WEEDit

USER MANUAL
Model 2009

Rometron B.V.
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The Netherlands

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Before using the equipment,
please read and follow the user manual and the safety instructions carefully.
Subject to changes without prior notice

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Without prejudice.

Last changed: 10 August 2011

Contents

Preface

This is the service manual of the **WEEDit** system. WEEDit is a revolutionary system for weed control that uses a patented method for recognising and spraying weed, based on the fluorescent properties of the cholorophyl molecules present in the leaves of living plants. This 3rd generation WEEDit is the successor to the original WEEDit system that was based on the same principle. By using modern components and higher processing power, the accuracy of the system is by far superior to earlier systems.

WEEDit is equipped with highly sensitive and accurate sensors, allowing the herbicide to be sprayed exactly on top of the living plants, saving herbicide and minimising environmental load. Depending on the width of the vehicle used for the WEEDit installation, up to 36 sensors may be used. Each sensor consists of five independant detection channels, each covering a width of only 20 cm.

Sensors

Detection Channels

width of the vehicle
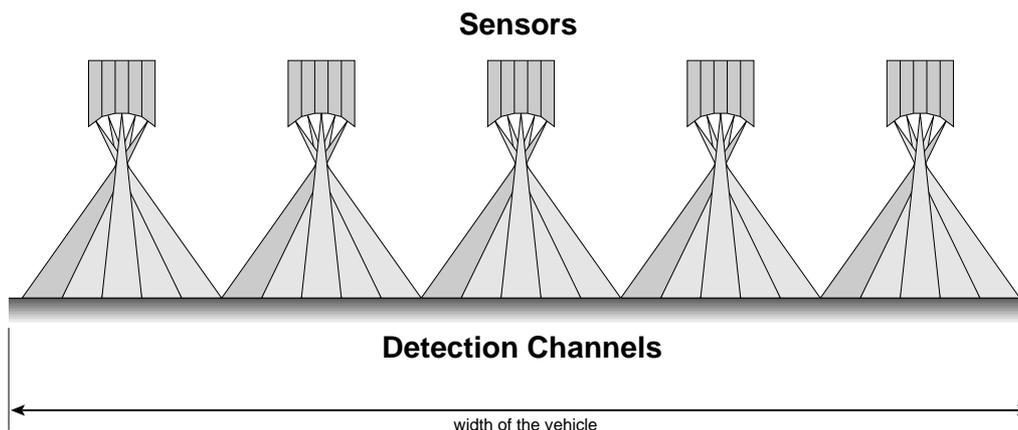
The drawing above shows a WEEDit installation with 5 sensors and hence 25 detection channels. It can therefore be used to treat a lane of 5 meters wide in one operation. The maximum width of a WEEDit system is 36 meters. A complete WEEDit setup consists of the following components:
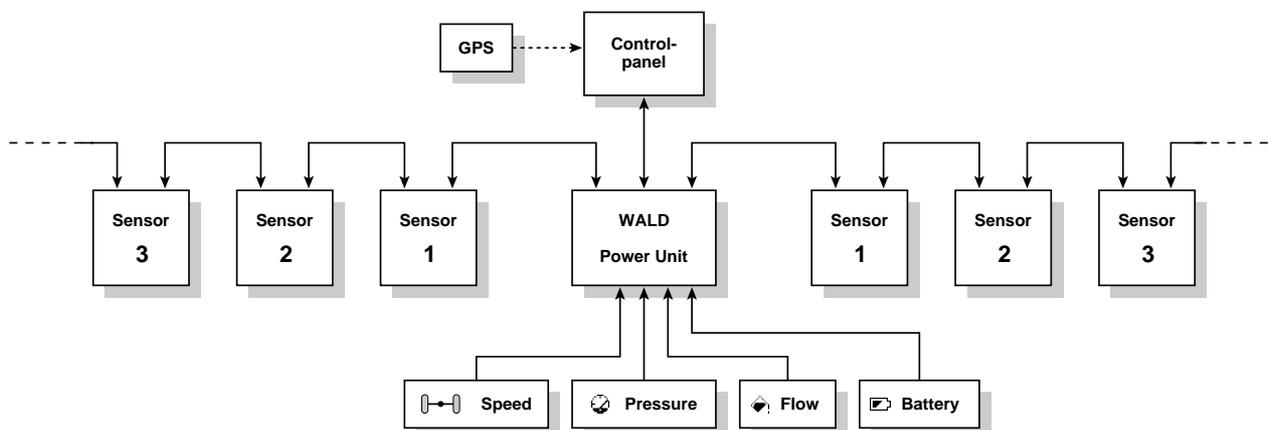
Please note that some components are optional and may therefore have been omitted in your installation. It is up to the dealer to configure the system in such a way that it 'knows' which options are available or not. This manual contains detailed information on how to install a new WEEDit system and how to adjust and calibrate the various settings and parameters. Please read the instructions carefully prior to carrying out an installation and follow the safety instructions in chapter 1 at all times. Please ensure that any collegues and/or customers are also aware of these safety instructions, prior to operating a WEEDit system.

All operator controls can be found on the control panel, consisting of a display (LCD) and a series of buttons in a rugged waterproof casing (see drawing below).
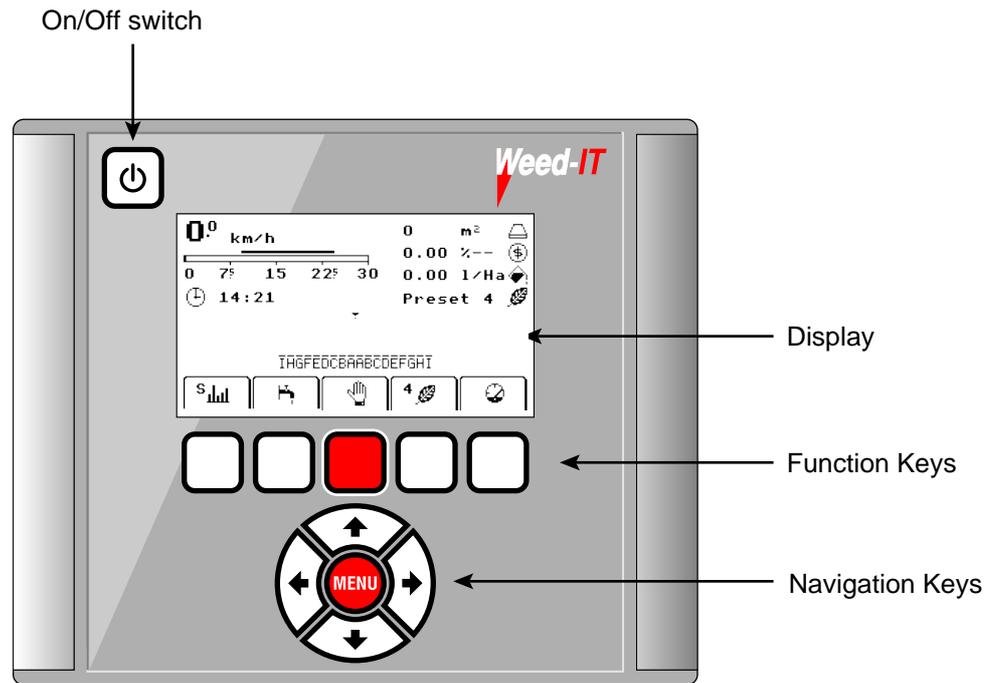
The user communicates with the WEEDit via the large LCD display, using a mixture of text and icons. Where possible icons have been used to avoid the use of text. A limited number of menus are available to the user. For the dealer a large number of extra (hidden) menus are available, allowing configuration and calibration of the standard settings.

In this manual, chapter 1 gives some safety warnings and advices. Please read and follow these instructions carefully and ensure that anyone with access to the WEEDit system are aware of these instructions.

Chapter 3 gives a complete overview of all user controls of the WEEDit. Please ensure good knowlegde of this chapter, so that you can answer any user queries. If you've never used a WEEDit before, please read this manual first.

We wish you all the best with the use of WEEDit.

Rometron Agricultural B.V.
The Netherlands

Acceptance

Immediately after receiving the machine, please check the package for transport damage and ensure that all components are present and complete. If any part is missing or incomplete, you **must** contact us <u>immediately</u> to exersise you rights for replacement and/or repair.

Declaration of Conformity CE

We,

Rometron Agricultural B.V., Rolandseck 87, 6865 AD Doorwerth, The Netherlands

declare, entirely at our own responsibility, that the product:

Machine number   **Type number**

...............................*)   ....*)

to which this declaration applies, conforms to the following EEC regulations:

- 98/37/EEG
- modified by 98/79EEG.

The machine also complies with the appendices:

- EN 1050
- EN 292-1
- EN 292-2.

