

HOW TO DRAW A THREE-VIEW PLAN FROM ONE PHOTOGRAPH

by

H. L. Kelley

Pursuing the hobby of old aircraft of 1900 to 1914 vintage has some interesting problems, particularly if one desires three view plans to accompany his pictures and specifications. Many of these airplanes were built with very sketchy plans and an idea; and with the passage of time both have been lost. With this realization one is faced with the problem of constructing his own three view plans from existing data and a picture or two.

I first heard that the Military used this system to produce their recognition silhouettes, but could not obtain instruction in its use. Later an article in Air Trails Pictorial by Phillip J. Lawson gave me a start. With some considerable study in various text-books I have settled on the system presented here as being a satisfactory solution to the problem. This system will give one an accurate three-view drawing to a given selected scale.

One must assume that the picture of the airplane is a true perspective which has one axis perpendicular to the plane of the horizon. The other two axes terminate in vanishing points on the same plane of the horizon. To obtain a three view with the correct proportions one must have at least two dimensions such as SPAN and CHORD, SPAN and LENGTH (fuselage overall), or PROPELLER DIAMETER and LENGTH (fuselage overall). The dimensions most often found are the span, surface area, and the propeller diameter. Note that the two given dimensions are on axes that are 90 degrees apart. The best type of picture to select is one that gives a three-quarter view of the airplane, and not too close, to avoid distortion.

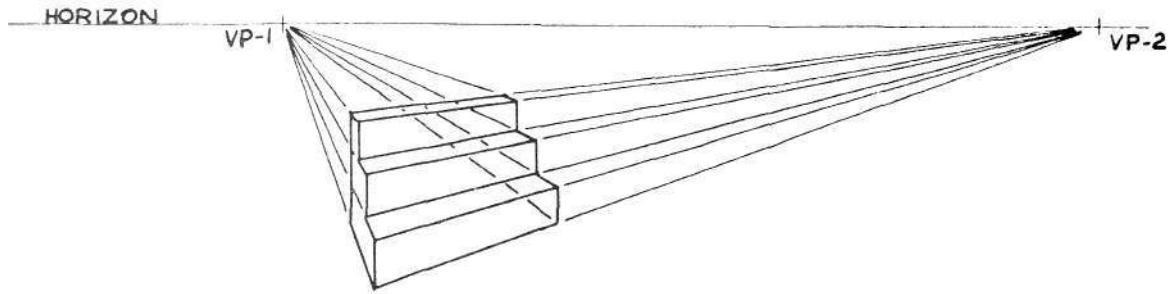
The simple figure presented in the diagrams is to help avoid confusion, but one can imagine it as the three staggered wings of a triplane. The longest side referred to as the length would be the span (2 ft.) and the shortest side referred to as width (1 ft. 3 in.) would be the chord of the three staggered wings. The vertical elevations referred to as heights would be the distance between the wings,

Diagram 1 establishes the vanishing points of the Span, VP-2, the chord VP-1, and the horizon which in turn is the vanishing point for the vertical edges. The horizon is a plane surface of which we see the edge.

Diagram 2 folds the horizon plane surface down flat into the plane of the paper so that we look at it from a vertical position above it. Since the horizon is the vanishing line for all the surfaces and edges of the picture it is also used for the folding line for projection.

Diagram 3 illustrates what the eye sees from three different positions on the locus circle. The lines of sight or extension rays from point (1) one establish a figure which, though a true top view of the airplane from that point has too great a span and too small a chord for our given dimension of 2 ft span and 1 ft, 3 in. chord. The lines of sight or rays from point 2 also establish a figure which, though a true top view of the airplane from that point has too small a span and too

ONE METHOD FOR CONSTRUCTING THREE TRUE VIEWS OF AN OBJECT FROM A PICTURE AND TWO OR MORE GIVEN DIMENSIONS. THE PICTURE IS ASSUMED TO BE A TWO POINT PERSPECTIVE.



(EXTEND RAYS FROM THE PRINCIPLE SIDES OF THE PICTURE TO ESTABLISH VANISHING POINTS VP-1 AND VP-2.

