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Assumptions

1. Fixed Engine Weight $W_{eng-tot} \leftarrow 6$ lbf $P_{shaft-maxMSL} \leftarrow 2.189$ kW. Also assuming that engine performance is affected by altitude and RPM.
2. Fixed range to station $R \leftarrow 200$ nmi
3. Fixed payload $W_{pay} \leftarrow 10$ lbf $Vol_{pay} \leftarrow 0.5$ ft^3
4. Fixed altitude at cruise $h_{cruise} \leftarrow 5000$ ft
5. Fixed altitude at station $h_{station} \leftarrow 1.5 \times 10^4$ ft
6. Fixed avonics $Vol_{avionics} \leftarrow 0.125$ ft^3 $W_{avionics} \leftarrow 8$ lbf
7. Fixed climb rate $h_{dot} \leftarrow 125$ $\frac{\text{ft}}{\text{min}}$
8. Fixed time to get on station $t_{cruise} \leftarrow 1$ day
9. Constant wind speed during loiter $V_{wind} \leftarrow 25$ m/s

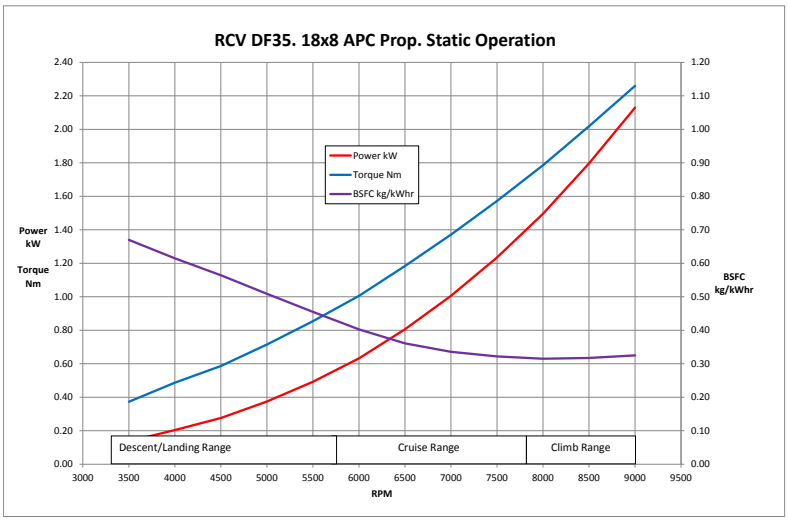

Figure 1: Engine Performance

Trade Studies

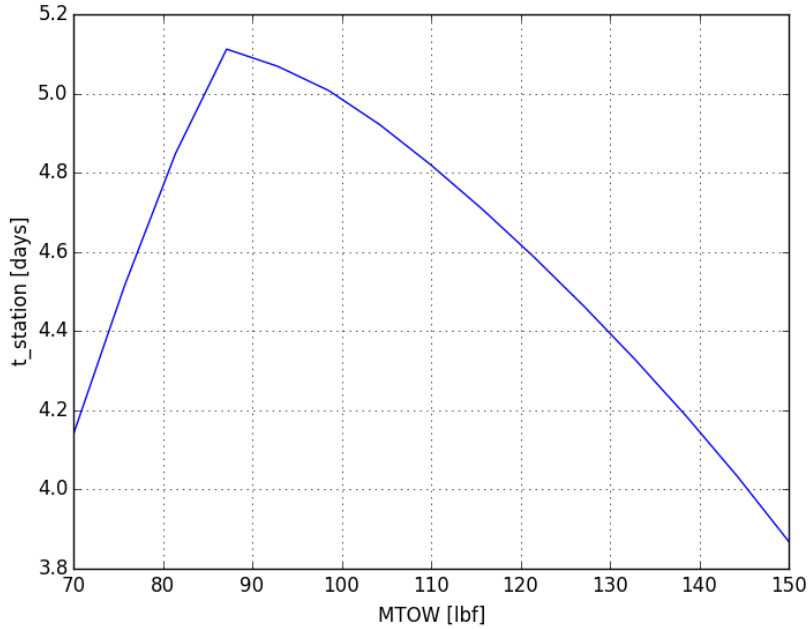

Figure 2: Time on station vs MTOW. This carries all the same assumptions.

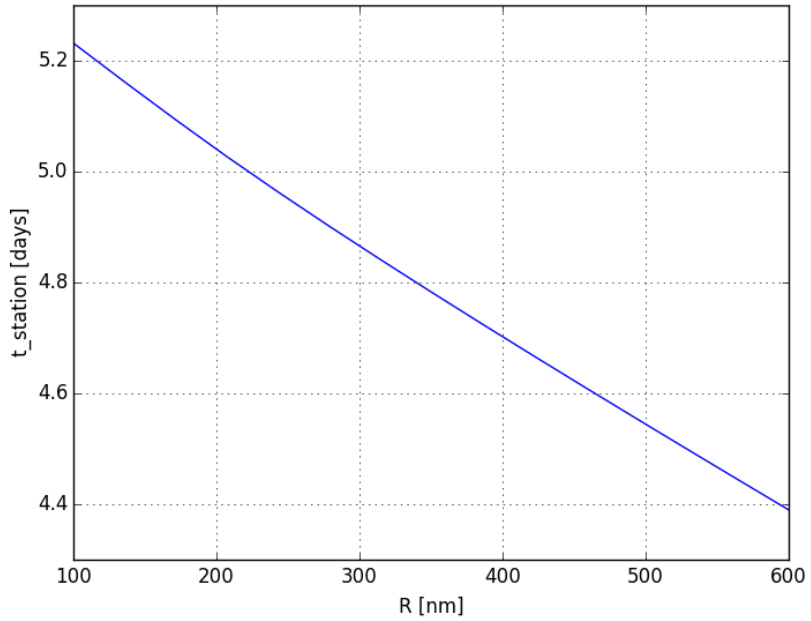

Figure 3: Time on station vs R. Assumes fixed weight of $MTOW = 87$ [lbf].

