READ THE USE AND MAINTENANCE HANDBOOK

PROGRAMMING WITH THE CONSOLE

Service of the console

The console allows to:

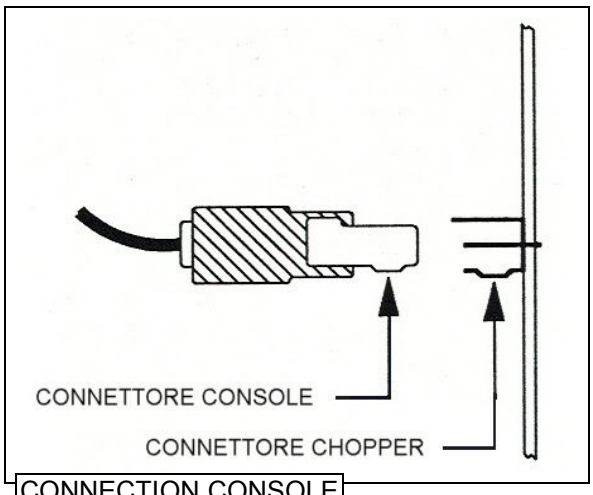
- set the chopper card for a personalised behaviour of the traction motor;
- read the type of the alarm for a correct and easy trouble shooting;
- test the different electric values and the state of the electric circuit relative to the traction.

Use of the console

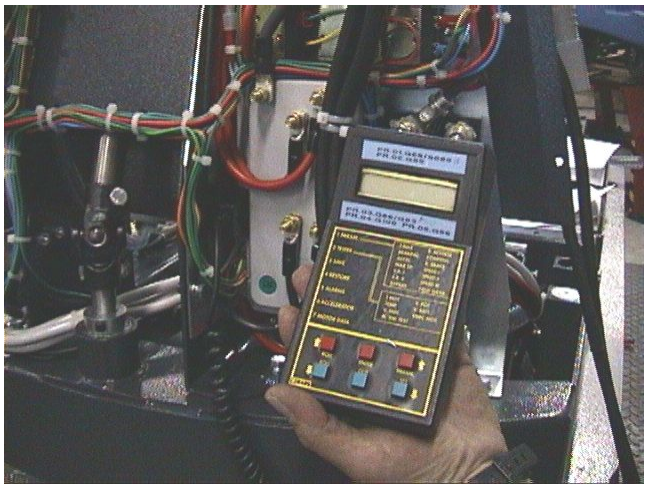
The use of this instrument is very easy and comparable to the most common electronic devices (such as mobile phones).
The sequence to follow always for the connection of the console is:

1. **SWITCH OFF THE GENERAL KEY** of the machine;
2. Disconnect the from the LED alarm connection;
3. Connect the console instead of the LED alarm connection with the connection of the chopper card. If this operation results to be difficult, check if the connector is positioned in the correct direction.
4. Switch on the general key of the machine and work with the console;
5. Quit from all the programs (main menu of the ignition) and **SWITCH OFF THE GENERAL KEY** of the machine;
6. Disconnect the console and reconnect with the LED alarm connection.

THE WRONG OPERATION SEQUENCE CAN EASILY COMPROMISE THE FUNCTIONALITY OF THE CHOPPER CARD OR OF THE CONSOLE



CONNECTION CONSOLE



Menu of the console

The following illustration indicates how to move inside the menu of the console and a short description of the menu (some menus provide only necessary information's for the correct functioning of the chopper and can not be modified without written authorisation from Comac).

For a detailed description, consult the chopper handbook. In the following we give you the basis information's for the debugging of the machine.

Press ENTER to get inside of the menu, in order to move inside of the different menus use the ROLL buttons, for changing the insert values use the button PARAM SET and OUT in order to quit one program.

For every modification of values in one menu the console will ask to confirm the modification when quitting the menu (ARE YOU SURE? YES=ENTER, NO=OUT).

HEADING: One reads the main characteristics of the console and of the chopper card: the name of the machine to which one is connected, voltage and maximum current of the chopper card, the working hours of the chopper card.

PARAMETER CHANGE: In this menu the parameters can be changed to personalise the machine. The adjustable parameters are: CUT BACK SPEED 1 (first speed limit of the machine) and CUT BACK SPEED 2 (second speed limit of the machine). **All the other parameters are chosen from Comac relative to the assembled traction motor and it is forbidden to change them without previous authorisation of Comac.**

TESTER: In this menu one can read the qualities of the electric characteristics (voltage traction motor, current motor, state of power switch = on/off).

SAVE: This permits, once the parameters have been changed, to enter the new setting in the memory of the console. Attention: in the console exists already AN parameter set MOD 00, which contain the correct configurations for the assembled traction wheel.

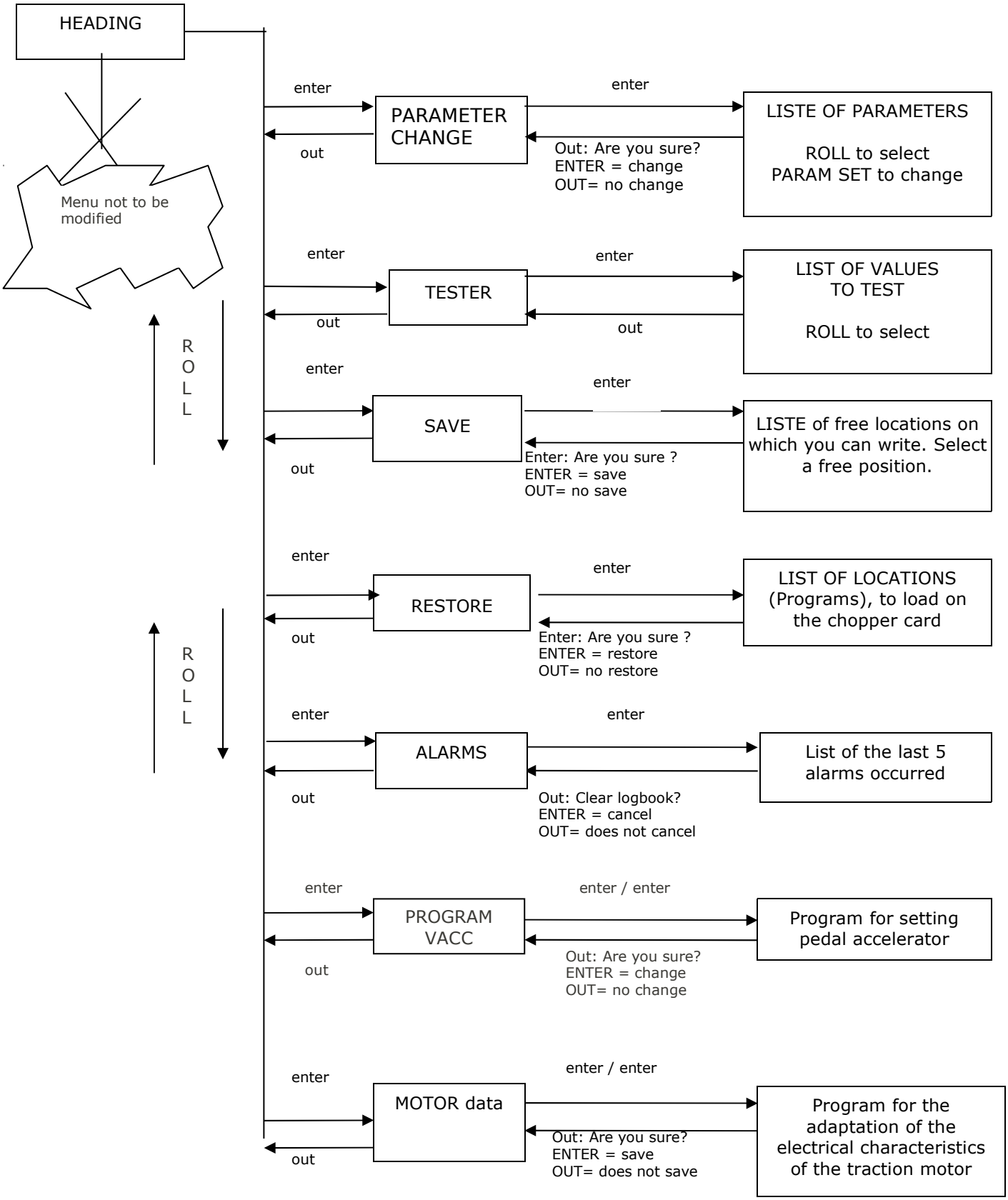
RESTORE: This permits to restore on the chopper card a parameter set, which has been entered in the console. The standard program MOD 00 refers to the standard traction wheel of the C85.

