

DITCH ASSIST



Installation & Operator Manual

Firmware Version: 1.4

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Safety Information, Warnings & Operator Responsibilities

(Read carefully before installing or operating Ditch Assist DIG)

1 Purpose of This Section

This page summarizes **critical safety warnings, legal notices, and operator responsibilities** that apply to the use of the Ditch Assist DIG grade-guidance system (“the Product”). It is **not** a complete operating guide. Failure to follow these instructions could result in **serious injury, death, property damage, or regulatory violations**. By installing, powering, or using the Product, you acknowledge that you have read, understood, and agreed to all terms contained herein.

2 Signal Words & Safety Label Definitions

Signal Word	Meaning	Example
DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury .	“DANGER: Stay clear of moving bucket during calibration.”
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury .	“WARNING: GNSS accuracy may be degraded near overhead obstructions.”
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury, or equipment damage .	“CAUTION: Do not route cables near hot exhaust components.”
NOTICE	Addresses practices not related to personal injury but important for reliable operation, data integrity, or regulatory compliance.	“NOTICE: System requires calibration after sensor replacement.”

3 General Safety Warnings

1. **DANGER – Machine Control Override**
The Product provides visual and/or audible guidance only. **It does not automatically prevent over-digging, collision, or underground utility strikes.** The operator must maintain full control and situational awareness at all times.
 2. **WARNING – Lock-Out / Tag-Out:** Park on level ground, lower all implements, shut off engine, remove key, relieve hydraulic pressure, and apply approved LOTO device before starting installation.
 3. **DANGER – Welding Hazards:** Disconnect machine battery, remove or isolate all electronic modules, sensors, and harnesses within 1 m (3 ft) of the weld zone. Attach ground clamp as close to weld as practicable to prevent current paths through bearings, pins, or wiring. Provide a fire watch and Class ABC extinguisher.
 4. **NOTICE – Competent Installer Required:** Bracket welding must be performed by a certified welder familiar with heavy-equipment structures. Improper welds can weaken the boom/stick and void the machine manufacturer's warranty.
 5. **WARNING – Fall Hazard:** Use an approved work platform or fall-arrest system when working above 1.8 m (6 ft). Do not stand on bucket, tracks, or makeshift ladders.
 6. **CAUTION – Hidden Lines:** Inspect structure and OEM drawings before drilling or welding to avoid puncturing hydraulic lines, wiring looms, or pressurised grease passages.
 7. **WARNING – Do Not Rely Solely on GNSS**
GNSS/RTK signals are subject to multipath, obstructions, atmospheric anomalies, jamming, and differential correction outages. **Always verify critical grades with an independent method (e.g., laser or survey staff)** before excavating near utilities, pipelines, foundations, or any location where tolerances are critical.
 8. **WARNING – Electrical & Mechanical Hazards**
Installation requires routing cables, mounting sensors, and securing hardware on heavy machinery. **Disconnect machine power and follow lock-out/tag-out procedures** before beginning installation. Use suitable fall-prevention and protective equipment.
 9. **CAUTION – Calibration & Maintenance**
Sensors must be installed and calibrated per the schedule in the Installation Manual (or immediately after sensor relocation, replacement, or machine service). Regular inspection to verify sensors are not damaged or misplaced are required. **Operating with a mis-calibrated system can cause grade errors exceeding published tolerances.**
 10. **NOTICE – Magnetic Field:** Keep ECU magnets at least 20 cm (8 in.) away from pacemakers, credit cards, and magnetic storage media.
 11. **NOTICE – Firmware & Software Updates**
Periodically check for updates at <https://www.ditchassist.com/support> or with your dealer. Installation of the latest firmware and app versions is required for regulatory compliance, performance, and cybersecurity. You may be required to return your control module to receive firmware and software updates.
-

4 Operator Responsibilities

Responsibility	Summary of Required Actions
Training & Competence	Only properly trained, licensed, and physically capable individuals may install or operate the Product. Operators must fully read the Operator Manual and complete the recommended training program.
Pre-Use Inspection	<ul style="list-style-type: none">• Verify secure mounting of sensors, antennas, and displays.• Confirm cables are free of abrasions, pinch points, and heat sources.• Check GNSS status, RTK correction link, battery/voltage levels, and sensor health indicators before each shift.
Work-Site Assessment	Conduct a hazard assessment per local regulations (e.g., CSA, OSHA). Mark overhead and underground utilities; establish exclusion zones; ensure safe egress.
Safe Operation	<ul style="list-style-type: none">• Maintain line-of-sight with digging area.• Never dig under suspended loads.• Pause operation if guidance indicators appear inconsistent with known grade, or if GNSS accuracy warnings are displayed.
Verification & Documentation	Independently verify final grade, slopes, and depths that are critical to structural integrity or regulatory compliance. Store project logs and calibration certificates as evidence of due diligence.
Maintenance & Updates	Follow maintenance intervals for mounting hardware torque inspection, sensor calibration, software updates, and environmental sealing checks. Document all actions in the machine logbook.
Regulatory Compliance	Use only antennas, radios, and power supply cables supplied or expressly approved by Northern Plains Drainage Systems Ltd. Unauthorized modifications void regulatory certifications (e.g., FCC Part 15, ISED RSS-Gen) and may void warranty.

5 Environmental & Radio-Frequency Notices

- **EMC Compliance** – The Product contains intentional radiators that comply with FCC Part 15 Subpart B/C and ISED RSS-247/RSS-Gen. Operation is subject to (1) this device not causing harmful interference, and (2) this device accepting any interference received.

- **Antenna Separation** – Maintain a minimum 20 cm (8 in.) separation between the GNSS antenna, Ditch Assist DIG ECU module, and all persons during normal operation.
 - **Operating Conditions** – ECU enclosures are weather-resistant but **not** submersible. Avoid exposure to corrosive chemicals, high-pressure washing, or temperatures outside –20 °C to +40 °C. Sensors are IP67-rated for protection against dust and can be submerged in water up to 1 meter (approximately 3.3 feet) for a maximum of 30 minutes.
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6 Warranty Disclaimer & Limitation of Liability

1. **NO OTHER WARRANTIES** – Except as expressly stated in the written Limited Warranty accompanying the Product, **Northern Plains Drainage Systems Ltd. (“NPDS”)** **disclaims all other warranties, express or implied, including but not limited to warranties of merchantability, fitness for a particular purpose, and non-infringement.**
 2. **LIMITATION OF DAMAGES** – In no event shall NPDS or its suppliers be liable for any **indirect, special, incidental, consequential or punitive damages**, including but not limited to loss of profits, downtime, loss of data, personal injury, property damage, or environmental claims, arising out of or related to the use or inability to use the Product, even if advised of the possibility of such damages.
 3. **MAXIMUM LIABILITY** – NPDS’s total cumulative liability under any circumstance shall not exceed the amount paid by the purchaser for the Product giving rise to the claim.
 4. **USER INDEMNITY** – The purchaser/operator agrees to **defend, indemnify and hold NPDS, its officers, employees, and agents harmless** from and against all claims, liabilities, damages, or expenses (including legal fees) arising from (a) operator’s misuse or unauthorized modification of the Product, (b) failure to follow instructions or safety warnings, or (c) violation of any law or regulation in connection with the Product’s installation or use.
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7 Important Regulatory & Standards References

For additional guidance, operators must consult and comply with:

- **ISO 20474-1** – *Earth-moving machinery – Safety.*

- **CSA Z432 / ANSI B11** – *Safeguarding of machinery.*
 - **OSHA 29 CFR 1926 Subpart P** – *Excavations.*
 - Local radio equipment regulations (e.g., FCC, ISED, CE).
 - Manufacturer's instructions for the host machine (excavator, backhoe, etc.).
-

8 Acceptance of Terms

By installing, powering, or operating the Ditch Assist DIG system, **you acknowledge that you have read and understood** all safety information, warnings, limitations, and responsibilities set forth herein, and **agree to operate the Product strictly in accordance with the Operator Manual, applicable laws, and recognized industry-standard safe-work practices.** Failure to do so **voids the warranty** and may result in severe injury or death.

