

# TOP GUN

## INVITATIONAL TOURNAMENT



# OFFICIAL RULE BOOK

Version 10-01-06

As its name implies, this contest is designed to find the best R/C Scale builder/flyer in the world. Thus, it is aimed at only the contestant who is already an expert in this special field. So, you might ask, what provisions exist in the rule framework for the average modeler? And the answer is none. What provisions for the up-and-coming flyers, then? *Almost* none! Only after modelers have come up through the ranks of the contests that cater to them can they be invited to fly the **Top Gun** event. Through this approach of giving no breaks, the winner of **Top Gun** will have achieved something truly meaningful.

### **SPORTSMANSHIP**

An important feature of the **Top Gun** competition is its congenial atmosphere. Yes, it's a serious contest, but rivalry is second to camaraderie. We will always protect our combination of competitiveness and good fellowship. **Top Gun** is as much as anything a social occasion. This provides an ideal relaxed counterpoint to the intensity of the competition.

### **THE PRIME DIRECTIVE**

The basic philosophy which governs the rules of the **Top Gun Invitational** is the following: no rule shall be made which either intentionally or accidentally results in an advantage or disadvantage to any particular type of subject choice. Thus it will be seen that the rules contained in this document have been carefully refined to give each contestant a free hand to choose a subject appealing to him, be it aerobatic or non-aerobatic, civilian or military, ancient or modern. Quality alone, both in building and flying, will determine the outcome.

## **PART 1 – GENERAL RULES**

**1.** The contest is open to any R/C model of any heavier-than-air, man-carrying, fixed-wing aircraft ever built and flown. Mockups, projected designs, or aircraft built but never flown are ineligible. If a pilot was visible in the full-scale aircraft, then an appropriately sized scale pilot must be visible in the model aircraft during the flying portion of the contest. If that pilot is not in place during the flying rounds, 10% of the flight score will be deducted.

**2.** First and foremost, ALL AMA Safety Guidelines are followed to the letter. However, other than the maximum weight limit of 55 lb imposed by the AMA insurance, there are no restrictions upon the design, size, or power of the model. Each contestant is allowed only one entry. However, the Board realizes that fielding an entry for **Top Gun** is a stressful endeavor as well as a financial one. With that in mind, we offer a provision for a backup aircraft. A backup aircraft may be used only if the primary entry is damaged beyond repair before it has flown a competition round, and if there is slot for the backup aircraft to be static judged without extending the static judging time past 5:00 PM the last day of judging. This luxury will be available on a first-come, first-served basis.

**A.** Every contestant should have a **DSC cord** with his entry. It is most difficult to maintain prompt flight scheduling if someone is hogging the frequency pin. Contestant cooperation is appreciated in helping with this matter.

**3.** Metal-bladed propellers are not allowed.

**4.** The model entered must have completed six flights by the pilot prior to its appearance at the contest.

**A.** A pilot or builder may enter only one class at **Top Gun**.

**B.** All pilots must have a caller. The responsibility of the caller is to keep the pilot informed of other models in the air or on the ground, to get clearance to land from the Flight Line Authority, and to keep the pilot on his flight schedule.

**5.** The contest is divided into two parts: Static Judging and Flight Judging. The potential scores for each are to be equal, giving no more significance to one part than the other. The only exception is that Pro-Am classes do not have a static judging schedule.

**6. Builder of the Model Rule.** The **Top Gun** contest will not succumb to the philosophy of “the highest static points that money can buy.” The rules are made for the guidance of the honest contestant, but no rule can eliminate cheating. Violation of the Builder of the Model Rule will result in disqualification from this and future **Top Gun** competition. The Pro-Am class is exempt from the Builder of the Model Rule. The rule is defined as follows:

**BUILDER OF THE MODEL DEFINITION** – The builder of model shall have satisfied the requirements of R/C Sport Scale if the individual modeler has constructed the airframe either from raw materials or from prefabricated components as found in the available kits, such as fiberglass cowl(s) and fuselage(s), foam cores, canopy, plastic molded exterior details, wheels, etc. All final assembly and finishing of the model aircraft shall also be performed by the same individual with materials of his or her choosing. Any other commercially advertised products may also be used without penalty to the modeler at the various stages of construction. Hardware independent of the airframe (visible or not) requiring machining or welding to assure reliability, safety, or required operation of the scale model aircraft, such as engine accessories and landing gear, may be com-

mercially acquired or designed by the modeler and commissioned independently when in the judgment of the modeler commercially available items are not adequate. No other airframe construction may be commissioned in this manner.

**7.** Models of multi-engine aircraft may be entered using less than the scale number of engines as long as 50% of the scale number of engines is represented by model engines. For example, a B-24 Liberator may fly on only two engines as long as the other two engines are not readily distinguishable as dummies; an F-4 Phantom can use one engine in a bifurcated duct, so that from outside appearance, the model has two engines. In any case, models that do not use the scale number of operating engines may not use the Multi option for scoring.

**8.** There is no limit to the number of channels used, but dual transmitters are not permitted.

**A.** Rate gyros are allowed to aid in rudder and steering control only. Rate gyros are NOT allowed to aid the control of ANY other surface or function.

**9.** All engines, except turbines, ducted fans, diesels, and four-strokes, must use mufflers.

**10.** Any and all rules governing the contest must be sanctioned by **Top Gun**. Proposals for changes to individual rules are acceptable, provided that:

**A.** The proposal is made in writing and signed by a past contestant of any **Top Gun** contest.

**B.** The proposal is submitted to the **Top Gun** chairman before December 31 of any year. Proposals will then be considered during January of the following year and, if accepted, be put into effect at the next contest.

**C.** Any contestant proven to be cheating in any manner will be banned from all future **Top Gun** competitions. Specific protests may be lodged with the Chief Judge. He and a panel of available judges will make a decision on site based upon the information available to them.

**11.** In the interest of safety, up to 100 sq inches of high-visibility material may be added to the model after static judging has been completed. It is suggested that this material be applied in a scale-like manner.