ALARMS: Indicates a list of the last five alarms occurred on the machine; according to the alarm a specific corrective action is adopted (see following paragraph).

PROGRAM VACC: This section is used to teach the chopper about the potentiometer which is assembled on the machine; **this operation must be carried out when the alarm Vacc not ok appears or when the potentiometer or the chopper card is replaced;** a wrong recognition of the potentiometer from the chopper card will block the machine.

MOTOR DATA: This section serves for the adaptation of the parameters according to the motor characteristics.

Flow chard of the console



Alarms and decoding

The chopper card visualises an anomaly on two information levels:

1. Through a red LED alarm (on the machine's instrument board), which blinks for a quantity of times relative to the type of anomaly;
2. Through a message on the console, that specifies more details on the nature of the anomaly.

Following table reports for each alarm the possible anomaly and how to proceed on the machine.

DIAGNOSIS LIST ALARMS

(for a better understanding of the list refer also to the electrical layout of the machine – drawing 22.51.29 and drawing 22.51.30)

Number of	**MESSAGE**	**NOTES**
1	**EEPROM DATA KO**	Memory failure, which contains data of the hourmeter. Actions: - Switch on and off with the main key; if the problem persist replace the chopper card.
1	**EEPROM PAR. KO**	The chopper memory has lost the parameters. Actions: - Switch on and off with the main key. If the alarm occurs again replace the chopper. If the alarm does not occur any more, reprogram the chopper (the memorised dates were cancelled and replaced by default dates).
1	**EEPROM CONF. KO**	The chopper memory has lost special configuration dates. Actions: - Reprogram the chopper (with reference to the instructions of the console); - Switch on and off with the main key. If the alarm occur again replace the chopper card. If the alarm does not occur any more reprogram the chopper (the memorised dates were cancelled and replaced by default dates).
1	**EEPROM OFF-LINE**	The chopper-memory has lost the setting dates with reference to the hourmeter, the memorised alarms and the saved parameters. Actions: - Switch off and on with the key. If the problem persists replace the chopper.

Number of	**MESSAGE**	**NOTES**

1	**WATCH-DOG**	**Test in resting or working conditions: this is an internal self-diagnosis of the chopper** Self-diagnosis of the chopper under resting or working conditions has registrated an irregularity. Possible causes: - The current sensor inside of the chopper is damaged; - The logic of the chopper card is damaged Actions: - Replace the chopper card.
2	**INCORRECT START**	Incorrect starting sequence. Possible causes: - Error in the sequence made by the operator; - The pedal microswitch and/or drive-selection microswitch are sticking; - Wiring not correct. Actions: - Check, that the starting sequence was carried out as follows: ▪ Sit down on the machine and close the seat-microswitch ▪ Switch on the general key ▪ Select gear (forward/backward) ▪ Push the acceleration pedal - Check, if the control microswitch n° 43 or the gear manipulator has not any sticking contacts and works exactly; - Check the continuity in the circuit between pedal-microswitch, chopper and gear selector; - Check the continuity in the circuit between seat-microswitch and chopper (point A3 and A8 of the choppers); - If you have not found any irregularities and the problem persists, replace the chopper card.
3	**NO FULL COND.**	The complete management is tested and results that VMN is under one third of the battery voltage. Possible causes: - Something does not work within the examined circuit; - The traction is blocked. Actions: - Check, if the negative voltage of the motor is under one third of the battery voltage; - If the failure persist replace the logic.

Number of	**MESSAGE**	**NOTES**

3	**VMN LOW**	The chopper checks, if under resting conditions (with opened remote control switches) the VMN voltage correspond to the half of the battery voltage. Contrary to this, if the value is below one third, the alarm will be released. Possible causes: - Remote control switch damaged; - Metal parts, which cause an short circuit between VMN and negative battery connection; - Short circuit in the power-Mosfet; - Sticking contacts Actions: - Check the correct wiring of the cables 9-10 and the good conditions of the connections to the holdfast of the chopper of the motor section (see also following paragraph); - Check, looking for possible short circuits; - Check if the microswitches does not have sticking contacts and work correct; - If the problem persists replace the chopper.
3	**VMN HIGH**	The chopper checks under resting conditions if the voltage VMN correspond to the half of the battery voltage. Otherwise, when two third of the voltage is exceed, the alarm will be released. Possible causes: - Wrong Wiring; - Current loss or short circuit inside the motor; - Performance of the chopper damaged; - Sticking contacts of the traction-remote control switches. Actions: - Check the right wiring on the cables 9-10 and the good conditions of the connections to the holdfasts of the motor section (see also following paragraph); - Check if there are current losses or short circuit disconnecting the VMN cable. If the alarm disappears replace the motor; - Check, if the microswitches have no sticking contacts and work correct; - If the problem persist replace the chopper card.

Number of	MESSAGE	NOTES
4	**VACC NOT OK**	The chopper checks if under resting conditions the voltage of the accelerator is under the memorised min. value with the function PROGRAM VACC. If the value exceeds 1 Volt the alarm will be released. Possible causes: - A cable of the potentiometer is interrupted; - The potentiometer is not connected; - The potentiometer is damaged. Actions: - Check the continuity of the connection between potentiometer, accelerator, and chopper; - Reprogram the chopper with PROGRAM VACC (see paragraph adjustments and inspections); - Check the functionality of the potentiometer (can be damaged) and if necessary replace this part (afterward reprogram the chopper).
5	**HIGH CURRENT**	The chopper tests under resting conditions with opened remote control switches, if the current signal is under 50 A. Contrary appears the alarm and the machine will be blocked. Possible causes: - The current sensor does not work; - The logic is damaged. Actions: - Replace the chopper.
5	**I=0 EVER**	The chopper checks if during the drive the current exceed a minimal value. Contrary appears this alarm and the machine will be blocked. Possible causes: - Wrong wiring between traction unit and chopper; - The motor resistance is to high, because of an failure on the motor; - Damaged current sensor. Actions: - Check the right wiring of the motor cables to the chopper (it is possible, that the rotor is connected to the holdfast +B of the chopper, instead to holdfast 1); - Replace the motor; - If the problem persists replace the chopper.

