

# 2015 Rules for the National Aeromodeling Championships (Nats)

## Sections 1 to 15, The Racing Rules and Procedures.

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#### 1. General

**1.1. Cross-references.** The AMA Safety Code, including documents 530 and 540-B and FCC regulations covering the pilot and his/her equipment, shall apply.

**1,2. Penalty for infractions.** Unless otherwise stated, the penalty for any infraction of these rules is disqualification from the contest.

#### 2. Defined Terms

**Backplate mount:** A backplate-type, radial engine mount is not allowed. Must use beam mounts.

**Black flag:** A signal from the starter that an aircraft is disqualified from the heat in progress and will receive a score of zero points. A pilot given the black flag must immediately fly his or her airplane to clear airspace away from the course and land as soon as it is safe to do so.

**Commercially available:** Prop can be obtained within 14 days by any consumer at a price that is independent of whom the consumer is.

**Remote needle valve:** A manual fuel-metering device located on the fuel feed line, between the fuel tank and the carburetor. The sole purpose of the remote needle valve shall be to regulate the amount of fuel flowing from the tank to the engine. A device that supplies pressure to the fuel system, or is adjustable by radio control, or combines any other function with the metering of fuel is not a remote needle valve. The use of a remote needle valve does not constitute modification of the engine's carburetor, and is encouraged.

**Stock:** Unmodified.

#### 3. Measurement Methods and standards

**3.1. Engine Displacement.** Engine displacement (total swept cylinder volume) is calculated by multiplying the cross-sectional area of the cylinder bore, in square inches, by the stroke of the piston from bottom dead center to top dead center, in inches, using the following formula:  $(1.2 \times \text{cylinder diameter}) \times (1.2 \times \text{cylinder diameter}) \times 3.1416 \times (\text{total piston stroke})$ .

**3.4. Projected Span.** The projected span of the wing is the straight-line distance from tip to tip, disregarding dihedral.

**3.6. Weight.** Weights specified are for the complete aircraft, ready to fly except for fuel. At least one aircraft from each heat shall be weighed immediately after the heat with any residual fuel remaining in the tank. In addition, the Contest Director (CD) may require any aircraft to be drained of fuel and weighed at any time.

**3.8. Wing thickness.** This may be determined using a "no-go" gauge with an opening of the specified thickness, or by comparison with a "standard" airplane.

#### 4. Safety

**4.1. General.** Consideration of safety for spectators, participants, and contest personnel is of the utmost importance. Hazardous flying over the racecourse or any flying over controlled spectator areas or pits during competition is a black flag offense. Alcoholic beverages shall not be allowed in the pits or on the racecourse. Intentional hazardous flying, unsportsmanlike conduct, or consumption of alcohol during

competition shall be cause for immediate disqualification from the contest. 72 MHz transmitters shall be equipped with conventional, collapsible antennas made from telescoping sections of metal tubing or an easily removable, non-collapsible antenna. Contestants shall keep their transmitter antennas collapsed or removed except when flying or preparing to fly at the starting line. Non-removable, non-collapsible antennas are prohibited. 2.4 GHz antennae do not need to be removable or collapsible.

**4.2. Crowd control; protection of on-course personnel.** All RC Pylon events and all other events, regardless of sanction, in which engine-powered RC model aircraft are flown in speed competition over a closed course shall be governed by the following safety procedures:

**4.2.1.** Every person going onto the racecourse or between the designated sideline and the racecourse (see racecourse diagram), and all officials, whether on or off the course, shall properly wear a helmet approved by OSHA, DOT, ANSI, SNELL, NOCSAE or other recognized organization that certifies safety equipment.

**4.2.2.** Pit and spectator areas shall be separated from the racecourse by at least the minimum distances shown in AMA document 540-B. Every person desiring to go within 275 feet of the pylon line shall first be required to sign a "Waiver of All Claims, Release of Liabilities, and Indemnity Agreement for Radio Control Pylon Events" on a form supplied by AMA Headquarters (HQ). It is the CD's responsibility to return all of such signed waivers to HQ at the conclusion of the event.

**4.2.4.** All judges, timers, lap counters, and other racecourse officials shall be located in compliance with document 540-B

In addition, all participants and racecourse workers shall be briefed on the safety aspects of their involvement in the event and instructed in the proper performance of their duties and the use of all safety equipment, communications systems, and timing devices.

**4.3. Absolute authority of CD.** During a racing event, an unforeseen situation may arise that requires immediate controls. Therefore, the CD is authorized to initiate any special procedure he or she deems necessary to eliminate a situation that may be considered unsafe.

**4.4. Authority of the Starter.** The starter acts for the CD in all matters arising on the racecourse. Unless overruled by the CD, the starter's actions and decisions concerning the start, finish, and operation of each heat are final.