For full installation, calibration, and operating procedures, refer to the subsequent sections of this Operator Manual.

Limited Warranty – Ditch Assist DIG™

Effective Date: Date of purchase from Authorised reseller.

Product Covered: Ditch Assist DIG grade-guidance system, including the primary display/control module, angle sensors, GNSS antenna bracket(s) and associated mounting hardware, and factory-supplied software/firmware (collectively, the “Product”).

Warranty Provider: Northern Plains Drainage Systems Ltd. (“NPDS”)

Beneficiary: The original end-user purchaser who acquired the Product new from NPDS or an NPDS-authorized dealer (“you”).

1 Warranty Coverage

NPDS warrants that the Product will be free from **defects in materials and workmanship** for **one (1) year** from the date of purchase shown on your original sales invoice (“Warranty Period”). During the Warranty Period, NPDS will, at its sole option and expense, **repair or replace** any component that NPDS confirms is defective under normal, intended use.

2 Exclusions

This Limited Warranty **does not cover**:

Category	Examples (non-exhaustive)
Accidental or Environmental Damage	Impact, crushing, abrasion, fire, flood, lightning, corrosive chemicals, or exposure outside the specified operating temperature or IP ratings.
Improper Use, Installation, or Maintenance	Use contrary to the Operator Manual; incorrect wiring; failure to follow calibration or torque procedures; unauthorised firmware; use with non-approved accessories or power sources.
Wear-and-Tear & Consumables	Cosmetic scratches, faded labels, standard mounting hardware, batteries.
Field Damage to Electronic Assemblies	Control module, sensors, or wiring harnesses damaged while the machine is in operation, transport, or storage (e.g., severed cables, crushed housings, water ingress after damage to enclosure).
Third-Party Components	GNSS receivers, data plans, radios, tablets or other items not supplied by NPDS.

If a reported issue is determined to fall under an exclusion, the repair will be treated as Off-Warranty (see § 5).

3 Obtaining Warranty Service

1. **Contact NPDS or your authorised dealer** within the Warranty Period and request a Return Material Authorisation (“RMA”).
 2. Provide proof of purchase (dated invoice) and a description of the defect.
 3. Ship the component(s) freight-prepaid and insured to the address provided with the RMA. NPDS is **not** responsible for loss or damage in transit.
 4. NPDS will examine the returned item(s). If covered, NPDS will repair or replace and return via ground freight at NPDS’s expense. Repaired or replacement items are warranted for the longer of the remainder of the original Warranty Period or 90 days from return shipment. Items deemed non-defective will be returned at your cost.
-

4 Limitations & Disclaimers

- **Exclusive Remedy.** Your sole and exclusive remedy under this Limited Warranty is repair or replacement of defective components as described above.
- **No Other Warranties.** Except for this express Limited Warranty, NPDS makes **no other warranties**, express or implied, including but not limited to implied warranties of merchantability, fitness for a particular purpose, and non-infringement.
- **Limitation of Liability.** To the fullest extent permitted by law, NPDS shall not be liable for any indirect, incidental, consequential, punitive, or special damages (including lost profits, downtime, or loss of data) arising from or relating to the Product, even if advised of the possibility. NPDS’s total liability shall not exceed the price paid for the specific Product giving rise to the claim.
- **Consumer Law Rights.** Some jurisdictions do not allow limitations on implied warranties or incidental/consequential damages. In such jurisdictions, the above limitations apply only to the extent allowed by local law and do not affect statutory rights that cannot be waived.
- **Governing Law.** This Limited Warranty is governed by, and construed in accordance with, the laws of the Province of Manitoba, Canada, without regard to conflict-of-law principles.

5 Off-Warranty Replacement Program

Should the Product or any component **fail or be damaged outside warranty coverage or after the Warranty Period**, NPDS offers an **Off-Warranty Replacement Program**. Eligible components may be purchased at a reduced price compared with new list cost. Contact NPDS or your authorised dealer for current pricing and RMA instructions.

6 Transfer & Assignment

This Limited Warranty is **non-transferable**. Any sale or other transfer of the Product voids remaining warranty coverage unless NPDS, in writing, agrees otherwise.

KEEP YOUR ORIGINAL SALES INVOICE. It is required for warranty verification.
For service, RMAs, or Off-Warranty Replacement inquiries, contact:

Northern Plains Drainage Systems Ltd.

Phone: +1-877-354-2899 Email: support@ditchassist.com

Web: <https://www.ditchassist.com/support>

Retain this document for your records.

GPS/GNSS & Display Device Requirements

Ditch Assist DIG is compatible with a wide range of GPS/GNSS receivers, and runs via a web user interface (web UI) in any compatible web browser on any device.

1. GPS Message Settings

Your GPS/GNSS receiver must be configured to output the following NMEA messages via a serial RS232 port:

- **Baud Rate: 38,400**
- **GGA messages at 5Hz or 10Hz**
- All other messages should be turned OFF

2. RTK Requirements

For accurate grade and depth your receiver must be outputting RTK position messages. Use of the system without RTK accuracy will result in digging errors that could be significant, particularly when compounded over long distances. For best results:

- Use a portable RTK base station setup within line-of-sight of your working location
- Pay extra attention if working under obstructions such as trees and buildings as this may cause loss of RTK accuracy
- If using a network RTK solution, verify with the service provider that it will meet your accuracy requirements

3. Display Device Requirements

The Ditch Assist DIG user interface is a web application that runs in your browser. It will, in theory, run on any device, however we recommend the following:

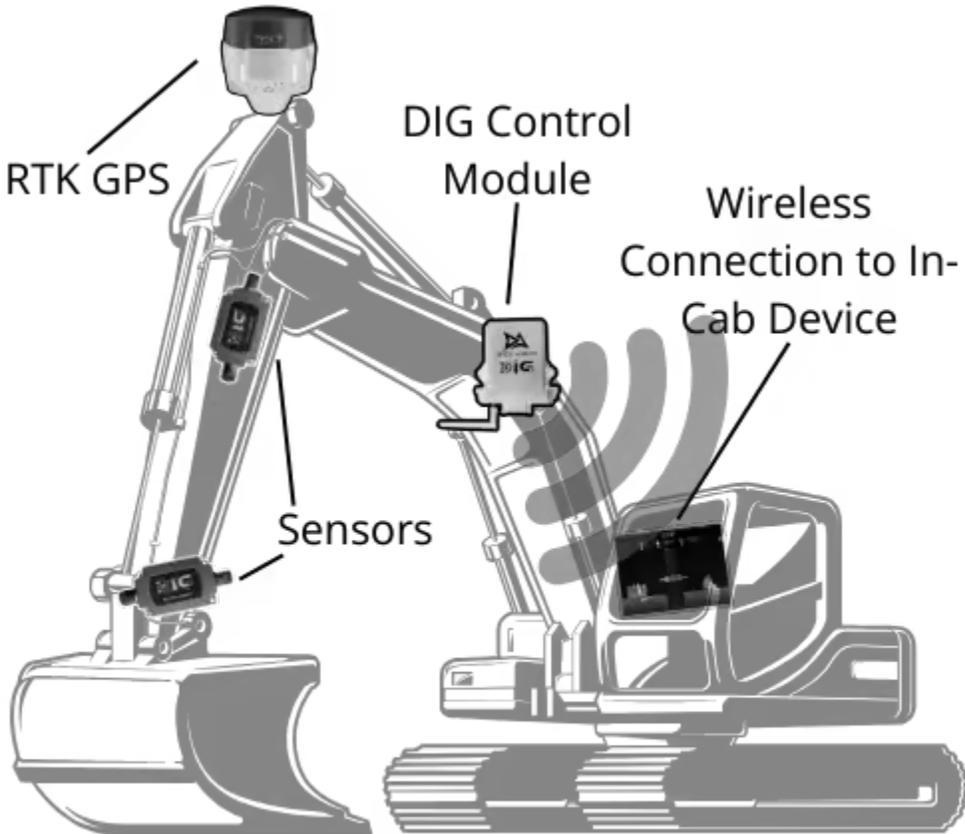
- Minimum screen size of 10" diagonally across the screen
- Reputable brand of Android or Windows tablet or an iPad
- Avoid low-cost Android or Windows tablets

