

Unlimited Scale Racing Association



Year 2018-2019 Rules

Contact: Unlimited Scale Racing Association (USRA)

Internet: www.usrainfo.org

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1 USRA Policy

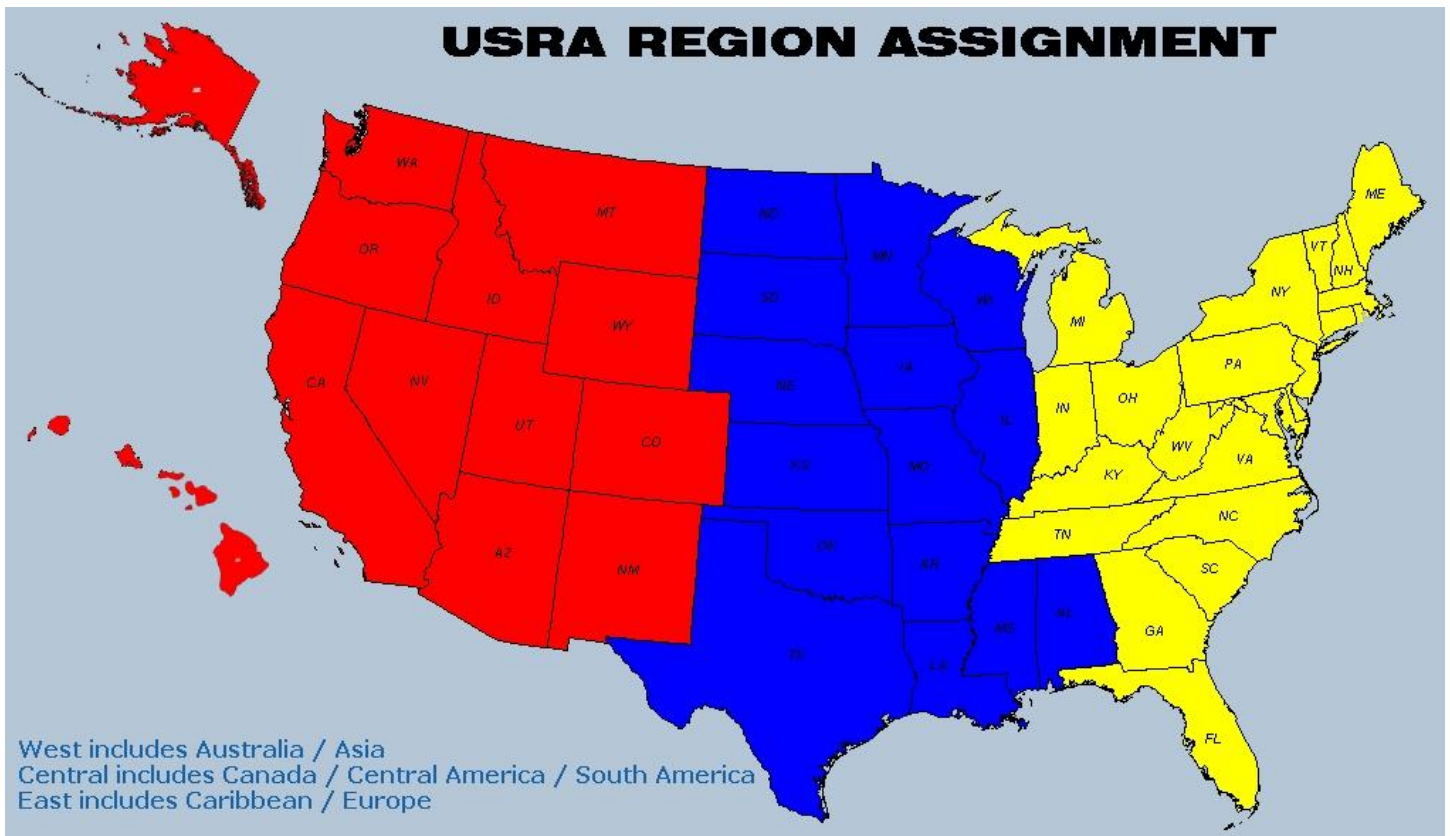
In order to maintain technical standardization the USRA shall provide uniform rules and technical specifications. Additionally, USRA will organize, conduct and enforce technical inspections at a racing event. USRA rules shall operate on a two-year rules cycle (except for emergency actions required for safety of operations) and a rules review shall be conducted annually by the Board of Directors.

2 USRA Officers

USRA Officers elected by the membership to serve from December 1, 2017 to November 30, 2019 are:

USRA President	Terry Raymond
USRA Vice President	Tim Foster
Eastern District Member Representative	Tony Husak
Eastern District Promoter Representative	
Central District Member Representative	Peter Goldsmith
Central District Promoter Representative	
Western District Member Representative	Jeff Wheless
Western District Promoter Representative	
Secretary	Kellie Raymond
Treasurer	Kellie Raymond

3 USRA District Map



4 Common Class Rules

4.1 Introduction

The following rules and specifications apply to all racing classes. Specific requirements and exceptions are detailed in the Specific Class Rules for each class.

4.2 Control Surfaces, Pushrods, Linkages & Servos

- 4.2.1 Each flight control surface shall be powered by servos of sufficient torque for the size, weight and speed of the aircraft and shall not be less than 69 in-oz torque as rated by the manufacturer.
- 4.2.2 Elevators must use one servo that meets or exceeds a 105 in-oz torque rating or two servos that each meet or exceed a 69 in-oz torque rating as rated by the manufacturer.
- 4.2.3 Ailerons must use one servo that meets or exceeds a 105 in-oz torque rating or two servos that each meet or exceed a 69 in-oz torque rating as rated by the manufacturer.
- 4.2.4 All flight control surface pushrods must have linkage and clevises at least 4-40 size.
- 4.2.5 Control linkages, horns, etc., shall be of sufficient size and strength to handle the aerodynamic forces at speed and have minimal play. Each clevis must have a "keeper" mechanism installed.
- 4.2.6 Fairings over control linkages are permitted provided that control integrity can be visually confirmed by the USRA Technical Inspectors.

4.3 Radio Batteries

Minimum acceptable battery capacity rating is based upon the number of servos used, multiplied by 200 mAh per servo. For example: 9 servos x 200 mAh = 1800 mAh battery capacity rating. Battery capacity must be rated at 1200 mAh or greater, even if less than six servos are used. Multiple battery packs operated in parallel may be used to achieve the required capacity.

- 4.3.1 Use of a 5 cell, 6-volt battery pack(s) to power the receiver is strongly recommended.
- 4.3.2 All major flight control servos and actuators must be visible for inspection with the wing removed and/or through access panels.
- 4.3.3 The aircraft owner/operator is to verify the integrity of the flight pack batteries prior to installation and, thereafter, at least annually prior to racing. This check is to include load testing and, discharge capacity of the battery pack(s), with notation in the logbook to indicate the date of the last battery check or replacement with a new battery pack.

4.4 Propellers

- 4.4.1 Propellers allowed are any fixed pitch propeller, constructed in one piece of any suitable material except metal. Component propeller systems, those composed of separate hub and blade elements, will not be permitted in any USRA sanctioned class.

- 4.4.2 Injection molded propellers, regardless of manufacturer or material composition, are not to be modified except for diameter reduction and/or minor blade chord narrowing at the trailing edge only. The blades are not to be thinned by sanding or any other method to achieve balance, nor will holes be drilled in the hub. Static balancing is to be accomplished by adding material to the lighter blade rather than removing material from the heavy one. Lead tape can be applied near the blade root to balance the propeller, or thin coats of clear paint or CA may be used. The strength of any injection-molded propeller depends upon the integrity of its outer skin, therefore, it is important to inspect the propeller surfaces for scratches or other damage before starting the engine.
- 4.4.3 The gray injected molded APC propellers specified for racing in the AT-6 class are designed for a stock G62 and can only be used on that displacement/power combination or less. The F-1GT APC propellers were designed for stock 80cc motors and can only be used on that displacement/power combination or less. The AT-6 and F-1GT propellers are not legal for racing in any class that permits engine modifications or fuel other than gasoline. When using a gray plastic, injection-molded APC propeller in any class, no modifications other than de-flashing and balancing will be allowed
- 4.4.4 AT-6 and F-1GT Class Propeller Specification
- 4.4.4.1 USRA will annually specify the propeller to be used by all contestants in this class during every sanctioned race on the schedule for the year. Certified race propellers will be available in new condition to each T-6 and F-1GT class entrant at the event registration table.
 - 4.4.4.2 Propellers needed for practice or testing are available for purchase from USRA or directly from the manufacturer.
 - 4.4.4.3 The specified propellers will be available from USRA at the races and the event organizers will obtain race propellers directly from USRA until further notice.
 - 4.4.4.4 The current racing propellers are manufactured by Landing Products (APC) and are identified as "T-6 Racing Propeller" or "F-1GT Racing Propeller" by Landing Products and USRA. These propellers are available for purchase by USRA members direct from Landing Products, 1222 Harter Ave. Woodland, CA 95776. Telephone (530) 661-0399 during business hours (Pacific time zone) or, the APC web site: www.apcprop.com/ or, e-mail: apcprop@aol.com
 - 4.4.4.5 These propellers are the current standard for USRA AT-6 and F-1GT Class racing and will remain so until further notice.
 - 4.4.4.6 No modifications to the specified propellers are allowed. Mold flashing around the blade edges may be removed if care is taken not to alter the blade shape or size. Race propellers are customarily marked for identification by USRA officials or the race promoter and no other propeller will be used by AT-6 and F-1GT Class

contestants at that race. Waxing or polishing of the propellers is prohibited. Race propellers will be administered by the Chief Technical Officer (Typically the Vice President of the USRA). The Chief Technical Officer or Chief Technical Inspector or his designated representative will be the source for all replacement propellers during the course of each event.

- 4.4.5 AT-6 and F-1GT Class Propeller Pool - USRA will provide propellers for the T6 and F-1GT classes. During the registration process of each race the competitor will be issued an appropriately marked propeller after providing a \$20 deposit per propeller. In the event the propeller becomes damaged or unserviceable during the racing event he is to return the damaged propeller and be reissued another propeller prior to the next round at no additional expense. Following completion of competition he is to return the issued propeller to the race promoter and the \$20 deposit will be returned to the pilot. Between the racing events the returned propellers will be re-inspected, remarked and any unserviceable propellers will be replaced with new propellers to provide an adequate supply of race propellers for the next race. Propellers not returned at the end of the event in which it was originally issued cannot be reused at any other event.

4.5 Engine Control & Security

- 4.5.1 All engines must be able to be shut down from the transmitter. For non-ignition engines, a positive fuel line shutoff is mandatory. Venting only of the fuel system is not considered sufficient for engine shutdown. All aircraft utilizing gasoline engines must have a manual emergency ignition kill switch (momentary push and hold pushbuttons are not permitted) visibly mounted on the exterior of the aircraft. Marking of the kill switch location is encouraged.
- 4.5.2 All airplanes with gasoline/ignition engines are required to use an on-board ignition kill switch operable from the transmitter, preferably operated by a dedicated servo. If a separate radio channel is not available the ignition switch servo may be slaved to throttle command via a "Y" harness however one servo cannot perform both functions.
- 4.5.3 It is mandatory that engines be secured in a secondary manner to a major airframe component such as the firewall, wing spar or landing gear structure through the use of a cable or safety strap of at least 200 lbs. tensile strength.

4.6 Radio

- 4.6.1 All radios will be on 2.4 MHZ . Radios that are failsafe capable are required to be programmed for engine shut off, fuel shut off or low throttle position when the transmitter is turned off. Inspection of the failsafe function is to be done during the airframe safety inspection with the wing off. Ground testing of the radio failsafe function is not to be done with the engine running on airplanes equipped with retractable landing gear.

4.7 Exhaust Systems

- 4.7.1 Exhaust systems (headers/pipes) may not exceed 8" measured along the centerline. The inside diameter from the end of the exhaust to within 1 1/2" of the header plate must remain constant. (1 1/2" allows fit to rectangular exhaust port shape)
- 4.7.2 No tuned pipes or augmenting methods of any kind are allowed.
- 4.7.3 The Experimental and Unlimited classes are exempt from these rules. See Specific Class Rules for further details.

4.8 Technical Inspection & Test Flights

- 4.8.1 All aircraft must pass an initial airframe certification inspection before approval to race is granted. Authorized USRA Technical Inspectors are USRA District Representatives and selected designees. The technical inspection certifies that the airplane meets all dimensional and current rule requirements for racing in the class intended. Documentation includes issuance of a permanent logbook for the airplane with serial numbered stickers affixed to the fuselage and wing(s) for identification. It is the responsibility of the aircraft owner/pilot to have available a pre-approved USRA specification sheet, if applicable, for the airframe type prior to inspection. The aircraft need not have flown prior to this inspection but will be presented in complete, ready to fly condition, less fuel. It is the competitors' responsibility to maintain their race plane in the same configuration it passed initial airframe certification. Adding or removing parts to gain a performance advantage is prohibited.
- 4.8.2 All aircraft must have been flown successfully prior to racing, regardless of inspection status. To complete the pre-race safety inspection, the pilot is required to certify that he or she has safely flown the aircraft two times in its present configuration.
- 4.8.3 To qualify for racing, all aircraft/pilot combinations must exhibit controlled and predictable handling characteristics on the racecourse and on the ground. Erratic or unsafe flying in any stage of the event may be cause for disqualification. The Contest Director has authority to ground any pilot or airplane when conditions are deemed to be unsafe.
- 4.8.4 Aircraft shall be fabricated in a sound manner using quality workmanship, construction practices and materials. Please be prepared to answer questions regarding construction methods, materials, etc.
- 4.8.5 Unless otherwise specified, wing thickness will have a straight taper from root to an area near the wing tip that is not affected by the wing tip shape. Wing root thickness, if defined at the centerline of an aircraft, may be calculated at the centerline from projected lines. Belly pans, fairings or other discontinuities are not part of a wing thickness measurement.

- 4.8.6 Statically balanced control surfaces and the use of selected full-size construction practices are strongly recommended.
- 4.8.7 Aircraft must race in the same configuration as passed in technical inspection. Spinners, cowls, canopies, etc., cannot be removed for racing. Exception: Wheel pants that become damaged beyond convenient repair or lost during an event may be temporarily removed for the duration of the event. The minimum weight requirement for the class will still apply when wheel pants are removed. Damaged or missing wheel pants must be repaired or replaced prior to technical inspection for the next race event.

If an aircraft sustains structural damage to one or more major airframe components, or is involved in a mid-air collision, the aircraft is grounded pending a damage assessment inspection by the aircraft owner and USRA Technical Staff, with the findings noted in the aircraft logbook. Upon completion of repairs, the aircraft must be re-inspected by a USRA Technical Inspector with the inspections noted and signed in the aircraft logbook prior to resumption of racing. The USRA Technical Staff may require the accomplishment of a radio range check and/or an observed test flight prior to approval for racing.
- 4.8.8 All decisions made by the USRA Technical Staff are final.
- 4.8.9 SAFETY IS THE PRIME CONSIDERATION. IF THE AIRCRAFT IS NOT SAFE IT WILL NOT BE PERMITTED TO FLY!

