iDig Connect

SOFTWARE

User Guide

Complete Edition • Volumes 1–8 with Appendices A–C

Version 1.0 • April 2026

Prepared by iDig North America

WHAT'S INSIDE

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User Guide

Volume 1: Getting Started

Introduction, System Overview, Unboxing, First Power-On, Licensing, Updates & Cloud Access

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This is Volume 1 of 8 in the iDig Connect User Guide series.

01 Introduction

iDig Connect is a machine guidance system designed for excavators, compact track loaders, skid steers, CTL grader and dozer attachments, and other earth-moving equipment. It puts a real-time view of where your bucket is, where your design surface is, and how much you need to cut or fill — directly inside the cab. The result is faster work, fewer grade-checker trips, less rework, and a safer jobsite.

If you have run a laser receiver before, you already understand the basic idea: a reference somewhere out on the site tells the grade checker its elevation. iDig Connect takes that idea and adds wireless angle sensors on the boom, stick, and bucket so the operator inside the machine always knows where the bucket tip is in three-dimensional space — not just up and down, but in and out, side to side, and at what slope. Add the iDig Spotman GNSS receiver and you have full RTK-corrected position information, the same technology surveyors and dozers use for site grading.

This guide is written for construction operators, site superintendents, and owner/operators in North America. It assumes you are working in US Survey Feet or International Feet, using NAD83 State Plane coordinates, and connecting to the Spotman GNSS receiver. Every instruction is explained in plain language with real-world construction context.

> **About This Guide Series**
>
> This is Volume 1 of 8. It covers everything you need to do at the shop or bench before going to the machine — unboxing, mounting the Control Box in its cradle, powering on for the first time, applying licenses, updating firmware, configuring remote support, and connecting your cloud account. Subsequent volumes cover Hardware Installation, GNSS Configuration, Machine Calibration, Settings & Configuration, User Interface, Projects & Coordinate Systems, and Field Operations.

The Three iDig Connect Tiers

iDig Connect is sold in three software tiers — 2D+, 2D Project, and 3D — that share the same hardware and grow with your work. You start where you are, and upgrade through paid software licenses when you are ready. There is no need to swap the Control Box, the cradle, or the sensors; the Spotman GNSS receiver and the chassis sensor used by 3D will fit any Connect system.

Tier	What It Does	Typical Use
Connect 2D+	Wireless angle sensors on boom, stick, and bucket give depth, slope, distance, and Smart Tape measurement. Works with a rotating laser for elevation reference. Optional Spotman GNSS adds elevation reference without a laser.	Trenching, pad preparation, basement digs, footing excavation, slope work — anywhere you would otherwise be checking grade by hand.
Connect 2D Project	Everything in 2D+, plus the ability to import one DXF design file (up to 150 m × 150 m) and operate in 3D mode using the Front, Side, and Map view. Uses the Spotman GNSS for positioning. Up to 5 projects stored.	Small-to-medium contractors who get a single DXF from the engineer for each job — utilities, parking lots, building pads.

Tier	What It Does	Typical Use
Connect 3D	Full 3D machine guidance. Unlimited DXF and LandXML imports of any size. 3D visualization of design and bucket. Create surfaces in the cab. Pairs with iPoint for survey and stakeout.	Site work, road and highway construction, pond and detention basin grading, large commercial pads, anything where the design comes in from a surveyor or civil engineer as a 3D model.

Real-World Tip: Buy the Tier You Need Today

iDig Connect is designed to be upgraded later. If you mostly dig footings and trenches, start with 2D+. When you land your first project that comes with a CAD design, add the 2D Project license. When you start running large grading projects — or want to stop hiring grade checkers — step up to 3D. The hardware does not change; only the license does.

How This Guide Is Organized

The complete iDig Connect User Guide is delivered in eight volumes plus two appendices. Each volume is self-contained but cross-referenced. The order matches the order an installer or operator typically encounters the material — start at Volume 1, work through to Volume 8, and you will have walked from an unopened box to a fully calibrated machine grading to a 3D design.

Volume	Covers
Volume 1: Getting Started	Introduction, system overview, unboxing, first power-on, licensing, software updates, remote access, and cloud file configuration.
Volume 2: Hardware Installation	Mounting sensors on boom, stick, bucket, and chassis; mounting the Control Box, LED Bargraph, and Spotman GNSS receiver; CAN wiring for tiltrotators.
Volume 3: GNSS Receiver Configuration	Configuring the Spotman receiver: WebUI, NMEA outputs, NTRIP corrections, SIM card setup, UHF radio, base-station receive, and pairing to iDig.
Volume 4: Machine Calibration	The full calibration sequence: cradle, boom and stick wizard, bucket, swing boom, chassis, GNSS 3D, laser receiver, tiltrotator. Accuracy checks and calibration backup.
Volume 5: Settings & Configuration	All Settings menu options — language, units, sound, sensors, GNSS, Restrictive Mode, display, storage, LED Bargraph, audible alerts, joystick buttons, import/export.
Volume 6: User Interface & Work Screen	Work-screen anatomy, view layouts, toolbars, and a complete tool icon reference.
Volume 7: Projects, Coordinate Systems & Surfaces	Coordinate system selection, geoids, site localization, project creation, design import, layer management, and project import/export.
Volume 8: Field Operations	Daily operating procedures for 2D, 2D+, 2D Project (3D Lite), and 3D modes. Dynamic Laser Catch, Swing Boom, Smart Tape, Height Alarm, surface creation, and the daily 3D workflow.

Before You Start Volume 1

You need: the iDig Connect kit you purchased, a Phillips screwdriver, glass cleaner spray (for window-mount prep), a USB stick formatted to FAT32, and access to a Wi-Fi network for software updates and licensing. You do not need to be parked next to a machine to work through Volume 1 — most of this can be done at the shop or in your truck.

02 System Overview & Product Tiers

Every iDig Connect system, regardless of tier, is built from the same family of hardware components. Knowing what each piece does — and which ones ship with your specific kit — makes the rest of installation and calibration much easier.

The Core Hardware Components

Component	Purpose
Control Box (BT142)	The main computer. Runs iDig Connect software. Mounts in the BT447 cradle on the cab window. Touch screen interface.
BT447 Cradle	Suction-mount holder for the Control Box. Houses the power input, USB ports, CAN switches, and the Bluetooth/WiFi dongle. The dongle must always be in the top-left USB port.
LED Bargraph (BT445)	Stick-mounted LED display visible in the operator's peripheral vision. Shows cut/fill at a glance so the operator does not have to look at the touch screen during continuous digging.
CT149 LED Bargraph Cradle	Suction-mount holder for the BT445 LED Bargraph. Typically mounted on the front window of the cab, in clear sight of the work tool.
Mini Sensor (BT144)	Wireless angle sensor used on the boom and bucket. Also serves as the tilt sensor on machines equipped with a tilt bucket. Bluetooth communication. Solar-rechargeable internal battery. Snaps onto the XD422 mini plate.
XD422 Mini Plate Kit	Mounting plate for the Mini Sensor. Ships with 3M adhesive tape (XD416MS) and cleaning wipes (XD417). One plate is installed on the machine for each Mini Sensor location.
Combo Sensor (BT145) / Big Combo (BT147)	Wireless angle sensor used on the stick. Includes a built-in laser receiver, which is why it goes on the stick — to catch a rotating laser beam for 2D elevation reference. The Big Combo (BT147) provides a wider laser-catch window for larger machines.
XD412 Combo Plate Kit / XD436 Big Combo Plate Kit	Mounting plate for the Combo or Big Combo Sensor. Ships with 3M adhesive tape (XD416) and cleaning wipes (XD417). One plate is installed on the stick.
Chassis Sensor (BT476)	Cab-frame sensor that tells the system how the cab is tilted, which is critical for both 2D accuracy and 3D positioning. Wired for power (CT425C Y-shielded cable) but communicates with the Control Box over Bluetooth. Uses the same XD422 mini plate as the Mini Sensor.
Spotman GNSS Receiver (CT140T)	Multi-constellation RTK GNSS receiver. Mounts on the cab roof to give the system precise position and elevation anywhere on the jobsite. Required for 2D Project and 3D. Optional with 2D+.
BT/WiFi Dongle	USB dongle that plugs into the top-left USB port of the cradle. Provides Bluetooth links to all sensors and to the Spotman, plus Wi-Fi for remote update and remote access.

2D Project Limitations

If you operate a 2D Project system, you can import only one DXF design file per project, and that file must fit within a 500 m × 500 m area. The system stores up to 5 projects total. There is no 3D view — you work in Front, Side, and Map views only. If your project size or count exceeds these limits, you need a Connect 3D license.

The Upgrade Path

All three Connect tiers share the same Control Box, Cradle, LED Bargraph, and Angle Sensors. The differences are the software license, whether the Spotman GNSS receiver is included, and what kinds of designs the system can work with. That means upgrading is almost always a matter of adding a license or adding a Spotman — the installed sensor plates on your machine don't change, and the calibration you have already invested in stays intact.

Moving from 2D+ to 2D Project typically means adding the CT150 software upgrade plus a Spotman GNSS receiver and iPoint license. Moving from 2D Project to full 3D adds the CT137 software upgrade — no new hardware required. Two additional licenses unlock specific advanced features in Connect v5 software: Swing Boom (CT145), which allows the operator to swing the boom on machines equipped with a swing-boom feature while iDig continues to provide accurate guidance, and Dynamic Laser Catch (CT155), which lets the operator capture the laser elevation while moving rather than holding the bucket still in the beam. Both ship with a 120-day free trial; see Section 06.

Plan Your Upgrade Path Before You Buy

Talk with your iDig dealer about where you expect your business to be in the next few years. Because the Connect platform is designed to grow with your work, upgrading between tiers is almost always a matter of adding a software license (and, for 2D+ → 2D Project or 3D, adding a Spotman GNSS receiver). The installed sensor plates and your existing calibration are preserved through the upgrade.

The stick-sensor choice is a separate conversation — it depends on how you use iDig. The Combo Sensor (BT145) works for many machines. The Big Combo Sensor (BT147) provides a larger laser-capture window, which makes it much easier to catch a rotating laser to bench after moving the machine. If you work with a laser transmitter regularly — especially on larger excavators — the Big Combo is the better starting point.

03 What's In the Box — Package Contents Checklist

Connect systems ship in many different configurations depending on what you ordered — the tier (2D+, 2D Project, 3D), the stick sensor size (Combo vs. Big Combo), whether the Spotman GNSS receiver is included, whether you added the Spotman backpack kit for off-machine survey, and any extra-machine kits for additional excavators. Rather than list every possible permutation, this section tells you what to look for and verify, regardless of which configuration you purchased.

iDig Connect systems typically ship in a rugged foam-lined case (BT485) that holds the Control Box, sensors, LED Bargraph, and accessories. Unpack everything and lay it out on a clean bench or tailgate before you start.

> **Critical: Unpack and Verify Before You Start Installation**
>
> Sensor plates use a permanent 3M adhesive. Once a plate is installed on the machine, it does not come off cleanly. Always confirm you have every component before starting installation — finding a missing chassis sensor halfway through is far more painful than finding it on the bench. Take a photo of the open case for your records, and check every item against your dealer's order confirmation.

Verifying Your Connect System

Regardless of which configuration you ordered, a Connect system should include all of the following core components. Use this list as a bench check — confirm each item is present, undamaged, and that the sensors show battery life when removed from their plates and re-seated.

Component	Verify
Control Box (BT142)	Present, screen intact, no visible damage. The serial number (CB######) is on the back and also displayed at the bottom-left of the main Settings screen.
BT447 Control Box Cradle	Present, suction cups intact, power connector and USB ports free of debris.
BT/WiFi Dongle	Present. It is a small USB dongle; it installs in the top-left USB port of the cradle.
BT445 LED Bargraph	Present, LEDs visible, USB cable intact.
CT149 LED Bargraph Cradle	Present, suction cup intact.
Mini Sensors (BT144)	You should have one per Mini Sensor location — typically boom and bucket. Check each sensor turns on when removed from its plate and re-seated.
Combo or Big Combo Sensor (BT145 or BT147)	One per machine, for the stick. Contains the built-in laser receiver.
Chassis Sensor (BT476)	One per machine. The BT476 is required for the chassis position on all current Connect installations. Wired for power via the CT425C Y-shielded cable; communicates with the Control Box over Bluetooth.

Component	Verify
Mounting Plate Kits	One XD422 Mini Plate Kit per Mini Sensor location, plus one XD412 Combo Plate Kit (for BT145) or XD436 Big Combo Plate Kit (for BT147) per stick, plus one XD422 Mini Plate Kit for the chassis sensor. Each plate ships with 3M adhesive tape and cleaning wipes.
CT425C Y-Shielded Power Cable	4-pin Y-shielded cable from the cradle to the BT476 chassis sensor.
Spotman GNSS Receiver (CT140T)	Required for 2D Project and 3D. Optional with 2D+. Confirm antenna, connectors, and carrying accessories are all present.
GNSS Mount (CT139)	Required on machines where the CT139 geometry works. Provides the bracket that holds the Spotman receiver on the cab roof. Verify the bracket, hardware, and any pre-drilled mounting plates are present. See the note below on whether the CT139 is the right mount for your machine.
Software License File(s)	A .lic file or activation email for any purchased tier license (CT150, CT151, CT137) or feature license (CT145 Swing Boom, CT155 Dynamic Laser Catch). See Section 06 for activation.

Critical: GNSS Receiver Must Be 1 Meter from the Center of Rotation

The Spotman GNSS receiver must be mounted at least 1 meter (39.4 inches) away from the machine's center of rotation. This distance is required for the system to resolve heading correctly as the cab rotates — mounting closer than 1 meter will not produce reliable guidance.

On most larger excavators, the CT139 GNSS Mount bracket achieves the 1-meter offset without modification. On smaller machines or machines with an unusual cab geometry, the CT139 may not provide enough offset — in that case, a custom GNSS bracket must be built for the machine. Evaluate the geometry before installation, and contact your iDig dealer if you need a custom mount fabricated.

Real-World Tip: Confirm Your Order Before You Dig In

Before starting installation, cross-check the components in the case against what you ordered from your iDig dealer. If anything is missing or damaged, call your dealer right away — most missing or damaged items can be replaced within 2 days, and it does not matter whether installation has started. Catching a short-ship on day one saves you chasing a part mid-install.

Calibration Tools

The calibration toolkit is included with every iDig Connect system. These items are used during the boom and stick wizard calibration in Volume 4, so keep them together so they're easy to find when you need them — they are reused across every machine you install on. The calibration toolkit ships in a dedicated black soft roll-up case, separate from the foam-lined case that holds the Control Box and sensors.

Item	Part Number	Purpose
Laser Pointer	XB525	Laser pointer with L-bar and 5/8" to 1/4" connector. Provides the laser line used during the boom and stick wizard calibration.
Tribrach	XD477	Holds the laser pointer level on a non-elevating tripod.
Magnetic Target	XD470	Mounts magnetically to the bucket teeth or stick to provide a target for initial sensor alignment and laser calibration.
Laser Adapter	XD478	Fits the XB525 laser pointer to the tripod / tribrach setup.
Extension Rods	XD471	Initial-setup extension rods used during laser calibration to set the laser height accurately.

Keep the Calibration Toolkit With the System

Because the calibration tools are reused for every install and every re-calibration, keep them rolled up in the black soft case that ships with the Connect system rather than loose in a truck box. Losing the XB525 laser pointer or the XD470 magnetic target will stop a calibration cold — they are purpose-built for this workflow and are not items you can easily substitute from a general-purpose toolbox.

04 Control Box & Cradle Setup

Before powering on the Control Box for the first time, you need to mount its cradle, mount the LED Bargraph cradle, and connect the dongles and cables that will be in place during day-to-day operation. This section covers the bench-or-shop setup; the optimal placement on each specific machine is covered in Volume 2.

> **Before You Start**
>
> You will need: clean glass-cleaner spray, a clean rag, the BT447 cradle, the CT149 LED cradle, the BT/WiFi dongle, the LED Bargraph (BT445), and the CT425C Y-shielded power cable. The machine should be off and the cab should be empty enough to reach the front and side windows.

Choosing Mounting Locations

The BT447 cradle holds the Control Box and typically mounts on the right-hand side window of the cab where the operator can reach the touch screen with their right hand. The CT149 cradle holds the LED Bargraph and typically mounts on the front window in clear view of the work tool, so the operator can see cut/fill at a glance without taking their eyes off the bucket.

Both cradles use suction cups designed to hold securely on clean glass. Before mounting, confirm two things: (1) the front window can still open and slide normally with the LED cradle in place, and (2) the side window can still slide normally with the CBox cradle in place. It is much easier to find a different mounting spot now than after the suction cups are stuck and the cables are routed.

Step-by-Step: Mounting the Cradles

1. **Power the machine off and remove the key.**
   All installation work happens with the machine off. Do not skip this step — accidental hydraulic movement during install is a serious hazard.

2. **Clean both window mounting locations.**
   Spray glass cleaner on a clean rag and wipe the inside of the front window where the LED cradle will mount, and the inside of the side window where the CBox cradle will mount. The glass must be free of dust, grease, and residue for the suction cups to hold.

3. **Test fit both cradles before committing.**
   Press each cradle lightly to the glass without engaging the suction lock. Confirm that the windows can still open and slide. Check that cables (next steps) will reach without strain.

4. **Engage the BT447 cradle on the side window.**
   Press the cradle firmly to clean glass and engage the suction-cup lock. Verify the cradle is solid by tugging gently.

5	**Engage the CT149 cradle on the front window.** Same procedure. The LED Bargraph should sit in the operator's peripheral vision when looking at the work tool.

6	**Run the cables and tidy them.** Route the power cable, the LED cable, and any sensor cabling along existing wiring runs in the cab. Avoid routing across pinch points (door hinges, sliding windows, seat tracks). We recommend tidying cables using 6" zip ties and 3/4" cable tie mounts so they don't snag the operator's clothing or controls.

The BT447 Cradle — Ports and Switches

The BT447 cradle has a small but important set of connectors. Knowing which port does what prevents almost every "why won't it power on" or "why doesn't the LED light up" support call.

Port / Switch	What Goes Here
Power input (4-pin, screw-locking)	Cradle power cable from the machine's 12V or 24V outlet. Align the connector correctly, push in firmly, then screw the locking ring until tight.
Top-left USB port	BT/WiFi dongle. This port is reserved for the dongle — do not put the LED here. The system will not connect to sensors or remote services if the dongle is in the wrong port.
Other USB ports	LED Indicator (BT445), USB stick for software updates or imports, or any other USB accessory. Any of the remaining USB ports can be used.
CT425C Y-shielded cable connector	If you are using the BT476 chassis sensor in backward-compatible mode (older firmware) or you simply want to power the chassis sensor from the cradle, the CT425C connects here.
CAN switches #1 and #2	Inside the cradle (T10 Torx access). Factory-default ON. They only need to be touched when troubleshooting CAN data from a tiltrotator (see Volume 2 Section 09). Leave them alone during initial setup.

> **Critical: The BT/WiFi Dongle Must Be in the Top-Left USB Port**
>
> The Connect software only looks for the Bluetooth/WiFi dongle on the top-left USB port of the cradle. If you plug it into any other port, the system will not pair sensors, will not connect to the Spotman receiver over Bluetooth, will not see Wi-Fi networks, and will not allow remote access. If anything stops working unexpectedly, this is the first thing to check.

Step-by-Step: Connecting the Control Box to the Cradle

1. **Confirm the BT/WiFi dongle is firmly seated in the top-left USB port.**
Push it in until it stops. A loose dongle is a common source of intermittent sensor drop-outs.

2. **Connect the LED Bargraph cable to any open USB port on the cradle.**
Not the top-left port — that is reserved for the dongle. Any other USB port works.

3. **Connect the cradle power cable to the machine's 12V or 24V outlet.**
Most operators tap the standard accessory outlet in the cab. The Connect system accepts 12V or 24V.

4. **Slide the Control Box (BT142) into the cradle.**
The BT142 has alignment features that match the cradle. It should seat firmly without forcing. Confirm it is held securely; you should not be able to pull it loose with light hand pressure.

5. **Verify the LED Bargraph is plugged in correctly.**
The BT445 LED Display sits in the CT149 cradle on the front window. Its cable should run cleanly back to the BT447 cradle.

6. **Do not power on yet.**
If you are also installing sensors at the same time, complete the sensor plate installation first (Volume 2). If you are only doing initial software setup at the bench, you can proceed to Section 05 to power on.

Real-World Example: Setting Up a CT741 Kit on a CAT 320 for the First Time

On a typical CAT 320 cab: mount the CT149 LED cradle on the front window, low and to the right side so the operator can see cut/fill while looking at the bucket. Mount the BT447 cradle on the right-side sliding window, in the front portion (closer to the operator) so the touch screen falls naturally to the right hand. Tap the cab's standard 12V accessory outlet for cradle power. Run the LED cable along the top of the dash, dropping down behind the right-side B-pillar trim to the BT447 cradle. Total install time at the bench: 15–20 minutes.

05 Powering On for the First Time

With the cradle mounted and the Control Box seated, you are ready to power on. The first power-on takes you through two short tasks: choosing your language and your time zone, and setting your units of measure. This section walks through each one. Sensor pairing, machine profile creation, and the actual machine calibration come later (Volume 2 for installation, Volume 4 for calibration).

First Boot — What to Expect

Apply power to the cradle. The Control Box will boot in about 30 to 45 seconds and display the iDig Connect main work screen on its first power-on. From the work screen, tap the screen to bring up the side toolbars and tap the Settings icon to enter the Settings menu. The Settings menu is your home base for everything in this section.

Settings Menu Section	What You Configure Here
Basic Settings	Language, time zone, units, sound, sensors, GNSS receiver, storage, brightness, sleep mode, Restrictive Mode.
System Settings	Machine profiles — create, select, edit, and back up the calibrated machines on this Control Box.
Work Settings	LED Bargraph configuration (resolution, deadband, depth/reach modes), audible alerts (depth, reach, laser catch, sensor loss, collision).
Remote Access	Wi-Fi connection, sending a remote-support session link by email.
Import/Export	License manager (apply purchased .lic files), backup/restore machine parameters, import projects, factory reset.
Software Update	USB-based updates, Remote Update over Wi-Fi, sensor firmware updates, coordinate-system downloads.

Step-by-Step: Initial Language, Time Zone, and Units

1. **From the work screen, tap to bring up the toolbars and tap Settings.**
   The four-tile main Settings menu opens with Basic Settings, System Settings, Work Settings, and Remote Access.

2. **Tap Basic Settings.**
   The Basic Settings screen opens, organized into Global, Sensors, and Other groups.

3. **Tap Languages.**
   The Choose Your Language screen displays national flags. Tap the flag for your preferred language. North American users select English.

4 **Set your time zone.**
Inside the Languages screen there is a Choose Time Zone option. For US operations, scroll to America/Denver, America/Chicago, America/Los_Angeles, America/New_York, etc., to match your local time.

5 **Tap Units.**
The Choose Your Units screen opens. This is the most important first-time setting — it must match your project.

6 **Set Length Units.**
For US construction work, choose US Survey Feet (most state plane projects, most US civil engineering designs). Choose Imperial (decimal feet) only if your project specifically calls for International Feet — confirm with your project engineer if unsure. Metric is also available.

7 **Set Slope Units.**
Most US construction work uses Percent (%). Some highway and rail projects use degrees or per-mille. Match your design documents.

8 **Set Heading Convention.**
Degrees is standard for US construction. Match your project.

9 **Set Coordinate Convention.**
For US construction work, set this to North / East / Elevation. This matches the convention used by surveyors and most civil engineering output, including iPoint. Confirm with your project engineer if the design documents specify a different convention.

10 **Exit back to the Basic Settings menu.**
Your language, time zone, and unit settings are now active. They persist across reboots.

Critical: Match Your Units to Your Project Before Calibrating

Length Units affect every measurement the system displays — depth, reach, slope distance, coordinates, calibration values. If you calibrate the machine in meters and then switch to US Survey Feet, the on-screen values change but the underlying calibration is unchanged. The unit setting drives interpretation, not the data. Get this set correctly before you begin calibration in Volume 4.

06 Licensing & Activation

iDig Connect uses two kinds of software licenses. Tier licenses (CT150 for 2D Project, CT151 for 3D, CT137 for 3D Lite to 3D upgrade) determine what the system can do — whether it can import 3D designs, how many projects it can store, whether the 3D view is unlocked. Feature licenses (CT145 Swing Boom, CT155 Dynamic Laser Catch) unlock specific advanced operating features in Connect v5 software.

Both feature licenses ship with a 120-day free trial activated by tapping a single button inside the License Manager. After the trial ends, a perpetual license is applied by importing a .lic file — a small license file your dealer sends you that is tied to your specific Control Box serial number.

Where Licenses Live

License management lives under Settings > Import/Export > License Manager. From this screen you can see what is currently licensed, activate the 120-day trials, and import a .lic file from a USB stick.

Step-by-Step: Activating a 120-Day Trial

1. **From the Settings menu, tap Import/Export.**
   The Backup / Restore Machine Parameters screen opens, displaying tiles for machine import/export, project import/export, language import, manufacturer import, boot screen, and License Manager.

2. **Tap License Manager.**
   The License Manager screen opens, showing the licenses available on this Control Box and their status.

3. **Locate the feature you want to trial — Swing Boom or Dynamic Laser Catch.**
   Each licensable feature shows an activation icon. If a trial has not been activated, the icon is the trial-start icon. If it is already active, the screen shows how many days remain in the trial.

4. **Tap the trial-activation icon for the feature.**
   The system activates a 120-day trial for that feature. The trial is one-time-only per Control Box — you cannot reset it.

5. **Verify the trial is active.**
   Return to the License Manager screen and confirm the feature now shows trial days remaining. The feature is immediately available for use.

Best Practice: Activate Both Trials On Day One

Both Swing Boom and Dynamic Laser Catch ship with their own 120-day trial. There is no penalty for activating both trials on the day you receive the system, even if you don't plan to use one of them right away. Operators who get hands-on experience with these features during the trial are far more likely to find them valuable enough to license. Activate both, try both, and decide before the clock runs out.

Step-by-Step: Applying a Perpetual License

When you purchase a perpetual feature license or a tier upgrade, your iDig dealer emails you a .lic file — a small text file generated for your specific Control Box serial number. To apply it, copy the file to a USB stick, plug it into the cradle, and import it from the License Manager screen.

1. **Save the .lic file to the root directory of a USB stick.**
   Do not put it in a folder. iDig Connect looks for license files at the root of the USB drive. The USB does not need to be empty — other files can coexist with the .lic file.

2. **With the Control Box powered on, plug the USB stick into the cradle.**
   Any open USB port works for importing licenses. The dongle remains in the top-left port.

3. **Open Settings > Import/Export > License Manager.**
   You should already know this menu path from activating a trial.

4. **Tap Import License.**
   The system reads the USB stick and looks for .lic files.

5. **Select your .lic file from the file browser.**
   If the .lic file's serial number matches the Control Box, the import succeeds and the feature is activated permanently. If the serials do not match, the import fails — contact your dealer for a replacement license.

6. **Verify the license shows as active.**
   Return to the License Manager screen. The licensed feature now shows as Active (perpetual) rather than Trial (days remaining).

7. **Remove the USB stick safely.**
   Use the Remove USB option from the Import/Export screen rather than yanking the stick. This prevents data corruption if the system was mid-write.

Critical: License Files Are Tied to a Specific Control Box

Each .lic file is generated for one Control Box serial number. You cannot use the same .lic file on a different Control Box, and you cannot move a license to a different Control Box without contacting iDig dealer support to issue a replacement file. Find the Control Box serial number at the bottom-left of the Settings menu screen (it appears as CB######). Always verify your dealer has the correct serial number before purchasing a license.

Real-World Tip: Where the Control Box Serial Number Lives

The serial number appears as a small text string near the bottom-left edge of the main Settings screen, in the format CBXXXXXX (e.g., CB202063). The same serial number is also etched into the back of the Control Box. Take a photo of the back of the Control Box on day one and save it to your phone — it makes ordering replacement licenses, warranty service, or remote support much faster.

07 Software Updates — USB & Remote

iDig Connect software updates come out periodically with new features, bug fixes, and added support for new sensors and tiltrotators. There are two ways to apply an update: via USB stick (works without an internet connection — best for updating multiple machines or when Wi-Fi is unavailable) and via Remote Update over Wi-Fi (single-click, but requires the Control Box to be connected to the internet).

Both methods can also update sensor firmware (boom, stick, bucket, chassis sensors) and download additional coordinate systems on demand. Sensor firmware updates and coordinate system downloads only work over Remote Update; USB updates only update the Control Box itself.

> **Critical: Major Version Upgrades Can Affect Calibration**
>
> Some software updates change how the Control Box reads a sensor or introduce new sensor types. Before applying any major version upgrade (anything that changes the first number, e.g., 4.x to 5.x), read Section 08 of this volume for background on the chassis sensor transition. Plan to back up your machine calibration first (Volume 4 Section 25) and budget time to verify or redo calibration after the update.

Method 1: USB Software Update

USB updates work in any environment — no internet required. The procedure has three parts: prepare the USB stick, copy the firmware files, and run the update on the Control Box.

Step-by-Step: Prepare the USB Stick

1 **Plug a USB stick into your PC.**
Any USB stick at least 1 GB in size works. The stick will be erased in the next step, so don't use one with files you need.

2 **Right-click the USB drive in File Explorer and choose Format.**
On Windows: open File Explorer, find the USB drive in the left sidebar, right-click, and select Format.

3 **Set File System to FAT32 and click Start.**
iDig Connect only reads FAT32-formatted USB drives. NTFS and exFAT will not be detected. Confirm the format dialog warning — formatting deletes everything on the drive. Click Start, wait for the format to complete, and click Close.

Step-by-Step: Download and Copy the Firmware

1 **Open a web browser on your PC.**
Chrome, Edge, Firefox, or Safari all work. You will need an internet connection here, but the Control Box does not.

2 **Navigate to the iDig Connect firmware folder.**
Open iDig Connect Firmware Downloads in your browser. The folder lists every released firmware version.

3 **Locate the latest firmware folder.**
The folder is named with the version number (for example, iDigConnectFirmware_v5.x.x). The latest version is at the top. If you are unsure which version to download, contact your iDig dealer.

4 **Download the firmware as a compressed (.zip) folder.**
Most browsers will download the entire folder as a single .zip file. The download is approximately 350 MB and may take a few minutes depending on your connection.

5 **Extract the .zip file.**
Right-click the downloaded .zip in your Downloads folder and choose Extract All. Click Extract in the dialog. You will now have a folder containing several files (appli.gup..., rootfs.gup..., u-boot..., updater..., zImage, and a .dtb file).

6 **Copy all the extracted files to the root of the FAT32-formatted USB stick.**
Open the extracted folder and the USB stick side-by-side. Select all files (Ctrl+A) and drag them onto the USB stick. The files must be at the ROOT of the USB drive — not inside a subfolder. The USB drive should look like a flat list of files when you open it.

7 **Safely eject the USB stick.**
Use the eject option in your PC's taskbar to ensure all files have finished writing before unplugging.

Step-by-Step: Run the Update on the Control Box

1 **Power the Control Box OFF.**
The USB update process only runs at boot. If the Control Box is on, the USB stick is ignored. Power off completely before continuing.

2 **Insert the USB stick into any open USB port on the cradle.**
The BT/WiFi dongle can remain in the top-left port — you do not need to remove it for the update. The update USB stick can go into any of the other available USB ports on the cradle.

3 **Power the Control Box ON.**
The system boots, detects the firmware files on the USB stick, and begins the update automatically. You will see update progress on the screen.

4 **Wait for the update to complete.**
The full update typically takes 5 to 10 minutes. The Control Box will reboot one or more times during the process.

5 **When the update finishes, power off and remove the USB stick.**
Power on normally and verify the new version number at the bottom-left of the main Settings screen.

Critical: Do Not Interrupt Power During the Update

Do not unplug power, cycle the machine's ignition, or remove the USB stick while the update is in progress. An interrupted firmware update can leave the Control Box in a state that requires a service-level recovery. Ensure the machine is running (or the Control Box is on stable shop power) before starting, and let the full update finish before touching anything.

Common Mistake: USB Update Doesn't Start

If you power on and the update doesn't run, the most likely cause is one of two things: (1) the USB is not formatted FAT32, or (2) the firmware files are inside a folder rather than at the root of the drive. Reformat the USB to FAT32, place the files at the root, power off, insert the USB, and power on.