Doorwerth, 12 November 2009

R. de Jonge
*P*roductmanager
Rometron Agricultural BV
The Netherlands

*) *Please keep the machine number at hand when asking any technical questions*

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(reserved for declaration of approval)

1. Important information

1.1   Safety icons

These icons are used for each safety advice in situations that can be dangerous. Please pay attention to these warnings and adjust your behaviour accordingly. Please ensure that all other users of the machine(s) are also aware of these instructions and warnings. Besides the information present in this manual, you should also follow any commonly available safety instructions and instructions to avoid accidents and human casualties.

1.2   Safety symbols and warning on the machine

- Safetly icons on the machine are used to mark any hazardous areas. Anyone operating the machine, need to be aware of these warnings which are present for their safety. These warnings are always used in combination with the safety warnings.

- Some symbols give information about specific characteristics of the machine and are necessary for a correct operation.

  - Always pay attention to any warnings, advices and symbols!
  - Pass all safety instructions to all other users!
  - Ensure that the symbols and icons are always clean and legible! Damaged or missing symbols need to be replaced immediately and are available from your supplier (symbol number = order number).

- Any warnings are placed on the machine in such a way that they are clearly visible at all times. The various symbols are further explained on the next pages.

D	Vor Inbetriefnahme die Be- triebsanleitung und Sicher- heitshinweise lesen und be- achten.
F	Lire le levret d'entrtien et les conceils de sécurité avant la mise en marche et en tenir compte pendant le fonction- nement.
GB	Carefully read Operator's Manual before handling the machine. Observe instruct- ions and safety rules when operating.
NL	Voor ingebruikname de bedieningshandleiding en de veiligheidsvoorschriften lezen en in acht nemen.

Note;
Read all user and safety instructions carefully, prior to using this machine.

KN: 1335148320

1.3   Application of the WEEDit machine

1. If the machine is not used as instructed in this manual, the manufacturer can never be held responsible for any damage resulting from that use. Any undocumented or unauthorised use is entirely at the user's own risc.

2. Documented and authorised use also implies that the operator and safety instructions, as issued by the manufacturer, are followed strictly and that only original WEEDit parts are used.

3. The selective anti-weed system may only be operated, maintained and repaired by people with the appropriate level of knowledge about the possible dangers. Any unauthorised changes and/or modifications to the machine are entirely at your own risk. The manufacturer can never be held responsible for any damage arising from such changes and/or modifications.

4. All safety instructions, as well as any other commonly applicable safety instructions and instructions with respect to labour circumstances, traffic, etc., should always be followed strictly. You should also be aware of (and follow) any instructions and/or legal limitations of the use of certain herbicides. This may be subject to local law.

Pass all safety instructions to all other users!

1.4   Warnings when using certain herbicides

1. Please note that the use of slow-effective herbicides (i.e. 20 hours or longer), may cause damage to pump membranes, hoses, pipes and tanks.

2. We specifically warn you against the use of any unauthorised mixture of two or more different herbicides.

3. Don't use herbicides that have the tendency to stick or coagulate.

4. The machine is not suitable for herbicide powders that need to be solved in water.

5. A combination of glyfosate with extra solvents may cause malfunction of the pump membranes.

   When storing the machine for a longer period of time, we advice you to flush the machine with clear water. Please note that you should also clean the hose carefully as the glyfosate solution has the tendency to degrade the quality of the PVC hose when it is not in motion.

1.5 Common safety instructions and instructions to avoid accidents

Basic Rule

> Before using the WEEDit, check the (traffic) safety
> of the machine and the vehicle. When in doubt, do not
> use the machine and consult your supplier.

1. Pay attention to the safety instructions in this manual as well as any other general safety instructions.

2. The warning and advice symbols are important if you want to work in a safe environment. Following the instructions is for your own safety!

3. Keep the machine clean to avoid the danger of fire!

4. Before driving off and using the system, check the area carefully. Ensure to have clear sight at all times!

5. When placing or removing supports, always put them in the prescribed position first (stability)!

6. Always pay attention to the maximum weight, axis load and dimensions!

7. Always check (and mount if necessary) any tranport items, such as lights, safety signs, safety covers, etc.

8. Never leave the driver seat when driving the vehicle!

9. Note that the behaviour of the vehicle, as well as its steering and break characteristics, are influenced by the WEEDit machine and the contra weights. Ensure you have sufficient steering and break power.

10. Only put the machine into service when all safety covers are in place and are in the right position.

11. Ensure that no people are present inside the virtual circle that the vehicle needs to turn around.

12. Never fill the tank above the specified maximum!

13. Read and follow the safety instructions of the manual of your sprayer.

1.6 Operation Instructions

Electrical installation

1. When serviceing the electrical installation, always remove the (-) terminal of the battery.
2. Only use approved fuses. Fuses that are too large, may cause a system overload and increases the possibility of a fire!
3. Always connect the battery in the proper order: first connect the (+) terminal, followed by the (-) terminal. When disconnecting, do the same in reverse order.
4. The (+) terminal should have a protective cover to avoid the possibility of a short-circuit (explosion)!
5. Avoid sparks and open fire close to the battery.
6. Ensure that no cables are trapped when working on the machine. Damage to the cables may cause a short-circuit and increases the chance of a fire.
7. When in doubt, always contact your supplier.
8. The charging capacity for the battery should be more than 100A.
   (When necessary, put the vehicle in a lower gear, so that the motor makes more revolutions per minute, to ensure that the alternator generates more power.)
9. When using an extra battery on the spraying rig, place the voltage regulating line on the battery of the rig, to ensure that the voltage drop between the vehicle and the rig is compensated by the voltage regulator on the alternator.

Common safety instruction and instructions to avoid casualties during service, maintenance and repair

1. Service, repair and cleaning of the machine <u>only</u> when the motor is turned off!

   Always remove the key from the lock

2. Check all bolts and nuts regularly and tighten them if necessary.
3. When welding on the vehicle or close to it, always remove the cables from the alternator and the battery!
4. When replacing any defective parts, ensure that the replacement parts conform to the specifications of the manufacturer of the WEEDit machine. Original WEEDit spare parts always conform to these specifications and are available from your supplier. Using un-approved replacement parts voids warranty.

Crop Protection Solutions

1. Always follow the instructions of the manufacturer of the Crop Protection Solution!

   - Wear protective clothing!
   - Pay attention to any safety instructions and warnings!
   - Follow the guidelines about the application of the solution, the amount to be used, and the cleaning instructions.

2. The use of certain herbicides may be subject to local law. Check for such laws and follow them strictly.
3. Never open a pipe or hose that is under pressure!
4. Repair the machine <u>only</u> after it has been cleaned extensively and always wear a protective mask.
5. Never fill the tank above the specified maximum level.
6. When handling herbicides or toxic agents, always wear protective clothing, such as protective gloves, protective clothing and protective glasses.
7. Check for a possible interaction between the herbicide and certain sensitive parts of the machine.
8. Don't use any herbicides that have the tendency to stick or coagulate.
9. Crop protection machine may not be filled with surface water, in order to protect humans, animals and the environment.

Storage instructions

1. Always flush the machine with sufficient clean water prior to storing it.
2. Always store the machine in a dry warm place.
3. Ensure that all pressure is released from the system before storing it.
4. When the machine is stored for a longer period of time, remove the mains plug of the battery charger.
5. Once the spraying season is over, remove the control panel and store it in a dry warm place.

Cleaning and transport instructions

1. Do not clean the machine with a high pressure nozzle (control panel, power box, sensors, etc.).
2. Do not expose the machine to rain during transport.
3. Clean the windows of the sensors with a soft cloth regularly. Note that sand can easily scratch the windows.

2.   Using WEEDit

2.1   Spraying mechanism

The WEEDit uses any type of pump, as long as it provides the required amount of liquid to feed all the nozzles along the boom. To maintain the pressure to all these nozzles, a Ramsay valve (pressure accumulator) is needed in the spray line.

To maintain the right pressure at the nozzles at all times, a Ramsay valve is included in the pumbing of the system. This valve is a big accumulator and is fed by a small air compressor. The Ramsay valve regulates the air pressure through to the pressure line of the sprayer. To get the desired pressure, an air regulator is installed between the air compressor and the Ramsay valve. The unused flow goes back into the tank via a return line.

Ensure that the primary valve (used to suck the liquid from the tank) and all couplings are absolutely water tight. Even the smallest leakage will result in pressure variations or even a complete pump failure. Sucked-in air may also result in 'dripping' of the nozzles. For all valves and fittings, one should use plastic, stainless steel or chromed brass. Never use galvanised fittings, as the use of Round-up® (and the likes) will cause corrosion.