4.9 Airframe Details

- 4.9.1 Aircraft are meant to be reasonably accurate scale models, which conform to scale outlines. For those classes that do not require published aircraft specification sheets, deviations from documented scale proportions regarding overall length or wingspan shall not exceed 5%. Questions regarding scale fidelity should be submitted to the USRA Technical Staff well in advance of planned competition with the airplane. It is the responsibility of the pilot/owner to produce scale documentation that supports the dimensions or details of the modeled aircraft. Refer to Specific Class Rules and/or aircraft specification sheets for further details. Minimum dimensions contained there are not subject to deviation.
- 4.9.2 Aircraft must compete in the same configuration as it passed technical inspection. No airframe components may be interchanged unless approved and re-inspected by a USRA Technical Inspector. At least one major airframe component, (Fuselage or Wing) must be retained from the original aircraft that passed technical inspection.
- 4.9.3 Wing dihedral, if appropriate to the model, may be reduced to one half the angle of the full-scale prototype, but will not be eliminated.
- 4.9.4 Aircraft may have either a clear plastic or fiberglass canopy. If an opaque canopy is used, it needs to be painted in a near-scale outline for that aircraft. If a pilot figure is installed, it needs to be of near-scale size to the aircraft.

- 4.9.5 Scale color schemes are not required and personalized schemes are highly encouraged to aid in aircraft identification. Exact cosmetic scale detail need not be followed, e.g., rivets, sliding canopies, etc. Non-scale wing tip skids are limited to 1/2" total height.
- 4.9.6 Scoops, blisters and air intakes necessary for full size operation must be included unless otherwise specified by the Aircraft Specification Sheet or Specific Class Rules.
- 4.9.7 If the engine does not fit completely within the cowl, the natural lines of the cowl will not be altered to cover any projection of the engine or its components. Covering these projections by application of non-scale fairings or tape to the cowl or obvious distortion of the cowl shape is not allowed. Limited Gas Class is exempt from this rule. See Specific Class Rules for further details.

4.10 Fuels and Fuel Handling

- 4.10.1 Any glow fuel may be used, with the exception that hydrazine, nitrobenzene or tetranitromethane fuel additives are not allowed. Nitrous oxide systems are not allowed.
- 4.10.2 Fuel for the classes requiring standardized gasoline/oil mixtures is the responsibility of the USRA. The specified gasoline/oil mixture will be dispensed using USRA fueling equipment at a designated fuel dock during all sanctioned events.
- 4.10.3 A fire extinguisher must be present during fueling operations at the fuel dock and in the engine run up area during radio range checks. Contestants are expected to have a fire extinguisher or water nearby whenever glow fuel is being mixed or dispensed in the pits.
- 4.10.4 AT-6 , F-1GT & Limited Gas Class Fuel Specification
 - 4.10.4.1 In order to provide a consistent fuel mix for the AT-6 & F-1GT Classes the following instructions are provided:
 - 4.10.4.2 GASOLINE: Fresh, Regular Grade automotive unleaded pump gasoline of the lowest octane rating available locally will be used. Typical octane rating for gasoline of this grade should be in the range of 86 to 88 (R+M) and may or may not be oxygenated. Aviation or commercial racing fuels are not to be supplied for this class.
 - 4.10.4.3 OIL: Any major brand two-cycle chain saw oil formulated for air-cooled engines, such as, Zenoah, Echo, Stihl, Husqvarna, Red Max, Redline, or Homelite, that are commonly available across the nation. No substitution for the above oil specification is allowed. Oil packages not intended for use in air-cooled engines, including all outboard motor oils or pre-mix, are not to be used.
 - 4.10.4.4 MIXING INSTRUCTIONS: The specified gasoline/oil mix ratio is 32 to 1, which is 4 oz. of oil to each gallon of gasoline. Please insure that the oil is thoroughly

mixed with the gasoline and kept in a clean container with clear, identifying markings for the fuel mix condition.

- 4.10.5 Any questions concerning the above instructions should be directed to your USRA Technical Representative.

4.11 Logbooks

The logbook issued upon airframe certification is a permanent historical record of the airframe. It remains valid for the life of the airplane and certifies that the airframe has met USRA standards for racing competition. The logbook is to be transferred with the airframe in the event of sale. Supplemental logbooks should be stapled to the original if additional space is required. Along with the logbook, the corresponding serial-numbered stickers attached to the airframe must be preserved in a legible condition. Failure to provide the logbook or legible identification stickers at a race site will require a complete re-inspection of the airframe before a new logbook or stickers can be issued. The pre-race airframe safety inspection and radio range verification shall be initialed in the logbook by a USRA Technical Inspector. Damage affecting airworthiness and the corresponding corrective repair(s) shall be annotated in the logbook and, upon completion of safety and range checks, signed off by a USRA Technical Inspector prior to racing. Pictures in the logbook are to reflect the current paint or color scheme used on the aircraft, including the race number.

4.12 Pilot and Crew Requirements

- 4.12.1 All pilots must be a current USRA member, show proof of Small UAS Certificate of Registration, and, when required, AMA members in good standing in order to participate in USRA sanctioned events. It is highly recommended that all flight line team members join both organizations.
- 4.12.2 Valid proof of membership is required and will be checked at Registration.
- 4.12.3 While on the flight line ALL pilots and callers are required to wear an approved (i.e., DOT, ANSI, etc.) helmet.
- 4.12.4 All pilots and crewmembers must conduct themselves in a professional manner displaying high standards of good sportsmanship.
- 4.12.5 Pilots must possess and demonstrate sufficient skill necessary to maintain and operate a giant scale race aircraft on the racecourse at race speeds.
- 4.12.6 The pilot and caller must demonstrate acute awareness of other aircraft on the course and on the ground. They must be willing to yield to dangerous situations in support of safety, even at the expense of their aircraft.
- 4.12.7 Rookie pilots are defined as pilots who have never competed in a USRA sanctioned racing event. Rookie pilots must complete one flight with a USRA legal race plane demonstrating satisfactory control of the plane in all of its flight regimes as witnessed by any member of the USRA Board of Directors or a delegate under their authority. This flight can be completed prior to arrival at the race venue or the flight can be

completed at the race site the afternoon prior to the race. In the event of inclement weather the race promoter will allow the demonstration flight prior to the commencement of round one on race day

4.13 Official Protests

- 4.13.1 During a race, only official protests will be accepted concerning USRA rules and specifications and it must meet the following requirements:
- 4.13.2 Filed in writing by either the pilot or owner and given to the USRA Chief Technical Inspector. Any additional supporting information will be included at the time the protest is filed.
- 4.13.3 Accompanied by a \$100.00 cash fee. If the protest is upheld, the fee is returned. If the protest is denied, one half of the fee is retained by the USRA and the other half is awarded to the party protested.
- 4.13.4 Filed within one hour of incident in question. No protests will be accepted within one hour prior to a Trophy Race.
- 4.13.5 The protest will be reviewed by a committee (not less than 3 persons) comprised of USRA officials and, if necessary, the race promoter/event organizer.
- 4.13.6 All decisions are final and are not open to appeal or any other action.

4.14 Race Numbers

- 4.14.1 Each aircraft must clearly display its assigned race number in visible, contrasting color - separate from any other artwork, on both sides of the fuselage between the wing and tail section and/or on the tail section. Numbers should be standard type, easily read numbers. [See Appendix A.](#)
- 4.14.2 The race numbers on the fuselage and/or tail shall be appropriately sized (either location is acceptable) so that they are as large as possible. The race number shall also be displayed on the lower surface of the right wing (as viewed from the cockpit) with the top of the wing number nearest the wing tip and each number of the race number shall be a minimum of 10" tall.

5 Experimental Class Specifications

5.1 Introduction

The following rules and specifications are for the Experimental Class. All [Common Rules](#) apply as appropriate. The Experimental Class was created for piston-engine, propeller-driven homebuilt or experimental aircraft designs. The Experimental Class represents aircraft of modern design, similar to the new full-scale Sport Class competition at the Reno Air Races. The dimensions of Experimental Class aircraft are based on current [USRA Aircraft Specification Sheets](#) and the Experimental Class Rules that follow.

5.2 General

- 5.2.1 Subjects need not have been entered in closed-course racing events, but must have been built and flown since the beginning of 1950.
- 5.2.2 No reduced-scale replicas of full-size aircraft, such as the Thunder Mustang, may be modeled for this class.
- 5.2.3 New designs not currently approved and dimensionally specified in writing by the USRA will not be allowed to compete until such approval is granted. Eligibility and scale documentation may be required of the applicant for use by the USRA Technical staff.
- 5.2.4 Aircraft that are eligible to race in the Unlimited Class may be entered in the Experimental Class under the following provisions:
 - 5.2.4.1 Engine limits are as stated for the [Unlimited Class](#).
 - 5.2.4.2 All aspects of the airframe must conform to minimum specifications for the [Unlimited Class](#).

5.3 Weight

- 5.3.1 Minimum aircraft weight is 25 lbs. (dry). Maximum aircraft weight is 55 lbs. (wet).
- 5.3.2 Aircraft weight may be verified at any time during a race.

5.4 Wing Specifications

- 5.4.1 For aspect ratio (span/average chord) of 8:1 or greater, a minimum wing area of 1060 square inches is required. Minimum thickness ratio for root and tip airfoils is 15% and 12% respectively, using not less than a straight taper from root to tip.
- 5.4.2 For aspect ratio (span/average chord) of less than 8:1, a minimum wing area of 1250 square inches is required. Minimum airfoil thickness ratio is determined by the applicable [USRA specification sheet](#) for the aircraft.
- 5.4.3 Minimum wingspan of 76", regardless of aspect ratio.

5.5 Engine Specifications

- 5.5.1 Maximum allowable engine displacement is 217 cubic centimeters.
- 5.5.2 Aircraft must be propeller driven with piston or rotary engines.

- 5.5.3 Engine weight on single engine aircraft may not exceed 14 lbs. Twin engine aircraft engines may not exceed 9.5 lbs. per engine. Engine weight is measured with the engine out of the aircraft in a "ready to race" mode, i.e. if you need the item to race, it must be included in the engine weight. Engine weight does not include ignition modules, batteries, wires, exhaust system, propeller, spinner, spinner back plate or prop nut. A propeller shaft extension is included, if used as part of the engine, is included in engine weight.
 - 5.5.4 Engines must be neatly cowled where possible with no more than 50% of the cylinder head length projecting outside the cowl (measured from the centerline of the output shaft to the top of the cylinder head).
 - 5.5.5 Experimentals based on the NAA NA-50 are limited to an engine with a displacement not to exceed 152cc.
- 5.6 Exhaust Systems**
 - 5.6.1 Exhaust system components (headers, mufflers, tuned pipes, etc.) may not protrude from the airframe more than 30% of their total length. If the exhaust system is not greater than 8 inches, any or all of it may protrude or be exposed.
- 5.7 Landing Gear**
 - 5.7.1 All aircraft must use scale-like retractable or fixed main landing gear as appropriate to the aircraft modeled.
 - 5.7.2 Landing gear must be of sufficient size and strength to permit takeoff, landing and taxi in a reliable manner.
 - 5.7.3 Tail wheels must be installed and steerable, but do not have to be retractable.
- 5.8 Airfoils and Planform**
 - 5.8.1 Wing and tail group airfoils suitable for model aircraft may be used. Wing and tail group planforms should follow scale planform, chord, area, etc., of the full size subject when scaled and/or as specified in the USRA Aircraft Specification Sheets.
 - 5.8.2 Tail area may be enlarged to insure stability as long as planform is preserved.
 - 5.8.3 Control surface dimension may vary as long as planform is preserved.

6 Unlimited Class Specifications

6.1 Introduction

The following rules and specifications are for the Unlimited Class. All [Common Rules](#) apply as appropriate. The dimensions of Unlimited Class aircraft are based on the current [USRA Aircraft Specification Sheets](#) and the Unlimited Class Rules that follow.

6.2 General

- 6.2.1 All entries must be a scale representation of a full size aircraft that qualified to race in the Unlimited Class during any year at the Reno National Championship Air Races or other scheduled Unlimited races such as the Phoenix 500. (Excludes aircraft which must race in the Experimental Class).
- 6.2.2 Aircraft model minimums are specified in the [USRA Aircraft Specification Sheets](#) for each type of aircraft. Aircraft Specification Sheets are available from the USRA.
- 6.2.3 Minimum wingspan for single engine aircraft is 100 inches. (Individual aircraft are sized by specific type via Aircraft Specification Sheets).
- 6.2.4 Minimum wingspan for twin-engine aircraft is 112 inches (P-38 Lightning and F7F Tigercat) and 122 inches (A-26 Invader).
- 6.2.5 NOTE: New aircraft that qualify at Reno or other events must be submitted to the USRA for approval and development of specifications prior to racing.

6.3 Weight

- 6.3.1 Minimum aircraft weight is 25 lbs. (dry). Maximum aircraft weight is 55 lbs. (wet).
- 6.3.2 Aircraft weight may be verified at any time during a race.

6.4 Engine Specifications

- 6.4.1 Aircraft must be propeller driven with piston or rotary engines.
- 6.4.2 Engine weight on single engine aircraft may not exceed 14 lbs. Twin engine aircraft engines may not exceed 9.5 lbs. per engine. Engine weight is measured with the engine out of the aircraft in a "ready to race" mode, i.e. if you need the item to race, it must be included in the engine weight. Engine weight does not include ignition modules, batteries, wires, exhaust system, propeller, spinner, spinner back plate or prop nut. A propeller shaft extension is included, if used as part of the engine, is included in engine weight.
- 6.4.3 Engines must be neatly cowled where possible with no more than 50% of the cylinder head length projecting outside the cowl (measured from the centerline of the output shaft to the top of the cylinder head).

6.5 Exhaust Systems

- 6.5.1 Exhaust system components (headers, mufflers, tuned pipes, etc.) may not protrude from the airframe more than 30% of their total length. If the exhaust system is not greater than 8 inches, any or all of it may protrude or be exposed.

6.6 Landing Gear

- 6.6.1 All aircraft must use scale-like retractable or fixed main landing gear as appropriate to the aircraft modeled.
- 6.6.2 Landing gear must be of sufficient size and strength to permit takeoff, landing and taxi in a reliable manner.
- 6.6.3 Tail wheels are required to be steerable, but do not have to be retractable. Tail wheels should be installed in the scale location, but may be relocated to another reasonable location on the fuselage for ground handling and safety purposes only.

6.7 Airfoils and Planform

- 6.7.1 Wing and tail group airfoils suitable for model aircraft may be used. Wing and tail group planforms should follow scale planform, chord, area, etc., of the full size subject when scaled and/or as specified in the USRA Aircraft Specification Sheets.
- 6.7.2 Control surface dimensions may vary as long as the aircraft's outline is not affected.
- 6.7.3 Wingspan to fuselage ratio may not vary by more than 1 inch of wingspan and no less than the minimum for the scaled aircraft.

7 Limited Gas Class Specifications

7.1 Introduction

The following rules and specifications are for the Unlimited Gas Class. All [Common Rules](#) apply as appropriate. The dimensions of Limited Gas Class aircraft are based on the current [USRA Aircraft Specification Sheets](#) and the Unlimited Class Rules that follow.