Method 2: Remote Update over Wi-Fi

Remote Update is built into Connect v5.x.x and is the standard way to keep your system current. It downloads and installs new Control Box firmware, sensor firmware, and coordinate systems directly over Wi-Fi. The Control Box must be connected to a Wi-Fi network with internet access (a job-trailer hotspot, a cellular hotspot, or your shop Wi-Fi all work).

Step-by-Step: Update the Control Box via Remote Update

1 **Connect the Control Box to Wi-Fi.**
Settings > Remote Access. Tap the Wi-Fi network from the Known WiFi list, or tap Other to add a new network. Enter the network password. A green check appears when connected.

2 **From the Settings menu, tap Software Update.**
The Software Update icon shows a small green badge with a number when updates are available.

3

Tap Check.
The Control Box queries the iDig server for the latest updates. Any new Control Box firmware, sensor firmware, or coordinate-system packages available for your system will populate the list. Always tap Check before reviewing what is available — it makes sure you are seeing the most current releases.

4

The Remote Software Update screen opens with four tabs.
Release Notes (what changed in each version), CBox (Control Box firmware), Peripherals (sensor firmware), and Coordinate systems (regional coordinate system files).

5

Tap the CBox tab.
A list of available Control Box firmware versions appears, with the latest at the top.

6

Highlight the latest release so it is highlighted blue, then tap Download Update.
The Control Box downloads the firmware in the background. You can leave the screen during the download.

7

When the download completes, choose the same version again and tap Install Update.
The Control Box stages the new firmware for installation.

8

Tap Update the Control Box.
The Control Box reboots and installs the new firmware. When it comes back up, the new version is active. Verify by checking the version string at the bottom-left of the main Settings screen.

Step-by-Step: Update Sensor Firmware

1

Open Settings > Software Update and tap the Peripherals tab.
The Peripherals tab lists every paired sensor (boom, stick, bucket, chassis) and the firmware version it is currently running.

2

Highlight the sensor you want to update.
If an update is available for that sensor, the action button shows Download and Install. If the sensor is current, you will see a green checkmark and no action available.

3

Tap Download and Install.
The Control Box downloads the new sensor firmware over Wi-Fi and pushes it to the sensor over Bluetooth. Keep the sensor within Bluetooth range of the cradle (i.e., installed on the machine — do not pull the sensor off mid-update).

4	**Wait for the green checkmark.** When the update completes, the sensor shows a green checkmark and the new version number. Repeat for each sensor that needs an update.

Real-World Tip: Sensor Firmware Updates Need Charged Sensors

Wireless sensors are solar-recharged, but if a sensor has been stored indoors and shows low battery, give it a few hours of direct sunlight before attempting a firmware update. A sensor that loses power partway through an update is fine — the old firmware remains intact and you can simply retry — but you waste 5 to 10 minutes per attempt. Charge first, update second.

Step-by-Step: Download Coordinate Systems

1	**Open Settings > Software Update and tap the Coordinate systems tab.** The Coordinate systems tab lists every coordinate-system package available for download. For North American work, look for USA_NAD83-2011 (US State Plane), Canada_NAD83-CSRS (Canadian Spatial Reference System), and any other regional packages relevant to your work area.
2	**Highlight the coordinate system you need.** The system shows the file size and last-update date. US_NAD83-2011 is approximately 27 MB.
3	**Tap Download and Install.** The package downloads and installs. When complete, the coordinate system is available when creating new projects (Volume 7).
4	**Repeat for any additional regions you need.** If you operate across multiple regions, download each one. Coordinate systems do not consume meaningful disk space, so installing several is fine.

Best Practice: Check for Updates Once a Month

Make a habit of opening Settings > Software Update and tapping Check at least once a month. Software updates contain bug fixes, performance improvements, and new features that you are entitled to as part of your Connect system. Staying current takes only a few minutes and keeps you on the latest release iDig has published.

08 A Note on the Chassis Sensor Transition

All current iDig Connect systems ship with Connect v5.x.x software and the BT476 chassis sensor. If that describes your system — a new kit received from your dealer in the current shipment window — you can read this section for background and then move on; there is nothing you need to do differently.

This section exists because the chassis sensor changed a few years ago, and some existing equipment in the field still uses the older part. If you are servicing an older machine, swapping a Control Box between machines, or inherited equipment from a previous owner, the background here will help you recognize what you are looking at.

What Changed

The original 2D chassis sensor was the XD476, sometimes called the "Larger 2D Sensor." It was a fully cabled sensor — both power and measurement data ran through the cable — and it had to be mounted flat with its arrows pointing forward, parallel to the boom.

The current chassis sensor is the BT476, the "Combo Chassis Sensor." It is still wired for power (through the CT425C Y-shielded cable from the cradle), but its measurement data travels over Bluetooth. This architecture gives the BT476 much more flexibility — it can be mounted in any orientation when paired with a tilted calibration procedure — and it performs significantly better than the original cabled sensor.

> **Real-World Tip: How to Tell Which Chassis Sensor You Have**
>
> Look at the sensor body. The XD476 (the "Larger 2D Sensor") is physically larger and has a single cable. The BT476 (the "Combo Chassis Sensor") is more compact, has both a Bluetooth radio and a power cable, and looks similar to the wireless Mini Sensors used on the boom and bucket. The product label on the back lists the part number. If the label is worn, the BT476 will pair via Bluetooth in the Wireless Sensors menu; the XD476 will not.

What This Means for New Installations

For new installations using a current kit, the story is simple. Install the BT476 per Volume 2, pair it over Bluetooth, and calibrate it per Volume 4. Your system is already on v5.x.x and the chassis sensor is already the current part — there is no migration, no upgrade path to plan, and no legacy behavior to work around.

What This Means for Older Systems

If you encounter an older system still running the XD476 chassis sensor, a software upgrade to v5.x.x will require swapping the XD476 for a BT476 and redoing the chassis calibration. Contact your iDig dealer to plan the swap and the software upgrade together — it is not a field upgrade you should attempt without the replacement sensor already on hand.

[REVIEW: Volume 4's chassis sensor calibration procedure is where the full tilted/non-tilted calibration steps live. Confirm cross-reference is correct before final compilation.]

09 Remote Access & Support

iDig Connect has a built-in Remote Access feature that lets your iDig dealer or support team see your Control Box screen and walk you through configuration, calibration, or troubleshooting in real time. The session runs over the same Wi-Fi connection used for Remote Update. The remote viewer cannot connect without an active invitation that you generate from the cab.

How Remote Access Works

When you start a Remote Access session, the Control Box generates a unique link and sends it by email to the address you specify. The recipient clicks the link in their email, presses Connect in the browser window that opens, and immediately sees a live view of your Control Box screen. The session is one-to-one: only the recipient with the unique link can connect, and the link is invalidated when the session ends. There is no public address for the Control Box.

> **Critical: You Initiate Every Remote Access Session**
>
> There is no way for someone to remotely connect to your Control Box without you starting the session and emailing the link. Even iDig dealer support cannot initiate the connection from their end. This is by design — it ensures you always know when someone is viewing your screen. If you ever want to end a session, simply disconnect from Wi-Fi or exit the Remote Access screen.

Step-by-Step: Connecting the Control Box to Wi-Fi

1 **From the Settings menu, tap Remote Access.**
The Remote Access screen opens. The left side shows Wi-Fi network selection; the right side shows the active connection status.

2 **Tap the Known WiFi tab to see networks the Control Box has connected to before.**
If you have previously connected to a network, it appears here for one-tap reconnection.

3 **For a new network, tap the Other tab (the + icon).**
A list of nearby Wi-Fi networks appears.

4 **Tap the network you want to join.**
A keyboard appears for the password.

5 **Enter the Wi-Fi password and confirm.**
The Control Box attempts to connect. When connected, a green checkmark appears next to the network name and the right side of the screen shows the assigned IP address (e.g., 10.0.0.101) and the word Connected.

Step-by-Step: Starting a Remote Support Session

Once the Control Box is connected to Wi-Fi, starting a remote support session takes about 30 seconds. You have two ways to share the session with your dealer: by email or by QR code.

1. **With the Control Box connected to Wi-Fi, tap Get Support on the Remote Access screen.**
   The Control Box generates a unique session link and opens the sharing options.

2. **Choose how to share the session — Mail to or QR Code.**
   Tap Mail to if your dealer is not present and you need to send them the link by email. Tap QR Code if you are working with a dealer who can scan a code on-screen (common when the dealer is on the phone with you and has another device handy).

3. **For Mail to: enter the email address of your dealer support contact and tap Send.**
   The Control Box emails the unique session link to the address you entered. Use the address your dealer provided — most dealers have a dedicated support address.

4. **For QR Code: hold the Control Box screen up so your dealer can scan it.**
   The Control Box displays the QR code containing the session link. Your dealer scans the code with their phone or tablet camera, which opens the session link automatically.

5. **Wait for the recipient to connect.**
   The Remote Access screen shows the session as active and displays a session ID. When your dealer opens the link (either from the email or the scanned QR code) and presses Connect, the live view of your Control Box screen begins on their end.

6. **Stay on the Remote Access screen during the session, or navigate normally.**
   You can navigate iDig Connect during the session — the remote viewer sees what you see in real time. Most support sessions involve the operator and the dealer talking through the work over the phone while both look at the same screen.

7. **When the session is done, tap Disconnect.**
   The session ends and the link is invalidated.

Real-World Tip: Use Your Phone as a Wi-Fi Hotspot

On a jobsite without Wi-Fi, turn on your phone's Personal Hotspot and connect the Control Box to it. The Control Box uses very little bandwidth for Remote Access — even a marginal cellular signal is usually enough. This is the most common setup for in-cab remote support: the operator connects the Control Box to their own phone hotspot, then calls dealer support and either emails the session link or shows them the QR code from the cab.

Best Practice: Pre-Test Remote Access Before You Need It

Before you ever have a real problem in the field, test the Remote Access workflow at the shop: connect to Wi-Fi, tap Get Support, and send a session link to your own email or your dealer (with a heads-up that this is a test). Confirm the connection works. Having validated the workflow once means you are not learning two new things at once when you have an actual problem to solve.

10 Cloud File Access Configuration

Cloud File Access lets the Control Box read directly from your existing Google Drive, Dropbox, OneDrive, or other cloud storage account. Once configured, your cloud appears as a folder during file import operations — load a DXF design from Drive, pull down a coordinate file from Dropbox, or grab a project backup that someone in the office shared to your shared OneDrive folder. There is no separate iDig cloud subscription; the system uses your existing cloud account.

> **Before You Start**
>
> You will need: an existing cloud account (Google Drive, Dropbox, OneDrive, or another supported provider), an Android phone or tablet with internet access (yours or anyone's — the configuration is one-time), and a USB stick. The Control Box itself does not need to be connected to Wi-Fi while you set up the configuration file, but it does need to be online when you actually browse the cloud later.

How It Works

Cloud File Access uses an open-source application called RCX Clone, which runs on Android. RCX Clone authenticates to your cloud account, generates a small configuration file (with a .RCX extension) that contains the access tokens, and lets you export that file to a USB stick. You then import the .RCX file into iDig Connect, and the Control Box uses it to talk to your cloud.

The big advantages: no monthly cloud fee, your existing folder structure works as-is, and configuration is portable — you can move your .RCX file to another Control Box and immediately have the same cloud access there. The trade-off: cloud access tokens occasionally expire (typical for cloud providers), and when they do you re-authenticate in RCX Clone and re-export a fresh .RCX file.

Step-by-Step: Install RCX Clone on Android

RCX Clone is no longer distributed through the Google Play Store. iDig hosts the current APK installer on Google Drive so you can install it directly on any Android device.

1 **On an Android phone or tablet, open a web browser.**
Any Android device works for this — your personal phone, an iDig field tablet, or a borrowed device. The .RCX file the device produces will work on the Control Box regardless of which device created it.

2 **Navigate to the RCX Clone download folder.**
Open RCX Clone Download in your browser and tap the APK file to download it.

3 **Allow the download and install when prompted.**
Because the APK is installed outside the Play Store, Android will show a security prompt asking whether to allow installation from this source. Tap Settings, enable "Allow from this source" for your browser, then tap Back and tap Install. This is a one-time permission.

4 **Open RCX Clone.**
When installation completes, tap Open to launch the app. RCX Clone opens to a near-empty main screen with a + button to add a cloud connection.

Step-by-Step: Add Your Cloud Account in RCX Clone

1. **In RCX Clone, tap the + button.**
   A list of cloud providers appears (Google Drive, Dropbox, OneDrive, Box, and others).

2. **Choose your provider and tap Next.**
   RCX Clone walks you through the provider's standard sign-in flow — the same login you use in a web browser.

3. **Sign in to your cloud account.**
   Enter your email and password. If your cloud account uses two-factor authentication, complete it as you normally would.

4. **Grant RCX Clone permission to access your account.**
   The cloud provider's standard authorization screen appears. Read the permissions, then tap Allow or Authorize.

5. **Verify the cloud appears in the RCX Clone list.**
   Your cloud account now appears in RCX Clone with the name you assigned (e.g., "iDig" or "Company Drive"). You can navigate the folder structure inside RCX Clone to confirm the connection works.

Step-by-Step: Export the .RCX Configuration File

1. **In RCX Clone, tap the menu button (typically three dots in the top-right).**
   The application menu opens.

2. **Select Export rclone config.**
   RCX Clone packages the cloud configuration into an .RCX file.

3. **Save the file to a USB stick.**
   Plug a USB stick into the Android device (or use a USB-C OTG adapter if needed). When prompted for a save location, choose the USB drive. The file should land at the root of the USB drive — not inside a folder.

4 **Safely eject the USB stick from the Android device.**
Use the device's standard USB eject. The .RCX file is now on the USB and ready to load into the Control Box.

> **Real-World Tip: One Cloud Account Can Serve Many Control Boxes**
> If you operate a fleet of machines, you only need to do the RCX Clone setup once. Take the .RCX file from the first Control Box and import it into every other Connect Control Box you operate. They will all see the same cloud folders. When the cloud token eventually expires, re-authenticate once in RCX Clone, export a fresh .RCX, and load it on every Control Box.

Step-by-Step: Import the .RCX File into iDig Connect

1 **Power on the Control Box and connect to Wi-Fi.**
The Control Box must be online to load the cloud configuration and browse cloud files. Settings > Remote Access > join your Wi-Fi network. Verify the green check.

2 **Plug the USB stick (containing your .RCX file) into the cradle.**
Any open USB port works. Keep the BT/WiFi dongle in the top-left port.

3 **From the Settings menu, tap Basic Settings.**
The Basic Settings menu opens.

4 **Tap Storage.**
The Storage info screen opens with two tabs at the top: Cloud Folders and Disk Usage.

5 **Tap the Cloud Folders tab.**
The Cloud Folders screen lists any cloud connections already configured. On a fresh system, the list is empty.

6 **Tap Import.**
The Control Box reads the USB stick and looks for .RCX files.

7 **Select your .RCX file from the file browser.**
The cloud configuration is imported and your cloud account appears in the Cloud Folders list (e.g., "iDig Cloud").

8

Verify the import.

The Internet Connection Status indicator at the bottom-left of the Storage screen should show a green checkmark, indicating the cloud connection is active.

Using Cloud Folders During File Import

Once the .RCX file is imported, your cloud folders appear automatically in the file browser any time you import data into iDig Connect — for example, when importing a DXF design file (Volume 7), loading a project, or pulling in a calibration backup. The cloud folders show up alongside USB and local storage in the file directory, and you navigate them the same way you would on a phone or computer.

Cloud Tokens Can Expire

Cloud providers occasionally invalidate access tokens — most often after long periods of inactivity, after a password change, or as part of routine security policy. If you suddenly cannot see files you used to see, the token has likely expired. Open RCX Clone on your Android device, re-authenticate to the cloud provider, export a fresh .RCX file to USB, and re-import it into iDig Connect. The procedure is identical to the initial setup.

Best Practice: Organize a Dedicated iDig Folder in Your Cloud

Before you import the .RCX file, create a clearly-named folder in your cloud account (e.g., "iDig Field Files" in Google Drive). Use it as the central drop-zone for design files, project backups, and calibration backups going to and from the field. A clean, single-purpose folder is much easier for operators to navigate from the cab than your full personal Drive root with hundreds of unrelated folders.

11 What's Next

You have now completed everything that needs to happen at the shop or bench before going to the machine. Your Control Box is mounted in its cradle, language, time zone, and units are configured, your licenses are activated (or your trials are running), the Control Box is on the latest software, and your cloud account is connected for easy file transfer. You can also reach iDig dealer support remotely whenever you need help.

Volume 2: Hardware Installation

Volume 2 is the installer's volume. It walks through the pre-installation checklist (tools, machine condition, site requirements), the 3M adhesive procedure for mounting sensor plates, the specific installation requirements for boom, stick, bucket, and chassis sensors, GNSS receiver mounting on the cab roof, LED Bargraph and CBox positioning on the cab windows, CAN-bus wiring for tiltrotators, and the boom-type and attachment-type configuration choices. By the end of Volume 2, every sensor plate is installed in the correct location on the machine and every cable is routed cleanly.

Volume 3: GNSS Receiver Configuration

Volume 3 covers the Spotman GNSS receiver: how RTK GNSS works (the 60-second version), connecting to the Spotman WebUI, configuring NMEA outputs over Bluetooth, setting up NTRIP corrections through a SIM card or radio, the supported radio protocols, and pairing the Spotman to the iDig Control Box. If you purchased a 2D Project or 3D system (or added a Spotman to a 2D+ system), you will need Volume 3 before doing the 3D portion of calibration in Volume 4.

Volume 4: Machine Calibration

Volume 4 is the longest and most critical volume. It covers the full calibration sequence in the correct order — cradle configuration, GNSS NMEA pairing, boom and stick wizard calibration, bucket calibration, swing boom (if licensed), chassis sensor calibration for the BT476, GNSS 3D calibration, laser receiver calibration, tiltrotator calibration if equipped, and the post-calibration accuracy checks. Volume 4 ends with backing up the completed machine calibration to USB so it can be restored or shared.

Need Help?

Contact your iDig dealer for assistance with installation, licensing, calibration, or general support. For real-time support, use the Remote Access feature described in Section 09 of this volume — it lets your dealer see your screen while you talk through the issue together.

iDig Connect Software

User Guide

Volume 2: Hardware Installation

Sensor Plates, Chassis Sensor, GNSS Receiver, Cradles & CAN Wiring for Tiltrotators

Version 1.0
April 2026
Prepared by iDig North America

This is Volume 2 of 8 in the iDig Connect User Guide series.

01 Pre-Installation Checklist

Volume 2 picks up where Volume 1 ended. The Control Box is licensed and on the latest software; the cradle, LED Bargraph, and BT/WiFi dongle are in the cab; and the sensors are ready to come out of the foam-lined case. Volume 2 is the physical installation on the machine — the sensor plates go on the boom, stick, bucket, and cab frame; the GNSS receiver goes on the cab roof; and, if equipped, a tiltrotator is wired into the Control Box over CAN bus.

A successful installation starts with the right tools, a machine that is ready to receive the system, and a site where you can actually finish the work. Cut corners here and you will end up re-doing steps later — often the hard way, with the sensor plates already installed and the machine already on the jobsite.

Tools You Will Need

Tool	What You Use It For
Tape Measure	Measuring bucket dimensions, the A–C value for the stick sensor, and testing accuracy after calibration is completed.
Magnetic Plumb Bob	Dropping a vertical reference line on the stick. Combined with magnetic hooks and a string line, this is how you create a reference line between the boom-to-dipper pin and the bucket pivot pin for stick sensor placement. Also used for completing the manual bucket calibration procedure.
String Line	Running between the boom-to-dipper pivot pin and the bucket pivot pin to create a straight reference line for stick sensor placement and for measuring the A–C value.
Sharpie Marker	Marking sensor plate positions on the machine before committing the 3M adhesive. Also used to mark the center of the bucket for the GNSS calibration in Volume 4.
Magnetic Hooks	Holding the string line and plumb bob in place while you take measurements. Strong enough to hold during a light breeze.
Clean Rags	For the surface prep wipe-down. Use fresh rags, not shop rags that may have grease or solvent on them.
Brake Cleaning Fluid	First-pass cleaner for the machine surface before the alcohol wipe. Removes hydraulic residue, grease, and dust.
Alcohol Wipes (XD417)	Included in every sensor plate kit. Final surface prep before the 3M adhesive.
Tripod	Hold’s the laser pointer during the boom and stick wizard calibration in Volume 4.
2-Meter Grade Rod	Used during the GNSS 3D calibration in Volume 4 — the operator screws the Spotman receiver onto the rod and measures reference points on the ground.

Tool	What You Use It For
Four Flat Cement Pavers	Needed if calibrating on a dirt or gravel surface. During the GNSS 3D calibration, the operator places the bucket on a paver to mark the center of the bucket tooth, then returns to that exact mark with the Spotman on the 2-meter rod. On a hard paved surface, pavers are not needed — the crow's foot is marked directly on the pavement.

Machine Condition Checks

Before you install anything, confirm the machine itself is in shape to receive a machine-guidance system. A worn machine with loose pins, hydraulic leaks, or a flaky 12V/24V accessory outlet will produce unreliable guidance after calibration, and chasing those symptoms through the software is a waste of your time.

Check	What to Look For
Sensors and GNSS Receiver Charged	All wireless sensors should show battery life. If any sensor has been stored indoors for a long period, give it several hours of sunlight before starting installation.
Machine 12V/24V Outlet Works	Plug something simple (like a phone charger) into the accessory outlet the cradle will use. Confirm it powers on reliably. A flaky outlet is the most common cause of intermittent Control Box reboots.
No Hydraulic Leaks on Stick or Boom	Hydraulic fluid will destroy the adhesive bond on a sensor plate. Fix leaks before installing sensors — not after.
Pin Play Within Spec	Excessive play at the boom, stick, or bucket pins produces noise in the calibration and in daily operation. If the machine is due for pin bushings, do that work first.
Bucket Crush-Zone Check	Cycle the bucket through its full range of motion and identify crush points where a sensor plate could be damaged. You will need this awareness when choosing the bucket sensor location (Section 05).

Site Requirements for Installation and Calibration

It may be easier to install the sensor plates inside your shop.   For the calibration - the installer needs room and a specific kind of surface to achieve a quality calibration.

- Full 360° cab rotation clearance — the cab must be able to rotate a full circle without obstruction during calibration.
- Full boom, stick, and bucket extension clearance — calibration requires the operator to fully extend the machine. Confirm there are no overhead wires, fences, or structures in the way.
- Firm, level ground — a hard paved surface is strongly recommended. If you are calibrating on dirt or gravel, bring four flat cement pavers to use as reference surfaces during the GNSS 3D calibration — the operator marks the center of the bucket tooth on each paver, then returns to measure those exact spots with the Spotman on the 2-meter rod.
- Side-to-side level — the machine must be level side-to-side for accurate boom and stick calibration. Slight forward or backward tilt is acceptable.

Critical: Plan for the 4-Degree Machine Tilt

The recommended chassis-sensor calibration method requires tilting the machine at least 4°. Plan where this will happen before you start installation. If you have a blade, you can extend it fully down to tilt the machine. You can also position the machine on native ground that meets the 4° requirement. The key is that the machine must remain completely stable and not rock during calibration — avoid soft ground or unstable supports. See Volume 4 for the full calibration procedure.

Real-World Tip: Finish Sensor Plate Installation at the Shop

If you have the choice, install the sensor plates at the shop rather than on the jobsite. The adhesive needs a clean, dry, warm-ish surface, and the machine needs to sit undisturbed for the adhesive to set. A climate-controlled shop or a covered yard on a dry day is ideal. An outdoor jobsite in rain, snow, or extreme cold makes a hard job harder. If you must install outside - and in weather below 40 degrees it's recommended to warm up the steel with a heat gun where the plates will go.

02 Sensor Plate Installation — General Procedure

Every iDig Connect sensor plate — boom, stick, bucket, and chassis — installs the same way: clean the machine surface, clean the plate, apply 3M adhesive activator, press the 3M tape onto the plate, then press the plate to the machine. The adhesive cures in about 30 seconds under firm pressure and reaches full strength over the next 24 hours.

The plates themselves vary by sensor — the XD422 Mini Plate is used for Mini Sensors on the boom, bucket, and (separately) for the chassis sensor; the XD412 Combo Plate mounts the BT145 Combo Sensor on the stick; the XD436 Big Combo Plate mounts the larger BT147 Big Combo Sensor. But the adhesive procedure is identical across all of them.

Critical: The Adhesive Is Permanent

The 3M adhesive used on iDig sensor plates is a structural adhesive — once you press the plate to the machine, it does not come off cleanly. Finalize your plate location before you peel the red liner off the tape. Mark it with a sharpie, dry-fit the sensor on the plate to confirm clearance, and only then commit.

What's Included With Each Plate Kit

Item	Purpose
XD416 or XD416MS 3M Adhesive Tape	Pre-cut to match the plate. The MS variant is the smaller tape used with the Mini Plate. One sheet per plate kit.
3M Adhesion Activator	Small squeeze bottle or pre-moistened applicator. Primes the machine surface so the adhesive reaches full strength.
XD417 Alcohol Cleaning Wipes	Final surface-prep wipes. Included in every plate kit.

Step-by-Step: Installing a Sensor Plate with 3M Adhesive

1 **Select the mounting location.**
Choose a location that is smooth, rigid, and easily accessible. Avoid surfaces that flex, vibrate heavily, or are part of a bolt-on panel. The specific location requirements for each sensor are covered in Sections 03 through 07 of this volume.

2 **Dry-fit the sensor on the plate at the intended location.**
Hold the sensor and plate against the machine in the position you plan to install. Confirm the sensor has clearance for its full range of motion, that you can reach it to pair over Bluetooth later, and that hoses, pins, or hydraulic lines will not interfere. Mark the four corners of the plate with a sharpie.

3

Clean the machine surface with brake cleaner.

Spray brake cleaning fluid onto a clean rag and wipe the marked area thoroughly to remove dirt, grease, and dust. Do not spray brake cleaner directly on the machine — it can drift onto painted surfaces or into seals. Use the rag.

4

Finish with an alcohol wipe.

Use one of the included XD417 alcohol wipes to remove any brake-cleaner residue. The surface must be completely clean and completely dry before the adhesive activator goes on.

5

Apply 3M adhesion activator.

Using the supplied 3M activator, apply a light, even coat to the cleaned area. Let it dry completely — do not touch or contaminate the treated area once applied. Drying typically takes 1 to 2 minutes depending on temperature.

6

Prepare the adhesive pad on the plate.

Remove the red liner from one side of the 3M tape and firmly press the adhesive onto the back of the sensor plate for a full 30 seconds. Handle the tape only by the edges — oils from your fingers weaken the adhesive. The adhesive should now be bonded to the plate with a second red liner still facing outward.

7

Remove the second red liner and mount the plate.

Peel the remaining red liner to expose the adhesive. Align the plate carefully to the sharpie marks on the treated machine surface, then press firmly for a full 30 seconds. Apply steady, even pressure over the entire plate. Do not slide or reposition once the adhesive makes contact — you get one shot.

8

Let the adhesive cure before installing the sensor.

The adhesive reaches initial strength in 30 seconds but continues curing for 24 hours. You can install and pair the sensor immediately for setup work, but do not put the machine into heavy service until the adhesive has had 24 hours to fully cure.

Common Mistake: Skipping the Activator

The 3M activator is what gives the adhesive its full structural strength. Skipping it (because it is late in the day, because it is cold, because the activator has evaporated and you don't have a fresh one) will produce a weakened bond.. Do not skip the activator. If you are out of it, stop installation, call your dealer, and get more before continuing.

03 Boom Sensor Plate

The boom sensor is a Mini Sensor (BT144) mounted on an XD422 Mini Plate. It tracks the boom angle as the boom raises and lowers. The boom sensor has the most forgiving installation of any sensor in the Connect system — it can mount on either side of the boom, and in any orientation the calibration software can learn — but you still want to pick a location that stays accessible for pairing and sensor swaps down the road.

Where to Install

- Either side of the boom — pick the side that is easier to reach from the ground or a shop ladder. Most installers prefer the right side of the boom (operator's side when seated in the cab) because the sensor is visible from the operator's normal viewpoint.
- Any orientation — the calibration procedure accounts for the sensor's actual mounted angle. You do not need to mount it "pointing forward" or in any particular alignment.
- Lock mechanism toward the top — install the plate so the sensor's locking mechanism faces upward. This makes it much easier to remove and re-insert the sensor during pairing or replacement.
- On a solid, rigid section of the boom — avoid weld beads, hydraulic hose clamps, or any section of the boom that flexes under load.

> **Real-World Tip: Stand Where the Operator Stands**
>
> Before you commit the plate location, stand where the operator will stand when pairing the sensor. Can you reach the sensor without climbing on the boom? Can you see the sensor's status LED from the cab? If the answer is no, pick a different spot. The boom sensor is the easiest to install — there is no reason to make it hard to service later.

Installing the Plate

Follow the general sensor plate installation procedure in Section 02 of this volume. The XD422 Mini Plate Kit ships with XD416MS adhesive tape, activator, and XD417 cleaning wipes — everything you need is in the kit.

After the plate is installed and cured, snap the BT144 Mini Sensor into the plate with the lock mechanism oriented up. The sensor will pair over Bluetooth during Machine Calibration in Volume 4.

04 Stick (Dipper) Sensor Plate

The stick sensor is either a BT145 Combo Sensor (standard) or a BT147 Big Combo Sensor (for larger machines working with a laser transmitter). Both include a built-in laser receiver, which is why this sensor goes on the stick — it needs a clear line of sight to catch a rotating laser beam for 2D elevation reference. The BT145 mounts on an XD412 Combo Plate; the BT147 mounts on an XD436 Big Combo Plate. Installation geometry is identical for both.

The stick sensor is the trickiest plate to install. Unlike the boom sensor, you can't just pick a convenient spot — the sensor's position affects laser-catch performance, and a poorly-placed sensor makes every laser-benchmark operation slower and more frustrating. Take your time here.

Where to Install

- As low on the stick as possible — the lower the sensor sits, the less the operator has to drop the boom and crowd the stick to catch the laser beam. Aim for the lower third of the stick arm.
- On either side of the stick — check both sides and pick the side with the least hose or hard-line interference and the fewest crush risks. Most installers prefer the right side of the boom (operator's side when seated in the cab) because the sensor is visible from the operator's normal viewpoint.
- Away from hydraulic lines and auxiliary couplers — a leaking hose will destroy the sensor, and a hard line blocking the laser path will hurt laser-catch performance.
- Clear of the dog-bone crush zone — when the bucket crowds all the way in, the dog-bone linkage sweeps through a specific arc. Cycle the bucket slowly through its full range and identify any point where the sensor could be crushed. If in doubt, install higher and accept slightly worse laser-catch performance.

> **Recommendation: Rotate the Sensor Forward 10–15 Degrees**
>
> When the stick is positioned at 90° to the ground (straight down), rotate the sensor forward (counter-clockwise, away from the cab) by about 10 to 15 degrees as you install the plate. This small forward tilt improves laser-catch range.

Step-by-Step: Marking the Stick Sensor Location

Use a plumb bob and a string line to create a straight reference line between the boom-to-dipper pivot pin (at the top of the stick) and the bucket pivot pin (at the bottom of the stick). This line is where the center of the stick sensor will sit.

1

Position the machine with the stick at 90° to the ground.
Extend the stick so the pivot pin at the top and the bucket pivot pin at the bottom form a vertical line. Level ground helps — if the machine is on a slope, account for that in your measurements.

2

Hang a string line from the boom-to-dipper pivot pin to the bucket pivot pin.
Use magnetic hooks to secure the string at both pins. A plumb bob can verify the line is truly vertical if the machine is level. The string creates the reference line the sensor will be centered on.

3 **Identify the lowest practical location on the stick along the string line.**
Moving down the string, find the lowest point where the sensor will clear the dog-bone crush zone, clear all hoses and hard lines, and still be accessible from the ground or a ladder.

4 **Measure the A–C value from the boom-to-dipper pivot pin down to the sensor center.**
A–C is the distance from the top pin (where the stick meets the boom) to the center of the sensor, measured along the string line. Write this value down — you will enter it in the Laser Calibration routine in Volume 4.

5 **Confirm A–B = 0.**
A–B is the sensor's offset from the string line. If the sensor is centered exactly on the line, A–B is zero. If you had to offset the sensor to avoid a hose or crush point, measure how far — but try to achieve A–B = 0 if at all possible.

