



# **M**ECCANICA **B**ENASSI S.r.l.

## Remote-Controlled Flail Mower **NINJA**

### User Manual

#### 1a - GENERAL DESCRIPTION OF THE MACHINE AND ITS PURPOSE



The NINJA remote-controlled flail mower manufactured by **Meccanica Benassi** is a professional machine designed and built for mowing grass and short shrubs. The operator controls it by remote, following on foot at a safety distance. It is designed for professional and trained operators with the know-how and experience required to understand how to work while minimising risks and dangers.

#### 1b – USER MANUAL



When displayed, the danger symbol indicates a situation that could cause death or serious injury to the operator or exposed people.



Carefully reading and understanding this manual is a **MANDATORY** and **CRUCIAL** condition to correctly use the machine, to prevent damage, injury or death. The manual must be stored with care. It must be read and understood by any operators different than the purchaser. It must always be handed over together with machine if sold, rented, lent, outsourced, etc.

**Should it be lost, ask a copy** from your dealer or from the manufacturer themselves. It is also advisable to download a PDF copy from the website [www.benassi.it](http://www.benassi.it) so that you may consult it when the hardcopy is (temporarily) lost. If the user does not comply with the requirements in this manual, he himself will be liable for any damage to objects, people, animals or property.

It is **MANDATORY** and **ESSENTIAL** to also read and understand the rest of the manuals and documentation supplied with the machine.

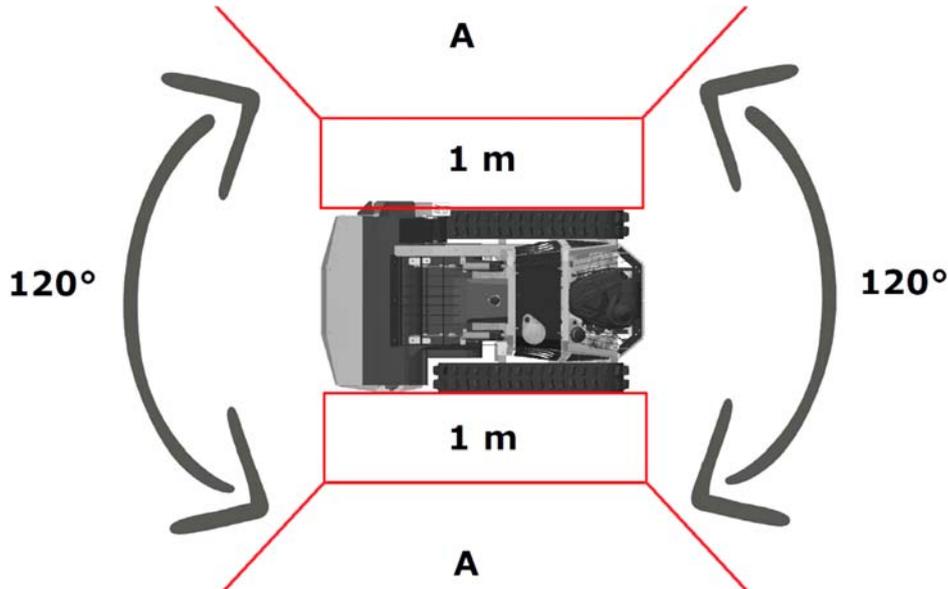
## TABLE OF CONTENTS

- 1a – GENERAL DESCRIPTION OF THE MACHINE AND ITS PURPOSE
- 1b – USER MANUAL: reading and comprehension
- 1c – INTENDED USE
- 1d – UNINTENDED, PROHIBITED, HAZARDOUS USE
- 2a – PICTOGRAMS ON THE MACHINE
- 2b – PICTOGRAMS ON THE REMOTE
- 2c – CE MARKING: position and content
- 3a – GENERAL SAFETY WARNINGS
- 3b – SPECIFIC SAFETY WARNINGS
- 3c – RESTRICTIONS FOR USE
- 3d – DANGERS AND REQUIREMENTS ON THE USE OF FUEL – ENGINE OPERATING RISKS
- 4a – MAIN PROTECTIONS
- 4b – MAIN PARTS
- 4c – DESCRIPTION OF THE REMOTE
- 4d – PACKAGING, TRANSPORT AND HANDLING IN SAFETY
- 5 – PRELIMINARY CHECKS
- 6a – SYNCHRONISATION and START-UP
- 6b – MOVEMENT
- 6c – CUTTING
- 6d – SWITCHING OFF
- 6e – RESTARTING AFTER A STOP
- 6f – MANUAL PROCEDURES IN CASE OF FAILURE
- 7a – FUEL
- 7b – LUBRICANTS
- 8 – MAINTENANCE
- 9 – STORAGE AND DISPOSAL
- 10 – DIMENSIONS AND TECHNICAL DATA
- 11 – ELECTRIC SYSTEM DIAGRAM, CAN BUS and COLOUR KEY
- 12 – FUSES
- 13 – TROUBLESHOOTING GUIDE
- DECLARATION OF CONFORMITY**



### 1c – INTENDED USE

The ONLY intended use is to mow grass and short shrubs. The machine is designed to be used by a single operator who controls it with the supplied remote. The operator must always be within the WORK ZONE, defined as areas “A” in figure below, at least 1 m from the rubber tracks. In addition to the instructions in this manual, the operator must also abide by what is prescribed in the engine and battery manuals.



Since the machine is fitted with tracks, with a low centre of gravity and an engine with dry sump lubrication, it is especially suited for sloping terrains.

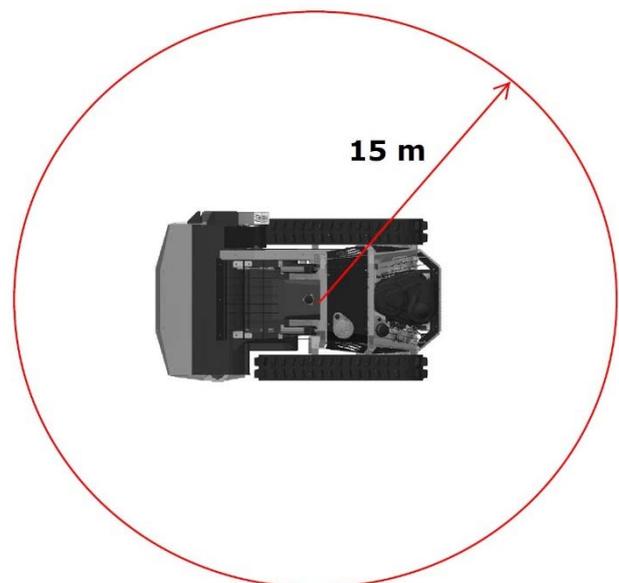
In fact the *Briggs & Stratton Vanguard EFI* engine is equipped with the *Oil Guard™* system: the engine oil is always pressurised and lubrication is assured for up to a 40° slope in continuous use and 45° slope in intermittent use.



### 1d – UNINTENDED, PROHIBITED, HAZARDOUS USE

It is prohibited to use the machine:

- indoors
- as a toy
- for towing, carrying, pushing
- for transporting objects, people, animals
- as a generic shredder for stones, wood, debris, waste, pruning, other
- for mowing on rooftops, unstable or artificial surfaces
- for driving on public roads
- in the presence of people other than the operator inside the **DANGER ZONE**, namely within 15 m in all directions, as indicated to the side. Only the operator is allowed to enter the danger zone.
- in any other condition not mentioned in the previous paragraph '*INTENDED USE*'



Any damage resulting from unintended, prohibited or dangerous use invalidates any warranty claim regarding the machine, engine, remote and hydrostatic transmissions.

## 2a – PICTOGRAMS ON THE MACHINE



- 1) Rotating parts hazard (belts below protective casings).
- 2) Prohibited to clean the machine with water jet or pressure washer. Prohibited for pacemaker bearers to come into contact with the electric parts.
- 3) "***CLEAN ENGINE SURFACE, CLEAN THE AIR FILTER BEFORE EACH USE!***"
- 4) Check the hydrostatic oil and engine oil level **before each use**.
- 5) Ignition key positions: turn clockwise to power the control units.
- 6) Battery switch positions: turn clockwise to power the wiring harness.
- 7) Reminder to grease rotor bearings every 50 hours.
- 8) "BYPASS" identifies the levers to pull to place each hydrostatic transmission in neutral (BYPASS) in case of manual/towing movement
- 9) Operating positions of the electromagnet, to release parking brake
- 10) Danger zone: 15 metres in all directions. No one other than the operator may enter this zone.
- 11) Do not stand on rotor casing. Do not insert hands into it.
- 12) Ignition hazard due to flammable fuel: no smoking! Use only unleaded gasoline and do not fill beyond the maximum allowed level. Top up the tank slowly so that it does not spill over.
- 13) Lifting or towing point
- 14) Read and understand this manual before using the machine. Objects ejection hazard. Be careful not to come into contact with rotary mechanical parts, despite being protected. Remove the ignition key and spark plug cap before any maintenance. Caution risk of inhalation of harmful exhaust gases, even outdoors (when operator is upwind). Mandatory to wear *Personal Protective Equipment* such as

earplugs, work shoes, gloves, dust mask and protective visor. Maximum allowed slope in continuous use in all directions 40° (83%). When operating the machine on a slope, the operator must stay outside its projected downhill footprint.!

**2b – PICTOGRAMS ON THE REMOTE**



ENGINE IGNITION:  
function of softkey S10



ENGINE SHUTDOWN:  
function of softkey S11



RIGHT/LEFT STEERING:  
function of left joystick J1 if moved sideways



CUTTING ENGAGEMENT:  
function of softkey S2



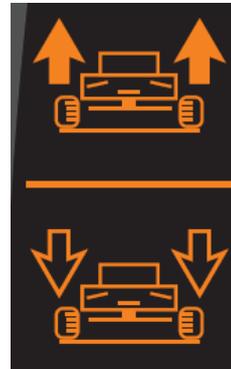
EMERGENCY STOP:  
function of button S3



MAXIMUM SPEED SETTING:  
function of potentiometer S15



FORWARD/BACKWARD DRIVE DIRECTION:  
function of right joystick J2 if moved back and forth



LIFTING OF CUTTING DECK:  
function of left joystick J1 if moved back and forth



TRACTION AUTHORISATION AND SIMULTANEOUS RELEASE OF PARKING BRAKE: function of switch S1



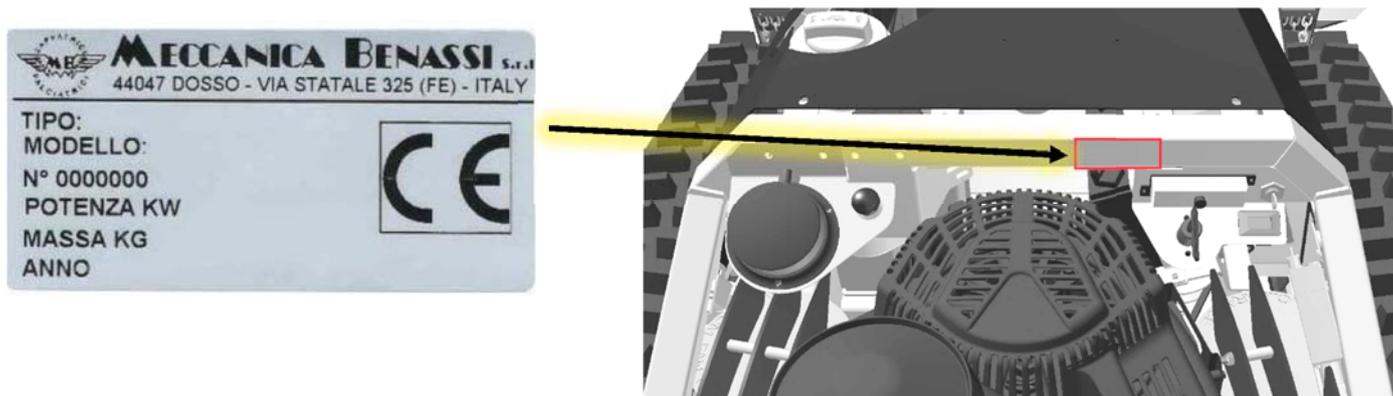
TX/RX SYNCHRONISATION:  
function of softkey S6



DRIVE DIRECTION CORRECTION (DRIFT):  
function of potentiometer S14

All of the requirements and procedures summarised by the pictograms, both on the machine and remote, are explained in detail further on in this manual.

## 2c – CE MARKING



The CE plate is applied on the top crossbar, as shown in the figure. It has the following information:

- Name and address of manufacturer
- Net engine power
- Machine type
- Machine dry weight
- Machine model
- Year of production
- Serial number



## 3a – GENERAL SAFETY WARNINGS

– IT IS ESSENTIAL to read and understand this manual and the attached engine manual **BEFORE** using the machine. The NINJA remote-controlled flail mower is a professional machine: it is important to ask for explanations even if you have apparently trivial doubts. Your local dealer will be available to give you the appropriate answers.

- Have **Meccanica Benassi** qualified sales staff show you the main controls and the specific operation of the machine.
- **It is strictly prohibited** to alter the controls or other technical features of this machine in any way whatsoever.
- **It is strictly prohibited** to intervene or modify the features of the engine in any way, especially its maximum speed (as this could irreversibly damage the hydrostatic transmissions).
- **With the engine running, any action is prohibited other than mowing carried out by the operator following on foot, inside the WORK ZONE.**
- From any control position, the operator must be able to make sure there is no one in the danger zone and must never lose eye contact with the machine.
- Do not perform any adjustments or maintenance with the engine running.
- It is strictly prohibited to load objects, people or animals.
- It is strictly prohibited to transport, tow or push objects, people or animals.
- **It is advised to become acquainted with the machine on a large and clear surface before starting the work.**
- It is important to understand the meaning and purpose of all the labels on the machine. Consult your dealer if doubts arise about the meaning of one or more symbols.
- The machine was designed taking into account operating ergonomics, clothing and personal protective equipment such as tightfitting work clothing, safety shoes, gloves, earmuffs, dust mask and visor.

