Assembly and Operation Manual

SECTION 1

Introduction

This section contains:

- Introduction
- Important Safety Warning
- Important Safety Information
- Table of Contents
- Warranty
- Disclaimer. Limit of Liability
- Unpacking your Pasture Meter
Introduction

Congratulations on your purchase of a C-Dax Pasture Meter. It represents World’s Best Technology, which has been carefully designed to provide key decision making tools to pastoral farmers. We anticipate these tools will deliver economic benefits to our customers - please be assured that this is our objective.

We are confident that your Pasture Meter will perform for many years as long as sensible equipment husbandry practices are followed. Extensive trials have been conducted during the development phase to ensure that this product is able to function reliably in the punishing agricultural environment. We have endeavoured to make the Pasture Meter as robust and functional as possible, but please remember that like any piece of precision electronic equipment, its performance parameters need to be respected.

We thank you for making this investment and assure you of our attention at all times.

IMPORTANT SAFETY WARNING

The C-Dax Pasture Meter is designed specifically to be trailed behind an All Terrain Vehicle (ATV) or similar type of agricultural vehicle. Operators should note that like any piece of trailed or mounted agricultural equipment, THE PASTURE METER WILL EFFECT THE STABILITY AND HANDLING CHARACTERISTICS OF THE TOWING VEHICLE. FAILURE TO TAKE ACCOUNT OF THIS AND EXERCISE CAUTION WHEN OPERATING THE PASTURE METER MAY RESULT IN INJURY, OR IN EXTREME CIRCUMSTANCES, DEATH TO THE OPERATOR OR BYSTANDERS. OPERATORS ARE REMINDED THAT GROUND CONDITIONS COULD BE SLIPPERY AND THAT UNDULATIONS IN TERRAIN MAY BE CONCEALED BY GRASS OR OTHER VEGETATION.

OPERATORS ARE FURTHER REMINDED NEVER TO EXCEED THE MANUFACTURERS RECOMMENDED LOADING LIMITS FOR THE TOWING VEHICLE. C-Dax accepts no liability whatsoever for damage or injuries sustained while using The Pasture Meter.
IMPORTANT SAFETY INFORMATION

AN IMPORTANT MESSAGE FOR OWNERS & OPERATORS OF C-Dax ATTACHMENTS/ACCESSORIES

Be warned of the dangers of loading your ATV or other vehicle in excess of its carrying capacity. It is important to understand that any loads or attachments whether fastened to, or placed on a vehicle or an ATV, will alter the stability or handling characteristics of that vehicle or ATV. Spray tanks or other equipment must be filled only to a level where the gross weight is within the load limit of the ATV or other vehicle.

Safety is a primary concern in the design, manufacture, sale, and use of spray tanks and other equipment. As manufacturers of spray tanks and other equipment we want to confirm to you, our customers, our concern for safety. We take this opportunity to remind you about the simple, basic and common sense rules of safety when using spray tanks and other equipment. Failure to follow these rules can result in severe injury or death to operators and bystanders.

It is essential that everyone involved in the assembly, operation, transport, maintenance and storage of this equipment be aware, concerned, prudent and properly trained in safety.

This also applies to equipment that is loaned or rented to someone who has not read the owner’s manual and is not familiar with the operation of the equipment.

- NEVER EXCEED THE LOAD LIMIT CAPACITY OF THE ATV OR OTHER VEHICLE.
- ALL ATV AND TRAILED EQUIPMENT TYRES SHOULD BE INFLATED TO MANUFACTURERS RECOMMENDED OPERATING PRESSURES.
- PLEASE NOTE THAT FILLING THE SPRAY TANK OR OTHER EQUIPMENT COMPLETELY AND OR THE ATTACHMENT OF ADDITIONAL EQUIPMENT TO THE ATV MAY EXCEED THE ATV’S MAXIMUM LOAD/CAPACITY AND IT IS NOT RECOMMENDED TO EXCEED MANUFACTURERS GUIDELINES
- LOAD/CAPACITY SHOULD BE PROPERLY DISTRIBUTED AND SECURELY ATTACHED.
- REDUCE SPEED WHEN CARRYING LOAD/CAPACITY OR PULLING A TRAILER OR TRAILED APPLICATION EQUIPMENT AND ALLOW GREATER DISTANCE FOR BRAKING.
- NEVER ALLOW ANYONE TO RIDE ON YOUR SPRAYER OR OTHER EQUIPMENT.
- ALWAYS FOLLOW THE INSTRUCTIONS IN THE OWNER’S VEHICLE MANUAL FOR CARRYING LOAD/CAPACITY OR PULLING A TRAILER.
- PROPER MAINTENANCE IN LINE WITH MANUFACTURER’S RECOMMENDED MAINTENANCE PROCEDURES IS ESSENTIAL.
- BEFORE APPLYING CHEMICALS, READ THE LABEL OF THE CHEMICAL MANUFACTURER OR SUPPLIER FOR THEIR PERSONAL PROTECTIVE EQUIPMENT INSTRUCTIONS AND OPERATE AS RECOMMENDED.
- THE SAFETY OF ALL CHEMICALS USED IN AGRICULTURE IS UNDER THE JURISDICTION OF A GOVERNMENT AGENCY, EG. N.Z. MINISTRY FOR THE ENVIRONMENT; USA ENVIRONMENTAL PROTECTION AGENCY ETC. FURTHER LOCAL GOVERNMENT OR STATE LAWS MAY APPLY.
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Warranty

1  **WARRANTY AND LIABILITY**

**Use of the equipment**

1.1 You must satisfy yourself as to the suitability of the equipment for your intended use(s) of the equipment.

**Your relationship with the retailer**

1.2 Where you consider you have a warranty claim (or any other claim) in relation to the equipment, you must contact the retailer who sold you the equipment, not C-Dax directly. The retailer is responsible for liaising with C-Dax in respect of your claim.