2. THE HORIZON IS ESTABLISHED BY CONNECTING THE VANISHING POINTS VP-1 AND VP-2, WITH A STRAIGHT LINE.

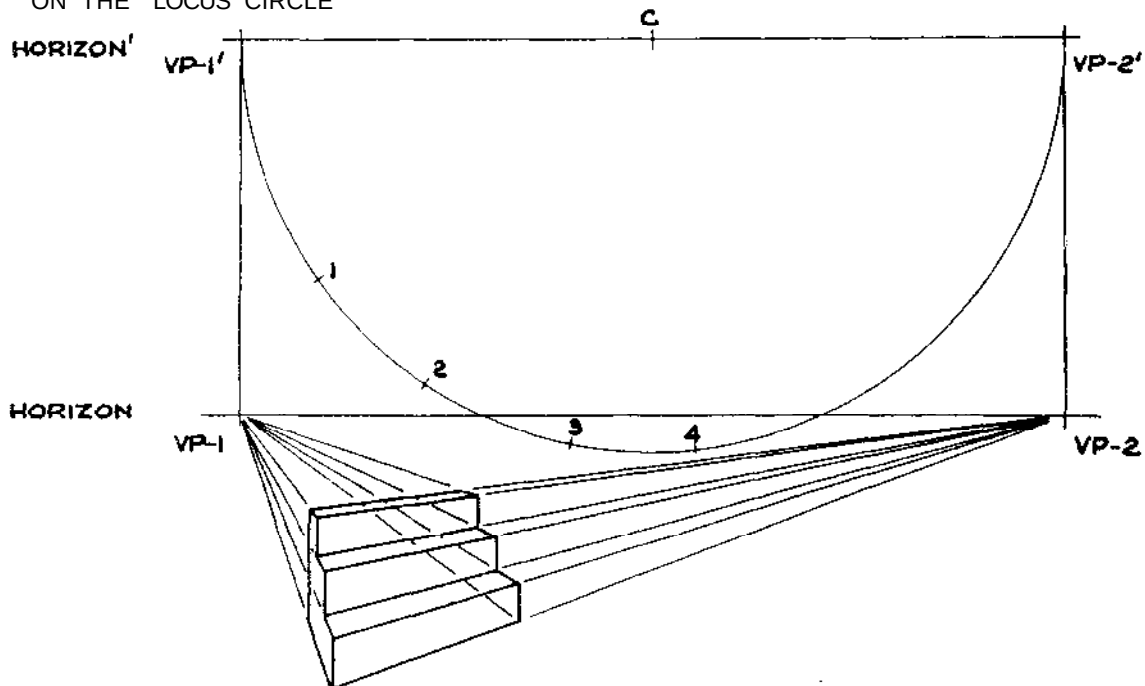
DIAGRAM-1