– **BEFORE EACH USE**, it is of the utmost importance to check that the emergency stop buttons work properly (the one on the remote and the one on the machine). **If the engine DOES NOT SWITCH OFF, it is prohibited to use the machine and you must contact an authorised workshop as soon as possible to address the problem.**

– Before switching on the machine or during work operations, make sure there are no people or animals in the danger zone (15 metres around the machine).

– Before switching on the machine, make sure that there are no objects on the ground which could be ejected.

– It is good practice to inspect the terrain to be mowed before starting work: the presence of foreign bodies can damage the equipment in case of impact. Or else objects, people or property could be damaged should debris be thrown. The most exposed area is in front of the cutting deck. But you must also pay attention at the back, especially when running over humps and the bottom of the machine temporarily lifts up.

– Always check that there are no people or obstacles behind the machine.

**– Should the machine strike a foreign body, stop it immediately to check the condition of the rotor and the rest of the machine. Switch off the engine, remove the key and inspect the rotor. In case of serious damage, missing blades or the onset of vibrations, stop work and address the problem as soon as possible.**

– Mowing must always be carried out with the engine at maximum rpm and with a forward speed and cutting height proportional to the length of the grass.

– Whenever the operator needs to inspect the machine on the field, it is mandatory to disengage cutting, engage the parking brake and switch off the engine.

– Whenever there is uneven ground or holes (especially on slopes) slow down and reduce speed to the minimum while changing direction. Overturning hazard!

– keep away from shoulders and cliffs, pay attention to hazards hidden by vegetation about to be cut such as holes, humps, stones and roots.

– NEVER place the hydrostatic transmissions in bypass with the machine on the slope.

– as far as possible, it is advisable not to change direction on slopes! You can rather drive the machine downhill in reverse while always standing within the work area as defined in Chapter 1c.

– reduce speed on slopes, keeping it constant, without sudden accelerations or braking, keep on a straight path.

– Damaged blades must be replaced, never repaired or sharpened. If a rotor has one or more broken or badly bent blades, it is unbalanced and transfers unexpected vibrations to the rest of the structure. **UNLIKE A RIDE-ON MACHINE, THE OPERATOR MIGHT NOT NOTICE THAT THE MACHINE IS VIBRATING. THIS IS WHY IT IS ESSENTIAL TO VISUALLY CHECK THE ROTOR BEFORE EACH USE.**

– You should take frequent breaks when tired, especially when work entails walking long stretches and on uneven ground.

– The electric circuit of the machine and that of the remote generate an electromagnetic field which is not normally harmful for the human body. **Nonetheless, pacemaker bearers or those with similar devices should ask their doctor authorisation to use the machine.**

– Moving from one work area to another must be done with the deck all the way up and the rotor not engaged.



### 3b – SPECIFIC SAFETY WARNINGS

The machine is equipped with the following safety and enabling devices:

- battery enabling switch (on machine)
- removable ignition key (on machine)
- emergency stop button (on remote)
- emergency stop button (on machine)
- mechanical and passive parking brake: always engaged unless the operator decides otherwise
- electromagnetic clutch (PTO)

The machine can move only with the parking brake disengaged and with a constant pressure on the joysticks on the remote. If you remove your hands from the joysticks, they snap back to the middle and the machine stops.

If the parking brake is engaged, the PTO cannot be engaged.

Under emergency situations, you may use one of the two stop buttons: the one on the machine or the one on the remote. They have the same function: stop the engine and engage the parking brake.



**Resuming from an emergency stop must only be done after the reasons for the emergency no longer subsist!**

When the engine stops suddenly (for example shutting down under excessive stress or if gasoline runs out) it is advisable to immediately engage the parking brake and only then to restart.

If the machine goes too far away from the operator and the radio signal is lost between the remote and the machine the engine stops and the brake is automatically engaged.



The remote does NOT have a command inversion feature. Front-facing work, where the machine moves toward the operator's position, is strictly prohibited.

The remote has a unique pairing code that links it to its receiver mounted on the machine. This way you may only use your control with your machine and vice versa, making sure there is no interference or overlaps even when working alongside another machine on the same field.

**PROTECTION OF COMPONENTS:** the remote is designed to impede the simultaneous engagement of the parking brake and hydro transmissions, thus protecting the transmissions. You first stop by releasing both joysticks and only then you may press the brake switch.

Furthermore, to prevent the battery from discharging with the machine inactive until the battery switch is put in OFF the flashing LED on the machine stays on as a reminder for the operator.



### 3c – RESTRICTIONS FOR USE

- The machine must not be used by people who do not know how it works or who have not read and understood this manual.
- Minors may not use the machine. Find out about standards in force in the place of use to establish the minimum age of the operator.
- The machine is not fitted with work lights. It is prohibited to work under poor natural visibility conditions (clear visibility for at least 100 metres).
- It is prohibited to use the machine under the effect of alcohol, drugs, medicine, when tired, ill or mentally disturbed.
- It is prohibited to use the machine on soft ground: **risk of the machine overturning or the operator on foot slipping!**
- It is prohibited to use the machine on gravel: the rotor could pick up stones and eject them beyond the danger zone.
- It is prohibited to use the machine with the air filter clogged, missing or with the silencer damaged or missing.
- Check the equipment before every work shift: mandatory inspections are described later.
- It is prohibited to use the machine on public roads. The machine must be brought to the worksite with a suitable vehicle, after having loaded it using ramps able to bear its weight (657 kg with fuel), as described later.
- Keep the remote and ignition key in a place not accessible to children, if present.
- Even with all of the required protections, there is still the risk of injuring the upper or lower limbs due to the rotation of the flails and tracks. **Never place your hands or feet below the rotor casing, in the vicinity of the tracks or inside any other bulkhead or guard.**
- The rotary parts of this machine can cut or catch hands, feet, hair, clothing or accessories. **Risk of amputation or serious lacerations!**
- Always use the machine with the guards in place. It is prohibited to use the machine without the guards in place or with the PVC strips and chains missing, broken or worn out.
- Keep hands and feet away from rotary parts.
- Tie up hair and remove jewellery.
- Do not wear loose clothing, long strings or other objects that could get caught. Always work with tight-fitting work clothing.
- **Do not stress the engine**, especially when smoke comes out of the exhaust, if it frequently sputters or stops. If a given job can't be done, slow down, raise the deck and pass one more time. You need to understand what to expect of the machine and when instead it's better to rely on specific forestry equipment.
- **Do not expose the machine to rain**: the electrical contacts could fail and the grip of the tracks on slopes diminishes exponentially.



### 3d – DANGERS AND REQUIREMENTS ON THE USE OF FUEL – ENGINE OPERATING RISKS

- the fuel used to operate these engines (**unleaded gasoline**) is toxic and flammable. Pay attention to the fire hazard and that of inhaling harmful vapours.
- the fuel must always be handled with gloves to avoid direct contact with skin.

- use a funnel to fill the tank and immediately dry any spills with a cloth.
  - use a very fine filter for refuelling: the fuel that reaches the engine must be as clean as possible.
  - **only refuel outdoors and with the engine off and cooled down.**
  - do not release fuel on the ground, in the environment or on the rest of the machine.
  - **no smoking while refuelling or during work:** there is always a fire hazard.
  - **store the fuel in sheltered, fresh places, away from sunlight, in approved containers** and far from people or animals.
  - gasoline vapours have a high ignition potential: do not place the machine in closed rooms while still hot.
- Wait for the machine to cool down before storing it indoors.** Wait at least 15 minutes before removing the fuel tank cap.
- the fuel tank must be replaced immediately in case of leaks.
  - the fuel cap and supply hose must also be replaced in case of breakage or leaks.
  - immediately call the emergency number in case of excessive exposure to the fuel (inhalation, ingestion, eye contact).
  - refuel outdoors and in a well-ventilated area.
  - do not overfill the tank beyond the inner neck. The fuel must have room to expand.
  - keep the fuel away from sparks, naked flames, pilot lights or other sources of ignition.
  - **check often related utilities looking for leaks:** tank, cap and accessories. Replace when needed.
  - if fuel spills, wait for it to evaporate and then clean the soiled surfaces and only afterwards start the engine.

#### **When starting the engine**

- make sure that the spark plugs, silencer, fuel cap, Oil Guard cap, Oil Guard filter and air filter are in place and well secured.
- make sure that the air filter is clean
- do not run the engine without spark plugs.

#### **When using the machine**

- use only at continuous slopes of 40° at most.
- never start or run the engine with the air filter missing or clogged.

#### **When tilting the machine for maintenance**

- the fuel tank must be empty, otherwise fuel could leak with consequent risk of fire or explosion.

#### **When transporting the machine**

- **keep the fuel tank at minimum and only top it up after having unloaded it** and in an open and ventilated place.

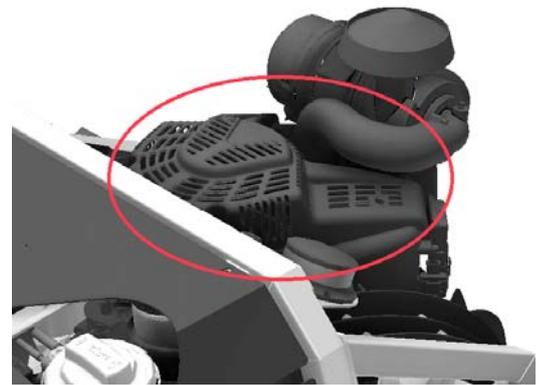
#### **Storing the machine with fuel in the tank**

- always keep away from furnaces, stoves, water heaters or other equipment with pilot lights or other sources of ignition, as the fuel vapours could catch fire.

**A spark is produced when starting the engine. Sparks can ignite flammable gases in the vicinity. This could result in explosion or fire.**

- Do not use pressurised starter fluids as the vapours are flammable.
- With the engine cool, ALWAYS remove the debris built up in the silencer and engine zone. **Especially those that accumulate on the engine surface** (highlighted in Fig. to the side). Also keep in mind that debris accumulated on the engine, manifold, silencer and battery can catch fire!

This area must be checked and cleaned even several times during the same work session if environmental conditions so require (very dusty).

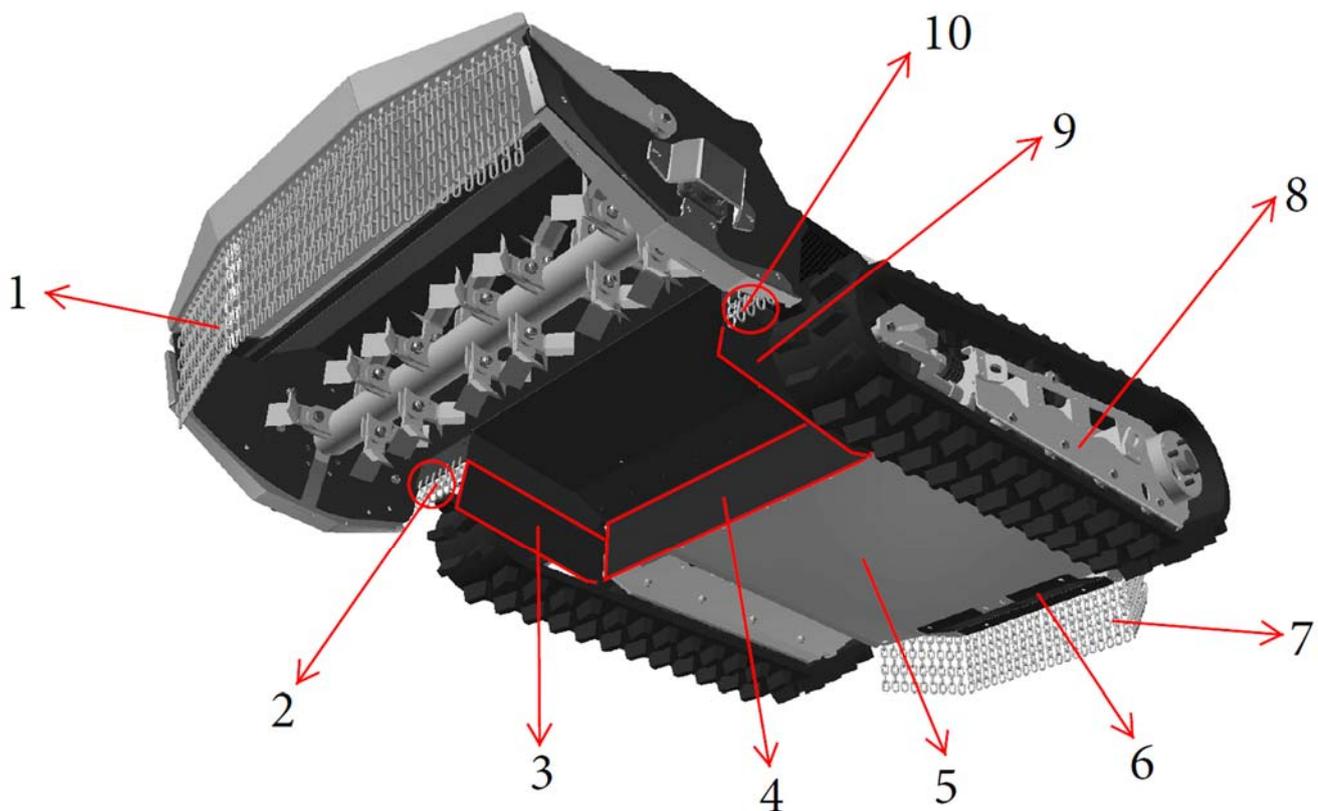


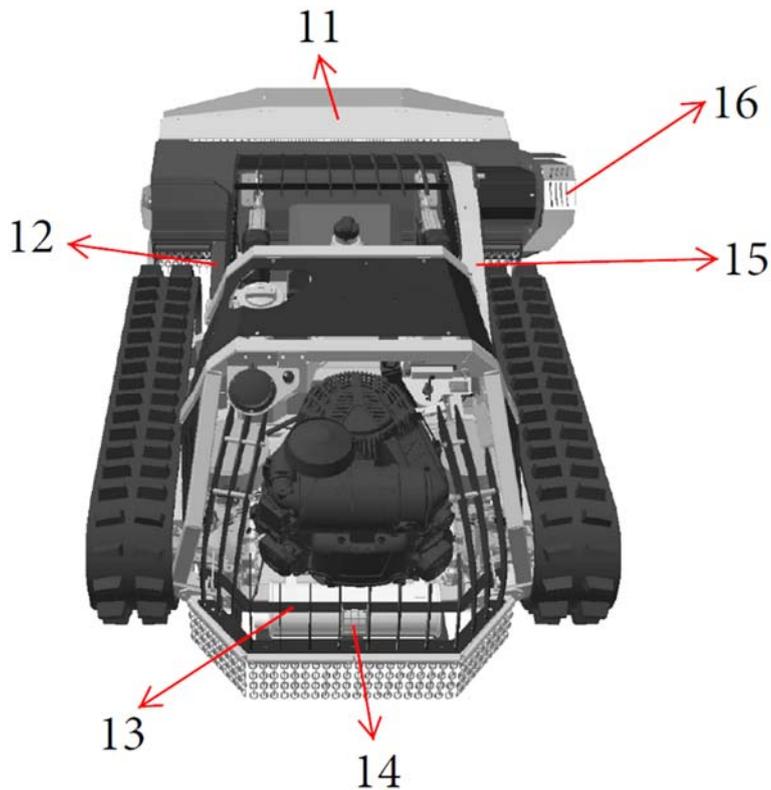
**The engine exhaust contains carbon monoxide**, a poisonous gas that can kill in a few minutes. It is invisible, tasteless and odourless. Even if you have not breathed in exhaust fumes, you can still be exposed to carbon monoxide. **If you start feeling sick or weak when using the machine, IMMEDIATELY stop the engine and contact a doctor.** Poisoning from carbon monoxide could have occurred.

