



Installation Course V. 2010

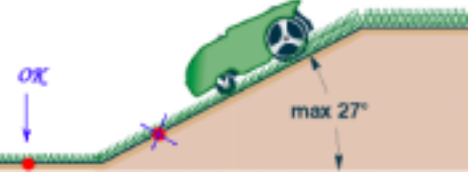
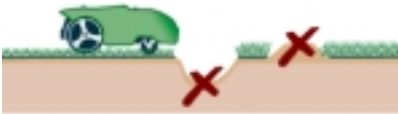
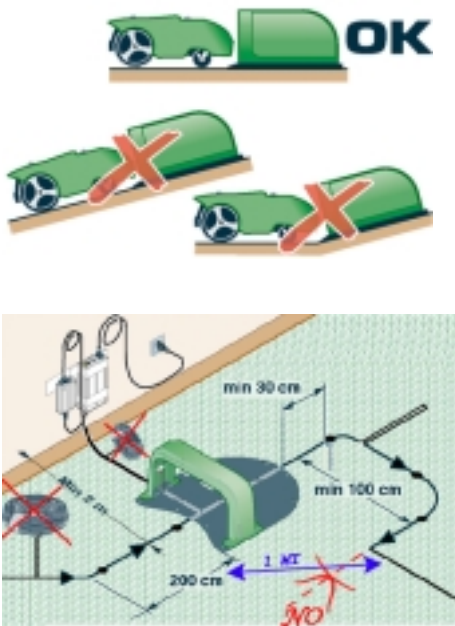
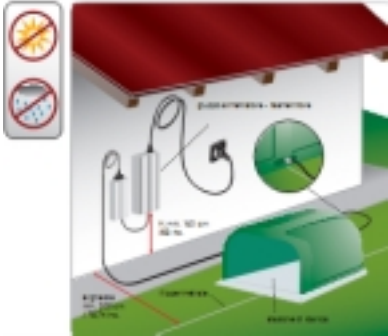


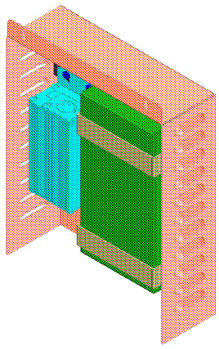
Lawn Mower Robot

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Installation

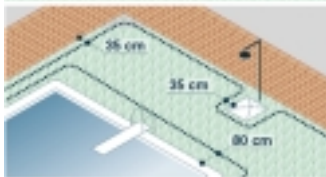
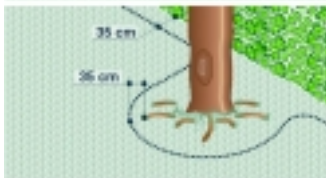
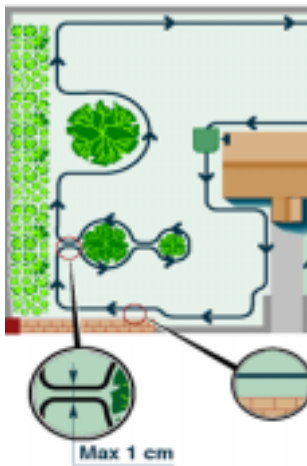
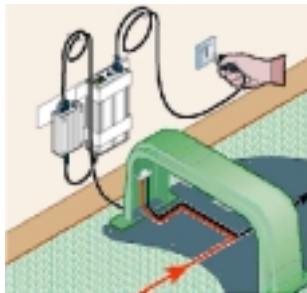
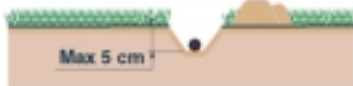
Preliminary Remarks

<p>Maximum Covering suggested</p>	<p>We must check the maximum Sm suggested for each model, also on the base of the installed batteries. However it is a good rule not to exaggerate and keep in mind that on more complicated gardens, with different separated areas the Sm covered by the robot are reduced.</p>
<p>Maximum slope: 27°</p> 	<p>This is the maximum slope achieved by the robot. Remember that the main problem is the slope because when the robot reaches the cable it is not able to come back. In order to improve the performance of the robot, it is useful to set the spiked wheels on the machine if possible. Before starting the installation we suggest you to have a test on a slide. In the user's menu, set out the option Border "NO", set the robot on a slide, let it feel a bump on the body and test that it doesn't slide while reversing or changing direction.</p>
<p>Secondary Areas Management.</p>	<p>The robot manages the main area and three secondary areas as well (according to models). With "secondary area" we mean a part of the garden connected to the main one thanks to a narrow passage and which can hardly be reached by chance. Saying if the passage is large or narrow for the robot depends on the primary area dimension.</p>
<p>Recharge of the robot</p>	<p>First of all put the robot in charge. At the end of the installation, it will be useful in order to test the correct operating.</p>
<p>Arranging the garden</p> 	<p>It is necessary to inform the customer about how to prepare the garden before the installation. The most common problems are small holes, small toys, stones, or all the objects that the robot can not recognize as an obstacle and that consequently might pass under the covering and be hit by the blade.</p>
<p>Watering System</p>	<p>Pay attention to the watering system! It is necessary to understand where the irrigators are and place the recharging base in a safe part of the garden, far from the irrigator that might wet the robot and especially the display side.</p>
<p>Recharging Base</p> 	<p>It is maybe the most difficult decision to take. The recharging base must be positioned according to some exact rules. The recharging base must be positioned on a:</p> <ul style="list-style-type: none"> - Plan area - Firm ground - In the widest area (if there is a big difference of square meters) Better but not compulsory. - Not nearby an irrigator - Before the recharging base there must be 2 mt of straight perimeter cable - Not nearby an electric gate because of interferences  <p>The recharging base must be well fixed to the ground and it is necessary to pay attention to the entrance step. There must not be any step. The problem can be solved by clearing away the grass surface or by putting an artificial grass mat in front of the recharging base, which makes easier for the robot to enter the station.</p>
<p>Transformer</p>	<p>The Transformer must be placed according to the following rules:</p>



- Place it in an area protected from water.
- Better to put it indoors.
- If it is placed outside, please put it in a ventilated box and not exposed to sun or water.
- It would be better to put it in a refreshed area.
- It must be outside the garden and not inside it.
- It must be at least 2-3 meters from the recharging base.
- The cable connecting the transformer to the recharging base must not be twisted, but it has to be spread so as not to create any magnetic field.
- Do not shorten the cable.
- Do not lengthen the cable.

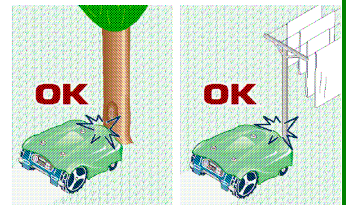
How to install the perimeter cable



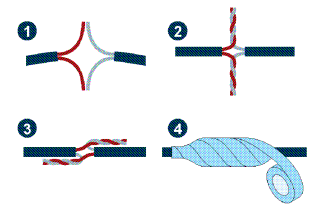
After deciding where to place the recharging base it is possible to install the perimeter cable. To install it, it is necessary follow some rules:

- For the first times, we suggest installing the perimeter cable on the ground rather than burying it. After some weeks, it will be soaked up by the ground. (The first weeks the blade has to be about 5 cm higher than the usual). Once become more experts, the best installation is the one made with the Wire layer machine.
- Start with the black connector. Follow the cable-trace on the recharging base and come out with the cable from the rear side of the base.
- It is suggested to leave a cable store for possible future modifications in front of the base and behind it (to create this store it is necessary to make a flowerbed and leave cable intermingled with the cable delimiting the surface)

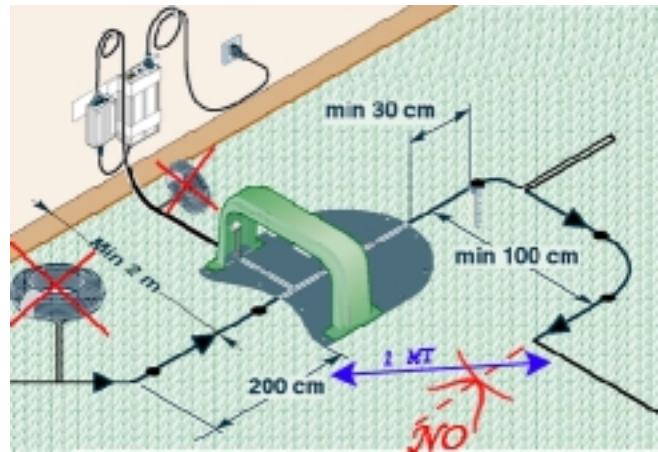
- Work in a clockwise direction
- Remember to position properly the fast returns to the base or "Arrows" (see next paragraph).
- When there is a flowerbed the installation has to be made anticlockwise. If you make a mistake, the robot feels the flowerbed before reaching the cable.
- If there are two flowerbeds close to each other, you shall lay the cable passing from one to the other.