**12. CLASSES: Top Gun** will have a variety of classes in which to compete. There will always be an **EXPERT Class** where the builder and pilot are the same person. Often, there will be a **TEAM Class** where there is both a builder and a designated pilot, and both are allowed to perform work on the model. If there is enough interest, we will also field a **MASTERS Class**. Masters Class is for the builder who has drawn the plans and has engineered and constructed the entire model himself. It cannot be a community project or one that has been designed and constructed by a

team of people! A Masters Class builder may choose to enter his airplane in the Expert Class, but an Expert entry must remain in the Expert division. Mass-produced models, meaning models produced in a factory, will not be allowed in the Masters Class. If the contestant feels he has an exception to this rule, the Chief Judge will be most happy to discuss the situation and perhaps issue an exemption.

**12A. The PRO-AM Class** will be subdivided into two subclasses: **SPORTSMAN** and **Pro**. To be eligible for the Sportsman Class, the pilot may have flown in any AMA-judged competition but not have finished in the top three in any two of the events entered. Or, he may be eligible for Sportsman if he has never placed higher than 15th in any **Top Gun** event. Any others must be entered in the Pro side of the class. Anyone entered in Sportsman that finishes in the top three twice will automatically move up to the Pro side the following year. The winner of the Sportsman side of the class will automatically move up to the Pro side the following year.

**12B.** Pro-Am aircraft **MUST** be models that are considered worthy of the **Top Gun** invitation. In this regard, **NO ARF** models are allowed. ARF means pre-painted models where most of the construction **AND** the finish is done at a factory. If the contestant is in doubt if his model is considered an ARF, a phone call to the CEO or Chief Judge might be prudent!

**13. PARTICIPATION:** A model may be entered in **Top Gun's** Masters, Expert, or Team classes a total of three times, regardless in what place it has finished. If the aircraft has received any flight score it is considered as having participated for that year. If a model has competed three times and the owner chooses to give it an entirely new color scheme, the **Top Gun** Board is apt to allow three more years of competition. An entirely new scheme must consist of a major color change, not just a trim and markings change. For example, a black Black Widow would have to be repainted in the Olive Drab scheme, an aluminum, checkerboard nosed Mustang would have to feature a scheme that was not aluminum, and a yellow Cub would have to be repainted in some other major color. In any event, the **Top Gun** Chief Judge or CEO will make the final decision. Changing color schemes may only be done once per model! That means the same model may compete only six times totally. However, there is an exception: the model may compete an extra two times after the six-time rule has been applied, but only in the Pro-Am class.

**14.** Only one entry is allowed per pilot or team. The aircraft is considered an "entry" once it has been static judged. Before static judging, a contestant may change his mind and enter an aircraft different from the one listed on his bio sheet.

**15. REPAIRS:** In a case where a model is damaged during a competition flight round, any parts may be replaced with new parts, from any source, as long as the new parts duplicate the overall general color scheme of the original. The intent of this rule is to offer a way for the contestant to remain in the event. However, a purple wing on an aluminum airplane will be met with some severe resistance! No more than 50% of the model may be replaced.

## **PART 2 – STATIC RULES**

**1.** The Static Judging portion of the contest will take place prior to flying. The flying rounds may commence prior to the conclusion of Static Judging, but only for entries that have already been Static Judged.

**2.** Static Judging will be performed in four categories:

(A) Outline; (B) Finish, Color, and Markings; (C) Craftsmanship; and (D) Realism. Realism will be a score for the overall impression the model creates in the terms of looking real or like a toy airplane. Each judge will give a score, and they will be averaged.

**3.** As shown upon the three separate Static Judging forms, the points available shall be:

A. Outline .....	.30 Points
B. Finish, Color, and Markings .....	.30 Points
C. Craftsmanship .....	.30 Points
D. Realism .....	.10 points
<b>Total .....</b>	<b>.100 Points</b>

**4.** Judging distance for all categories except craftsmanship shall be fifteen feet, maximum. The Outline or Color judge may examine the model from zero feet any time they feel a need to, but he may not touch it. The Craftsmanship Judge will judge the aircraft from zero feet, but he may not touch it.

**5.** A documentation/presentation book from which the model may be judged is required. If no book accompanies the model, no Static Judging will be performed.

**6.** For Pro-Am classes the only documentation required is one item that proves the color scheme existed on the particular aircraft modeled. The proof may be the artwork from a plastic kit, an artist's rendition found in a book, or a photo of the actual full-scale aircraft. For proving the color scheme in Pro-Am, 25 points are awarded as a Static Score. Zero points if the color scheme is not proven.

### **CONTENTS of the DOCUMENTATION:**

**1.** A published three-view (at least three views) of the aircraft, indicating the source, is required. Size is not limited, but large drawings or plans should be mounted on stiff cards, etc. If no three-view is available, a number of photos of the aircraft type sufficient to allow the three main views to be verified are required. No pictures of any model airplanes are allowed in documentation. Contestant-generated or contestant-altered views are NOT allowed, unless the alterations are published or approved and signed off by an AMA Scale Board Member or the **Top Gun** Chief of Static Judges.

**2.** Proof of the markings scheme is required. This may be a photo, a published painting, (artists conception, plastic kit box art, etc.) or a published, detailed drawing.

- 3.** Proof of the color match is required. This may be presented in the form of color chips, color photos, or an artist's rendition. In cases of very obscure subjects, e.g. where only one aircraft was built, a description of the colors is sufficient. Since it is very difficult and sometimes impossible to document more than one side or view of a subject aircraft, there will be no loss of points for failure to show the colors and markings of the "other side or bottom" of the airplane.
- 4.** If color chips are used, they must be from a published source. Contestants may NOT paint their own color chips.
- 5.** Any parts of the model aircraft that are not permanent (e.g. bombs, drop tanks, crop dusting equipment, etc.) but are not shown on the three-views must be documented elsewhere by photos, scrap drawings, etc. Optional ordnance drawn on the three-view does not have to be represented on the model and may be omitted.
- 6.** Documentation shall be sufficient to verify the model as presented for Static Judging. Any item not verified will be cause for loss of points. Examples: if the documentation is vague as to the appearance of the landing gear, the Outline score will be downgraded; if the documentation is vague in proving the color scheme presented, the Markings score will be downgraded.
- 7.** Contestants are cautioned against presenting conflicting data in their books. In cases where, for example, a color painting is shown for color layout and it conflicts in detail with a provided photo of the same aircraft, the photo will have ascendancy.
- 8.** The documentation is limited to ten pages sized 8½ x 11 or equivalent area in some other size. The three-view is not counted in this total. Up to three pages of the total may be used to verify craftsmanship details only, such as skin texture, trailing edge thickness, the fitting of certain panels, etc.
- 9.** Contestants may be required to move the model during judging to allow all aspects to be viewed.
- 10.** Canopies and any moveable control surface may be presented in any position. However, the judge may request that these be reconfigured during judging to aid in comparison with the documentation provided. Additional working features will be presented in the manner shown on the three-view presented to the judges.
- 11.** Any items that will not be on the model when it is flown, e.g. chocks, tie-downs, ordnance that will not be carried in flight, or other "dioramic" features, may not be presented during Static Judging.
- 12.** Exception to Rule 11: scale props/spinners may be included for Static Judging. However, when this is done, the flight spinner must be approximately the same size and shape as the static version. It must be exactly the same color. The overall shape of the flight spinner may be blunted or rounded for safety reasons. Aircraft not incorporating a spinner should utilize a rounded safety nut.

