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**FW: 5 Veco Pursuit - Full Size Wing Geometry Development**

1 message

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3 August 2021 at 13:19

**From:** Tandy Walker [mailto:rdb435021@icloud.com]  
**Sent:** Saturday, July 31, 2021 2:25 PM  
**To:** Tandy Walker <rdb435021@icloud.com>  
**Subject:** 5 Veco Pursuit - Full Size Wing Geometry Development

*Developing the full size wing planform geometry from a small sketch can be quite involved, depending on a specific requirement. In the Veco Pursuit's case, the requirement is for the tapered wing to have an 8.00" chord at the outside edge of the 2.50" wide fuselage. This translates into having an 8.00" chord at a distance 1.25" inboard of the wing center line. It is a lot of detail, but I want to share with you the analytical process I used to develop the full size wing planform geometry subject to this specific requirement.*

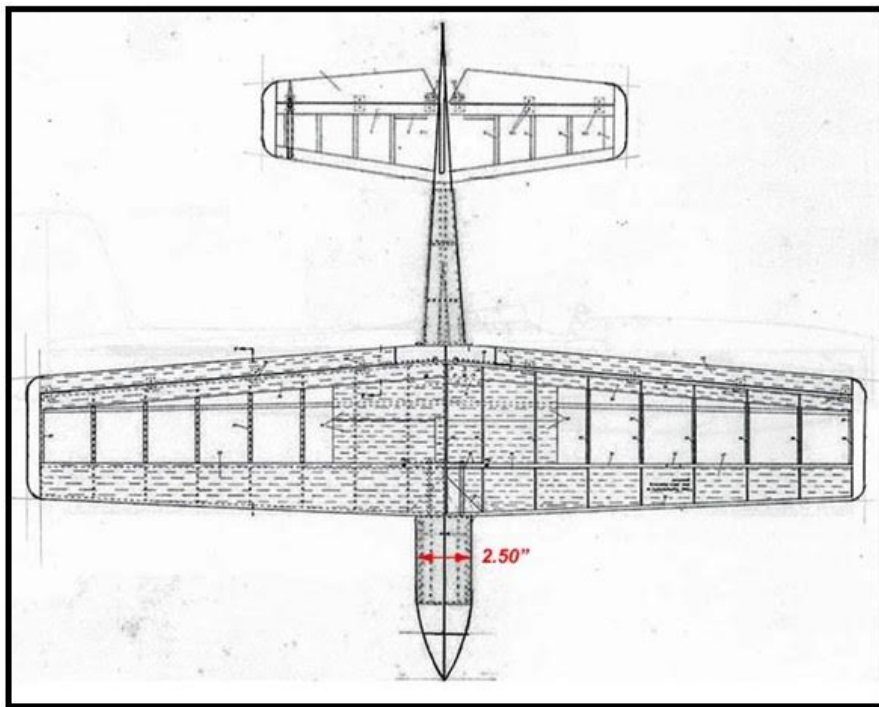
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Report No. 5

