Radio Control Pylon Racing

AMA recognizes four classes of RC Pylon Racing for US competition. All are intended for multi-channel RC aircraft powered by conventional 2-stroke glow engines. The task consists of an ROG (rise-off-ground) takeoff (or, in the case of 1/2A, a hand launch) followed by left turns around a closed course marked out by pylons. The builder-of-the-model rule does not apply.

Specific rule formulas concerning airframes and engines, as well as any nonstandard rules or procedures applicable to each event, can be found under section 16, *Event-Specific Rule Formulas.*

OUTLINE/TABLE OF CONTENTS

1. General

1.1. Cross-references. All AMA regulations (see sections entitled *Sanctioned Competition, Records, Selection of Champions,* and *General*) and FCC regulations covering the RC pilot and his or her aircraft and radio equipment shall apply except in cases of direct conflict between such regulations and an RC Pylon rule. To the extent of any such conflict, the applicable RC Pylon rule shall prevail.

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

2. Defined Terms

Words and phrases used in these rules shall be read in context and construed according to the rules of grammar and common usage. Standard dictionary definitions shall govern except when terms are specifically defined in this section.

AAC: Aluminum/Aluminum/Chrome metallurgy used in the piston and cylinder liner of an engine such that an aluminum piston runs in a chrome-plated, aluminum liner.

ABC: Aluminum/Brass/Chrome metallurgy used in the piston and cylinder liner of an engine such that an aluminum piston runs in a chrome-plated, brass liner.

APC: Brand name of a line of composite propellers manufactured by Landing Products, Woodland, California.

Backplate mount: A backplate-type, radial engine mount that replaces the stock engine backplate and that displaces the same crankcase volume as the stock backplate assembly.

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.

Carburetor: An open chamber, at or near the air intake of the engine, in which fuel and air are mixed and which features a rotating barrel, butterfly valve, slide valve, or other device that regulates the

total amount of fuel/air mixture entering the engine.

Commercially available: An engine or part is commercially available if:

a. An identical engine or part can be obtained within 14 days by any consumer at a price that is independent of who the consumer is; and

b. The manufacturer or other source has given the notice required by subsection 6 of this section, *Availability of Engines and Parts,* and received a letter of approval from the chairman of the RC Racing Contest Board; and

c. The following information is disseminated by means of a catalog, an advertisement in a regular AMA or NMPRA (National Miniature Pylon Racing Association) publication or aeromodeling magazine, or other means reasonably calculated to bring it to the attention of RC Pylon Racing contestants:

1) Catalog number or other specific identification;

2) Price; and

3) Name and telephone number of the manufacturer or other source.

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; except that the following parts may be substituted for the original parts and may come from any source:

Backplate mount

Bearings

Gaskets

Glow plug

Head and crankcase bolts

Propeller nut

Propeller washer

Remote needle valve assembly

Shutoff mechanism

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

Expansion chamber muffler: A muffler that completely covers the exhaust outlet of the engine and collects exhaust gases in a hollow chamber containing no internal pipes, baffles, perforations, ducts, or other devices of any kind.

Front-intake engine: An engine that has a single carburetor or venturi permanently mounted ahead of the cylinder and in which fuel/air mixture flows into the crankcase through an opening in the crankshaft. The use of a remote needle valve does not convert a front-intake engine into a rear-intake engine.

NMPRA: The National Miniature Pylon Racing Association or a successor organization officially recognized by the AMA as the special interest group for RC Pylon Racing.

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 or venturi 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.

Tuned muffler: A type of muffler, also known as a "magic muffler" or "folded pipe," in which a constant-diameter exhaust extractor of a specific length is enclosed within a chamber so that it resonates at the engine's operating rpm, adding power.

Tuned pipe: An exhaust pipe of specified length, containing diverging and converging chamber sections, that resonates at the engine's operating rpm, adding power.

Unmodified: Identical to a commercially available engine or part received from a manufacturer that has met all requirements of part 6, *Availability of Engines and Parts.*

Venturi: An open chamber, at or near the air intake of the engine, in which fuel and air are mixed. A venturi differs from a carburetor in that a venturi does not have a rotating barrel, butterfly valve, or other device that regulates the total amount of fuel/air mixture entering the engine.

Zero-boost muffler: A muffler that contains internal pipes, stepped pipes, baffles, perforations, ducts, or other devices to offset the power loss normally associated with an expansion chamber muffler, but does not increase power by more than 300 rpm in any rpm range.

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 x cylinder diameter) x (1/2 x cylinder diameter) x 3.1416 x (total piston stroke).

3.2. Expansion chamber muffler. The presence of internal pipes, baffles, etc., can be determined by disassembly of the muffler or, if this is not practical, by the insertion of a wire or probe through the exhaust outlet. Alternatively, the engine can be run with and without the muffler using a propeller that allows the engine to unload to the expected in-air rpm (normally 10% to 15% higher than takeoff rpm). If the engine gains rpm with the addition of the muffler, or will not run without the muffler, the muffler is not an expansion chamber muffler.

3.3. Fuselage depth. When fuselage depth is measured within the chord of the wing, the thickness of the wing at the point of measurement is included in fuselage depth.

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

3.5. Propeller diameter. Propeller diameter is the straight-line distance from tip to tip.

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.

3.7. Wing area. Wing area is determined by multiplying the projected wingspan by the average wing chord, including the area displaced by the fuselage but not including fillets or stall strips. On aircraft that have flaps, the wing area shall be measured with the flaps retracted.

3.8. Wing thickness. This shall be determined using a "no-go" gauge with an opening of the specified thickness. On aircraft with tapered wings, the gauge shall not "go" less than three (3) inches outboard of the wing centerline. If fillets or other obstructions prevent measurement at the three-inch point, the gauge shall not "go" past a point outboard of such obstructions.

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.

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.

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 on the racecourse diagram. Every person desiring to go onto the racecourse or between the designated sideline and the racecourse 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.

4.2.3. A ready area should be established for pilots who have fueled and are preparing to go onto the racecourse for their next heat. The ready area shall not be closer to the racecourse than the designated sideline.

Only pilots, callers (one per pilot), starter, and assistant starter are to be permitted on the racecourse, in the locations indicated on the racecourse diagram, during the operation of any race.

4.2.4. Except for the starter and assistant starter, all judges, timers, lap counters, and other racecourse officials shall be located at least 300 feet from the nearest pylon or from the nearest line running between two pylons, as shown on the racecourse diagram.

Racing events that cannot obtain the 300-foot minimum due to the geographic restrictions at their specific race site may apply in writing to the AMA Technical Director for a waiver of the 300-foot requirement. This must be done on the Pylon Sanction Application at the time of initial sanction request. The Technical Director will consult with the District Vice President and either grant or deny the waiver. The waiver shall only be granted if all workers closer than 300 feet are protected by a barrier cage.

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.

4.5. NMPRA cooperation. Violation of safety procedures by a contestant may result in the cancellation of NMPRA championship points earned by that contestant in the contest. Disregard of AMA event rules or safety procedures by a CD, hosting club, or racecourse official may result in the cancellation of all NMPRA championship points earned by all contestants in the contest. Any decision concerning NMPRA championship points shall be made exclusively by NMPRA and are not subject to AMA's protest procedure.

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

6.1. Declaration.

6.1.1. Any person, group of persons, or business entity may declare themselves to be a manufacturer or source of commercially available engines or parts. Such a person, group, or entity does not have to fully or partially fabricate complete engines or engine parts, but must fully comply with any and all applicable quantity and availability requirements applicable to the event(s) the engine or part is qualified to be used in.

6.1.2. An acceptable declaration shall contain a list of all uniquely identifiable engine assemblies, subassemblies, or parts for each applicable competition event. The list shall contain any pertinent part, assembly, or product identification numbers plus source-approved or recommended replacement, alternative, or modified part associations. Furthermore, the declaration shall state that the listed products conform to the current AMA rules for competition events of interest.

