# TREATISE ON VISUALIZING AIRCRAFT MARKINGS ON CURVED SURFACES…A MENTAL EXERCISE

**Keith Ferris and John Clark**

We as aviation artists, have many challenges facing us in the drawing of the airplane. None is more important than the National Star Insignia. Draw that incorrectly, and it jumps out of your painting for all to see. An embarrassment to say the least! Especially when we pride ourselves as "aviation artists."

I asked Keith to take us through the thinking process for this exercise. Where else other than ASAA does one have an opportunity to gain such knowledge? Whether we choose to use it in our work is a choice we will make, but it cannot be said that the opportunity to learn it was not made available.

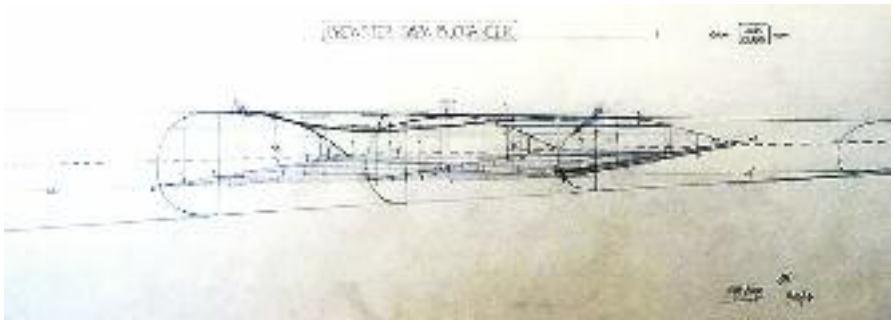
The importance of learning this is not so much that others will look at your drawing and point out the error, but that you understand the process of knowing how it is done.

This drawing exercise by Keith was one of the most successful workshops we have had to date. Everyone who participated seem to have grasped the concepts.

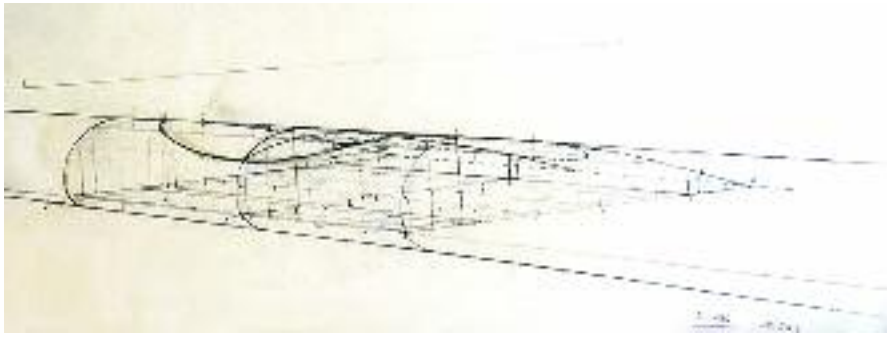
John Clark

(This workshop was presented at the 2016 ASAA Kalamazoo Forum, Kalamazoo, MI.)

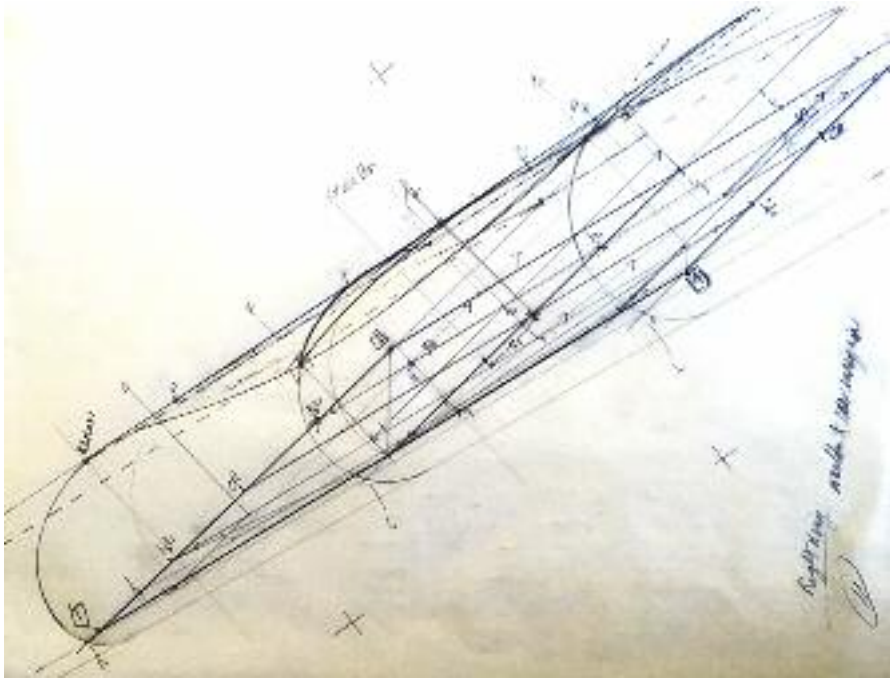
Starting on page 39 is an exercise by analysis, not mechanical, designed to program the mind.