## **5. Challenges to Legality**

**5.1. Challenge by contestant.** Any contestant may have another contestant's engine or aircraft inspected for compliance with the rules by posting a challenge fee of \$25 cash with the CD. As soon thereafter as is practicable, the CD and at least one other person appointed by the CD shall inspect the challenged engine or aircraft. If the engine or aircraft is found to be legal, the challenge shall be dismissed and the owner of the challenged engine or aircraft shall be given the \$25. If the engine or aircraft is found to be illegal, the owner shall be disqualified from the contest and the \$25 shall be returned to the protester.

**5.2. CD's option.** At any time, the CD or the CD's designee may inspect an engine or aircraft entered in the contest without requiring the posting of a challenge fee.

## **6. Availability of Engines and Parts**

All of 6 has been removed.

## **7. General Model Aircraft Requirements**

**7.2.1.** The engine of every aircraft shall be capable of being shut off by transmitter command.

**7.2.2.** A pilot who cannot shut off his engine on command after a heat shall be given one warning. Upon a second instance of shutoff failure, the pilot shall receive a score of zero for that heat. Upon a third such instance, the pilot shall be disqualified from the contest.

### **7.3. Flight controls.**

**7.3.1. Steering:** Every aircraft shall be equipped with a positive means of steering on the ground using a dedicated, operable servo(s). In addition, while in flight, all aircraft shall be positively and independently controllable in pitch, roll and yaw modes using dedicated, operable servos. Mixing of control functions is permitted so long as the aircraft remains positively and independently controllable in both pitch and roll modes at all times while in flight.

**7.3.2. Fuel/air mixture:** There shall be no adjustment of the engine's needle valve from the ground while the aircraft is in flight. As all engines are equipped with an RC carburetor, in-flight adjustment of the engine's fuel/air mixture by partially throttling back is permissible.

**7.4. Spinner or prop nut.** On all aircraft, the front end of the engine crankshaft shall be covered with a rounded spinner or safety nut.

**7.5. Propeller.**

**7.5.1.** Propellers shall be fixed-pitch, with two (2) blades of equal length, area, and shape. Metal propellers are prohibited. Where wood is the material specified, the propeller shall be made from a single piece of wood. Wooden propellers may be finished with a clear coating for purposes of waterproofing or balancing only.

**7.5.2.** This event requires stock, commercially available propellers. However, the following modifications may be made without penalty:

- a. One blade may be sanded on the top (front) side only for balancing.
- b. One side of the hub may be sanded for balancing.
- c. The shaft hole may be enlarged, but only as much as necessary to fit the engine crankshaft. The enlarged hole shall be concentric with the original hole.
- d. Edges and tips may be sanded, but only as much as necessary to remove sharp molding flash.

**7.6. Airworthiness.**

**7.6.1. General.** Materials and workmanship shall be of satisfactory standards. The CD or the CD's designee may refuse permission to fly or may disqualify any aircraft which, in his or her opinion, is not safe and airworthy in terms of materials, workmanship, radio installation, radio function, design details, or evidence of damage.

**7.6.2. Repairs.** Any aircraft that has been damaged after a safety inspection or has a known history of problems shall not be permitted to fly until it has been satisfactorily repaired and reinspected. Materials used for repair may come from any source. However, if a pilot chooses to completely replace a damaged wing or fuselage, the replacement wing or fuselage may come only from that pilot's alternate aircraft. In other words, a pilot may not use more than two wings or two fuselages, or both, during one contest.

**8. Preflight Inspection of Aircraft**

During registration, all aircraft shall undergo a safety inspection to ensure that, at a minimum, the following requirements have been complied with:

- a. Push/pull rods or cables, control horns, and servo leads shall be installed in such a way that they will not become disconnected in flight. Clevises shall be physically held closed by short pieces of fuel tubing or similar material. Metal clevises shall be protected from deterioration of the threads due to vibration by means of a jam nut, thread treatment such as Loctite® or Vibra-Tite®, or a similar method. Ball-links shall be tight.
- b. All screws holding the engine to the mount and the mount to the firewall shall be in place and secure.
- c. The radio receiver and battery pack shall be surrounded by soft foam rubber or other vibration-dampening material and adequately protected against contamination by engine exhaust, raw fuel, or fuel residue.
- d. Batteries shall be of adequate capacity for the size and number of servos used
- e. Servos controlling the pitch, roll and yaw functions shall be of adequate strength for the weight and speed of the aircraft. Two-screw servos especially must be mounted securely and of adequate strength.
- f. Control surfaces shall be firm on the hinge line without excessive play. Safety inspectors shall be alert to the danger of excessive play whenever electronic servo throw reduction is used in combination with a mechanically inefficient linkage.
- g. All screws holding the servos to the servo rails or trays and holding any trays to the airframe shall be in place and secure. Rubber grommets shall be used on all servos designed to accept them. If the heads of the servo mounting screws are small enough to pull through the grommets, washers shall be used to prevent this.
- i. Pushrods shall have only one threaded end that is free to turn. The other end shall consist of a "Z" bend, an "L" bend with keeper or collar, a metal clevis that is soldered on, or a threaded ball-link that is glued or otherwise secured so that it cannot turn.
- j. Wings, if removable, shall be securely attached to the fuselage with bolts or screws.
- k. Wheels shall be securely attached and shall turn freely.
- l. The aircraft shall be free of stress cracks and any other indications of structural damage.
- m. There shall be nothing loose rattling around in or on the airplane. Everything must be securely fastened!