**13.** Items not present during Static Judging may not be added to the aircraft after static judging is completed, prior to the flying rounds. No items present during Static Judging may be changed prior to flight except for the following:

**A.** Pitot tubes, radio masts, or radar antenna may be removed.

**B.** Droppable stores or ordnance may be substituted but must be the same size, shape, and color as those presented for Static Judging.

**C.** Intake strakes or grillwork on ducted fan jet aircraft intakes may be removed, since their inclusion sometimes interferes with proper performance.

**D.** An external whip antenna of any type may be added for flying rounds.

**14.** Sometimes, a model's engine may not be mounted in the same position as in the full scale airplane. Therefore, the static score will not be downgraded for visible engine parts, such as a head, muffler, or openings to aid engine cooling, provided that the installation was made to be as inconspicuous as the subject allowed.

**15.** Portions of the cockpit detail visible in the three-view will be judged for outline at fifteen feet. Cockpits should have some substance. The entire cockpit area will be judged for craftsmanship, but the fidelity to scale will be overlooked. **Top Gun** aircraft should not have a "stick" sitting across the cockpit area with a simple pilot bust glued to it! Along with cockpit interiors, the interiors of wheel wells, flaps, and hatches, if visible, will also be judged for craftsmanship from zero feet.

**16.** Upon completion of scoring a model, the judges will hand their score sheets to the Chief of Judges. The C.O.J. must sign the sheet before it can go to tabulation. If a score appears out of line, he may request a consultation with the static judges and may authorize another judging session before tabulation.

**17.** When all entries have been Static Judged, and the first round of flying has been completed, the scores will be promptly posted. Once posted, no score will be changed for any reason other than to correct an error in tabulation. Contestants are cautioned to ensure that their documentation does not invite judging mistakes which will not be corrected.

### **PART 3 – FLYING RULES**

**1.** A minimum of four rounds shall be flown if conditions allow.

**2.** In a case where conditions prevent any flying, and the contest cannot be postponed to a future date, Static Judging alone shall determine the result. Any ties will be broken first by the Outline and Realism total, followed by the addition of one-half the craftsmanship score.

**3.** The flight pattern will be to the left or the right depending on prevailing wind. The pattern can be changed, even in mid-round, to accommodate changed conditions. The direction of the pattern shall be at the discretion of the C.D. and Chief Judge.

**4.** Time limit for each flight is fifteen minutes, inclusive of starting time and any required explanations or demonstration. Any maneuver started after the time has expired will score zero.

**5.** Crossing the “deadline” (to be determined by the C.D.) during any part of the flight will incur a warning. A repeat crossing disqualifies the flight and the contestant must land. To receive a warning or to be disqualified, the entire aircraft must cross the deadline.

**6.** If the contestant is delayed after the clock is running (e.g. delayed take off or landing due to adjacent flight line traffic) the clock is to pause for the duration of the delay.

**7.** The flight plan shall consist of ten scores consisting of four mandatory maneuvers and five optional maneuver/scale operations. The tenth score will be for realism for the entire flight. Maximum score for each maneuver is ten.

**A.** There will be a minus 2% adjustment to the flight score of any jet model entry built from a kit or prototype of a kit where the fuselage and wings are molded from fiberglass or composite materials, producing proven airfoils and perfected skin texture and appearance. Kits having a built-up wing are exempt. Self-designed one-off models, ones that are not mass produced, are exempt.

**B.** Analyzing the flight scores from past years has proven that tail dragger aircraft have a distinct disadvantage, especially during takeoff and landing, compared to tricycle gear aircraft. Crosswinds have been prevalent at **Top Gun** 80% of the time, and tail draggers, particularly lightly loaded World War One types, have suffered dramatically. With this in mind, to help level the playing field, which has been **Top Gun's** interest from the beginning, all tail dragger aircraft will receive a slight compensation to their flight score. For aircraft with a non-steerable tail skid, a 2% bonus will be applied. All other tail draggers will receive a 1% bonus.

**8.** With the exception of the high-speed and low-speed passes, the contestant may complete all his maneuvers/scale operations in any order he chooses, but he must follow the flight plan he has submitted to the Judges. The fly-bys may be done at any time but must follow each other. If a maneuver is called out of sequence, the entire flight will not receive a zero. The Flight Judge will assess a two-point penalty to that maneuver only and inform the pilot that he is out of sequence, allowing him to get back on sequence.

**A.** The only maneuver that may be inserted between the slow-speed and high-speed fly-bys, in the interest of cleaning up the aircraft for the high-speed run, will be an ordnance or wing tank drop. This “drop” must be done in the opposite direction of the fly-bys.

**B.** If multiple runways are made available, the contestant may choose which he prefers for either takeoff or landing. That is, the aircraft may take off from a hard surface runway then land on a grass runway, or vice-versa.

**9.** Options: It is the intent of **Top Gun** to require models to be flown in a “display-type” flight. To ensure this, certain restrictions apply to nominated options:

**A.** Aircraft having any aerobatic capability may not select “straight flight out/procedure turn/straight return” or “flight in a triangular pattern” as a nominated option. However, non-aerobatic types may perform them. No “on the ground” mechanical options may be performed as a separate scoring maneuver. However, they may be added to enhance the presentation. A list of flying maneuvers and mechanical options is given later in these rules.

**B.** Operations such as or similar to the following may be incorporated as part of a maneuver or performed independently, but may not be nominated for a scored option: smoke systems, light systems, canopy movements, individual engine run-ups, brakes, pilot movements, folding wings, flaps, speed brakes, slats, and similar devices.