4. Web Browser Requirements

Ditch Assist DIG is compatible with most of the popular web browsers, including Chrome and Safari. On Android devices, we recommend trying Fully Kiosk Browser as it provides more of an app-like experience (see instructions on configuring in later section).

Ditch Assist DIG Installation Overview

The Ditch Assist DIG kit includes weld-on brackets as a standard feature, offering the most efficient and reliable method for mounting sensors and GPS. For situations where welding isn't feasible, a clamp-on mounting system can be obtained from your local dealer. It is recommended to initially tack weld all brackets, then maneuver the machine through its full range of positions to confirm there are no points of contact before final welding.



Mounting Components Overview



Tube #1: 2" ID SCH80 with GPS mount and counterbalance removal flange attached



Tube #2 1 7/8OD SCH40 with GPS mount



Counterbalance Plate



GPS Receiver Mount Rod ($\frac{5}{8}$ " thread)



Sensor Mounting Plates

Safety Notices

Warnings	Mandatory	Requirements
 General Warning	 Mandatory Action	 Fire Extinguisher
 Overhead Load	 Refer to Instructions	 No Open Flames
 Crushing Hazard	 Eye Protection	 First Aid Kit
 Crushing of Hands	 Safety Footwear	
 Electricity	 Protective Gloves	
 Arc Flash	 High Visibility Vest	
 Hot Surface	 Head Protection	
 Magnetic Field	 Welding Mask	
 Fall Hazard	 Protective Clothing	

Hardware Installation Steps

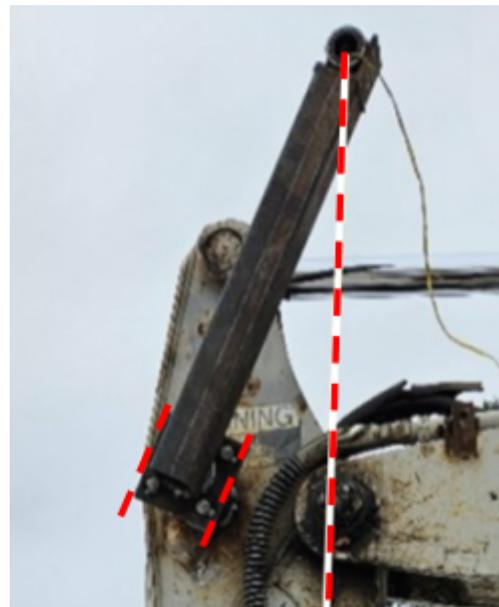
1. Attach GPS Mount (Tube #1)

Mark a location at the top of the stick of the excavator for the GPS mount to tack weld on TUBE #1, 2" ID SCH80.

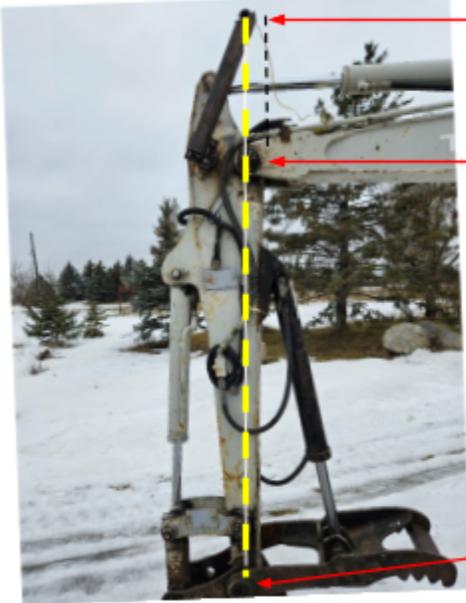


Angle Tube #1 to allow for the GPS mount pivot point to be positioned above the boom-end pivot point, avoiding obstruction from the flange removal bolts when Tube #2 is inserted.

Tack weld in place.



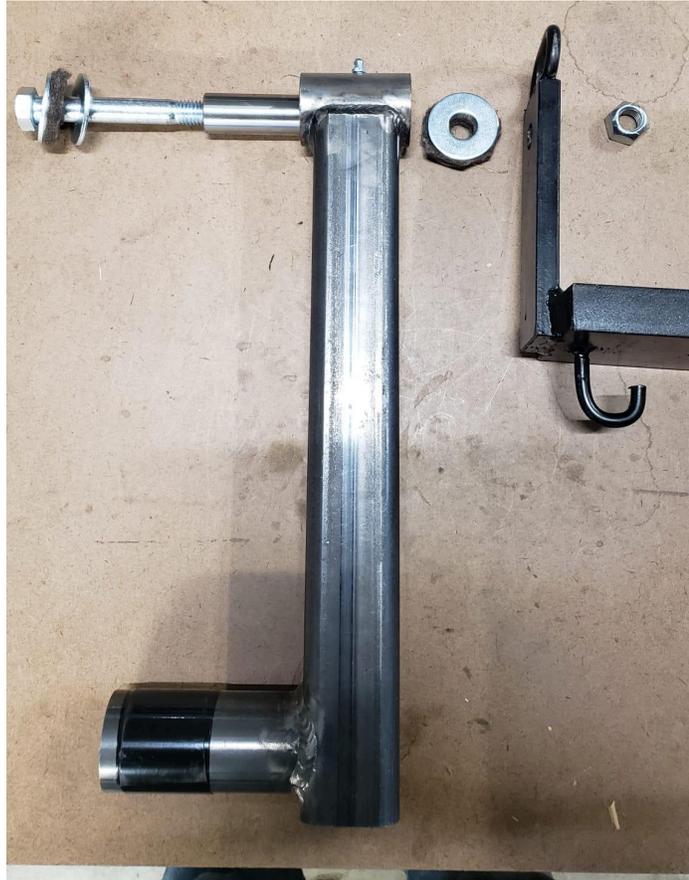
2. Attach Tube #2

<p>Insert Tube #2 into Tube #1. The GPS mount pivot point should be far enough outwards to clear the boom and any other obstacles.</p>	
<p>Align the GPS mount pivot point (F) with pins (H) and (B). If a small horizontal offset is unavoidable, you must input the offset distance during calibration.</p>	 <p>GPS Mount Pivot Point (F) <i>If offset is required, measure distance from yellow to black dashed line and enter during calibration</i></p> <p>Boom End Pivot Point (H)</p> <p>Bucket Pivot Point (B)</p>
<p>Tack weld tube #2 to GPS & counterbalance removal flange.</p>	

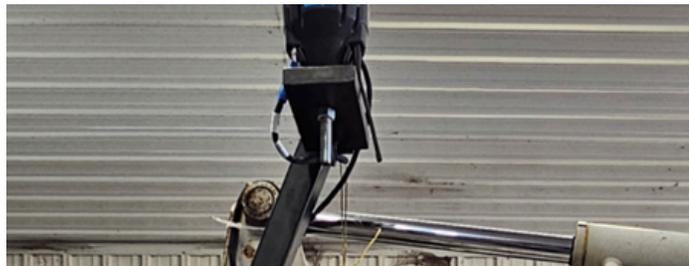
3. Install GPS Mount and Counterbalance Plate

Use the included hardware to attach the Counterbalance Plate to Tube #2 via the GPS Pivot Point. Tighten until the felt washers dampen movement, but avoid over-tightening, as the GPS unit must be able to level itself during operation.