The system is equipped with narrow fan 40 degress nozzles and cap filters. Check these filters regularly.
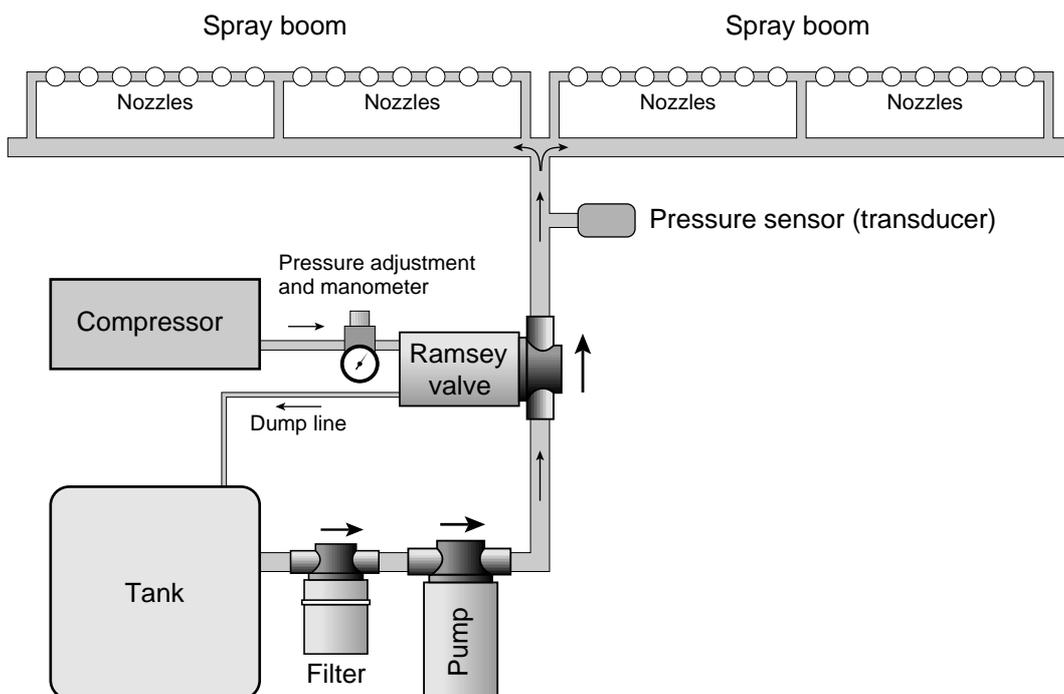
Image 2.1 - Herbicide flow in a standard WEEDit machine

2.2 Switching the WEEDit system on

The *Power Switch* is located at the top left of the contol panel. Keep this switch depressed for 1 second to turn the machine on. Immediately after switching it on, you'll hear a short beep and the display will be activated. After a short delay, the start-up screen will be displayed (image 2.2).

Image 2.2 - Start-up screen

The system will now perform a self-test and the control panel tries to contact the WALD Power Box and all connected sensors. Once the self-test has been completed, the default screen appears (image 2.3).
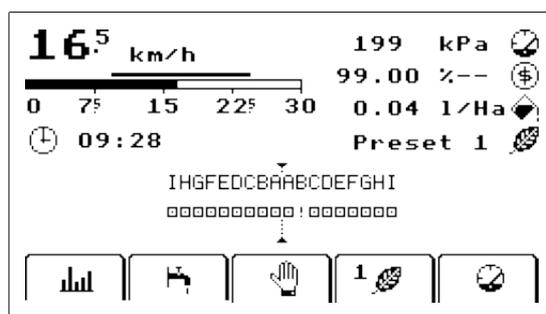
Image 2.3 - Default screen

The precise contents of the default screen are depending on the number of connected sensors, the various (optional) extensions and the current settings. In the example above, 18 sensors are present, 9 at either side (identified as 'A' to 'I'). The sensors are always numbered from the center outwards, as seen from the driver seat. This is also the case when the machine is mounted to the rear of the vehicle. Each sensor is represented as a small square with a dot at the centre. Each sensor is identified by a single letter from the alphabet, starting with the letter 'A' at the centre.

Some important measurements are shown in the top right of the display. Again, this is subject to the current settings. If the settings on your system have been altered, different measurements may be shown.

Pressure

When a pressure sensor is mounted, the current pressure of the herbicide tank is continuously updated in the top right corner of the display. If the pressure becomes too high or too low, a warning will be issued. Chapter 2.3 describes how the pressure can be checked.

Switching the machine off

The WEEDit can be turned *off* by briefly pressing the Power Button. All settings and counters will then be stored and the machine turnes itself off after a brief delay.

2.3 Checking the pressure

Check the pressure of the system by briefly flushing it. Press the *Flush button* (image 2.4a).
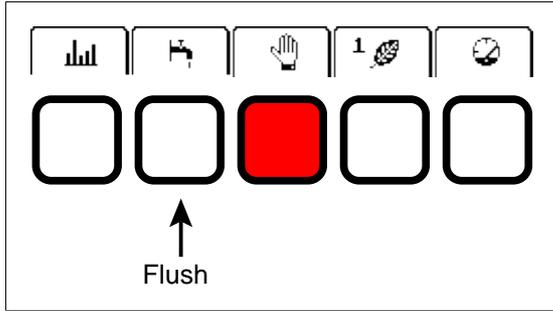
Image 2.4a - Flusing
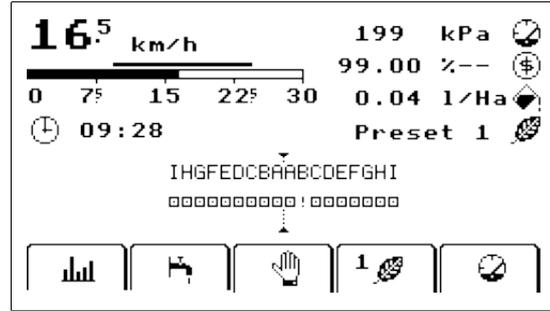
Image 2.4b - Reading the pressure

When all valves are closed, the pressure should be about 3.0 bar. This can be read from the manometer which is mounted to the pressure adjustment. If your WEEDit is equipped with an electronic pressure transducer, the pressure can also be read from the display (top right in image 2.4b)

Ensure that the system is flushed prior to reading the pressure for the first time. If the machine has been stored for a longer period of time, the pressure may be raised. After flushing the system, it will fall back to the required pressure.
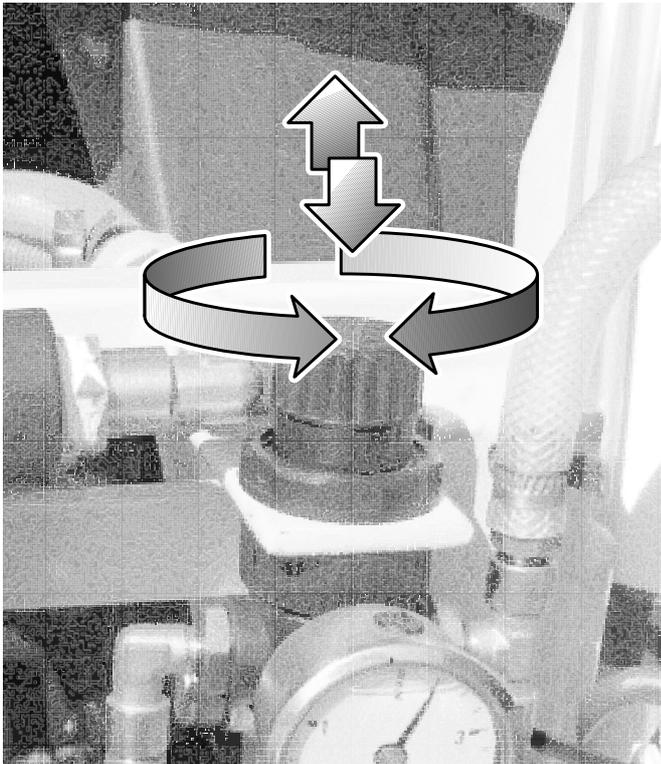
Image 2.5 - Adjust the Pressure

Pressure Adjustment (image 2.5)

1. Pull the knob on top of the manometer upwards.

2. Rotate the knob to set the required pressure.

3. Push the knob down again to lock it in place.

2.4 Adjusting the pressure system

When the system is first used on a given vehicle, the following steps should be followed:

- Fill the tank with sufficient water (or herbicide).

- Turn the system and the pump on. The display will show the default screen and the air compressor should start running.

- The pressure in the accumulator should be 3.0 bar. Check this at the valve at the rear and adjust the pressure when necessary.

- Ensure that the system does not suck in any air.

- Flush the system and check if the pressure remains 3.0 bar at all the nozzles. The air compressor should start running after flushing a while.