7.2 General

- 7.2.1 All entries must be a single engine scale representation of a full size aircraft that qualified to race in the Unlimited Class during any year at the Reno National Championship Air Races or other scheduled Unlimited races such as the Phoenix 500. (Excludes aircraft which must race in the Experimental Class).
- 7.2.2 Aircraft model minimums are specified in the [USRA Aircraft Specification Sheets](#) for each type of aircraft. Aircraft Specification Sheets are available from the USRA.
- 7.2.3 Minimum wingspan for single engine aircraft is 100 inches. (Individual aircraft are sized by specific type via Aircraft Specification Sheets).
- 7.2.4 NOTE: New aircraft that qualify at Reno or other events must be submitted to the USRA for approval and development of specifications prior to racing.

7.3 Weight

- 7.3.1 Minimum aircraft weight is 25 lbs. (dry). Maximum aircraft weight is 55 lbs. (wet).
- 7.3.2 Aircraft weight may be verified at any time during a race.

7.4 Engine Specifications

- 7.4.1 Engines must be a stock 150cc motor (as it comes in stock form from the engine manufacturer) with stock ignition, running gas/oil supplied by the race promoter/event organizer. No modifications of any kind are allowed to engine, carb., or ignition. This includes removal of chokes, piston ring heating, porting, polishing, changing of ignition timing, etc.
- 7.4.2 Engines may be inspected at any time to verify stock condition.

7.5 Propellers

- 7.5.1 Any commercially available non metal propellers may be used.

7.6 Fuel

- 7.6.1 Engine fuel will be the only liquid carried in the aircraft. Any foreign liquid, other than provided fuel, will be grounds for disqualification.
- 7.6.2 Fuel will be supplied by the race promoter/event organizer. Fuel will be formulated and mixed according to the other USRA Class fuel specification as stipulated in paragraph 4.10.4 of the [Common Class Rules](#).
- 7.6.3 A means of defueling through the fuel supply line to the engine must be provided.

7.6.4 Engines must be neatly cowled where possible with no more than 50% of the cylinder head length projecting outside the cowl (measured from the centerline of the output shaft to the top of the cylinder head).

7.6.5 A blister or cover may be used to cover the carburetor in this class.

7.7 Exhaust Systems

7.7.1 Exhaust system components (headers, mufflers, etc.) may not protrude from the airframe more than 30% of their total length. If the exhaust system is not greater than 8 inches, any or all of it may protrude or be exposed.

7.8 Landing Gear

7.8.1 All aircraft must use scale-like retractable or fixed main landing gear as appropriate to the aircraft modeled.

7.8.2 Landing gear must be of sufficient size and strength to permit takeoff, landing and taxi in a reliable manner.

7.8.3 Tail wheels are required to be steerable, but do not have to be retractable. Tail wheels should be installed in the scale location, but may be relocated to another reasonable location on the fuselage for ground handling and safety purposes only.

7.9 Airfoils and Planform

7.9.1 Wing and tail group airfoils suitable for model aircraft may be used. Wing and tail group planforms should follow scale planform, chord, area, etc., of the full size subject when scaled and/or as specified in the USRA Aircraft Specification Sheets.

7.9.2 Control surface dimensions may vary as long as the aircraft's outline is not affected.

7.9.3 Wingspan to fuselage ratio may not vary by more than 1 inch of wingspan and no less than the minimum for the scaled aircraft.

8 Formula One Pro Class Specifications

8.1 Introduction

The following rules and specifications are for the 42% Formula One Class. All [Common Rules](#) apply as appropriate. The dimensions of Formula One Class aircraft are based on the Formula One Class Rules that follow.

8.2 General

- 8.2.1 All entries must be a 42% scale representation (aircraft are not meant to be precision scale) of a full size aircraft that qualified to race during any year at the Cleveland National Air Races or Reno National Air Races.
- 8.2.2 Three-view drawings of the aircraft modeled (or at least a side view and top view) and basic scale dimensions, must be approved by the USRA Board and available, when required, from the pilot/owner during initial certification (Logbook) inspection. Any further changes or modifications to the aircraft that would affect the planform and/or scale outline of the model must also be approved by the USRA Board

8.3 Weight

- 8.3.1 Minimum aircraft weight is 25 lbs. (dry). Maximum aircraft weight is 40 lbs. (wet).
- 8.3.2 Aircraft weight may be verified at any time during a race.

8.4 Scale and Wing Area

- 8.4.1 All aircraft must be scaled to a minimum of 42% of the full size prototype by dimension with a minimum wing area of 1675 square inches.

8.5 Engine Specifications

- 8.5.1 4.88 cubic inch displacement (81cc) maximum size reciprocating engine allowed with glow.
- 8.5.2 A stock 7.20 cubic inch displacement (120cc) maximum size reciprocating engine with stock ignition running gas/oil supplied by the race promoter/event organizer.. No modifications of any kind are allowed, including reed block and the carburetor.
- 8.5.3 Maximum engine displacement checks may be required at any sanctioned racing event.

8.6 Bottom Scoops

- 8.6.1 Bottom scoops are required if present on the full size subject unless an inverted engine installation prevents modeling.

8.7 Landing Gear and Wheel Pants

- 8.7.1 Aircraft must have and use fixed scale landing gear and wheel pants.
- 8.7.2 Wheel/tire assembly must be a minimum of 4 1/2" diameter and 1" wide.
- 8.7.3 Wheel pant minimum width is 2 1/2" at the axle centerline. Axle hardware will not be included in width measurement.

- 8.7.4 Wheel pant contours from leading to trailing edge and top to bottom must be smoothly curved to represent the scale shape as appropriate to the aircraft. Non-scale projections or bumps will not be used to affect the required minimum dimensions of the wheel pant shape.
- 8.7.5 Tail wheels must be installed and steerable.

8.8 Airfoil Thickness and Planform

- 8.8.1 Airfoil thickness shall be no less than 10% of the root and tip chords. In the case of round tips or elliptical wings, the thickness will be 10% to within 5 inches of the extreme tip of the wing. At that point, it can taper to the tip in a scale fashion.
- 8.8.2 Wing and tail group airfoils suitable for model aircraft may be used.
- 8.8.3 Tail surfaces must follow the scale planform of the full size subject but may be enlarged to provide adequate stability and control.
- 8.8.4 Control surface dimensions may vary as long as the aircraft outline is not affected.
- 8.8.5 Separate flap surfaces may not be used if the full-scale subject did not have flaps.

8.9 Cowling

- 8.9.1 If the engine cylinder does not fit in the cowl when side mounted the natural lines of the cowl will not be altered to cover any such projection of the engine or its components.
- 8.9.2 The minimum width across the cowl at the location of the full size prototype engine must be no less than 13.5 inches.

9 Formula One GT Class Specifications

9.1 Introduction

The following rules and specifications are for the 42% Formula One GT (F-1GT) Class. All [Common Rules](#) apply as appropriate. The dimensions of Formula One GT Class aircraft are based on the Formula One Class Rules that follow.

9.2 General

- 9.2.1 All entries must be a 42% scale representation (aircraft are not meant to be precision scale) of a full size aircraft that qualified to race during any year at the Cleveland National Air Races or Reno National Air Races.
- 9.2.2 Three-view drawings of the aircraft modeled (or at least a side view and top view) and basic scale dimensions, must be approved by the USRA Board and available, when required, from the pilot/owner during initial certification (Logbook) inspection. Any further changes or modifications to the aircraft that would affect the planform and/or scale outline of the model must also be approved by the USRA Board

9.3 Weight

- 9.3.1 Minimum aircraft weight is 27 lbs. (dry). Maximum aircraft weight is 40 lbs. (wet).
- 9.3.2 Aircraft weight may be verified at any time during a race.

9.4 Scale and Wing Area

- 9.4.1 All aircraft must be scaled to a minimum of 42% of the full size prototype by dimension with a minimum wing area of 1675 square inches.

9.5 Engine Specifications

- 9.5.1 Aircraft must use a stock 4.8 cu. in. (80cc), magneto or electronic ignition, Zenoah GT80™. as it comes stock from Zenoah. No modifications of any kind are allowed to either engine. This includes removal of chokes, piston ring heating, porting, polishing, removal of bearing seals, etc.
- 9.5.2 Any commercial brands of replacement spark plugs are permitted.
- 9.5.3 Indexing of the spark plugs by using various thickness washers is permitted.
- 9.5.4 The removal of the Zenoah recoil spring starter is permitted. The resulting protruding crankshaft cannot be trimmed or altered in any way.
- 9.5.5 Any extension shaft length is acceptable.
- 9.5.6 Straightening of the crankshaft is permitted.

9.6 Propellers

- 9.6.1 USRA-specified propellers will be supplied by the race event organizer.
- 9.6.2 No modifications may be made to the propeller or propeller hub.

9.7 Bottom Scoops

- 9.7.1 Bottom scoops are required if present on the full size subject unless an inverted engine installation prevents modeling.

9.8 Landing Gear and Wheel Pants

- 9.8.1 Aircraft must have and use fixed scale landing gear and wheel pants.
- 9.8.2 Wheel/tire assembly must be a minimum of 4 1/2" diameter and 1" wide.
- 9.8.3 Wheel pant minimum width is 2 1/2" at the axle centerline. Axle hardware will not be included in width measurement.
- 9.8.4 Wheel pant contours from leading to trailing edge and top to bottom must be smoothly curved to represent the scale shape as appropriate to the aircraft. Non-scale projections or bumps will not be used to affect the required minimum dimensions of the wheel pant shape.
- 9.8.5 Tail wheels must be installed and steerable.

9.9 Airfoil Thickness and Planform

- 9.9.1 Airfoil thickness shall be no less than 10% of the root and tip chords. In the case of round tips or elliptical wings, the thickness will be 10% to within 5 inches of the extreme tip of the wing. At that point, it can taper to the tip in a scale fashion.
- 9.9.2 Wing and tail group airfoils suitable for model aircraft may be used.
- 9.9.3 Tail surfaces must follow the scale planform of the full size subject but may be enlarged to provide adequate stability and control.
- 9.9.4 Control surface dimensions may vary as long as the aircraft outline is not affected.
- 9.9.5 Separate flap surfaces may not be used if the full-scale subject did not have flaps.

9.10 Cowling

- 9.10.1 If the engine cylinder does not fit in the cowl when side mounted, the natural lines of the cowl will not be altered to cover any such projection of the engine or its components.
- 9.10.2 The minimum width across the cowl at the location of the full size prototype engine must be no less than 13.5 inches.

9.11 Fuel

- 9.11.1 Engine fuel will be the only liquid carried in the aircraft. Any foreign liquid, other than provided fuel, will be grounds for disqualification.
- 9.11.2 Fuel will be supplied by the race promoter/event organizer. Fuel will be formulated and mixed according to the USRA F1-GT Class fuel specification as stipulated in paragraph 4.10.4 of the Common Class Rules.
- 9.11.3 A means of defueling through the fuel supply line to the engine must be provided.

10 AT-6/SNJ Class Specifications

10.1 Introduction

The following rules and specifications are for the AT-6/SNJ Class. All [Common Rules](#) apply as appropriate. The dimensions of the AT-6/SNJ Class aircraft are based on the current [USRA Aircraft Specification Sheet](#) and the AT-6/SNJ Class Rules that follow.

10.2 General

- 10.2.1 Aircraft are meant to be accurate scale models, which conform to basic scale outlines and are not meant to be "precision scale".
- 10.2.2 All entries must be a 1/5 scale (2.4" = 1') model of the full size, two-place, North American AT-6/SNJ aircraft.
- 10.2.3 No dimension may be less than the dimensions prescribed on the USRA AT-6/SNJ Specification Sheet.
- 10.2.4 Non-scale blisters, fairings, etc. are not permitted.
- 10.2.5 The trailing edge of the cowling will maintain a minimum gap of 1/4" around the entire perimeter of the firewall, i.e. the diameter of the cowling (at the trailing edge of the cowling) is 1/2" larger than the diameter of the fuselage at the firewall station.

10.3 Weight

- 10.3.1 Minimum aircraft weight is 25 lbs. (dry). Maximum aircraft weight is 40 lbs. (wet).
- 10.3.2 Aircraft weight may be verified at any time during a race.

10.4 Engine Specifications

- 10.4.1 Aircraft must use a stock, 3.7 cu. in., magneto ignition, Zenoah G-62ä. No modifications of any kind are allowed. This includes the removal of chokes, piston ring heating, porting, polishing, etc.
- 10.4.2 Any commercial brand of replacement spark plug is permitted.
- 10.4.3 Indexing of the spark plugs by using various thickness washers is permitted.
- 10.4.4 Straightening of the crankshaft is permitted.

10.5 Propellers and Spinners

- 10.5.1 USRA specified propellers will be supplied by the race promoter/event organizer.
- 10.5.2 No modification may be made to the propeller or propeller hub.
- 10.5.3 All aircraft must have a spinner. Spinner diameter may vary slightly to the closest commercially available size as long as scale size and shape are retained with a minimum diameter of 3 1/4 inches.

10.6 Exhaust Systems

- 10.6.1 Exhaust systems (headers, mufflers) must exit in the scale location.
- 10.6.2 Maximum length of the exhaust header/pipe from manifold to end is 8 inches regardless of how much of that is outside the cowl.

- 10.6.3 No tuned pipe or exhaust augmenters are allowed. The exhaust pipe may not be restricted (pinched) or otherwise altered.
 - 10.6.4 Spark plug and spark plug wire may protrude neatly from the engine cowling.
- 10.7** Airfoils, Planforms and Control Surfaces
 - 10.7.1 Wing and tail group airfoils must follow scale planform, chord area, thickness, etc., of the full size AT-6/SNJ aircraft and meet the minimums as indicated on the [USRA AT-6/SNJ Specification Sheet](#).
 - 10.7.2 Control surface dimensions may vary as long as the aircraft outline is not affected.
- 10.8** Canopy, Air Scoops and Pilot Bust
 - 10.8.1 Aircraft must have a clear or tinted (not opaque) canopy. Typical tinting of the "greenhouse" panels is permitted.
 - 10.8.2 Canopy panel lines must be shown in scale-like size and location. Panel lines may be either molded, painted or taped.
 - 10.8.3 A near-scale 1/5 size pilot (human likeness preferred) will be installed in the cockpit.
 - 10.8.4 Side air scoop is required. The bottom air scoop may be omitted if desired.
- 10.9** Landing Gear and Tail Wheels
 - 10.9.1 Aircraft must have and use scale-like retractable main landing gear. Gear must be of sufficient size and strength to allow aircraft to repeatedly taxi to runway from the staging area, takeoff, land and taxi for recovery in a reliable manner.
 - 10.9.2 Scale size main wheels (5" x 1 1/2" minimum) and a steerable tail wheel (2 1/4" x 1/2" minimum) must be installed in the scale location. Retractable tail wheels are not permitted.
- 10.10** Fuel
 - 10.10.1 Engine fuel will be the only liquid carried in the aircraft. Any foreign liquid, other than provided fuel, will be grounds for disqualification.
 - 10.10.2 Fuel will be supplied by the race promoter/event organizer. Fuel will be formulated and mixed according to the USRA T-6 Class fuel specification as stipulated in paragraph 4.10.4 of the [Common Class Rules](#).
 - 10.10.3 A means of defueling through the fuel supply line to the engine must be provided.
- 10.11** Drawings

Paul Matt drawings are used as a scale reference only. The USRA AT-6/SNJ Specification Sheet takes precedence. Paul Matt drawings are 1/2" = 1', 3 sheets, 17 x 22 and are available from: Aviation Heritage Books, Sunshine House, Inc., P.O. Box 2065, Terra Haute, IN 47802 Phone: 1-800-999-0141

11 Biplane Class Specifications

11.1 Introduction

The following rules and specifications are for the Biplane Class. All [Common Rules](#) apply as appropriate. The dimensions of Biplane Class aircraft are based on the Biplane Class Rules that follow.

