



<i>Section</i>	<i>Page No.</i>
INTRODUCTION	1
PURPOSE OF MACHINE	2
MACHINE DIMENSIONS & SPECIFICATIONS	2
PARTS LOCATION DIAGRAMS	4
SAFE WORKING	6
Operator's Personal Protective Equipment Required	6
Basic Woodchipping Safety	6
General Safety Matters - Do's and Dont's	7
Noise Test	8
OPERATING INSTRUCTIONS	9
Safe Transportation	9
Hitching onto the Tow Ball	9
Unhitching the Chipper	9
Stabilising the Chipper	9
Delivery	10
Operator's Personal Protective Equipment Required	10
Manual Controls	10
Auto Controls	11
Emergency Stopping	11
Engine Controls	11
Blade Wear	11
Hydraulic Oil Level Indicator	11
Fuel Level Indicator	11
Daily Checks Before Starting	11
Before Using the Chipper	12
Starting the Engine	12
Stopping the Engine	12
Discharge Controls	12
Starting to Chip	13
Chipping	13
Blockages	13
SERVICE INSTRUCTIONS	14
Service Schedule	15
Safe Maintenance	16
Safe Lifting of the Chipper	16
Spares	16
Battery Removal and Maintenance	16
Check Fittings	16
Copper Ease Safety Information	17
Battery Safety Information	17
Change Blades	19
Tension Drive Belts	20
Change Hydraulic Oil and Filter	20
Grease the Discharge Flange	20
Grease the Roller Spline and Rotor Bearings	21
Grease the Roller Box Slides	21
Engine Servicing	21
Check Hoses	21
WARRANTY STATEMENT	22
EC DECLARATION OF CONFORMITY CERTIFICATE	23
IDENTIFICATION PLATE	24
DECALS	25
ELECTRICAL DETAIL	27
CIRCUIT DIAGRAM	28
HYDRAULIC LAYOUT	29
PARTS LISTS	30



INTRODUCTION

Thank you for choosing Timberwolf. Timberwolf chippers are designed to give safe and dependable service if operated according to the instructions.

IMPORTANT HEALTH AND SAFETY INFORMATION

Before using your new chipper, please take time to read this manual. Failure to do so could result in:

- PERSONAL INJURY
- EQUIPMENT DAMAGE
- DAMAGE TO PROPERTY
- 3RD PARTY INJURIES

This manual covers the operation and maintenance of the Timberwolf TW 230DHB. All information in this manual is based on the latest product information available at the time of purchase. .

All the information you need to operate the machine safely and effectively is contained within pages 3 to 13. Ensure that all operators are **properly trained** for operating this machine, especially **safe working practices**.

Timberwolf's policy of regularly reviewing and improving their products may involve major or minor changes to the chippers or their accessories. Timberwolf reserves the right to make changes at any time without notice and without incurring any obligation.

Due to improvements in design and performance during production there may be, in some cases, minor discrepancies between the actual chipper and the text in this manual.

The manual should be considered an important part of the machine and should remain with it if the machine is resold.

ALWAYS FOLLOW SAFE OPERATING AND MAINTENANCE PRACTICES



CAUTION or WARNING

BE AWARE OF THIS SYMBOL AND WHERE SHOWN, CAREFULLY FOLLOW THE INSTRUCTIONS.

This caution symbol indicates important safety messages in this manual. When you see this symbol, be alert to the possibility of injury to yourself or others and carefully read the message that follows.



The Timberwolf TW 230DHB

Designed to chip solid wood material up to 160mm in diameter and capable of chipping over 5 tonnes of brushwood per hour.

DIMENSIONS

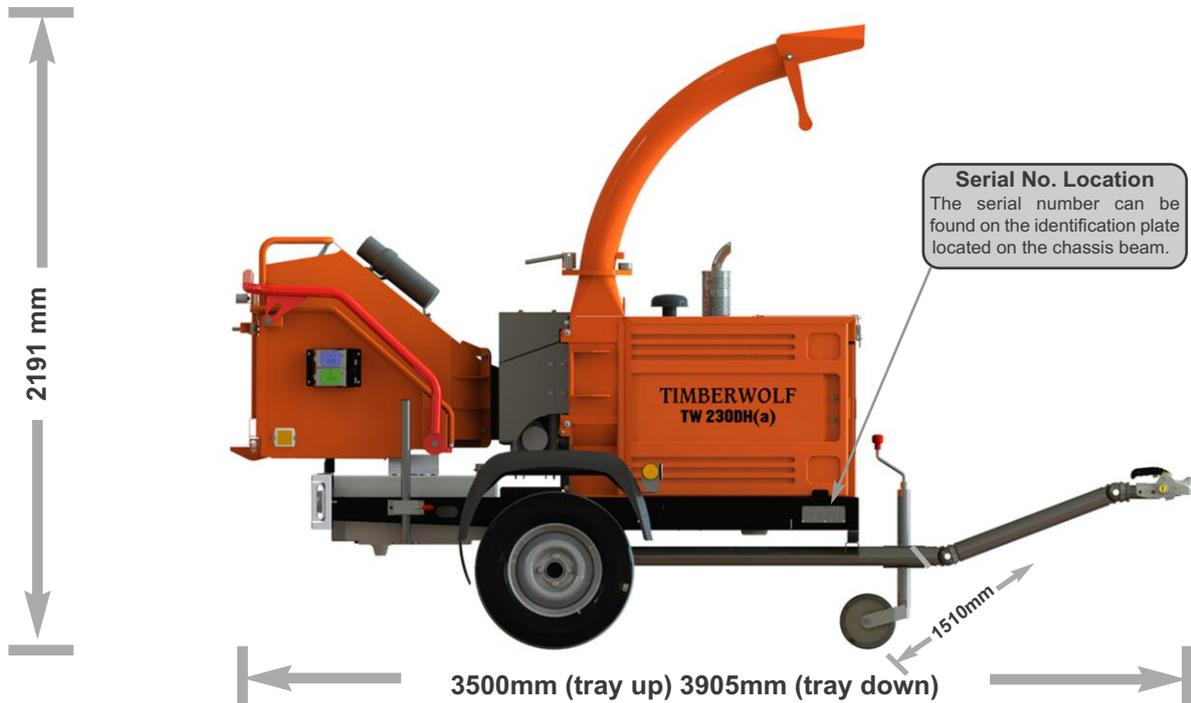


TIMBERWOLF TW 230DHB SPECIFICATION

Engine type:	<i>Kubota 4-cylinder diesel</i>	Maximum diameter material:	160mm (6 1/8 ")
Maximum power:	26kW (35hp)	Fuel capacity:	18 litres
Cooling method:	Water cooled	Hydraulic oil capacity:	15 litres
Overall weight:	749kg	Material processing capacity:	up to 5 tonnes/hr
Starting method:	Electric	Fuel type:	Diesel
Roller feed:	Twin hydraulic motors		



DIMENSIONS - WITH ADJUSTABLE TOWHEAD

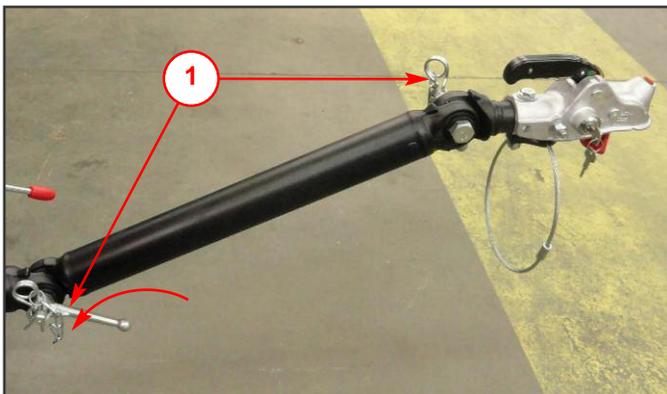


TIMBERWOLF TW 230DH(a) (ADJUSTABLE TOWHEAD) SPECIFICATION

Engine type:	<i>Kubota 4-cylinder diesel</i>	Maximum diameter material:	<i>160mm (6 1/8")</i>
Maximum power:	<i>26kW (35hp)</i>	Fuel capacity:	<i>18 litres</i>
Cooling method:	<i>Water cooled</i>	Hydraulic oil capacity:	<i>15 litres</i>
Overall weight:	<i>749kg</i>	Material processing capacity:	<i>up to 5 tonnes/hr</i>
Starting method:	<i>Electric</i>	Fuel type:	<i>Diesel</i>
Roller feed:	<i>Twin hydraulic motors</i>		

ADJUSTING THE TOWHEAD HEIGHT

The TW 230DH(a) chipper has the ability to adjust the towhead height to correspond with the vehicles towing point.



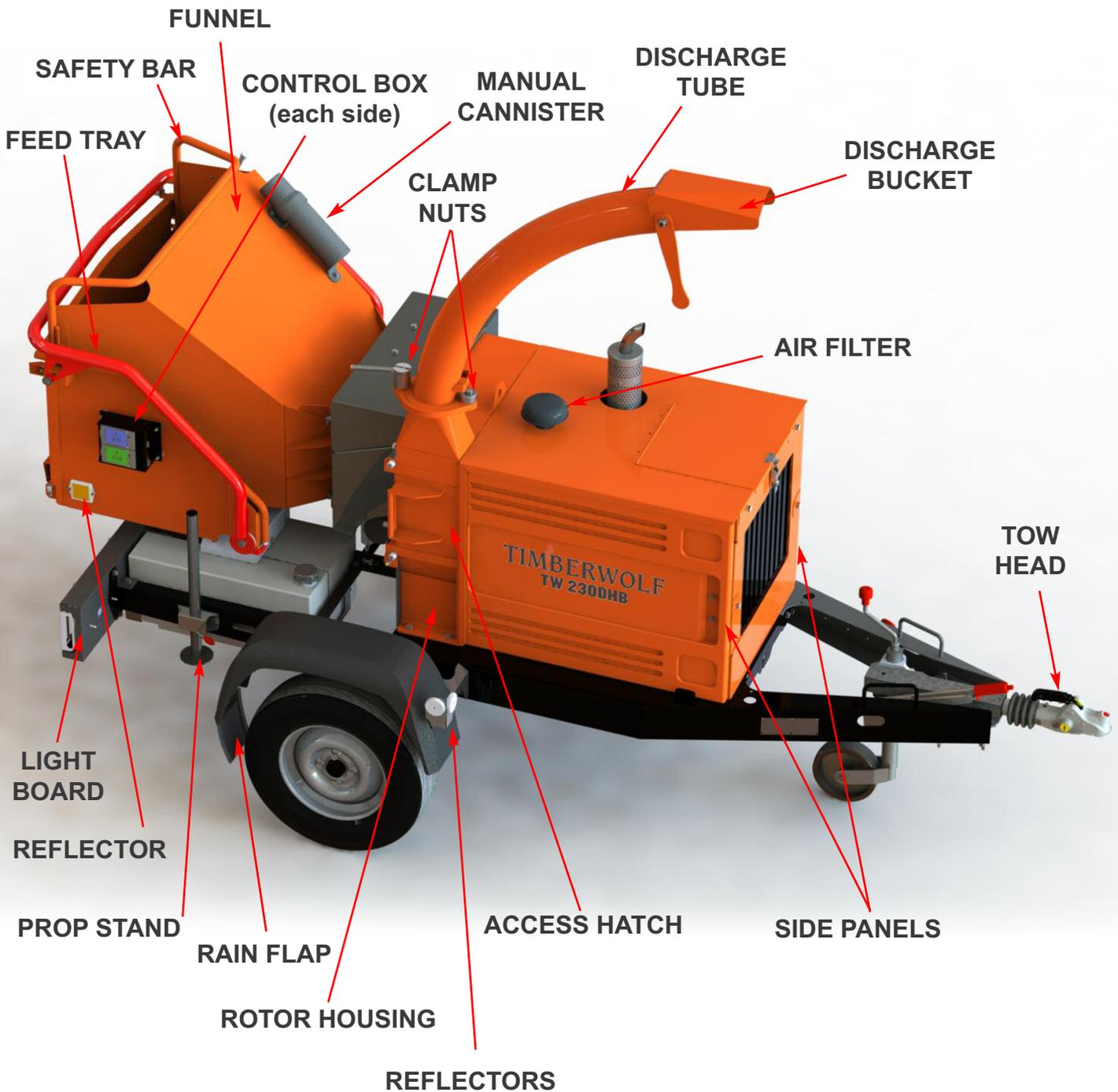
The preferred towing angle of any chipper is with the chassis level to the ground. The adjustable head has the ability to move between 320mm from the ground to 810mm giving an overall adjustment of 490mm.

The adjustable towhead fundamentally works the same as a fixed standard towhead, however the front section of the head is retained in position via 2 locking rings.

To adjust the height the locking handles located on the side of the head (1) are turned in an anticlockwise direction to allow for the locking ring to disengage from its apposing ring. Once the desired height has been achieved the locking handles are turned clockwise until tight. The latching of the hitch is as normal as is the fitting of the light plug and breakaway cable as outlined in the 'Hitching onto the tow ball' section on page 9.