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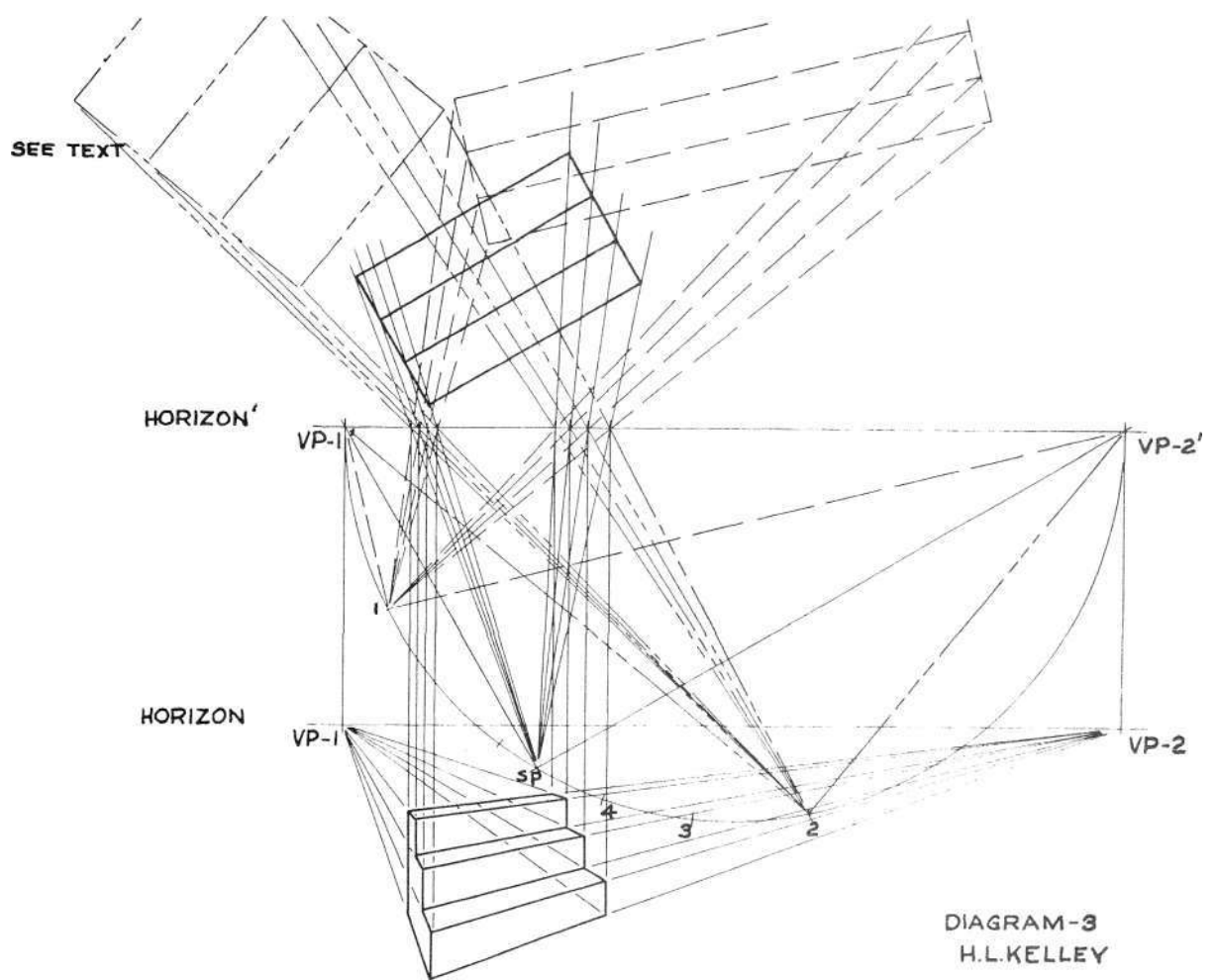
- 3 CONSTRUCT HORIZON' PARALLEL TO AND ABOVE HORIZON TO PROVIDE A WORKING AREA.