- Be sure that the pressure drop in the feeding lines is not too big, by checking the actual pressure at the nozzle outlet. You could use a nozzle tester for this.

2.5 Remarks when using WEEDit

🍃

- The sensitivity of the detectors may have to be adjusted, depending on the circumstances. Four different presets are available. This allows the WEEDit to be used under different conditions, such as wet surface after rain, bright sunlight or with very small plants. Each preset is indicated with a number in the sensitivity key.

  You may have to experiment a bit in order to find the appropriate setting. Use the display to verify the response of the sensors. The activity of each nozzle is represented as a series of vertical bars under the sensor icons:

  IHGFEDCBAABCDEFGHI
  ▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯▯

- Always ensure clean sensors. The cleaner the detector, the better the detection. Clean the sensors regularly with a wet towel.

- The maximum possible speed is about 25 km/h (8 m/s). This depends on the <u>spacing between the nozzles and the sensors</u> **and** the <u>height of the nozzles</u>. With a nozzle height of 70 cm, the spacing between the front of the sensor and the nozzles should be at least 60 cm to reach 25 km/h operating speed.

  🔋

- For a proper operation, the battery voltage has to be between 11.5 and 14.5 Volt. Whenever the battery voltage drops below a certain level, a warning will be issued.

- On a 36-meter system, a charge capacity of 100 Amp. is needed. The current draw is around 60 Amp on a 36-meter system. If necessary, select a lower gear, so that the motor runs faster.

- The valves (nozzles) have to be flushed regularly with clear water, in order to avoid clodding of herbicide.

- The operational height of the sensors should be around 110 cm, whilst the operational height of the nozzles is around 70 cm.

3.   Controlling the WEEDit

3.1   Introduction

All parts of the WEEDit machine are controlled from the Control Panel (see below). The control panel holds all keys and a display on which the current status of the system is visible. Icons are used whenever possible.
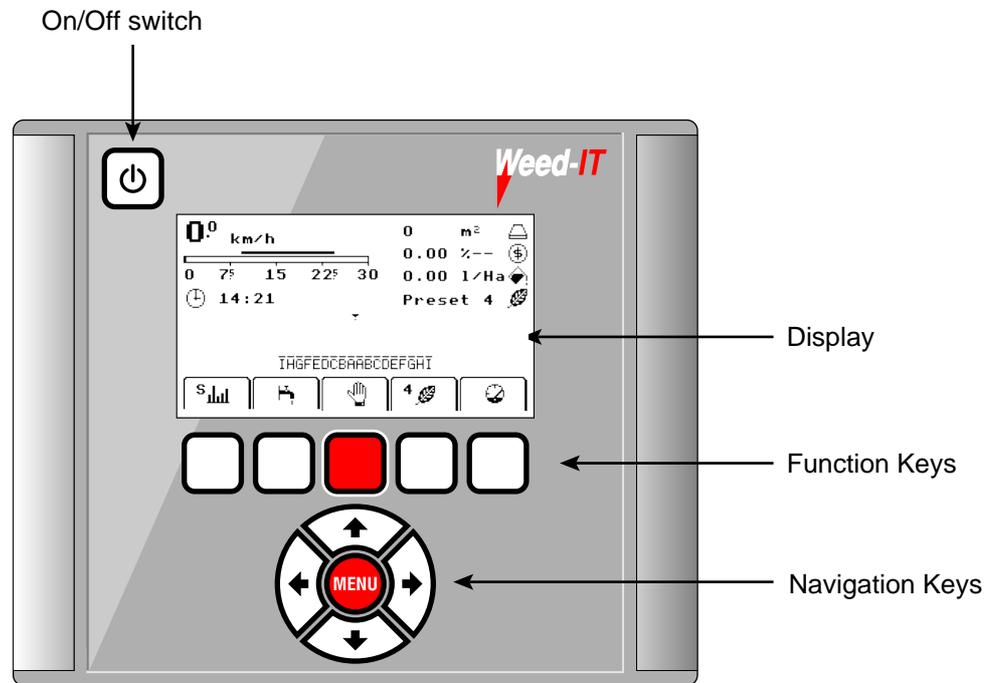
The Power button is at the top left of the control panel. Directly below the display are five function keys. The function of each of these keys is depending on the current menu level and is indicated by an icon. Below the function keys are the navigation keys. The menu key (at the center of the navigation keys) is used to alter the menu level, whilst the arrows are used to select a value (where appropriate).

The start-up screen always shows the version number of the firmware (the software inside the WEEDit). In the description of certain features in this manual, the version number is sometimes referred to. In most cases the differences between the version described in this manual and the actual version you are using will be marginal. Certain features will only be available from a given version number onwards. The software version in the example above is 2.10.

Also shown in the startup screen is the serial number of the console (31000001 in this case) and the date the firmware was released (e.g. 10 March 2010). The current date and time are shown at double height.

3.2   The Keyboard

⏻ Power Switch

Switching ON

The Power switch is located at the top left of the *Control Panel*. Keep this button depressed for one second to turn the WEEDit *on*. Immediately after the machine is turned on, you'll hear a short beep and the display will be activated. The following screen will now appear:
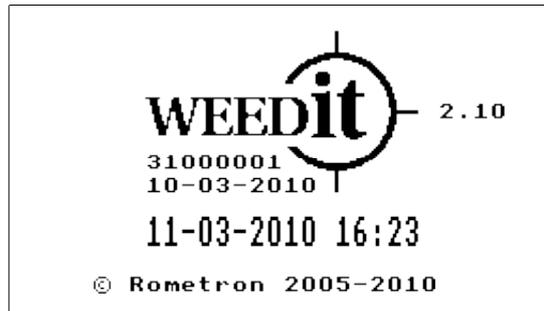
The system will now do a self-test and the control panel tries to contact the WALD Power Box (to which all components are connected). Once the self-test has been completed successfully, the default screen appears:
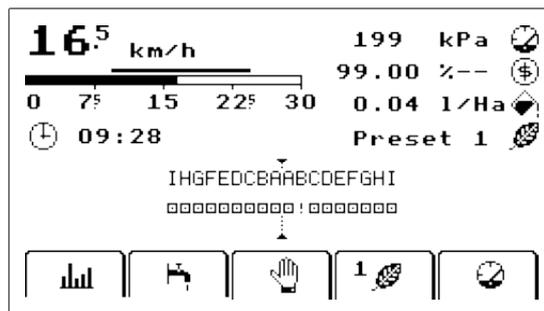
Switching OFF

During normal operation, the WEEDit can be switched *off* by pressing the power button briefly. All current settings and counters will be stored in memory and the WEEDit will turn itself *off*. During this procedure, the screen will show the WEEDit logo and the text '**Shutting down...**'. If you pressed the power button accidently, you may restart the machine by pressing the **Restart** key (i.e. the leftmost function key).

Forced shut down

In the rare event of a system failure, it is possible that the WEEDit cannot be turned *on* or *off* in the usual manner. If this is the case, you need to carry out a forced shut down by keeping the power button depressed for 5 seconds or longer. Once the power button is released, the system will be turned off. Wait 5 seconds and turn it on again.

 Function Keys

At the center of the control panel are the five function keys. The function of each of these keys is depending on the currently selected menu and is identified by an icon at the bottom of the screen. The main menu, for example, looks like this:
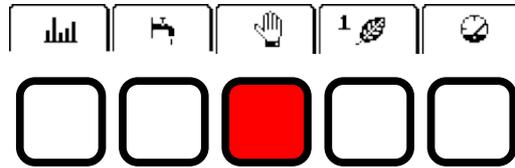
If a certain key has no function in a certain menu, the icon will disappear automatically, like in this menu:
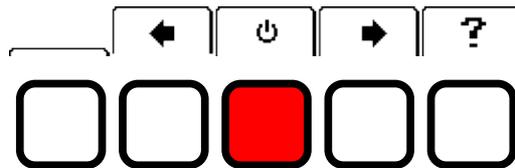
Once an alternative menu has been selected, you will autmatically be taken back to the main menu if no key is pressed for 3 seconds. More information about the use of the function keys can be found in the description of the individual menus.

The middle function key is red, as it is used for the Hold feature in the main menu. When driving the vehicle and using the WEEDit, it will be easy to find the key and temporarily disable (Hold) the sytem, e.g. when turning the vehicle. In other menus, the red key is often used to confirm a setting (OK).
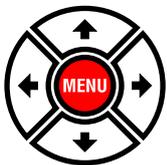
 Navigation keys

Below the function keys are the navigation keys. The **MENU**-key is at the heart of the navigation keys and is used to select a menu. More information can be found in chapter 4.4 – Menus.