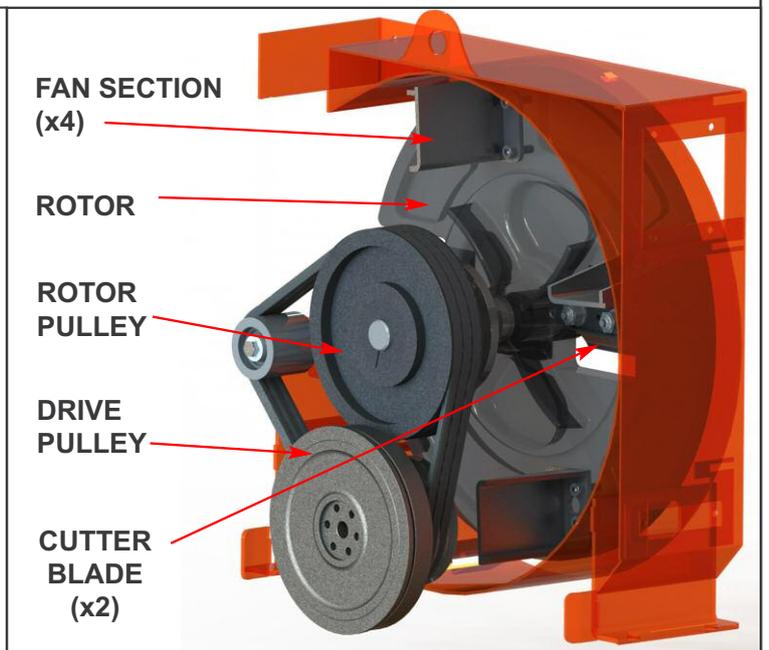
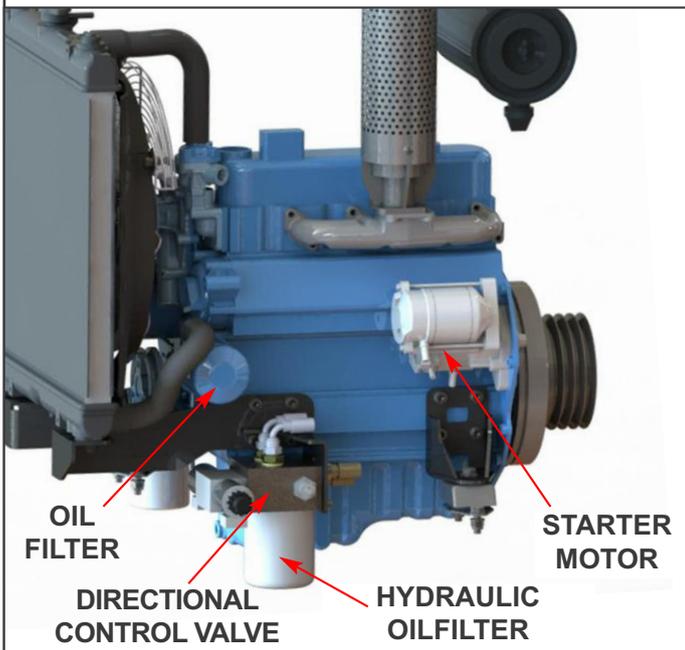
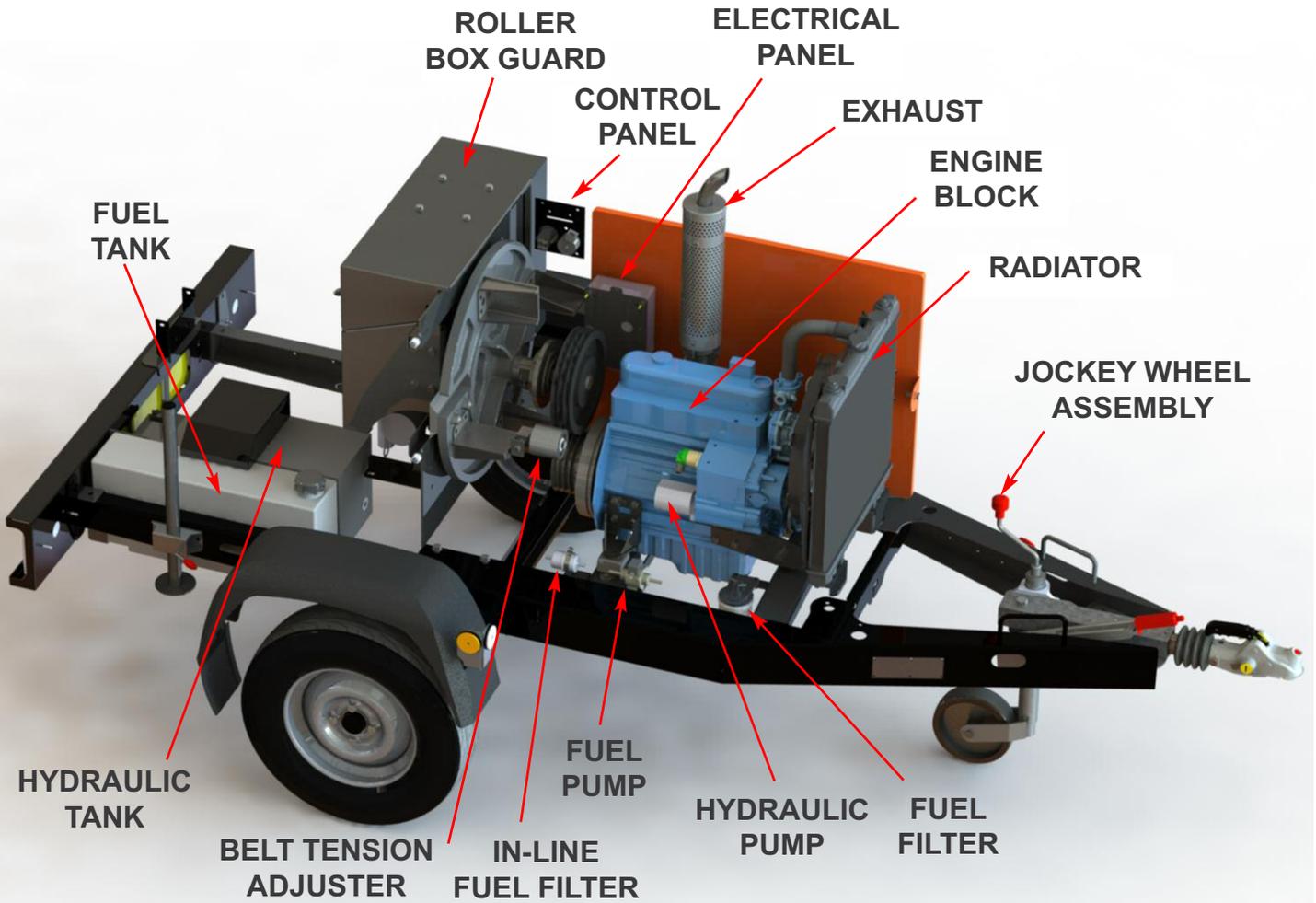


PARTS LOCATOR





PARTS LOCATOR





WARNING

The chipper will feed material through on its own. To do this, it relies on sharp blades both on the feed rollers and the chipper rotor. To keep the blades sharp, only feed the machine with clean brushwood. **DO NOT** put muddy/dirty wood, roots, potted plants, bricks, stones or metal into the chipper.



OPERATOR'S PERSONAL PROTECTIVE EQUIPMENT REQUIRED



Chainsaw safety helmet fitted with mesh visor and recommended ear defenders to the appropriate specifications.



Close fitting heavy-duty non-snag clothing.



Work gloves with elasticated wrist.



Face mask if appropriate.



Steel toe cap safety boots.



DO NOT wear rings, bracelets, watches, jewellery or any other items that could be caught in the material and draw you into the chipper.

BASIC WOODCHIPPING SAFETY

The operator should be aware of the following points:

- **MAINTAIN A SAFETY EXCLUSION ZONE** around the chipper of at least 10 metres for the general public or employees without adequate protection. Use hazard tape to identify this working area and keep it clear from debris build up. Chips should be ejected away from any area the general public have access to.
- **HAZARDOUS MATERIAL** - Some species of trees and bushes are poisonous. The chipping action can produce vapour, spray and dust that can irritate the skin. This may lead to respiratory problems or even cause serious poisoning. Check the material to be chipped before you start. Avoid confined spaces and use a facemask if necessary.
- **BE AWARE** when the chipper is processing material that is an awkward shape. The material can move from side to side in the funnel with great force. If the material extends beyond the funnel, the brush may push you to one side causing danger. Badly twisted brush should be trimmed before being chipped to avoid thrashing in the feed funnel.
- **BE AWARE** that the chipper can eject chips out of the feed funnel with considerable force. Always wear full head and face protection.
- **ALWAYS** work on the side of the machine furthest from any local danger, e.g. not road side.



GENERAL SAFETY MATTERS



DO'S AND DON'TS



ALWAYS stop the chipper engine before making any adjustments, refuelling or cleaning.

ALWAYS check rotor has stopped rotating and remove chipper ignition key before maintenance of any kind, or whenever the machine is to be left unattended.

ALWAYS check the machine is well supported and cannot move.

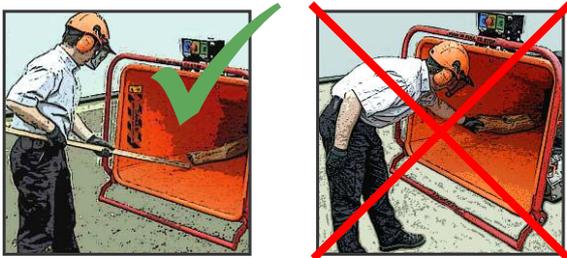
ALWAYS operate the chipper with the engine set to maximum speed when chipping.

ALWAYS check (visually) for fluid leaks.

ALWAYS take regular breaks. Wearing personal protective equipment for long periods can be tiring and hot.

ALWAYS keep hands, feet and clothing out of feed opening, discharge and moving parts.

ALWAYS use the next piece of material or a push stick to push in short pieces. Under no circumstances should you reach into the funnel.



ALWAYS keep the operating area clear of people, animals and children.

ALWAYS keep the operating area clear from debris build up.

ALWAYS keep clear of the chip discharge tube. Foreign objects may be ejected with great force.

ALWAYS ensure protective guarding is in place before commencing work. Failure to do so may result in personal injury or loss of life.

ALWAYS operate the chipper in a well ventilated area - exhaust fumes are dangerous.

DO NOT operate chipper unless available light is sufficient to see clearly.

DO NOT use or attempt to start the chipper without the feed funnel, guards and discharge unit securely in place.

DO NOT stand directly in front of the feed funnel when using the chipper. Stand to one side.

DO NOT allow -



BRICKS STRING CLOTH PLASTIC STONES



METAL GLASS RUBBER ROOTS BEDDING PLANTS

- to enter the machine, as damage is likely.

DO NOT smoke when refuelling.



DO NOT let anyone who has not received instruction operate the machine.

DO NOT climb on the machine at any time.

DO NOT handle material that is partially engaged in the machine.

DO NOT touch any exposed wiring while machine is running.

DO NOT use the chipper inside buildings.

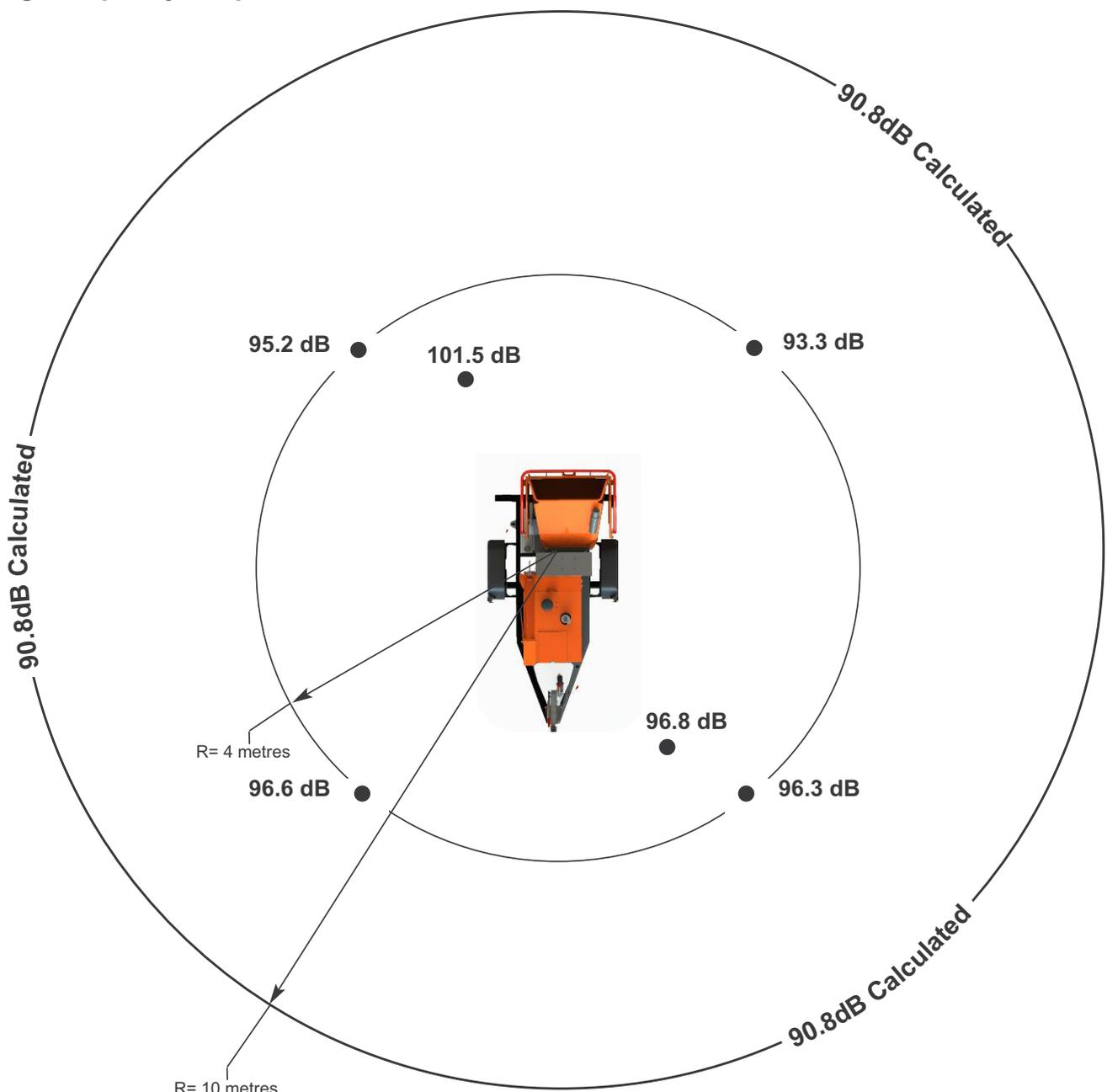


NOISE TEST

MACHINE: TW 230DHB

NOTES: Tested chipping 120mm x 120mm corsican pine 1.5m in length

Noise levels above 80dB (A) will be experienced at the working position. Wear ear protection at all times to prevent possible damage to hearing. All persons within a 4 metre radius must also wear good quality ear protection.



