

Western Scale Invitational
- Scale Competition with a Difference –

2009 WSI RULE BOOK - Version 04/01/09.3

Part I – General Rules

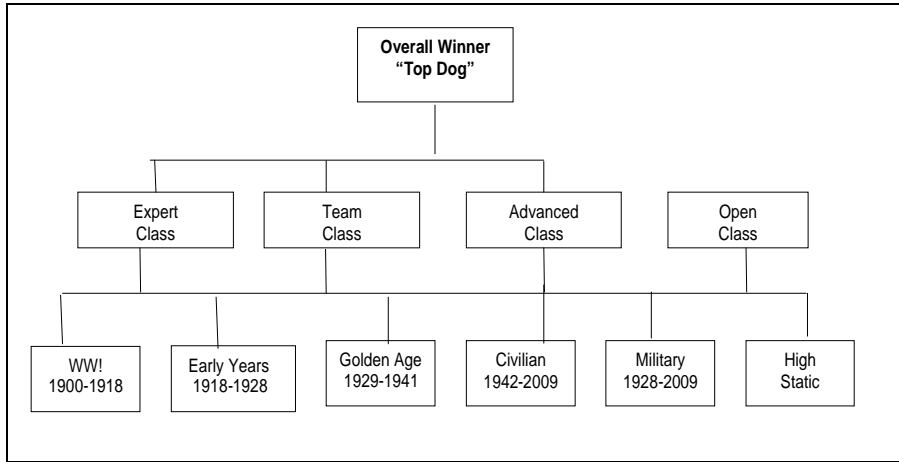
1. This invitational event is open to all, so if you wish to attend, you are invited. As this event is a structured scale contest (Static Judging, Flight Judging of pre-defined maneuvers), previous contest experience (AMA 512, 522 and/or Scale Masters Qualifiers) or participation at other structured contests/events would be beneficial, but is not a requirement.
2. Unless otherwise stated in this Rule Book, the current US Scale Masters Competition Guide shall take precedence on all matters.
3. Static and Flight Judging criteria for this scale event have undergone some changes from that of Scale Masters. The intent of these changes is to simplify documentation and judging criteria for Static Judging, and secondly, furnish uniform guidelines for executing and judging flight maneuvers and scale operations of model aircraft. WSI judging criteria is less demanding, less critical and will primarily identify and score obvious errors. Feedback to the contestant will be given. Hopefully, WSI Static Judging as well as Flight Judging will provide a training ground and form a framework for other competition events.
4. This event will have four entry classes in which to compete: Expert, Team, Advanced and Open. Expert Class is where the builder and pilot is the same person and is governed by the Builder of Model (BOM) rule. The Team Class is where there is both a builder and a designated pilot, and both are allowed to perform work on the model. The Advanced Class is for top-level pilots that are using aircraft that are not governed by the BOM rule. Those competing in Expert and Advanced may also enter as a designated pilot in one Team class. The Open Class is available as an entry-level for new and developing scale competitors using aircraft that are not governed by the BOM rule. Contestants may enter the Open Class provided they have not previously competed in Expert, Team or Advanced at a WSI Event.
5. In addition to awards and recognition being given to Class winners and High Static, awards and recognition will also be given to aircraft Category winners, regardless of Class. An aircraft's Category will be specified on a pilot's Registration form and noted on the Flight Judging Form. A contestant will now compete not only against all aircraft types in his Class, but will also compete against similar aircraft types in his selected Category, regardless of Class.

Aircraft Categories are as follows:

1. WW1: 1900-1918
 2. Early Years: 1918-1928
 3. Golden Age: 1929-1941
 4. Civilian: 1942-2009
 5. Military: 1928-2009
6. All rules specified in this Rule Book are applicable to all competitive classes. Judging criteria for both flying and static judging are identical for Expert, Team, and Advanced Classes. Open Class static judging is based upon documentation provided and flight scoring is identical to Expert, Team and Advanced Classes.

7. The Official Score will be the total of static points and the average of three best flight scores when three or four flight rounds are flown. The average of four best flights will be utilized when five flight rounds are flown. The flight with the lowest score will be removed and the average of all remaining flight scores will be used as the final overall flight score of the contest. The overall winner (or Top Dog) will be determined from the Expert, Team and Advanced winners and be awarded to the contestant with the highest Official score.

