

JR SCAT

Aerobatic Series

Aresti Made Simple

by
Barry Wegman

I was practicing the SCAT 2001 Sportsman sequence with a stick plane. At first I used the posted narrative because I hadn't seen it before. I found myself stopping the flow of the sequence, reading the next maneuver and then questioning what was meant before returning to "perform" the next maneuver. I then pulled out the Aresti. One glance at the figure and I knew what was needed.

Every year I see new pilots requesting a narrative because they don't understand how to read the Aresti diagram. Sometimes its more advanced pilots that need narratives. This article will attempt to make sense of the Aresti diagrams. However, it will not tell you how to do a maneuver or how it will be scored. For that information, you will need to refer to a judging and scoring manual. This is strictly to help the reader understand the Aresti figures.

Colonel Jose Luis de Aresti Aguirre published his *Sistema Aresti* in 1961, and the FAI adopted it in 1962. This system of diagramming aerobatic figures came about because pilots competing internationally needed a way to communicate, even if they didn't speak the same language. The simplicity of the diagrams made the system work and it has been accepted worldwide as the system of drawing aerobatic figures.

Most of the diagrams are pretty straightforward. A diagram of a loop looks like a loop. But before we get to the particulars of specific figures, let's talk about some of the conventions used in drawing Aresti figures.

Either a solid line or a dashed line represents the line of flight. Solid lines demonstrate upright flight, dashed lines show inverted flight. Looking at Fig. 1, you can see that Aresti figures start with a dot and end with a perpendicular line. Looking at any Aresti sequence, it should be clear that all maneuvers start and end in level flight, whether upright or inverted. Lines can also be drawn on 45° or 90° angles, though figures will not end in anything other than level flight. The same rules apply here. If you push to enter a 90° downline, it is a dashed line. If you pull, it's a solid line. However, if you push from a vertical up line into upright flight, it's a solid, not a dashed line.

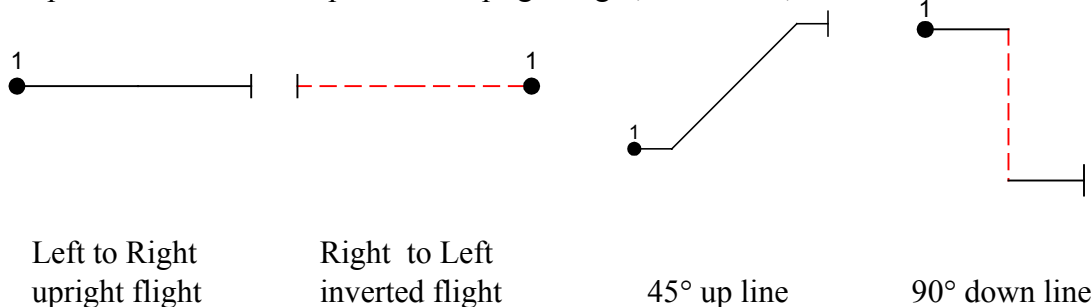


Fig. 1

A curved line running through a line shows rolling figures. The figure is always shown with the direction of flight into the “cup” of the curved line. A curved line completely through a line with an arrow at one end shows a single roll, but does not indicate which direction the plane should roll. Direction of roll is at the pilot’s discretion. See Fig 2.



Fig. 2

If the arrow only meets the line, it is a half roll. Again, the arrow does not indicate direction of roll. See Fig. 3. Note that if the line starts upright, a half roll results in finishing the line inverted. You already know this, but this is how it looks when diagrammed.



Fig. 3

Rolls can also be performed in sections, as in a point roll. A point roll is shown as a full roll with a number adjacent to the arrow. See Fig. 4a. Where the number is a 2, the figure is a 2-point roll; a 4, the figure is a 4-point roll; and so on. A partial point roll ending less than a full roll is shown by using a half roll figure with a small number adjacent to the arrow indicating the number of points, and a fraction, indicating the number of points required. A half roll figure with a 4 and $\frac{3}{4}$ indicates 3 points of a 4-point roll. See Fig. 4b. If the maneuver requires a $\frac{1}{4}$ or $\frac{3}{4}$ roll, it will appear as a fraction without the other number identifying how many points in a roll. See Fig. 4c.

