MEMORANDUM OF UNDERSTANDING (MOU)

BETWEEN

Hang Gliding Federation of Australia (HGFA)
4C/60 Keilor Park Drive,
KEILOR PARK VIC 3033

and

Recreational Aviation Australia (RA-Aus)
Box 1265,
FYSHWICK ACT 2609

Reference: CASA File EF11/155471 "MOU between RA-Aus and HGFA"

Definitions

CASA	Civil Aviation Safety Authority
MoU or MOU	Is the Memorandum Of Understanding
RA-Aus	Recreation Aviation Australia
HGFA	Hang Gliding Federation of Australia
WSM	Weightshift Microlight or Trike registered by RAA or HGFA in accordance with provisions stipulated by CAO 95.8 or CAO 95.32
Aircraft	As for WSM

Purpose

In accordance with the CASA directive issued on 22nd July 2011, both parties are to provide assurance to CASA that the oversight of Weightshift Microlights administered by the HGFA & RA-Aus under CAO95.32 are standardised. This standardisation is to be across those elements of flight training and training aircraft maintenance as specified during the meeting attended by all parties 13th July 2011.

Validity

1. This document unless otherwise re-negotiated will be reviewed and ratified by each organisation every 2 years.
2. The review process will include assessment of the current agreement and appropriate international standards by the HGFA and RA-Aus.
3. The ratified agreement will be a new agreement and approved by CASA.

Adjustment

An interim adjustment during the period of validity to the MoU will constitute a new MoU and will be approved and lodged with CASA as the new agreement.

Elements specified by the reference document.

Element 1:

Requirement

A standardised weightshift microlight pilot certificate syllabus acceptable to CASA.

Outcome

Attachment 1- Weightshift Microlight Syllabus, 14th February 2012

Element 2:

Requirement

A standardised weightshift microlight pilot certificate exam.

Outcome

Attachment 2 - A standardised syllabus of Basic Aeronautical Knowledge (BAK)

Attachment 3 - Standardised BAK Exam Questions whereby:

- **a.** multiple BAK exams may be created;
- **b.** each exam will contain fifty (50) questions;
- **c.** the pass mark will be 80%.

Element 3:

Requirement

A common minimum standard for weightshift microlight Flight Training Facilities acceptable to CASA e.g. documenting student records.

Outcome

1) C**lassroom facilities may be permanent or temporary and must contain:**
    a. Sufficient tables and chairs to accommodate at least four trainees, plus instructional staff;
    b. a blackboard or whiteboard (recommended size 1200 mm x 1800 or larger);
    c. Wall maps defining the training area and local area procedures; and
    d. Lockable filing cabinets in which training records can be stored safely.

2) **Aircraft:** One or more approved and registered training aircraft.

3) **Documentation**
    a. Competency based record system for student training which includes:
        i. A student's signature confirms the competency achievement;
        ii. A system of confirming competency across all syllabus items;
        iii. A system chart confirming systematic achievement of membership, exams, age minimums and certification as required; and
        iv. To reference competencies and standards within the respective *Operations Manuals*.
    b. Including:
        i. Student Pilot training program and progress sheets;

ii. Training aircraft logbook(s) and training aircraft maintenance record sheets;
iii. Hand out information sheets outlining training activities any local procedures, organisation manuals and specific documentation, associated costs, certificate requirements, organisation membership requirements, health standards requirements, and suitable clothing;
iv. Organisation membership and pilot certificate application forms and Accident and Incident reporting procedures;
v. Organisation's *Operations Manual* and any other applicable manual or documentation; and
vi. Access to relevant CASA and Air Services documentation (e.g. CARs, AIP, CAOs & CAAPs)

4) Audits: Flight Training Facilities will undergo a site audit every 2 years at a minimum and it is to be conducted by the Operations Manager or approved delegate of the respective organisation.

Element 4:

Requirement

A common minimum standard of maintenance for weightshift microlight Flight Training aircraft only, acceptable to CASA.

Outcome

1. Only the following appropriately registered two seat factory built aircraft will be used for the purpose of flying training:
    a. Factory built type certified aircraft or an aircraft with a certificate acceptable to CASA that relates to the airworthiness of the aircraft; or
    b. A light Sport Aircraft manufactured by a qualified manufacturer as defined in regulation 21.172 of CASR 1998, which holds a current Special Certificate of Airworthiness.

2. Maintenance on aircraft used for hire and reward must be carried out by a person that holds a valid Authority and conducted in accordance with the manufacturer's maintenance schedules and requirements.

3. Modifications to training aircraft as defined in Paragraph 1 of this section must only be conducted in accordance with:
    a. for aircraft in 1.a. of this section, the procedures and requirements of the manufacturer, or the requirements of Regulation 21M of CASR 1998 (old CAR 35 approval); or
    b. for aircraft described in 1.b. of this section, may only be modified within the requirements, procedures and approvals of the aircraft's manufacturer.

4. Authorities (to conduct maintenance) are issued in accordance with *MAINTENANCE AUTHORITIES* (Attachment 4) and procedure specified *CRITERIA FOR AUTHORITY ASSESSMENT* (Attachment 5).

Element 5:

Requirement

An agreed process for the full and free communication between the two organisations on the transfer of pilot qualifications and information with the owner's consent.

Outcome

1. Agreed procedure by the Member
    a. Member to sign a *Member Release Form*, or send an email which will include:
        i. Name, address, current organisation member number and date;
        ii. Transferring Member's consent to release from the first organisation and transfer to the new organisation, membership information applicable to the Member;
        iii. Transferring Member's consent to release from the first organisation and transfer to the new organisation any documentation pertaining to disciplinary action; and
        iv. Details of any aircraft included in the transfer and attach any required condition report etc. in accordance with the registration transfer procedures of the new organisation.

    b. Member to submit the form or email to the first organisation for that organisation to complete the required details and acknowledgments and forward to the new organisation.

2. Agreed procedure by an organisation:
    a. Each organisation on receipt of an application by a member to transfer to the other organisation will comply with the member's request in a reasonable time frame;
    b. Each organisation will provide to the other, a copy of the most recent membership details contained within the file which must include details of any disciplinary and/or enforcement action taken or issued by the organisation against the member, be it successful or otherwise;
    c. The organisation may, in accordance with its Constitution accept or reject the application by the member;
    d. The new organisation will inform the old organisation and member of their acceptance or rejection of the transferring member's application; and
    e. If accepted by the new organisation, the member will be required to join the new organisation and that organisation will inform the other organisation (and member) of the transfer within a reasonable time. Any transfer of aircraft registration accompanying the member/owner will be advised to the other organisation and member in the same manner.

Element 6:

Requirement

An agreed process between the organisations on the transfer of aircraft from one to another.

Outcome

1. Member to submit to both organisations a *Notification of Transfer* application form or email.

2. The organisation holding the registration will:
    a. advise and coordinate with the other organisation when de-registration will take place
    b. advise the member who submitted the notification, the time frame for the transfer.

3. Member to prepare documentation including but not limited to:
    a. The Airworthiness Compliance certificate;
    b. Flight Manual and Engine Operations Manual and/or other similar named Operators Manuals;
    c. Airframe, wing and engine Logs;
    d. Aircraft Condition Report (RA-Aus) or WSM Inspection Report (HGFA); and
    e. Any other notice issued by the manufacturer, CASA or by the HGFA or RA-Aus.

4. The de-registering organisation will issue a *De-Registration Notice* to the member submitting the *Notification of Transfer* application and any other party nominated on the *Notification of Transfer* application;
    a. Documentation previously prepared will be transferred at the time of de-registration or as agreed

5. On receipt of a *De-Registration Notice* the organisation accepting registration will, upon completion of the new registration, issue a Registration notice to the nominated party on the *Notification of Transfer* application to receive notice.