4. CONSTRUCT A CIRCLE WITH CENTER "C" ON HORIZON¹ EQUI-DISTANT BETWEEN VP-1' AND VP-2'.

5. THIS CIRCLE IS THE LOCUS OF POSSIBLE POSITIONS OF THE CAMERA WHICH TOOK THE PICTURE-

6. POINTS 1,2,3, & 4 ARE RANDOM CHOICES FOR THIS POSITION ON THE LOCUS CIRCLE





TEXT FOR DIAGRAM 3

7. EXTEND VERTICAL RAYS FROM THE PICTURE TO HORIZON'. THESE POINTS THUS ESTABLISHED ARE THE INTERSECTION POINTS FOR EXTENSION RAYS FROM THE TRIAL POINTS 1,2,3,&4 ON THE LOCUS CIRCLE.
8. SELECT POINT 1. EXTEND RAYS FROM POINT 1 THRU VP-1', THE VERTICAL INTERSECTION POINTS ON HORIZON', AND VP-2'. THESE LINES ARE THE LOCUS OF POINTS WHICH ESTABLISH A TRUE TOP VIEW WHICH IS A FIXED RATIO OF LENGTH TO WIDTH WHEN THE SIDES OF THE FIGURE ARE CONSTRUCTED PARALLEL TO LINES 1-VP-1' AND 1-VP-2'.
9. THE TOP VIEW CAN BE CONSTRUCTED TO SCALE BY VARYING ITS DISTANCE FROM THE LOCUS CIRCLE; BEAR IN MIND THE GREATER THE DISTANCE THE MORE INACCURATE THE PROJECTION WILL BE.
10. IF POINT 1 DOES NOT GIVE THE PROPER RATIO OF LENGTH TO WIDTH TRY POINT 2 ETC. UNTIL BY TRIAL AND ERROR POINT "SP" IS LOCATED
11. THE POINT "SP" IS THE ONE LOCATION ON THE LOCUS CIRCLE THAT WILL PRODUCE A TOP VIEW WITH THE DESIRED RATIO
12. THIS PROCEDURE WILL PRODUCE A TRUE TOP VIEW OF THE OBJECT WITH A MINIMUM OF TWO DIMENSIONS WHETHER THE PICTURE WAS TAKEN ABOVE, BELOW, OR ON THE SAME LEVEL WITH THE OBJECT

13. TO CONSTRUCT A SIDE VIEW OF TRUE HEIGHT EXTEND RAYS FROM THE TOP VIEW TO H' AND THEN VERTICAL TO INTERSECT RAYS FROM VP-2.
14. THE SAME METHOD IS USED TO CONSTRUCT A FRONT VIEW, IF DESIRED.
15. NOTE THAT THE FRONT TO REAR LENGTHS ARE NOT TRUE LENGTHS.