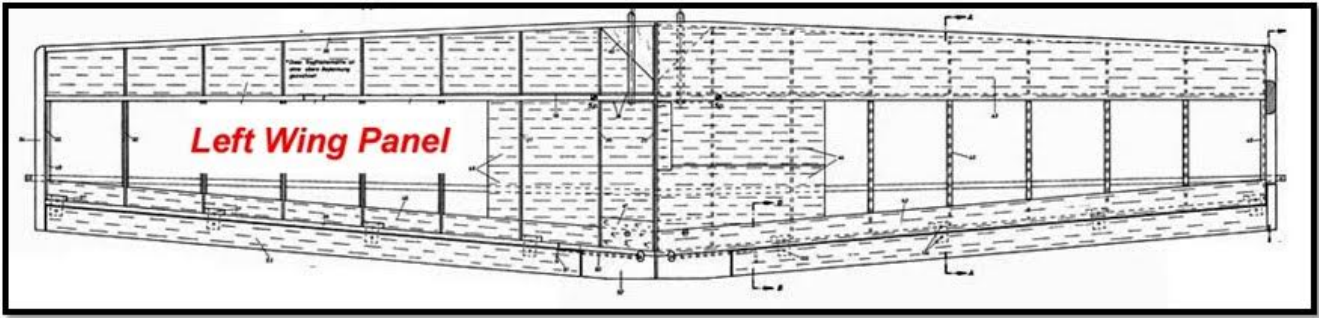
*Veco Pursuit*

*July 31, 2021*

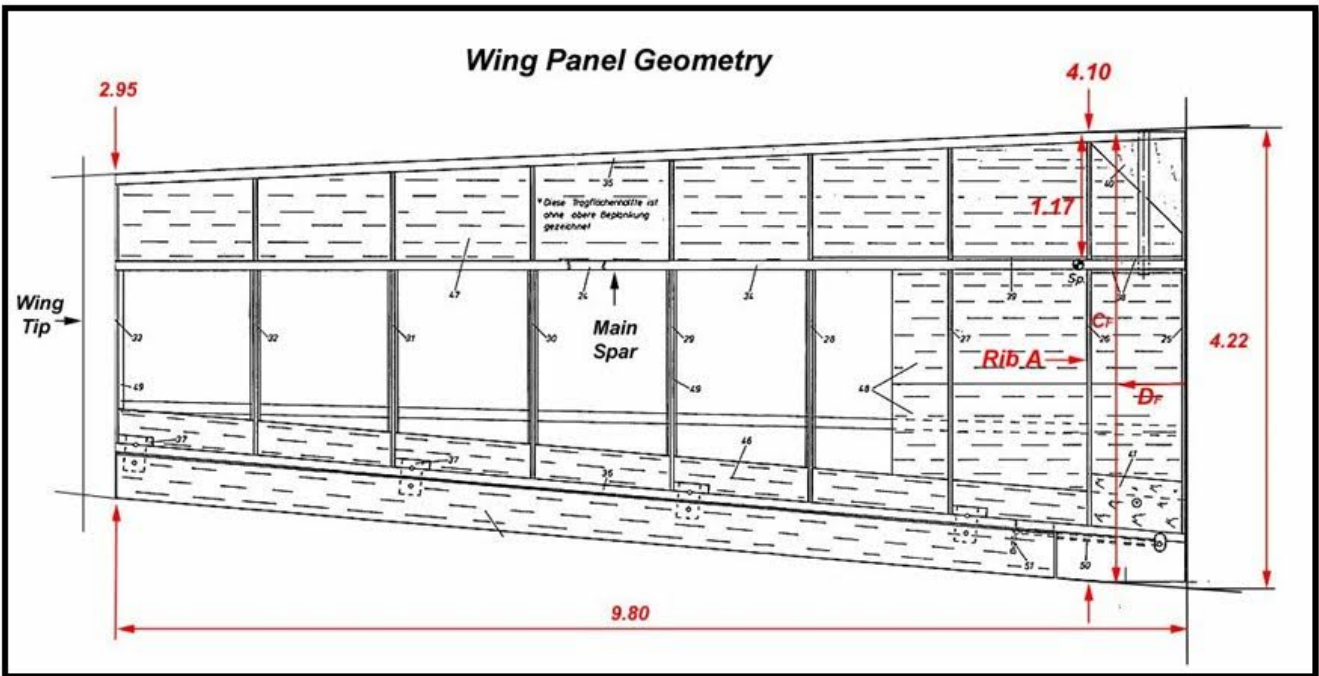
The planform for the Veco Pursuit shown below was developed in Report No. 1 by adjusting and superimposing the wing and stab from the Zlin-50 plans onto the 2.5" wide fuselage. The tips of the wing and stab were also modified.



The left wing panel shown below was enlarged and printed out on a 8-1/2" X 11" letter size page for measurements.



The measurements for the enlarged sketch of the left wing panel are shown below.



**MEASURED DIMENSIONS FROM THE FIGURE ABOVE**

$C_r = 4.22 \sim$  Root Chord

$C_t = 2.95 \sim$  Tip Chord

$b/2 = 9.80 \sim$  Panel Span

$TR = (4.22 - 2.95) / 9.8 = 0.12959 \sim$  Taper Ratio

The chord for Rib A is  $C_a = 4.10$

The distance from the LE to the main spar for Rib A is 1.17"

The ratio for Rib A in front of the main spar is  $RR = 1.17 / 4.22 = 0.27725$

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To recap the requirement, the wing is to have a chord ( $C_f$ ) of 8.00" at a distance ( $D_f$ ) of 1.25" inboard of the wing center line. Both  $D_f$  and  $C_f$  are shown on the figure above.

**CALCULATIONS FOR ROOT CHORD ( $C_r$ )**

The equation for a rib chord  $C_x = C_r - \text{Taper Ratio} \times (d) \sim$  distance outboard from the root chord ( $C_r$ )

$$C_x = C_r - 0.12959 \times d$$

where  $C_x$  must be 8.0" at  $d = 1.25$ "

Therefore,

$$8.0 = C_r - 0.12959 \times 1.25 = C_r - 0.16199$$

$C_r = 8.16199'' \sim 8.16''$  Full Size Root Chord

CALCULATIONS FOR TIP CHORD ( $C_t$ ), PANEL SPAN ( $b/2$ ), & WING SPAN ( $b$ )

The full size scaling factor (SF) is then  $8.16199/4.22 = 1.93412$

$C_t = 2.95 \times 1.93412 = 5.70566'' \sim 5.71''$  Full size tip chord

$b/2 = 9.80 \times 1.93412 = 18.95438'' \sim 18.95''$  Full size panel span without wing tip

with wing tip widths of 0.5",

$b = (18.95438 + 0.5) \times 2 = 19.45438 \times 2 = 38.90876'' \sim 38.91$  Full size wing span