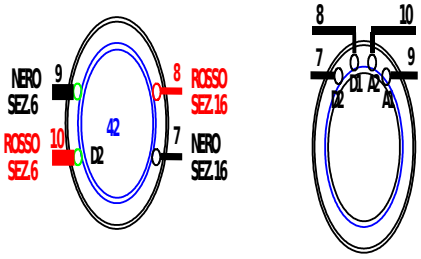
Number of	MESSAGE	NOTES
6	**PEDAL WIRE KO**	The potentiometer does not receive current, because of an interruption of one of the two current supply cables. Possible causes: - Loosen red cable which must be connected to PPOT (A14); - Loosen black cable which must be connected to NPOT (A12); - Interrupted resistance of the potentiometer; - Potentiometer overloaded. Actions: - Check the connections to the chopper; - Replace the potentiometer.
7	**TEMPERATURE**	The chopper works with a temperature under 76°. If the will is exceeded, the max. current will be reduced until the value zero will be achieved at a temperature of 86°. Possible causes: - If the alarm occur at environment temperature (±20°): ▪ Malfunction of the chopper; ▪ Machine blocked through the brakes; ▪ Thermal sensor damaged or loosened; ▪ Interrupted connections; ▪ Damaged chopper; - Stressing working conditions with high environment temperature; - Insufficient heat derivation. Actions: - Check the thermal sensor inside the chopper; - Check the brakes of the machine; - Check the connections to the motor; - Let the chopper in dormant state and let it cool down; - Check if the nuts are fixed and the right installation; - If the problem persists replace the chopper.

8	**DRIVER 1 KO**	The voltage to the connection NT1 (A11) does not correspond to the scheduled value. Possible causes: - Double remote control switch damaged; - Loosened cable wiring to the connection NT1; - Short circuit MOSFET in the chopper. Actions: - Replace the double remote control switch; - Check the connections; - Replace the chopper.
8	**DRIVER 1 SIC KO**	Overloaded main remote control switch connected to NT1 (A11). Possible causes: - Short circuit in the cable wiring to NT1; - Damaged remote control switch. Actions: - Check the connections; - Replace the remote control switch.
8	**DRIVER 2 KO**	The voltage to the connection NT2 (A4) does not correspond to the scheduled value. Possible causes: - Double remote control switch forward gear damaged; - Loosened cables to connection NT2; - Short circuit MOSFET inside chopper. Actions: - Replace double remote control switch; - Check the connections; - Replace the chopper.
8	**DRIVER 2 SIC KO**	Overloaded main remote control switch connected to NT2 (A4). Possible causes: - Short circuit in the cable connections to NT2; - Damaged remote control switch. Actions: - Check the connections; - Replace remote control switch.

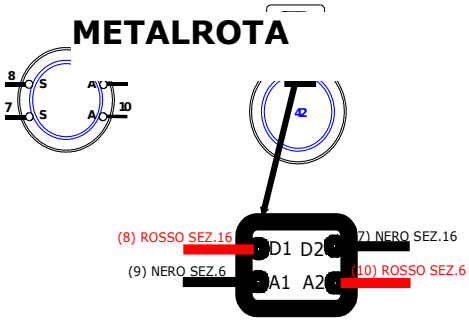
8	**CONTACTOR OPEN**	One or both remote control switches are not closed, when the traction is activated. The test verifies the VMN-signal. Possible causes: - Dirt, Dust or anything else does prevent a good connection to the remote control switch; - Motor-Isolation or interrupted contacts; - Remote control switch damaged or overloaded; - Damaged chopper. Actions: - Clean the contacts with compressed air and if necessary scrub off the dirt slightly; - Check wiring and connections to the remote control switch – positive A4 (NT2) and A11 (NT1); - Check the motor wiring and replace if necessary; - Replace the chopper.
Number of	**MESSAGE**	**NOTES**
PERMANENT BLINK SIGNAL	**BATTERY**	The voltage to the chopper is fallen under 60% of the scheduled value. The machine will be blocked. Possible cause: - The battery is discharged. Actions: - Check the charge level of the batteries; - Try to restart activating the traction.
PERMANENT LIGHTED UP	**FORW BACK**	This test is carried out permanently and gives an alarm, when the two gears are activated simultaneously. Possible causes: - Wrong wiring; - Sticking gear-micro; - Wrong operation. Actions: - Check if the control-microswitch n° 43 and the manipulator do not have any sticking contacts and work correct; - Check the right wiring between traction pedal, manipulator and seat-microswitch; - If the failure is not solved replace the chopper.

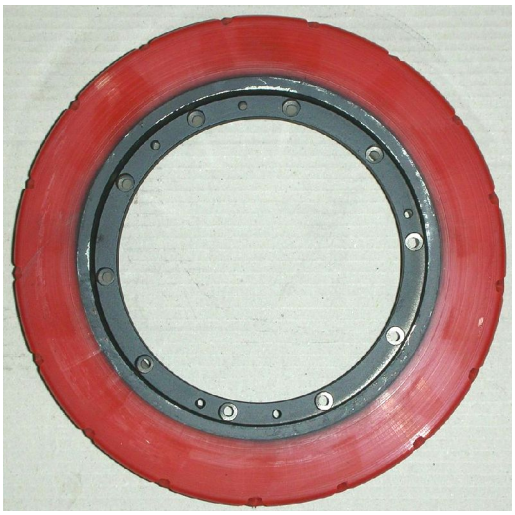
Adjustments and Calibration for the traction units

CIMA



METALROTA





ATTENTION: If the movement direction is wrong invert the cables 7 and 8.

CHOPPER ZAPIMOS HO 200A

PARAMETER		PROGRAM 00
ACCELERATION DELAY		**4**
BRAKING		**3**
RELEASE BRAKING		**7**
CUTBACK SPEED 1		**3**
CUTBACK SPEED 2		**6**
COMPENSATION		**9**
CREEP SPEED		**1**
TRACTION IMAX		**3**
MAX SPEED FORWARD		**9**
MAX SPEED BACKWARD		**7**
SPEED LIMIT BRAKING		**3**

Calibration with console

Connection with the console
1. Check, if all switches are switched off. 2. Lift the front wheel on a security stand. 3. Remove the connection of the LED alarm from the chopper. 4. Connect the console with the corresponding connection with **key in off-position**. 5. Turn the key and switch the machine on. 6. After switching on the machine appears the message **"HO AUTOSTOP V1.0 36V 200A 00000"** or **"*Alarm* abcdef …"**. 7. Press onto the seat. 8. In any case Push ENTER in order to get access to the main menu. **For a more detailed description consult also the manual and the function description of the chopper Zapi.**

Chopper programming	**Display Console**
1. Press *ENTER* to get into the main menu. 2. It appears the menu: "PARAMETER CHANGE" = CHANGE THE PARAMETERS. 3. Press ENTER and check, scrolling with ROLL the single values, if they correspond to the above mentioned values.	*** MAIN MENU *** **PARAMETER CHANGE**
4. At the end press *OUT* and confirm with *ENTER* (after the request "ARE YOU SURE?") if you changed parameters (Use the button PARAM SET on the console). ATTENTION: THE SECURITY PARAMETERS, AS ACCELERATION, BRAKING, ETC. CAN NOT BE MODIFIED **ONLY THE SPEED REDUCTIONS CAN BE MODIFIED (CUTBACK SPEED 1 AND 2).**	
5. Select with *ROLL* "RESTORE PARAM." (in case of memory losses of the chopper) = REPROGRAMMING THE CHOPPER-PARAMETER:	*** MAIN MENU *** **RESTORE PARAM.**