11.2 General

- 11.2.1 All entries must be a scale representation of full size aircraft that have raced.
- 11.2.2 Any biplane type or variant that has raced in a Biplane Class at the Reno National Championship Air Races is a valid subject to model for the USRA Biplane Class.
- 11.2.3 Any new design or kit, including variations, must have prior USRA approval before entering a USRA sanctioned race.

11.3 Weight

- 11.3.1 Minimum aircraft weight is 20 lbs. (dry). Maximum weight is 30 lbs. (wet).
- 11.3.2 Aircraft weight may be verified at any time during a race.

11.4 Size, Shape and Scale

- 11.4.1 Aircraft are to be controlled first by outline and shape, then by actual measured wing area and finally fuselage and component minimums. The intent of this class is to have scale appearing race planes, not non-scale ones built to meet minimums.
- 11.4.2 Control surfaces may vary in size but must follow the full size aircraft's outlines.
- 11.4.3 Scoops are required if present on the full size aircraft.
- 11.4.4 All aircraft must have and use scale-like non-retractable landing gear and wheel pants.
- 11.4.5 Tail wheels must be in the scale location and steerable.

11.5 Fuselage and Component Minimums

- 11.5.1 Bumps, lumps, profiles, etc., are prohibited to obtain dimensions.
- 11.5.2 Overall length, including spinner, is preset on each approved aircraft with a deviation of +/- 1 inch. Minimum overall length is 60 inches.
- 11.5.3 Fuselage minimum (width at pilot's shoulder location) is 6 3/4" inches.
- 11.5.4 Cowl width minimum (at full size engine location) is 10 1/2" inches.
- 11.5.5 Minimum height of canopy to fuselage bottom is 11" inches.
- 11.5.6 Minimum spinner diameter is 4" inches.
- 11.5.7 Minimum wheel pant width is 2 1/8" inches.
- 11.5.8 Minimum main gear tire (diameter x width) is (3 1/2" x 1")
- 11.5.9 Minimum tailwheel tire (diameter x width) is (3/4" x 5/16")

11.6 Wings

- 11.6.1 Airfoils suitable for models are acceptable for both wing and tail groups.
- 11.6.2 The minimum wing area (combined) of the top and bottom wing is 1460 square inches. Aircraft shall have no less than 30% (438 sq. in.) of the 1460 sq. in. total combined wing area contained in the smaller of the two wings.

- 11.6.3 Minimum wing airfoil thickness is 12% of the chord.
- 11.6.4 Wing struts/cabanes are required and must be scale-appearing in shape and angle to those of the full size aircraft. Flying wires are not required.

11.7 Engine and Exhaust Systems

- 11.7.1 4.88 cubic inch displacement (81 cc) maximum size reciprocating engine. No modifications of any kind are allowed. This includes the removal of chokes, piston ring heating, porting, polishing, etc. Aircraft must use a stock 4.8 cu. in. (80cc) maximum, magneto ignition, Zenoah GT80™ or 445. No modifications of any kind are allowed. This includes removal of chokes, piston ring heating, porting, polishing, etc.
- 11.7.2 Any commercial brand of replacement spark plug is permitted.
- 11.7.3 Indexing of the spark plug by using various thickness washers is permitted.
- 11.7.4 Straightening of the crankshaft is permitted.
- 11.7.5 Engine may not protrude from the cowling. Carburetors, spark plug boot (cap) and wires may protrude from the cowling.
- 11.7.6 Exhaust pipes may not exceed 8 inches length, measured from the flange face along the centerline. The inside diameter from end to within 1 1/2" inches of the mounting flange must remain constant. (1 1/2" inches allows fit to rectangular exhaust port shape)
- 11.7.7 Tuned pipes or similar systems are prohibited.
- 11.7.8 The removal of the recoil spring starter is permitted.
- 11.7.9 Any extension shaft length is acceptable.

11.8 Fuel

- 11.8.1 Engine fuel will be the only liquid carried in the aircraft. Any foreign liquid, other than provided fuel, will be grounds for disqualification.
- 11.8.2 Fuel will be supplied by the race promoter/event organizer. Fuel will be formulated and mixed according to the USRA F1-GT Class fuel specification as stipulated in paragraph 4.10.4 of the Common Class Rules.
- 11.8.3 A means of defueling through the fuel supply line to the engine must be provided.

Please Note: Some sources for kits and plans of these aircraft include: ACE R/C, Byron Originals, Eagle Aviation, Ohio R/C, Horndog Aircraft, Lanier, KT Aviation, Godfrey, Wendell Hostetler Plans, Nick Ziroli Plans, Miles Reed Plans, RPN Racing (Ed Rankin) and RnR Products.

12 Thompson Trophy Class Specifications

12.1 Introduction

The following rules and specifications are for the Thompson Trophy Class. All [Common Rules](#) apply as appropriate. The specifications are based on a scale factor method combining wingspan plus fuselage length for a total required 156" (with exceptions as noted). The goal is to make a variety of aircraft from this "Golden Age" as similarly competitive as possible while keeping aircraft at a large scale and incorporating existing plans and kits.

12.2 General

- 12.2.1 All entries must be a scale representation of a full size aircraft that qualified, attempted to qualify or competed in the Thompson Trophy Races between the years of 1929 to 1939.
- 12.2.2 Additional golden age aircraft may be added based on the race experience of this class.

12.3 Weight

- 12.3.1 Minimum aircraft weight is 22 lbs. (dry). Maximum aircraft weight is 40 lbs. (wet).
- 12.3.2 Aircraft weight may be verified at any time during a race.

12.4 Scale Sizing Requirements

- 12.4.1 All aircraft must conform to basic scale outlines and meet a total minimum size of 156", calculated by adding the wingspan to the fuselage length.
- 12.4.2 EXCEPTIONS: An 8" overall deviation (4" maximum on wingspan, 4" maximum on fuselage length) is allowed for use of existing kits and plans only. Total minimum size for an existing kit or plan is 148". Any existing plan or kit that falls under a total minimum size of 148" must be redesigned to 156". (Note: The 1/4 Scale Byron Original's Gee Bee R-2 is legal only with the 80" wing)
- 12.4.3 There is a 25% reduction rule allowed for biplanes so that the total size is 117" inches. No other biplane reductions are allowed and wingspan is based on the larger (upper) wing.

12.5 Size Examples

- 12.5.1 Please refer to Thompson Trophy Specification Sheets.

12.6 Scale Details

- 12.6.1 Three views and/or other scale documentation is the responsibility of the pilot/owner and must be available to verify fidelity to scale for Technical Inspections.
- 12.6.2 Canopy or windscreen must be clear or tinted - not opaque.
- 12.6.3 A human-likeness pilot bust installed in the cockpit is required.
- 12.6.4 A minimum instrument panel with at least three scale size gauges is required.
- 12.6.5 Scale color paint schemes are not required; however typical schemes of the era, such as scallops, etc., are encouraged in order to help maintain the "feel" of the time. The

"look" of the era, such as fabric-covered structure (regardless of the material used) should be maintained / replicated where possible but is not a requirement.

12.7 Engine Specifications

- 12.7.1 4.88 cubic inch displacement (81 cc) maximum size reciprocating engine. No modifications of any kind are allowed. This includes the removal of chokes, piston ring heating, porting, polishing, etc.
- 12.7.2 Maximum engine displacement checks may be required before, during or after any sanctioned racing event.
- 12.7.3 Any commercial brand of replacement spark plugs is permitted.
- 12.7.4 The removal of the recoil spring starter is permitted. The resulting protruding crankshaft cannot be trimmed or altered in any way.
- 12.7.5 Any extension shaft length is acceptable.
- 12.7.6 Straightening of the crankshaft is permitted.

12.8 Exhaust Systems and Cowling

- 12.8.1 Exhaust systems should exit as close as possible to the scale location(s) where possible and should not exceed more than 8" inches from the manifold to the end of the header/pipe unless a large cowl requires excess length to exit.
- 12.8.2 Engines must be cowled. Narrow cowls require that single cylinder engines be mounted inside the natural line of the cowl.
- 12.8.3 No engine parts may protrude from the cowling except the carburetor, exhaust header, spark plug, spark plug wires or twin engine cylinder heads (if in a narrow cowl).

12.9 Airfoils and Planform

- 12.9.1 Wing and tail group airfoils suitable for model aircraft may be used.
- 12.9.2 Wing and tail surfaces must follow the scale planform of the full size aircraft. Slight modifications such as washout and small increases in both wing and tail surface dimensions may be used to enhance the flight characteristics of this era's aircraft.
- 12.9.3 Control surface dimensions may vary as long as the aircraft's outline is not affected.

12.10 Landing Gear

- 12.10.1 Aircraft must have and use scale-like landing gear for the aircraft modeled. Gear may be modified for simpler construction and operation; however, the overall scale appearance must be retained to include the use of wheel pants, etc., if used on the full size aircraft.
- 12.10.2 Tailwheels must be installed and steerable.

12.11 Thompson Trophy Class Aircraft

A list of Thompson Trophy Class aircraft (by year, type, finish position and race number with remarks) is available from the USRA together with a listing of available kits, plans and scale sources. Information has been compiled from the EAA Aviation Foundation book, *The Golden Age of Air Racing - Pre-1940*, 2nd Edition, 1991. However, this listing contains some minor discrepancies. It includes some of the aircraft (*) that were built for the Thompson Trophy Race but did not qualify or compete due to problems,

schedules or crashes. For example, "Wendell-Williams 45", the Pearson-Williams PW-1, "Mr. Smoothie" and the Hughes H-1 (short wing) are legal to race. Note that several types raced in multiple years and that most of these aircraft underwent many improvements and revisions as well as changes in race and registration numbers year to year. The Thompson Cup Race became the Thompson Trophy Race in 1930.

12.12 Thompson Trophy Specifications

The following information is referenced from "The National Air Racers In 3-Views 1929-1949" by Charles A. Mendenhall. The associated model requirements at the required 156" (based on the prototype specs) are available from the USRA along with some of the known plans/kits that meet the requirements. Modifications of plans and/or kits to meet the required minimums are the responsibility of the builder/pilot. Note that specifications may vary slightly between published reference works, three views, etc. Additionally, in order to support the use of existing kits and plans, an overall five percent (5%) deviation is allowed. This allows a deviation of up to eight (8) inches (4" max wingspan, 4" max fuselage length). Due to the unique nature of the very short-coupled GeeBee's and only one fiberglass kit being available, the Byron Original's 1/4 Scale GeeBee R-2 is legal only when built with the 80" wing. A GeeBee "Z" is also legal with an 80" wing.

13 Sportsman Class

13.1 Introduction

The following rules and specifications are for the Sportsman Class. The Sportsman Class exists for propeller-driven aircraft designs and requires a minimum wingspan of 80 inches.

13.2 General

- 13.2.1 Subjects need not have been entered in closed-course racing events, but must have been built and flown since the beginning of 1930.
- 13.2.2 Aircraft that are eligible to race in other USRA classes may also be entered in the Sportsman Class. These aircraft must meet all Common Class Rules as well as Class specific rules.
- 13.2.3 Aircraft are not limited to current USRA approved airframes, but must meet the minimum 80" wingspan requirement. Aircraft must meet all Common Class Rules with the following exceptions:
 - 13.2.3.1 Common Class Rule 4.14 – Race numbers
- 13.2.4 Racing Procedures
 - 13.2.4.1 A raw time of less than 120 seconds will result in zero (0) points for that heat race.
 - 13.2.4.2 Pilots must not deviate from the racing line or engage in time-stalling behavior during the race, unless in an emergency situation. Obvious time stalling will result in a warning from the CD. Issuance of a second warning during the same heat race will result in zero (0) points for that heat race.
 - 13.2.4.3 Use of any form of timing device during the race by pilot or caller is prohibited. Timing usage will result in zero (0) points for that heat race.
 - 13.2.4.4 Pylon cuts will be penalized by the addition of 15 seconds to the raw time. More than 2 cuts will result in a zero round.

13.3 Weight

- 13.3.1 Minimum aircraft weight is 12 lbs. (dry). Maximum aircraft weight is 55 lbs. (wet).
- 13.3.2 Aircraft weight may be verified at any time during a race.

13.4 Wing Specifications

- 13.4.1 Minimum wingspan of 80 inches, regardless of aspect ratio.

13.5 Engine Specifications

- 13.5.1 Maximum allowable engine displacement is 400 cubic centimeters.
- 13.5.2 Aircraft must be propeller driven, electric, piston, or rotary engines.
- 13.5.3 Engine weight on single engine aircraft may not exceed 14 lbs. Twin engine aircraft engines may not exceed 9.5 lbs. per engine. Engine weight is measured with the engine out of the aircraft in a "ready to race" mode, i.e. if you need the item to race, it must be included in the engine weight. Engine weight does not include ignition

modules, batteries, wires, exhaust system, propeller, spinner, spinner back plate or prop nut. A propeller shaft extension is included, if used as part of the engine, is included in engine weight. Electric power systems will be allowed. Motor and battery combined weight shall not exceed 14 pounds. Battery capacity should be sufficient for 7 minutes of flight time.

- 13.5.4 Engines must be neatly cowled where possible with no more than 50% of the cylinder head length projecting outside the cowl (measured from the centerline of the output shaft to the top of the cylinder head).

13.6 Exhaust Systems

- 13.6.1 Exhaust system components (headers, mufflers, tuned pipes, etc.) may not protrude from the airframe more than 30% of their total length. If the exhaust system is not greater than 8 inches, any or all of it may protrude or be exposed.

13.7 Landing Gear

- 13.7.1 All aircraft must use scale-like retractable or fixed main landing gear as appropriate to the aircraft modeled.
- 13.7.2 Landing gear must be of sufficient size and strength to permit takeoff, landing and taxi in a reliable manner.
- 13.7.3 Tail wheels must be installed and steerable, but do not have to be retractable.

13.8 Airfoils and Planform

- 13.8.1 Wing and tail group airfoils suitable for model aircraft may be used. Wing and tail group planforms should follow scale planform, chord, area, etc., of the full size subject.
- 13.8.2 Tail area may be enlarged to insure stability as long as planform is preserved.
- 13.8.3 Control surface dimension may vary as long as planform is preserved.

12a Sportsman Pro Class

12a.1 Introduction

The Sportsman Class exists for propeller-driven aircraft designs and requires a minimum wingspan of 80 inches.

12a.2 General

12a.2.1 Subjects need not have been entered in closed-course racing events, but must have been built and flown since the beginning of 1930.

12a.2.2 Aircraft that are eligible to race in other USRA classes may also be entered in the Sportsman Class. These aircraft must meet all Common Class Rules as well as Class specific rules.

12a.2.3 Aircraft are not limited to current USRA approved airframes, but must meet the minimum 80" wingspan requirement. Aircraft must meet all Common Class Rules with the following exceptions.

12a.2.3,1 Common Class Rule 4.14 – Race numbers.

12a.2.4 Racing Procedures

12a.2.4.1 A raw time of less than 100 seconds will result in zero (0) points for that heat race.