6.2. Acceptance and publication. The declaration shall be sent to AMA Headquarters and forwarded to the Contest Board Chairperson for his or her letter of approval. If approved, a copy of the declaration and approval letter shall be sent to *Model Aviation* for publication and to the NMPRA.

7. General Model Aircraft Requirements

(Note: for event-specific requirements such as wing area, weight, engine displacement, etc., please refer to the individual event listings.)

7.1. Conventional design. Aircraft used in RC Pylon events shall be of conventional design with forward wing, aft horizontal stabilizer, and a single engine mounted in front. No deltas or other tailless designs shall be allowed. An aircraft shall be considered tailless if the ratio of its wingspan to its overall length is greater than 2:1. The "overall length" of the aircraft, for purposes of this measurement, is the distance from the front of the propeller to the trailing edge of the rearmost movable tail surface.

7.2. Engine shutoff.

7.2.1. Every aircraft shall be equipped with a positive means of shutting off the engine in flight. In 1/2A, this may consist of a fixed fuel pickup inside the fuel tank or some other method activated by the aircraft's attitude or by the operation of flight controls. In all events other than 1/2A, the throttle or shutoff mechanism shall be activated by a dedicated, operable servo and shall not affect the aircraft's flight path. Regardless of the method used, shutoff must occur within five (5) seconds of command.

7.2.2. A pilot whose shutoff system fails 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: Except in 1/2A, every aircraft shall be equipped with a positive means of steering on the ground using a dedicated, operable servo(s). Aerodynamic yaw control by means of a movable rudder or "V" tail fulfills this requirement. In addition, while in flight, all aircraft shall be positively and independently controllable in pitch and roll 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. If the engine is 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. A spinner with a flat, oval, or Allen (hex) head of at least 3/16-inch diameter on the front fulfills this requirement. The use of a spinner of any size in Quickie 500 or Sport Quickie shall not be considered streamlining of the engine.

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. In events requiring stock, commercially available propellers, 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: 250 milliamp-hours (mAh) for all events except 1/2A, and 150 mAh for 1/2A.

e. Servos controlling the pitch and roll functions shall be of adequate strength for the weight and speed of the aircraft. Except in 1/2A, whenever a single servo is used to control one of these functions, it shall be designed and built to accommodate at least four mounting screws. When two or more servos are used together to control the same function, as in the case of dual aileron servos or the movable tail surfaces on a "V"-tailed aircraft, each of such servos may be of the two-screw variety.

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.

h. Servo trays, if used, shall be restrained by at least one safety screw (not turned down tight) that will prevent the tray from becoming completely dislodged if the primary mounting screws loosen in flight.

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 Markings

10.1. Registration numbers. Registration numbers shall consist of the last two or three digits of the pilot's AMA number, preceded by a capital "N" and followed by the first letter of the pilot's last name. Alternatively, registration numbers may consist simply of the pilot's full AMA number. Letters and numbers shall be clearly legible, at least one (1) inch high, and located either on the top of the starboard wing panel or on both sides of the fuselage, behind the wing.

10.2. Racing numbers and area letters.

10.2.1. Racing numbers and area letters may be obtained from the NMPRA Secretary. The use of these identifiers is highly recommended, but not required. The numbers are located on the upper left and lower right hand wing panel facing toward the left side, so that the number will be right-side-up when the model is in a left bank. The height of the numbers shall be at least three (3) inches. Area letters should immediately follow the racing numbers and should be at least 1/2 inch high.

10.2.2. The assigned area letters are as follows:

A-Northern California.

B-Central California, Hawaii.

C-Southern California.

D-Nevada, Utah, Arizona.

E-Oregon, Washington, Idaho, Alaska.

F-Colorado.

G-Montana, Wyoming, South Dakota, North Dakota, Nebraska, Kansas.

H, I-New Mexico, Oklahoma, Texas, Arkansas, Louisiana.

J-Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island.

K, L, M-New York, New Jersey.

P-Ohio, Pennsylvania, West Virginia.

Q, R-Maryland, Virginia, North Carolina, Delaware, Washington D.C.

S, T-Tennessee, Mississippi, Alabama, Georgia, Florida, South Carolina.

U, V-Missouri, Illinois, Indiana, Kentucky.

W-Minnesota, Wisconsin, Michigan, Iowa.

11. Advertisements

Advertising of a racing contest through any media should include the following information:

a. Event numbers of the events that will be run.

b. Airframe and engine rule variations, if any;

c. Course length and number of pylons, if different from the 3-pylon, 2-1/2-mile course;

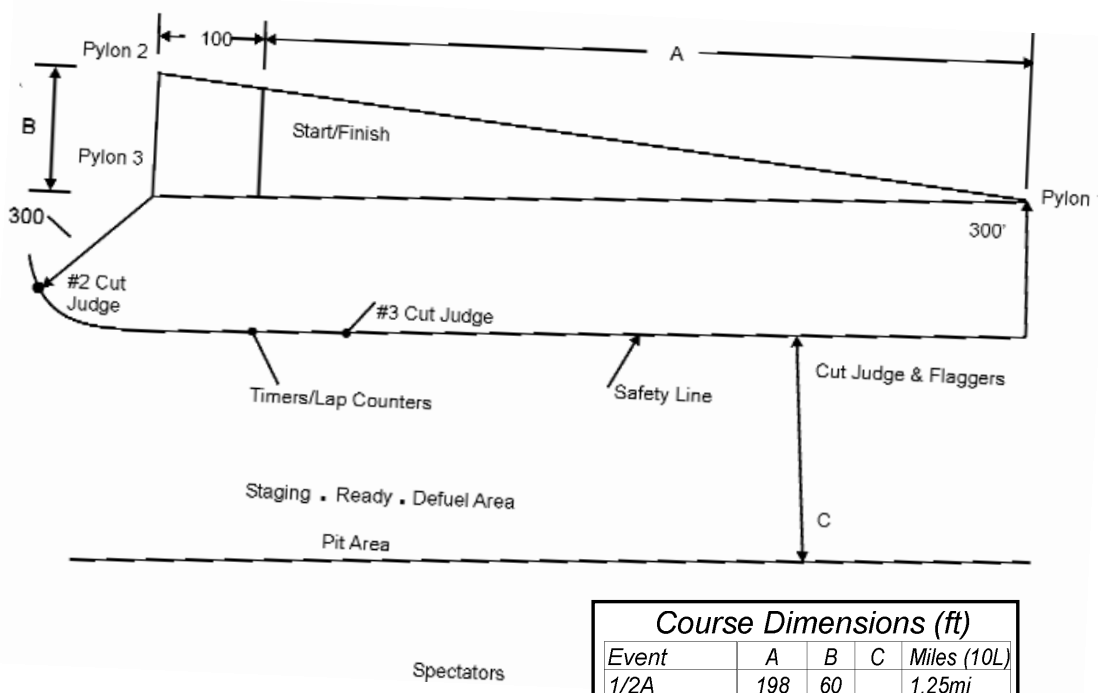
d. Nitro content of fuel to be supplied.

e. Brand and size of propellers to be supplied, if any.

12. Test Flying

Test flying at the contest site on the day of the contest is strongly discouraged and, if allowed, shall be strictly limited. Whenever possible, the hosting club is encouraged to set aside practice time on the day before the contest so that all contestants shall have an equal chance to get the feel of the race-course. Regardless of when test flying occurs, the following rules shall apply:

a. Each test flight shall be individually cleared in advance by the CD or other representa-



Course Dimensions (ft)

Event	*A*	*B*	*C*	*Miles (10L)*
1/2A	*198*	*60*		*1.25mi*
Q-40	*508*	*100*	*150*	*2.5mi*
Q 500 Sport	*375.5*	*100*	*150*	*2.0mi*
Q 500	*508*	*100*	*150*	*2.5mi*

tive of the hosting club.

b. Some form of radio frequency control shall be observed.

c. 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.

e. No more than two aircraft shall be in the air at a time except during a warm-up heat for the benefit of the racecourse workers.