CLACULATIONS FOR ROOT CHORD FORWARD ( $C_{rf}$ ) AND AFT ( $C_{ra}$ ) OF MAIN SPAR

$C_{rf} = RR \times C_r = 0.27725 \times 8.16199 = 2.26292'' \sim 2.26''$  Root chord in front of the main spar

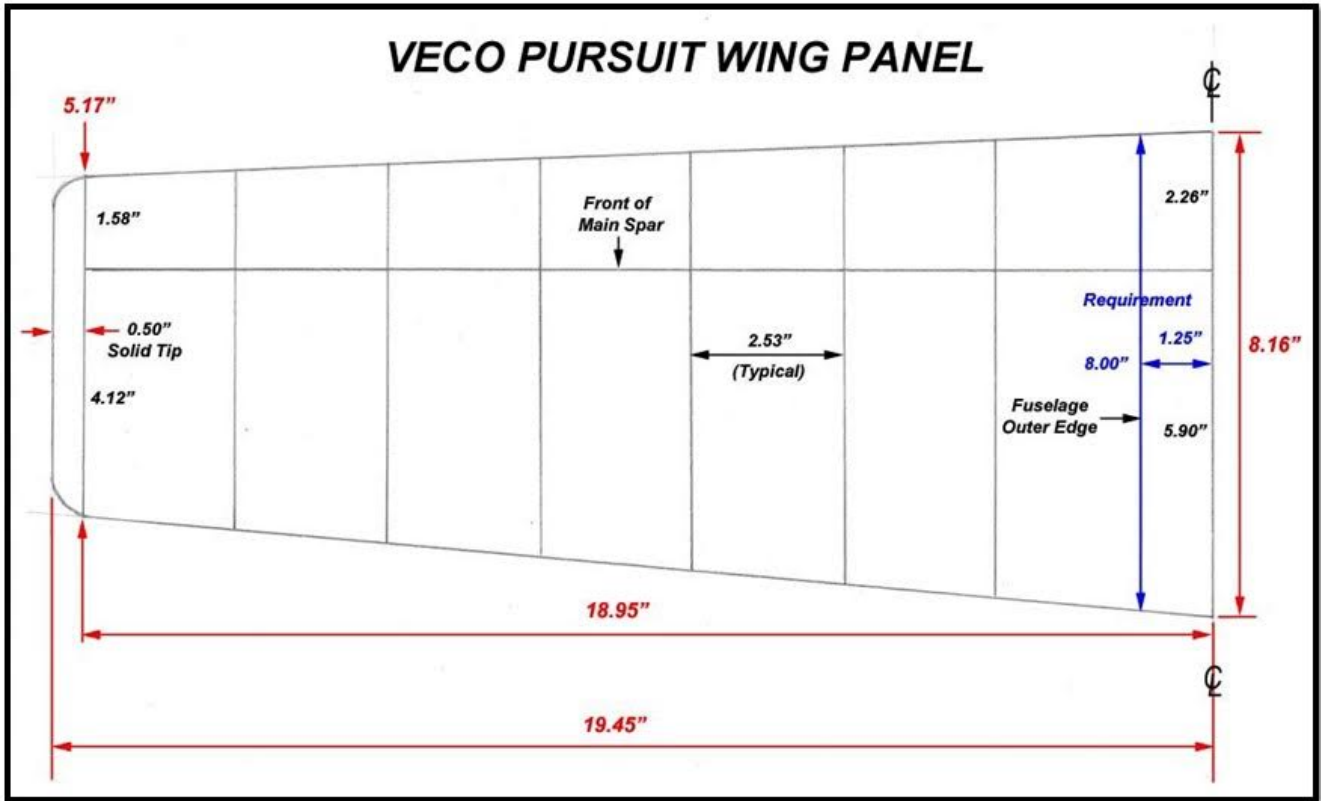
$C_{ra} = 8.16199 - 2.26292 = 5.89907'' \sim 5.90''$  Root chord aft of the main spar

CLACULATIONS FOR TIP CHORD FORWARD ( $C_{tf}$ ) AND AFT ( $C_{ta}$ ) OF MAIN SPAR

$C_{tf} = 0.27725 \times 5.70566 = 1.58190'' \sim 1.58''$  Tip chord in front of the main spar

$C_{ta} = 5.70566 - 1.58190 = 4.12376'' \sim 4.12''$  Tip chord aft of the main spar

These full size calculated dimensions were used to develop the scale drawing of the wing panel shown below. Notice the accomplishment of the sizing requirement (8.00" at 1.25") illustrated in blue below. The " typical rib spacing" was calculated by having 7 rib bays in the exposed wing panel which is  $(18.95 - 1.25)/7 = 2.53''$ .



The next steps will be to draw the wing panel full size, finalize the airfoil, and design the structure of the wing. I am considering putting the main landing on the wing instead of on the fuselage. There use be hard wood strips with 1/8" slots available for mounting the wire landing gear.....  
Tandy