# EPS Simulation Results

## ✅ Observations

- \*\*Sunlight Phase (3.6 s ON)\*\*

- Solar source outputs ~7 V.

- Capacitor (battery proxy) charges (SOC ↑).

- \*\*OBC Load:\*\* Always on (housekeeping + control). Runs stably at ~6.5–7 V, supplied directly from solar bus.

- \*\*Payload (PL Load):\*\* Operates during sunlight, draws higher current (~V/R).

- \*\*TT&C Load (TT Load):\*\* Active during bursts; powered from bus, voltage stable.

- Extra solar energy charges the capacitor, preparing for eclipse.

- \*\*Eclipse Phase (1.8 s OFF)\*\*

- Solar source = 0 V.

- Capacitor discharges into all loads (SOC ↓).

- \*\*OBC Load:\*\* Must remain powered; continues to draw current from capacitor. Voltage slowly decreases but remains above safe limit for short eclipse duration.

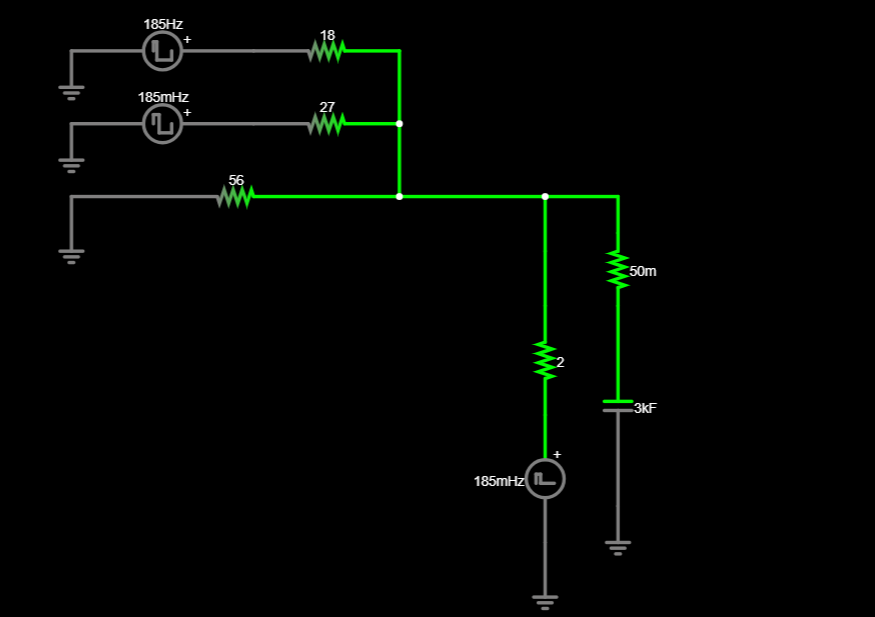
- \*\*Payload (PL Load):\*\* If active, operates until capacitor voltage < ~5 V, then performance degrades.

- \*\*TT&C Load:\*\* Low current demand means it can stay functional longer than payload, but depends on capacitor SOC.

- Output bus voltage follows capacitor discharge curve.

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## 📊 Waveforms

1. \*\*Circuit Diagram\*\* 

2. \*\*Capacitor Voltage (SOC Proxy)\*\*

- Rises steadily in sunlight, falls during eclipse.