**Warranty**

1.3 C-Dax warrants to the original purchaser that the equipment is sold free from defects in materials and workmanship for a period of 12 months from date of first retail sale (6 months from date of first retail sale if the equipment is sold in the U.K.) subject to the terms set out below.

1.4 C-Dax will at its option repair or replace the defective equipment (or part of the equipment) or notify the retailer of the equipment to refund the purchase price for such defective equipment to you in the event of a breach of this warranty, subject to the terms set out below.

**Liability**

1.5 Except for the warranty set out in clause 1.2 above, all warranties and representations (including those expressed or implied by law) in respect of the equipment or advice relating to the equipment provided to you by C-Dax are excluded to the extent permitted by law.

1.6 Notwithstanding anything else in this manual, C-Dax’s maximum liability to you (in the event that such liability exists) in respect of any breach of warranty, any matter set out in this manual, or for defective equipment or advice relating to the equipment provided is limited at C-Dax’s option to:

(a) repairing or replacing the equipment (or part of the equipment); or

(b) notifying the retailer of the equipment to refund the price for the equipment paid by you.
1.7 Notwithstanding anything else in this manual, in no event will C-Dax be liable, whether in contract, tort (including negligence) or otherwise:

(a) where you have altered or modified the equipment, misused or misapplied the equipment, or the equipment has been subjected to any unusual, excessive or non-recommended use, service or handling (including as set out in this manual);

(b) where the equipment is not transported, stored, handled or used in accordance with any directions given by C-Dax (or the retailer) to you (including as set out in this manual);

(c) where the equipment:

   (i) has been subject to neglect, accident or hireage, or the damage arises from fair wear and tear, battery damage or chemical attack;

   (ii) has been built to a customer’s specifications; or

   (iii) has been dismantled, repaired or serviced other than by an authorised service agent of C-Dax;

(d) for loss or damage caused by any factors beyond C-Dax's control; or

(e) for any loss of profit or revenue, or for any special, indirect, incidental or consequential damage, loss or injury of any kind suffered by you.

1.8 Where C-Dax elects to repair or replace the equipment it will use reasonable endeavours to do so as soon as practicable but will not be liable for any delay in doing so.

1.9 You agree that the transactions entered into between you and the retailer (and C-Dax) are for the purposes of trade and that, having regard to all relevant circumstances of the transactions, it is fair and reasonable that the provisions of the Consumer Guarantees Act 1993 (NZ) do not apply to those transactions to the fullest extent permitted by law.
Unpacking Your Pasture Meter

When unpacked, you should have the following components:

- Sensor
- Sled
- Indicator Console
- Indicator Console Mounting Bracket
- Black Sensor Cable
- Power Cable
- Battery Connecting Cable
- Operation & Assembly Manual
- Indicator Console Mains Adaptor

Should any of the above items be missing or damaged, please contact our Customer Service Department for replacement.

Customer Services - Technical
C-Dax Ltd
P O Box 1010
Palmerston North
New Zealand

Email: sales@c-dax.co.nz
This section contains:

- General Description
- The Sled Assembly
- Safety Warning
- The Sensor
- The Indicator Console
General Description

To date, pasture cover measurement is normally performed by one of the following 3 methods.

- Visual assessment
- Rising Plate Meter
- Pasture Probe

These methods can either be subjective, time consuming or rely on a limited number of individual measurements per paddock.

The C-Dax Pasture Meter has been designed to greatly improve the collection of pasture cover data in quantity, speed and ease of collection.

It is an electronic device that is trailed behind an ATV, and operated at speeds of up to 20 kph. It has wheels which are lowered to allow travel on roads, farm races / tracks, and which can be raised to allow the sled to run directly on the ground in the measurement position. The wheels then act as outriggers for stability.
The Pasture Meter has been designed to measure the height of pasture grass and average the readings. Internal software then converts the averaged readings to kgDM/ha by using a calibration equation that can be changed for different times of the year.

**Note:** The operator is able to set the indicator console to show pasture height in “mm” or the available pasture cover in “kgDM/ha.”

The sensor takes 200 height readings per second. At a ground speed of 20kph, this represents a reading every 27mm of ground traveled.

The measuring sensor is mounted on a purpose built sled which is trailed behind an ATV or farm vehicle at speeds of up to 20 kph depending on terrain. The sensor has 18 light beams for measurement purposes between the left and right vertical arms. The indicator console is normally mounted at the front of the vehicle for easy observation by the operator. It is connected to the sensor by cable and also to the vehicle’s own 12 volt battery system.
The Sled Assembly

The Sled has been designed to be solid, strong, and heavy in order to keep the sensor as close to the ground as possible at all times. The Sensor’s lowest light beam is 20mm from the ground. To generate accurate pasture cover readings, it is important that the sled remains in contact with the ground. To ensure that this is maintained as much as possible, the frame on which the sensor is mounted has been constructed from heavy gauge steel. This provides both structural strength and the weight necessary to keep the sled on the ground. Special “blade” like fixtures have been built into the “feet” of the frame to stabilise tracking during operation.