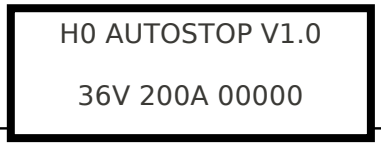
6. Press *ENTER*.	
7. It appears the Code of Progr. 00 :	**SELECT: Mod. 00 HO AUTOSTOP**
8. Press *ENTER* for confirmation and load the program.	
9. It appears the confirmation-request *ENTER* = YES, *OUT*= NO:	**ARE YOU SURE? YES=ENTER NO=OUT**
10. Press *ENTER* in order to confirm the loading process.	
11. The single parameters, which are in stage of loading, appear:	**STORING ACCELER. DELAY**
12. At the end of the process appears the description:	*** MAIN MENU * RESTORE PARAM.**

Lign up the chopper card to the movement of the acceleration pedal	**Display Console**
1. Scroll through the list with the button *ROLL UP* to "PROGRAM VACC" and select:	*** MAIN MENU * PROGRAM VACC**
2. Press *ENTER*, in order to access to the function "PROGRAM VACC"; the current max. values corresponding to the forward and reverse gear appear:	**VACC SETTING 1,7 1,7**
3. Press *ENTER*.	
4. The chopper is now prepared to record the new min. and max. values, which will be signalised from the potentiometer:	**MIN VACC MAX 0.0 - 0.0**
5. Select the forward gear and press the pedal, take care to move the pedal slowly at the beginning of this process and to move the pedal until stop:	**MIN VACC MAX 0,3 ↓ 1,7**
6. Repeat the process for the reverse gear.	**MIN VACC MAX 0,3 ↑ 1,7**
7. Press *OUT*.	
8. It appears the confirmation request in order to load the new values:	**ARE YOU SURE? YES = ENTER NO =OUT**
9. Press ENTERS for confirmation.	

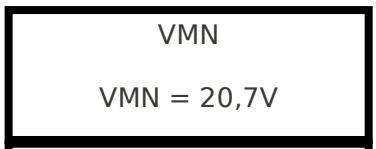
Motor Data	**Display Console**
1. Move through the list with the button *ROLL UP* or *ROLL DOWN* from " PROGRAM VACC " to " MOTOR DATA ":	* **MAIN MENU** * **MOTOR DATA**
2. Press *ENTER* to get access to the function "MOTOR DATA" = LOADING THE DATES OF THE TRACTION MOTOR. If the value „50" appears it is correct, otherwise carry out a reprogramming in order to get closer to the value „50" by pushing the brake more or less on request of the chopper.	**MOTOR DATA VALUE 50**
3. Press *ENTER* to prepare the calibration process.	
4. It appears a message to execute following process:	**BLOCK MOTOR AND INSERT FWR DIR.**
5. Block the motor and push the brake.	
6. Push the traction pedal and select the third speed.	
7. Select the **reverse gear**.	
8. Push the button *ENTER and wait for a message on the display*:	**READING MOTOR**
9. When this message appear the chopper start to carry out the calibration process (2 seconds) and the machines tends to move in the reverse direction.	
10. Check, if the value gets closer to the "50" and repeat it if necessary:	**MOTOR DATA VALUE 50**
11. Stop the process and press OUT and you will come back to the menu:	**MAIN MENU MOTOR DATA**
12. Press *OUT* in order to conclude the programming.	
13. Remove the general key.	
14. Remove the console connection from the chopper.	

Tester Function

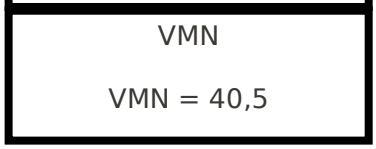
After the console connection the starting message will appear, this message tell you the chopper model, the default machine where is installed and the worked hours
Enter in TESTER submenu and with ROLL buttons scroll all the items.



Verify that **VMN** (which is the voltage on the negative output connection of the chopper, is > 30% (of the battery voltage VB).



Push the pedal till the end stroke and verify that the VMN value become similar to the battery voltage.

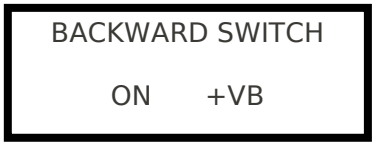


If some error is shown you the chopper replacing is needed because the power stage of the chopper is damaged.

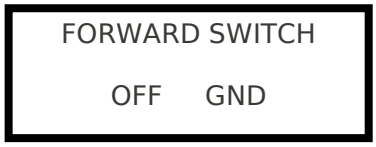
Verify the **backward direction microswitch**:

Verify the backward direction:
- Push the direction selector for backward direction;
- Push the accelerator pedal;

On the console a message like the picture one should appear.

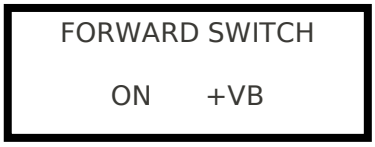


Verify the **forward direction microswitch**:



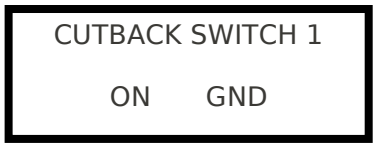
Verify the forward direction:
- Push the direction selector for forward direction;
- Push the accelerator pedal;

On the console a message like the picture one should appear.

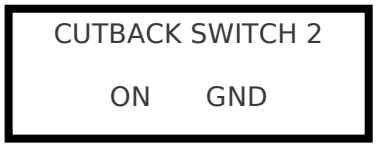


If some problem occur, verify the direction microswitch (on the pedal group) and the direction selector.
WARNING: lift up the traction wheel before doing this test.

Verify the functionallity of **cutback speed 1**.



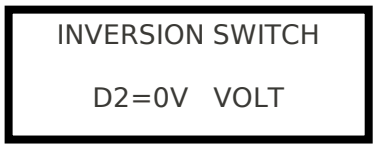
Verify the functionallity of the **cutback speed 2**.



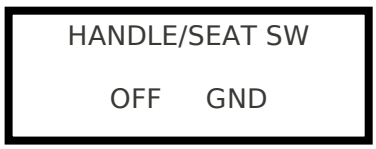
Verify that the cutback switc 1 and cutback switch 2 values correspond at the following table:

Speed	Switch 1	Switch 2
Minimun	ON GND	ON GND
Middle	OFF +VB	ON GND
Maximun	OFF +VB	OFF +VB

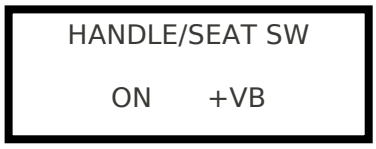
The INVERSION function is not implemented in the scrubbing machine so this function is disabled.



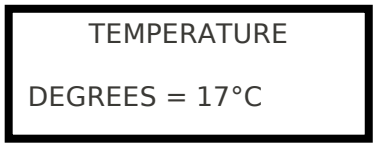
Verify the functioning of the **seat microswitch**. Usually the indication should be like the picture one.



Sit down on the seat to press the seat microswitch and verify that the message on the console become like the picture one.

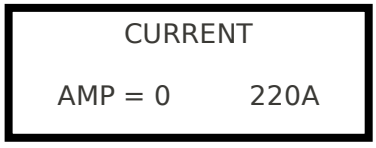


Verify the **temperature** read by the chopper card.
The temperature you can read with the console has to be equal to the environment one only if the machine, before the reading, had been turned off at at least one hour.