Signed .....
HGFA Operations Manager
Brett Coupland
Date: 20/08/2015

Signed .....
RA-Aus Operations Manager
Jill Bailey
Date: 20/08/2015

Signed .....
Mr Lee Ungermann
Self Administering Sport Aviation Organisation Section
Office of the Director, CASA
Date

Attachment 1

Weightshift Flight Training Syllabus **14th February 2012/Revised Oct 2013**

1. **THE AIRCRAFT**
    - 1.1. Aircraft Stability and Control
    - 1.2. Complete Pre & Post Flight Administration
    - 1.3. Perform Daily Inspection
    - 1.4. Certify Daily Inspection
2. **THE CONTROLS**
    - 2.1. Pitch
    - 2.2. Roll
    - 2.3. Trim
    - 2.4. Master/Ignition
    - 2.5. Throttle
    - 2.6. Start And Stop Engine
3. **INSTRUMENTS**
    - 3.1. Engine Management
    - 3.2. Fuel Management
    - 3.3. Flight Instruments
4. **FUEL SYSTEM, USE AND MANAGEMENT**
    - 4.1. Fuel System
    - 4.2. Plan Fuel Requirements
    - 4.3. Refuel Aircraft
5. **TAXIING**
    - 5.1. Taxi Aircraft
6. **CARRY OUT PRE-TAKEOFF CHECKS**
    - 6.1. Carry Out Pre-Takeoff Checks
7. **TAKEOFF AIRCRAFT**
    - 7.1. Line Up Aircraft
    - 7.2. Takeoff
    - 7.3. Perform After Takeoff Checks
8. **OPERATION OF CONTROLS / STRAIGHT AND LEVEL FLIGHT**
    - 8.1. Demonstration Of Stability
    - 8.2. Operation Of Controls
    - 8.3. Maintain Straight And Level Flight
    - 8.4. Straight and Level Flight at Various Airspeed
9. **CLIMBING AND DESCENDING**
    - 9.1. Climbing
    - 9.2. Descending
10. **TURNING FLIGHT <45 ANGLE OF BANK**
    - 10.1. Level, Climbing And Descending Turns
    - 10.2. Billow Shift, effect on turning
11. **STALL ENTRY AND RECOVERY**
    - 11.1. Approach Stall
    - 11.2. Stall Entry
    - 11.3. Stall Recovery
    - 11.4. Stall Recovery While Turning
12. **CIRCUITS**
    - 12.1. Perform Circuits And Approach For Landing

13. LANDING
- 13.1. Normal Landing
- 13.2. Crosswind Landing

14. MISSED APPROACHES
- 14.1. Missed Approach And Go Around

15. ENGINE FAILURE ON TAKEOFF
- 15.1. Manage Engine Failure On Takeoff

16. ENGINE FAILURE IN CIRCUIT
- 16.1. Manage Engine Failure In All Areas Of The Circuit

17. FIRST SOLO
- 17.1. Perform Solo Flight

18. STEEP TURNS
- 18.1. Steep Turns >45 Angle Of Bank
- 18.2. Steep Descending Turns
- 18.3. Spiral Dive Recovery

19. FORCED LANDINGS
- 19.1. Perform A Forced Landing

20. MANAGE ABNORMAL SITUATIONS
- 20.1. Recover From Unusual Attitudes
- 20.2. Tuck / Tumble Avoidance
- 20.3. Manage In-Flight Abnormal Situations

21. PRECAUTIONARY SEARCH AND LANDING
- 21.1. Conduct Precautionary Search And Landing

22. OFF-AIRFIELD OPERATIONS
- 22.1. Short Field Takeoff
- 22.2. Short Field Landing
- 22.3. Soft Field Takeoff
- 22.4. Soft Field Landing

23. LOW LEVEL OPERATIONS (500'-1000' AGL)
- 23.1. Safety And Navigation

24. DEPART AND REJOIN CIRCUIT
- 24.1. Depart Circuit
- 24.2. Rejoin Circuit

25. FIRST TRAINING AREA SOLO
- 25.1. Perform Solo Flight In Training Area

End of Syllabus

Attachment 2

SYLLABUS OF WEIGHTSHIFT BASIC AERONAUTICAL KNOWLEDGE

LEVELS OF KNOWLEDGE AND APPLICATION

The following syllabus specifies the **MINIMUM** standard of knowledge required. Qualifying letters are used to indicate the specific levels of knowledge necessary for each individual item within a particular subject, as follows:

A A **basic** understanding of the subject matter, sufficient, with some assistance from an instructor, for the solution of simple practical problems either by calculation or by the exercise of judgment.

B A **sound** understanding of the subject matter, sufficient, without assistance, for the solution of more advanced practical problems either by calculation or by the exercise of judgment.

C A **thorough** understanding of the subject matter, achieving without assistance, a first attempt accuracy of 80% in the solution of advanced practical problems either by calculation or by the exercise of judgment.

P- **Basic** practical application of relevant procedures

P+ **Thorough** practical application of relevant procedures

Note The pass mark for the examinations set to this syllabus is 80%.

1 PRICIPLES OF FLIGHT

1.1- AERODYNAMICS		**Standard Prior to:**	
		Solo	**P/Cert**
1.1.1	**Terminology**		
	Identify descriptions/drawings of the following terms:		
	(a) aerofoil; span; chord; camber; thickness/chord ratio	A	B
	(b) relative airflow; angle of attack	A	B
	(c) total reaction; lift; drag	A	B
1.1.2	**Design features**		
	State the purpose of the following design features/controls:		
	(a) aspect ratio; wash-out	A	B
	(b) Keels	A	B
	(c) Dive sticks, Reflex bridle and Luff lines	A	B
	(d) Sweep back	A	B
1.1.3	**Lift and drag**		
	Define the relationship between the following factors in the production of lift by an aerofoil; (a) Air density (b) Surface area (c) Angle of attack (d) Airspeed	A	B
	Define the relationship between the following factors in the production of drag by an aerofoil; (a) Angle of attack	A	B

	(b) Airspeed (c) Shape (d) Effect of damage to an aerofoil surface		
	State whether lift and drag of an aerofoil will increase or decrease with changes in: (a) airspeed; (b) angle of attack;	A	B
	List the types of drag, which affect an aircraft in flight. ***Note:*** *Types are:* *(a) Parasite (zero lift):* *form, interference, skin friction;* *(b) Induced (lift dependent).*	A	B
	State how Total Drag varies with airspeed. ***Note:*** *Students should be aware that these values are representative only.*	A	B
1.1.4	**Straight and level flight** State the relationship between attitude, angle of attack and airspeed in level flight. ***Note:*** *Students should appreciate that this relationship is only true in level flight.*	A	B
1.1.5	**Changes in angle of attack** State/identify the effect of changes in angle of attack up to the stalling angle on: (a) pressure changes above and below the wing; (b) changes in airflow characteristics; streamlined to turbulent (c) lift and drag;	A	B
	Recall typical angles of attack at which a basic low speed aerofoil: (a) generates maximum lift (16 degrees); (b) is most efficient (best L/D : 4 degrees);	A	B
	and relate these angles to: i. stall speed; ii. best glide speed.	A	B

1.2 – STABILITY AND CONTROL		**Standard prior to:**	
		Solo	**P/Cert**
1.2.1	State the effect of the factors listed below on the stability and control of an aircraft in each of the three planes of movement: (a) longitudinal stability: i. position of CG; Ii. movement of centre of pressure; iii. changes in thrust;	A	B
	(b) lateral stability:	A	B
	(c) directional stability: i. large fore/aft displacement of the CoG;	A	B
	Recognise statements/diagrams which describe static and dynamic stability.	A	B
	Explain the purpose of: (a) trim and hang point (b) Aircraft design features	A	B

