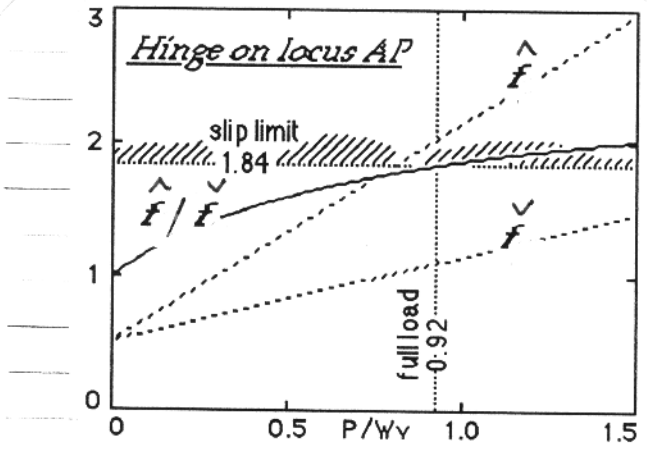
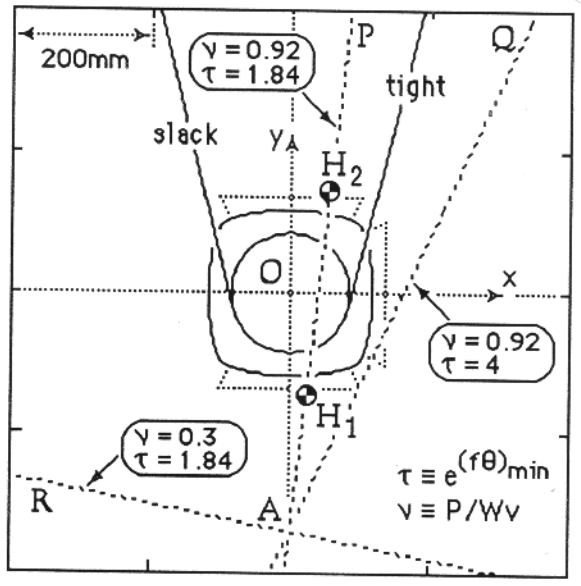




similarity arises as a result of the vertical centre line here, and is not general.

The locus AP is ill-conditioned as it lies close to the y-axis ($h_x \to 0$). Two other loci are shown for interest: AQ corresponds to a V-V drive for which $\tau \sim 4$, whilst AR refers to a load parameter of $\nu = 0.3 = P/Wv$ – i.e. to an increased water effective weight via spring augmentation. We shall ignore augmentation here, and proceed with AP.

Two possible hinges, H_1 and H_2 are shown distant 145mm ($\approx$132 mm) from O. H_2 requires water inversion – check lubrication with manufacturers.

From (a):— $H_1 = (22, -145)$, $H_2 = (55, 145)$ mm.

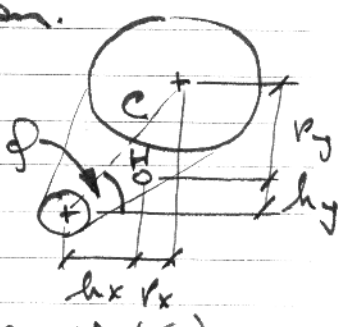
To prove our suspicion that H_2 is better than H_1 because it's further from the y-axis, we define

b) hinge sensitivity $\$ = \frac{c}{\nu^*}\left|\frac{d\nu^*}{dc}\right|$

which represents the normalised change in full load per unit change in centre distance arising from belt wear etc. We seek an insensitive hinge position.

To evaluate $ for H_1 and H_2 we have

$$\left.\begin{aligned} c\cos\phi - h_x &= \rho_x = \text{constant} \\ c\sin\phi - h_y &= \rho_y = \text{constant} \end{aligned}\right\}$$
$$h_x^2 + h_y^2 = \text{constant}$$



which when differentiated give us h_x' ($' \equiv d/dc$), h_y' and ϕ' – which in turn yield s' and t' from derivatives of (6).

Finally, from i) ii) & iii) $\nu^* = (\epsilon - 1)h_x/(\tau t + s)$ which is differentiable and gives $ from (b).

We find $\$_{H1} = 523$, $\$_{H2} = 49$ – which confirms our suspicions that H_2 is preferable. But really need augmentation to yield single figure $ values.