DC load balancing

Solar panels intended to keep batteries charged when boat idle and not on shore power

Self discharge loss	per day	0.5% AGM	Domestic battery	0.55 Ahr/day
		1% Flooded	Engine battery	0.80 Ahr/day
Continuous loads when boat idle			Alarm system	1.00 Ahr/day
Without solar charger time for battery to discharge to			70%	11 days
Required Solar charge capacity	(Self discharge batteries + Continuous loads) / Charge accept			2.94 Ahr/day
Actual Solar charge capacity	assume equinox to equinox use only, worst case			1.61 Ahr/day 55%
Actual charge is less than required, time for battery to discharge to			70%	25 days
			50%	41 days

Solar panel STC			1000 W/m^2		25 °C		
Solar panel spec	12.0%	eff	16.55 Wpk	310	x 445	mm	0.14 m^2

Location	50.8 N	Portsmouth
Solar elevation range	+/- 23.5 deg	summer to winter solstice
Noon summer solstice elevation	62.7 deg	
Noon equinox elevation	39.2 deg	
Noon winter solstice elevation	15.7 deg	

Panel mounted horizontally so:		Effective output	Average day temp	Panel efficiency
Lack of inclination, summer solstice	88.9%	14.7 Wpk	17 °C	12.44%
Lack of inclination, equinox	63.2%	10.5 Wpk	10 °C	12.83%
Lack of inclination, winter solstice	27.1%	4.5 Wpk	7 °C	12.99%

				day length	Solar panel output
Insolation average	Summer solstice	470 W/m^2	7.2 W	14 Hours	7.84 Ahr/day
	Autumn equinox	230 W/m^2	2.6 W	8 Hours	1.61 Ahr/day
	Winter solstice	30 W/m^2	0.1 W	5 Hours	0.06 Ahr/day
	Spring equinox	330 W/m^2	3.7 W	10 Hours	2.88 Ahr/day