3.3 The display

When the WEEDit is turned on, the following (default) screen will appear after a brief delay.
The precise contents of the display are depending on the options and the number of connected sensors.
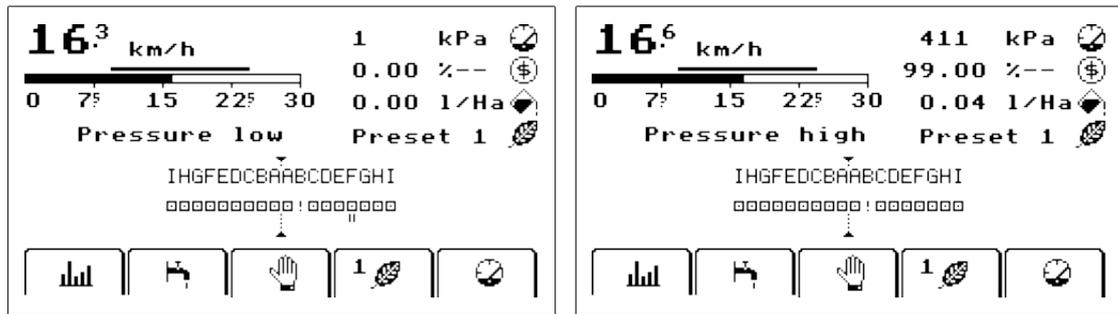
Speed

The current speed of the vehicle is display at the top left of the display. Depending on the model, the speed is presented either in m/s (meters per second), km/h (kilometers per hour) or mph (miles per hour). The speed is also graphically represented by a moving bar. The maximum speed is approx. 25 km/h.
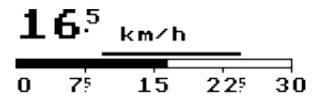
Values

Some frequently used values are displayed at the top right of the display. Use the rightmost function key to toggle between various measurement displays.

◔ Pressure

This is the pressure of the herbicide in **kPa** or **bar**. The pressure has to be around 3.0 bar. A warning will be displayed if the pressure is either too high or too low (as in the leftmost example above).

△ Surface

This is the total area that has been processed (in Ha).

⚙ Trip distance

This is the total travelled distance [km] from the moment the machine was turned *on*. The counter will be reset automatically when the machine is turned *off*. The grand total (i.e. from the moment the machine was installed) can be read in a special service menu.

⊕ Uptime

This is the time [hours] that has expired since the machine was turned *on*. The counter will be reset automatically when the machine is turned *off*. The total uptime can be read from a special service menu.

◈ Usage

If a flow meter is connected, the herbicide usage is presented instead of the uptime clock.

🍃 Sensitivity

This shows the currently selected sensitivity preset (in the example, preset 1 is selected).

$ Saving

If a flow meter is connected: the percentage of herbicide that has been saved (compared to full coverage).

◔ Flow

If a flow meter is connected: The current liquid flow in litres per minute.

Sensors

All sensors are shown at the center of the display. Each sensor is represented by a rectangular icon with a dot at the centre and is identified by a letter of the alphabet above it. In the example below, 18 sensors are present, 9 at either side (left and right).

IHGFEDCBAABCDEFGHI

Each sensor has 5 nozzles to spray a corresponding lane of the surface. Vertical bars are used to indicate the activity of the nozzles. In the example above, 11 sensors show activity. Sensor B on the right boom has a problem, indicated by the exclamation mark.

A disabled sensor is indicated by a single dot (without the rectangle), e.g. sensor C on the left boom below:

IHGFEDCBAABCDEFGHI
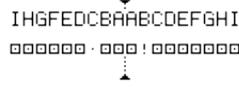
In case of a serious malfunction or error (e.g. when the data cable to the sensor is broken), the display will show an exclamation mark, such as sensor B on the right boom (below). Contact your supplier if you see this icon.

IHGFEDCBAABCDEFGHI

Menu bar

The bottom of the display holds the menu bar. Icons are used to illustrate the function of each function key. Depending on the selected menu, different icons may appear. The main menu looks like this:
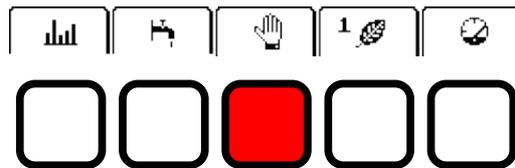
Whenever a certain key has no function associated with it, the icon will disappear automatically, like here:
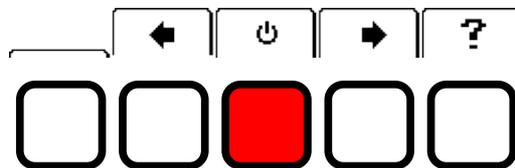
If you key is pressed for 3 seconds, the system willl automatically revert to the main menu. Please refer to chapter 4 (Menus) for a detailed description of each menu.

Warnings and messages

In case of trouble, e.g. when a speed sensor is malfunctioning, or when the herbicide pressure is too low, a message will be displayed on the screen. This messge will always appear just below the speed bar.
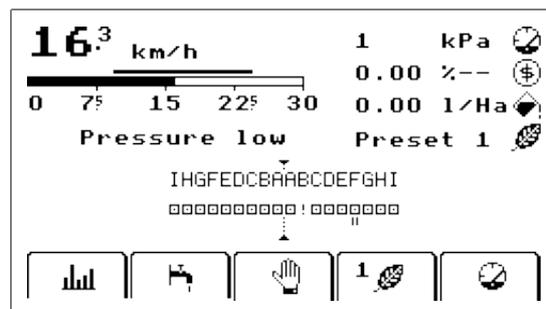
3.4   Menus

The WEEDit is entirely controlled by the keys on the control panel. In particular the function keys are used to enable or disable certain features. In order to keep the user interface as simple as possible, all features are grouped together in a series of menus and the five function keys are used to make a selection. The various menu entries are described in *this* chapter.

Please note that some features described in this chapter may not be available on all WEEDit machines. This is depending on the number of installed options. If a feature is not available, the icon will simply not appear.

For the average user of a WEEDit system, two menu levels are available:

    1   User mode
    2   Service mode

We'll first describe the various menus available in the U*ser mode*. Further down this chapter, the menus of the *service mode* will be described.

Menus in User Mode

When in U*ser Mode*, the standard (default) screen will be visible and the <u>main menu</u> will be selected.
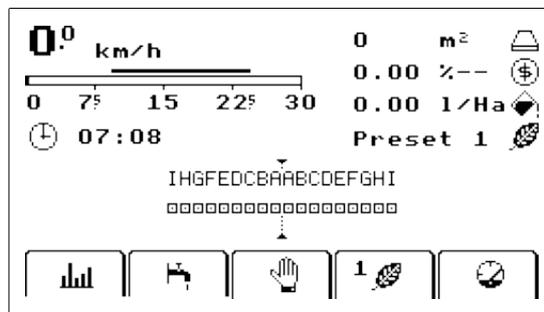
Press the **MENU**-key briefly to toggle the menus.
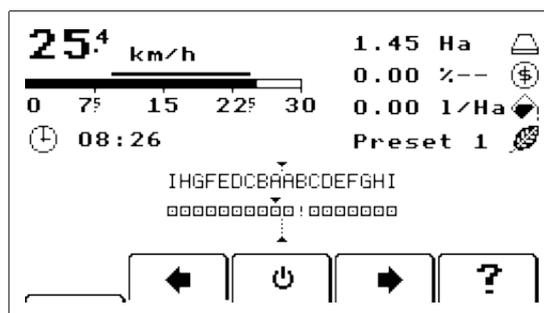
Pressing the MENU-key whilst the 2nd menu is displayed, the first one (i.e. the main menu) will appear again. If no key is pressed for 3 seconds, the system will take you back to the **main menu**.

ılıl Activity (histogram)

This key can be used to toggle between the standard activity display and three different usage histograms. The standard usage display shows the activity of each individual sensor as small vertical bars under the sensor. Histograms can be used to display the level of activity over time:
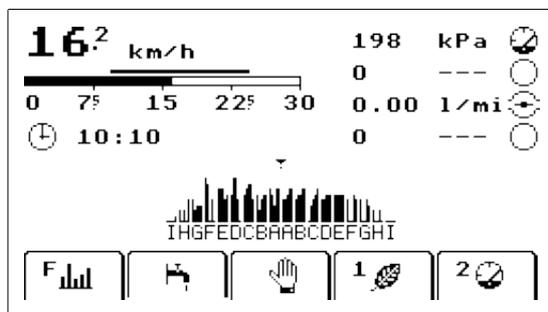
Three different histogram levels can be selected by repeatedly pressing the Histogram key:

F	Fast - the display shows the short-term activity in a histogram.
S	Slow - the display shows the long-term activity in a histogram.
+	All - the display shows all activity from the moment the machine was started.

⊢ Flush

This key can be used to flush the system. When flushing, all nozzles will be opened and the liquid (herbicide or water) will be sprayed with maximum pressure. Only use this feature to clean the machine on a solid surface.