2 OPERATION OF AIRCRAFT

2.1- MANOEUVERING		Standard prior to:	
		Solo	P/Cert
2.1.1	Identify the forces of lift, weight, thrust and drag acting on an aircraft in: (a) "steady" level flight; (b) a "steady" climb; (c) a "steady" descent; (d) a balanced level turn.	B	C
	State why: (a) power must be applied to maintain height in a level turn; (b) an aircraft tends to overbank in level and climbing turns and not in descending turns.	B	C/P
2.1.2	**Climbing**		
	Differentiate between rate and angle of climb.	B	C
	State the effect (increase/decrease) on climb rate and angle resulting from changes in: (a) weight; (b) power; (c) airspeed (changed from recommended); (d) head/tailwind component, windshear; (e) bank angle; (f) altitude and density altitude.	B	C
2.1.3	**Descents:**		
	State the effect on rate/angle of descent and attitude resulting from changes in: (a) power - constant IAS; (b) drag - constant IAS.	B	C
	State the effect of head/tail wind on the glide path and glide distance (relevant to the earth's surface).	B	C
	Explain why a pilot should maintain the recommended glide speed, if undershooting an approach to land.	B	C
2.1.4	**Turning**		
	Describe what is meant by a balanced turn, effect of Billow shift on turning	B	C
	Describe the terms "g"; wing loading; load factor.	B	C
	During a level turn, state the effect (increase/decrease) of bank angle on: (a) stall IAS; (b) the aircraft's structure (load factor).	A	C
	List reasons for avoiding steep turns: (a) shortly after take-off; (e) during a glide - particularly on approach.	B	C
2.1.5	**Stalling & spiral dives.**		
	Define stalling angle and describe: (a) the symptoms when approaching the stall; (b) the characteristics of a stall. (c) spin and tumble avoidance	B	C
	Explain: (a) why an aircraft may stall at different speeds.	B	C

	List the effect (increase/decrease/nil) of the following variables on the level flight stall IAS: (a) power; (b) wind shear; vertical gusts; (c) manoeuvres (d) weight; (e) frost and ice; (f) altitude.	B	C
2.1.6	**Taxi, take-off and landing** Describe the stability and control characteristics, during ground operation of; (a) nose wheel aircraft	B	C
	Describe the result of the following factors on the controllability of an aircraft: (a) propeller torque and slipstream effect; (b) gyroscopic effect;	B	C
	Describe the term "ground effect" and its effect on aircraft performance.	B	C
	Cite situations which may cause an aircraft to "wheel barrow" and state the recommended pilot action in the event of such an occurrence.		
	List the advantages of taking-off and landing into wind.	B	C
	Compare a powered approach to a glide approach in terms of: (a) attitude during descent; (b) approach path angle; (c) landing roll.	B	C
	Describe the effect of wind shear, wind gradient and ground effect on aerodynamic and flight characteristics and identify.	B	C
2.1.7	**Turbulence** **Wake turbulence***: If a student is operating from an aerodrome where helicopters or heavy aircraft also operate, all 'B' items must be taught prior to pre-solo.* List factors affecting the strength of Wake turbulence: (a) aircraft weight, speed, wing shape	B	C
	State the primary control hazard that may result from Wake turbulence. (a) approximate location of vortices (in still air) generated by a preceding aircraft during: i. cruise flight; ii. take-off and landing; (b) approximate take-off/touch-down points and flight profiles	B	C
	Caution: Students should be advised that heavy/med. aircraft are capable of steep climb gradients after take-off when operating at low take-off weights. Recall that rotor downwash can be a hazard to a radius of approximately thrice the rotor diameter, and that this area should be avoided by light aircraft. ***Note:*** *Students should be aware of wake turbulence separation standards in order to make value judgements to provide their own separation at non-controlled aerodromes.*	B	C
	Mechanical Turbulence a) Describe factors creating mechanical turbulence b) Effect on manoeuvring aircraft c) Effect on takeoff and landing	B	C

	In flight Turbulence a) Describe factors that may cause in flight turbulence b) Aircraft structure and airframe limitations **c)** Manoeuvring speed	B	C

2.2 –AIRCRAFT PERFORMANCE CONSIDERATIONS		**Standard Prior to:**	
		Solo	**P/Cert**
2.2.1	Given that certain flight conditions remain constant, state the effect of: (a) changes in weight and altitude (height) on: i. angle of attack and IAS in level flight; ii. level flight range and endurance; iii. glide range and endurance. iv. rate of climb v. takeoff distance required. vi. landing distance required. (b) changes in head/tail wind component on: i. level flight range and endurance; ii. glide range and endurance. iii. takeoff distance required. iv. landing distance required.	B	C
	Identify different types of climbs; (a) maximum angle climb (b) maximum rate climb (c) cruise climb	B	C
2.2.2	Takeoff techniques Explain the techniques required for (a) into wind (b) cross wind (c) Various surface and slope conditions Explain differences in aircraft performance from low density to high density altitude airstrips Explain the importance of pre-takeoff checks Explain the importance of pre-takeoff safety brief	B/P	C/P+
2.2.3	Explain landing techniques; (a) into wind (b) cross wind	B/P	C/P+
2.2.4	Circuit Operations; (a) legal requirements (b) circuit pattern, names of circuit legs (c) mandatory/recommended radio calls (d) pre-landing checks	B/P	C/P+
2.2.5	Ground operations; (a) effect of wind on ground handling (b) braking and testing of brakes	B/P	C/P+
2.2.6	Emergency procedures (a) forced landings (b) engine failure on takeoff (c) engine failure in the circuit (d) missed approach/ go round	B/P	C/P+

2.2.7	Aircraft Weight and Balance a) MTOW b) Empty Weight c) Useful load calculation d) Effect on in-flight and ground roll performance	B/P	C/P+

2.3 – AIRCRAFT GENERAL KNOWLEDGE		**Standard prior to:**	
		Solo	**P/Cert**
2.3.1	**Terminology** With respect to the items listed below, recall the standard abbreviations used and meet the objectives stated:	A	B
	Direction: (a) recall the following methods of expressing direction: i. as a three figure group; ii. as a two figure group for runways; iii. in the clock code; (b) define heading (HDG); (c) define True (T), Magnetic (M), and Compass North;	A	B
	Distance, Speed and Velocity (a) state the units used for distance: i. navigation - nautical miles (NM); ii. visibility - metres (m), kilometres (km); (b) define wind velocity (W/V);	A	B
	Time: (a) mentally convert local time (EST, CST, WST) to UTC and vice versa;	A	B
	Vertical measurement. (a) state the unit used (ft) for vertical measurement and differentiate between: i. height; ii. altitude; iii. elevation;	A	B
	Other units. (a) state the units used for: i. runway dimensions; ii. temperature; iii. pressure; iv. weight; v. volume; (b) given W/V and runway directions determine the appropriate runway for take-off/landing: i. the direction (left/right) of any cross wind component; ii. the value of crosswind component.	A	B

2.3.2	**Power plants and systems – Basics.**		
	Demonstrate a basic understanding of the principle of operation of a two/four stroke cycle internal combustion engine and state the purpose of the following components: (a) cylinders; pistons; piston rings; inlet/exhaust valves; crank shaft; cam shaft; spark plugs.	A	B
	State the purpose of the following components/features: (a) carburettor; (b) throttle; (c) CDI, dual ignition; (d) regulator/rectifier; (e) battery, battery compartment vent; (f) propeller; (g) circuit breaker, fuse, bus bar; (h) oil cooler; (i) fuel tank vents.	A	B
	State the purpose of the following gauges: (a) RPM (Tachometer); (b) CHT, EGT; (c) voltmeter, ammeter; (d) fuel pressure; (e) oil temperature and pressure. ***Note:*** *"Purpose" means the importance in relation to monitoring the powerplant and systems.*	A	B
	State how the following affect the power output of an engine: (a) throttle position; (b) RPM; (c) air density.	A	B
	State the purpose of engine lubrication. ***Note:*** *"Purpose" means the reduction of friction and engine cooling.*	B	B
	Describe the effect of excessively rich and lean mixture strengths on engine operation.	A	B
2.3.3	**Fuels and Oils.**		
	List safety precautions when refuelling aircraft;	A	B
	List reasons why a fuel drain is taken and when;	A	B
	List sources of fuel contamination;	A	B
	State the advantage of filling tanks prior to overnight parking;	A	B
	Explain the terms: (a) viscosity, oil sump, multi-grade oils; (b) octane rating; (c) Avgas, Avtur, ULP; and indicate how to identify Avtur, Avgas and ULP;	A	B
	List factors conducive to fuel vaporisation and identify procedures to minimise this phenomenon.	A	B
	Identify differences in fuel gauge indications in tail and level flight attitudes in a tail wheel aircraft.	A	B
	Pre-mix requirements for two strokes	A	B
	Explain the fuel system terms;	A	C

