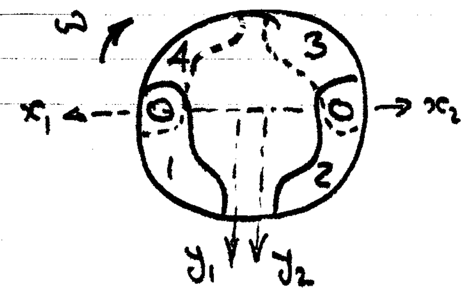
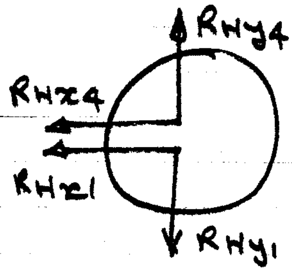
from the lower two:-



Suppose ω is clockwise.
Shoes 1 & 3 behave identically - they are both leading
Shoes 2 & 4 are both trailing.



Having got results for 1 & 2 from program display, we use results of 2 in 4 to find LH hinge reaction. Thus rotating 2:

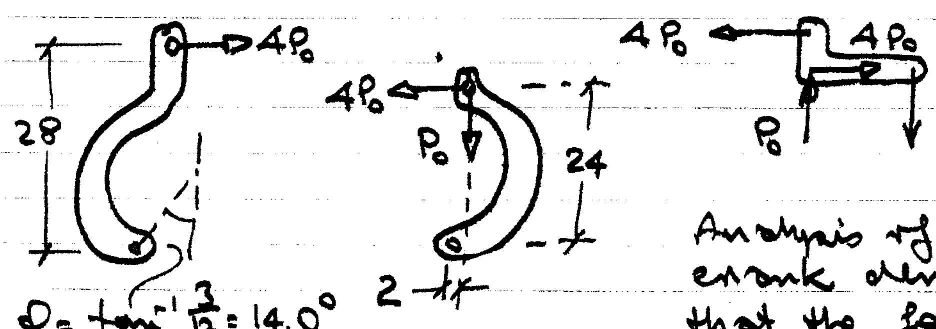
$$R_{Hx} = R_{Hx1} + R_{Hx4} = R_{Hx1} + R_{Hx2}$$
$$= -991 - 209 = -1200 \text{ N}$$
$$R_{Hy} = R_{Hy1} - R_{Hy4} = R_{Hy1} - R_{Hy2}$$
$$= 14910 - 6090 = 8820 \text{ N}$$

whence $R_H = 8901$ N.

The torque of the brake will be twice that of the two lower shoes, i.e. 2646 Nm.

By symmetry it is readily shown that the drum shaft reaction vanishes.

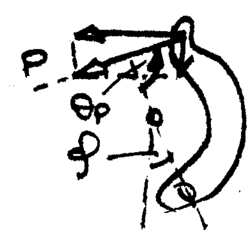
5.



Analysis of the bell crank demonstrates that the forces must be as shown.

The LH shoe is straightforward
$\theta_1 = 20 - 14.0 = 6.0°$ $\qquad \theta_2 = \theta_1 + 130° = 136.0°$
shoe/brake actuation force ratio = 4

The RH shoe needs consideration for program input.
The actuation force ratio $= \sqrt{(4^2 + 1^2)} = 4.123$
The moment arm of the shoe actuation force, 'e', is
$4.123e = 4 \times 24'' - 1 \times 2'' \Rightarrow e = 22.8''$
The inclination of the shoe actuation force is:
$\theta_P = 90° + \tan^{-1}\frac{P_o}{4P_o} - \varphi$
$= 90°$.



Hence the program input.

6. As (5) but superior as lining pressure more nearly the same for the two shoes.