8. The following Hierarchy Chart illustrates the competition scheme for this contest:



Part II – Static Judging

1. The Static Judging portion of this 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. Static Judging will be limited to a maximum of 6 minutes overall per aircraft.

2. Static Judging will be performed in four categories for Expert, Team and Advanced Classes: (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 terms of looking real or looking like a Toy airplane. Static Judging will be conducted by two judges, a "Color" judge and a "Craftsmanship" judge. Their scores will be added together for a final static score. The Static Judging Forms to be used for Static Judging are contained in Appendix 2 and 3.

As shown upon the two separate Static Judging forms, the points available will be:

- Outline 10 points
- Finish, Color and Markings 30 points
- Craftsmanship 30 points
- Realism 10 points
- Total 80 points

3. 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.

Part III – Flying Rules

1. The flight plan will consist of ten scores, consisting of four mandatory maneuvers and five optional maneuver/scale operations. The tenth score will be for Overall Flight Realism for the entire flight. Maximum score for each maneuver is ten.
2. There is no Gyro rule. All aircraft may use Gyros in any way they like.
3. If a maneuver is called out of sequence, the entire flight will not receive a zero. The Flight Judges 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.
4. Any aircraft having any aerobatic capability may not select "Procedure Turn" as a flight Option. However, non-aerobatic types may perform it. Non-aerobatic means the aircraft was not capable of inverted flight or extreme attitudes. A non aerobatic aircraft is not rated to exceed 60-degree bank angle or 30-degree pitch angle.
5. To be eligible for any awards the model must have at least a Static score greater than zero and one Flight score, i.e. at least a Take Off.

Part IV – Flight Judging

The intent of the flying portion of a WSI Scale Event is to determine the pilot's ability to fly the model aircraft in the most realistic manner possible. A theme or mission should be established in choosing flight maneuvers so the flight routine's order is easier to track by judges and is more pleasing to watch.

The emphasis of the flying portion of the WSI Scale Event is placed on scale realism, so the chosen aircraft type will determine the maneuvers parameters such as speed, geometry, and positioning with respect to the judges centerline, so, contestant beware. Contestants should indicate aircraft type and be designated either Aerobatic capable or Non-Aerobatic by checking the appropriate box on the flight score sheet.

1. 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 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.
2. Each Maneuver starts with a score of 10 points and the Flight Judge will deduct for errors noted during the execution a the maneuver. Errors include mismatches noticed in Placement and Precision for each maneuver. The contents elements are scored to the nearest 1/2 point. A Flight Judging Form reflecting these two elements is contained in Appendix 1 and will be used for this event. Note that this form provides for feedback of a maneuver's performance. The "Plac" column is for Placement content and the "Prec" column is for Precision content. The "Score" column is for the awarded score for the maneuver. Digits, marks, symbols, X's, etc., in the appropriate downgrade column (Plac, Prec) will be used by the Flight Judge for maneuver downgrade feedback. The Realism content of each score for a maneuver will not be judged or scored at this event, but rather, will be reflected in the mandatory maneuver "Overall Flight Realism".

2. Retracts

Retraction should commence immediately following the takeoff maneuver, during climbout. 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.

Errors:

1. Failure to operate when required
2. Points will be deducted from the Realism score if the contestant fails to use them

3. Parachute/Cargo 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 scale with the model.

Errors:

1. Parachute(s) fail to open
2. Chute(s) do not clear aircraft
3. Chute(s) is emitted from the aircraft in a manner not typical of the aircraft type

4. Strafing Run

This maneuver consists of a wings level, slightly diving pass, followed by a steep pull-up. Some onboard representation of firing guns or some sort of ordinance must be dropped. A strafing run during which nothing is dropped from the model or gun firing is not simulated will score zero for its part of the maneuver combination.

5. 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:

1. Tank(s) not securely attached to the model.
2. Has visible oscillation in slipstream prior to release
3. Tank does not fall clearly away from the model at release
4. Model not in level flight at release

6. 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 maximum score, the bomb(s) should contact the ground approximately in front of the judges or a spot called by the pilot in advance.