	(a) gravity feed (b) pump feed (c) difference between electronic boost pumps and mechanical pumps (d) fuel tank vents and importance		
2.3.4	**Engine Handling.** List the causes and effect of detonation. State the effect on engine operation of: (a) using a mixture that is too rich or too lean. Give reasons for the following limitations/actions: (a) minimum oil pressure; (b) minimum/maximum oil temperature; (c) minimum/maximum CHT; (d) maximum RPM; (e) ignition checks: pre-takeoff and shutdown; (f) prolonged use of starter motor. (g) engine warm up on prolonged descents. Explain the significance of blue or black exhaust smoke.	A B B A	B C C B
2.3.5	**Malfunctions.** With respect to a malfunction or a failure of the components listed in (a) to (h) below: • identify cockpit indications which may suggest a malfunction • state pilot actions (if any) to rectify the problem • describe the consequences if the malfunction cannot be rectified. Components: (a) Regulator/rectifier; (b) CDI's or ignition modules; (c) battery; (d) ignition switch; (e) fuel vent (blockage), fuel/booster pump; (f) oil cooler; (g) hydraulic brakes With respect to the following engine gauges: • identify reasons for an abnormality • state pilot actions (if any) to rectify a problem • state the consequences if the problem cannot be rectified by the pilot	A A A B B B	B B B C C C
	Engine Gauges: (a) oil temperature and pressure; (b) CHT; (c) fuel pressure; (d) tachometer; (e) ammeter;		

2.3.6	**Engine Icing.** ***Note:*** *Students should be advised that the following material is general in nature and that the operational application of engine ice prevention/control varies between individual aircraft and engines. Pilots should therefore follow procedures recommended in the pilots' operating handbook.*		
	Describe the method for checking the operation of carburettor heat prior to take-off.	B/P	C/P+
	For aircraft fitted with a fixed pitch propeller, identify cockpit indications which would signify the presence of engine ice.	B	C
	Discuss the use of carburettor heat for: (a) anti-icing; (b) de-icing; (c) ground operation.	B	C
	State the effect of the application of carburettor heat on engine performance and engine instrument indications.	B	C
2.3.7	**Flight Instruments.** General:		
	(a) explain the following terms: i. pitot-static system; ii. pitot pressure; static pressure; iii. alternate static source; iv. pressure error;	A	B
	(b) explain the relationship between: i. IAS; TAS.	A	B
	(c) have a basic knowledge of the principle of operation and construction of the: i. ASI, VSI, altimeter;	A	B
	State the effect of the following factors on the accuracy of pressure instrument indications: (a) ASI: i. blockage/leaks (pitot or static); (b) VSI: i. blockage of the static source; ii. lag. (c) Altimeter: i. blockage of the static source; ii. lag; iii. incorrect sub-scale settings; iv. errors due to changes in atmospheric temperature and pressure.	A	B
	Magnetic compass Background knowledge Principle of construction:		
	• magnetic needles point to magnetic north	A	B
	• fluid decreases oscillations and friction	A	B
	• should not contain bubbles	A	B
	State the effect of the following errors on compass indications in the southern hemisphere: (a) turning errors; (b) acceleration errors.	A	B

	State the purpose of and use a compass correction card to determine magnetic heading. Interpret colour codes on an ASI.	A	B
	Note: *Pressure instruments are the:* • *ASI, altimeter, VSI.* State the effect of a blockage of the pitot or static source on the indications displayed by each pressure instrument listed above. State the effect of an incorrect sub-scale setting on the reading of an altimeter;	 A A	 B B
	State the effect of using an alternate static source located inside the cockpit, on the reliability of pressure instrument indications. Describe checks which would ensure the serviceability of a magnetic compass and the flight instruments mentioned above.	A A	B B

Attachment 3

BASIC AERONAUTICAL KNOWLEDGE EXAM QUESTIONS

1. **To turn right after takeoff from within a standard left hand circuit pattern, it is recommended to:**
   a) Climb straight ahead, staying below circuit height as not to impede other airfield users
   b) Climb to a height of 500ft AGL before turning right
   c) Climb to 1000ft AGL and clear of circuit area before turning right
   d) Climb to 1500ft AGL before turning right and broadcast intentions IAW the AIP

2. **The VNE speed indicated on the airspeed indicator should:**
   a) Be exceeded only if no abrupt manoeuvres are attempted
   b) Only be exceeded in calm air
   c) Never be exceeded under any circumstances
   d) Be exceeded when only in a dive recovery

3. **When are the indications of a magnetic compass most accurate during flight?**
   a) In straight and level, un-accelerated flight
   b) At a constant speed
   c) During turns with a bank angle of less than 30 degrees
   d) At all times in flight

4. **The angle of attack of a propeller blade section is:**
   a) The angle between the relative airflow and the chord line of the blade section
   b) The angle between the plane of rotation and the relative airflow
   c) The angle between the back of the blade section and the plane of rotation
   d) The angle between the thrust line and the angle of attack of the wing

5. **If fuel/air mixture adjustments are not made during operation at high altitudes, engine performance will be effected because of:**
   a) An increase in the amount of fuel and a decrease in the volume of air entering the carburettor
   b) A decrease in the weight of air while approximately the same amount of fuel enters the carburettor
   c) A decrease in the amount of fuel and a decrease in the volume of air entering the carburettor
   d) A constant volume of air and an increase in the amount of fuel metered by the carburettor

6. **Luff Lines:**
   a) Increase stability by reflexing the wing
   b) Increase stability at low speed
   c) Eliminates the need for trailing edge battens
   d) Holds the wing tight in a turn

7. **Carburettor icing can be detected by:**
   a) A decrease in engine RPM
   b) An increase in engine RPM which may be combined with agitated engine power
   c) An increase in engine RPM
   d) A decrease in engine RPM which may be combined with agitated engine power

8. **An aeroplane with a gross weight of 400kg is banked in level flight at an angle of 60 degrees, the effective weight or load factor is equivalent to?**
   a) 1600kg or 3g
   b) 400 kg or 2g
   c) 800 kg or 2g
   d) 1200kg or 3g

9. **After takeoff, adopting which lAS will assist an aeroplane to gain height in minimum time?**
   a) Best rate of climb speed
   b) Cruise-climb speed
   c) Best angle of climb speed
   d) Minimum control speed

10. **The best angle of climb in relationship to the ground can be achieved:**
    a) Into a headwind
    b) With a tailwind
    c) Is not effected by wind direction
    d) In smooth air

11. **At a constant power setting the rate of climb of a microlight is greater when the wings are level than when in a climbing turn because when level:**
    a) Centre of lift is nearer the trailing edge of the wing
    b) Vertical lift component is greater
    c) Wing loading is greater
    d) Relative airspeed is greater

12. **Billow Shift will happen:**
    a) In straight and level flight
    b) On the up going wing in a turn
    c) On the down going wing in a turn
    d) In a power off glide and low airspeed

13. For a given aerofoil the angle of attack which results in a stall:

a) Varies with speed around the aerofoil
b) Varies directly with the degree of bank
c) Is dependent on the load factor
d) Remains constant regardless of bank, load factor or airspeed