The wheels are only used for transport purposes to and from work sites and when travelling along farm tracks / races. When in the measurement position, the wheels are locked up clear of the ground and the sled sits down firmly on the ground. In this position, the wheels act as stabilising outriggers minimising the effects of sideways rocking.

**Please Note.** The wheels should be placed in the transport position whenever the Pasture Meter is not being operated on grass, however brief the period is.
The geometry and construction of the central section of the sled frame has been designed to minimize dirt fouling the glass windows covering the sensor’s light beams. However, given the nature of measuring pasture cover, particularly post grazing, the glass may occasionally need cleaning. How often this is required is entirely dependent upon the environment in which the device is working.

Operator experience and regular inspection of the glass windows will ensure reliability of results.

**The Sensor**

The sensor consists of 18 light beam emitters at 20 mm spacings on one side of the sensor frame and 18 light beam detectors at 20 mm spacings on the other side of the sensor frame. In operation, 18 light beams exist between one side of the sensor and the other. Whenever any light paths between the two sides are broken, the result is recorded as a relative height measurement.
The sensor measures the height of grass at 20mm increments and then converts this into **kgDM/ha**. Some grass obviously falls between the light beams and must therefore be factored into the measurement. It has been scientifically established that a 10mm adjustment provides an accurate overall reading.

The height shown on the indicator console in mm is the number of light paths broken at any instant, multiplied by 20mm, plus the 10mm adjustment.

**For example:**
- 7 light paths broken records as = 140mm (7 x 20mm)
- PLUS the 10mm adjustment
- = 150mm
The Indicator Console

This is normally mounted in a convenient position on the front carrier of the ATV. It is connected by cable to the ATVs battery and also by a thick black cable to the sensor at the rear of the sled. Various functions are shown on the display and the operator has the ability to input the calibration equation of choice. The indicator console is mounted on a purpose built bracket and locked in place with a wing nut. The two cables can then be connected.

Removal of the indicator console is the reverse process.

The indicator console is shown mounted on the corner of the carrier frame to allow use of toolboxes and other equipment.
This section contains:

- The Sled
- The Indicator Console
- Using your Pasture Meter
- Understanding the Sensor
- Understanding the Indicator Console
- Measuring your First Paddock
- Indicator Console Settings
Assembly & Setup – The Sled

Setting the angle of sled to the ground

The angle between the sled and the ground will need to be adjusted to suit the terrain and towing vehicle. Flat pasture with no obstacles will only require a slight angle, but this should be increased when operating on undulating or pugged ground.

It is most important that the sled be slightly raised at front to allow easy passage over terrain. If angled downwards, the front of the sled is likely to dig into the ground. Particular care should be taken in conditions where stones are present to ensure the angle of the Pasture Meter is set to ride over stones that might be protruding slightly through the soil.

Please note: The Pasture Meter is not intended to be operated in conditions where it is likely to be subject to repeated contact with whole, large stones.
To fit the draw-bar:

1. Slide the drawbar into approximate position ensuring tow hitch is the correct way up.

2. Loosely fit rear attachment bolts.

3. Attach draw bar to tow-ball on ATV or other towing vehicle.

4. Attach cable protector tube to drawbar in position shown.

5. Fit adjustment bolts and nuts as per the illustrations on Pages 17 and 18.

Adjusting the angle of sled

The drawbar position should be set so the front of the sled is slightly raised. A gap of 25mm between the front of the sled skidplate and the ground should suffice for most pasture. Experience will determine the best angle for the terrain being traversed.

The operator should exercise care and common sense when determining the speed to be traveled. The equipment is designed to travel at up to 20kph on ideal terrain. This maximum speed applies regardless of whether the unit is measuring or in transit. If the surface is rough, or if obstacles are present, then a much slower speed should be used.
Should further adjustment be necessary, follow the steps in the next 2 illustrations. Should the angle be satisfactory as it is, then tighten the bolts as indicated by Step 4 on the next page.

Once the sled is correctly adjusted, the equipment is ready for use.
Step 1.
Loosely fit rear attachment bolts.

Step 2.
Attach drawbar to tow-ball on ATV or other vehicle. Raise the front of the sled slightly above horizontal.

Step 3.
Loosely fit adjustment bolts and nuts.

Step 4.
Tighten adjustment bolts and the 2 rear attachment bolts.
Set-up Sled & Sensor Assembly.
Attach coupling on the sled to the tow-ball on the ATV. Ensure wheels are down in the transport position.

Connect sled cable to indicator console cable hanging from rear.

Maneuver sled to extreme left and right positions to ensure cable will not foul wheels and not be damaged by hot exhaust pipe or hot exhaust emissions.

Return sled to position directly behind ATV. Using safe lifting practice, raise the wheels and lower sled to the measurement position. The sled will now be on the ground.
CAUTION

When raising the sled into the transport position, be careful to follow safe lifting practice. Always ensure you have secure footing, bend knees and do not lift weight with your back. Keep feet and hands away from the underside of the sled.