Apply grease to the pivot surfaces via grease nipple and repeat regularly during operation.



Thread the 5/8" GPS mount rod through the Counterbalance Plate and adjust so that GPS receiver can be mounted without interference.



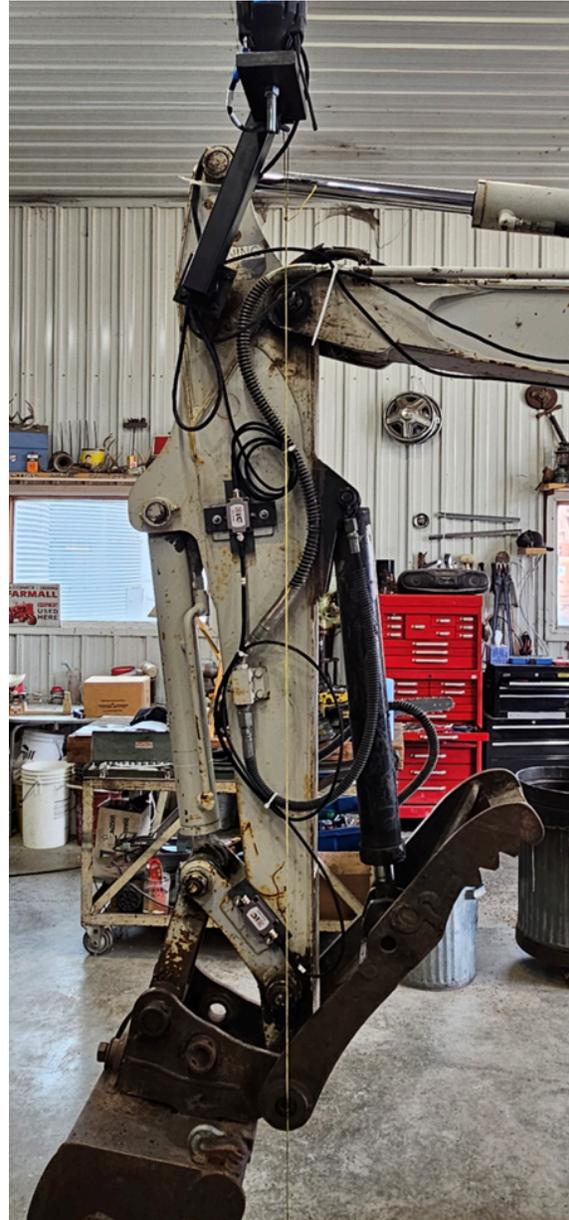
4. Verify GPS Mount Installation

Confirm that GPS pivot point can be vertically aligned with the boom end pivot point and bucket pivot point (ideal).

While a small horizontal offset can be tolerated if GPS mounting hardware cannot be installed in the recommended manner, it may lead to slightly reduced system accuracy at more extreme angles.

Slowly move the stick fully in both directions, while another person observes to confirm there are no points of contact.

Ensure the Counterweight Plate maintains GPS level during movement, some swing is unavoidable, but it should help avoid extreme angles.



5. Install Stick and Bucket Sensor Mounts and Sensors

For optimal visibility and damage detection, it is recommended to install sensors on the left side of both the stick and bucket (when viewed from the cab). While installation on either the left or right side is possible, the left-side placement generally provides the operator with a better view.

Tack weld the stick and bucket sensor plates as shown.

The stick sensor should be mounted vertically, approximately three-quarters of the way up the stick.

Weld the bucket sensor plate horizontally onto the Dog Bone. Ensure this placement avoids interference throughout the full range of motion.



Install the sensors to the mounts using the included hardware to secure.

When installing the **Stick Sensor**, connect the cable from the Control Module to the **top port**. The unique connectors ensure a proper fit. The cable connecting the stick sensor to the Bucket Sensor should exit from the **bottom port**.

Install the **Bucket Sensor** with the **cable connector facing the cab**, and the capped end facing away from the machine. If installed on the right side of the machine, the label may appear upside down; this is expected.

Coil and secure any excess cable with zip ties or similar fasteners to prevent snagging during movement.



6. Install the Ditch Assist DIG ECU Module

Securely mount the Ditch Assist DIG ECU Module near the cab using the provided magnet mounts. Ensure the connection port faces downward and the module is positioned to avoid potential damage. For optimal Wi-Fi connectivity, the module should have a clear line of sight to the cab.

Once the module is in place, attach and tighten the Wi-Fi antenna to the ECU. Finally, connect the Main Module Harness to the designated port on the ECU.



7. Install and Route all Cables

Ditch Assist DIG features a straightforward wiring setup. Connect the power cable to the battery and the long CAN cable from the main harness to the stick sensor. Then, attach the shorter CAN patch cable between the stick sensor and the bucket sensor. Finally, plug the GPS cable into the main harness.

Install the power cable from the battery to the Ditch Assist Main Module Harness.

Connect the power leads in a 12V configuration. (Positive and Negative on the grounded 12V battery).

The ECU and sensors are compatible with both 12V and 24V systems. However, the voltage supplied to these components is also routed to the GPS unit. Therefore, if connecting to a 24V circuit, confirm that your GPS can safely operate at 24V to prevent damage.

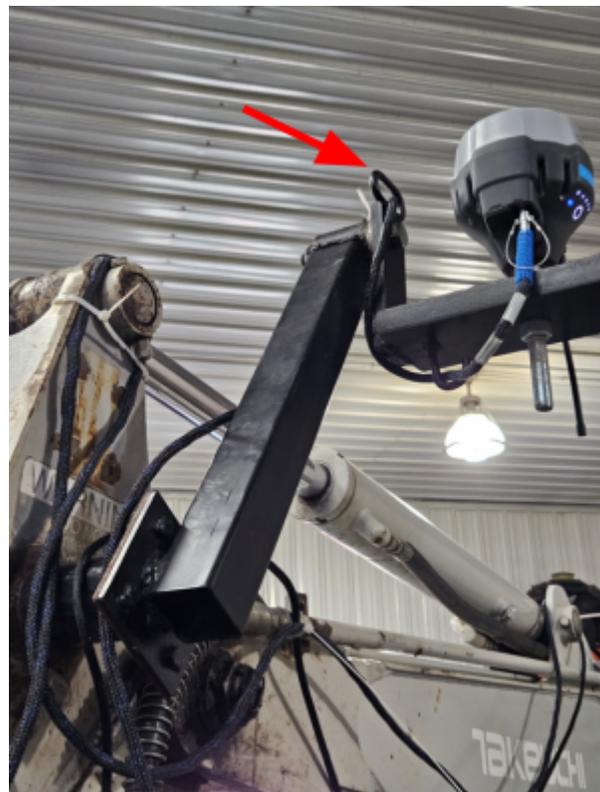
Begin by installing the CAN harness.

