



AMA[®] RULEBOOK

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**Control Line
Navy Carrier**



RULES GOVERNING MODEL AVIATION COMPETITION IN THE UNITED STATES

Amendment Listing

Amendment Topic	Publication Date	Description
Original Issue	1/1/2015	Publication of Competition Regulations
Line length change	1/1/2017	Chart, column 3 change
High-Speed Flight	1/1/2017	Section 10.2
Low-Speed Flight	1/1/2017	Section 11.2
Scoring	1/1/2017	Section 13.2
Stopwatches	1/1/2017	Section 16
Flying for Record	1/1/2017	Section 17, paragraph c
Profile Carrier Muffler Pressure	1/1/2022	Section 3.3.1

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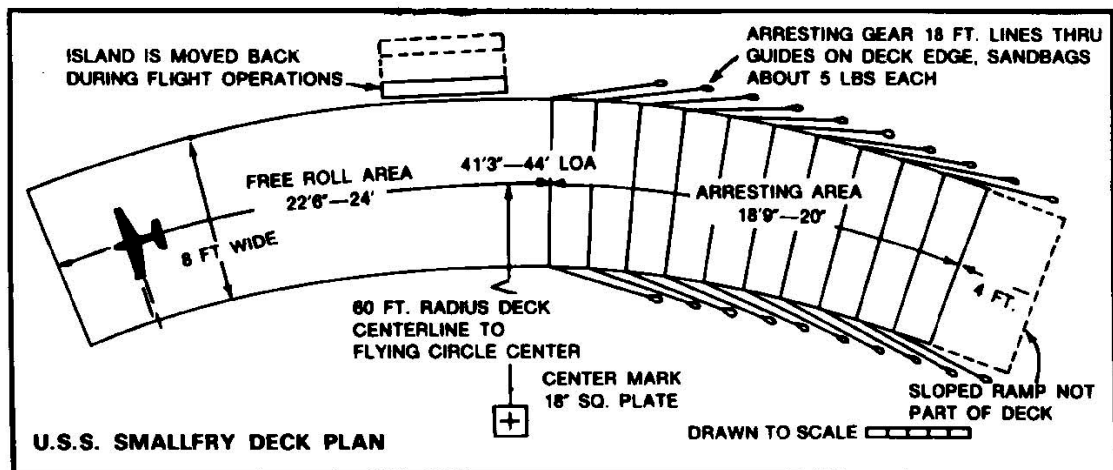
FOR EVENT 319, 320, 321.

11. Applicability.

All pertinent AMA regulations (see sections titled Sanctioned Competition, Records, Selection of Champions, and General) and the General Control Line rules shall apply, except as specified below.

12. Carrier Deck.

A carrier deck or suitable area shall be provided for the event. It shall be 41 feet, 3 inches to 44-feet long at the center line and eight (8) feet wide, and the deck center line shall be curved to the perimeter of a 60-foot radius arc, the center of which shall be plainly marked by a marked six inch diameter solid circle in the center of a 36 inch diameter circle which are either clearly marked or painted on the flying circle center. The flying circle center shall be 60 feet from the center line of the flight deck. A sloped protective ramp four (4) feet long extending from the ground up to and flush with the edge of the deck shall be provided at the stern of the carrier deck. The edge of the deck shall be adequately marked. The arresting area of the deck shall be 18 feet, 9 inches to 20 feet long, and have 10 arresting cables with a minimum diameter of one-eighth (.125) inch, and a maximum diameter of one-fourth (.250) inch, with a minimum breaking strength of 200 pounds suspended from one-fourth (.250) inch to one-half (.500) inch above the deck, spaced two (2) feet apart starting two (2) feet from the stern of the deck. Sand bags weighing approximately five (5) pounds each shall be attached to each end of the 18-foot long arresting cables. Screw eyes or other suitable guides shall be used on the outer edges of the deck to hold up the cable and also allow the cable to move through when an arrested landing is being made. The free roll area shall be 22 feet, 6 inches to 24 feet long and smooth enough to make a free rolling takeoff. If the carrier deck is laid out on the ground or hard surface, the outline of the deck edges and the takeoff limit line shall be clearly marked. Crepe paper streamers or thread shall be stretched across the deck two feet in front of the bow and one foot back of the stern of the carrier deck, approximately one-half (1/2) inch above the ground. The beginning of the landing area and the end of the



takeoff area shall be identified by highly visible vertical markers on the outside of the circle which are clearly visible by the contestant from the center of the circle.