- Respect the following distances:
 - o Sidewalk at the same grass height : 0-5Cm
 - o Wall 35 Cm
 - o Hedge 35 Cm
 - o Swimming pool, Hole, Precipice 80 Cm

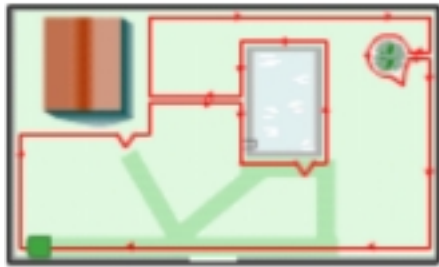
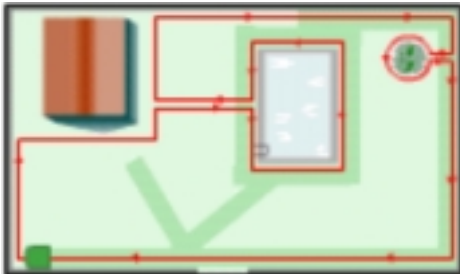


- As far as possible, all the bents must not be done like a 90° angle.
- Every connection must be made with proper material like the 3M self stretching tape "scotch 23".
- It is suggested to leave a cable store for possible future modifications in front of the base and behind it (to create this store it is necessary to make a flowerbed and leave cable intermingled with the cable delimiting the surface).
- in front of the base, the cable must be positioned straight for the total length of 2 meters.
- The extra cable must not be left gathered.
- At the end of the installation it is necessary to connect the going in of the cable to the red connector.
- The maximum cable length is 600mt +- 20%. By means of the "Border Powered" it can reach 1000mt+-20%.



- Leave the robot at least 1 meter away from the point where the robot makes the signal synchronization (when it comes out of the base it turn with an angle of 90°)

Quick Return “Arrows”



The quick return or “Arrow” is a perimeter cable symbol recognized by the robot in order to come back quickly to the recharging base. There are many advantages:

- The robot goes back to the recharging base earlier, so there is a lower consumption of batteries.
- The robot goes back earlier to the recharging base and resumes quickly mowing the lawn again.
- There are fewer traces on the ground.

The first picture aside shows the installation without arrows, the second one shows the installation with arrows. As you can see the route made by the robot is shorter. We recommend to position the arrows as shown in the second picture.

An arrow is often put shortly after the recharging base because, if the robot fails to enter the base, it returns quickly to recharge again.

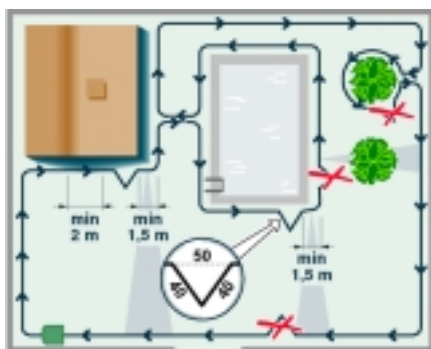
Remember that the robot recognizes consequently a maximum of three arrows each working cycle.

IMPORTANT!!!!!!. Never put an arrow in the return way otherwise the robot never comes back to the recharging base.

IMPORTANT!!!!!!. Once the installation is completed and the perimeter cable is connected, check that the transformer and the transmitter are working properly.

Arrows measures.

Model: Ambrogio L300



Model: Ambrogio L200

Transmitter Led Explanation:

Flashing Yellow : Border Ok.

Steady Green : Interrupted or not connected border

Steady red : Robot is charging. Signal is not transmitted

Switched off Led : Not connected Battery Charger, Faulty fuse in the transmitter, Faulty Transmitter

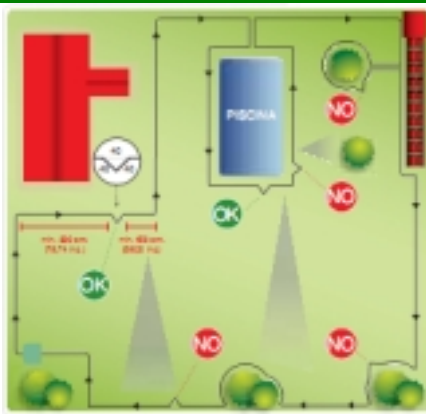
Battery Charger Led Explanation:

Steady Green : Working Battery charger

Steady red : Working Battery Charger with batteries in fast charge.

Off : Switched off or faulty Battery Charger.

IMPORTANT!!!!!!. The measures are approximate. Sometimes and especially in case of sliding, it is recommended to increase the measure with some more cms. It would be helpful to test the correct recognition with not completely charged batteries and therefore in the same conditions occurring while the robot is normally working.



Secondary Area



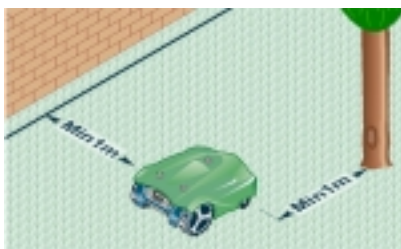
The secondary area is a part of the garden connected to the main garden by a narrow passage that is hard to be achieved by chance. Saying if the passage is big or small for the robot depends on the primary area dimension. Obviously the secondary area must be at the same level of the primary area (without steps).

The robot can manage up to three secondary areas (the primary and three secondary areas).

The minimum passage is 70 cm from cable to cable. So the passage that you need is 1 meter and 40 cm wide. It is better to increase the distance if the passage is very long. On the contrary, if the passage is shorter than 2 meters, we can venture some centimeters less.

During the programming it is necessary to set in the robot the dimensions of the secondary areas with percentage in relation to the lawn and to the best way for the robot to reach them faster (clockwise/anticlockwise), and obviously in relation to the meters the machine has to follow the cable in order to reach the secondary area.

Closed secondary area



The secondary area is a part of the garden separated from the main area but connected to it with the going in and out of cable.

The robot must be carried to the closed area by hand and it must be taken again to the primary area to recharge its batteries.

These solutions do not fit big gardens because the management will be difficult.

In fact the robot cannot fulfill the charging cycle completely and the mulching effect is not completely successful because it is highly probable that the customer won't punctually move the machine from one area to the other or may forget to do it.

In order to tell the robot that it is working in a closed area, it is necessary to switch it on in the closed area. Push "Enter" to enter programming mode. Scroll voices up to "WORK MODE". Set "NO PERIMETER" and set Robot working minutes.

From this moment on the robot knows that it is in a closed area and that when it finishes working it must not look for the recharging base but has to stop.

Installation without perimeter

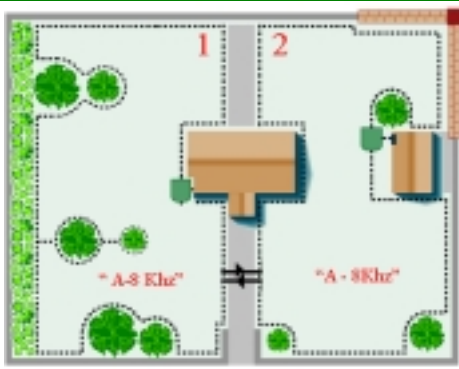
It's possible to let the robot work even without a border. We do not suggest this option. It is normally used for demonstrations only or for small gardens situated near the main lawn and completely delimited by fences (even the flowerbeds).

Installation of neighboring perimeters

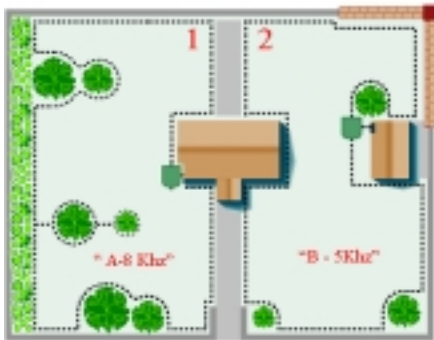
Situation : 1 – Solution "A"

Situation 1: (Same owner with 2 different and separated gardens not accessible to the same robot)

- In these situations there are 2 different solutions.
- **Solution "A"**. Have only one installation of the garden 1 and 2 by linking the 2 gardens together. The recharging base in garden no 1



Situation 1 – Solution “B” and Situation 2



Situation : 3



is connected as usual. The recharging base in garden no 2 is placed on the border wire without connecting the cable to the black and red connector.

ATTENTION!!!. Robot transmitter “1” must have the DIP-SWITCH 1 ON, to transmit even when robot 1 is in its recharging base

Advantages:

- No change must be done with the robots you have.
- In case of failure of the robot in garden no 1, the robot no 2 can be taken to garden 1 and there put at work.

Disadvantages

- The length of the border wire can be excessive. Please keep in mind the limit is 600MT, beyond that limit the (48V) signal amplifier is required.
- If the border wire is interrupted both the robots stop.
- An extra battery charger can be necessary. The one given as equipment is used to supply the signal transmitter, the other one charges the batteries of the robot.

- **Solution “B”.** Have two normal and different installations

Advantages:

- If the border wire is interrupted only one robot stops.
- There are no problems in finding a passage to connect the 2 gardens.

Disadvantages

- The B channel (receiver + transmitter) must be installed in the robot no. 2
- In case of failure of one robot, the other one cannot be used to mow the zone 1 as well.