Connect it from the ECU, over the boom, and to the stick sensor. Ensure the stick sensor's connection port is positioned at the top. Next, use the CAN patch cable to connect the bottom of the stick sensor to the bucket sensor. The bucket sensor should always connect on the side facing the cab, with its capped end facing away from the machine. Finally, connect the GPS cable to the Main Module Harness.

When routing the cables, always ensure they are not pinched or stretched during operation. Running the cables as close as possible to the end of pivot pins will minimize the required slack and reduce the potential for damage.



Route the GPS cable through the loop on the GPS mount, connecting it to the main harness. Secure any excess cable, ensuring sufficient slack for full GPS mount movement.



8. Installation Verification and Welding

As the operator slowly moves the machine through all possible configurations, observe all cables, mounts, and sensors. Reroute cables or reposition sensor brackets as needed. Once the sensors, modules, and GPS are removed, the brackets can be securely welded.

Ditch Assist DIG Calibration Steps

For precise grade guidance, accurate calibration is essential. Even minor measurement errors can lead to significant inaccuracies. Therefore, it is crucial to verify all measurements and alignments meticulously during the calibration process. We recommend recording your measurements for future reference or when transferring the system to another machine.

Measurements Records

Link Lengths	Machine 1	Machine 2	Machine 3
	_____	_____	_____
	Bucket	Bucket	Bucket
	_____	_____	_____
B-F	mm	mm	mm
B-E	mm	mm	mm
A-B	mm	mm	mm
B-C	mm	mm	mm
C-D	mm	mm	mm
A-D	mm	mm	mm
GPS Offset			
Offset Required	YES / NO	YES / NO	YES / NO
Offset Direction	Towards / Away	Towards / Away	Towards / Away
Offset Distance	mm	mm	mm

Connecting to Ditch Assist DIG Wi-Fi

When powered on, the Ditch Assist DIG ECU Module creates a Wi-Fi hotspot. Connect your device to the network (SSID) that includes "Ditch" and/or "DIG" in its name.

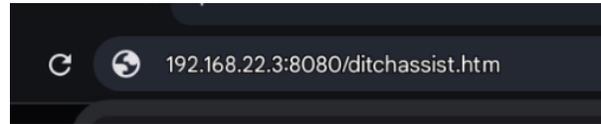
- The default Wi-Fi password is "ditchassistdig"

1. Open the Ditch Assist DIG User Interface

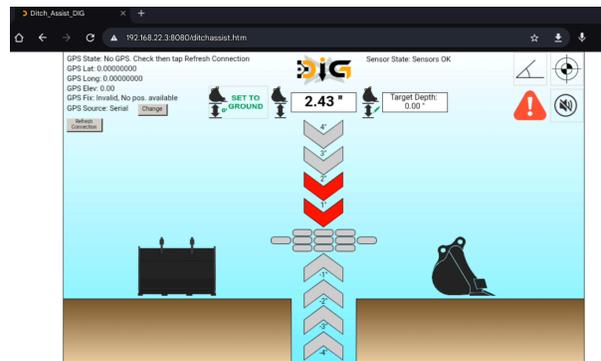
On your device web browser, enter the following address into the address bar:

192.168.22.3:8080/ditchassist.htm

(it is recommended to bookmark this address for easy access in future).



The DIG user interface will open in your browser



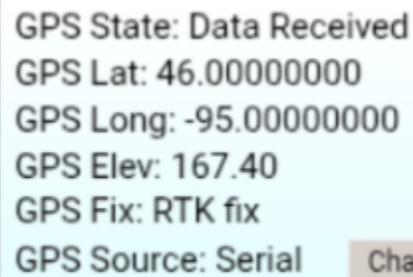
2. Verify GPS and Sensor Detection

Confirming GPS Status

To ensure proper GPS functionality, verify the following:

- **GPS State:** Should display "*Data Received*," indicating the system is receiving GPS coordinates and elevation data.
- **GPS Fix:** Should show "*RTK fix*," confirming precise positioning.

If these details are not visible, check the GPS connection and verify GPS settings are correct, and confirm it is receiving RTK corrections. Then, tap "*Refresh Connection*" to re-verify the status.



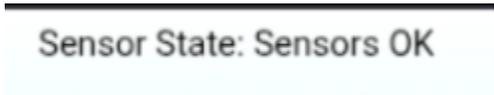
GPS State: Data Received
GPS Lat: 46.00000000
GPS Long: -95.00000000
GPS Elev: 167.40
GPS Fix: RTK fix
GPS Source: Serial

Confirming Sensor Status

To ensure proper sensor functionality, verify the following:

- **Sensor State:** Should display "Sensors OK," indicating the system is detecting both stick and bucket sensors.

If the message isn't displaying, check that the sensors are connected and powered on. A pulsing red LED should be visible at the bottom of the stick sensor and to the left of the bucket sensor.



Sensor State: Sensors OK

3. Calibration Procedure

To complete the calibration procedure, you will need:

- Metric measuring tape
- Visual or digital level (long enough to cover the distance between dog bone linkages)
- Weighted plumb bob (long enough to reach the length of the stick to the bucket)
- Ladder
- Two people

1. From the Home screen, tap on the Calibration Icon.

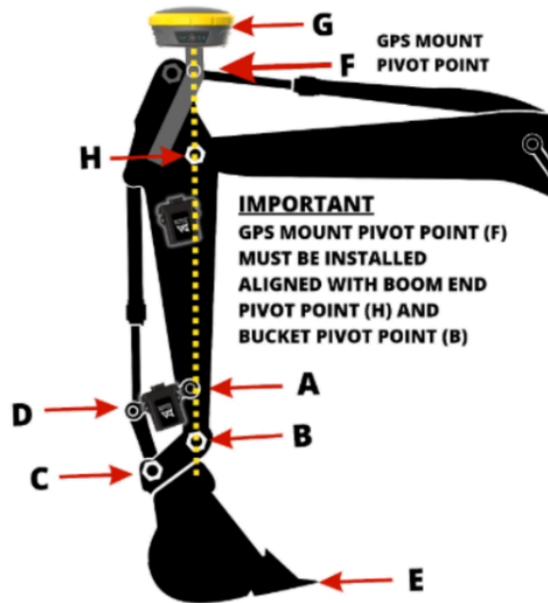
Open the Link Lengths screen if not already selected.



2. All measurements should be taken from the center of each link. Measure twice for best results, and convert measurements to mm (1cm = 10mm).

Tap on the text labels for each measurement to see a more detailed image of the required measurement

- **Sensor Location** (bucket sensor - typically this will be Dog-Bone)
- **Sensor Side** (as viewed from the cab)
- **B-F Distance** (note that F is the pivot point on the GPS pendulum mount)
- **B-E Distance** (measure E at bucket edge or edge of teeth, if present)
- **A-B Distance**
- **B-C Distance**
- **C-D Distance**
- **A-D Distance**



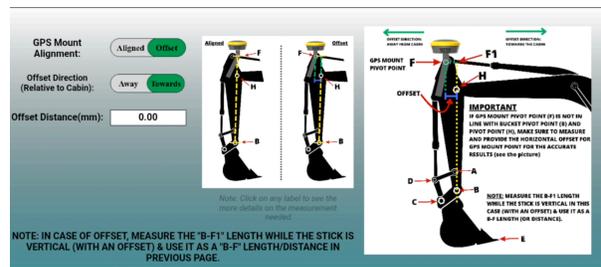
3. After entering all measurements, tap **SAVE**, then **NEXT** to proceed.