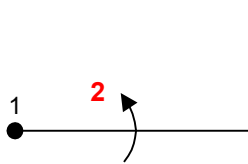


Fig. 4a
Two point roll

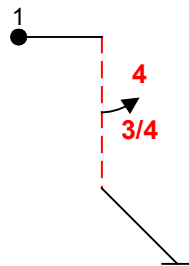


Fig. 4b
3 of 4 points on down line

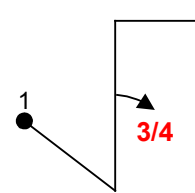


Fig. 4c
 $\frac{3}{4}$ roll on up line

Note that a $\frac{1}{4}$ or $\frac{3}{4}$ roll on a down line will take the plane off the X-axis (left to right, right to left) and put it on the Y-axis (into or away from the flight line). This is a cross-box figure. It will be joined with another cross-box figure that will put you back on the X-axis. The diagonal line in Figs. 4b and 4c is how a cross-box maneuver is drawn. Fig. 4b could be flown directly into Fig. 4c.

Rolls can be combined either in the same direction, or in opposite directions. When they are in the same direction a small line is drawn over the arrows. These rolls are linked, and both rolls are flown as one figure in the same direction. See Fig. 5a. Where the arrows are in opposite sides of the line, the rolls are flown in opposite directions. See Fig 5b. These combinations can include a full roll linked with a half roll. See Fig 5c.

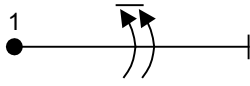


Fig. 5a
Linked rolls

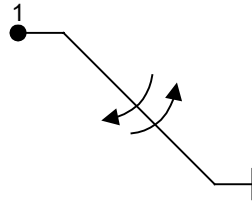


Fig. 5b
Unlinked Opposite rolls

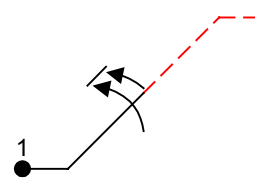
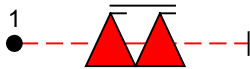
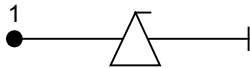
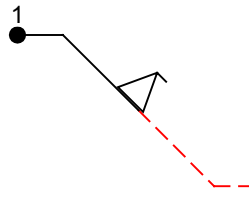


Fig. 5c
Linked 1½ rolls

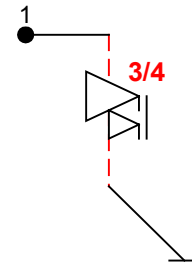
Snaps are shown as a triangle with a short line, drawn in the direction of flight, from one corner. Just like the rolls, snaps can be linked or unlinked. (Rule of construction: You should never see more than 2 linked figures.) Half snaps are shown with a small triangle that does not cross the line on which it's drawn. These can be linked or not as well. Solid color snaps represent negative snaps. Open triangles are positive snaps. See Fig. 6.



Full snaps



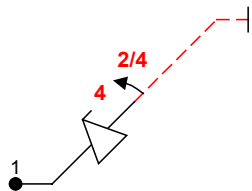
Half snap



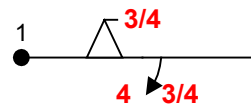
1¾ Snaps into Cross-box

Fig. 6

Rolls and snaps can be combined, in the same direction or opposition direction, on any of the three angles on which lines can be drawn. See Fig. 7.