Guaranteed Sound Power: 120dB (A)

As required by Annex III of Directive 2000/14/EC "Noise Emission in the environment by equipment for use outdoors".



SAFE TRANSPORTATION

WARNING

DO NOT RIDE ON THE CHIPPER WHEN IT IS BEING TOWED.



- WHEN towing a chipper the maximum speed limit is 60 mph.
- ON rough or bumpy road surfaces reduce speed accordingly to protect your machine from unnecessary vibration.
- WHEN towing off road be aware of objects that may catch the chipper undergear.
- WHEN towing off road ensure inclination is not excessive.
- AVOID excessively pot holed ground.

- WHEN reversing the chipper the short wheel base will react quickly to steering.
- ALWAYS check the discharge is tight before moving.
- KEEP tyre pressures inflated to 2.2 bar or 32 psi.
- CHECK wheel nuts are tightened to 90Nm or 65 lbs ft.
- CLEAR loose chippings and debris from the machine before departing.
- ENSURE feed funnel is closed and the catch is properly engaged before departing.

HITCHING ONTO THE TOW BALL

- CHECK ball head is well greased.
- WIND jockey wheel assembly anticlockwise until the tow head is above the height of the ball hitch on the vehicle.
- REVERSE vehicle so the ball hitch is directly below the tow head.
- ATTACH breakaway cable to a strong point on the vehicle, not the ball hitch.
- GRASP handle on tow head and push back catch with thumb.
- WIND jockey wheel assembly clockwise, to lower the tow head onto the ball hitch.
- RELEASE handle and continue to wind jockey

wheel clockwise. The tow head should snap into place on the ball hitch. If it doesn't, repeat previous 2 steps.

- WIND jockey wheel up until fully retracted and the jockey wheel frame is seated in its notch on the stem. The chipper weight should be fully on the vehicle.
- RELEASE jockey wheel clamp and slide the jockey wheel assembly fully up.
- TIGHTEN clamp on jockey wheel assembly.
- CONNECT electrical plug to socket on rear of towing vehicle and check operation of all the trailer and vehicle lights.
- THE chipper is now properly attached to the vehicle.

UNHITCHING THE CHIPPER

- ENSURE the chipper will not roll away after being disconnected from the vehicle.
- DISCONNECT the electrical cable from the vehicle socket.
- RELEASE breakaway cable.
- RELEASE the jockey wheel assembly clamp.
- LOWER the jockey wheel assembly fully.
- RETIGHTEN the jockey wheel assembly clamp.
- WIND the jockey wheel assembly anticlockwise until it

starts to take the weight of the chipper.

- GRASP the handle and release the catch with your thumb.
- CONTINUE to wind the jockey wheel anticlockwise. This should lift the tow head clear of the ball hitch.
- DRIVE the vehicle clear of the chipper.
- WIND the jockey wheel assembly to a suitable point where the chipper is level.
- THE chipper is now fully detached from the vehicle.

STABILISING THE CHIPPER

When hitched to a vehicle the chipper handbrake should be released and the prop stand and jockey wheel stored in the towing position (a).

When the chipper is unhitched it should be made secure before starting work by applying the handbrake and lowering the prop stand and jockey wheel (b).





DELIVERY

All Timberwolf TW 230DHB machines have a full pre - delivery inspection before leaving the factory and are ready to use. Read and understand this instruction manual before attempting to operate the chipper. In particular, read pages 6-8 which contain important health and safety information and advice.

OPERATOR'S PERSONAL PROTECTIVE EQUIPMENT REQUIRED

- CHAINSAW safety helmet fitted with visor and recommended ear defenders to an appropriate specification.
- HEAVY-DUTY gloves with elasticated wrist area.
- CLOSE - FITTING heavy-duty non-snag clothing.
- SAFETY footwear.
- FACE MASK (if appropriate).

See page 6 for more detailed information.

MANUAL CONTROLS

Roller control boxes- a control box is located on either side of the feed funnel. Their function is to control the feed roller whilst processing material. **They do not control the main rotor.**

RED SAFETY BAR = This is the large red bar that surrounds the feed tray and side of the feed funnel. The bar is spring loaded and connected to a switch that will interrupt the power to the rollers. The switch is designed so that it only activates if the bar is pushed to the limit of its travel. The rollers stop instantly, but can be made to turn again by pressing either the **GREEN FEED** or **BLUE REVERSE** control buttons.

RED SAFETY BAR TEST

To ensure the safety bar is always operational it must be activated once before each work session.

WARNING

DO NOT remove, jam, disable, bypass, override or otherwise impede the effectiveness of the red safety bar.

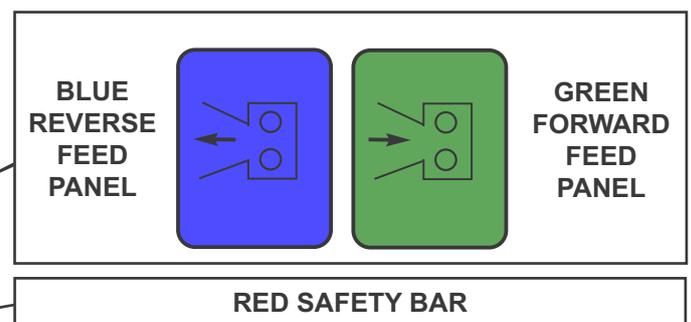


GREEN BUTTON = Forward feed - Push the button once - this activates the rollers and will allow you to start chipping (if the rotor speed is high enough).

BLUE BUTTON = Reverse feed - allows you to back material out of the rollers. The rollers will only turn in reverse as long as you keep pressing the button.

Control Box Diagram

There are two control boxes, located on either side of the feed tray.



Do not rely on the red bar to keep the roller stationary if it is necessary to clear or touch the roller. Always switch off the machine and remove ignition key before approaching the roller.



AUTO CONTROLS

The no stress unit controls the feed rate of the material going into the chipping chamber. When the rotor speed is below the predetermined level the no stress unit will not allow the feed rollers to work in the forward direction. When the rotor speed rises above the predetermined level the feed rollers will start turning without warning.

EMERGENCY STOPPING

Push the **RED SAFETY BAR**. The rotor will still be turning, the engine must be powered down to stop the rotor. Turn off the engine ignition key.

ENGINE CONTROLS

For operator convenience the engine speed control is mounted on the funnel. Always start the engine with the lever in the 'slow' (idle) position. With the throttle lever in the 'fast' position the machine is ready to chip. It MUST be fully pushed to the left to achieve a suitable working speed. If no wood is to be chipped for a few minutes the throttle should be returned to the 'slow' (idle) position.



BLADE WEAR

The most important part of using a wood chipper is keeping the cutter blades sharp. Timberwolf chipper blades are hollow ground to an angle of 40 degrees. When performing daily blade checks ensure blade edge is sharp and free from chips, if there is any evidence of damage, or the edge is "dull" change the blade(s). The TW 230DHB is fitted with 2 blades 135mm (5") long. They are 100mm wide when new. A new blade should chip for up to 25 hours before it requires sharpening. This figure will be drastically reduced by feeding the machine with stony, sandy or muddy material.

As the blade becomes blunt, performance is reduced. With increased stress and load on the machine the chips will become more irregular and stringy. At this point the blade should be sent to a reputable blade sharpening company. The blade can be sharpened several times in its life. A wear mark indicates the safe limit of blade wear. Replace when this line is exceeded.

The machine is also fitted with a static blade (anvil). It is important that the anvil is in good condition to allow the cutting blades to function efficiently. Performance will be poor even with sharp cutter blades if the anvil is worn.

HYDRAULIC OIL LEVEL INDICATOR

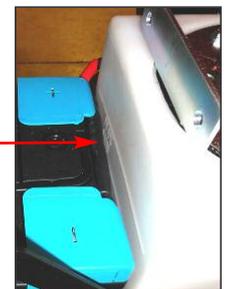
The oil level will be visible through the tank wall. It should be within the upper and lower level marks.

FUEL LEVEL INDICATOR

The fuel level can be seen through the wall of the plastic tank.

DAILY CHECKS BEFORE STARTING

- LOCATE the machine on firm level ground.
 - CHECK machine is well supported and cannot move.
 - CHECK jack stand is lowered and secure.
 - CHECK all guards are fitted and secure.
 - CHECK the discharge unit is in place and fastened securely.
 - CHECK discharge tube is pointing in a safe direction.
 - CHECK the feed funnel to ensure no objects are inside.
 - CHECK feed tray is in up position - to prevent people reaching rollers.
 - CHECK controls as described on page 12.
 - CHECK (visually) for fluid leaks.
 - CHECK fuel and hydraulic oil levels.
- For parts location see diagrams on pages 4 & 5.*





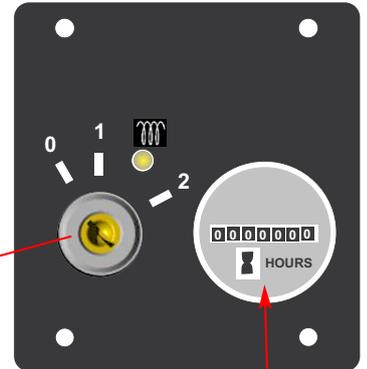
BEFORE USING THE CHIPPER

WITH THE ENGINE RUNNING AT FULL SPEED



STARTING THE ENGINE

- ENSURE throttle lever is in the slow (tortoise) position.
- INSERT key. Turn to heat.
- HEATER LED comes on.
- WAIT FOR HEATER LED TO GO OUT.
- TURN key to engage starter motor.
- RELEASE key once engine starts.



HOURS COUNTER

Do not engage starter motor for more than 20 seconds - allow one minute before attempting to start. Investigate reasons for failure to start.

STOPPING THE ENGINE

- MOVE the throttle lever to the 'Tortoise' to reduce the engine speed to idle.
- LEAVE the engine running for 1 minute.
- TURN the power switch to position 0. The engine should stop after a few seconds.
- REMOVE the ignition key.

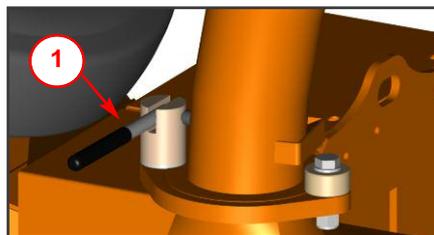
For more detailed information refer to the Engine Owner's Manual

DISCHARGE CONTROLS

Controlling the discharge is an essential part of safe working.

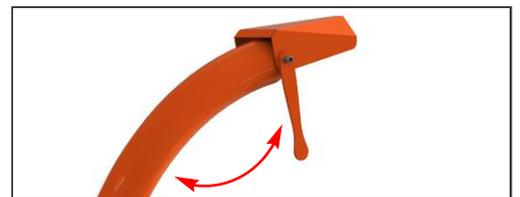
ROTATION

1. Slacken nut using integral handle.
2. Rotate tube.
3. Retighten nut.



BUCKET ANGLE

4. Adjust the bucket to the desired angle using the handle provided.





STARTING TO CHIP

WARNING

Do not use or attempt to start the chipper without the protective guarding and discharge unit securely in place. Failure to do so may result in personal injury or loss of life.



- CHECK that the chipper is running smoothly.
- RELEASE the catches on the feed tray and lower.
- PERFORM the “before using the chipper” tests (see page 12).
- PRESS the green control button. The rollers will commence turning.
- STAND to one side of the feed funnel.
- PROCEED to feed material into the feed funnel.

CHIPPING

Wood up to the recommended diameter can be fed into the feed funnel. Put the butt end in first and engage it with the feed rollers. The hydraulic feed rollers will pull the branch into the machine quite quickly. Large diameter material will have its feed rate automatically controlled by the no stress unit.

Sometimes a piece of wood that is a particularly awkward shape is too strong for the feed rollers to break. This will cause the top roller to either bounce up and down on the wood, or both rollers to stall. If this occurs, press the **BLUE REVERSE** button until the material has been released. Pull the material out of the feed funnel and trim it so the chipper can handle it.

Both feed rollers should always turn at the same speed. If one or both rollers stop or suddenly slow down it may be that a piece of wood has become stuck behind one of the rollers. If this occurs, press the **BLUE REVERSE** button and hold for 2 seconds - then repress **GREEN FEED** button. This should enable the rollers to free the offending piece of material and continue rotating at the correct speed. If the rollers continue to stall in the 'forward feed' or 'reverse feed', turn the engine off, remove the ignition key and investigate.

BLOCKAGES

Always be aware that what you are putting into the chipper must come out. If the chips stop coming out of the discharge tube but the chipper is taking material in - **STOP IMMEDIATELY**. Continuing to feed material into a blocked machine may cause damage and will make it difficult to clear.