**C.** To enhance his demonstration, the contestant may perform any additional option he chooses within the time allowed, but no points will be scored.

**D.** Other than the maneuvers listed in A above, the contestant may choose any aerobatic or mechanical option capable of being performed by the full-scale prototype.

**E.** A maximum of two mechanical options may be performed by any aircraft.

**10.** If retractable landing gear is used as a mechanical option, it must be demonstrated to the judges prior to flight. Door fit and retraction speed will be considered.

**11.** Contestant is allowed to choose different options in succeeding rounds.

**12.** The option “touch and go” will count as two options (see Judging Guide).

**13.** “Attempt” – Note that the “attempt” rule (allowing a second attempt at a flight) is operative only during any one round of the competition. An “attempt” occurs if the model does not become airborne. If the model does not become airborne at its first attempt:

**A.** Any points earned are cancelled.

**B.** Contestant will go to end of the line, or a place in line deemed fair by the Chief Judge, for his second and final attempt. The flight is official and no attempt may be called once the model becomes airborne, regardless of subsequent events.

**C.** Unless otherwise specified at the beginning of the event, the flight lines will have their pilot order reversed the following day.

**14.** Maximum flight score is 100 points.

**15.** If four or more rounds are flown, the contestants flight score will be the average of the best three. If three rounds are flown, the best two will be averaged. If two rounds are flown, both flights will be averaged.

**16.** Total contest score will be the sum of the static score and the flight score.

**17.** In the event of a tie, the model with the highest aggregate flight score of all rounds shall have ascendancy. If this results in a tie as well, the static score will be added to the aggregate flight score. If further tie breaking is needed, the craftsmanship points will be added as well.

**18.** Only under extreme weather conditions will the flying portion of the contest be postponed or cancelled, and then only by the decision of the C.D. and Chief Judge.

**19.** To be eligible for any special awards the model must have at least one score, including a takeoff.

## **PART 4 – FLIGHT JUDGING**

The subject of flight-judging of scale R/C models is one that has occupied the minds of competition fliers and judges for some five decades. In many cases problems arise for which there are no real solutions, because unlike any other model aircraft contest category we aren't comparing apples with apples.

In this brief preface to the Flight Judging Guide some assistance to the judge and to the flier is offered in order that the best attempt at fairness can be accomplished.

As a basis for further guidance let us compare the ultimate R/C flying machine, the "Pattern Aerobatics" model, against the scale replica of a full-size aircraft which, in this case, happens to be controlled by radio. Note the distinction; the scale model is not by definition a flying machine in the same way as a pattern model.

The designer of the pattern model, having no physical limitations to his application of the science of aerodynamics to R/C models, has free reign. He can make design or shape adjustments to cure any unwanted tendency. Airfoils, moments, dihedral, and a host of other considerations can all be tuned individually to achieve the desired results.

On the other hand, consider the scale model. To a great degree its design is "locked-in." True, a few things can be adjusted: wing loading, C.G. position, and force arrangements come to mind. But many other factors cannot be changed.

The only type of scale model, perhaps, that could be expected to compare in flying accuracy with the pattern model would be a model of a purpose-built aerobatics-only subject such as the popular Extra. For this type of subject a high standard of flying finesse could be justifiably demanded. But consider this: how good would a scale Fokker Tri-plane be as a pattern model? Clearly, it would be useless.

Yet here is a contestant with a model of this “useless” flying machine and he is going to fly it in competition. Furthermore, one of the most important, perhaps the most important aspect of scale modeling is that the contestant shall have free choice to build a model of whatever aircraft “rings his chimes” as the saying goes makes him want to recreate a particular piece of aviation history enough that he will make all the effort required. Moreover, he must be able to be “competitive” with whatever choice he makes.

This free choice is at the very core of scale modeling, but it poses a serious dilemma for the judge. By what yardstick can its flying performance be judged? Obviously not by the same criteria as a machine designed for flying alone.

A thousand other examples could have been named in lieu of the Fokker, but the point is the same; any scale model can only be judged by the yardstick of the subject chosen. For instance, in the case of a full-size Fokker, nine landings out of ten may have resulted in a ground loop or a nose-over. The ground crew merely righted it and life went on. Having no effective throttle control, and with a design that violated every rule of ground-handling we now know, the pilot had little chance.

Therefore, the sophisticated scale judge will bear these inherent factors in mind. The Fokker model pilot who made a perfect approach, and actual touch-down, rolled a few feet, then nosed-over, may have done as good a job as was possible to do, especially on a paved strip! Neither the judge nor any pilot on the field could have done better. Would it be “fair and just” to give a zero?

No, it wouldn't. For the same reason, while a judge may expect and demand landing perfection again, remembering our paved strip from a tricycle-gear model, he should make allowances for a narrow-tracked tail-dragger. If he doesn't, soon the only competitive subjects will be tricycles. Nobody wants this to happen.

From this one example, the flying judge can get some idea of what is needed from him in scale competition. He cannot compare the delivered performance to some theoretical ideal as obtainable from a pattern design. He must use a different yardstick comparison against the best that could have been done by the subject involved crosswinds and other weather factors must be taken into account, too.

Nobody could expect every judge to be familiar with the inherent flying characteristics of every aircraft; nevertheless, aircraft can be “grouped.” The judge who rates the performance delivered to that expectable from the model before him will be doing the best that can be asked.

**REALISM** – The size of the aerobatic maneuvers performed by a contestant should reflect the capabilities of the aircraft modeled. For example, it would be expected that a loop performed by a J-3 Cub would be smaller in diameter than one performed by a P-51 Mustang if both were modeled to the same scale. The speed at which maneuvers are performed also must reflect the capabilities of the prototype.

In all aerobatic maneuvers consideration should be given to the forces that would be exerted on the full-scale counterpart. Exceedingly small or tight maneuvers with unnecessarily high rates of roll, pitch, or yaw do not simulate the performance of the majority of full-scale aircraft and should be downgraded accordingly.

Finally, the contestant should acknowledge that the smoothness or gracefulness of the flight presentation will have a large impact on its realism. The judge should consider himself to be a passenger in the model and assess these maneuvers in terms of the effect they would have on his well-being.