Errors:

1. Bombs not carried or delivered in the manner of the prototype
2. Bomb doors are grossly different in operation from the prototype
3. Finned bombs tumble erratically after release
4. Bomb is released prematurely or misses the "target zone"

7. Torpedo Run

For maximum points, a torpedo drop should be performed as part of a torpedo run at a low altitude. Actual altitude of the model at release would depend on its scale, but 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.

4. Climb and descent angles not equal throughout the maneuver
5. Arcs misshapen
6. Maneuver not symmetrical about judges' position
7. Start and finish positions not as indicated
8. Overall size of maneuver not realistic for prototype
9. Aircraft flight path not smooth and steady
10. Too far away/too close/too high/too low

Part VII - Mechanical Options

1. Multi-Engines
2. Swing or Folded Wings

Multi-Engines

The mechanical option of multi-engines will be judged entirely for its mechanical fidelity in configuration and size to duplicate the performance of its full size counterpart. Refer to the Scalemasters Competition Guide, Para. 6.1 Multi-engines: for a complete description of this option.

Swing or Folded Wings

This option will be judged in two parts, as the aircraft is taxiing away from the judges before takeoff (up to 5 points) and after the aircraft lands and has begun the taxi back (up to 5 points for a total of ten). The wings do not have to be synchronized in operation but should not "flop" unrealistically as they travel over center. On swing-wings, both wings should operate together in a synchronized manner, and be extended on the taxi out and retracted on the taxi back.

Part VIII - Scale Operations

All scale operations that are briefly used or deployed for independent scoring must be presented, or complemented with a skill related option flight maneuver. These optionally selected maneuvers with scale operations are referred to as "maneuver combinations". Refer to the Scalemasters Competition Guide, Section VII for a complete description of maneuver combinations.

1. Flaps
2. Retracts
3. Parachute/Cargo Drop
4. Strafing Run
5. Tank Drop
6. Bomb Drop
7. Torpedo Run
8. Agriculture Spraying or Dusting

1. Flaps

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. For maximum points during landing, the flaps should be lowered on the base or final leg of the traffic pattern. In addition, to the landing, flaps will also be used during the Slow Fly-By, Touch-and-Go, or a Missed Approach. Points will be deducted from the Realism score if the contestant fails to use them.

Errors:

1. Failure to operate when required
2. Model exhibits excessive trim change during the flap operation

3. All maneuvers, whether mandatory or optional, are listed and described in this Invitational Rule book as well as in the current AMA and the US Scalemasters Competition Guide. Unless specified otherwise the maneuvers will be performed and judged per AMA maneuver descriptions. Exceptions are 1) Procedure Turn, 2) Touch-and-Go, 3), Missed Approach, 4), Takeoff, and 5), Landing, which will be performed and judged using Scale Master's maneuver criteria as follows:

- The Procedure Turn is scored as one maneuver
- The Touch-and-Go, Missed Approach and Landing maneuvers begin when entering final approach to landing.
- The Touch-and-Go, Missed Approach and Takeoff maneuvers end when the aircraft attains an altitude of 30 feet.

Note that the AMA Fly Past and Dirty Inspection Fly Past maneuvers are different from Scale Master's. The difference is that the AMA maneuvers are timed (5 seconds) judged, while the Scale Master's maneuvers are distance (300feet) judged. These two maneuvers are judged using the AMA's maneuver descriptions.

4. The only approved mechanical Options permitted for a scored flight option are Multi-Engines, Swing or Folded Wings. Scale operations are only scored as Maneuver Combinations. Rules and criteria for Mechanical Options and Maneuver Combinations are as stated in the Scalemaster's Competition Guide.

Part V - Mandatory Maneuvers

1. Take Off
2. Fly Past
3. Figure Eight
4. Landing
5. Overall Flight Realism

1. Take Off

The Take Off maneuver shall be scored after heading position is initially established with a brief hesitation near the centerline of the active runway. A full stop may be made, but is not required between the end of the taxi and the beginning of takeoff. The contestant must announce that "Take Off maneuver is starting now" prior to starting the takeoff roll. For optimum scoring, the roll must be parallel and in close proximity to lengthwise centerline of the runway. The roll distance and tracking prior to lift-off should be realistic in scale to that of the full size aircraft. During climb out, the wings should remain reasonably level with original heading maintained. The takeoff optimum heading and prototypical ascent angle should be maintained to an elevation of at least 30 feet to complete the maneuver.