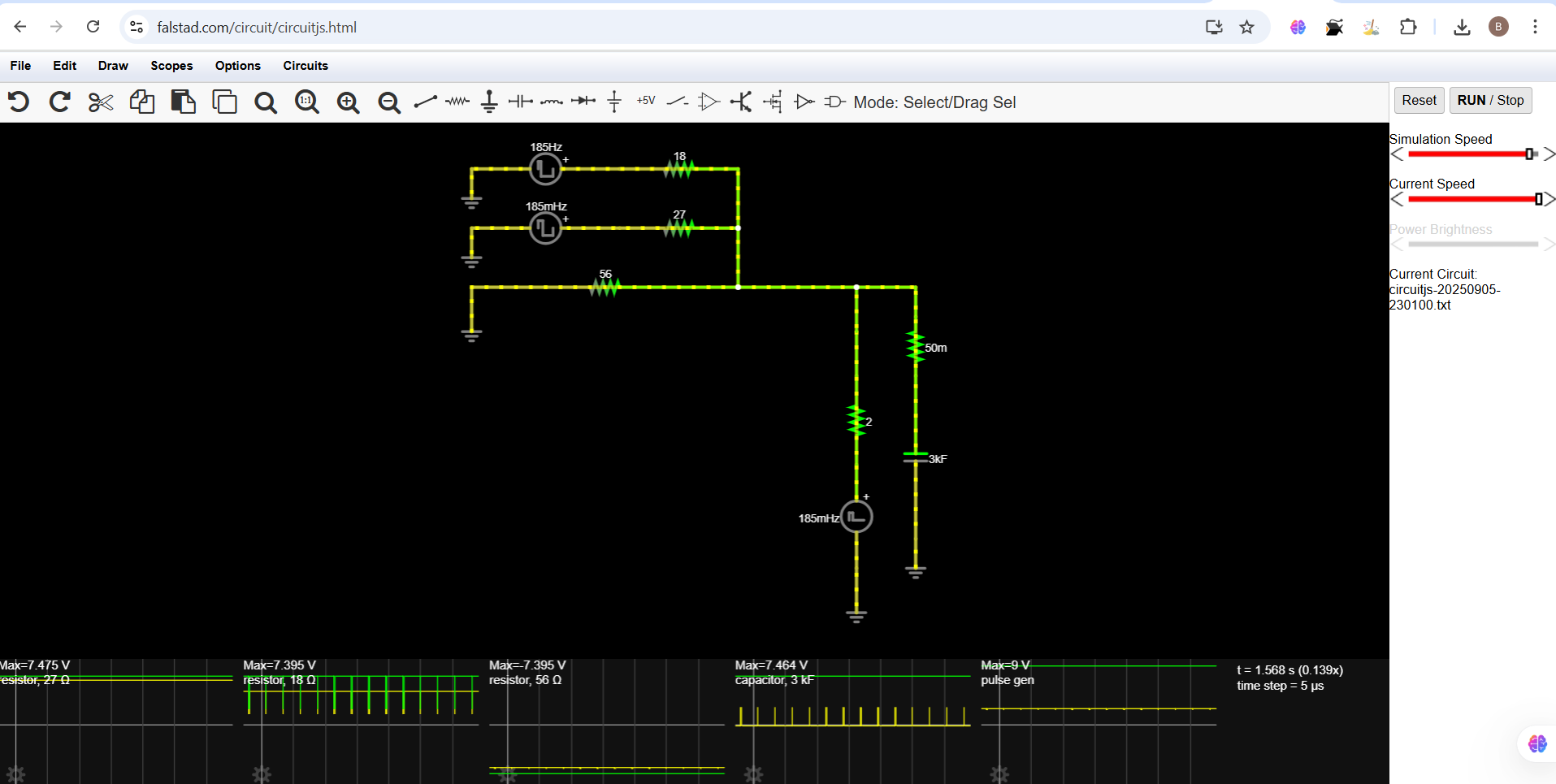
3. \*\*Load Voltages & Currents\*\*

- \*\*OBC Load:\*\* Continuous draw; stable in sunlight, decays slowly in eclipse.

