Boom Height Controller – Field Tuning Guide

1. Field Tuning Checklist

Prep

- Boom unfolded over flat ground
- Controller DISARMED
- Oil warm (important)
- Constant speed (5–6 MPH recommended)

Initial Parameters

```
targetIn = desired spray height
deadbandIn = 1.0
sensorLeadIn = measured physical lead (~24 in)
hydraulicDelaySec = 0.50
pulseMinMs = 250
pulseMaxMs = 650
errForMaxPulseIn = 8.0
```

Tuning hydraulicDelaySec

- Boom reacts late or dips → increase delay (+0.1 sec)
- Boom oscillates or hunts → increase delay (+0.1 sec)
- Boom reacts too early or feels nervous → decrease delay (–0.05 sec)

2. Diagnosing Delay Errors

Delay Too Low

Symptoms: oscillation, chasing ground, rapid pulsing.
Cause: controller assumes hydraulics respond faster than reality.
Fix: increase hydraulicDelaySec.

Delay Too High

Symptoms: sluggish response, early movement, overreaction to bumps.
Cause: controller predicts too far ahead.
Fix: decrease hydraulicDelaySec slightly.

3. Tap Test – Measuring Hydraulic Delay

The Tap Test automatically measures the time between commanding a valve and detecting first boom movement. This captures valve lag, oil compressibility, hose expansion, and boom

inertia in one measurement.

Tap Test Procedure

- Controller DISARMED
- Press Tap Test button
- System pulses valve briefly
- Sensor detects first height change
- Delay is calculated and displayed

Advantages

- No stopwatch required
- Accounts for oil temperature and engine RPM
- Repeatable and objective
- Can auto-fill hydraulicDelaySec