

**RCPRO Club 40  
Racing Regulations & Procedures  
2014**

**(Version 8/22/2012)**

**These regulations are derived from the  
AMA Radio Control Pylon Racing Regulations  
Rules Governing Model Aviation  
Competition in the United States**

RCPRO stresses that all flying shall be done in compliance with the AMA Safety Code.

RCPRO recognizes two (2) classes of Club 40 Pylon Racing, Sport and Advanced. Both are intended for multi-channel RC aircraft powered by conventional two-stroke glow engines. The task consists of an ROG (rise-off-ground) takeoff (or, in the case of the RCPRO Warbird Racing concept, an air start) followed by left turns around a closed course marked out by pylons. The builder of the model rule does not apply.

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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.

**Engine:** A two-stroke cycle, glow ignition, reciprocating-piston internal combustion engine. For purposes of events requiring stock or commercially available engines and parts, the "engine" is defined as the complete unit, ready to run, needing only propeller, fuel, and starting voltage

**Engine displacement:** The total swept cylinder volume of the engine.

**Pressurized fuel system:** Any system, other than a simple, continuously open conduit between the fuel tank and a muffler or pipe, by which fuel is delivered to the carburetor at greater than ambient atmospheric pressure. A fuel tank containing a flexible bladder that prevents bubbling or foaming of the fuel but does not generate pressure is not a pressurized fuel system.

**Remote needle valve:** A manual fuel-metering device located on the fuel feed line, between the fuel tank and the carburetor or venturi. 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 or venturi, and is encouraged in all events.

**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 removed. ,We are using easily available engines.

## 7. General Model Aircraft Requirements

**7.2.1.** The engine of every aircraft shall be capable of shutting off the engine by transmitter command.

**7.2.2.** A pilot who can not 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 the 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. Minimum battery capacity shall be: 600 milliamp-hours (mAh) for both classes.

**e.** Servos controlling the pitch, roll and yaw functions shall accommodate at least four mounting screws.

**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.

## **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 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 helmets.

## 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 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 at idle for 30 seconds.
- C. At the end of 30 seconds, there may be a standing race start, or alternatively, the planes may be restrained by the pilots' callers while the throttles are brought to full in preparation for start..

#### 13.1.7.2. RCPRO Warbird-style Engine Starting Procedures (air start): (from RCPRO Warbird Rules)

After the aircraft flying in the heat have been identified to the pylon judges, and radios have been checked to insure they are operating, the starter begins a 90-second timing clock. Pilots and their callers then have 90 seconds to get their engines running. Pilots are allowed 1 takeoff. Once either of their aircraft main wheels leaves the ground a takeoff has been made. If during the 90-second window an engine dies and a takeoff has not been made, the plane may be restarted.

Two common scenarios that allow an engine re-start if time is remaining on the 90-second clock.

- 1. The engine dies when the pilot attempts to takeoff.
- 2. The plane noses over and stops the engine.

#### Take Off Procedures & Direction:

Contestants may take off on a first-come, first-served basis, but the starter will control access to the runway. Callers will carry, or guide, the pilot's

aircraft onto the runway, and should take great caution when handling aircraft with the engine running, so as to not pose danger to themselves or others. Taxiing of aircraft onto the runway to take off is prohibited. The starter will determine what direction aircraft must use to take off. This will generally be dictated by the wind direction. If the take off direction is from right to left, the aircraft must be carried to a position on the runway beyond the left most pilot station and released from there. This is a safety procedure to help compensate for aircraft that tend to turn to the left on take off, due to engine torque and/or wind.

#### 13.1.8 Heat Start procedures.

**13.1.8.1. ROG Heat Start Procedure.** At the end of the idle period, any pilot who is not prepared for takeoff (facing #1 pylon with both hands on the transmitter) is disqualified from the heat and shall not be allowed to fly or run his/her engine in the course. In addition, this pilot will not be granted a "refly" as described in 13.1.15. 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. Except in Warbird style racing, all takeoffs shall be ROG. No mechanical device shall be used to assist in launching the aircraft. Laps shall be flown in a counterclockwise direction, with all turns to the left

#### 13.1.8.2. Warbird Style Heat Start Procedure. (from RCPRO Warbird Rules)

An audible 45 second countdown is used to start the heat. For consistency, it is best to use a recording but the flagman could speak the countdown into a PA system. The flagman or designee will announce as the clock counts down to 30 seconds, 15 seconds, and then countdown from 10 seconds to the start of the heat. The heat begins when the clock reaches zero and the starter drops the green flag. At this time all aircraft are to be to the left of the start/finish line. Failure to meet this requirement is a jumped start, and results in disqualification for the heat. Loops to avoid jumping the start are not permissible. Pilots, who find they are about to jump the start, can execute a legal sharp left pitchout turn circle back to the start/finish line.