14. The point on an aerofoil through which it is said total lift acts is the:

a) Midpoint of the chord
b) Centre of pressure
c) Centre of rotation
d) Centre of gravity

15. While over flying an aerodrome with the intent to land, you notice a white cross at either end of a runway. This would mean?

a) No significance
b) The aerodrome has a right hand circuit pattern
c) Hard surfaces must only be used
d) The runway is unserviceable and should not be used

16. More sweepback in a wing will:

a) Increase surface area forward of C of G
b) Decrease stability in a roll
c) Increase stability in pitch
d) Decrease stability in yaw

17. The most effective way to scan the sky for other aircraft during level flight is to?

a) Move the head about 10 to 15 degrees at a time, pausing after each movement to allow the peripheral vision to detect any movement
b) Move the head in a continual arc from side to side
c) Do not look anywhere but straight ahead unless you detect movement
d) Keep the head still and move the eyes continuously from side to side

18. Reflex refers to:

a) How quickly a wing shape recovers from a turn
b) A wing's flexibility
c) Trailing edge tension
d) Movement in the kingpost

19. What changes in aeroplane control must be made to maintain height while the airspeed is being decreased?

a) Decrease the angle of attack to compensate for the increase in drag
b) Increase angle of attack to produce more lift than drag
c) Maintain a constant angle of attack until the desired airspeed is reached, then increase the angle of attack
d) Increase the angle of attack to compensate for the decreasing lift

20. Frost or moisture covering the upper surface of a microlight wing may cause:

a) Drag factors so large that sufficient speed cannot be obtained for takeoff
b) The aeroplane to stall at an airspeed that is higher than normal
c) No problems for pilots of weightshift aircraft
d) The aeroplane to stall at an angle of attack that is higher than normal

21. When considering the forces acting upon an aeroplane in straight and level flight at constant airspeed, which statement is correct?

a) Thrust always acts forward parallel to the relative wind and is greater than drag
b) Lift always acts perpendicular to the longitudinal axis of the wing and is greater than weight
c) Weight always acts vertically toward the centre of the earth
d) Drag always acts rearward parallel to relative wind and is less than thrust

22. The three axes of motion on an aeroplane intersect at the:

a) Midpoint of the datum line
b) Centre of pressure
c) Midpoint of the mean chord
d) Centre of gravity

23. Flight in excess of an aircraft maximum takeoff weight is illegal and may cause:

a) Excessively stability in flight
b) It is impossible to reach the required takeoff speed
c) Significant increase it will cause in fuel consumption
d) Hidden structural stresses that could result with structural failure

24. The angle of attack at which an aeroplane wing stalls will:

a) Remain the same regardless of gross weight
b) Change with an increase in gross weight
c) Decrease if the centre of gravity is moved aft
d) Increase if the centre of gravity is moved forward

25. The tendency of an aeroplane to return to its original condition, when disturbed from a condition of steady flight, is known as:

a) Stability
b) Balance
c) Manoeuvrability
d) Controllability

26. An aeroplane's fuel is to be checked for the presence of water:

a) Prior to the first flight of the day and after refuelling
b) As part of each pre-flight check
c) Prior to the last flight of the day and after refuelling
d) After refuelling and any change of pilot

27. Which of the following factors affect the stability around the longitudinal axis of an aeroplane?

a) The relationship of thrust and lift and weight and drag
b) The effectiveness of the luff lines
c) The location of the centre of gravity with respect to the centre of pressure
d) The dihedral and angle of sweep back

28. Dihedral built into a wing will:

a) Improve longitudinal stability
b) Decrease lateral stability
c) Improve lateral stability
d) Leave lateral stability unchanged

29. Induced drag is caused by?

a) An accumulation of frost on the wings
b) Flying with arms out the side
c) The generation of lift by the wing
d) The combination of parasitic and form drag

30. The total drag of an aeroplane is?

a) Form drag plus parasitic drag
b) The sum of induced drag, form and parasitic drag
c) The resultant of the total aerodynamic force and the induced drag
d) The arithmetic difference between thrust and drag

31. Compared to taking off in nil wind, a takeoff into a headwind:

a) Improves rate of climb
b) Shortens ground roll and improves obstacle clearance
c) Has no effect on takeoff roll but obstacle clearance i.e. climb gradient, is improved
d) The lift-off IAS can be reduced

32. An aircraft's maximum take-off weight is 401kg. The aircraft's empty weight is 170kg, you weigh 92kg, your passenger weighs 95kg and you are carrying 20kg of baggage. How much fuel can be carried? (fuel = 0.7 kg per litre)

a) 34 litres
b) 32 litres
c) 26 litres
d) 40 litres

33. Where can the operating limitations of an aircraft be found?

a) On the airworthiness certificate
b) Only in the aircraft or engine log books
c) In the aircraft operations handbook and placards
d) In the maintenance release

34. Sweepback in a wing will:

a) Increase profile drag
b) Increase aircraft VNE
c) Affect stability
d) Decrease stall speed

35. Which airspeed is used to clear obstacles on takeoff?

a) Best rate of climb.
b) Best cruise climb airspeed.
c) Best angle of climb.
d) Minimum controllable airspeed climb.

36. For aircraft climbing at best rate of climb airspeed, which of the following would result in an increased rate of climb:

a) An increased headwind component.
b) A reduction in aircraft weight.
c) A reduction in air density.
d) A 10 knot increase in airspeed.

37. "Maximum Take-Off Weight" refers to the maximum weight at which an aircraft can legally:

a) Be loaded to under any conditions.
b) Be loaded to and move using its power.
c) Takeoff.
d) Takeoff in the takeoff distance available under the prevailing conditions.

38. An aerodrome has an elevation of 100ft AMSL but the density altitude is 3000ft AMSL, which indicates a hot day. In respect to taking off, which of the following statements is true?

a) It will take longer to get airborne, but the climb performance will be unaffected.
b) It will be shorter in time to get airborne, but the climb performance will be unaffected.
c) It will take longer to get airborne and the climb performance will be reduced.
d) It will take longer to get airborne and the climb performance will be increased.

39. During a prolonged descent the power should periodically be increased to about 50% of maximum RPM for a few seconds in order to:

a) Ensure that the engine will respond to throttle inputs when required.
b) Avoid carbon fouling of the spark plugs.
c) Keep the engine warm and prevent uneven cooling.
d) Ensure a, b, and c above.

40. Altimeter indication (or reading) depends on the relationship between:

a) Dynamic and static pressure.
b) Static pressure and the datum set on the subscale.
c) Cockpit and static pressure.
d) Dynamic and MSL pressures.

41. Increasing the angle of bank up to an angle of 60^{o} in a level turn will:

a) Not affect anything.
b) Increase wing loading and stall speed significantly.
c) Decrease wing loading and increase stall speed significantly.
d) Be 2g therefore your stall speed will double.

42. If the engine fails at 150 feet in a climb after takeoff the first action should be to:

a) Choose a suitable area to land.
b) Turn back towards the runway.
c) Pitch down and attain best glide speed.
d) Use any excess speed to gain more height.

43. An aircraft will stall when:

a) The stalling angle of attack is exceeded.
b) There is insufficient power to maintain level flight.
c) The load factor exceeds its critical limit.
d) Weight exceeds the lift produced.

44. When practising straight and level stalling a severe left wing drop is experienced at the point of stall: This was most likely because:

a) Poor rigging of the wings.
b) The aircraft yawing to the right.
c) The left wing stalling before the right wing.
d) The aircraft yawing to the left.

45. The propeller of an aircraft is replaced with a propeller having a slightly coarser pitch. The likely effect on performance will be.

a) Increased takeoff distance, decreased climb performance, improved cruise performance.
b) Increased takeoff distance, steeper climb angle, higher fuel consumption.
c) Decreased takeoff distance, increased rate of climb, decreased cruise speed.
d) Decreased takeoff distance, decreased rate of climb, improved cruise performance.

