

***MODEL AERONAUTICAL ASSOCIATION
of AUSTRALIA Inc.***



AUSTRALIAN OFFICIAL RULES

Section 3 - Control Line Rules

LIST OF CONTENTS

	page
4. Control Line Contests	
4.1 General Rules	3
Definition	
Pull Test Rig	
Proto Speed Record Attempts	
Proxy Eligibility	
4.2 [Deleted]	
4.3 C/L Speed Classes [Australian]	5
4.4 [Deleted]	
4.5 Australian Team Races	9
4.6 Open Combat [Australian]	10
4.6A Australian Fast 2.5cc Combat	11
4.7 Rat Races [2.5cc]	18
4.8 Open Rat Race	21
4.9 Scale Team Racing [Goodyear]	24
4.10 Mini-Goodyear	28
4.11 Junior Rat Race	32
4.12 Junior Combat	33
4.13 Bendix Racing	35
4.14 Vintage A Team Race	40
4.15 Vintage Stunt	44
4.16 C/L Classic Stunt	49
4.17 C/L Vintage 'B' Team Race	54
4.18 C/L Classic 'B' Team Race	57
4.19 Classic FAI Team Race	61
4.20 Australian Vintage Combat	67

4.0. CONTROL LINE CONTESTS

4.1. GENERAL RULES

Except where specifically contradicted in rules for a particular event, the following rules apply to all C/L contests.

- 4.1.1. **Definition:** Control line flight is flight during which the model aeroplane is aerodynamically manoeuvred by control surfaces in altitude or attitude, by the pilot on the ground, by means of one or more inextensible wires or cables directly connected to the aero model.
- 4.1.2. In Australian Control Line Rat and Team Racing, the competitor must either pilot the model or start and tune the engine. Contestants will be called three minutes before the first start signal of the particular heat or flight in which they are required to participate. The contest director may increase this time if the program permits.
- 4.1.3. Models must take off from the ground in the normal manner.
- 4.1.4. Headgear for pilots and mechanics shall be limited to peaked sports caps, eyeshades or safety helmets.
- 4.1.4.1. During the duration of combat, the pilot and his mechanic(s) must wear protective headgear fitted with an effective retaining strap worn under the chin. It is recommended that the helmet have side protection and be close fitting with no protrusions to snag the lines of fellow competitors. Hearing protection is also recommended.
- 4.1.5. Deleted
- 4.1.6. One starting judge should be assigned to clear the flight line for each race, to start races, to end races, to use signal flags in conjunction with a whistle and, in general, to control flight operations. He should be equipped with a stopwatch to check the overall race time. He has the power to disqualify any contestant who persists in ignoring instructions of the Contest Director.
- 4.1.7. In racing contests when several models fly together, pilots may be required to demonstrate the control-ability of their models in a qualifying flight before the contest. Contest Directors will take note of practice flights to minimise this requirement.
- 4.1.8. **Pull Test Rig:** Refer 4.1.6 and diagram in Chapter 1.
- 4.1.9. The FAI pylon (page 1 - 36) and a suitable metal handle shall be used in Speed events and Proto Speed Record attempts. Cross bars are not required in the handles used in events to Australian speed rules but are required for FAI Speed (class F2A). Metal based control handles must be used in Bendix, Class 2 Team race, Open Rat Race and Open Combat events.
- 4.1.10. Fishing lines swivels must not be used for line connectors.
- 4.1.11. **Proxy Eligibility** [C/L Contest Categories]

In control line contest categories where pilot skill is a major requirement, for example, Stunt and Combat, proxy fliers are not permitted. Proxy flying of Speed and Scale models [all classes] is permitted where the entrant is involved in the starting, tuning and release of the model or where a person who has a confirmed and permanent physical disability preventing his flying the model or tuning the engine [e.g. crippling arthritis, partial paralysis, amputated limb] but who has contributed significantly to the preparation of the model, may elect a proxy pilot and pit crew to start, tune and fly the model under his name.

Both the person and proxy(ies) must hold a current MAAA sporting licence. The proxy(ies) may themselves be a competitor in the same contest category. Except for Trans Tasman events, no Australian team selection points shall be awarded to the person or his proxy(ies) when proxy participation is not permitted under FAI rules. Lack of experience or inability to attend a contest shall not be deemed sufficient reason to permit proxy flying

- 4.1.12. In Vintage Stunt & Classic Stunt, engines may be started with an electric starter with no loss of starting points. In all control line events where hand starting is used, hand and finger protection should be used (eg a glove or a chicken stick).
- 4.1.13. In Australian Control Line racing and combat events, competitors from the same State/Territory and previous opponents shall be drawn apart if possible, to fly against each other only if there are no remaining opponents from another State/Territory

4.2. **Deleted**

||

4.3 **CONTROL LINE SPEED CLASSES**

4.3.1. **Model Characteristics**

- a] No restrictions on areas or loadings.
- b] Model may R.O.G. or be hand-launched, except for Jets and Proto Speed which will be R.O.G. only
- c] Detachable undercarriages are permissible for R.O.G. except for Proto Speed
- d] For Class V: Models to be upright engine design with a wing not more than 1 inch difference between inboard or outboard wings. Single blade propellers not allowed.
- e] Proto Speed models must conform to the model size, engine size and relevant minimum line size specifications for the Class II team racer. They must have fixed undercarriage and be flown on dual control lines of minimum length 18.3 metres. Single strand lines are recommended. However, multi-strand lines may be used. Fuel and tanks are unrestricted. The model bellcrank, lines and handle shall be subject to a 35g pull test. The maximum flying height is five metres. The event is timed as a drag race of 1.6 km [14 laps] and for flight to be official a pylon must be used within 3 laps. A pylon must be used by the end of the first lap when a record is being attempted.

4.3.2. **Fuel.** Allowable fuel for Australian Speed classes other than Sport Jet and Open Jet is a mix of 70% methanol, 10% nitro, 20% castor oil. Allowable fuel for Sport Jet is a mix containing a minimum of 80% Shellite, white spirit, petrol or methanol, with no more than 20% additive of Propylene oxide, Nitro methane, MEK or similar. Fuel for Open Jet is unrestricted apart from banned substances noted in General Rules.

4.3.3. **Classes and Specifications**

Class	Max Engine Capacity	Exhaust System	Max Model Weight
I	2.2	Open or mini-pipe #C	500
II	5.0	Unrestricted	950
III	10.0	Unrestricted	1300
IV	6.6	Open or mini-pipe #C	1000
V	3.5	Open or mini-pipe #C	800
Proto (3.5cc)	3.5	Unrestricted	850
Proto (5cc)	5.0	Unrestricted	950
Open Jet	#A	#A	1300 (wet)
Stock Jet	#B	#B	1300 (wet)

#A Max. Engine Capacity for Open JET

Maximum head length (valve face to air intake) – 85mm
 Maximum internal cross section of tailpipe (excluding end flare) – 9.675 sq cm
 Engines to be either O.S., Dyna, Bailey, Jet Bill, home-built or any commercially available jet to the above specifications.
 The pulse jet is to be attached to the model and is not to be an integral part of the airframe.

#B Max Engine Capacity for Stock Jet

Maximum head length (valve face to air intake) – 65mm
 Maximum internal cross section of tailpipe (excluding end flare) – 9.675 sq cm
 Engines to be either O.S., Dyna, Bailey, Jet Bill, home-built or any commercially available jet to the above specifications.

The pulse jet is to be attached to the model and is not to be an integral part of the airframe.

#C Mini-pipes

A mini-pipe is a constant diameter pipe whose length, measured from the centre line of the piston to the end of the exhaust system, does not exceed 150mm

Note: The metric dimensions shown have been converted from imperial measurements. Equivalents are:-

- 15.92m = 52ft 3in 17.69m = 58ft 5in
- 18.3 m = 60 ft, 19.8m = 64ft 11.5in 21.35 m = 70 ft.
- 0.30mm = 0.012 in. 0.406mm = 0.016 in
- 0.455mm = 0.018 in. 0.500mm = 0.020 in.
- 0.525mm = 0.021 in. 0.560mm = 0.022 in.
- 0.600mm = 0.024 in. 0.787mm = 0.031 in.

4.3.4. **Control Lines**

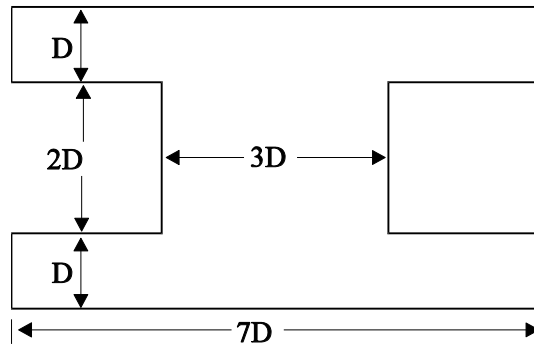
- a) Lines are to be of good quality, high tensile, unplated steel and/or steel alloys. Commercially graded wire diameters will be acceptable provided that they do not measure more than 0.01 mm (0.0004 in). under nominal size. Multi stranded type lines may not be used except for Proto.

Table 4.3.4 Control Line Specifications

Class	Timed Laps	Timed Distance	Line Length in metres	Line Diameter (mm) Monoline	Line Diameter (mm) 2 lines	Pull Test G
I	10	1 km	15.92	N/A	0.40	40
II	7	½ mile	18.30	0.60	0.455	45
III	6	½ mile	21.35	0.787	0.60	50
IV	8	1 km	19.80	0.787	0.50	45
V	9	1 km	17.69	N/A	0.455	40
Proto (3.5cc)	14	1 mile	18.3	N/A	0.40	35
Proto (5cc)	14	1 mile	18.3	N/A	0.455	35
Open Jet	6	½ mile	21.35	0.787	0.60	45
Stock Jet	7	½ mile	18.30	N/A	0.525	45

- b) All control lines on class 2 and class 3 models are to be attached at the model by the use of bobbins, as is standard practice in mono line classes. Bobbins are to be of steel or material of equal strength. Bobbins are to measure a minimum of the following formula based on the control line wire diameter [D] applicable to the class. The width of the bobbin groove is to be no less than the total of the wire diameters or greater than 0.010 in. clearance on the wire diameters. [See diagram, page 2 - 44]
- c) All handle connections are to have a deformation strength greater than the control line used.
- d) Where the two-line configuration is used on any class of speed model, no twisting or linking together of the two lines is permitted.
- e) A safety strap or similar device effectively connecting the pilot and the handle together must be used.
- f) Class I, Class IV and Jet models using dual lines must use bobbins to the above formula. Double over locking type connectors or similar with a minimum strength of 20 kg [44 lbs] for Class I and 45 kg (100 lbs) for Jet and Class IV may be used

with bobbins. The use of line connectors only is not permissible and centre type connectors are banned.



4.3.5. **Line Length Measurement [Flight Radius].** Lines shall be measured from the grip edge of the handle grip - finger grip if torpedo type handle is used, or cross bar [if fitted to the handle] - to the axis of the propeller. Where two or more engines or propellers are employed, the axis of symmetry is taken as the reference for measurement.

4.3.6. **Line Tests.** Line tests shall be made prior to each flight.

- a) The entire system of safety strap, handle, lines and model shall be subjected to a pull test as shown in Table 4.3.4
- b) In addition to the load test, a visual examination is to be made by the Contest Director, FAI Observer or other appointed officer.
- c) The Contest Director or other authorised person responsible for checking lines and equipment has the right to disallow any model, on points of safety, even if the requirements of the rules are fulfilled.

4.3.7. **Number of Timekeepers and Judges**

- a) For an attempt to be recognised as an official flight, there must be present three [3] timekeepers who are known to be experienced and capable, each equipped with a 1/100th second stopwatch. In addition an optical electronic system with equal or better resolution and accuracy may be used.
- b) A FAI Observer must be present as witness to the timekeepers, or be one of the timekeepers, and is to ensure that all aspects of the flight, timekeeping and processing of the model conform to the rules.

4.3.8. **Starting of Timing.** For timing to commence, the pilot must position the control handle in the pylon fork so that the point on the handle from which the line length was measured is not behind the pylon pivot.

4.3.9. **Timing Procedure**

- a] Upon the pilot placing the handle correctly in the pylon fork, the timekeepers shall allow two full laps from opposite the timekeeping position before starting timing for the appropriate number of laps.
- b] The time keepers, in unison, will count down and then up throughout the flight - that is, , 2-1-0-1-2-3-4-5-6-7-8-9 or 10.
- c] The official time shall be the average of the three watches, if all the watches are within 1/10th of a second. If only two watches are within 1/10th of a second, then the average of the two will count; the third watch will be ignored.
- d] In the event that none of the watches are within 1/10th of a second of each other, then the competitor may claim the longest time or request a repeat of his flight.

- 4.3.10. **Cancellation of the Flight.** A flight is cancelled:-
- a] when any form of assistance is applied for the purpose of increasing the speed of the model, other than that provided by the engine, during the official part of the flight;
 - b] if, at any time during the timing procedure, the model exceeds a height of 4.5 metres [15 feet] (5 metres for Proto) for more than one lap;
 - c] continuous contact is not maintained with the pylon fork during the timing procedure; or
 - d] jettisoning of other than the take off dolly occurs.
- 4.3.11. **Number of Flights and Attempts**
- a] Each competitor is entitled to three official flights.
 - b] Two attempts shall constitute an official flight.
 - c] An attempt shall not be more than three minutes, or five minutes for Jet.
 - d] A competitor may elect to call an attempt and use the pylon provided the Contest Director is notified beforehand.
 - e] The flight is official whenever the competitor places his handle in the pylon fork during an attempt and when the timekeepers start the watches, except under rule 4.3.11.d].
- 4.3.12. All participants must be current affiliate members of the MAAA[Inc].
- 4.3.13. Records may be set at sanctioned contests without prior notice and at such times and places as outlined by Section 7 of Chapter 2 of the Rules Handbook.
- 4.3.14. All other record flights must be witnessed by an FAI Observer who shall ensure that all requirements of the rules are met.
- 4.3.15. Contest organisers may run the event combining all speed classes and award places on the achieved percentage of current speed records in the class contested. When there is a minimum of five entries in Jet Speed, it may be run concurrently with Combined speed although listed as a separate event.
- A contestant can enter all classes and be listed in the results more than once if the event is organised in this fashion, but will be credited with (and receive any applicable trophy for) only their highest placing in the Jet Speed. For example, if a single contestant enters both Open Jet and Stock Jet classes, and achieves the fastest and second fastest Jet Speed times with these two entries, they will be credited with only the higher placing, and the next fastest Jet Speed contestant will be credited with the next Jet Speed placing (and so on down the Jet Speed results)

4.5. AUSTRALIAN TEAM RACES

Classes 1/2A and 2 [Australian Rules]

Class 1/2A and 2 events to Australian Rules are similar to the FAI Team Race but use different size models. FAI team race rules in effect as at January 2012 apply except as follows.

4.5.1. Model Characteristics

Exhaust shrouds not required, engine mounting lugs and fuel feed lines can be exposed.

	Class 1/2A	Class 2
Engine capacity total	1.6 cc max	5.00 cc max
Minimum wing area	5.8 dm ²	8 dm ²
Minimum cross section [at pilot]	76 mm X 38 mm	95 mm X 51 mm
Max. fuel tank capacity	6.00 cc	30.00 cc

4.5.2. Contest Requirements

	Class ½ A	Class 2	
		Up to 3.5cc (0.21cu in)	3.5 to 5.00cc (0.29 cu in)
Min. control line length	14.2 metres	18.3 metres	18.3 metres
Min. line diameter	0.30 mm	0.40 mm (-0.011mm)	0.455 mm (-0.011mm)
Load test (before each heat)	25g	35g	35g
Maximum weights	500gm	850 gm	950gm

4.5.3.

Heats and semi-finals	90 laps	70 laps	70 laps
Finals	180 laps	140 laps	140 laps

At least one refuelling stop is required in heats, semi finals and finals.

A team shall consist of a pilot, a mechanic and an assistant (if required)

The contest shall be divided into two preliminary rounds and a final. Each entrant team shall be given the opportunity to fly once in each preliminary round.

4.5.4.

Flight circle radius	17.7 metres	22.1 metres	22.1 metres
----------------------	-------------	-------------	-------------

4.5.4.b

The site may be laid out on grass. A hard surface may be used for the pilot's/centre circle but is not mandatory.

4.5.5.

A race will be terminated 10 minutes for heats and 15 minutes for finals after the starting signal.

4.6 OPEN COMBAT

[Australian Rules]

4.6.1. Open Combat to Australian Rules is similar to Australian Fast 2.5cc Combat but allows larger models and modified contest procedures. Australian Fast 2.5cc Combat rules apply unless specifically changed by these rules.

4.6.1.1. Radius of flight circle 22 metres
Radius of centre circle 2 metres
Radius of pitting circle 24 metres

4.6.2. Characteristics of an Open Combat Model

- a) Maximum surface area: unlimited
- b) Maximum weight: 5 kg
- c) Maximum loading: 100 g/dm²
- d) Total engine capacity: 6.5 cc
- e) Fuel: unrestricted.
- f) Venturi: unrestricted. Sub-piston induction permitted.
- g) Muffler(s) not required in non-noise sensitive areas.
- h) Fuel Shut Off : not required

Two pieces of stranded wire, each of a minimum diameter 0.40 mm, must be visibly and safely attached between the bell crank bolt and the engine [not the mounting bolts].

4.6.3. CONTROL SYSTEMS

1. Control lines shall be multi-strand of a minimum diameter of 0.455mm (-0.011mm). No free ends or handle protrusions capable of entangling an opponent's lines shall be permitted.
2. **Control line length:** 18.3 metres +/- 40 mm.
3. Line connectors shall be of a closed overlapping loop style similar to an elongated key ring. However, key rings and all other types of connectors are not permitted.
4. **Pull Test:** The model control mechanism from the handle and including the model shall withstand a 32g pull test which load shall be held for five seconds prior to each heat.

4.6.4. **JUDGES and TIMEKEEPERS** The organiser shall appoint a panel of three judges. Two timekeeper/scorers shall be allocated to each competitor.

4.6.5. Streamer size shall be 50 mm wide by 2.5 metres long, attached by a string leader 2.2 metres long with an ink mark 2 meters from the streamer which shall be aligned with the rear of the model."

4.6.6. Pilots may leave the centre circle to start their engines without incurring loss of points or flight cancellation.

4.6.7. There is no time limit for becoming airborne.

4.6A AUSTRALIAN FAST 2.5cc COMBAT MODEL AIRCRAFT

4.6A.1. Definition of a Combat Event

A combat event is a contest during which eliminating heats are followed by a final in which two competitors with their model aircraft fly in the same circle at the same moment for a predetermined time, the object being to cut a streamer attached on the longitudinal centre line of the opponent's model aircraft, points being awarded for each cut taken.