If the chipper becomes blocked, proceed as follows:

- STOP the engine and remove the ignition keys.
- REMOVE the discharge tube. Check that it is clear.
- WEARING gloves, reach into the rotor housing and scoop out the majority of the debris causing the blockage.

WARNING

Do not reach into the rotor housing with unprotected hands. There are sharp blades and any small movement of the rotor may cause serious injury.



- REPLACE the discharge tube.
- RESTART the engine and increase to full speed.
- ALLOW machine time to clear excess chips still remaining in rotor housing before you continue feeding brushwood. Feed in a small piece of wood while watching to make sure that it comes out of the discharge. If this does not clear it, repeat the process and carefully inspect the discharge tube to find any obstruction.

NOTE

Continuing to feed the chipper with brushwood once it has become blocked will cause the chipper to compact the chips in the rotor housing and it will be difficult and time consuming to clear.

AVOID THIS SITUATION - WATCH THE DISCHARGE TUBE AT ALL TIMES.



**THE FOLLOWING PAGES DETAIL ONLY
BASIC MAINTENANCE GUIDELINES SPECIFIC
TO YOUR CHIPPER.**



THIS IS NOT A WORKSHOP MANUAL.

THE FOLLOWING GUIDELINES ARE NOT EXHAUSTIVE AND DO NOT EXTEND TO GENERALLY ACCEPTED STANDARDS OF ENGINEERING/MECHANICAL MAINTENANCE THAT SHOULD BE APPLIED TO ANY PIECE OF MECHANICAL EQUIPMENT AND THE CHASSIS TO WHICH IT IS MOUNTED.

AUTHORISED TIMBERWOLF SERVICE AGENTS ARE FULLY TRAINED IN ALL ASPECTS OF TOTAL SERVICE AND MAINTENANCE OF TIMBERWOLF WOOD CHIPPERS. YOU ARE STRONGLY ADVISED TO TAKE YOUR CHIPPER TO AN AUTHORISED AGENT FOR ALL BUT THE MOST ROUTINE MAINTENANCE AND CHECKS.

TIMBERWOLF ACCEPTS NO RESPONSIBILITY FOR THE FAILURE OF THE OWNER/USER OF TIMBERWOLF CHIPPERS TO RECOGNISE GENERALLY ACCEPTED STANDARDS OF ENGINEERING/MECHANICAL MAINTENANCE AND APPLY THEM THROUGHOUT THE MACHINE.

**THE FAILURE TO APPLY GENERALLY ACCEPTED
STANDARDS OF MAINTENANCE, OR THE PERFORMANCE OF
INAPPROPRIATE MAINTENANCE, MAY INVALIDATE
WARRANTY IN WHOLE OR IN PART.**

**PLEASE REFER TO YOUR AUTHORISED
TIMBERWOLF SERVICE AGENT FOR
SERVICE AND MAINTENANCE.**





SERVICE SCHEDULE

WARNING

Always immobilise the machine by stopping the engine, removing the ignition key and disconnecting the battery before undertaking any maintenance work.



SERVICE SCHEDULE	Daily Check	50 Hours	100 Hours	500 Hours	1 Year
Check water.	✓				
Check radiator is clear.	✓				
Check engine oil - top up if necessary (10W-30).	✓				
Check for engine oil / hydraulic oil leaks.	✓				
Check fuel level.	✓				
Check feed funnel, feed roller cover, access covers, engine covers and discharge unit are securely fitted.	✓				
Check blades.	✓				
Clean air filter element.	DEPENDING ON WORKING ENVIRONMENT				
Check tyre pressure is 2.2 Bar (32 psi).	✓				
Check safety bar mechanism.	✓				
Check for tightness all nuts, bolts and fastenings making sure nothing has worked loose.		✓			
Grease discharge flange.		✓			
Check tension of main drive belts (and tension if necessary).		✓			
Grease the roller box slides.		✓ OR AS REQUIRED - SEE PAGE 21			
Grease the roller spline and bearing.		✓ OR AS REQUIRED - SEE PAGE 21			
Check anvils for wear.		✓			
Check safety bar mechanism.			✓		
Check fuel pipes and clamp bands.			✓		
Check battery electrolyte level.			✓		
Check for loose electrical wiring.			✓		
Replace hydraulic oil filter - every year or 100 hours after service or repair work to the hydraulic system.			✓	OR	✓
Replace hydraulic oil.			✓	OR	✓
Replace fuel pipes and clamp bands.] REFER TO YOUR ENGINE SUPPLIERS MANUAL				
Check coolant.					
Change engine oil.					
Replace engine oil filter cartridge.] RETURN TO DEALER FOR ANVIL CHANGE				
Check valve clearance.					
Replace anvils when worn.] REFER TO SUPPLIERS INSTRUCTION SHEET				
Axle maintenance.] REFER TO SUPPLIERS INSTRUCTION SHEET				
Tow head maintenance.] REFER TO SUPPLIERS INSTRUCTION SHEET				

NOTE: Your Timberwolf wood chipper is covered by a full 12 months parts and labour warranty. Subject to correct maintenance and proper machine usage, the bearings are guaranteed for 12 months regardless of hours worked by the machine. In conditions of 'heavy usage' - i.e. in excess of 500 hours per year - it is recommended that the bearings are changed annually to ensure that the machine retains optimum working performance.



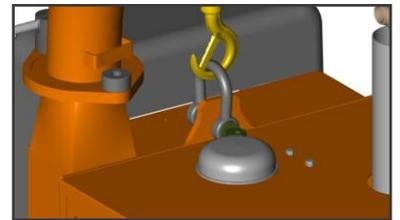
SAFE MAINTENANCE

ALWAYS IMMOBILISE THE ENGINE BEFORE UNDERTAKING ANY MAINTENANCE WORK ON THE CHIPPER BY REMOVING THE KEY AND DISCONNECTING THE BATTERY.

- HANDLE blades with extreme caution to avoid injury. Gloves should always be worn when handling the cutter blades.
- THE drive belts should be connected while changing blades, as this will restrict sudden movement of the rotor.
- THE major components of this machine are heavy. Lifting equipment must be used for disassembly.
- CLEAN machines are safer and easier to service.
- AVOID contact with hydraulic oil.

SAFE LIFTING OF THE CHIPPER

The lifting eye is designed to lift the machine's weight only. Do not use hoist hook directly on the lifting eye, use a correctly rated safety shackle. Inspect the lifting eye prior to each use - DO NOT USE LIFTING EYE IF DAMAGED.



SPARES

Only fit genuine Timberwolf replacement blades, screws and chipper spares. Failure to do so will result in the invalidation of the warranty and may result in damage to the chipper, personal injury or even loss of life.

BATTERY REMOVAL AND MAINTENANCE

WARNING

Refer to the battery safety section on pages 17-18.



1. The battery can be located under the funnel.
2. Remove the negative lead first and then the positive lead.
3. Clean, charge and/or top up the battery as required.
4. Refitting is the reverse of removal. Apply a smear of vaseline to the terminals to prevent corrosion.

CHECK FITTINGS

The Timberwolf TW 230DHB is subject to large vibrations during the normal course of operation. Consequently there is always a possibility that nuts and bolts will work themselves loose. It is important that periodic checks are made to ensure the security of all fasteners. Fasteners should be tightened using a torque wrench to the required torque (see below). **Uncalibrated torque wrenches can be inaccurate by as much as 25%. It is therefore essential that a calibrated torque wrench is used to achieve the tightening torques listed below.**

	Size	Pitch	Head	Torque lb ft
Blade Bolts	M16	Standard	24mm Hex	125
Anvil Bolts	M16	Standard	24mm Hex	80
General	M8	Standard	13 mm Hex	20
General	M10	Standard	17 mm Hex	45
General	M12	Standard	19 mm Hex	65
Drain Bung in Fuel Tank	3/8" BSP	-	22 mm Hex	25



COPPER EASE SAFETY INFORMATION

Product name: Copper Ease.

Copper Ease contains no hazardous ingredients at or above regulatory disclosure limits, however, safety precautions should be taken when handling (use of oil-resistant gloves and safety glasses are recommended - respiratory protection is not required). Avoid direct contact with the substance and store in a cool, well ventilated area avoiding sources of ignition, strong oxidising agents and strong acids. Dispose of as normal industrial waste (be aware of the possible existence of regional or national regulations regarding disposal), do not discharge into drains or rivers.

In case of fire: in combustion the product emits toxic fumes, extinguish with alcohol or polymer foam, carbon dioxide or dry chemical powder. Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

FIRST AID

Skin contact: there may be mild irritation at the site of contact, wash immediately with plenty of soap and water.

Eye contact: there may be irritation and redness, bathe the eye with running water for 15 minutes.

Ingestion: there may be irritation of the throat, do not induce vomiting, wash out mouth with water.

A safety data sheet for this product can be obtained by writing to the manufacturer at the following address: Comma Oil and Chemicals Ltd., Deering Way, Gravesend, Kent DA12 2QX. Tel: 01474 564311, Fax: 01474 333000.

BATTERY SAFETY INFORMATION

WARNING NOTES AND SAFETY REGULATIONS FOR FILLED LEAD-ACID BATTERIES



For safety reasons, wear eye protection when handling a battery.



Keep children away from acid and batteries.



Fires, sparks, naked flames and smoking are prohibited.
-Avoid causing sparks when dealing with cables and electrical equipment, and beware of electrostatic discharges.
-Avoid short circuits.



Explosion hazard:
-A highly explosive oxyhydrogen gas mixture is produced when batteries are charged.



Corrosive hazard:
-Battery acid is highly corrosive, therefore:
-Wear protective gloves and eye protection.
-Do not tilt the battery, acid may escape from the vent openings.



First aid:
-Rinse off acid splashed in the eyes immediately for several minutes with clear water! Then consult a doctor immediately.
-Neutralise acid splashes on the skin or clothes immediately with acid neutraliser (soda) or soap suds, and rinse with plenty of water.
-If acid is swallowed, consult a doctor immediately.

Warning notes: The battery case can become brittle, to avoid this:



-Do not store batteries in direct sunlight.
-Discharged batteries may freeze up, therefore store in an area free from frost.



Disposal:
-Dispose of old batteries at an authorised collection point.



-The notes listed under item 1 are to be followed for transport.
-Never dispose of old batteries in household waste.



BATTERY SAFETY INFORMATION...cont.

1. Storage and transport

- Batteries are filled with acid.
- Always store and transport batteries upright and prevent from tilting so that no acid can escape.
- Store in a cool and dry place.
- Do not remove the protective cap from the positive terminal.
- Run a FIFO (first in-first out) warehouse management system.

2. Initial operation

- The batteries are filled with acid at a density of 1.28g/ml during the manufacturing process and are ready for use.
- Recharge in case of insufficient starting power (cf. section 4).

3. Installation in the vehicle and removal from the vehicle

- Switch off the engine and all electrical equipment.
- When removing, disconnect the negative terminal first.
- Avoid short circuits caused by tools, for example.
- Remove any foreign body from the battery tray, and clamp battery tightly after installation.
- Clean the terminals and clamps, and lubricate slightly with battery grease.
- When installing, first connect the positive terminal, and check the terminal clamps for tight fit.
- After having fitted the battery in the vehicle, remove the protective cap from the positive terminal, and place it on the terminal of the replaced battery in order to prevent short circuits and possible sparks.
- Use parts from the replaced battery, such as the terminal covers, elbows, vent pipe connection and terminal holders (where applicable); use available or supplied filler caps.
- Leave at least one vent open, otherwise there is a danger of explosion. This also applies when old batteries are returned.

4. Charging

- Remove the battery from the vehicle; disconnect the lead of the negative terminal first.
- Ensure good ventilation.
- Use suitable direct current chargers only.
- Connect the positive terminal of the battery to

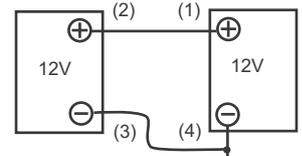
- the positive output of the charger. Connect the negative terminal accordingly.
- Switch on the charger only after the battery has been connected, and switch off the charger first after charging has been completed.
- Charging current-recommendation: 1/10 ampere of the battery capacity Ah.
- Use a charger with a constant charging voltage of 14.4V for re-charging.
- If the acid temperature rises above 55° Celsius, stop charging.
- The battery is fully charged when the charging voltage has stopped rising for two hours.

5. Maintenance

- Keep the battery clean and dry.
- Use a moist anti-static cloth only to wipe the battery, otherwise there is a danger of explosion.
- Do not open the battery.
- Recharge in case of insufficient starting power (cf. section 4).

6. Jump Starting

- Use the standardised jumper cable in compliance with DIN 72553 only, and follow the operating instructions.
- Use batteries of the same nominal voltage only.
- Switch off the engines of both vehicles.
- First connect the two positive terminals (1) and (2), then connect the negative terminal of the charged battery (3) to a metal part (4) of the vehicle requiring assistance away from the battery.
- Start the engine of the vehicle providing assistance, then start the engine of the vehicle requiring assistance for a maximum of 15 seconds.
- Disconnect the cables in reverse sequence (4-3-2-1).