46. The difference between operating from a landing area located 3000ft AMSL where the temperature is 30°C, compared with a sea level takeoff where the temperature is 15°C, will be evidenced by:

a) A significant increase in takeoff distance required and reduced climb rate.
b) Lower EGT indications.
c) Greatly increased takeoff distance required, reduced climb rate, identical landing distance required.
d) Reduced climb rate, takeoff distance required unaffected.

47. While maintaining a stable final approach, how can a sudden decrease in the headwind component detected?

a) A decrease in indicated airspeed and rate of descent.
b) A decrease in indicated airspeed and increase in rate of descent.
c) An increase in both indicated airspeed and rate of descent.
d) Less power required to reach the landing point.

48. Symptoms of a spiral dive are characterised by:

a) Stable airspeed, increasing rate of descent and bank angle.
b) One wing being stalled.
c) Increasing airspeed, steep nose down attitude, increasing rate of descent.
d) A much higher rate of rotation.

49. Setting 1013.2 hectopascals on the subscale of an altimeter causes it to indicate:

a) Standard density altitude.
b) True height above mean sea level.
c) Zero when the altimeter is at mean sea level in a standard atmosphere.
d) The height of the aerodrome (on a standard day.).

50. If thick frost is not cleared from an aircraft's wings:

a) The increased weight could cause damage to the skin during taxi and takeoff.
b) The aircraft will be above its maximum weight for takeoff.
c) Takeoff distance and stalling speed will increase.
d) All of the above.

51. An aircraft is at 200ft on final approach with a slight tailwind during a forced landing and undershooting the selected landing point. The pilot should:

a) Reduce airspeed below best glide speed to take advantage of the wind.
b) If landing space is available, execute a 180 degree turn into wind.
c) Plan to land as close to stalling speed as possible.
d) Maintain best glide speed and continue the approach.

52. Mechanical turbulence is caused by:

a) Machinery operating on the movement area (jet engines, rotating propellers).
b) An abrupt change of wind direction at altitude.
c) Wind circulating around objects (hangars, large trees, hills).
d) Thermal heating.

53. An increase in airspeed affects the primary flight controls in the following manner:

a) They become less effective.
b) They become more sensitive and more difficult to deflect.
c) They are not affected at all.
d) They will become more difficult to deflect but trimming will make it easier.

54. Which of the following instruments will read incorrectly in a descent if the Pitot tube becomes blocked?

a) The vertical speed indicator only.
b) The airspeed indicator only.
c) The airspeed and vertical speed indicators.
d) The altimeter and vertical speed indicator.

55. Which of the following situations is most likely to cause structural damage to an aircraft?

a) Applying in excess of 90 degrees of bank.
b) Applying full power on the ground with the brake on.
c) Flying at the manoeuvring speed in severe turbulence.
d) Encountering moderate turbulence while flying at VNE.

56. One of the following expressions describes 'Chord Line':

a) The name given to the pull-starter for some engines.
b) The line joining the leading and trailing edges of the wing.
c) The line created by the main bracing wire.
d) The line joining each wingtip.

57. Which of the following combinations of problems may result from a stone-damaged propeller?

a) Loss of thrust, increased engine wear, vibration, possible structural failure.
b) No loss of performance if the damage is blended out properly.
c) Greater chance of engine over-speed.
d) Less efficient engine cooling, change in the thrust line.

58. The person ultimately responsible for ensuring that an aircraft is safe to fly is:

a) The certificate of registration holder.
b) The Civil Aviation Safety Authority.
c) The CFI of the operating flying school.
d) The pilot in command.

59. Takeoff and landing distance required is:

a) Decreased by a tailwind and increased by a headwind.
b) Not affected by the wind component.
c) Increased by either a tail wind or a headwind.
d) Increased by a tailwind and decreased by a headwind.

60. When must the aircraft fuel system be checked for the presence of water?

a) Before every flight.
b) Before and after every flight.
c) Before the first flight of the day and after every flight.
d) Before the first flight of the day and after every refuelling.

61. While carrying out an engine run up prior to takeoff, the pilot switches the left ignition off, but there is no change in RPM. This would indicate that:

a) The left ignition system is operating satisfactorily.
b) The tachometer is faulty.
c) The left ignition system is unserviceable.
d) The right ignition system is unserviceable

62. In a dive, a Dive Stick will:

a) Control the luff tension
b) Prevent sail collapse on the wing tip
c) Decrease the angle of attack, thereby assisting dive recovery
d) Prevent the angle of attack from increasing

63. How is altitude maintained after reducing power in level flight?

a) The angle of attack must be increased to compensate for the decreasing lift caused by a reduction in airspeed.
b) The angle of attack must remain the same.
c) The angle of attack must be decreased.
d) Choke should be applied.

64. Airspeed indication (or reading) depends on the relationship between:

a) Dynamic and static pressure.
b) Static pressure and the datum set on the subscale.
c) Cockpit and static pressure.
d) Dynamic and MSL pressures.

65. An aircraft is descending at the Best Glide speed, increasing the angle of attack will:

a) Increase the gliding range.
b) Decrease the gliding range.
c) Decrease the gliding angle.
d) Decrease the rate of descent and increase your gliding range

66. While climbing, the vertical speed indicator remains at zero, the cause could be a blockage in the:

a) Pitot tube.
b) Static tube.
c) Electrical system.
d) Vacuum system.

67. Stalling speed is increased if:

a) Weight is decreased.
b) Weight is increased.
c) Load factor is decreased.
d) Angle of attack is increased.

68. When thick aerofoils are compared to thin ones, it can be stated that under the same in flight conditions that thick aerofoils will have:

a) Lower lift and drag.
b) Lower lift and higher drag.
c) Higher lift and drag.
d) Higher lift and lower drag.

69. If the static vents become blocked, the instruments which will be affected are the:

a) Airspeed indicator, altimeter and vertical speed indicator.
b) Attitude indicator, compass and airspeed indicator.
c) Altimeter only.
d) Airspeed indicator, vertical speed indicator and attitude indicator.

70. Billow shift can be a design characteristic of:

a) The wing internal batten system
b) Sail fastening to the leading edge
c) Luff line tension
d) A floating cross tube

71. The magnetic compass system in an aircraft should be:

a) Always accurate in flight.
b) Accurate in un-accelerated straight and level flight.
c) Not affected by turning errors.
d) An accurate heading reference, provided wings are level.

72. One of the causes of detonation in an aircraft engine is:

a) Using fuel of a higher grade than normal.
b) Deposits of lead in the cylinders.
c) Richer than normal mixture.
d) Using a fuel of a lower grade than normal.

73. If the charging system was to fail in flight, the electrical system will receive its power for a limited period from:

a) The inverter.
b) The battery.
c) The emergency power supply.
d) The lighting coil.

74. Which of the following factors improves takeoff performance?

a) The runway sloping upwards.
b) A tailwind.
c) Low atmospheric pressure.
d) Low atmospheric temperature.

75. If you encounter severe turbulence, what speed should be flown?

a) The minimum speed possible.
b) The manoeuvring speed.
c) Velocity Never Exceed.
d) Normal cruise speed.

76. Carburettor icing can occur when:

a) The mixture is rich at high altitudes.
b) The temperature is low with low humidity.
c) There is visible moisture in the air.
d) The temperature is high with low humidity.

77. On an aerofoil, the angle between the chord line and the relative airflow is the:

a) Dihedral angle.
b) Chord angle.
c) Angle of advance.
d) Angle of attack.

78. The term 'Washout' is used to describe the:

a) Reduction of wing angle of incidence towards the tips to ensure the inboard sections of the wing stalls first.
b) Increase in camber towards the wing tips to increase lift produced.
c) The angle of the wings to the aircrafts longitudinal axis.
d) Increase of the propeller blade angle towards the tips.