4.6A.2. Definition of a Combat Model Aircraft

- a) Model aircraft in which the propulsion energy is provided by a piston motor(s) and in which lift is obtained by aerodynamic forces acting on surfaces which remain fixed in flight, except for control surfaces.
- b) The longitudinal centre line shall be defined as the axis of the propeller in case of a single engine model aircraft and the axis of symmetry in the case of multi-engine model aircraft.

4.6A.3. Combat Site

A combat site must consist of three concentric circles which shall be marked on the ground.

- a) The pilot circle: radius 2 metres.
- b) The flight circle: radius 20 metres
- c) The pitting circle: radius 22 metres

The flight and pitting circles must be laid out on grass. The pilot circle may be laid out on grass or any other material. The area between the 20 and 22 metre circles is called the pitting area.

During active combat periods the pilot and his mechanic(s), officials, team managers and others within the boundary of the designated combat flying area must wear a safety helmet, with a fastened chinstrap, strong enough to withstand the impact of a flying combat model aircraft.

To avoid the catching of the opponent's lines the protruding parts of the helmet must be covered.

No communication using electronic devices is allowed between the pilot and mechanics/persons outside

4.6A.4. Competitor

The pilot, who shall be the entrant and known as the competitor, may employ a maximum of two mechanics in any one heat. (In exceptional circumstances of wet or extremely windy weather, an additional helper may be used as a streamer holder and must perform no other function for the duration of that combat period).

4.6A.5. Characteristics

- a) Maximum loading: 100 g/dm²
Maximum swept volume of motor(s): 2,5 cm³
- b) Line length: 15,92 +/- 0,04 m
Minimum line diameter: 0,385 mm (no minus tolerance)
Two multi-strand control lines must be used. No free ends capable of entangling an opponent's lines, and no line splices, are permitted. Open connection connectors are not allowed.
- c) Engines with glow plug ignition shall have their exhaust port(s) connected to silencer(s) (one or two), consisting of a simple chamber with one circular cross-

section, rearmost outlet aperture of 8 mm diameter (1) or 4,2 mm diameter (2) opposing the exhaust port connection.

The minimum total volume of the exhaust system shall be 12,5 cm³. In the case of two exhausts, each silencer shall have a minimum volume of 6 cm³. The maximum total length of the exhaust system from exhaust port(s) of the cylinder to and including outlet(s) is 15 cm. One pressure tap directly connected to the fuel tank, of 2 mm maximum diameter is allowed. No other openings or vents are allowed.

- d) The motor shall be naturally aspirated via a single round venturi with a maximum effective diameter of 4 mm.
- e) Any interconnecting chamber between the air intake and the induction port of the motor shall have a maximum volume of 1,75 cm³. This clearly prohibits sub-piston induction for supplementary air intake.
- f) A safety wire with a minimum diameter of 0,5 mm must be attached between the control system and the engine(s). The engine(s) must always stay connected to the lines.
- g) A safety strap connecting the competitor's wrist to the control handle must be provided by the competitor and worn at all times while his model aircraft is flying. The strap should be as shown in the sketch i.e. it should be attached to the wrist with a loop and sliding knot so that if the handle is released it will tighten itself securely around the wrist. The point of attachment at the handle is up to the discretion of the pilot.
- h) The model aircraft shall not carry any artificial aid to assist the cutting of the streamers.
- i) The model aircraft shall be equipped with a device specially designed to retain the streamer which shall be fitted on the longitudinal centre line and sufficiently strong so that the streamer does not become detached under normal flying conditions.
- j) Standard fuel shall be supplied by the organisers to the following formula: 10% nitromethane 20% castor oil lubricant (first pressing) 70% methanol. Fuel shall be mixed by volume.

Note: Fuel for compression ignition engines is not restricted.

4.6A.6. **Technical Verification**

To be tested before each heat:

- a) Each set of lines must be checked for length and diameter.
The line length is measured from the inboard face of the grip of control handle to the longitudinal centre line of the model aircraft.
A pull test shall be applied to the assembled handle(s), control lines and model aircraft. The pull test shall be equal to 20 kgf.
The processing officials or judges may ask the competitor to change the lines if there is any doubt about the line quality, such as kinks, curls, stress or rubbing marks.
- b) The intake opening shall be checked with a simple plug gauge (diameter 4,05 mm)
- c) The outlet of the silencer(s) shall be checked with a simple plug gauge (diameter 8,05 mm for one silencer)
- d) The safety strap(s) and safety wire(s) may be pull tested with a load equal to 20 kgf

4.6A.7. **Number of Model Aircraft**

- b) Each competitor shall be permitted a maximum of two model aircraft, two handles, two pairs of lines and two engines in each combat heat. If the reserve model aircraft is used, the streamer or its remaining parts must be transferred to the reserve model aircraft. The handle plus lines for the reserve model aircraft must be placed just outside the pilot circle.

- c) Engines, control lines and handles may not be replaced or interchanged during the combat period.

4.6A.8 **Streamer**

The streamer shall consist of double weight crepe paper (80 g/m²) or any replacement of equivalent strength, not less than 2,25 m or more than 3 m long and 3 +/- 0,5 cm wide, fixed to a sisal (or any replacement of equivalent strength) string of 3,25 m minimum length.

All streamers must be of the same length.

There shall be a clearly visible ink mark 2,5 m from the junction of the string and streamer.

The streamer shall be attached to the model aircraft in such a way that the ink mark is level with, or behind, the rearmost portion of the model aircraft (see sketch). The attachment part of the string shall have a minimum length of 0,75 m.

The attachment end of the streamer shall be reinforced on either side by tape approximately 2 cm wide affixed diagonally to the length of the streamer with one at right angles to the other and extending for a maximum of 5 cm. An additional fibre/fabric reinforced tape 2 cm wide is affixed across the streamer (see detail below). The colour of the streamer must be different for the two competitors in the heat. Each pilot/pit crew shall be issued with a streamer at the start of the heat by the judge assigned to that competitor. A second streamer will be available from this judge when needed.

4.6A.9. **The Heat from Start to Finish**

- a) All signals shall be both acoustic and visual.
- b) During the starting period the launching positions must be separated by at least a quarter of a lap. The first named competitor in the draw shall have the choice of streamer colour and the other the choice of starting position
- c) It is the responsibility of the pilot/mechanics to make sure the streamer is unrolled before takeoff.
- d) The motor(s) must be started by flicking the propeller by hand.
- e) A first signal, given by the Official Timer, shall signify the beginning of the 30 seconds period when the mechanic(s) or the pilot have the opportunity to start, run and adjust their motors.
- f) A second signal, given by the Official Timer, shall signify the beginning of the combat heat period on or after which the model aircraft may be launched.
- g) From the moment the Official Timer has given the signal to launch, the combat heat lasts for a maximum of 4 minutes.
- h) When the Circle Marshal is satisfied that each model aircraft has completed two level laps, anticlockwise, separated by approximately half a lap, he will give a signal that combat may begin.
- i) Following an interruption when one or both model aircraft have been grounded, combat may restart after a signal from the Circle Marshal. This signal shall be given as soon as the Circle Marshal is satisfied that there is approximately half a lap separation between the two model aircraft.
- j) If, after a mid-air collision, no streamer can be found and the streamer retaining device is missing or bent, then, with the permission of the judges, it is acceptable to continue the heat without replacing the streamer.
- k) Only the streamer/string may be moved around the circle by the mechanics/pilot. Models in the pitting area may not be moved, other than to maintain a safe distance of approximately 5 metres from the opponent's mechanics. Unless otherwise directed by the judges, it is the rearmost team's responsibility to move back before

pitting. Under conditions of heavy wind, the Judges can allow models with a non-running engine to be moved to a safer starting position.

- l) When moving around the circle the mechanics/pilots must be on the outside of the pitting circle.
Within the pitting area and flight circle, mechanics may only move radially inward and outward.
- m) If, as a result of a mid-air collision, the silencer is detached and the model aircraft remains airborne, the heat may continue. After a landing, however, the silencer must be replaced before the model aircraft can be used again.
- n) The Circle Marshal will monitor the conduct of both pilots, and shall issue a yellow card warning to any pilot who uses a rough or unsafe flying style, causes line tangles, or displays unsportsmanlike behaviour. Each yellow card issued (a maximum of three for each pilot, per competition) shall be officially recorded and retained for the remainder of the competition. Initial and subsequent offences during a competition are to be penalized in accordance with 4.6A.12A and 4.6A.12C, respectively. If the first yellow card incident is considered severe, the pilot shall also be disqualified for the offence.
Note: Yellow cards are cumulative throughout the competition.
1st yellow card = 40 point penalty or disqualification from the heat for a more serious offence.
2nd yellow card = disqualification from the heat.
3rd yellow card = disqualification from the heat.
- o) The Circle Marshal shall signal both pilots to fly level and anti-clockwise and to cease combat when both streamer strings have been cut. If one pilot has only the string remaining he may request the circle marshal instruct both pilots to fly level and anti-clockwise and to cease combat.
- p) The Circle Marshal shall give an acoustic signal to terminate the combat heat:
 - i) 4 minutes after the signal to launch (10 seconds countdown).
 - ii) if the heat has to be terminated due to disqualification of one or both competitors or for any other reason.

4.6A.4.10. **Scoring**

- a) Scoring shall start at the signal to launch and continue during the 4-minute heat.
- b) 100 points shall be awarded for each distinct cut of the opponent's streamer. There is a cut each time the model aircraft, propeller or lines fly through the opponent's streamer resulting in particle(s) becoming detached from the streamer. A cut that contains only string does not count.
- c) Two points shall be awarded for each second that a model aircraft is airborne during the heat. In the case of a model aircraft fly-away the watches should be stopped from the moment of the flyaway.
- d) Each penalty point given (See 4.6A.12) shall be subtracted from the competitor's score.
- e) In the event of a tie score in any heat, that heat shall be re-flown. A heat is considered a tie if the score difference is 10 points or less.

4.6A.11. **Reflights**

A reflight may be granted:

- a) In the event of a line tangle resulting in the control line(s) breaking and only one model aircraft being grounded, making it impossible to clear the line tangle.
- b) If, as a result of combat, a model aircraft cuts its own streamer/string or the streamer/string becomes wrapped around the model aircraft and/or the lines (unless only string remains).

- c) at the discretion of the Judges/Circle Marshal if an unfair situation occurs and none of the pilots/mechanics is to blame.

4.6A.12. Penalties and Disqualifications

A. A competitor will receive a penalty of 40 points:

- a) If he steps outside the pilot circle with one foot while his model aircraft is airborne.
- b) If the mechanics enter the flying circle at an oblique angle or cut across the flying circle to reach a downed model aircraft. One penalty only will be given for each offence even if more than one mechanic is involved.
- c) If the mechanic(s)/pilot do not immediately, or after a clearing a line tangle, withdraw a grounded model aircraft to the pitting area prior to servicing it. It is not allowed to service the model or remove the streamer until any line tangle is cleared.
- d) If the model aircraft is launched prior to the starting signal.
- e) If the mechanic(s)/pilot allows both engines to be running at the same time during the flight period.
Brief bursts, not longer than 10 seconds to warm the engine with a prime or to clear a flood is permitted. Running the engine from the tank is not permitted.
- f) When he receives his first yellow card (Subject to 4.9.n.).

B. A competitor will receive a penalty of 100 points:

- a) If the streamer does not cleanly unfurl upon launching the model aircraft.
- b) If the mechanic(s) damage the streamer or allow the model aircraft to cut its own streamer whilst still on the ground, and launch the model without replacing the streamer.
- c) If the string becomes detached from the model aircraft while airborne prior to the signal to start combat.

C. A competitor will be disqualified from the heat:

- a) If he flies with a model that does not conform to 4.5.
- b) If his model aircraft fails to become airborne within two minutes of the signal to launch.
- c) If he attempts to fly a model aircraft which at the time of launch does not have a:
 - i) strong effective control mechanism
 - ii) secure engine attachment
- d) If he deliberately attacks the streamer of his opponent's model aircraft prior to the Circle Marshal's signal to start combat.
- e) If he interferes with his opponent, or forces his opponent to leave the pilot circle.
- f) If, while his model is not airborne and his opponent is flying or ready to fly, he leaves any parts of his model or lines in the pilot circle without an immediate attempt to clear them.
- g) If he attacks his opponent's streamer without his own, or the remaining parts, attached to his model aircraft (Except for 4.6A.9.j).
- h) If he is not present at his allotted flight time, unless he has the express permission of the Event Director.
- i) If he intentionally leaves the pilot circle, while his model aircraft is flying.
- j) If he leaves the pilot circle without informing his opponent of his intention to do so when his model aircraft is grounded for a purpose other than to pick up the lines of the reserve model aircraft or to allow his model aircraft to be serviced.
- k) If he flies in such a manner as to inhibit his opponent, or his opponent's pit crew, from clearing any line tangle.

- l) If he flies other than level in an anti-clockwise direction when only his model aircraft is airborne and there is no line tangle. Sudden or rough manoeuvres are not allowed.
- m) If he fails to clear any line tangle prior to launching his reserve model aircraft unless both he and his opponent have informed the Circle Marshal that they have agreed to continue the heat without clearing the line tangle. In this event the Circle Marshal must agree to the continuation, only doing so when he is satisfied that it is safe to continue.
- n) If he releases the handle and the safety strap separates from handle or wrist or he removes the safety strap, for any reason, while the model aircraft is flying.
- o) If he interferes to cause a ground hit of, or collides with, his opponent's model aircraft that clearly has no streamer left and flies level in anticlockwise direction without any manoeuvres to chase and attack.
- p) If the streamer becomes detached from the streamer retaining device during combat, but not as a result of a mid-air collision.
- q) If the model aircraft lands with no streamer string, unless the streamer retaining device is missing or bent as a result of a mid-air collision.
- r) If, during a line tangle where one or both models remain airborne, his mechanic(s) enters the flying circle.
- s) If, in the event of a flyaway, his engine shut-off device does not activate.
- t) When he receives his second or third yellow card.
- u) For any other flagrant breach of the rules.

4.6A.13 **The use of Video equipment**

The Organiser/Judges may use video recording equipment to monitor the pilots and the pilot circle.

At the discretion of the Judges/Circle Marshal the officially recorded video can be used as a judging tool.

4.6A.14 **Individual Classification**

- a) The contest shall be run as a knockout tournament.
- b) The competitor who obtains the highest score in points shall be the winner of each heat.
- c) A competitor shall be eliminated from the competition when he has lost two heats.
- d) Each round shall be randomly drawn (subject to 4.14.e) from the competitors remaining in the competition.
- e) Previous opponents and competitors of the same state or club shall be drawn apart if possible with competitors of the same state or club to fly against each other only if there are no remaining opponents.
- f) In a round with an odd number of competitors the non-flying competitor will fly twice in the following round, in the first heat and in the last heat (if the number of competitors permit it and he is still in the contest).
- g) Each competitor shall be ranked according to his number of wins, not counting fly-off heats, with the fly-off heats being used to establish second and third place as necessary.
- h) In the event of a tie for second or third place, the equal placed flyers shall take part in a fly off, during which they shall be allowed only one loss. In the event of a tie for third place after a flyoff for second place then there shall be a new fly-off for third place.
- j) The competitors' "win" scores, not counting fly-offs, shall be added for the participants of each

4.6A.4.15. **Judges and Timekeepers**

- a) The organisers shall appoint a panel of three judges who shall be selected from a list of persons.
- b) Up to three timekeepers/scorers shall be allocated to each competitor

4.7. **RAT RACES [2.5 cc]**

4.7.1.1. A Rat Race is a simultaneous race between three control line models and their pilots, similar to Team Racing, but with fewer restrictive requirements. The object is to fly the greatest number of laps in a set race time.

4.7.1.2. A team shall consist of a pilot, a mechanic and an assistant (if required).

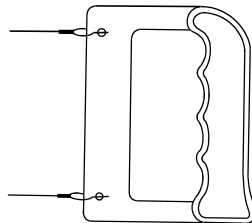
4.7.2. **Model Specifications.**

- Models must be rigged for counter-clockwise flying.
- Models must R.O.G.
- Engines shall have a displacement of 1.91-2.5 cc.
- There is no restriction on wing area, fuselage cross-section or fuel tank capacity.
- Fuel shut-offs are mandatory; pilots must be able to stop and land the model within ten laps when required by the Contest Director.
- Model shall have a maximum weight of 650 gm.

4.7.3. Line length: 15.92 metres, + 100mm, - 0mm

4.7.4. Line diameter: Minimum line diameter: 0.3 mm.

4.7.5. Control line handles may be made of metal, wood or plastic. The handle shall be of a size and shape that the pilot is able to safely change hands while flying. The handle should be of such construction that it has two places to hold.



Control Line Handle suitable for holding in two places.

4.7.6. Single line systems shall not be used.

4.7.7. The model's control mechanism from the handle and including the model shall withstand a 25 g pull test prior to each heat.

4.7.8. **RACE SITES:** A race site must consist of two concentric circles which shall be marked on the ground as follows:-

- a) Circle to be used by mechanics is 19.6 m radius. This is called the flight circle and is divided into six equal 60 degree sectors, the limits of which define the starting and refuelling points.
- b) Circle to be used by the pilot shall be 3 m radius. This is called the centre circle. The pilot shall be permitted to place one foot outside the centre circle after the mechanic has retrieved the model.

- 4.7.9. Races shall consist of two heats, if needed, and a final. The three highest single heat scorers will go into the final. Each entrant shall be entitled to fly in two heats (one in each round) to qualify for the final.
- 4.7.10. Heat times will be 10 minutes.
- 4.7.11. Final time will be 20 minutes.
- 4.7.12. One refuelling stop is mandatory in each heat and two refuelling stops in the final.
- 4.7.13. Rat Race starting procedures will apply as follows :-
- a) A first signal given by the Contest Director authorizes the mechanics to proceed with the warming up to the engine(s), during the 90 seconds. A second signal announces the end of the warming up period and orders the mechanics to stop engine(s).
 - b) A period of 30 seconds is allowed for final preparations (filling up the tanks) and the Contest Director announces the last 5 seconds by reverse counting.
 - c) The starting signal is given by the Contest Director through a sound signal. For the last 3 seconds of the countdown and at the starting signal the mechanics must be standing erect close to their model aircraft and the pilots must be crouching on the border of the centre circle, with their control handles as close to the ground as defined by the Contest Director. Landings take place inside the flight circle.
 - d) The model aircraft must touch the ground with its engine(s) stopped before the mechanic is allowed to catch it.
 - e) After the mechanic has caught the model aircraft, he must go to the nearest free pitting area from the point at which the model aircraft was stopped. A pitting area is occupied if a mechanic is standing at such an area, even if his team's model aircraft is still in the air.
 - f) After the mechanic has caught the model aircraft, but only then, the pilot is allowed to put 1 foot outside the centre circle.
 - g) During the refueling and the restart of the engine(s), and until the time when he releases the model aircraft, the mechanic must keep the model aircraft in contact with the ground by at least 1 point and with the centre line outside the flight circle. During that time the pilot must be crouching or sitting inside the centre circle. He keeps his handle and lines as close to the ground as defined by the Contest Director until the model aircraft starts again.
 - h) The race ends when the official time limit has been reached, which is fixed at 10 minutes for a heat and 20 minutes for a final race.
 - i) When the model aircraft cannot continue after a stop, its pilot must sit down or crouch outside the centre circle as long as the other competitors are still engaged in the race, unless the Contest Director allows him to leave the circle earlier.
- 4.7.14. Except for overtaking, flying height shall be between 2 metres and 6 metres.
- 4.7.15.
- a) Whipping will be permitted, however, contestants will be warned for dangerous flying. Three such warnings will lead to disqualification.
 - b) Refer 4.7.2. **Fuel Shut-offs**. Failure to shut engine off and land the model within 10 laps when directed by the CD will lead to disqualification.
 - c) A team shall be eliminated from a race if a member of the team or the model causes a collision or crash

- 4.7.16. Pilots may not leave the centre circle while flying. Mechanics must not at any time enter the flight circle without consent of the Contest Director and then they must enter the flight circle radially to retrieve the model.
- 4.7.17. Mechanics must wear safety helmets at all times with the chinstrap attached and worn under the chin.
- 4.7.18. Mechanical engine starting devices shall not be allowed.
- 4.7.19. **Scoring:**
1. Officials shall be a Contest Director and a lap counter for each team.
 2. The laps flown by each model shall be counted from the starting signal until the end of the flying time.