Errors:

1. Aircraft swings on takeoff
2. Takeoff run too long or too short
3. Unrealistic speed / too rapid acceleration
4. Not a smooth liftoff
5. Climb rate wrong (too steep or shallow)
6. Flaps, gear not used / raised, if applicable
7. Significant wing drop
8. Climb out track not same as takeoff run

2. Fly Past

The Fly Past maneuver is flown at a mandatory 10 to 20 foot elevation and will be centered in front of the judges' and located over the maneuvering line, parallel to the "defined runway" width. Direction will

be the same as the designated takeoff unless otherwise specified by the CD or Air Boss. Downgrading will also start occurring if the maneuver is too far out beyond the maneuvering line (approx. 100 feet), or in closer than the far side of the defined runway edge. For optimum score, the maneuver should track straight and level over the maneuvering line for at least 5 seconds. Elevation and horizontal Placement of this literally "straight forward" maneuver is therefore essential for maximum points.

Errors:

1. Aircraft not flown on a straight course
2. Aircraft not flown at a constant height
3. Aircraft not centered on judges' position
4. Aircraft not flown parallel to the maneuvering (or Judges') line
5. Aircraft not flown at least 300 feet (over 300 feet not an error)
6. Aircraft flight path not smooth and steady
7. Aircraft flown too far away, too close, too high, too low

3. Figure Eight

Model approaches in straight & level flight on line parallel with judges' line, and then a 1/4 circle turn is made in a direction away from judges' line. This is followed by a 360-degree turn in the opposite direction, followed by a 270-degree turn in the first direction, completing the maneuver on the original approach line. The intersection (mid point) of the maneuver shall be on a line that is at right angles to the direction of entry and passes thru the center of the judges' line.

Errors:

1. Entry into first circle not at right angles to original flight path
2. Circles of unequal size
3. Circles misshapen
4. Constant height not maintained
5. Intersection not centered on judges' position
6. Entry and exit paths not on same line
7. Entry and exit paths not parallel with judges' line
8. Overall size of maneuver not realistic for prototype
9. Aircraft flight path not smooth and steady
10. Too far away/too close/too high/too low

4. Landing

The Landing maneuver will be scored from the time the aircraft enters the final approach to landing or at the end of an optional Traffic Pattern Approach preceding it. In this latter case, it will start when the model is at 10 feet altitude. Immediate judging considerations will include optimum alignment to "center line" of the runway and constant rate of descent and flare to touchdown. The optimum point of landing touchdown shall be determined by runway length to permit the necessary safe roll out of the type aircraft flown. Therefore, positioning for touchdown in front of the judges is not required. The judging of roll out and overall landing maneuver is not complete until the aircraft has sufficiently slowed to permit a safe controlled taxi from the active portion of the runway. If flaps, slats, and/or retracts are prototypical features of the aircraft, they must be properly deployed prior to landing for "Overall Flight Realism" qualities.

Errors:

1. Maneuver does not commence when entering final approach, OR at the end of an optional Traffic Pattern Approach preceding it
2. Descent from base leg not smooth and continuous
3. Model does not maintain a constant rate of descent and flare to touchdown
4. Model touches down into any area outside of defined runway

21. Chandelle

This maneuver is an exaggerated climbing turn in which the aircraft changes direction through 180-degrees. The model may begin with a shallow dive to pick up speed, the nose should then pull up and the model begins a climbing turn proceeding away from the flight line. The maximum climb and bank occur at approximately the midpoint during the change in direction. The maximum may only be 45 to 60-degrees for non-aerobatic aircraft and up to 90-degrees for fully aerobatic aircraft. 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 which it entered, the wings are brought level for the maneuver completion. At this time, the aircraft would be flying at reduced speed compared to entry.

Errors:

1. Same turn rate is not maintained throughout the maneuver
2. The model slips or skids
3. The model does not provide a notable climb rate
4. The model does not finish with wings level on a heading opposite to that entered

22. 360 Descending Circle

Commencing from straight and level flight, the model performs a gentle 360-degree descending circle in a direction away from the judges, at a constant low throttle setting. The maneuver terminates at a height of between 10 and 20 feet resuming straight and level flight on the same path.