79. In level flight the angle of attack is increased from 4 degrees up to the stalling angle:

a) Lift will increase and drag will decrease up to the stalling angle.
b) Lift and drag will both increase up to the stalling angle.
c) The lift/drag ratio will remain the same.
d) Drag will increase and lift will decrease.

80. What will happen in straight and level flight if thrust is increased and the angle of attack is not altered?

a) The airspeed will increase slightly and the aircraft will start to climb.
b) The aircraft will gradually lose height and gain speed.
c) The aeroplane will remain in straight and level flight, but its airspeed will increase.
d) The airspeed will increase and the aircraft will maintain height.

81. One of the following statements is true in respect of wake turbulence generated by an aircraft in flight:

a) Helicopters do not pose a problem because they do not generate wingtip vortices.
b) The severity decreases the faster the generating aircraft travels.
c) Atmospheric turbulence greatly increases the severity of wake turbulence.
d) The greater the lift being produced by the generating aircraft, the greater the wake turbulence.

82. Reflex lines are:

a) A primary control attachment to the cross bar
b) The attachment from the keel to the King Post
c) Used to tension the trailing edge
d) To replace a primary control wire to the main spar

83. If the hang point could be set inadvertently to far forward on the longitudinal axis the pilot would:

a) Require forward pressure on the cross bar
b) Apply ballast in the front seat
c) Hold the cross tight to the pilots chest
d) Apply more power

84. For an aerofoil:

a) The faster the airspeed the higher the angle of attack
b) The slower the airspeed the higher the angle of attack
c) Induced drag increases with decrease in angle of attack
d) The angle of attack is not relative to airspeed

85. Leading up to the stall, buffeting is caused by:

a) Lamina flow separation
b) Skin separation
c) Mechanical turbulence
d) Wake turbulence

86. Dynamic stability in flight:

a) Requires the pilot to be proactive controlling aircraft
b) Means the aircraft will not fly too fast
c) Means the aircraft has a tendency to return to its original flight position
d) The aircraft is always stable

87. In a straight and level flight at a constant airspeed:

a) Lift is the sum of thrust and drag
b) Lift is always equal to thrust
c) Weight equals drag
d) Thrust equals drag

88. When maximum obstacle clearance is required on takeoff into a 5KT head wind, the best airspeed is:

a) Best L/D
b) Max rate of climb
c) Cruise climb speed
d) Max angle of climb

89. On a very hot day with no wind, an aircraft would:

a) Require some wind for takeoff
b) Need less runway on takeoff
c) Have higher fuel consumption
d) Experience a higher pressure altitude at takeoff

90. Pilots need to be aware of wind gradient when landing because it can:

a) Reduce turbulence
b) Cause cloud to form very quickly
c) Increase glide angle
d) Increase rate of descent

91. TAS is:

a) IAS compensated for Density Altitude
b) IAS plus instrument error
c) Vs plus Pressure altitude
d) Vs + IAS

92. The length of ground roll required at takeoff is effected by:

a) Wet or dry conditions
b) Length of grass
c) Runway gradient
d) All of the above

93. Vra is stipulated by the manufacture to account for:

a) Stalling at heavy weight
b) Dynamic stability
c) Flying in turbulent conditions
d) Ensuring the engine is not over loaded in steep turns

94. Wake Turbulence in flight is:

a) In front of approaching heavy aircraft
b) In the wind shear near cloud formation
c) Is generated by all aircraft
d) A result of mechanical turbulence

95. At higher altitude you would expect:

a) The aircraft to perform as it would at a lower altitude
b) Have a lower TAS
c) Use more fuel
d) Takeoff distance will be greater

96. A tail wind in flight:

a) Reduces the wind flow over the aerofoil
b) Reduces the angle of climb
c) Reduces the rate of climb
d) Reduces the endurance of the aircraft

97. A headwind:

a) Increases take off distance required
b) Increases fuel consumption per nautical mile
c) Increases Vs
d) Increases glide angle

98. Full useful load can only be utilised:

a) If it exceeds MTOW
b) With full power and full fuel tanks
c) If gross weight is less than MTOW
d) If the runway length is long enough

99. MTOW is 600Kg, Pilot and passenger are 180 kg, Empty weight 390 Kg, and the fuel tanks are appropriately full, the aircraft should:

a) Be flown at Vs
b) Have a high AoA
c) Takeoff
d) Not be loaded above its useful load of 210kg

100. A heading is expressed as a:

a) 1 digit number
b) 2 digit number
c) 3 digit number
d) 4 digit number

101. North on a compass in an aircraft is:

a) True north
b) Compensated north
c) Magnetic North
d) Geographic north

102. Which statement is false:

a) Microlights fly at a unit of speed called knots, which represents statute miles/hour
b) Mountain heights are expressed in feet
c) Runway lengths are expressed in meters
d) VSI is expressed in feet per minute

103. At a higher density altitude the engine:

a) Power will increase
b) Fuel mixture will be lean
c) Fuel mixture will be rich
d) Fuel will pre detonate

104. If a static vent was blocked:

a) Fuel flow would cease
b) Pilot would see no visible indications
c) The ASI would read VNE
d) The VSI would freeze

105. An adjustable sub-scale is found on which instrument:

a) VSI
b) RPM gauge
c) Altimeter
d) Fuel Pressure gauge

106. Range of an aircraft is:

a) Decreased with a tail wind
b) Decreased with less weight
c) Decreased at lower density altitude
d) Decreased with profile drag

END OF BAK QUESTIONS

Attachment 4

MAINTENANCE AUTHORITIES

1. **RA-Aus members for *RA-Aus Level 2***
2. **HGFA members for *WSM Maintenance Endorsement***

DEFINITIONS

"Authority" an approval issued, with or without limitation by either the HGFA or RA-Aus to undertake maintenance of a WSM

WSM a 1 or 2 place Weight Shift Microlight aircraft or Trike.

RA-Aus Level 2 Maintenance Authority

HGFA WSM Maintenance Endorsement

For suitable persons to conduct maintenance on all aircraft or conduct and/or authenticate maintenance on aircraft used for hire or reward.

RA-Aus Level 2 Restricted

HGFA WSM Maintenance Endorsement Restricted

For suitable persons to conduct *line maintenance* on training aircraft or aircraft used for hire and reward, unless as otherwise defined. *Line maintenance* is defined at Annex A of this section.

Requirement for Issue

a. Hold a current membership of the issuing association
b. Fulfilling all requirements specified by the *Criteria for Authority Assessment* issued by the members respective association
c. Lodging the completed form and references with the members association
d. RAA and HGFA reviewing and approving the applicant submission, with or without limitation

Privileges

a. Undertake maintenance on WSM aircraft used for hire or reward as defined

Responsibilities

a. Conduct maintenance on factory built aircraft used for hire and reward in accordance with any limitation specified on the Authority
b. Conduct maintenance on private aircraft in accordance with any limitation specified on the Authority
c. Conduct maintenance on factory built aircraft used for hire and reward in accordance with the manufactures Operations Manual
d. Record all maintenance undertaken in the aircrafts log book
e. Report the airworthiness and condition of an aircraft to an owner and record details in the aircraft log book
f. Retain a log of maintenance undertaken on all aircraft

Period of Validity

a. An Authority will be valid for period of 24 months

Requirement for renewal or variation

a. An applicant for renewal of an Authority or variation to a condition must submit a new *Maintenance Authorisation Application* and 2 referees to the members association
b. RA-Aus and HGFA will review and approve the applicant submission, with or without limitation

Annex A

DEFINITION OF LINE MAINTENANCE

INTRODUCTION

Line maintenance is defined as:

1. Removal or installation of landing gear tyres.

2. Repair of pneumatic tubes of landing gear tyres.

3. Servicing of landing gear wheel bearings.

4. Replacement of defective safety wiring or split pins.

5. Replacement of side windows.

6. Replacement of seats.

7. Repairs to upholstery or decorative furnishings inside the cockpit.

8. Replacement of seat belts or harnesses.

9. Replacement or repair of signs and markings.

10. Replacement of bulbs, reflectors, glasses, lenses and lights.

11. Replacement, cleaning, or setting gaps of, spark plugs.

12. Replacement of batteries.

13. Changing oil filters or air filters.

14. Changing or replenishing engine oil or fuel.

15. Lubrication of components.

16. Replenishment of hydraulic fluid.

17. Application of preservative or protective materials.

18. Removal or replacement of glider tow hooks.

19. Carrying out an inspection of a flight control system that has been assembled, adjusted, repaired, modified or replaced.