4.8. **OPEN RAT RACE**

4.8.1.1. A Rat Race is a simultaneous race between two control line models in heats and final races, similar to Team Racing, but with less restrictive requirements. The objective is to fly the set number of race laps in the least possible time.

4.8.1.2. A team shall consist of a pilot, a mechanic and an assistant (if required).

4.8.2. **Model Specifications:**

1. Engine shall have a displacement of 2.51 - 6.6 cc.
2. The undercarriage must be arranged to permit normal take-off and landing. It may be retractable during flight, but must return to its unretracted position before landing.
3. Models shall be rigged for counter-clockwise flying.
4. Models must R.O.G.
5. Fuel shut-offs are mandatory. Pilots must be able to stop and land the model within ten laps, when required by the Contest Director.
6. Model shall have a maximum weight of 1300 gm.

4.8.3. Models shall pass a general safety inspection prior to each race or heat.

4.8.4.

1. The line length shall be 18.3 metres + 100 mm, - 0 mm.
2. The minimum line diameter shall be 0.45mm
3. Metal handles are mandatory. They must be of a size and shape that the pilot shall be able to safely change hands whilst flying.
4. Single line control systems shall not be used.
5. Model control mechanisms from the handle and including the model shall withstand a 35 g pull test which will be held for a minimum period of five seconds prior to each heat.
6. Each entrant may have two models. Only one model may be used in each heat race.

4.8.5. **RACE SITES:** A race site must consist of two concentric circles which shall be marked on the ground as follows:-

- a) Circle to be used by mechanics is 22.1 m radius. This is called the flight circle and is divided into six equal 60 degree sectors, the limits of which define the starting and refuelling points.
- b) Circle to be used by the pilot shall be 3 m radius. This is called the centre circle. The pilot shall be permitted to place one foot outside the centre circle after the mechanic has retrieved the model.

4.8.6.

1. Races shall consist of two 70 lap heats and two 140 lap finals. One refuelling stop is mandatory in each heat and two refuelling stops in the finals.
The race ends when the number of laps completing the required distance has been covered by all the competing models or, when the official time limit has been reached, which is 10 minutes for heats and 15 minutes for finals.
2. The four teams who have recorded the fastest times from one of their two heats qualify for the finals.
3. Each contestant must take part in at least one heat to qualify for the final but may participate in two.
4. The first and second fastest teams in the heats fly in the first 140 lap final and the third and fourth fastest teams in the heats fly in the second 140 lap final. The fastest three times from the finals shall determine the placings.

4.8.7.

Procedure:

1. All races shall be run with two fliers.
2. The contestants have three minutes to appear at the competition circle after they are called to fly. The Contest Director may disqualify contestants who are late.
3. A first signal given by the Contest Director authorises the mechanics to proceed with the warming up of the engine(s) during 90 seconds. A second signal announces the end of the warming up period and orders the mechanics to stop engines.
4. A period of 30 seconds is allowed for the final preparations and the Contest Director announces the last five seconds by reverse counting.
5. The starting signal is given by the Contest Director through a sound signal.

4.8.8.

Flying Regulations:

1. All flying must be done between 2 and 6 metres altitude, except for passing. A warning shall be given for consistent violation.
2. Passing shall be accomplished as quickly and as safely as possible. Warnings will be given for dangerous or high flying.
3. The event director may at his discretion call for a re-start in the event of a collision.
4. Engine starting devices shall not be allowed.
5. Whipping is permitted but contestants will be warned for dangerous flying.
6. Mechanics must not at any time enter the flight circle without the consent of the Contest Director, and then they must enter the flight circle radially to retrieve models.
7. The wearing of safety helmets worn on the head with the chinstraps worn under the chin by mechanics is mandatory.

8. After the mechanic has caught the model, he must pit the model at a vacant segment line.
9. In the event of an accident or entanglement bringing down all models, a new heat shall be run. A contestant causing a deliberate collision shall be disqualified and the heat re-run.
10. When a model is being pitted and the other model is landing, the landing model must clear the already grounded model's lines.

4.8.9. **Scoring:**

1. Officials shall be a Contest Director and a time keeper for each team.
2. Each model shall be timed from the starting signal until the completion of the required number of race laps.

4.8.10. If, in the Contest Director's opinion, a contestant with deliberate or malicious intent, conducts himself or performs any flight manoeuvre so as to endanger other pilots or team members, cause damage to other models or to flagrantly disregard any of the aforementioned rules (either pilot or crew member), such action will result in the disqualification of the team for the event.

4.8.11. **Warnings and Disqualifications**

Warnings shall be given to the mechanics; a team receiving three warnings will be disqualified.

A team shall be warned for:

1. mechanics not pitting to segments;
2. pilots not flying between specified height levels;
3. dangerous flying;
4. pilots leaving the centre circle;
5. if during the start of a race or during a pit stop the model is not kept in contact with the ground or kept outside the flight circle or the handle and lines are not kept as close as possible to the ground.

A team shall be disqualified:

6. if passing is done by flying under the slower model;
7. if a member of the team or the model causes a collision;
8. for any other flagrant breach of the Rules;
9. for arguing with the Contest Director.
10. Refer 4.8.2.5 failure to shut engine off and land the model within ten laps when directed by the CD.
11. Refer 4.8.8.10. Landing model fails to clear lines of already grounded model.

4.9 SCALE TEAM RACING (GOODYEAR)

4.9.1. Definition of Scale Team Racing

Scale Team Racing is a simultaneous race between three models flown by three pilots in the same circuit (in exceptional circumstances, two models flown by two pilots). The objective of the race is to complete the required number of laps in the shortest possible time. A team shall consist of one pilot who shall remain in the centre of the circle piloting the model, and one mechanic (and one assistant, if required) who shall remain outside the flight circle and who shall start the engine(s) and perform any other necessary duties throughout the race. The personnel of a team shall remain unaltered throughout a contest. It is not permissible for any person to be a member of two teams.

4.9.2. Number of Models:

A team may enter and have checked only two models; either or both may be used to complete the necessary number of flights. Only one model may be used in each race. The team may interchange the various model parts provided that the resulting model is re-checked by the Contest Director.

Spare propellers, plugs and general accessories are permitted. In the case of engines, spares are permitted but such engines must not be used by, or exchanged with, other entrants during the contest.

4.9.3. Model Characteristics:

- a) Maximum engine capacity - 2.5 cc.
- b) Models shall be models of actual Goodyear racing planes that have flown in Goodyear or Continental Trophy races or other NPRPA Formula 1 races.
- c) Model profiles shall be within 5% of scale linear dimensions, the scale being one-eighth except where noted below.
- d) Tail area may be increased by 25% over scale area to permit safe handling. The scale shape of the tail must not be altered.
- e) Models shall be coloured in a scale-like fashion, i.e. in a colour scheme that may have been used on a full sized aircraft.
- f) The racing number of the full sized aircraft is to be displayed on the fuselage sides and on the upper inboard wing. The contestant's MAAA number is to be displayed on the upper outboard wing (preceded by "AUS"). All numbers are to be of block type letters.
- g) Models shall have profile fuselages with a maximum width of 25 mm excluding cheek cowls. Engines shall be side-mounted and uncowed. Fuselage side cheeks are permitted in so far they do not cowl the engine.
- h) The landing gear must exit from the scale side profile location but may be longer, higher or swept forward. Minimum wheel diameter is 25 mm. Wheel pants are optional. Mono wheel undercarriages are allowed.
- i) The entrant, if requested, shall produce a three-view drawing to substantiate the scale outline of his model. The drawings shall be a source acceptable to the Contest Director. A commercial or published full-size plan shall be acceptable, provided it meets the above specifications.
- j) Distance between the centre of the control handle and the centre line of the model shall be 15.92 metres +100mm, - 0 mm. Minimum line diameter:- 0.385 mm -

0.011 mm. Mono line control systems are not permitted. The control apparatus (handle, lines and bellcrank) must withstand a minimum pull of twenty five times the total weight of the model. A second pull test will be applied immediately after the first.

- k) A fuel shut-off is required on all scale team race models. The pilot must stop his engine and land within 10 laps when directed to do so by the Contest Director.
- l) Engines must be started by flicking the propeller by hand.
- m) Models must fly in an anti-clockwise direction.
- n) No nose skids are allowed.
- o) Divergent cone exhaust extensions are not permitted.
- p) Model shall have a maximum weight of 750 gm.

4.9.4. **Conduct of Contests.**

The number of laps flown shall be:

- 100 laps (10 km) for heats, with two mandatory refueling stops.
- 200 laps (20 km) for finals, with five mandatory refueling stops.

4.9.5. **Race Sites.**

A race site must consist of two concentric circles which shall be marked on the ground as follows:

- a) Circle to be used by the mechanics is 19.6 metre radius. This is called the flight circle and is divided into six equal 60 degree sectors, the limits of which define the starting and the refuelling points.
- b) Circle to be used by the pilot shall be three metre radius. This is called the centre circle. The pilot shall be permitted to place one foot outside the pilot's circle after the mechanic has retrieved the model.

4.9.6. The mechanic, and assistant if used, must wear a safety helmet worn on the head and strong enough to withstand the impact of a scale team race model, with the helmet chinstrap worn under the chin.

4.9.7. **Starts**

- a) Allocation of the positions shall be by draw - the team drawing No. 1 shall have a choice of starting position. The remaining teams will, in order of the draw, select one of the remaining unoccupied starting positions.
- b) A first signal gives the mechanic the opportunity of running his engine(s) for a 90 second warm-up period.
- c) A second signal announces the end of the warm-up period.
- d) Thirty seconds are then allowed during which final preparations may be made. The starter will count off the last five seconds during which the pilot must be crouching, the mechanic and assistant (if used) standing upright and with the model on the ground.
- e) The starting signal is then given by means of an acoustic signal.

4.9.8. **Pit stops**

- a) The model may not be retrieved with the engine running, or prior to touchdown with the engine stopped.
- b) The pilot shall be permitted to place one foot outside the centre circle only after the mechanic has retrieved the model.

- c) Mechanic(s) must not at any time enter the flight circle without the consent of the Contest Director, and then they must enter the flight circle radially to retrieve models.
- d) The mechanic must refuel the model in the nearest rearward sector of the flight circle in which the model stops or is stopped. Only when this sector is already occupied by another team, may he occupy the sector forward of the stopping point. A sector is occupied if a mechanic is standing at such an area even if his teams' model is still in the air.
- e) In the case of a model stopping in a sector whose adjacent sectors are already occupied, the mechanic must go back to the nearest free sector.
- f) During a pit stop (refueling & restarting) the model must be kept in contact with the ground & the centre line kept outside the flight circle, the handle and lines must be kept as close as possible to the ground.
- g) During the pit stop, fuel must be added to the fuel tank; otherwise a pit stop will not be considered done.
- h) When a model is being pitted and another is landing, the landing model must clear the already grounded model's lines.

4.9.9. **Flying Height**

Racing height shall not exceed 3 metres and the height of overtaking models shall not exceed 6 metres. In over-taking, the faster model must pass over the top of the slower model.

4.9.10. **Flying Style**

The pilot shall fly with his handle not more than 300 mm from his chest/ Whipping of the model is not allowed. The pilot must walk in a forward direction at all times.

4.9.11. **Finish of Race**

The race is ended when the competitors' models have completed the required distance. In any event, A Scale Team Race will finish 10 minutes after the starting signal in heats and 15 minutes in the final.

4.9.12. **Team Qualification and Classification**

- a) The contest shall be divided into two preliminary rounds and a final. Each entrant team shall be given the opportunity to fly once in each preliminary round.
- b) Time is decided from the moment of the starting signal to the moment of completing the last lap.
- c) The three teams which have recorded the three fastest times in the preliminary rounds qualify for the final. In the event of a tie, the entrants' final placings will be decided by their slower preliminary round time. In the event of a further tie, placings shall be determined by a fly-off race, flown over the final 200 lap distance.
- d) If, through interference or obstruction, a team is eliminated from a race through no fault of its own, it shall be given the opportunity of a further attempt in that round.
- e) If only one team remains in participation at the half distance mark in the race, that race will be declared null and void, and that team shall be rematched in another race during that same round.

4.9.13. **Warnings and Disqualifications**

Warnings shall be given to the mechanics. Any team receiving three warnings shall be disqualified.

4.9.14. **A team shall be warned:**

- a) if a pilot interferes with or obstructs another pilot, either by his conduct in the circle or by a manoeuvre of his model, prevents another model from flying or landing normally.
- b) if a pilot, instead of walking forward at all times, walks backwards.
- c) if the pilot flies with his handle more than 300 mm from his chest.
- d) if a pilot applies physical effort to increase the speed of his model.
- e) if the height levels prescribed are exceeded.
- f) if, during the start of a race or during pit stops, the control handle, the lines and the model are not on the ground or the centreline of the model is not kept outside the flight circle.

4.9.15. **A team shall be disqualified from a race:**

- a) if the pilot steps out of the centre circle before the mechanic has retrieved the model.
- b) if passing is done by flying under the slower model.
- c) if the pilot whose model is being overtaken carries out any manoeuvre to impede the overtaking competitor.
- d) if a member of a team or their model causes a collision.
- e) if the model is retrieved with engine running or prior to touchdown with the engine stopped.
- f) for any other flagrant breach of the rules.
- g) for arguing with the Contest Director.
- h) if the landing model fails to clear the already grounded model's lines.
- i) failure to shut engine off and land the model within 10 laps when directed by the CD

4.10. **MINI GOODYEAR COMPETITION RULES**

4.10.1. **Definition of Mini Goodyear Competition.**

Mini Goodyear competition is a simultaneous race between three models flown by three pilots in the same circuit (in exceptional circumstances, two models flown by two pilots). The objective of the race is to complete the required number of laps in the shortest possible time. A team shall consist of one pilot who shall remain in the centre of the circle, piloting the model, and one mechanic (and one assistant if required) who shall remain outside the flight circle and who shall start the engine(s), and performing other necessary duties throughout the race. The personnel of a team shall remain unaltered throughout a contest. It is not permissible for any person to be a member of two teams.

4.10.2. **Number of Models**

A team may enter and have checked only two models, and either or both may be used to complete the necessary number of flights. Only one model may be used in each heat or final. The team may interchange the various model parts provided that the resulting model is rechecked by the Contest Director. Spare propellers, plugs and general accessories are permitted. In the case of engines, spares are permitted but such engines must not be used by, or exchanged with, other entrant teams during the contest.

4.10.3. **Model Characteristics**

- a) Maximum engine capacity - 2.00 cc.
- b) Models shall be models of actual Goodyear racing planes that have flown in Goodyear or Continental Trophy races or other NPRPA Formula 1 races.
- c) Model profiles shall be within 10% of scale linear dimensions, the scale being 1/10 except where noted below.
- d) Tail area may be increased by 25% over scale area to permit safe handling. The scale shape of the tail must not be altered.
- e) Models shall be coloured in a scale-like fashion, i.e. in a colour scheme that may have been used on a full-sized aircraft.
- f) The racing number of the full-sized aircraft is to be displayed on the fuselage sides and on the upper inboard wing. The contestant's MAAA number is to be displayed on the upper outboard wing (preceded by "AUS"). All numbers are to be of block type letters.
- g) Models shall have a profile fuselage with a maximum width of 19.05 mm (3/4 inches) excluding cheek cowls. Engines shall be side-mounted and uncowled. Fuselage side cheeks are permitted in so much that they do not cowl the engine.
- h) The landing gear must exit from the scale side profile location but may be longer, higher or swept forward. Minimum wheel diameter is 25 mm. Wheel pants are optional. Mono wheel undercarriages are allowed.
- i) The entrant, if requested, shall produce a three-view drawing to substantiate the scale outline of his model. The drawings shall be a source acceptable to the Contest Director. A commercial or published full-size plan shall be acceptable, provided it meets the above specifications.
- j) Distance between the centre of the control handle and the centre line of the model shall be 14.2 metres +100 mm, -0 mm. Minimum line diameter:- 0.30 mm. Monoline control systems are not permitted. The control apparatus (handle, lines and bellcrank) must withstand a minimum pull of twenty times the total weight of the model.

- k) A fuel shut-off is required on all Mini Goodyear models. The pilot must stop his engine and land within 10 laps when directed to do so by the Contest Director.
- l) Engines must be started by flicking the propeller by hand.
- m) Models must fly in an anti-clockwise direction.
- n) No nose skids are allowed.
- o) Divergent cone exhaust extensions are not permitted.
- p) Pressurised refuelling systems not permitted.
- q) A suction fuel system must be used.
- r) Model shall have a maximum weight of 500 gm.

4.10.4. **Conduct of Contests.**

The number of laps flown shall be:-

- 100 laps for heats, with two mandatory refueling stops.
- 200 laps for finals with five mandatory refueling stops.

4.10.5. **Race Site**

A race site must consist of two concentric circles which shall be marked on the ground as follows:

- a) Circle to be used by the mechanics is 17.7 metre radius. This is called the flight circle and is divided into six equal 60 degree sectors, the limits of which define the starting and the refuelling points.
- b) Circle to be used by the pilot shall be three metre radius. This is called the centre circle. The pilot shall be permitted to place one foot outside the centre circle after the mechanic has retrieved the model.

4.10.6. The mechanic, and assistant if used, must wear a safety helmet worn on the head and strong enough to withstand the impact of a Mini Goodyear model, with the helmet chinstrap worn under the chin.

4.10.7. **Starts**

- a) Allocation of the positions shall be by draw - the team drawing No. 1 shall have a choice of starting position. The remaining teams will, in order of the draw, select one of the remaining unoccupied starting positions.
- b) A first signal gives the mechanic the opportunity of running his engine(s) for a 90 second warm-up period.
- c) A second signal announces the end of the warm-up period.
- d) Thirty seconds are then allowed during which final preparations may be made. The starter will count off the last five seconds during which the pilot must be crouching, the mechanic and assistant (if used) standing upright and with the model on the ground.
- e) The starting signal is then given by means of an acoustic signal.

