22 ) failure of one engine at cruise speed and power : engine failure clearly recognized ;

23 ) failure of one engine at low speed and high power ( not below V sse ) : engine failure most positively recognized ;

24 ) failure of one engine at higher speeds and low power : possible failure to recognize engine failure ;

25 ) minimum control speeds ;

26 ) establish the V yse :

( i ) select maximum permitted manifold pressure and RPM ;

( ii ) close the throttle on one engine ;

( iii ) raise the aeroplane nose and reduce the air speed ;

( iv ) note the air speed when maximum rudder deflection is being applied and when directional control can no longer be maintained ;

( v ) lower the aeroplane nose and reduce power until full directional control is regained ;

( vi ) the lowest air speed achieved before the loss of directional control will be the V mc for the flight condition ;

( vii ) repeat the procedure closing the throttle of the other engine ;

( viii ) the higher of these two air speeds will identify the most critical engine to fail.

***Note :*** *warning - in the above situations the recovery is to be initiated immediately before directional control is lost with full rudder applied, or when a safe margin above the stall remains, for example when the stall warning device operates, for the particular aeroplane configuration and flight conditions. On no account should the aeroplane be allowed to decelerate to a lower air speed.*

27 ) establish the effect of using 5 ° of bank at V mc :

( i ) close the throttle of one engine ;

( ii ) increase to full power on the operating engine ;

( iii ) using 5 ° of bank towards the operating engine reduce speed to the V mc ;

( iv ) note lower V mc when 5 ° of bank is used.

28 ) “ in - flight “ engine failure procedure ;

29 ) in cruise and other flight circumstances not including take-off and landing ;

30 ) immediate actions : maintenance of control including air speed and use of power :

( i ) identification and confirmation of failed engine ;

( ii ) failure cause and fire check ;

( iii ) feathering decision and implementation ;

( iv ) reduction of any other drag, for example flaps, cowl flaps etc.. ;

( v ) re-trim and maintain altitude.

31) subsequent actions :

( i ) live engine :

(A) oil temperature, pressure, fuel flow and power ;

(B) remaining services ;

(C) electrical load : assess and reduce as necessary ;

(D) effect on power source for air driven instruments ;

(E) landing gear ;

(F) flaps and other services.

( ii ) re-plan flight :

(A) ATC and weather ;

(B) terrain clearance ;

(C) SE cruise speed ;

(D) decision to divert or continue.

( iii ) fuel management : best use of fuel ;

( iv ) dangers of re-starting damaged engine ;

( v ) action, if unable to maintain altitude :

(A) adopt V yse ;

(B) effect of altitude on power available.

( vi ) effects o n performance ;

( vii ) effects on power available and power required ;

( viii ) effects on various airframe configurations and propeller settings ;

( ix ) use of flight manual or equivalent document *( for example owner’s manual or pilot’s operating handbook ) :*

(A) cruising ;

(B) climbing : ASI colour coding *( blue line )* ;

(C) descending ;

(D) turning.

( x ) “ live “ engine limitations and handling ;

( xi ) take - off and approach : control and handling ;

***Note :*** *to be done at a safe height away from the circuit ;*

( xii ) take-off case with landing gear down and take-off flap set *( if applicable )* ;

( xiii ) significance of take-off at or above safety speed *( at safety speed. The ability to maintain control and to accelerate to SE climb speed with aeroplane clean and zero thrust set. Thereafter to achieve a positive climb ) ;*

( xiv ) significance of flight below safety speed *( below safety speed and above V mca. A greater difficulty to maintain control, a possible loss of height whilst maintaining speed, cleaning up, accelerating to SE climb speed and establishing a positive climb);*

( xv ) significance of best SE climb speed *( the ability to achieve the best rate of climb on one engine with minimum delay ).*

32 ) Significance of asymmetric committal height :

( i ) the ability to maintain or accelerate to the best SE rate of climb speed and to maintain heading whilst cleaning up with perhaps a slight height loss before climbing away ;

( ii ) below this height, the aeroplane is committed to continue the approach to a landing.

33 ) Engine failure during take-off run and below safety speed briefing only ;

34 ) Engine failure after take - off ;

***Note :*** *to be initiated at a safe height and at not less than take-off safety speed with due regard to the problems of a prolonged SE climb in the prevailing conditions.*

( i ) immediate actions :

(A) control of direction and use of bank ;

(B) control of air speed and use of power ;

(C) recognition of asymmetric condition ;

(D) identification and confirmation of failed engine feathering and reduction of drag

 *( procedure for type ) ;*

(E) re-trim ;

( ii ) subsequent actions : whilst carrying out an asymmetric power climb to the downwind position at SE best rate of climb speed :

(A) cause and fire check ;

(B) live engine, handling considerations ;

(C) drills and procedures applicable to aeroplane type and flight situation ;

(D) ATC liaison ;

(E) fuel management.

 35 ) Asymmetric circuit, approach and landing ;

( i ) downwind and base legs :

(A) use of standard pattern ;

(B) normal procedures ;

(C) landing gear and flap lowering considerations ;

(D) position for base leg ;

(E) live engine handling ;

(F) air speed and power settings ;

(G) maintenance of height.

( ii ) final approach :

(A) asymmetric committal height drill ;

(B) control of air speed and descent rate ;

(C) flap considerations.

( iii ) going round again on asymmetric power *( missed approach )* :

(A) not below asymmetric committal height ;

(B) speed and heading control ;

(C) reduction of drag, landing gear retraction ;

(D) maintaining V yse ;

(E) establish positive rate of climb.

 36 ) Engine failure during all engines approach or missed approach :

***Note :*** *to be started at not less than asymmetric committal height and speed and not more than part flap set :*

( i ) speed and heading control ;

( ii ) reduction of drag flap ;

( iii ) decision to attempt landing or go-around ;

( iv ) control of descent rate if approach is continued ;

( v ) if go-around is initiated, maintain V yse, flaps and landing gear retracted and establish positive rate of climb.

***Note :*** *at least one demonstration and practice of engine failure in this situation should be performed during the course.*

37 ) Instrument flying on asymmetric power ;

38 ) Flight instrument checks and services available :

( i ) straight and level flight ;

( ii ) climbing and descending ;

( iii ) standard rate turns ;

( iv ) level, climbing and descending turns including turns onto pre - selected headings.

***AMC 1.* FCL. 940. CRI CRI — Revalidation and Renewal**

 *REFRESHER TRAINING*

a ) Paragraph *( c )( 1 )* of FCL. 940. CRI determine that an applicant for Renewal of a CRI Certificate shall complete Refresher Training as a CRI at an ATO.

Paragraph *( a )( 2 )* also establishes that an applicant for Revalidation of the CRI Certificate that has not completed a minimum amount of instruction hours ( *established in paragraph ( a ) ( 1 ) )* during the validity period of the certificate shall undertake Refresher Training at an ATO for the revalidation of the certificate. The amount of Refresher Training needed should be determined on a case by case basis by the ATO, taking into account the following factors:

1 ) the experience of the applicant ;

2 ) whether the training is for revalidation or renewal ;

3 ) the amount of time lapsed since the last time the applicant has conducted training, in the case of revalidation, or since the certificate has lapsed, in the case of renewal. The amount of training needed to reach the desired level of competence should increase with the time lapsed.

b ) Once the ATO has determined the needs of the applicant, it should develop an individual training programme that should be based on the CRI Training Course and focus on the aspects where the applicant has shown the greatest needs.

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