13. Operation of the Race

(Refer to racecourse diagram and Addendum A, *Racecourse Personnel and Their Duties.*)

13.1. Three pylon racecourse.

13.1.1. The standard course is triangular, with an individual lap length of 1/4 mile. Total distance traveled in 10 laps is 2-1/2 miles (13,200 feet). CDs should strive to select a course length that will produce 10-lap times between one (1) minute (a very fast pace) and two (2) minutes (a slow pace, suitable for beginners). This will depend on the rule formula selected and the reasonably anticipated speed of the aircraft. When in doubt, follow the guidelines on the chart accompanying the racecourse diagram.

13.1.2. Pylon height shall be a maximum of 20 feet and a minimum of 15 feet. pylons #2 and #3 shall be equal in height. There shall be no pilots' helpers at any of the pylons or near any judges.

• **13.1.3.** On the sideline and looking toward #1 pylon, there shall be one chief judge plus an additional judge ("flagger") assigned to each pilot in the heat. The flaggers shall sit or stand perpendicular to the direction of the course and at least 300 feet away, unless a specific distance waiver has been granted by the Technical Director and District Vice President as described in paragraph 4.2.4. If the distance waiver is granted, the chief judge and flaggers must be seated in a protective barrier cage.

• **13.1.4.** For the #2 pylon, there be shall a judge positioned at least 300 feet away from the #3 pylon in the direction indicated on the racecourse diagram. This is approximately a 30 degree angle from the center line of the course, but may be up to 45 degrees if space permits.

• **13.1.5.** For the #3 pylon, there shall be a judge positioned at least 300 feet away from the #3 pylon in the direction indicated on the racecourse diagram. This is approximately a 30 degree angle from the center line of the course, but may be up to 45 degrees if space permits.

• **13.1.6.** Lap counters and timers are to be located on the sideline and looking toward the start/finish line.

• **13.1.7.** Each heat race begins with the aircraft stationary at or behind the start/finish line and ends when the aircraft cross the start/finish line after completing 10 laps (or 11 laps for an aircraft that has cut once). 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 1/2A, 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. Engine starting time.

13.1.8.1. Pilots have a maximum of one (1) minute to start their engines and prepare for takeoff. Once the starting period has elapsed, 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 or her engine in the course area.

13.1.8.2. If determined at the pilots' meeting before the race, the heat may be started on a "go when ready" basis, that is, when all pilots and callers are ready before the starting period has elapsed. If the pilots have elected to go when ready, 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 or her "ready" status by a nod of the head or other agreed signal. However, the pilots are only entitled to a confirmation *before* the starting period has elapsed. Once the starting period has elapsed, 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 or her engine in the course area.

13.1.9. Unless otherwise specified, 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. 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. All aircraft are to be signaled the moment they break the plane ("gate") established by the #1 pylon and the flaggers' position. There will be no signals at the #2 or #3 pylons unless a pylon is cut. 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 refly if the pilot does not receive notification of a cut before the completion of the heat.

13.1.11. 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.

13.1.12. Pilots whose callers push off before their launch signal shall receive a cut for that heat. A blatant early push 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 #2 twice, or once below the top of #2 and once below the top of #3) 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 timekeeping 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 ("refly"). The refly shall be held at the earliest convenience of the pilons 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 and who were prepared for takeoff (facing #1 pylon with both hands on the transmitter) at the end of the engine starting period shall be called up again for the refly. Except for zeros earned as a result of not being prepared for takeoff, none of the prior scores or results from the void heat shall carry over.

13.2. Optional two-pylon racecourse.

13.2.1. The purpose of the two-pylon race course is to provide a course layout that does not require any personnel to be on the race course. All flying and judging is to be conducted from the sidelines.

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) all located off the course. 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.

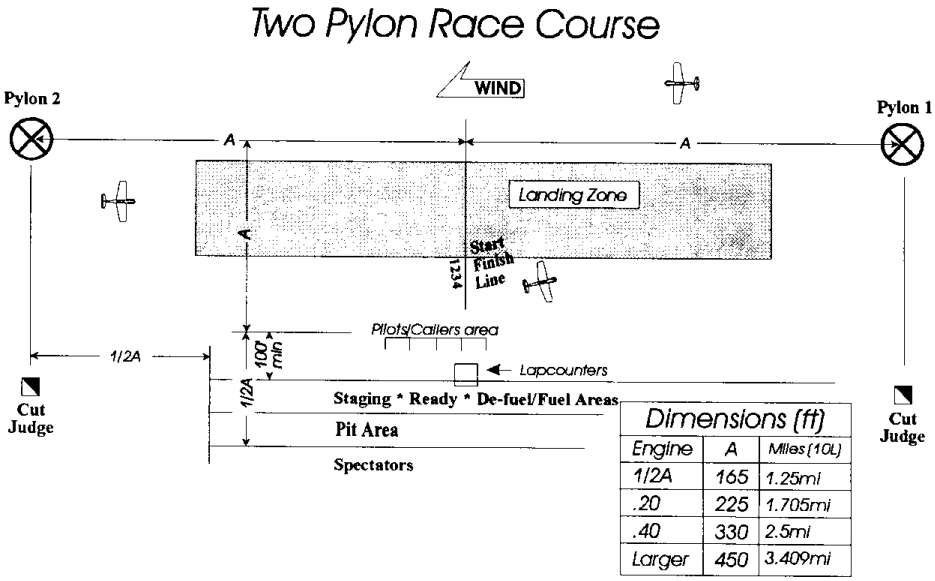
b. Method 2: This is the same as Method 1 except it requires flaggers for each aircraft, stationed off the race course, in line with the pylons. They signal (by flag, shutter or light) when each aircraft has passed the respective pylon and record cuts as in Method 1. This method requires a much larger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

14. Heat matrix

(Refer to matrix diagram.)

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. 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 the loser 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. 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. If a new national record is set during a flyoff race, the flyoff race shall be considered part of the "AMA-sanctioned competition" for purposes of paragraph 2, "Acceptance of Records," under "RECORDS" in the General Information section of this rulebook.

16. Event-specific rule formulas

16.1. Event 422: Quarter 40

16.1.1. Airframe

a. Weight. Minimum four (4) pounds, maximum five (5) pounds.

b. Wings.

1) Area: Minimum 400 square inches.

2) Span: Maximum 56 inches (projected).

3) Chord: No limit.

4) Airfoil thickness: Minimum 7/8-inch at the "no-go" point (see paragraph 3.8.). Thickness shall progress uniformly in a straight line or convex taper from root to tip; except that, if the full-scale prototype has a different progression, the progression on the model may be similar. The wing taper, in addition to other distinctive design features, is subject to the design approval requirements of paragraph f. below.

c. Fuselage.

1) Depth: Minimum five (5) inches at its deepest point; except that models of P-51s and other full-scale prototypes with belly-mounted radiators shall have a fuselage depth of at least six (6) inches. Depth includes the radiator or belly scoop (if any) and the windshield, canopy, pilot's head, or headrest, but does not include tail surfaces, dorsal or sub fins, tail skids, or non-scale protuberances.

2) Width: Minimum three (3) inches at its widest point. Width and depth points need not coincide. Width does not include fillets, cheek cowl fairings, or non-scale protuberances.

3) Cross-sectional area: At some point, the cross-sectional area of the fuselage shall be at least 12.5 square inches, and the contestant shall be required to furnish templates to prove this. Fillets and cheek cowls are not to be included in the measurement.