4. For precise elevation calculations, input the offset distance and direction if the GPS mount is not vertically aligned with points H and B. If it is aligned, maintain the 'Aligned' setting and proceed.

If an offset exists, specify whether it is towards or away from the cab. Then, enter the horizontal offset distance between B and F when the stick is vertical.

Tap **NEXT** to move on when finished.



5. Complete Angle Calibration Steps 1-2

Ensure the stick and dog bone are perfectly vertical/horizontal for their respective calibrations to accurately account for the angles of mounted sensors.

i. Stick Vertical Alignment

Align the stick so that points H and B are vertically aligned. If GPS is offset, use a plumb bob attached to point H (stick boom pivot point). If no offset is present, attach the plumb bob to point F (GPS pivot point), ensuring point F is also aligned. Once all points are vertically aligned, tap YES next to the 'Is Stick vertical?' prompt.

ii. Dogbone Horizontal Alignment

Use a level to align the dogbone horizontally. If the dogbone is curved or uneven, level the center of the two linkages. Once the dogbone is horizontal, tap YES next to the 'Is DogBone Horizontal?' prompt.

Tap **SAVE** then **NEXT** to move on.

Link Lengths Angles PREV. NEXT

1. After taking the measurements, adjust the stick so that the line connecting points F, H, and B is parallel to the vertical axis. Use a plumb-bob or other equipment to ensure accuracy. Once the dipperstick is vertical, click the YES button.

Is Stick vertical? YES

Stick Sensor Angle(°):

Stick Sensor offset:



After positioning the stick vertically, gradually adjust the bucket until the dogbone is horizontal. You may use a bubble leveler tool for assistance. Once the dogbone is horizontal, click the "Yes" button below. If your dogbone is curved instead of straight, ensure that the line connecting the two pivot points is horizontal.

Is DogBone Horizontal? YES

Bucket Sensor Angle(°):

Bucket Sensor mount offset:



6. Complete Angle Calibration Steps 3-4

Complete the final two calibration steps:

iii. Bucket Vertical Alignment

With the stick remaining vertical (as in step i.), align the bucket so points B and E are vertically aligned. Tap YES when prompted, 'Is Bucket vertical?'.

iv. A-B Vertical Alignment

Align the stick so that points A and B are vertically aligned. Once aligned, tap YES to the prompt, 'Is A-B line vertical?'.

Tap **SAVE** then tap on the **HOME** icon.

3. Once the stick is positioned vertically, ensure the bucket is also vertical without moving the stick. Align points F, H, B, and E in a straight line that is parallel to the vertical axis. Once this is achieved, click the YES button.

Is Bucket vertical? YES

Bucket Sensor Angle(°):

Bucket Sensor offset:

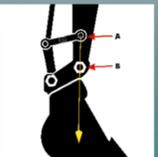


4. Now, slowly move the stick until the link connecting the A-B pivots is vertical. Use a plumb bob if necessary to ensure both points are aligned vertically. Once this is achieved, click the "Yes" button below.

Is A-B line vertical? YES

Stick Angle(°):

Stick link offset:

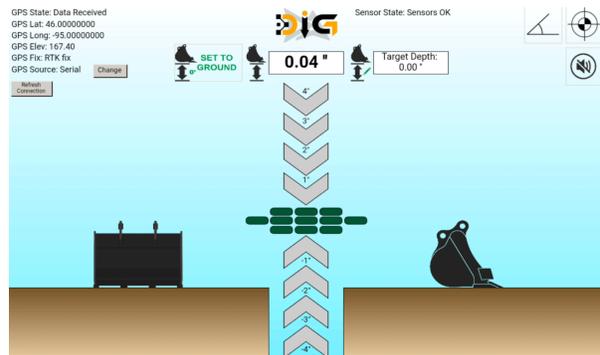


7. Test System Accuracy

- Place an object, such as a wooden block, in front of the machine. Position the bucket edge or teeth on top of the block.
- On the home screen, tap the Angle icon  and confirm that the slope value is set to 0
Slope Value (%):
- Return to the Home screen and tap  **SET TO GROUND**. Verify that the visual lightbar indicates you are within the center deadband.
- Move the machine to various angles and positions, placing the bucket edge back on the test block at each new position. The guidance bar should consistently show that you are on target.

Note that minor fluctuations are expected due to RTK performance, and a slightly greater offset may be observed at more extreme angles.

A well-calibrated system will show values within 1-2 inches across all positions. If you observe higher values, or if values increase significantly with changes in bucket position or angle, this typically indicates an issue with a calibration value or angle. In such cases, repeat the calibration process, paying close attention to measurements and re-running angle calibrations.

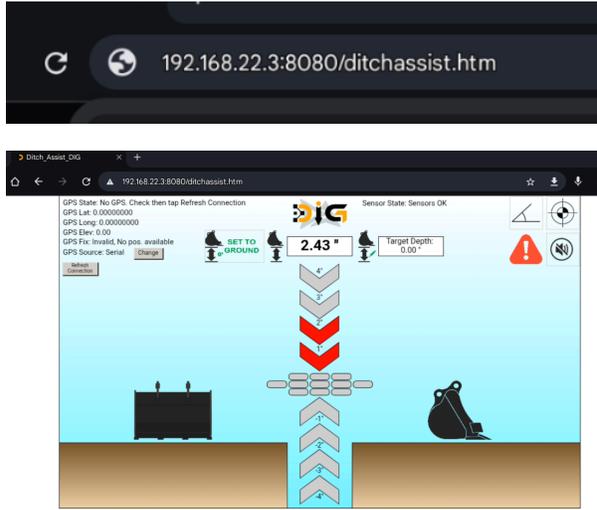


Ditch Assist DIG Operation

Overview

Ditch Assist DIG offers a straightforward, precise alternative to laser grade guidance systems. Its GPS-based operation eliminates the need for constant laser repositioning, and its sensors calculate bucket elevation at any digging angle, removing the requirement to align the boom, stick, and bucket to a fixed position for grade checks. DIG determines target grade using the straight-line distance from your starting reference point and a user-defined percentage gradient. A depth offset can also be entered if a specific depth is needed at the beginning of the run. To maintain accurate calculated grades, a new reference point must be set whenever the digging direction changes by more than a slight deviation. Changing the gradient will also reset the starting reference point.