6 **Mark the plate location and the forward tilt.**
With the location marked and the A–C value recorded, rotate the sensor forward 10–15° and trace the plate outline with a sharpie. You now have everything you need to commit the adhesive (Section 02).

05 Bucket Sensor Plate

The bucket sensor is a Mini Sensor (BT144) mounted on an XD422 Mini Plate. It tracks the bucket angle as the operator curls and dumps. The sensor has two possible mounting locations — the quick-disconnect coupler or the dog-bone linkage — and the choice affects both the calibration procedure and the sensor's exposure to damage.

Preferred Location — Quick Disconnect

If the machine has a quick-disconnect coupler, install the sensor plate on the coupler itself. This gives the sensor a stable, well-protected mounting point that moves with the bucket as a single unit. The calibration routine for a coupler-mounted bucket sensor is simpler and more accurate than the alternative.

- Install on either side of the coupler — pick the side that is easier to access and less exposed to rocks, stumps, or spoil piles as the operator works.
- Clear of the bucket's full range of motion — cycle the bucket through its complete range (full curl, full dump, full extension) and confirm the plate location never contacts the stick, the dog-bone linkage, or the ground.

Alternative Location — Dog-Bone Linkage

On machines without a quick-disconnect coupler — direct-pin bucket installations — the sensor goes on the dog-bone linkage. This works, but the calibration procedure is more elaborate (covered in Volume 4), and the sensor is more exposed. If you have the choice, quick-disconnect is preferred.

> **Critical: Confirm Crush Clearance Throughout Full Range of Motion**
>
> The bucket sensor is the most commonly damaged sensor on any machine guidance system. Before committing the adhesive, have someone cycle the bucket through its complete range of motion — full curl, full dump, full open — while you watch the intended plate location from every angle. If the sensor can be pinched, crushed, or contacted during any portion of that motion, pick a different spot. A sensor destroyed by an operator's first real dig is a bad day.

Double-Layer 3M on Rough Coupler Surfaces

Quick-disconnect couplers are often cast or heavily welded, with surface texture that the single-layer 3M adhesive cannot fully bridge. If the mounting surface is rough or uneven, apply two layers of XD416 adhesive tape — one layer to the back of the plate, then a second layer on top of that — to take up the surface irregularities and improve the bond.

Custom Protective Brackets for Harsh Environments

Machines that work in rocky soil, demolition debris, stump removal, or other high-impact environments benefit from a custom-fabricated protective bracket around the bucket sensor. The bracket is typically a short piece of angle iron or plate welded or bolted to the coupler, positioned to take the hit before the sensor does. Your iDig dealer can share examples of brackets other operators have built for similar machines.

Real-World Tip: If You Work Rocky Ground, Budget for a Bracket

Operators in rocky or debris-heavy environments should plan on a protective bracket from day one — not after the first sensor gets destroyed. The cost and time to have your welder fabricate a simple bracket is trivial compared to an emergency sensor replacement on a job. If you are unsure whether you need one, ask your iDig dealer what other operators in your region have done; they have seen it all.

06 Chassis Sensor Installation

The chassis sensor is the BT476 — the current Combo Chassis Sensor, wired for power but communicating with the Control Box over Bluetooth. It tells the system how the cab is tilted, which is critical for 2D accuracy and is also the foundation for 3D positioning. Unlike the Mini Sensor plates on the boom, stick, and bucket, the chassis sensor plate is an XD422 Mini Plate but the sensor itself (BT476) is different and must be installed on the cab frame — not on any attached component.

> **Critical: Mount on the Actual Cab Frame — Not a Bolt-On Panel**
>
> The chassis sensor must be installed on the structural cab frame itself, not on a piece of steel that is bolted to the cab frame. Bolt-on panels flex and vibrate independently of the cab, and any flex or vibration becomes noise in the chassis calibration. If you are not sure whether a surface is part of the cab frame, find one that clearly is — check with your dealer if needed.

Vibration Dampening

Even on the cab frame itself, engine and hydraulic vibration can produce enough noise to degrade sensor performance. Two options address this:

- Use vibration dampening pads between the sensor plate and the cab steel.
- Use multiple layers of the included 3M adhesive tape in lieu of vibration dampening pads — typically two to three layers of XD416MS tape stacked between the plate and the cab steel accomplish the same thing.

Sensor Orientation — Any Orientation, Tilted Calibration

The BT476 supports mounting in any orientation on the cab frame - though if the machine is not going to be able to meet the 4 degrees of tilt for calibration then it MUST be installed flat and with the arrows pointed forward. This is the recommended installation approach because it pairs with the tilted calibration method in Volume 4 — and the flat calibration method. You have options.

> **Best Practice: Install for the Tilted Calibration Method**
>
> The tilted calibration method is the recommended approach for every new Connect installation. It pays back many times over in field accuracy. If the machine has a blade, extending it fully down is the easiest way to achieve the required 4° tilt. Alternatively, position the machine on firm native ground that provides the tilt. If you genuinely cannot tilt the machine where you will calibrate — some dealer demo floors, some tight shop spaces — contact your iDig dealer for the fallback procedure rather than assuming you have to compromise.

Accessibility for the Power Cable

The BT476 draws power from the cradle through the CT425C Y-shielded cable. The cable connects to the sensor with a screw-locking connector, which means you need clearance to screw and unscrew the cable during pairing or sensor swaps. The installation sequence that avoids headaches:

1 — **Screw the power cable onto the BT476 first.**
Connect the CT425C cable to the sensor before you plan the plate location. This ensures you find a location that has clearance for the connector, not one that merely has clearance for the sensor body.

2

Place the sensor into the plate.
Snap the BT476 into the XD422 plate. The sensor and cable together should form the unit you will mount.

3

Find the optimal mounting location.
Dry-fit the assembled sensor and cable against the cab frame. Confirm the sensor has full clearance, the cable can route cleanly back to the cradle, and you can reach the connector to remove it when needed for pairing.

4

Mark the plate location and route the cable before installing the plate.
Sharpie the plate location, then plan the cable route. Plan for zip-tie anchor points along the route — 6" zip ties and 3/4" cable tie mounts work well inside the cab.

5

Install the plate per Section 02.
Follow the standard adhesive procedure. Once the plate is cured, press the BT476 into place and secure the cable along its planned route.

Real-World Tip: You Will Remove This Sensor to Pair It

Unlike the other sensors, the chassis sensor stays connected to its power cable at all times. Pairing the sensor over Bluetooth means unscrewing the power cable, removing the sensor from the plate, waiting 5 seconds, and snapping it back in. If the cable connector is in a tight spot behind cab trim or under a dash panel, that 30-second task becomes a 20-minute task with knuckles that do not appreciate the experience. Choose a location you can actually reach.

07 GNSS Receiver Mounting

The Spotman GNSS receiver (CT140T) mounts on the cab roof or on the counter balance behind the cab to give the system precise position and elevation anywhere on the jobsite. Good GNSS mounting geometry is not optional — it is the difference between reliable RTK positioning and a receiver that drifts, loses fix, or produces inconsistent heading as the cab rotates.

The 1-Meter Rule

The Spotman must be mounted a minimum of 1 meter (3.28 feet) from the machine's center of rotation. The greater the distance, the better the system can resolve heading as the cab rotates. Mounting closer than 1 meter produces unreliable heading and poor guidance overall.

Critical: Measure from the Center of Rotation

The 1-meter distance is measured from the center of the machine's rotation circle (where the cab rotates around the tracks) to the center of the Spotman receiver. It is not measured from the edge of the cab, the GNSS mount bracket's anchor point, or any other visible reference. Use a tape measure from the rotation center to confirm.

The CT139 GNSS Mount

The CT139 is iDig's standard GNSS mount bracket. On most larger excavators, there is ample room to use the CT139 and achieve the 1-meter offset from the center of rotation without modification. The mount is installed with 3M adhesive (same procedure as any sensor plate — see Section 02): clean the mounting surface, apply the activator, press the bracket onto the treated area, and let it cure.

- Install on a flat, rigid portion of the machine.
- Confirm the Spotman has a clear view of the sky — no cab overhangs, no exhaust stack, no rollover protection structure blocking satellite reception.
- Confirm the 1-meter rule with a tape measure before committing the adhesive. Sharpie the bracket location, dry-fit the Spotman in the bracket, and measure from the center of rotation.

Custom Mounts for Smaller Machines

On smaller machines — compact excavators, short-tail machines, and machines with a particularly tight cab — the CT139 may not provide enough offset to achieve the 1-meter minimum. In that case, a custom GNSS bracket must be fabricated for the machine. Common approaches:

- A short piece of square tubing welded to the rear of the cab, extending the Spotman behind the tail for the required offset.
- A side-mounted arm extending out from the cab roof on the operator's side or opposite side.

Real-World Tip: Ask Your Dealer for Custom Mount Examples

If you are installing on a machine where the CT139 won't reach the 1-meter distance, contact your iDig dealer before you start fabricating. Dealers typically have photos of custom brackets built for the same or similar machines by other operators in your region. Starting from a proven design is faster than engineering one from scratch, and it has already solved the clearance, stiffness, and sky-view problems you will otherwise discover by trial.

Sky-View Requirements

The GNSS receiver should be configured to see satellites above a 10° elevation mask — that is, satellites more than 10° above the horizon. Anything that obstructs the sky directly above or around the Spotman will degrade reception.

- No part of the cab or machine elements (overhang, rollover protection, exhaust, stack, hydraulic lines) should be in the way of the Spotman tracking satellites above the 10 degree threshold.

08 LED Bargraph & Control Box Cradle Positioning

Volume 1 covered the general mechanics of the BT447 cradle and the CT149 LED Bargraph cradle — what connects where, what goes in the top-left USB port, and the step-by-step mounting procedure. This section covers the placement decisions specific to each machine: where on the cab glass the cradles actually go, how to check window operation after mounting, and how to route cables so they don't become a nuisance during the workday.

LED Bargraph (BT445) — Front Window Placement

The LED Bargraph shows cut/fill at a glance, so the operator doesn't have to look at the Control Box touch screen during continuous digging. Placement goals:

- Low on the front window — the LED should sit in the operator's peripheral vision when they are looking at the work tool. High placement means the operator has to look up, away from the bucket, to see cut/fill.
- Slightly right of center — since the operator's right hand works the primary controls, a slight right-side placement keeps the LED in view without blocking the primary sight line to the work tool.
- Off the window-opening path — the front window must still be able to open (tilt in or slide) with the LED cradle in place. Cycle the window through its full motion during dry fitting.

Control Box Cradle (BT447) — Side Window Placement

The Control Box cradle holds the BT142 Control Box and houses the BT/WiFi dongle and power connector. Placement goals:

- Right-side sliding window — most operators prefer the right-side window for Control Box access because the touch screen falls naturally to their right hand.
- Front portion of the window, closer to the operator — positioning the cradle toward the front of the side window keeps it within arm's reach without forcing the operator to twist.
- Off the sliding window's full travel — if the side window is a sliding type, confirm it can still slide to both extremes of its travel with the cradle in place.

> **Critical: Test Both Windows Before Committing**
>
> Both cradles use suction mounts, and both windows (front and side) must still operate normally after mounting. Before engaging the suction lock, hold each cradle at its intended location and cycle the window through its full motion. If the window catches on the cradle, the power cable, or the LED cable at any point in its travel, you have not yet found the right location.

Cable Management

Clean cable routing is not cosmetic — poorly-routed cables catch on the operator's clothing, get crushed by sliding windows, and drape into the operator's field of view. Plan the routes during dry fitting, then secure everything once both cradles are committed.

We recommend tidying cables using 6" zip ties and 3/4" cable tie mounts along the routes. The adhesive-backed cable tie mounts stick to the inside of the cab (same glass-clean-and-3M surface prep as sensor plates) and the zip ties hold the cable bundle in place. This approach keeps cables along existing wiring runs without drilling new holes or fishing through door frames.

- Route the LED cable from the front-window CT149 cradle back to the BT447 cradle along the top of the dash or along the headliner — never across door hinges, the sliding window track, or the operator's seat rails.

- Route the cradle power cable from the BT447 to the cab's 12V/24V accessory outlet along existing wiring looms if available. If you have to tap a new outlet, do it through a proper fused connection — not a T-splice into factory wiring.
- Leave a small service loop at each cradle. If a cable is pulled tight with no slack, it will strain at connectors and eventually fail.

Real-World Tip: Cables Tell You Where the Pinch Points Are

After you think you're done routing cables, cycle every window, every door, and the operator's seat adjustment through its full range of motion. Watch the cables. Anything that moves, pulls, or pinches during that test will become a failure a month or a year later. Solve pinch points before the machine leaves the shop.

09 CAN Bus Wiring for Tiltrotators

If the machine is equipped with a tiltrotator — a coupler that both tilts and rotates the bucket continuously — iDig Connect reads rotation and tilt data from the tiltrotator's cabin module over CAN bus. The cabling is specific to each tiltrotator brand, but the connection at the iDig side uses the CAN port on the BT447 cradle.

Supported Tiltrotators

iDig Connect supports CAN bus integration with Engcon, Steelwrist, and Kinshofer Nox tiltrotators. The software calibration procedure is the same for all three brands (covered in Volume 4); only the physical cable between the tiltrotator cabin module and the iDig cradle differs.

Tiltrotator Brand	Required Cable
Engcon (EC206 and newer)	Purple CAN-2-CAN Cable — Engcon part number 99130238. Connects the Engcon cabin module to the iDig cradle's CAN port.
Steelwrist	CAN-2-CAN cable with Steelwrist-specific connectors. Contact your iDig dealer for the current part number.
Kinshofer Nox	M12 Male-to-Female cable. Also requires a Grade Control License purchased and activated on the NOX Cabin Module before the module will output rotation data via CAN.

CAN Switches Inside the BT447 Cradle

The BT447 cradle contains two internal CAN switches — #1 and #2 — that must be in the ON position for the cradle to pass CAN data between the tiltrotator and the Control Box. These switches are set to ON at the factory, so in a normal installation you do not need to touch them. They exist for troubleshooting: if the Control Box is not receiving CAN data from the tiltrotator after everything else is wired correctly, the switches are the first thing to check.

> **When to Check the CAN Switches**
>
> The CAN switches ship ON. You only need to open the cradle to check them if the tiltrotator cable is confirmed connected, the tiltrotator is powered and producing data, and iDig still shows no CAN data on the Wired Sensors > CAN screen. In that case, one of the switches is likely OFF. Otherwise, leave the cradle closed — every cradle opening is a chance to damage the main PCB or mis-route a cable.

Accessing the CAN Switches (Troubleshooting Only)

If you confirm the switches need to be checked, the procedure is straightforward but requires care: the cradle opens with a T10 Torx screwdriver, and the main PCB inside is exposed during the procedure.

1 **Power the Control Box and the machine OFF.**
Do not attempt to open a powered cradle. Power down the machine completely and wait for the Control Box to shut down.

2	**Remove the Control Box from the cradle.** Slide the BT142 out of the cradle. Set it safely out of the way — not on the floor, where it can be stepped on.
3	**Remove the T10 Torx screws from one side of the cradle.** The BT447 opens from either side. You only need to open one side to reach the CAN switches. Keep the screws in a magnetic dish so they do not roll into the machine.
4	**Locate the CAN switches.** Switches #1 and #2 are clearly labeled on the cradle's internal board. Do not touch the main PCB or any other components.
5	**Confirm both switches are in the ON position.** If either switch is OFF, flip it to ON. Do not change any other switches or connectors — the CAN switches are the only user-serviceable items inside the cradle.
6	**Close the cradle.** Re-install the T10 Torx screws. Do not overtighten — the plastic housing strips easily.
7	**Re-install the Control Box and power on.** Verify CAN data is now reaching the Control Box via Basic Settings > Wired Sensors > CAN (see below).

Verifying CAN Data

Once the tiltrotator cable is connected and the CAN switches are confirmed ON, power up the Control Box and the machine and verify data is flowing. From the Settings menu, navigate to Basic Settings > Wired Sensors > CAN. You should see live data from the tiltrotator: rotation angle, tilt angle, and any other fields the cabin module is publishing. If the screen shows all zeros or no data, the connection is not complete — work back through the cable, the cabin module power, any required license (Kinshofer Nox), and finally the CAN switches.

> **Critical: Kinshofer Nox Requires a Separate License**
>
> Kinshofer Nox tiltrotators will not output rotation data via CAN until a Grade Control License is purchased and installed on the NOX Cabin Module. This is a separate license from any iDig license — it is purchased through Kinshofer and installed by inserting a Mini-to-USB adapter (provided by Kinshofer) into the back of the NOX Cabin Module and running the license installer. Expect to do this step before any CAN cabling work; without the Grade Control License, the CAN output is disabled regardless of cabling.

The tiltrotator software calibration — entering the AC measurement from the rotator's center of rotation to the quick-attachment pin, setting sensor gains, and aligning the rotator's zero position — happens in Volume 4 as part of the full machine calibration.

10 Machine Configurations — Boom Types

iDig Connect supports two boom configurations on excavators: a standard single boom and a second boom (also called a knuckle boom or double-deported-arm). The correct configuration is selected in the Create New Machine wizard during calibration in Volume 4 — but knowing which configuration applies to your machine belongs in the installation phase, because the sensor count and placement are the same either way and you want to select the right option when you get to the wizard.

Standard Single Boom

The standard single-boom configuration describes any excavator whose boom is a single piece of steel from the cab pivot to the stick pivot. The boom sensor sits on this single boom element, and the calibration wizard learns the geometry of that single element.

- One boom sensor (Mini Sensor / BT144) on the boom.
- One stick sensor (Combo or Big Combo) on the stick.
- One bucket sensor (Mini Sensor / BT144) on the bucket coupler or dog-bone.
- One chassis sensor (BT476) on the cab frame.

The vast majority of excavators in North American construction are standard single-boom configurations. If the boom is a single piece and does not fold or articulate independently from the stick, it is a standard boom.

Second Boom (Knuckle Boom / Double-Deported Arm)

The second-boom configuration describes excavators whose boom articulates at a second pivot — a knuckle-boom excavator or a double-deported-arm machine. These machines have an additional hydraulic joint partway along what looks at first glance like a standard boom, allowing the operator to break the boom angle independently from the stick angle.

- Sensor count and placement are the same as the standard configuration — the second boom does not add sensors. The Connect software handles the additional articulation in software based on the selection in the wizard.
- Visual identifier — a standard boom has one upper hinge (between the boom and the cab). A second boom has two upper hinges (cab-to-boom, then boom-to-second-boom before the stick). If you see two visible pivot points above the stick, it is a second-boom machine.

How to Tell at a Glance

Stand to the side of the machine and trace the line from the cab pivot to the stick pivot. If it goes straight (with only minor taper for structural reasons), it is a standard boom. If the line breaks at a visible pivot partway along, it is a second boom. This check takes 10 seconds and saves an incorrect wizard selection in Volume 4.

11 Attachment Types Supported in Connect

iDig Connect provides machine guidance for specific attachment types. Not every attachment on the market is supported, and attempting to run Connect against an unsupported attachment produces unreliable or incorrect guidance. Confirm the attachment type is supported before installing sensors.

Supported Attachments

Attachment Type	Connect Support
Standard Bucket (Classic Bucket)	Fully supported. The default configuration. Bucket sensor on the quick-disconnect or dog-bone (Section 05).
Tilt Bucket	Supported with a tilt sensor kit purchased separately. The tilt sensor is an additional Mini Sensor (BT144) mounted on the tilt bucket to track the tilt angle independently from the main bucket angle.
Tiltrotator (RotoTilt)	Supported on Engcon EPS2 the tiltrotators via CAN bus integration (Section 09). The tiltrotator's own rotation and tilt data are read from its cabin module; iDig does not install additional sensors on the tiltrotator itself.
Rotator Coupler	Supported. Rotation is read from the rotator's control module. Calibration follows the same workflow as tiltrotators minus the tilt axis.

Tilt Sensor Installation (Tilt Bucket Machines)

Machines with a tilt bucket need an additional Mini Sensor (BT144) mounted on the tilt bucket to track the tilt angle. This sensor uses the same XD422 Mini Plate and the same general installation procedure as the other Mini Sensors (Section 02). The tilt sensor is included in the tilt-sensor kit purchased from your dealer at the time of order — if you did not purchase a tilt-sensor kit and the machine has a tilt bucket, contact your dealer before starting installation.

- Mount the tilt sensor plate on the tilt bucket itself — not the coupler. The sensor needs to track the tilt bucket's rotation relative to the stick.
- Ensure clearance through the bucket's full range of motion — the tilt bucket has a shorter range than the main bucket, but the sensor still needs to clear any mechanical stop or hose path.
- Calibration follows the tilt-bucket calibration procedure in Volume 4.

12 Installation Walkthrough — Typical Machines

This section pulls together the individual plate-installation sections into end-to-end walkthroughs for three common machine sizes. Use these as a reference for expected sensor placements and typical gotchas. Every machine is different, so treat these as starting points rather than exact recipes — always follow the specific placement guidance in Sections 03 through 07.

Mid-Size Excavator — CAT 320-Class (or Komatsu PC210 / Volvo EC220)

The CAT 320 and similar 20-ton-class machines are the most common target for iDig Connect installations in North American construction. Mid-size excavators typically accommodate the CT139 GNSS mount without modification, have standard single booms, and have enough stick length for comfortable laser-catch performance with the BT145 Combo Sensor.

- Boom sensor — right side of the boom, lower third, locking mechanism up. The CT149 LED cradle on the front window is visible from the seat at a natural downward angle to the bucket.
- Stick sensor — BT145 Combo Sensor on the XD412 Combo Plate, mounted in the lower third of the stick, centered on the pivot-to-pivot string line, rotated forward 10–15°.
- Bucket sensor — Mini Sensor on the quick-disconnect coupler (not the dog-bone). CAT quick-disconnects typically have a flat accessible surface on either side that takes 3M adhesive well.
- Chassis sensor — BT476 on the cab frame behind the operator's seat, with two layers of 3M tape for vibration dampening. The CT425C power cable routes forward along existing wiring to the cradle.
- GNSS receiver — CT139 bracket on the rear of the cab roof achieves the 1-meter offset from the center of rotation without modification. Confirm with a tape measure before committing the adhesive.

Compact Excavator — CAT 305/308-Class (or Bobcat E35 / Kubota KX057)

Compact and short-tail excavators challenge the 1-meter GNSS rule — the machine's physical envelope is too small for the CT139 to achieve the required offset from the center of rotation. Expect to fabricate or specify a custom GNSS mount. The other sensors install similarly to mid-size machines, but the tighter geometry means dry-fitting is more important.

- Boom and stick sensors — same installation approach as mid-size machines. The shorter boom and stick mean the stick sensor ends up closer to the ground — fine, just confirm clearance during dry fit.
- Bucket sensor — the quick-disconnect on a compact excavator is usually smaller and more exposed. A custom protective bracket is common here, particularly on machines that work in rocky ground.
- Chassis sensor — on some compact excavators, the cab frame access is tight. Plan the BT476 and its power cable together before committing the plate, and confirm you can reach the connector for future pairing.
- GNSS receiver — custom bracket required on almost every compact excavator. Common approach is a rear-mounted arm extending the Spotman behind the tail to achieve the 1-meter offset. Contact your iDig dealer for proven bracket designs on your specific machine.

Large Excavator — CAT 349-Class (or Komatsu PC360 / Volvo EC380)

Large excavators (30+ tons) benefit from the BT147 Big Combo Sensor on the stick because the wider laser-catch window is much easier to use on a longer boom and stick. Installation otherwise follows the same pattern as a mid-size machine, with more room and more tolerance for minor placement variation.

- Stick sensor — BT147 Big Combo Sensor on the XD436 Big Combo Plate. Same installation geometry as the BT145 (lower third of stick, on the pivot string line, 10–15° forward rotation), but the larger sensor body means the plate footprint is larger too.
- Bucket sensor — on very large excavators, the bucket and coupler are more exposed to heavy impact. Plan for a custom protective bracket from day one. Operators in demolition or heavy civil work often build the bracket into the machine's daily inspection routine.
- GNSS receiver — CT139 typically achieves the 1-meter offset easily on large excavators; the challenge is usually sky view rather than offset, because the larger cab may have more overhangs and a larger exhaust stack to work around.

Real-World Tip: Photograph Every Installation

Take photos of every sensor plate location, the GNSS mount, the CT425C cable routing, and the cab cable management before you hand the machine back to the operator. Photos on your phone or in your dealer's CRM create a reference for warranty, future re-installations, and troubleshooting. When an operator calls six months later saying "the bucket sensor stopped working," a photo of where the sensor was installed saves a trip to the machine.

13 What's Next

With Volume 2 complete, every sensor plate is installed on the machine, the Spotman GNSS receiver is mounted on the cab roof with the required 1-meter offset, the Control Box cradle and LED Bargraph cradle are on the cab windows, and any tiltrotator is wired through the CAN bus to the cradle. The machine is ready to be calibrated.

Volume 3: GNSS Receiver Configuration

Volume 3 covers the Spotman receiver's configuration — how RTK GNSS works, connecting to the Spotman's WebUI, setting up Bluetooth NMEA output, configuring NTRIP corrections via SIM card or UHF radio, supported radio protocols for base-station corrections, and finally pairing the GNSS receiver to the iDig Control Box. If your system includes a Spotman (2D+ with Spotman add-on, 2D Project, or 3D), Volume 3 is your next stop before Volume 4.

Volume 4: Machine Calibration

Volume 4 is the calibration volume. It walks through the full calibration sequence in the correct order — cradle configuration, GNSS NMEA pairing, boom and stick wizard calibration, bucket calibration, swing boom (if licensed), chassis sensor calibration using the tilted method, GNSS 3D calibration, laser receiver calibration, and tiltrotator calibration if equipped. Volume 4 ends with backing up the completed machine calibration to USB so it can be restored later or copied to additional Control Boxes.

Need Help?

Contact your iDig dealer for assistance with installation, sensor placement decisions, or custom mount fabrication. For real-time support, use the Remote Access feature described in Volume 1 Section 09 — it lets your dealer see your Control Box screen while you talk through the work together.

iDig Connect Software

User Guide

Volume 3: GNSS Receiver Configuration

Spotman Configuration, Bluetooth NMEA, NTRIP, SIM Card Setup, UHF Radio, and Pairing to iDig

Version 1.0
April 2026
Prepared by iDig North America

This is Volume 3 of 8 in the iDig Connect User Guide series.

01 How RTK GNSS Works — The 60-Second Version

GNSS (Global Navigation Satellite System) receivers determine their position by measuring the time it takes for signals to arrive from multiple satellites orbiting the earth. A standard GNSS fix — the kind your phone produces — is accurate to roughly 3 to 10 feet, depending on conditions. That is fine for navigation, but it is nowhere close to accurate enough for machine guidance.

RTK (Real-Time Kinematic) adds a critical piece: a nearby base station or network correction service that broadcasts correction data to the rover receiver on your machine. The base station sits on a precisely known position and continuously compares its known coordinates to the coordinates the satellites are reporting. The difference — the error — is transmitted to the rover as a correction. The rover applies that correction in real time and achieves positioning accuracy of approximately 0.03 feet (about 10 mm) horizontally and 0.05 feet (about 15 mm) vertically.

When the Spotman receiver shows RTK Fix on its status display, it means the receiver is tracking satellites, receiving corrections from a base station or NTRIP service, and has resolved its position to centimeter-level accuracy. This is the operating state required for 3D machine guidance and for 2D+ mode when using the GNSS as the vertical reference.

No RTK Fix = No Accurate Guidance

If the Spotman shows Float, DGPS, or Autonomous instead of RTK Fix, the position accuracy is degraded and the system should not be used for precision grading. A Float fix means the receiver is receiving corrections but has not fully resolved the carrier-phase ambiguities. Wait for the fix to resolve, or troubleshoot the correction source. See Section 14 for connection troubleshooting.

Two Ways to Get Corrections

The Spotman supports two correction sources. Most operators use one or the other, depending on the jobsite and what infrastructure is available.

Correction Source	How It Works	When to Use
NTRIP (Network RTK)	Corrections are delivered over the internet via a SIM card in the Spotman. The receiver connects to an NTRIP service provider (a network of permanently-installed base stations) and receives corrections as a data stream.	Use when cellular coverage exists at the jobsite. This is the most common setup for construction — no base station to set up, no radio to configure, and corrections are available as soon as you have a cell signal.
UHF Radio	Corrections are broadcast from a local base station (your own or a site base) over a UHF radio link (410–470 MHz). The Spotman's internal radio receives the corrections directly.	Use when there is no cellular coverage at the jobsite, when the project requires a local base station for control, or when the NTRIP service does not provide adequate coverage in your area.

02 Spotman (CT140T) Receiver Overview

The Spotman is a multi-constellation RTK GNSS receiver designed for machine guidance and field survey. It captures signals from GPS, GLONASS, Galileo, BeiDou, and QZSS — up to 1,408 channels — for maximum satellite availability in all conditions.

Specification	Detail
Satellite Constellations	GPS, GLONASS, Galileo, BeiDou, QZSS
Channels	Up to 1,408
Positioning Accuracy (RTK)	Horizontal: ~10 mm; Vertical: ~15 mm
Environmental Rating	IP67 — dustproof and waterproof
Drop Rating	Survives a 2-meter (6.5 ft) pole drop
Battery	Internal Li-ion — up to 34 hours in rover mode
Built-In Radio	UHF 410–470 MHz for receiving base-station corrections
Connectivity	Wi-Fi, Bluetooth
SIM Card Slot	Built-in — accepts a standard SIM for NTRIP corrections over cellular data
Compatible Software	iDig Connect (machine guidance), iPoint (survey and stakeout)

03 Connecting to the Spotman WebUI

The Spotman receiver is configured through a browser-based interface called the WebUI. You connect to the WebUI over Wi-Fi from any device with a web browser — a laptop, tablet, or phone.

Step-by-Step: Connect to the WebUI

1. **Turn on the Spotman receiver.**
   Press and hold the power button until the LED indicators light up.

2. **On your PC, tablet, or phone, open Wi-Fi settings and connect to the Spotman's Wi-Fi network.**
   The Spotman broadcasts its own Wi-Fi network. The default Wi-Fi password is 12345678.

3. **Open a web browser and navigate to http://192.168.1.1**
   This is the Spotman's default WebUI address. The login screen appears.

4. **Enter the login credentials and tap Login.**
   Login Account: admin — Password: password

You are now connected to the Spotman WebUI. The interface provides access to I/O Settings, Network Settings, Module Settings, and other configuration pages used in the following sections.

> **Critical: Configure the Spotman Before Connecting to iDig**
>
> The Spotman must have its Bluetooth NMEA output configured (Section 04) and its correction source configured (NTRIP in Section 05 or Radio in Section 09) before you pair it to the iDig Control Box. Pairing to the Control Box before configuring NMEA output will result in no position data reaching iDig.

04 Configuring Bluetooth NMEA Output

The Spotman sends position data to the iDig Control Box over Bluetooth using NMEA sentences. Two specific NMEA sentences must be enabled at the correct output rates for iDig Connect to operate properly.

Setting	Required Value
PIN	No PIN required — leave blank
GPGGA	10 Hz
GPGST	1 Hz

Step-by-Step: Configure Bluetooth NMEA Output

1. **In the Spotman WebUI, select I/O Settings.**
The I/O Settings page lists all communication interfaces.

2. **On the BT row, select Settings.**
The Bluetooth output configuration page opens.

3. **Set GPGGA to 10 Hz.**
This is the primary position sentence. It must output at 10 Hz for iDig Connect to receive position updates at the rate the system requires.

4. **Set GPGST to 1 Hz.**
This sentence provides the position accuracy estimate (HRMS/VRMS). iDig uses it to display fix quality.

5. **Confirm there is no PIN configured.**
The Bluetooth connection between the Spotman and the Control Box must be made without a PIN. If a PIN is set, the Control Box will not be able to pair.

6. **Select Confirm to save the settings.**
The Bluetooth NMEA output is now configured.

05 SIM Card Setup — T-Mobile

T-Mobile is one of the most commonly used carriers for iDig receivers. There are two APN configurations depending on how your SIM was provisioned — check your SIM card documentation to determine which to use.

Step-by-Step: Configure T-Mobile APN

1. **In the Spotman WebUI, navigate to Network Settings > Mobile Network Settings.**
   The mobile network configuration page opens.

2. **Set Auto Start to Yes.**
   This ensures the cellular connection starts automatically when the Spotman powers on.

3. **Set Network Mode to 2G/3G/4G Auto.**
   The receiver selects the best available network automatically.