4) Cross-sectional shape and features:

(a) Profile representations of any significant feature of the full-scale prototype are prohibited. Cross-sectional contours at the height and width measurements and at stations

Pylon Racing Heat Matrix

Maximum Number of Entries Per Column																																			
5	1	6	11	16	1	7	13	19	1	8	15	17	1	9	12	20	1	10	14	18															
	2	7	12	17	2	8	14	20	2	9	11	18	2	10	13	16	2	6	15	19															
	3	8	13	18	3	9	15	16	3	10	12	19	3	6	14	17	3	7	11	20															
	4	9	14	19	4	10	11	17	4	6	13	20	4	7	15	18	4	8	12	16															
	5	10	15	20	5	6	12	18	5	7	14	16	5	8	11	19	5	9	13	17															
6	1	7	13	19	4	9	14	19	2	12	16	19	3	10	18	19	3	11	14	22															
	2	8	14	20	5	10	15	20	3	7	17	20	4	11	13	20	4	12	15	23															
	3	9	15	21	6	11	16	21	4	8	18	21	5	12	14	21	5	7	16	24															
	4	10	16	22	1	12	17	22	5	9	13	22	6	7	15	22	6	8	17	19															
	5	11	17	23	2	7	18	23	6	10	14	23	1	8	16	23	1	9	18	20															
	6	12	18	24	3	8	13	24	1	11	15	24	2	9	17	24	2	10	13	21															
7	1	8	15	22	1	9	17	25	1	10	19	28	1	11	21	24	1	12	16	27	1	13	18	23	1	14	20	26							
	2	9	16	23	2	10	18	26	2	11	20	22	2	12	15	25	2	13	17	28	2	14	19	24	2	8	21	27							
	3	10	17	24	3	11	19	27	3	12	21	23	3	13	16	26	3	14	18	22	3	8	20	25	3	9	15	28							
	4	11	18	25	4	12	20	28	4	13	15	24	4	14	17	27	4	8	19	23	4	9	21	26	4	10	16	22							
	5	12	19	26	5	13	21	22	5	14	16	25	5	8	18	28	5	9	20	24	5	10	15	27	5	11	17	23							
	6	13	20	27	6	14	15	23	6	8	17	26	6	9	19	22	6	10	21	25	6	11	16	28	6	12	18	24							
	7	14	21	28	7	8	16	24	7	9	18	27	7	10	20	23	7	11	15	26	7	12	17	22	7	13	19	25							
8	1	9	17	25	4	11	18	25	7	13	19	25	2	15	20	25	6	10	21	25	3	12	24	25											
	2	10	18	26	5	12	19	26	8	14	20	26	3	16	21	26	7	11	22	26	4	13	17	26											
	3	11	19	27	6	13	20	27	1	15	21	27	4	9	22	27	8	12	23	27	5	14	18	27											
	4	12	20	28	7	14	21	28	2	16	22	28	5	10	23	28	1	13	24	28	6	15	19	28											
	5	13	21	29	8	15	22	29	3	9	23	29	6	11	24	29	2	14	17	29	7	16	20	29											
	6	14	22	30	1	16	23	30	4	10	24	30	7	12	17	30	3	15	18	30	8	9	21	30											
	7	15	23	31	2	9	24	31	5	11	17	31	8	13	18	31	4	16	19	31	1	10	22	31											
	8	16	24	32	3	10	17	32	6	12	18	32	1	14	19	32	5	9	20	32	2	11	23	32											
9	1	10	19	28	1	11	21	31	1	12	23	34	1	13	25	30	1	14	27	33	1	15	20	36											
	2	11	20	29	2	12	22	32	2	13	24	35	2	14	26	31	2	15	19	34	2	16	21	28											
	3	12	21	30	3	13	23	33	3	14	25	36	3	15	27	32	3	16	20	35	3	17	22	29											
	4	13	22	31	4	14	24	34	4	15	26	28	4	16	19	33	4	17	21	36	4	18	23	30											
	5	14	23	32	5	15	25	35	5	16	27	29	5	17	20	34	5	18	22	28	5	10	24	31											
	6	15	24	33	6	16	26	36	6	17	19	30	6	18	21	35	6	10	23	29	6	11	25	32											
	7	16	25	34	7	17	27	28	7	18	20	31	7	10	22	36	7	11	24	30	7	12	26	33											
	8	17	26	35	8	18	19	29	8	10	21	32	8	11	23	28	8	12	25	31	8	13	27	34											
	9	18	27	36	9	10	20	30	9	11	22	33	9	12	24	29	9	13	26	32	9	14	19	35											

Pylon Racing Heat Matrix

Maximum Number of Entries Per Column

10	1	11	21	31	1	12	23	34	1	13	25	37	1	14	27	40	1	15	29	33	1	16	22	39	1	17	24	32	1	18	26	35				
	2	12	22	32	2	13	24	35	2	14	26	38	2	15	28	31	2	16	30	34	2	17	23	40	2	18	25	33	2	19	27	36				
	3	13	23	33	3	14	25	36	3	15	27	39	3	16	29	32	3	17	21	35	3	18	24	31	3	19	26	34	3	20	28	37				
	4	14	24	34	4	15	26	37	4	16	28	40	4	17	30	33	4	18	22	36	4	19	25	32	4	20	27	35	4	11	29	38				
	5	15	25	35	5	16	27	38	5	17	29	31	5	18	21	34	5	19	23	37	5	20	26	33	5	11	28	36	5	12	30	39				
	6	16	26	36	6	17	28	39	6	18	30	32	6	19	22	35	6	20	24	38	6	11	27	34	6	12	29	37	6	13	21	40				
	7	17	27	37	7	18	29	40	7	19	21	33	7	20	23	36	7	11	25	39	7	12	28	35	7	13	30	38	7	14	22	31				
	8	18	28	38	8	19	30	31	8	20	22	34	8	11	24	37	8	12	26	40	8	13	29	36	8	14	21	39	8	15	23	32				
	9	19	29	39	9	20	21	32	9	11	23	35	9	12	25	38	9	13	27	31	9	14	30	37	9	15	22	40	9	16	24	33				
	10	20	30	40	10	11	22	33	10	12	24	36	10	13	26	39	10	14	28	32	10	15	21	38	10	16	23	31	10	17	25	34				
11	1	12	23	34	1	13	25	37	1	14	27	40	1	15	29	43	1	16	31	35	1	17	33	38	1	18	24	41	1	19	26	44	1	20	28	36	1	21	30	39
	2	13	24	35	2	14	26	38	2	15	28	41	2	16	30	44	2	17	32	36	2	18	23	39	2	19	25	42	2	20	27	34	2	21	29	37	2	22	31	40
	3	14	25	36	3	15	27	39	3	16	29	42	3	17	31	34	3	18	33	37	3	19	24	40	3	20	26	43	3	21	28	35	3	22	30	38	3	12	32	41
	4	15	26	37	4	16	28	40	4	17	30	43	4	18	32	35	4	19	23	38	4	20	25	41	4	21	27	44	4	22	29	36	4	12	31	39	4	13	33	42
	5	16	27	38	5	17	29	41	5	18	31	44	5	19	33	36	5	20	24	39	5	21	26	42	5	22	28	34	5	12	30	37	5	13	32	40	5	14	23	43
	6	17	28	39	6	18	30	42	6	19	32	34	6	20	23	37	6	21	25	40	6	22	27	43	6	12	29	35	6	13	31	38	6	14	33	41	6	15	24	44
	7	18	29	40	7	19	31	43	7	20	33	35	7	21	24	38	7	22	26	41	7	12	28	44	7	13	30	36	7	14	32	39	7	15	23	42	7	16	25	34
	8	19	30	41	8	20	32	44	8	21	23	36	8	22	25	39	8	12	27	42	8	13	29	34	8	14	31	37	8	15	33	40	8	16	24	43	8	17	26	35
	9	20	31	42	9	21	33	34	9	22	24	37	9	12	26	40	9	13	28	43	9	14	30	35	9	15	32	38	9	16	23	41	9	17	25	44	9	18	27	36
	10	21	32	43	10	22	23	35	10	12	25	38	10	13	27	41	10	14	29	44	10	15	31	36	10	16	33	39	10	17	24	42	10	18	26	34	10	19	28	37
	11	22	33	44	11	12	24	36	11	13	26	39	11	14	28	42	11	15	30	34	11	16	32	37	11	17	23	40	11	18	25	43	11	19	27	35	11	20	29	38
12	1	13	25	37	1	14	27	40	1	15	29	43	1	16	31	46	1	17	33	38	1	18	35	41	1	19	26	48	1	20	28	39				
	2	14	26	38	2	15	28	41	2	16	30	44	2	17	32	47	2	18	34	39	2	19	36	42	2	20	27	37	2	21	29	40				
	3	15	27	39	3	16	29	42	3	17	31	45	3	18	33	48	3	19	35	40	3	20	25	43	3	21	28	38	3	22	30	41				
	4	16	28	40	4	17	30	43	4	18	32	46	4	19	34	37	4	20	36	41	4	21	26	44	4	22	29	39	4	23	31	42				
	5	17	29	41	5	18	31	44	5	19	33	47	5	20	35	38	5	21	25	42	5	22	27	45	5	23	30	40	5	24	32	43				
	6	18	30	42	6	19	32	45	6	20	34	48	6	21	36	39	6	22	26	43	6	23	28	46	6	24	31	41	6	13	33	44				
	7	19	31	43	7	20	33	46	7	21	35	37	7	22	25	40	7	23	27	44	7	24	29	47	7	13	32	42	7	14	34	45				
	8	20	32	44	8	21	34	47	8	22	36	38	8	23	26	41	8	24	28	45	8	13	30	48	8	14	33	43	8	15	35	46				
	9	21	33	45	9	22	35	48	9	23	25	39	9	24	27	42	9	13	29	46	9	14	31	37	9	15	34	44	9	16	36	47				
	10	22	34	46	10	23	36	37	10	24	26	40	10	13	28	43	10	14	30	47	10	15	32	38	10	16	35	45	10	17	25	48				
	11	23	35	47	11	24	25	38	11	13	27	41	11	14	29	44	11	15	31	48	11	16	33	39	11	17	36	46	11	18	26	37				
	12	24	36	48	12	13	26	39	12	14	28	42	12	15	30	45	12	16	32	37	12	17	34	40	12	18	25	47	12	19	27	38				