CL Navy Carrier								
			Required Minimum Diameter of Each Line					
			Single Strand			Multi-Strand		
Class/Engine Size (cubic inch)	Max. Model Weight Without Fuel	Required Line Length	1 Line	2 Lines	3 Lines	2 Lines	3 Lines	Pull Test
Class I: .0000-.4028	4 lbs.	60'0"- (-0"/+6")	.026"	.020"	.015"	.020"	.015"	25G
Class II .4029-.6500	4 lbs.	60'0"- (-0"/+6")	.033"	.024"	.018"	.024"	.018"	25G
Profile:	4 lbs.	60'0"- (-0"/+6")	.026"	.020"	.015"	.020"	.015"	20G

13. Aircraft Requirements.

Model must have a fixed or retractable landing gear. If a retractable gear is used, it must be lowered for landing. The model must be equipped with an arresting hook which when extended may not be longer than a one-third (1/3) the length of the fuselage. The model wingspan shall be 44 inches maximum for Class I and Class II and 50 inches maximum for the Profile Class. It is permissible to change the position of any control surface during flight. The model shall be rigged for counterclockwise flight. Models shall not exceed four (4) pounds weight in flight configuration, but without fuel. Autogiros and helicopters, or aircraft which rotate their propellers to a horizontal plane to act as rotors for hovering flight, are prohibited. Models (entries) shall be placed and compete in three (3) groups as follows.

13.1. Class I

Models having an engine displacement up to and including .4028 cubic inch.

13.2. Class II

Models having a minimum engine displacement of .4029 cubic inch to maximum of .6500 cubic inch. Class II will also include jet-type as outlined in the CL General section. Jet models shall be entered in Class II only.

13.3. Profile Class

All aircraft shall be of the profile fuselage type. Engine(s) must not be cowled in. Minimum wing area shall be 300 square inches. Models shall have a fixed landing gear consisting of at least a two-wheel main gear with at least four (4) inches separating the wheels. If a clear canopy is not used, the cockpit or canopy area must be defined with a contrasting color or color outline. It is encouraged that the plane outlines follow some type of Navy aircraft.

3.3.1.

The engines in the Profile Navy Carrier event shall have a maximum total displacement of .3661 cubic inch. Two-stroke cycle engines must be of the front-intake type. No pressure fuel systems will be permitted **except muffler pressure**; however, the vents in the tank may be pointed forward in the air stream. (Note that CL General, paragraph 11.1. states that 60% of the displacement of a four-stroke engine is taken for competition classification so that a 10cc [.61 cu. in.] four-stroke may be used.)

13.4.

In the case of the multiengine models, the sum of the displacement of all engines shall govern the class into which they are placed.

3.4.1.

The length of the passage through which the exhaust exits the engine may not be longer than three inches measured from the centerline of the engine cylinder along the centerline of the exhaust passage. Exhaust ducting beyond the 3-inch limit is permitted provided that there are at least 1/8-inch clearance at all points between the additional ducting and the exhaust extension attached to the motor. Fuel of standard formula shall be supplied by the contest organizers. The percentages of ingredients in the fuel mixture supplied must be accurate, consistent with careful and accurate mixing techniques. The fuel shall contain 10% nitromethane, 20% lubricant, and 70% methanol by volume. If the contestant uses this fuel, the length of the passage through which the exhaust exits the engine is not restricted. The engines used must be of the reciprocating internal combustion or jet type. Neither rocket power nor auxiliary takeoff booster devices are permitted in any case. Noise abatement regulations do not apply.

14. Control Requirements.

14.1.

Line specifications and pull test as per chart.

14.2.

The required minimum line sizes are determined by the number of lines which bear the load of the model in flight. A load-bearing line is one which is tight during the pull test as determined by visual inspection, line-plucking, or other means. Non-load-bearing lines (lines which are not tight during the pull test) may be of any diameter.