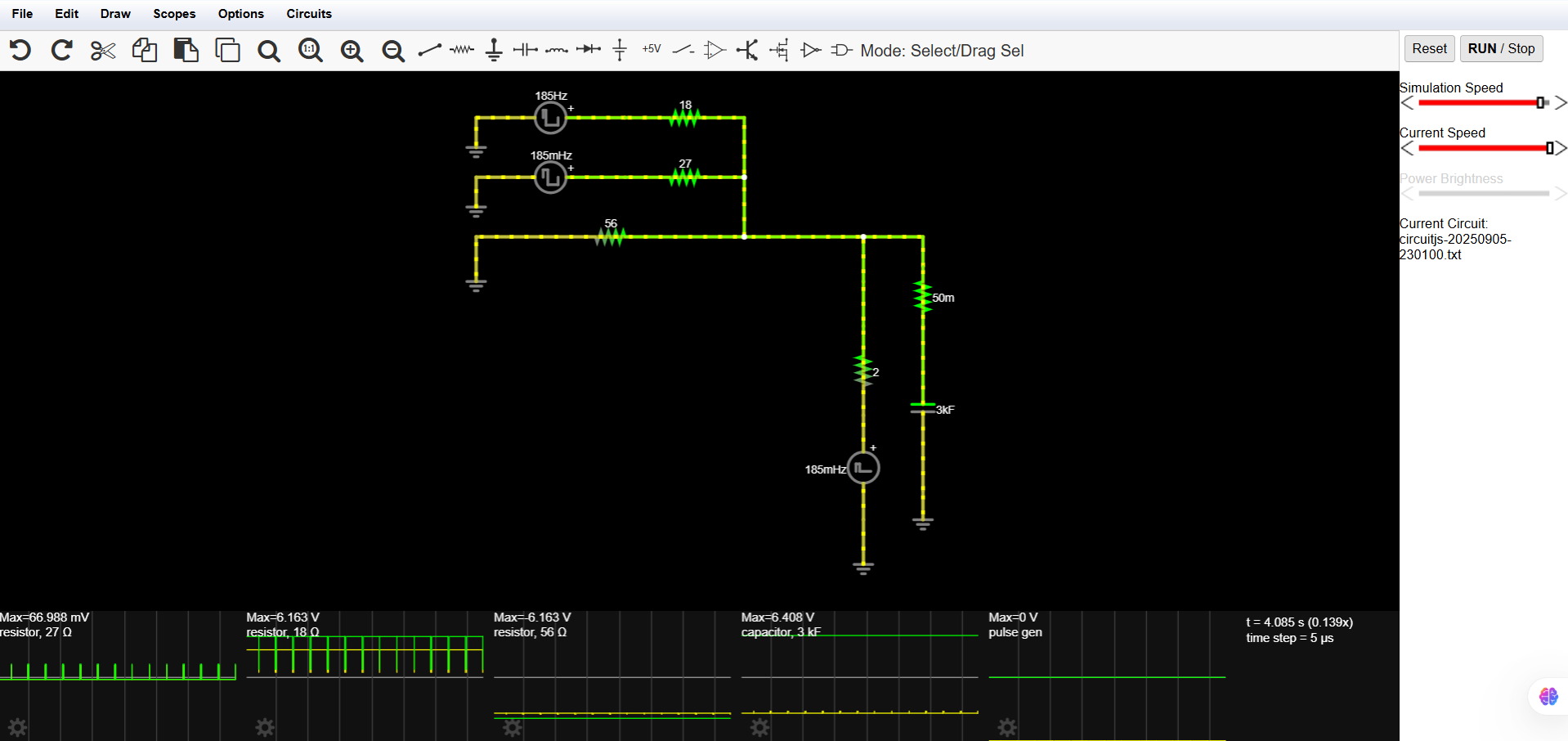
- \*\*Payload Load (PL):\*\* On in sunlight; if switched on in eclipse, voltage/current gradually decrease.

- \*\*TT&C Load (TT):\*\* Active bursts; remains functional longer due to smaller current draw.

- \*\*Output Bus Voltage:\*\* Stable ~6.5–7 V in sunlight, drops gradually in eclipse.



---During Solar



----During Eclipse

## 🎯 Key Result

- The EPS successfully:

- Powers \*\*OBC, Payload, and TT&C loads\*\* continuously.

- Uses solar power to supply loads and charge the capacitor in sunlight.

- Discharges capacitor in eclipse to maintain bus voltage.

- Keeps OBC (critical load) powered at all times, while payload and TT&C performance depend on SOC during eclipse.