20. Carrying out a daily inspection on an aircraft.

Attachment 5

CRITERIA FOR AUTHORITY ASSESSMENT OF

1. **RA-Aus members for *RA-Aus Level 2***
2. **HGFA members for *WSM Maintenance Endorsement***

DEFINITIONS

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WSM a 1 or 2 place Weight Shift Microlight aircraft or Trike.

INTRODUCTION

1. Technical maintenance is a combination of skill of hand, knowledge pertinent to the application of that skill and knowledge of the regulations. To competently examine an applicant, a combination of theory and practical tests would need to be successfully completed by the applicant. To acknowledge the wealth of technical skills held by members, a process of assessment has been introduced until formal qualifying courses can be put in place.

2. The assessment process begins with the applicant completing a Maintenance Authorisation Application [see Annex A], which is available from the respective organisation Office. This completed pro-forma is assessed by both the HGFA Operations Manager and RA-Aus Technical Manager or delegate for:

    a. a recognised mechanical hand skill or equivalent;
    b. extensive recreational experience or equivalent;
    c. recommendations from two peers.

3. Applicants must provide as much detail as possible to substantiate their claims under paragraphs 2 a. and b. above. Suitability for acceptance will be based on the claims made in the application and the recommendation from two peers who currently hold an Authority or equivalent qualifications. Applicants are to complete the form at Annex A to this Section and forward the completed form to the member's organisation Office.

4. Applications for Authorities can only be received from a financial member of their respective organisation.

5. An application for a WSM Authority will require both HGFA & RA-Aus assessment and approval before a valid Authority can be issued from the members organisation.

6. Authorities issued are valid only while the holder is a financial member of their respective organisation.

7. Authorities holders may only exercise the maintenance privilege issued on aircraft from the Authority holder's organisation.

8. The assessment to issue an Authority can be challenged in writing to the members Committee of Management or Board within 28 days of the decision being communicated to the applicant.

NOTES FOR MAINTENANCE AUTHORITIES

A *Maintenance Supervisor Questionnaire* is to be completed by all applicants for RA-Aus Level Two Maintenance Authorities or HGFA WSM Maintenance Endorsement. Three criteria are set for assessing applicants for an Authority and determining if a person has the experience and skills necessary to qualify for the issue of an Authority.

Authority holders accept a high degree of responsibility for the maintenance and serviceability of recreational aircraft. They are the sport aviation equivalent of heavier aviation's LAME's who are required to pass significant written examinations and have at least 4 years experience in the aviation industry before being qualified. While WSM aircraft may be simpler than most of the aircraft on the CASA register, once airborne there is little difference to the outcome if inappropriate maintenance practices are perpetrated.

In applying for an Authority, members must list **IN DETAIL** their formal technical training and qualifications they have in the technical trades. Fitting and Turning Certificates, TAFE Certificates etc. should all be copied and forwarded with the application. Details of experience in one or more of the trades should be outlined in detail. Where this qualification is of only marginal relevance to aviation maintenance a connection should be established.

The second criterion is experience in working on WSM aircraft. Again, list **IN DETAIL** all work performed on WSM aircraft noting the nature of the work done and the aircraft types involved. More, rather than less detail should be included and the work should be able to be substantiated, if possible. Any information forwarded with the application will not be used to prosecute members who may have been undertaking maintenance work "illegally".

To assist assessing an application, the applicant is to obtain the recommendation of two peers to the effect that they consider the applicant has the experience and responsibility to be granted an Authority. The recommendation may be from either two current Authority holders or from one Authority holder and a LAME. A Form that may be signed to meet this requirement is also attached.

When issued by an Authority, it may be unlimited or may be restricted to permitting the applicant to work on specific aircraft, specific types of aircraft, or only on specified components, for example engines or wings only. When forwarding the application and other paperwork, applicants should specify if they wish to have the Authority limited to specific aircraft types or components. Notwithstanding any such request, Authorities may be limited at the discretion of the RA-Aus and or HGFA, in the interest of flying safety.

There is currently no compulsory training required for the acceptance of an application for a maintenance Authority nor is there likely to be a training requirement. The issuing of an Authorisation is primarily based on experience with recreational aircraft maintenance, similar general aviation maintenance experience, allied trade qualifications and experience.

MAINTENANCE AUTHORISATION APPLICATION

Personal Details

Member No: _____ RA-Aus or HGFA (circle your organisation)

Name (in full)_____

Address: _____

_____

Phone: _____ Fax:_____

Mobile _____ Age:_____

Reasons for Requiring L2 Maintenance Authority

Reasons and justification for requiring a L2 Maintenance Authority:

_____

_____

_____

_____

_____

State nature of approval requirement such as: the type WSM aircraft maintenance work you are requesting i.e. will be largely for private owners, or recreational flying school, or for some other organisation. In the case of Schools or Organisations, please advise the schools details, including types and numbers of aircraft they operate

Formal Technical Training:

Technical Training Institution(s) Attended:

Periods of Employment in a Technical Capacity:

Highest Trade Level Attained:

Indentured Apprenticeship:

Disciplines (trades) for which qualified:

What Accreditation has been awarded for the formal training (copies of certificates to be included):

Aeronautical Experience

Highest CASA maintenance (or other airworthiness authority) qualifications held, and periods:

Aeronautical Equipment Types worked on:

Level of Repairs undertaken on Equipment:

Aircraft types on which maintenance has been conducted:

Aircraft, Re-design work undertaken:

Aircraft Components or Equipment manufactured (type & numbers):

Experience

Periods of Employment: (in a maintenance capacity) (please indicate the employers details)

Equipment worked on during the periods of employment indicated above:

Maintenance skill and supervisory level(s) achieved while in employment:

Maintenance Supervisory Responsibilities held (and periods):

Workshop Facilities you have or have access to:

Location of Workshop:

Workshop Floor Space:

Workshop Machinery:

Date Established: _____

CASA Maintenance Accreditation (if any):

RECOMMENDATION FOR ISSUE OF A MAINTENANCE AUTHORITY

- **Two recommendations are required.**
- **Persons signing this form should be holders of a current CASA LAME licence or an RA-Aus Level 2 Maintenance Authority or a HGFA WSM Maintenance Endorsement**

Applicant:

Name:.....

Address:.....

First Referee

I, the undersigned, have known the above applicant for over..... years and I am fully familiar with the applicant's technical training, work and expertise in maintaining recreational or other aircraft. I believe the applicant has demonstrated a satisfactory standard in approach to the maintenance of WSM aircraft and is fully aware of the responsibility and professionalism needed by the holder of an Authority.

Name.....Signature.....

Company.....Contact Number.....

LAME or RA-Aus or HGFA Authority Number.....

Position.....

Second Referee

I, the undersigned, have known the above applicant for over..... years and I am fully familiar with the applicant's technical training, work and expertise in maintaining recreational or other aircraft. I believe the applicant has demonstrated a satisfactory standard in approach to the maintenance of recreational aircraft and is fully aware of the responsibility and professionalism needed by the holder of a RA-Aus Level 2 Maintenance Authority.

Name.....Signature.....

Company.....Contact Number.....

LAME or RA-Aus or HGFA Authority Number.....

Position.....