Situation 3: (Installation of Ambrogio when in the closest garden there is a robot by another manufacturer installed).

1. AMBROGIO ROBOT :

- a-) If possible leave the dip-switch 1 on OFF (signal stop while the robot is in recharging base)
- b-) Activate on transmitter a channel different from the one used in the other robot and install the relative channel receiver, that must be selected on the robot menu as well.
- d-) Leave a distance of 60-90 Cm between the two gardens. If the robot of the adjacent garden is a old generation Ambrogio with “Standard” or “RX” signal, it is necessary to leave a distance of 120Cm.

2. FRIENDLY:

- a-) If possible leave the dip-switch 1 on OFF (signal stop while robot is in its recharging base)
- b-) Activate Channel “C” on transmitter and install C receiver on the robot menu as well.
- c-) If possible, reduce the power of our transmitter modifying the Dip-Switch.
- d-) Leave a distance of 120Cm between two gardens.

3. AUTOMOWER:

- a-) If possible leave the dip-switch 1 on OFF (signal stop while the robot is in recharging base)
- b-) Activate Channel “A” on transmitter and install A receiver on the robot menu as well.
- c-) If possible, reduce the power of our transmitter modifying the Dip-Switch.
- d-) Leave a distance of 120Cm between the two gardens

To remind before the installation

You have to keep in mind that :

Before the installation :	Have You cut the garden before the installation, especially the edges?
	Is there a socket preferably in the widest area?
	How wide is the garden? check the model specification and the batteries provided
During the installation	Put the robot into charge on “PAUSE” modality.
	Check the slides, by trying the robot with the option No Border.
	Secondary areas. We manage the main area and three secondary areas. (according to models)
	Decide where to install the recharging base <ul style="list-style-type: none"> - “Preferred” Widest area but not compulsory. - Socket - Flat area - Water system
	Check the water systems position.
At the end of the installation	Settle the rain sensor
	Test how the robot follows the border cable <ul style="list-style-type: none"> • (With the key– Switch the blade off)
	Test the recognition of the arrows. <ul style="list-style-type: none"> • (With not too charged batteries) • With the key “CHARGE” you simulate low batteries.
	Program the working times of the Robot. (Pay attention to the working times of the irrigators).
	Inform the customer that he has to set out a password.
	Leave the blade at 5-6 Cm and inform the customer that he has to lower it when the border cable has been absorbed.
	Hooked wheels (if the model robot allows this). It would be helpful not to install them until the border cable has been absorbed by the ground.

Robot Programming

Programming and other.

Explanation of the keys



“ON” : To switch the robot on.

“OFF “: To switch the robot off.

“STOP-EMERGENCY“ : It is needed to switch the robot off in case of emergency. We must use this key in case of emergency and when we need to work on the cutting motor. In order to restart the robot, we must press it once again. The emergency Led will switch off . Then it is possible to switch it on again by pressing on the key ON.

“PAUSE” : To put the robot in Pause mode or to resume working.

“CHARGE” : To make the robot come out while is in the recharging base. To let it enter the recharging base while working.

“-“: To change the values during the programming. To turn off the blade while the robot is working.

“+ “: To change the values during the programming. To turn the blade on while the robot is working.

“ENTER” : To confirm the choice during the programming. To activate the spiral while the robot is working.

Programming Menu

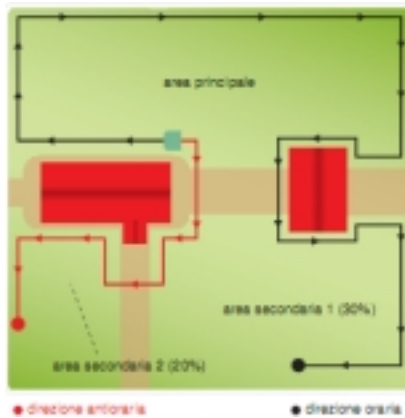
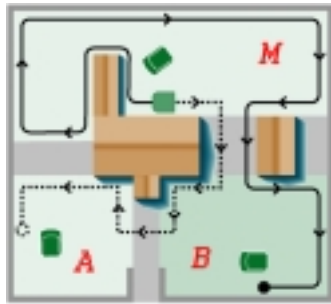
To enter the programming menu, it is necessary to put the robot in “PAUSE” and push “ENTER”. The menu consists in menus and under menus. With the key “+” and “-“ you can scroll the menu entries or change the value displayed. With the “ENTER” key, you can select the entry, enter the under menu or confirm the displayed value.

Here below only the most correct parameters for a proper functioning are listed:

- Working days: For every working day, it is possible to show with “1” if the robot must work and with “0” if not. The robot must work every day or every other day to exploit the mulching effect.
- Working hours : It is possible to plan two working hours to make the robot come out. Always remember that in order to charge the batteries the robot needs from 3.5 to 4 hours. So between the working time 1 and the working time 2 this break will be necessary.
- Secondary area 1 _ Dimension % : it allows to set out the dimension of the secondary area in relation with the entire surface.
 - o 20% Indicates a very very small area.
 - o 30% Indicates an area which is approximately ¼ of the whole garden.
 - o 50% Indicates an area, which is approximately the half of the whole garden.
 - o 80% Indicates a secondary area which is bigger than the primary area.
 - o 100%. Every time the robot goes out of the docking station, it will follow the border cable to mow the secondary area.
- Secondary area 1_Direction: it indicates the fastest direction to follow in order to reach the secondary area. The direction can be both clockwise and anticlockwise. Coming out the recharging base, the robot will follow the cable according to the settled direction in order to cut in the secondary area.
- Secondary area 1_Distance: it allows to set out the distance (in meters) the robot needs to reach the secondary area, following the perimeter cable. It is recommended to measure the distance on the half of the secondary area, so that you can be sure that the robot will be in the secondary area when it starts mowing.

- Secondary area 2: This is like the previous options but for the area number 2
- Secondary area 3: This is like the previous options but for the area number 3

Work and Programming example of the secondary area.



Examples of programming the work-cycles.

Model: Ambrogio L300

Sq. mts.	time 1	time 2	
0400Sq mts	10:00 - 11:30		
0800Sq mts	10:00 - 13:00		
1200Sq mts	10:00 - 14:00		
2000Sq mts	10:00 - 13:00	17:00 - 20:00	
3000Sq mts	09:00 - 13:00	17:00 - 21:00	
4000Sq mts	08:00 - 13:00	17:00 - 22:30	(4 Lithium Batteries)
5000Sq mts	07:00 - 13:00	17:00 - 23:00	(4Lithium Batteries)

Model : Ambrogio L200

Mq	time 1	time 2
0200Mq	10:00 - 11:00	
0500Mq	10:00 - 12:00	
0900Mq	10:00 - 11:30	16:00 - 17:30
1200Mq	10:00 - 12:00	16:00 - 18:00
1500Mq	10:00 - 12:00	16:00 - 19:00
2000Mq	08:00 - 21:00	
2500Mq	08:00 - 22:30	
3000Mq	07:00 - 23:30	

Secondary Areas.

While configuring the secondary area, you must be very careful in setting out the percentage-parameter, which is extremely important. The percentage-parameter represents the dimension of the secondary area in relation with the whole garden (100%).

Let's see some examples that show how often the robot mows the secondary area according to percentage variations.

P=Primary A=Secondary

50%	5 Times every 10 Cycles	PAPAPAPAPA
40%	4 Times every 10 Cycles	PAPAPPAPAP
30%	3 Times every 10 Cycles	PPAPPAPPPA
20%	2 Times every 10 Cycles	PPPPAPPPPA

With percentage superior to 50%, we can manage gardens where the secondary area is bigger than the primary. For example:

80% 8 Times every 10 Cycles AAAAPAAAAP

IMPORTANT!!!. Remember that:

- When there are secondary areas, increase the working times of the robot.
- Set out very low percentage values for dimensions only when the area is very small, otherwise the robot will go considerably seldom in this area to mow the grass.
- Use both the working times in order to lower the times when the robot mows a secondary area.

Examples of Secondary Areas Configuration

PA = Sq mts Primary Area

SA1= Sq mts Secondary Area 1 SAD1= Secondary Area Dimension 1

SA2= Sq mts Secondary Area 1 SAD2= Secondary Area Dimension 2

PA	SA1	SA2	SAD1	SAD2
1000	1000	1000	30%	30%
1000	800	800	30%	30%

1000	800	200	40%	20%
1000	400	400	20%	20%

In case the primary area, where the recharging base is positioned, is smaller, please set out the values as follows:

PA	SA1	SAD1
1500	2000	60%
1000	2000	70%
500	2000	80%

In case the base is positioned in a closed and very narrow area and you need to set out the robot for working in the secondary areas, it is possible to settle the robot as follows:

PA	SA1	SA2	SAD1	SAD2
0	2000	1000	70%	30%

Bluetooth Software installation in mobile phones and Control over the robot



Software Icon on the mobile phone



Robot Search. Function for activating new robots research and for combining with them.



Quick Connection to the Robot already previously combined.



Charge Key. It orders the robot to go to the recharging base or, in case it is already in the recharging base, it orders the robot to come out.