- ONLY use this machine outdoors, far from windows, doors and fans to reduce the risk of carbon monoxide building up and reaching areas occupied by other people or animals.
- Do NOT use the machine inside the house, garage, basement, sheds or other partially enclosed spaces even if there are fans or open doors/windows. Carbon monoxide builds up quickly in these spaces and can stagnate for hours after the machine has been switched off.

Running engines generate a lot of heat. Use the machine wearing work gloves and before touching any part of the engine or its utilities, allow the silencer, cylinders, heads and fins to cool off.

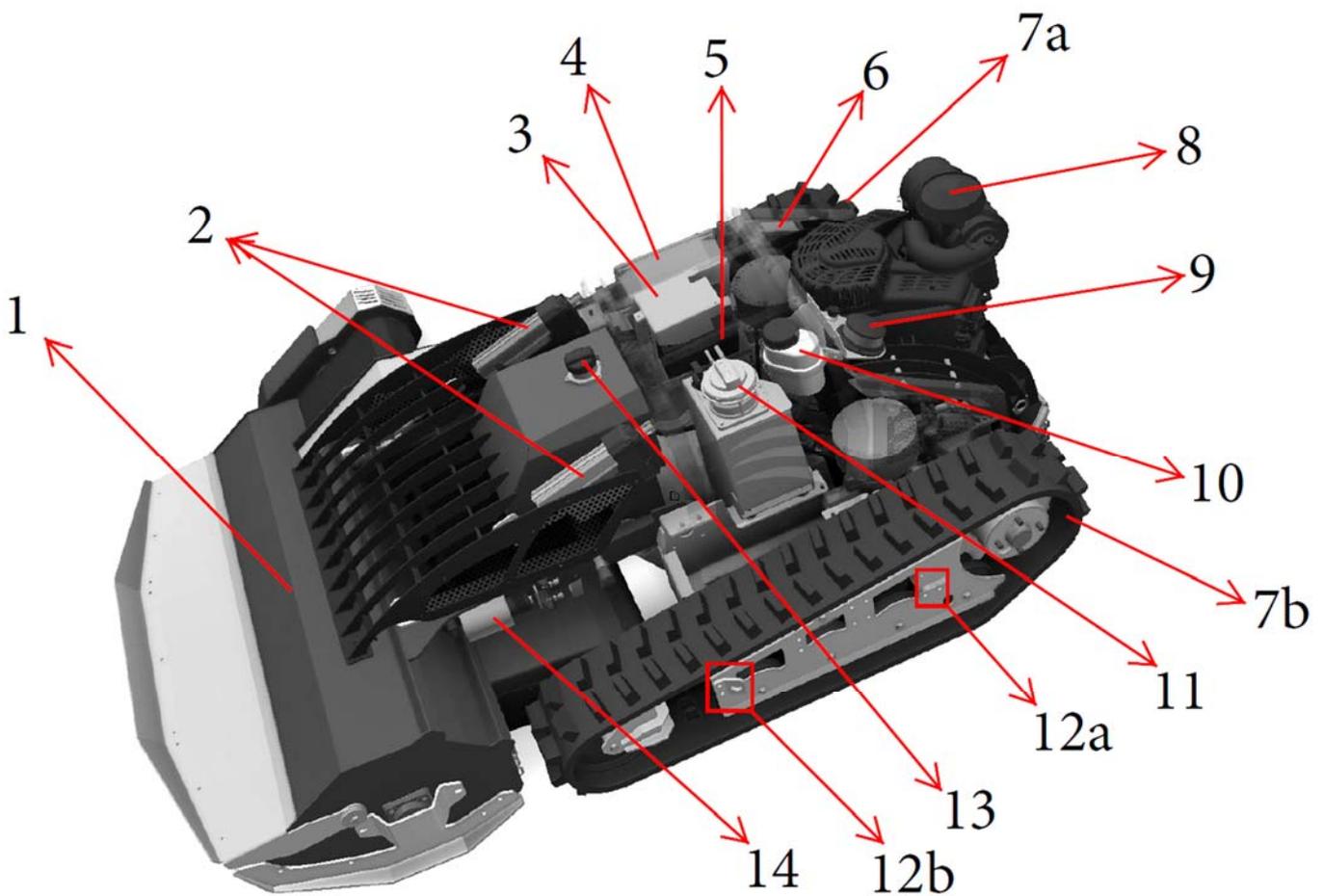
#### 4a – MAIN PROTECTIONS



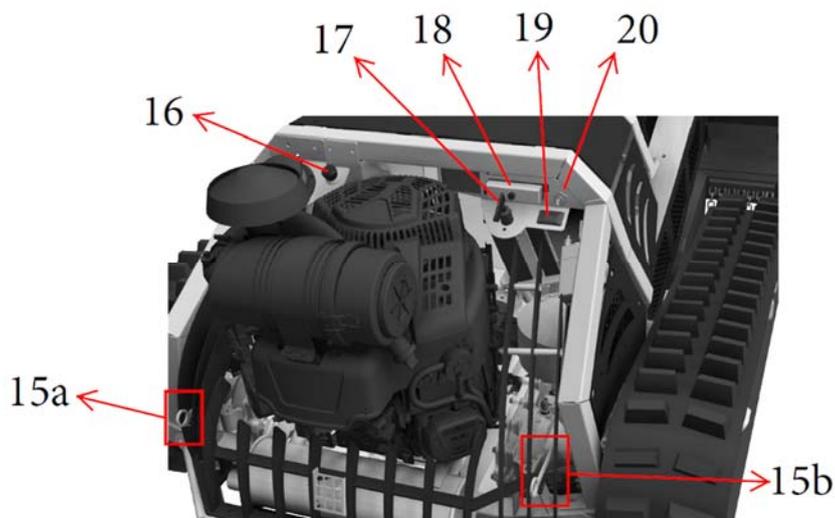


- 1) Front chains
- 2) Rear left chains
- 3) Rear left strip
- 4) Rear strip
- 5) Bottom guard
- 6) Silencer guard
- 7) Rear chains
- 8) Track roller guard (same on both sides)
- 9) Rear right strip
- 10) Rear right chains
- 11) Front guard
- 12) Electromagnet guard
- 13) Engine and silencer guard
- 14) Lambda probe guard
- 15) Side belt guard
- 16) Side belts guard

**4b – MAIN PARTS**



- 1) Rotor deck
- 2) Pair of lifting actuators
- 3) Remote receiver (RX)
- 4) Electric panel box
- 5) 12V-32Ah battery
- 6) Throttle actuator
- 7a) Right track
- 7b) Left track
- 8) Air filter
- 9) Flashing LED
- 10) Hydrostatic oil tank
- 11) *Oil Guard* engine oil tank
- 12a) Rear left towing/lifting hitch (same on the right side, not visible)
- 12b) Front left towing/lifting hitch (same on the right side, not visible)
- 13) 24 L fuel tank
- 14) Electromagnet for parking brake release



- 15a) Bypass lever for left hydrostatic transmission
- 15b) Bypass lever for right hydrostatic transmission
- 16) Emergency stop button (machine side)
- 17) Battery enabling switch
- 18) Main fuse box
- 19) Digital hour meter
- 20) Ignition key

**4c – DESCRIPTION OF THE REMOTE**



### **CONTROLS**

**S1** : SWITCH TO ALLOW TRACTION (LED E = on) or to ENGAGE PARKING BRAKE (LED E = off)  
**S2** : PTO ENGAGEMENT SOFTKEY  
**S3** : EMERGENCY STOP BUTTON  
**S4** : (not used)  
**S5** : (not used)  
**S6** : SOFTKEY FOR REMOE SYNCHRONISATION (if engine off) or TO REDUCE ENGINE SPEED (if engine on)  
**S7** : SOFTKEY TO INCREASE ENGINE SPEED  
**S10** : ENGINE IGNITION SOFTKEY  
**S11** : ENGINE SHUTDOWN KEY  
**S14** : DRIFT CORRECTION POTENTIOMETER  
**S15** : POTENTIOMETER TO SET MAXIMUM SPEED  
**J1** : JOYSTICK FOR STEERING OR ROTOR LIFTING  
**J2** : JOYSTICK FOR DRIVE DIRECTION (FORWARD/BACKWARD)

### **INDICATOR LIGHTS**

**A** : GREEN "TX" LIGHT  
on = REMOTE SYNCHRONISED  
flashing = SYNCHRONISATION IN PROGRESS  
**B** : ORANGE LIGHT  
on = CAUTION, SYNCHRONISATION IN PROGRESS BUT S3 STOP BUTTON STILL ENGAGED  
**C** : YELLOW LIGHT  
on = PTO ENGAGED  
**D** : BLUE "RX" LIGHT  
on = REMOTE SYNCHRONISED  
flashing = SYNCHRONISATION IN PROGRESS  
**E** : BLUE LIGHT  
on = TRACK MOVEMENT ALLOWED  
off = PARKING BRAKE ENGAGED

## **4d – PACKAGING, TRANSPORT AND HANDLING IN SAFETY**

The machine arrives at the dealer on a pallet and protected by a cardboard box.

Inside, the necessary fluids for the initial startup and movement to unload from the packaging are already provided, such as:

- engine oil in the Oil Guard tank
- oil in the hydrostatic transmissions and their external tank
- enough fuel (unleaded gasoline) for first movement, to be TOPPED UP as soon as possible to avoid sudden shutdowns.

Instead of driving it with the remote, the machine can also be lifted or towed out from the packaging as long as the procedures described in chapter 6f are followed.

The remote is provided in a separate box, also including:

- 2 x batteries (1 backup, 1 to be installed on the remote)
- 1 x battery charger, that can be plugged into the wall (220V) or a lighter socket (12V or 24V)

The batteries of the remote are usually supplied ready to use; if in doubt, it is always better to charge them before first use.

This manual also comes with:

- engine manufacturer's manual
- 12V battery manufacturer's manual
- Declaration of Conformity and certifications of the remote's manufacturer.

A kit of fuses is also supplied (those present on board). There is also a second kit of fuses (those of the RX receiver) in the remote's box.

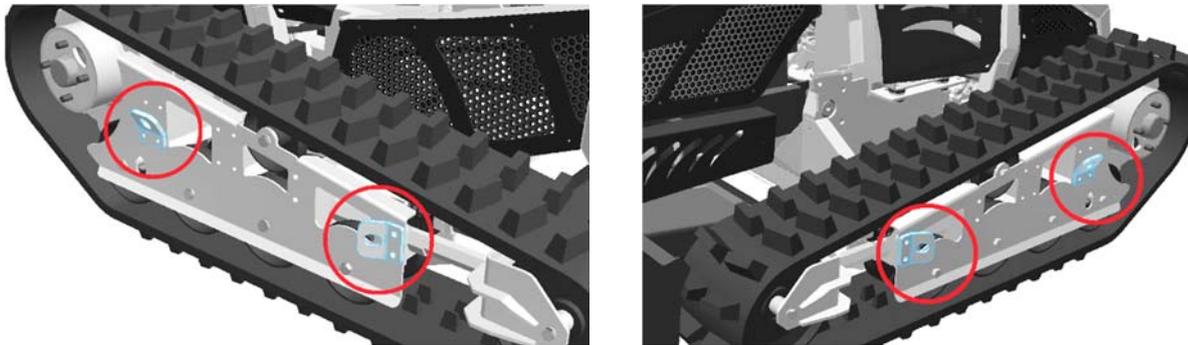
## **! IMPORTANT !**

### **When the shipment arrives, check that the packaging is intact!**

The machine can be handled with engine OFF or ON, specifically:

**WITH ENGINE OFF** it is possible to:

- lift it, with suitable equipment. As long as all four anchors shown in the figure are used, using straps fit to bear the total weight of the machine (657 kg).
- tow it, as long as two anchor points are used at the same time. Either the two on the right or the two on the left.



Before towing, it is ESSENTIAL and MANDATORY to:

- 1) release the parking brake either by remote or by hand
- 2) manually engage the bypass of both hydrostatic transmissions

These operations are described in detail in chapter 6f.



**DO NOT LIFT OR TOW THE MACHINE FOR LONG STRETCHES**

**WITH ENGINE RUNNING** the machine can move thanks to its own traction as long as all the standards and requirements mentioned in the following chapters are complied with.

When loading onto vans or pick up trucks using ramps:

- get loading ramps that can bear the weight of at least 350 kg each and with non-slip surfaces and wide enough to support the tracks.
- keep the rotor as high as possible while loading/unloading.
- secure the machine on the transport vehicle with straps using the same anchors for lifting/towing and ENGAGE the parking brake.



## 5 – PRELIMINARY CHECKS

### CHECKS PRIOR TO FIRST START-UP

After having released the machine from its packaging, **before starting it**, FULLY read this manual and **perform the following checks**:

- Check that all the items described in the previous chapter has arrived.
- Check that there are no oil or fuel leaks in the package.