REMEMBER: Let your legs do the lifting.
Assembly & Setup – Indicator Console

Step One

- Locate bottom plate under carrier tube and position as desired
- Place bolts through the carrier mounting bracket
- Tighten nuts firmly – do not over tighten to the point where the carrier or bracket deforms
- Attach two smaller bolts through brackets and tighten

Step Two

- Locate swivel latch on back of console so that it fits through bracket
- Slide console onto bracket until it rests on the back bracket
- Tighten swivel latch firmly

Step Three

- Connect silver plug wired to blue / white power cable to underside of indicator console.
- Connect other end of power cable to battery connector cable and run power cable to ATV battery housing
- Connect pin (Male) end of coiled black cable to underside of indicator console.
- Run cable to rear of ATV
**Important:**

Make sure you attach the end of the cable to the rear carrier so that it is on the opposite side of the ATV from the exhaust pipe.

**Note:**

The battery connector cable is supplied for connection to batteries that do not already have a C-Dax battery connector cable fitted. If already fitted, connect the blue / white power cable directly to it.

The path to run the cables to the battery and rear carrier is up to the installer but should be chosen to protect the cables and so as not to obstruct the operator.

The rear end of the black cable should be attached so that just the plug and 50mm of cable hang down for attachment to the sled sensor cable. Coil excess cable under seat or tie under rear carrier out of the way.
Using Your Pasture Meter

This series of steps assumes that the operator has read and understood the operator's chart supplied and familiarised him/herself with the use of this equipment.

Operating Hints

1. Tyre pressure requirement will vary depending on the terrain. Smooth terrain would best suit higher pressures. Note: Do not exceed manufacturers maximum pressure as stated on the tyre. Lower tyre pressures should be maintained on rougher terrain. If sled bounces excessively, try lowering the tyre pressures. A starting point would be 20 PSI.

2. The black cables have screw on plug covers. These protect the plugs and keep moisture out when the cable ends are not connected. When cables are not connected, the caps MUST be securely fastened to the plugs. Failure to do this will result in moisture ingress and deterioration of the electrical connectors.

3. It is strongly recommended that the unit be raised up onto its wheels if travelling through any type of waterway.
Raising and Lowering the Sled

Grasp draw-bar on one side at position shown and carefully lift off the ground

Using other hand, raise or lower the wheels as desired

Repeat the operation to raise or lower each side of the sled

CAUTION
When raising the sled into the transport position, be careful to follow safe lifting practice. Always ensure you have secure footing, bend knees and do not lift weight with your back. Keep feet and hands away from the underside of the sled.

REMEMBER: Let your legs do the lifting.

DANGER
Do not attempt to reverse the towing vehicle with wheels locked in measuring position. It is not designed to go backwards and any attempt to do so is could result in severe mechanical damage and perhaps personal injury.
Understanding the Sensor

Assuming the indicator console is switched on and set to mm while in the ‘wheels-down’ transport position, and has no light paths broken, the indicator console will be reading 10mm.

**Note.** Should any other height reading be shown while in this position, it indicates that one or more of the beams is obstructed. If this occurs, inspect the glass windows and the side protective tapered edge shields and wipe off the obstructing material with a soft damp cloth. Should this not rectify the situation, please refer to the trouble shooting tips at the end of this manual.

Placing an object or hand between the sensor side arms will result in height readings being displayed on the indicator console. The sensor takes 200 readings a second which are then averaged to update the indicator console display once per second.

- **When stationary in the pasture measurement position (wheels up), the indicator console readings can vary if individual blades of grass are blown across the light beams intermittently.**

- **The glass windows should be inspected at the beginning and end of any period of operation.**

Time spent familiarizing one’s self with the sensor operation will aid the interpretation of display results especially if the glass covering the light beams becomes dirty.
NOTE: The following applies to both sides of the sensor

Keep clear poly carbonate clean

Warning: Do NOT use cleaning objects likely to damage the polycarbonate. Metal objects are likely chip or scratch which may lead to moisture contacting electronic components. This is likely to lead to equipment failure.
Understanding the Indicator Console

In preparation for use of your Pasture Meter Indicator Console you need to ensure that you have attended to the following:

- Made the initial hardware setups for the Pasture Meter
- You have successfully created a Smartmaps account, created a farm map and installed the C-Dax upload tool

**NOTE:** If you wish to use an existing farm map please contact C-Dax

**Please Note:** It is critical that the correct numeric Farm & Paddock numbers are selected in the indicator console to ensure the correct pasture cover information is recorded against the corresponding farm and paddock.
Understanding Pasture Covers

Pasture Cover Equations are used to convert the height of the grass measured into the more useful Pasture Dry Matter, displayed as Kilograms per Hectare (KgDM/Ha). There is more than one pasture cover equation available, and you need to make sure that you enter the correct equation to suit the seasonal growth stage of the grass. Equations are continually evolving for different regions and pasture species. Contact C-Dax or visit our website to find up to date equations that suit your conditions.

A set of suggested pasture cover equations have been developed for typical New Zealand ryegrass and clover mix pastures, under non-irrigated conditions. Under irrigated conditions, the pasture cover equation designed for use in Winter may be appropriate all year round. As a starting point use the following equation:

\[
\text{KgDM/ha} = \text{Pasture height} \times 18.6 + 750
\]

**Pasture cover equation adjustment**

- If low covers are reading too high on the Pasture Meter then reduce the adder
- If low covers are reading too low on the Pasture Meter then increase the adder
- If high covers are reading too high on the Pasture Meter then reduce the factor
- If high covers are reading too low on the Pasture Meter then increase the factor

**Keep in Mind**

Because the Pasture Meter uses a standing height measurement, it may give slightly different results to that of a Rising Plate Meter, in some circumstances. The accuracy of a Rising Plate Meter is typically +/- 300KgDM/ha, however unlike a Rising Plate Meter, the Pasture Meter is not dependent on operator technique to achieve consistent results.