“Configure” Key. It permits to enter the User’s Programming.

In order to control the robot with your own mobile phone, you need first of all to have a mobile phone supporting Bluetooth, Java and which permits the Java applications to control the Bluetooth module. In technical terms, it is necessary for the mobile to support this function “A midlet can use Bluetooth (JSR-82)”. To install the software you need to have a PC with Bluetooth. Download with “LAWN MOWER PROGRAMMER” the last release. Select “Other”.

A folder will open: 3 short movies are available showing instructions on how to install the software on the mobile in three different ways (according to the Bluetooth module available on the PC).

In general the operation consists in selecting the file “**BT-Remote-Control.jar**” and then select in the menu FILE->Send to->Bluetooth device. At this point the procedure changes in relationship with the Bluetooth module installed on the PC, but in general it consists in searching for the mobile phone, selecting it, defining a connection password (for instance 1234) and pressing the button “send”. Follow the instructions appearing on the mobile. At this point the software has been installed in the mobile phone.

Each model of mobile phone has its own way for saving the received files. Generally, they are saved in “Received Files, Applications, Collection or Games”.

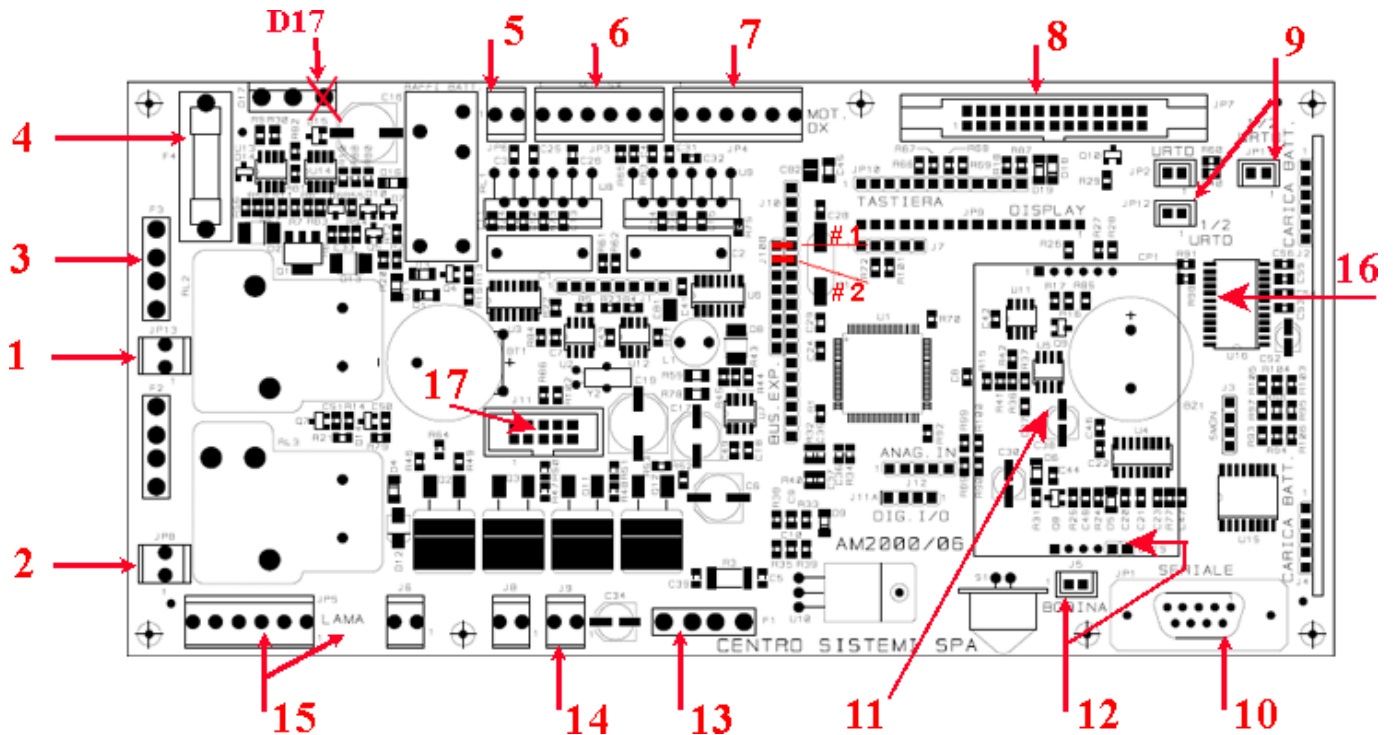
After having found and executed the received file, the first time it is necessary to select the language and combine the phone with your robot.

- Switch the robot on and enter the User’s Menu.
- Select the option Bluetooth. Configuration.
- Select ID on which we want to set up the phone. (It is possible to set up up to 3 handy phones enabled to drive the robot.) The connection between robot and handy phone cannot take place contemporarily with more than one handy phone.
- It begins to count 60 seconds down; the combining operation must be completed within the 60 seconds, otherwise it is necessary to repeat the operation.
- On the mobile phone, execute the application “Remote”.
- Select “Robot Search”. At the end of the research a list of the individuated robots is displayed. Select the robot which we want to connect to and press the OK key. Automatically the Robot have the name of “ROBOT”.
- The Robot stops counting down and at this point the combination has been pursued.
- Press the Pause key on the mobile to check it works properly.
- From now on, in order to connect with the Robot it is sufficient to select in the mobile the option “fast” for a faster connection.

With the mobile phone, it is possible to make the following operations:

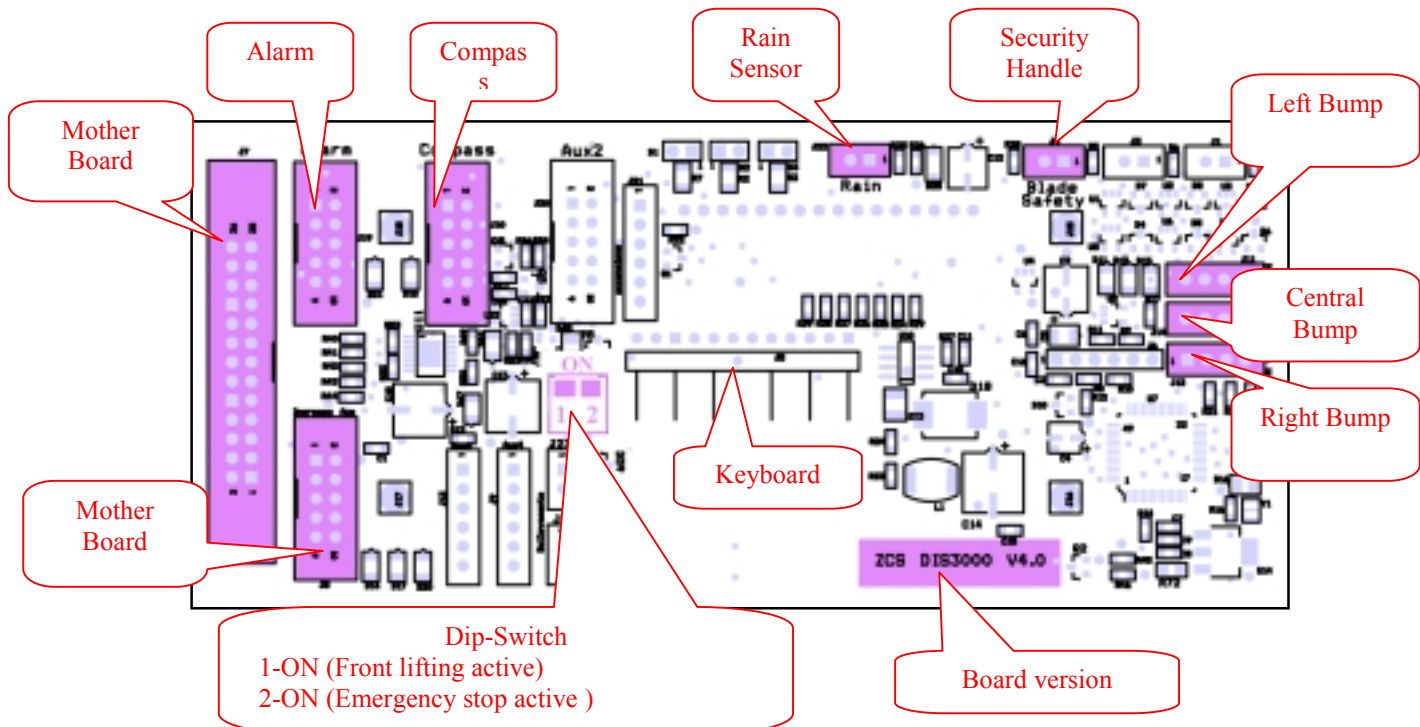
- ✓ **Drive the robot in all directions. Pay attention: when the robot meets the perimeter cable or it bumps, the robot has the priority control over the mobile phone. Until the movement for re-entering the perimeter has not been fulfilled, it is not possible to control the robot with the mobile.**
- ✓ **Settle it in Pause and restart it.**
- ✓ **Settle the spiral in order to optimize the work in that area.**
- ✓ **While the robot is working, it is possible to send it back to the recharging base.**
- ✓ **While the Robot is in the recharging base, it is possible to:**
 - **Let it get out of the recharging base.**
 - **Settle it in Pause modality and enter the User's configuration. (Working times, Secondary Areas, Rain Sensor, Perimeter Y/N, Robot's name etc....)**

Upgrade and Connection – Mother Board



- | | | |
|---|--|--|
| <ul style="list-style-type: none"> 1. + Battery 2. - Battery 3. L300 - F3 - Fuse 30Ah
L200 - F3 - Fuse 20Ah 4. F4-Fuse 315mAh Delay 5. Recharging connectors 6. Right wheel motor | <ul style="list-style-type: none"> 7. Left wheel motor 8. Display Connector 9. L200 - Microswitch 10. serial connector (Upgrade and Bluetooth remote control) 11. Sinusoidal Receiver 12. Coil | <ul style="list-style-type: none"> 13. F1-Fuse 1Ah 14. L200 - Light bulb. 15. Blade Motor 16. Anti reversing detector. 17. Display Connector. |
|---|--|--|

Display Board Connection (200Z04600A)



Robot Software Update

Version Updating. With the new programmer

Ambrogio Client

The new programmer doesn't work on Windows98 and previous.

