CONTROLLING HELICYCLE ENGINE SPEED
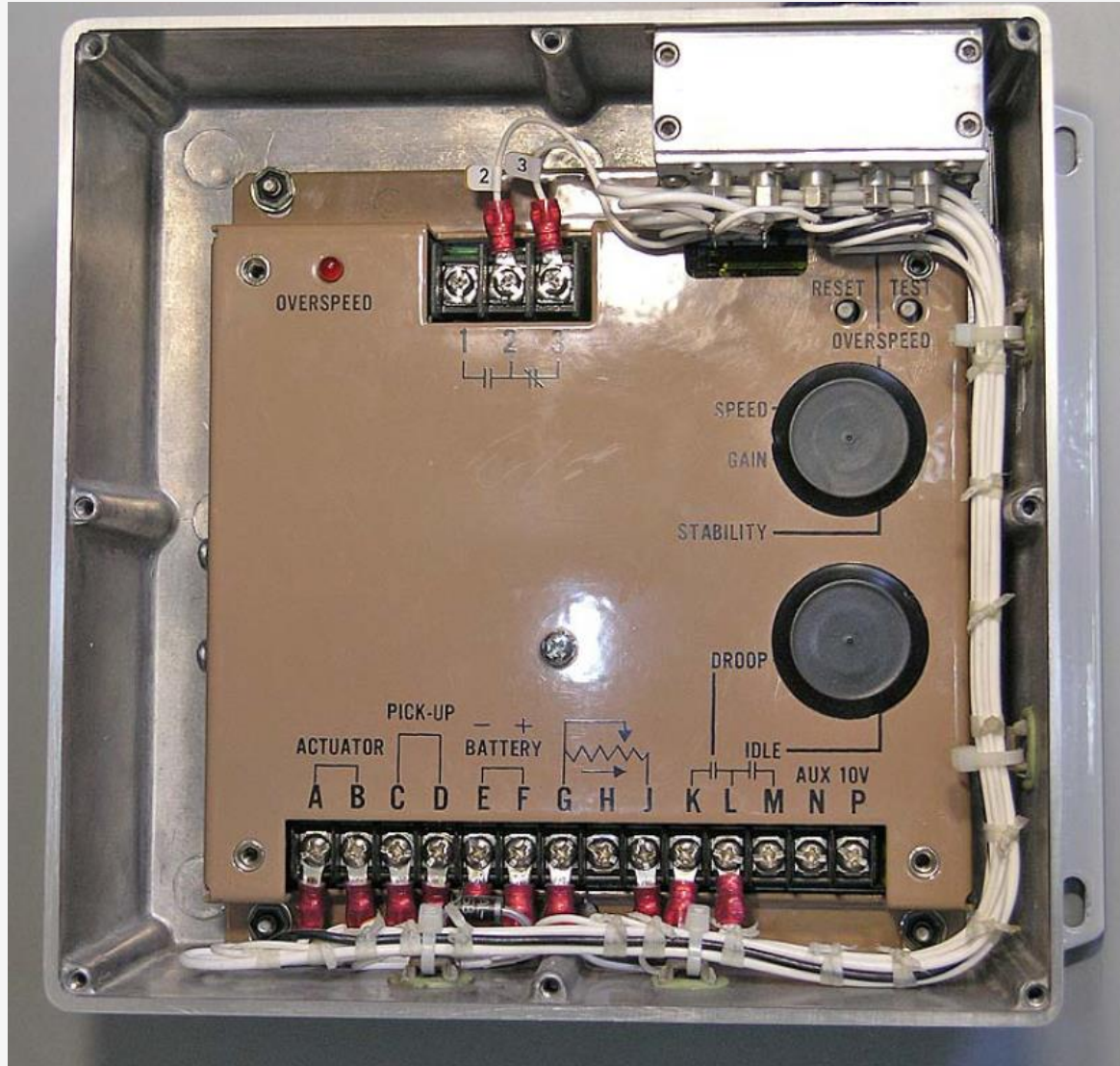
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21 Sept 2021

The Governor controls the Engine Fuel Control...