14.3.

All lines shall emerge from the model within the fore-and-aft range covered by the wing root chord. All lines other than the elevation control line(s) shall emerge either between the elevation control lines or, if not between, then within one (1) inch of the nearest elevation control line.

14.4.

The use of radio control shall be allowed for all controlled functions except elevation, subject to restrictions outlined in CL General Rules.

15. Official Flight.

Flight is official when the aircraft crosses the stern of the deck as the contestant signals for the timed low-speed run.

16. Attempts.

Three (3) attempts shall be allowed for two (2) official flights. Any of the following shall constitute an attempt:

16.1.

Failure of the contestant's model to become airborne within five (5) minutes of being called to the deck. In the case of multiengine models, an extra minute starting time shall be allowed for each additional engine.

16.2.

Any endeavor to make a takeoff is an attempt.

16.3.

Whipping or shortening the effective length of the control line(s) during high-speed flight.

16.4.

Exceeding an altitude of 20 feet for more than one-half ($\frac{1}{2}$) lap during high-speed flight.

16.5.

Flight terminated for any reason prior to the signal for low-speed flight.

17. Flight Termination.

Any of the following shall result in the immediate termination of the flight:

17.1.

Touching of the ground or any obstruction by any part of the model.

17.2.

Touching of the protective ramp (or crepe paper streamers or thread, if applicable) by any part of the model.

17.3.

Touching the deck with any part of the model except during initial takeoff and during landing approaches following the signal for landing.

17.4.

The model does not maintain forward counterclockwise motion with respect to the ground.

18. 8. Bonus Points.

18.1.

A scale model of a carrier aircraft of any nation, provided it displays the national markings of the using nation, shall receive bonus points. A carrier aircraft is any man-carrying aircraft which was successfully flown and which meets at least one (1) of the following requirements:

a. Aircraft made actual carrier-type takeoff and arrested landing on an actual or simulated carrier deck, or

b. Aircraft is designated as a carrier aircraft by an acceptable source (in cases where actual carrier-type takeoff and arrested landing are not documented).

8.1.1.

Scale three-view drawings of the full-scale aircraft and proof that the aircraft meets the above requirements must be submitted to be eligible for scale bonus points. (See Proof of Scale rules in the Unified Scale Judging section for acceptable sources of plans and documentation.)

8.1.2. Class I and Class II

18.1.2.1.

Class I and Class II models shall receive 100 bonus points if the linear dimensions of the major components of the model are to the same scale, within a plus or minus five (5) percent tolerance. Models which appear to comply with this tolerance upon rudimentary inspection need not be further checked except in case of dispute. “Major components” of Class I and Class II models are considered to be the fuselage (excluding surface markings) engine nacelles, air brakes, the side-view profiles of the vertical stabilizer and rudder, and the top-view profiles of the wing and horizontal tail surfaces, and all movable surfaces which are attached to or form a part of these surfaces (flaps, ailerons, elevators, etc.). Although complex motions of moveable surfaces need not be duplicated (such as Fowler flaps), the general direction of movement must be the same as on the full-scale aircraft being modeled. Unless proven otherwise, ailerons shall be assumed to move simultaneously in opposite directions. Although landing gears need not be scale, it must emerge from the model in the same location as the prototype.

18.1.2.2.

If the engine or accessories protrude from the scale contours of the model, there may be openings in the skin sufficient to accommodate the protruding part with 1/4-inch maximum clearance at all points around the protruding part.

18.1.2.3.

The model dihedral as viewed from the front must be similar (within two (2) or three (3) degrees by official’s visual judgment) to the actual airplane as shown in the three-view drawing. Namely, it must have some positive or negative angle, as shown on the three-view drawing.

8.1.3. Profile Class

18.1.3.1.