## **MANDATORY MANEUVERS**

### **IMPORTANT!**

Unless specified otherwise, ALL maneuvers are expected to be centered on the judges. However, if the maneuver is called at a specific location, say to the left or right of the judges, it will be judged accordingly. This is NOT a license to describe HOW the maneuver is to be flown, only its placement. Other than explaining an unusual maneuver or placement of a maneuver to the judges, no other conversation is appropriate before takeoff.

As in the past, there are five mandatory maneuvers, of which Realism is one, and five optional maneuvers. All aircraft, regardless of class, must fly nine maneuvers plus get a realism score. The five mandatory maneuvers are:

- 1. Takeoff**
- 2. Fly-Past High Speed (Between 3 and 20 feet altitude)**
- 3. Fly-Past Slow Speed ( Between 3 and 20 feet altitude)**
- 4. Landing**
- 5. Realism**

### **TAKEOFF**

Takeoff should be into the wind as much as possible and should begin with a ground run followed by a gentle lift-off with a climb angle consistent with that of the prototype. Takeoff is completed when the model is ten feet from the ground. A “stop or near stop” is not a requirement; the model may turn onto the runway and take off in one smooth motion typical of full-scale aircraft. (Pilots are not to be positioned behind the model or out on the runway during takeoff or landing.) The model may not be touched after “Takeoff” has been called. If it must be, Takeoff will score zero OR the contestant’s one “attempt” must be called. For maximum points, the model does not have

to take off in front of the judge. However, breaking ground at one extreme end of the field, if there was enough room to prevent it, may prevent a perfect score.

**Errors:**

Model is touched by pilot or helper after advancing throttle to takeoff power. Model swings on takeoff run [a slight swing should not be the cause of loss of points on light aircraft types with conventional (tail wheel) gear if it is corrected promptly.] Model becomes airborne too soon. Model jumps off ground. Model climbs too steeply after takeoff. Model drops a wing badly during takeoff.

**FLY-PAST (High Speed)**

The model shall fly straight along a path parallel to the runway, no closer than the centerline of the runway and no farther than twenty feet from the far edge, at an altitude between three and twenty feet. Direction shall be the same as that used for takeoff. The model shall be flown at its maximum flying speed at the fly-past altitude for at least 300 feet. Important: it is the caller's responsibility to watch for traffic in the vicinity.

**FLY-PAST (Low Speed)**

Same as for the high speed pass and flown in the same direction but flown at a minimum SAFE flight speed. If the aircraft has flaps and retractable landing gear they should be deployed during this maneuver. The aircraft would typically be flown in a high-drag configuration but with sufficient throttle to maintain a constant altitude and heading.

**Errors:**

Flight path is not parallel to runway. Straight and level flight at a constant altitude is not maintained during the minimum time required for the maneuver.

(Note: Allowance should be made for slower types of light aircraft that should not be downgraded for slight corrections in gusty wind conditions or minimum change in high and low speeds)

Altitude is not between three and twenty feet. The maneuver is offset to the right or left of the judges. Insufficient speed differential between high- and low-speed passes. Model "coasts" (from a higher altitude or speed) through the maneuver and speed decreases throughout.

**LANDING**

The judging of the landing maneuver begins when the model is at ten feet altitude. The approach and touchdown count for half of the landing score, and the rollout after touchdown counts for the other half of the score. The landing maneuver is complete when the model has slowed sufficiently to make a safe controlled turn off the runway.

If the rollout is wavy, with bounces, ground loops, etc., or the model noses over, the second part

of the score will be downgraded leaving the mark for “approach” unaffected. If the model flips upside down, the second half of the maneuver will score zero, again leaving the approach score unaffected. Example: A perfect approach and touchdown, on or very close to the runways centerline (score: 5) followed by a flip over (score: zero) means the landing maneuver will score a total of five points. In the event a landing gear malfunction occurs, the rollout portion of the score will be based on the judges assessment in terms of saving an imaginary crew. This landing would be called an “Emergency Landing” and with a perfect approach and a “safe” landing, a score of ten points may still be earned. Emergency landings may be judged only if the model lands on or adjacent to the active runway. Higher scores will be awarded to aircraft that touch down a third of the runway away from the judge as opposed to landing “long,” causing the judge to get up from his seat to see the actual touchdown.

## **MECHANICAL OPTIONS**

### **RETRACT AND EXTEND GEAR**

Retraction should commence immediately following the takeoff maneuver, during climb out, before the model reaches twenty-five feet altitude. It is important that the judges see the gear actually retract. If the model makes its first turn away from the flight line and the gear is not yet retracted at that point, there will be a downgrade. The speed of gear operation and its action should approximate that of the prototype. Since landing gear operation is impossible to accurately judge during flight, the gear must be demonstrated to the judges prior to takeoff. The judges should observe the following points: speed of retraction, operation of gears and their fit when closed, “lag” between legs if appropriate, etc. The judges should form a mental score which they will then award if the gear functions similarly during the flight plan. If the gear fails to function correctly during flight an appropriate downgrade will be made.

### **MULTI ENGINES**

To be eligible to claim a multi-engine option, the model must have the same number of operating engines as the prototype. Also, the displacement of the engines must differ, or agree, per the prototype. Exception: reciprocal engine aircraft with auxiliary jet pods. Jet pods may be dummies. Example: Neptune, B-36, C-123 etc.

Judges will look for various throttle settings during the flight. This maneuver is no longer an automatic ten as it was years ago.

#### **Errors:**

For maximum score all engines should be running from beginning of takeoff until landing maneuver is completed.

### **FLAP OPERATION – MANDATORY, NOT AN OPTION**

If the prototype had flaps then the model must incorporate their use. Flaps may or may not be used for takeoff and **MUST** be used for landing. A minimum flap angle of thirty degrees is to be used for landing. For maximum points during landings the flaps should be lowered on the base

or final leg of the traffic pattern. In addition to the landing the flaps will also be used during the Slow Fly-By, Touch-and-Go, or an Overshoot, and points will be deducted from the realism score if the contestant fails to use them.

It is suggested that if flaps are incorporated in the design, that they be run through a cycle as the airplane is taxied away from the judges prior to takeoff. This will show the judges that the minimum angle of thirty degrees is attained.

**Errors:**

Failure to operate flaps when required.

Model exhibits violent trim change during flap operation.