determining the likeness to the full-scale prototype shall maintain the integrity of the contours in the full-scale prototype. The only exception permitted shall be in the engine compartment for maintenance purposes.

(b) Cheek cowls, canopy, and belly scoop, if any, shall have at least a 5/8-inch radius at their widest point so that a hypothetical 1-1/4-inch-diameter ball would fit inside, tangent to the outer surface. A cowl, canopy, or scoop with an oval or rectangular cross-section and corners of less than 5/8-inch radius satisfies this requirement if the hypothetical 1-1/4-inch-diameter ball would be fully enclosed.

(c) Removable cowls are prohibited. The front end of the fuselage shall be configured so that the engine head and cylinder protrude on all sides at least 3/4 inch, not including the glow plug, and the muffler is fully exposed for its entire length. However, the fuselage may incorporate a shallow channel, dimple, or trough to provide clearance for the muffler. In addition, the access hole for the engine crankcase and mounting lugs may be covered with a piece of fiberglass, Mylar®, or other stiff material, not more than 0.020 inches thick, that restores the original contours of the fuselage in that area.

d. Landing gear.

1) Location and size: The landing gear shall be fixed and shall resemble that of the full-scale prototype aircraft as to location on the airframe and the number of wheels used. At least two (2) of the wheels shall have a diameter of at least 2-1/4 inches.

2) Streamlining: Wheel pants, wheel spats, or strut fairings are not required, and are permitted only if they were used on the full-scale prototype.

e. Replica rule.

Models entered in this event shall be recognizable replicas of full-scale, human-carrying, propeller-driven aircraft that either raced in or were built for closed-course or cross-country racing or a speed record attempt.

f. Prior approval of designs.

1) Procedure: All designs, past and future inclusive, shall not be entered in competition until three (3) accurate views or photos of the model and the full-scale prototype aircraft have been submitted to a five-member subcommittee of the RC Racing Contest Board and approved by an affirmative vote of at least three members thereof. Such approval may be given orally, but shall be recorded for future reference. In the case of unusual or little-known designs, the designer shall produce documentation to clarify that such a design did exist. A model shall be considered eligible for competition if it meets all dimensional requirements of these rules and, in addition, does not vary significantly from the approved three-views or photos of the same design.

2) Membership of committee: The five-member committee shall be appointed by the Chairperson of the RC Racing Contest Board and may consist of any five members, including the Chairperson, who do not have a financial interest in any kit manufacturing business that produces airplane kits for this event. If a design has been disapproved by the five-member subcommittee, the designer is entitled to review by the entire contest board.

16.1.2. Powerplant

a. Engine.

1) Maximum displacement: 0.403 cubic inch.

2) Configuration: Stock, commercially available, front-intake, side-exhaust.

3) Intake: A single carburetor or venturi with a maximum inner diameter of 9 mm (0.3543 inch). Carburetors or venturis may be modified and are not subject to availability rules.

4) Exhaust system:

(a) General description: The engine shall be equipped with an expansion chamber muffler, zero-boost muffler, or tuned muffler as provided by the manufacturer for the engine being used, and having a single exhaust outlet with a maximum outlet area of 0.0621 square inches (equivalent to the area of a round hole measuring 9/32 inch in diameter).

(b) Inner configuration of tuned mufflers: A tuned muffler used in this event shall have only one internal part, a straight tube or extractor of the type commonly known as a "mini-pipe". The mini-pipe shall have a constant, circular cross-section and constant inside and outside diameter, with the following exception: the sidewall of the tube may be thickened, not to exceed 1/16-inch wall thickness, within 1/2 inch of the front end of the mini-pipe where it attaches to the header.

(c) Outside dimensions: The distance from the center of the piston to the centerline of the muffler shall not exceed 2-3/4 inches. The overall length of the muffler shall not exceed 7-1/4 inches, measured from the front of the header to the back of the exhaust outlet. The outside diameter shall not exceed 1-3/4 inches, and both the inside and outside diameter of the outside shell of the muffler shall remain constant for at least 4-1/2 inches.

(d) Modifications: No modifications to the muffler are permitted except that the muffler may be tapped for a pressure fitting to supply pressure to the fuel system.

5) Fuel feed: Other than muffler pressure, no fuel system pressurization is permitted.

b. Propeller.

1) Material: Either wood or a chopped carbon fiber filled injection-molded compound with tensile strength at least equivalent to that of Ticona Celstran PA6-CF35-15.

2) Dimensions: No limit for wood. Injection-molded propellers shall have a diameter, pitch, blade width, and blade airfoil identical to that of the approved part number at every measurable station.

3) Availability, modification: Wood propellers may be modified. Injection-molded propellers shall be commercially available and stock except for balancing, etc. as permitted by para-

graph 7.5.2 under "General Model Aircraft Requirements."

4) Prior approval: APC part number LP07480C, bearing raised markings "7.4 x 8.0" on the blade outside the hub, is approved.

5) Eligibility for competition: A propeller once approved shal be wligible for competition so laf as it remains commercially available, as defined in section 2, "Defined Terms."

c. Fuel.

The fuel shall be commercially available, containing not more than 15 percent nitromethane, and shall be supplied and dispensed by the hosting organization. The dispensing operation shall include draining the tank of any existing fuel and then filling from a supply container when the pilot brings the aircraft to the ready box.

16.2. Event 428: Quickie 500

16.2.1. Airframe

a. Weight. Minimum 3-1/2 pounds, maximum 4-1/2 pounds.

b. Wings.

1) Area: Minimum 500 square inches.

2) Span: Minimum 50 inches (projected), maximum 52 inches (projected).

3) Chord: Constant for at least 47-1/2 inches of span.

4) Airfoil thickness: Minimum 1-3/16 inches for at least 47-1/2 inches of span.

c. Fuselage.

1) Depth: Minimum 3-1/2 inches at its deepest point, which must occur within the wing chord.

2) Width: Minimum 2-7/8 inches at its widest point, which must occur within the wing chord. Width and depth points need not coincide.