✋ Hold

This key can be used to temporarily halt the machine, e.g. when turning the vehicle. When in Hold-mode, the icon will blink and a message will be displayed. The buzzer will beep intermittendly.

🍃 Sensitivity

The WEEDit will automatically adjust itself to changes in the circumstances, e.g. the size of the plants, the colour of the surface, ambient lighting and the whether situation (sun, rain, fog, etc.). Nevertheless it may be necessary under special circumstances to adjust the sensitivity of the sensors manually. For this purpose, four pre-programmed presets are available.

⊘ Measurement toggle

This key can be used to toggle between several different measurement display in the top right corner.

| *Default* | *Measurements 1* | *Measurements 2* |
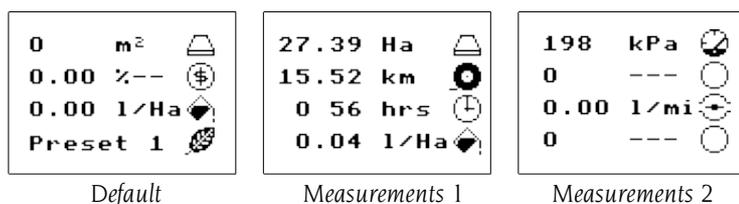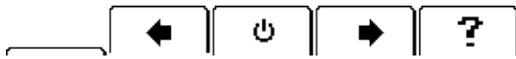
The Sensor Menu can be used to enable or disable an entire sensor. The function keys marked with an arrow (left and right) are used to select the required sensor. A small arrow will be shown above the selected sensor. In the example below, sensor 'A' on the left boom is selected. The On/Off button is then use to turn the selected sensor on or off.
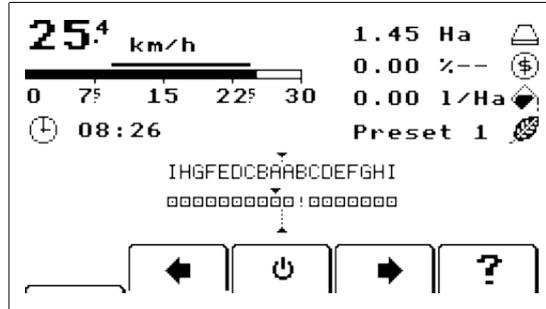
The function-keys have the following functions:

◀ **Previous sensor**

Select the sensor to the left of the current sensor. The selected will be indicated with an arrow.

⏻ **On/Off**

Turn the selected sensor *on* or *off*.

▶ **Next sensor**

Select the sensor to the right of the current sensor. The selected will be indicated with an arrow.

? **Show status**

Show the current status of the selected sensor.

Pressing the '?'-key shows the current status of the selected sensor (menu **100**). In the example below, the status of sensor 'A' on the left boom (L) is shown. The screen shows the sensor's serial number, the current temperature (inside the sensor) and its status (shown here as 'Running'). The screen also shows the current activity on each of the individual nozzles. Use the browse keys (PageUp/PageDown) to browse through the available sensors.
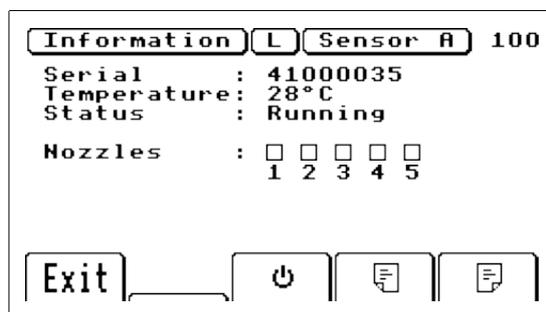
3.5 Service Mode

Service Mode can be entered by keeping the **MENU**-key depressed for <u>one second</u>. You'll hear a long beep to confirm that you are now in Service Mode. The display will now show the *global information* screen, like this:

```
┌─────────────────────────────────────┐
│ ┌────────────┐┌─┐┌──────┐    100    │
│ │Information ││R││Global│           │
│ └────────────┘└─┘└──────┘           │
│ Temperature: 20/26    °C            │
│ Battery    : 12.98    V ext         │
│ Lowest     : 12.34    V             │
│ Contrast   : 60       ← →           │
│ Uptime     :  9:33    hrs           │
│ Area       : 77400    m²            │
│ Total      : 1312     km²           │
│          More  information ↴        │
│ ┌────┐┌───┐┌────┐┌──────┐┌────┐     │
│ │Exit││L/R││ OK ││      ││ ▤ │     │
│ └────┘└───┘└────┘└──────┘└────┘     │
└─────────────────────────────────────┘
```
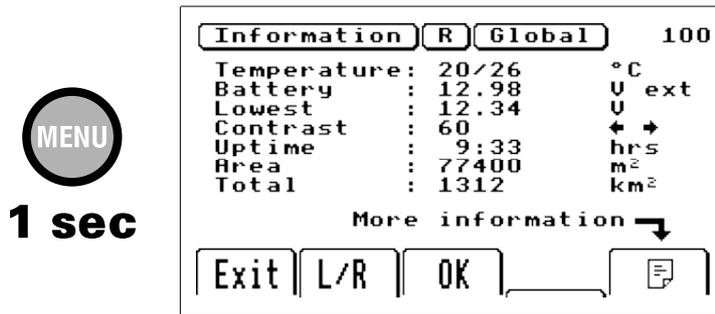
The following menus are available in Service Mode (use the MENU-key to toggle the menus):

100	Information
101	Warnings
102	Bleeding
103	History
104	Set clock (date/time)
105	Full coverage calibration

WEEDit Service Mode

MENU — Press and hold the MENU button for 1 second

100 Information — *Information about the various WEEDit components*

101 Warnings — *Warnings issued by the system*

102 Bleeding — *Test sensor and nozzle activity*

103 History — *Read productivity status of individual jobs*

104 Set time/date — *Set the current time and day with the arrow-keys*

105 Full coverage — *Set standard usage for full field coverage*

EXIT — Go back to normal display by pressing the EXIT key

100 Information Menu

The *information menu* contains global information about the WEEDit system, plus information about each individual sensor. This information is spread over several pages. Use the L/R key to toggle between the left and right boom. The first page contains global information about this WEEDit system.

```
┌─────────────────────────────────────────┐
│ ┌─────────────┐┌─┐┌────────┐             │
│ │ Information ││R││ Global │    100       │
│ └─────────────┘└─┘└────────┘             │
│ Temperature: 20/26      °C               │
│ Battery    : 12.98      V ext            │
│ Lowest     : 12.34      V                │
│ Contrast   : 60         ← →              │
│ Uptime     :  9:33      hrs              │
│ Area       : 77400      m²               │
│ Total      : 1312       km²              │
│                                          │
│           More information ⤵             │
│ ┌──────┐┌─────┐┌──────┐┌───────┐┌─────┐  │
│ │ Exit ││ L/R ││  OK  ││       ││  ▤  │  │
│ └──────┘└─────┘└──────┘└───────┘└─────┘  │
└─────────────────────────────────────────┘
```
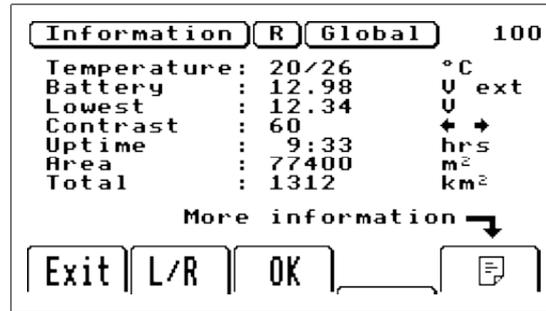
In this menu, the following information is available:

Temperature	Two temperatures are shown here. The first one is the temperature measured inside the <u>control panel</u>. The second one is the temperature in the <u>power box</u>.
Battery	This is the current battery voltage measured at the WALD power box.
Lowest	This is the lowest battery voltage measured during this session.
Contrast	Display contrast. Use the arrow keys ⇦ ⇨ and press **OK** to confirm.
Uptime	Total age (hours) of this unit (from the moment of installation)
Area	Sprayed area during this session.
Total	Total sprayed area (during the machine's lifetime).

In this menu, the function keys have the following meaning:

Exit **Exit**
Press this key to leave Service Mode. The default screen will now appear.

L/R **Select Left or Right boom**

OK **Confirm**
Press this key to store the new contrast setting.