7. Taking the battery out of service

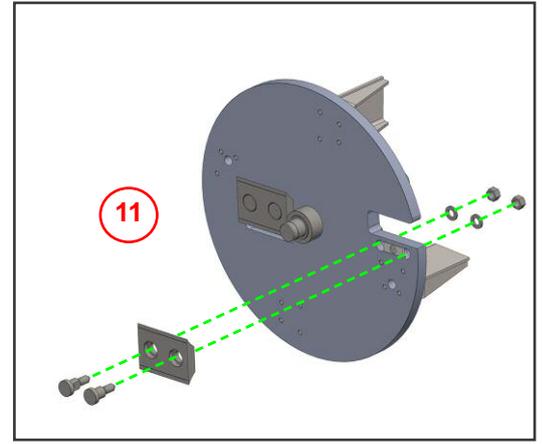
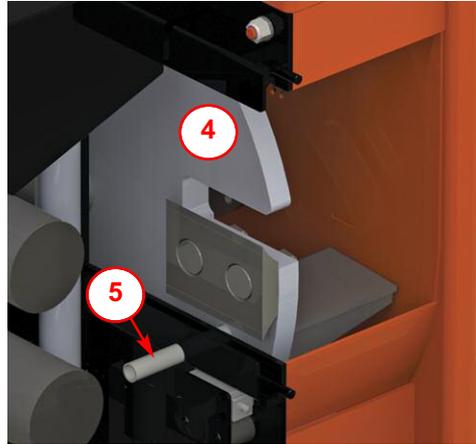
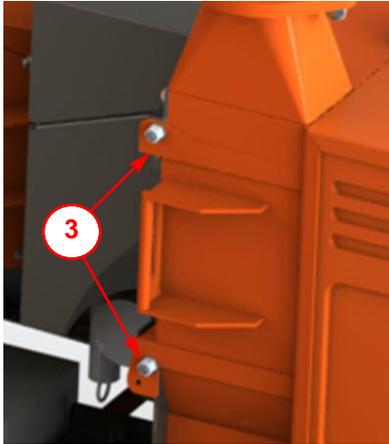
- Charge the battery; store in a cool place or in the vehicle with the negative terminal disconnected.
- Check the battery state of charge at regular intervals, and correct by recharging when necessary (cf. section 4).



CHANGE BLADES

WARNING

Wear riggers gloves for the blade changing operation.



1. Turn the chipper off and remove the ignition keys.
2. Remove battery leads.
3. Remove the 2 nuts retaining the access hatch, slide hatch clear of rotor housing.
4. Turn rotor to blade change position.
5. Insert locking bar into rotor housing and rotor.
6. Brush away all dirt and debris from the rotor and blades.
7. With a 24mm spanner/socket undo the two nyloc nuts and washers that are holding the blade in place. Remove both blade bolts from the blade.
8. Grasp the blade by the flat edges while wearing heavy duty gloves.
9. Withdraw the blade from the rotor.
10. Clean the back surface of the blade, blade bolts and blade area of the rotor before reseating blades. **The blades must not have any material underneath them when tightened. If they are not flat and tight they will become loose very quickly.**
11. Reassemble the blades, bolts, washers and nuts in the order shown in the diagram above. Use only genuine Timberwolf nuts and washers, as they are of a higher grade than normally stocked at fastener factories. Failure to use the appropriate grade nuts or washers may result in damage, injury or death. The use of genuine Timberwolf blades and bolts is recommended.
12. Apply a smear of anti seize compound (copper ease) to the bolt threads and back face of the nuts. Do not apply copper grease onto the counter bore faces of the blades or bolts.
13. **A calibrated torque wrench must be used to tighten the bolts to a torque setting of 125 lbs ft (170 Nm).**
14. Remove lock pin, rotate rotor to next blade then replace lock pin and repeat steps 6 - 13.
15. Refit access hatch.
16. Refit the nuts and tighten to 40lb/ft.
17. Refit battery leads.

WARNING



Always sharpen blades on a regular basis. Failure to do so will cause the machine to under perform and will overload engine and bearings causing machine breakdown. Blades must not be sharpened beyond the wear mark (see diagram). Failure to comply with this could result in machine damage, injury or loss of life.



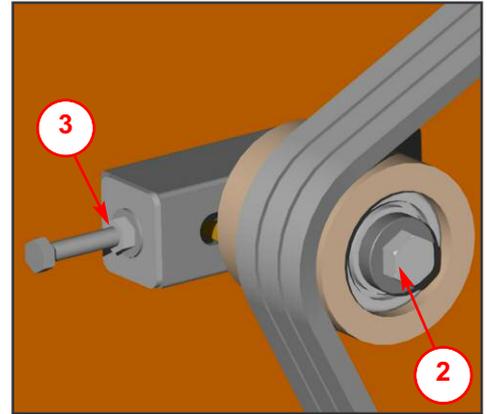


TENSION DRIVE BELTS

NOTE: There will normally be a rapid drop in tension during run-in period for new belts. When new belts are fitted, check the tension every 2 - 3 hours and adjust until the tension remains constant.

Belt failures due to lack of correct tensioning will not be covered under your Timberwolf warranty.

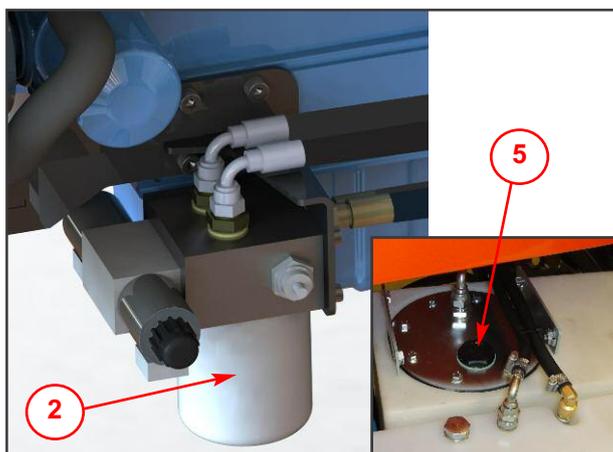
1. Remove side panel.
2. Loosen bolt in centre of tensioner pulley with a 19 mm spanner so that pulley is able to slide with minimal wobble.
3. Turn nut in end of tensioner pulley slider until correct belt tension is achieved. For instructions on checking belt tension & correct belt tension values, please refer to the Timberwolf V-Belt Tensioning Data Table at the end of the manual.
5. Re-tighten bolt in centre of tensioner pulley.
6. Run machine and test, recheck belt tension.
7. **NOTE:** Slack drive belts will cause poor performance and excess belt and pulley wear.



CHANGE HYDRAULIC OIL AND FILTER

WARNING

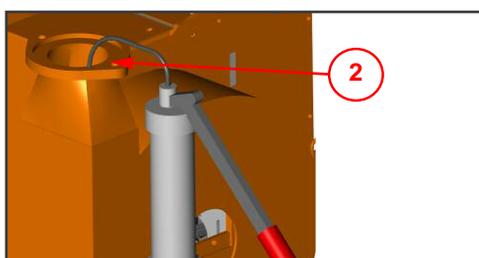
Use plastic gloves to keep oil off skin and dispose of the used oil and filter in an ecologically sound way. The oil and filter should be changed once a year or at any time it becomes contaminated. Before starting check that the chipper is standing level and brush away loose chips.



NOTE: This is a non-adjustable air breather filter.

1. Remove near side panel.
2. Locate the oil filter cartridge and unscrew (a filter strap or similar tool may be required to loosen the filter).
3. Apply a smear of oil onto the seal of the new filter.
4. Screw new filter on. Hand tighten only.
5. Remove filler cap from tank.
6. Remove drain plug from the hydraulic oil tank and drain oil into a suitable container.
7. Replace drain plug.
8. Refill with VG 32 hydraulic oil until the level is between the min and max lines on the tank (about 15 litres).
9. Refit filler cap.

GREASE THE DISCHARGE FLANGE

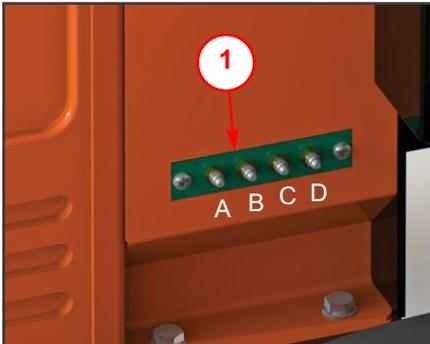


1. Remove the discharge tube.
2. Apply multipurpose grease to surface shown.
3. Refit discharge tube.



GREASE THE ROLLER SPLINE AND ROTOR BEARINGS

NOTE: This should be done regularly. In dirty and dusty conditions or during periods of hard work it should be weekly. If the bearings and splines are allowed to run dry premature wear will occur resulting in a breakdown and the need for replacement parts. This failure is not warranty. Early signs of insufficient grease includes squeaking or knocking rollers.

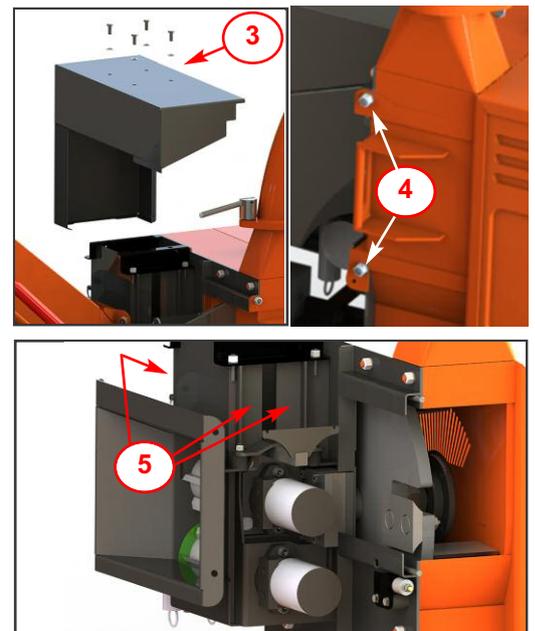


1. Locate the greasing panel.
2. Apply 4 pumps of grease to each nipple.
3. It is recommended to grease all the nipples whilst the engine is running and rollers are turning to distribute the grease evenly.
DO NOT USE GRAPHITE BASED GREASE.
4. Both front and rear bearings are greased by nipples A and B. The top and bottom roller splines are greased by nipples C and D.

GREASE THE ROLLER BOX SLIDES

NOTE: This should be done regularly. In dirty or dusty conditions or during periods of hard work it should be done weekly. If the slides become dry the top roller will tend to hang up and the pulling-in power of the rollers will be much reduced. Excessive wear will ensue.

1. Turn the chipper off and remove the ignition keys.
2. Ensure machine has come to a complete stop - remove battery leads.
3. Remove the 4 nuts and washers retaining the roller box guard and remove guard.
4. Remove the blade access hatch as blade change procedure.
5. Apply thin grease with a brush directly to the slide surfaces indicated, including inner cheeks of slider. **DO NOT USE GRAPHITE BASED GREASE.**
6. Replace access hatch then top guard. Refit nuts and washers.
7. Refit battery leads.



ENGINE SERVICING

All engine servicing must be performed in accordance with the Engine Manufacturer's Handbook provided with the machine. **FAILURE TO ADHERE TO THIS MAY INVALIDATE WARRANTY AND/OR SHORTEN ENGINE LIFE.**

CHECK HOSES

All the hydraulic hoses should be regularly inspected for chafing and leaks. The hydraulic system is pressurized to 150 Bar and thus the equipment containing it must be kept in good condition.

Identify the hoses that run to the top motor. These have the highest chance of damage as they are constantly moving. If any hydraulic components are changed new seals should be installed during reassembly. Fittings should then be retightened.



ENTEC INDUSTRIES LTD 12 MONTH CHIPPER WARRANTY

WARRANTY PERIOD

The warranty period for the woodchipper commences on the date of sale to the first end user and continues for a period of 12 months. This guarantee is to the first end user only and is not transferable except when an authorised Timberwolf Dealer has a woodchipper registered with Entec Industries Ltd as a hire chipper or long term demonstrator – in these situations they are duly authorised to transfer any remaining warranty period to their first end user. Any warranty offered by the Timberwolf Dealer beyond the original 12 month period will be wholly covered by said Dealer.

LIABILITY

Our obligation under this warranty is limited to repair at Entec Industries Ltd premises or at our option an Entec Industries Ltd approved Timberwolf dealer. No liability will be accepted for special, indirect, incidental, or consequential loss or damages of any kind.

WARRANTY STATEMENT

Entec Industries Ltd warrants to the first end user that;

- Your woodchipper shall be designed, built and equipped, at the point of sale, to meet all current applicable regulations.
- Your chipper shall be free from manufacturing defects both in materials and workmanship in normal service for the period mentioned above.

Warranty will not apply to a failure where normal use has exhausted the life of a component.

Engine units are covered independently by their respective manufacturer warranties.

OWNERS WARRANTY RESPONSIBILITIES

As the owner of an Entec Industries Ltd woodchipper you are responsible for the following;

- Operation of the woodchipper in accordance with the Entec Industries Ltd instruction manual.
- Performance of the required maintenance listed in your Entec Industries Ltd instruction manual.
- In the event of a failure the Entec Industries Ltd authorised Timberwolf dealer is to be notified within 10 days of failure and the equipment is to be made available for unmolested inspection by the dealer technician.

WARRANTY RESTRICTIONS

The Entec Industries Ltd warranty is restricted to the first end user only and is not transferable except when an authorised Timberwolf Dealer has a woodchipper registered with Entec Industries Ltd as a hire chipper or long term demonstrator – in these situations they are duly authorised to transfer any remaining warranty period to their first end user.

The Entec Industries Ltd warranty may be invalidated if any of the following apply;

- The failed parts or assembly is interfered with in any way.
- Normal maintenance has not been performed.
- Incorrect reassembly of components.
- The machine has undergone modifications not approved in writing by Entec Industries Ltd.
- In the case of tractor driven equipment, use has been on an unapproved tractor.
- Conditions of use can be deemed abnormal.
- The machine has been used to perform tasks contrary to those stated in the Entec Industries Ltd instruction manual.

WARRANTY SERVICE

To obtain warranty service please contact your nearest Entec Industries Ltd approved Timberwolf dealer. To obtain details of the nearest facility please contact Entec Industries Ltd at the address on the front of this manual.