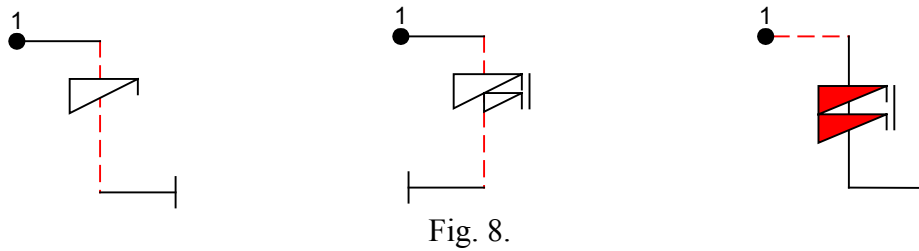
Same direction snap and 2 of 4 pt. roll



Opposite ¾ snap and 3 of 4 pt. roll

Fig. 7

Spins are shown as right triangles across the line, with a short line pointing down. Half spins are shorter triangles that don't cross the line on which they are drawn. Linked spins are flown as one figure. The color of the spin figure determines if it is positive (white) or negative (red or black). See Fig. 8

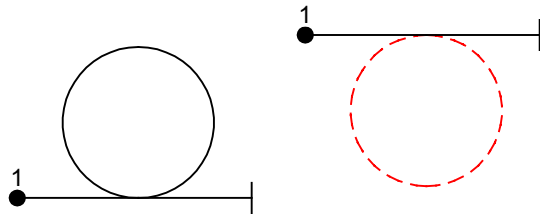


Hammerhead or stall turns are drawn as a vertical line with a line angled off the top. Fig. 9a. Rolls and snaps can be put on the vertical line. Fig 9b. The line at the top does not indicate the direction of rotation of the plane.



A turnaround figure is usually an end box maneuver, designed to reverse the direction of flight.

Loops are drawn, as loops. Inside loops are solid lines, outside loops are dashed lines. Fig. 10a. Loops can have rolls or snaps placed on them. Fig. 10b. Loops can be partial as well. The most common is the half loop. Fig. 10c. Some very common maneuvers involve a partial loop, such as an Immelman, which couples a half loop with a half roll. See, Fig. 10d. Other variations on loops include square loops, diamond loops and 8 sided loops. You will not see 3 sided loops.



Inside loop
Outside Loop
Fig. 10a

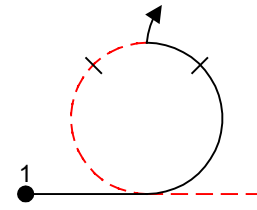


Fig. 10b

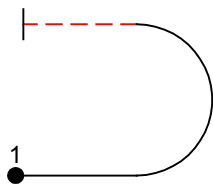


Fig. 10c

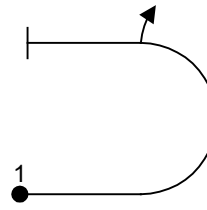


Fig. 10d
Immelman

That is the basics. All the fancy maneuvers in sequences are nothing but combinations of the above. Lets look at a few of them.

Just as the Immelman is a half loop followed by a half roll, the Split "S" is a half roll followed by a half loop. See Fig. 11.

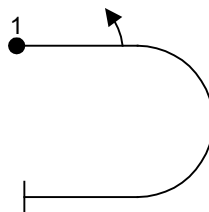
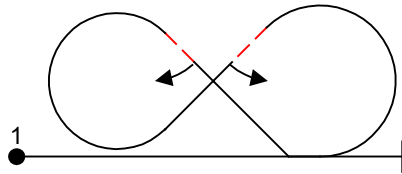
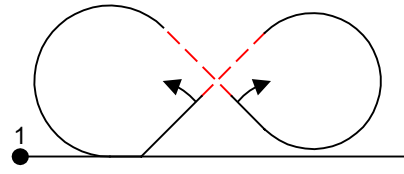


Fig. 11

A Cuban 8 is a 5/8 inside loop to a 45° downline with a half roll followed by another 5/8 inside loop to a second 45° downline with a half roll. A reverse Cuban 8 just does this in reverse: 45° upline with a half roll to a 5/8 inside loop followed by another 45° upline with a half roll. Fig. 12a and b. Roll elements can be changed, but this is the essence of a Cuban 8.