12a.2.4.2 Pilots must not deviate from the racing line or engage in time-stalling behavior during the race, unless in an emergency situation. Obvious time stalling will result in a warning from the CD. Issuance of a second warning during the same heat race will result in zero (0) points for that heat race.

12a.2.4.3 Use of any form of timing device during the race by pilot or caller is prohibited. Timing usage will result in zero (0) points for that heat race.

12a.2.4.4 Pylon cuts will be penalized by the addition of 15 seconds to the raw time. More than 2 cuts will result in a zero round.

12a.3 Weight

12a.3.1 Minimum aircraft weight is 12 lbs. (dry). Maximum aircraft weight is 55 lbs. (wet).

12a.3.2 Aircraft weight may be verified at any time during a race.

12a.4 Wing Specifications

12a.4.1 Minimum wingspan of 80 inches, regardless of aspect ratio.

12a.5 Engine Specifications

12a.5.1 Maximum allowable engine displacement is 400 cubic centimeters.

12a.5.2 Aircraft must be propeller driven, electric, piston, or rotary engines.

12a.5.3 Engine weight on single engine aircraft may not exceed 14 lbs. Twin engine aircraft engines may not exceed 9.5 lbs. per engine. Engine weight is measured with the engine out of the aircraft in a "ready to race" mode, i.e. if you need the item to race, it must be included in the engine weight. Engine weight does not include ignition modules, batteries, wires, exhaust system, propeller, spinner, spinner back plate or prop nut. A propeller shaft extension is included, if used as part of the engine, is included in engine weight. Electric power systems will be allowed. Motor and battery combined weight shall not exceed 14 pounds. Battery capacity should be sufficient for 7 minutes of flight time.

12a.5.4 Engines must be neatly cowled where possible with no more than 50% of the cylinder head length projecting outside the cowl (measured from the centerline of the output shaft to the top of the cylinder head).

12a.6 Exhaust Systems

12a.6.1 Exhaust system components (headers, mufflers, tuned pipes, etc.) may not protrude from the airframe more than 30% of their total length. If the exhaust system is not greater than 8 inches, any or all of it may protrude or be exposed.

12a.7 Landing Gear

12a.7.1 All aircraft must use scale-like retractable or fixed main landing gear as appropriate to the aircraft modeled.

12a.7.2 Landing gear must be of sufficient size and strength to permit takeoff, landing and taxi in a reliable manner.

12a.7.3 Tail wheels must be installed and steerable, but do not have to be retractable.

12a.8 Airfoils and Planform

12a.8.1 Wing and tail group airfoils suitable for model aircraft may be used. Wing and tail group planforms should follow scale planform, chord, area, etc., of the full size subject.

12a.8.2 Tail area may be enlarged to insure stability as long as planform is preserved.

12a.8.3 Control surface dimension may vary as long as planform is preserved.

14 Race Course Specifications

14.1 Introduction

In order for a racing event to be sanctioned by the USRA, the following racecourse specifications must be met by the race event organizer/promoter. These specifications are designed to meet certain specific dimensions set forth by the USRA and the AMA for insurance purposes and ensure, to the maximum extent possible, the safety of race crews, flight line workers, race officials and spectators. In addition to safety, the racecourse specifications establish an accurate and consistent racecourse and ensure that lap times and calculated race speeds are comparable between each racing event. Any deviation from these specifications must be accounted for and approved by the USRA Board. The event organizer/promoter is responsible for ensuring that the race site and racecourse are set up in accordance with these racecourse specifications. However, racecourse accuracy and ultimate racecourse approval rests with the USRA.

14.2 Race Course Inspection and Approval

Prior to December 31 of the year preceding a racing season, a potential race promoter must acknowledge in writing to the USRA that the planned racing site will conform to USRA Race Course Specifications. A racing event cannot be scheduled until this information is presented. Once a racing event is scheduled, the racing event organizer/promoter is responsible for ensuring that the racecourse is set up in accordance with USRA Race Course Specifications. At the race, prior to any racing, a USRA official will inspect the course for accuracy and sign the Race Course Approval Letter. The race event organizer/promoter will retain the original of this letter and the USRA will retain a copy of this letter until the race is completed. This is to ensure that the race event organizer/promoter is protected against disputes concerning racecourse distances and world record times. Protests of the racecourse must be presented in writing to a USRA official in accordance with the Race Protest Procedure established in the Common Rules. Racecourse protests may not be filed after the completion of a racing event.

14.3 General Minimum Race Course Recommendations

- 14.3.1 Runway - Minimum of 2000' x 60' paved runway. In order to meet all of the distance requirements associated with a giant scale air racing event, it is preferable, but not a requirement, to utilize a full size airport to hold a racing event. Full size airports typically have enough size to adequately provide sufficient safe distances to all event participants and spectators.
- 14.3.2 Pylons - Two pylons will be used for racing, Pylon 1 and Pylon 2. The pylons will be placed on an imaginary line that is 200 - 300 feet from, and parallel to, the Flight Line/Dead Line. Each must utilize a 5-color (red, white, green, yellow, blue) light "turn-caller" system (controlled by the Pylon Judges) to indicate turns to the race crews. Pylons must be at least 15' tall and should be marked in such a way (such as a standard checkerboard pattern) so that they are easily visible from the Pilot Station. Each pylon will utilize a flag/flag pole arrangement on top for accurate judging by the

- Pylon Judges. Each pylon typically will require its own generator for power. (See typical pylon construction requirements)
- 14.3.3 Flight Line/Dead Line - The Flight Line/Dead Line is the line that runs parallel to the line between Pylon 1 and Pylon 2. It is normally the inboard edge of runway and is also delineates the Dead Line for flying aircraft prior to and after the race. Aircraft that cross the Flight line/Dead Line in flight during the start/launch period, the race countdown period, or during the post-race recovery period will score a zero for that heat. An aircraft that crosses the deadline on the landing rollout will not be penalized. During the race, the centerline of the runway, or a line no less than 50 feet from the pilot's stations will serve as the Racing Dead Line/Racing Boundary Line. Crossing this line during the race will score a zero for that heat.
- 14.3.4 Start/Finish Line - The Start/Finish Line is the line that is perpendicular to the Flight Line/Dead Line and bisects the Green Pilot Position. It is the center of the course and is the reference line used for the start and finish of a race. The Start/Finish Line shall be readily identifiable by Lap Counters/Timers, race officials and race crews. Normally, the Countdown Clock is placed on the Start/Finish Line on top of "checker-boarded" hay bales.
- 14.3.5 Pylon Judge Stations - A Pylon Judge Station will be used for each pylon. Each station will utilize six workers comprised of five pylon judges and a pylon boss. Each Pylon Judge Station is located 550 feet from its respective pylon on an imaginary line that is perpendicular to the line that would connect the two pylons. A Pylon Judge Station normally has two 6' tables and 6 chairs and must contain some method by which each Pylon Judge can control the on/off function of the respective colored pylon lights. The Pylon Judge Station is housed under a canopy or tent. The five Pylon Judge's operate the 5 pylon lights and are supervised by the Pylon Boss. The Pylon Boss will utilize a radio to maintain contact with the Contest Director and the Flight Line Director for coordination of the pylon during racing.
- 14.3.6 Pilot Station - The Pilot Station is comprised of five pilot positions, one for each lane of racing. Each lane/position is labeled with a colored flag or tarp that corresponds to the lights on the pylons as follows: Lane 1 - Red, Lane 2 - White, Lane 3 - Green, Lane 4 - Yellow, Lane 5 - Blue. The Pilot Station is centered on the racecourse, adjacent to the Flight Line/Dead Line. The Start/Finish Line bisects the Green pilot position. Construction of the Pilot Station is normally through the use of hay bales.
- 14.3.7 Lap Counter/Timer/Contest Director Station - This area houses the Contest Director, the Lap Counters/Timers, the lap counting and timing equipment, pertinent race officials, the public address system and the Announcer. It is normally housed under a tent to protect against adverse weather conditions and to provide shade to workers. It

is located at least 300 feet behind the Flight Line. The Lap Counter/Timer/Contest Director Station normally requires its own generator for power of the Timing System, Countdown Clock and Public Address system.

- 14.3.8 Timing System and Countdown Clock - The Timing System and Countdown Clock are used for the collection of race data and to begin a typical race. The timing system is normally housed in the Lap Counter/Timer/Contest Director Station. The Countdown Clock is located on the Start/Finish Line across the runway from the Pilot Station. A set of 7 stopwatches will be provided as a backup in case of timing system failure, and race personnel will be instructed on their use.
- 14.3.9 Public address system - The public address system is used to keep race teams informed of upcoming heats and to provide spectators with race commentary.
- 14.3.10 Preliminary Staging Area - The Preliminary Staging Area is the first area used to stage race aircraft. Normally, aircraft will stage in the Preliminary Staging Area approximately two heats before the heat they are to race in. The Preliminary Staging Area also includes the AT-6 Fueling/Weighing Area and the F1-GT Fueling Area. AT-6 Class aircraft will defuel, weigh, then fuel while in the Preliminary Staging Area. The F1-GT class aircraft will defuel and fuel while in the Preliminary Staging Area. The Preliminary Staging Area is located at least 400 feet from the Flight Line, near the Spectator Line.
- 14.3.11 Final Staging Area - The Final Staging Area is the area used to line up aircraft for a heat race in their assigned lane that are one heat away from racing. It is located a minimum of 400 feet from the Flight Line and normally adjacent to the Lap Counter/Timer/Contest Director Station.
- 14.3.12 Race Ready Area - The Race Ready Area is the area located immediately in front of the Pilot Station on the runway and contains five stations, one for each aircraft that will race. The Race Ready Area is where the aircraft engines are started in preparation for launch.
- 14.3.13 Designated Pit Area - The Designated Pit Area is the area where race teams set up their pits. It is located behind the Spectator Line (minimum of 400 feet from the Flight Line) and is normally shared with and open to spectators.
- 14.3.14 Designated Engine Run-up Area - The Designated Engine Run-up Area is where engine run-up and testing occurs. It is normally located behind the Spectator Line (400 feet from the Flight Line), but in an area that may or may not be open to spectators. This area is normally coordinated with the airport or site owner and provides a safe area to perform engine testing.
- 14.3.15 Spectator Line - The Spectator Line is the line that spectators may not proceed beyond at any time. It is located a minimum of 400 feet from the Flight Line, parallel to the Flight Line and is the closest point that spectators may view racing from. It generally

contains the Designated Pit Area for race teams and will be clearly defined with a yellow "Do Not Cross" ribbon. The ends of the Spectator Line will be clearly marked so that spectators will not pass around the ends of the Spectator Line.

14.4 Race Course Specifications (See Appendix B and Appendix C)

- 14.4.1 Distance between Pylon 1 and Pylon 2 - 1600 feet
- 14.4.2 Start/Finish Line to Pylon 1 - 800 feet ,
- 14.4.3 Start/Finish Line to Pylon 2 - 800 feet
- 14.4.4 Dead Line to Pylon 1 - 250 feet recommended - may vary from 200 - 300 feet
- 14.4.5 Dead Line to Pylon 2 - 250 feet recommended - may vary from 200 - 300 feet
- 14.4.6 Dead Line to Pylon 1 Judge's Station - 350 feet
- 14.4.7 Dead Line to Pylon 2 Judge's Station - 350 feet
- 14.4.8 Pylon 1 Judge's Station to Pylon 1 - 600 feet recommended - may vary from 550 - 700 feet
- 14.4.9 Pylon 2 Judge's Station to Pylon 2 - 600 feet recommended - may vary from 550 - 700 feet
- 14.4.10 Pilot Stations to Race Boundary Line, a minimum of 50 feet with Start/Finish Line through center of Green (middle) Pilot Position. Pilot Stations to Dead Line, a minimum of 15 feet.
- 14.4.11 Lap Counter/Timer/Contest Director's Station to Dead Line - 300 feet minimum
- 14.4.12
- 14.4.13 Dead Line to Preliminary Staging Area (includes Fueling Area) - 350 feet
- 14.4.14 Dead Line to Final Staging Area - 350 feet
- 14.4.15 Dead Line to Rear Deadline - 1250 feet
- 14.4.16 Dead Line to Spectator Line - 400 feet minimum - 600 feet recommended
- 14.4.17 Clear Areas at each end of course – recommended 1000 feet beyond pylons

15 Racing Procedures

15.1 Introduction

The following racing procedures will be used at all USRA sanctioned racing events. The purpose of drafting these racing procedures is to standardize the operation of a USRA sanctioned race and to allow members, new and old, to review (prior to participation) how a typical race is conducted. Additionally, members will be aware of their responsibilities prior to, during and after a race.

15.2 Aircraft Entries

- 15.2.1 You may register as many aircraft as you wish.
- 15.2.2 Each aircraft will be considered a separate entry.
- 15.2.3 Racing Entries will be open until the first heat race of the event; however, last minute entries are subject to missing the first round due to timely completion of inspections and the race matrix. Pre-entered racers arriving late will be allowed to join the race in progress with proper notification of the Race Promoter. Late arrivals will receive Zero points for rounds not flown in. In no case will the race be delayed to allow any competitor to complete technical inspections. Late arrivals can expect their technical and safety inspections to be completed at the end of the day's race activities if an inspector is not available during the lunch break.
- 15.2.4 Each aircraft must have one and only one designated pilot. Only that designated pilot is allowed to compete with that entry.
- 15.2.5 A properly completed Aircraft Safety Inspection form is required for each aircraft at every race.
- 15.2.6 Backup aircraft are allowed at an event. An associated backup entry fee will be set at the promoter's discretion with 50% of the fee going to the USRA. Backup aircraft must pass technical and safety inspection prior to racing. In the event that a USRA Technical Inspector rules that the primary aircraft is no longer airworthy and cannot be repaired, or at any other time the competitor chooses, the primary aircraft may be grounded and the backup aircraft activated. Once the backup aircraft is activated, the original primary aircraft is no longer eligible to race for the duration of that event. Backup aircraft must display the same race number as the primary aircraft, and be on the same frequency. A backup aircraft may not be another primary entry in the same class. Backup aircraft are specific to the pilot for the duration of the event.

15.3 Prior to a Race

- 15.3.1 Approximately 3 months prior to a race, the race promoter will make available to race participants a race application form. Race participants must complete a race application form for each aircraft they intend to race, including backup aircraft, and submit the form, with entry fee, to the race promoter.
- 15.3.2 Aircraft Safety Inspection forms are required for each race that an aircraft enters.

- 15.3.3 Race participants must obtain an Aircraft Safety Inspection form for each aircraft entered and, if possible, complete it (except for the portion the inspector will complete) prior to arriving at the race. Forms are available by writing to the USRA or by downloading from the USRA website at usra-racers.org. It is the responsibility of the aircraft owner to ensure the aircraft meets all technical specifications, which includes the Common Rules, Specific Class Rules and Aircraft Specification Sheets. Please do not put the Technical Inspector in the uncomfortable position of “grounding” your aircraft because it does not meet a technical specification. If you are unsure about a specification, contact your District Representative or a USRA officer and rectify any problems prior to arriving to a race.
- 15.3.4 Last minute entries may complete the Aircraft Safety Inspection form upon arrival at a race.
- 15.3.5 If your aircraft is new and/or does not have a logbook, coordinate with your USRA District Representative to have your aircraft inspected and issued a logbook and serial number stickers prior to the race if possible. If this is not possible, the aircraft must be inspected and issued a logbook by a USRA Technical Inspector at the race. Please make arrangements with the Technical Inspector as soon as possible after arrival at the race.

