

## Miller's Data

Measurement Position	Hanger position	$h$ (m)	$r$ (m)	$\theta = \cos^{-1}(h/r)$
Loop Center	1L	0.051	0.077	48.5
	2L	0.051	0.125	65.9
	3L	0.051	0.178	73.4
Loop Contact	1L	0.054	0.078	46.2
	2L	0.054	0.126	64.6
	3L	0.054	0.179	72.4

## Left Side Torque

Measurement Position	Hanger position	$r_{\text{Left}}$ (m)	$\theta_{\text{Left}}$	$m_{\text{Left}}$ (kg)	$\tau_L = m_L g r_L \sin\theta$ (N·m)
Loop Center	3L	0.178	73.4	0.090	0.150
	2L	0.125	65.9	0.090	0.101
Loop Contact	3L	0.179	72.4	0.090	0.151
	2L	0.126	64.6	0.090	0.100

## Right Side Torque

Measurement Position	Hanger position	$r_{\text{Right}}$ (m)	$\theta_{\text{Right}}$	$m_{\text{Right}}$ (kg)	$\tau_R = m_R g r_R \sin\theta$ (N·m)	% diff ( $\tau_L$ and $\tau_R$ )
3L - Loop Center	1R	0.077	48.5	0.270	0.153	1.5%
	2R	0.125	65.9	0.135	0.151	0.4%
	3R	0.178	73.4	0.090	0.150	0.0%
3L - Loop Contact	1R	0.078	46.2	0.270	0.149	-1.1%
	2R	0.126	64.6	0.135	0.151	0.1%
	3R	0.179	72.4	0.090	0.151	0.0%
2L - Loop Center	1R	0.077	48.5	0.180	0.102	1.1%
	2R	0.125	65.9	0.090	0.101	0.0%
	3R	0.178	73.4	0.060	0.100	-0.4%
2L - Loop Contact	1R	0.078	46.2	0.180	0.099	-1.1%
	2R	0.126	64.6	0.090	0.100	0.0%
	3R	0.179	72.4	0.060	0.100	-0.1%

Is it better to measure  $h$  and  $r$  to the loop center, as shown in the sketch, or to the part of the loop where the mass hanger makes contact?

**Conclusion:** No real difference, as long as measured carefully and consistently