4.10.8. **Pit stops**

- a) The model may not be retrieved with the engine running, or prior to touchdown with the engine stopped.
- b) The pilot shall be permitted to place one foot out-side the centre circle only after the mechanic has retrieved the model.
- c) The mechanic(s) may enter the flight circle radially to retrieve models.
- d) The mechanic must refuel the model in the nearest rearward sector of the flight circle in which the model stops or is stopped. Only when this sector is already occupied by another team, may he occupy the sector forward of the stopping point. A sector is occupied if a mechanic is standing at such an area even if his teams' model is still in the air.

- e) In the case of a model stopping in a sector whose adjacent sectors are already occupied, the mechanic must go back to the nearest free sector.
- f) During a pit stop (refueling & restarting) the model must be kept in contact with the ground & the centre line kept outside the flight circle, the handle and lines must be kept as close as possible to the ground
- g) When a model is being pitted and another is landing, the landing model must clear the already grounded model's lines.
- h) A pit stop is not considered done unless fuel is added to the fuel tank.

4.10.9. **Flying Height**

Racing height shall not exceed 3 metres and the height of overtaking models shall not exceed 6 metres. In over-taking, the faster model must pass over the top of the slower model.

4.10.10. **Flying Style**

The pilot shall fly with his handle not more than 300 mm from his chest except on taking off, overtaking and landing where three laps off the chest is allowed. Whipping of the model is not allowed. The pilot must walk in a forward direction at all times.

4.10.11. **Finish of Race**

The race is ended when the competitors' models have completed the required distance. In any event, Mini Goodyear Race will finish 10 minutes after the starting signal in heats and 15 minutes in the final.

4.10.12. **Team Qualification and Classification**

- a) The contest shall be divided into two preliminary rounds and a final. Each entrant team shall be given the opportunity to fly once in each preliminary round.
- b) Time is decided from the moment of the starting signal to the moment of completing the last lap.
- c) The three teams which have recorded the three fastest times in the preliminary rounds qualify for the final. In the event of a tie, the entrants' final placings will be decided by their slower preliminary round time. In the event of a further tie, placings shall be determined by a fly-off race, flown over the final 200 lap distance.
- d) If, through interference or obstruction, a team is eliminated from a race through no fault of its own, it shall be given the opportunity of a further attempt in that round.
- e) If only one team remains in participation at the half distance mark in the race, that race will be declared null and void, and that team shall be rematched in another race during that same round.

4.10.13. **Warnings and Disqualifications**

Warnings shall be given to the mechanics. Any team receiving three warnings shall be disqualified.

4.10.14. **A team shall be warned:**

- a) If a pilot interferes with or obstructs another pilot, either by his conduct in the circle or by a manoeuvre of his model, prevents another model from flying or landing normally.
- b) If a pilot, instead of walking forward at all times, walks backwards.
- c) If the pilot flies with his handle more than 300 mm from his chest.
- d) If the pilot applies physical effort to increase the speed of his model.
- e) If the height levels prescribed are exceeded.
- f) If, during the start of a race or during a pit stop the model is not kept in contact with the ground or kept outside the flight circle or the handle and lines are not kept as close as possible to the ground.
- g) If a model is brought forward on pitting when the sector to the rear is not occupied.

4.10.15. **A team shall be disqualified from a race:**

- a) If the pilot steps out of the centre circle before the mechanic has retrieved the model.
- b) If passing is done by flying under the slower model.
- c) If the pilot whose model is being overtaken carries out any manoeuvre to impede the overtaking competitor.
- d) If a member of a team or their model causes a collision.
- e) If the model is retrieved with the engine running, or prior to touchdown with the engine stopped.
- f) For any other flagrant breach of the rules.
- g) For failing to comply with 4.10.8.
- h) For arguing with the Contest Director.
- i) Failure to shut engine off and land model within 10 laps when directed by the CD

4.11 **JUNIOR RAT RACE**

4.11.1. Junior Rat Race is a simultaneous race between three control line models and their pilots, similar to 2.5 cc Rat Race (4.7). Rat Race rules apply except as follows:

4.11.2. **Model Specification**

- a) Engine to have a maximum displacement of 2.5cc and be plain bearing. Fuel to be supplied to the following formula:- 10% Nitro Methane, 20% castor oil lubricant, 70% Methanol. A reasonable charge may be made for the fuel. Fuel for compression ignition engines is not restricted.
- b) The engine is to be uncowled.
- c) Fuel shut-offs are mandatory.

4.11.3-7. Reserved

4.11.8 As 4.7.8. but the site is to be laid out on grass. A hard surface may be used for the pilots'/centre circle but is not mandatory

4.11.9 Reserved

4.11.10. Heat times shall be five minutes.

4.11.11. Final time shall be ten minutes.

4.11.12- 4. Reserved.

4.11.15. No whipping or physical effort shall be applied to increase the speed of the model.

4.11.16-19. Reserved.

4.12. **JUNIOR COMBAT**

4.12.1. **Definition of a Combat Event.** As per FAI F2D para. 4.4.1.

4.12.2. **Definitions.** As per FAI F2D, para 4.4.2.

4.12.3. **Combat Site.** As per FAI F2D, para 4.4.3.

4.12.4. **Competitor.**

The pilot, who shall be the entrant and known as the competitor, may employ a maximum of two mechanics, who may be Senior, in any one bout. In exceptional circumstances of wet or extremely windy weather, an additional helper may be used as a streamer holder and must perform no other function for the duration of that combat period. During active combat periods, the mechanic(s) must wear protective headgear fitted with an effective retaining strap worn under the chin.

4.12.5 **Characteristics of Combat Model.**

Maximum surface area: 150 dm²

Maximum weight: 5 kg

Maximum loading: 100 g/dm²

Maximum swept volume of engine(s): 2.5 cm³, plain bearing;

Fuel Shut –offs not required

Models shall have fuselages (no flying wings) and must have at least one wheel for take-off (ROG) and landing which must remain attached for the whole of the combat period.

Mufflers are compulsory on all engines except compression ignition engines.

Effective venturi diameter is unrestricted. A safety wire with a minimum diameter of 0.5 mm must be attached between the bellcrank bolt (axle) and the engine(s) so as to withstand a minimum pull of 100 Newtons.

The model shall not carry any artificial aid intended to assist the cutting of the streamers. The model shall be equipped with a device specially designed to retain the streamer which shall be fitted on the longitudinal centre line and sufficiently strong so that the streamer shall not become detached under normal flying conditions.

Standard fuel shall be supplied by the organisers to be used for practice (minimum 0.5 litres) and competition (sufficient to complete rounds) to the following formula: 10% nitromethane, 20% castor oil lubricant (first pressing), 70% methanol. A reasonable charge may be made for the fuel.

Note: Fuel for compression ignition engines is not restricted.

4.12.6. **Controls - Technical Verification.**

a) **Line length:** The length of the control lines must be 15.92 metres +/- 0.04 metres. It is measured from the inboard face of the grip of the control handle to the longitudinal centre line of the model.

b) **Control System:** two multi-strand control lines of a minimum diameter 0.30 mm (no minus tolerance) must be used. No free ends capable of entangling an opponent's lines and no line splices shall be permitted. A safety strap connecting the competitor's wrist to the control handle must be provided by the competitor.

c) **Line Tests:** Before each heat any sets of lines which may be used must be checked for length and diameter. A pull test shall be applied to the assembled handle(s), control lines and model(s) for all equipment to be used in that heat. The pull test shall be equal to 150 Newtons (15 kgf).

- 4.12.7 a) A junior competitor shall have a maximum of four models processed;
b) Each competitor shall be permitted one model, one handle, one pair of lines and one engine in each combat period.
- 4.12.8 **Streamer.** As per FAI F2D, para 4.4.8.
- 4.12.9 **Method of Starting.** As per FAI F2D, para 4.4.9 except:
d) A first signal, given by the Circle Marshal, shall signify the beginning of the 60 second period when the mechanic(s) or pilot has the opportunity to start, run and adjust their engine.
e) A second signal, given by the Circle Marshal, shall signify the beginning of the combat period on or after which the models may be launched by taking off from the ground (no hand launches).
- 4.12.10 **Termination of Contest.** As per FAI F2D, para 4.4.10.
- 4.12.11 **Method of Scoring.** As per FAI F2D, para 4.4.11.
- 4.12.12 **Attempts.** As per FAI F2D, para 4.4.12 except:
b) In the event of a model flyaway, as a result of the lines having been severed by his opponent's model, in which the airplane and streamer may not be retrievable due to the distance flown.
- 4.12.13 **Conduct.** As per FAI F2D para 4.4.13
- 4.12.14 **Offences.** As per FAI F2D, para 4.4.14. except sub para (e) is deleted.
- 4.12.15 **Cancellation of Flight.** As per FAI F2D, para 4.4.15 except sub paras (b) and (m) are deleted.
- 4.12.16 **Classification.** As per FAI F2D, para 4.4.16 except:
j) Previous opponents and competitors of the same State/Territory shall be drawn apart if possible with competitors of the same State/Territory to fly against each other only if there are no remaining opponents.
- 4.12.17 Reserved
- 4.12.18 **Timekeepers.**

One timekeeper/scorer, efficiently briefed about his/her task, shall be allotted to each competitor to count cuts taken and airtime gained during the four minute combat period.

4.13 CONTROL LINE BENDIX RACING

4.13.1. DEFINITION OF BENDIX RACING.

Bendix Racing is a simultaneous race between three models flown by three pilots in the same circuit (in exceptional circumstances, two models flown by two pilots). The objective of the race is to complete the required number of laps in the shortest possible time. A team shall consist of one pilot who shall remain in the centre of the circle, piloting the model, and one mechanic (and one assistant if required) who shall remain outside the flight circle and who shall start the engine(s) and perform any necessary duties throughout the race. The personnel of a team shall remain unaltered throughout a contest. It is not permissible for any person to be a member of two teams.

4.13.2. CHARACTERISTICS OF A BENDIX MODEL

- a) **Number of Models** - A team may enter and have checked two models, and either or both may be used to complete the necessary number of flights. Only one model may be used in each race. The team may interchange various model parts provided that the resulting model is re-checked by the Contest Director.
- b) Spare propellers, plugs and general accessories are permitted. In the case of engines, spares are permitted, but such engines must not be used by, or exchanged with, other entrant teams during the contest.

4.13.3. MODEL CHARACTERISTICS

- a) Maximum engine/s capacity shall not exceed 6.00 cm³. Mufflers are optional except where local noise rules exist.
- b) Maximum fuel tank capacity (including fuel tube) shall not exceed 40.00 cm³. Pressure feed acceptable, but pressure re-fuelling is not allowed. Fuel shut-offs are mandatory. Fuel is at entrant's discretion excepting substances banned by the MAAA Inc. and the FAI.
- c) Model shall be semi-profile in appearance and must resemble in outline, the fuselage and flying surfaces of a full size aeroplane which has competed in the BENDIX-THOMPSON series of trophy races or NPRPA Formula 1 races or GOODYEAR and CONTINENTAL Trophy Races.

Onus of proof, i.e. photos, drawings, etc. are the responsibility of the entrant and must be produced to the contest officials for processing

d) The Fuselage shall:-

Have a minimum width of 12 mm and a maximum width of 25 mm (excluding cheek cowls) at a point between the leading edge and the minimum vertical depth of wing root section.

Engine must be uncowed.

Have a minimum length of 609 mm excluding the rudder (as measured from the back of the propeller to the rudder hinge line which must be clearly marked on the aircraft);

Shall have a minimum height of 125 mm at the cockpit.

e) **The Wing shall:-**

Be of built-up construction (including foam);

Have a minimum wingspan of 1000 mm;

Have a minimum root chord (outside fuselage) of 225 mm;

Wing thickness of the root shall be at least 38 mm.

If the wing is tapered in thickness then the thickness must reduce at a constant rate from a minimum of 38mm at the root to a minimum of 28mm at the tip measurement point. The measurement of tip thickness will be made at a point 400mm from the fuselage centreline.

Note: Root shall be defined as the innermost wing section, not counting fillets, that may be measured at the fuselage.

f) **Colour Scheme and Numbers:-**

"Models shall be coloured in a scale-like fashion, i.e. in a colour scheme that may have been used on a full-sized aircraft.

The racing number of the prototype must be permanently affixed to each side of the fuselage, and also the inboard wing, in a minimum height of 50 mm.

The contestant's MAAA number (preceded by "AUS") must be permanently affixed to the upper surface of the outboard wing in a minimum height of 25 mm.

g) **The Lines shall:-**

Be a minimum length of 18.3 metres measured from the hand grip of the handle to the centre line of the fuselage, + 100 mm, - 0.00 mm.

Be a minimum diameter of 0.455 mm (0.018") (-0.011mm). (Mono line control systems are NOT permitted.)

All lines, handles, bellcranks and connectors must withstand a pull-test of 30g and must also meet a safety inspection. "LUXON" type or central sliding type line connectors are NOT permitted.

h) **The Undercarriage shall:-**

Be of scale location.

Wheels shall be of a minimum diameter of 50 mm and be at least 100 mm apart. In the case of a tricycle undercarriage, the main gear must be at least 100 mm apart.

The use of all-metal wheels is prohibited.

Nose skids are not allowed.

- i) Engines shall be started by flicking the propeller by hand.
- j) Model and contestants must conform to local, club, safety and noise regulations.
- k) Model shall have a maximum weight of 1300 gm.

4.13.4. **CONDUCT OF CONTESTS**

The number of laps flown shall be:-

Heats - 80 laps with one mandatory re-fuelling stop.

Final - 160 laps with three mandatory re-fuelling stops.

4.13.5. **RACE SITES**

A race site must consist of two concentric circles which shall be marked on the grass as follows:-

- a) The circle to be used by the mechanics is 22.3 metres radius. This is called the flight circle and is divided into six (6) equal 60 degree sectors, the limits of which define the starting and re-fuelling points.
- b) The circle to be used by the pilot shall be three (3) metres in radius. This is called the centre circle. The pilot is permitted to place one foot outside the centre circle after the mechanic has retrieved the model.

The mechanic and assistant, if used, must each wear a safety helmet with a chinstrap worn under the chin, strong enough to withstand the impact of a model being used in the competition.

4.13.6. **STARTING OF THE CONTEST**

- a) A pitting area [1.5 (a)] is occupied by each of the models which are to participate in the race. The model of the team designated first in the draw occupies the place chosen by that team. The other team(s) choose one of the remaining free pitting areas in the order of the draw.
- b) A first signal gives the mechanic the opportunity of running his engine for a 90 second warm up period.
- c) A second signal announces the end of the warm up period.
- d) Thirty (30) seconds are then allowed in which final preparations may be made. The starter will count off the last five seconds during which the pilot must be crouching, the mechanic and assistant, if used, standing upright and with the model on the ground.
- e) The starting signal is then given by means of an acoustic signal.

4.13.7. **PIT STOPS**

- a) The model may not be retrieved with the engine running or prior to touchdown with the engine stopped.
- b) The pilot shall be permitted to place one foot outside the centre circle only after the mechanic has retrieved the model.

- c) Mechanics must not, at any time, enter the flight circle without the consent of the Contest Director, and then they must enter the flight circle radially to retrieve the model.
- d) The mechanic must refuel the model in the nearest rearward sector of the flight circle in which the model stops or is stopped. Only when such sector is already occupied by another team may he occupy the sector forward of the stopping point.
- e) In the case of a model stopping in a sector whose adjacent sectors are already occupied, the mechanic must go back to the nearest free sector.
- f) During the pit stop (re-fuelling and re-starting) the model's lines and control handle must remain as close as possible to the ground. The centre line of the model must remain outside the flight circle during the pit stop. During the pit stop, fuel must be added to the tank.
- g) Landing models must over-fly all occupied pit segments.

4.13.8. **FLYING HEIGHT**

Racing height shall NOT exceed four metres and the height of overtaking models shall NOT exceed six metres. In overtaking, the faster model must pass over the top of the slower model(s).

4.13.9. **FLYING STYLE**

The pilot shall fly with his handle not more than 300 mm from his chest. "WHIPPING" of the model is not allowed. The pilot must walk in a forward direction at all times.

4.13.10. **FINISH OF RACE**

The race is ended when the competitors' models have completed the required number of laps. In an event, a BENDIX race will finish 10 minutes after the starting signal in any heat and 20 minutes in the final.

4.13.11. **TEAM QUALIFICATION AND CLASSIFICATION**

- a) The contest shall be divided into two (2) preliminary rounds and a final. Each Entrant Team shall be given the opportunity to fly once in each preliminary round.
- b) Time is decided from the moment of the starting signal to the moment of completion of the last lap.
- c) The three teams which have recorded the three fastest times in the preliminary rounds qualify for the final. In the event of a tie, the Entrant's final placing will be decided by their other preliminary round time. In the event of a further tie, placing shall be determined by a fly-off race flown over 160 laps.
- d) If through interference or obstruction, a team is eliminated from a race through no fault of their own, they shall be given the opportunity of a further attempt at that round.

- e) If only one team remains in participation at the half distance mark in a race, that race will be null and void and that team rematched in another race during the same round.

4.13.12. **WARNINGS AND DISQUALIFICATIONS**

Warnings shall be given to mechanics. Any team receiving three (3) warnings shall be disqualified.

A Team Shall Be Warned:-

- a) If a pilot interferes with or obstructs another pilot, either by his conduct in the circle or by a manoeuvre of his model, prevents another model from flying or landing normally.
- b) If a pilot, instead of walking forward at all times, walks backwards.
- c) If a pilot flies with his handle more than 300 mm from his chest.
- d) If a pilot applies physical effort to increase the speed of his aircraft.
- e) If the prescribed height levels are exceeded.
- f) If during the start of a race or during a pit stop the model is not kept in contact with the ground or kept outside the flight circle or the handle and lines are not kept as close as possible to the ground.

4.13.13. **DISQUALIFICATIONS**

- a) If the pilot steps out of the centre circle before the mechanic has retrieved the model.
- b) If the passing is done by flying under the slower model.
- c) If the pilot whose model is being overtaken carries out any manoeuvre to impede the overtaking competitor
- d) If a member of a team or their model causes a collision.
- e) If the model is retrieved with the engine still running or prior to touchdown with the engine stopped.

Arguing with the Contest Director will lead to disqualification.

4.14 VINTAGE A TEAM RACE

4.14.1 General

Vintage A team race is a nostalgia event based on pre-1957 Class A Team racing.

4.14.2 Circle Layout

The layout shall consist of two concentric circles which shall be marked out on a grass surface.

- a) The pitting circle: radius 19.6 metres
 - i) The pitting circle shall be marked into six equally spaced segments for pitting/restarting the models.
- b) the centre circle: radius 3 metres.