**9. Number of Aircraft Entered**

Each pilot may enter up to two aircraft. If two are entered, both shall be inspected.

## 10. Aircraft Marking

RCPRO member number is preferred. NMPRA markings or AMA number may be used, if desired. See the AMA Pylon Rules, section 10.

**11. Advertisements** Advertising of an RCPRO Club 40 racing contest through any media should include the following information

- a. RCPRO Club 40 classes that will be run.
- b. Airframe and engine rule variations, if any;
- c. Course length and number of pylons, if different from the 2-pylon, 400-foot, and 10 lap course.
- d. If fuel is supplied; the nitro content and makeup of the lubricant content.
- e. Brand and size of propellers to be supplied, if any
- f. Whether ROG or Air Start

## 12. Test Flying

- a. Only during times allowed by the CD.
- b. Some form of radio frequency control shall be observed.
- c. All persons, other than the pilots and their callers who are actually test flying, shall remain behind the designated sideline.
- d. Participants shall be required to wear hard hats.

## 13. Operation of the Race

(Refer to AMA Safety Document 540-B and AMA or RCPRO Addendum A, *Racecourse Personnel and Their Duties.*)

### 13.1. Racecourse. (Two Pylon)

**13.1.2.** Pylon height shall be a maximum of 20 feet and a minimum of 15 feet. Pylons shall be equal in height. There shall be no pilots' helpers at any of the pylons or near any judges.

**13.1.6.** Lap counters and timers are to be located a minimum of 175 feet from the pylon line and looking toward the start/finish line

**13.1.7.1. ROG Engine Starting Procedures:** Prior to starting the engines, the planes will be held up to allow identification by cut judges and lap counters.

**A.** Pilots have a maximum of one (1) minute to start their engines.

**B.** Once the starting period has elapsed, those started in the time allotted, shall stand restrained by mechanical stooge or the pilots' helpers, in preparation for start.

### 13.1.8 Heat Start procedures.

**13.1.8.1. ROG Heat Start Procedure.** The starter shall check that all pilots are in position and ready to control their aircraft before giving the signal to launch. Each pilot shall confirm his/her "ready" status by a nod of the head or other agreed signal. However, the pilots are only entitled to one, immediate confirmation. Timers' clocks shall be started with the first drop of the starter's flag. No more than four aircraft per heat are allowed.

Takeoffs shall be ROG. No mechanical device shall be used to assist in launching the aircraft. A mechanical stooage may be used to hold the aircraft until they are released by the starter to start the heat. Laps shall be flown in a counterclockwise direction, with all turns to the left.

In 4-plane heats, **if a mechanical stooage is not used**, the aircraft shall be flagged off the starting line in two groups, the first group being the aircraft in lanes #1 and #3 and the second group being the aircraft in lanes #2 and #4 and the Starter shall use two distinct motions of the starting flag to signal both groups approximately one-half (1/2) to one (1) second apart.

**13.1.10.** The cut judges shall use an appropriate method to notify pilots of cuts. If possible, such notification shall be simultaneous; however, it is not grounds for a re-fly, if the pilot does not receive notification of a cut before the completion of the heat.

**13.1.11.1. Cut procedures.** If a pylon is cut, that lap shall not be counted. In addition, a cut penalty shall be assessed for any flying over the designated sideline, pit, or spectator area or in "no-fly" zones clearly identified at a pre-race pilots' meeting. A pilot who cuts twice in the same heat shall receive a score of zero points and, if both cuts occur before the last lap, the starter shall give that pilot the black flag.

Pilots, whose planes move forward before their launch signal, shall receive a cut for that heat. A blatant early takeoff is a black flag offense. In the event of a midair or takeoff contact between aircraft, or at any other time during the heat, the starter is empowered to black-flag any pilot whose aircraft may be damaged or whose flying becomes erratic or dangerous. This decision is entirely at the discretion of the starter and is not subject to protest.