15.4 Race Check In

- 15.4.1 Upon arrival to a race, locate the check-in area and register your arrival.
- 15.4.2 At check-in, you will be assigned your Pit Area and issued your Flight Line Access wristbands. Any additional race information will be provided at this time.
- 15.4.3 Flight Line access is controlled through the use of non-removable wristbands. Only Flight Line team members are permitted to obtain a wristband. Receipt of a wristband at check-in is contingent upon the race team member's completion of a Waiver of Liability form.
- 15.4.4 After check-in, the Flight Line Access wristband must be worn at all times. Modified wristbands or wristbands worn on hats, belt loops, etc. are not acceptable.
- 15.4.5 No person is permitted access past the Spectator Line unless they are wearing a valid wristband.
- 15.4.6 After race check-in, set up your pit area so that your aircraft may be inspected.

15.5 Pit Areas

- 15.5.1 You will normally be assigned one pit area (size determined by race promoter) for a race entry. If you have more than one aircraft, your pit area size will be correspondingly increased to accommodate more aircraft. Please coordinate your pit area with the race promoter.

- 15.5.2 If an airport ramp area is used for the pit area, there will be no driving of motor vehicles on the ramp area or in the pits other than for arrivals and departures and official vehicles.
- 15.5.3 Golf carts and other motorized vehicles are permitted at the race promoter's discretion.
- 15.5.4 Engine run-ups are not permitted in the pit area. You may perform engine run-ups only in the designated engine run-up area. Crews performing an engine run-up in any area other than the designated engine run-up area may be disqualified at the discretion of the promoter.
- 15.5.5 Please keep the appearance of your pit area professional and clean.

15.6 Alcoholic Beverages

- 15.6.1 No alcoholic beverages are to be consumed in the pit area or by any pilot until the Flight Line closes for the day. Failure to comply may result in immediate disqualification.
- 15.6.2 Intoxicated persons may be asked to leave the grounds at any time. The aircraft owner, entrant and/or pilot are responsible for the conduct of all of his/her crewmembers.

15.7 Technical & Safety Inspection

- 15.7.1 All aircraft must pass a static safety inspection and powered radio range check inspection prior to racing. Technical and safety inspections are held the day before racing begins. All backup aircraft should be declared and presented at this time for inspection. Any aircraft present at the event that can reasonably be expected to fly or held as a spare aircraft should be registered and passed tech during the normal tech session. Tech inspections after the normal tech session will be subject to the availability of the USRA Technical Inspectors.
- 15.7.2 The safety inspection must be completed by a USRA Technical Inspector prior to any flying. Please have your aircraft ready for inspection (wing, cowling and hatches removed) and your Aircraft Safety Inspection form available.
- 15.7.3 If your aircraft is being inspected for the first time (in order to be issued a logbook and serial numbers) the aircraft measurements must be verified by a USRA Technical Inspector. Please allow more time for this inspection and have readily available for the inspector the 3-views for the aircraft and any/all supporting documentation. Additionally, be prepared to discuss construction methods, materials used, etc. The logbook and serial number stickers will be issued upon successful completion of this inspection.
- 15.7.4 Upon completion of the safety inspection, proceed to the powered radio range check inspection area with your aircraft, logbook, Aircraft Safety Inspection form and starting equipment.

- 15.7.5 If a range check is deemed necessary by a Technical Inspector, the operation of the aircraft flight control surfaces will be checked from a distance of 90 feet (or manufacturer's recommended distance) with the transmitter in "Range Check Mode" and the aircraft engine at full power. Upon successful completion of this inspection, the Aircraft Safety Inspection form and your logbook will be signed off-
- 15.8 Radio Requirements**
- 15.8.1 All radios are required to be 2.4. -
- 15.9 Scheduling**
- 15.9.1 Only one class at a time is raced. That is, all of the heats for Biplane Class are run, then all of the heats for the AT-6 Class are run, then Formula One and so on.
- 15.9.2 The tentative order of rounds is Biplane, AT-6, Sportsman, Sportsman Pro, Formula 1 GT Formula 1 Pro,, Limited Gas, Unlimited, , Thompson Trophy and Experimental.
- 15.10 Staging**
- 15.10.1 In order to know when to stage, please keep track of the race matrix or appoint a team member to do so.
- 15.10.2 There are two staging areas - the Preliminary Staging Area and the Final Staging Area. Plan to stage in the Preliminary Staging Area at least two heats prior the heat you are scheduled to race in. If you are in the AT-6 Class or Formula 1 GT, please allow more time since de-fuel, weigh-in and fueling must take place during Preliminary Staging.
- 15.10.3 Proceed to Final Staging when directed. In most cases you will be able to have possession of your transmitter prior to Final Staging.
- 15.10.4 Final Staging is assigned by lane color according to the printed heat race matrix. Stay in your assigned position. While in Final Staging, the heat prior to yours is racing - you are the next heat. Be ready to race!
- 15.10.5 As soon as all of the aircraft in the heat prior to your heat have landed, you will be directed into the Race Ready Area. Pilot and Turn Caller will proceed to the correct color pilot position in the Pilot Station. Your aircraft, aircraft holder and aircraft starter will be directly in front of your pilot position in the Race Ready Area. A minimum of three people per entry should be present on the flight line to allow for an expeditious and safe start and takeoff.
- 15.11 Engine Start and Takeoff**
- 15.11.1 Once the runway has been cleared of the previous race, your heat race will begin. If you are not in the Race Ready Area at this point, you have only two more minutes to arrive.
- 15.11.2 At the end of those two minutes the Race Ready Area is closed. No one may enter the Race Ready Area with an aircraft at this time. Your transmitter and aircraft receiver should be on and your aircraft starter in a position to start the engine. Check your flight

controls now! The race official will signal all crews for engine start. Start your engine. You have two minutes to start the engine and be ready for launch.

- 15.11.3 Takeoff will be in the order of your colors unless an aircraft is having trouble. Do not launch if you are not ready. The pilot and turn caller should be in the Pilot Station and the aircraft launch person holding the aircraft. Confirm with each other that you are ready for launch. Once again, do not launch if you are not ready! When signaled by the race official, your aircraft launch person will walk the aircraft to the center of the runway and point it down the runway in the direction of the launch. On the pilot's cue, he/she will let go of the aircraft and then clear the runway directly to an area behind the Pilot Station.
- 15.11.4 If your engine fails to start or subsequently stops after the expiration of the two-minute start window you must clear the start line immediately. No restarts are allowed during the one-minute countdown. Aircraft already running and delayed from takeoff during the two-minute start window may takeoff following the Flight Line Director's direction.
- 15.11.5 During the takeoff, pre-race, post-race, and landing phases of your flight, the near edge of the runway will be the Dead Line. Observe the Dead Line and do not cross it. During the race phase of your flight, you must not cross the Racing Boundary Line, which is the centerline of the runway. Crossing the Dead Line or Racing Boundary Line earns you a zero (0) for that race. The Contest Director, Flight Line Director or Assistant Flight Line Director will call Dead Line or Racing Boundary Line violations.
- 15.11.6 In the event that an aircraft propeller strikes the ground or appears to strike the ground during takeoff, the Flight Line Director will black flag the aircraft. The contestant should immediately reduce power to minimize the potential damage to the airframe and await landing instructions from the Flight Line Director. After the aircraft lands the Flight Line Director will inspect the propeller for evidence of a prop strike and if none is found the heat will be re-flown.
- 15.11.7 After takeoff, fly to each pylon at an altitude that allows others room to takeoff. Confirm that your color of light on each pylon operates as you round the pylon. If it is not, have your caller alert the Flight Line Director. They will rectify the situation. Continue to fly the course to each pylon so that the lights can be verified.

15.12 Race Start

- 15.12.1 At the end of the two-minute engine start window, the Countdown Clock (across the runway and in front of the Pilot Station) will reset to one minute and begin counting down. Your goal is to position your aircraft so that it arrives at (or just prior to) the Start/Finish Line when the Countdown Clock hits zero.
- 15.12.2 During the one-minute countdown you must fly in a predictable manner in a left-hand pattern that approximates the course.

- 15.12.3 When the one-minute Countdown Clock reaches zero, you are now racing!
- 15.13 The Race**
- 15.13.1 When the clock reaches zero,, the race has begun regardless of your position on the course. You must complete six laps of the course around the pylons, starting at the Start/Finish Line and ending at the Start/Finish Line.
- 15.13.2 If you were late getting to the Start/Finish Line, you must catch up that distance. There is no penalty. If you were early, i.e. you crossed the Start/Finish Line before the clock reached zero, you have incurred a Start Cut and will be assessed a Start Cut time penalty when the race is complete. Continue to race the course and complete six laps as if you did not Start Cut. The Start Cut time penalty will be added to your official race time after the race is over in accordance with the rules.
- 15.13.3 If a video replay system is used at the race site all starts will be reviewed for start cuts as deemed necessary by the Contest Director or Flight Line Director. If the replay is inconclusive the racer will be given the benefit of the doubt.
- 15.13.4 Fly safe and courteous. Observe the Dead Line and Racing Boundary Line at all times for your safety and the safety of others. Crossing the Dead Line or Racing Boundary Line scores an automatic zero (0) for that heat race. Fly predictably and do not perform any aerobatics.
- 15.13.5 Any race pilot may be Black flagged by the Contest Director for unsafe flying. This includes gross Dead Line violations, prop strikes, unauthorized maneuvers, extremely low flying or intentional over-aggressive flying that would result in midair contact with another aircraft. Black flagged aircraft score a zero (0) for that heat race.
- 15.13.6 If midair contact occurs between two or more aircraft at any time after launch, pre-race start or during a heat race, all of the aircraft involved in the midair contact (including aircraft hit by debris) will be Black flagged and required to land as soon as possible or when directed by a race official. Midair contact after the conclusion of the race are not subject to being black-flagged. After the completion of the race any aircraft suspected of being involved in a midair collision will be inspected by the Flight Line Director. In the event that it is unclear as to which aircraft was involved in the midair (only one aircraft obviously damaged) all aircraft will be impounded at the flight line and all aircraft will be inspected. The Flight Line Director will look for paint marks as well as minor damage to control surfaces, loose hinges, broken and stripped servo gears or any other damage that could be evidence of midair contact. A USRA technical inspector can be called upon to assist in the aircraft inspection. Once the aircraft are released from the flight line no further investigation can be done and the ruling of the Flight Line Director will be final. It is suggested that all pilots maintain an accurate record of damage in their logbooks so prior damage is not misinterpreted as midair

damage. Responsibility to maintain logbooks is solely the responsibility of the pilot. Black-flagged aircraft or aircraft found to be involved in midair contact will score a zero (0) for that heat race.

- 15.13.7 While you are racing, your Lap Counter/Timer will verify laps and record any cuts. Your Lap Counter/Timer will also verify last lap and completion of six laps.
- 15.13.8 When you have completed six laps, pull up and off of the racecourse to signal the Pylon Judges that your race is completed.
- 15.13.9 A re-fly can result from various reasons including timing and scoring issues, full scale airplane arriving in the airport traffic area, unauthorized persons in the safety zone, or any issue that is deemed by the Contest Director or Flight Line Director to result in an inaccurate race result or is unsafe to the contestants or aircraft. If the race is called and the heat is to be re-flown, all contestants that were originally scheduled to fly will be given an opportunity to re-fly regardless of what occurred in the cancelled heat (e.g. a black flag, engine flame out, crashed plane) it is as if the cancelled heat never occurred. In a Trophy race the alternates will be reset and must wait to see if one of the primary planes fails to launch. A re-fly does not have to be done in all circumstances, if the race is well underway or completed and all affected contestants feel that the outcome of the race was already determined, the primary heat pilots can agree not to do a re-fly. If any one of the primary pilots objects then the race will be re-flown. A minimum of 45 minutes will be provided to fuel and service the aircraft will be given before the re-fly takes place. The minimum time can be reduced if agreed to by all affected pilots.
- 15.13.10 There will be a minimum 45-minute break scheduled between rounds to allow the contestants adequate time to prepare, service, and inspect their aircraft for the next round. These breaks may be done in conjunction with a lunch break and may be reduced to 30 minutes if circumstances dictate and safety will not be compromised as approved by the USRA Chief Technical Officer or his designated representative.

15.14 Landing

- 15.14.1 When each aircraft in your heat has completed the race, prepare your aircraft to land.
- 15.14.2 Continue to fly an approximate racecourse pattern at an altitude to avoid conflict with aircraft in the landing phase.
- 15.14.3 When directed by the race official, set up your aircraft in a standard rectangular landing pattern and land. Be alert for other aircraft and people on or near the runway. Do not land if you feel the conditions are unsafe. Go around and set up again.
- 15.14.4 Race officials will advise you of dead sticks or other landing priorities. If you are on final and are made aware of a priority landing, go around (unless you are a priority

yourself). Remember that you are pilot-in-command of your aircraft - fly it accordingly and do not compromise safety for any reason.

- 15.14.5 Once your aircraft is on the ground, taxi clear of the runway and shut off your engine. Allow your crew to retrieve the aircraft.
- 15.14.6 Review your heat sheet for time, cuts, etc. If you agree with the heat sheet, sign it (your turn caller may do this) and keep your copy. After signing the heat sheet, you may not protest any portion of that particular heat race. If you disagree with any part of the heat sheet, proceed to the Contest Director at the Lap Counter/Timer/Contest Directors Station to discuss your disagreement. Please be professional in your discussion. Any discrepancies must be resolved prior to leaving the Flight Line or protested at that time in accordance with the Official Protest procedures of the Common Rules.
- 15.14.7 Points will not be credited for any heat sheet that is not signed.

15.15 Penalties

- 15.15.1 Dead Line - At no time can you fly across the near edge of the runway (Dead Line) or its extension. This will result in a Dead Line penalty.
- 15.15.2 Racing Boundary Line - At no time during the race can you fly across the runway centerline or its extension. This will result in a Dead Line penalty.
- 15.15.3 Start Cut - Treated the same as a Pylon Cut. The number of seconds added to the official time varies according to the Class you are flying. (See below) Assessed if:
 - 15.15.3.1 You are beyond the Start/Finish Line when the clock reaches zero.
 - 15.15.3.2 You perform any aerobatics, including loops, just prior to the Start/Finish Line.
 - 15.15.3.3 You fly toward the pilots in an attempt to make a left turn when the clock reaches zero. Ideally you should be in a cone 20 degrees wide as you enter the start zone with your final turn made toward the Start/Finish line at or near pylon two.
 - 15.15.3.4 You make an abrupt pull up just prior to the Start/Finish Line as the clock reaches zero.
 - 15.15.3.5 You fly a 360-degree circle immediately prior to the Start/Finish Line.(**In order to clarify this rule,**" You may turn out away from the pilots station prior to the start clock reaching zero, establish a straight line back towards pylon two and then make your final turn towards the Start/Finish line at or near pylon two. This cut will be called by the Contest Director or the Flight Line Judge if deemed unsafe").
- 15.15.4 Gross Start Cut - Treated the same as a Dead Line call. A Gross Start Cut will result in zero (0) points for that particular heat race and is assessed if you have crossed the Start/Finish Line and there are 2 seconds or more of time remaining on the Countdown Clock.