Operation Steps

<p>1. Connect Device to Wi-Fi and Open the DIG Web App</p> <p>To begin, power on your DIG system</p> <ul style="list-style-type: none">• Connect your tablet to the Ditch Assist DIG ECU's Wi-Fi access point.<ul style="list-style-type: none">• The password is "ditchassistdig". <p>Next, open your web browser</p> <ul style="list-style-type: none">• Enter or access the bookmarked address for the DIG UI web app:<ul style="list-style-type: none">○ 192.168.22.3:8080/ditchassist.htm <p>The User Interface should then open as shown.</p>	 <p>The screenshot shows a mobile browser interface. The address bar displays '192.168.22.3:8080/ditchassist.htm'. The main content area features a graphical user interface for the DIG system. At the top, it shows 'GPS State: No GPS. Check then tap Refresh Connection', 'GPS Lat: 0.00000000', 'GPS Long: 0.00000000', 'GPS Elev: 0.00', 'GPS Fix: Invalid, No pos. available', and 'GPS Source: Serial'. There are buttons for 'Refresh Connection', 'SET TO GROUND', and 'Change'. A central display shows a gradient of '2.43%' and a 'Target Depth: 0.00'. Below this is a graphical representation of a ditch with a digger bucket on the right side, and a vertical line of arrows indicating the digging path.</p>
<p>2. Verify GPS and Sensor Status</p> <p>Confirming GPS Status</p>	

Ensure GPS functionality:

- **GPS State:** "Data Received" (receiving coordinates/elevation)
- **GPS Fix:** "RTK fix" (precise positioning)

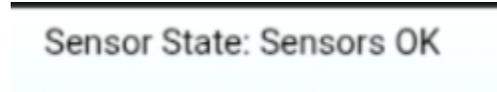
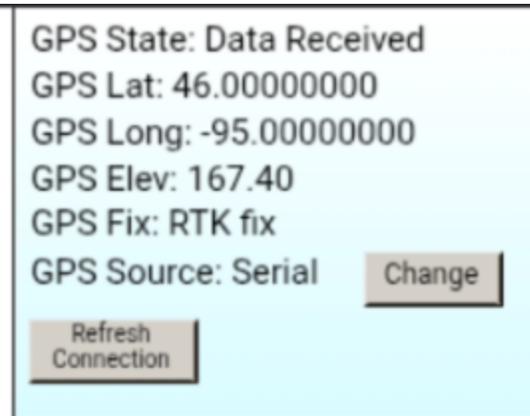
If not visible, check GPS connection, settings, and RTK corrections. Tap "Refresh Connection."

Confirming Sensor Status

Ensure sensor functionality:

- **Sensor State:** "Sensors OK" (stick and bucket sensors detected)

If not displaying, check sensors are connected and powered (pulsing red LED on stick and bucket sensors).



3. Target Gradient & Direction

To set the target gradient, tap the "Grade

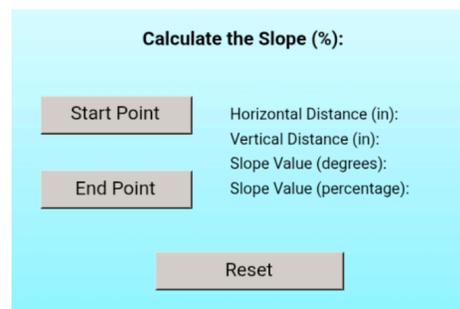
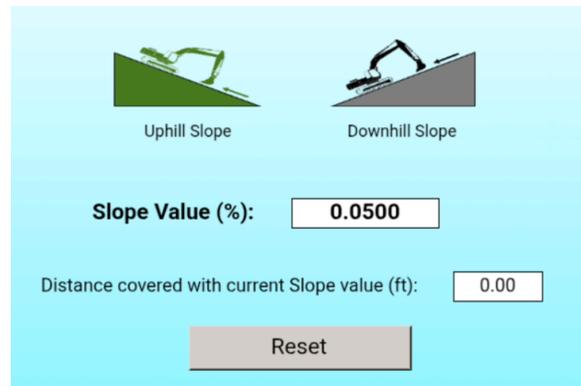
Icon"  and input the desired Slope Value in percent. For a level area, enter "0".

- *1% grade signifies a 1-foot fall or rise per 100 feet of run.*
- *0.1% grade signifies a 1-foot fall or rise per 1,000 feet of run.*

Next, choose your digging direction:

"**UPHILL**" (starting at the outlet) or "**DOWNHILL**" (starting at the upstream end).

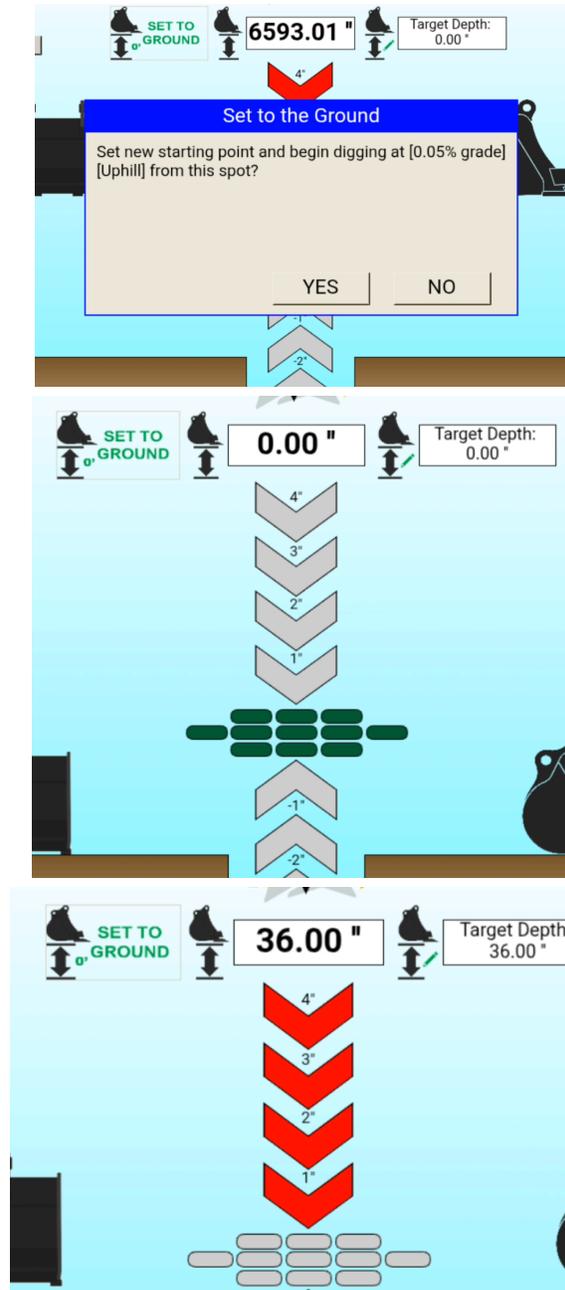
This screen also offers an optional feature to calculate the grade between two points. Position your bucket on the ground or a reference point, tap "Start Point", then move your machine to a second location, touch the



bucket to the ground or a reference point, and tap "End Point". The system will then display the gradient between these two points.

4. Set Reference Point and Begin Working

- A. Return to the Home  screen.
- B. Position the bucket edge on the ground or at a designated reference point at the starting location.
- C. Tap "Set To Ground" to establish this as the current reference point for all subsequent grade calculations.
- D. Confirm that the displayed information is accurate, then click "YES" on the pop-up box.
- E. If necessary, add a depth offset by tapping the "Target Depth" box and inputting the desired starting depth. You should observe that your current bucket height reflects this same distance above the target depth.
- F. Begin working away from the start reference location. As you work, your target elevation will be updated based on distance and the on-screen guidance will show you when you have achieved the target grade at any location.
- G. Repeat Steps 3 and 4 each time you begin a new job.