INPUTS
- **Engine Pick-Up**
- **Throttle Pot**

OUTPUTS
- **Fuel Control Actuator**
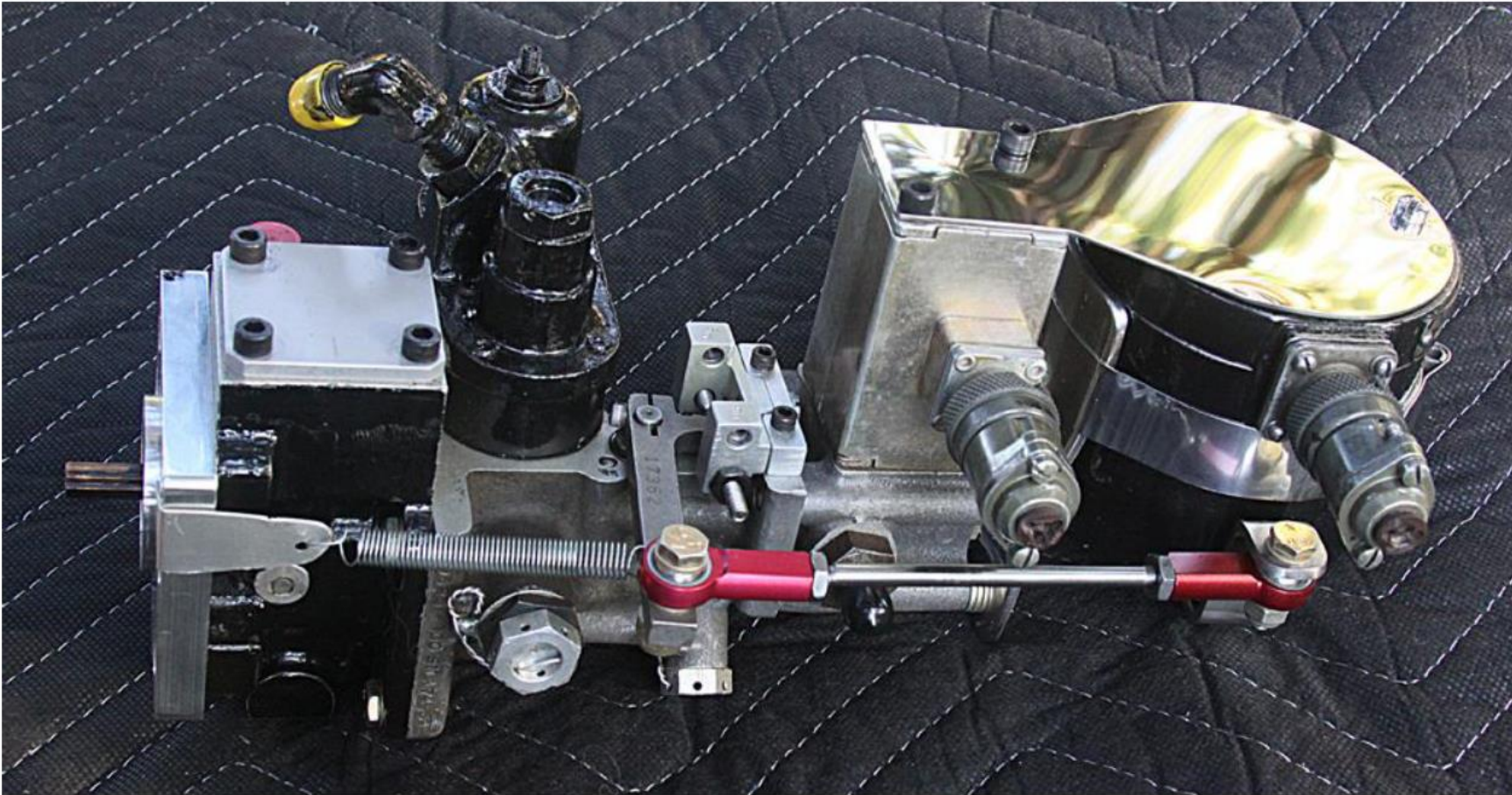
ADJUSTMENTS
- **Speed**
- **Gain**
- **Stability**
- **Droop**
- **Idle**