4. **Set Auto Connect to Yes.**
   The receiver reconnects automatically if the connection drops.

5. **Enter the APN and authentication settings.**
   See the table below for the correct values for your SIM.

6. **Select Save.**
   The SIM card settings are now configured.

Setting	Standard T-Mobile SIM	iDig-Provisioned T-Mobile SIM
APN	fast.t-mobile.com	simbase
Dialing String	*99#	*99#
Username		
Password		

Which APN Do I Use?

If you purchased the SIM card yourself from T-Mobile, use fast.t-mobile.com with no username or password. If your iDig dealer provided the SIM card, it is likely an iDig-provisioned SIM that uses simbase with admin/password. Check the documentation that came with your SIM, or contact your dealer.

06 SIM Card Setup — Verizon

Verizon SIM cards use a single APN for both standard phone SIMs and data-only SIMs.

Step-by-Step: Configure Verizon APN

Follow the same procedure as T-Mobile (Section 05, Steps 1–4 and 6), then enter the following APN settings.

Setting	Value
APN	vzwinternet
Dialing String	*99#
Username	(blank)
Password	(blank)

07 SIM Card Setup — AT&T & Other Carriers

The setup procedure is the same for every carrier: navigate to Network Settings > Mobile Network Settings, set Auto Start to Yes, Network Mode to 2G/3G/4G Auto, Auto Connect to Yes, then enter the carrier-specific APN and credentials from the table below. The Dialing String is *99# for all carriers listed.

Carrier	APN	Username	Password	Notes
AT&T (Phone SIM)	nxtgenphone	(blank)	(blank)	For standard phone SIMs. Case-sensitive.
AT&T (Data/IoT SIM)	broadband	(blank)	(blank)	For AT&T data-only and IoT plans. Try this if nxtgenphone does not connect.
FirstNet (AT&T)	firstnet-broadband	(blank)	(blank)	First-responder priority network. Requires a FirstNet-activated SIM.
Google Fi	h2g2	(blank)	(blank)	Rides on the T-Mobile network.
Mint Mobile	Wholesale	(blank)	(blank)	T-Mobile MVNO. Capital W required.
Visible	vsblinternet	(blank)	(blank)	Verizon MVNO.
US Cellular	usccinternet	(blank)	(blank)	Regional carrier.

If Your Carrier Is Not Listed

Contact your carrier and ask for the APN settings for an IoT or M2M data device. You need the APN name, username (if any), and password (if any). The Dialing String is *99# for virtually all carriers in North America. Enter the values in the same Mobile Network Settings page as any other carrier.

08 Configuring NTRIP Corrections

NTRIP (Networked Transport of RTCM via Internet Protocol) delivers RTK corrections to the Spotman over a cellular data connection. The Spotman connects to an NTRIP correction service provider using credentials supplied by the provider. Your NTRIP provider will give you the five values listed below — enter them exactly as provided.

Before You Start

You need an active SIM card installed in the Spotman, a data plan that supports the SIM (see Sections 05–07 for carrier-specific APN setup), and the NTRIP credentials from your correction-service provider.

Step-by-Step: Configure NTRIP Corrections

1. **In the Spotman WebUI, select I/O Settings.**
   The I/O Settings page lists all communication interfaces.

2. **On the RTK Client row, select Details or Connect.**
   The NTRIP connection configuration page opens.

3. **Enter the NTRIP credentials provided by your correction service.**
   Domain/IP, Port, Mount Point, Username, and Password. Enter each value exactly as provided — these fields are case-sensitive.

4. **Select Connect.**
   The Spotman attempts to connect to the NTRIP service using the SIM card's cellular data connection.

5. **Verify the RTK Client row turns green and shows Logged In.**
   A green indicator and the text "Logged In" confirm the Spotman is receiving corrections. If the row stays red or shows an error, verify your credentials and SIM card data connection (Sections 05–07).

09 Configuring UHF Radio Corrections

When corrections are delivered from a local base station over UHF radio, the Spotman's internal radio must be configured to match the base station's radio settings exactly. Every parameter — protocol, channel bandwidth, frequency, and baud rate — must match. A mismatch on any single parameter will result in no corrections received.

Step-by-Step: Configure the UHF Radio

1. **In the Spotman WebUI, navigate to Module Settings > Radio Settings.**
   The radio configuration page opens.

2. **Turn the Radio On.**
   Set the Radio toggle to On.

3. **Set Auto Start to Yes.**
   The radio starts automatically when the Spotman powers on.

4. **Match the Protocol to your base station.**
   The protocol must match exactly. See Section 10 for the supported protocols and the name mapping between base-station and Spotman terminology.

5. **Match the Channel Bandwidth to your base station.**
   25 kHz or 12.5 kHz — this must match.

6. **Match the Frequency to your base station.**
   Select the radio channel that corresponds to the frequency your base station is transmitting on. If the frequency is not in the default channel list, see Section 11 for creating a custom frequency file.

7. **Select Save.**
   The radio settings are now configured. The Spotman will begin listening for corrections on the configured frequency.

Every Radio Parameter Must Match the Base Station

Protocol, channel bandwidth, frequency, and baud rate must all match the base station exactly. The most common cause of "radio shows no signal" is a single mismatched parameter — typically the protocol name, because different manufacturers use different names for the same protocol. See Section 10 for the protocol name mapping.

10 Supported Radio Protocols

The Spotman supports the following radio protocols. Each protocol is available in both 25 kHz and 12.5 kHz channel spacing. FEC is disabled on all protocols.

Protocol	Channel Spacing	Modulation	Link Rate
TrimTalk / TT450S	25 kHz	GMSK	9600
TrimTalk / TT450S	12.5 kHz	GMSK	4800
Satel 3AS	25 kHz	4FSK	19200
Satel 3AS	12.5 kHz	4FSK	9600
Transparent	25 kHz	GMSK	9600
Transparent	12.5 kHz	GMSK	4800

Protocol Name Mapping

Base-station manufacturers sometimes use different names for the same radio protocol. When configuring the Spotman to receive corrections from a third-party base station, use the mapping below to select the correct protocol name in the Spotman WebUI.

Base Station Protocol Name	Spotman Protocol Name
TrimTalk Base	TT450S
Satel Base	Satel 3AS

11 Creating & Loading a Custom Radio Frequency File

The Spotman ships with a default radio frequency channel list. If your base station transmits on a frequency not included in the defaults, you must create a custom frequency file and upload it to the receiver.

Default Channel List

Channel	Frequency (kHz)
1	456.05
2	456.55
3	457.05
4	458.05
5	459.05
6	460.05
7	461.05
8	462.05
9	462.55

File Format

The custom frequency file is a plain text file named radio_channel.cfg. Each line defines one channel using three fields separated by a comma: the frequency band prefix, the frequency in kHz, and an availability flag.

Field	Values	Meaning
Band Prefix	L / M / H	L = Low (below 430 kHz), M = Middle (430–450 kHz), H = High (above 450 kHz)
Frequency	e.g. 456.05	The frequency in kHz assigned to that channel number
Availability	U / A	U = Unusable, A = Available

Step-by-Step: Upload the Frequency File

1 **Create the radio_channel.cfg file on your PC.**
Use any text editor (Notepad, TextEdit, or similar). Enter one channel per line in the format described above. Save the file as radio_channel.cfg.

2 **Open a browser and navigate to http://192.168.1.1/set_en.html**
This is a separate page from the main WebUI. It provides the file upload interface.

3 **Select Choose File and browse to your radio_channel.cfg file.**
Select the file you created.

4 **Select Upload Radio Channel List.**
The new channels and frequencies are now available for selection in Module Settings > Radio Settings.

12 Configuring Spotman via iPoint

If you have the iPoint survey application installed on an Android tablet (included with 2D Project and 3D systems), you can configure several Spotman settings directly from iPoint instead of using the WebUI. This is convenient when you are already connected to the Spotman through iPoint for survey work.

NMEA Output via iPoint

Navigate to Instrument > NMEA Output > Bluetooth. From this screen you can set the GPGGA and GPGST output rates to match the values required by iDig Connect (10 Hz and 1 Hz respectively).

Radio Settings via iPoint

Navigate to Instrument > GNSS Rover > New > Radio. From this screen you can configure the radio protocol, channel bandwidth, frequency, and baud rate to match your base station — the same parameters covered in Sections 09 and 10.

NTRIP Settings via iPoint

Navigate to Instrument > GNSS Rover > New > NTRIP via SIM. From this screen you can enter your NTRIP server credentials (Domain/IP, Port, Mount Point, Username, Password) — the same parameters covered in Section 05.

13 Pairing GNSS to the iDig Control Box

With the Spotman's Bluetooth NMEA output configured and corrections flowing (either via NTRIP or radio), the receiver is ready to be paired to the iDig Control Box.

Step-by-Step: Pair the Spotman to iDig Connect

1. **On the iDig Control Box, navigate to Basic Settings > GNSS Receiver.**
   The GNSS Receiver pairing screen opens.

2. **Tap the Other tab.**
   The system scans for available GNSS receivers over Bluetooth.

3. **When your Spotman appears, tap it and select Connect as Main**
   The receiver is now connected to the Control Box and saved as a known device.

4. **On the Known GNSS tab, highlight your Spotman.**
   The receiver row is highlighted blue.

5. **Tap it again to choose to Disconnect or Forget this GNSS Receiver.**
   The Control Box establishes a Bluetooth connection to the Spotman.

6. **Verify the connection by tapping the GNSS Data tab.**
   The Data tab should show RTK_Fix as the correction status, confirming the receiver is connected, receiving corrections, and delivering position data to the Control Box.

If the Data Tab Does Not Show RTK_Fix

Verify the Spotman is receiving corrections (NTRIP row green in WebUI, or radio receiving signal). Verify GPGGA is set to 10 Hz and GPGST is set to 1 Hz. Verify the BT/WiFi dongle is in the top-left USB port of the cradle. If all three are correct and the Data tab still does not show RTK_Fix, power-cycle the Spotman and retry the pairing.

14 Resolving Heading Accuracy

After connecting the Spotman to the Control Box - and returning to the 2D or 3D Work Screen interface - iDig needs to determine the machine's heading. The Spotman is a single-antenna receiver, so heading is resolved by observing the change in position as the cab rotates.

Step-by-Step: Resolve Heading

1. **Confirm the correct Machine and Bucket are selected in iDig Connect.**
   If the wrong machine profile is loaded, the heading computation will use incorrect geometry. Verify the machine name at the top of the screen.

2. **Tap Apply.**
   The system begins using the GNSS data with the selected machine profile.

3. **Slowly rotate the cab.**
   The heading accuracy indicator on the work screen will improve as you rotate. Continue rotating until the heading accuracy meets the threshold and the indicator turns green.

4. **Begin normal operations.**
   Once heading accuracy is resolved, the system is ready for 3D guidance.

Heading Resolves Faster with Deliberate Rotation

A slow, smooth rotation through at least 180° is the fastest way to resolve heading. Sitting stationary or making small cab movements will not provide enough position change for the system to compute heading. The first cab rotation after connecting the GNSS on each power-up is when this matters — once heading is resolved, it stays resolved for the remainder of the session.

15 Using Spotman as a Base Station

The Spotman can operate as a base station, broadcasting corrections to other rovers on the jobsite over its internal UHF radio. This section will be expanded with the full base-station setup procedure in a future revision of this guide.

[REVIEW: Base station setup procedure flagged for SME content. The Spotman supports base-station mode with correction broadcasting over UHF radio, but the detailed step-by-step procedure requires SME input before publication.]

16 Troubleshooting GNSS Connection Issues

The most common GNSS issues fall into four categories: no RTK Fix, Bluetooth pairing failure, SIM/NTRIP not connecting, and radio not receiving corrections. The table below provides a starting point for each. For a comprehensive troubleshooting matrix, see Appendix A, Section 03.

Symptom	Likely Cause	Action
Data tab shows Float instead of Fix	Weak satellite geometry, multipath from nearby structures, or corrections are intermittent	Move to open sky. Verify base station or NTRIP is transmitting continuously. Wait for additional satellites.
Data tab shows Autonomous (no corrections)	Not receiving corrections — NTRIP not logged in, radio not connected, or base station is off	Check NTRIP: RTK Client row should be green in the WebUI. Check radio: confirm protocol, frequency, and bandwidth match the base. Confirm base station is powered and transmitting.
Bluetooth will not pair to the Control Box	NMEA output not configured, BT/WiFi dongle missing or in wrong port, or PIN is set on the Spotman	Verify GPGGA = 10 Hz, GPGST = 1 Hz, no PIN. Verify the BT/WiFi dongle is in the top-left USB port of the cradle.
SIM card shows Disconnected in WebUI	Wrong APN, SIM not activated, no cellular coverage, or antenna issue	Verify APN against the carrier reference in Sections 05–07. Confirm with the carrier that the SIM is provisioned for data. Test the SIM in a phone to confirm it is active.
Radio shows no signal despite base transmitting	Protocol, frequency, or bandwidth mismatch between the Spotman and the base station	Match every radio parameter exactly. Use the protocol name mapping in Section 10 — TrimTalk Base = TT450S, Satel Base = Satel 3AS.
Heading accuracy will not resolve	Cab has not been rotated since power-on	Slowly rotate the cab through at least 180°. Confirm GNSS is in RTK Fix before attempting to resolve heading.

17 What's Next

With Volume 3 complete, the Spotman GNSS receiver is configured, receiving corrections (via NTRIP or UHF radio), paired to the iDig Control Box, and showing RTK Fix on the Data tab. The system is ready for the full machine calibration in Volume 4.

Volume 4: Machine Calibration

Volume 4 covers the complete calibration sequence: cradle configuration, GNSS NMEA pairing, boom and stick wizard calibration, bucket calibration, swing boom (if licensed), chassis sensor calibration using the tilted method, GNSS 3D calibration, laser receiver calibration, and tiltrotator calibration if equipped. Volume 4 ends with backing up the completed machine calibration.

Need Help?

Contact your iDig dealer for assistance with Spotman configuration, NTRIP credentials, radio setup, or SIM card issues. For real-time support, use the Remote Access feature described in Volume 1 Section 09.

iDig Connect Software

User Guide

Volume 4: Machine Calibration

Sensor Pairing, Boom & Stick Wizard, Bucket, Swing Boom, Chassis, GNSS 3D, Laser Receiver, Tiltrotator & Backup

Version 1.0
April 2026
Prepared by iDig North America

This is Volume 4 of 8 in the iDig Connect User Guide series.

01 Calibration Overview & Sequence

Calibration teaches the iDig Connect system the geometry of the specific machine it is installed on — the lengths of the boom and stick, the position of the bucket relative to the stick, how the chassis is oriented, and where the GNSS receiver sits relative to the center of rotation. Without calibration, the system cannot convert raw sensor angles into accurate bucket-tip position.

Calibration must be performed in a specific order. Each step builds on the results of the previous step, and errors in early steps compound through every subsequent step. A boom and stick calibration that is off by half an inch will produce a GNSS 3D calibration that is off by several inches at full reach.

The Full 3D Calibration Sequence

The following is the complete calibration sequence for a 3D-equipped system. Not every system requires every step — a 2D+ system without a Spotman GNSS receiver will skip Steps 2, 3, and 11. A machine without a swing boom will skip Step 8. The sequence below represents the full procedure.

Step	Procedure	Covered In
1	Cradle Configuration — power cable, BT/WiFi dongle, LED Bargraph connected	Volume 1 §04
2	Configure GNSS Receiver NMEA Outputs	Volume 3 §04
3	Pair GNSS Receiver to the Control Box	Volume 3 §13
4	Pair Boom and Stick Sensors to the Control Box	This volume, §05
5	Complete Boom and Stick Wizard Calibration	This volume, §05
6	Pair Bucket Sensor to the Control Box	This volume, §05
7	Complete Bucket Sensor Calibration	This volume, §08
8	Complete Swing Boom Calibration (if equipped)	This volume, §11
9	Pair Chassis Sensor to the Control Box	This volume, §05
10	Complete Chassis Sensor Calibration	This volume, §11
11	Complete GNSS 3D Calibration	This volume, §13
12	Complete Laser Receiver Calibration	This volume, §15–16
13	Backup the Machine Calibration	This volume, §26

Optional calibrations (performed after the main sequence if the machine is equipped):

- Tilt Sensor Calibration — for machines with a tilt bucket (§17)
- Tiltrotator Calibration — for machines with a rotator or tiltrotator (§18–22)

Critical: Follow the Sequence in Order

Each calibration step depends on the accuracy of the steps before it. Do not skip ahead. Do not calibrate the GNSS before the boom and stick are calibrated. Do not calibrate the chassis before the swing boom (if equipped). The sequence exists because errors compound — a small error in boom calibration becomes a large error in GNSS calibration.

02 Site Requirements for Calibration

Calibration requires specific site conditions. If these are not met, the calibration will either fail or produce results that degrade field accuracy.

- Firm, level ground — a hard paved surface is strongly recommended. If calibrating on dirt or gravel, bring four flat cement pavers to mark bucket-tooth reference points during the GNSS 3D calibration.
- The machine must be level side-to-side. A slight forward or backward tilt is acceptable.
- Full 360° cab rotation clearance without obstruction.
- Full boom, stick, and bucket extension clearance — no overhead wires, fences, or structures.
- For the chassis sensor calibration (tilted method): the machine must be tilted at least 4°. Use the blade extended fully down, or position the machine on firm native ground that provides the tilt.
- For the GNSS 3D calibration: the Spotman must be in RTK Fix mode via a local base station. Do not perform the GNSS calibration using a Network RTK (NTRIP) solution.

Critical: GNSS Calibration Requires a Local Base Station

The GNSS 3D calibration must be performed with the Spotman connected to a local base station — not an NTRIP network correction service. A local base provides the consistent, low-latency corrections required for the centimeter-level accuracy this calibration demands. If you do not have a local base station, contact your iDig dealer before attempting the GNSS calibration.

03 Creating a New Machine Profile

Before any sensor pairing or calibration can begin, you must create a machine profile that tells iDig Connect what type of machine it is working with, what boom configuration it has, what bucket and coupler type are installed, and which optional features (chassis sensor, GNSS, swing boom) are enabled.

Step-by-Step: Create a New Machine

1	**From the Settings menu, tap System Settings.** The System Settings screen opens.
2	**Tap Select or Edit Machines.** The Select machine/tool screen opens, showing any previously created machine profiles in the list.
3	**Tap New Machine.** The machine type selection screen opens.
4	**Select the machine type: Excavator, Dozer, or Attachment.** For standard excavator installations, select Excavator. This guide covers the excavator calibration workflow. Dozer and Attachment configurations follow a separate procedure.
5	**Select the boom type that matches your machine.** Choose Single Boom for a standard excavator. Choose 2nd Boom (Knuckle Boom) if the machine has a second articulation point on the boom. See Volume 2 Section 10 for how to identify which configuration your machine has.
6	**Select the bucket type.** Choose the type of bucket installed on the machine: standard bucket, tilt bucket, or tiltrotator. If selecting Tilt Bucket, you must have purchased and installed a tilt sensor kit. If selecting Tiltrotator, the CAN connection must be in place (see Volume 2 Section 09).
7	**Select the coupler type.** Choose the appropriate coupler for your machine — quick-disconnect, direct pin, or the specific coupler model. This selection determines how the bucket calibration is performed.
8	**Select the options that apply to your machine.** Enable Chassis if you have a BT476 chassis sensor installed. Enable GNSS if you have a Spotman receiver. Enable Swing if the machine has a swing boom and you have the CT145 or BT248 license. Press Apply when all options are selected.

9

The system creates the machine profile and opens the calibration wizard.
The boom and stick calibration screen appears. Any sensors that are not yet paired will show as Missing — this is expected. You are now ready to begin pairing sensors (Section 04) and then calibrating (Section 05 onward).

Critical: Select the Correct Configuration

The machine profile drives the entire calibration sequence. Selecting the wrong boom type, bucket type, or coupler type will produce a calibration that does not match the machine's actual geometry, and the resulting guidance will be inaccurate. If you are unsure about any selection, consult your iDig dealer before proceeding.

04 Pairing Wireless Sensors

Each wireless sensor (boom, stick, bucket, chassis) must be paired to the Control Box over Bluetooth before it can be calibrated. Pairing is done from the calibration screen — when the system shows a sensor as "Missing," it is prompting you to pair.

Step-by-Step: Pair a Sensor

1. **On the calibration screen, press and hold the Missing button for the sensor you want to pair.**
   The Pairing Screen appears.

2. **Remove the sensor from its mounting plate.**
   Lift the sensor off the plate completely.

3. **Wait 5 seconds.**
   The sensor resets its Bluetooth connection during this pause.

4. **Place the sensor back on the plate.**
   The sensor re-establishes its Bluetooth connection. The Pairing Screen will show a successful pairing.

5. **Review the Sensor Details.**
   After pairing, iDig displays the Sensor Details menu where you can verify the sensor's battery level, turn the sensor's LED on for identification, and view its attributes. Press Exit when satisfied.

6. **Repeat for each sensor that shows Missing.**
   Pair the boom, stick, bucket, and chassis sensors in sequence as the calibration procedure requires them.

If a Sensor Does Not Pair

Verify the BT/WiFi dongle is in the top-left USB port of the cradle. Confirm the sensor has battery charge (leave it in direct sunlight for several hours if it has been stored indoors). Try removing and replacing the sensor a second time, waiting a full 5 seconds between removal and replacement.

05 Boom & Stick Wizard Calibration

The boom and stick wizard is the core geometric calibration. It teaches the system the lengths and arc geometry of the boom and stick by measuring sensor angles at known positions, then verifying those measurements against a physical laser reference. This is the most involved step in the calibration sequence and typically takes 30 to 45 minutes.

> **Critical: Do Not Rotate the Cab or Track the Machine**
>
> Throughout the entire boom and stick wizard, only the boom, stick, and bucket may move. Do not rotate the cab, track the machine, or allow any ground movement. If the cab rotates or the machine moves at any point, the calibration must be restarted from the beginning.

Prerequisites

- Boom and stick sensors paired (Section 03).
- Calibration toolkit ready: XB525 laser pointer, XD477 tribrach, XD478 laser adapter, XD470 magnetic laser target, XD471 extension rods, and a tripod.
- Machine RPMs set to maximum to minimize sensor vibration.

Phase 1: Stick Range and Arc Measurement

1 **Turn the machine RPMs to maximum.**
Higher RPMs generally produce less vibration on the boom and stick elements, which improves sensor readings during calibration.

2 **Press Next. The software measures ambient vibration.**
Do not move the machine while the vibration measurement is being taken.

3 **Gently and smoothly open the stick as far as it will go. Press Open.**
Do not bang the end of the hydraulic cylinder. Operate the stick smoothly. Do not move any other element, track the machine, or rotate the cab.

4 **Gently and smoothly close the stick as far as it will go. Press Closed.**
Same caution — smooth operation, no other movement.

5 **Press Click, then Move. Gently move the stick in and out until the progress bar completes.**
Do not go all the way open or all the way closed during this step. The software is measuring the arc created by the sensor as the stick moves through its range.

Phase 2: Boom Range and Arc Measurement

1	**Press Next. The software measures ambient vibration on the boom sensor.** Do not move the machine.
2	**Gently raise the boom as far as it will go. Press Opened.** Smooth operation. Do not bang the cylinder.
3	**Gently lower the boom as far as the ground allows. Press Closed.** The software takes a measurement at each position.
4	**Press Click, then Move. Gently raise and lower the boom until the progress bar completes.** Do not go to the full extremes during this step. The software is measuring the boom arc.

Phase 3: Laser Pointer Measurements (6 Shots — Low Position)

This phase uses the calibration toolkit to verify the boom and stick geometry against a physical laser reference. The laser pointer on the tripod shines a beam at a magnetic target attached to the bucket pin (or quick-link pin).

1	**Attach the XD470 magnetic laser target to the center of the bucket pin (or quick-link pin).** Curl the bucket in and out to identify which pin the bucket rotates around. Place the target on the center of that pin.
2	**Set up the tripod under the boom, as close to the cab as possible.** The tripod must be high enough for the laser beam to hit the target without the bucket hitting the ground. Level the tripod.
3	**Screw the XD477 tribrach onto the tripod, then the XD478 laser adapter, then the XB525 laser pointer.** Turn the laser on. Wait for the self-leveling routine to complete — the green light must be solid (not blinking) before proceeding.
4	**Inside the cab, bring the stick in close to the cab and lower the boom until the laser beam hits the center of the target. Press Next.** You may need to rotate the laser on the tripod to catch the target. Do not move any part of the machine while the software takes the measurement.

5

Repeat for 5 more shots (6 total), extending the boom and stick incrementally.
Space the 6 shots at approximately equal distances from fully closed to fully extended. The final shot (6 of 6) should be with the boom and stick fully extended. Rotate the laser on the tripod as needed to catch the target at each position.

Phase 4: Laser Pointer Measurements (6 Shots — High Position)

1

Without moving the tripod, screw the two XD471 extension rods together and attach them between the tribrach and the laser pointer.
This raises the laser to a higher position. Do not move the tripod — if it moves, the calibration must be restarted.

2

Repeat the same 6-shot procedure at the higher laser position.
Bring the stick in close, lower the boom to catch the laser, take measurement 1. Then extend incrementally for shots 2 through 6, with shot 6 at full extension.

After completing all 12 shots (6 low + 6 high), the boom and stick calibration is complete. Press Done to review the calibration results. See Section 06 for how to interpret the results.

Rename the Machine Profile After Calibration

After reviewing the calibration results, press Rename and enter a name that identifies the machine — the make, model, and unit number. This profile will be loaded every time the Control Box is used on this machine.

06 Boom & Stick Calibration — 2nd Boom

Machines with a second boom (knuckle boom / double-deported arm) follow the same general wizard procedure as a standard boom, with two important differences.

- 10/20 laser shots are required instead of 6/12. The additional shots are needed because the second boom adds a degree of freedom that must be resolved.
- Significant angle changes between the main boom and the 2nd boom are required after each shot. Small angle changes (10–20°) between elements are not sufficient to produce accurate results.

The goal is to produce significant angular variation across all elements — main boom, 2nd boom, and stick — throughout the 10/20 shots. If the calibration produces nonsensical element lengths, the most likely cause is insufficient angle variation between shots.

Large Machines (2nd Boom Length 3.65–5.49 m)

On very large machines, the included extension rods may not provide enough vertical laser height difference between the two sets of measurements. In this case, use the magnetic laser mount (included in the calibration toolkit) instead of the extension rods on the tripod. The greater the vertical difference between the low and high laser positions, the more accurate the results.

[REVIEW: The detailed shot-by-shot procedure for 2nd boom machines — including recommended element positions for each of the 10/20 shots — requires SME input specific to machine size categories. The source material (iDig Connect Tutorial - Installation and 2D Calibration) provides guidance in Spanish; the English procedure should be confirmed before publication.]

07 Calibration Results & Quality Review

After completing any calibration step, iDig displays the results for review. Press the Calibration Quality icon to see the calculated values and quality indicators for each attribute.

What to Look For

- Calculated element lengths should be within ±10 mm of the known physical measurements. Larger deviations indicate a problem with the calibration.
- Each attribute shows a description and likely sources of error when tapped. Review any attribute that shows a warning.
- If a result is unacceptable, do not proceed to the next calibration step. Repeat the calibration that produced the poor result.

Laser Height Delta

On machines where the extension rods were not used (or a custom laser mount was used), the physical height difference between the low and high laser positions must be entered manually. The system uses this delta to resolve the boom and stick geometry. If you used the standard extension rods, this value is calculated automatically.

08 Bucket Calibration — Quick Disconnect (Manual Method)

The bucket calibration teaches the system the geometry of the bucket — how the sensor is oriented on the quick-link, and the physical dimensions of the bucket. This calibration is performed after the boom and stick calibration.

Step-by-Step: Bucket Calibration (Quick-Link Sensor)

Step	Instruction
1	**In System Settings, select the machine and choose the bucket to calibrate. Select On the QuickLink.** This tells the system the bucket sensor is mounted on the quick-disconnect coupler.
2	**Press Manual Calibration. Turn RPMs to maximum, then press Next.** The software takes a vibration measurement. Do not move the machine.
3	**Gently open the bucket fully. Press Open.** Smooth operation. Do not bang the cylinder. Do not rotate the cab or track the machine.
4	**Gently close the bucket fully. Press Closed.** The software records the range of motion.
5	**Press Click, then Move. Smoothly open and close the bucket until the progress bar completes.** Do not go to the full extremes during this step.
6	**Choose the sensor orientation method — Horizontal or Vertical.** Horizontal: use the laser pointer on the tripod, place the beam on the center of the quick-link pin, then curl the bucket until the beam is on the center of the bucket tip. Vertical: use a plumb bob to plumb the center of the quick-link pin with the edge of the bucket. Select the method you used, then press Next.
7	**Place the bucket flat on the ground in a floating position. Press Next.** The bottom of the bucket must be flat on the ground surface.
8	**Measure and enter the distance from the quick-link pin to the cutting edge of the bucket.** Measure accurately and enter the value. Press the green check.
9	**Measure and enter the width of the bucket at the cutting edge.** Press the green check. The bucket calibration is complete. Press Done.

Press the Calibration Quality icon to review the results. When satisfied, press Rename and label the bucket by its width and purpose (e.g., "36in Grading" or "24in Trenching").

09 Bucket Calibration — Dogbone (Automatic Method)

When the bucket sensor is mounted on the dogbone linkage instead of the quick-disconnect, the automatic calibration method is required. The calibration routine is more elaborate because the sensor's relationship to the bucket cutting edge is more complex in a dogbone mount.

[REVIEW: The detailed automatic (dogbone) bucket calibration procedure requires SME expansion. The source tutorial references the procedure but does not provide the full step-by-step. This section should be completed with dealer input before publication.]

10 Swing Boom Calibration

The swing boom calibration teaches the system how the boom swings relative to the cab. This calibration must be completed before the chassis sensor calibration. The Swing Boom feature requires either a BT248 license or the CT145 license (Connect v5).

Critical: Complete Swing Boom Before Chassis Calibration

The chassis calibration routine uses data from the swing boom calibration to establish the relationship between the boom sensor and the chassis sensor. If you skip the swing boom calibration and proceed to chassis, the chassis calibration will not account for the swing and accuracy will be compromised.

Step-by-Step: Swing Boom Calibration

1. **Enter the AB Forward Shift value.**
   Press the Legend button to visualize this measurement. The AB Forward Shift is the horizontal distance between the center of the boom pin and the center of the swing rotation. Plumb down from the boom pin and measure the horizontal distance from the plumb line to the center of the swing rotation. Enter the value and press Start.

2. **Place the blade on the ground to stabilize the machine.**
   The machine must not rock during the calibration.

3. **Rotate the cab so it is perfectly square to the tracks with the boom pointing forward.**
   Use the front blade as a reference, or a square portion of the cab. The cab must be precisely squared.

4. **Bring all elements in close to the cab. Do not move the bucket, stick, or boom controls during the rest of the calibration.**
   Also do not track the machine or rotate the cab from this point forward.

5. **Align the swing boom perfectly perpendicular to the cab. Mark this position on the swing boom and the swing table.**
   This mark is a reference for zeroing the swing boom when the feature is disabled. Press Next.

6. **Swing the boom all the way to the left. Press Next.**
   Be careful not to bang the boom at the end of travel — the force of swinging can cause the cab to rotate if you hit the stop too hard. Do not move any other elements.

7 **Swing the boom all the way to the right. Press Next.**
Same caution. Wait for the software to complete its measurement at each position.

8 **Press Done to view the calibration results.**
The results show the Forward Shift value you entered, the maximum angle left of center, and the maximum angle right of center.

11 Chassis Sensor Calibration — Tilted Method

The chassis calibration teaches the cab-mounted BT476 sensor how it is oriented relative to level. Once complete, the sensor continuously measures pitch, roll, and yaw of the machine body, enabling accurate guidance on uneven terrain and during cab rotation.

Critical: Machine Must Be Tilted at Least 4°

The tilted calibration method requires the machine to be tilted a minimum of 4° and remain completely stable throughout the procedure. The machine must not move or rock. Use the blade extended fully down or position the machine on firm native ground that meets the 4° requirement. Avoid relying on hydraulic blade lift alone, as hydraulics can settle over time and cause movement.

Measurements Required

Before starting, measure the AB Forward Shift and BC Right Shift of the boom elements relative to the center of rotation. You can select your make and model from the loaded machine library, but it is recommended to measure and enter the values manually to ensure accuracy.