Errors:

1. Rate of descent not constant
2. Descent too steep
3. Throttle not constant or low enough
4. Circle misshapen
5. No significant loss of height
6. Descent not to a height between 10 and 20 feet
7. Circle not centered on judges position
8. Entry and exit paths not parallel with the judges line
9. Start and Finish not called in straight and level flight
10. Too far away, too close

23. Lazy Eight

The model approaches in straight and level flight on a line parallel with the judges' line. After passing the judges position, a smooth climbing turn is started away from the judges. At the apex of the turn, the bank should be at least 60 degrees. The nose of the model aircraft then lowers and the bank comes off at the same rate as it went on. The turn is continued beyond 180 degrees to cross in front of the judges with wings level before intercepting and turning on to the reciprocal of the original approach track. This completes half of the figure, which is then repeated in the opposite direction to give the full symmetrical maneuver about the judges' position. Intercepting the original approach track parallel with the judges' line completes the maneuver. A low powered aircraft would be expected to execute a shallow dive at full throttle in order to pick up speed before starting the maneuver. The figure should be symmetrical each side of the judges' position. This maneuver is essentially two Wingovers in opposite directions.

Errors:

1. Entry and exit paths not parallel with judges' line
2. Insufficient climb achieved
3. Insufficient bank achieved

at 10 feet 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 and/or flaps are used, these should be deployed at appropriate points of the pattern.

Errors:

1. The upwind and downwind legs are not parallel to the runway
2. First turn not 90-degrees
3. Model does not reduce speed during the downwind leg
4. The gear/flaps are not deployed at appropriate points in the pattern
5. Model does not make a smooth, constant descent during the base and final legs
6. Model not lined up with centerline after turn to final
7. Excessive use of throttle during the final approach

19. Military Traffic Pattern Approach to Landing

The model begins with an upwind pass on the far side of the runway with a 180-degree turn away from the judges followed by a 180-degree turn to final. The traffic pattern ends at 10 feet altitude. An alternate military traffic pattern commences with a low entry approach on the far side of the runway with a climbing pitch out away from the judges culminating in another 180-degree turn to final. As before, the traffic pattern ends at 10 feet altitude. Flaps and landing gear are extended at the beginning of the 180-degree turn to final.

Errors:

1. Excessive use of throttle during the approach
2. Varying turn rate and glide path especially during the final 180-degree turn

20. Slow Speed Inspection Pass

This maneuver is only allowed for aircraft with flaps as a minimum. This maneuver includes the described transition periods on a common heading and elevation to enter and exit slow flight. The model will transition smoothly into and out of a high lift and high drag aerodynamic configuration using the applicable features of the aircraft. As a minimum, this maneuver must include the use of fully deployed flaps as the model is progressively brought to its slow fly by speed. This will be along a straight and level path parallel and over the far edge of the runway at an elevation of between 20 and 40 feet for a minimum of 5 seconds. This slow midpoint period of the maneuver should be opposite the judges. The model's flying speed should be much slower than the mandatory Fly Past, to the extent that the apparent stall speed has been effectively reduced by use of flaps and other applicable features. The model will often require some low level power to "drag" it through this high drag period. The model will then slowly transition out of this high lift and high drag profile while speed is again increased. This transition should not include immediate lifting of flaps prior to increasing speed, which could otherwise stall the model.

* When electing this maneuver, it must immediately follow the mandatory Fly Past.

Errors:

1. A smooth, straight and level flight at a constant altitude is not provided to transition into, during, and out of the Slow Speed Inspection Pass
2. The model is not on the same heading
3. *Allowances should be made for corrections in gusty wind conditions*
4. Altitude is not between 20 and 40 feet
5. Maneuver is offset to the left or right of the judges
6. The 5 second slow speed portion is not remarkably slower than the Fly Past
7. All applicable high lift or high drag features such as flaps and retracts were not deployed
8. If flaps were not deployed, the maneuver will score a zero

5. Model bounces, experiences uncontrollable premature turns after landing
6. Model noses over or over-turns
7. Model does not come to a gradual and smooth stop or has not sufficiently slowed after landing to permit a safe, controlled taxi
8. Mechanical operations, i.e., slats retracts, partial flaps on base leg, full flaps on final not utilized (Overall Flight Realism)

5. Overall Flight Realism

Overall flight realism score is an objective summary based upon Continuity of flight and Power management. Overall flight realism will be awarded in proportion to how well the model simulates the complete flight, stability, takeoff, landing, and taxiing characteristics of the prototype aircraft. The model will be judged for its realistic attitudes in flight, smoothness of control in yaw, pitch, and roll axes. Use of throttle management is anticipated to fly an aircraft at moderate speeds in interim flight for turnarounds compared to other fast or slow speeds applicable to the maneuvers performed. It is the competitor's option to choose any flight maneuver as long as the prototype aircraft was capable of performing those maneuvers. Full flight performance capabilities need not be performed. NO downgrade will be given for choice of maneuvers.