The robot update is made with the **Programming** Software which can be downloaded from Cassiopea.

There are two different Update procedures: The manual and the automatic one.

Before speaking about the update procedure it is necessary to know that the mother boards Version Advanced Mode V. 2010 contain a part of the code inside the software, which allows the robot to recognise the model automatically. By this mode it is also possible to update the microprocessor with a protocol of ours. This software portion is called BootLoader. In case the mother board loses the programme because of any reason, it is necessary to install the programme again, not with the standard software but only with the Boot Loader. Only after this action it is possible to install the new programme in the mother board with the software version without using the auto recognition.

The function "Guided Update" allows us to update the robot through the auto recognition (Only V. 2010) or through the manual selection of the model and the software.

- Auto recognition. With this mode the model of the robot is recognised and the software suggests the available updates. Normally only the update of the motherboard or of the whole robot is available.
- No Auto recognition. With this mode it is necessary to select the model manually. Step by step the software will suggest the devices which can be updated

The function "Advanced Update" is available only for expert users and it allows us to choose the kind of microprocessor and the version to be updated. It is a low level function which can make the device unusable in case it is used in an incorrect way.

The updated mother boards of the last generation, as they are switched on, show some information needed to understand the state of the art of the software and hardware.

On the display it is shown as follows

Robot L2E A 09
V. 2009/12/04

Robot L2E-> It indicates the model of Robot .

A-> It identifies the mother board advanced mode V. 2010

09-> It indicates the mother board revision

V. 2009/12/04 -> The version date which is then replaced by the internal code of the release, for instance (r.5814)

When we start the software we check the compatibility with the software of the boards : Display, Alarm, Compass and Sinus receiver. In case the software of these boards is not compatible with the same version of the mother board, the motherboard shows an error such as the following one:

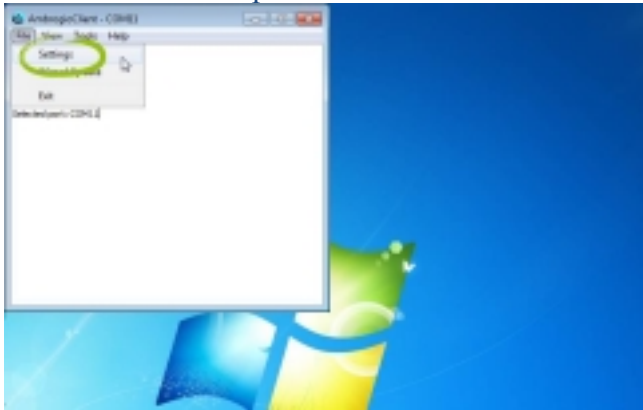
DISPLAY R 5810
Required R 5814

This message means that in the display there is the release 5810 which is not the last version and so there could be problems with the functioning of the robot. We suggest to you to update the display board. With the key ENTER it is possible to ignore the message and to go on. The possible messages are the following ones: DISPLAY, ALARM, COMPASS, RECEIVER.

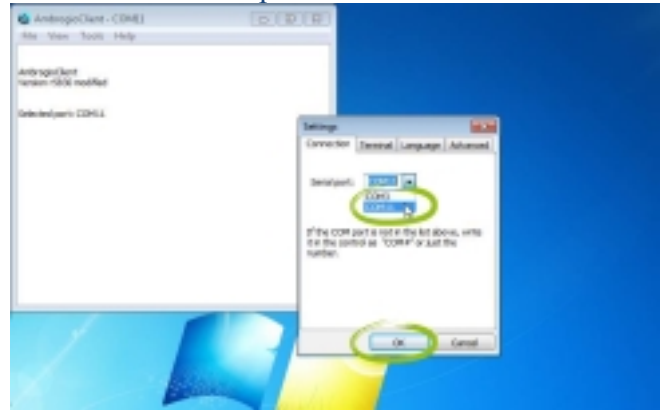
Here below you can find the procedure to set up and to use the programmer :

It is necessary to configure the serial connected to the Robot only the first time.

1. Select File-Set up

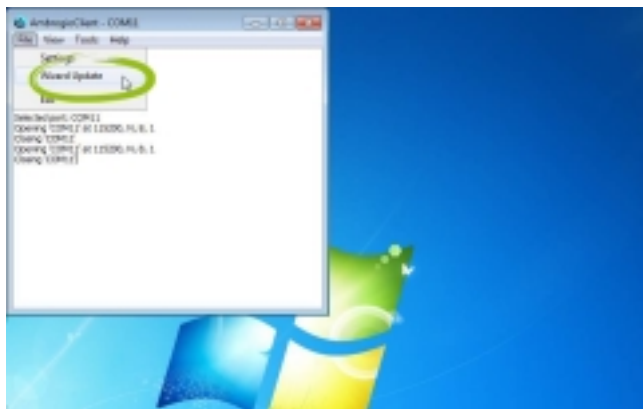


2. Select the serial port



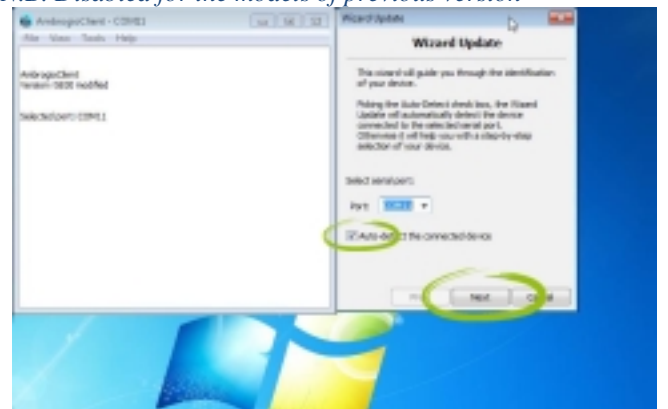
Update Procedure

1. Select guided File Update

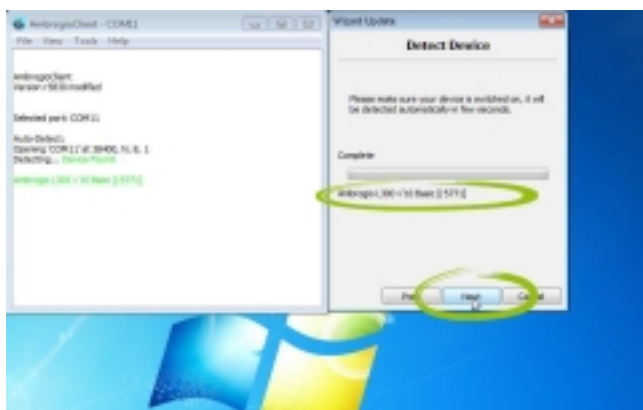


2. In the models with advanced mode we must leave the auto recognition activated

N.B. Disabled for the models of previous version



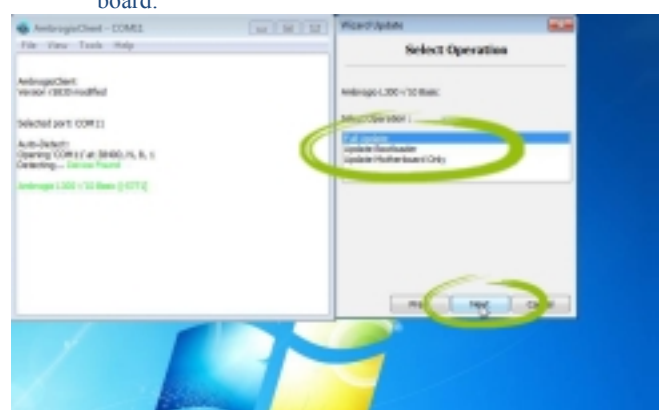
3. Auto recognition successfully completed. Press the key "Next"



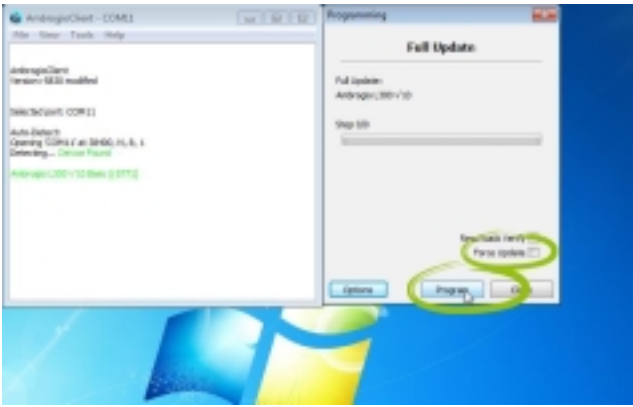
4. The programmer suggests the possible updates for this model.