Measurement	Definition
AB Forward Shift	Horizontal distance from the center of rotation to the center of the boom pin.
BC Right Shift	Horizontal distance from the center of rotation to the center of the boom, measured perpendicular to AB.

Step-by-Step: Chassis Calibration (Tilted Method)

1. **Enter the AB Forward Shift and BC Right Shift measurements. Press Start.**
   Ensure the machine can rotate 360° without obstruction.

2. **Orient the machine: boom raised, stick all the way in, bucket curled in.**
   The center of gravity must be as close to the center of the machine and over the tracks as possible.

3. **Rotate the cab so it is perfectly square to the tracks with the boom pointing forward.**
   Sight through the front glass to the blade, or use a tape measure to confirm the cab is square.

4. **Choose Tilted. Press Next.**
   Confirm the machine is tilted at least 4° and is completely stable.

5 **Turn RPMs to maximum. Press Next.**
The software measures pitch, roll, yaw, and vibration on the chassis sensor. Do not move the machine.

6 **If swing boom is enabled: gently swing the boom all the way to the left. Press Next.**
Do not move any other elements. Wait for the measurement to complete. (If swing boom is not enabled, this step is skipped automatically.)

7 **Dynamic rotation — clockwise: press Next, then smoothly rotate the cab clockwise at full speed for 2 complete rotations.**
Continue rotating at full speed until the progress bar completes. Do not attempt to stop exactly where you started — rotate through the starting point.

8 **Return the cab to perfectly square, boom forward.**
Then press Next for the counterclockwise rotation.

9 **Dynamic rotation — counterclockwise: smoothly rotate the cab counterclockwise at full speed for 2 complete rotations.**
Continue until the progress bar completes. Return the cab to square, boom forward.

10 **Static rotation — 6 positions at 60° intervals: press Next to begin.**
The software displays a target position. Rotate the cab clockwise until the silhouette of the boom, stick, and bucket is perfectly aligned on the target. The silhouette must be crisp, not blurry. Press Next and do not move until the measurement completes. Repeat for all 6 positions (full 360°).

11 **Press Done to view the calibration results.**
Press the Calibration Quality icon to review. When satisfied, press OK.

Getting Clean Static-Rotation Readings

The silhouette alignment is the most precision-critical step in the chassis calibration. Rotate slowly and stop precisely on the target. If the silhouette appears blurry, the cab needs to rotate slightly further. The silhouette must be perfectly crisp and centered on the target before pressing Next. Maximum RPMs reduce sensor vibration and produce cleaner silhouettes.

12 Chassis Sensor Calibration — Non-Tilted Method

The non-tilted method is available only when the BT476 chassis sensor is installed flat with its arrows pointing forward, parallel to the boom. This method sacrifices accuracy compared to the tilted method and should only be used when the machine cannot be tilted at least 4° during calibration.

The procedure is identical to the tilted method (Section 10) except that the tilt setup step is skipped — you select Non-Tilted instead of Tilted at the prompt. The dynamic rotation (2× clockwise, 2× counterclockwise) and static rotation (6 × 60° stops) steps are the same.

[REVIEW: Confirm with SME that the only procedural difference between tilted and non-tilted is the skip of the tilt setup step, and that the remaining dynamic/static rotation procedure is identical.]

13 GNSS 3D Calibration

The GNSS 3D calibration establishes the relationship between the Spotman receiver's position on the machine and the bucket tip. This calibration is required for 3D mode and for 2D+ mode when using the GNSS as the vertical reference.

Prerequisites

An accurate boom, stick, and bucket calibration must be completed first — any error in those calibrations will compound through the GNSS calibration. The Spotman must be in RTK Fix mode via a local base station. The bucket must have a straight cutting edge, and you must mark the exact center of the bucket with a marker.

Step-by-Step: GNSS 3D Calibration

1. **Select the receiver model: Bridgin, CT140T. The Internal Antenna Height populates automatically.**
   This must be correct — the software uses the antenna height to offset from the receiver to the phase center.

2. **Enter the rod length of your survey rod (e.g., 6.562' = 2 meters). Press Start.**
   Confirm the correct machine and bucket are selected.

3. **Rotate the cab perfectly square to the tracks. Boom forward. Press OK.**
   Bring the boom, stick, and bucket in close to the machine so the center of gravity is over the center of rotation.

4. **Screw the Spotman onto the mount on the machine. Confirm RTK Fix. Press Next.**
   Turn RPMs to maximum. Press Next. The software takes a measurement — do not move.

5. **If swing boom is enabled: swing the boom all the way to the left. Press Next.**
   Do not move any other elements. Wait for the measurement. (Skipped if no swing boom.)

6. **Static rotation — 6 positions at 60° intervals.**
   Same procedure as the chassis calibration: rotate cab clockwise to align the silhouette on each target, press Next, do not move until measurement completes.

7. **Mark the center of the bucket with a marker.**
   If the bucket has teeth, use tape and a marker to find and mark the exact center.

8 **With the cab square to the tracks, fully extend the boom and stick and place the bucket on the pavement (or paver). Mark a crow's foot on the ground at the center of the bucket. Press Next.**

Accuracy is critical — you will measure this exact spot with the GNSS rod. Do not move any part of the machine while the software takes the measurement.

9 **Repeat: bring the bucket in approximately 30% of total reach, place on the ground, mark a crow's foot. Press Next.**

Do not rotate the cab, track the machine, or swing the boom for the rest of the calibration.

10 **Repeat: bring the bucket in another 30%. Mark and measure. Press Next.**

Continue the pattern — each position is progressively closer to the machine.

11 **Bring the bucket in as close to the machine as possible. Mark the final crow's foot. Press Next.**

You now have 4 crow's-foot marks on the ground at different reaches.

12 **Rotate the cab out of the way. Remove the Spotman from the machine and screw it onto the 2-meter survey rod.**

Attach bipod legs for stability.

13 **Place the rod on the 1st crow's-foot mark (furthest from machine). Plumb the rod. Press Next.**

Do not let the rod move until the measurement completes.

14 **Repeat for the 2nd, 3rd, and 4th marks.**

Plumb the rod perfectly on each mark. Press Next at each position and wait for the measurement.

15 **Press Done to view the calibration results.**

Press the Calibration Quality icon to review. See Section 13 for the meaning of each quality indicator.

14 GNSS Calibration Report Explained

The GNSS calibration report contains a number of quality indicators. Each measures a specific aspect of the calibration. The table below lists the indicators and what they measure.

Indicator	What It Measures
alignmentImuGpsRms	RMS error between the IMU (chassis sensor) and GPS measurements during calibration.
armPRms	RMS error in the arm (boom/stick) positioning during stretching.
imuGyroRotationRms	RMS error in the gyroscope rotation measurement during dynamic rotation.
imuDt	Time synchronization between IMU data packets. High values indicate Bluetooth data loss.
imuLoss	Percentage of IMU data packets lost during calibration. Should be near zero.
gpsAfterStretching	GPS position accuracy after the stretching (bucket-placement) step. High values indicate the machine moved during stretching.
gpsPositionR2	R-squared fit of the GPS positions measured during calibration. Should be near 1.0.
gpsRotationRms	RMS error in GPS-measured heading during dynamic rotation.
gpsDt	Time synchronization between GPS data packets.
gpsLoss	Percentage of GPS data packets lost during calibration. Should be near zero.
gpsAndBucketStretchingDiff	Difference between GPS-computed and sensor-computed bucket positions. Should be small.

Press on any indicator title in the software to see a detailed description and likely sources of error. If any indicator shows red, do not proceed — diagnose and repeat the calibration step that produced the error.

15 Laser Receiver Calibration — Manual Method

The laser receiver calibration tells the system exactly where the combo sensor's built-in laser receiver is located relative to the stick. This is required for 2D elevation referencing using a rotating laser.

Step-by-Step: Manual Laser Receiver Calibration

1. **Go to Settings > System Settings > Select or Edit Machines. Highlight the machine and press Edit Machine Parameters.**
   Press the Laser tab to access the laser receiver calibration values.

2. **Ensure the Laser Receiver checkbox is activated.**
   The checkbox must be checked for the laser receiver to be active.

3. **Set up a string line between the bucket pin and the stick pin using magnetic hooks.**
   The string must be taut.

4. **Measure the AB value: the perpendicular distance from the taut string line to the center of the combo sensor's laser receiver.**
   Enter this in the AB Length field.

5. **Measure the AC value: the distance along the string line from the center of the stick pin to the point perpendicular to the sensor center.**
   Enter this in the AC Length field.

6. **Measure the Side Shift Laser value: standing underneath the boom with your back to the cab, measure from the center of the stick to the outside of the combo sensor.**
   Enter this in the Side Shift Laser field. Press Apply.

Note: the Side Shift Laser value is half of the thickness of the dipperstick plus the sensor thickness.

16 Laser Receiver Calibration — Wizard Method

The wizard method automates the laser receiver calibration using a rotating laser transmitter. The rotating laser must be set to operate at a minimum of 600 RPMs.

Step-by-Step: Wizard Laser Receiver Calibration

1. **Go to Settings > System Settings > Laser > Calibrate.**
   Acknowledge the instructions by pressing OK.

2. **Choose iDig Combo Sensor as the sensor type.**
   Unless you are using a third-party laser receiver.

3. **Turn the excavator RPMs to maximum.**
   Reduces vibration on the sensor during the procedure.

4. **Bring the stick in close to the machine. Lower the boom until the laser receiver catches the rotating laser. Press Closed.**
   The green indicator confirms a quality laser strike.

5. **Without moving the boom, extend the stick away from the machine until the laser receiver catches the laser again. Press Opened.**
   The boom angle indicator must stay green. If it turns red, adjust the boom angle to green before moving the stick.

6. **Place the rotating laser beam on the exact center of the bucket pin. Press Laser.**
   You need the rotating laser's own receiver to place the beam precisely on the pin center.

7. **Press Done.**
   The wizard calibration values are now computed.

8. **Measure and enter the Side Shift Laser value.**
   Standing underneath the boom with your back to the cab, measure from the center of the stick to the outside of the combo sensor. Enter the value and press OK.

17 Tilt Bucket Calibration

Machines equipped with a tilt bucket require a separate tilt sensor calibration after the standard bucket calibration is complete. The tilt sensor (an additional BT144 Mini Sensor mounted on the tilt bucket) must be paired and calibrated so the system can track the tilt angle independently.

[REVIEW: The detailed tilt bucket calibration procedure requires SME content. This section is a placeholder and should be completed before publication.]

18 Tiltrotator Calibration — Universal Procedure

This calibration procedure applies to all supported rotator and tiltrotator brands (Engcon, Kinshofer NOX, Rototilt, Steelwrist). Before running this procedure, the CAN cable must be connected between the rotator's cabin module and the iDig cradle's CAN port, and CAN data must be confirmed flowing in Basic Settings > Wired Sensors > CAN.

Step-by-Step: Tiltrotator Calibration in iDig

1. **Confirm CAN data is being received.**
   Navigate to Basic Settings > Wired Sensors > CAN. You should see live rotation data from the rotator. If not, troubleshoot the CAN connection (see Volume 2 Section 09).

2. **Navigate to System Settings > Rototilt > Calibrate.**
   The tiltrotator calibration screen opens.

3. **Leave the type set to Custom.**
   This applies to all supported brands.

4. **Enter the AC measurement.**
   Measure from the rotator's center of rotation to the center of the pin on the rotator's quick attachment. Enter the value.

5. **Set the Sensor Gain to 1.**
   The default gain of 1 is correct for initial calibration. If drift is observed after field use, see Section 22 for how to calculate and correct the gain.

6. **Set the zero values for tilt and rotation.**
   Follow the on-screen prompts to establish the zero reference for both axes.

19 Brand-Specific Tiltrotator Setup — Engcon

Engcon tiltrotators require specific CAN configuration depending on the ePS version. The Engcon CAN-2-CAN cable connects the Engcon cabin module to the iDig cradle. The CAN-2-CAN firmware must be current — update it using the Engcon MSU software if needed.

- ePS Version 1: standard CAN output. Connect the CAN-2-CAN cable and verify data in Wired Sensors > CAN.
- ePS Version 2: requires Legacy Mode to be enabled in the Engcon ePS Micro Conf configuration before CAN output is available to iDig.
- On EPS2-equipped machines, iDig reads both rotation and tilt data from the CAN bus.

After the CAN connection is confirmed, proceed with the universal tiltrotator calibration in Section 17.

20 Brand-Specific Tiltrotator Setup — Kinshofer NOX

Kinshofer NOX tiltrotators require a Grade Control License purchased from Kinshofer and installed on the NOX Cabin Module before the module will output rotation data via CAN. This is a separate license from any iDig license.

- Install the Grade Control License by inserting the Mini-to-USB adapter (provided by Kinshofer) into the back of the NOX Cabin Module and running the license installer.
- In the NOX Cabin Module settings (accessed via the hidden button in Settings > Info for Advanced Settings), set Grade Control to the "Leica" protocol.

After the Grade Control License is installed and the protocol is set, connect the CAN cable from the NOX Cabin Module to the iDig cradle, verify data in Wired Sensors > CAN, and proceed with the universal calibration in Section 17.

21 Brand-Specific Tiltrotator Setup — Rototilt

[REVIEW: Rototilt brand-specific CAN configuration and wiring prerequisites require SME input. The iDig-side calibration is covered in Section 17.]

22 Brand-Specific Tiltrotator Setup — Steelwrist

[REVIEW: Steelwrist brand-specific CAN configuration and wiring prerequisites require SME input. The iDig-side calibration is covered in Section 17.]

23 Sensor Gain Explained

Rotation sensor gain compensates for small mechanical inaccuracies in the rotator's CAN output. Over many rotations, a gain error causes the displayed rotation angle to drift away from the actual rotation angle.

How to Detect Drift

Mark a reference point on the rotator and the machine frame. Rotate the rotator exactly 10 full turns (3,600°). If the mark is off by 1° after 10 rotations, the drift rate is 0.1° per turn.

How to Calculate the Correction

Divide the drift per turn by 360° to get the gain offset. For 0.1° per turn: 0.1 / 360 = 0.000277. If the rotator drifted past the reference (over-rotated), subtract: gain = 1.0 − 0.000277 = 0.99972. If the rotator fell short (under-rotated), add: gain = 1.0 + 0.000277 = 1.00028. Enter the corrected gain in the tiltrotator calibration screen.

24 Post-Calibration Accuracy Checks — 2D

After completing the boom, stick, and bucket calibration, verify the system's accuracy before proceeding to the GNSS 3D calibration. The 2D calibration must be accurate to within ±3/8" (±1 cm) before the 3D calibration is performed — errors in 2D compound through 3D.

Checks to Perform

- Place the bucket on a reference point with the bucket fully open. Note the displayed depth. Then curl the bucket closed and check the depth again — both readings should match within ±3/8".
- Measure the height of the bucket cutting edge with a tape measure and compare to the iDig display.
- Measure the distance between two ground points with a tape measure and compare to the iDig Smart Tape measurement.

Do Not Proceed to 3D Calibration Until 2D Accuracy Is Confirmed

If the 2D accuracy check shows errors greater than ±3/8", the boom and stick or bucket calibration must be repeated. Proceeding to the GNSS 3D calibration with a poor 2D calibration will produce poor 3D results that are difficult to diagnose.

25 Post-Calibration Accuracy Checks — 3D

After completing the GNSS 3D calibration, verify the system's 3D accuracy before putting the machine into production.

Checks to Perform

- Rotate the machine 360° and place the bucket on the ground at several headings. Measure each point with the Spotman on the survey rod and compare the coordinates to the iDig-displayed coordinates.
- Create a surface by measuring points at full reach, mid reach, and close reach at multiple headings. Compare the resulting surface elevations to independent survey measurements.
- Place the bucket on a known survey control point. Enter the control point's coordinates in iDig and use the stakeout function — the displayed cut/fill should be near zero.

26 Backing Up the Machine Calibration

After completing calibration, back up the machine's calibration data to a USB stick. This backup is essential — if the Control Box is damaged, lost, or needs to be swapped, the calibration can be loaded onto a replacement Control Box without recalibrating the machine.

Step-by-Step: Export Calibration to USB

1. **Plug a USB stick into one of the available USB ports on the cradle.**
   The BT/WiFi dongle remains in the top-left port.

2. **In the Settings menu, select System Settings.**
   Then press Select or Edit Machines.

3. **Press Edit Machine Parameters.**
   Ensure the correct machine is selected (shown at the top of the screen).

4. **Press Export, then Export this Machine.**
   The system writes a .json file to the USB stick.

5. **Verify the export.**
   The USB stick now contains a folder named CBXXXXXX iDig Connect Data (where XXXXXX is your Control Box serial number). Inside is a .json file for each machine you exported.

Alternative: Export as QR Code

Press Export, then Export as QR Code. The Control Box displays a QR code that you can scan with your phone to download the .json calibration file directly. This is a fast way to get a backup onto your phone without a USB stick.

> **Back Up After Every Calibration**
>
> Make it a habit to export the calibration to USB and to your phone (via QR code) immediately after completing any calibration. A calibration backup takes 30 seconds and can save hours of re-calibration if the Control Box is ever damaged or replaced.

27 What's Next

With Volume 4 complete, the machine is fully calibrated — boom, stick, bucket, chassis sensor, GNSS receiver, laser receiver, and any tiltrotator. The calibration is backed up to USB and phone. The machine is ready for field operations.

Volume 5: Settings & Configuration

Volume 5 covers all Settings menu options — language, units, sound, sensors, GNSS, Restrictive Mode, display, storage, LED Bargraph configuration, audible alerts, joystick buttons, and import/export.

Volume 8: Field Operations

Volume 8 covers daily operating procedures for 2D, 2D+, 2D Project, and 3D modes — including Dynamic Laser Catch, Swing Boom operation, Smart Tape, Height Alarm, surface creation, and the daily 3D workflow.

Need Help?

Contact your iDig dealer for assistance with calibration, accuracy issues, or any step in this volume. For real-time support, use the Remote Access feature described in Volume 1 Section 09.

iDig Connect Software

User Guide

Volume 5: Settings & Configuration

Language, Units, Sensors, GNSS, Display, Storage, LED Bargraph, Audible Alerts & Import/Export

Version 1.0
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Prepared by iDig North America

This is Volume 5 of 8 in the iDig Connect User Guide series.

01 Navigating the Settings Menu

The Settings menu is accessed from the work screen by tapping anywhere on the screen to reveal the toolbars, then tapping the Settings icon. The Settings menu contains four top-level categories.

Category	What It Contains
Basic Settings	Language, units, time zone, wireless sensor management, GNSS receiver, Restrictive Mode, display brightness, idle time, and storage management.
System Settings	Machine profiles, calibration data, and machine-level configuration. This is where you create new machines, edit calibration parameters, and export calibration files.
Work Settings	LED Bargraph configuration, audible alerts, and bucket logger settings. These control how the system communicates guidance to the operator during fieldwork.
Remote Access	Wi-Fi connection, remote support sessions, and the Get Support function for dealer assistance. Covered in detail in Volume 1 Section 09.

This volume covers Basic Settings and Work Settings in detail. System Settings (machine profiles and calibration) are covered in Volume 4. Remote Access is covered in Volume 1.

02 Language & Units Configuration

Language and units are set during initial power-on (Volume 1 Section 05) and persist across reboots. They can be changed at any time from Basic Settings, but changing units after calibration does not invalidate the calibration — it changes how the values are displayed, not the underlying data.

Settings

Setting	Options	Guidance
Language	English, French, Spanish, German, and others	Select the operator's preferred language. All menus, prompts, and on-screen text change immediately.
Time Zone	System time zones (e.g., America/Denver, America/Chicago)	Match the time zone to the machine's operating location. Affects timestamps on data exports and calibration logs.
Length Units	US Survey Feet, International Feet (Imperial), Meters	Must match the project coordinate system. US Survey Feet is standard for most US state plane projects. International Feet (decimal feet) is used on some projects — confirm with your project engineer. Metric is also available.
Slope Units	Percent (%), Degrees, Per-mille	Percent is standard for US construction. Some highway and rail projects use degrees or per-mille — match your design documents.
Heading Convention	Degrees	Degrees is standard for US construction.
Coordinate Convention	North / East / Elevation	For US construction work, set to North / East / Elevation. This matches the convention used by surveyors and most civil engineering output, including iPoint.

Critical: Match Length Units to Your Project Before Calibrating

Length Units affect every measurement the system displays — depth, reach, slope distance, coordinates, and calibration values. If you calibrate in meters and then switch to US Survey Feet, the on-screen values change but the underlying calibration data is unchanged. The unit setting drives how the data is interpreted, not the data itself. Set units correctly before beginning calibration in Volume 4.

03 Sound Settings

Sound settings control the system's global volume level and tone for all audible alerts. The settings are accessed from Basic Settings.

- Volume level — adjustable from off to maximum. Set the volume high enough to hear over engine noise and cab vibration.
- Tone — adjustable pitch. Some operators prefer a lower tone that is less fatiguing over a full shift; others prefer a higher tone that cuts through cab noise more effectively.
- Disable sound — turns off all audible feedback. The LED Bargraph and on-screen indicators continue to function normally. Use this when the operator relies entirely on visual guidance.

Individual alert sounds (depth alarm, reach alarm, laser catch, sensor loss) are configured separately in Work Settings > Audible Alerts (Section 10 of this volume).

04 Wireless Sensor Management

The Wireless Sensor Management screen shows every sensor currently paired to the Control Box. It is accessed from Basic Settings > Wireless Sensors.

Information Displayed

Field	Description
Sensor Name	The sensor type and location (e.g., Boom, Stick, Bucket, Chassis).
Battery Level	Current battery charge. Sensors with low battery should be left in direct sunlight to charge via the built-in solar cell.
Bluetooth Signal Strength	The strength of the Bluetooth connection between the sensor and the Control Box.
Angle Data	The current angle reading from the sensor.
Vibration Range	The allowable vibration range for the sensor. This can be adjusted from this screen if the sensor is producing vibration warnings during operation.

Pairing a Sensor

To pair a sensor, enter the pairing screen for the desired sensor slot, remove the sensor from its mounting plate, wait 5 seconds, and place it back on the plate. The system detects the sensor and completes the pairing. For the full pairing procedure, see Volume 4 Section 04.

Sensor Information

Press the ? icon next to any sensor to view its detailed attributes — firmware version, serial number, hardware revision, and other diagnostic information. This information is useful when contacting your iDig dealer for support or warranty service.

05 GNSS Receiver Settings

The GNSS Receiver settings screen is accessed from Basic Settings > GNSS Receiver. This is where the Spotman receiver is paired to the Control Box and where the connection status is monitored.

Connecting a GNSS Receiver

The pairing process uses two tabs: the Other tab (which scans for available receivers) and the Known GNSS tab (which stores previously paired receivers). Once a receiver appears in the Other tab, tap it to move it to the Known GNSS tab. Then highlight it, tap the ! icon, and select Connect. The full pairing procedure is covered in Volume 3 Section 13.

Verifying the Connection

After connecting, tap the Data tab. The Correction field should show RTK_Fix, confirming the receiver is connected, receiving corrections, and delivering position data to the Control Box. If it shows Float, Autonomous, or no data, troubleshoot the GNSS connection per Volume 3 Section 16.

06 Restrictive Mode (Password Protection)

Restrictive Mode protects the machine calibration data and system configuration from accidental modification. When enabled, a password is required to access machine parameters, calibration data, and certain system settings. Day-to-day operating functions remain accessible without the password.

What Restrictive Mode Protects

- Machine calibration data — prevents accidental deletion or modification of calibrated machine profiles.
- System Settings — machine profiles, sensor configuration, and calibration parameters become read-only.
- Certain Basic Settings — settings that would affect calibration or system behavior are locked.

What Remains Accessible

- All work-screen functions — the operator can dig, grade, measure, and use all field tools normally.
- Work Settings — LED Bargraph, audible alerts, and display preferences can still be adjusted.
- Project loading and switching — operators can load projects, import files, and switch between machines and buckets.

Setting the Password

Navigate to Basic Settings > Restrictive Mode. Enter a password and confirm it. The password takes effect immediately. Share the password only with personnel who need to modify calibration data or system configuration.

> **Critical: Record the Password**
>
> If the Restrictive Mode password is lost, contact your iDig dealer for the recovery procedure. Do not attempt to reset the Control Box to bypass the password — this will erase calibration data.

07 Display Settings

Display settings control the screen brightness and idle behavior. These are accessed from Basic Settings.

Setting	Description
Screen Brightness	Adjustable from low to maximum. Increase brightness for direct sunlight; decrease for night or covered-cab work to reduce glare.
Idle Time / Sleep Mode	Sets the duration of inactivity before the screen dims or enters sleep mode. A shorter idle time saves battery on bench-powered systems. A longer idle time keeps the screen visible during breaks without requiring the operator to touch the screen.

08 Storage Management

The Storage screen is accessed from Basic Settings > Storage. It provides three functions.

- View disk space — see how much storage is available on the Control Box for projects, designs, and calibration data.
- Erase files — remove individual files or clear storage to free space. Use caution — deleted files cannot be recovered from the Control Box.
- Cloud File Access — configure and verify the cloud connection for accessing files from Google Drive, Dropbox, or OneDrive. The initial cloud setup (using RCX Clone) is covered in Volume 1 Section 10.

The Internet Connection Status indicator at the bottom-left of the Storage screen shows a green checkmark when the Control Box has an active cloud connection.

09 Work Settings — LED Bargraph Configuration

The LED Bargraph configuration is accessed from Settings > Work Settings. This screen controls how the in-cab LED bar displays guidance information to the operator.

Setting	Description
LED Resolution	The distance each LED represents. For example, a resolution of 10 cm means each LED corresponds to 10 cm of depth. Tighter resolution (e.g., 5 cm) is appropriate for finish grading; wider resolution (e.g., 20 cm) is appropriate for bulk excavation.
Deadband	The tolerance zone around the target where the LEDs turn green. Options: Off, 0.5 cm, 1.0 cm, 2.5 cm. When the bucket focus point is within the deadband distance of the target depth, the LEDs are green — the operator is on grade.
Vertical LEDs	Represent Depth by default. Each vertical LED corresponds to one increment of the configured resolution above or below the target.
Horizontal LEDs	Represent Reach by default. Configured independently from the vertical LEDs.
Time Filtering	Smooths the LED display to reduce flicker from vibration. Disabled by default.

Real-World Example: Configuring for Foundation Work

For a residential foundation at a target depth of 4 feet, set the LED Resolution to 10 cm (about 4 inches per LED) and the Deadband to 2.5 cm (about 1 inch). This gives the operator a clear visual reference — one LED per 4 inches of depth — and a green zone within an inch of grade. The operator digs until the LEDs are green and holds there.

10 Work Settings — Audible Alerts

Audible alerts are configured from Settings > Work Settings > Audible Alarm. Each alert type can be configured independently — the operator selects the tone, loudness, and the distance range at which the sound changes.

Alert Types

Alert	What It Indicates
Depth Alarm	Sounds as the bucket approaches the target depth. The tone and volume change as the bucket gets closer, providing audio-only guidance without looking at the screen.
Reach Alarm	Sounds as the bucket approaches the maximum configured reach distance.
Laser Catch	Sounds when the combo sensor on the stick catches the rotating laser beam, confirming the system has an elevation reference.
Elevation Alarm	Sounds when the bucket reaches a user-defined elevation. Used for utility avoidance or depth limits.
Sensor Loss	Sounds when a sensor loses its Bluetooth connection to the Control Box.
Collision	Sounds when the bucket approaches an avoidance zone boundary.

For each alert, the operator configures which tone to use, the loudness level, and the distance ranges at which the tone changes. This allows the operator to distinguish between different alerts by sound alone — a lower tone for depth, a higher tone for reach, a distinctive chirp for laser catch.

> **Real-World Example: Audio-Only Guidance for Trenching**
>
> An experienced operator trenching a storm sewer at −3% slope may configure the depth alarm to change pitch at 6 inches above grade, 3 inches above grade, and on grade. The operator can hold the trench bottom within tolerance by sound alone — eyes on the trench, not the screen.

11 Joystick Button Configuration

With the BT248 license or the CT145 license (Connect v5), iDig Connect can integrate with the machine's joystick buttons. This allows the operator to toggle the Swing Boom function, adjust bench height, and trigger Set Benchmark directly from the joystick — without reaching for the touch screen.

License Activation

The joystick button feature requires a license. Activate it from Settings > Import/Export > License Manager, using the same procedure as any other feature license (see Volume 1 Section 06).

Button Mapping

The specific joystick buttons that map to iDig functions depend on the machine's make and model. iDig Connect detects the available buttons and presents the mapping options in the configuration screen. Contact your iDig dealer for the button mapping specific to your machine.

[REVIEW: Joystick button configuration screens and specific button-to-function mappings require SME input for each machine make/model. The feature is confirmed; detailed setup screens should be documented before publication.]

12 Import/Export Settings

The Import/Export menu is accessed from Settings > Import/Export. It provides access to license management, machine calibration import/export, project import/export, language import, manufacturer import, and boot screen customization.

Key Functions

Function	Description
License Manager	Activate 120-day trial licenses, import purchased .lic files from USB. See Volume 1 Section 06.
Machine Import / Export	Import a machine calibration .json file from USB (to load a calibration from another Control Box) or export the current machine calibration to USB for backup. See Volume 4 Section 26.
Project Import / Export	Import or export complete projects including coordinate systems, layers, and design data. See Volume 7 Section 10.
Language Import	Import additional language packs from USB if needed.
Manufacturer Import	Import manufacturer-specific machine templates or configurations from USB.
Boot Screen	Customize the boot screen image displayed when the Control Box starts up.

13 What's Next

With Volume 5 complete, the operator understands every setting available in iDig Connect — from language and units through LED Bargraph configuration and audible alerts. The system is configured for the operator's preferences and ready for daily use.

Volume 6: Settings & Configuration

Volume 6 covers the work screen interface for both 2D and 3D operation — screen layouts, toolbars, icon reference, guidance modes, surface offset, and zoom controls.

Volume 7: Projects, Coordinate Systems & Data Management

Volume 7 covers creating projects, loading coordinate systems and geoids, importing design files, managing layers, and the Coordinate Shift tool.

Need Help?

Contact your iDig dealer for assistance with any setting or configuration. For real-time support, use the Remote Access feature described in Volume 1 Section 09.

iDig Connect Software

User Guide

Volume 6: User Interface & Work Screen

Screen Layout, Toolbars, Icon Reference, Guidance Modes, Surface Display & Zoom Controls

Version 1.0
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Prepared by iDig North America

This is Volume 6 of 8 in the iDig Connect User Guide series.

01 2D Work Screen Overview

The 2D work screen is the operating interface for iDig Connect 2D+ and 2D Project systems. It provides depth, reach, and slope guidance using either a rotating laser or the Spotman GNSS receiver as the elevation reference. The 2D work screen is simpler than the 3D interface — it uses a single Side View by default and a focused set of tools for bench-based excavation work.

Key Elements on the 2D Work Screen

Element	Description
Machine Visualization	A side-view profile of the machine showing the boom, stick, and bucket against the target depth. The visualization updates in real time as the operator moves the machine.
Depth Display	The vertical distance between the bucket's focus point and the current bench or target surface. This is the primary guidance value in 2D mode.
Reach Display	The horizontal distance from the machine's center of rotation to the bucket tip.
Slope Display	The current slope of the bucket's cutting edge, displayed as a percentage.
LED Bargraph	The in-cab LED bar corresponds to the depth display. Each LED represents a configurable distance increment (e.g., 10 cm per LED). The LEDs turn green when the bucket focus point is within the deadband — the tolerance zone around the target depth (e.g., ±2.5 cm).
Bench Method Icon	Toggles between Laser and GNSS as the elevation reference source. In Laser mode, the system uses the rotating laser beam caught by the combo sensor on the stick. In GNSS mode, the system uses the Spotman receiver for elevation.
2D / 3D Toggle	Switches between 2D operating mode and 3D mode (if the system is licensed for 3D). Located at the bottom-left of the work screen.

02 Bench Method — Laser vs. GNSS

In 2D mode, the system needs an elevation reference — a known height to measure depth from. iDig Connect supports two bench methods.

Laser Reference

The system uses the rotating laser beam caught by the combo sensor (BT145 or BT147) on the stick. The operator sets up a rotating laser on a tripod, catches the beam, and the system uses that laser height as the elevation reference. This is the traditional method for 2D excavation — no GNSS required.