1. Continuity of flight primarily addresses how well the aircraft maintains a general realistic appearance on the ground and in the air before, between or after selected maneuvers. Continuity includes taxi, airborne turnarounds, altitude, smoothness or stability, etc., except when such features are included in defined listed options such as Traffic Pattern, Procedure Turn, etc. Trim passes are permitted without deduction in continuity.
2. Power management is anticipated to fly an aircraft at moderate speeds in interim flight for turnarounds compared to other fast or slow speeds applicable to the maneuvers performed.

Judges are to evaluate:

1. Model performs smooth transitions through each axis (roll, pitch, and yaw) consistently throughout the entire flight (including between maneuvers)
2. Bank angles consistent with full-size aircraft
3. Attitude in flight is realistic
4. G-loading consistent with full size aircraft
5. Chosen maneuvers consistent with full-size aircraft's capabilities
6. Power management demonstrated throughout the flight
7. Aircraft that feature retractable gear are not flown with their wheels down.

Part VI - Optional Flight Maneuvers

All optional flight maneuvers are to be selected from the following list. Unless authorized by the CD prior to the event, the following are the only maneuvers that may be selected as Optional Flight Maneuvers.

1. Procedure Turn
2. Loops and More Loops
3. Vintage Loop
4. Inside Loop
5. Outside Loop
6. Immelmann Turn
7. Stall Turn
8. Wingover Aerobatic)
9. Wingover (Non-Aerobatic)

10. Split-S
11. Rolls and More Rolls
12. Rolls With a Break: Snap Roll-Inside, Snap Roll-Outside
13. Rolls Without a Break: Slow, Axial, Vintage and Barrel.
14. "N" Turns Spin
15. Cuban Eight
16. Touch-and-Go
17. Overshoot (Missed Approach)
18. Standard Traffic Pattern Approach to Landing
19. Military Traffic Approach to Landing
20. Slow Speed Inspection Pass
21. Chandelle
22. 360 Descending Circle
23. Lazy Eight

1. Procedure Turn

This individual maneuver may be done by any aircraft similar to that described by the AMA rules. However, it shall not include the straight-flight entry or exit as additional scored options. The Procedure Turn is positioned where the initial 90 degree turn away from the runway begins *before* reaching judging center, and the remaining 270 degree turn optimally starts at judging center to the left or right. (NOTE: This is identical in desired position as the start of the mandatory figure eight for optimum judging view.)

Errors:

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

2. Loops and More Loops:

The contestant should nominate which type of loop that will be performed, e.g. Inside, Outside, Vintage, etc. While the loop is intended to be a circular maneuver, the ability of a low powered aircraft to achieve a perfect circle will be less than that of an aerobatic airplane. A slightly elongated loop (a "Vintage loop") by the former would therefore expect to score as well as a circular loop.

3. Vintage Loop

The maneuver should begin with a shallow dive at full throttle to pick up speed. The aircraft then pulls up into a smooth elliptical loop and resumes straight and level flight on the same heading as the entry. The throttle should be cut back at the top of the loop and opened when normal flight is resumed.