Profile Class models shall receive 10 bonus points if the outlines of the major components of the model closely resemble (by official’s visual judgment) the actual aircraft as shown in the three-view drawing. (Judges Guide: The model should be identifiable with the full-scale aircraft shown in the three-view.) The “major components” of

Profile Class models are considered to be the side-view profiles of the fuselage, engine nacelles, and vertical tail surfaces, and the top-view profile of the wing and horizontal tail surfaces. Movable surfaces need not have scale hinge lines or dimensions as long as the outlines of the major components are preserved. Neither scale dihedral nor scale landing gear location is required.

8.1.4. To receive bonus points in any class:

a. The color of the model must be similar to any military-type aircraft paint scheme.

b. If a clear canopy is not used the cockpit or canopy area must be defined with a contrasting color or color outline denoting the scale area.

18.2.

Twenty (20) points shall be awarded if more than one engine is used to power the model, provided all engines contribute to the performance of the model from takeoff through at least the low-speed portion of the flight.

19. Takeoff.

Model must successfully take off from free roll portion of the deck. At the time of release, the nose of the model must be no more than 60 inches from the last arresting line.

110. High-Speed Flight.

110.1.

The first seven (7) laps after takeoff constitute the high-speed phase of the event. Timing shall start the instant the model is released for takeoff, and shall end when the model completes its seventh lap over the stern of the carrier.

110.2.

High-Speed Points. High Speed in Mile Per Hour (PMH) shall be calculated using the following formula, rounded to the nearest 0.01 MPH: $MPH = 1799.28 / \text{time in seconds per paragraph 10.1}$. High-Speed Points shall be scored as 1 point per MPH, to the nearest 0.01 point.

111. Low-Speed Flight.

111.1.

When the contestant has decelerated the speed of his model to his satisfaction, he shall signal the judges to start timing his low-speed run by using a prearranged signal that is acceptable to the judges. This signal shall be given as the model crosses the stern of the deck, one (1) lap prior to the start of low-speed timing. The model shall then be timed for seven (7) laps, using the stern of the carrier flight deck as the starting point. The start of the low-speed run must be signaled for within three (3) minutes of the completion of the high-speed run. Time for the seven (7) laps shall be used to calculate the average speed.

111.2.

Low-Speed Points. Low-Speed Points shall be scored as 10 times the ratio of High-Speed to Low-Speed using the following formula, rounded to the nearest 0.01 point: $\text{Low-Speed Points} = 10 \times \text{High-Speed MPH} / \text{Low-Speed MPH}$. Low-Speed in Miles Per Hour (MPH) shall be calculated using the following formula, rounded to the nearest 0.01 MPH: $\text{MPH} = 1799.28 / \text{time in seconds per paragraph 11.1}$. As an option, $\text{High-Speed MPH} / \text{Low-Speed MPH}$ may be calculated as $\text{Low-Speed Time (sec)} / \text{High-Speed Time (sec)}$.

11.2.1. No low-speed points shall be awarded if any of the following infractions occur:

111.2.1.1.

The flight radius of the model is lengthened by the contestant walking a circle greater than three (3) feet in diameter. The contestant may step out of the three-foot circle to regain control of the model when lines go slack, but he/she is expected to return to the three-foot circle when control is established.

111.2.1.2.

The longitudinal (forward and aft) axis of the fuselage as viewed from the center of the circle exceeds a 60-degree nose-high attitude except for momentary inadvertent deviations. When the 60-degree limit is exceeded, the contestant shall be notified immediately and must correct model attitude immediately. Failure to do so shall result in loss of low-speed score. A maximum of three notifications shall be given. *The longitudinal axis of the fuselage should be level during the high-speed flight. The intent is to limit the model attitude to no more than 60 degrees above the level-flight attitude. Judging is best performed from the*

center of the circle using a viewing angle as near as possible (consistent with the safety) to that of the contestant. The fourth notification shall result in loss of the low-speed points

112. Landing.

All landings on the carrier deck shall be made at low speed only. The landing must be signaled within three (3) minutes of completion of the low-speed run. After lining up with the deck upon completion of the low-speed run, the pilot shall signal the judges that he is ready to land. The signal of the pilot's intent to land shall be given as the model crosses the deck beginning his lap prior to landing. If other than a hand signal is used, the pilot shall describe his signal to the official immediately prior to each of his flights (i.e., before he starts his engine).