4.14.3 Characteristics of a Vintage A Team Race Model

- a) Model designs published up to and including December 1957 or commercial kits complying with the 1957 rules shall be used. The model must conform to the outline as shown on the original plan. Proof shall be provided by the contestant if required by the contest director.
- b) **1957 Vintage A Specifications**
 - i) Models shall be of a scale or semi-scale appearance with a raised windshield or canopy.
 - ii) The model shall carry a realistic scale pilots head.
 - iii) Wing aspect ratio shall be between 4:1 and 11:1.
 - iv) Minimum effective wing area: 70 sq in. (452 sq cm.) [Note: This excludes the fuselage and tailplane].
 - v) The minimum width of the fuselage, measured at the longitudinal position where the pilot's head is located, shall be 1 ½" (38mm).
 - vi) The minimum height of the fuselage, including the canopy/cockpit profile, measured at the longitudinal position where the pilot's head is located, shall be 3" (76mm).
 - vii) The minimum wheel diameter shall be 1 1/2" (38mm) with a 1/16" (1.5mm) negative tolerance. Distance between the wheels shall be a minimum of 75mm.
- c) **Maximum engine capacity: 2.5 cc.**
- d) **Eligible Engines:** The following engines are permitted for Vintage A:
 - i) **Pre-1957:** Any engine that was commercially available may be used.
 - ii) 1957 and later: Any commercially available plain bearing, non schneurle ported engine may be used. The following engines may also be used:-
 - any commercially available, non-schnurle ported Taipan 2.5 cc diesel (Series 1-13).
 - PAW Single Ball Race (non schneurle ported)
 - E.D. Super Racer
 - CS Oliver Mk 3 Replica
 - Russian MARS 2.5 cc diesel
 - CTAH Oliver Mk 3 replica
 - Oliver Tiger Mk 4
 - NBN Engines PFEFFER 2.5cc diesel replica
 - Rothwell R250 Oliver Mk111 replica

Modifications are permitted to any engine but must be in the spirit of the event. The components of a Vintage A engine should be equivalent to the design of the original components. Modifications which are carried out on these components are legal.

Components or engines which are other than original origin must be equivalent in design to the permitted engines as listed taking into account the production variations of the period.

Schneurle porting, AAC or ABC piston and cylinders or other configurations which differ in principle both materially and conceptually are not legal.

Such items as the chroming of sleeves to reclaim worn engines and connecting rods of different cross section are considered to be within the spirit of the rules.

e) **Fuel System**

- i) Max. fuel tank capacity: 15 cc (Note: This includes all fuel lines and filters).
- ii) No multifunction valves may be used.
- iii) Refuelling shall be by squeeze bottle only.
- iv) Fuel shut-offs are optional but must not be used during the race. Each use will result in a 30 second penalty added to the race time.
- v) Schraeder type tank valves are permitted.
- vi) Cox style needle and venturi systems are legal.
- vii) Shut offs may be used during the warm up period and only when the race has finished for that competitor.

f) **Propellers:** Only commercially available wood, nylon or glass filled nylon propellers may be used. Propeller modifications are permitted.

g) **Permitted Modifications:** The following modifications may be made in the interests of practicality:

- i) The model may be strengthened, provided that the outline is not changed in any way. Only materials available in 1957 may be used in construction; however, modern adhesives may be used and metal motor mounts are allowed.
- ii) The undercarriage legs may be extended, shortened or raked forward to promote safer handling on grass surfaces. Spreader bars are optional.
- iii) The fuel tank shape, venting and location may be changed to any suitable dimensions, and position in the model can be changed from that shown on the plan, that is, higher up, further inboard or outboard.
- iv) Air Inlet/Outlet and exhaust duct size and position can be changed from the original plan, provided the fuselage outline is not altered. The ducting of the air around the engine inside the cowl may be changed to allow correct operation of the engine. This means that the inlet, outlet and exhaust may be redirected. This may also mean some alteration to the shape of the cowl.
- v) Built up wings may be made of solid and aerofoil sections may be changed, for example, from flat bottom to symmetrical or asymmetrical or vice versa. Wing and tail planform outline must remain the same as original or within +/- 6.35mm of plan. Wing thickness may be changed; for example, 1/2 inch to 3/8 inch or 3/8 inch to 1/4 inch.
- vi) Internal leadouts are permitted even if not shown on plan.
- vii) Covering in fibreglass cloth is permitted.
- viii) The elevator position, size and number may be varied from the plan.
- ix) The vertical positioning of the wing may be altered; eg designs with wings that are installed above the engine bearers may now have the wing positioned below

and low wings may be raised. There is no limitation to the amount of movement but in all other respects the profile and plan view of the design must remain as plan.

h) **Maximum weight:** 500 gm

4.14.4. **Control Systems**

- a) **Line Length:** The length of the control lines must be 15.92 metres (+40mm -0mm). The length is measured from the face of the grip on the control handle to the centre line of the model.
- b) **Control lines:** Two control line wires of a minimum diameter of 0.012" (0.3 mm) must be used. No internal line hook up allowed. Line connectors must be external.
- c) **Line Test:** A pull test of 20 g shall be applied for 5 seconds to the model/line combination.

4.14.5 **Contestant**

- a) A contestant (pilot or mechanic) may compete in only one team in each event, unless otherwise permitted by the contest director.

4.14.6 **Number of Models**

- a) A contestant may use two models in any one event to complete the required number of heats/finals. Parts may be interchanged between the two models providing the resulting model conforms with all Vintage A rules.

4.14.7 **Conduct of Races**

- a) Races shall consist of two heats and a final. The three fastest heat times will go into the final. (A division 2 final for the fastest three teams with a time slower than 4:45 may be flown at the C.D's discretion).
- b) Heat distance will be 80 laps with one compulsory refuelling stop.
- c) Final distance will be 160 laps with two compulsory refuelling stops.
- d) Each race shall have a minimum of two teams and a maximum of three teams competing.
- e) **Starting Procedure**
 - i) 90 second warm-up
 - ii) 30 second cool downFinal preparations are to be made during this time. Pilots must be crouching and pit crew standing at the starting signal.
- f) Flying height shall be between 2 and 3 metres except on overtaking when the height must not exceed 6 metres.
- g) The faster model shall fly above the slower model on overtaking.
- h) Whipping is not permitted except on take off and landing. Whipping will incur a warning.

- i) The pilot may fly with hand on chest or extended, but will be warned for dangerous flying.
- j) Two-wheeled models being pitted with wheels and fuselage touching the ground shall not be penalised for "Lines off Ground". Model must be in contact with the ground while being pitted.
- k) Landing models should clear models being pitted on the ground. The team operating a landing model that contacts a pitting model or its lines will be disqualified and a re-run given to the affected team".
- l) Models must be carried backward to the nearest pitting segment. If that segment is occupied, the model may be carried forward. (A pitting segment is occupied if a mechanic is standing at such an area even if his teams' model is still in the air). Failure to comply incurs a warning.
- m) During the start of a race or during a pit stop the model is must be kept in contact with the ground and kept outside the pitting circle and the handle and lines must be kept as close as possible to the ground. Failure to comply incurs a warning.
- n) Three warnings will lead to disqualification.

4.14.8 **Records**

Records for Vintage A will apply only to events flown over grass.

4.14.9 **Safety**

- a) Mechanics must wear a safety helmet fitted with a chin strap worn under the chin.
- b) Pitting segments must be used at all times.
- c) Piloting style is "relaxed"; however, pilots should observe good race practice.
 - i) Walk in a forward direction only.
 - ii) Crouch when your model is being pitted.
 - iii) Remain inside the centre circle at all times. (One foot can be placed outside when the mechanic has retrieved the model).
 - iv) Take off smoothly, that is, no wingovers on take off.
 - v) Do not obstruct other teams from flying/overtaking normally.
 - vi) Model may be retrieved. Mechanics must not at any time enter the flight circle without the consent of the Contest Director, and then they must enter the circle radially to retrieve models

4.15. C/L VINTAGE STUNT

4.15.1 OBJECT

To encourage the building and flying of vintage control line stunt model aircraft.

4.15.2 GENERAL RULES

A visual safety inspection and pull testing of control line(s) shall be carried out before flying.

Pull Test As per FAI F2B Rule 4.2.4.

Silencers Fitting of silencers is encouraged and may be mandatory at noise-sensitive sites. Organisers should advise contestants of specific requirements in advance of each contest.

4.15.3 STATIC JUDGING

Authentication

It is the responsibility of each contestant to provide documentation, of a standard acceptable to the judges, substantiating age of the model and its particulars, and the age of the engine used, to confirm eligibility and to facilitate the awarding of static judging points. The degree of authenticity and completeness of documentation will influence the potential for static judging points. If a competitor does not provide proof of age then no points can be awarded.

a) Construction points

Construction points are to be given for workmanship and building the model in the same manner and using the same materials as were used in the original. Internal construction may be changed to improve strength, but external dimensions must remain as per the original.

Permitted alterations

- Alterations to controls and fuel system, to permit normal flight in an anti-clockwise direction.
- Two-line control systems in place of monoline (or vice versa).
- Alteration of control mechanism ratios
- Modification of models to allow fitting of silencers.

Points for Construction

Building Workmanship 20 points maximum

In addition to neatness of execution, the complexity of construction and replication of difficult features (such as metal cowls) will be considered.

Finish 20 points maximum

Use of original materials 20 points maximum

The substitution of modern, externally visible hardware items such as wheels and spinners, in place of original Vintage items that cannot reasonably be obtained or reproduced in the home workshop, will not prejudice points in this section. The evident use of plastic film covering material will result in a downgrading of five points.

b) Age of Models

Points are awarded on a sliding scale as follows:

1945	16	1949	12	1953	8	1957	4
1946	15	1950	11	1954	7	1958	3
1947	14	1951	10	1955	6	1959	2
1948	13	1952	9	1956	5	1960	1
Bonus for Biplanes				5 points			
Bonus for fixed flaps				5 points			

Adherence to original Plan

Any dimension incorrect to the eye should be verified by measurement and be within 2%.

The judges may disqualify any model that in their opinion differs (except where permitted) significantly in appearance from the plan or contains modifications that would significantly enhance performance over the original design.

Particulars such as wing section, overall outline and proportions, nose and tail moments, fuselage cross-section, shape, size and position of wheels, rib spacing etc. are examples of what judges might assess.

c) Age of Engines

Points are awarded on a sliding scale as follows:

1944 ¹	27	1949	19	1954	14	1959	9	1964	4
1945	25	1950	18	1955	13	1960	8	1965	3
1946	23	1951	17	1956	12	1961	7	1966	2
1947	21	1952	16	1957	11	1962	6	1967	1
1948	20	1953	15	1958	10	1963	5	1968 ²	0

Notes: 1- or earlier. 2 – or later.

Bonus for spark ignition	10 points
Bonus for engine 2.5cc or less	10 points

Note:

Reproduction engines shall qualify for full points, relevant to the particular year, providing they substantially replicate the overall design and performance characteristics of the original.

Spark ignition bonus is awarded only when the engine was originally sold as a spark ignition engine.

Modifications to allow fitting of mufflers shall not prejudice engine points.

Unless proven otherwise by suitable documentation provided by the contestant, all variants of the Fox 35 Stunt engine will be awarded five “age of engine” points.

4.15.4. FLYING

There shall be two official flights. Each competitor is entitled to two attempts for an official flight. An attempt shall have occurred when:

- The competitor does not commence the takeoff manoeuvre within 2 minutes of the start of official timing of the flight period;
- Or the model noses over on take-off;
- Or the competitor himself declares an attempt before commencing the take-off manoeuvre.

At least two laps are required between manoeuvres.

Competitors should signal before commencing each manoeuvre.

Maximum duration for an official flight is 7 minutes. No further flying points will be awarded beyond this time.

Points for flying shall be scored as follows:

Starting and takeoff 10 points maximum (both elements)

The model becomes airborne within two minutes from when the pilot signals that he/she is about to start the engine (5 points). The model proceeds smoothly to level flight of 2 metres in 1/2 lap. Maximum 5 points for take-off.

Errors: The model jumps from the ground with no take-off roll, climbs unsteadily or does not attain smooth level flight within the permitted distance.

Level flight 10 points maximum (per lap)

The model completes two laps of level flight at a height of 2 metres. The pilot may use as much time as desired for warm-up laps before signalling to the judges that the judged laps of level flight will commence.

Errors: The model wobbles or deviates more than 0.5 metres from this height.

Climb 10 points maximum

The model, starting from normal level flight, makes a smooth precise change of direction into a vertical climb, climbs for at least 3* metres and recovers smoothly into sustained level flight with the lines inclined at an angle of 60 degrees or less from the ground. (*Judges should make due allowance for the practical vertical distance possible where smaller models are flown on lines shorter than 18 metres).

Errors: Model starts from other than level flight, wobbles or mushes going into climb. Flight path does not display a clear, straight component perpendicular to the ground of the specified nominal distance. Model mushes or wobbles when recovering to high altitude level flight, or if recovery is above 60 degrees line angle.

Dive 10 points maximum

The model starts from level flight at a height not exceeding an angle of 60 degrees from the ground, makes a smooth precise change to a vertical dive of at least 3* metres and recovers smoothly into normal level flight. (*Judges should make due allowance for the practical vertical distance possible where smaller models are flown on lines shorter than 18 metres).

Errors: Model starts from a level above 60 degrees, wobbles or mushes going into dive. Flight path does not display a clear, straight component perpendicular to the ground of the specified nominal distance. Model mushes or wobbles when recovering to normal level flight altitude, or recovers at other than normal level flight altitude.

Wingover

10 points maximum

The model, starting from normal level flight, makes a vertical climb and dive passing directly over the pilot's head, cutting the ground circle in half, and recovers in normal flight level.

Errors: The model starts at other than normal level flight, wobbles or mushes going into the climb or recovering from the dive. Model does not cross directly over the pilot's head. Model does not cross the circle in a straight line with a distinct vertical alignment. Model wobbles, mushes or recovers at other than normal flight level. The sharpness of turns into climb and recovery is not the same.

Three inside loops

10 points maximum (each)

The model starts from normal level flight and makes a series of three smooth, round loops, all done in the same place with the lines at no time exceeding an angle of 60 degrees from the ground. The model then continues for another half loop, recovering inverted and descending to normal level flight altitude. Note that the half loop, recovery and descent are not judged.

Errors: Loops are rough and irregular. Lines exceed an angle of 60 degrees from the ground. Subsequent loops vary in size or position from the first.

Inverted flight

10 points maximum (per lap)

The model completes two laps of inverted level flight at a height of 2 metres. The pilot may use as much time as desired for warm-up laps before signalling to the judges that the judged laps of level flight will commence.

Errors: The model wobbles or deviates more than 0.5 metres from this height.

Three outside loops

10 points maximum (each)

Commencing in the inverted position at a height of 2 metres, the model enters three smooth, round loops all done in the same place with the lines at no time exceeding an angle of 60 degrees from the ground. The model then continues for another half loop, recovering in normal level flight. Note that the half loop, recovery and descent are not judged.

Errors: Loops are rough and irregular. Lines exceed an angle of 60 degrees from the ground. Subsequent loops vary in size or position from the first.

Two horizontal eights

10 points maximum (each)

Beginning from normal level flight, the model performs three quarters of an inside loop, followed by an outside loop of the same size. The model is momentarily vertical at the transition point between the two loops. The second eight overlaps the first, with a final quarter inside loop recovery to normal level flight. Lines at no time exceed 60 degrees from the ground and the model is momentarily vertical at the transition point between the two loops.

Errors: Flight is rough or irregular. Halves of each eight are not round or differ in size. The second eight varies in size or position from the first. Eights exceed the height limit.

Two vertical eights

10 points maximum (each)

Beginning from normal level flight, the model performs a half inside loop followed by an outside loop of the same size. A further half inside loop to normal level flight altitude

completes the eight. The second vertical eight overlaps the first. Lines at no time exceed 90 degrees from the ground and the model is momentarily horizontal at the transition point between the two loops.

Errors: Flight is rough or irregular. Halves of each eight are not round or differ in size. Height limit is exceeded.

Two overhead eights 10 points maximum (each)

Similar to a horizontal eight, but performed above rather than in front of the pilot. The manoeuvre starts to the pilot's left at a line angle not less than 30 degrees from the ground with a partial inside loop. Transition to the second half of the eight is vertically above the pilot. When the transition point is again reached, a half inside loop completes the eight. The second eight overlaps the first. Recovery is to level flight at not less than 30 degree line angle.

Errors: Flight is rough or irregular. Halves of each eight are not round or differ in size. The second eight varies in size or position from the first. Lower height limit of 30 degree angle from the ground is exceeded. Transition point is not vertically above pilot.

Two inside square loops 10 points maximum (each)

The model, starting from normal level flight, makes a vertical climb and recovers into inverted flight with the lines inclined at an angle of 60 degrees or less from the ground. It continues for a minimum of ¼ lap and maximum ½ lap before making a vertical dive and recovery at normal level flight to the starting point. The second loop overlaps the first. The corners should have a radius of approximately 1.5 metres.

Errors: Flight is rough or irregular, corners are not of the same shape, vertical sections are not straight and of the same length or exceed height limit, horizontal sections are not straight and of the same length. The second loop varies in size or position from the first.

Landing 10 points maximum

With the engine stopped, the model makes a smooth, controlled descent and lands with no bounce or roughness and rolls to a halt.

Errors: The engine has not stopped. Descent is not smooth. The model slows too much and drops to the ground. The model bounces or flips over.

4.15.5. CLASSIFICATION

The order of place getters will be determined in descending order, based on each competitor's aggregate static judging points and points from his/her best flight.

4.16. C/L CLASSIC STUNT

4.16.1 Definition

Classic Stunt is an event formulated to display control line aerobatic aircraft designed during the classic era.

4.16.2 Eligibility

Aircraft to be designed prior to 1971.

Proof of age and design required (plan, magazine article).

An aircraft designed in the Classic era but not published as a plan, or featured in a magazine, will be eligible if a copy of the plan submitted is accompanied by an affidavit from the designer as to the correctness of the plan and the year designed plus a photo or a photo in a magazine that shows the aircraft with surroundings that can prove the aircraft to be of the Classic era.

Max noise reading, taken at a distance of 3 m from model, to be 96 dB.

Outlines of wings, tail, fuselage, fin, rudder, cowl, control surfaces to be as plan. Spans, chords, lengths and widths to be as plan (a 2% error is acceptable).

Variations will be allowed to the positions of needle valve, venturi, exhaust, cylinder head orifices, tank pipes, cowl joins, hatch joins and lead-outs (adjustable lead-outs and tip weight boxes are allowed).

Plastic canopies will need to conform closely to plan.

There will be no limitations on hinges, fuel tubing, materials, paint, motors, (see 3.) construction methods, and coverings.

A.R.F. Models will be acceptable if they conform to the plan presented.

4.16.3 Specifications

Max flying weight - 5.0 kg

Max wing area - 1.5 m²

Max motor capacity - 10.0 cc

Max line length - 21.5 m

Min line length - 12.0 m

4.16.4 Static judging

Fidelity to plan can be judged purely by eye, the judge comparing plan to model. If there appears to be a discrepancy then a measurement may be used to determine if there has been a modification.