**N.B. For information on DIY and seasonal calibration refer to page 53 of this manual.**
How the measurement process works

The steps below outline the overall process for obtaining and recording your farm's pasture cover. They will be explained in the remaining sections of this guide.

1. **Turn on Smart Control console**
   - Press ON Button

2. **Adjust Calibration Equation if Necessary**
   - Press MENU Button and scroll through menu
   - Select farm and paddock number. Lower Sled into measuring position. Press centre of grey cursor to start recording and again when paddock is finished

3. **Enter Paddock and Lower Sled**
   - Drive around paddock (either transect or figure 8)

4. **Measure Paddocks**
   - Plug console into wall adaptor and transfer using Bluetooth

5. **Download Pasture Covers in Smart Maps**
   - Feed wedge will display pasture covers for measured paddocks

6. **Create Feed Wedge**
   - Create weekly grazing plans
Measuring your First Paddock

Step 1 – Turning the Indicator Console ON

Push this button

Step 2 – Adjust Your Calibration Equation if Necessary

Press MENU:

- Scroll by pressing the grey cursor key on the right hand side until $\text{ConSt}$ appears
- Adjust the constant by pressing the up and down cursor
- Scroll by pressing the grey cursor key on the right hand side until $\text{FACTr}$ appears
- Adjust the constant by pressing the up and down cursor
- Press MENU again to save settings and return to pasture cover display

Step 3 – Choosing Farm ID

- When Farm ID is enabled, you will be prompted to enter a Farm ID Number when the unit is turned on.

Use: UP and Down

To adjust the Farm ID Number (1-999) as shown:

- Press right cursor to accept farm number
Step 4 – Recording Your First Paddock

- When you have entered the selected calibration equation in the Indicator Console you are ready to start measuring pasture cover.

Before you start, make sure that you read the following:

  - Ensure the wheels are down on the sled for travelling
  - Check the sensor glass is clean
  - Press UNITS to switch between mm and kgDM/ha

- Ensure that the sensor is clear of any interference. The display should read 10mm. This confirms that all light beams are functioning correctly.

- Lower sled and set Indicator Console to either kgDM/ha or mm.

- To Start Recording, Push right cursor button once:

  With Paddock ID enabled, you will be prompted to select which paddock you are in, as shown:

  - Use: UP & Down
  - To adjust number (1-999) Press right cursor to start recording

  - The unit will display START confirming that it is starting to record
  - Once you have measured your first paddock you need to Stop Recording and Save the average value shown on the display.

  - Note: You MUST pause recording whenever you stop the ATV
To Stop/Pause recording, push this button once:

**PAUSE** will be displayed to confirm that recording has been paused, as shown:

Then the **average paddock value will flash on the display.**

From the paused state, to either stop or restart recording, press right cursor is displayed.

To restart recording, do not press any key. is displayed

To stop recording, press right cursor again. is displayed

followed by **Stop**

NOTE: Console will only save 99 average values. If you require more than 99 values, you will need to download the data first, the oldest data will be progressively overwritten

**Data displayed during recording**

- While recording, the normal display mode shows the **running average.** This can be changed at any time to show a **live reading** (the reading detected by the sensor at any instant) of the **mm** or **kgDM/ha**
- To switch between the **Average** and **Live** modes press **live/average** button.
Turning Farm ID and Paddock ID On and Off

- The Farm ID and Paddock ID options allow you to allocate a number to a specific farm and paddock (i.e. Farm 1, Paddock 12)
- To turn Farm ID and Paddock ID On and Off,
  - Turn the console off.
  - Press MENU then press the right cursor until you see PId.On and FId.On, you can switch the value between on/off by pressing the up/down cursor.
  - Press right cursor until SAVED is displayed.

Disconnected Sensor
When the Sensor is disconnected from the console, the console will display 5 dashes as shown:

If this occurs unexpectedly check cable connection between sensor and console.
This section contains:

- Software Installation
- Downloading Your Pasture Measurements
Software Installation

Introduction

- This installation and setup guide will assist you in getting the C-Dax Pasture Meter Bluetooth™ software for the Rapid Pasture Meter up and running.

Installation Components

There are 2 key components as follows:

- A SmartMaps account. Go to www.c-dax.co.nz and follow the SmartMaps link. Click ‘create account’ next to the login button. Follow the on-screen prompts from there.
- You must still draw or upload your map into Smart Maps to be able to use the Tier 2 unit.
- A Bluetooth™ to USB adapter and associated driver software (supplied with unit)

System Requirements

IMPORTANT: The Pasturemeter software requires a desktop or notebook computer running Windows XP with Service Pack 2 (SP2), Windows 7 or Windows 8.

[Note: Previous versions of Windows do not have built-in support for Bluetooth™]

The Pasturemeter software is not compatible with Apple computers.