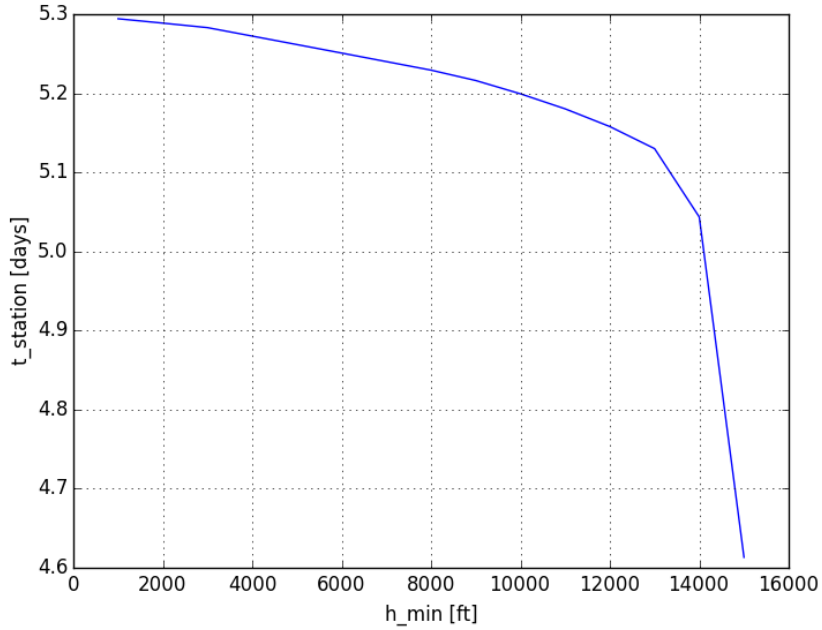

Figure 4: Time on station vs cruise altitude. Assumes fixed weight of $MTOW = 87$ [lbf].

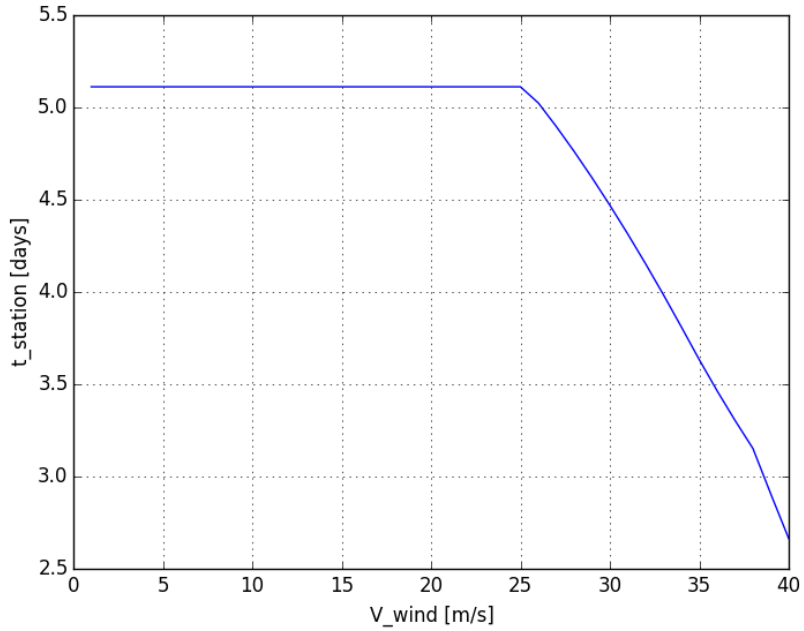

Figure 5: Time on station vs wind velocity. Assumes fixed weight of $MTOW = 87$ [lbf].

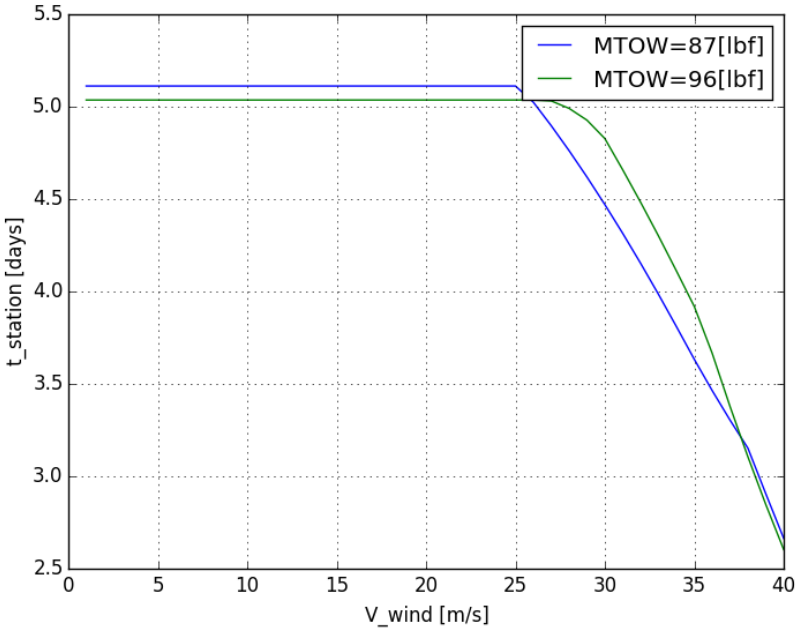

Figure 6: Time on station vs wind velocity.