When I (John Clark) first attempted to draw the National Star Insignia, my thinking was that it would require an analysis by a mechanical process. Shown here is the left wing of the Brewster SB2A Buccaneer.



Above: Right wing
Below: Right wing showing the layout and measurements for locating the ellipse and star. I could not believe that Keith went through this process everytime he drew the star insignia on an airplane.

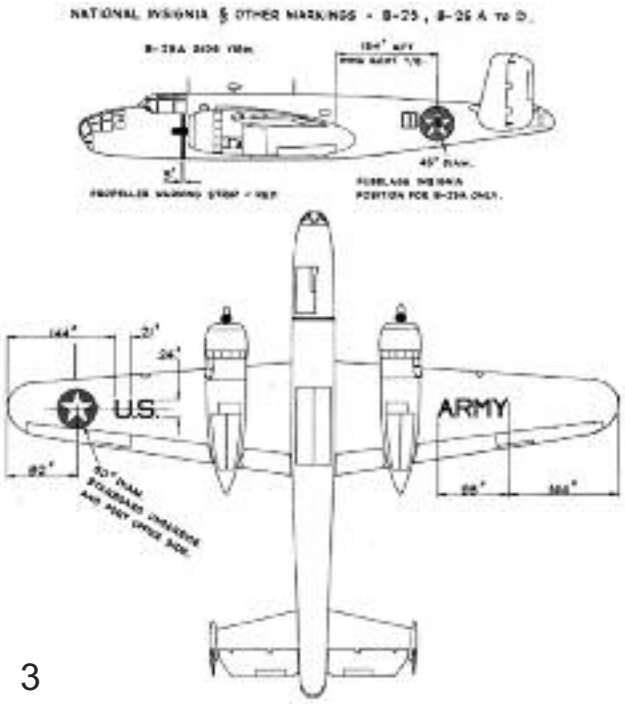


## The Keith Ferris Solution


1

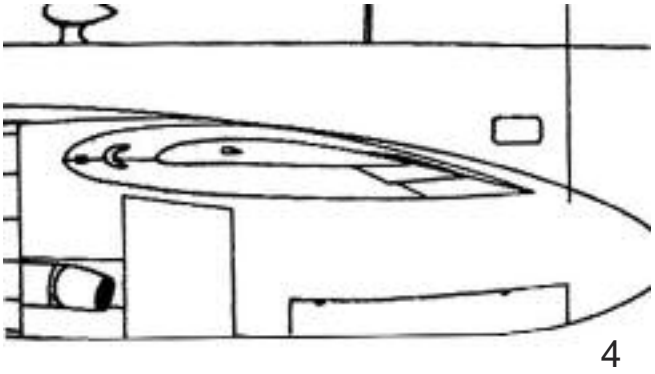
2

You will need to know the principles of constructing the star.




3

You will need to know where they are located.



4

You will have to know the form or shape of the surface on which you will be placing the insignia.


5

The idea is to be able to draw this star from any view on any surface.


6

Even the Buccaneer.

7

Step one will be to identify location, shape/form and desired view of the surface on wehich you will place the star.

8

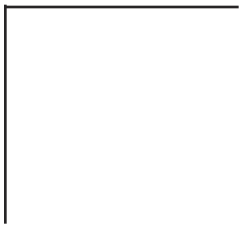
Before attempting to place the star on a surface, we had better first learn to construct the star itself. This is a mental exercise not a mechanical one.

9

First, begin with a perfect square. It will be much easier to wrap a square around a curved surface.

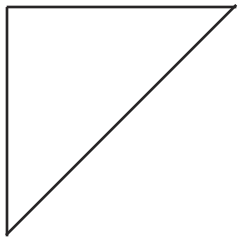
10

Start by drawing a straight line. Mentally divide the paper in quarters.



11

Add the left vertical.