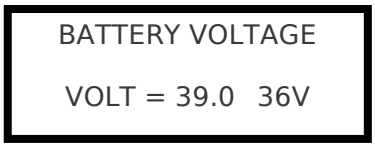
If some anomaly occur verify the tightness of the connection regarding the chopper card and the traction wheel. If the problem can't be solved replace the chopper card.

Verify the **motor current**. The first value indicates the current which is flowing on the motor, the second value (220A) indicates the maximun current that chopper card can supply. If the machine is steady the current has to be 0.



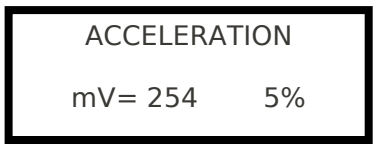
If some anomaly occur you need to verify the traction motor and in case replace the chopper card.

Verify the **battery voltage**.
Compare the voltage read by the chopper card with the one read using a voltmeter.

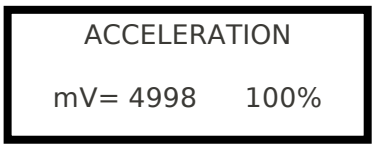


If the two values are different you have to verify the connection of the chopper card, the battery poles conditions and the battery connections cables. If the problem can't be solved the chopper card has to be replaced.

Verify the **potentiometer**:
Without pressing the accelerator pedal the console should show a message similar to the picture one.

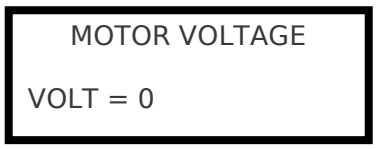


Push completely the pedal to verify the potentiometer conditions. When the pedal is totally pressed the message on the console should be like the picture one. Verify the linearity of the value increasing.

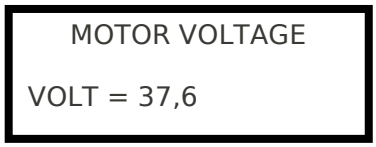


If some anomaly occur verify the connections between the chopper card and the potentiometer. If the connections are ok the potentiometer has to be changed.
To perform this kind of verify is not necessary to push the seat microswitch nor to move the direction selector.

Verify the **motor voltage**. The value shown is the value of the voltage on the motor.
If the machine is steady the motor voltage has to be null.



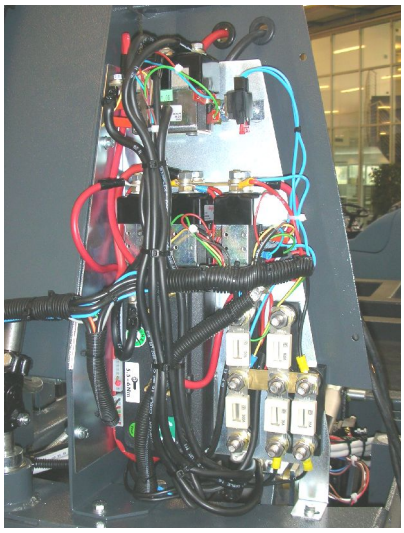
If the machine is at its maximun speed the motor voltage should be similar to the battery voltage.



If some anomalies occur verify the connections between chopper card and traction wheel, the correctness of the chopper parameters the connections of the speed selector switch.

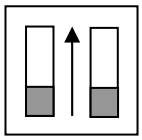
Electric harness tests

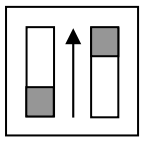
1. Remove the battery connection.
2. Check the cleanness and the attachment of battery cable connections.
3. Check the connection and the attachment of the cables: **remote control switches, fuses, motors** etc.
4. Restore the battery connection.
5. Switch the machine on with the key and check, if the red control light blinks 5 times.
6. Check of the control lights and switches:
   - Check the green control light in order to switch on the machine;
   - Check the function of the hourmeter;
   - Check the function of the horn;
   - Check the lifting – lowering function of the brush base;
   - Check the function of the manipulator forward-/reverse gear;
   - Check the function of the battery control display;
   - Check the control switch and the function of the winking light;
   - Check the function of the front and back head lights;
   - Check the right control light for the activated brake and the indicator for the oil level;
   - Check the reserve light – float solution tank;
   - Check the light for the completely lowered squeegee;
   - Check the light for the lifted brush base;
   - Check the AUT-MAN function with reference to the squeegee operation and the suction motor;
   - Check the switch and the function of the suction motor (with insert forward gear);
   - Check the switch and the function of the solenoid valve (with machine in working conditions and working brush motor);
   - Check the switch and the function of the brush motor (with machine in working conditions);
   - Check the display switch and the function of the squeegee movement;
   - Check the float of the recovery tank and that the suction motor switches off accordingly;
   - Check the function of the seat-microswitch;
   - Check forward-, reverse gear, speed reduction, acceleration and brakes;

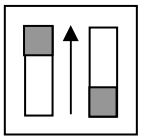


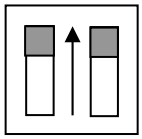
Adjustment battery check card

1. Check-up the right set-up of the battery check card. The adjustment can be performed by **microswitches**.
2. The possibles configurations are the following:

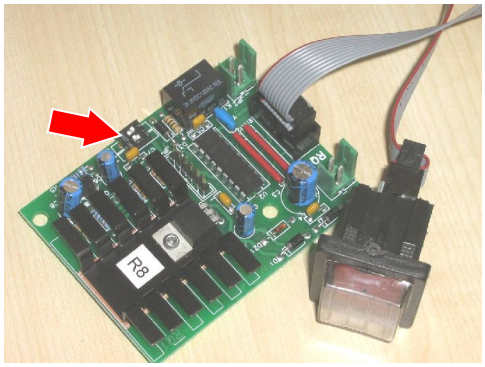

24 V Pb

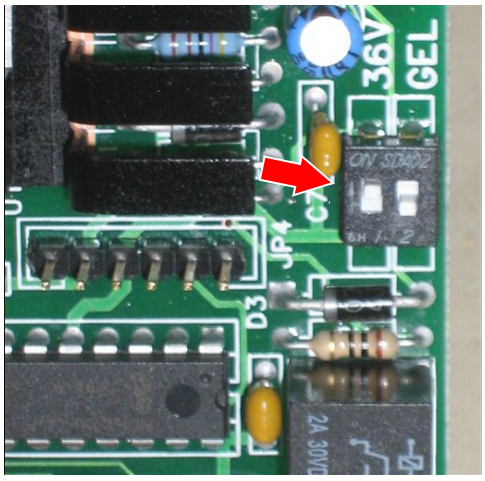

24 V Gel


36 V Pb


36 V Gel

The right configuration is one of the two below depending on the battery type.