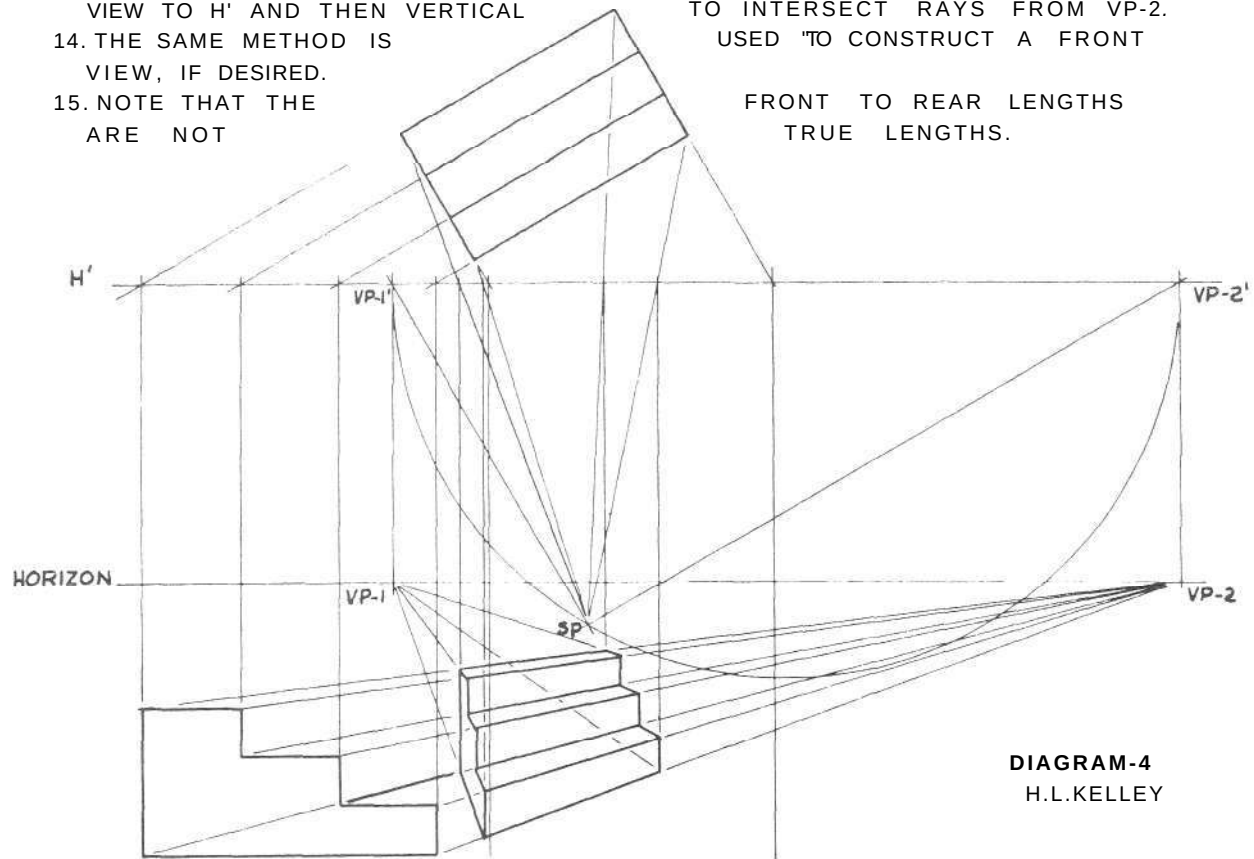


DIAGRAM-4
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16. THE TRUE SIDE VIEW IS CONSTRUCTED BY TRANSFERRING THE TRUE HEIGHTS TO RAYS EXTENDED FROM THE TOP VIEW AS SHOWN. THIS CAN BE DONE TO CONSTRUCT THE FRONT VIEW.