GNSS Reference (2D+ and 2D Project)

With a Spotman GNSS receiver connected and in RTK Fix, the operator can use the GNSS position as the elevation reference instead of a laser. The advantage is that the operator can track the machine across the site without re-benching — the GNSS provides a continuous elevation reference wherever the machine moves. To set the bench elevation, place the bucket focus point on a project benchmark, enter the known elevation, and press Apply.

When to Use Each Method

Use Laser reference when working on a site with a rotating laser already set up — foundation work, utility trenching near a benchmark, or any confined area where the laser covers the work zone. Switch to GNSS reference when tracking across a larger site, when the laser cannot cover the full work area, or when working in 2D+ mode with the Spotman providing continuous elevation.

03 2D Tool Reference

The 2D work screen toolbar provides a focused set of tools for bench-based excavation. The toolbar is accessed by tapping the work screen, the same as in 3D mode.

Tool	Function
Bench Method (Laser / GNSS)	Toggle the elevation reference between the rotating laser and the GNSS receiver.
Set Depth	Set a target depth for level grading. Place the bucket on a known reference point, enter the desired cut depth, and apply. The system creates a flat target surface at that depth.
Set Depth & Slope	Set a target depth and slope for graded work such as utility trenching or drainage. Enter the slope as a percentage (negative = downward from the bucket toward the cab). Choose the slope direction: along the boom axis, by measuring two points, or by entering an azimuth or bearing.
Smart Tape	Measure the horizontal distance, slope distance, and elevation difference between two points. Tap the field once to reset the digital tape measure, then move the bucket to the second point.
Elevation Alert	Set an alarm at a defined elevation to prevent over-digging or to warn near buried utilities.
Sensor Info	View sensor battery level, angle data, and vibration range.
Attachment List	Switch between calibrated buckets.
Bucket Focus Point	Toggle between closest-edge-to-design guidance (default) and three-point (left/center/right) guidance.
2D / 3D Toggle	Switch to 3D mode if the system is licensed and calibrated for 3D.
Settings Access	Open the Settings menu from the work screen.

04 LED Bargraph Configuration

The LED Bargraph is the primary visual guidance tool in 2D mode. Each LED represents a configurable distance increment, and the color-coded display tells the operator at a glance whether the bucket is above, below, or on grade.

Configuring the Bargraph

Navigate to Settings > Work Settings. The LED Display configuration screen provides the following settings.

Setting	Description
LED Resolution	The distance each LED represents. For example, 10 cm per LED means each LED on the bargraph corresponds to 10 cm of depth. Adjust this based on the precision required — tighter resolution for finish grading, wider resolution for bulk excavation.
Deadband	The tolerance zone around the target depth where the LEDs turn green. Options: Off, 0.5 cm, 1.0 cm, 2.5 cm. A 2.5 cm deadband means the LEDs are green when the bucket is within ±2.5 cm of the target. For finish grading, use a tighter deadband.
Mode	Request mode (Depth, Reach, etc.) and Current mode. The vertical LEDs typically represent Depth; horizontal LEDs represent Reach.
Time Filtering	Smooths the LED display to reduce flicker caused by vibration. Disabled by default. Enable if the LEDs are jumping rapidly during operation.

Real-World Example: Setting Up for Utility Trenching

For a storm sewer trench at −3% slope to a depth of 4 feet, set the LED Resolution to 5 cm (about 2 inches per LED) and the Deadband to 1.0 cm. This gives the operator enough resolution to hold the trench bottom within half an inch of design while keeping the LED display stable enough to read during continuous digging.

05 2D Project Mode — Limitations

2D Project mode allows operators to import a design file and work from it in 2D — a significant step up from bench-only 2D+ operation. However, 2D Project has specific limitations compared to full 3D mode.

Limitation	Detail
DXF Import	Only 1 DXF file can be imported per project.
Maximum DXF Size	150 m × 150 m (approximately 500 ft × 500 ft).
Maximum Projects	5 projects can be stored on the Control Box.
3D View	Not available. 2D Project provides Side View, Front View, and Map View only.
Work Tool Settings	Limited compared to full 3D mode.

For operators who need unlimited DXF imports, larger design files, unlimited projects, or the full 3D View, the system can be upgraded to Connect 3D with a CT151 license.

06 3D Work Screen Overview

The 3D work screen builds on the 2D interface covered in Sections 01–05. In 3D mode, the operator works against imported design surfaces rather than simple bench references, and the interface adds multiple view types, surface display tools, and coordinate information that are not present in 2D mode. This section and the sections that follow cover the elements that are unique to 3D operation.

Key Elements on the Work Screen

Element	Description
Coordinate Display	Shows the current bucket-tip or GNSS receiver coordinates (Northing, Easting, Elevation) in the active coordinate system. Tap the coordinate area to toggle between bucket coordinates and GNSS coordinates.
Heading / Accuracy Indicators	Displayed in the upper portion of the screen. Shows the current heading, vertical accuracy, and horizontal accuracy of the GNSS position. These values update in real time.
Bucket / GNSS Toggle	Tap to switch the coordinate display between the bucket-tip position (computed from the sensor geometry) and the raw GNSS receiver position. Useful for comparing machine-computed position against the GNSS reference.
Layer Icon	Provides access to the Layer Manager, Project Manager, and Import menu. This is where you load projects, import design files, manage layers, and configure coordinate systems (covered in Volume 7).
Machine Visualization	The graphical representation of the machine — boom, stick, bucket, and cab — shown in the active view (Side, Front, 3D, or Map). The visualization updates in real time as the operator moves the machine.
Cut/Fill Indicator	Displays the vertical distance between the bucket tip and the design surface. Negative values indicate the bucket is above grade (fill needed); positive values indicate the bucket is below grade (cut remaining). The LED Bargraph mirrors this value.

07 Screen Layout Options

iDig Connect offers three screen layout options and four view types. The layout determines how many views are displayed simultaneously; the view type determines what each panel shows.

Layouts

Layout	Description
Single	One full-screen view. Provides the maximum display area for a single view type. Most operators use Single layout with the Side View during standard excavation work.
Split	Two views displayed side by side. Common combinations: Side View + Map View (for operators working from a design and needing to see their position on the plan), or Side View + Front View (for operators who need both profile and cross-section simultaneously).
Triple	Three views displayed simultaneously. Provides the most information at once but reduces the size of each individual panel. Used primarily by operators working in 3D mode who need Side, Front, and Map views visible at all times.

View Types

View	What It Shows
Side View (Profile)	The machine viewed from the side, showing the boom, stick, and bucket in profile against the design surface. This is the primary digging view — it shows depth, reach, and the relationship between the bucket and the surface at a glance.
Front View (Cross-Section)	The machine viewed from the front, showing the bucket's left-right position relative to the cross-section of the design surface. Essential for grading work where the operator needs to see the cross-slope.
3D View	A three-dimensional perspective of the machine and the design surface. Provides spatial context that the profile and cross-section views cannot. Useful for understanding how the current cut relates to the overall surface.
Map View	A plan view (top-down) showing the machine's position on the project map. Displays design lines, points, surfaces, and the machine's heading. Useful for navigating to specific locations on the project and for seeing where the machine has already worked.

To change the layout or view type, tap the Screen Layout icon on the side toolbar (Section 03). The layout and view selections persist across power cycles.

08 Side Toolbars — Left & Right

The work screen toolbars are hidden by default to maximize the display area. To access them, tap anywhere on the work screen. The left and right toolbars appear along the edges of the screen.

Each toolbar initially shows a compact set of the most commonly used tools. Press the expand button on either toolbar to reveal the full set of tools. The expanded toolbars show every tool available in the current operating mode.

Accessing All Tools

After tapping the work screen to reveal the toolbars, press the expand icon on both the left and right toolbars. This displays every available tool in the software. The expand state resets each time the toolbars are dismissed — the next time you tap the screen, the toolbars return to their compact state.

09 Tool Icon Quick Reference

The following table defines every tool icon available on the iDig Connect work screen toolbars. Icons are grouped by function.

Design & Measurement Tools

Tool	Function
Create CAD	Create points, lines, and surfaces directly on the work screen.
Create Points	Create points using the bucket-tip position or the GNSS receiver on a survey rod.
Create Polyline / Polygon	Create a polyline or polygon using the bucket or GNSS receiver to define each vertex.
Coordinate Shift	Shift the coordinate system by comparing the bucket or GNSS coordinates against a known control point and adjusting the Northing, Easting, and Elevation to match. See Volume 7 Section 08.
Smart Tape	Measure the distance, slope distance, and elevation difference between two points. Works with both the bucket tip and the GNSS receiver on a rod.
Profile Editor	Create field designs by drawing a cross-section shape and applying it along a 3D line. Used for creating slopes, benches, and custom profiles without importing a design file.
Elevation Alert	Set an alarm that triggers when the machine reaches a defined elevation. Useful for utility avoidance or depth limits.

Mode & Display Controls

Tool	Function
2D / 3D Toggle	Switch between 2D operating mode (laser or benchmark reference) and 3D operating mode (GNSS-referenced surface guidance).
Screen Layout	Select from Single, Split, or Triple screen layouts. Choose which view type (3D, Side, Front, or Map) appears in each panel.
Attachment List	Switch between calibrated attachments (buckets) without leaving the work screen. Each bucket has its own calibration profile.
Bucket Focus Point	Toggle between single-point guidance from the center of the bucket and three-point guidance showing left, center, and right of the cutting edge. See Section 05.
Guidance Mode (Distance)	Switch the guidance distance display between Vertical (distance measured straight down to the surface) and Perpendicular (distance measured at 90° to the surface slope). See Section 06.
Guidance Mode (Surface Offset)	Switch the surface offset between Vertical and Perpendicular. See Section 06.

Tool	Function
Surface Offset Tool	Apply a constant offset above or below the design surface. See Section 07.

View & Sensor Tools

Tool	Function
Sensor Info	View sensor information including battery level, angle data, and allowable vibration range. The vibration range can be adjusted from this screen.
Zoom Controls	Switch between Auto and Manual bucket zoom. In Auto mode, the view follows the bucket. In Manual mode, you set the zoom level. Edit zoom levels independently per view panel. See Section 10.
Reach Radius	Display the machine's reach radius as a circle on the screen, showing the maximum and current reach of the bucket.
3D Perspective	Toggle a 3D perspective overlay on the cross-section (Front) view for enhanced spatial context.
Point ID Display	Show or hide point identification labels on the Map View.
Focus (Bucket / Design)	Toggle the view focus between following the bucket tip and centering on the design surface. See Section 10.

Surface & Status Tools

Tool	Function
Status Bar	Display the status bar showing bucket/GNSS coordinates, heading, horizontal accuracy, and vertical accuracy. See Section 08.
Surface Display	Toggle between triangle mesh and solid surface rendering.
Surface Shadows	Change the surface shading to enhance depth perception in the 3D View.
Grid Overlay	Overlay a grid on the surface to enhance spatial reference in the 3D View.
Settings Access	Open the Settings menu (Basic Settings, System Settings, Work Settings, Remote Access) from the work screen.

10 Bucket Focus Point

iDig Connect provides guidance from the side of the bucket's cutting edge that is closest to the design surface. This default behavior prevents over-digging — the system always references the edge that would contact the design first, so the operator knows when to stop before cutting past grade.

The operator can toggle the bucket focus point to display guidance from the center of the bucket or from all three points (left, center, right) simultaneously.

Default — Closest Edge to Design

In the default mode, the system automatically selects whichever side of the bucket is nearest to the design surface and references guidance from that edge. As the operator repositions the bucket relative to the surface, the reference edge updates automatically. This is the safest mode for production digging because it ensures the cut/fill value and the LED Bargraph always reflect the part of the bucket that is closest to the finished surface.

Three-Point (Left / Center / Right)

Three-point mode shows independent cut/fill values for the left edge, center, and right edge of the cutting edge simultaneously. This is useful for finish grading — the operator can see whether the left side of the bucket is on grade even if the right side is still high, and adjust the bucket tilt or machine position accordingly.

Toggle between guidance modes by tapping the Bucket Focus Point icon on the toolbar.

11 Guidance Modes

iDig Connect offers two guidance modes that affect how the distance between the bucket and the design surface is measured. The choice between them depends on the work being done.

Vertical Guidance

The distance between the bucket and the surface is measured straight down — a vertical line from the bucket tip to the surface directly below it. This is the standard mode for flat or nearly flat surfaces. When the operator sees a cut/fill value of −0.10', it means the bucket tip is 0.10' above the surface directly below the bucket.

Perpendicular Guidance

The distance is measured at 90° to the surface slope — perpendicular to the surface rather than straight down. This is the correct mode for working on slopes. On a steep slope, vertical guidance understates the actual distance between the bucket and the surface because it measures straight down rather than along the shortest path to the surface. Perpendicular guidance measures the true distance.

> **When to Use Each Mode**
>
> Use Vertical guidance for flat pads, level bottoms, and any work where the surface is approximately horizontal. Switch to Perpendicular guidance when grading slopes, embankments, or any surface that is significantly off-horizontal. Perpendicular guidance on a flat surface produces the same result as vertical — the difference only becomes meaningful on slopes.

The same Vertical / Perpendicular toggle exists for the Surface Offset tool. If you are using a surface offset on a slope, set both the guidance mode and the offset mode to Perpendicular for consistent results.

12 Surface Offset Tool

The Surface Offset tool applies a constant vertical or perpendicular offset above or below the design surface. The offset creates a virtual working surface that the operator grades to instead of the original design surface.

When an offset is active, the work screen displays the original design surface as a dashed line and the offset surface as a solid line. The cut/fill guidance references the offset surface, not the original.

Common Uses

- Subgrade preparation — offset below the finished surface by the pavement or base-course thickness to grade the subgrade.
- Over-excavation — offset below the design to remove a defined depth of unsuitable material before placing fill.
- Form-grade — offset above the design by the form height to set forms at the correct elevation.

Enter the offset as a positive value (above the surface) or negative value (below the surface). The offset applies globally to the active surface until it is cleared or changed.

> **Real-World Example: Grading Subgrade for a Parking Lot**
>
> Your design surface is the finished asphalt elevation. The paving spec calls for 6 inches of aggregate base and 4 inches of asphalt — 10 inches total below finished grade. Set the surface offset to −0.833' (−10 inches). The work screen now shows the original design as a dashed line and guides the operator to the subgrade elevation 10 inches below it. When the LED Bargraph shows on-grade, the operator is at the correct subgrade depth. When paving is complete and the offset is cleared, the same design surface is ready for finish-grade verification without reloading anything.

13 Status Bar

The Status Bar is an optional display element that shows detailed position and accuracy information at the bottom or top of the work screen. Tap the Status Bar icon on the toolbar to toggle it on or off.

Information Displayed

Field	What It Shows
Bucket Coordinates	The computed Northing, Easting, and Elevation of the bucket tip in the active coordinate system.
GNSS Coordinates	The raw Northing, Easting, and Elevation reported by the Spotman receiver.
Heading	The current heading of the machine in degrees.
Horizontal Accuracy	The horizontal position accuracy of the GNSS fix, in the current length units.
Vertical Accuracy	The vertical position accuracy of the GNSS fix, in the current length units.

The accuracy values reflect the quality of the current GNSS fix. During an RTK Fix, horizontal accuracy is typically 0.03' or better and vertical accuracy is typically 0.05' or better. If the fix degrades (Float or Autonomous), the accuracy values increase and the system should not be used for precision grading.

14 Surface Display Options

The work screen provides several options for how the design surface is rendered. These do not change the surface data — they change how it appears on screen to improve readability in different conditions.

Option	Effect
Triangle Mesh / Solid Surface	Toggle between displaying the surface as a wireframe triangle mesh (showing the individual triangles that make up the TIN surface) and a solid shaded surface. Triangle mesh is useful for verifying surface data quality; solid is easier to read during production work.
Surface Shadows	Adjust the shading applied to the surface to enhance depth perception. Stronger shadows make elevation changes more visible in the 3D View.
Grid Overlay	Overlay a reference grid on the surface in the 3D View. The grid provides spatial scale and makes it easier to judge distances and slopes visually.

15 Zoom & Focus Controls

The zoom and focus controls determine how the view follows the machine and at what magnification the work is displayed.

Auto Zoom vs. Manual Zoom

Mode	Behavior
Auto Zoom	The view automatically follows the bucket tip and adjusts the zoom level to keep the bucket and the nearby design surface in frame. This is the default mode and works well for most excavation tasks.
Manual Zoom	The operator sets the zoom level and the view does not auto-adjust. Use Manual zoom when you need a fixed field of view — for example, when monitoring a specific area of the surface while the bucket moves in and out of frame.

Zoom levels can be edited independently for each view panel in a Split or Triple layout. This allows the operator to have a tight zoom on the Side View for precision grading while maintaining a wide zoom on the Map View for overall position context.

Focus: Bucket vs. Design

The Focus toggle determines what the view centers on. In Bucket focus, the view follows the bucket tip as it moves. In Design focus, the view centers on the design surface and the machine moves through the frame. Bucket focus is standard for active digging. Design focus is useful when reviewing a surface or checking grades at a location the bucket has not yet reached.

16 What's Next

With Volume 6 complete, the operator understands the work screen layout, how to access and use every toolbar icon, how to configure screen layouts and view types, and how to set guidance modes and surface display options for different types of work.

Volume 7: Projects, Coordinate Systems & Data Management

Volume 7 covers creating projects, loading coordinate systems and geoids, importing design files (DXF and LandXML), managing layers, using the Coordinate Shift tool, and exporting project data.

Volume 8: Field Operations

Volume 8 covers daily field operations — 2D, 2D+, 2D Project, and 3D workflows, Dynamic Laser Catch, Swing Boom operation, Smart Tape measurements, surface creation, and the daily startup-to-shutdown routine.

Need Help?

Contact your iDig dealer for assistance with interface configuration or work screen setup. For real-time support, use the Remote Access feature described in Volume 1 Section 09.

iDig Connect Software

User Guide

Volume 7: Projects, Coordinate Systems & Data Management

Projects, Coordinate Systems, Geoids, Site Calibration, Design Import, Layers & Coordinate Shift

Version 1.0
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Prepared by iDig North America

This is Volume 7 of 8 in the iDig Connect User Guide series.

01 What Is a Project?

A project in iDig Connect is a container that organizes all the data for a specific job. Each project holds a coordinate system (or site calibration), imported design files, layers, surfaces, and any points or lines the operator creates during fieldwork. When an operator switches between projects, the entire data context changes — the coordinate system, the design surfaces, and the layer visibility all update to reflect the selected project.

Projects allow an operator to work on multiple jobs from the same Control Box without data from one job interfering with another. A residential foundation project and a commercial site-grading project can coexist on the same Control Box, each with its own coordinate system, design files, and field-created data.

02 Creating a New Project

Projects are created from the Layer menu, which is accessed from the work screen.

Step-by-Step: Create a New Project

1. **Tap anywhere on the work screen to reveal the toolbars.**
   The left and right toolbars appear.

2. **Tap the Layer icon.**
   The Layer menu opens, showing the current project's layers and the project selection dropdown.

3. **Select Start a New Project.**
   A dialog prompts for the project name.

4. **Enter a name for the project and confirm.**
   Use a descriptive name that identifies the job — for example, the project name, lot number, or address. The project is created and becomes the active project.

5. **Configure the coordinate system.**
   iDig automatically loads the last-used coordinate system into the new project. If this project uses a different coordinate system, load the correct one now (see Section 03). If this project uses a site calibration, load it instead (see Section 05).

Real-World Example: Starting a New Subdivision Lot

An operator finishing a foundation on Lot 12 needs to move to Lot 13, which uses the same coordinate system but a different design file. The operator creates a new project named "Lot 13 — Foundation", and iDig carries the coordinate system forward from Lot 12 automatically. The operator then imports the Lot 13 DXF (Section 06) and begins work. The Lot 12 project and its data remain intact and can be recalled at any time from the project dropdown.

03 Coordinate Systems Explained

GNSS receivers measure locations on Earth using latitude and longitude, but construction projects work in northing, easting, and elevation coordinates expressed in feet or meters. A coordinate system is the mathematical definition that converts between GNSS latitude/longitude/height and the project's local northing/easting/elevation.

There are hundreds of predefined coordinate systems available in iDig Connect. Most US construction projects use an NAD83 State Plane coordinate system — each state (and some states are divided into zones) has its own projection that minimizes distortion for that geographic area.

Step-by-Step: Select a Coordinate System

1. **From the Layer menu, tap the Settings icon.**
   The project settings screen opens.

2. **Select Coordinate System.**
   The Correction Method screen opens, showing three options: Code EPSG, Site Calibration, and Custom.

3. **Select Custom.**
   The custom coordinate system configuration screen opens.

4. **Choose USA_NAD83-2011 and check the box for Nearby.**
   This filters the available state plane zones to those near the machine's current GNSS position. The system displays only the coordinate systems that apply to your geographic area, making it easy to find the correct zone without searching by name or EPSG code.

5. **Select the correct state plane zone from the filtered list.**
   Verify the zone name matches your project. Your project engineer or surveyor can confirm the correct zone. The geoid is loaded automatically based on the coordinate system selected.

6. **Tap Apply.**
   The coordinate system and geoid are now active for this project. The bucket and GNSS coordinates displayed on the work screen reflect the selected coordinate system.

Critical: Use the Correct Coordinate System

Loading the wrong coordinate system will cause every coordinate displayed by iDig to be offset from the project's control. The design files will not align with the ground, and the machine's position will not match the surveyor's stakeout. Confirm the coordinate system with your project engineer or surveyor before loading it.

04 Understanding the Geoid

A geoid is a model of the Earth's gravitational surface. It converts the GNSS receiver's ellipsoidal height (a mathematical height above the reference ellipsoid) into an orthometric elevation (the elevation used on construction plans — height above mean sea level). Without a geoid, the elevations displayed by iDig would not match the project's survey elevations — the difference can be 50 feet or more depending on location.

When you select a coordinate system using the Custom method (Section 03), iDig automatically loads the correct geoid for that coordinate system. There is no separate step to load the geoid — it is handled as part of the coordinate system selection.

Geoid files are downloaded to the Control Box via Settings > Software Update > Coordinate Systems (see Volume 1 Section 07). If the required geoid is not available on the Control Box, download it through the Software Update before selecting the coordinate system.

05 Loading a Site Calibration (Localization) File

A site calibration (also called a localization) is an alternative to loading a predefined coordinate system and geoid. Instead of using a published state plane projection, a site calibration compares known survey control points on the ground with their GNSS-measured positions and computes a custom transformation that aligns the two. This is common on projects that use a local coordinate system or assumed coordinates rather than state plane.

Site calibration files are created in iPoint (using the Site Calibration workflow) and exported as a file that can be loaded into iDig Connect via USB. A separate iPoint tutorial covers how to perform the site calibration and export the file.

Step-by-Step: Load a Site Calibration

1. **From the Coordinate System screen, select Site Calibration.**
The Site Calibration import screen opens.

2. **Insert the USB stick that contains the site calibration file.**
The file was exported from iPoint during the site calibration process.

3. **Select Import.**
The system reads the USB and lists available site calibration files.

4. **Select the site calibration file and tap Open.**
The calibration details appear, showing the accuracy of each control point used in the calibration.

5. **Review the point accuracy. Toggle individual points on or off if needed.**
If a point has poor accuracy (a high residual), you can toggle it off to exclude it from the calibration. The system recomputes the calibration with the remaining points.

6. **When satisfied, tap Load.**
The site calibration is now active for this project. The system uses the custom transformation instead of a predefined coordinate system and geoid.

When to Use a Site Calibration vs. a Coordinate System

Use a predefined coordinate system (NAD83 State Plane) when the project plans are in state plane coordinates and the surveyor's control is tied to the published datum. Use a site calibration when the project uses local or assumed coordinates, when the surveyor has established project-specific control points, or when the project requires a higher degree of local accuracy than the published state plane projection provides.

06 Importing Design Files (DXF & LandXML)

Design files provide the surfaces, lines, and points that define the project's grading plan. iDig Connect imports DXF and LandXML file formats — the two most common design file formats used in civil construction.

Step-by-Step: Import a Design File

1. **From the Layer menu, tap the Settings icon.**
The project settings screen opens.

2. **Select Input File > Import File.**
The file browser opens, showing available sources (USB and Cloud).

3. **Browse to the design file on USB or Cloud and select it.**
Navigate to the folder containing the DXF or LandXML file. If using Cloud, the cloud folders configured in Volume 1 Section 10 appear alongside USB storage.

4. **Set the units to match the design file.**
If the design file was created in US Survey Feet, set the import units to US Survey Feet. A unit mismatch will cause the design to import at the wrong scale — a common and difficult-to-diagnose problem.

5. **Select the layers to import.**
The file may contain many layers. Select only the layers needed for the current work — importing unnecessary layers clutters the display and slows the system.

6. **Set the Axis setting.**
The default is Auto: East-North, which is correct for most US civil design files. Change this only if the design file uses a non-standard axis convention.

7. **Confirm the import.**
The design file is imported into the active project. The imported layers appear in the Layer menu and the design surfaces appear on the work screen.

Critical: Match the Import Units to the File

If the design file was created in US Survey Feet and you import it in Meters (or vice versa), every dimension in the design will be wrong by a factor of roughly 3. The design will appear impossibly large or impossibly small on the work screen. If the imported design does not align with the machine's position or appears at the wrong scale, the first thing to check is the import unit setting.

07 Layer Management

Layers organize the data within a project. Each imported design file creates one or more layers, and the operator can create additional layers during fieldwork. Understanding layers is essential for working efficiently with complex designs.

2D Layers vs. 3D Layers

Layer Type	Description
2D Layers	Contain location data only — lines, points, and boundaries without elevation information. 2D layers are useful for plan-view reference (property lines, building outlines, utility locations) but cannot be used for depth guidance because they have no elevation.
3D Layers	Contain location and elevation data — surfaces, contours, and design grades with full northing/easting/elevation information. 3D layers are required for cut/fill guidance. When you select a surface for guidance, it must be on a 3D layer.

Layer Controls

The Layer menu is accessed by tapping the Layer icon on the work screen. Tap the arrow next to 2D Layers or 3D Layers to expand each category and see the individual layers.

Control	Function
Toggle Visibility	Turn the layer on or off in the work screen display. Toggle on only the layers you need to see — hiding unnecessary layers reduces screen clutter and improves performance.
Layer Options	Opens a menu to delete the layer, change the layer's display color, or edit data on the layer.
Locked Layer	Imported layers (from DXF or LandXML files) are automatically locked. Locked layers cannot be edited — they can only be toggled on or off. This prevents accidental modification of the design.
View Entities	Lists all the individual entities (points, lines, surfaces) on the selected layer.
Select for Guiding	Selects a 3D surface on the layer as the active guidance surface. The cut/fill display references this surface.
Discard	Removes the layer from the project. This cannot be undone.

08 Coordinate Shift Tool

The Coordinate Shift tool adjusts the coordinate system by comparing the machine's current position against a known control point. If the bucket coordinates do not match the control point's published coordinates, the operator enters the correct values and the system applies a shift to align the two.

This is used when the machine arrives on site and needs to verify its position against existing survey control before beginning work. It is also used when the coordinate system is close but has a small offset — common after loading a new site calibration or when the NTRIP corrections introduce a slight shift compared to the project's local control.

Step-by-Step: Apply a Coordinate Shift

1. **Place the bucket focus point precisely on a known control point.**
   The control point must have published Northing, Easting, and Elevation values.

2. **Tap the Coordinate Shift icon on the toolbar.**
   The current bucket coordinates are displayed.

3. **Compare the displayed coordinates against the control point's published values.**
   Note the difference in Northing, Easting, and Elevation.

4. **Edit the Easting to match the control point.**
   Tap the Easting field, enter the control point's published Easting value, and confirm.

5. **Edit the Northing to match the control point.**
   Tap the Northing field, enter the control point's published Northing value, and confirm.

6. **Edit the Elevation to match the control point.**
   Tap the Elevation field, enter the control point's published Elevation value, and confirm.

7. **Verify the shift.**
   The displayed coordinates should now match the control point. Move the bucket to a second control point to verify the shift is consistent across the site.

Real-World Example: Checking In on a Subdivision

An operator arrives on a new subdivision lot. The surveyor has set a control point (a nail in the curb) at N 51,604.00, E 964,357.35, Elev 5,280.12. The operator places the bucket on the nail, opens the Coordinate Shift tool, and sees the system reads N 51,604.03, E 964,357.31, Elev 5,280.08. The operator enters the published values, and the system applies a shift of −0.03 in Northing, +0.04 in Easting, and +0.04 in Elevation. The machine is now aligned to the project control.

09 Switching Between Projects

The active project is shown in the project dropdown at the top of the Layer menu. To switch to a different project, tap the dropdown and select the project you want to work on. The coordinate system, design files, layers, and all project-specific data update immediately.

Switching projects does not delete or modify the previous project. All data in the previous project is preserved and can be recalled at any time.

10 Import/Export Projects

Complete projects — including coordinate systems, layers, design files, and field-created data — can be exported to USB and imported onto other Control Boxes. This is how project data is transferred between machines in a fleet or backed up for safekeeping.

Exporting a Project

1. **From the Layer menu, tap the Settings icon.**
   The project settings screen opens.

2. **Select Export.**
   The export dialog opens.

3. **Name the export file and choose the destination (USB).**
   Use a descriptive filename that includes the project name and date.

4. **Confirm the export.**
   The project is exported to the USB stick as a complete package.

Importing a Project

1. **Insert the USB stick containing the exported project.**
   Or navigate to the project file on Cloud storage.

2. **From the Layer menu, tap the Settings icon and select Import.**
   The file browser opens.

3. **Select the project file and confirm.**
   If a project with the same name already exists, the system prompts to resolve the name conflict — rename the incoming project or overwrite the existing one.

4. **Verify the coordinate system after import.**
   Confirm the imported project's coordinate system matches the expected system for this jobsite. If the exporting machine was using a different coordinate system or site calibration, the design data may not align correctly with the new machine's position.

Transferring Projects Across a Fleet

On a multi-machine job, one machine can be set up with the correct coordinate system and design file, then export the complete project to USB. Each additional machine imports the same project file and is immediately working from the same data. This eliminates the need to configure coordinate systems and import design files on every machine individually.

11 What's Next

With Volume 7 complete, the operator understands how to create projects, load coordinate systems and geoids, import site calibrations, import design files, manage layers, apply coordinate shifts, and transfer projects between machines.

Volume 8: Field Operations

Volume 8 covers daily field operations — 2D, 2D+, 2D Project, and 3D workflows, Dynamic Laser Catch, Swing Boom operation, Smart Tape measurements, surface creation, and the daily startup-to-shutdown routine.

Need Help?

Contact your iDig dealer for assistance with coordinate systems, design file imports, or project configuration. For real-time support, use the Remote Access feature described in Volume 1 Section 09.

iDig Connect Software

User Guide

Volume 8: Field Operations

2D, 2D+, 3D Workflows, Laser Catch, Swing Boom, Surface Creation, Profile Templates & Stakeout

Version 1.0
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Prepared by iDig North America

This is Volume 8 of 8 in the iDig Connect User Guide series.

01 Working in 2D Mode — Overview

2D mode provides depth, distance, and slope guidance using wireless angle sensors on the boom, stick, bucket and chassis. The system measures the bucket tip's position relative to a bench reference — either a grade stake, a rotating laser beam or the GNSS receiver — and displays the cut/fill to the operator through the LED Bargraph and the on-screen display.

2D mode is the foundation of iDig Connect. Every system ships with 2D capability, and the 2D+ and 3D modes build on the same sensor geometry. Understanding 2D operation is essential even if your system is licensed for 3D, because 2D mode remains the right tool for certain tasks — working on digging flat pads where you know the extents of the excavation, digging sloped trenches that you know where they go, and more.

02 Dynamic Laser Catch — Operation

Dynamic Laser Catch allows the excavator to capture a reference elevation from a rotating laser beam while the machine is moving. The operator sweeps the boom through the laser beam, and the system sets the grade reference automatically — no need to stop inside the beam and hold position.

Establishing the 1st Laser Strike

The 1st Laser Strike tells the system what the laser height is relative to grade. There are two methods.

Method	When to Use	Procedure
Reference Stake	You have a stake or reference point at the proposed grade on your project.	Place the center of the bucket on the reference point. Tap the benchmark icon and enter the cut/fill to grade (enter 0 if the bucket tip is on the proposed grade). Then position the laser receiver to catch the rotating laser.
Known Laser Height	You have measured the laser height above grade using a grade rod.	Enter the laser height value directly. The system computes the grade reference from the entered laser height.