**13.1.13.** The starter may interrupt a heat in progress at any point if he or she believes that an unsafe

condition exists. Unsafe conditions include, but are not limited to, persons or vehicles approaching the racecourse; full-scale aircraft in the area; sudden wind, rain, or lightning; or an out-of-control model. A heat that is stopped due to unsafe conditions shall be re-flown at the earliest convenience of the officials and contestants, preferably before the beginning of the next round.

**13.1.14.** Aircraft shall not fly lower than the tops of the pylons at any time except for takeoff and landing. A pilot flying below the top of a pylon more than once in any heat (for example, below the top of #1 twice, or once below the top of #1 and once below the top of #2) shall be warned once, during or after the heat in which the low flying occurs. Another such violation in any later heat shall be cause for a black flag. Determination of low flying shall be made by the starter and is not subject to protest.

**13.1.15.** In the event of a dead heat, where the finish order of a heat is disputed or scoring equipment failure occurs and a clear-cut decision cannot be made as to the outcome of the heat, the heat shall be declared void and rescheduled for another attempt ("re-fly"). The re-fly shall be held at the earliest convenience of the pilots and officials, preferably by the end of the round during which the void heat was originally scheduled. All pilots who were originally scheduled to fly in the void heat shall be called up again for a re-fly. A pilot will not be granted a re-fly under the following conditions:

1. If a pilot is not ready for flight prior to the engine starting period elapsing.
2. If a pilot receives a zero in the original heat not as a result of a dispute or scoring equipment failure. (Examples of a zero not as a result of dispute or scoring may include but are not limited to: nose over on take-off, mid-air collisions, and double cuts.) This situation will be decided by the starter. Except for zero earned as a result of items 1 and 2, none of the prior scores or results from the void heat shall carry over.

### **Race Operating Methods**

**13.2.2.** The operation of a two-pylon race minimally requires a starter, four (4) lap counters and two (2) cut judges (a minimum of seven (7) people). Cut judges are stationed in line with [each](#) pylon. They record cuts and relay them to the starter. Therefore, the responsibility for flying the proper distance lies solely with the pilot and his or her caller.

**14. Heat matrix.** Will be generated using Paul Hermans NMPRA program. All pilots shall be given an equal number of opportunities to race

### **15. Scoring**

**15.1. Points per heat, AMA style.** After each heat, points shall be awarded based on the order of finish. If the matrix is set up for four-plane heats, the result is four (4) points for first place, three (3) points for second place, two (2) points for third place, and one (1) point for last place. If the matrix is set up for three-plane heats, the winner receives three (3) points, second place two (2), and last place one (1) point. If the matrix is set up for two-plane heats, the winner receives two (2) points and second place receives one (1). Zero points are awarded for a no-start (DNS), failure to complete the heat (DNF), double cut (XX), or black flag (DQ).

**15.2. Adjustment of the matrix during the contest.** In the case of severe attrition, rematrixing will only be done at the completion of a round, and even then only after a pilots' meeting to obtain the pilots' informed consent to the decision.

**15.3. Ties and flyoffs.** The winner of the event is the pilot who has accumulated the most points after the conclusion of all heats. If time permits, and there is no frequency conflict, ties shall be broken by a flyoff race. Otherwise, the best single race time shall be considered in determining final placings. If a prize is to be awarded for the best single race time of the event ("fast time trophy"), race times achieved during flyoff races shall be eligible for the fast time trophy

**15.4. "Mains" or "Features".** In the very last round of the day, all remaining racers will be ranked according to and race in "Features/mains". This should result in closer, more exciting races.

The top 10 pilots that finish 5 rounds will be ranked by points from 1 to 10 to race in the A, B and C Main races. Pilots that finish 1, 2 and 3 will be in the A-Main heat; pilots that finish 4, 5 and 6 will be in the B-Main heat, and pilots that finish 7, 8, 9 and 10 will be in the C-Main heat. After 5 rounds of racing the C-Main will be flown and the winner of that heat will move up to the B-Main, the winner of the B-Main will move up to the A-Main, and the winner of the A-Main will receive the first place trophy. Pilots that finish 2<sup>nd</sup> 3<sup>rd</sup> and 4<sup>th</sup> in the C and B Main races will also receive trophies indicating their place within their Main heat."

Unless circumstances prevent, the NMPRA JudgeTimer, sometimes called Judgeman, program will be used for lap counting and timing

The "**ADDENDUM A: RACECOURSE PERSONNEL AND THEIR DUTIES (Derived from the AMA document of the same name) Version 2007-2015**" is not included here, as it is not rules, but helpful material for those putting on races.