• Full Update Total update of all the electronic devices.
Suggested procedure.

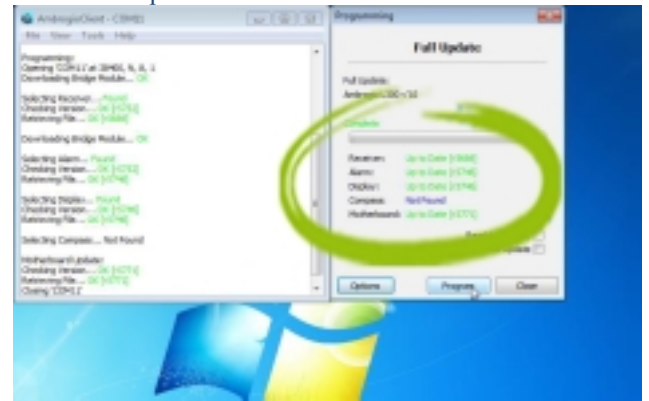
- Update boot loader.. It resets the boot Software needed to update the new boards. After updating a board with the boot loader it is necessary to update the board with the Manual procedure..
- Update Motherboard Only.Update of the only mother board.



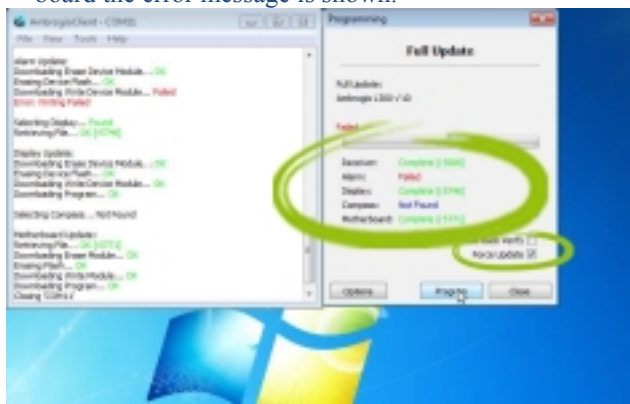
- With the option “Forced Update” disabled. The software updates the motherboard and the peripheral devices only if it is necessary.



- Once the update has been completed the update situation of each electronic board is shown. In this case the boards had already been updated and the board of the compass was not present.



- Example for the update by activating the flag “Forced Update”. The Software forces the update even if it is not necessary. In case there are problems with the update of a board the error message is shown.



Service Menu

Service Menu - (Release November 2009)

Only retailers and authorized technicians can enter the Service menu. There are some submenus. All the indications are in English only

1. **“Statistics”**: Used to verify the health state of the machine. It informs about working hours, errors occurred and state of batteries.
2. **“Test Motors”**: Used to verify the wheel and cutting motors functioning.
3. **“Battery Type”**: Used to change the type of lithium batteries.
4. **“Test Signal”**: Used to execute more accurate controls on the signal values.
5. **“Test Tilt”**: Used to control the inclinometer functioning.
6. **“Test Bump”**. Used to check the correct functioning of each bump sensor.
7. **“Safety Handle”**. Enable or disable the handle control.
8. **“Safety Lift”**. Enable or disable the control on the lifting cover. **ACCORDING TO MODELS.**
9. **“Compass”**. Used to enable or disable the Compass use. **ACCORDING TO MODELS.**
10. **“Blackout”**: Used to deactivate the attempt of signal recovering, when the robot loses the synchronization. In case of swimming-pools nearby we advice you to put this option on “STOP”.
11. **“Border Blade”**: It permits to turn off the cutting blade, while following the wire. **“ACTIVATE ONLY ACCORDING TO ZCS ADVICE”**
12. **“Hot Blade”**: It allows us to control the temperature of the cutting motor. If the value is over the limit established by the manufacturer, the robot switches the blade off, by continuing its movement waiting for the temperature to lower again so that it can restart the blade. **“ACTIVATE IT ONLY ACCORDING TO ZCS ADVICE”**
13. **“Force charge”**: During the entrance in the recharging base, it imposes the power supply to speed up the recharging. **“ACTIVATE ONLY ACCORDING TO ZCS ADVICE”**
14. **“Debug”**: Used to visualize some useful information to detect problems in place of battery signalling while the robot is operating.

To enter the menu, push in sequence the keys: **ON, PAUSE, CHARGE, Key (+) and Key (-)**.



Scroll the key (+ or -), and select with ENTER



Service menu parameters must be changed only by high qualified staff. Here below a short legend of main parameters:

	Default	Advices
Battery Type		Pay attention to the stick on battery. You cannot install batteries of different type on the same machine.
Safety Handle	ON	Disable only for debug in agreement with client to verify if the switch-off of the blade is caused by the handle safety system.
Safety Lift	OFF	If enabled, it controls the cover lift through a sensor positioned on it. SENSOR NOT AVAILABLE.
Compass	OFF	To enable only if the Compass is present
Blackout	RESTART	Set it on “STOP” but only in presence of swimming pools. If the robot loses signal, it doesn’t attempt the recovering but it stops and displays “SIG 04”..
Hot Blade	ON	By setting this parameter on “OFF” it doesn’t control the temperature of the cutting motor. You must set it on OFF only according to Zucchetti Centro Sistemi Advice.
Border Length	Standard	Set on “Long” only if robot has not enough autonomy to go back to the recharging base. ATTENTION !!! Robot work autonomy is reduced by at least 30 minutes.
Force Charge	OFF	During the entrance in the recharging base, it imposes the power supply to speed up the recharging. Set it on ON, only if recommended by Zucchetti Centro Sistemi technicians.
Debug	Battery ON Temperat. OFF Handle Val OFF Ampere Val. OFF Free Stack OFF	We can change it only according to Zucchetti Centro Sistemi Advice. Temperature. Cutting Motor Temperature Handle Val. Handle Safety Values Ampere. Wheel Motor Current Free Stack. Reserved to the engineers Zucchetti Centro Sistemi

Service Menu: "Statistics"

This menu allows you to check the robot conditions. Here you can find info about working time, errors and batteries. The following info is displayed:

First Charge	date of the first charge.
Charge	Number of charges done.
Charge Time	time necessary to charge the batteries. The lower the time is, the more used are those batteries. If this value reaches 30 minutes, batteries must be replaced.
Total Work Time	total robot working time.
Last Work Time	working time of the last working cycle.
Failed Charge	number of failed charges caused by an abrupt contact loss in the recharging plates or for a contact loss in a post step. Any crashes are not considered as causes for a failed charge.
Clock Error	Errors occurred in the clock. Ask the manufacturer.
Blackout	(DATE) X/Y/Z. Show the date from last time signal error occurred. The important parameter indicating blackout number is the last value.
Checksum Error	It shows the date of the last time in which the Robot gave checksum error. In case the robot shows this error it is necessary for us to set up the whole user menu and the service menu. We must also inform Zucchetti Centro Sistemi about this inconvenient.
Temperature MAX	It shows the maximum temperature reached by the cutting motor after the last "Clear Error". The temperature is important to understand possible faults in case the motor is internally burnt.
Low Battery	last time the robot switched off for low battery and total number of the times an error has been indicated. Generally the problem is caused by problems on the way or on the base which do not allow the robot to recharge.
High Battery	last time the robot switched off for high battery and total number of the times an error has been indicated.
Out of Border	last time the robot stopped for an out-of-perimeter and total number of the times an error has been indicated.
Blocked	last time the robot blocked and total number of the times an error has been indicated.
E01-Right Motor	last time the robot stopped for 'Motor Error' and total number of the times an error has been indicated.
E02-Left Motor	last time the robot stopped for 'Motor Error' and total number of the times an error has been indicated.
E03-Blade	last time the robot stopped for 'Blade Motor Error' and total number of the times an error has been indicated.
Last clear Error	Show the date of the last setting at zero in statistics.
Clear Errors	it clears all the errors shown in the Statistics till now. Check every single error before clearing.

Service Menu: "Test Motors"

This menu allows you to check more thoroughly the motors operation. With the **ENTER** key the cutting motor switches on and off. With the **(+)** and **(-)** keys you can start up the wheel motors increasing the speed up to 100%.