Any model deemed to be modified will be downgraded 100 points on each official flight.

4.16.5 Line tests

Line length to be measured from axis of handle grip to the centre line of the fuselage. Where more than one propeller is employed, then the axis of symmetry of all propellers is taken.

A static load test will be applied to the assembled control handle, lines and aircraft equal to 10 times the weight of the model.

4.16.6 Flight procedure

Contestants will have 2 minutes to enter the circle after being called. From the moment of entering the circle, the contestant will have 3 minutes preparation time, after which flight time will commence. If the contestant is ready prior to the end of the 3 minutes preparation time, he/she will hand signal the timekeeper to start flight time.

Flight time will be 7 minutes maximum.

4.16.7 Flight attempts

Two attempts are allowed for each official flight.

An attempt occurs when:

- The contestant signals to the judges that an attempt is to be taken.
- The model does not become airborne within 3 minutes of the starting signal.
- The competitor does not enter the circle within 2 minutes of being called.

After the first attempt, the contestant will indicate whether the 2nd attempt will be taken immediately (a further 3 minute preparation time allowed) or that he/she will leave the flight circle.

If the contestant leaves the circle, then the 2nd attempt will be taken immediately after the next three official flights. (If there are no more official flights, then the 2nd attempt is to be taken no more than 30 minutes after the 1st attempt.)

An attempt becomes an official flight when the aircraft becomes airborne.

4.16.8 Number of flights

To be at the discretion of the C.D. with a maximum of three.

4.16.9 Classification

When 3 rounds are flown, the mean of the best 2 scores will be used. If only 2 rounds are flown, then the highest single score will prevail.

4.16.10 Cancellation of a flight

An official flight will be cancelled if jettisoning occurs.

4.16.11 Number of helpers

Each competitor is entitled to 2 helpers.

4.16.12 Execution of manoeuvres

The manoeuvres must be executed in the order listed.

A minimum of 2 laps is to be flown between manoeuvres except Take-off and Level flight.

A manoeuvre may be attempted only once in an official flight.

Any manoeuvres completed outside the 7 minutes flight time will not be scored.

A manoeuvre flown out of sequence will not be scored.

An omitted manoeuvre is not scored, but succeeding manoeuvres will be considered to be in sequence.

4.16.13 Scoring

During an official flight, each manoeuvre will be awarded points between 0 and 10 by each judge. The points are to be multiplied by a coefficient factor, which varies with the difficulty of the manoeuvre. The flight score will be the addition of the resultant of all manoeuvre points.

4.16.14 Judges

Number of judges to be at the discretion of the C.D.

Three judges would be ideal.

All judges scores to count.

4.16.15 Timekeeping

Timekeeping can be performed by the judges or a specially appointed timekeeper.

4.16.16 Schedule of manoeuvres

4.16.16.1 Starting K=2

Take off within one minute of Contestant's start signal receives full points.

4.16.16.2 Take-off K=2

A correct take-off consists of the aircraft rolling smoothly along the ground for a distance of not less than 4.5 metres but not greater than $\frac{1}{4}$ lap and then rises smoothly into the air with a gradual climb to normal level flight (at 2m.) at a point 1 lap from the start of the ground roll.

4.16.16.3 Level flight K=3

Correct level flight is when the aircraft flies 2 smooth, stable laps at a height of 2 metres in an upright position.

4.16.16.4 Inverted flight K=4

Correct inverted flight is when the aircraft, flying in upright level flight at a height of 2m. rises to 45° line angle and performs a half outside loop (BUNT), pulling out inverted smoothly at 2 metres height. The aircraft then flies 2 smooth, stable laps in an inverted position at 2 metres height.

4.16.16.5 Recovery from inverted K=4

A correct recovery is when the aircraft, flying inverted at a height of 2 metres, rises smoothly to 45° line angle and performs a half inside loop, smoothly regaining upright level flight at 2 metres height.

4.16.16.6 Double wingover K=8

A correct double wingover is when the aircraft, flying in upright level flight at 2 metres height, performs a vertical climb, continuing over the top, bisecting the flight circle, and then makes a vertical descent, pulling out inverted at 2 metres height and continuing in inverted flight at 2 metres height for approximately half a lap. The aircraft then performs another vertical climb, superimposed on the first climb, continues over the top (as before) then makes a vertical descent, pulling out into upright level flight at 2 metres height.

4.16.16.7 Three inside loops K=3

Correct inside loops are performed when the aircraft, flying in upright level flight at 2 metres height, enters into the loops smoothly, continuing until 3 round loops are completed, exiting into upright level flight at 2 metres height. The height of the loops is to be at a 45° line angle. Loops are to be superimposed.

4.16.16.8 Three outside loops K=3

Correct outside loops are performed when the aircraft, flying in upright flight at 45° line angle, enters the loop with a bunt and continues smoothly until 3 round loops are completed, and then exits at 45° line angle in upright flight. Height at the bottom of the loops is to be at 2 metres. Loops are to be superimposed.

4.16.16.9 Two triangular inside loops K=8

Correct loops are performed when the aircraft, flying in upright level flight at a height of 2 metres, makes an inside turn of 120° at 1.5 m. radius, proceeding straight in an upward and backward direction, then makes another 120° inside turn at 1.5 m. radius (the top at 45° line angle) proceeding straight in a downward and backward direction, then making a 120° inside turn at 1.5 m. radius, returning to upright level flight at a height of 2 metres. The aircraft then flies a second loop in the same flight path as the first. After the 2nd loop, the aircraft resumes upright level flight at 2 metres height.

4.16.16.10 Three horizontal eights K=5

Correct eights are flown when the aircraft, flying in upright level flight at a height of 2 metres, performs $\frac{3}{4}$ of a round inside loop, arriving at the intersection point, then changes direction to perform a round outside loop, returning to the point of intersection, then changing direction again to perform $\frac{1}{4}$ of a round inside loop, thus completing one figure eight. The model continues on the same flight path for a further 2 eights, exiting into upright level flight at 2 metres height.

- Top of eights to be at 45° line angle.
- Height at the bottom of the eights to be 2 metres.
- Aircraft to be vertical at intersection of eights.
- Loops of eights to be round and of the same size.

4.16.16.11 Three vertical eights K=8

Correct vertical eights are flown when the aircraft, flying in upright level flight at a height of 2 metres, performs a ½ round inside loop, arriving at the intersection point, then changes direction, performing a round outside loop, returning to the intersection point, then changing direction to perform a ½ round inside loop, thus completing one figure eight. The aircraft then continues on the same flight path for a further 2 eights, exiting into upright level flight at a height of 2 metres.

- Aircraft to be horizontal and at 45° line angle at the point of intersection.
- Top of eights to be at 90° line angle.
- Axis of the 2 loops to be vertical.
- Both loops to be round and of the same size.
- Height at the bottom of the eights to be 2 metres.

4.16.16.12 Three overhead eights K=8

Correct overhead eights are performed when the aircraft performs a vertical climb to the intersection point directly overhead of the flight circle centre, then performs a round inside loop, returning to the intersection point, changing direction and performing a round outside loop and returning to the intersection point, thus completing the first eight. The aircraft continues on the same flight path for a further 2 eights, exiting from the intersection point in a vertical dive.

- Both loops to be round and of the same size.
- Bottom of loops to be at 45° line angle.
- Aircraft to be tangential to loops at intersection point.

4.16.16.13 Four leaf clover K=10

A correct clover is performed when the aircraft, flying in upright flight at 45° line angle, performs a round inside loop, arriving back at 45° line angle, then flies horizontally at 45° line angle a distance equal to the diameter of a loop, then performs ¾ of a round outside loop, continues climbing vertically a distance equal to the diameter of a loop, performs another ¾ of a round outside loop, exiting inverted at 45° line angle and continuing horizontally in inverted flight at 45° line angle for a distance equal to the diameter of a loop. The aircraft then performs ¾ of a round inside loop, exiting the loop and climbing vertically, then exiting the manoeuvre over the flight circle centre and recovering into upright level flight.

- All loops to be round.
- Loops are to be tangential to each other.
- Tangent lines between the left and right loops to be vertical.
- Bottom of the manoeuvre to be at a height of 2 metres.

4.16.16.14 Landing K=6

A correct landing is when the aircraft descends smoothly from upright level flight at a height of 2 metres and touches down without bounce, and rolls to a stop without nosing over.

4.17 VINTAGE 'B' TEAM RACE

4.17.1 Model details.

The following section gives typical (but not exhaustive) guidelines for what may or may not be allowed.

- a) Entrants are encouraged to adhere as closely as possible to the original design to capture the flavour and authenticity of the period. A +/- 5% dimensional building tolerance is allowed. Any modifications which, in the opinion of the C.D., significantly change the appearance or performance of the model as originally designed will not be allowed. Minimum cross section at pilot head to be 2" by 3 ¾" and minimum wing area of 125 sq in.
- b) Structures may be strengthened for racing to the current rules using materials and methods consistent with the period, i.e. solid balsa in place of sheeting or planking, silk or nylon in place of tissue on built up flying surfaces or stringered fuselages etc. In addition, open structures such as built up flying surfaces may be sheeted with thin balsa before covering.
- c) Models with split fuselage construction (e.g. Footprint) may be made in one piece, with a contemporary helmet cowl if the engine was originally attached to the top half of the fuselage or a drop in layout if it was originally fixed to the bottom half. Models designed with a built-in engine installation may be modified to a drop in layout.
- d) Lead out positions and spacing can be done as required (no grouping) and line connections must be external to the model unless shown as internal on the original plan.
- e) Engine access must be as per plan with no metal pans or drop in layouts except as noted in c) above.
- f) Wheels must not be behind a vertical line through the plan position, with track likewise conforming to the plan dimensions. A spreader bar may be fitted if desired.
- g) Elevators must be as per plan.
- h) The use of carbon and kevlar is not allowed.
- i) Glow plug activation systems shall be limited to commercial clips, two pin plugs, jack plugs or the original clothes peg battery connector system. Any other system must be shown on the plan or have acceptable proof of use in the period.
- j) Models may be flown with spinners removed but, if so, a domed safety nut must be fitted.
- k) A shut-off can be fitted and used during the warm-up period but not for the purpose of a normal pit stop. Once the race has finished it can be used.
- l) Entrants are encouraged to find additional models with acceptable proof of eligibility.

4.17.2 **Eligibility of Engines.**

- a) The maximum engine size is 5cc or .29cu inches.
- b) A Vintage 'B' engine is one whose design and mark number was advertised for sale prior to 1st January, 1959, although the engine need not necessarily have been manufactured by that date.
- c) The engine used in a model in Vintage 'B' Team racing shall either conform to the above or, if of later design and manufacture, be a plain bearing, non-schneurler engine, commercially advertised at some time.
- d) The use of ETA 6Cs will be permitted as they are direct lineal descendants of earlier, scarce, engines and offer no marked increase in performance.
- e) Any engine modifications, replacement parts or hybrid engines must use materials and technology clearly in use for model aircraft engines used in Class "B" team racing prior to 1st January, 1959; e.g. a loop scavenged engine will have a baffle piston. Although available at the time, peripheral jet carburettors will be allowed. Note – A hybrid engine must have the crankcase of an engine as defined in (a), (b), (c) or (d) above.

4.17.3 **Propellers.**

Propellers shall not be of the glass, carbon, kevlar or other resin bonded types.

4.17.4 **Tanks.**

- a) Tank capacity, including fuel lines and filters shall be 30cc for Vintage 'B'.
- b) There shall be no use of such modern features as multi-function, fast filling valves and pressure refuelling. Refuelling shall be by squash bottle only.

4.17.5 **Lines.**

- a) The control lines shall be measured from the front of the handle grip to the centre line of the model. They shall conform to the current safety regulations for team racing and each ready to fly system of handle/lines/model shall be subject to a load test of 20 times the model weight for Vintage 'B'.
- b) For Vintage 'B', the line length shall be 18.30 metres (60.0ft) with a minimum line diameter for solid lines of 0.345mm (0.0136in) and for multi-strand lines of 0.38mm (0.015in).

4.17.6 **Distances.**

Heats : Vintage 'B' – 70 laps.
Finals : Vintage 'B' –140 laps.

4.17.7 **The Circle.**

- a) The radius of the pilot's circle shall be three (3) metres and the radius of the flight circle shall be 22.3 metres (73ft 2in) for Vintage 'B'.
- b) The circle shall be divided into six (6) equal segments for the locations of the starting positions, choice of which shall be by means of a draw.

4.17.8 **Race Conduct.**

The conduct of the race shall be in accordance with the rules laid down for the conduct of Vintage 'A' team racing events in the current edition of the MAAA inc. contest rules book.

4.17.9 **Scrutineering.**

Scrutineering shall be carried out at the discretion of the contest director and may include model/engine, tank capacity and lines. The onus of proof lies with the entrant for any model/engine feature not listed and the entrant must have acceptable provenance on the day of the contest.

4.17.10 **Proof of Authenticity.**

- a) A Vintage 'B' Team racing model must be built to a constructional detailed and dimensioned plan or three-view published or kitted prior to 1st January, 1958. January 1958 magazines are accepted as published in 1957. The model must comply with the accepted team racing rules at the time of publication. Exceptions to this rule may be permitted as follows :-
- b) Where only photographic evidence of a design was published before 1st January, 1958, but the original designer/s can confirm accurate details of the model by signing the plan.

4.18 **CLASSIC 'B' TEAM RACE .**

OBJECTIVE. It is the purpose of team racing to fly semi-scale realistic airplanes in direct competition through a series of heat races and a final.

Original model designs that can be documented to have been designed, constructed and actually flown in competition prior to January 1, 1966 are eligible to compete in this event. Any other model can be built, but must conform to all the specifications of the 1965 rules.

4.18.1 **MODEL SPECIFICATIONS**

- (a) Engine shall be as listed below. It shall be completely cowled with only glow plug, needle valve stem, cut-off lever (if fitted), fill-vent tubes, and exhaust permitted to protrude through the cowling. An air intake & small access hole for choking is permissible.

Allowable engines: Any engine (max. .30 cid) manufactured for commercial sales prior to January 1, 1961. Any "modern" (max. .30 cid) plain bearing engine. Any of the following modern ball race engines are allowed:

OS FX .25

GMS .25

Enya SS.25 BB (diesel or glow)

Thunder Tiger PRO 25 BB

Rothwell R320BR

Irvine .25

ASP .25

Glowplug engines in the above list of modern ball race engines must use a 1/4 " x 32TPI standard thread glow plug. No Nelson plugs, Turbo plugs or button heads are permitted in the modern ball race glowplug engines listed above.

No tuned pipes are allowed. Full length metal engine mounting pans (like those used on an Open Rat Race or speed model) are not permitted. However, half pans are acceptable as are engine plates with a front cone.

- (b) Model shall have a cockpit or cabin containing a dummy pilot's head with both being in proportion to the model. The dummy pilot must have direct forward vision to the outside of the model. The minimum height of the fuselage, including the canopy/cockpit profile, shall be 3-3/4" and the minimum fuselage width shall be 2", both height and width to be measured at the longitudinal position where the dummy pilot's head is located. Model shall have a minimum effective wing area of 125 square inches.
- (c) Model landing gear shall be of the two wheel, side-by-side type. The minimum wheel diameter is two inches (50mm sizes are acceptable) with a 1/16th (1.5mm) negative tolerance. Distance between the wheels shall be a minimum of 100mm.

- (d) Fuel used will be the contestant's choice. Any substance banned by the MAAA will not be permitted.
- (e) Fuel tank, including filler line and fuel line from tank to needle valve, shall hold no more than 30 cubic centimetres. Fuel systems shall be subject to measurement at any time. Refueling shall be by squeeze bottle only. No multifunction valves may be used. The overflow can be either a pipe or a schraeder valve. Engine shutoffs are recommended but are not compulsory. If fitted they must not be used in flight during a race. The penalty for this is 30 seconds added to the race time. Shutoffs may be used during the warm up and after completion of race.
- (f) Model shall have the contestants AUS number on top of a wing panel.
- (g) Strengthening is permitted. Models may be covered in fibreglass cloth. Modern materials such as carbon fibre or kevlar may be used for strengthening or repairs.
- (h) Team Racers shall not be acceptable if they are pod-and-boom, flush cockpit, fibreglass or carbon fibre shell, single wheel, or flying wing designs.

4.18.2 MODEL SAFETY REQUIREMENTS:

- (a) All models must pass a general safety inspection by the Contest Director or his nominated assistant.
- (b) Line length, measured from centre line of the model to face of hand grip of control handle, must not be less than 18.3m, or longer than 18.45m.
- (c) Two line systems are required and each line shall have a minimum diameter of .015" (0.385mm). No internal line hook-ups are allowed.
- (d) The lines and model control mechanism shall withstand a 20G pull test at the handle.

4.18.3 FIELD SAFETY REQUIREMENTS:

The following changes in field layout and racing safety requirements are based on the FAI Sporting Code for F2C Team Racing. Dimensions, figures and methods stated here must always be in agreement with the current FAI Sporting Code in the future.

- (a) Pilots must stay near the centre of a 3metre radius "centre" circle and walk around the centre while flying.
- (b) Pilots must move to the edge of the "centre" circle to land for refuelling or at the finish of a race. Pilots must keep one foot inside the "centre" circle during the start of the race and during pit stops.
- (c) During a race, any pilot not flying (unable to continue or having finished), must take a sitting or kneeling position outside the "centre" circle and keep out of the way of other pilots. He, or she, may not leave the Racing Zone until the finish of the race.
- (d) Pilots should be crouching, straddling the "centre" circle for the start of the race and for take-off after refuelling during a race and move back to the centre of the circle as quickly as possible when racer becomes airborne.

- (e) The “Pitting” or “Flying” circle shall be a radius of 22.1m from the centre of the flying area with six equally spaced pitting segments. Crew members must keep themselves and their equipment outside the “Pitting” circle during the race.
- (f) Mechanic(s) must not at any time enter the flight circle without the consent of the Contest Director, and then must only enter radially to retrieve models.

4.18.4 ENTRY AND QUALIFICATION.

- (a) The individual team shall consist of one pilot and not more than two crew members.
- (b) While the entrant need not necessarily be the pilot, he, or she, must be a member of the team.
- (c) A team may enter two models.

4.18.5 RACES.

- (a) Heats will be flown over 70 laps with one compulsory refueling stop. The final will be over 140 laps and will consist of teams who have flown the 3 fastest heats.
- (b) A two-minute preparation period consisting of a 90 second warmup and a 30 second cool down will apply. Towards the end of the cool down “10 seconds” will be announced with a loud countdown of the last 5 seconds ending with a sharp, clear “GO” signal.
- (c) At that moment the crew members must be standing upright close to their model and the pilots must be crouching on the border of the “centre” circle with the control handle near the ground below the knees.