### CHECKS PRIOR TO ANY START UP:

*for details on these operations, see chapter 8*

- Check that the tracks are properly tensioned.
- Check that the remote battery is charged and ready for use.
- Check that the 12V battery on the machine is charged.
- If the machine was previously towed manually, remember to remove the bypass on both hydrostatic transmissions before switching the machine on, to avoid damage to internal components!
- Check that all the guards are present and intact, especially those highlighted in chapter 4a. **Immediately replace them if broken or missing.**
- Check the integrity of the main structures of the frame, welded parts, the rotor casing. And of all the protective sheet metal. Make an inspection walking around the machine before using it. Promptly report any damage and **DO NOT USE THE MACHINE.**
- Check that there are no oil or fuel leaks on the vehicle, or where the machine was stored last time.
- Visually check the hydrostatic oil level.
- Check the engine oil in the *Oil Guard* tank using its provided dipstick
- Check the conditions of the engine air filter and clean it if necessary.
- Check that the tank has enough fuel for the job to be carried out.
- Check that when you press switch S1 (track movement authorisation) you can distinctly hear the disengagement of the parking brake.
- Check that when turning on the battery switch the orange LED on board is flashing, confirming that the system is powered.
- Check that there is no debris **above and around the engine.**
- Check that there is no debris **above and around the hydrostatic transmissions** and that both of their cooling fans rotate freely. Replace if damaged. **DO NOT WORK WITH THE FAN DAMAGED!**
- **Rotor visual inspection:** do any blades need to be replaced? Are the fixing screws tightened properly? Does it rotate freely?
  - **Tracks tension and wear check:** if worn excessively and/or too slack, they tend to come out of the guide rollers causing malfunctioning and mechanical damage.
  - **Guide rollers wear check:** the guide rollers, and in particular the front roller, are subject to the same potential consumption as the tracks and sometimes even greater.
  - Check that the fixing nuts of the drive wheels of the tracks are properly tightened.
  - **Check battery voltage:** it must be higher than 12V. The battery is charged and sealed. It requires no acid and must only be charged when necessary. If the battery has trouble charging, get a new one, original and with the same features.

- **Check operation of all controls and mechanisms**, specifically:
    - emergency stop buttons: both the one on the machine and on the remote must switch off the engine when pressed
    - parking brake: are the tracks locked with the brake engaged? If not, contact a workshop.
    - rotor braking: when the PTO disengages, the rotor must come to a complete stop within 7 seconds. If this is not the case, contact an authorised workshop.
    - lifting actuators of the cutting deck
    - throttle actuator
  - **Checking safety systems for start-up:**
    - if the battery enabling switch is OFF, the engine must not start.
    - if the ignition key is OFF, the engine must not start.
    - if the connection between remote and machine has not been established, the engine must not start.
  - **Leak check**, in particular: fuel tank, hydrostatic oil tank and hoses, engine crankcase. In case of leaks, do not start the machine and contact service.
  - **Checking clamping**, especially on hoses. If anything has slackened, tighten before switching the machine on.
  - Visual check of main fuses and replacement before use, if needed. Main fuses are listed in chapter 12.
  - Check the total working hours marked on the hour meter on the machine. Check whether it is time for scheduled maintenance among those recommended in this manual in chapter 8.
- NB:** the hour meter has an internal battery which cannot be removed or recharged and lasts several years. It is not powered by the machine's electrical system and therefore does not generate any output with the engine off.

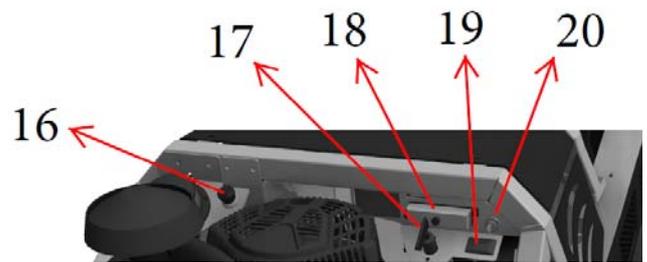
Before any use, check that the pictograms displayed in chapter 2a are all present and properly legible on the machine. It is prohibited to use the machine before having restored any missing or illegible pictograms or markings.

**If anything is missing, broken, out of place or faulty, immediately contact your dealer and DO NOT USE the machine for any reason whatsoever.**

**6a – SYNCHRONISATION and START-UP**

1) Go to the machine and turn the battery enabling switch (17) clockwise to power the wiring harness.

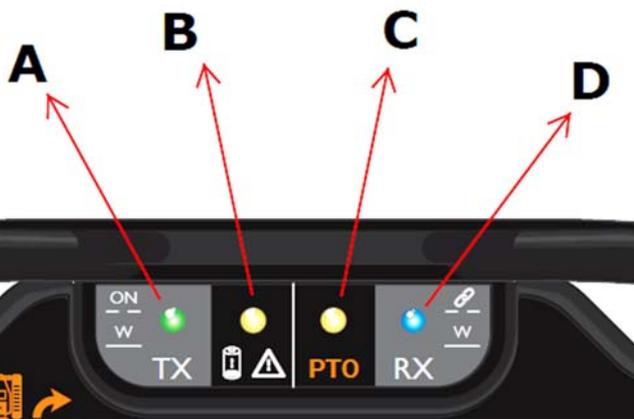
2) Turn the ignition key (20) to power the control units.



3) To synchronise remote and machine, you must first have deactivated the emergency stop button (S3) on the remote. Turn it clockwise to make sure it's disengaged.



4) To synchronise the remote to the machine, press the green button S6 on the right side of the remote. At this point the transmitter (TX) starts to search for the receiver (RX) on the machine.



The green light (A) "TX" starts flashing and after a bit the blue light (D) "RX" will follow suit.

5) When both lights are flashing, press the green button S6 again.

Lights will remain steady and connection has been established between remote and machine receiver.

**NB:** synchronisation will not be possible if you omit what's described in point 3) and pressing the green button S6 will produce an audible error accompanied by the orange light (B) on the remote lighting up.

With the remote synchronised, you may now turn on the engine.

**NB:** the B&S Vanguard 810cc engine supplied with the NINJA flail mower has electronic injection and therefore no choke control when starting cold!



**It is prohibited to use the machine if the engine starts in conditions other than those described and in any case until all the necessary conditions have been restored!**

6) There are two softkeys, S10 and S11, on the left side of the remote.

To turn on the engine, press the bottom one (S10), to turn it off, press the top one (S11).



## 6b – MOVEMENT

### RECOMMENDATIONS FOR SAFE WORK:

- the operator must always stay alert in any transfer and work condition. Even during short transfers, there is still the risk of injuring people or animals or of damaging objects/property.
- pay attention to obstacles in every direction.
- always keep sight of the machine and of the ground right in front of it to anticipate any problems.
- also pay attention to obstacles for the operator when walking behind the machine, as he is exposed to the risk of tripping, slipping and falling.
- be careful with changes of direction: should problems arise, deactivate all controls, stop and apply the brake.
- use on slopes: the most dangerous situations require even greater attention when on steep slopes. The most critical phase with risk of overturning is when turning on steep slopes. Pay the utmost attention! It is equally dangerous for the operator to be outside of the working zone when the machine drives over the top of humps as he is more exposed to the ejection of objects.

1) With the engine running, the buttons on the right side of the remote act as a throttle.

- press the top softkey (S7) to increase engine speed.
- to reduce engine speed, press the bottom softkey (S6, the same one responsible for synchronisation with engine off).



**NB: The tracks are always normally locked by a passive parking brake, which must be released to allow the machine to move**



2) To release the brake and enable the tracks for movement, press the switch S1 on the remote. Lighting up of the blue LED (E) on the side means that the brake is disengaged and the machine may be driven.

Vice versa, to apply the parking brake, especially to stop on slopes, press switch S1 again and the blue light (E) turns off.



**THE PARKING BRAKE CAN ONLY BE ENGAGED AFTER HAVING RELEASED BOTH JOYSTICKS (J1 and J2)!**



3) The joystick on the right (**J2**) controls the direction of travel:

- moving the joystick forward moves the machine forward
- moving the joystick back moves the machine backward.



Since this control is proportional, it also controls the speed. A greater stroke corresponds to quicker speed of the machine in that direction!

4) The joystick on the left (**J1**) has two distinct functions:

- turns the machine from right to left, and also:
  - if joystick J2 is pressed: standard steering
  - if joystick J2 is not pressed: machine spins around 360° (inner track moves back while the outer track moves forward)
- adjusts the cutting height: moving the joystick forward lifts the cutting deck while moving it back lowers the cutting deck. This control is also proportional.



**NB:** “*right/left*” and “*forward/backward*” always refer to the machine’s point of view, not to the operator one.

There are two potentiometers in the middle of the dashboard that can be turned.

5) Potentiometer **S14** (“**DRIFT**”) corrects any machine drift if it does not go perfectly straight. For example if the machine goes slightly to the left, set DRIFT to the right and vice versa.

This control corrects a small drift caused by a slight speed difference between right and left hydrostatic transmission. Whereas if the machine is clearly unstable, you must look for the mechanical causes, quite likely the tension and wear of the tracks.

6) Potentiometer **S15** (“**SPEED**”) allows you to set the maximum speed (from 0 to 100%) corresponding to the end stroke of joystick **J2**. This way if you wish to proceed (for example) at 50% of the maximum speed, you set the SPEED potentiometer halfway and still press joystick **J2** all the way, for better ergonomics.

## 6c – CUTTING

### RECOMMENDATIONS FOR CORRECT and SAFE CUTTING

- when driving to the work area, keep the rotor at the highest position and PTO not engaged, travelling at a speed adequate for the conditions of the ground.
- start work with the engine hot and always use it at maximum RPM when mowing.

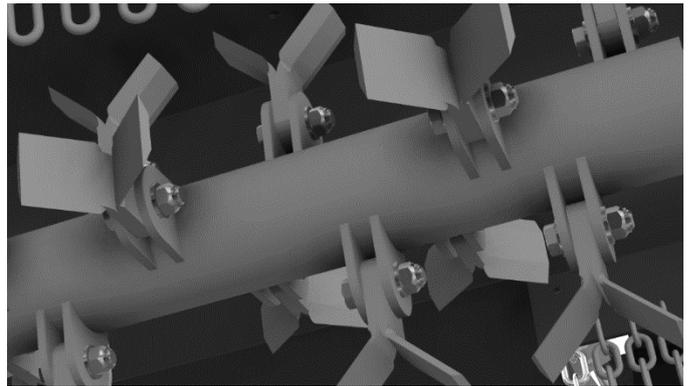
The rotor is powered by an electromagnetic clutch and then belt transmissions. Refrain from continuously engaging/disengaging the rotor so that these components may last longer.

Check the condition of the rotor before each use. **It is of the utmost importance to always cut with all the blades intact, present and well sharpened.**

If one or more blades are:

- damaged
- broken
- bent
- missing

It is **PROHIBITED** to use the machine before having replaced them! A rotor with the defects described above is unbalanced and generates vibrations which are harmful for all the equipment during operation.



Keep in mind that:

- A single blade must be replaced with a new one when broken, bent or worn.
- All the blades must be replaced (with relative fasteners) every 50 hours.
- Whenever replacing (or removing) a blade, use a new *cone-lock* self-locking nut when refitting it, and discard the old nut.

Grease the support bearings of the rotor at the deadlines described in Chapter 8 *Maintenance*. The chosen cutting height must take into account the surface you are about to work on: adjust the height in case of humps or holes so that the blades do not strike the ground.

Press the softkey **S2** “PTO” to activate the cut; when engaged, light (C) “PTO” at the top of the remote dashboard lights up. Remember that mowing cannot be engaged when the brake is applied.



**IT IS MANDATORY TO DISENGAGE THE ROTOR BEFORE APPROACHING IT FOR ANY REASON WHATSOEVER!**

## 6d – SWITCHING OFF

Before parking and turning off the machine, you must:

- deactivate the rotor by pressing softkey **S2** "PTO"
- slow down and stop the machine by releasing joystick **J2** which goes back to the middle
- idle the engine by pressing the softkey **S6**
- engage the parking brake by pressing the switch **S1** making sure that the light on the side switches off

1) At this point press the softkey **S11** on the left side of the remote to turn off the engine.



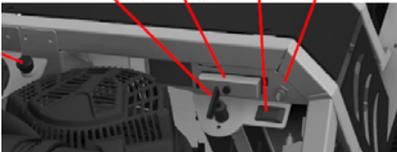
In case of an emergency, the engine can be turned off at any time even in one of the following ways:

- with the emergency stop button on the remote
- with the emergency stop button on the machine

Unlike standard switch off, namely pressing the softkey **S11**, when you use the emergency buttons (**S3** or **16**) the parking brake is engaged automatically.

2) Regardless of how the machine was switched off, if you do not expect to restart it, it is essential to go to the machine and to turn both the ignition key (**20**) and the battery enabling switch (**17**) clockwise to cut power to the control units and to the wiring harness.

17 18 19 20



**THIS STEP IS VERY IMPORTANT SO THAT THE BATTERY DOES NOT DISCHARGE WHEN NOT IN USE!**

3) When the complete switch-off operations are over, remove the ignition key.

Only at this point can you abandon the machine.

**When the machine is parked for a long time, it must be stored on flat ground for the correct outflow of the engine oil.**



**NEVER LEAVE THE MACHINE UNATTENDED WITH THE KEY INSERTED!**



## **6e – RESTARTING AFTER A STOP**

If the machine needs to restart **after a short stop** in which the electrical system was not switched off (key still ON and battery switch still ON) you can turn on the engine just by pressing the softkey **S10** on the left side of the remote.

If the machine needs to restart **after a long stop**, in which the electrical system was switched off (key OFF, battery switch OFF), you must turn on the engine by following the entire procedure described in chapter SYNCHRONISATION and START-UP. Switching off the system entails loss of radio signal between the transmitter (TX) of the remote and the receiver (RX) on the machine.

If the machine needs to restart **after an emergency stop**:

- remove the source of the emergency
- move the stop button that was used (on machine or remote) back to the neutral position
- if the electrical system on the machine was not switched off, you may switch on the engine by pressing the softkey **S10** on the left side of the remote.
- if after the emergency stop the electrical system was also switched off for some reason, then you must proceed with the complete start-up procedure described in chapter SYNCHRONISATION and START-UP.