Errors:

1. Maneuver does not begin or end in level flight
2. Wings are not level throughout the maneuver
3. Aircraft does not execute shallow dive before commencing the loop
4. Loop is not elliptical or is executed endwise
5. Inappropriate use of throttle
6. Size and speed of Vintage Loop not in manner of prototype

4. Inside Loop

From straight flight, the aircraft pulls up into a circular loop and resumes straight and level flight on the same heading as the entry. The throttle should be cut back at the top of the loop and opened when

16. Touch-and-Go

The Touch-and-Go option requires the aircraft to slow sufficiently after landing to *below flying speed*, before again accelerating for the "GO" prior to take-off. This does *not* require that the tail wheel or skid settle to the ground for "tail draggers". ALL other qualities expected of landing and takeoff will prevail including the start of this maneuver at the beginning of the final approach. The start of the "GO" maneuver will coincide with the throttle acceleration after previously being slowed. On prototypes so equipped, flaps and retracts would be used on both sides of the maneuver. When coming in, the flaps and gear should be down. When departing, the gear and flaps should be retracted in the same sequential manner as would be expected for a Takeoff where flaps are retracted last to avoid stalls. Maneuver should be scored from the time flaps and gear are deployed and finished when gear and flaps are fully retracted again. The maximum score for this maneuver sequence is 20 points, i.e., 10 points for "TOUCH" and 10 points for "GO". Each maneuver will be listed on two consecutive lines of the score sheet one as "TOUCH", the other, "GO".

Errors:

1. Maneuver does not commence when entering final approach
2. Descent from base leg not smooth and continuous
3. Model does not maintain a constant rate of descent and flare to touchdown
4. Model impacts or thuds on to ground due to lack of flare out
5. Model bounces on landing
6. Model does not slow sufficiently after landing to below flying speed
7. Take off roll and climb out not smooth and realistic
8. Inappropriate use of flaps and gear

17. Overshoot (Missed Approach)

The model makes a landing approach at low throttle to below 10 feet altitude without touching down, followed by a climb out at full throttle to resume level flight. Model should commence by flying a final crosswind leg followed by a turn onto a normal landing approach at a low throttle, using flaps and gear if applicable, until it reaches a point over the center of the runway at a point immediately opposite the judges at a height of 10 feet or less. The aircraft continues on final until it reaches a point over the center of the runway at a point immediately opposite the judges at a height of 10 feet or less. At this point, full throttle is applied and the model climbs straight ahead to resume level flight. On prototypes so equipped, flaps and retracts would be used on both sides of the maneuver.

Errors:

1. Model does not commence maneuver with the correct landing approach
2. Model must be descending until full power is applied
3. Lowest point of maneuver not achieved in front of judges
4. Model does not climb away smoothly
5. Model simply dives or dips toward runway and climbs away
6. Inappropriate use of flaps and gear

18. Standard Traffic Pattern Approach to Landing

The primary objective is to fly a rectangular shaped maneuver. The model begins on an upwind heading on the far side 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

Errors:

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

13.3 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 direction of the pilot's cockpit indicating that a stall was induced by the application of down elevator control.

Errors:

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

14. "N" Turns Spin

The number of turns to be performed shall be noted on the judges' score sheets. The contestant may chose any whole number. The entry shall be from straight and level flight parallel to the runway. Power shall be reduced and the aircraft 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:

1. Entry not from level flight parallel to runway
2. Entry into spin not clean and positive
3. Start of spin not centered at judges' position
4. Does not perform the prescribed number of complete turns
5. Does not recover on the same heading as entry
6. Wings not level on recovery
7. Not a true spin, but a spiral dive performed

15. Cuban Eight

The model approaches in straight and level flight on a line parallel with the judges' line. After passing the judges' position, the model pulls up into a circular inside loop and after completing half the loop, heads inverted downwards at 45-degrees. When abeam the judges' position, does a half roll followed by another half inside loop to the inverted downwards 45-degree heading, then does another half roll and when again abeam the judges' position, pulls out into straight level 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.

Errors:

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

normal flight is resumed. Non aerobatic or low powered aircraft types would be expected to execute a shallow dive at full throttle in order to pick up speed before commencing the loop.

Errors:

1. Maneuver does not begin or end in level flight
2. Light aircraft type does not execute shallow dive before commencing the loop
3. Wings are not level throughout the maneuver
4. Loop is not round or is executed endwise
5. Light aircraft type does not execute shallow dive before commencing the loop
6. Throttle is not cut back at top of loop and opened when normal flight is resumed

5. Outside Loop

Starting in level flight, the model 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:

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

6. Immelmann Turn

From a straight and level flight, the model aircraft performs the first half of a circular loop (commensurate with the performance of the subject type), and when inverted, performs a half roll before resuming straight and level flight on the opposite heading. Light 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:

