

Docking Mechanism Dynamics			
$\dot{\phi}$	0.048	rad/s	Angular Velocity
$\ddot{\phi}$	0.0108	rad/s ²	Angular Acceleration
T	-2.388	lbs	Tension in cable from force F
T_R	13.008	oz-in	Torque required to raise arm
T_L	9.767	oz-in	Torque required to lower arm

Battery Mechanism Dynamics			
TR	7.523	oz-in	Torque required to connect battery
TL	2.594	oz-in	Torque required to release battery
TC	0.719	oz-in	Torque required to overcome collar friction
TR+TC	8.242	oz-in	Total torque to connect battery
TL+TC	3.313	oz-in	Total torque to release battery

Variables	Values	Units	Description
$I_{x_{arm}}$	5.61E-06	(slugs-ft ²)	Moment of Inertia of Arm (x-axis)
$I_{x_{p1}}$	2.650E-09	(slugs-ft ²)	Moment of Inertia of Pulley 1 (x-axis)
$I_{x_{p2}}$	2.650E-09	(slugs-ft ²)	Moment of Inertia of Pulley 2 (x-axis)
R_{p1}	0.3125	in	Radius of Pulley 1
R_{p2}	0.3125	in	Radius of Pulley 2
F	12	lbs	Force due to weight of Reserve
X_f	0.1875	in	Distance of force F to pivot on arm
g	32.17	ft/s ²	Acceleration due to gravity
M_{arm}	0.001	lbs	Weight of arm (6061 Aluminum)
L_{ACG}	0.616	in	Distance of arm C.G. to pivot
LH1	0.942	in	Distance from pivot to hole 1
ϕ	1.152	rad	Angle from vertical to line from pivot to hole 1
p	0.0625	in	Thread pitch of shaft
r	0.125	in	Radius of threaded shaft
α	0.0794	rad	Slope of thread
dm	0.21875	in	Mean diameter of threaded shaft
l	0.0625	in	Lead of threaded shaft
dc	0.375	in	Diameter of collar
f	0.25	-	Coefficient of friction
fc	0.25	-	Coefficient of collar friction
2.06	F		force due to weight of battery and battery holder