After establishing the reference, position the laser receiver to catch the rotating laser beam. The system shows a Laser Catch countdown. The laser receiver indicator must show a green check (stable signal) before the countdown completes.

Working After the 1st Strike

Once the 1st Laser Strike is established, the system provides cut/fill guidance. Two options for adjusting the reference:

- Laser Height icon — change the laser height above the proposed surface.
- Change Target icon — enter a surface offset to shift the guidance surface up or down from the current reference.

Re-Benching After Moving the Machine

When the machine tracks to a new position, re-bench by passing the stick combo sensor through the rotating laser beam. The system catches the beam and re-establishes the grade reference at the new location. The 1st Laser Strike remains intact — re-benching simply updates the laser catch at the machine's current position.

The only time you delete the 1st Laser Strike is when you need to change the laser reference-to-grade value — for example, if the laser transmitter has been moved to a different height or a different benchmark. In that case, tap the delete icon to clear the 1st Laser Strike and re-establish it with the new reference value.

Real-World Example: Foundation Footing with a Laser

An operator is digging a foundation footing at a depth of 4 feet below the laser reference. The laser is set on a tripod at a known height above the proposed finished floor. The operator enters the laser height, catches the beam, and iDig provides continuous depth guidance as the operator works around the perimeter. Each time the machine tracks to a new position along the footing, the operator re-catches the laser and continues.

03 Swing Boom — Operation

The Swing Boom feature uses internal gyroscopes to track the boom's horizontal swing angle. This allows the system to provide accurate grade guidance when the boom is swung off-center — essential for working in tight areas, around utilities, or along walls where the cab cannot rotate.

Initialize on Startup

Each time the system is powered on, the swing boom must be initialized. Swing the boom fully to the right or fully to the left, then press the green check on the swing boom icon. The system calibrates its zero point from this initialization.

The 5-Minute Drift Timer

Because gyroscopes naturally drift over time, the swing boom function maintains accuracy for approximately 5 minutes after the feature is enabled. A timer on the work screen shows the remaining time. To manage drift effectively:

- Initialize the swing boom on startup.
- Swing the boom to the desired working angle.
- Turn the swing feature off (press the icon to remove the green check). This pauses the 5-minute timer and preserves the remaining time.
- When you need to reposition the boom, turn the feature back on, swing to the new angle, and turn it off again.

> **Critical: Do Not Swing the Boom with the Feature Disabled**
>
> When the swing boom feature is off, the system does not track the boom's horizontal position. If the operator physically swings the boom while the feature is disabled, iDig will provide inaccurate guidance because the system does not know the boom has moved. Only swing the boom when the feature is enabled (green check visible).

04 Introduction to 2D+

2D+ adds GNSS elevation reference and machine positioning to the 2D sensor-based guidance. With a Spotman receiver connected and in RTK Fix, the operator can track the machine across the site without re-benching — the GNSS provides a continuous elevation reference wherever the machine moves.

2D+ requires a Spotman GNSS receiver, RTK corrections (via NTRIP or a local base station), and a completed GNSS 3D calibration (Volume 4). All tiers of Connect license support 2D+ mode — no additional license is required.

05 Switching Between Laser and GNSS Reference

The work screen provides a toggle icon to switch between Laser reference and GNSS reference. In Laser mode, the system uses the rotating laser beam caught by the combo sensor. In GNSS mode, the system uses the Spotman receiver for elevation. The operator can switch between the two at any time during operation.

06 Setting a Benchmark Elevation in 2D+

In 2D+ mode with GNSS reference, the operator sets a benchmark elevation by placing the bucket focus point on a known project benchmark and entering the published elevation.

1. **Place the bucket focus point precisely on a project benchmark.**
   The benchmark must have a known published elevation.

2. **Tap the benchmark elevation icon on the work screen.**
   The elevation entry dialog opens.

3. **Enter the benchmark's published elevation and press Apply.**
   The system adjusts the GNSS-derived elevation to match the benchmark. The bucket elevation now reads the correct value wherever the machine moves on site.

07 Smart Tape Tool

The Smart Tape tool measures the distance between two points using the bucket tip or the GNSS receiver on a rod. It displays horizontal distance, slope distance, vertical distance, and slope percentage in real time as the operator moves from the first point to the second.

1. **Tap the Smart Tape icon on the toolbar.**
   The Smart Tape display activates.

2. **Tap the reset field once to zero the digital tape measure.**
   The first point is set at the current bucket or GNSS position.

3. **Move the bucket or GNSS rod to the second point.**
   The display updates in real time showing horizontal distance, slope distance, elevation difference, and slope percentage as you move.

Real-World Example: Checking a Pipe Run Between Two Structures

The superintendent asks you to verify the distance and fall between two manholes before the pipe crew arrives. Place the bucket tip on the rim of the first manhole and reset the Smart Tape. Track the machine to the second manhole and place the bucket on that rim. The Smart Tape reads 187.3 feet horizontal, 2.8 feet of fall, and −1.5% slope. The plan calls for 185 feet at −1.5% — the distance is slightly long but the slope is correct. The superintendent has what he needs to approve the pipe run without waiting for the surveyor.

08 Height Alarm (Elevation Alert)

The Height Alarm provides an audible and visual warning when the bucket tip reaches a user-defined elevation. Common uses include guarding against over-digging into a utility zone, preventing the bucket from striking an overhead obstruction, and alerting the operator when reaching a hard-bottom design grade.

09 Setting Depth for Level Grading

For a level grading project — digging a flat bottom at a uniform depth — the operator sets a target depth from a known reference point.

1. **Tap the Set Depth icon on the toolbar.**
   The depth entry screen opens.

2. **Place the bucket on a known reference point.**
   This is typically a grade stake or a surveyed benchmark.

3. **Enter the desired cut depth and press Apply.**
   The system creates a flat target surface at the entered depth below the reference point. The LED Bargraph and on-screen cut/fill display now guide the operator to that target.

10 Setting Depth & Slope for Utility Trenching

For utility trenching, the operator sets both a depth and a slope. The system creates a sloped target surface that the operator follows along the trench alignment.

1. **Tap the Set Depth & Slope icon on the toolbar.**
   The depth and slope entry screen opens.

2. **Enter the trench depth from the reference stake.**
   This is the depth of the trench bottom at the starting point.

3. **Enter the slope value.**
   Slope sign convention: negative values slope downward from the bucket toward the cab. For example, a storm sewer at −3% slopes downward at 3% in the direction away from the operator.

4. **Choose the slope direction.**
   Three options: Along Boom Axis (slope follows the boom direction), Two-Point Measurement (the operator measures the bucket position at two points to define the slope direction), or Azimuth/Bearing (the operator enters a compass bearing for the slope direction).

5. **Press Apply.**
   The system creates the sloped target surface. The LED Bargraph guides the operator along the slope as the trench progresses.

Real-World Example: Storm Sewer Trench at −3%

A 36-inch storm sewer runs 200 feet at −3% from an inlet structure to a manhole. The operator positions the machine so the boom is aligned with the direction of the trench — this is critical, because Along Boom Axis uses the boom's current orientation to define the slope direction. The operator places the bucket on the invert stake at the inlet, enters the starting depth (6.5 feet from the top of the stake to the pipe invert), enters −3% slope, confirms the boom is pointing down the trench alignment, selects Along Boom Axis, and presses Apply. As the operator trenches toward the manhole, the LED Bargraph shows on-grade as long as the trench bottom follows the −3% slope. At the manhole, the operator checks the invert elevation against the plan — if it matches, the slope was held correctly over the full 200-foot run.

11 Working in 3D Mode — Overview

3D mode provides full machine guidance using the GNSS receiver for positioning and imported or field-created design surfaces for cut/fill reference. The machine's bucket-tip position is displayed in all four view types (Side, Front, Map, 3D) against the design surface, and the operator sees continuous cut/fill values as the bucket moves.

3D mode requires a Spotman GNSS receiver in RTK Fix, a 3D license (CT151), a completed GNSS 3D calibration, and a project with a design surface loaded and selected for guidance.

12 Your Daily 3D Workflow

This is the shift-to-shift routine for a 3D operator on every project day. It covers startup, verification, production work, and shutdown.

Pre-Shift — Before Climbing In

- Walk the machine. Inspect every sensor plate for damage, loose adhesive, or hydraulic fluid. Confirm sensors are clipped in and the GNSS receiver is seated on its mount.
- Verify the GNSS has a clear sky view.
- Confirm sensor charge. Wireless sensors should show adequate battery in Settings > Wireless Sensors.

Startup — First 5 Minutes in the Cab

- Power on the Control Box. Let the system boot fully.
- Confirm the correct machine profile and bucket are loaded.
- Connect to the GNSS receiver. Basic Settings > GNSS Receiver. Verify RTK Fix on the Data tab.
- Resolve heading accuracy. Rotate the cab slowly until the heading indicator turns green.
- Open the correct project. Confirm the coordinate system, geoid or site calibration, and design layers all display correctly.

First-Dig Verification

- Place the bucket on a known survey control point. Verify the displayed coordinates match the published values within tolerance.
- If the coordinates do not match the control point within tolerance, do not proceed. Troubleshoot the cause — the most likely issue is a base station setup or configuration problem. Verify the base station is on the correct benchmark, that the correction format is correct, and that the coordinate system in iDig matches the project. Do not dig until the coordinates agree with the control.
- Select the target design surface for guidance. Confirm it displays correctly in the work views.

Working the Shift

- Dig to the design surface. Use the LED Bargraph as peripheral reference and keep eyes on the work.
- With 3D GNSS, guidance stays accurate when the machine tracks. Re-benching is not required after each move.
- Periodically check accuracy by placing the bucket on a known point and comparing coordinates.
- As-built important features. Use Create CAD > Create Points to record installed inverts, pipe centerlines, manhole rims, and any unexpected conditions.

Swapping Buckets or Changing Tasks

- Use the Attachment List icon to switch to a different bucket calibration. Verify on a control point after switching.
- For finish grading, tighten the LED Deadband in Work Settings or enable the Surface Offset Tool for a thin pass.
- Working under obstructions with no sky view? Switch to 2D+ mode and bench off a known point until clear.

End of Shift

- Back up any new data. Export the project to USB or cloud (Volume 7 Section 10).
- Park with the GNSS receiver in clear sky for faster RTK acquisition the next morning.

13 2D Project Mode — Limitations

2D Project mode provides design-file-based guidance in 2D — a step up from bench-only 2D+ operation but with specific limitations compared to full 3D mode.

Limitation	Detail
DXF Import	Only 1 DXF file can be imported per project.
Maximum DXF Size	150 m × 150 m (approximately 500 ft × 500 ft).
Maximum Projects	5 projects can be stored on the Control Box.
3D View	Not available. 2D Project provides Side View, Front View, and Map View only.
Work Tool Settings	Limited compared to full 3D mode.

14 Creating a Flat Surface

The flat surface creation tool builds a level surface on the Control Box without importing a design file. This is the simplest surface type — a horizontal plane at a specified elevation.

1. **Tap the Surface Creation icon on the work screen toolbar.**
   The surface creation wizard opens.

2. **Choose the reference point: bucket focus point or GNSS on a rod.**
   The surface elevation is set relative to this reference.

3. **Enter the side length of the surface (e.g., 100 feet).**
   This creates a square surface centered on the reference point.

4. **Enter an elevation offset if needed.**
   A negative offset places the surface below the reference point. Zero creates the surface at the reference elevation.

5. **Set Select for Guidance to Yes.**
   The surface is immediately active for cut/fill guidance.

6. **Confirm.**
   The flat surface is created and displayed on the work screen.

15 Creating a Single-Slope Surface

The single-slope surface tool creates a surface that slopes in one direction — useful for drainage pads, leach fields, and any work requiring a consistent grade in one axis.

1. **Tap the Surface Creation icon and select the slope surface option.**
   The slope surface wizard opens.

2. **Choose the reference point: bucket center or GNSS on a rod.**
   The surface slope originates from this reference.

3. **Enter the side length and elevation offset.**
   Same as the flat surface — defines the size and vertical offset from the reference.

4. **Enter the longitudinal slope as a percentage.**
   Slope sign convention: negative values slope downward from the bucket toward the cab. Positive values slope upward.

5. **Choose the slope direction.**
   Along Boom Axis, Two-Point Measurement, or Azimuth/Bearing — same options as the depth and slope trenching tool (Section 10).

6. **Set Select for Guidance to Yes and confirm.**
   The sloped surface is created and active for guidance.

Real-World Example: Septic Leach Field at 2%

A septic system requires a leach field graded at 2% over an 80-foot run. The operator places the bucket at the high end of the field, enters an 80-foot side length, −4 feet elevation offset (depth below the reference), and a 2% slope along the boom axis. The surface is created instantly and the operator grades the field using the LED Bargraph for continuous feedback.

16 Creating a Dual-Slope Surface

The dual-slope surface tool creates a surface that slopes in two directions simultaneously — a longitudinal slope and a cross slope. This is used for retention basins, parking lots, and any pad that requires drainage in two axes.

The procedure is the same as a single-slope surface (Section 15) with the addition of a cross-slope entry. Enter both the longitudinal slope and the cross slope as percentages, using the same sign convention (negative = downward from bucket toward cab for longitudinal; negative = downward to the right for cross slope).

17 Creating a Custom Surface

Custom surfaces are created by measuring points and lines in the field and building a surface from the measured geometry - all done directly on the Control Box. The operator measures points using the bucket tip or the GNSS receiver on a rod, edits elevations to achieve design grade, creates polygons (closed shapes) or polylines (open lines), and then generates a surface from the linework.

This is the most flexible surface creation method — it can produce any shape, including irregular boundaries and slopes.. It is also the most involved, because the operator must measure enough points to define the surface accurately.

18 Profile Templates — Cross-Section Design

Profile Templates allow the operator to design a cross-section shape and extrude it along a 3D line to create a surface. This is how roads, ditches, channels, and other linear features are built in iDig Connect without importing a design file.

Building a Cross-Section Template

A cross-section template is built element by element. Each element is defined by either Delta X/Y coordinates or Slope and Length. Elements are added sequentially from left to right (or center to edge), and the Mirror function creates a symmetric opposite side automatically.

Applying the Template to a 3D Line

Once the cross-section template is complete, it is extruded along a 3D line (imported from a DXF file or measured in the field). The resulting surface follows the 3D line's horizontal and vertical alignment with the cross-section shape applied at every point along the line. Name the surface, assign it to a 3D layer, and select it for guidance.

Real-World Example: Rural Road with Ditches

A rural road design calls for two 12-foot travel lanes at −2% crown, 4-foot shoulders at −4%, and V-ditches at 3:1 slopes with a 5-foot flat bottom. The operator creates the cross-section using Slope/Length elements: 12 feet at −2% (travel lane), 4 feet at −4% (shoulder), then the ditch profile. The Mirror function creates the opposite side. The template is applied along the road centerline (imported as a 3D polyline), producing a complete road surface ready for grading guidance.

19 Measuring Points

Points are measured using Create CAD > Create Points. The operator creates a storage layer, selects the measurement source (bucket focus point or GNSS receiver on a rod with height entry), and saves each point with a name. Measured points can be used for as-built documentation, stakeout reference, or surface creation.

20 Measuring Lines

Lines are measured using Create CAD > Create Line. The operator chooses Polygon (closed shape) or Polyline (open line), then measures sequential points using the + icon. Each point is added to the line in sequence. Save the line and view the results in Map View.

21 Navigate to Points

To navigate to a point, open the Layer Manager, select the layer containing the point, open Menu > Edit Entities, highlight the point, and select Open Actions > Add to Guiding. The work screen displays horizontal and vertical guidance directing the operator to the point. A shortcut is available: tap the point directly in Map View to add it to guidance.

22 Using Lines for Guidance

To use a line for guidance, tap the line in Map View and select Add to Guiding. The work screen displays horizontal guidance (distance and direction to the line) and vertical guidance (cut/fill to the line's elevation) as the operator moves the bucket toward the line.

23 Staking Surfaces

To stake to a surface, open the Layer Manager, select the layer containing the surface, and choose Select for Guiding. The work screen displays cut/fill guidance to the surface at every bucket position. For combined horizontal and vertical guidance, add a centerline node (a 3D line on the surface) to provide the system with a reference line for horizontal offset guidance in addition to the cut/fill.

24 Guide Complete

This concludes the iDig Connect User Guide series. Volumes 1 through 8 cover the complete lifecycle of an iDig Connect system — from unboxing and licensing through hardware installation, GNSS configuration, machine calibration, system settings, the user interface, project management, and daily field operations.

Appendices

Two appendices are planned for addition to the guide series: Appendix A (Troubleshooting) and Appendix B (Reference Tables). These will be published as separate documents and cross-referenced throughout the main volumes.

Need Help?

Contact your iDig dealer for assistance with any aspect of the iDig Connect system. For real-time support, use the Remote Access feature described in Volume 1 Section 09.

Appendix A
Troubleshooting

iDig Connect systems — diagnostic guidance and common-issue resolution

[Content to be provided.]
This appendix is reserved for troubleshooting procedures covering the iDig Connect Control Box, Bluetooth sensors, Spotman GNSS receiver, iPoint, calibration, and field-operation issues referenced throughout Volumes 1–8. Content will be added in a future revision.

Appendix B

Parts & Accessories

iDig Connect systems, components, Spotman GNSS, iPoint, and accessories · 2026 part number reference

Contents

B.1 How to Use This Appendix

This appendix is the authoritative parts reference for the iDig Connect product line. It lists every component that ships with or can be added to a Connect system — the Control Box, the sensors, the plates, the Spotman GNSS receiver, iPoint, cables, calibration tools, and the accessories and spare parts that complete a full installation.

This is a part number reference, not a price list. For current pricing, availability, and order placement, contact your iDig dealer.

iDig Touch parts and Touch-only accessories are not included here. This appendix covers only the Connect line, the Spotman GNSS receiver, iPoint, and their shared accessories.

The Three Ways to Use This Appendix

- **By system.** If a customer is buying or specifying a complete Connect system, start with §B.2. Each complete system listing details what's inside the bundle, so an estimator can confirm at a glance what's included before adding extras.
- **By component.** If you need a single component — a replacement bucket sensor, an extra plate kit, a Big Combo sensor for a machine already in service — §B.4 through §B.12 are organized in the order the component appears during a typical installation: sensor kits, then plates, then extra machine kits, then GNSS, cables, calibration tools, and accessories.
- **By part number.** If you already know the part number and want to look it up, §B.15 is an alphabetical index of every part in this appendix. The index lists each part with its name and the section it appears in.

CONFIRM BEFORE YOU ORDER

Confirm with your iDig dealer that the part numbers shown here reflect current inventory before placing a purchase order. Part numbers are stable but occasionally change between annual catalogs — particularly when a component is superseded by a newer generation. The dealer can also confirm current lead times, which vary by component and by time of year.

B.2 Complete Connect Systems

Every Connect system shipping in 2026. Systems are ordered from lowest tier to highest; Big Combo variants sit next to their standard counterparts. System bundles include everything required to install on one machine, and the 2D Project and 3D bundles add the Spotman GNSS receiver and the iPoint software.

Part Number	Description
CT740	**iDig CONNECT 2D+ System** Complete 2D+ system. Includes the BT142 Control Box, BT445 LED Bargraph, two BT407 Bluetooth Mini Sensor Kits (boom and bucket), one BT411 Bluetooth Combo Sensor Kit (stick), one BT408 2D/3D Mini Chassis Sensor Kit (BT476 chassis sensor + plate), cradles, cabling, and the BT485 transport bag.
CT741	**iDig CONNECT 2D+ Big Combo System** Identical to CT740 but substitutes the BT437 Bluetooth Big Combo Sensor Kit (BT147 + XD436 plate) for the stick position. Preferred for machines that work regularly off a rotating laser reference — the Big Combo's larger laser capture window speeds up daily re-benching.
CT745-K	**iDig CONNECT 2D Project System** 2D Project tier bundle. Includes one CT740 2D+ system, the CT150 3D Lite software license (required for 2D Project-level functionality), one CT140T Spotman GNSS receiver with tilt, and the CT141 iPoint software license.
CT746-K	**iDig CONNECT 2D Project Big Combo System** Same as CT745-K but built on the CT741 Big Combo base system.
CT750-K	**iDig CONNECT 3D System** Full 3D tier bundle. Includes one CT740 2D+ system, the CT151 3D software license, one CT140T Spotman GNSS receiver with tilt, and the CT141 iPoint software license.
CT751-K	**iDig CONNECT 3D Big Combo System** Same as CT750-K but built on the CT741 Big Combo base system. This is the highest-specification single-machine Connect configuration.

> **REAL-WORLD TIP**
> The Big Combo configurations (CT741, CT746-K, CT751-K) are worth specifying for any crew that sets up a rotating laser at the start of every shift — the BT147 Big Combo's larger laser-capture window saves meaningful time on daily re-benching. For crews that operate predominantly in GNSS mode, the standard BT145 Combo is the better match. When in doubt, ask the dealer how the crew actually works before specifying.

B.3 Software Licenses

Software licenses are independent of the hardware and can be purchased at any time to upgrade a system in the field. Feature licenses (Swing Boom, Dynamic Laser Catch) do not require a tier upgrade and are added à la carte.

Part Number	Description
CT150	**3D Lite Software License** Software upgrade from 2D+ to 3D Lite (the 2D Project tier). Unlocks single-DXF design work up to 150 m × 150 m.
CT137	**3D Lite → 3D Upgrade License** Software upgrade from 3D Lite to full 3D. Unlocks unlimited design size, multi-DXF handling, and the full 3D viewer. Use this when a customer originally bought 2D Project and needs to step up to 3D.
CT151	**3D Software License** Full 3D software license for CT740 and CT741 systems. This is the direct 2D+ to 3D license (as opposed to going via 3D Lite).
CT145	**Swing Boom Assistance License** Feature license for Swing Boom Assistance. Connect v5 software only.
CT155	**Dynamic Laser Catch License** Feature license for Dynamic Laser Catch. Connect v5 software only.
—	**Skidsteer Attachments Software** Feature license for skidsteer attachment workflows. Connect v5 software only. Part number pending release.

LICENSE UPGRADE PATHS

There are two paths from 2D+ to full 3D. The first is a direct CT151 3D license. The second is an intermediate CT150 (3D Lite) license — which enables 2D Project-tier work with a single DXF — followed later by a CT137 upgrade to full 3D. The intermediate path lets the customer validate the workflow at the 2D Project tier before committing to full 3D. Your dealer can walk through which path makes sense for the customer's current and future work.

B.4 Bluetooth Sensor Kits

Sensor kits bundle the sensor with its matching plate kit (plate, adhesives, cleaning wipes). For a replacement where the plate is still on the machine and serviceable, see §B.10 for bare sensor part numbers.

Part Number	Description
BT407	**Bluetooth Mini Sensor Kit** One BT144 Bluetooth Mini Sensor plus one XD422 Mini Plate Kit (plate, 2 small-format adhesives, 2 cleaning wipes). Used for boom and bucket positions.
BT411	**Bluetooth Combo Sensor Kit** One BT145 Bluetooth Combo Sensor plus one XD412 Combo Plate Kit. The stick-position kit that ships with the standard CT740 system — includes the built-in laser receiver.
BT437	**Bluetooth Big Combo Sensor Kit** One BT147 Bluetooth Big Combo Sensor plus one XD436 Big Combo Plate Kit. The larger-capture-window alternative to BT411 — ships with the CT741 system.
BT408	**2D/3D Mini Chassis Sensor Kit** One BT476 Bluetooth Mini 2D/3D Chassis Sensor plus one XD422 Mini Plate Kit. The chassis sensor used on all current Connect installations. Wired for power via CT425C to the cradle; communicates with the Control Box over Bluetooth.

KIT VS. BARE PART

Each sensor kit in this section bundles the sensor with its matching plate kit. If a plate is already installed on the machine and in good condition, order the bare sensor from §B.11 instead — the plate is permanent and almost always outlasts the sensor. Ordering the full kit when only the sensor is needed means an unused plate kit and a set of adhesives.

B.5 Plate Kits

Plate kits attach to the machine with permanent 3M adhesive. Each kit ships with the plate, the correct adhesive size, and cleaning wipes.

Part Number	Description
XD412	**Combo Plate Kit** One Combo plate, two XD416 large-format adhesives, two XD417 cleaning wipes. For the stick-mounted BT145 Combo Sensor.
XD422	**Mini Plate Kit** One Mini plate, two XD416MS small-format adhesives, two XD417 cleaning wipes. For BT144 Mini Sensors (boom, bucket) and the BT476 chassis sensor.
XD436	**Big Combo Plate Kit** One Big Combo plate, four XD416 large-format adhesives, four XD417 cleaning wipes. For the BT147 Big Combo Sensor.

CRITICAL

Plate kits use permanent 3M adhesive. Once a plate is installed on a machine, it does not come off cleanly. Always confirm sensor position and machine geometry before committing to the adhesive — see Volume 2 for the installation procedure and Volume 4 for the calibration flow that follows.

B.6 Extra Machine Kits

An extra machine kit is what you order when an existing Connect customer adds a second (or third) machine and wants to use the same Control Box. The kit includes a cradle set, plate kits, and the cables and adhesives to complete the second installation.

Part Number	Description
BT527	**Extra Machine Kit — CT740 with XD476 chassis** For adding a CT740 system to a second machine where the chassis is the XD476 2D sensor. Includes BT447 Control Box Cradle, CT149 LED Display Cradle, plate kits (2× XD412, 2× XD422), CT425C Y-shielded power cable, XD440 suction cup and arm, CT135 double suction cup and arm, adhesives, and cleaning wipes.
BT528	**Extra Machine Kit — CT741 with XD476 chassis** Same as BT527 but with one XD412 Combo and one XD436 Big Combo plate kit, for a CT741-based second machine using the XD476 chassis sensor.
BT531	**Extra Machine Kit — CT740 with BT476 chassis** For adding a CT740 system to a second machine where the chassis is the BT476 Bluetooth 2D/3D sensor (current standard). Includes BT447, CT149, 1× XD412, 3× XD422, CT425C, XD440, CT135, adhesives, and cleaning wipes.
BT532	**Extra Machine Kit — CT741 with BT476 chassis** Same as BT531 but with an XD436 Big Combo plate kit added, for a CT741-based second machine using the BT476 chassis sensor.

WHICH EXTRA MACHINE KIT?

The four BT5xx extra machine kits differ on two dimensions: stick size (CT740 base = BT527/BT531, CT741 Big Combo base = BT528/BT532) and chassis sensor generation (XD476 = BT527/BT528, current-standard BT476 = BT531/BT532). Confirm the second machine's chassis sensor before ordering. All current commissions on new machines use the BT476, so BT531 and BT532 are the right defaults.

B.7 GNSS & iPoint

All parts related to the Spotman GNSS receiver — the machine-mounted receiver, the rover kit, the off-machine survey hardware, and the iPoint software license.

Part Number	Description
CT140T-K	**Spotman Rover Kit** Full off-machine rover bundle. Includes one CT140T Spotman GNSS with tilt, CT141 iPoint software license, CT133 8-inch tablet data collector, CT146 tablet holder, CT148 2m rover pole, CT152 quick-release male/female connector, and BT486 transport backpack. Use when the contractor surveys points away from the machine.
CT140T	**Spotman GNSS Receiver (with Tilt)** The GNSS receiver that mounts on the cab roof for 2D Project and 3D tiers. Integrated tilt sensor. Ships standard with every CT745-K / CT746-K / CT750-K / CT751-K system.
CT141	**iPoint Software License** Software license for the iPoint application — the off-machine survey and stakeout app that runs on the CT133 tablet and pairs with the Spotman. Ships with every 2D Project and 3D bundle.
CT133	**Tablet Data Collector** Eight-inch tablet that runs the iPoint application. Sold separately or as part of the CT140T-K rover kit.
CT146	**Tablet Holder** Mounting holder for the CT133 tablet. Ships with the CT140T-K rover kit.
CT139	**Small GNSS Machine Support** 6.3-inch INOX stainless steel GNSS mounting pole. Used when the machine's cab geometry allows the shorter mount while still achieving the required 1 m offset from the center of rotation.
CT139-L	**Big GNSS Machine Support** 15.75-inch carbon fiber GNSS mounting pole. Used when additional offset is required to meet the 1 m minimum distance from the center of rotation.
CT152	**GNSS Quick Release — Male/Female Pair** Quick-release connector pair for switching the Spotman between the machine mount and the rover pole. One male and one female. Ships with the CT140T-K rover kit.
CT153	**GNSS Quick Release — Female Only** Additional female quick-release connector. Used when a customer needs a second machine mount point and already has a CT152 pair.
BT486	**Rover Transport Backpack**

Part Number	Description
	Padded transport backpack sized for the CT140T Spotman and its accessories. Ships with the CT140T-K rover kit.
CT148	**2m Rover Pole** Four-piece 2-meter rover pole for off-machine survey. Breaks down for transport in the BT486 backpack. Ships with the CT140T-K rover kit.
BT248	**Bluetooth Button** Wireless pushbutton paired to the Control Box over Bluetooth. When activated, it triggers Swing Boom Assistance, Dynamic Laser Catch, and setting a benchmark — shortcuts for operations the operator otherwise reaches through the on-screen menu.

1-METER OFFSET REQUIREMENT

The Spotman GNSS receiver must be mounted at least 1 meter from the machine's center of rotation for correct heading resolution. This is what drives the two mount options — CT139 (6.3 inches, stainless) for machines where cab geometry allows, and CT139-L (15.75 inches, carbon) when additional offset is required. Confirm the geometry before ordering; an undersized mount is the most common reason a GNSS installation has to be re-done.

B.8 Cables

Cables specific to Connect systems. The CT425C is the standard chassis-sensor cable for every current installation. XD448 and XD449 are tiltrotator integration cables.

Part Number	Description
CT425C	**Armored Y Power Cable (4-pin)** Shielded Y-cable from the BT142 Control Box cradle to the BT476 2D/3D Bluetooth Mini Chassis Sensor. Standard chassis-sensor power cable for all current Connect installations.
CT242	**Spotman Power Cable** 12 V power cable with battery connectors, for powering the CT140T Spotman from the machine's electrical system when the rover is in off-machine use.
XD448	**Steelwrist Cable (6 ft., shielded)** Sensor cable for CAN integration with Steelwrist tiltrotators.
XD449	**ENGCON Cable (15 ft.)** Sensor cable for CAN integration with ENGCON tiltrotators. The longer length accommodates ENGCON's typical stick routing.

B.9 Calibration Tools

The calibration toolkit ships in a dedicated black soft roll-up case with every new Connect system. These items are used during the boom and stick wizard calibration in Volume 4 and are reused across every machine you install on.

Part Number	Description
XB525	**Laser Pointer** Laser pointer with L-bar and 5/8-inch to 1/4-inch connector. Provides the laser line used during the boom and stick wizard calibration.
XD477	**5/8-inch Adapter** Fits the XB525 laser pointer to non-elevating tripods.
XD478	**Adapter 5/8-inch to 1/4-inch** Fits the XB525 laser pointer to the tripod setup.
XD470	**Magnetic Target Tube** Mounts magnetically to the bucket teeth or stick to provide a target for initial sensor alignment and laser calibration.
XD471	**Extension Poles (2 pieces)** Two extension poles for use during initial setup and laser calibration.

B.10 Other Accessories

Consumables, dongles, transport cases, and the small items that get misplaced during an install. The XD416, XD416MS, and XD417 are replacements for the adhesives and wipes bundled with plate kits.

Part Number	Description
BT244	**WiFi & Bluetooth Dongle** The standard BT/WiFi dongle that installs in the Control Box cradle's top-left USB port. Ships with every Connect system.
BT249	**WiFi & Bluetooth Dongle with External Antenna** Long-range version of BT244, with external antenna. Use when the standard dongle's range is insufficient for a given cab or shop environment.
BT485	**Transport Case — CONNECT** Rugged foam-lined case sized for all iDig Connect systems. Ships as the outer case with every Connect system.
XD416	**Adhesive Tape — Size L** Large-format 3M adhesive tape. For XD412 Combo and XD436 Big Combo plates. Sold individually.
XD416MS	**Adhesive Tape — Size S** Small-format 3M adhesive tape. For XD422 Mini plates. Sold individually.
XD417	**Cleaning Pad** Surface-prep cleaning wipe, used to prepare the machine surface before applying a plate adhesive. Sold in minimum quantities of 2.

B.11 Replacement Parts (Sold Individually)

Major components sold as bare parts — without plate kits, cradles, or cables — for replacement. Use these part numbers when a sensor or display needs swapping but the rest of the installation is still good.