1. Wings are not level during half loop
2. Model does not resume straight and level flight on the correct heading
3. Model is climbing or diving during half roll
4. Roll is begun too early or too late

7. Stall Turn

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

Errors:

1. Model does not assume the correct attitude
2. Throttle is not closed
3. Model turns in wrong direction
4. Model does not exit from the maneuver on the correct heading

8. Wingover (Aerobatic)

Model starts in level flight and noses up to the near vertical attitude, at which time it is flown through a 180-degree arc, using rudder to end up on a near vertical dive. Throttle should be closed at this point

and 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:

1. Model not level at start
2. Model rolls left or right during pull-up
3. Model tucks under a wing during 180-degree turn
4. Throttle not closed during dive
5. Return path not parallel to entry
6. Recovery not at same altitude as entry
7. Model does not fly straight and level to complete the maneuver

9. Wingover (Non-Aerobatic)

The aircraft approaches in straight and level flight on a line parallel with the judges' line. After passing the judges position, a smooth climbing turn is commenced away from the judges. At the apex of the turn the bank should be no greater than 60 degrees. The nose of the aircraft then lowers and the bank comes off at the same rate as it went on. The turn is continued through 180 degrees to recover straight and level flight at the same height and on a heading opposite to that of the entry. A low powered aircraft would be expected to execute a shallow dive at full throttle to pick up speed before commencing the maneuver. Note that this is an offset maneuver.

Errors:

1. Start and finish not centered on judges' position
2. Insufficient climb achieved
3. Climb is not smooth and continuous
4. Insufficient bank achieved
5. Climb and descent angles not equal throughout maneuver
6. Aircraft does not fly a smooth and symmetrical arc
7. Entry and exit paths not in straight and level flight

10. Split-S

From a straight and level flight, the model performs a half roll and when inverted, performs the second half of a loop and resumes straight and level flight on a heading opposite that of the entry. The throttle should be closed at the inverted position and opened when normal flight is resumed.

Errors:

1. Model changes heading (track) during half roll
2. Wings are not level during half loop
3. Throttle is not used
4. Track of half loop not on line or vertical
5. Model does not exit from maneuver on the exact opposite heading to entry

11. Rolls and More 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-degree of travel. Examples are a military roll, victory roll, axial roll, barrel roll, and snap roll. Rolls with interruption or breaks include a two-point, 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.

12. Rolls With a Break (2, 4 and 8 Point Rolls)

Rolls with interruption or breaks include a two-point, and the four- or eight-point roll. Only the four-point roll is described. However, the two and 8 point rolls are performed in a similar manner and judged accordingly.

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 bring it to a level inverted position. It then makes another quarter-roll, slightly diving, and then makes the last quarter-roll into level upright flight. Each point is held for approximately one second.

Errors:

1. No arc (trajectory) during maneuver
2. Points held too short or too long
3. Altitude at finish different from beginning
4. Wings not level or vertical at points
5. (8-point roll would also include 45-degree points)

13. Rolls Without a Break (Slow, Axial, Vintage and Barrel)

From straight and level flight, the aircraft rolls at a constant rate through one (1) complete rotation and resumes straight and level flight on the same heading. Non-aerobatic or low powered aircraft would be expected to execute a shallow dive at full throttle before the maneuver. The contestant should nominate which type of roll that will be performed, e.g. Slow, Axial, and Vintage.

Errors: Slow, Axial, Vintage Rolls

1. Model does not begin and end in level flight
2. Roll rate is not constant
3. Model does not finish maneuver on same heading and/or altitude as entry
4. Style of roll not as nominated

13.1 Barrel Roll

The maneuver should begin with a shallow dive at full throttle to pick up speed, the nose should then pull up and the aircraft begins what appears to be a climbing turn. Continued application of ailerons in the turn will roll the aircraft which when inverted, may be as much as 90 deg. off its original heading. No down elevator is applied in the inverted position so the nose will fall as both turn and roll continue until the aircraft returns to the upright position at the same altitude and on the same heading as the entry. The barrel roll orbit should be big and fat like a beer barrel.

Errors:

1. Roll rate is not constant
2. Model does not finish maneuver on same heading and/or altitude as the entry
3. Maneuver is not centered on judges' position
4. The barrel roll orbit is not big and fat like a beer barrel

13.2 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.