4.18.6 RACING ETIQUETTE.

- (a) Pilots must keep their controlling hand and the model on a plane perpendicular to a line joining their shoulders and passing through the centre line of their body, pilots must also keep their controlling hand on the vertical line between the middle of the chest and the top of the forehead, except when passing, taking off and landing when an exception of three laps is allowed.
- (b) Models must fly at a normal height of between 2 and 3 metres, except for passing, take-off or landing.
- (c) Passing must be done by overflying.
- (d) The model is not in any case allowed to fly over 6 metres high when passing a competitor.
- (e) The pilot should always find himself on an imaginary line between the centre spot of the circle and the model.
- (f) The model is allowed to fly a maximum of two laps without the engine running.
- (g) Landings take place inside the “Pitting” circle.

- (h) The model must touch the ground with its engine stopped before the mechanic is allowed to catch it.
- (i) After the mechanic has caught the model, he must be to the pitting area at (or immediately behind) the point at which the model was stopped. If that pitting area is already occupied, he must go to the next pitting area ahead of his stopping point. A pitting area is occupied if a mechanic is standing at such an area, even if his team's model is still in the air.
- (j) Should the model stop between two pitting areas, the mechanic must go to the nearest free pitting area.
- (k) After the mechanic has caught the model, but only then, the pilot is allowed to put one foot outside the "centre" circle.
- (l) During the refuelling and the restart of the engine, and until the time when he releases the model, the mechanic must keep the model in contact with the ground by at least one point and with the centre line outside the "pitting" circle. During that time the pilot must be crouching (*) straddling the "centre" circle. He keeps his handle and his lines near the ground below the knees until the model starts again.
- (m) The model completing the race in the shortest time shall be declared the first place winner with others following in order of race completion times.
After all models have completed the race, pilots should land and clear the area for the next race.
- (n) Any conduct or flight manoeuvre by a pilot that endangers, or results in damage to any other participating pilot or his model will constitute a foul and cause immediate disqualification from the race in which it occurs. Pilots will be warned for whipping, walking the back of the circle, pivoting or blocking. A team will be allowed two warnings during a race. A third offence will mean disqualification. As with Vintage A Team Race, interpretations of the Classic B Rules should be relaxed with only blatant offences resulting in disqualifications.

4.19 **CLASSIC FAI TEAM-RACE**

The aim of Australian Classic FAI team race is to re-create FAI team racing as it was before 1970, when in the eyes of many people, models were more beautiful, less expensive, and flew over grass at speeds most people can cope with. The 1968 FAI team race F2C rules (modified) apply as follows:

- 4.19. 1 Definition of Team Racing - Team racing is a simultaneous race between three models flown by three pilots, in the same circuit. (In exceptional cases - two models flown by two pilots).
- 4.19. 2 Team - Each model is presented by a Team consisting of a pilot and a mechanic. The name of the pilot and the mechanic must be indicated in the Entry Form. The pilot of each model must remain in the centre circle; he has no other function than the piloting of the model and stopping the engine while flying. The mechanic must remain on the outside of the flight circle during the race; his function is to start the motor, and refuel the tank during the race. His duties include the operations necessary to restart the motor after each stop.
- 4.19. 3 Definition of Team Racing Models - Model aeroplanes in which the propulsion energy is provided by a piston engine and in which the lift is obtained by aerodynamic forces acting on the supporting surfaces which must remain fixed during flight. The models must be of the semi-scale type and their general lines must be in accordance with those of full-size aircraft. Competitors may be required to justify their model design with documentary evidence of similar full-sized aircraft.

The choice of models designed before 1970 is encouraged, and such designs may be modified provided all other provisions of these rules are met. "Own design" and designs never before published are allowed. Models must be of traditional "Wing and tail" layout. Flying wing type models are prohibited.

Asymmetry in the plan view is limited to a maximum of 15mm. V tails are permitted.

Construction materials for models are unrestricted, except for the following which are not allowed: Components such as wings moulded from carbon fibre and all-metal wings.

Aluminum or Magnesium pans are allowed.

4.19. 4 Characteristics of Team Racing Models

Characteristics of Team Racing Models:

Total maximum weight 700 grams.

Maximum swept volume of engine(s) 2.5 c.c.

Total surface (wing and stabiliser) minimum 12 sq. dms.

Minimum dimensions of the fuselage at the pilot's location: Height 100 mm; Width 50 mm; Minimum cross sectional area 39sq.cm.

Wing fillets shall not be included in the fuselage cross sectional area.

The wheel or wheels shall have a minimum diameter of 25 mm.

Landing gear must not be retractable.

Mono wheel is permitted.

The tank complete with all connecting tubes must be accessible. A single function valve is permitted.

Pressurised refuelling systems other than a hand held squeeze bottle are not permitted.

The use of multi-function filler valves is not permitted.

The entire fuel feed system to the engine (tank, valve, tubing filter etc.) must not exceed the maximum capacity determined for the engine used and detailed in the Acceptable Engines List herein.

The use of Tetraethyl Lead (TEL) is prohibited.

The models must fly anti-clockwise round the course.

The engine(s) must be entirely enclosed within the body of the model, except openings for the entry and exit of air/exhaust (including a silencer if fitted) may be provided for proper functioning of the engine(s). The only parts permitted to protrude from the body are those which have to be manipulated during the operation of starting the engine(s) or regulating the mixture. (e.g. Fuel, needle valves, compression control, plugs, tank fillers, etc.)

Pilots must be able to stop and land the model within ten laps, when required by the Contest Director.

Internal connection of control lines is permitted.

Acceptable Engines List. Currently acceptable engines are:

Group A. (subject to maximum capacity of entire fuel feed system of 15ml)

- Oliver Tiger (original or replica up to Mk4)
- ST G20 diesel,
- ST20/15RV Diesel,
- Enya 15D (any model)
- ETA 15,
- Taipan up to series 13 Diesel,
- MVVS (TRS an D7)

Group B (subject to maximum capacity of entire fuel feed system of 10ml)

- MVVS (Schnuerle ported)
- Rossi 15 RV T/R engine
- KMD
- Fora Junior or Pioneer.
- Parra 15

Group C. (subject to maximum capacity of entire fuel feed system of 7ml)

- Nelson Steel
- Nelson rear exhaust engine AAC or ABC (max venturi size 3.5mm)

Other engines may be approved by the MAAA Control Line Working Group upon request; ad hoc approvals for a single contest only can be granted by the contest director after consulting with other competitors. The MAAA Control Line Working Group may approve the use of other engines for a trial period to determine the appropriateness of ongoing inclusion in this “acceptable engines” list. Newly approved engines must not diminish the competitiveness of the currently acceptable engines.

The model must have a representation of a cockpit in accordance with the semi-scale requirements of 4.19.3.

The undercarriage must be fixed in a permanent manner to the model so as to permit normal take-off and landing.

The use of wheels totally made from metal is forbidden.”

Models need to be designed and constructed in such a manner as to be in the spirit of the rules.

There is no restriction on exhaust outlets. Propellers are limited to commercially available injection moulded glass reinforced plastic propellers.

Propellers may be reduced in diameter or area over the outer half of each blade.

Graupner or APC 7"x 6" are suggested as a good starting point. Carbon fibre or glass fibre props are prohibited.

- 4.19. 5 Control Handle and Lines - Distance between the centre of the control handle and the centre line of the model shall be 15.92 metres +100mm, - 0 mm. The diameter of the control lines must not be less than 0.381 mm (0.015 inches). Single line control (monoline) is not permitted.

In control line handles used for team racing, the distance from the axis of the handle to the point of attachment of the control lines shall not exceed 4 cm.

A load test shall be applied to the assembled control handle, lines and model equal to 20 times the weight of the model before any heat.

The use of line groupers attached to the wing tip is not permitted.

The round, diecast control handle/reels commonly used in Australia before 1970 are permitted.

Control handles must be near the ground during the start of the race and during pit stops.

- 4.19. 6 Length of Course - The length of the course shall be 10 kilometres (100 laps) with two mandatory refueling stops except for the final which shall be 20km. (200 laps) with five mandatory refueling stops.

- 4.19. 7 Team Racing Site-

(a) The flight circle of 19.6 metres radius is divided into six equal segments for the location of the starting positions of the competitors.

(b) The radius of the centre (piloting) circle must be 3 metres

A team racing site may have a short grass or hard surface.

- 4.19. 8 Starts

(a) Allocation of the starting positions will be by means of a draw. The competitor drawing position No. 1 will have the choice of starting positions, the remaining competitor's will, in the order of the draw; select one of the remaining unoccupied starting segments.

(b) The teams shall be matched by a draw, made by team names and if possible arranged so as to avoid more than one team from any State competing in one heat.

(c) It is not permissible to run an engine while entering the circle or before the signal at 4.19.9(a).

- 4.19. 9 Method of Starting

(a) A first signal gives the mechanic the opportunity of running his engine or engines for 90 seconds.

(b) A second signal announces the end of the warming-up period.

(c) Thirty seconds are then allowed during which last moment preparations may be made and the starter counts the last five seconds. Filling of the fuel tanks is carried out

before the starting signal.

(d) The starting signal is given by means of an acoustic signal (e.g whistle)

(c) Timing commences at the instant of the starting signal.

N. B. - The pilots must be crouching at the moment of starting and the mechanics must be standing.

4.19. 10 Refueling

(a) The mechanic must carry out the refueling of the model in the nearest rearward sector of the flight circle in which the model stops forward motion.

(b) Only when this sector is already occupied by another competitor may he occupy the sector forward of this point.

(c) In Cases when the model stops its forward motion within two sectors which are already occupied the mechanic must go back to the nearest rearward free sector.

(d) During the refueling and re-starting the model, the lines and control handle must remain near the ground.

(e) The model is allowed to fly a maximum of two consecutive laps without its engine running.

N. B. - The pilot must be crouching or seated during refueling and restarting. The model may not be recovered with the engine running or prior to touchdown with the engine stopped.

4.19. 11 Flying Style Height and Passing - The normal flying height must be between 2 and 3 metres.

The pilot should have his control handle near the middle line of his chest (except when overtaking, starting and landing when an exception for two laps is allowed). However, he may employ a more relaxed flying style by positioning his controlling hand forward of the vertical line (hand off chest) between the middle of the chest and the top of the forehead.

Passing must always take place over other competitors and the overtaking pilot must indicate his intention of overtaking to the other competitors. A height of 6 metres must not be exceeded while passing.

The pilot being overtaken must on no account carry out any manoeuvre to impede the overtaking competitor.

4.19. 12 End of Race

(a) Timing will finish when the model has completed the necessary circuits of the course to cover the specified distance.

(b) The race will, in any case, be terminated 10 minutes after the starting signal (for the final, 15 minutes).

(c) A pilot whose model can no longer continue to fly or has finished the course must remain crouched or seated just outside the piloting circle of 3 metres radius so long as the other competitors have not finished their flights, except when instructed otherwise by the Contest Director.

4.19. 13 Team Classification

(a) Each competing team must take part in at least one eliminating race to qualify for the final, but it may participate in two. If, during the first fifty laps in an eliminating race only one team remains in participation the race shall be declared null and void and the remaining team shall be re-matched in another heat during the round.

(h) The three teams which have registered the three best times during the eliminating races qualify for the final race. In the case of a tie, the results of a second heat will be

taken to establish the teams for final race. If there is still a tie, a new heat will decide.
(c) The final placing of the finalists is established solely on the results of their flight in the final after rechecking the tank capacity and declared characteristics. The remaining competitors are placed according to their best flight in the eliminating races.

- 4.19. 14. Warning and Cancellation of the Heat. The Contest Director will be responsible for observing the conduct of each team during a heat. Teams will be informed of any offence. After any three offences a team will be eliminated from a heat. Warning or cancellation of the heat shall be notified to the mechanic. If the misdemeanor persists or is repeated a second warning shall be given. If the misdemeanor still persists or any other infringement occurs, cancellation of the heat shall be notified. In the event of any serious breach of the rules the Contest Director shall cancel the flight immediately.

A team shall be warned:

- (a) If the pilot interferes with, or obstructs, other pilots, either by his conduct in the circle or by the manoeuvre of his model preventing the other model from flying or landing normally.
- (b) If a pilot in the center does not walk around, standing on the same place, or walking backward.
- (c) If a pilot does not have the control handle near the middle line of his chest (except overtaking, starting and landing when an exception for two laps is allowed).
- (d) If a pilot applies physical effort to increase the speed of his model during the official flight.
- (e) If the height level of the flight is exceeded by the model (in overtaking especially by the lower model).
- (f) If during refueling the model is not on the ground or the control handle is not near the ground.
- (g) If, after refueling the mechanic starts his model in front of the sector line.
- (h) If the refueling is not made in the appropriate sector.
- (i) If an engine is started while entering the circle or before the signal at 1.1.9(a).
- (j) Any other flagrant breach of the rules.

A team shall be disqualified from a heat:

- (a) If during the heat the pilot steps out of the center circle of 3 metres (10 ft.) radius, except as allowed by 1.1.12(c).
- (b) If the mechanic penetrates into the zone of flight with both feet.
- (c) If the mechanic retrieves his model by any device from the zone of flight.
- (d) If the model is recovered with the engine running or prior to touchdown with the engine stopped.
- (e) If a member of a team or the model caused a collision.
- (f) Jettisoning occurs (at each Intermediate take-off, the model must be in the same condition as it was at the start).

- 4.19. 15. Second Attempts — If through interference or obstruction (and through no fault of its own) a team is eliminated from a heat, or a time-keeping or lap counting error prevents a valid race time, that team shall be given the opportunity of making another attempt.
- 4.19. 16. Judges and Time-keepers. — The organisers must appoint a panel of at least three Judges who shall preferably each be of a different State and be selected for their proficiency and experience. This requirement does not apply for local competitions,

where the Contest Director can be the sole judge.

Two time-keepers and two lap counters are allotted to each team and they must be located on the outside of the flight circuit adjacent to the starting point of the team they are timing. (Single time-keepers and lap counters may be sufficient during heats, but two must be used in the finals.) A single time-keeper/lap counter per team is acceptable at local competitions.

4.20 AUSTRALIAN VINTAGE COMBAT

Purpose

Vintage Combat is a nostalgia class largely based on combat flying at a time when equipment was relatively straightforward and model performance was within the capabilities of the average flyer. It does not aim to be historically accurate in every respect. Innovation and the needs brought about by modern times can be accommodated. However, it is essentially a contest of flying skill using equipment that performs no better than the models and engines actually used in that era.

The model

- 4.20.1 A vintage combat model aircraft must conform to a design that was used in combat before 1971. That design must be authenticated by a published plan, kit plan or a plan approved by the MAAA Control Line Sub-committee from time to time. Approved models are listed in Appendix A.
- 4.20.2 A vintage combat model must match the plan view of the original design in overall shape (except as allowed in the rules) and not differ by +/- 6mm from major dimensions, such as wing span, wing chord and leading edge to elevator hinge line. The elevator must be dimensionally accurate within +/-2mm.
- 4.20.3 The name (and mark number, if appropriate) and the year of the original design must be clearly visible on the upper flying surface of the model.
- 4.20.4 The model must be constructed from materials and techniques in use at the time. However, modern adhesives are allowed. Polyester film and tissue, or any commercially available heat- shrink plastic film covering are acceptable substitutes for the covering products of that time.
- 4.20.5 Styrofoam or other expanded foam plastic may only be used if it was originally specified in the design (e.g. Styrobat). Alternatives such as wood are acceptable substitutes for foam.
- 4.20.6 The fuel tank must be made entirely of rigid material.
- 4.20.7 The model must have surface colour or markings sufficient to distinguish it in flight from the opponent's model. Applying colour to approximately 25% the model's surface would meet this requirement.
- 4.20.8 A single safety wire with a minimum diameter of 0.45 mm must be attached between the control system and the engine. The engine must always stay connected to the control system.
- 4.20.9 Lead outs from the bellcrank should be a minimum diameter of 0.45mm.
- 4.20.10 The following alterations from the original design are permitted;
 - 4.20.10.1 Wing thickness and airfoil section
 - 4.20.10.2 Internal structure, including sheeted areas

- 4.20.10.3 While retaining the original plan form, the engine and elevator can be repositioned to give a different degree of asymmetry to the wing.
- 4.20.10.4 Altered or omitted vertical fins or fences
- 4.20.10.5 Alternative tail boom material, additional or repositioned tail booms
- 4.20.10.6 A balanced elevator in place of a conventional type and vice versa.
- 4.20.10.7 Engine cylinder orientation changed or recessed into the leading edge.

Engine

- 4.20.11 Eligible glowplug or diesel engines with maximum swept volume of 2.5cc are;
 - 4.20.11.1 Any engine made before 1971, or a replica/reproduction that is an accurate representation of the original engine from that era, giving no significant performance advantage over a good example of the original engine.
 - 4.20.11.2 Any engine with a plain crankshaft bearing
 - 4.20.11.3 Any other engine approved by the MAAA Control Line sub-committee from time to time. The following engines have been approved;
 - Parra 2.5cc diesel - steel cylinder version
 - PAW 15 – versions with one or two ball races
 - Enya 15 SS – diesel or glowplug
 - Marz 2.5 – diesel or glowplug
 - Fora Junior diesel
 - Fora Pioneer diesel

Models fitted with these engines are subject to a speed limit of 3 seconds per lap when flying level and towing a full length streamer. The Circle Marshal may require a speed check before combat commences, over five laps (minimum 15 seconds) with the handle held near the pilot's chest. Any competitor whose model is found to be exceeding the speed limit must subsequently demonstrate to the Centre Marshal that his model will consistently meet the speed limit before being allowed to re-fly the bout.

- 4.20.12 Only commercially available injection moulded thermoplastic propellers can be used.

Lines

- 4.20.13 Two multi-strand control lines (steel or stainless steel) with minimum diameter of 0.34mm must be used. Free ends capable of entangling an opponent's lines, and line splices, are not permitted.
- 4.20.14 Control line length must be 15.92 metres (+/- 0.04 metres). It is measured from the inboard face of the control handle grip to the axis of the propeller.
- 4.20.15 The control handle must be fitted with a safety strap and worn by the competitor around the wrist at all times while the model is flying. The strap must be of the lasso type,

where the loop on the wrist tightens securely if the handle is released. This strap is subjected to the full pull test separately from the line pull test.

- 4.20.16 Before each bout the lines to be used must be checked for length and diameter. A pull test equal to 10 kgf shall be applied to the assembled handle, control lines and model before the bout begins.

Combat site

- 4.20.17 The combat site comprises two concentric circles marked on the ground;
- 4.20.17.1 The flight circle with radius of 20 metres, laid out on grass; and
- 4.20.17.2 The centre (piloting) circle with radius of 2 metres, laid out on grass, or any other non-slip material with maximum radius of 4 metres.