**BOMB DROP**

Bombs should be carried and dispensed in the same manner as the prototype. For bombs carried internally, bomb bay doors should open, bombs should drop, and doors should close for maximum score. The model must perform a bomb run in the manner of the prototype. For example, if the model is a dive bomber, the dive is the "bomb run."

A contestant is permitted to substitute an expendable bomb or bombs for the flight presentation as long as the number, size, shape and coloring are the same as those used for Static Judging. For maximum score, the bomb or bombs should contact the ground approximately in front of the judges or a spot called by the pilot in advance.

**Errors:**

Bombs are not carried or delivered in the manner of the prototype. Bomb doors are grossly different in operation from prototype. Bomb drop not preceded by a bomb run. Finned bombs tumble erratically after release. Externally mounted bomb(s) wobble(s) in slipstream during flight prior to release. Bomb is released prematurely or misses the "target zone."

**TORPEDO DROP**

For maximum points a torpedo drop should be performed as a part of a torpedo run at low altitude. Actual altitude of the model at release would depend on its scale, but it should be low enough to enable the torpedo to strike the ground in a relatively flat attitude. Release should be performed with the model in a level attitude, and approximately in front of the judges.

**Errors:**

Model is too high at release. Release is not preceded by a straight run. Release is too early or too late.

**TANK DROP**

Jettisonable fuel tank(s) should be carried in the manner of the prototype. The drop should be performed with the model in level flight in clear view of the judges.

**Errors:**

Tank(s) not securely attached to model, has visible oscillation in slipstream prior to release. Tank does not fall clearly away from model at release. Model not in level flight at release.

**PARACHUTE DROP**

A parachute drop or ejection should be performed in the manner of the prototype. Cargo should be dropped via doors or hatch. A single-seat aircraft must not drop its pilot. For maximum points the parachute(s) must be to scale with the model.

**Errors:**

Parachute fails to open. Chute does not fall clear of aircraft. Chute is emitted from the aircraft in a manner not typical of the prototype. Parachute(s) not properly sized to aircraft.

**BRAKING PARACHUTE (Landing Enhancement)**

This does NOT get a separate score. A braking chute should extend upon or immediately prior to initial contact with the ground and remain attached until the model comes to a complete stop. For maximum impression the chute must appear to work with the brakes and bring the aircraft to a stop before the end of the runway.

**AGRICULTURAL SPRAYING OR DUSTING**

This scale operation is for models of aircraft used for crop spraying or dusting only. The contestant should be prepared to document that the prototype aircraft was used for this purpose. Since the manner in which this operation was performed by full scale aircraft may differ according to aircraft type and/or crop being covered, the contestant should describe to the judges his intended presentation. Generally the aircraft will make a low pass down the runway centerline and visibly perform its spraying or dusting mission on command by the contestant. The maneuver should begin and end on the same heading and with the wings level.

**Errors:**

Model does not release visible spraying/dusting material. Maneuver is not presented in full view of the judges. Model follows erratic course during operation. Model changes heading during operation.

**OTHER MECHANICAL OPTIONS**

A contestant may elect to perform a scale operation of his own choice that was typical of the prototype. Any such operation must be cleared by the Chief of Judges and explained to the judges before flight.

**STRAFING RUN**

This maneuver represents an attack upon personnel or equipment. It consists of a wings level, slightly diving pass, followed by a steep pull-up. Some onboard representation of firing guns or some sort of ordnance must be dropped. A Strafing Run during which nothing is dropped from

the model or gun firing is not simulated will score zero. Gun firing may not be simulated verbally or by a sound making device on the ground.

ROTATING BEACONS, STROBE LIGHTS, OPERATING CARGO DOORS, ROTATING RADOMES, ETC. ARE NOT ALLOWED AS ANY SCORED OPTION, BUT THEY MAY BE INCORPORATED IN A MANEUVER FOR THE ENHANCEMENT OF THE REALISM SCORE!

### **OPTIONAL FLIGHT MANEUVERS**

All maneuvers, whether mandatory or optional, are listed and fully described in this **Top Gun** rule book as well as in the current AMA competition rule book. The rule book is available at [www.Model Aircraft.org](http://www.ModelAircraft.org) The maneuvers are described in the section titled "Radio Control Flight Judging Guide, Sub-Section: Radio Control Sport Scale (Sportsman & Expert)."

ALL MANEUVERS TO BE SELECTED FROM THE FOLLOWING LIST. Unless authorized prior to the event, the following are the only maneuvers that may be elected as Optional Flight Maneuvers.

- Straight Flight Out, Procedure Turn & Straight Return  
(The above maneuver is for non-aerobatic aircraft only)
- Chandelle
- One Roll (with breaks)
- Figure Eight
- Stall Turn
- Wing-over
- Split-S
- Touch & Go
- Overshoot
- Standard Traffic Pattern
- Immelmann Turn
- One Roll (without breaks)
- Descending 360
- Cuban Eight (Or Reverse, full or half)
- One Pylon Lap Demo
- Straight Inverted Flight
- Inside or Outside Loop
- Standard or Inverted Spin
- Military Traffic Pattern

### **PROTO TAXI OUT AND BACK** (one option)

The model is required to simulate prototypical taxi from the starting position next to the judges (hangar) to a position ready to begin the takeoff. The model is also required to taxi back, beginning at the conclusion of the landing rollout, and proceed to its original hangar position next to the judges. Actual stops at any point may be made but are not required. If the full scale aircraft would need to make S-turns while taxiing to enhance pilot visibility, the model must do likewise.

### **STRAIGHT FLIGHT OUT, PROCEDURE TURN, STRAIGHT RETURN** (one option)

The model begins this maneuver directly in front of the judges, making a straight run for at least four seconds, then executes a 90-degree turn away from the spectator line followed immediately by a 270-degree turn to the original path. It then flies in a straight line to the original starting-point. During the entire sequence altitude is to be constant.

#### **Errors:**

Altitude varies. Heading changes during straight runs. Radius of 90-degree & 270-degree turns dissimilar. Model does not make full 90-degree or 270-degree turns.

## **INSIDE LOOP**

The model commences this maneuver in level flight. It then gains airspeed with a shallow dive; if the full scale aircraft was capable of an inside loop directly from level flight, the dive is omitted. It then pulls up into as round a loop as was possible for the prototype to manage. The throttle may (but need not) be reduced for descending portion. The loop is complete when the aircraft resumes level flight at the same altitude where the loop (minus the initial dive) began. Center of loop must be directly in front judges.