The flagman determines when the countdown clock is started. The objectives are to get the heat started in a safe and timely manner. The countdown clock may be started before the 90 second engine start clock has ended. It may also be started some time after the 90 second engine start clock has ended. The flagman should start the 45 second countdown when:

1. All of the aircraft that are allowed to takeoff have done so.

2. All of the aircraft have had ample time after takeoff to reach flying altitude and get in the traffic pattern.

Here are the 2 extreme scenarios for starting the 45 second clock:

1. All aircraft get their engines started almost immediately and takeoff quickly. The countdown clock is started before the 90 second engine start time clock ends.

2. All aircraft get their engines running just before the 90 second clock ends. The countdown clock cannot be started until all aircraft meet conditions 1) and 2) above. This could be well after the 90 second clock ends.

**13.1.8.3.** Unless otherwise specified, (for example, an RCPRO Warbird style air start) the following starting procedure shall be used. Lane assignments shall be determined by drawing lots or by another random method at the start of each heat. In 4-plane heats, 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. 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.** If equipment and/or personnel is available, aircraft are to be signaled the moment they break the plane ("gate") established by the 2 pylons and the flaggers' positions. **(See**

**13.2.2.b)**

The 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. AMA-Style 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.

**13.1.11.2 RCPRO Warbird-Style cut procedures**

**Effect of cuts on Points Awarded- (from RCPRO Warbird Rules)**

If an aircraft cuts one pylon, by not flying past it, that aircraft will only receive 1 point, regardless of finish position. Any aircraft cutting

more than one pylon will receive no (0) points for that heat. Aircraft finishing without cuts behind aircraft receiving cuts, will have their finish position advanced one place in their standing for each aircraft ahead of them that received cuts. The following four-plane heat example illustrates the point scoring system:

1<sup>st</sup> place finisher with 1 cut – 1 point

2<sup>nd</sup> place finisher with 2 cuts – 0 Points

3<sup>rd</sup> place finisher with no cuts – 4 points

4<sup>th</sup> place finisher with no cuts – 3 Points

**3.1.12. AMA Style:** 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 reflown 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 may be conducted by either of the following methods:

**a. Method 1:** 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 the pylons. 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.

**b. Method 2:** This is the same as Method 1 except it requires flaggers for each aircraft, . They signal (by flag, shutter or light) when each aircraft has passed the respective pylon and record cuts as in Method 1. This method requires a much larger number of workers including an extra communications person standing with each group of flaggers.

**14. Heat matrix.** Note: The following instructions assume that four-plane heats will be flown. Two- or three-plane heats may be a better choice in situations where there are not many entries, not enough racecourse workers, a narrow runway, or inexperienced pilots. In any case, the number of columns in the matrix always must equal the number of airplanes per heat.

Divide the entries into four columns of separate frequencies or groups of frequencies so that each frequency appears in only one column. Column totals should be adjusted so that the number of entries in each column is as equal as possible.

Pilot numbers should be assigned according to the following matrix. If a particular column has less than the indicated number, simply skip that number. Use the matrix schedule to set up the heats for each round. 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).

**15.1.a.** For races with more than 8 participants, we heartily recommend Paul Herman's NMPRA matrixing and scoring program and the NMPRA JudgeTimer program for lap counting.

**15.1.1. RCPRO Warbird Racing style points reduction procedures.** Check 13.1.11.2)

**15.1.1.a.** For races with more than 8 participants, we heartily recommend Paul Herman's RCPRO Warbird matrixing and scoring program.

**15.2. Adjustment of the matrix during the contest.** Sometimes, attrition or other factors may result in a number of "bye" or solo heats. In such a case the CD may be tempted to rematrix the remaining entries. Remember that consistency is part of the task of racing, and depriving a contestant of an easy win when competitors are not prepared to come to the starting line alters the task. Therefore, rematrixing should 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 may be ranked according to points or fast times and race in "Features/mains". This should result in closer, more exciting races.

We encourage all RCPRO Club 40 race promoters to consider use of the NMPRA JudgeTimer, sometimes called Judgeman, program for lap counting and timing. I may be downloaded FREE from the NMPRA site. You can test it using your mouse or keyboard input. In actual use, you will need push button signalers for the lap counting personnel. There is an article in the RCPRO forums on how to do this quite easily.