112.1. Landing Points.

Landing (dead stick included) shall be scored as follows:

12.1.1.

Arrested landing with airplane in normal three-point attitude (takeoff attitude), 100 points.

12.1.2.

Arrested landing with airplane in other than normal three-point attitude, 50 points.

12.1.3.

Arrested landing with airplane coming to rest on its back or with one (1) wheel off the edge of the deck, 25 points.

12.1.4.

All other landings, zero (0) points.

12.1.5.

An arrested landing is any landing in which the model's forward motion is stopped primarily by the arresting hook engaging any arresting cable. The landing is scored at the point where the model's forward motion is first arrested, and the flight is terminated at that time. (Judges Guide: A model which is arrested in a normal attitude shall receive full points. If the hook subsequently becomes disengaged, or the model rolls or is pulled off the deck after forward motion has been arrested, the landing score is not affected. A model which stops on its nose and subsequently falls back into a normal attitude shall receive 50 points for a landing in other than a three-point attitude.)

112.2.

From the above score, five (5) points shall be deducted for each unsuccessful landing approach made after signaling. Each lap flown after signaling shall be considered a landing approach even if the contestant does not attempt a landing. The landing score shall, in no instance, be less than zero (0).

113. Scoring.

113.1.

Competition and record scoring shall be based on the contestant's best official flight score.

113.2.

The score of an official flight shall be the sum of the High-Speed Points, the Low-Speed Points, Landing Points, and Bonus Points, rounded to the nearest 0.1 point. If the flight is terminated after the low-speed signal (see section 7), the score shall be the sum of the Bonus Points plus points for all phases of flight completed prior to termination, rounded to the nearest 0.1 point.

114. Builder of the Model.

The builder-of-the-model rule does not apply to the CL Navy Carrier events.

115. Model/Engine Use Restrictions.

Once a model or engine has been used by a contestant to make an official attempt in an event, the same model or engine cannot be used by another contestant in that contest.

116. Stopwatches.

Stopwatches with a 0.01 second resolution or greater shall be used for timing all Control Navy Carrier events.

117. Flying for Record.

A score shall be accepted for record purposes provided:

- a.** A full-sized carrier deck as specified in the "Carrier Deck" paragraph has been used, and
- b.** All other requirements of Control Line Navy Carrier have been met, and
- c.** At least two (2) timers, equipped with stopwatches having 0.01 second resolution or greater, have timed flights in unison from the same judge's position. If more than two timers are used, then two of the timers shall be designated primary timers, and the rest shall be backup timers. Only when too great a

difference between the times as required below or a watch malfunction negates a valid time for a primary timer shall a valid time from a backup timer be used. Records shall be recognized where no more than 0.2-second variation on the high speed and 0.4-second variation on the low- speed timing exist between the watches used. The average of the two (2) watches shall be used to calculate speed, and

d. Only those flights made outdoors shall be recognized for record purposes.

e. Navy Carrier records may be set only during the course of normal competition flying at an A or higher-rated AMA sanctioned contests.

ELECTRIC CONTROL LINE NAVY CARRIER (340), (341), (342)

21. *Applicability*

All pertinent AMA regulations for Control Line Navy Carrier shall apply, except as specified below. In places where the term “engine” is used in the AMA regulations, the term “motor” shall be understood for purposes of applicability and pertinence to the Electric Navy Carrier events.

Electric Class I (340), Electric Class II (341), and Electric Profile Class (342) CL Navy Carrier events shall correspond to CL Navy Carrier Class I, Class II, and Profile Class, respectively.

22. *Power systems.*

Models shall be propelled only by one or more electric motors which receive their power from one or more onboard battery packs. Size and type of motors and battery packs are unrestricted. Electrical signals for control may be transmitted through the control lines but electrical power to power the motor(s) or recharge the battery pack(s) may not be transmitted through the control lines.

23. *Weights and pull test.*

The weight of Profile Class and Class I models shall not exceed 3.50 pounds ready for flight, including batteries. The weight of Class II models shall be greater than 3.50 pounds but shall not exceed 4.50 pounds ready for flight, including batteries. All models shall be pull tested to 20G.