3) Cross-section: The fuselage shall have a simple, rectangular "box" cross-section with a maximum radius of 1/4 inch at the corners. Diamond-shaped cross sections are prohibited. Fillets or fairings between the fuselage and wing are prohibited. Canopies and turtle decks are acceptable but shall not be included in width or depth measurements. The front firewall shall be a rectangular, flat plate measuring at least 2-1/4 inches by 2-1/4 inches. The perimeter of the front firewall may be rounded to a maximum radius of 1/4 inch.

4) Engine installation: The engine and engine mount shall be fully exposed. No cowling or streamlining of the engine is permitted. A backplate-type radial engine mount that replaces the stock engine backplate may be used so long as it displaces the same crankcase volume as the stock backplate assembly. Corners and edges of the engine mount may be rounded to a maximum radius of 1/4 inch.

d. Landing Gear. The landing gear shall be fixed, with at least two main wheels of a diameter not less than 2-1/4 inches. The main wheels shall be at least seven (7) inches apart, measured parallel to the wing span. No wheel pants, wheel spats, or strut fairings shall be used to streamline the main landing gear. Struts shall be either round wire, at least 1/8-inch in diameter, or flat stock no more than 1/8-inch thick. Flat stock may be filed or otherwise shaped to an airfoil cross-section but must have a blunt leading edge. Nose or tail wheels, if used, may be streamlined or enclosed.

16.2.2. Powerplant

a. Engine.

1) Maximum displacement: 0.403 cubic inch.

2) **Configuration:** Stock, commercially available, front-intake, side-exhaust.

3) **Intake:** A single carburetor with a maximum inner diameter of 9 mm (0.3543 inch). The carburetor may be locked or pinned in the open position and needs not be functional; except that, if the carburetor is not functional, a separate engine shutoff mechanism shall be used. Other than such locking or pinning, the carburetor shall be stock. Venturis are prohibited.

4) Exhaust system:

(a) General description: The engine shall be equipped with an expansion chamber muffler, zero-boost muffler, or tuned muffler as provided by the manufacturer for the engine being used, and having a single exhaust outlet with a maximum outlet area of 0.0621 square inches (equivalent to the area of a round hole measuring 9/32-inch in diameter).

(b) Inner configuration of tuned mufflers: A tuned muffler used in this event shall have only one internal part, a straight tube or extractor of the type commonly known as a "minipipe." The minipipe shall have a constant, circular cross-section and constant inside and outside diameter, with the following exception: the sidewall of the tube may be thickened, not to exceed 1/16-inch wall thickness, within 1/2-inch of the front end of the minipipe where it attaches to the header.

(c) Outside dimensions: The distance from the center of the piston to the centerline of the muffler shall not exceed 2-3/4 inches. The overall length of the muffler shall not exceed 7-1/4 inches, measured from the front of the header to the back of the exhaust outlet. The outside diameter shall not exceed 1-3/4 inches, and both the inside and outside diameter of the outside shell of the muffler shall remain constant for at least 4-1/2 inches.

(d) Modifications: No modifications to the muffler are permitted except that the muffler may be tapped for a pressure fitting to supply pressure to the fuel system.

• **5) Fuel feed:** Other than muffler pressure, no fuel system pressurization is permitted.

b. Propeller.

1) Materials:

(a) Wood; or

(b) APC composite, packaged for '40 Pylon' and containing a D-1 designation on the outside hub.

2) Dimensions: Minimum diameter 8-3/4 inches for APC, 8-1/2 inches for wood.

3) Availability, modification: Propellers shall be commercially available and stock, except as otherwise provided in paragraph 7.5.2.

c. Fuel. The fuel shall be commercially avail-

able, containing not more than 15 percent nitromethane, and shall be supplied and dispensed by the hosting organization. The dispensing operation shall include draining the tank of any existing fuel and then filling from a supply container when the pilot brings the aircraft to the ready box.

16.2.3. Special Provisions. The CD or the CD's designee may elect to check the top three finishers' engines for legality at the end of the contest. In addition, CDs are encouraged to check the carburetor bore, muffler outlet area, and propeller diameter of aircraft that are being weighed immediately after each heat.

16.3. Event 424: Sport Quickie

• **16.3.1. Airframe.** The airframe specifications for this event are identical to those for Quickie 500 (Event No. 428) with the following exceptions: wing and tail construction. Wings and tails must be constructed of either all wood or wood sheeting over a solid foam core. Wings and tails manufactured in molds designed to produce hollow core structures are prohibited. Traditional fiberglass reinforcement or carbon fiber or inset wood spars continue to be acceptable. The last three inches of each wing tip may be made of any material. The intent of the rule is to keep the cost of participation to a minimum.

16.3.2. Powerplant

a. Engine.

1) Maximum displacement: 0.403 cubic inch.

2) Configuration: Stock, commercially available, front-intake, side-exhaust.

3) Intake: A single carburetor, as supplied by the manufacturer of the engine being used, with a maximum inner diameter of 0.325 inch. The carburetor shall be fully functional and shall be stock, except for longevity-enhancing modifications as follows:

(a) Adjustment screws and idle needle valves may be held in place with commercially available thread locker, epoxy, or other adhesives and safetied with rubber bands, wire, or plastic ties.

(b) Barrel retaining screws or pins may be replaced with commercially available screws or pins of harder material and may be held in place with commercially available adhesives. Barrels may be deburred for smoother movement and may be safetied with rubber bands, wire, or plastic ties.

(c) Throttle arms may be modified or replaced.

4) Exhaust system: The engine shall be equipped with an expansion chamber muffler or zero-boost muffler as provided by the manufacturer of the engine being used, and having a single exhaust outlet with a maximum outlet area of 0.0621 square inches (equivalent to the area of a round hole measuring 9/32 inch in diameter). The distance from the center of the piston to the centerline of the muffler shall not exceed 2-3/4 inches. The overall length of the muffler shall not exceed 7-1/4 inches, measured from the front of the header to the back of the exhaust outlet. The outside diameter shall not exceed 1-3/4 inches. No modifications to the muffler are permitted except that the muffler may be tapped for a pressure fitting to supply pressure to the fuel system. Tuned mufflers and tuned pipes are prohibited.

5) Fuel feed: Other than muffler pressure, no fuel system pressurization is permitted.

• 6) Power output: Sport Quickie is intended as an entry-level event for pilots who are new to racing. Sample engines are tested via committee and a list of permissible engines is published and updated as necessary, annually. Criteria include purchase price and power output in both the normal takeoff RPM range and the presumed in-air ("unloaded") RPM range. Any engine with a tuned muffler is strictly prohibited. The cost of the engine must be below $120 (street price). If engines more powerful than this are to be used at a contest, the contest should be sanctioned as Quickie 500 (Event No. 428), not sport Quickie.

• 7) Prior approval of engines

a. Procedure: All engines, past and future inclusive, shall not be entered into competition until a five-member sub-committee of the RC Racing Contest Board has approved the engine by an affirmative vote of at least three members thereof. Such approval may be given orally, but shall be recorded for future reference. An engine shall be considered eligible for competition if it meets all requirements of section 16.3.2 and, in addition, does not hinder the state of this entry-level event as determined by the aforementioned five-member committee. The committee is appointed by the Racing Contest Board Chairman and will not include any member with a vested interest in the sale of manufacturing of an engine for this event. In addition any engine can be removed from the list by an affirmative vote of at least three members thereof.

b. Propeller.

1) Material: APC composite or a similar, commercially available composite.

2) Dimensions: Minimum diameter nine (9) inches. Nominal pitch six (6) inches, as indicated by the manufacturer's stamp or packaging.

3) Availability, modification: Propellers shall be commercially available and either supplied by the hosting organization or specified by brand and size in all pre-contest publicity. Propellers shall be stock, except as otherwise provided in paragraph 7.5.2.

c. Fuel. The fuel shall be commercially available, containing not more than 15 percent nitromethane, and shall be supplied and dispensed by the hosting organization. The dispensing operation shall include draining the tank of any existing fuel and then filling from a supply container when the pilot brings the aircraft to the ready box.