LF"; Left Motor Speed

BL"; Cutting Motor Speed

"RG"; Right Motor Speed

With charged battery and with the robot with raised wheels we push the wheel motors up to 100%. The blade is switched on. In this case the ideal values are the following ones:

"LF>=40" "BL>=40" "RG>=40". The speed already shown by the robot shows for the cutting motor the turns x100 40=4000rpm, rather than for the wheel motors they are the turns per minute of the external wheel.

During the modulation the turns of the blade motor decrease up to about 29-30.

- Different values indicate failure problems, errors with the encoder (pulse control card) or broken “F1” fuse in the Mother Board

Should the wheel motors register a high current absorption, the wheel motor speed will be brought back to 0% in few seconds.

Service Menu “Battery Type”

This menu is used to set the type of battery present in the robot. In case of battery change, set the right parameter.

DO NOT INSTALL DIFFERENT TYPES OF BATTERIES IN THE SAME ROBOT.

In order to verify the correct type of battery is installed, it is necessary to check if one of the following values is displayed:

In case of Lithium Type “A” it is displayed: Battery 2750 A.

In case of Lithium Type “B” it is displayed: Battery 2750 B.



Service Menu “Test Tilt”

This menu allows to check the right working of the inclinometer. If the sensor does not work properly, the blade is not activated and then the display shows the “**Tilt error**” message.

The display shows the “Pitch” and “Roll” values in degrees that refer to the inclination of the two axes of the robot compared to the horizontal plan. Every time the robot goes into the recharging base, it resets the reference of the two terrestrial axes of the sensor. The horizontal plan of the robot will be the new reference parameter. When the values are being checked, it is necessary to place the robot in a horizontal plan without lifting the wheels. The parameters must be near 0 of a few units. The ENTER key allows the reset and zeroing the values.

Service Menu “Test Bump”

This menu allows you to check the bump sensor is properly working.

Once entered the submenu, 3 values appear. The first value indicates the left bump sensor. The second one indicates the central bump sensor and the third one is the bump sensor on the left. Every time the sensor is activated, the counter increases. On the robots equipped with mechanical bump detectors only one value is shown, referred to both the microswitches.

Service Menu “Blackout”

This menu allows to set the robot functioning when it loses the signal synchronism.

“STOP”. Once the signal is lost, the robot stops displaying “Blackout – SIG04”

“RESTART”. Once the signal is lost, the robot tries to recover it. If when turning on itself, it does not find any bump or wire, it starts working regularly. Otherwise it stops for safety reason.

In case of swimming-pools inside or adjacent the installations, we advice to set the parameter on “STOP”

Service Menu “Border Blade”

This option allows you to switch off the cutting disc during the wire following. It can be helpful whenever there are strong signal disturbs and the robot can not find the perimeter wire while looking for the charger.

- OFF- it disables the cutting disc
- ON- it enables the cutting disc (default setting up).

Errors displayed by the robot and related causes

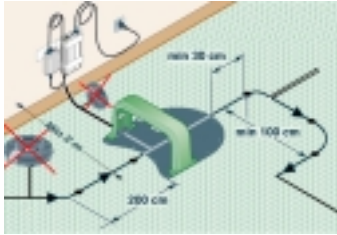
Errors list

<p>BUS Error</p>	<p>The Bus Error shows a communication problem between the motherboard and the peripheral devices. The problem can occur as follows:</p> <ul style="list-style-type: none"> • During the working time, the robot displays the message for 1 sec. then it disappears immediately and the robot keeps working. In this case, it is only a warning and you should do nothing. • Robot just switched on. In this case, it means a faulty peripheral device is giving problems to the 12V of the motherboard. The first thing to do is to check the fuse F1, then to identify the faulty device, it is necessary to detach every single part (motors, sinusoidal receiver, Bluetooth, compass and alarm). <ul style="list-style-type: none"> ○ Try to switch on the robot. If the problem persists, it means the motherboard or the display card is damaged. ○ Connect a peripheral device at a time, trying each time to switch on the robot and check the problem. • As soon as the robot gets out of the base, the communication with the display starts. If the problem occurs now, maybe there is a bad flat connection between motherboard and display, or maybe the display or the motherboard is broken. • Occasionally. During the working time, the robot stops displaying “BUS ERROR”. In this case, the best thing is to test the robot detaching the compass flat and the alarm, in order to check if the problem is with one of the two peripheral devices.
<p>“Blackout”</p> <p>“Problems in detecting the signal”</p> <p>“Not regular Robot movements such as, for example, moving forward for 1 meter, coming back, moving again forward, again backwards”</p>	<p>In the statistics menu there are three different values which point out how serious is the problem. The most serious is the third one, which tells you how many times the robot stopped with this error.</p> <p>Robot can stops working for 4 different reasons:</p> <ul style="list-style-type: none"> • SIG01: Robot loses signal while following a straight line of wire; when the signal got back robot, it did not find the wire on the left and it stopped for safety reason. • SIG02 : Robot lost the signal while it meets the wire on curve and it stops for safety reason. • SIG03 : Robot lost the signal during normal working; when signal got back, the robot was next to wire and stopped working for safety reason. • SIG04 : Robot lost the signal without trying to recover it, gave the error message because in the service menu the parameter “Blackout” is set on STOP <p>Possible reasons:</p> <ul style="list-style-type: none"> - The power supplier goes under protection during the hottest hours. Should that be the case, space the transmitter and install the charger and the transmitter in an aired seat. - Flowerbeds not correctly made (clockwise). You can easily find out the error because the problem usually occurs next to the flowerbeds and the robot does not recognize its wire about 30cm before. - Excessive perimeter cable length (see the explanation under the transmitter) . You can solve this problem, by installing the signal amplifier. - Damaged perimeter wire, which is going to break. Check the Ohm and the impedance with a tester, as shown in the section “Looking for the perimeter wire interruption”. - Coil inside the robot, which is come off. Disassemble the front part and check. - Especially in case of not regular movements, the cause is a signal attenuation. It is important to check the perimeter cable, estimate if

	<p>it is necessary to install the signal amplifier and eventually try to substitute the coil and sinus receiver.</p> <ul style="list-style-type: none"> - If the problem occurs near a footpath it can be caused by the cement. Try to place the wire at 10-15 cm from the border. <p>Correct parameters in wire impedance to be measured on the white connector which reaches the transmitter. (Pin 3 e 4) :</p> <ul style="list-style-type: none"> ○ 200 meters cable 2,8 ohm ○ 400 meters cable 5,6 ohm ○ 600 meters cable 8,4 ohm
<p>“Out of Border”</p>	<p>Possible reasons:</p> <ul style="list-style-type: none"> - The transformer reaches the temperature protection during the hottest hours. In this case, move the transmitter and install the recharging base in an aired place. - Excessive slope. The solutions are: the lithium battery and hooked spikes or hooked wheels. - Troubles with wheel motors (Encoder). - Blocked crashes or not well working. Try to make the robot drive off again and check it after a crash. Try also to make the robot drive off with the option “NO perimeter” and the raised wheels, then check the robot does not step back as when it perceives the crash.
<p>No signal</p>	<ul style="list-style-type: none"> - Faulty transformer - Transformer in heat protection - Really broken cable - Detached coil in the robot - Broken receiver - Broken wires under the recharging base - Detached white connector <p>Transmitter led meanings</p> <p>Flashing Green/Yellow : Perimeter Ok. Steady Green : The perimeter is interrupted or not connected. Steady Yellow : Initial reset of about 5 seconds. Flashing Red : Dip-Switch configuration is wrong.. Steady Red : Robot recharging. Take off Robot from the recharging base and check again. Or disable the Dip-Switch of recharge control. Led out : Battery Charger not connected, faulty fuse of the transmitter, broken transmitter.</p> <p>Tests to be made: Take off the battery charger for 5 minutes and try again. Try to make a little jumper near the recharging base. Then check the transmitter led.</p> <p>IF THE FAILURE PERSISTS, CHECK THE ENHANCED SESSION FOR FAILURES RESEARCH. LOOK FOR INFO ABOUT WHAT TO DO IN CASE THE PERIMETER CABLE IS BROKEN.</p>
<ul style="list-style-type: none"> • “Failed Charge” • Entrance errors in the recharging base • The robot enters the base and comes off soon after • The robot is on in the recharging base and it displays “PAUSE” 	<p>Check:</p> <ul style="list-style-type: none"> - The contacts of the charging nuts with a tester. - Clean the plates and the charging nuts. - Check there are no steps which may obstruct the entering of the robot. Check also that the perimeter wire is well aligned and on the surface. - Check the white connector to the transmitter. If there are some burn signs, it means there is a bad contact. Check the contact and the wire under the base. - Oxidized wires under the base. Check every single wire, which

- connect the transmitter to the base up to the recharging springs.
- When the robot is not in the docking station, check the plates tension with a tester. For the Lithium should be 29,3V.
- When the robot is switched on CHARGING in its docking station, check with a tester the tension of the plates and of the charging nuts. The tension should be the same. If it is different, maybe the plates or the nuts are dirty. If the tension is the same, check also the batteries tension. It should be the same. If it is different, maybe the problem is inside the micro switches/charging wiring group.

