Calculating counterweights

Explain dangers

Without the right number of counterweights, suspended access equipment can fail, leading to injury or death.

Identify controls

Here's how to calculate the number of counterweights you need.

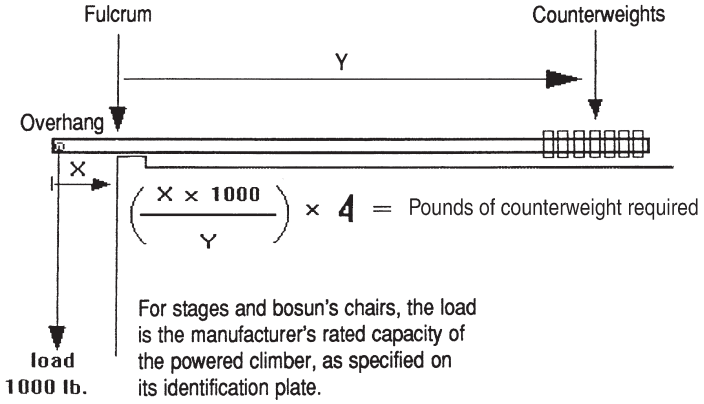
Let's start with the design factor. For beams and weights the design factor must be 4 to 1.

This means that the effect of the counterweights holding the equipment up must be at least 4 times greater than the load pulling the equipment down.

Another way of saying this is that...

- the distance of the outrigger beam from the fulcrum to the centre of the counterweights (Y)...
- multiplied by the load of the counterweights...
- must be at least 4 times greater...
- than the distance of the outrigger beam from the fulcrum to the suspension line (X)...
- multiplied by the capacity of the climber.

Let's look at an example.



Demonstrate

Go over this example with your crew.

The beam is 18 feet long. The counterweights will require at least 2 feet of space at the end of the beam. There is a 1-foot overhang and a supported load of 1000 lb.

X = 1 ft. Climber load = 1000 lb. Therefore 1ft. x 1000 lb. = 1000 ft. lb. pulling down.

The resisting force, including the design factor of 4 that must be provided by the counterweights = 4 x 1000 ft. lb. = 4000 ft. lb.

Y = 18 ft. – 1 ft. (overhang) – 1 ft. (centre of weights) = 16 ft.

The load required by the counterweights = $\frac{4000 \text{ ft. lb.}}{16 \text{ ft.}}$ = 250 lb.

Assuming counterweights are 55 lb. each, number of weights required = $\frac{250 \text{ lb.}}{55 \text{lb.}}$ = **5 counterweights**

If labels on an outrigger beam are missing or not readable, do not use the beam.

Remember—only use counterweights that have been specifically manufactured for the particular outrigger beam you are using.