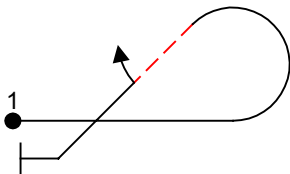


Cuban 8
Fig. 12a

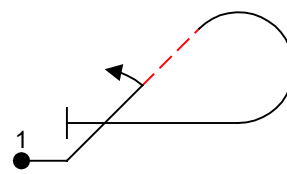


Reverse Cuban 8
Fig. 12b

The half Cuban 8 starts out straight and level, then pulls into a 5/8 inside loop into a 45° down line with a half roll before pulling out straight and level. The reverse half Cuban 8 begins with a 45° up line with a half roll into a 5/8 loop ending with straight and level flight. Fig. 13a and b. Again, other roll combinations can be used.

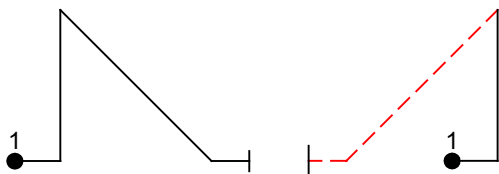


Cuban 8
Fig. 13a



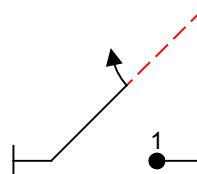
Reverse Cuban 8
Fig. 13b

A Shark's tooth is a pull or push to a vertical line, followed by a pull or push to a 45° line. It is common to see these with a half roll on the 45° line, but any roll combinations to the 45° line or the vertical line are permitted. A reverse Shark's tooth is a 45° line with a pull or push to a vertical downline. Fig. 14a and b.

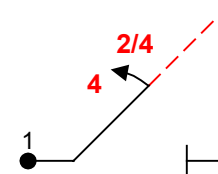


Shark Tooth

Fig. 14a



Shark Tooth
with half roll on
45° down line



Reverse Shark Tooth
with half roll on
45° down line

Fig. 14b

The humpty bump has an up or down line followed with an arc to a down or up line. Rolls and snaps can be placed on the up or down lines, which can be vertical, or 45° lines. When they are on 45° lines they are called lay down humpties. Fig. 15.

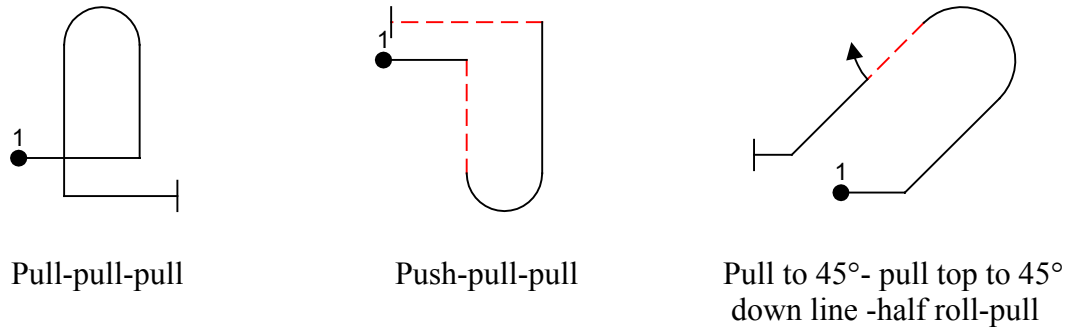


Fig. 15

Turns are shown by an oval circle, with a starting line and ending line. Fig. 16a. The type of circle is sometimes indicated within the oval as 90°, 180°, 270° or 360°. Fig. 16b. Rolls can be added to these circles as well. Usually it is one roll per 90°, but 1 per 120° or 180° is not uncommon. Rolls can be in the same direction or opposition direction. Fig. 16c.