5. Changing Grade or Reference Point

Changing Grade Mid-Run

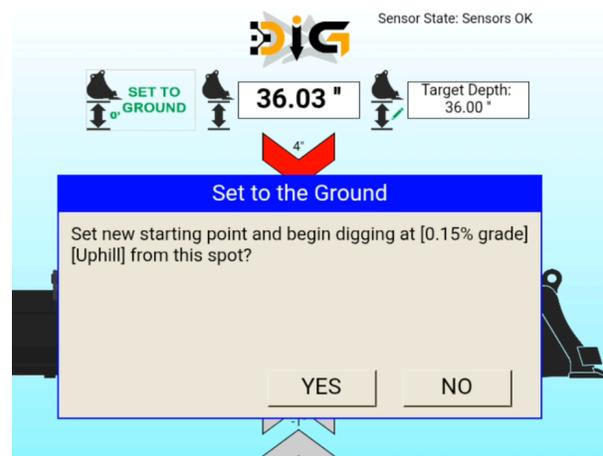
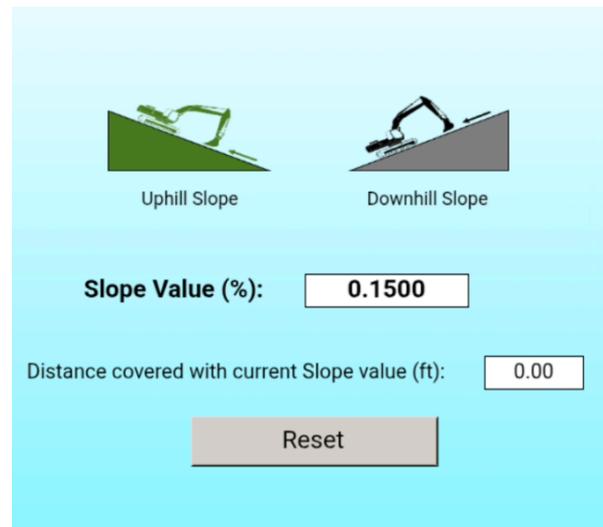
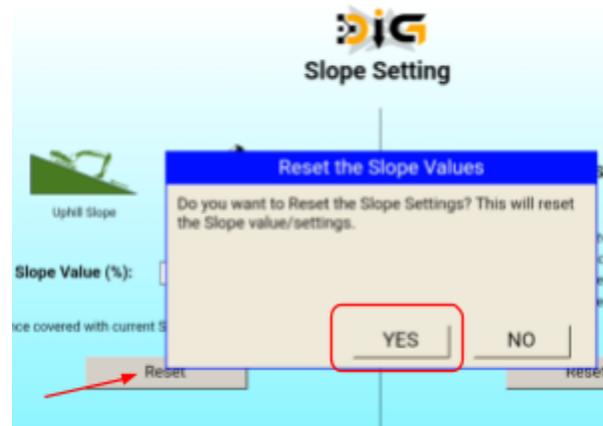
To change the grade mid-run, first ensure you have a valid reference point, such as a previously dug area that has been finished to grade.

- A. Tap the Grade Icon.
- B. Under slope settings, tap Reset to clear the current grade and reference point.
- C. Enter the new target grade and update the digging direction if necessary.
- D. Return to the Home screen.
- E. Place the bucket edge on the valid reference point.
- F. Tap SET TO GROUND and continue working. All subsequent work will now calculate the new grade from this new reference point.

Changing Reference Point

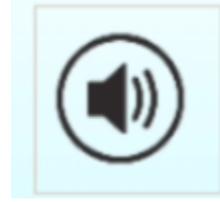
If you are changing direction significantly (e.g., a ditch or trench turns more than a few degrees), you must reset your reference point to maintain accurate gradient.

- A. Confirm you have a valid reference point for the new distance calculation to begin from (i.e., a previously dug area finished to grade).
- B. Place the bucket edge on the valid reference point.
- C. Tap SET TO GROUND and continue working. All subsequent work will now calculate the new grade from this new reference point.

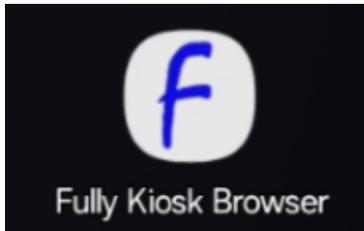


6. Audible Guidance Option

You can optionally enable audible guidance when you are on-grade by toggling the speak icon. Please note that this feature is only available on Android and Windows devices; Apple iPads do not support this browser-controlled audio function.

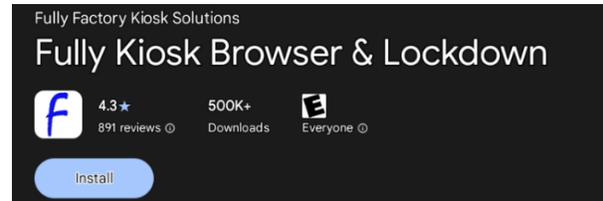


Using Fully Kiosk Browser on Android for an App-Like Experience

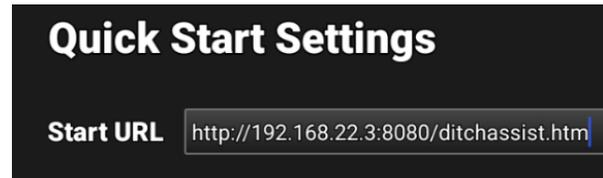


Users with Android tablets are encouraged to install and use the Fully Console Browser from the Play Store. Follow these instructions to configure the browser to run Ditch Assist DIG like a native app from your Home screen.

1. **Install Fully Kiosk Browser from the Play Store.**
2. Reconnect your tablet to the Ditch Assist DIG ECU's Wi-Fi.

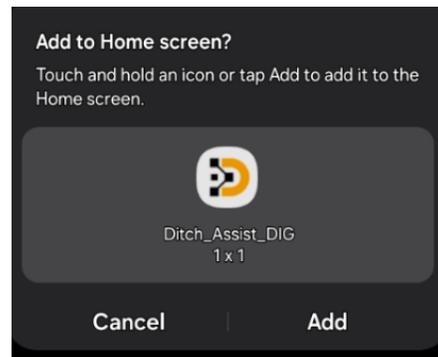
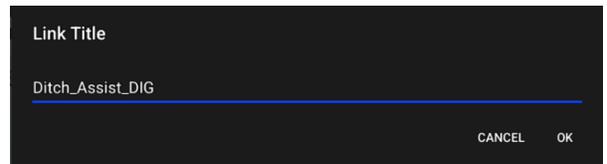
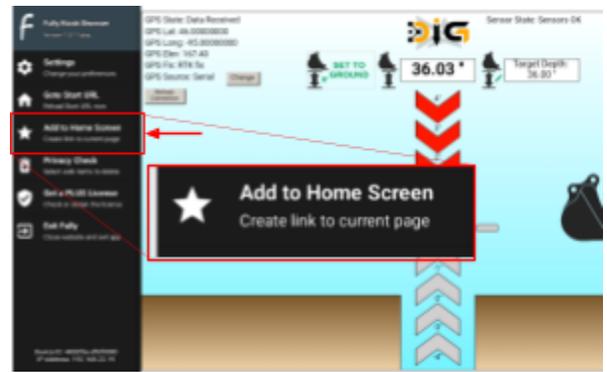


3. **Upon initial launch, configure the Start URL to** <http://192.168.22.3:8080/ditchassist.htm>, then select "START USING FULLY."
 - a. Subsequent adjustments to the Start URL can be made by swiping left on the screen and navigating to Settings > Web Content Settings.



4. Add the Ditch Assist DIG user interface to your home screen:

- a. Open the Ditch Assist DIG user interface in Fully Kiosk Browser.
- b. Swipe from the left and select "Add to Home Screen."
- c. Acknowledge the shortcut name (edit if desired) and click "OK."
- d. On the next window, click "Add."
- e. Exit the browser by swiping from the left and choosing "Exit Fully."
- f. Navigate to your device's Home screen.
- g. If the icon is not on the main home screen, swipe right until you locate it.
- h. Long-press and hold the icon, then drag it to your main home screen.



An app icon will now appear on your home screen. Tapping it will launch the DIG interface in a full-screen, app-like experience.