If the machine needs to restart **after accidentally shutting down** the engine (for example if fuel ran out or due to mowing too thick vegetation):

- address the reason for the accidental shutdown
- proceed with normal ignition by pressing softkey **S10** on the remote

## **6f – MANUAL PROCEDURES IN CASE OF FAILURE**

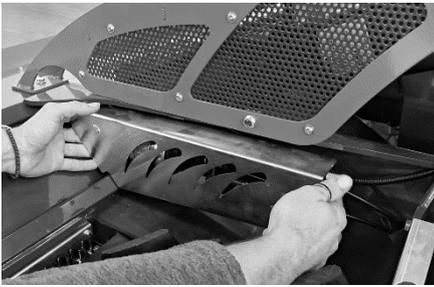
If the machine breaks down during work and it needs to be TOWED manually, first of all it is MANDATORY to:

- 1) release the parking brake
- 2) release the hydrostatic transmissions by inserting their bypass

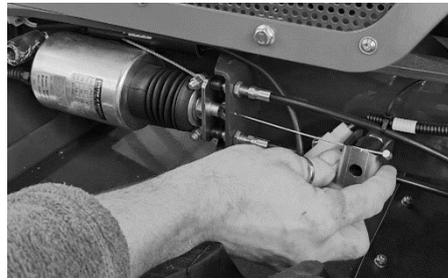
### **1) MANUALLY RELEASING PARKING BRAKE**

The brake can be released in two ways

- if the electrical system is still running you can release the brake by acting on the switch S1 like under normal conditions
- if the electrical system is not running and the machine has no power then the brake must be released manually, as follows. These operations must be performed wearing work gloves but do not require special tools, so that they can be carried out anywhere in case of a failure



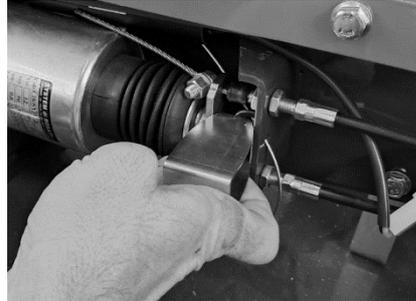
1) Remove the electromagnetic cover by pulling it out by hand.



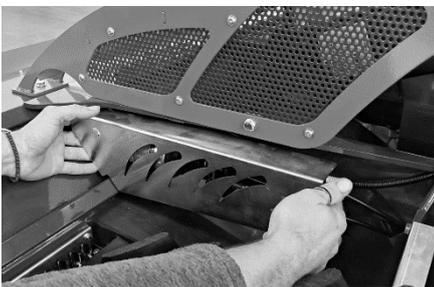
2) Pull out the U-shaped key from its rubber support.



3) The key is tied to the machine with a metal cord so that it doesn't get lost.



4) Firmly push the key into the two metal sheets to move away the electromagnet and pull the cables.

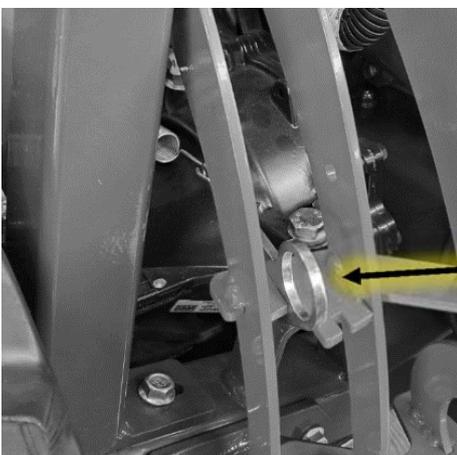


5) Put the cover back on the electromagnet.

At this point the parking brake is disengaged. Nonetheless to tow the machine, the second and most important step is still missing.

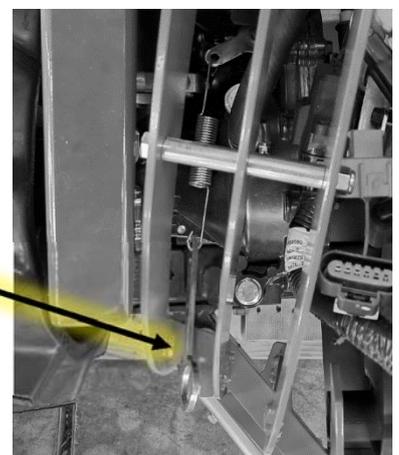
## 2) INSERTING HYDROSTATIC TRANSMISSIONS' BYPASS

For the tracks to be free to move BOTH hydrostatic transmissions must be put in neutral by inserting their bypass. THE FOLLOWING DESCRIPTION APPLIES TO BOTH TRANSMISSIONS USING THE LEVERS 15A AND 15B INDICATED IN THE MAIN PARTS CHAPTER.



1) Go to the back of the machine.

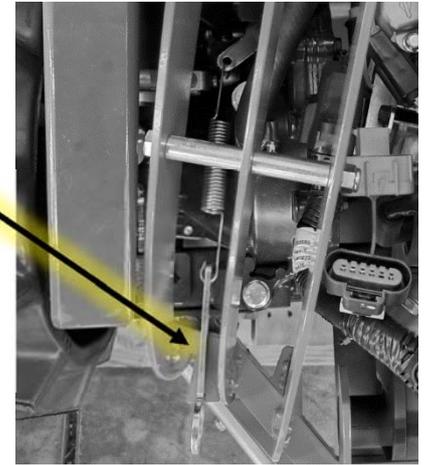
Under normal operating conditions, the bypass lever is inserted in the outermost slot of that metal grid, as shown in both figures to the side. This is the position for normal driving operations.





2) To engage the bypass, pull the lever back until it is wedged in the innermost slot of the metal grid, as shown in both figures.

In this position the transmission is in neutral and the machine can be TOWED.



**If you prefer to move the machine by loading it onto another vehicle, then it is not strictly necessary to release the brake and insert the bypass, though it is useful to prevent damage if it needs to be towed eventually.**

### 7a – FUEL

The machine is delivered with the fuel necessary for unpacking and first start-up. **To use the machine, it must be filled with gasoline.** The tank can hold a maximum of approximately 24 litres. **The machine is not equipped with a reserve cock or fuel level indicator. Act accordingly.**

The only type of fuel allowed has the following characteristics. Any other type of fuel risks damaging the engine and immediately invalidates any warranty claim. Fuel must be stored in cool and dry places, sheltered against light and ignition sources, in approved containers suited to the purpose.

The fuel tank cap can be unscrewed by hand, there's no key. Use a funnel when refuelling, immediately dry any spills and follow all the rules on fuel specified in this manual and those of the engine manufacturer. Also use a fine filter so that impurities do not enter.

As indicated by the engine manufacturer, **gasoline must comply with these requirements:**

- Clean, new, unleaded gasoline.
- Minimum 87 octane/87 AKI (91 RON).
- An ethanol content (blend of gasoline and alcohol) up to a maximum of 10% is acceptable.

**NB:** do not use unapproved gasoline, such as E15 and E85. Do not add oil to gasoline or modify the engine so that it can work with different types of fuel. Use of unapproved fuels causes damage not covered by warranty.

At altitudes higher than 1500 m, gasoline with a minimum octane number of 85/85 AKI (89 RON) is acceptable.

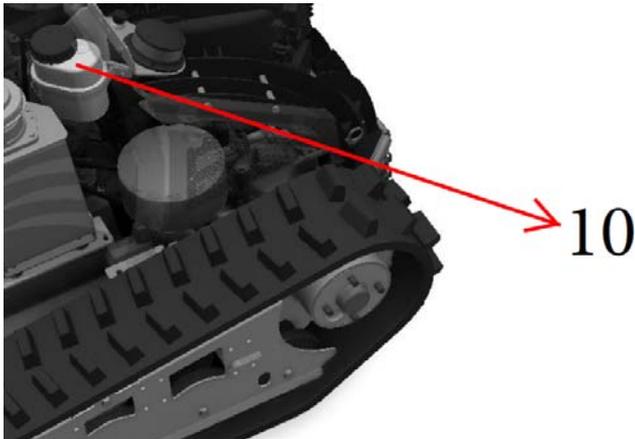
For information on adjustments at high altitudes, contact an authorised *Briggs & Stratton* dealer.

## 7b – LUBRICANTS

### HYDROSTATIC OIL



The machine uses two hydrostatic transmissions, one for each track (picture to the side). The transmissions, hoses and outside tank are already filled with the right amount of oil straight from the factory. It is good practice to visually check the level inside the tank before each use and in general to inspect the areas around the machine to look for leaks.



The oil tank (N° 10 in Fig. to the side) is in white transparent plastic, and the oil level is visible for inspection. The hydrostatic oil tank is located behind the *Oil Guard* engine oil tank. Do not get the two mixed up.

The hydrostatic transmissions, hoses and oil tank are factory-equipped with:

### PAKELO MULTI-V EVO SAE 20W-50 (mineral oil)

Total amount in system = approximately 4,8 litres.

It is prohibited to use any other type of oil for these utilities, otherwise the manufacturer's warranty will be void (*Hydro-Gear*).

#### CHECKING THE HYDROSTATIC OIL LEVEL:

this must be done with the machine horizontal and the oil cold (therefore BEFORE a work session): visually check that there is oil and that it is approximately 2/3 of the tank, at the "LEVEL" mark, visible through the openings of the top bonnet (indicated to the side).

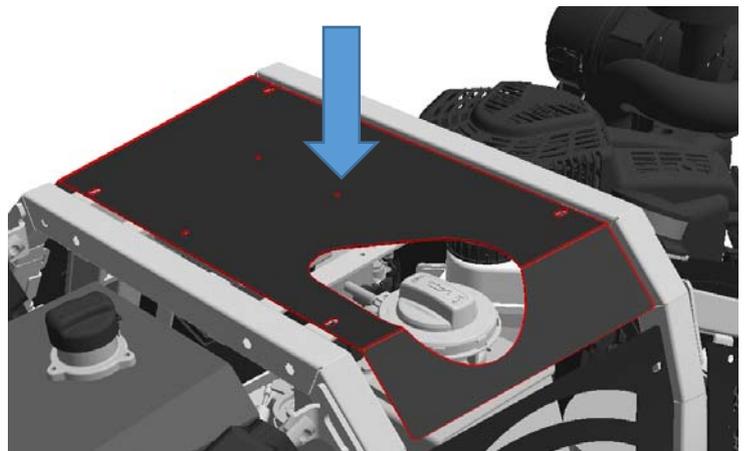
If the oil needs to be topped up:

- remove the top bonnet
- unscrew the oil tank cap by hand
- pour the new oil using a funnel.

Immediately clean any spills.

**PLEASE NOTE:** always leave some room for hot oil to expand. Never fill the tank all the way.

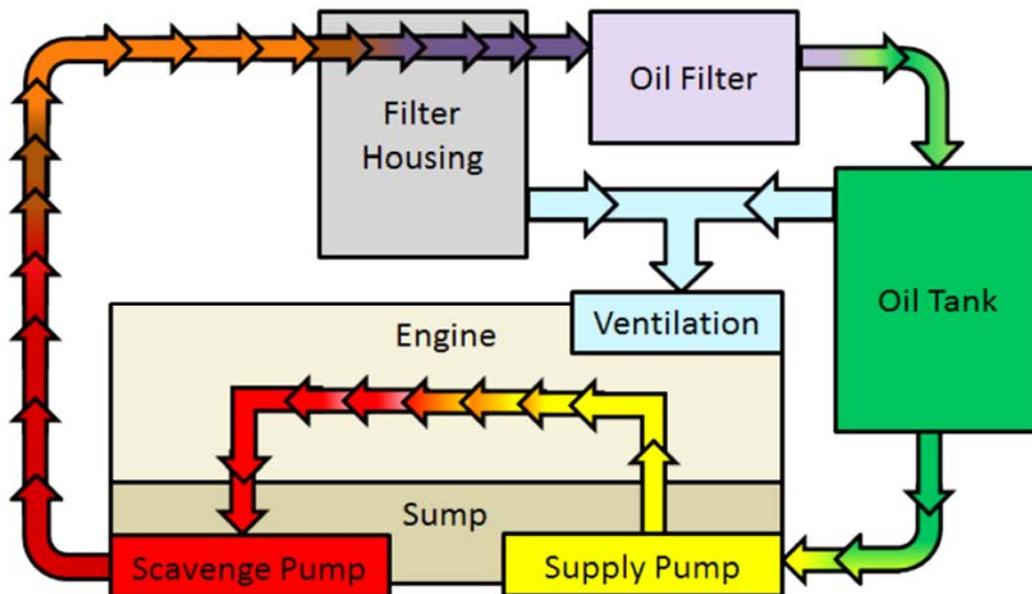
For a complete oil change and consequent bleeding, contact a service centre.



## **ENGINE OIL: Briggs & Stratton OIL GUARD™ system**

Oil Guard is a dry sump lubrication system designed for the Vanguard 810cc engine that uses an outside tank to supply the engine with oil. This allows the machine to be used continuously on slopes which would not be possible with standard lubrication engines.

The oil flows in the Oil Guard system from the tank by means of the supply pump, passes through the engine and then goes back to the tank through the scavenge pump. The outside tank (detail No. 11 in the MAIN PARTS Chapter) transports a higher volume of oil to the engine, allowing oil to be cooler and longer-lasting. The Oil Guard system was designed to lengthen oil change intervals to 500 hours, thus reducing machine downtimes and costs for the operator.



**NB:** The Oil Guard tank also acts as an oil radiator, so avoid the build-up of dust and debris on its walls!

For other engine-related details please refer to the engine's manufacturer manual.

**The engine warranty is in fact covered by the engine manufacturer (*Briggs and Stratton*) and by its area service centres.**

### **TYPE OF ENGINE OIL:**

The only engine oil allowed for this application has to be like the factory-filled one, namely

### **PAKELO KRYPTON MBK SAE 15W-50 (synthetic oil)**

Total amount circulating in the Oil Guard system + Engine + Hoses = approximately 5,2 litres.