16.3.3. Special Provisions

a. Routine inspections encouraged: The CD or the CD's designee may elect to check the top three finishers' engines for legality at the end of the contest. In addition, CDs are encouraged to check the carburetor bore, muffler outlet area, and propeller diameter of aircraft that are being weighed immediately after each heat.

b. Rule variations permitted: The engine rules specified below have been used successfully on a local basis to limit the cost or power output of engines used in this event. These and any other variations from the rules specified above should be noted in all pre-contest publicity.

Note: any variation that results in the use of engines larger than 0.403 cu. in. displacement, tuned mufflers, or tuned pipes will result in the event being sanctioned as Quickie 500 (Event No. 428) rather than Sport Quickie.

1) A Claiming rule: In addition to either or both of the above approaches, a claiming rule allows any contestant to purchase any other contestant's engine after the contest for a specified price. $100 is suggested.

16.4. Event 423: 1/2A

16.4.1. Airframe.

a. Weight. Minimum 20 ounces, maximum 32 ounces.

b. Wings.

1) Area: Minimum 200 square inches.

2) Span: No limit.

3) Chord: No limit.

4) Airfoil thickness: Minimum 3/4 inch at the "no-go" point (see paragraph 3.8.). Thickness shall progress uniformly in a straight line or convex taper from root to tip.

c. Fuselage.

1) Depth: Minimum 3-1/2 inches at its deepest point, which must occur within the wing chord. Depth does not include tail surfaces, dorsal or sub fins, wheels, skids, or profile features.

2) Width: Minimum 2-1/4 inches at its widest point, which must occur within the wing chord. Width and depth points need not coincide. Width does not include fillets or cheek cowl fairings.

3) Cross-sectional shape and features: Models used in this event need not resemble full-scale aircraft; however, canopies and cowlings shall not be counted as part of the width or depth measurements unless they are at least one (1) inch wide at their base and have a cross-section similar to that found on an ordinary full-scale aircraft.

d. Landing Gear. Landing gear is not required.

16.4.2. Powerplant

a. Engine.

1) Maximum displacement: 0.0519 cubic inch.

2) Configuration: Stock, commercially available, front-intake.

3) Intake: A single carburetor or venturi. Carburetors or venturis may be modified and are not subject to availability rules.

4) Exhaust system:

(a) Mufflers: Local conditions shall determine muffler usage. When required, mufflers shall be stock, commercially available units. Only modification to the muffler inlet for the sole purpose of mounting to the engine shall be permitted.

(b) Exhaust extractors: When used, exhaust extractors shall be of constant inside diameter.

5) Fuel feed: Pressurized fuel systems are prohibited.

b. Propeller.

1) Material: Wood or composite.

2) Dimensions: No limit.

3) Availability, modification: Propellers shall be commercially available and stock, except as otherwise provided in paragraph 7.5.2.

c. Fuel. Fuel shall be commercially available and commercially mixed, containing not over 50 percent nitromethane.

ADDENDUM A: RACECOURSE PERSONNEL AND THEIR DUTIES

The material presented here is intended to "flesh out" the bare bones of the rules in a way that is helpful and readable. New CDs and racecourse workers should look here first for answers to frequently asked questions about how to conduct an RC Pylon race.

Please note, the suggestions contained in this addendum are not "rules," however, experience has shown that following these suggestions greatly improves the odds of conducting a race that complies with the rules and that contestants will consider fair and enjoyable.

Additional information, as well as illustrative diagrams and photographs of racecourse equipment, may be found in the NMPRA's *Pylon Racing Procedure Guide*. Contact AMA Headquarters for information about how to obtain a copy.

1. Overview. In addition to the CD, the personnel required to fully staff a three-pylon race at which four-plane heats will be flown consist of the following:

Starter
Assistant starter
Four timers/lap counters
Four pylon #1 flaggers
Pylon #1 chief judge
Pylon #2 cut judge
Pylon #3 cut judge
Pit boss
Scorekeeper
Fueling station supervisor
Transmitter impound supervisor

This brings the total to 17. Some of these positions can be combined if necessary. For example, an experienced starter may be able to get along without an assistant. The scorekeeper can double as pit boss. Fuel and transmitter impound functions can be combined so long as strict attention is paid to ensuring that all transmitters brought to the impound are turned off.

At smaller meets, the crew can be further

reduced by one timer/lap counter and one pylon #1 flagger if the aircraft are flown in three-plane heats rather than four-plane heats.

2. Starter and Assistant Starter. The starter's primary duties are to signal the start and finish of each heat, coordinate the efforts of the other racecourse workers, and transmit the scores and times from each heat to the assistant starter or scorekeeper.

The starter should be equipped with the following:

(a) A clipboard containing heat result sheets, in sequential order, with the pilots' names filled in and blanks for each pilot's finish position, number of cuts, official time, and points earned for the heat;

(b) A signal flag, preferably one bearing the classic black-and-white checkerboard pattern; and

(c) A walkie-talkie or headset radio. Other helpful accessories are a bullhorn, some numbered dice or cards for random assignment of aircraft to starting lane positions, and a large starting clock with a clearly visible sweep hand.

The assistant starter's primary duties are to help the starter deal with the paraphernalia listed above (chiefly the clipboard) and to act as a second set of eyes and ears for the starter in case of a close finish or other complication.

The starter and the CD should not be the same person, so the CD can act as an impartial arbiter if questions arise concerning operation of the race.

The starter should stand ahead and to the left of the starting line, as viewed from the pilots' standing area facing pylon #1. When the pilots have reached their assigned positions on the starting line, the starter should direct the pilots or callers to hold up the aircraft one by one, so that all the racecourse workers can clearly see and identify them. The starter should then broadcast (via walkie-talkie) a unique identifying number or color for each aircraft.

After identifying the aircraft, the starter should remind the pilots to make sure their transmitters and receivers are turned on and functioning properly. It is a good idea to ask to see a "wiggle" of confirmation from one of the control surfaces on each aircraft. After that, the starter announces, "You're on the clock," and the heat is ready to begin.

If one or more pilots have trouble starting their engines, the starter should not delay the launch signal. To do so would unfairly penalize those who got running promptly by allowing their engines to overheat. However, even if the pilots in the first of two groups in a staggered start (see paragraph 13.1.9.) are unable to go, the pilots in the second group still must wait for the second launch signal.

A good way to signal the two groups for a staggered start is to press the tip of the starting flag against the ground as the starting clock winds down, then abruptly raise the flag for the first launch signal. This prevents any chance of flinching ahead of time, and makes it easy to immediately drop the flag downward for the second launch signal.

During the heat, the starter and assistant starter should keep track of the lead aircraft and remain apprised of any cuts via walkie-talkie. The starter should strive to inform the pilots and callers (using the bullhorn if one is available) of any cuts as they are called by the cut judges. However, the fact that a pilot did not hear this information right away is not grounds for a refly.

The starter should call "up and out" to any pilot who appears to have double-cut or who is otherwise disqualified.

At the finish, the starter should wave the checkered flag for the aircraft in the order in which they complete their required number of laps. Then the starter and assistant starter should double-check via walkie-talkie with the timers/lap counters individually for each pilot's finish position, elapsed time, and cuts (if any), fill out the heat result sheet, and send it in to the scorekeeper with the winner of the heat.

Note that it is possible for a pilot who has already cut once to cut again on the 11th lap. This counts as a double-cut and results in a score of zero points even though the pilot received the checkered flag.

In the case of a "photo finish," the starter and assistant starter must determine the order of finish. Stopwatch times should not be used as a tiebreaker because manually operated stopwatches are not precise enough for this purpose.

Any disputes concerning the order of finish, times, cuts, etc., should be resolved promptly at the conclusion of the heat. If a pilot believes that a mistake in lap counting or calling of cuts has affected the order of finish, the order of finish can be changed only if the timer/lap counter or other racecourse officials involved freely admits making a mistake or if all the pilots in the heat agree on a different order of finish.