These warranty terms are in addition to and not in substitution for and do not affect any right and remedies which an owner might have under statute or at common law against the seller of the goods under the contract by which the owner acquired the goods.



CERTIFICATE OF CONFORMITY

Environmental Manufacturing LLP

Entec House,
 Tomo Industrial Estate,
 Stowmarket,
 Suffolk IP14 5AY

Tel: 01449 765800 Fax: 01449 765801

EC Declaration of Conformity



Environmental Manufacturing LLP as the designer and manufacturer, certifies that the machine stipulated below complies with all the relevant provisions of the:

Machinery Directive; 2006/42/EC (& other relevant directives)

and the National Laws and Regulations adopting these directives.

Designer/Manufacturer	:	Environmental Manufacturing LLP
Description of Machinery	:	Self-powered portable machine intended to chip up tree waste prior to disposal.
Model	:	TW 230DHB
Serial No.	:	<i>Serial Manufacture</i>

BSI Transposed Harmonised Standards applied: (including parts/clauses of):
 BS EN 12100-1: 2010 Safety of Machinery- Basic concepts, BS EN 13857-1: 2008 Safety of Machinery-Safety distances to danger zones, BS EN 60204-1: 2006 +A1 2009 Safe electrical practices, BS EN 13732-1:2008 Safety of Machinery – Temperatures of touchable surfaces, BS EN 13849-1: 2008 – Safety of Machinery – Safety related parts of control systems, BS13850:2008 safety of Machinery Emergency stop BS EN 982: 1996 + A1 2005 – Safety of Machinery – Hydraulics, BS EN 1088: 1995 + A2 2008 – Safety of Machinery – Interlocking devices, BS EN 13525: 2005 + A2 2009 – Forestry Machinery – Wood chippers – Safety. BS EN 953:1997+A1:2009

“Responsible” Person empowered to sign:  Mr. Jeff Haines
 Position in Company: **Technical Director**

Date: 31 July 2014



IDENTIFICATION PLATE

		TIMBERWOLF ENVIRONMENTAL MANUFACTURING LLP Entec House, Tomo Industrial Estate, Stowmarket, Suffolk IP14 5AY - UK	
MODEL			
SERIAL NO.			
CARR. TYP/SN.		GROSS WEIGHT	
NOM. PWR		DATE	
			ENVIRONMENTAL MANUFACTURING LLP
			0 - KG
			1 - KG
			2 - KG

25 DECALS



TIMBERWOLF
TW 230DHB

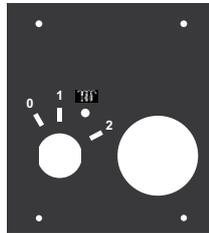
Decal	Description	Decal	Description
	616 Hot exhaust		4099 Danger. Rotating blades. Keep hands and feet out.
	617 High velocity discharge - keep clear		2800 Reverse feed
	670 Personal Protective Equipment required		2801 Forward feed
	1661 Read the instruction manual for greasing and maintenance information		19517 Warning Do not engage starter motor for more than 20 seconds. Allow one minute before attempting to start. Investigate reasons for failure to start. Excessive cranking will result in starter motor failure. This will not be covered under warranty.
	1662 The instruction manual with this machine contains important operating, maintenance and health and safety information. Failure to follow the information contained in the instruction manual may lead to death or serious injury.		2949 Lifting eye is designed to lift the machine's weight only. Do not use hoist hook directly on lifting eye. Use correctly rated safety shackle only through lifting eye. Lifting eye to be inspected every 6 months or before each use. Always visually inspect lifting eye prior to each use. Do not use lifting eye if damaged.
	1399 Push to stop.		3022 Clean under blades before refitting or turning. Failure to do so may result in blade(s) coming loose and damage being caused to the rotor housing.
	P691 Do not pull here.		18393 New drive belts need re-tensioning. When new belts are fitted check tension every 2-3 hours & adjust until tension remains constant.

DECALS



TIMBERWOLF TW 230DHB 26

Decal	Description	Decal	Description
P637	Danger. Do not operate without this cover in place.	P653	Danger. Rotating blades inside. Stop engine and remove key before removing discharge unit.
P652	Caution. Do not put road sweepings in machine as grit will damage blades.	P654	Caution. When transporting, discharge clamps may work loose. Check frequently.
P655	Caution. Avoid standing directly in front of feed funnel to reduce exposure to noise, dust and risk from ejected particles.	P656	Danger. Do not use this machine without the discharge unit fitted. Failure to comply may result in serious injury or damage.
1258	Warning Failure to maintain brake adjustment will result in damper failure. No warranty liability will be accepted on this item.	P650	Danger. Autofeed system fitted. Rollers may turn without warning! When the engine is switched off the rollers will turn during the run down period.
P2053	Grease the bottom roller.	P1812	Torque blade bolts to 125 lbs ft (170 Nm).
P1809	To go on relays. Auto Back-off Forward Latch Engine Safety		
P1810			
P1811			



TIMBERWOLF TW 230DHB

3004

1522

18008

1363

P*1302



TIMBERWOLF TW 230DH(a)