### **Errors:**

Wings are not level throughout the maneuver. Position at conclusion of maneuver is different in altitude or distance from pilot. Loop not centered properly.

## **OUTSIDE LOOP**

Starting in level flight, the model noses down to perform a smooth, round, outside loop which is completed when the model regains its starting altitude and exits in level flight on the same heading as the entry. The throttle should be closed at entry and should be opened after completion of the first half of the loop when the model is inverted and is at a point closest to the ground.

### **Errors:**

Maneuver does not begin and end in level flight. Exit altitude is not same as entry altitude. Model does not begin and finish on same heading. Loop is not round. Wings do not remain level. Throttle is not closed during first half of maneuver.

## **STALL TURN**

The model starts in level flight, noses up to a near-vertical attitude, at which point the throttle is closed and the airplane yaws through 180 degrees. It then dives and finally recovers to straight and level flight on a heading in the opposite direction to the entry. The contestant needs to specify if the turn will be to the left or to the right.

### **Errors:**

Model does not assume the correct attitude. Throttle is not closed. Model turns in the wrong direction. Model does not exit the maneuver on the correct heading.

## **CHANDELLE**

This maneuver is an exaggerated climbing turn where the aircraft changes direction by 180 degrees. Depending on the type of aircraft performing the maneuver the model may begin with a shallow dive to pick up speed. The nose should come up and the aircraft should complete a climbing turn, away from the flight line. Maximum climb and bank occur at approximately mid-point during the change in direction. Max bank angle may be from 45 to 60 degrees. Entry speed should be sufficient to prevent visible slipping or skidding and maintain the same turn rate throughout the maneuver. The degree of bank angle and rate of climb are constantly changing as the speed continues to decline through the maneuver. As the 180-degree point is reached in the turn where the aircraft is traveling in the opposite direction from its entry the wings are

brought level for completion of the maneuver. At that time, the aircraft will be flying at quite a reduced speed as compared to its entry speed.

**Errors:**

Same turn rate not maintained. Aircraft skids or slips. The model does not establish a notable climb rate. Model does not finish with wings level on a heading opposite to that entered.

**STRAIGHT INVERTED FLIGHT**

The model approaches the runway, parallel to it and at least twenty feet outside the centerline. When approximately 150 feet away from the judges stand, the pilot will invert the model and keep the aircraft in straight, level and inverted flight for a distance of 300 feet. After 300 feet or so, the model is returned to the upright position and the maneuver is called complete.

**Errors:**

Model is put into the inverted position too early or not while parallel to the flight line. Model waivers in heading or in altitude. Maneuver is completed too soon.

**IMMELMANN TURN**

The model performs the first half of an inside loop and when inverted performs a half-roll to resume straight and level flight on the opposite heading. Some aircraft types would be expected to commence the maneuver by executing a shallow dive at full throttle in order to pick up the necessary speed.

**Errors:**

Wings are not level during half loop. Model is climbing or diving during half-roll. Roll is begun too early or too late. Exit heading is not 180 degrees from entry heading.

**FIGURE EIGHT**

The model approaches in straight and level flight on a line parallel to the spectators, then a 90-degree turn is made in a direction away from the spectators, followed by a 360-degree turn in the opposite direction, followed by a 270-degree turn in the first direction completing the maneuver directly over the center of the landing circle on the original approach line. The intersection (mid-point) of the maneuver shall be on a line which is at a right angle to the direction of entry and passes through the center of the judges.

**Errors:**

Entry not made parallel with spectator line. Rate of turn not constant throughout the maneuver. (Depending on wind velocity and direction, a change in bank angle is expected) Model does not maintain constant altitude. Model does not complete 270-degree turn at point where first 90-degree turn was started. Finish not on the same heading as entry. Model does not begin and end in level flight. Size of each circle is not the same.

**WING-OVER**

Model starts in level flight and noses up to a near vertical attitude at which time it is flown

through a 180-degree arc using rudder to end up in a near vertical dive. The model pulls out of the dive at the same altitude as the entry on a parallel path, but on a 180-degree opposite heading.

**Errors:**

Model not level at start. Model rolls left or right during pull-up. Wings not perpendicular to ground during 180-turn. Throttle not closed during dive. Return path not parallel to entry. Recovery not at same altitude as entry. Model does not fly straight and level to complete the maneuver.

**SPLIT-S (REVERSAL)**

From straight and level flight the model may or may not pitch up slightly, the throttle is reduced, and the model performs a half-roll to inverted followed by the second half of a loop, down to straight and level flight on a heading opposite to that of the entry.

**Errors:**

Model changes heading during half-roll. Wings are not level during half loop. Model does not exit from maneuver on the exact opposite heading to entry.

**ROLLS, ROLLS, ROLLS**

There are three styles of rolls that may be performed. A **roll with a break**, a **roll without a break**, and a **slow roll**. A roll without a break means that the maneuver is a continuous roll about an axis with no hesitation through its 360 degrees of travel. Some examples are a military roll, victory roll, axial roll, barrel roll, and snap roll. Rolls with an interruption or break include a two-point roll, and the four- or eight-point roll.

The last type of roll is the slow roll which is done for the approximate length of the flight line. At **Top Gun** the contestant may select to perform only ONE roll without a break in addition to a slow roll.

**ROLL**

From straight and level flight the model rolls at a constant rate through one complete rotation and resumes straight and level flight on the same heading. Light aircraft types would be expected to execute a shallow dive at full throttle before the maneuver. The contestant should nominate what type of roll he will perform, i.e. axial, slow, etc. Usually, the aircraft will commence the roll from a shallow climb and exit the roll in a shallow dive. Some ultra-high-powered aircraft may perform a roll beginning and ending in level flight.

**Errors:**

Rate of roll not constant. Deviation in heading during, Loss or gain in height.

**FOUR-POINT ROLL**

The model starts in level flight, then assumes a slight climb, makes a quarter-roll in a nose-up attitude, then makes another quarter-roll bringing it to a level inverted position. It then makes another quarter roll, slightly diving, then makes the last quarter-roll into level upright flight. Each

point is held for approximately 1 second. Some specialized acrobatic prototypes may be capable of a four-point roll during which the aircraft is always level.