Squeegee microswitches adjustment

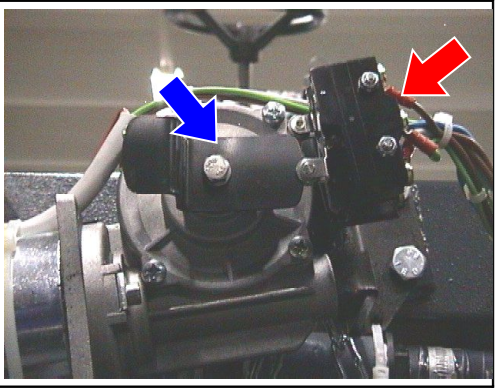
1. Loose the screw that fix the **cam** to the squeegee actuator shaft. In this way you will bypass the cam functioning

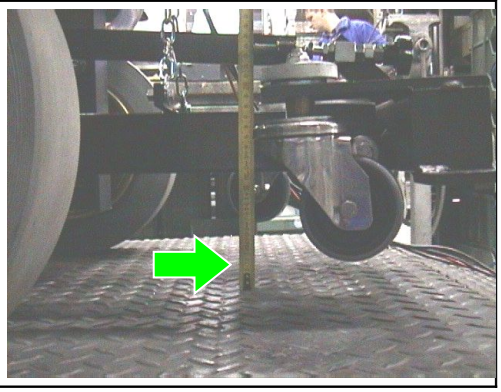
2. Lift up the squeegee assembly until the distance between the squeegee arm and the floor is about **160mm**;

3. With the squeegee lifted up rotate the cam until the lift **microswitch** switches (it's the microswitch nearest the actuator);

4. Stops the cam by its screw.

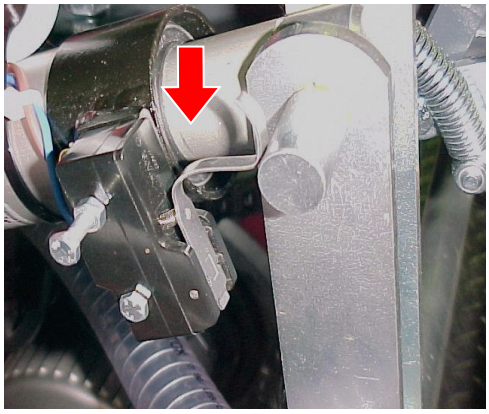
The micro that stops the squeegee in lowering will be automatically activated by the other side of the cam.

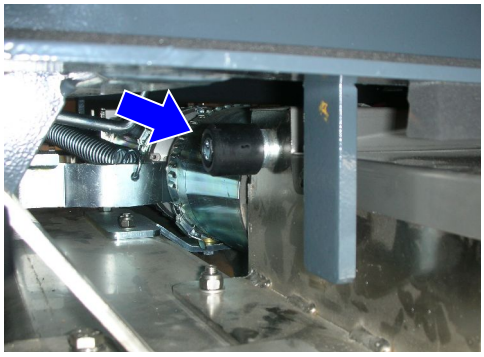




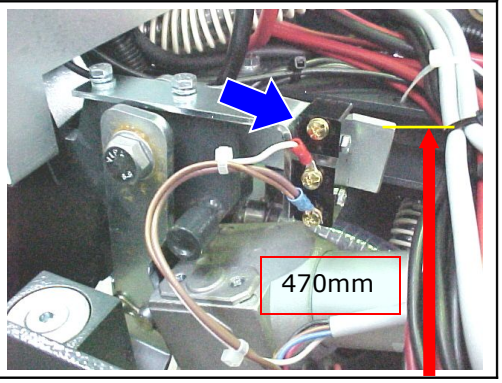
Brush assembly microswitches adjustment

1. remove the bottom plate.
2. adjust the **microswitch lever** to stop the lifting of the brush base when the **wheels** of the brush base touch the rails on the frame.





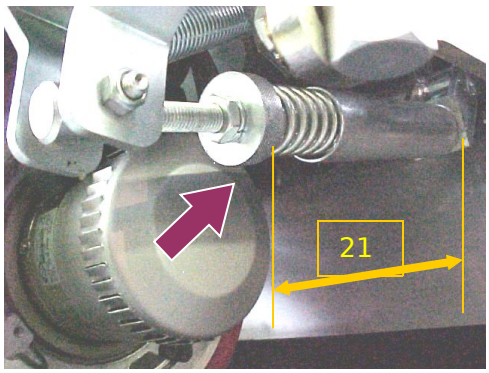
3. adjust the position of the second **microswitch** to stop the lowering when the most high edge of the arm is at **470mm** from the floor.



Adjustment of the sweeping brush assembly

1. loose the **metal ring** jam nut.
2. lower the brush assembly (with installed brushes) and adjust the length of the spring at about 210mm by the **metal ring**.
3. block the jam nut

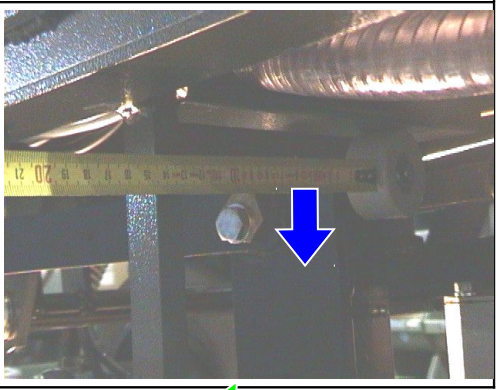
Screw the metal ring to reduce the pressure.



3. Adjust the brush assembly inclination: if necessary (so if you have a different current consumption on the two motors) andjust the inclination operating on the **eccentric bushers** that block the lower right and left arms:

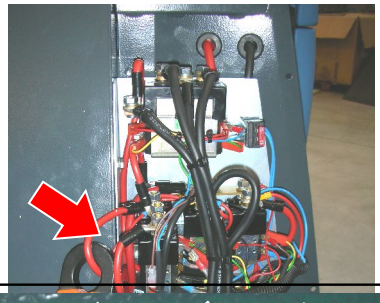
- Unscrew the jam nut;
- Loose the screws;
- Turn the eccentric brushes until the reaching of the correct adjustmen of the brush base;
- Block the screws and block the jam nut.

2. verify that the brush base can move free (about 100mm) to the center of the machine in case of incident.
3. verify the correct lowering and lifting of the brush base.

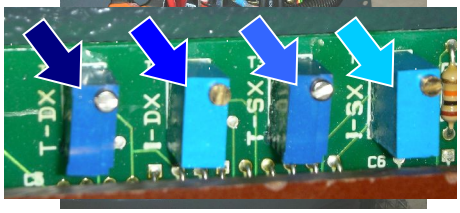


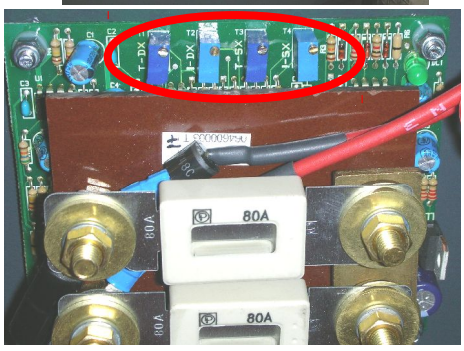
Motor control card adjustment.

1. put the **ampermeter** on the cable **n°20** (which is the brush motor supply cable). Unconnect the other motor by unconnecting the cables that supply its teleructor.
2. lower the brush assembly. The lamp on the right of the dashboard has to begin to blink when the current is about 40A, if necessary adjust the trimmer **Idx** to allow that. (to reach a 40A absorbtion you should press the brush assembly.
3. rise the brush assembly pressure until the current absorbed is about 45A. The motor has to stop itself after 15/17 blinks. Adjust the **Tdx** trimmer to obtain the required functionallity.