▤ **Previous page (PageDown)**

▤ **Next page (PageUp)**

Use the N*ext* and P*revious* keys to reveal the information about each individual sensor. The number of available extra pages is equal to the number of connected sensors.

```
┌──────┐┌──────┐
│  ▤   ││  ▤   │
└──────┘└──────┘
```

The display header will tell you what information is being shown, e.g. when sensor 'B' on the right boom is selected:

```
┌─────────────┐┌─┐┌──────────┐
│ Information ││R││ Sensor B │
└─────────────┘└─┘└──────────┘
```
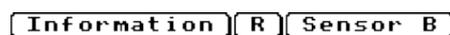
The following informatio is available about each individual sensor:

Temperature	This is the temperature inside the sensor.
Status	The current status of the sensor (e.g. **Running**).
Nozzles	The status of the nozzles. Nozzles failures are indicated with a cross.

101 Warnings

In the default screen, a message is always displayed directly below the speed bar. <u>Only one message</u> can be shown here, for example:

⚠ 🔋 **11.28 V**
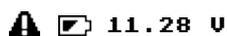
Due to lack of space in the default screen, these messages will always be short and cryptic. If more than one problem occurs at the same time, only the one with the highest priority will be shown in the default screen. Any other messages can be revealed by selecting the **Message Menu**.

MENU

Whilst in Service Mode, press the **MENU**-key briefly to select the Message Menu. A new screen, titled '*Messages Global*' will now appear. This screen will show all outstanding messages and errors. Please refer to chapter 5 – *Messages* – for further information on this topic.

If there are no warnings or error messages, the screen will look like this:

```
┌─────────┐┌────────┐          101
│Warnings ││ Global │
└─────────┘└────────┘

         There are no warnings


┌─────┐
│Exit │
└─────┘
```

If there are any warnings, they will be shows in a list. If the list is too long to fit the page, you may use the PageUp/PageDown keys to browse through the pages. Warnings may look like this:

```
┌─────────┐┌──────────┐          101
│Warnings ││ Global  2│
└─────────┘└──────────┘
 1:Pressure low        <   1.00
 2:Pressure high       >   3.50




┌─────┐┌─────┐
│Exit ││Zero │
└─────┘└─────┘
```
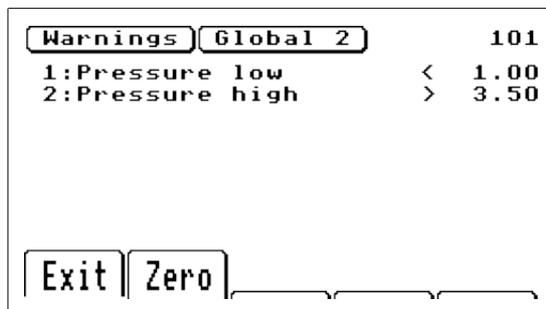
In this example, the pressure has been too low and too high. In both instances, the boundaries are shown at the end of the line. In this example, the pressure has to stay between 1.00 and 3.50 bar.

All warnings and error messages will be retained when the WEEDit is switched off. You may clear the list of warnings by pressing the 'Zero' key.

102 Bleeding

This menu is only available when the vehicle is <u>completely stopped</u>. If the vehicle is still moving, this menu will be skipped. Bleeding can be used for checking the sensors. Selecting menu **102**, brings up this display:

```
┌─────────────────────────────────┐
│ [Bleeding]              102      │
│                                  │
│ Lift the Weed-IT and use the     │
│ middle button to turn            │
│ bleeding ON or OFF. Use a        │
│ green leaf to active an          │
│ nozzle.                          │
│                                  │
│                                  │
│ ┌─────┐      ┌─────┐             │
│ │Exit │      │ °°° │             │
│ └─────┘──────└─────┘─────────    │
└─────────────────────────────────┘
```
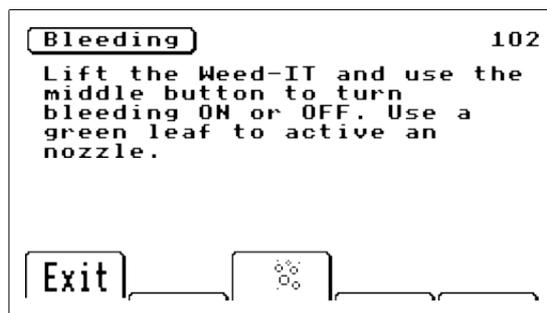
Press the red function key (marked with the bubbles) to start bleeding. As long as bleeding is active, the bubbles will flash. Press the red key again to resume normal operation. Press 'Exit' to return to the default screen.

Bleeding allows to check the operation of the sensors and the nozzles. This is done as follows:

- Stop the vehicle.
- Press and hold the **Menu**-button for 1 second (service mode).
- Press the Menu-button repeatidly until menu **102** is displayed.
- Use a green (living) leaf to activate a single nozzle.

103 History

In this menu, the actual herbicide usage is given in *liters per hectare*. The menu also shows the amount of herbicide and the total amount of herbicide solution used since the last reset. WEEDit is capable of remembering the usage parameters for a full week (or 7 days of usage if WEEDit is not used every day). When entering menu **103**, the screen shows **today's** totals:

```
┌─────────┬───────────────┐
│ Today   │ 12-03-2010    │      103
├─────────┴───────────────┘
 Time      :   220         min
 Active    :  50.30        km
 Area      :  66.68        Ha
 Dose      :   2.00        %    ← →
 Liquid    :   0.02        l
 Herbicide :   0.00        l
 Usage     :   0.04        l/Ha
 Saving    :  99.00        %--

 ┌──────┐           ┌──────┐ ┌────┐ ┌────┐
 │ Exit │           │  OK  │ │  🗐 │ │ ⟳ │
 └──────┘           └──────┘ └────┘ └────┘
```

Dose calibration

For an accurate calculation of the usage, it is necessary to specify the concetration of the chemical (around 2-4%). Use the arrow keys (*left* and *right*) to adjust the setting. Then press **OK** to confirm. You may return to the default setting by pressing the **2%** button.

Refresh screen

When viewing today's totals, the screen is not refreshed so that values can be read accurately. You may refresh the screen at any time and as often as you like by pressing the **refresh**-key.

⟳

Looking back in time

The initial screen always shows today's totals, like in the example above. You may, however, also recall the totals of the last 7 days on which WEEDit was used. To do this, use the PageDown key to select the previous day, like in the example below. The date on which the data was recorded is shown at the top:

```
┌─────────┬───────────────┐
│ History │ 11-03-2010    │      103
├─────────┴───────────────┘
 Time      :   108         min
 Active    :   0.00        km
 Area      :   0.00        m²
 Dose      :   2.00        %    ← →
 Liquid    :   0.00        l
 Herbicide :   0.00        l
 Usage     :   0.00        l/Ha
 Saving    :   0.00        %--

 ┌──────┐                  ┌────┐ ┌────┐
 │ Exit │                  │  🗐 │ │ 🗐 │
 └──────┘                  └────┘ └────┘
```

104 Set Clock

WEEDit has an internal clock that keeps track of the current date and time, even when WEEDit is turned off or when the battery is disconnected for a longer period of time. The clock is powered by its own Lithium battery, that will keep it running for approx. one year.

When the unit is first delivered, or after the battery has been replaced, you may need to set the clock to the current date and time. For this, use menu **104**. If WEEDit detects an impossible date when it is turned on, it will automatically enter menu **104**. The clock is driven by a small chrystal, similar to that of an electronic watch. It has an accuracy of several seconds per year, but it may lose some accuracy as a result of very low or very high ambient temperatures. If this is the case, you need to use menu **104** to adjust the clock.

```
┌─────────────────────────────────────────┐
│ ┌──────────────┐              104        │
│ │ Set time/date│                         │
│ └──────────────┘                         │
│             ↑                            │
│         ┌─────┐ ┌────────────┐ ┌───────┐ │
│         │ Fri │ │ 12-03-2010 │ │ 13:28 │ │
│         └─────┘ └────────────┘ └───────┘ │
│             ↓                            │
│                                          │
│       ┌──────┐        ┌────┐             │
│       │ Exit │        │ OK │             │
│       └──────┘        └────┘             │
└─────────────────────────────────────────┘
```
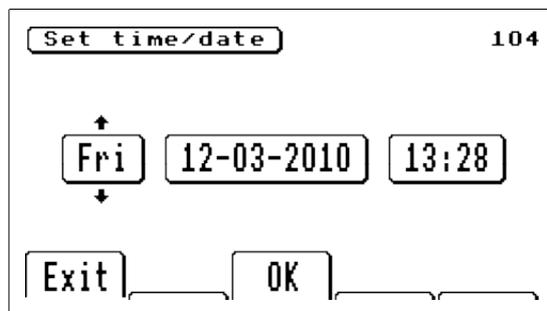
Use the navigation keys (left/right) to select the parameter you wish to change. Then use the up/down keys to alter the setting. Once you are satisfied with the result, press 'OK' to confirm the settings. The clock is now programmed.