**Errors:**

Points held too long or too short. Altitude at finish different from beginning. No arc (trajectory) during maneuver. Wings not level or vertical at points.

**SNAP ROLL – INSIDE**

Model begins in level flight. As the nose is pulled up to the point where the wing will stall, rudder is applied to roll the model in the desired direction. The nose of the model should break the line of flight in a direction towards the pilot's cockpit, indicating that a stall has occurred. While most models will roll faster in a snap roll than in an aileron-induced roll, roll rate should not be a factor in judging. The roll should stop precisely when the model is again upright and the maneuver should be completed in straight and level flight. Snap rolls may be performed vertically or on a 45-degree climbing or diving flight path, but such maneuvers should always begin and end in straight and level flight.

**Errors:**

Model does not begin and end in straight and level flight. Wing does not stall during roll. Roll is not terminated precisely after 360-degree rotation. Model does not exit from maneuver on the same heading as entry.

**SNAP ROLL – OUTSIDE**

This maneuver should be performed in a similar manner to the inside snap roll, except that as the break occurs the nose of the model moves away from the direction of the pilot's cockpit indicating that a stall was induced by the application of down elevator control.

**Errors:**

Same as inside snap roll.

**BARREL ROLL**

Aircraft is pulled ten degrees off heading and rolled around an imaginary point on the horizon describing an arc around that point without crossing through it.

**Errors:**

Roll rate is not constant. Model does not finish maneuver on same heading and/or altitude as entry. Maneuver is not centered in front of the judges.

**ONE-LAP PYLON OR SPEED RUN DEMONSTRATION**

Models performing this maneuver must be models of pylon racers or long distance race aircraft. Models of aircraft which raced over a closed course (pylon racers) shall perform one lap of a simulated triangular race course. One leg of this shall be parallel to the runway.

**Errors:**

Model does not fly straight and level during the designated straight legs of the maneuver.

Model does not make a pass parallel to the runway. Models of pylon racers do not perform turns in the manner of race aircraft (model yaws noticeably when banked. Model gains or loses excessive altitude in turns.)

### **SPIN**

The number of turns to be performed shall be noted on the judges' score sheets. The contestants may choose any whole number. The entry shall be from straight and level flight parallel to the runway. Power shall be reduced, and the model should remain on heading in a slightly nose-high attitude until it stalls and commences to spin. The model should auto-rotate through the prescribed number of turns and recover on the same heading at a lower altitude. The rate at which the model rotates in the spin will depend on its size and type, but judges should be alert to observe models which are performing a spiral dive rather than a true spin.

#### **Errors:**

Entry not from level flight parallel to runway. Does not perform the prescribed number of turns. If the number of turns performed is greater or less than the prescribed number by more than one complete turn, a zero score should be given. Does not recover on a same heading as entry. Wings not level during recovery. A spiral dive rather than a true spin shall be scored zero.

### **INVERTED SPIN**

Same description and errors as for spin, but the model commences the spin, and recovers, in the inverted position.

### **CUBAN EIGHT**

The model pulls up into an inside loop and after completing half the loop heads inverted downward 45 degrees, does a half-roll followed by another half inside loop to the inverted downward 45-degree heading, does another half-roll and pulls out into straight flight at the same altitude as the entry and on the same heading. A light aircraft type would be expected to execute a shallow dive at full throttle in order to pick up speed before commencing the maneuver. Throttle may be closed at the top of each loop and reopened during each descent. One half of a Cuban Eight or Reverse Cuban Eight is also permitted.

#### **Errors:**

Maneuver is not performed in a constant vertical plane or is executed endwise. Loops are of unequal diameter. Half-rolls are not executed at the correct point in the maneuver. Model does not exit from the maneuver at the same height as entry.

### **DESCENDING 360**

The model passes in front of the judge at an altitude greater than 100 feet and performs a gentle, descending 360-degree circle, away from the flight line with a reduced throttle setting. The aircraft should finish the maneuver in front of the judges at an altitude no lower than three feet but as high as twenty feet. Throttle should be advanced and the aircraft continues on a straight path, parallel to the flight line.

**Errors:**

Model is banked too sharply and performs a high-speed circle of small diameter, model finishes maneuver at too high altitude or throttle was not reduced enough to allow the gentle descending 360 that the judges are looking for.

**OVERSHOOT or GO-AROUND**

Model should commence by flying a final base leg followed by a turn onto a normal final approach at low throttle, using flaps if applicable until it reaches a point immediately opposite the judges at a height of five feet or less. At this point throttle is applied gradually, and the model climbs straight ahead to resume level flight.

**Errors:**

Model does not commence maneuver with the correct landing approach. Model does not use flaps (if applicable.) Model does not climb away smoothly. Model simply dives or dips towards runway and climbs away.

**TOUCH AND GO**

This maneuver shall be judged as a landing followed immediately by a takeoff, each half being scored separately. A total maximum points is 20. After a smooth and gradual descent on a straight path to the runway, the model lands and slows to below flying speed. All wheels may, but need not, be in contact with the runway. Contact must be maintained for at least 25 feet. Following this, the model must accelerate and take off on the same heading as entry. If this maneuver is done immediately prior to the landing, the landing gear or flaps do not have to be retracted.

**Errors:**

Same as Takeoff and Landing but with this addition: model bounces once and becomes airborne. Model bounces on landing. Model deviates left or right while rolling on ground. Model fails to slow down to an "un-airborne" condition. Model stops on ground. Changes in heading during the takeoff run.

**STANDARD TRAFFIC PATTERN APPROACH TO LANDING**

The Primary Objective is to fly a rectangle-shaped maneuver. The model begins on an upwind heading directly over the centerline of the runway. After passing in front of the judges it should continue, straight and level, and at a constant altitude for approximately 200 feet before making a turn away from the flight line onto the crosswind leg. A second turn begins a downwind leg with the model flying at a constant altitude and again passing in front of the judges. A third turn towards the flight line begins the base leg during which the model may begin its descent. A fourth turn, into the wind, should line up the model with the runway centerline, and straight descending flight should continue. Traffic Pattern is complete when the model is at ten feet of altitude, at which time a landing maneuver begins. Note that in some cases the third and fourth turns are joined to become one continuous 180-degree turn. When retractable landing gear or flaps are used, these should be deployed at appropriate points of the pattern.

