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 inch lbs

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

CBE = CBT/TF@90^o + SU (TF determined from API linkage dimensions)
CBE = 1,887,159/78.581 - 320 = **23,695 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^o
CBT = (20,000 + 320) * 78.581 = 1,596,766 inch lbs

CBTC = (2 * 4354* 49.5) + (2 * 53.54 * 403) = 474,199 inch lbs

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

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

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

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