Governor EMI / RFI Filtering

Individual EMI filters in this small shielded box filter all wiring entering or exiting the enclosure to prevent interference from the VHF transceiver.
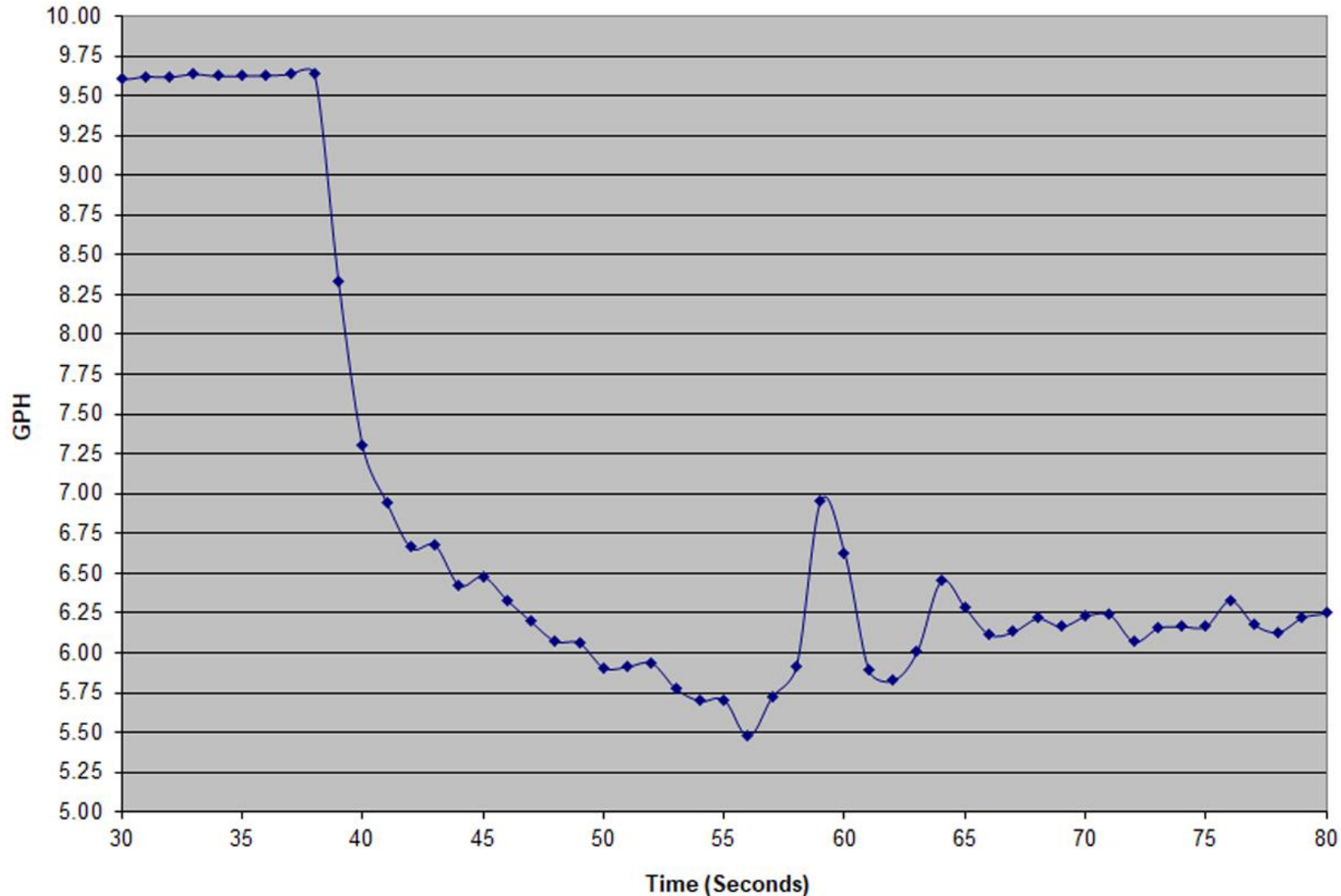
Engine Fuel Control

Governor controls torque acting on lever arm at far right. Arm controls position of fuel control arm in middle of Fuel Control via Heim Joint linkage, which is apposed by spring at left.

With no input from Governor the spring will pull the fuel control arm back to a hard stop set screw…

Power Reduction From Full Speed to Idle – Clutch Disengaged

Governor overshoots resulting in a damped oscillation that lasts approximately 30 seconds.

At the time I was very hesitant to touch the governor adjustments. I should have played with the Stability and Droop to see what effect they would have on this oscillation...

