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Machine Control / GPS / AI System Check & Calibration Guide

Machine Control / GPS / AI System Check & Calibration (2026 Tech) interactive checklist for excavators; commentable steps; capture evidence; export as PDF/Excel for QA sign-off.

Project:
Date:
Filled by:

Sensor Health & Alignment	
1	Power-cycle controller, displays, and sensors; verify firmware against approved versions in release notes. Acceptance: all modules current; attach version screenshots to the checklist.
2	Warm up IMU for 5 minutes; run bias test in diagnostics. Acceptance: gyro bias < 0.05 deg/s, accel bias < 0.05 g; save bias report.
3	Sweep boom, stick, and bucket through full travel; monitor encoder/IMU signals. Acceptance: no dropouts or spikes; attach signal graph screenshots.
4	Inspect GNSS antenna mount and cables; perform continuity test with multimeter. Acceptance: cable resistance < 2 ohm; upload photos of connectors and routing.
5	Torque-check sensor and antenna mounts using a calibrated wrench. Acceptance: within manufacturer torque spec ±10%; record N·m values and photos.

GNSS & Base Corrections	
6	Confirm base station coordinates against site control. Acceptance: delta < 0.02 m horizontal and < 0.03 m vertical; attach comparison calc.
7	Connect to NTRIP/UHF corrections; verify age-of-correction. Acceptance: corrections age < 2 s with stable link; screenshot status page.
8	Check multi-constellation tracking (GPS, GLONASS, Galileo, BeiDou). Acceptance: PDOP ≤ 2.0 and ≥ 18 satellites; upload satellite view screenshot.
9	Measure GNSS antenna ARP height with a steel tape to nearest mm. Acceptance: entry within ±2 mm of physical measure; photo of measurement.

Bucket/Implement Calibration	
10	Measure bucket geometry (tip radius, tooth offset, pin distances) with calibrated tape. Acceptance: entries within ±5 mm of physical; upload measurements with scale in frame.
11	Perform three-point tip touch on a flat steel plate; follow OEM sequence. Acceptance: residual error < 8 mm; attach calibration report file and photos.
12	Zero tilt/rotation (tiltrotator if fitted) on level surface using digital level. Acceptance: neutral within ±0.3 deg; save screen and level readings.

Design Model Verification	
13	Load latest approved 3D surface; verify name, timestamp, and checksum. Acceptance: exact match to approval record; screenshot model metadata.
14	Apply site localization/coordinate system per survey control. Acceptance: RMS residuals ≤ 0.015 m; attach localization report and control list.
15	Check layer visibility, design offsets, and exclusion zones. Acceptance: offsets 0.000 m unless specified; upload overlay photos showing alignment to stakes.

Accuracy Validation (Test Dig)	
16	Excavate a 1–2 m trial cut to design; survey as-built with rover/total station. Acceptance: vertical error ≤ 0.03 m; attach CSV and photos.
17	Check cross-slope over a 2 m pass using machine readout and digital level. Acceptance: slope error ≤ 0.3%; upload screenshots and level photo.
18	Repeat measurement on same target after repositioning. Acceptance: repeatability difference ≤ 0.015 m; attach two logs showing consistency.

Telematics & Diagnostics	
19	Verify telematics connectivity; ping server and upload a test log. Acceptance: successful upload with latency < 10 s; portal screenshot.
20	Scan ECU and machine control for active fault codes. Acceptance: no critical codes present; export diagnostics report and note resolutions.

Comments:

Filled by:

Signature:

Introduction	How to use this checklist
Machine Control / GPS / AI System Check & Calibration (2026 Tech) helps excavator teams verify guidance accuracy before digging. This practical workflow covers machine control sensors, GNSS base/rover corrections, bucket tip calibration, 3D design model verification, and on-site test dig validation. By systematically checking IMU health, antenna setup, and communication links, you prevent cumulative errors that create overdig, service strikes, and rework. Verifying design versions and localization ensures your machine guidance aligns with the survey coordinate system and adjacent equipment. A short accuracy validation confirms vertical and slope tolerances under real ground conditions, while telematics connectivity and fault-code review keep data flowing and issues visible. The checklist is focused on excavator machine control; dozer/blade workflows are out of scope. Use it at shift start, after hardware changes, or when results drift. Open interactive mode to tick items, add comments, and export as PDF/Excel with a QR-secured sign-off.	1. Preparation: Gather GNSS rover, torque wrench, multimeter, steel tape, digital level, flat calibration plate, laptop/tablet, reliable radio/SIM, PPE, and survey control data. 2. Site conditions: Park on level ground, establish a safe exclusion zone, confirm clear sky view, and identify verified control marks for base checks. 3. Open the checklist: Start interactive mode on tablet, select machine and job, and enable QR session tagging for authenticated evidence. 4. Work through sections: Follow group order (sensors, GNSS, bucket, model, validation, telematics) and record readings as you go. 5. Capture evidence: Add photos, screenshots, and CSVs; write comments noting tools used, tolerances, and any corrective actions. 6. Export and distribute: Generate an export as PDF/Excel, share with foreman, survey, and client, and archive on the project drive. 7. Sign-off: Obtain digital signatures from operator and surveyor; verify the QR code to confirm authenticity and lock the record.