Bluetooth™ Installation (Tier 2 and XP1)

The Pasturemeter console uses a Bluetooth™ wireless link to transfer data to the PC. [Note: Bluetooth™ is not the same as 802.11a/b/g - otherwise known as WiFi]. Plug in the Bluetooth dongle that was supplied with the unit.
Downloading your Paddock Measurements

Once you have measured all of your paddocks, you can download your measurements into Smart Maps and then plot a feed wedge to determine optimum grazing breaks. To do this, follow the instructions below:

- Open your internet browser (Google Chrome is being used for the purposes of this manual) and go to: www.myravensdown.co.nz/Account/LogOn/?theme=cdax.
- Log in using your existing email address and password (or create an account if you haven’t already done so)
Once you log in to Smart Maps, you should see the following screen:

- Click on the SmartMaps tab then the C-Dax Uploads tab
- Click on the ‘How to upload button’

- Follow the on-screen prompts
- Click the “Download Installer Now” button
- Click the CDAX.Upload.Application button when it appears.

- Click the ‘Install’ button.
- Once the program has installed, ‘Looking for Bluetooth radio’ will appear.

![Image of C-Dax Uploader window](c-dax-uploader.png)

- Make sure you have plugged in the dongle that was supplied with your Pasturemeter.

- The first time through Windows may need to install the Bluetooth serial driver.

![Image of Driver Software Installation window](driver-software-installation.png)
• "Looking for C-Dax devices" will appear.

• Once the console has been discovered “Reading Summary” and “Reading Records” will appear.

• Follow the onscreen prompts to send the desired records to SmartMaps

• Go to your web-browser and log into your SmartMaps account

• Newly uploaded data will appear in SmartMaps under the “Unallocated Data” tab

• To confirm data so it appears on your feed wedge simply click on the record and click the “Review and edit” button

• Check the information then click “Save and confirm”
This section contains:

- Maintaining your Pasture Meter
- Removing the Sensor
- Dispatching for Repair
Maintaining Your Pasture Meter

Whilst the equipment has been designed to withstand the purpose for which it is intended, regular inspection and timely attention to any necessary maintenance will reduce the likelihood of equipment failure in the field.

Please remember: How you treat it, is how it will treat you.

1. Regularly check all sled bolts to ensure they are tight.

2. Regularly check that the 4 bolts attaching the sensor to the sled.

3. The nuts on the bolts associated with the wheel raising and lowering mechanisms are required to be only tight enough to remove slack.

4. **Do not adjust the 14 Allen head screws which bolt the sensor together.** There are 4 on each rear side of the sensor and 6 on top securing the lid. These screws are torque set and sealed against the ingress of water. The lid is also sealed in place with sealing compound. **Note: Removal of any of these screws will void the product warranty.**

5. Regularly inspect the two strips of glass on either side of the sensor uprights for damage and signs of water ingress. Evidence of condensation on the inside of the glass indicates the presence of moisture. If moisture is present internally, return the sensor to C-Dax for inspection immediately.
WARNING

Should the need arise to make a weld repair on the sled, the sensor MUST be unbolted and COMPLETELY SEPARATED from the sled. The tube through which the sensor cable is routed must be unscrewed and the sensor cable disconnected from the indicator console cable at the rear of the ATV. These components must be carefully put aside while any welding work is undertaken.

Welding sets up high circulating currents in the steel framework and these can damage or destroy the sensor electronics. Welding must not be undertaken on the sensor.

Damage to electronics resulting from welding will void warranty.

Please Note: Welding may distort the frame of the sled making realignment necessary. If this occurs you will need to contact C-Dax Limited to arrange repair.
Removing the sensor for Repair

Should the Sensor need to be removed for any reason, it must be disconnected from the ATV, unbolted from the sled uprights and the cable protector unscrewed from the draw-bar.

The cable protector tube can be laid diagonally across the sensor and the excess cable coiled inside the sensor for packing. (See far left illustration below)

Both legs of the sensor must be securely wrapped in suitable packaging material eg: bubble wrap, cardboard etc.

The indicator console and all cables should also be returned with the sensor in order to allow for a full system check. Return the items shown below.
This section contains:

- Exploded parts diagram
- Parts list
Exploded Parts Diagram

Parts List
<table>
<thead>
<tr>
<th>Item No.</th>
<th>QTY.</th>
<th>e9 part no</th>
<th>e9 description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1010-2385</td>
<td>Actuator-Electrical-Pasturemeter-LA31-12V</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>1013-2355</td>
<td>Adaptor-Electrical-Power Pack-240 Volt to 12 Volt</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>1082-5705</td>
<td>Axle-Pasturemeter-G3-ZP</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>1400-1500</td>
<td>Buffer-Rubber-Size-25 ODx5 Deepx12 Hole-Rubber</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>1500-3600</td>
<td>Cable-Electrical-Loom-Battery Feed-0.5M</td>
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<tr>
<td>6</td>
<td>1</td>
<td>1500-5700</td>
<td>Cable-Electrical-Loom-Pasturemeter-Actuator-Control Box</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>1500-7100</td>
<td>Cable-Electrical-Loom-Pasturemeter-Console to Battery Cable</td>
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<td>8</td>
<td>1</td>
<td>1500-7200</td>
<td>Cable-Electrical-Data-Pasturemeter-Sensor Extension-4M</td>
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<td>9</td>
<td>1</td>
<td>1500-7205</td>
<td>Cable-Electrical-Data-BREAKAWAY-Pasturemeter-1.2M</td>
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<td>Drawbar-Pasturemeter-G3-ZP</td>
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<td>4</td>
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<td>Fastener-Bolt&amp;Nut-Hex-8.8 Grade-M6x80-ZP</td>
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<td>Fastener-Machine-Screw-Pan-M6x16-Pozi-ZP</td>
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<td>6</td>
<td>3170-0010</td>
<td>Fastener-Nut-Nyloc-M10-ZP</td>
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<td>17</td>
<td>8</td>
<td>3170-0012</td>
<td>Fastener-Nut-Nyloc-M12-ZP</td>
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<td>Fastener-Pin-Split-M4x25-ZP</td>
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<td>Fastener-Set Screw-Hex-8.8 Grade-M6x16-ZP</td>
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<td>4</td>
<td>3310-5021</td>
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<td>6</td>
<td>3310-6006</td>
<td>Fastener-Washer-Flat-M6-ZP</td>
</tr>
<tr>
<td>23</td>
<td>2</td>
<td>3310-6010</td>
<td>Fastener-Washer-Flat-M10-ZP</td>
</tr>
<tr>
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<td>3310-6020</td>
<td>Fastener-Washer-Flat-M20-ZP</td>
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<td>25</td>
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<td>3500-5200</td>
<td>Frame-Pasturemeter G3-Galv</td>
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<td>26</td>
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<td>4070-5800</td>
<td>Hinge-Pasturemeter Autolift-G3-ZP</td>
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<td>4500-1410</td>
<td>Kit-Console Mount-XC1/Tier 2 Current-ATV Style</td>
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<td>28</td>
<td>1</td>
<td>5005</td>
<td>XC1 Smart Controller (kit includes mounting brackets/bolts/LIC Farmkeeper software)</td>
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<tr>
<td>29</td>
<td>4</td>
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<td>Machined-Bush-Round-25 ODx12 Longx12 ID-ZP</td>
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<td>4</td>
<td>5200-9200</td>
<td>Machined-Bush-Round-25 ODx14 Longx12 ID-ZP</td>
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<tr>
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<td>4</td>
<td>6250-8500</td>
<td>Plug-Tube End-Rectangular-50x25mm-Black-Plastic</td>
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<td>Rota-Cover-Actuator-Pasturemeter-Blue-MDPE</td>
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<td>Sensor-Electrical Assembly-Pasturemeter-HDPE-Plastic</td>
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<td>8420-4755</td>
<td>Strut-Link-Pasturemeter-G3-ZP</td>
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<td>8800-3800</td>
<td>Tow-Coupling-Handle-Double Ended-1 78 x 50mm-ZP</td>
</tr>
<tr>
<td>37</td>
<td>2</td>
<td>9200-8800</td>
<td>Wheel-Turf-Bearing-400x6-Steel Rim-25mm Oil Seal-Pasturemeter</td>
</tr>
</tbody>
</table>
This section contains:

- Trouble Shooting Tips
This section contains:

- Quick Reference Guide
- DIY Calibration Method
Tier 2 Model – Quick Reference Guide

1. Ensure wheels are down for travelling to place of use.

2. Check that sensor glass is clean.

3. Turn on indicator, select “Farm ID” (if enabled) and switch display to show height in mm.

4. Ensure that the sensor is clear of any interference. The display should read **10 mm (when set to mm using the units button)**. This confirms that all light beams are functioning correctly.

5. Place hand or object through light beams and note that a height reading occurs. If any **4** holes are blocked, the reading should be **90mm** showing correct operation.

6. Travel to the paddock to be measured.

7. Lower sled to Measure/Operation position by retracting the wheels

8. Set indicator to now show the desired display. (ie. **kgDM/ha** or **mm**)

9. Press the “right cursor” button on the indicator console, select “Paddock ID” if enabled and proceed along the path to be measured.
10. When measuring/recording is completed within a paddock or area, press the right cursor button again. This will cease recording until measuring is recommenced by repeating steps 10 and 11.

11. Save the data by pressing the right cursor button twice. “Saved” will appear on the screen followed by “Stop” to confirm that the measurements have been saved.

12. Travel to next paddock to be measured. (Please Note. The wheels should be placed in the transport position whenever the Pasture Meter is not being operated on grass, however brief the period is.)

13. Press right cursor and repeat the processes 10 to 14 as required.

14. Once measurement has been completed, turn off the indicator console and place the sled wheels in the transport position

**WARNING**

Ensure that cables are disconnected when uncoupling the sled draw-bar. Moving the towing vehicle away from the sled with the cables attached will result in severe damage to the electrical components.
DIY Calibration Method

Purpose

Every farm is different in terms of Soil type, pasture type and climate. Pasture measuring devices are calibrated on a regional basis and may not always be representative of your particular farming operation.

This DIY Calibration Method will allow you to self calibrate your pasture meter so you can make decisions with confidence on your collected data.

Calibration Method

1. Find a range of paddocks to calibrate against – Pre Grazing, post grazing, and in between (approximately 5 paddocks).

2. Turn your pasture meter on and set the units to mm.

3. Sit the pasture meter over each of your pastures of differing growth stages.

4. Read the height off the console and record in Column A in the table provided.

5. Visually estimate (using consultant or experienced visual pasture estimator) the pasture cover (kgDM/ha) underneath the pasture sensor and record in the table provided.