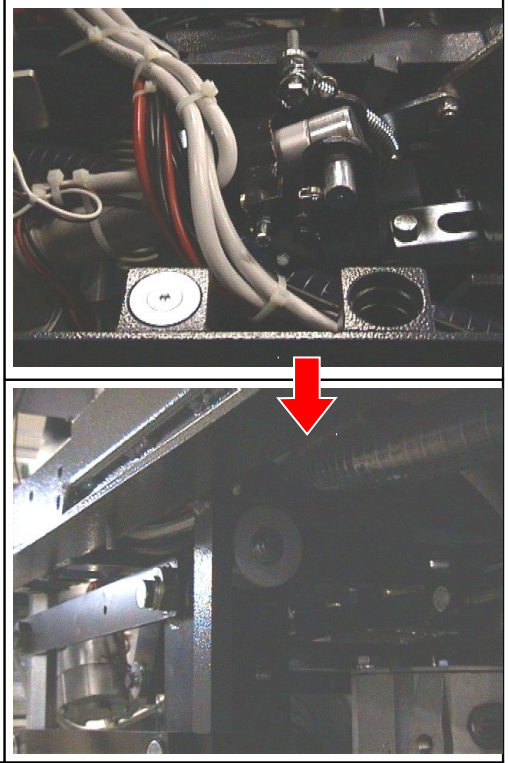
4. ripetere la procedura per il motore della spazzola anteriore che si trova sul lato sinistro del basamento mettendo la pinza amperometrica sul cavo **n20A** .
5. regolare i trimmer **Isx** per la corrente di intervento e il **Tsx** per regolare il tempo di intervento.
6. Sigillare I trimmer con una goccia di smalto.





Side movement brush assembly microswitches

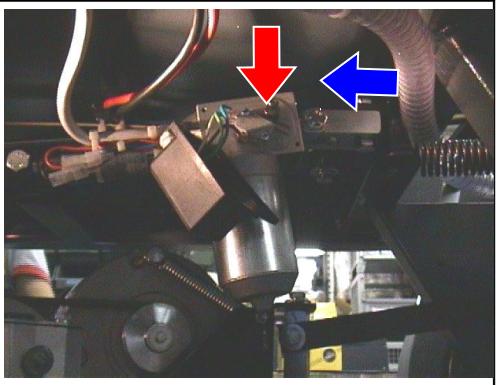
4. Adjust the **support** of the miscroswitch (which stops the brush assembly when it is lifted up) to let it stops the brush assembly when its **wheels** touch the frame.



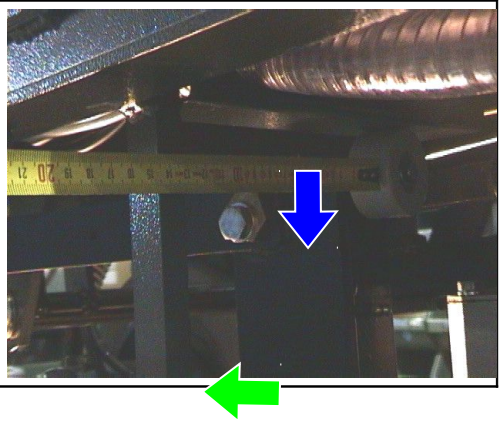
4. Adjust the **microswitches** of the side movement of the brush base which are on the actuator. The more distant to the actuator has to switch when the wheel thouch the endd stroke blade. Regulate the nearest one to have a **distance** between the wheel and the end stroke blade of about:

   for Magna 85 da 120mm a 130mm

   for Magna 100 da 100mm a 110mm

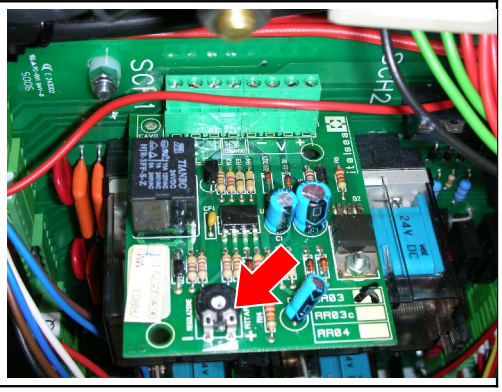


5. Check, with the brush assembly completely down of the machine, the wheel touches but is not blcked against **lateral blade**.



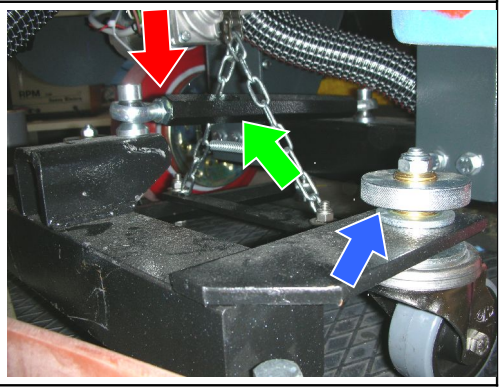
Floating card adjustment

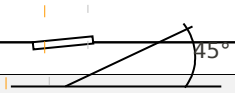
4. Turn on the suction motor and varify that, lifting up the float on the recovery tank by hand, the motor stops in about 2-3 seconds. If the time is different act on the card **trimmer** to adjust it.
5. Seal the trimmer with enamel.



Squeegee adjustment

1. Unscrew the metal **rings**.
2. Lift up completely the squeegee wheels screwing their supports.
3. Adjust the squeegee inclination rotating the **tie rod** (before you have to loose the **jam nut**). You have to inclinate the squeegee so the rubber has an inclination respect the floor equally on all its length.
4. Screw the wheels to lift up the squeegee to not let the rubber to stay pressed on the floor. The rubber has to have an inclination of about 45° respect the floor.
5. Block the jam nut and the **metal rings**.



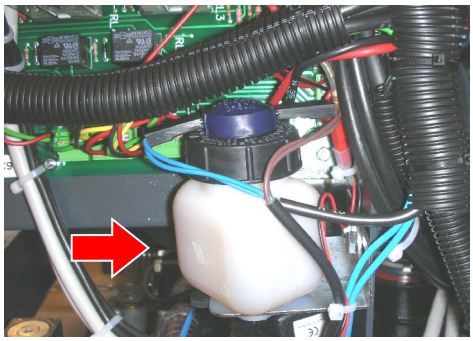


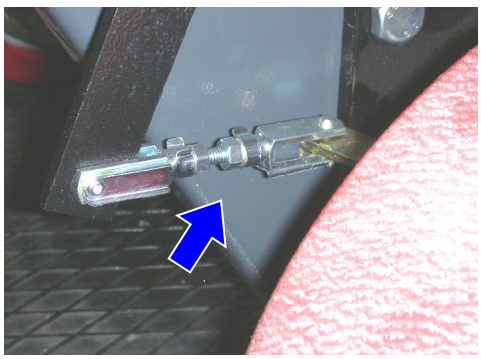
Brake adjustment

1. To reach a correct park brake pedal excursion act on the brake tie rod as follow:

- loose the jam nut and screw the tie rod in the **forks** until the pedal block the brake at two or three steps of the pedal. Block the jam nut.
- Verify the **brake oil** in its tank and if necessary fill with D.O.T.4. oil.