Streamers

- 4.20.18 The streamer must be of double weight crepe paper (80 gsm) or any replacement of equivalent strength, between 2.25 and 3 metres in length and 3 +/- 0.5 cm wide, fixed to a sisal (or any replacement of equivalent strength) string of 3.25 metres length.
- 4.20.19 All streamers must be of the same length.
- 4.20.20 There shall be a clearly visible ink mark 2.5 metres from the junction of the string and the streamer.
- 4.20.21 The streamer shall be attached to the model in such a way that the ink mark is level with, or behind the rearmost portion of the model. The attachment part of the string must have a minimum length of 0.5 metres.
- 4.20.22 The attachment end of the streamer must be reinforced on either side by tape approximately 2 cm wide affixed diagonally to the length of the streamer with one at right angles to the other and extending for a maximum of 5 cm. An additional fibre/fabric reinforced tape 2cm wide is affixed across the connection area of the streamer.
- 4.20.23 The colour of the streamer must be different for the two competitors in the bout. Each pilot/pit crew shall be issued with a streamer by the Judge assigned to that competitor. A second streamer will be available from this Judge if needed.

Number of models

- 4.20.24 A competitor will be allowed to use one model per bout.
- 4.20.25 A competitor will be allowed to use three models for the contest.

Competitor

- 4.20.26 The competitor is the pilot. The competitor may employ a maximum of two mechanics in any one bout. However, in exceptional circumstances of wet or extremely windy weather, an additional helper may be used as a streamer holder and must perform no other function during that bout.

- 4.20.27 During combat bouts, the pilot and his mechanic(s) (and streamer holder if used), and Centre Marshal must each wear a safety helmet, with a fastened chinstrap, capable of withstanding the impact of a flying combat model.

Officials

- 4.20.28 The Centre Marshal, who is the overall timekeeper, and will normally run the competition together with one Judge per competitor.

Competition procedure

- 4.20.29 Competitors will normally compete with each other in a knockout competition of combat bouts.
- 4.20.30 The competitor with the highest score in points is the winner of the bout (unless he has been disqualified).
- 4.20.31 A competitor shall be eliminated from the competition when he has lost a bout, except as allowed under 10.6, or his model fails a second speed limit check per 16.4.
- 4.20.32 The competitors for each bout are chosen by random draw, except that the officials should as far as possible avoid re-matching competitors that have flown against each other in an earlier round.
- 4.20.33 In a round with an odd number of competitors the non flying competitor will fly twice in the following round, in the first bout and the last bout (if the number of competitors permits it and he is still in the contest).
- 4.20.34 The losers of each of the first round bouts will be allowed to compete in a further losers re-fly round.
- 4.20.35 The winners from the losers re-fly round will be drawn with the winners from the first round to provide a second round of bouts.
- 4.20.36 The rounds will continue until an overall winner is determined. Places for the other competitors are determined by the number of bouts each has won during the competition.
- 4.20.37 Competitors must enter the circle within 5 minutes of being called by the Centre Marshal.
- 4.20.38 If a competitor is unable to enter the circle for any reason to compete against his drawn opponent, his opponent will be awarded the win.

Starting method

- 4.20.39 All signals must be acoustic and visual.
- 4.20.40 During the starting period, the launching positions must be separated by at least a quarter of a lap. The first named competitor in the draw shall have the choice of streamer colour and the other the first choice of launching position.
- 4.20.41 A first signal from the Centre Marshal begins the 60 second starting period when the mechanic(s) or pilot may start, run and adjust their engine.

- 4.20.42 The engine must be started by flicking the propeller by hand.
- 4.20.43 The Centre Marshal counts down the last ten seconds of the starting period and signals the beginning of the bout. On or after this signal, the model may be launched.
- 4.20.44 The bout lasts for four minutes.
- 4.20.45 When the Centre Marshal is satisfied that each model has completed two level laps, anticlockwise, and the models are separated by approximately half a lap, and he does not require a speed limit check, he will give a signal that combat may commence.
- 4.20.46 Combat can only resume after a signal from the Centre Marshal following an interruption when one or both models have been grounded. That signal is given as soon as the Centre Marshal is satisfied that there is approximately half a lap separating the two models.

End of the contest

- 4.20.47 The Centre Marshal will give an acoustic and visible signal to end the bout;
 - 4.20.47.1 At the end of the four minute combat period, or
 - 4.20.47.2 If one or both competitors are disqualified.
- 4.20.48 Although the combat period does not end, the Centre Marshal will signal both pilots to cease combat and fly their models level and anticlockwise when;
 - 4.20.48.1 Both streamer strings have been cut, or
 - 4.20.48.2 One pilot has only the string remaining and requests that combat ceases. Once made, that decision cannot be reversed.

Conduct

- 4.20.49 The pilot must remain inside the centre of the flight circle while his model is flying, except for the short period following the release of his model by the mechanic.
- 4.20.50 At the start of each bout and after a restart when one or both models have been grounded, both models MUST fly level and anticlockwise and combat MUST NOT commence until a signal is given by the Centre Marshal.
- 4.20.51 The pilot must not fly his model level (upright or inverted) at a height of less than two (2) metres for more than two consecutive laps during the bout unless instructed to by the Centre Marshal. The Centre Marshal will warn a pilot that he is approaching this limit.
- 4.20.52 The pilot must fly his model level and anticlockwise when only his model is in the air and there is no line tangle.
- 4.20.53 After a mid air collision the bout shall continue as if both models had landed.
- 4.20.54 If the pilot(s) accidentally leave the centre circle during a combat bout, the Centre Marshal must signal to stop combat although the bout timer will continue to run. He will then direct the pilot(s) back to the centre circle. The combat will be restarted as at the start of the bout. Any cuts taken during the period will not be counted, and attacking during the pause may lead to disqualification.

- 4.20.55 Mechanics may only enter the flight circle to retrieve a downed model when there is no line tangle or to help clear a line tangle when BOTH models are grounded.
- 4.20.56 Line tangles when just one model is airborne must be cleared by the pilot and Centre Marshal. The Centre Marshal will indicate to the mechanics when the line tangle is cleared and that they may enter the flight circle.
- 4.20.57 If during the servicing of a grounded model the mechanics break or the propeller cuts the streamer it must be replaced with a new full length streamer prior to launch.
- 4.20.58 The pilot must immediately land his model following an instruction from the Centre Marshal to have the streamer untangled or replaced if:
- 4.20.58.1 The model is launched with a streamer that has been broken or cut while on the ground; or
- 4.20.58.2 The streamer is not cleanly unfurled after launch; or
- 4.20.58.3 The string (with or without streamer) becomes detached from the model or engine while airborne, but not as a result of a midair collision.

Re-flights

A re-flight will be allowed when:

- 4.20.59 A streamer breaks before combat has commenced due to a fault in materials or construction; or
- 4.20.60 In the event of a model fly-away (caused by the opponent's model severing its lines) the Centre Marshal asks the affected pilot whether or not he wants a re-flight. The affected pilot must respond immediately, without consulting with others about the status of the bout; or
- 4.20.61 As the result of a line tangle, an opponent's model aircraft cuts its own streamer in flight, or the streamer (unless only string remains) becomes wrapped around the model aircraft and/or the lines; or
- 4.20.62 A bout has been cancelled owing to a failed speed limit check and the offender has satisfied the Centre Marshal that his model is unlikely to again exceed the speed limit; or
- 4.20.63 In the event both point scores in a bout are equal. If the subsequent re-fly also results in equal point scores, then the contestant with the first cut is awarded the bout. If no cuts were taken in the re-flight, further re-flights are flown (and the "first cut" rule applied if necessary) until a winner is determined.

Scoring

- 4.20.64 Scoring commences from the start of the combat period.
- 4.20.65 Sixty (60) points are awarded for each distinct cut off the opponent's streamer. A cut must contain at least part of the paper streamer (not string alone). A cut occurs each time the model aircraft, propeller or lines fly through the opponent's streamer detaching one or more paper particles.

- 4.20.66 If a midair collision causes the streamer to separate while attached to any part of the model or engine, it will not be counted as a cut. However, if the streamer falls separate to any part of the model, a cut is scored.
- 4.20.67 One point is awarded for each whole second that the model aircraft is airborne during the combat period, except when the model aircraft is launched with a streamer that has been damaged before launch, by the mechanic(s) or cut by its own propeller while the model aircraft is not airborne.
- 4.20.68 Points are deducted for each instance of an action set out in sub-sections 16.1 and 16.2.

Penalties and disqualifications

A competitor will receive a penalty of thirty (30) points if:

- 4.20.69 He unintentionally leaves the centre circle while his model is flying; or
- 4.20.69.1 During the bout his mechanics enter the flying circle at an oblique angle or cut across the flight circle to reach a downed model. One penalty only will be incurred for each offence even if more than one mechanic is involved; or
- 4.20.69.2 He/his mechanic(s) do not immediately, or after a line disentanglement withdraw a grounded model to outside the 20 metre flight circle prior to servicing it; or
- 4.20.69.3 The model is launched before the launch signal; or
- 4.20.69.4 The streamer becomes detached from the model during combat but not as a result of a mid air collision; or
- 4.20.69.5 When his model is grounded, he leaves the centre circle without informing his opponent and the Centre Marshal.

4.20.70 **A competitor will receive a penalty of sixty (60) points if:**

- 4.20.70.1 His mechanics launch the model without replacing a streamer that has been broken or cut during servicing.
- 4.20.70.2 His model exceeds a speed limit check. This penalty will apply to the competitor's score in the subsequent re-flight.

4.20.71 **A competitor will be disqualified from the bout if:**

- 4.20.71.1 He attacks the streamer of his opponent's model prior to the Centre Marshal's signal to commence combat; or
- 4.20.71.2 His model fails to become airborne within two minutes of the signal to launch; or
- 4.20.71.3 He attempts to fly a model, which at the time of launch, does not have a strong and effective control mechanism, or does not have a secure engine attachment, or does not have a running engine; or
- 4.20.71.4 He interferes with his opponent, or forces his opponent to leave the centre circle; or
- 4.20.71.5 He deliberately flies in a dangerous manner; or

- 4.20.71.6 He attacks his opponent's streamer while his own or the remaining parts have become detached from the model or engine while airborne, but not as a result of a midair collision; or
- 4.20.71.7 He is not present at his allotted flight time, unless he has the express permission of the Centre Marshal; or
- 4.20.71.8 He leaves the centre circle intentionally whilst his model is flying; or
- 4.20.71.9 He flies in such a manner as to inhibit his opponent, or the Centre Marshal, from clearing any line tangle; or
- 4.20.71.10 At the start of each bout and after a restart when one or both models have been grounded, he does not fly his model level and anticlockwise until a signal is given by the Centre Marshal; or
- 4.20.71.11 He releases the handle, or removes the safety strap, for any reason, while the model is flying; or
- 4.20.71.12 He deliberately attacks or interferes with his opponent's continuously level flying model which clearly has no paper streamer left. He may, however, follow closely.
- 4.20.71.13 His mechanics jump over the opponent's model and lines kept within the pitting area: or
- 4.20.71.14 He fails to clear any line tangle prior to re-launching his model; or
- 4.20.71.15 He flies level (upright or inverted) at a height of less than 6 feet for more than two consecutive laps whilst the bout is under-way unless instructed to by the Centre Marshal. The Centre Marshal will warn a flier that he is approaching this limit; or
- 4.20.71.16 The Centre Marshal believes that he has behaved in an un-gentlemanly manner; or
- 4.20.71.17 For any other flagrant breach of the rules.
- 4.20.72 **A competitor will be eliminated from the competition** if a speed limit applies to his model (per 3.1.3) and the model fails a second speed limit check.

Appendix A

The following model designs have been verified as acceptable for vintage combat. No documentary evidence is required, although the contest director may request the competitor provide copies of the plans, to verify the model has been constructed per the requirements of section 2.

Additional models may be acceptable, provided documentary evidence is provided to the contest director proving the model complies with section 2.1. It would be prudent to verify model acceptability with the contest director before commencing model construction.

Anduril 1 & 2	Mick Tiernan (UK)	Frank Smart 1970
Apache		A.M. Annual 1970/71 p72
Assagai	Alan Thompson	Frank Smart 1968
Banshee	Mike Davis (UK)	Frank Smart 1968
Barbarian	John Dixon (UK)	Frank Smart 1969

Billy Bones	Dave Packwood (UK)	Frank Smart 1963
Black Ghost	M Grimmett (UK)	M.A. 295 Nov 1958
Boogy-man	Terry Lee (UK)	A.M. June 1964
Bumblebug	Vernon Hunt (UK)	Frank Smart 1969
Buzzard	Neil Blackburn (UK)	Frank Smart 1970
Chaos	Peter Freebrey (UK)	A.M Jun 1963 p294
Cleaver	George Copeman (UK)	A.M.799 Sep 1961 p466
Cobra II	Don Halls (Australia)	A.M. May 1968
Combat King		Contest Kits
Dominator	Mike Davis (UK)	A.M.893 Dec 1965 p581
Dongus	Johnson/Pinckert (USA)	A.M.789 Feb 61 p74-75
Duellist	A Tristany (Spain)	A.M.648 Mar 1957 p150
Early Bird	Richard Wilkins(UK)	M.A.1022 Sep 1965 p232
Falco		A.M. Annual 1963/64 p106
Firebird	Dave Platt (UK)	Keil Kraft Kit
Flingel Bunt	Stu Holland (UK)	A.M Jan 1965 p20
Freecloud	Bob Morgan Frank	Smart 1970
Gladiator	G.F. (UK)	Frog Kit
Gunslinger Mk 1,2 & 3	E Varley and Fred Pateman	Frank Smart 1963
Ironmonger	Richard Evans (UK)	A.M. Oct 71 p550 1970
Jaguar Mk 1	Mick Chesterton (UK)	Frank Smart 1969
Junior Satan	Carl Goldberg (USA)	Goldberg Kit (A.M.) Nov 1964
Junior Monitor(II)	Henry J Nichols (UK)	Mercury Kit
Kanible	John Dixon (UK)	A.M. Annual1 968/69 p92
Kanible GT	John Dixon (UK)	Frank Smart 1968
Kanible GTO	John Dixon	Frank Smart 1969
Karnivore	Dave Gibbard	Frank Smart 1961
King Twister	Mick Chesterton (UK)	Frank Smart 1967
Kombat Kapers	R Gibbard (UK)	A.M. Jan 1954
Komm-Batt		A.M.288 Aug 1958 p278
Liquidator	Frank Dowling (UK)	A.M.998 May 1969 p230
Mini – Voodoo	Riley Wooton (USA)	A.M. May 1963
Mister Pogle	Terry Mortimer (UK)	Frank Smart 1965-1967
Nemesis	Howard Rush	Frank Smart 1970 (USA)
Oliver Twist Mk 6	Martyn Cowley (UK)	Frank Smart 1969
Oliver Twist Mk 7	Martyn Cowley (UK)	Frank Smart 1970
Olympic Rocket	C.Bergamaschi (Italy)	Kit (A.M.) Apr 62
Orcrist	Steve Jones (UK)	AM Oct 71 p550 1969
Pallisandra		A.M. Annual 1960/61 p77
Pallisandra		C.L. Manual 1961 p131
Panic	Peter Freebrey (UK)	American Modeller Jan-Feb 1965
Peacemaker	George Aldridge (USA)	A.M. Feb 1959
Piraja		A.M. Annual 1965/66 p46
Piranna	Mk 1 Frank Smart (UK)	Frank Smart 1968
Piranna Mk 2	Frank Smart (UK)	Frank Smart 1969
Proton	O.F.W.Fisher (UK)	Performance Kits Apr 1959
Pygar	Mick Lewis	Mick Lewis 1974
Razor Blade	Pete Tribe (UK)	A.M.729 Mar 1959 p222
Razor Blade `64	Pete Tribe (UK)	A.M.729 Jul 1964 p332
Rhino Mk 5	John Dixon (UK)	Frank Smart Apr 1967
Riot-Act 1& 2	Andrew Longhurst	Frank Smart 1968
Rogue	A.M. Staff (UK)	A.M. 716 Dec 1958 p643
Ruteress	Steffan Larson (Swe)	A.M. 969 Dec 1968 p657

Satana		A.M. Annual 1969/70 p32
Schuco-Hegi 160 (Germany)		A.M. Annual 1959/60 p83
Scorcher		Frog Kit 1969
Sennapod		M.A.389 Mar 1964 p90
September Warrior Bazz Bumstead (UK)		M.A.385 Nov 1963 p334
Shim-Shek 1 & 2 I. Turner (UK)	Frank Smart 1963	
Shrike	(UK)	A.M.634 Sep 1956 p484
Shuffler MK 2	Frank Smart	
Splinter	Bill Netzeband (USA)	American Modeller Apr 1967 p30
Squig	J Benoy (UK)	A.M. Jul 1961
Streamer Eater	A. Ytreoy (Norway)	A.M.883 Jun 1965 p280
Stockport Warlord	Graham Howard	Frank Smart 1968
Styrobat	Peter Short (UK)	A.M. Jan 1967
Super Twister	John Chamberlain (UK)	1967
Sword	J Templeman (UK)	A.M.674 Oct1957p518
Talon	Dave Platt (UK)	Keil Kraft Kit
Taper- Wing	Arthur Garnett (UK)	Frank Smart
Terminator	Stu Holland (Eire)	1970
Terminator	Mick Davies	Frank Smart 1970
The Proposition		A.M. Annual 1955/56 p88
Titan Mk 1	John Shaw (UK)	Frank Smart 1966
Titan Mk 4	John Shaw (UK)	Frank Smart
Titan Mk 5	John Shaw (UK)	Frank Smart 1969
Toreador	Henry J Nichols (UK)	Mercury Kit
Turncoat	Moggs Morris (UK)	A.M.926 Feb 1967 p74
Twister Mk 1	John Chamberlain (UK)	Frank Smart 1965
Twister Mk 4	John Chamberlain (UK)	Frank Smart 1966
Twister Mk 9	John Chamberlain (UK)	Frank Smart 1969
Twister Mk 10	John Chamberlain (UK)	Frank Smart 1970
U.F.O.	Dave Budd (UK)	Frank Smart 1968
Unlimited	R. Smith (UK)	A.M.369 Dec 1980 p656
Warlock	Richard Evans	Frank Smart 1967
Warlock	Steve French	Frank Smart 1969/70
Warlord	Mick Chilton (UK)	Frank Smart 1968 - 1972
Warlord	Heanor MAC (UK)	A.M. Annual 1968/69 p77
Warlord	John Dunker	Frank Smart 1968
Warmonger Mk 1	John Dixon (UK)	Frank Smart 1965
Warmonger Mk 2	John Dixon (UK)	Model Avia (France) Feb 1968
Warmonger Mk 3	John Dixon (UK)	Frank Smart 1969
Warrior	Frank Smart (UK)	Frank Smart 1970
Wildcat (USA)	Bradshaw M.P. Kit	(AM) Mar 1963
The Yeti 1 & 2	John Dixon (UK)	Frank Smart 1965
Zack-Zack	Klaus Seegers (Germany)	C.L. Manual 1961 p131
Zig-Zag	Brian Mills (UK)	1965
Zot-Box 'N'	Cpl Red Phin (Australia)	Frank Smart 1966
Zot-Box 'M'	Cpl Red Phin (Australia)	Frank Smart 1967-1968