Thirty-Three Minute Hover Test
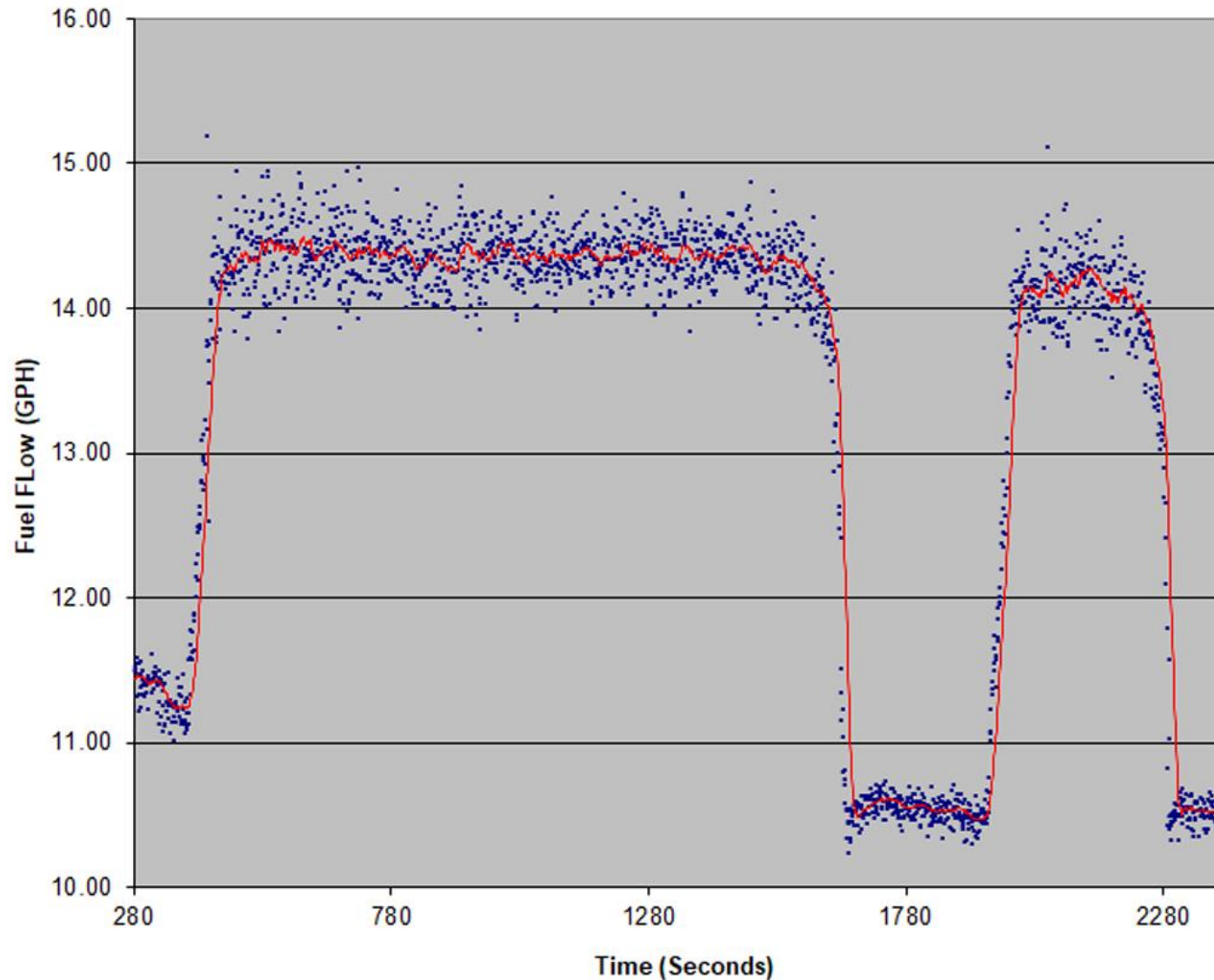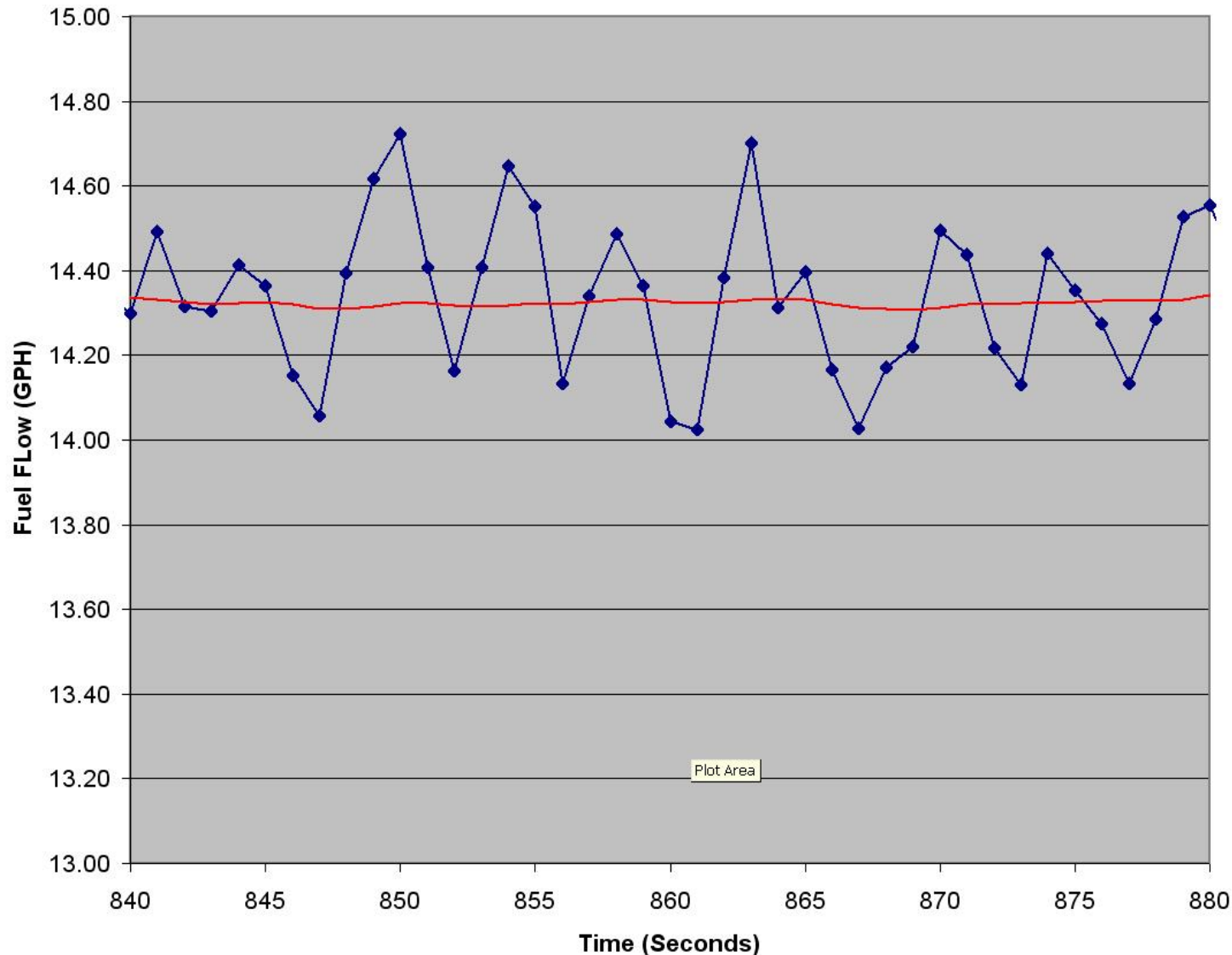

Test lasts 33 minutes and Burns approximately 54 pounds of fuel.

Fuel flow required to hover decreases as weight is reduced...

Blue dots are individual samples taken once a second. Red line is 9-second moving average.

Expanded Time Scale of Previous Plot

I trust the data but can't explain these cycles that have periods of about five seconds. This explains the wide dispersal of data points in the previous graph.

I enjoy trying to solve mysteries like this, but I did this testing in 2013. I must have moved on to other projects since I can't find any more test data to explain this. Turbulent flow in the fuel line? Maybe…

My Fluke 287 Data Capture and Plotting Instructions

Capture frequency data on DMM
    Set duration and set sample interval to 1 second
     Press START to begin recording and STOP to end recording
     Press SAVE to bring up the save display
     Press the Name key and pick RECORDING
     Press SAVE on last time to save the data
        Shut down when done

Plotting data on Excel
        K factor = 30070 (for my fuel flow transducer)
        GPH = hz * 3600/30070 (convert from Hz to pulses per hour and divide by K factor
        Open data file
        Strip 'Hz' from Average data field 'LEFT(XX,6)'
        Convert to GPH using 'XX * 3600/30070'
        Plot the GPH column
        Use 9 period moving average trend line
        Scale and annotate
        Save file