



Sample Calculations

See "Counterweight Position & Counterbalance Effect" for equations and nomenclature

1. Calculate ECB, given X (*two different counterweight sizes*)

Ex) Determine ECB for the 912-365-168 unit w/ (2) #1 cwts at position 70 & (2) #2 cwts at position 80 as measured w/ scale on crank arm. Stroke position is in the long stroke.

$$CBTC = (2 * 4354 * 49.5) + (2 * 53.54 * 403) = 474,199 \text{ inch lbs}$$

$$CBT = (X_1 * N * W_1) + (X_2 * N * W_2) + CBTC; \text{ where X is position of counterweight on crank arm}$$
$$CBT = (70 * 2 * 5280) + (80 * 2 * 4211) + 474,199 = 1,887,159 \text{ inch lbs}$$

$$CBE = CBT/TF@90^\circ + SU \text{ (TF determined from API linkage dimensions)}$$
$$CBE = 1,887,159/78.581 - 320 = \mathbf{23,695 \text{ lbs ECB}}$$

2. Calculate X, given ECB (*two different counterweight sizes*)

Ex) Determine counterweight position X_1 and X_2 for (2) #1 & (2) #2 cwts as measured w/ scale on crank arm for a desired ECB of 20,000 lbs. for the 912-365-168 w/ stroke in the long stroke position.

$$CBT = (CBE - SU) * TF@90^\circ$$
$$CBT = (20,000 + 320) * 78.581 = 1,596,766 \text{ inch lbs}$$

$$CBTC = (2 * 4354 * 49.5) + (2 * 53.54 * 403) = 474,199 \text{ inch lbs}$$

Set a position of (2) #1 cwts at 70 inches, then calculate position of (2) #2 cwts

$$X_2 = \frac{CBT - CBTC - (X_1 * N * W_1)}{(N * W_2)}$$

$$X_2 = \frac{1,596,766 - 474,199 - (70 * 2 * 5280)}{(2 * 4211)}; \mathbf{X_2 = 45.5 \text{ inches}}$$