3. Timers/Lap Counters. The job of each timer/lap counter is to follow one aircraft, to the exclusion of all others, for the duration of the heat and to accurately record the laps completed and the elapsed time for that one aircraft. Ideally, the timer/lap counter's eyes should never leave his or her assigned aircraft between the time it is held up on the starting line for identification and the time the starter gives it the checkered flag at the end of the heat.

Standard equipment for the timer/lap counter consists of a stopwatch and a hand-held clicker or similar device for counting laps. At least one of the timers/lap counters should also be provided with a walkie-talkie, headset radio, or other means of communicating with the starter on the racecourse. Alternatively, a graphic display visible to the pilots. callers, and starter and actuated from the sideline may be used.

All of the timers/lap counters should start their stopwatches at the *first* launch signal from the starter. This is a reference from which all elapsed times are measured.

Each timer/lap counter should record a lap completed each time his or her assigned aircraft crosses the start/finish line. If the pilot of the aircraft is called for a cut and the cut information is relayed to the timer/lap counter, the timer/lap counter should make a mental note that the pilot will not be finished after 10 laps, but must go 11 laps to complete the heat.

On the pilot's last lap, the timer/lap counter should watch for the aircraft to cross the start/finish line and stop the stopwatch at the instant it does so.

If the stopwatches are capable of a "split" func-

tion, it is a good idea to get both a 10-lap and 11-lap time for each aircraft, just in case the pilot should cut on the 10th lap and need to make one more to complete the heat. (Experienced pilots will often make an 11th lap whether they need to or not, just for this reason.)

4. Pylon #1 Flaggers. Like the timers/lap counters, the pylon #1 flaggers each watch one aircraft, to the exclusion of all others, for the duration of the heat.

The primary job of each flagger is to signal the pilot when his/her aircraft has gone the required distance to pylon #1 and therefore can turn without cutting. The secondary job of each flagger is to notify the pylon #1 chief judge if the aircraft turns before getting to the pylon.

Flaggers are stationed on the sideline, looking directly out (i.e., perpendicular to the sideline) toward pylon #1.

The flaggers' standard equipment consists of (a) a color-coded signal light, shutter, or flag with which to signal a turn, and (b) some form of "cut" indicator with which to signal a cut. The flagger must choose between these two types of signals every time a signal is given. The "turn" and "cut" signals are mutually exclusive.

As viewed from the sideline, it is physically impossible for an aircraft to go the required distance to pylon #1 and also to cut inside pylon #1 on the same turn. Therefore, if you have signaled the pilot that he/she has gone the distance, you should not call a cut.

Also, resist the temptation to "help" the pilot by signaling too soon. This will just mislead the pilot into thinking the racecourse is shorter than it actually is, and possibly cause the pilot to cut on the next lap. The pilot is relying on you to be precise, consistent, and impartial.

When the aircraft are held up for identification before the beginning of the heat, the flagger for each lane should flash or waggle the turn signal device to indicate recognition of his/her assigned aircraft. After launch, and after the aircraft crosses the start/finish line on each succeeding lap, the flagger should do as follows: If the signal device is a flag, hold the flag aloft so that it is clearly visible as the aircraft approaches, then drop it smartly the instant the aircraft intersects the imaginary plane established between pylon #1 and the flagger's position on the sideline. (See racecourse diagram.) If the signal device is a shutter or light, activate it crisply at that same instant and hold it in the open or "on" position for one or two full seconds at least, so the pilot and caller are sure to see it—but not much longer than that, to avoid confusing the other pilots.

A turn is legitimate (i.e., there is no cut) if any part of the aircraft goes past the pylon. If there is any doubt about a possible cut, the pilot should be given the benefit of the doubt.

Sometimes the "cut" indicator is simply a continuous flashing or waving of the signal device. If this is the method being used, be sure to flash or wave as necessary for at least several seconds, and communicate the cut to the pylon #1 chief judge. If he or she concurs that it is indeed a cut, the chief judge will notify the starter. Then continue signaling as before.

5. Pylon #1 Chief Judge. The pylon #1 chief judge is stationed with the pylon #1 flaggers and should be equipped with a walkie-talkie or headset. The chief judge communicates aircraft identification information to the flaggers at the beginning of each heat, confirms any cuts called by the flaggers, and relays cut information to the starter. Other than the starter, the pylon #1 chief judge should be the most experienced worker on the racecourse.

6. Pylon #2 and #3 Cut Judges. The primary job of the pylon #2 and #3 cut judges is to watch all of the aircraft in each heat and relay cut information to the starter. Standard equipment for the cut judges includes a chair and sunshade, a walkie-talkie or headset, and a note pad or dry-erase board on which to jot color schemes and other aircraft identification information for each heat.

The #2 and #3 cut judges should be positioned on the sideline, looking out toward their respective pylons at an angle sufficient to see whether the aircraft are cutting (see racecourse diagram).

Each of the cut judges may also be equipped with an ordinary transmitter antenna, fishing rod, or thin dowel mounted vertically on a stand or stake in front of his/her chair to help judge whether the aircraft are staying outside of the imaginary vertical line extending above the pylon, and/or an air horn to "toot" as an offending aircraft passes the pylon.

To notify the starter of a cut, the cut judge announces on the walkie-talkie, "Cut on Yellow!", "Cut on Lane Three!", or words to that effect. Alternatively, the cut judge may simply put a check mark next to the appropriate aircraft lane or color on his/her notebook or dry-erase board, then report the total number of cuts recorded for each aircraft at the end of the heat.

A turn is legitimate (i.e., there is no cut) if any part of the aircraft goes outside and around the pylon. If there is any doubt about a possible cut, the pilot should be given the benefit of the doubt.

7. Pit Boss. The pit boss calls up the pilots by heats to fuel and place their aircraft in the ready area. A public address system or bullhorn is helpful in this task. Both the pit boss and the scorekeeper, if possible, should be equipped with walkie-talkies to communicate with the starter. In addition, one of them should have an air horn to sound in case of a sideline cut.

The pit boss may be the same person who conducted safety inspection at registration. (See 8. Preflight Inspection of Aircraft.)

8. Scorekeeper. The scorekeeper collects heat results from the starter and records scores on a master list or scoreboard as the contest progresses. This may be done manually or, if suitable computer equipment and power supply are available, scorekeeping may be done via computer using any of several commercially available matrix programs.

The scorekeeper may be the same person who set up the heat matrix at registration. (See 14, Heat Matrix, and 15, Scoring.)

The scorekeeper should take care to differentiate a pilot's place in the heat (that is, his or her finish position) from the points awarded for that place. The two numbers are usually the reverse of each other: a pilot who finishes first will have a "1" under "Place" on the heat card, but a "4" under "Points." On the other hand, a pilot who finishes 4th (last) in the heat

will have a “1” under “Points.” (If three-plane heats are being flown, the numbers to watch out for are “3” and “1.”) To reiterate: a better finish results in more points, not fewer.

9. Fueling Station Supervisor. This person runs the fueling table. He or she should ensure that each pilot who brings an aircraft to the ready area drains it of fuel, then refuels it from the common supply. After fueling, the aircraft should be placed in the ready area and not taken back to the pits.

The fueling station supervisor should be equipped with an accurate scale for weighing-in of aircraft that are returning to the pit area after flying a heat. Usually the heat winner (who may also be carrying the completed heat result sheet for the scorekeeper) will need to stop at the scale to verify that his/her aircraft is at or above the minimum allowable weight. The fueling station supervisor can supervise the weighing-in operation as well.

10. Transmitter Impound Supervisor. This person should be provided with a large rack or folding table, protected from the sun and rain, on which to collect and safeguard the contestants’ transmitters. Transmitters should only be given to pilots who are on their way to the ready area, and should be checked when brought in after each heat to ensure that they are not left on.

The transmitter impound supervisor may also be one of the people who helped with registration, inspection, or setting up the matrix.