- 15.15.5 Pylon Cut - You must fly past the pylons. If you do not completely pass a pylon before turning, you will be assessed a Pylon Cut. Additional seconds are added to your official time for each Pylon Cut you receive. The number of seconds added vary according to the Class in which you are racing and are as follows: AT-6 = 10 seconds, Formula 1 GT = 10, Biplane = 10 seconds, Formula One Pro = 8 seconds, Thompson Trophy = 8 seconds, Unlimited = 6 seconds, Experimental = 6 seconds, Sportsman class= 15 seconds, Sportsman Pro =10 seconds, Limited Gas= 8 seconds.
- 15.15.6 Gross Pylon Cut - When, during a race, a turn to the opposite side of the racecourse is performed that is not in the immediate vicinity of a pylon, you will receive a Gross Pylon Cut. A Gross Pylon Cut will result in zero points for that heat race.
- 15.15.7 Black flagged - Any race pilot/aircraft may be Black flagged by the Contest Director for unsafe flying. This includes gross Dead Line violations, prop strikes, unauthorized maneuvers, extremely low flying, intentional over-aggressive flying that would result in midair contact with another aircraft, midair contact with another aircraft at any time after launch, pre-race start or during a heat race or trophy race (including aircraft hit by debris). Black flagged aircraft are required to land as soon as possible or when directed by a race official and score a zero for that heat/trophy race.
- 15.15.8 Disqualification - Any disqualification for any reason will result in the loss of all points for the entire racing event.
- 15.15.9 Sportsman Violations Gas Class
 - 15.15.9.1 120 Second Violation – A raw time of less than 120 seconds will result in zero (0) points for that heat race.
 - 15.15.9.2 Second Time Stalling Warning - Issuance of a second warning during the same heat race will result in zero (0) points for that heat race.
 - 15.15.9.3 Timing Device Usage – Use of any form of timing device during the race by pilot or caller is prohibited. Timing usage will result in zero (0) points for that heat race.

15.16 Trophy Races

- 15.16.1 Trophy Races are conducted using the same procedures as the heat races. If circumstances prevent the running of a Trophy Race, trophies and prizes will be awarded at the discretion of the race event organizer/promoter.
- 15.16.2 The five aircraft with the most points at the end of heat racing will advance to the Trophy Race on the last day of the race.
- 15.16.3 Two alternate aircraft will be staged in the event that one or more of the finalists are unable to compete. Both alternate aircraft must be running prior to the completion of the two-minute countdown clock. If the 5 primary aircraft are airborne at the completion of the two-minute start clock, the alternates should shut down and clear the start line. If

the primary planes are unable to become airborne at the completion of the two-minute start clock, an alternates will be used. Alternates are not to be used for a Dead Stick aircraft. Be prepared to launch at the Flight Line Director's direction. Safety and good headwork are paramount in this dynamic situation. Follow the Flight Line Director's directions!

- 15.16.4 If Bronze and Silver Trophy Races are run, the Bronze winner and 2nd place Bronze finisher will stage as alternates to the Silver Trophy Race. Likewise, the Silver winner and 2nd place Silver finisher will stage as alternates to the Gold Trophy Race. In the event that the winner and/or 2nd place finisher cannot stage, the next higher finisher will stage in their place.
- 15.16.5 All aircraft that fly in a Trophy Race may be subject to a complete technical inspection after the Trophy Race is flown. At the completion of each Gold Trophy race all aircraft will immediately be impounded. An area will be designated adjacent to the primary staging area as the impound area and the planes must be placed in this area for defueling and completion of other trophy races. No maintenance can be performed on the plane nor can it be returned to the pits. After defueling the planes the aircraft will be weighed. This may occur in an enclosed area to minimize atmospheric effects. In addition the AT-6 and Formula 1 GT class aircraft will have their cowls removed for visual conformation of the stock engine status. Based on a random drawing one engine in each of the classes will be removed and torn down for further inspection. If an aircraft is found to be illegal, the pilot will be disqualified and is not eligible to win the event. Additionally, the pilot will receive zero points for the racing event.
- 15.16.6 Racing event trophies and cash prizes will be awarded based on the outcome of the Trophy Races and after all post-race technical inspections are completed.

16 USRA Championship Point System

16.1 Introduction

The USRA Championship Point System awards points to each USRA member/pilot that competes in any of the USRA Championship Series sanctioned races in a given racing season. Racing events must be sanctioned by the USRA to be eligible to award USRA points. Pilots may enter as many classes at a race as they desire, but only one primary aircraft per class. A pilot may choose to enter different aircraft at different events, and all points earned by these pilot / aircraft combinations will count towards a single total for the Championship. Backup aircraft (when entered as a backup) competing with the same race number in the same class are considered the same aircraft as the primary for points calculations. It is the responsibility of the USRA to maintain an accurate record of the points accrued for each pilot/aircraft combination throughout the racing season (calendar year) and to publish point totals after each race so that pilots and their teams may determine their overall standings on a continuing basis. The pilot/aircraft with the highest point total for a given racing class shall be named the USRA Class Champion for the racing season and is eligible to win any awards for that status.

16.2 USRA Championship Point System

16.2.1 The USRA Championship Point System awards points for finish position in a heat race conducted at any USRA sanctioned race. Heat races are determined through the use of a USRA approved heat matrix computer program. The points for finish position in a heat race are awarded as follows:

First place	20 points	Greater than 2 cuts	0 points
Second place	15 points	Deadline penalty	0 points
Third place	11 points	Black flagged	0 points
Fourth place	8 points	Gross pylon cut	0 points
Fifth place	6 points	Gross start cut	0 points
No show	0 points	Disqualified	0 points

16.2.2 Race Event Criteria for Awarding of USRA Championship Series Points

16.2.2.1 The following criteria is mandatory in order for USRA Championship Series Points to be awarded to a given participating pilot/aircraft at a USRA sanctioned racing event:

- 16.2.2.1.1 The race event must be sanctioned by the Unlimited Scale Racing Association.
- 16.2.2.1.2 A minimum of five aircraft must be entered in a given class in order for that class to score full USRA Championship Series Points at that race.
- 16.2.2.1.3 In the event a race organizer elects to run a class with less than 5 entries but with a minimum 3 entries, points will be awarded as follows.

4 entries

1st = 15 points

2nd = 11 points

3rd = 8 points

4th = 6 points

3 entries

1st = 11 points

2nd = 8 points

3rd = 6 points

16.2.2.1.4 A minimum of five (5) rounds of racing are completed in a given class in order for that class to score USRA Championship Series Points at that race. (Four rounds of racing are permitted under certain conditions – see Incomplete Racing Events.)

16.2.3 Scoring

16.2.3.1 Scoring of a typical heat race at a USRA sanctioned racing event shall be based on the official time of each pilot/aircraft competitor as recorded by the timing equipment used by the Lap Counters/Timers at the race and/or the determination of the C.D. Once a heat race is complete an official time is recorded for each pilot/aircraft competitor in the heat. The official position is only determined by the official recorded time and/or the observation of the CD after any time penalties (based on pylon cuts or a start cut) are assessed. USRA Championship Series Points are awarded to each pilot/aircraft competitor based on their official finish position in the heat race. When the racing event is complete, the finish position points from the best five rounds of racing are added to the season point total for that pilot/aircraft competitor.

16.2.3.2 At any given USRA sanctioned racing event, the awarding of USRA Championship Series Points shall be based on five rounds of racing (with regard to finish position) for each given pilot/aircraft competitor. If five rounds of racing are completed (for a given class) at a racing event, then the points awarded to each pilot/aircraft competitor in that class for each of the five rounds of racing, based on official finish position, shall be added to each pilot/aircraft competitor's season point total. If more than five rounds of racing are completed, then only the points earned in the best five rounds (with regard to finish position of each pilot/aircraft competitor) shall be added to each pilot/aircraft competitor's season point total. If, due to weather or special circumstances (See Incomplete Racing Events) a USRA sanctioned racing event is unable to complete five rounds of racing for a given class, it is permissible to award USRA Championship Series Points based on a minimum of four (4) complete rounds of racing in a given class. No less than four rounds of racing may be used in order to calculate or award USRA Championship Series Points. If four (4) rounds of racing are used for scoring, the average points (based on official finish position) shall be

calculated for each pilot/aircraft competitor in the class using the following formula:

- 16.2.3.3 Round 5 points = Average for Four Rounds = (Round 1 + Round 2 + Round 3 + Round 4) divided by 4.
- 16.2.3.4 The average points calculated for each pilot/aircraft competitor for four rounds of racing shall be assigned as the Round 5 points for each pilot/aircraft competitor. The “calculated” Round 5 points shall then be added to the total of Rounds 1 through 4, thereby creating a five round total for each pilot/aircraft competitor. The five round point total for each pilot/aircraft competitor shall then be added to each pilot/aircraft competitor's season point total.
- 16.2.3.5 USRA Championship Points will not be awarded for Trophy Races.
- 16.2.4 Incomplete Racing Events
 - 16.2.4.1 A USRA sanctioned racing event is deemed incomplete for a given class when five rounds of racing are not completed. USRA Championship Series Points shall not be awarded to any pilot/aircraft competitor when a race is incomplete. However, it is permissible to award USRA Championship Series Points if a minimum of four (4) rounds of racing are completed in a given class if any one of the following criteria are applicable:
 - 16.2.4.2 Weather or forces of nature.
 - 16.2.4.3 Race site/airport/field closure.
 - 16.2.4.4 Special circumstances (as determined by a minimum of three (3) USRA officials).
- 16.2.5 Ties (Individual Race)
 - 16.2.5.1 At any given individual race USRA Championship points are earned on the best five heats flown at that race. However, advancement to the Trophy Races is based on the points scored for all rounds of racing flown at that event. In the event of a tie between two or more pilot/aircraft competitors, advancement to the Trophy Races shall be determined, in order, by:
 - 16.2.5.1.1 Best finish positions, i.e. number of 1st place finishes, number of 2nd place finishes, etc.
 - 16.2.5.1.2 Fastest official heat time.

- 16.2.6 Ties (End of season USRA Championship Series Point Totals)
- 16.2.6.1 When all of the races of the USRA Championship Series are complete, the racing season is ended and the point totals for each pilot/aircraft competitor are totaled to determine the USRA Class Champion of each of the USRA Classes of racing. If there is a tie between two or more competitors for the title of USRA Class Champion, the tie will be broken by a fly-off between those competitors and the fly-off finish position of each fly-off competitor shall determine each competitor's USRA Championship Series finish position. In no case shall the USRA Championship Series finish position of a fly-off competitor be any worse than if that competitor had placed last in the fly-off, irregardless of whether that competitor fails to launch or crashes in the fly-off. When a fly-off is not possible, ties will be broken using the criteria outlined in section 15.2.7.
- 16.2.7 Ties for subsequent positions (other than USRA Class Champion) shall be broken, in order, by:
- 16.2.7.1 Best heat finish positions scored in the season, i.e. number of 1st place finishes, number of 2nd place finishes, etc.
- 16.2.7.2 Average time of all heats scored in the season for USRA Championship Series points (best five heats per race).
- 16.2.8 Class Eligibility for USRA Championship Status.
- 16.2.8.1 The following racing classes are currently eligible for USRA Championship status:
- 16.2.8.1.1 Biplane
 - 16.2.8.1.2 Thompson Trophy
 - 16.2.8.1.3 1/5th Scale AT-6
 - 16.2.8.1.4 42% Formula 1 Pro
 - 16.2.8.1.5 42% Formula 1 GT
 - 16.2.8.1.6 Unlimited
 - 16.2.8.1.7 Experimental
- 16.2.8.2 A class must have a minimum of 3 entries at 2 different events during a racing year in order for a USRA Championship to be awarded in that class.
- 16.2.9 USRA Championship Series Awards
- 16.2.9.1 USRA Class Champions will be determined by the pilot that has the most points in their respective class when:
- 16.2.9.1.1 All races of the USRA Championship Series are complete and the season has ended.
 - 16.2.9.1.2 All required fly-off heats are complete.
 - 16.2.9.1.3 All applicable and/or cut penalties are applied.

- 16.2.9.1.4 All post-race technical inspections are complete.
- 16.2.9.1.5 All tiebreaker calculations are complete.
- 16.2.9.1.6 All protests that would affect the outcome are resolved.

17 USRA World Records

17.1 Requirement for setting a new World Record

17.1.1 World Records will be kept in all USRA approved racing classes. In order to set a new USRA World Record, a pilot must fly a complete 6 lap heat race during a scheduled USRA event with no infractions, confirmed by the Contest Director, quicker than the existing record.

17.2 Existing Records

17.2.1 Existing records and classes

Formula 1 GT - Mike Tallman	143.04
Formula 1 Pro - Craig Grunkemeyer	121.768
Unlimited Class - Jeff Powell	106.100
Experimental Class - Fred Sattler	111.258

17.2.2 All previous world records will remain as they are.

18 USRA Forms

- 18.1** USRA Race Course Approval Letter
- 18.2** USRA Agreement & Liability Release
- 18.3** USRA Aircraft Safety Inspection Form
- 18.4** USRA Timing and Scoring Sheet
- 18.5** AMA Rules (Appendix B)
- 18.6** AMA Race Course Spec (Appendix C)

From: Unlimited Scale Racing Association



To: _____

Date _____

Subject: USRA Race Course Approval

The race course at _____ set up by _____
location name of promoter

has been inspected by the USRA and meets all USRA sanctioning specifications. This racecourse is hereby approved for USRA sanctioned racing and is declared legal for all USRA competition, including USRA points and all USRA World Record Times.

USRA Representative signature

Title

Date

*Noted Deviations/Remarks

USRA Race Course Approval Form - Revision 02/00

USRA Agreement & Release of Liability

RACE CLASS _____

RACE NUMBER _____

To the USRA, its Trustees, Board Members, Officials & Race Workers; Race Event Organizers, Employees & Volunteer Workers; Airport & Race Site Owners, Employees & Volunteer Workers; All Racing Contestants, their Representatives and Team Members and all persons connected with the race.

RELEASE

In consideration of my being allowed to participate in the USRA World Championship Series events and for other valuable considerations, I hereby release you and each of you, individually and collectively, from any and all claims, damages, liability or indebtedness of any kind or character, known or unknown, fixed or contingent, which I may have or claim to have now or at any time hereafter by reason of my participation in said Air Race regardless of the character of such participation, including any and all injury and damage to person or property. I hereby expressly agree to save you and each of you harmless from any and all claims by myself or others arising directly or indirectly out of any phase of my participation in such Air Race, including your cost, expenses or attorney's fees, directly or indirectly arising out of your defense of any specific enumeration therein contained.

ASSUMPTION OF RISK

I am aware that participating in the USRA World Championship Series events is a hazardous activity. I am voluntarily participating in these activities with knowledge of the danger involved, hereby agree to accept any and all risks of injury or death, and verify this statement by placing my initials here: _____

I hereby declare that I am participating in said Air Race of my own free volition and that I accept the Rules of Competition and all appurtenances hereto.

It is my understanding that the pilot of each airplane is in full and complete charge and control of said airplane and is responsible for all decisions to be made concerning the same and all things and persons in or connected with said airplane on the ground or in the air. Officials of said Air Race may supply information, guidance or data, but I understand that I act or rely on all such information at my own peril and said officials assume no responsibility for the completeness or accuracy of such information.