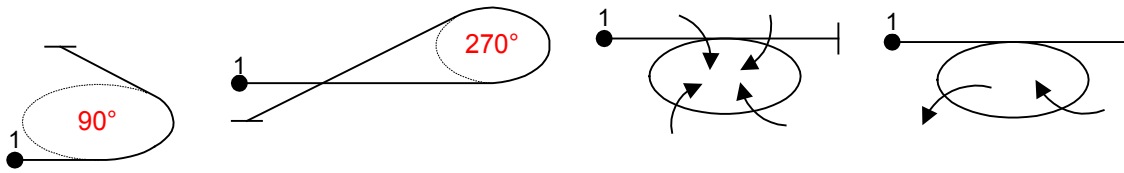


Fig. 16a

Fig. 16b

Fig. 16c

Tailslides are flown so that after the actual slide, they either flop to the canopy (or wheels up) (Fig. 17a) or the belly (or wheels down) (Fig. 17b). They can also have rolls or snaps on the vertical lines (Fig 17c).

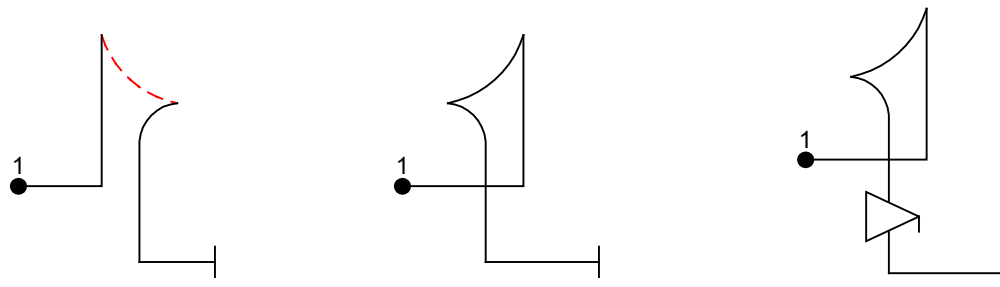


Fig. 17a
Wheels up tailslide

Fig. 17b
Wheels down tailslide

Fig. 17c
Wheels down with snap on down line

All of these variations on lines, angles and loops can be done inverted as well as upright. Half rolls can become 2 of 4 points or even a 1½ roll or maybe just a half snap. The combinations are endless. I have not shown every combination possible, as there are literally thousands of combinations. Here is how some more common figures are drawn:

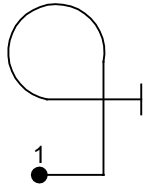
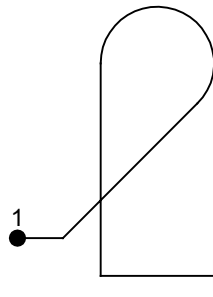
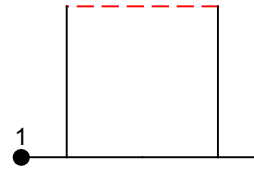


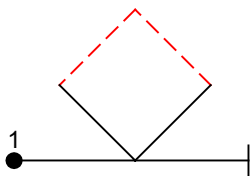
Figure "9"



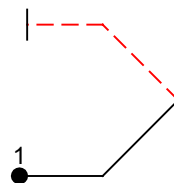
Teardrop



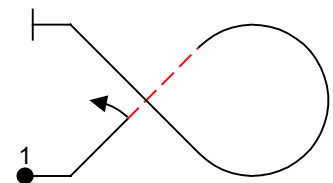
Square loop



Diamond Loop



Half Diamond Loop



Goldfish

Knowing how these figures are drawn takes the mystery out of the Aresti diagram. Once you become familiar with the rudiments of drawing the figures, you really don't have to know it's called a Cuban 8, an Immelman or a hammerhead. You can figure out what the maneuver requires including all the elements contained in the figure by looking at the drawing. And you can create your own narratives if you wish. About the only thing I ever really need to write on my Aresti sequence is whether I need to roll to the left or right to finish the figure. (Roll the wrong way on a vertical downline and you could be headed for the next state instead of center box.)

Now that you have a better understanding of Aresti diagrams, the only thing you really need to do is practice, practice, and practice.

If you are interested in reading more about Aresti and the FAI Catalog upon which all scale aerobatic figures are created, including the rules for sequence creation, you can download the Catalog at the CIVA web site:

<http://www.fai.org/aerobatics/catalog/>