SYSTEM SPECIFICATIONS:

- Max travel increment: 0.1mm
- Max hysteresis: 0.1mm
- Relative position: 0.1mm
- Relative Accuracy: 1mm
- Travel time for 150mm = 60 sec

PROPERTIES & ASSUMPTIONS:

180 degrees = π radians $\quad arc_{min} := \frac{1}{60}\cdot deg \quad arc_{sec} := \frac{1}{3600}\cdot deg$

Given: Angle at vertex $\theta_A := .01\cdot deg$

$\theta_A = 1.745\times 10^{-4}\,rad$

One radian = deg $\quad rad = 57.296\,deg$

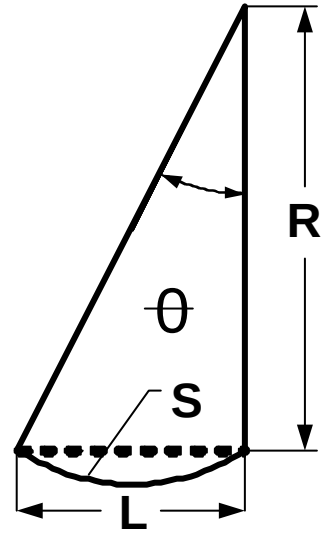
One degree = rad $\quad deg = 0.017\,rad$

Arm length = r_x

Rotary Axis-1 $r_1 := 16\cdot in$

Rotary Axis-(Pan) $r_2 := 8\cdot in$

Rotary Axis-(Tilt) $r_3 := 4\cdot in$



CALCULATION:

Arc Length = S1 & S2

$S_1 := \theta_A\cdot r_1 \quad S_2 := \theta_A\cdot r_2$

$S_1 = 2.793\times 10^{-3}\,in \quad S_2 = 1.396\times 10^{-3}\,in$

(Alternate check @ arc length = .002 inch)

Therefore if Arc length = $S_X \quad S_X := .002\cdot in$

$\theta_1 := \frac{S_X}{r_1} \quad \theta_2 := \frac{S_X}{r_2} \quad \theta_3 := \frac{S_X}{r_3}$

$\theta_1 = 1.25\times 10^{-4}\,rad \quad \theta_1 = 7.162\times 10^{-3}\,deg \quad \theta_1 = 25.783\,arc_{sec}$

$\theta_2 = 2.5\times 10^{-4}\,rad \quad \theta_2 = 0.014\,deg \quad \theta_2 = 51.566\,arc_{sec}$

$\theta_3 = 5\times 10^{-4}\,rad \quad \theta_3 = 0.029\,deg \quad \theta_3 = 103.132\,arc_{sec}$

For Gear Ratio 1

$$G_X := \frac{1}{200} \qquad M_{os2} := M_S \cdot G_X$$

Time: $T := 1 \cdot sec$ $M_{os2} = 15\,rpm$ $M_{os2} = 0.25\,rps$

Direct Motor shaft travel: $M_T := M_{os2} \cdot T$ $M_T = 1.571\,rad$ $M_T = 0.25\,rev$

$M_T = 3.24 \times 10^5\,arc_{sec}$

motor encoder 16 counts per rev

Travel = 45 deg in one sec

Motor shaft travel for HDUR-25 $M_{T1} := M_{os} \cdot T$

$M_{T1} = 3.24 \times 10^5\,arc_{sec}$

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$\frac{ip}{in^2}$ $psi \equiv \frac{lbf}{in^2}$ $k \equiv kip$ $ksf \equiv \frac{kip}{ft^2}$ $psf \equiv \frac{lbf}{ft^2}$ $pcf \equiv \frac{lbf}{ft^3}$ $plf \equiv \frac{lbf}{ft}$