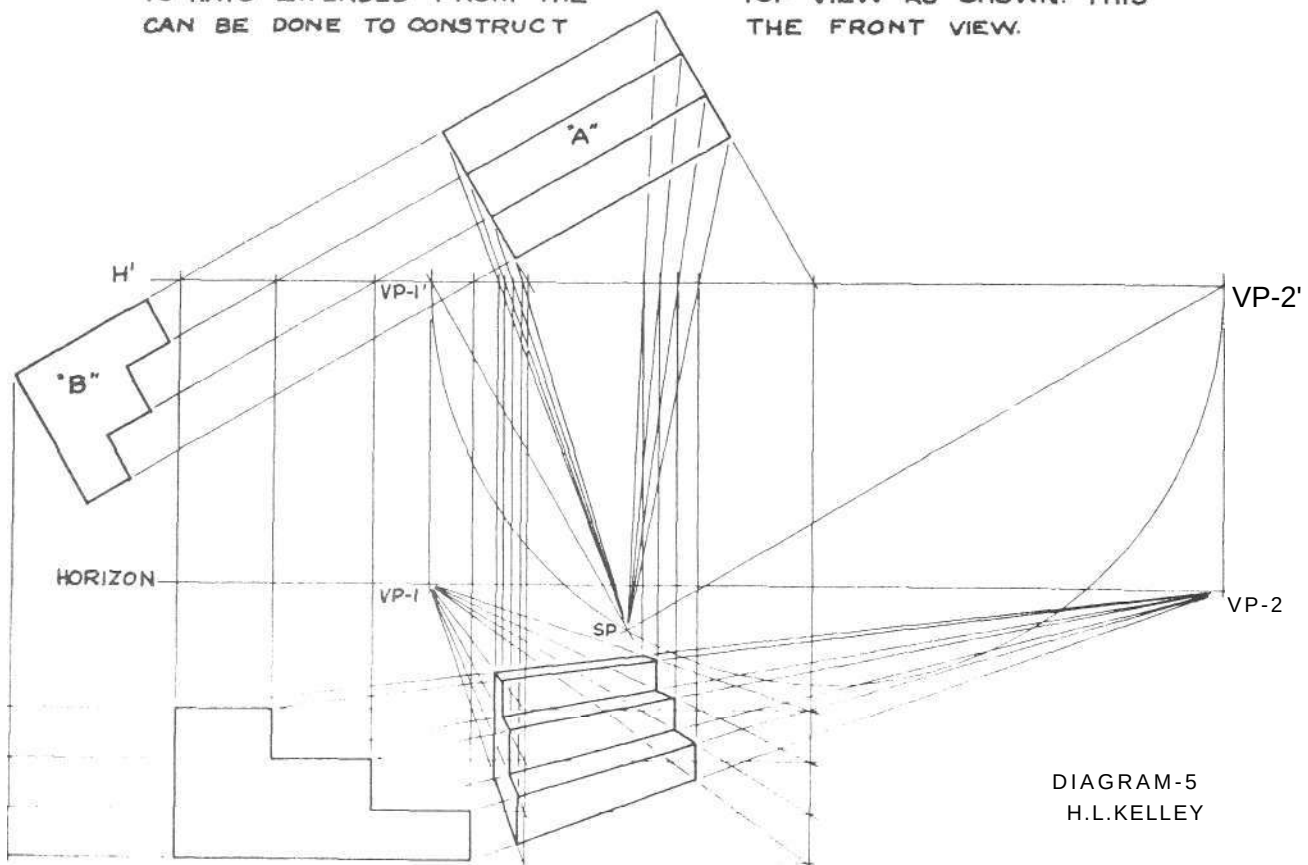


DIAGRAM-5
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great a chord for the given dimensions of 2 ft. span and 1 ft. 3 in. chord. Point SP satisfies the conditions of 2 ft. span and 1 ft. 3 in. chord. Note that the lines of sight expand as they leave point SP,, thus the farther away from SP that one draws the figure the larger its scale. Note that the span of the figure is parallel to the side SP-VP-2, and the chord of the figure is parallel to side SP-VP-1, The scale selected for these diagrams is one (1) inch equals one (1) foot.

Diagram 4 illustrates the first step in constructing a true side view of the airplane. Only the heights are true length, the chord lengths are elongated because this view is not a parallel projection from the top view.

Diagram 5 illustrates the second step in constructing a true side view of the airplane. The true heights are transferred with dividers to the parallel lines extended from the top view and one finishes up with two true scale views.

The true top view is labeled "A" and the true side view is labeled "B", Using these two views one can construct the third or front view; or one can construct the front view by using the system starting with step 13 but instead of extending the rays parallel to the span to intersect with Horizon' extend the rays parallel to the chord to intersect with the Horizon', Then continue as before and proceed thru step 16.

After one has used this system for awhile he will be able to guess very close to the proper position of the point SP and will also find that even though this is an approximate method that the three-views will be accurate to inches. By combining and averaging out the three views from two or more pictures one can evolve a plan in which one can detail the size of the structure.

FIVE DOWN AND GLORY, by Capt. Gene Gurney, edited by Mark P. Friedlander, Jr., with foreword by Capt. Eddie Rickenbacker, G.P. Putnam's Sons, New York, 1958.

This book should be called a comparative history, for in it the records of America's Aces are compared back and forth, by groupings, by theatre of operation, to the enemy, to our allies in war and to each other. An exhaustive study of a particular class of men whose skill, bravery and determination brought them to distinction by shooting down five or more enemy aircraft, Five Down and Glory draws from a very wide scope of recorded data.

By group, Gurney covers the Lafayette Escadrille, U.S. Air Service Squadrons, the Flying Tigers, the Eagle Squadron, U.S. Navy in WWII, the Marines in WWII, the Far East theatre, China-Burma-India, North Africa and the Mediterranean, the 8th Air Force and the Korean War. Lists of Aces are compiled for each, with decoration citations and combat reports. Their postwar duties and accomplishments and, sometimes ultimate fates are studiously followed. For sheer presentation of mountains of data alone, each page deserves careful consideration by the reader. Of special interest is the Appendix on Congressional Medal of Honor Aces.

Capt. Gene Gurney is currently on duty as a SAC tanker pilot, has been in the Air Force since 1943 and began his interest in Aces as a boy. He discovered that the Air Force itself had not compiled official lists of Aces, and working with official historians he has brought to book form the most complete record yet made. Certain inaccuracies are present, and sometimes careless use of official designations and terminology, but in the main it is not merely statistical, it makes good reading.

J.J. Sloan