Part Number	Description
BT142	**Series 74 Control Box** The Control Box used by all Connect systems. Sold separately for replacement or expansion.
CT149	**Control Box Cradle (for BT142)** Suction-cup cab cradle for the BT142 Control Box. Sold separately for replacement or additional machines.
BT445	**LED Bargraph (Bluetooth)** The LED Bargraph display that mounts on the front window of the cab. Sold separately for replacement.
BT447	**LED Bargraph Cradle** Suction-cup cradle for the BT445 LED Bargraph. Sold separately for replacement.
BT144	**Bluetooth Mini Sensor (no plate)** Bare BT144 sensor without plate kit. For replacement when the plate is still serviceable.
BT145	**Bluetooth Combo Sensor (no plate)** Bare BT145 Combo Sensor without plate kit. Includes the integrated laser receiver.
BT147	**Bluetooth Big Combo Sensor (no plate)** Bare BT147 Big Combo Sensor without plate kit. Larger laser-capture window than the BT145.
BT476	**2D/3D Bluetooth Mini Chassis Sensor (no plate)** Bare chassis sensor without plate kit. The current standard chassis sensor for Connect installations.

B.12 Dealer Demo & Mounting Hardware

Dealer-facing items: non-permanent magnetic demo plates (for showing an iDig system on a customer's machine without committing to adhesive), the desktop demo excavator, and alternative RAM-style mounts for cabs where the standard suction cup does not hold.

Part Number	Description
XD424	**Magnetic Plate — for XD412 and XD422** Magnetic demo plate that mimics the XD412 Combo and XD422 Mini plates. Allows a dealer to demonstrate an iDig system on a customer's machine without applying permanent adhesive.
XD438	**Magnetic Plate — for XD436** Magnetic demo plate for the XD436 Big Combo plate. Same purpose as XD424.
XD455	**Demo Trolley — Excavator** Desktop demo excavator model with trolley carrying case, four plates, and power supply. Used by dealers to demonstrate the system without a real machine.
XD440	**Suction Cup & Mount (Size B)** RAM-style suction cup mount for either the LED Bargraph (BT445) or the BT142 Control Box.
XD441	**Clamp (Size B)** RAM-style clamp mount for the LED Bargraph or Control Box, as an alternative to the suction-cup mount.
CT135	**Double Suction Cup (Size C) and Arm** Double suction-cup mount sized for the BT142 Connect Control Box. Used in cabs where the standard cradle suction cup does not hold reliably.

B.13 Extended Warranty

The Connect system ships with a standard warranty of 12 months from the date of sale to the end user, or 15 months from the date of sale to the dealer, whichever comes first. Extended warranty extends coverage to 24 months and includes software upgrades during the warranty period.

Part Number	Description
CT492	**Extended Warranty — 24 months (Connect)** Extends warranty coverage on a Connect system from the standard 12 months to 24 months. Includes software upgrades during the warranty period.

B.14 Warranty & Returns

The terms below apply to iDig Connect parts and systems in North America. For ordering, lead times, shipping terms, and current pricing, contact your iDig dealer.

Standard Warranty

Bridgin, the parent company of iDig, provides a one-year warranty on its systems and components. The warranty period begins on the date of sale to the end user by the dealer, or fifteen months from the date of sale to the dealer, whichever comes first.

The warranty does not apply under the following conditions: the serial number is unreadable or has been removed; the item has been modified or repaired by an unauthorized person; or the defect was caused by improper use.

The extended warranty (CT492, §B.13) extends coverage to 24 months and includes software upgrades during the warranty period.

> **INSPECTION ON DELIVERY**
> All products must be inspected upon delivery. Any shipping damage must be documented with the carrier and communicated to iDig within 24 hours of receipt. Catching a damaged shipment on day one is the difference between a straightforward replacement and a contested claim.

Returns

Goods in their original delivered condition may be returned to iDig within 14 days of the invoice date. After inspection, iDig will process the return through your dealer.

Goods returned after 14 days are subject to a depreciation deduction, calculated from the invoice date to the date of arrival and inspection by iDig. Before any return, a Return Merchandise Authorization (RMA) must be requested — returns without an RMA cannot be processed.

RMA Contact

Send RMA requests and return-related correspondence to:

> **iDig Inc.**
> c/o Mr. Oliver Woolley
> 2201 Statham Blvd., #114
> Oxnard, CA 93033

o.woolley@idig-system.com
805-320-4738

B.15 Part Number Quick Index

Every part in this appendix, alphabetically by part number. Use this index to look up a part when you already know the number — for example, from an existing quote, a prior order, or a sensor label in the field.

Part #	Name	Part #	Name
BT142	Series 74 Control Box	**CT150**	3D Lite Software License
BT144	Bluetooth Mini Sensor (no plate)	**CT151**	3D Software License
BT145	Bluetooth Combo Sensor (no plate)	**CT152**	GNSS Quick Release — Male/Female Pair
BT147	Bluetooth Big Combo Sensor (no plate)	**CT153**	GNSS Quick Release — Female Only
BT244	WiFi & Bluetooth Dongle	**CT155**	Dynamic Laser Catch License
BT248	Bluetooth Button	**CT242**	Spotman Power Cable
BT249	WiFi & Bluetooth Dongle with External Antenna	**CT425C**	Armored Y Power Cable (4-pin)
BT407	Bluetooth Mini Sensor Kit	**CT492**	Extended Warranty — 24 months (Connect)
BT408	2D/3D Mini Chassis Sensor Kit	**CT740**	iDig CONNECT 2D+ System
BT411	Bluetooth Combo Sensor Kit	**CT741**	iDig CONNECT 2D+ Big Combo System
BT437	Bluetooth Big Combo Sensor Kit	**CT745-K**	iDig CONNECT 2D Project System
BT445	LED Bargraph (Bluetooth)	**CT746-K**	iDig CONNECT 2D Project Big Combo System
BT447	LED Bargraph Cradle	**CT750-K**	iDig CONNECT 3D System
BT476	2D/3D Bluetooth Mini Chassis Sensor (no plate)	**CT751-K**	iDig CONNECT 3D Big Combo System
BT485	Transport Case — CONNECT	**XB525**	Laser Pointer
BT486	Rover Transport Backpack	**XD412**	Combo Plate Kit
BT527	Extra Machine Kit — CT740 with XD476 chassis	**XD416**	Adhesive Tape — Size L
BT528	Extra Machine Kit — CT741 with XD476 chassis	**XD416MS**	Adhesive Tape — Size S
BT531	Extra Machine Kit — CT740 with BT476 chassis	**XD417**	Cleaning Pad
BT532	Extra Machine Kit — CT741 with BT476 chassis	**XD422**	Mini Plate Kit
CT133	Tablet Data Collector	**XD424**	Magnetic Plate — for XD412 and XD422
CT135	Double Suction Cup (Size C) and Arm	**XD436**	Big Combo Plate Kit

Part #	Name	Part #	Name
CT137	3D Lite → 3D Upgrade License	**XD438**	Magnetic Plate — for XD436
CT139	Small GNSS Machine Support	**XD440**	Suction Cup & Mount (Size B)
CT139-L	Big GNSS Machine Support	**XD441**	Clamp (Size B)
CT140T	Spotman GNSS Receiver (with Tilt)	**XD448**	Steelwrist Cable (6 ft., shielded)
CT140T-K	Spotman Rover Kit	**XD449**	ENGCON Cable (15 ft.)
CT141	iPoint Software License	**XD455**	Demo Trolley — Excavator
CT145	Swing Boom Assistance License	**XD470**	Magnetic Target Tube
CT146	Tablet Holder	**XD471**	Extension Poles (2 pieces)
CT148	2m Rover Pole	**XD477**	5/8-inch Adapter
CT149	Control Box Cradle (for BT142)	**XD478**	Adapter 5/8-inch to 1/4-inch

End of Appendix B — Parts & Accessories.

Appendix C

Release History

Every documented iDig Connect firmware release, from v4.14.0 through v5.3.4 · Version lineage, feature timeline, and release-by-release detail

Contents

C.1 How to Use This Appendix

This appendix documents every iDig Connect firmware release from v4.14.0 through v5.3.4 — sixty releases spanning roughly three years of continuous development. It is intended as a reference, not a narrative: find the version the Control Box is running, look up what changed in that release, and move on.

The material is organized to answer the three questions that come up most often in the field. What version am I on, and is that the right one for this machine? What was added, fixed, or removed between my version and the current release? When did a specific feature — Smart Tape, tiltrotator CAN support, dual-GNSS on attachments — first ship?

The Four Ways Into This Appendix

- **By version.** If you know the version number, go to §C.5 for v5.x releases or §C.6 for v4.x legacy releases. Every v5.x version has its own entry. v4.x versions are grouped into a summary table.
- **By date.** The timeline in §C.2 lists every release in order, newest first, with a one-line headline for each. Scan it to find the release that matches when a machine was commissioned or last updated.
- **By feature.** §C.4 is a feature lineage — the list of major features in alphabetical order, each tagged with the version it first appeared in. Use this when a dealer asks "what's the oldest version that supports X?"
- **By reading the whole thing.** §C.3 tells the story of the v4-to-v5 architectural rewrite, which is the single most important thing to understand if you support machines in the field. Everything else in this appendix makes more sense once §C.3 is read.

> **BEFORE YOU START**
> The Control Box displays its current firmware version at the bottom of the main Settings screen, near the serial number. If a machine is on site and something isn't behaving the way this guide describes, check the firmware version first — a subtle UI difference or a missing feature is almost always a version mismatch, not a fault.

C.2 Release Timeline at a Glance

Every release from v4.14.0 through the current v5.3.4, newest first. The one-line headline captures the release's headline change — the full detail is in §C.5 (v5.x) and §C.6 (v4.x).

Rows tagged "current" mark the release shipping at the time this volume went to press. Rows tagged "v5 start" and "v4 legacy" mark the boundary between the v5 platform rewrite and the v4 line that preceded it. The row tagged "hardware break" marks v4.15.0, which dropped compatibility with the legacy XD466 chassis sensor — a machine still running the XD466 cannot move past v4.14.15 until the chassis sensor is upgraded.

Version	Headline	Tag
v5.3.4	Attachment & skidsteer refinements; simulator-over-ethernet detection	*current*
v5.3.3	Stability pass for the 3D engine introduced in v5.3.0	
v5.3.0	Major expansion: dozer blades, skidsteers, backhoes, attachments, Machine Control Ready	
v5.2.9	Wireless range and connection stability improvements	
v5.2.8	Fixes for tilt-sensor calibration and GNSS loss recovery	
v5.2.7	Tiltrotator encoder support; surface wizard refinements	
v5.2.5	Profile wizard polish; additional CAN tiltrotator models	
v5.2.4	Site calibration quality-of-life and crash fixes	
v5.2.3	Layer panel and project import improvements	
v5.2.2	Tiltrotator CAN support and additional localization formats	
v5.2.1	Early-v5.2 stability and translation sweep	
v5.2.0	Rotators (wired tilt), telescopic dippers, Profile Wizard, large-area site calibration	
v5.1.7	Minor fixes on the v5.1 branch	
v5.1.6	Bluetooth pairing, import/export, and 3D view fixes	
v5.1.5	3D depth-guiding polish and additional tiltrotator options	
v5.1.4	Wireless sensor behaviour and calibration fixes	
v5.1.3	Front/Side view improvements; cloud sync fixes	
v5.1.2	Sensor diagnostics and crash fixes	
v5.1.1	Follow-up fixes to the v5.1.0 3D engine	
v5.1.0	3D feature restored; new 3D algorithm; 2D+; Bluetooth double-click; manual bucket calibration	
v5.0.2	Stability fixes on the post-rewrite platform	

Version	Headline	Tag
v5.0.1	Follow-up fixes to v5.0.0 with Dynamic Guiding and Swing	
v5.0.0	Platform rewrite: new calibration, Dynamic Guiding, Swing feature, Remote button	*v5 start*
v4.16.5	Smart Tape direction prompt fix; surface guiding fix	*v4 legacy*
v4.16.4	Bug-fix release	
v4.16.3	Bug-fix release	
v4.16.2	Bug-fix release	
v4.16.1	Bug-fix release	
v4.16.0	Late-v4 feature additions	
v4.15.13	Maintenance release	
v4.15.12	Maintenance release	
v4.15.11	SmartTape 2D→3D view fix; guiding-line extension	
v4.15.10	Maintenance release	
v4.15.9	Maintenance release	
v4.15.8	Maintenance release	
v4.15.7	Maintenance release	
v4.15.6	Maintenance release	
v4.15.5	Maintenance release	
v4.15.4	Smart Tape feature introduced; 3D improvements	
v4.15.3	Maintenance release	
v4.15.2	Maintenance release	
v4.15.1	Maintenance release	
v4.15.0	NOT compatible with legacy XD466 chassis sensor — transition point	*hardware break*
v4.14.15	Last-generation XD466-compatible maintenance	
v4.14.14	Maintenance release	
v4.14.13	Maintenance release	
v4.14.12	Maintenance release	
v4.14.11	Maintenance release	
v4.14.10	Maintenance release	
v4.14.9	Maintenance release	
v4.14.8	Maintenance release	

Version	Headline	Tag
v4.14.7	Maintenance release	
v4.14.6	Maintenance release	
v4.14.5	Maintenance release	
v4.14.4	Maintenance release	
v4.14.3	Maintenance release	
v4.14.2	Maintenance release	
v4.14.1	Maintenance release	
v4.14.0	Remote Software Update; 3D Auger/Clamshell; NEKR Roto; WiFi recovery	*oldest documented*

REAL-WORLD TIP

When a machine comes in from the field on an older firmware, it almost never makes sense to jump it straight to the newest release. Read the headline for the current version, then step back through the timeline until you find the version the machine is on. The entries in between tell you what the operator will see that's different — which menus moved, which features appeared, and which calibrations need to be redone. Jumping versions without reading the intermediate entries is how small surprises become field support calls.

C.3 The v4 → v5 Transition — What Changed and Why

v5.0.0 was not a normal release. It was a platform rewrite. The Control Box software was rebuilt from the ground up on a new architecture, and several features that had been in the v4 line were temporarily removed so that the new platform could ship on a clean, stable base. Those features returned progressively through the v5.1, v5.2, and v5.3 lines — but understanding which features left and when they came back is the single most important piece of knowledge for anyone supporting machines across the transition.

What Was Removed at v5.0.0

The v5.0.0 release shipped as a Pure 2D System. The following were not available in v5.0.0, regardless of what had been working on the same machine under v4:

- 3D guidance and 3D project viewing.
- Auger work tool support.
- Roto work tool support.
- Dozer blade support.
- Clamshell support.

In addition, v5.0.0 required a full new calibration — the calibration data from a v4 machine could not be carried forward — and all wireless sensors had to be re-paired to the Control Box after the update.

What Was Added at v5.0.0

- **Dynamic Guiding and Dynamic Laser Catch.** The guidance updates continuously as the machine moves, rather than only at discrete checkpoints. This is the change operators notice first when moving from v4 to v5.
- **Swing Boom Assistance.** A dedicated feature for machines with swing-boom geometry.
- **The Remote button.** A dedicated on-screen entry point for remote support sessions, which previously lived several menus deep.

When Removed Features Returned

The features removed at v5.0.0 came back in this order:

Feature	Returned in
3D feature	v5.1.0 — with an entirely new 3D algorithm
Tiltrotator CAN support	v5.2.2 — CAN bus reading, eliminating separate wired sensors on CAN-equipped machines

Feature	Returned in
Rotator (as wired tilt)	v5.2.0 — ePS2 platform only
Telescopic dipperstick	v5.2.0 — via the Baumer R600V radar
Dozer blade (excavator)	v5.3.0 — simple and double-offset
Skidsteer	v5.3.0 — radial lift, 2D+ and 3D with one GNSS
Backhoe (swing-sensor configuration)	v5.3.0
Attachment mode	v5.3.0 — two-laser in 2D, two-GNSS in 2D+ and 3D
Auger	Still not supported in v5.3.4 as of press time
Clamshell	Still not supported in v5.3.4 as of press time

What This Means for Upgrades

The practical implications of the transition fall on three groups, and the right answer is different for each.

FOR DEALERS SUPPORTING V4 MACHINES

A machine running v4 firmware that is working correctly is not a candidate for forced upgrade. The v5 line required a full recalibration and sensor re-pairing, and the features the operator relies on may not have returned to v5 yet. Before upgrading, look up the features currently in use on the machine and confirm they are all supported in the target v5 release. The one hard forcing function is hardware: v4.15.0 and later are not compatible with the legacy XD466 chassis sensor, and v5 does not recognize v4-calibrated machines at all. If the XD466 is still on the machine and the operator is happy, leave the firmware alone.

FOR DEALERS COMMISSIONING NEW MACHINES

Any machine commissioned in 2025 or later should be on the v5 line. The current-generation BT476 chassis sensor is the standard, the calibration flow is cleaner, and Dynamic Guiding is a clear operator upgrade. Start at the highest v5.3.x release that supports the work tools the customer runs. See the feature lineage in §C.4 for the specific cutoffs.

FOR OPERATORS ASKING "WHY IS MY MENU DIFFERENT?"

The v4-to-v5 transition reorganized several menus and changed the calibration flow. If an operator who has been running an iDig system for years gets in a cab with v5 for the first time, they will notice the difference within a minute. The most visible change is Dynamic

Guiding — the values on the bargraph update continuously rather than stepping. The next most visible is the Remote button, which is now a single on-screen tap instead of a path through Settings. Orient new-to-v5 operators on these two points first; the rest of the transition goes smoothly from there.

C.4 Feature Lineage — When Each Major Feature Arrived

The major features of iDig Connect, listed alphabetically, each tagged with the release in which it first shipped. Use this table to answer "what's the oldest version that supports X?" without reading the full timeline.

A feature shown against a v5.x version was either new in v5 or was the re-introduction of a v4 feature after the platform rewrite. In the latter case, the v4 origin of the feature is not repeated here — see §C.6 for the v4 lineage.

Feature	First shipped in
Attachment mode (two lasers or two GNSS)	v5.3.0
Backhoe with swing sensor	v5.3.0
Bluetooth double-click button	v5.1.0
Customizable 3D map background	v5.3.4
Dozer blade (excavator, simple/double offset)	v5.3.0
Dual-GNSS on attachments	v5.3.4
Dynamic Laser Catch	v5.0.0
Ethernet Cbox detection (Simulator scan)	v5.3.4
Large-area site calibration (>50m × 50m, left-handed)	v5.2.0
Machine Control Ready	v5.3.0
Manual bucket calibration with laser pointer	v5.1.0
New 3D algorithm	v5.1.0
Profile Wizard	v5.2.0
Remote button	v5.0.0
Remote Software Update (OTA)	v4.14.0
Rotators (wired tilt, ePS2)	v5.2.0
Skidsteer (radial lift, 2D+ and 3D)	v5.3.0
Smart Tape measurement	v4.15.4
Swing Boom feature	v5.0.0

Feature	First shipped in
Telescopic dippersticks (Baumer R600V radar)	v5.2.0
Tiltrotator CAN support	v5.2.2
Tunable GNSS thresholds (Fine/Medium/Coarse)	v4.14.0

C.5 v5.x Release Detail

Every v5.x release in reverse chronological order, newest first. Each entry gives a short headline, any context that matters for the release, and then the changes grouped as Added (new capabilities), Improved (existing capabilities made better), Fixed (bugs corrected), and Limitations (known restrictions called out by the release).

Not every category appears in every release. A maintenance-only release may have only a Fixed list; a major release may have all four.

v5.3.4 — Attachment and skidsteer calibration polish

The current shipping release at the time this volume went to press. The focus was on refinements to the attachment and skidsteer workflows introduced in v5.3.0 and on streamlining how multiple GNSS receivers behave together.

Added

- Automatic detection of the Control Box over Ethernet — used by the Simulator scan.
- An AB length parameter during skidsteer calibration.
- Attachment and excavator demo licenses that were previously missing.
- Support for two different GNSS receivers on an attachment, with improved handling when multiple receivers are live during guiding.
- Virtual joystick in the Simulator tool.
- Customizable background color for the 3D Map view.
- Additional 3D chassis models for attachments and skidsteers.

Improved

- Chassis calibration for attachments.
- The Wizard calibration setup for excavators.
- The UI of the laser calibration step for attachments.
- Quick customization of the bargraph from inside the guiding views.
- Editable text-box behaviour throughout the interface.
- The bargraph now lights up automatically during brightness tuning.
- Annotations stay visible at all zoom levels in the 3D view.
- Clickable zones are now visible in 2D view so the operator can see what is tappable.
- A three-second wait is now enforced before a new sensor threshold can be confirmed, to prevent accidental commits.

Fixed

- Various UI text and translation corrections.
- Bargraph state is now properly restored after the bargraph is unplugged and replugged.

- Screensaver exit no longer shows NaN (not a number) on guiding values.
- Excavator dozer blade calibration no longer misbehaves when an offset or double-offset is calibrated.
- Several stability fixes in 3D views when switching between projects.
- Zoom on the attachment blade in 3D view.
- Incorrect error messages about machine compatibility.
- Loading a machine that has no tool defined.
- Flat-angle display of the bucket in 3D view.
- Shortest-distance calculation between the bucket and a surface when the bucket is outside the surface.
- Skidsteer GNSS calibration and heading system.
- Import of v4 machines is now blocked, and v4 machines already on the SD card cannot be edited — this prevents mixing incompatible calibration data.

Limitations

- Auger and clamshell work tools are still not supported in the v5.3 line.

v5.3.3 — Stability pass for the v5.3.0 3D engine

A focused follow-up to v5.3.0 addressing crashes and edge cases in the rewritten 3D pipeline. No new features.

Fixed

- Numerous issues and crashes in the 3D engine.
- Stability fixes across calibration and project workflows.

Limitations

- No auger or clamshell support.

v5.3.0 — Major feature expansion across new machine classes

The v5.3.0 release opened up several new machine classes and work-tool configurations. If the dealer is selling into contractors who run anything other than a standard excavator, v5.3.0 is the baseline to be on.

Added

- Simple and double-offset dozer blade for excavators in 2D.
- Skidsteer with radial lift, in 2D+ and 3D with one GNSS.
- Backhoe configuration using a swing sensor instead of a chassis sensor.
- Attachment mode — 2D with two lasers, 2D+ and 3D with two GNSS.
- Machine Control Ready, which increases the computation rate of the system.
- Teeth count handling in 2D.

- Rework of the CAN logger with a variable data rate and the ability to log to file.
- The ability to enable or disable the open/close and left/right error indicators via a touch area.

Improved

- Bucket calibration quality indicator.
- Chassis calibration automatically bypasses tilt-specific steps if the machine is detected to be flat.

Fixed

- License warning message sizing.
- Sensor ID saved during tilt calibration.
- TRS encoder support.
- Several additional stability items addressed during the beta cycle.

Limitations

- No auger, clamshell, double-offset, or dozer features.

v5.2.9 — Wireless range and connection stability

Improved

- Wireless sensor connection stability under weak-signal conditions.
- Recovery behaviour when a sensor briefly drops out of range.

Fixed

- Intermittent disconnects on certain sensor firmware combinations.

v5.2.8 — Tilt calibration and GNSS recovery fixes

Fixed

- Tilt-sensor calibration edge cases.
- GNSS loss-of-fix recovery behaviour during an active guiding session.

v5.2.7 — Tiltrotator encoder support and surface wizard refinements

Improved

- Tiltrotator encoder integration — wider range of encoder models accepted.
- Surface wizard flow, with clearer prompts during point selection.

v5.2.5 — Profile wizard polish; additional CAN tiltrotator models

Added

- Additional CAN tiltrotator models recognized out of the box.

Improved

- Profile wizard usability.
- Tiltrotator configuration flow.

v5.2.4 — Site calibration quality-of-life and crash fixes

Improved

- Site calibration flow, particularly around point selection on large surfaces.

Fixed

- Several crashes during long calibration sessions.

v5.2.3 — Layer panel and project import improvements

Improved

- Layer panel UI — clearer layer switching and visibility control.
- Project import handling from USB and cloud sources.

v5.2.2 — Tiltrotator CAN support and additional localization formats

Added

- CAN tiltrotator support — the system can now read tiltrotator rotation and tilt directly over CAN bus, eliminating the need for separate wired sensors on CAN-equipped machines.
- Additional site-calibration file formats accepted.

v5.2.1 — Early-v5.2 stability and translation sweep

Fixed

- A range of stability fixes following the v5.2.0 feature release.
- Translation and UI-text adjustments across multiple languages.

v5.2.0 — Rotators, telescopic dippers, Profile Wizard, large-area site calibration

A feature-heavy release on the v5.2 line. Of particular note: support for rotators as wired tilt sensors, support for telescopic dippersticks (via the Baumer R600V radar), and the removal of the 50m × 50m size limit on site calibration surfaces.

Added

- Rotators as wired tilt sensors, on the ePS2 platform only.
- Telescopic dippersticks, using the Baumer R600V radar.
- A Profile Wizard, added to the wizard list.
- Left-handed site calibration on surfaces larger than 50 m × 50 m.

- A download link for the Android App used in Cloud configuration, shown directly in the setup flow.
- A surface-wizard point-elevation picker.
- A project creation/import prompt when the Control Box is empty — previously only creation was offered.

Improved

- Reach and Transversal can now be used without setting a depth.
- 3D view reduced on-screen information, with a priority order of SmartTape → Entity → Depth.
- Changed highlight colour in 3D view.
- Picking-list entity filters are now saved.

Fixed

- Refresh of H/V GNSS accuracy status during calibration.
- Most cases of bucket and entity disappearances in 3D view.
- Side Layer panel button state refresh.
- Several crashes.
- Layer name no longer changes when the edit is validated without modifications.
- Negative numbers can now be entered in object creation.
- Loss of custom noise threshold.
- Object tracker behaviour.
- Issue where losing RTK fix before the machine was loaded caused problems.

Limitations

- No auger, clamshell, double-offset, or dozer features.

v5.1.7 — Minor fixes on the v5.1 branch

Fixed

- A set of small stability fixes on the v5.1 line before feature work moved to v5.2.

v5.1.6 — Bluetooth pairing, import/export, and 3D view fixes

Improved

- Bluetooth sensor pairing flow.
- Import and export of machine and project files.

Fixed

- Several issues in the 3D view related to layer rendering and picking.

v5.1.5 — 3D depth-guiding polish and additional tiltrotator options

Improved

- Depth-guiding behaviour in 3D view.
- Tiltrotator configuration — additional options exposed for advanced setups.

v5.1.4 — Wireless sensor behaviour and calibration fixes

Fixed

- Wireless sensor battery reporting.
- A calibration edge case affecting boom-and-stick machines with unusual geometry.

v5.1.3 — Front/Side view improvements; cloud sync fixes

Improved

- Front and Side view rendering and information density.

Fixed

- Cloud folder synchronization issues affecting a subset of users.

v5.1.2 — Sensor diagnostics and crash fixes

Improved

- Sensor diagnostics panel — clearer indication of battery, signal, and pairing state.

Fixed

- Several crashes during long guiding sessions.

v5.1.1 — Follow-up fixes to the v5.1.0 3D engine

Fixed

- Crashes and rendering issues in the new 3D engine introduced in v5.1.0.

v5.1.0 — 3D feature restored with a new algorithm

The 3D feature, which had been temporarily removed in v5.0.0 during the platform rewrite, was reintroduced in v5.1.0 with an entirely new underlying algorithm. This is the release most v5-era 3D customers first landed on.

Added

- 2D+ and 3D feature tiers restored.
- Double-click support on the Bluetooth button — gives the operator a second programmable action from the BT remote.

- Manual bucket calibration using the laser pointer.
- The ability to retrieve a machine file without using a USB key.

Limitations

- Same limitations as v5.0.0, except that 3D is once again available.

v5.0.2 — Stability fixes on the post-rewrite platform

Fixed

- Several crash and stability items that surfaced on v5.0.0 and v5.0.1 in the field.

v5.0.1 — Follow-up fixes to v5.0.0

Improved

- Dynamic Guiding and Laser Catch refinements.
- Swing feature polish.

Fixed

- A set of early-v5 field issues.

v5.0.0 — Platform rewrite — pure 2D baseline

v5.0.0 was an architectural reset. The platform was rewritten from the ground up, and several features from the v4 line were temporarily removed so that the new platform could ship on a clean, stable base. 3D returned in v5.1.0, and the other removed features returned progressively through the v5.2 and v5.3 lines. See §C.3 in this appendix for a full explanation of the transition and what it means for upgrades.

Added

- Dynamic Guiding and Dynamic Laser Catch — the guidance now updates continuously as the machine moves instead of only at discrete checkpoints.
- Swing Boom Assistance feature.
- The Remote button, a dedicated on-screen entry point for remote support sessions.

Limitations

- Pure 2D system — no 3D feature in this release.
- No auger, roto, dozer, or clamshell work tools.
- A new calibration is required when upgrading from v4.
- Wireless sensors must be re-paired to the Control Box.

C.6 v4.x Legacy Release Summary

The v4 line preceded the v5 platform rewrite. It is documented here at summary level rather than per-release: most v4 customers have either upgraded to v5 or are pinned to a v4 version because of a specific hardware consideration (typically the XD466 chassis sensor). Release-by-release v4 detail is preserved in the original iDig release notes document — this appendix captures the milestones that matter in the field.

v4 Milestones

Release / branch	What matters about it
v4.16.x line	Late-v4 feature additions and bug-fix cycle. v4.16.5 was the last v4 release before the v5 rewrite.
v4.15.0	Hardware break point — this release and everything after is NOT compatible with the legacy XD466 chassis sensor. Machines still running the XD466 must remain on v4.14.15 or earlier until the chassis sensor is upgraded.
v4.15.4	Smart Tape measurement feature first introduced.
v4.14.0	Earliest release documented in this appendix. Introduced Remote Software Update (over-the-air installs), 3D support for Auger (with bubble) and Clamshell, site-calibration file parsing from Hemisphere receivers, named points on the Map view, the NEKR brand of rotator, and WiFi improvements including recovery from wrong passwords and support for multiple access points. Compatible with the XD466 chassis sensor.

The XD466 Chassis Sensor — Why v4.15.0 Is a Hardware Line

The earliest iDig Connect systems used the XD466 big chassis sensor. Starting with v4.15.0, the firmware dropped support for the XD466 in favour of the BT476 — the chassis sensor that ships with every current system. This is a hardware change, not a software one: a machine still running an XD466 cannot simply update to v4.15.0 or later, because the firmware will not recognize the sensor.

If a machine comes into the shop running v4.14.x and the chassis sensor part number begins with XD466, the correct action depends on the customer. If they are happy with the system as-is, leave it on the latest v4.14.x release (v4.14.15). If they want access to newer features, the chassis sensor must be replaced with a BT476 before the firmware can be moved forward, and the machine will need a full recalibration afterward.

REAL-WORLD TIP

There is no v4.14-to-v5 upgrade path that preserves the XD466. A full chassis sensor replacement is required, followed by a v5 installation and full recalibration. This is a full bench-and-cab day — scope it accordingly. Most dealers schedule XD466 replacements as part of a broader machine service rather than standalone.

C.7 How to Read a Release Note

The release entries in §C.5 follow a standard structure. The four categories — Added, Improved, Fixed, and Limitations — are used consistently across every release.

Added

Describes a new capability that did not exist in the previous release. A feature in Added requires the user to know it exists in order to use it — the system behaviour has not changed unless the user invokes the new feature.

Improved

Describes a change to an existing capability that is automatically applied. The user does not have to enable anything; the improvement is in effect the moment the firmware is installed. Improved items are where to look when an operator says "this menu used to behave differently."

Fixed

Describes a bug that was present in the previous release and is no longer present in this one. If a dealer is troubleshooting a specific problem, searching the Fixed lists for a keyword match — "drift", "bargraph", "calibration" — is often the fastest way to determine which release resolves the issue.

Limitations

Describes capabilities that are known to be missing or not yet supported in this release. The most important use of Limitations is cross-checking against a customer's workflow before committing to an upgrade — if the customer's job relies on a feature listed in Limitations for the target version, the upgrade is not ready for that machine.

> **BEFORE YOU UPGRADE A MACHINE**
>
> Before updating the firmware on any in-service machine, read the Limitations section of the target release and of every release between the machine's current version and the target. A feature listed in Limitations in any intermediate release may have returned by the target release — but if it has not, and the customer depends on it, the upgrade needs to wait. This check takes two minutes on the bench and saves a field callback.

End of Appendix C — Release History.

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