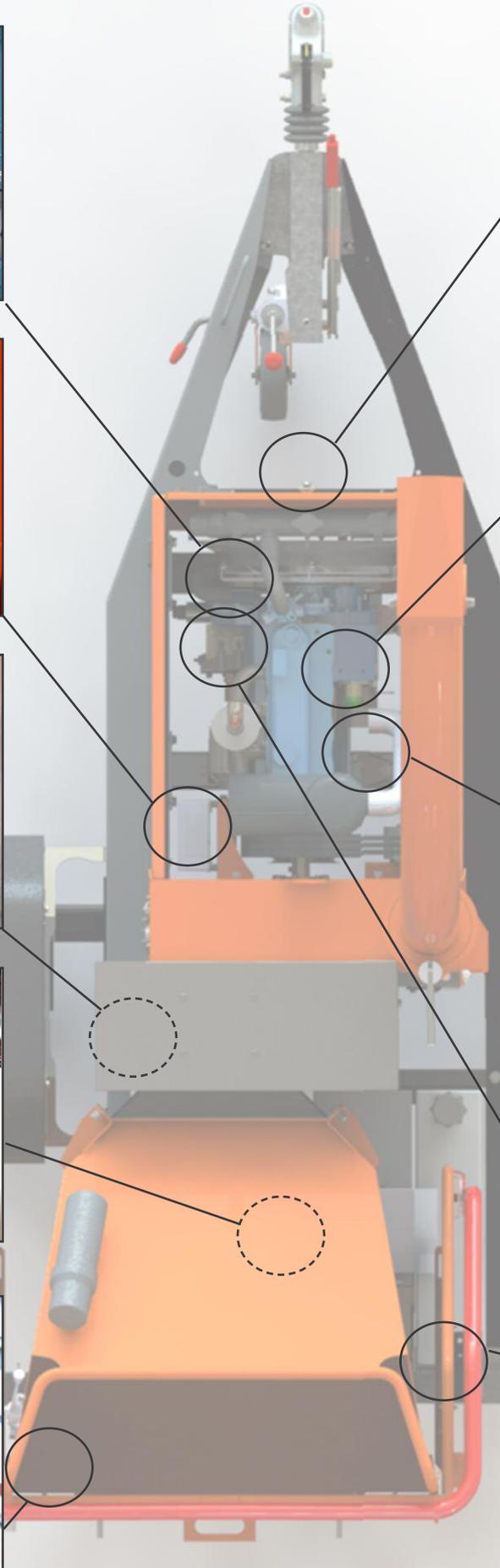


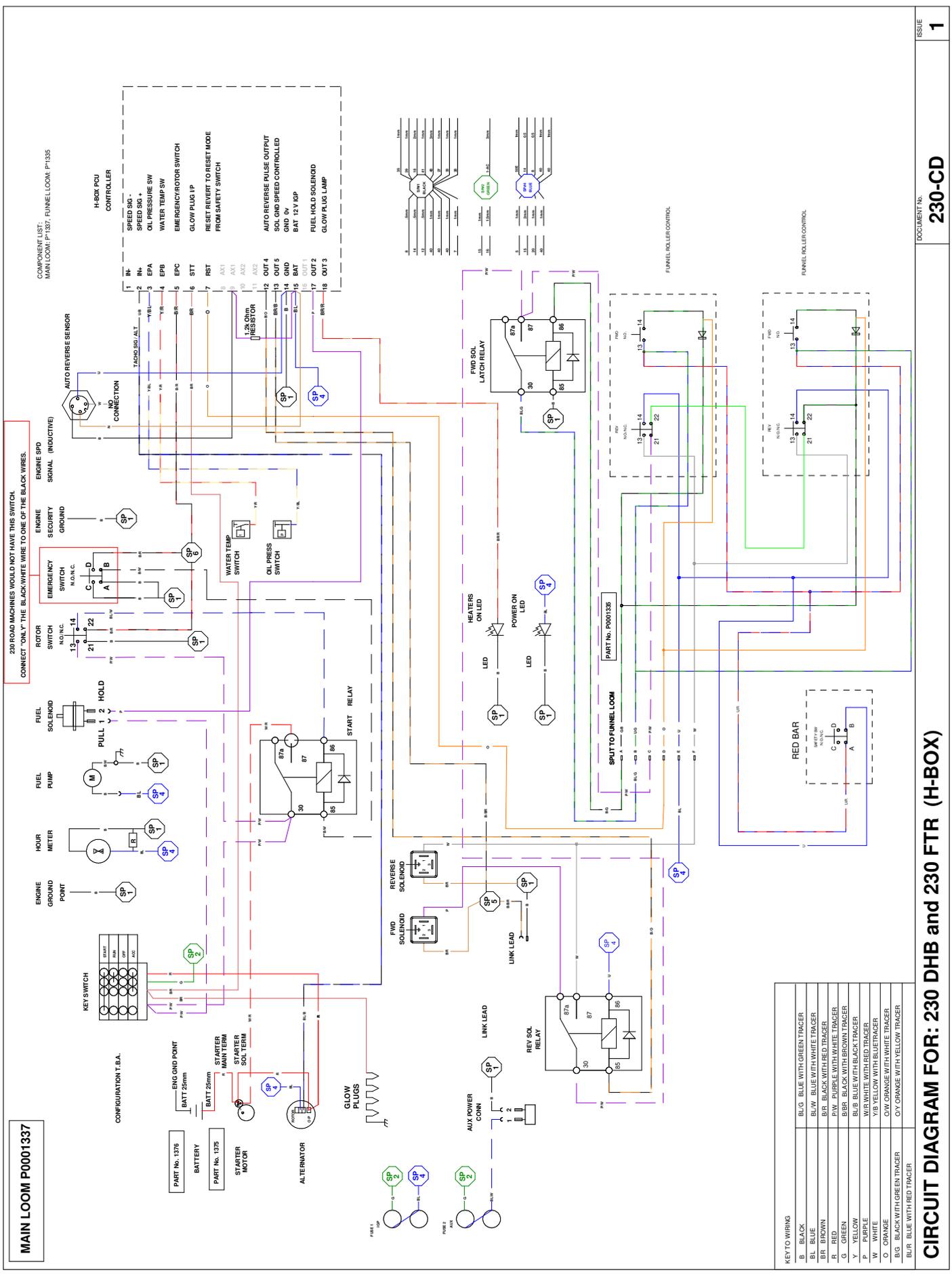
P*1303

P*1428

P*1438

P*729





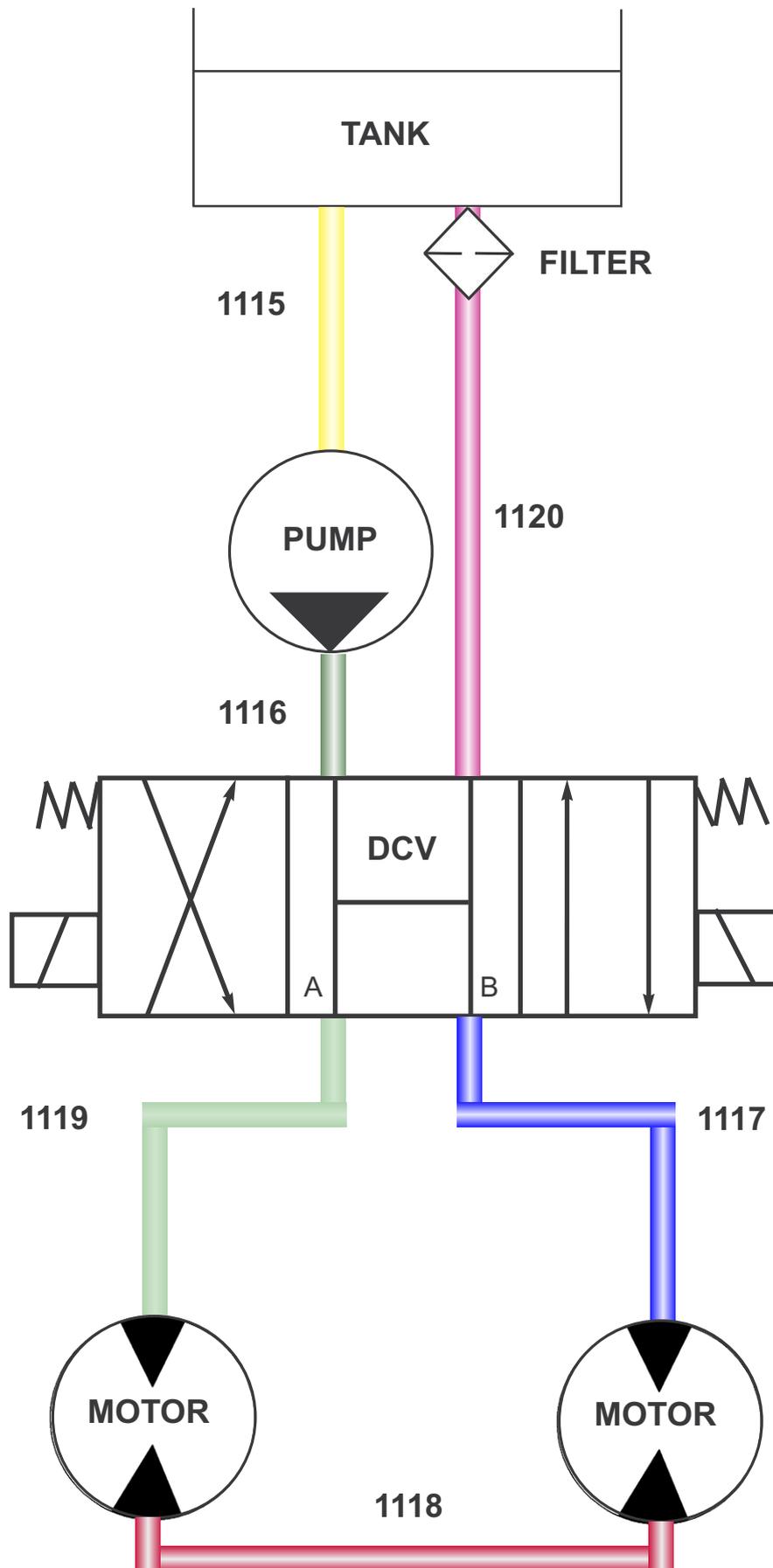
MAIN LOOM P0001337

COMPONENT LIST:
MAIN LOOM: P137; FUNNEL LOOM: P135

KEY TO WIRING	
B	BLACK
BL	BLUE
BLW	BLUE WITH WHITE TRACER
BR	BROWN
BRW	BLACK WITH RED TRACER
PW	PURPLE WITH WHITE TRACER
R	RED
BRN	BLACK WITH BROWN TRACER
BLB	BLUE WITH BLACK TRACER
BY	BLACK WITH YELLOW TRACER
W	WHITE
O	ORANGE
OW	ORANGE WITH WHITE TRACER
BLG	BLACK WITH GREEN TRACER
BLR	BLUE WITH RED TRACER



Hose Kit P*1396





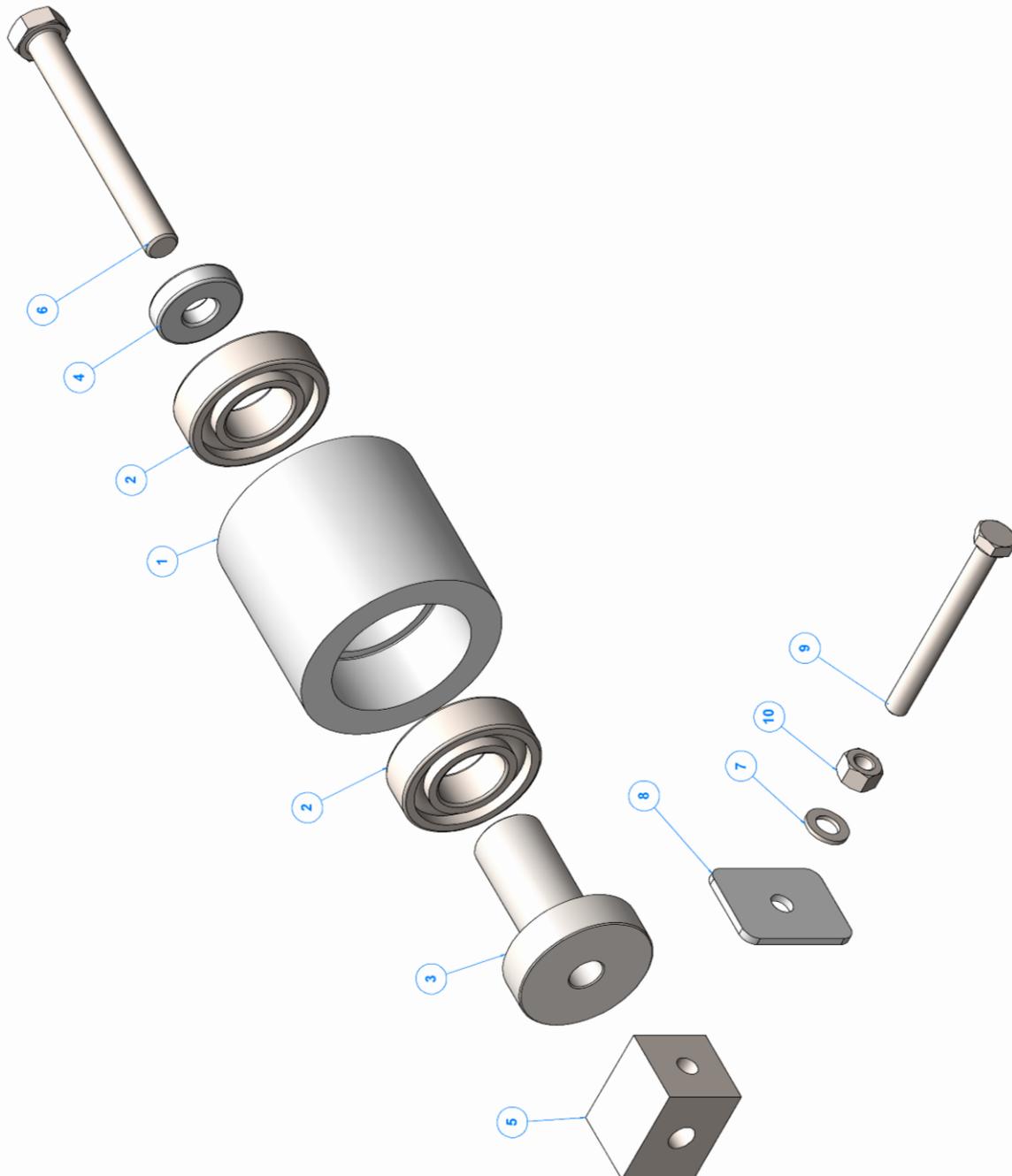
PARTS LISTS

The following illustrations are for parts identification only. The removal or fitting of these parts may cause a hazard and should only be carried out by trained personnel.

	<i>Page No.</i>
BELT TENSIONER	31
CHASSIS (1)	32
CHASSIS (1) WITH ADJUSTABLE TOWHEAD	33
CHASSIS (2)	34
CONTROL BOX	35
CONTROL PANEL	36
DECALS	See pages 25 - 26
DISCHARGE	37
DRIVE TRAIN	38
ELECTRICAL LAYOUT	39
ELECTRICAL PANEL	40
ENGINE	41
ENGINE BAY	42
FUEL TANK	43
FUNNEL	44
HYDRAULICS	45
ROLLER BOX	46
ROLLER SLIDES	47
ROTOR	48
ROTOR HOUSING	49
V- BELT TENSIONING TABLE	50



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	0411M	Pulley Tension Outer	1
2	BE491	Bearing 6205 2Rs C3	2
3	0472M	Pulley Tension Boss	1
4	WA0415	Washer Heavy M12 32 Belt Tensioner	1
5	0469MS	Block Pulley Tension Adjuster	1
6	BO313	Bolt M12 1.75 100 BZP	1
7	WA712	Washer M8 C BZP	1
8	P0001329	Profile Belt Tensioner	1
9	P0001442	Bolt M8/80 BZP	1
10	NU476	Nut M8 1.75 BZP	1

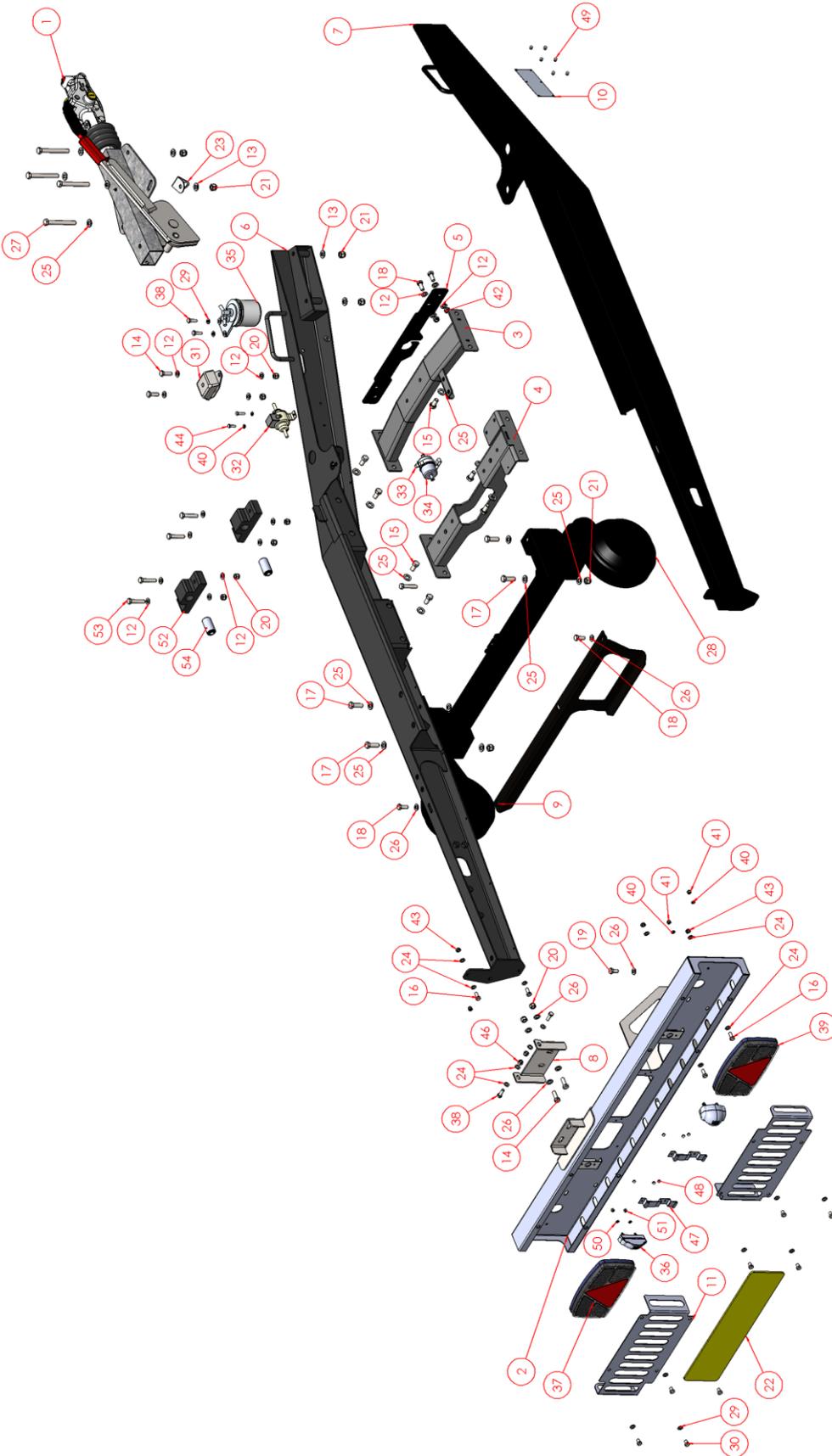


CHASSIS (1)