**CHECKING THE OIL LEVEL:**



Before topping up or checking the engine oil level:

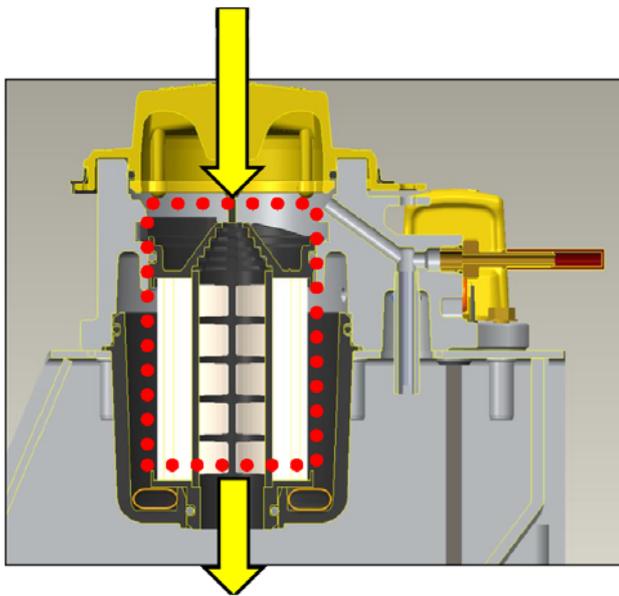
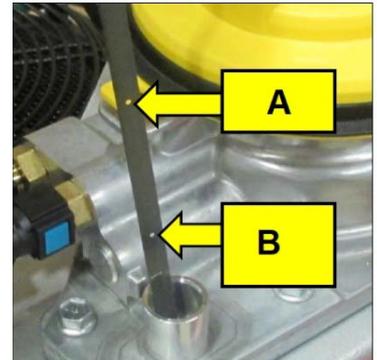
- Make sure that the machine is on flat ground.
- Get rid of all debris in the oil filling area. Perform the following operations only with the engine off and cold, and with the ignition key removed.

Nothing needs to be disassembled to check and top up the oil, as you have full access to the top of the tank.

**Checking oil and topping up, if necessary:**

- 1) Remove the dipstick and clean it with a cloth.
- 2) Put the dipstick back in the tank.

3) Pull out the dipstick and check the oil level. The correct level corresponds to the top mark (A) indicated on the dipstick. A low oil level corresponds to the mark (B) below.



**TOPPING UP:**

If the oil needs to be topped up, unscrew the Oil Guard tank cap. The oil filter is underneath. Briggs & Stratton recommends NOT removing the filter to avoid contamination. The oil will flow inside the tank passing through the filtering element.

## 8 – MAINTENANCE



You must be aware that incorrect maintenance or one provided by unauthorised workshops can expose the user to the risk of serious injuries or technical failures not covered by warranty.

### **Safety warnings:**

All maintenance operations must be carried out with the engine off, the ignition key removed, parking brake applied and machine parked on ground that adequately supports its weight.

- Also make sure that there is no one in the vicinity.
- Check that the machine can by no means drift.
- Always bear in mind the risks related to the use of fuel (fire and vapour inhalation) and pay attention to the presence of sharp tools.
- When the machine needs to be raised on one side or lifted, attach the straps directly at the anchor points. **NEVER LIFT from the covers or bonnets!**

- Keep the engine off and remove the ignition key during maintenance operations.
- Let the machine cool off before intervening on any part. The engine, transmissions and metal covers tend to remain hot even for several minutes after shutdown: be careful.
- It is essential to correctly dispose of gasoline, oil and other special waste (like the battery) in compliance with standards in force in the place of use. Do not release them into the environment or treat them as generic waste.

---

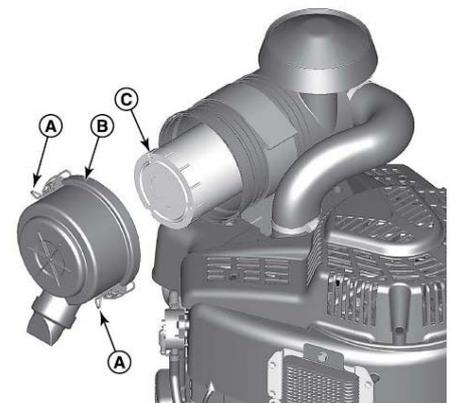
### ***BEFORE EACH USE***

---

**CLEAN THE AIR FILTER:** cleaning the air filter is of the utmost importance in these machines and is **an operation to be done before each use.**

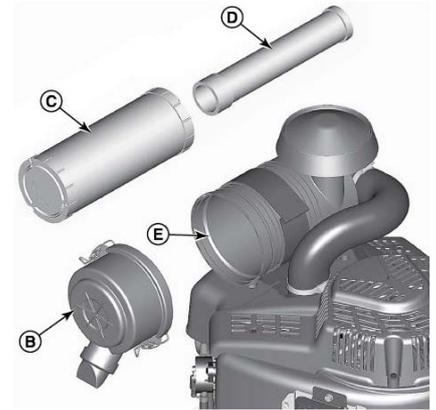
The filter must be REPLACED with a new one **every 250 hours.** The following is the procedure for cleaning the filter recommended by *Briggs & Stratton*. In any case read the engine manual to have more extensive information.

1. Unhook latches (A) and remove cover (B).
2. Remove the air filter (C).
3. Tap the filter gently on a hard surface to remove any debris. If the filter is too dirty, replace it with a new one. **DO NOT BLOW WITH COMPRESSED AIR! DO NOT USE SOLVENTS!**
4. The system also has a safety filter (D). To remove it, carefully pull out the safety filter from the body of the air filter (E) and dispose of it. Make sure that no filth or debris enters the engine during this operation.



5. Insert the new safety filter (D) into the body of the air filter.
6. Install the air filter (C) over the safety filter (D).
7. Close the cover (B) by using the latches (A).

Please note that the hour counter of the machine marks its actual hours of operation and cannot be reset, nor does it display notices or deadlines.



---

### **EVERY 50 HOURS**

---

- complete replacement of all blades and their nuts and bolts.
- grease the UCF supports of the rotor, as explained in paragraphs below.
- check and adjust the belts, contact an authorised workshop for information.
- check the oil level in the bevel gearbox, explained in paragraphs below.
- check and, if needed, tighten all the machine's nuts and bolts.

---

### **EVERY 150 HOURS**

---

- replace rotor support bearings

---

### **EVERY 250 HOURS (or every 2 years)**

---

- replace the engine air filter
- replace all belts

---

### **EVERY 400 HOURS**

---

- COMPLETE hydrostatic oil change in the entire system and replacement of filters in hydro transmissions. This is a rather delicate operation, contact a workshop for support.

**NB:** should the normal noise level of the transmissions increase and/or should performance drop on slopes, evaluate whether to change all the oil even before 400 hours.

---

### **EVERY 500 HOURS**

---

- complete engine oil change and replacement of *Oil Guard* filter, contact a workshop for details.

- complete oil change of bevel gearbox, explained in paragraphs below.

---

## **ONCE A YEAR**

---

- replace the spark plugs, check the *Briggs & Stratton* engine manual.

---

## **WHEN NEEDED**

---

### **REPLACING THE BATTERY:**



Keep metal objects away from the terminals when performing maintenance.

Only use original batteries. They are sealed, dry charged, designed for use on slopes as they have no acid leaks.

Follow the instructions in the manual of the battery manufacturer supplied with the machine.

When disconnecting the battery (to mount a new identical one):

- disconnect the **black** negative terminal (-)
  - disconnect the **red** positive terminal (+)
- remove the dead battery and place the new one
- connect the **red** positive terminal (+)
  - connect the **black** negative terminal (-)

Follow this order of operations also when disconnecting the battery to charge it for winter storage. To remove the battery (after having disconnected the terminals as indicated) simply disassemble the sheet metal latch that keeps it in place.

**PLEASE NOTE: the manufacturer SHALL NOT BE HELD LIABLE for damages resulting from short circuits due to incorrect connection of the terminals; the same applies for faults due to the use non-original batteries!**

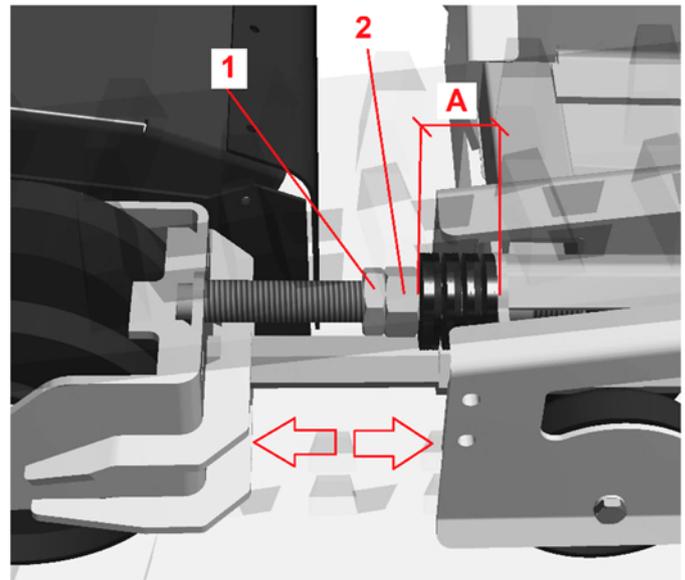
To be sure that the machine starts immediately in every occasion, it is advisable to regularly check the conditions of the wiring harness, its connections and terminals. Clean the contacts that are oxidising and check that the covers and sheaths are in good condition. To safeguard the life of the electric components, you must keep the machine away from running water, rain and moisture.

**IT IS ALSO PROHIBITED TO WASH IT WITH A PRESSURE WASHER. YOU MAY ONLY USE A WATER HOSE TO WASH THE INSIDE OF THE ROTOR CASING!**

### **TRACK ADJUSTMENT:**

The guide rollers of each track are fixed, except for the front one, which can sway back and forth and has the task of keeping the track guided, under tension. This is provided by a series of 16 spring washers of an overall length "A" of approximately 37 mm. Periodically check the springs in the figure to the side as an elongation of the track corresponds to an increase in that measure. To restore tension to the desired value:

- unscrew lock nut #1
- screw nut #2 to compress the spring pack and restore A = 37 mm.
- tighten lock nut #1



**NB:** Spring washers have a precise order and arrangement, therefore if that part is disassembled, make sure to reassemble them in the same order and orientation.

### **TRACK REPLACEMENT (at authorised workshop)**

replace the tracks if one of the following situations occurs

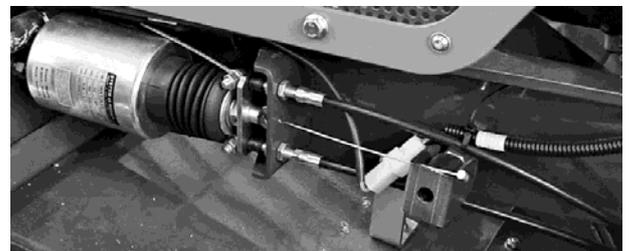
- excessive tread consumption
- excessive consumption of the steel core and coupling difficulties on the teeth of the drive wheel
- excessive elongation and inability to tension them further
- excessive consumption of the internal teeth leading to premature wear of the guide rollers

### **ROLLER REPLACEMENT (at authorised workshop)**

the tracks are aligned and kept tensioned by a series of 6 cylindrical rollers, subject to wear like the tracks. They should be replaced when worn.

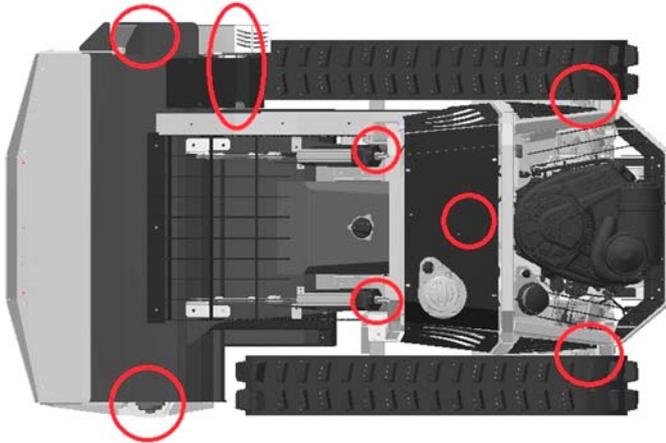
### **REPLACING PARKING BRAKE CABLES (at authorised workshop)**

two cables come out of the electromagnet (in figure to the side) going to the back of the machine. These are responsible for releasing the parking brake of the hydrostatic transmissions. Over time, wear and dust can increase friction. If the release of the brake (or its reactivation in the opposite direction) should slow down compared to when the machine was new, replace both cables.



## **GREASING UCF SUPPORTS:**

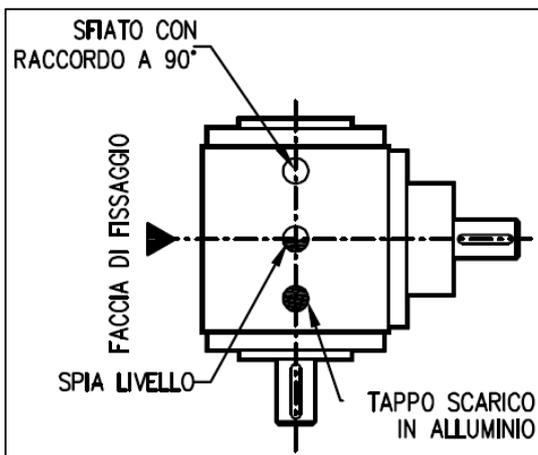
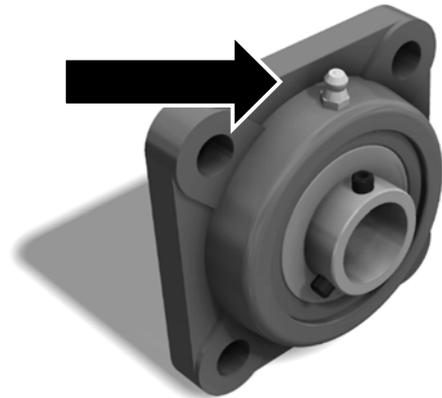
As needed and depending on the conditions of use, the machine's UCF supports need to be lubricated. They are located at the following points:



from left to right in the figure:

- rotor shaft
- intermediate transmission shaft
- lifting pivot points of the deck
- intermediate pulley shaft
- hydrostatic transmission axles

Greasing must be carried out using the nipple shown to the side.