105 Full coverage

In order to calculate the correct saving of herbicide, WEEDit needs to know how much herbicide you would have used when spraying at full coverage. In the example below, full coverage spraying is assumed to use 100 l/Ha:

```
┌─────────────────────────────────┐
│ ┌─────────────────┐        105  │
│ │ Full coverage   │             │
│ └─────────────────┘             │
│  Enter standard usage for       │
│  full field coverage.           │
│                  ↑              │
│         Usage  ┌─────┐          │
│         Usage  │ 100 │  l/Ha    │
│                └─────┘          │
│                  ↓              │
│                                 │
│  ┌──────┐      ┌──────┐         │
│  │ Exit │      │  OK  │         │
│  └──────┘      └──────┘         │
└─────────────────────────────────┘
```
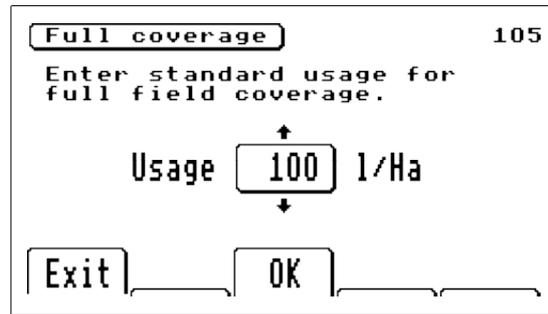
Use the navigation keys (up/down) to alter the current setting and press 'OK' to confirm. The new setting will be retained when WEEDit is turned off.

WEEDit Service Mode

MENU — Press and hold the MENU button for 1 second

100 Information — *Information about the various WEEDit components*

101 Warnings — *Warnings issued by the system*

102 Bleeding — *Test sensor and nozzle activity*

103 History — *Read productivity status of individual jobs*

104 Set time/date — *Set the current time and day with the arrow-keys*

105 Full coverage — *Set standard usage for full field coverage*

EXIT — Go back to normal display by pressing the EXIT key

3.6   Warnings

3.6.1 Introduction

In case of problems or errors, a message may appear on the screen. When in User Mode, such a message will always be displayed immediately below the speed bar, just like in the example below where the herbicide fluid pressure dropped too low:
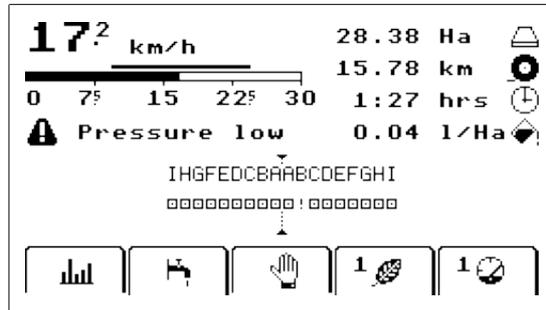
In User Mode, only one message can be displayed at a time. If more than one message is pending, or if multiple errors occur at the same time, only the message with the highest priority will be shown.

Detailed information about all messages can be read in the *Message Menu*. When in User Mode, keep the **MENU**-key depressed for one second to enter *Service Mode*. As series of menus are available in Service Mode. Press the MENU key repeatidly until the screen shows menu **101**.

The number of warnings is always given in the header. Each line on the display will show one message. Where possible, the message will be more informative than the rather cryptic message that was displayed in the default screen. For example, a *Low Battery* warning will also show the lower limit. Depending on the circumstances, the Message Menu may look like this:
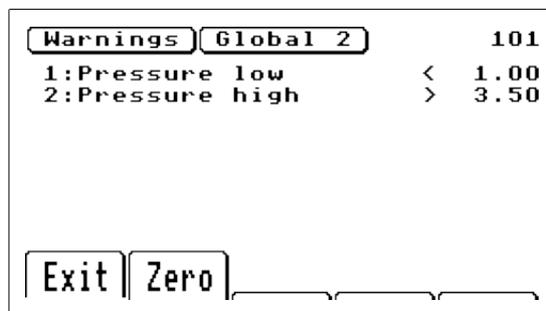
In the above example, 2 warnings are pending. Only the first warning (Pressure low) will be visible in the default screen (User Mode) as it has the highest priority. In this case, the lower limit is 1 bar (shown at the right).

The second line indicates that the current pressure has been too high (i.e. above the upper limit of 3.50 bar).

⚠   Press the key with the warning symbol to clear any temporary errors and messages. In case of a permanent failure, the message will re-appear immediately, of course.

Exit   Press '**Exit**' to leave this menu. You will be taken back to the default screen in User Mode.

WEEDit identifies the following types of messages (highest priority first):

    1   Errors
    2   Warnings
    3   Messages

3.6.2   Overview

The following <u>errors</u> and <u>warnings</u> may appear (highest priority first):

1	ERROR	A serial problem has occurred
2	No WALD	The WALD Power Box does not reply
3	Power off	Sensors have been switched off due to low voltage
4	Battery	Battery voltage too low
5	Battery too high	Battery voltage too high
6	COM error	A communication failure has been encountered
7	Sync error	Synchronisation failure between sensors
8	WALD ERROR	The WALD Power Box has reported a problem
9	Max Sensor	The maximum number of sensors has been exceeded
10	Serial # invalid	The control panel doesn't have a valid serial number
11	Sensor firmware too old	The version of the firmware inside the sensor is too old
12	Sensor serial number	One of the sensors doesn't have a valid serial number
13	Configure	Restored to factory default. System needs calibration now!
14	Pressure too low	Herbicide pressure below lower limit
15	Pressure too high	Herbicide pressure above upper limit
16	Wheel sensor	One (or more) wheel sensor(s) broken
17	Sensor order changed	The sequence of the sensors has been altered. Calibrate!
18	New sensor found	A new sensor has been detected. Calibrate!
19	Sensor missing	A sensor that was previously there, is now missing
20	No sensors	No sensors have been found

Furthermore, the following messages may appear:

24	HOLD	The WEEDit is in HOLD Mode
25	Reverse	The vehicle is draving backwards
26	Manual	The nozzles are being controlled manually
27	Flushing	The nozzles are being flushed
28	Simulation	Speed simulation is active

Continued on the next page…

If more than one warning has been issued, they will cycle in the standard screen (user mode). You will see each message for a few seconds before the next one is displayed. To see all messages simultaneously, use menu **101**.

If there are more outstanding messages, they can be viewed in menu **101** – *Messages Global* – (see example on the right). The total number of messages is always printed in the header (behind the word 'Global'). In the above example, three messages are waiting.

Any temporary (or incidental) messages can be removed by pressing the *Zero*-key. Permanent errors however, will persist and stay on the screen. When the WEEDit is turned off, all messages will be deleted. Only the dealer can then recall the 'old' messages by using menu **211**.

3.6.3 Errors

This chapter gives further information about each error message. Whenever possible, advise will be given to prevent or solve the problem. In some cases, a malfunction is permanent, but a temporary solution is possible, so that you can continue to use the WEEDit, whilst engineers are working on a more permanent solution. In case of doubt, always contact your supplier.

ERROR

This message will appear whenever a serious internal malfunction has occurred in the control panel's firmware. Under normal conditions, this message should never appear. However, should this message appear, contact your supplier immediately and report a method to reproduce the problem. Please make a note of the circumstances under which the error has occurred, as well as the precise text in the error report (including any error numbers etc.).

Battery voltage too low

Whenever the battery voltage drops below a certain (pre-determined) value, a message will appear. The message will also report the lowest voltage measured during the current session. For example:

Even though the battery voltage seems to be sufficient, it is entirely possible that the voltage sometime briefly drops below the lower limit. The lowest battery voltage can also be read in the Message Menu (101). The lower limit is printed to the right of the message. The lower limit is preset by the manufacturer and cannot be changed. A typical message in menu **101** may look like this:

In this example the lowest measured battery voltage is 11.28 Volt, whilst the lower limit is 11.50 Volt. This may be an indication that the battery is exhausted and needs to be recharged. Whenever the voltage exceeds the upper limit (factory preset), the WEEDit may decide to turn itself off, in an attempt to protect the hardware. When the voltage is too high, a message will be displayed. As soon as the voltage becomes dangerously high, the unit will turn itself off without prior warning.

Current WEEDit Calibration Settings

Use this page to write down the current settings of your WEEDit system. You may need these settings when replacing a sensor or after returning to the factory default settings.

Setting	Menu	Value	Date	
Offset	202			
Margin	202			
Fluid speed	202			
Distance	203			
Height	203			

Setting	Menu	Value	Date	
Offset	202			
Margin	202			
Fluid speed	202			
Distance	203			
Height	203			

Setting	Menu	Value	Date	
Offset	202			
Margin	202			
Fluid speed	202			
Distance	203			
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