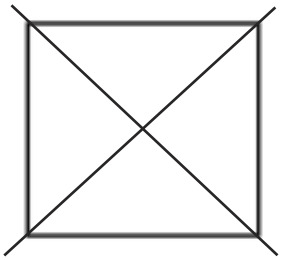


12

Think 45 degrees.

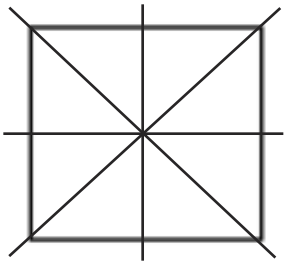
13

Complete the square.



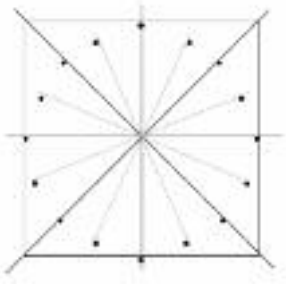
14

Cross the corners to locate the center of the square.



15

Now divide vertically and horizontally.



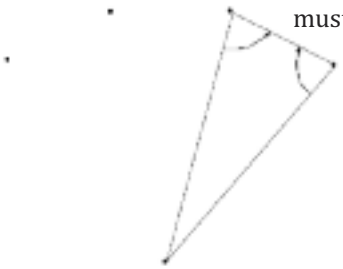
16

Plot circle by eye.

17

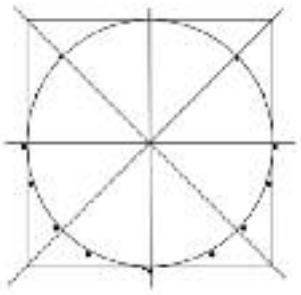
Note the the corner dots in red fall approximately 1/4 of the distance in from the corners.

...and these two angles must be equal.

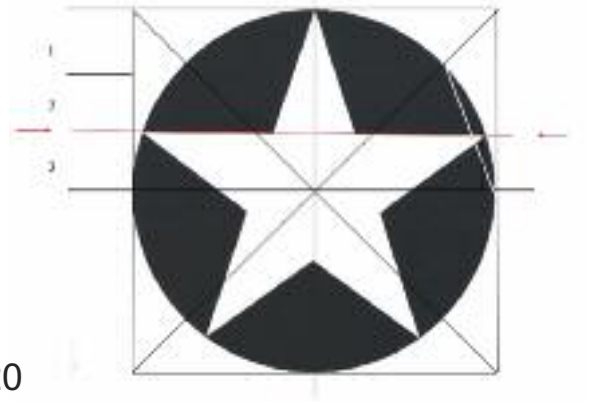


18

Think of these as a piece of pie. The trick is to place the two points equidistance from the center.

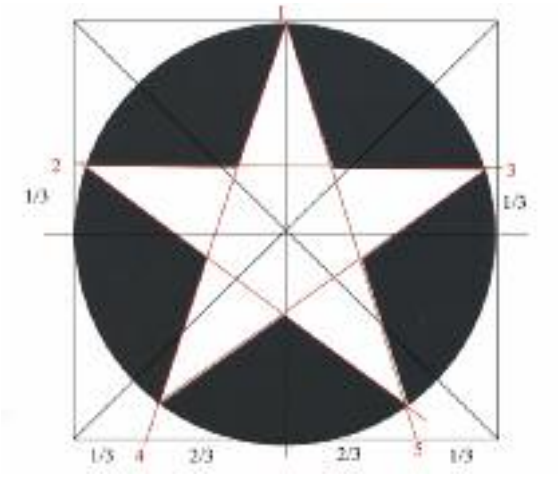


19 Now that you created the circle, how do you place it in the circle?



20

Note that the “shoulders” of the star lie about 1/3 up from the horizontal center of the star.




21

Note the five points on the square, when connected, automatically draw the star.

22

Of all the lines involved, this one will prove most important.

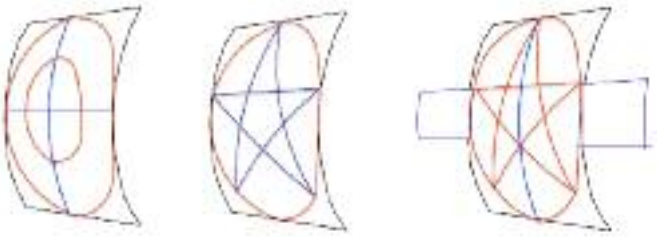
It’s not the mechanics, it’s the process of estimating and comparing proportions.