It is my understanding that the Technical Committees may inspect all aircraft entered in the Air Race, but such inspection is only for the purpose of determining whether the aircraft complies with all the rules of eligibility of said Air Race. The approval of the aircraft by said officials does not constitute a representation or warranty of any kind or character whatsoever concerning the mechanical condition of the aircraft, or whether or not it is airworthy.

KNOWING AND VOLUNTARY EXECUTION

I HAVE CAREFULLY READ THIS AGREEMENT AND FULLY UNDERSTAND ITS CONTENTS. I AM AWARE THAT THIS IS A RELEASE OF LIABILITY IN A CONTRACT BETWEEN MYSELF AND THE USRA, ITS TRUSTEES, BOARD MEMBERS, OFFICIALS & RACE WORKERS; RACE EVENT ORGANIZERS, EMPLOYEES & VOLUNTEER WORKERS; AIRPORT & RACE SITE OWNERS, EMPLOYEES & VOLUNTEER WORKERS; ALL RACING CONTESTANTS, THEIR REPRESENTATIVES AND TEAM MEMBERS AND ALL PERSONS CONNECTED WITH THE RACE.

_____ PILOT SIGNATURE	_____ PRINT NAME	_____ DATE	_____ I.D. NUMBER
_____ CREW MEMBER SIGNATURE	_____ PRINT NAME	_____ DATE	_____ I.D. NUMBER
_____ OWNER SIGNATURE	_____ PRINT NAME	_____ DATE	_____ I.D. NUMBER
_____ RACE WORKER SIGNATURE	_____ PRINT NAME	_____ DATE	_____ I.D. NUMBER



USRA Aircraft Safety Inspection Form

Class _____ Race # _____ Date _____
 Aircraft Type _____ Engine _____
 Logbook #'s : Fuselage _____ Wing #1 _____ Wing #2 _____
 Radio Manufacturer _____ Frequency _____2.4_____
 Pilot/Owner _____
 Address _____
 City _____ State _____ Zip Code _____

DECLARATION: I hereby certify that the model aircraft designated above has been constructed in accordance with large scale racing techniques and has been successfully flown a minimum of two (2) flights. I further certify that I have the necessary skills to safely fly this aircraft or have named a pilot who can safely do so. The transmitter and receiver which operate this aircraft meet the Academy of Model Aeronautics' requirements.

SIGNED (Owner/Builder) _____

Airworthiness inspection: This inspection is being performed by you and witnessed by an experienced giant scale pilot. While the ultimate responsibility for the safety and airworthiness of this aircraft rests solely with the owner and pilot, all inspection items listed must be witnessed by the observer for the aircraft to be certified for flight at this event.

AIRFRAME INSPECTION CHECKLIST	Observer	Owner/Builder
PROPELLER - secure and free from cracks and nicks	_____	_____
ENGINE - securely attached and tethered	_____	_____
ENGINE KILL - external ignition switch	_____	_____
On board radio activated ignition kill switch	_____	_____
PCM FAIL SAFE- demonstrate power reduction/engine kill	_____	_____
WING - attachment, linkage, servos secure	_____	_____
STAB - attachment, linkage, servos secure	_____	_____
RUDDER - attachment, linkage, servos secure	_____	_____
CANOPY / WINDSCREEN - secure	_____	_____
HATCHES AND COVERS - secure	_____	_____
WHEELS AND LANDING GEAR - secure	_____	_____
BATTERIES - secure	_____	_____
GENERAL APPEARANCE - damage, warps, loose covering, etc.	_____	_____
DIMENSIONS - correct for type of aircraft	_____	_____

(over)

RADIO INSPECTION CHECKLIST

	Make & Model	Rating
Aileron Servo(s)	_____	_____
Flap Servo(s)	_____	_____
Elevator Servo(s)	_____	_____
Rudder Servo(s)	_____	_____
Throttle Servo(s)	_____	_____
Gear Servo	_____	_____
Receiver	_____	_____
		PCM/FM
Transmitter	_____	_____
		PCM/FM
Batteries (200 mah per servo min)	_____	_____
	Single/Dual	Capacity

RADIO RANGE CHECK

Frequency _____

DO NOT DEMONSTRATE PCM FAILSAFE WITH THE ENGINE RUNNING

Ignition engine:	External ignition kill demo	Pass	Fail
	Transmitter ignition kill demo	Pass	Fail
Engine Kill		Pass	Fail

Passed by _____

Inspector - sign the logbook

Comments:

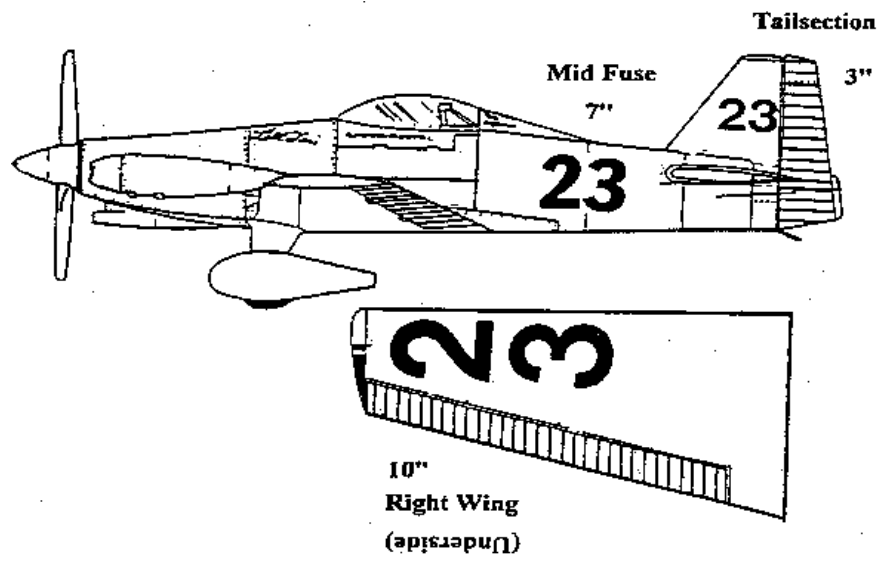


USRA Timing and Scoring Sheet

Date _____ Lane Color _____

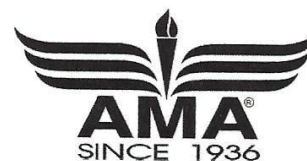
DNF-did not finish, **DNS**-did not start, **NS**-no show, **CO**-cut out, **DL**-deadline, **BF**-black flagged,
GSC-gross start cut, **GPC**-gross pylon cut, **DQ**-disqualified

Appendix A



Academy of Model Aeronautics

5161 East Memorial Drive
Muncie, Indiana 47302
(765) 287-1256 – Business
(765) 289-4248 – Fax
(800) 435-9262 – Membership Services
<http://www.modelaircraft.org>



REQUIRED SAFETY STANDARDS FOR GIANT SCALE RACING

Approved by Executive Council Action of July 25, 1995

Amended by EC on April 29, 2006 (as noted in bold)

Minimum Course/Site Measurements

Deadline to Spectators	400 feet
Deadline to Pylon Judges	350 feet
Deadline to Lap Counter/Timers	300 feet
Deadline to pylon center line	200 feet
Deadline to Rear Deadline	1250 feet
Racing Boundaries Line to Pilots	50 feet
Deadline to Pilot Stations	15 feet

General

1. There must be an individual pilot barrier system such as a stack of hay bales arranged to form a barricade against errant aircraft.
2. There must be a closed flight line with a system to regulate access during racing operations.
3. All aircraft must have been successfully flown prior to racing. Each aircraft will have a logbook issued with identifying serial numbers upon airframe certification, which will serve as a permanent historical record of that airframe. This logbook must be kept up to date and is to be presented with the aircraft for any required inspection. The logbook remains valid for the life of the airframe and is to be transferred with the aircraft in the event of sale. Pre-race airframe safety inspections and radio range verification check shall be noted in the logbook, as well as any damage affecting airworthiness and the corresponding corrective repairs. Pictures in the logbook are to reflect the current paint or color scheme used on the aircraft, including the race number.
4. Aircraft must pass a technical inspection for safety including a radio range check with the engine running. All inspections will be recorded in the aircraft's logbook.
5. Damaged aircraft must pass a technical re-inspection including a radio range check with the engine running. All damage, repairs, and re-inspections will be recorded in the aircraft's log book.
6. There must be a frequency impound with a system of verifying where transmitters are at all times.
7. There must be a flight line system to identify those persons allowed on the flight line such as wristbands or vests. Only essential personnel and contestants will be allowed beyond the spectator area.

General continued

8. No smoking is allowed within 50 feet of **full scale** aircraft or **any** designated fueling area.
9. All other pertinent AMA rules apply.

Aircraft and Pilots

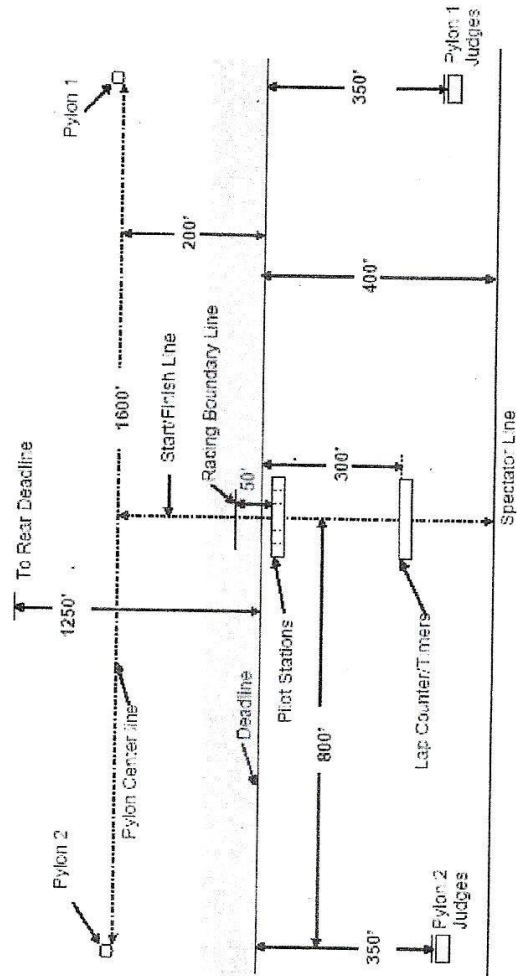
1. Maximum **model aircraft** weight, **with fuel**, is 55 lbs.
2. Care should be taken to select a power plant of reasonable weight and power for the size, strength, and weight of the aircraft.
3. Engine weight on a single engine aircraft may not exceed 14 lbs. Total engine weight on a multiple engine aircraft may not exceed 19 lbs. (excluding exhaust and ignition system).
4. Metal propeller blades may not be used.
5. All engines must be able to be shut off from the transmitter by either a servo operated kill switch or by closing the carburetor. All aircraft with ignition engines must have a manual emergency ignition kill switch visibly mounted on the exterior of the aircraft.
6. Gear must be of sufficient size and strength to allow aircraft to taxi to runway from the staging area, take off, land and taxi to recovery in a reliable manner.
7. **Nose or tail wheel steering capability is required.**
8. All aircraft/pilot combinations must exhibit predictable handling characteristics on the race course and on the ground.
9. Erratic or unsafe aircraft operation while on the ground or in the air, are cause for disqualification at the discretion of the Contest Director. Other infractions that are cause for disqualification include; Dead-line violations; Unauthorized maneuvers; Extremely low flying; Over-aggressive flying that could result in midair contact with another aircraft; Midair contact with another aircraft at any time during the pre-race and race periods (including aircraft hit by debris).
10. Fire extinguishers must be stationed at the flight line and designated fueling area during racing operations.
11. Any fuel may be used with the exception that hydrazine, nitrobenzene, or tetranitromethane fuel additives are **prohibited**. **Nitrous oxide systems are not allowed.**
12. Aircraft shall be fabricated in a sound manner utilizing quality workmanship.
13. **All engine and airframe control** systems shall be in working order and exhibit reliability **in use.**
14. Each flight control surface shall be powered by servos of sufficient size torque for the size, weight and speed of aircraft and in any case shall not be less than 69 in-oz torque rated.
15. Elevators must use one servo that meets or exceeds a 105 in-oz torque rating or two servos that each meet or exceed a 69 in-oz torque rating.
16. If using one servo to operate both ailerons, that servo must meet or exceed 105 in-oz torque rating.
17. All pushrod linkages and cable connectors must be a minimum 4-40 screw or the metric sized equivalent. Long pushrod runs will be braced for support to prohibit pushrod flexure. Flexible pushrods (NyRod) of any size are not permitted for actuation of primary flight control surfaces.
18. **The aircraft radio control** system shall be powered by **at least one battery pack with a rated capacity equal to or greater than 200 MAH per servo.**

Aircraft and Pilots continued

19. All major flight control servos and actuators must be made visible for inspection.
20. Hinges, horns, etc. shall be of sufficient size and strength and should have minimum play.
21. Each clevis must have some kind of "keeper mechanism".
22. Slip-type connectors with a set screw (such as EZ connectors) may not be used on primary flight control surfaces.
23. Engines **shall** be secured in a secondary manner to a **strong** airframe component **by means** of a cable or safety strap of at least 200 lbs tensile strengths.
24. Pilots **are** required to demonstrate competency during all phases of racing operations. Competency will be judged by **the Contest Director and infractions by the pilot may result in disqualification.**

Giant Scale Racing Diagram

Giant Scale Racing Diagram (not to scale)



063023

0.100" = 10' 0" 100'

Aircraft Specification Sheets

December 2011

USRA AIRCRAFT SPECIFICATION SHEET INDEX

BELL P-39D AIRCOBRA
BELL P-63A KING COBRA (CLIPPED WING)
BELL P-63A KING COBRA
BLIND MANS BLUFF
CURTISS P-40D WARHAWK
CZECH MATE
DOUGLAS A-26 INVADER
FIAT G594B
FW-190
GRUMMAN F4F WILDCAT
GRUMMAN F7F TIGERCAT
GRUMMAN F-8-F BEARCAT (RARE BEAR)
GRUMMAN F8F BEARCAT
HAWKER SEA FURY F.B. MK II
HAWKER SEA FURY TT-20 DREADNOUGHT
LANCAIR IV
LANCAIR 360
LEGEND
LOCKHEED P-38 LIGHTNING
NAA NA-50
NORTH AMERICAN AT-6 TEXAN
NORTH AMERICAN P-51D (DAGO RED)
NORTH AMERICAN P-51D (MISS AMERICA)
NORTH AMERICAN P-51D (MISS ASHLEY)
NORTH AMERICAN P-51D (MISS CANDACE)
NORTH AMERICAN P-51D (RED BARON RB51)
NORTH AMERICAN P-51 (ROTO FINISH)
NORTH AMERICAN P-51D (STILETTO CIRCA 1984)
NORTH AMERICAN P-51D (STILETTO CIRCA 1992)
NORTH AMERICAN P-51D (STREGA)
NORTH AMERICAN P-51D (VENDETTA)
NORTH AMERICAN P-51D
POLEN SPECIAL II
POND RACER
REPUBLIC P-47 RAZORBACK
REPUBLIC P-47D THUNDERBOLT
Thompson Trophy Specifications
TSUNAMI
VOUGHT (GOODYEAR) F4U CORSAIR
VOUGHT (GOODYEAR) F4U1 SUPER CORSAIR
YAK 11