## **BEVEL GEARBOX:**

The bevel gearbox in the figure to the side is prefilled from the factory with the right amount of oil.

Nonetheless, as stated earlier, you should:

- **EVERY 50 HOURS:** check the oil level. While checking the belts the bevel gearbox should also be checked making sure the oil reaches the level in the middle.
- **EVERY 500 HOURS:** COMPLETE OIL CHANGE. Drain the old oil through the drain hole at the bottom and fill with new oil (type: **CLP 220** or **80W-90**) through the upper filler hole, after removing the venting cap, not shown in the figure.

## 9 – STORAGE AND DISPOSAL

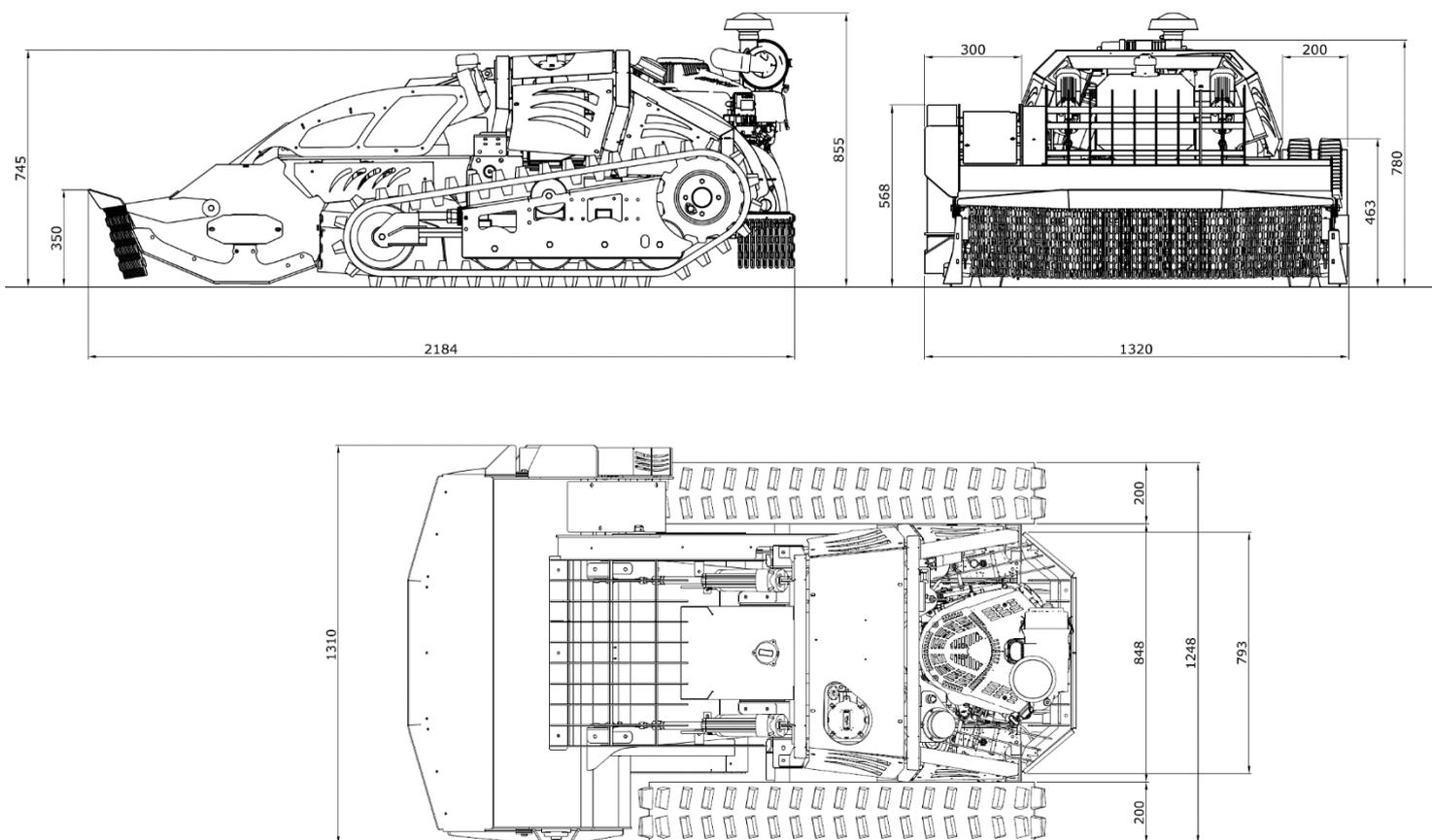
When work is finished, the machine must always be stored on a flat surface to allow the correct outflow of the engine oil.

– **Short-term storage** (< 1 month): park the machine in a closed and dry place after it has been left to cool off completely. Remove the ignition key. Make sure that the battery switch is off. Cover the machine with a tarp. Regularly check that the battery charge does not drop below 12V.

– **Long-term storage** (> 1 month): in addition to the measures taken for short-term storage, the fuel tank should be emptied out, to keep deposits from forming. Lubricate and grease the parts mentioned in the *Maintenance* chapter. Fuel must be stored in cool and dry places, sheltered against light and ignition sources, in approved containers suited to the purpose. Keep the battery under charge during long downtimes!

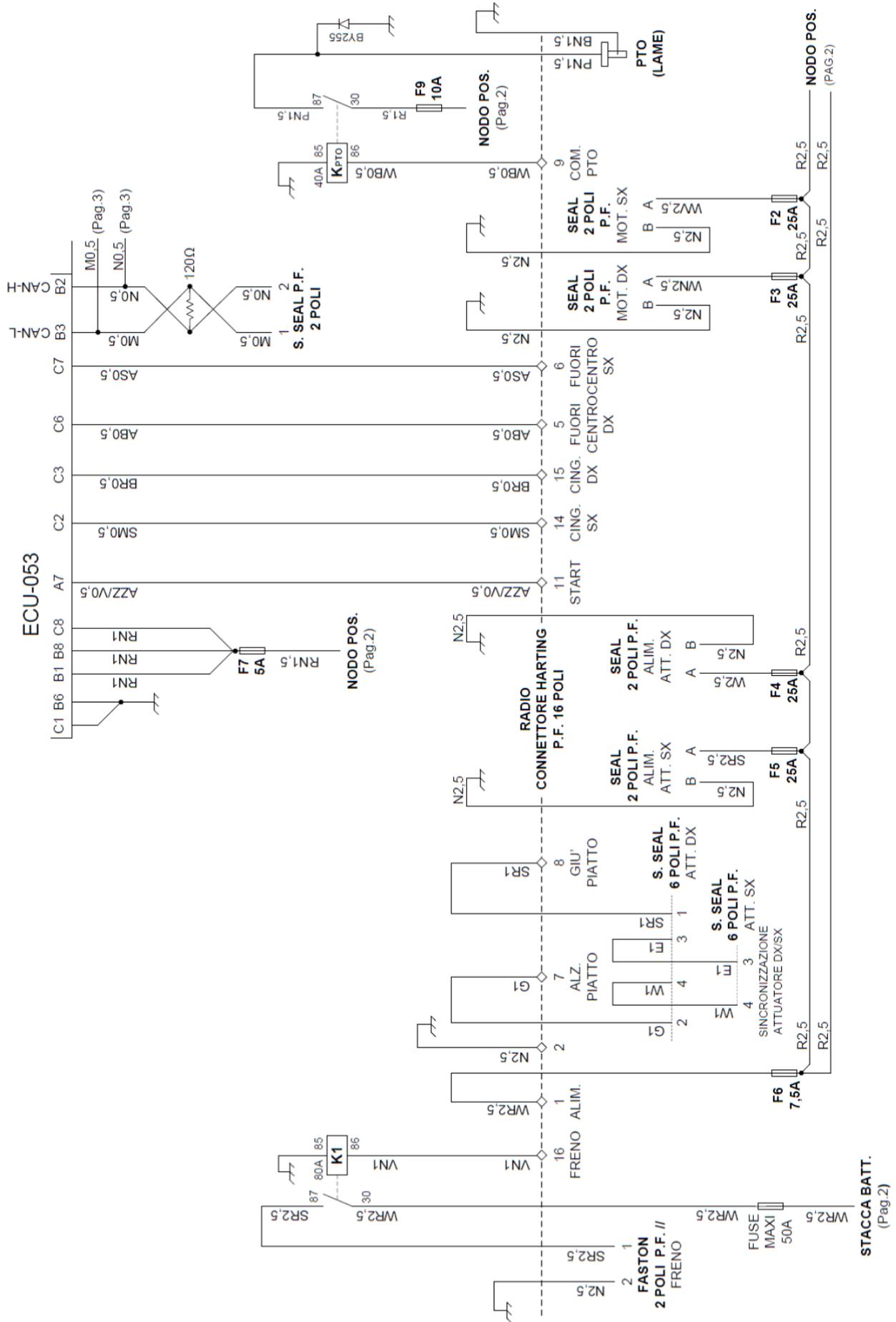
– **End-of-life machine disposal:** the NINJA remote-controlled flail mower consists of various parts whose disposal may follow regulations that differ from one country to another. It is crucial to take care of correct disposal, especially of lubricants and gasoline, battery, belts, electrical parts, all often considered special waste in most places. The rest of the machine consists for the most part of sheet metal. Contact the authorised bodies and NEVER release waste into the environment.