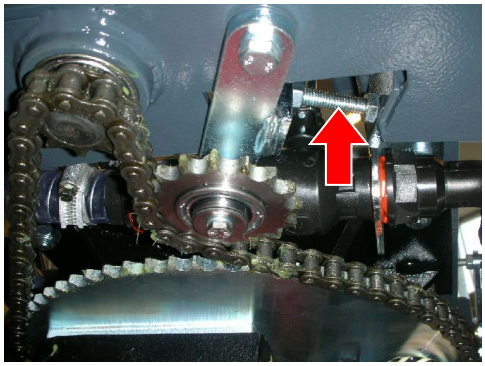
2. Verify that the wheels are not blocked and that they brake simultaneously If necessary adjust the **tie rods** and block the jam nuts.



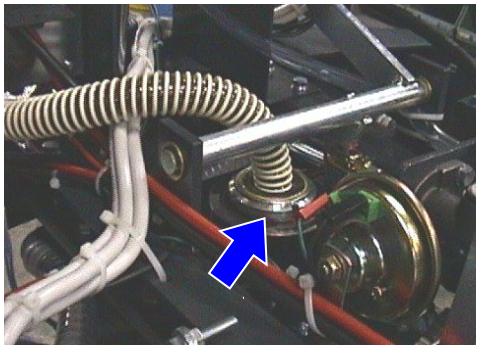


Steering wheel adjustment

1. Check that the chain has the correct tension. If necessary act as follow:
2. loose the jam nut;
3. screw the **M8 screw** to increase the tension;
4. Try to rotate the traction wheel to check its correct movement.
5. block the jam nut.

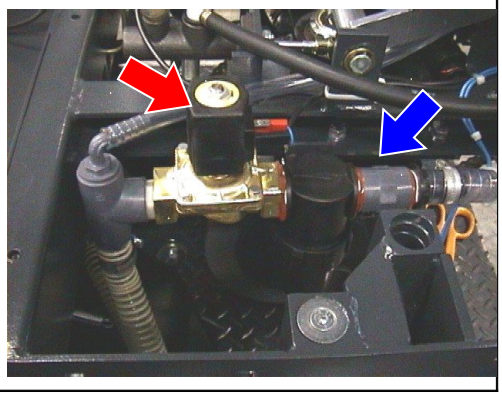


6. Verify the steering axle clearance. If necessary screw the **bush**. Verify the complete an correct movement.



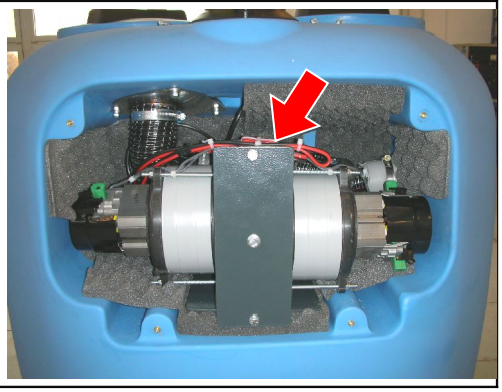
Water pipe adjustment

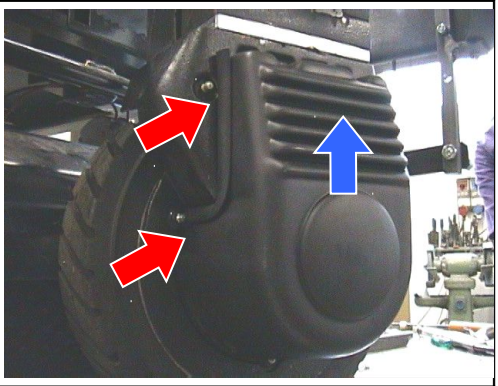
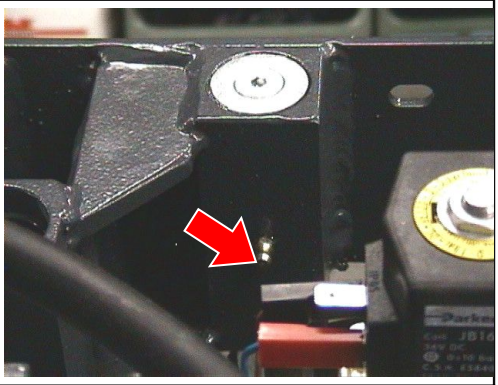
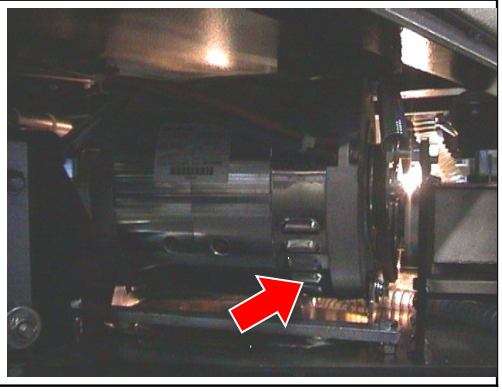
1. Veriy the cleanness and the right assembling of the **solution filter**.
2. Fill the tank by water and check that there are not leakages.
3. Verify the hoses sealing the **solenoid valve** conditions and the water cock functionallity.
7. Verify that the solution, when the cock is totally open, fall evenly on both brushes.
8. Fill the recovery tank and check that there are not leakages.
9. Check the functionallity of the exaust water hose and the exaust water plug.



Suction tests

1. Verify the cleanness and functionality of the **filter**.
2. verify the connections and the seal of the suction hose system.



Maintenance and lubrification points	
1. Clean the **filter** inside the motorwheel carter. 2. Keep the traction wheel gears librificated by the **greasers.**	
3. grease the brush assembly support **shaft**.	
4. Verify the cleanness and functionality of the carbon brush cover of the **brush motor**. 5. Verify the conditions of the motor carbon brushes.	

Function inspection of the machine

- ☐ Check the functions of the switches and the control-lights;
- ☐ Check the function of the seat microswitch;
- ☐ Check the function of the acceleration pedal;
- ☐ Check the function of the cylindrical brush unit;
- ☐ Check the functionality of the brush motors;
- ☐ Check the function of the solenoid valve;
- ☐ Check the squeegee function operating it manually or automatically;
- ☐ Check the squeegee function;
- ☐ Check the function of the emergency and parking brake;
- ☐ Check the function of the steer;
- ☐ Check the conditions of the batteries, the holdfasts and the cables;
- ☐ Check the functionality of the horn;
- ☐ Check the functionality of the headlight and the winking light.

Test the functions of the machine

- ☐ Fill the tanks with water and check if there are any leakages.
- ☐ Check the tightness of the water supply and the regularly water flow on both brushes.
- ☐ Adjust the inclination and the wheels of the squeegee and carry out a test.
- ☐ Adjust the brush pressure and the inclination of the basement and carry out a test.
- ☐ Check the marks of the cylindrical brushes on the floor, adjust them and carry out a test.
- ☐ Adjustment of the lateral bars with the knobs and carry out a test.
- ☐ Check the automatic function.
- ☐ Check the function of the seat-microswitch.
- ☐ Check the function of the adjustment lever of the seat position.
- ☐ Check the function of the selection switch for the water outlet.
- ☐ Check the function of the manipulator for the pressure adjustment of the brushes.
- ☐ Check the efficiency of the parking and emergency brake: brake with max. speed and check, if the wheels are blocked simultaneously.
- ☐ Check, that the machine, outgoing from max. speed, with full tank, after releasing the acceleration pedal, is stopped within 125-130 cm. Otherwise check again the parameter in the console again, especially “Release Braking”.
- ☐ Check the forward-, reverse gear, acceleration and brakes.

Final inspection

Check all functions: Scrubbing, suction, forward-, reverse gear and brakes.