6. Use the calculation steps and table to calculate your personal calibration equation for your farm.
Equation Calculation Steps

Step 1 - Calculate total and Avg. For columns A & B

- Calculate (G) = Sum of Column A (i.e. 25 + 40 + ... = 250)
- Calculate (H) = Sum of Column B (i.e. 1200 + 2350 + ... = 7800)
- Calculate (I) = G ÷ No. of Samples (i.e. 250 ÷ 5 = 50)
- Calculate (J) = H ÷ No. of Samples (i.e. 7800 ÷ 5 = 1560)

Step 2 – Subtract the averages (I & J) from each entry

- Calculate values for Column C = A – I (i.e. 10 – 50 = -40)
- Calculate values for Column D = B – J (i.e. 1200 – 1560 = -360)

Step 3 – Calculate Column E

- Square each entry in Column C (i.e. -40 x -40 = 1600)

Step 4 – Calculate Column F

- Multiply each entry in Column C by it’s corresponding entry in Column D (i.e. -40 x -360 = 14400)

Step 5 – Add up columns E & F and record in cells K & L respectively

Step 6 – Calculate parameters to use in pasture equation

- Calculate Slope of line (Factr)  \( M = \frac{L}{K} \)
- Calculate the Constant (Const)  \( N = J - (M \times I) \)

Pasture Meter Formula Equation Table

<table>
<thead>
<tr>
<th>Pasture Sample</th>
<th>A Pasture Height (mm)</th>
<th>B Pasture Cover (kgDM/ha)</th>
<th>C (A - I)</th>
<th>D (B - J)</th>
<th>E (C²)</th>
<th>F (C x D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example</td>
<td>40</td>
<td>1500</td>
<td>-40</td>
<td>-360</td>
<td>1600</td>
<td>14400</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
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</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum</td>
<td>G</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>I</td>
<td>J</td>
<td></td>
<td></td>
<td></td>
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<td>M</td>
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<tr>
<td>Eq. Constant</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Understanding the Pasture Calibration Process

Calibration Equations are used to convert the raw sensor measurement, pasture height (reordered in mm), to pasture cover (kgDM/ha).

There are several ways to do this; these include comparing your height reading with:
- Calibration cuts
- Visual assessment
- Rising Plate Meter

A calibration equation is most commonly expressed as a straight line formula, a straight line formula has two parameters slope of the line \( m \) and where the line intercepts the y axis of a graph \( c \) (see below).

The parameters are used to convert pasture height to pasture dry matter using the formula below:

\[
\text{kgDM/ha} = \text{Pasture height} \times \text{Slope} + \text{Intercept}
\]

N.B. Use the form on the previous page to calculate both Slope and Intercept for your equation.

What do the Values Mean?

**Slope**
- On your console the slope is referred to as “FACtr”
- The slope measures how much dry matter (expressed as kgDM/ha) there is per increase in measured unit (i.e. mm).

- If your calculated slope = 18.6 this means:
  - For every 1 mm increase in pasture height there is an increase of 18.6 kgDM/ha.
  - Therefore if the difference in pasture height was 10mm then the difference in pasture dry matter is 186 kgDM/ha.
**Intercept**
- On your console the intercept is referred to as “ConSt”
- The intercept relates to how much dry matter cannot be read by the sensor (i.e. is below the bottom sensor)
- If your calculated intercept = 750 this means:
  - 750 kg DM/ha sits below the bottom sensor and cannot be read
  - When pasture height using the sensor 0 mm there is actually 750 kgDM/ha of pasture residue
  - Pasture residue accumulates (increases) as grasses become more established and/or the growing season becomes drier (i.e. moving from spring through to summer).

**Working Example**
- Slope “Factr” = 18.6, intercept “ConSt” = 750
- Measured pasture height = 110 mm

\[ \text{Pasture height} \times \text{Slope} + \text{Intercept} = \text{kgDM/ha} \]
\[ 110 \times 18.6 + 750 = 2796 \text{ kgDM/ha} \]

During 2008, AgResearch, DairyNZ and Massey University with the support of Pastoral 21 Feeds Program conducted extensive independent calibration of the C-Dax Pasture Meter on dairy pastures throughout New Zealand. Pastoral 21 is funded by NZ Governments Foundation for Research, Science and Technology (FRST), DairyNZ, Fonterra and Meat &Wool NZ.

Standardised trials were run in Northland (Dargaville), Waikato (Ruakura), Taranaki (Hawera), Canterbury (Lincoln) and Southland (Wallacetown). The results of these trials are shown in the table below.

### Year Round Pasture Cover Equations Table

Use the following table to select the suggested Pasture Cover Equation:

<table>
<thead>
<tr>
<th>Region</th>
<th>Multiplier (FACTr)</th>
<th>Constant (ConSt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northland</td>
<td>22.6</td>
<td>744</td>
</tr>
<tr>
<td>Waikato</td>
<td>16.3</td>
<td>700</td>
</tr>
<tr>
<td>Taranaki</td>
<td>21.8</td>
<td>827</td>
</tr>
<tr>
<td>Canterbury</td>
<td>18.1</td>
<td>729</td>
</tr>
<tr>
<td>Southland</td>
<td>17.7</td>
<td>825</td>
</tr>
</tbody>
</table>
Clearing The Console Memory

From time to time it is good practice to clear the console memory. If the memory is getting full you may experience a slower than usual download of pasture cover to your PC. **Please note that this will remove all of the pasture data retained in the console memory so please ensure that the data has been downloaded prior to running this procedure.** All other settings will be retained it is just clearing the memory.

Make sure unit is off. Hold down UNITS and tap the ON button.

Continue to hold UNITS until DEL? is shown, take your finger off UNITS then quickly press the * button once.

The clearing procedure should take approximately 30 seconds.