“Low battery “ and to short working Time & Charging lithium problem



Should the robots not work for a sufficient time, please check the following things:

First of all, before checking the robot, make the following modifications and repeat the working cycle.

- Disable the self-programming in the user's menu
- Clean the blade from grass remains
- Clean and check the plates and recharging plates.
- Have the robot recharged all the night long and check the first working cycle.
- Check the cutting motor speed that must reach at least 16 RPM when the batteries are totally charged, there are no cutting efforts and the robot is not, for sure, under modulation mode.

These tests make the robot reach a normal working condition. If the problem is not solved, please do as follows:

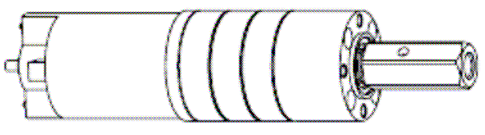
- If the robot has 2, 3 or 4 lithium batteries make the following test. Try to turn on the robot by connecting one only battery at a time. This permits to check if both the batteries are well working. If one of them is not working, check the internal fuse; otherwise get in touch with our service office in ZCS.
- Control visually or with a tester the contact from the recharging nuts up to the wiring inside the robot in order to load the batteries.

If the problem is not solved it is necessary to remove the body and transparent protection out from the robot. Take out the covering from the recharging base as well. Turn on the robot when it is in the recharging base and put it under pause mode. After 3 hours make the following tests by using a digital tester device:

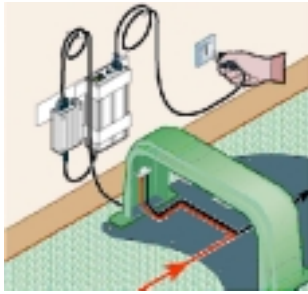
- Measure the current tension at the outgoing point of the battery charger (white connector - outgoing point 1,2). It must be 29,3-29,5
- Measure the current tensions of the recharging plates. It must be 29,3-29,5 otherwise the problem is with cabling under the recharging base or with the grey cable from the battery charger to the transmitter.
- Measure the current tension of the batteries. It must be 29,0-29,5. Otherwise the problem is with the internal cable of the micro switch
- If the previous tests are correct, check what the display of Ambrogio shows. It must show at least Battery 2900. Otherwise the problem is with the voltmeter of the mother board.

If all these tests do not identify the problem, unfortunately it is necessary to make a step check with the following items that affect the recharge and working time.

- Battery Charger
- Recharging Base (Under base cabling + Plates)
- Charging Cabling (Bump group)
- Robot cabling
- Mother Board
- Battery
- Cutting Motor
- Blade

<p>Lithium Batteries. Reference values.</p>	<p>When the display shows “battery L”</p> <ul style="list-style-type: none"> - 2200 the mother board turns off. - 2340 Battery Type “A” - it turns off the blade - 2390 Battery Type “A” – it goes to the recharging base - 2480 Battery Type “B” - it turns off the blade - 2520 Battery Type “B” - it goes to the recharging base - 2930 Tension of stabilization. It is the recharging value of the battery. During the recharge the battery reaches about 2990 and then goes down again to 2930. During the fast recharge phase the transformer led shows the red color fixed.
<p>E01 – E02 Motor Error</p> 	<p>The damage can be in the:</p> <ul style="list-style-type: none"> - Motor - Encoder - Wasted brushes (replace the brushes) - Mother board drive - Broken “F1” fuse of the mother board - Possible grass heap between the wheel and the body.
<p>“E03-Blade” Blade motor error</p>	<p>The damage can be in :</p> <ul style="list-style-type: none"> - After hitting a stone - Burnt motor - Encoder - Wasted brushes (replace the brushes) - Bearing - Mother board relay - Broken “F1” fuse of the mother board - Motor cables or green connector cable may be broken or detached because of the BLADE vibration.
<p>Blade motor encoder not working The robot is working but the speed is not displayed</p>	<p>The failure is probably in one of the following components:</p> <ul style="list-style-type: none"> - Blade motor encoder - IMPORTANT: set the double magnet - Wiring - Mother board F1 fuse - Mother board <p>First reverse the wiring from the motor side. Connect the wiring of a wheel motor to the blade motor; try to start the wheels from the service menu. If the speed of the wheel motor is correctly displayed, it means that blade motor encoder is working. Then try to connect the wheel motor to the blade motor wiring, try to start the blade from the service menu. If the blade speed is correctly displayed, it means that both the mother board and the wiring are working.</p> <p>These tests let you locate the broken component, by ruling out the others. Check also the mother board F1 fuse.</p> <p>Another solution is to replace the 3 pieces listed.</p>
<p>High grass</p>	<ul style="list-style-type: none"> - Really high grass - Material that blocks the shaft - Blocked bearing - Wasted brushes - Faulty motor - Encoder

“Blocked”.	When the robot does not perceive the cable or a crash for 5 minutes, it tries to turn by 90° three times consecutively then it stops and displays “Blocked”. Generally, it happens when the robot is held up into a hole or if the wheels are loose.
Bump error	Blocked crash <ul style="list-style-type: none"> - Check the correct positioning of the covering - From the service menu check which bump group is damaged - Check inside the bump group that a spring has not come off - Check the cabling properly inserted in the right display connector
Safety on the handle not working	In case the safety blade sensor does not work, check the following points: <ul style="list-style-type: none"> - User service menu. Check it is enabled. - Turn it on and off. - Control the wiring is well connected to handle. - Verify link from display to handle with a tester. - Verify with debug the obtained values
“Clock Error”	<ul style="list-style-type: none"> - If the robot does not correctly upgrade the date and the time, it is necessary to replace the mother board.
Sync Error	The error message “sync error” is displayed only in robots which manage the sinusoidal signal. In that case, the message shows that the sinusoidal receiver is not recognized. The reasons may be the following: <ul style="list-style-type: none"> - The sinusoidal receiver is not correctly inserted. Any remove or insertion operation should be done with the batteries unplugged. - Broken F1 fuse in the mother board - Broken sinusoidal receiver - Faulty mother board
“High Battery”	<ul style="list-style-type: none"> - Should the robot display too many errors, it is necessary to check the output tension of the charger. If it is correct, maybe there is a failure in the mother board Voltmeter. As a result, you should replace the mother board.
The Robot switches off	Check the following things: <ul style="list-style-type: none"> - Fuses connection is not good. Take them off, clean and tighten them. Above all fuse F3. - Control the battery wiring. - Motherboard with a faulty relè and bulges. White RL1 near to connectors wheel motors. - Keyboard with key ‘off’ in short circuit. - Display with moisture on the keyboard connector. - Control the battery. See technical advanced information
Research of the perimeter wire interruption	If the perimeter is interrupted and the Green led is fixed, you have to perform the following tests: <ul style="list-style-type: none"> - Check the fuse inside the transmitter and eventually replace it. - Check the ohms of the perimeter wire with a tester. Then check the impedance disconnecting the white connector (A) from the 6-pin transmitter (+Charger, -Charger, Perimeter, Perimeter, Not Used, Not Used), check the central pins. The impedance should be under 20 ohm, otherwise the interruption may be under the base or on the perimeter. It is then necessary to check the impedance by disconnecting the



perimeter wire from the red and black cable in the base (B). If even in this case the impedance is too high, it means that the perimeter is really interrupted. Otherwise the interruption is under the base. Approximately the impedance should be as here below indicated:

200 mt cable 2.8 ohm

400 mt cable 5.6 ohm

600 mt cable 8.4 ohm

If the values are much higher, it means that the junctions are not well connected.

Try then to put a tester top on the ground and the other in contact with both the perimeter wires. The value shown should be higher than 850K ohm, if not it means that the junction are not well insulated from the ground.

Research of the perimeter wire interruption with the interruption detector.

This device allows you to find the rupture of the sinusoidal perimeter wire 8Khz A channel.

During the first turn-on, the robot could switch on and remain switched on even far away from the perimeter wire. Should that be the case, release the button and press it again.

Operations to follow:

- Switch the charger on and connect the base to the transmitter
- Disconnect in the base the cable end passing under the recharging base (red connector)
- Press the button following the perimeter in clockwise direction (cable still connected)
- The interruption detector aerial should be located close to the wire (1CM)
- If the perimeter wire is buried, it is necessary to unbury it. This operation must be made every 10 mts.
- Once the interruption detector switches on, it means it receives the signal, so the perimeter is surely connected up to this point
- Should the detector not switch on, the problem is certainly between the point where it previously worked and the point where you are now
- To be sure, repeat the last two steps
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ATTENTION !!!!!. In case the interruption detector gives out a continuous beep during the whole perimeter cable, it means that the interruption is not neat. Should that be the case, you must insert in the ground the cable that you have removed from the connector in the base. With this operation, the weak signal arriving in the damaged part, goes down in the ground and should not activate the beep in the detector.

Once you find the interruption, the perimeter wire must be correctly connected once again. It is recommended to use the 3M Scotch 23 tape for the junctions.