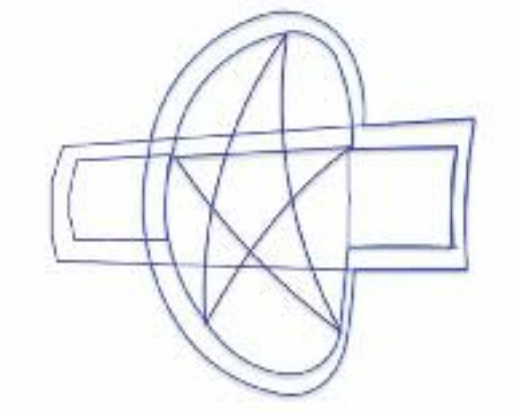
23

Working on a curved surface.

24

Different shapes wrapped around curved surfaces.





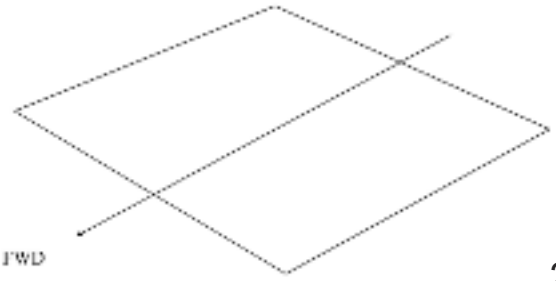
Placing the star on aircraft shapes.


25

The above photo of the Buccaneer provides a treasure of information, an idea of the airfoil, wing shape and size of star.

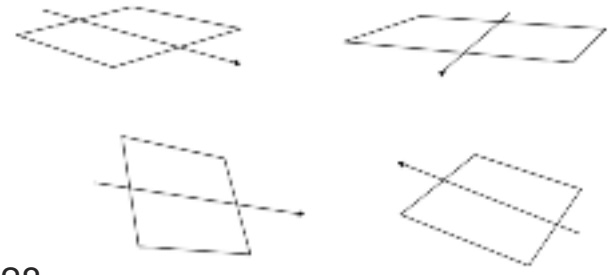
26

A wonderful photo of the Buccaneer showing size location of star relative to wing tip and aileron plus wing shape and airfoil shape.




27

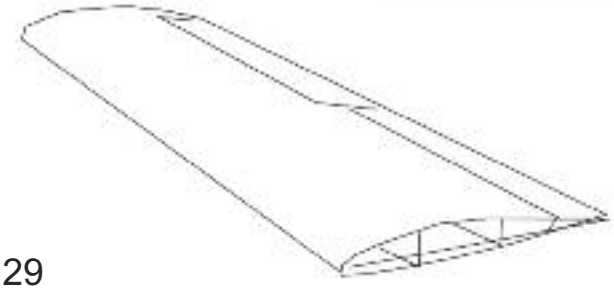
Before wrapping the star on a wing, using all the information you have learned about developing the star insignia, can you place the star in the rectangle on a flat surface in perspective like that above?
Do you remember how to find the center of the square?



28

It would be very helpful to practice developing the roundel and star from many different views.

Remember the information available in this photo ....



29

.... and using methods discussed so far can you place the proper sized and located star insignia on the curved surface of this Buccaneer wing?

1. Locate the ribs at the outer and inner edges of the roundel.

2. Locate the center rib then draw all three "ribs" (the center rib forms the all-important now curved vertical centerline of the star).

3. Locate the leading and trailing edges of the now-curved "square" (You have established the perspective of the square).

4. Divide the now-curved square as we did in developing the roundel and then the star.

5. Plot the roundel using proportions of lines we did earlier, only now you are in perspective.

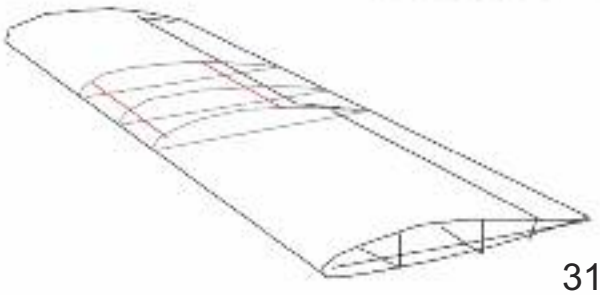
6. Now use the same five points learned earlier to plot the star.

Remember the information available in this photo ....