## 10 – DIMENSIONS and DATA SHEET

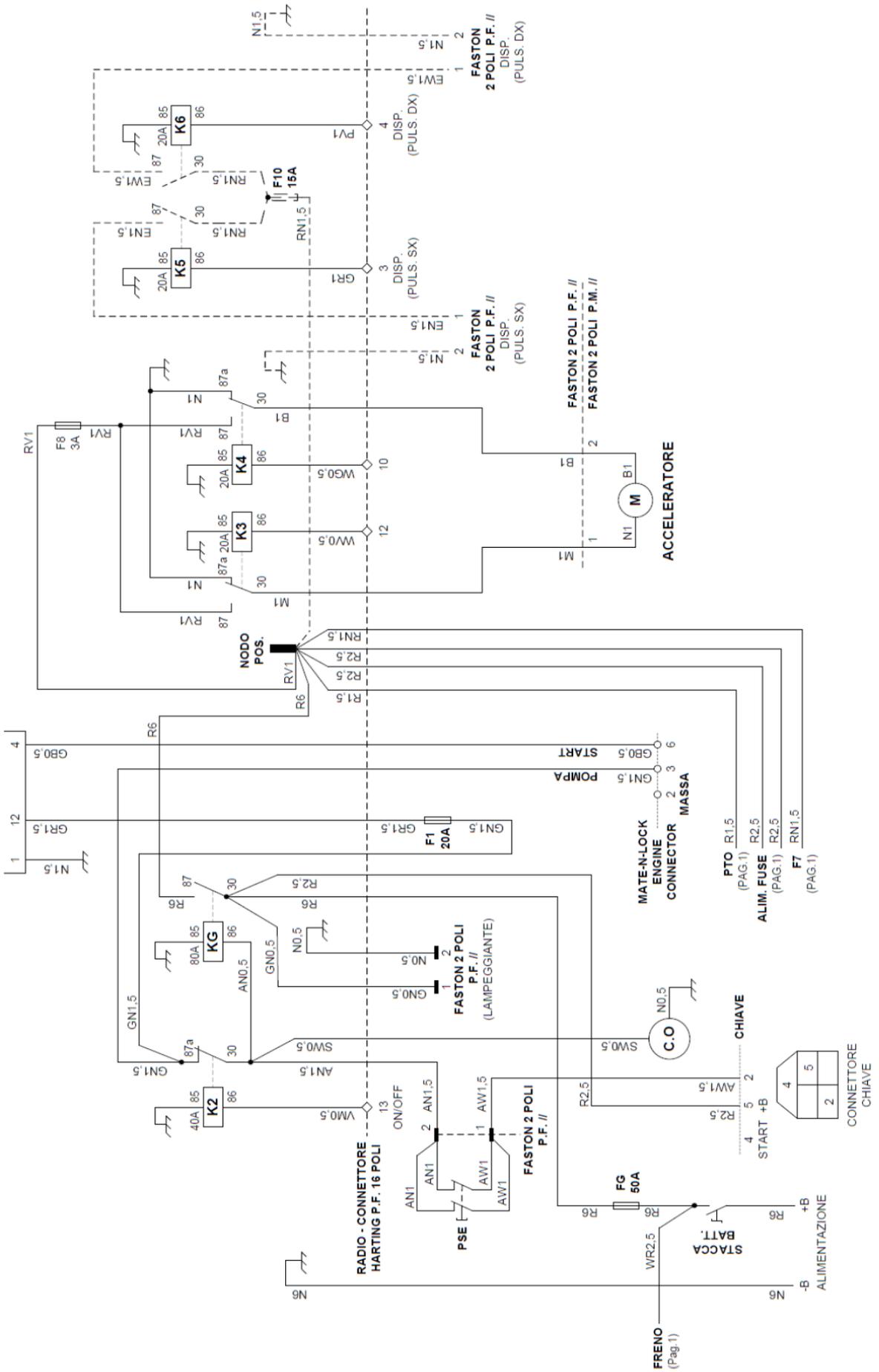


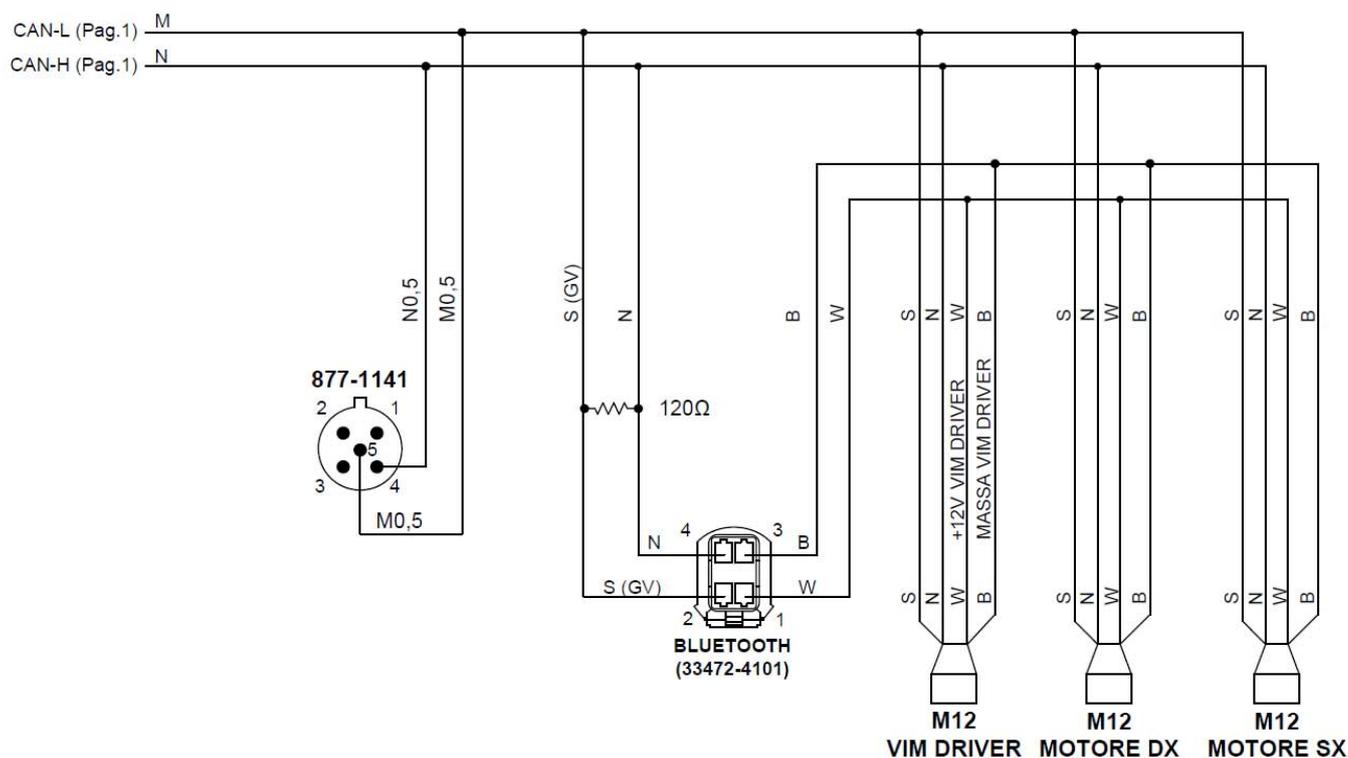
Total Length	2184 mm
Total Width	1310 mm
Total Height	855 mm
Track size	200x72x39
Weight	657 kg (639 kg without fuel)
Hydrostatic Transmissions	Hydro-Gear ZT 3800
Cutting Type	Flail mower with blades
Cutting Height Range	35 – 120 mm
Actual Cutting Width	1100 mm
Number of Blades	48 (= 24 pairs "Y"-shaped)
Rotor Speed and Direction	3200 RPM / backwards
Final Transmission to Rotor	3 x Belts in parallel
PTO	Electromagnetic clutch
Track Outside Width	1248 mm
Fuel Tank Capacity	24 L
Total q.ty of hydrostatic oil (20W-50 mineral)	4,8 L
Total q.ty of engine oil (15W-50 synthetic)	5,2 L
Mowing capacity at 5 km/h	5500 m <sup>2</sup> /h
Max. Speed	5 km/h in both directions
Max. inclination in continuous use	40°
Max. inclination in intermittent use	45°
Max. fuel consumption (approximate)	7 L/h
Battery	12V-32Ah
Sound emission <i>EN ISO 3744:2010</i>	Lwa = 101 dBA ± 3 dBA
Max sound pressure <i>EN ISO 11201-1:2010</i>	Lpa = 92,2 dBA ± 3 dBA
Engine Features	B&S Vanguard 810c EFI (49E8 series) with <i>Oil Guard</i>
Displacement	810 cc
Fuel	Gasoline
Air filter	Cyclonic
Carburetion	Electronic Fuel Injection (EFI)
Crankshaft	Ø28,5 x 109 mm
Max operating speed	3200 RPM
<b>Net</b> power @ 3200 rpm	17,4 kW (23,6 CV)
Starter	Electric
Start-up air management	Electronic
Throttle	Mechanical, electro-actuated

**11 – ELECTRIC SYSTEM DIAGRAM, CAN BUS and COLOUR KEY**



CONNETTORE VIM DRIVER  
(19418-0037) + CONTATTI (19420-0009)





## WIRING DIAGRAM KEY:

### SINGLE COLOURS:

A = ORANGE  
 B = BLUE  
 E = PURPLE  
 G = YELLOW  
 M = BROWN  
 N = BLACK  
 P = PINK  
 R = RED  
 S = GREY  
 V = GREEN  
 W = WHITE  
 AZZ = LIGHT BLUE

### DOUBLE COLOURS:

GB = YELLOW BLUE  
 AR = ORANGE RED  
 VM = GREEN BROWN  
 SB = GREY BLUE  
 WR = WHITE RED  
 PV = PINK GREEN  
 GN = YELLOW BLACK  
 VAZZ = GREEN LIGHT BLUE  
 RN = RED BLACK

THE NUMBER AFTER THE COLOUR IS THE WIRE CROSS-SECTION IN MILLIMETERS.

## 12 – FUSES

In box N°18 of the chapter MAIN PARTS

- **F1: 20A** VIM control unit if key is ON (pin 12)
- **F2: 25A** left hydrostatic transmission
- **F3: 25A** right hydrostatic transmission
- **F4: 25A** rotor lifting actuator
- **F5: 25A** rotor lifting actuator
- **F6: 7,5A** receiver (RX)



Other fuses in wiring harness:

- **F7: 5A** ECU
- **F8: 3A** K3 and K4 relays of engine throttle control
- **F9: 10A** PTO / electromagnetic clutch
- **F10: 15A** optional
- **FUSE MAXI 50A** electromagnet (identified as "BRAKE" in wiring diagram)
- **FG: 50A** on battery key-switch line

## 13 – TROUBLESHOOTING GUIDE

This general guideline cannot completely substitute the experience of an Authorised Workshop with full knowledge of the product. If the following recommendations are not enough to solve a given problem, you should contact a support centre.

In case of impact, drifting, overturning or generic damage, even if the machine appears intact, it must be inspected as soon as possible by an authorised workshop. You must check to make sure the functional and structural parts (chassis, engine, hydrostatic axles, actuators, electromagnet) are completely free of damage and make sure no fluids have spilled. PLEASE NOTE: even if you detect no damage at first sight, an extensive inspection must still be done; certain failures might not be evident to an unskilled user!

### ■) ENGINE STARTER does not run

- Start-up disabled => check the procedure in chapter SYNCHRONISATION and START-UP
- one or more fuses need to be replaced => see chapter FUSES.
- battery can't supply sufficient current / is low / is faulty => check that the cables are properly secured to the terminals / recharge/ replace with a new one.

### ■) ENGINE STARTER works but the engine does not

- fuel tank empty => fill up.
- engine flooded due to incorrect priming after a complete oil change => contact authorised workshop
- spark plug caps off => put them back in place.
- air filter blocked / to be changed => clean as described in chapter MAINTENANCE or replace with a new one.
- the fuel tank breather cap does not work => open and close again to see whether the engine starts. Get a new cap or bleed the breather cap.
- spark plugs soiled or wrong distance between electrodes => see engine manual.
- gasoline is dirty or fuel line obstructed => empty tank, clean hoses, fill with new gasoline compliant with the specifications mentioned in the chapter FUEL.
- gasoline filter blocked => clean, as described in engine manual.

### ■) ENGINE heated up but still works irregularly

- air filter blocked / to be changed => clean as described in chapter MAINTENANCE or replace with a new one.
- spark plugs soiled or wrong distance between electrodes => see engine manual.
- gasoline is dirty or fuel line obstructed => empty tank, clean hoses, fill with new gasoline compliant with the specifications mentioned in the chapter FUEL.
- gasoline filter partially blocked => clean, as described in engine manual.

### ■) ENGINE starts and works regularly but the machine does not move

- bypass engaged: hydrostatic transmissions damage hazard! => remove it immediately as described in chapter 6f 2)
- parking brake engaged: hydrostatic transmissions damage hazard! => immediately check the parking brake release electromagnet. Pressing switch S1 with the relative light switching on, you should hear a distinct metal sound which means that the electromagnetic is moving properly forward and the parking brake releases.

- hydrostatic transmissions overheated from intense, prolonged use, on slopes, and at high environmental temperatures => let the machine cool off completely before resuming work. Check that the transmissions are clear of debris which make them overheat.

■) **ENGINE switches off suddenly during work**

- too much effort: forward speed too high / cutting height not proportionate to the ground / throttle not at maximum speed => reduce forward speed / raise the cutting height / move the throttle to maximum speed.
- fuel has run out => fuel tank.
- fuel intake problems => inspect the fuel tube coming out of the tank and/or the fuel filter of the engine, looking for impurities to remove.
- extreme overheating => let the engine and machine cool off and do not keep working in similar conditions. Wait for better conditions or take more frequent breaks.
- electric problem with the engine => contact *Briggs & Stratton*.

■) **the ROTOR does not engage**

- electromagnet clutch at end-of-life => replace
- belts to rotor elongated => adjust or replace, contact a workshop for information.

■) **the machine VIBRATES more than expected**

- blades missing, broken, bent => replace them immediately
- fixing nuts and bolts loose => tighten immediately and assess whether to completely change the fixing nuts if they have lost their clamping capacity (M12 cone-lock nuts).
- blades and bolts all right, rotor bent by shocks received => complete rotor change at authorised workshop.
- engine plate loose => tighten fixing bolts of the engine to the chassis

■) **the machine makes more NOISE than expected**

- if the noise comes from the hydrostatic transmissions => wait for them to cool off and see whether it stops; otherwise continue with inspection and perform a complete oil change at an authorised workshop.

■) **the engine SMOKES anomalously**

- the engine burns oil because piston rings are worn => contact Briggs & Stratton
- engine oil level too high => draw it from the Oil Guard tank.

■) **the ENGINE overheats**

- debris around and especially on top of the engine surface => clear all engine surfaces from buildups, especially on top.
- insufficient amount of oil => top up immediately as described in chapter LUBRICANTS.

■) **the CUT is irregular**

- blades partially damaged, worn, missing => *act as described in chapter CUTTING*
- the rotor deck is clogged => have it washed. **Cutting quality greatly depends on clearance space around the rotor!**
- the engine (and therefore the rotor) is not running at full speed => move the throttle control to maximum while mowing to achieve ideal cutting speed.
- the forward speed and/or cutting height are not proportionate to the density of vegetation to be cut => slow down and raise the deck. If necessary, pass again over the part already cut.
- if the cut is not symmetrical, the rotor deck has likely undergone shocks that damaged it. Check and if necessary contact an authorised workshop.

- if the cut is not symmetrical but the rotor deck has not undergone shocks => check whether the two threaded tie rods that lift the casing are adjusted differently.
- if the cut is too rough with a fully grassy terrain => INCREASE forward speed by lowering the height of the rotor to further clog the casing and increase shredding before it unloads on the ground. This doesn't apply IF THE TERRAIN HAS BRANCHES OR SHRUBS.

■) **rotor CASING clogged**

- the terrain is too moist => clean the inside of the casing more frequently, raise the cutting height, assess whether to perform more passes or to work at a time of the day with a drier climate.
- blades consumed => replace them because poor shredding due to a worn cutter leads to further accumulations.

■) **THE MACHINE DOES NOT BRAKE**

- tracks are worn and lose grip => replace
- tracks too slack lose the tooth of the drive wheel => tension them as described in the relative paragraph in chapter MAINTENANCE
- check that releasing joystick J2 makes it actually move to the middle
- if parking brake is not happening check that switch S1 works properly, and in particular that there are no obstacles that hold the electromagnetic cables.

■) **BATTERY does not recharge**

- recharging circuit of wiring harness does not work properly => check fuses
- engine alternator does not work properly => *Briggs & Stratton* service centre.
- battery is faulty => replace.

■) **the TRACKS often come off the guide rollers**

- insufficient tension => restore correct preload
- guide rollers worn => replace
- tracks worn => replace
- foreign body has entered from the side => remove it safely and check for any damage



**MECCANICA BENASSI S.r.l.**

CAP. SOC. € 619.200 INT. VERS.

SEDE SOCIALE E STABILIMENTO: VIA STATALE 325, DOSSO – 44047 TERRE DEL RENO (FE) ITALIA

www.benassi.it e-mail: [info@benassi.it](mailto:info@benassi.it)

TEL. +39 0532 848193

FAX +39 051 0822449

R.E.A. FE 97187

EXPORT FE 001080

REGISTRO IMPRESE FERRARA

COD.FISCALE 00341260388

P.IVA 00341260388

ISO IT00341260388

## DECLARATION OF CONFORMITY Annex IIA - 2006/42/EC

The company **Meccanica Benassi Srl** with headquarters in Dosso, via Statale 325, 44047 Terre di Reno (FE) - Italy, as manufacturer and depositary of the technical documentation, declares that the machine:

Type: remote-controlled flail mower

Models: NINJA

Serial number: D100000 - D199999

Power @ 3200 rpm: 17,4 kW

Weight (dry): 639 kg

Complies with the following applicable directives/standards:

2006/42/EC

2014/53/EU

2011/65/EU as amended

The following standards were followed:

EN 12100:2010; EN 12733:2018; EN 4254-1:2015; EN 60204-1:2018; EN 62841-1:2015; EN 60950-1:2006 +A11:2009+A12:2011+A1:2010+A2:2013; EN ISO 13849-1:2015; EN 300 328 V2.1.1; EN 300 228 V2.2.2; EN 61326-3-1:2017; EN 301 489-1 V2.1.1; EN 301 489-17 V3.1.1; EN 301 489-17 V3.2.4; EN 62479:2010; EN ISO 14982:1989; EN 55012:2007+A1:2009; EN 62233:2008

Dosso, 12/2025

Mattia Mantovani  
Legal Representative