30

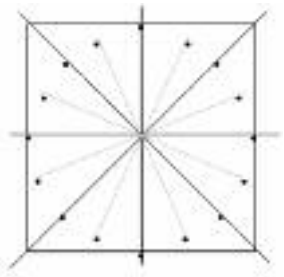
....and using methods discussed so far can you place the proper ribs on the curved surface of the Buccaneer wing.

Remember the information available in this photo ....



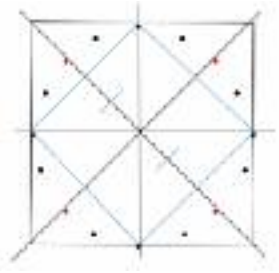
31

.... and using methods discussed so far can you place leading and trailing edges of the square on the curved surface of this Buccaneer wing?



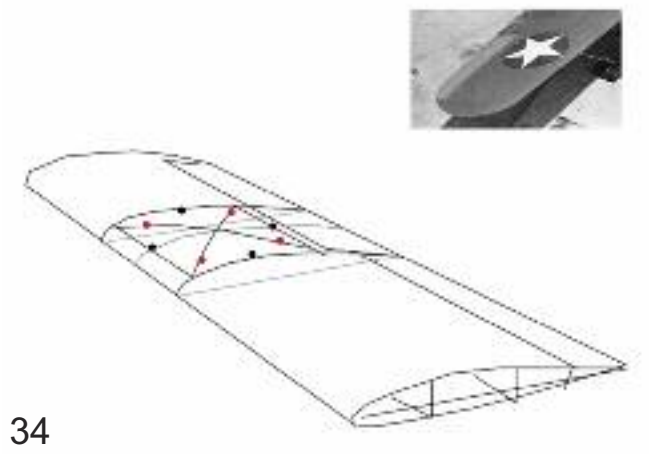
32

Plot circle by eye.



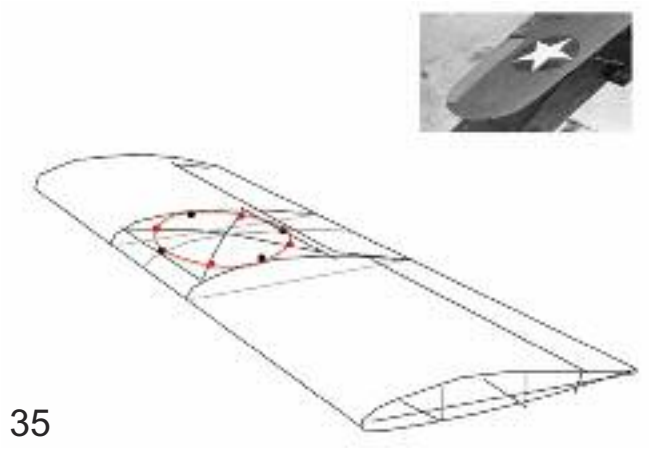
33

THE DOTS IN RED, UPPER RIGHT AND LOWER LEFT, BECOME THE MAJOR AXIS AND THOSE UPPER LEFT AND LOWER RIGHT BECOME THE MINOR AXIS OF THE ELLIPSE



34

Once placing the ellipse can you place the proper sized and located star insignia on the curved surface of this Buccaneer wing?



35

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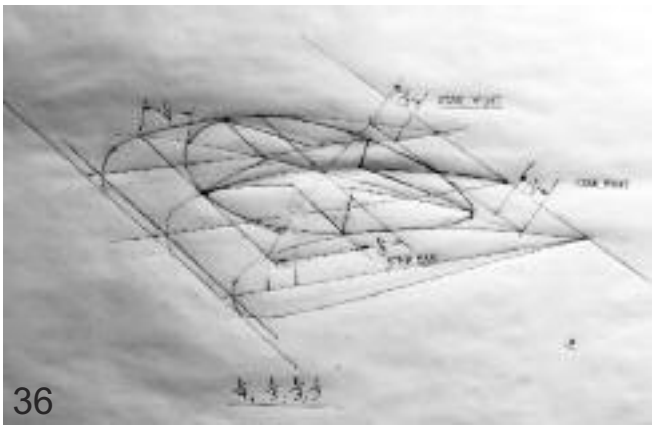

36

National Star Insignia plotted on the wing of the Buccaneer by John Clark.

PRACTICE!
PRACTICE!
PRACTICE!

DRAW DRAW DRAW DRAW DRAW!

Using analysis of the various elements of structures and insignia and markings... and practicing the thinking process recommended here you should be able to visualize and draw insignia on any shape by eye without going through this whole process every time.

The brain can be trained to think this way.

## REFERENCE