TIMBERWOLF
TW 230DHB

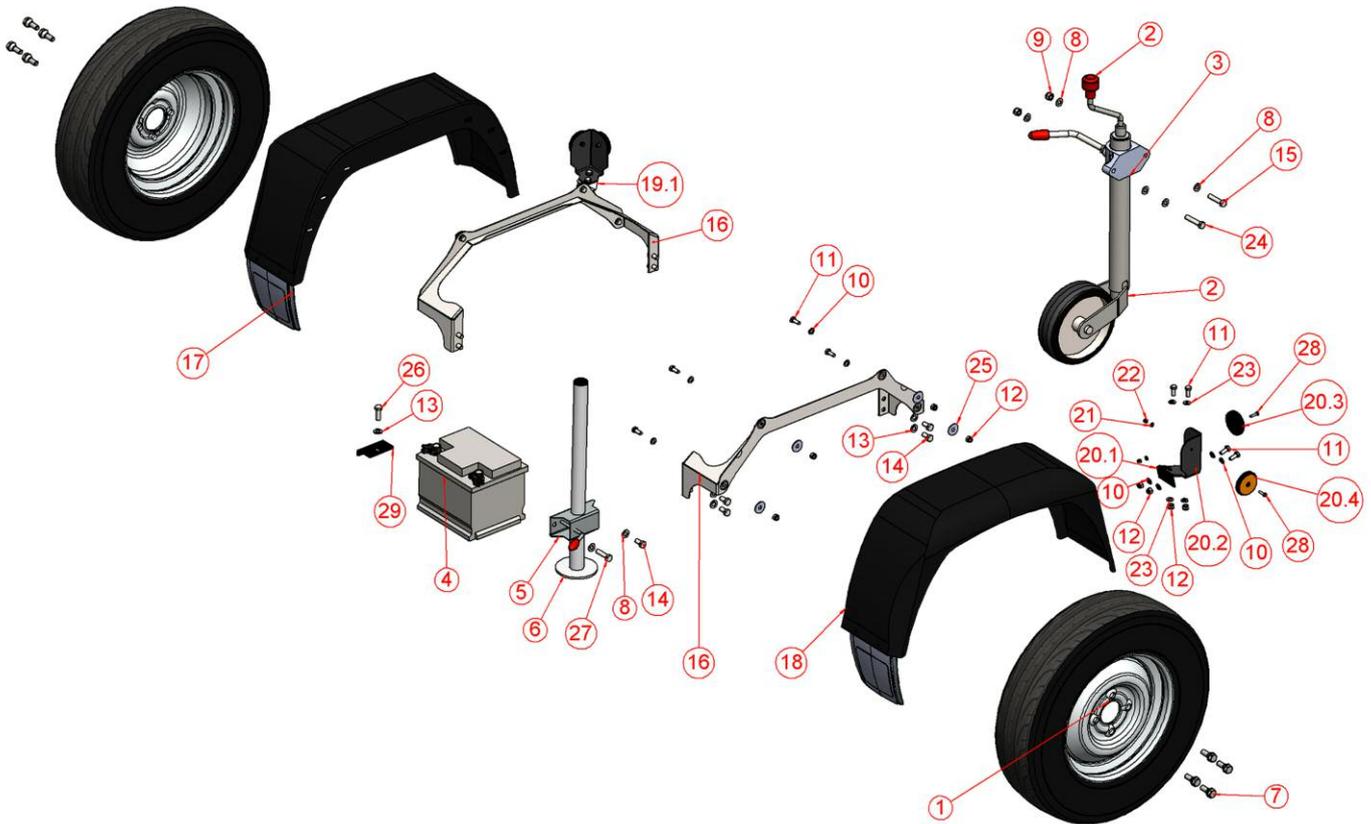
32



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	P0000074	Cast Head Delta AK301	1	19	BO378	Bolt M10 20 BZP	1	37	P0001405	NIS LED Cluster	1	40	WA709	Washer M6 13.9 C BZP	6
2	P0000684F	Light board bracket	1	20	3435	Nut M10 P Nyloc	8	38	BO350	Set Screw M6 25 BZP	4	41	NU142	Nut M6 P Nyloc	4
3	P0000857	Rear engine bracket	1	21	NU644	Nut M12 P Nyloc	8	39	P0001406	OIS Led Cluster	1	42	NU052	Nut M10 Nyloc T	4
4	P0000858F	Bracket	1	22	Number plate mock up	P0001354F	1	40	WA709	Washer M6 13.9 C BZP	6	43	NU481	Nut M8 Nyloc T	4
5	P0000683F	LIGHT SOCKET BRACKET	1	23	P0001354F	Bracket Guide Break Away Cable	1	41	NU142	Nut M6 P Nyloc	4	44	1236	Set Screw M6 20 BZP	1
6	P0000733F	Beam Chassis NS Opposite of P0000742F	1	24	WA712	Washer M8 16 C BZP	12	42	NU052	Nut M10 Nyloc T	4	45	BO1253	Bolt M6 25 BZP	1
7	P0000742F	Beam Chassis OS Opposite of P0000733F	1	25	WA704	Washer M12 C BZP	20	43	NU481	Nut M8 Nyloc T	4	46	NU0479	Nut M8 1.25 Nyloc P	2
8	P0000802F	Bracket Funnel Support	1	26	WA839	Washer M10 C BZP	7	44	1236	Set Screw M6 20 BZP	1	47	17895	Number Plate Clip	2
9	P0000754F	Bracket Tank Support	1	27	BO313	Bolt M12 1.75 100 BZP	4	45	BO1253	Bolt M6 25 BZP	1	48	R0866	Pop Rivet 5 x 8	6
10	19600	Plate Machine Identification	1	28	P0001306	Braked Axle Assembly	1	46	NU0479	Nut M8 1.25 Nyloc P	2	49	WA857	Rivet M5 12 All Pop	6
11	P0001316F	Bracket Light Board Guard	2	29	WA711	Washer M8 A BZP	10	47	17895	Number Plate Clip	2	50	WA857	Washer M5 5.3 A BZP	4
12	WA701	Washer M10 BZP C Washer	21	30	18337	Bolt M8 1.25 12 BZP	8	48	R0866	Pop Rivet 5 x 8	6	51	NU238	Nut M6 P Nyloc	4
13	WA702	Washer M12 A BZP	4	31	P0000998	Engine AV Mount	1	49	R0867	Rivet M5 12 All Pop	6	52	P0001635M	Square Boss AV Mount Engine	2
14	BO382	Set Screw M10 30 BZP	4	32	0807	Fuel Pump	1	50	WA857	Washer M5 5.3 A BZP	4	53	ISO 4017 - M10 x 50-N	Bolt M10 50 BZP	4
15	BO277	Set Screw M12 1.75 25 BZP	8	33	18197	Spring Clip	1	51	NU238	Nut M6 P Nyloc	4	54	18522	AV Bush Engine Mount M12 (27 OD X 56 Lg)	2
16	BO346	Set Screw M8 1.25 20 BZP	4	34	4315	Pre-Fuel Filter	1	52	P0001635M	Square Boss AV Mount Engine	2				
17	BO429	Set Screw M12 35 BZP	4	35	0085	fuel filter	1	53	ISO 4017 - M10 x 50-N	Bolt M10 50 BZP	4				
18	BO360	Set Screw M10 25 BZP	6	36	P0001407	Lighting assembly LED	2	54	18522	AV Bush Engine Mount M12 (27 OD X 56 Lg)	2				



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	P0001350F	Beam Chassis OS Opposite of P0001351F	1
2	P0001351F	Beam Chassis OS Opposite of P0001350F	1
3	WA704	Washer M12 C BZP	8
4	BC321	Set Screw M12 30 BZP	2
5	NU644	Nut M12 P Nyloc	2
6	BC277	Set Screw M12 1.75 25 BZP	4
7	P0000827	Unbracketed Axle	1
8	P0001455	Swan Neck	1
9	P0001353F	Bracket Chassis Adjustable Tow Head	1

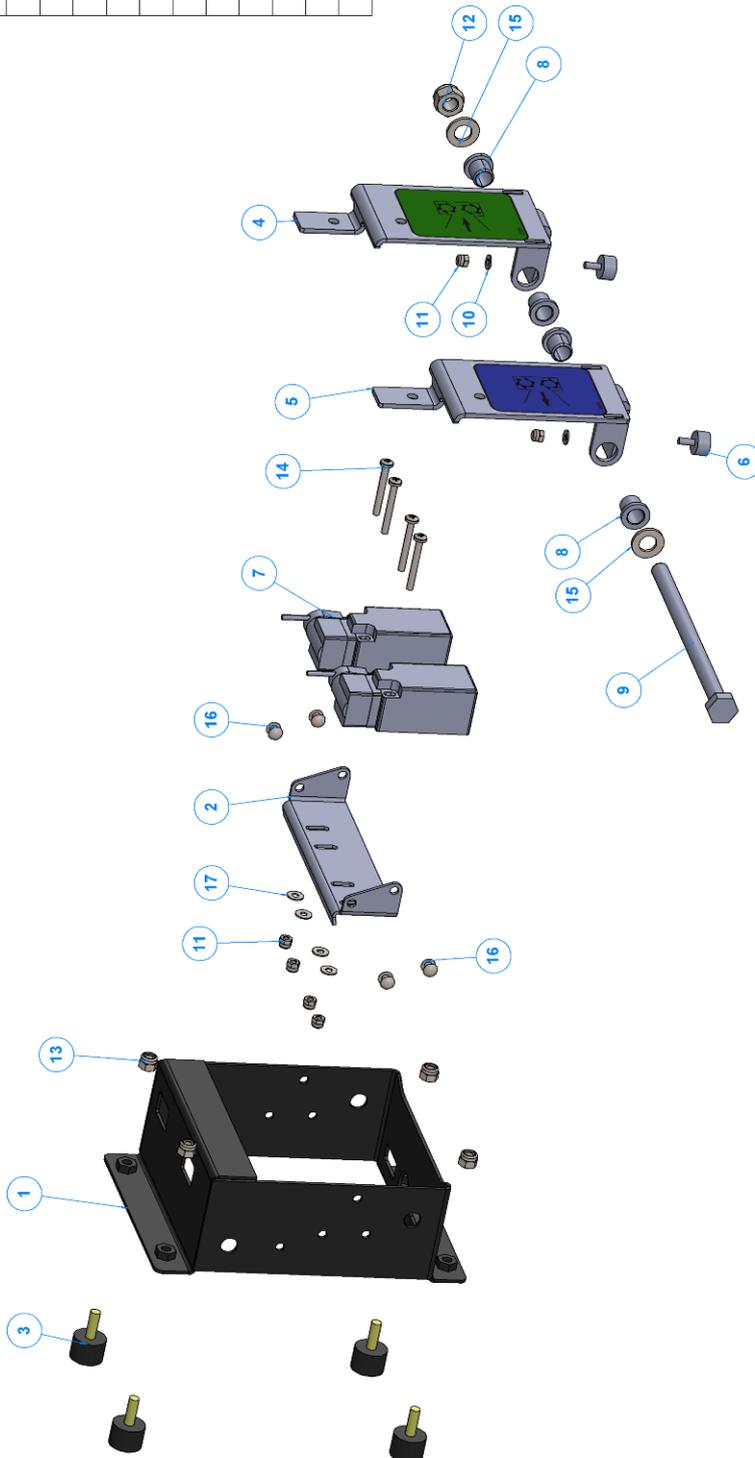


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	P0000818	Wheel 13 Inch Tyre 185	2
2	17478	Jockey Wheel	1
3	17501	Cast Clamp Alko 190Dh	1
4	4210	Battery	1
5	AX017	Clamp Jack Stand	1
6	P0001309	Prop Stand	1
7	Wheel bolt	Bolt M12 1.5 Wheel	8
8	WA701	Washer M10 A Washer BZP	7
9	3435	Nut M10 P Nyloc	2
10	WA712	Washer M8 16 C BZP	16
11	BO0346	Set Screw M8 1.25 20 BZP	16
12	NU0479	Nut M8 1.25 Nyloc P	16
13	WA839	Washer M10 C BZP	9
14	BO878	Bolt M10 20 BZP	9
15	BO1520	Bolt M10 45 BZP	1
16	P0000665F	Bracket Mount Mudguard	2
17	P0001308	Mudguard NS Plastic	1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
18	P0001308	Mudguard OS Plastic	1
19.1	P0001250F	Bracket Reflector Mudguard NS Opposite of P0001251F	1
20.1	P0001251F	Bracket Reflector Mudguard OS Opposite of P0001250F	1
20.2	18919	Support For Light Reflector Painted	2
20.3	18922	Reflector clear round front	2
20.4	18923	Reflector amber round side	2
21	WA857	Washer M5 5.3 A BZP	4
22	NU236	Nut M5 P Nyloc	4
23	WA711	Washer M8 A BZP	8
24	BO1252	Bolt M10 1.5 50 BZP	1
25	WA714	M8x30 Mudguard washer Bzp.	8
26	BO382	Set Screw M10 30 BZP	1
27	BO309	Set Screw M10 40 BZP	1
28	BO856	Screw M5/20 Pan Pozi Bzp	4
29	P0000801F	Battery Clamp Bracket	1

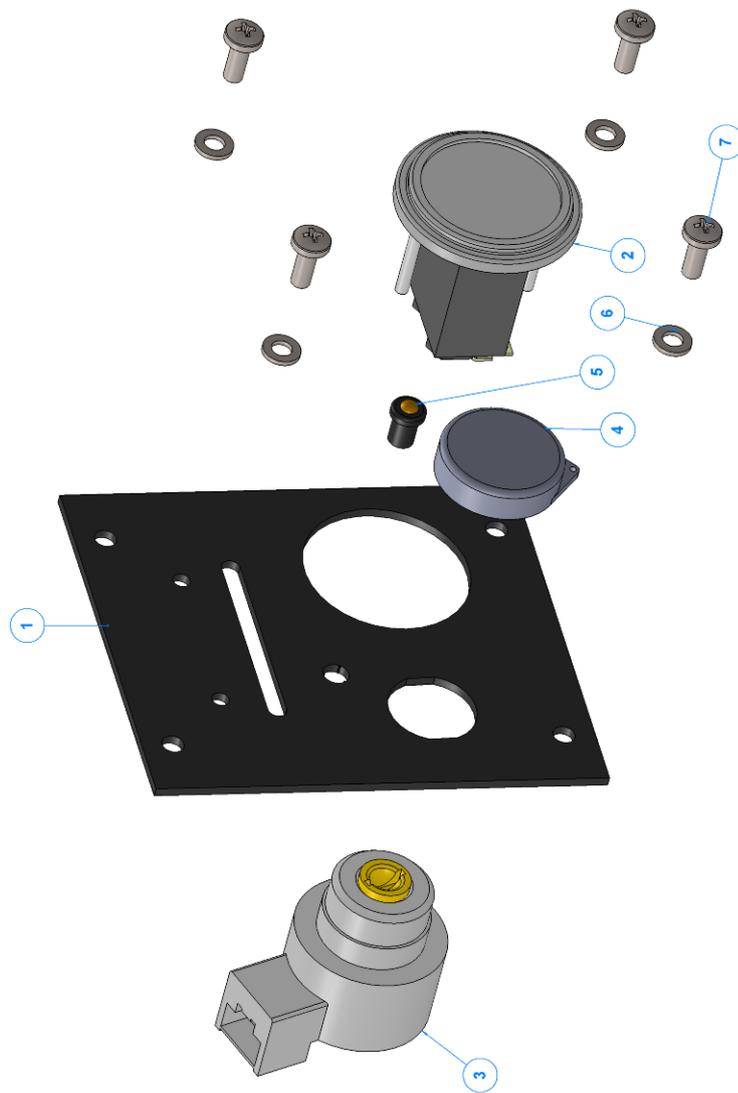


ITEM NO.	PART NUMBER	DESCRIPTION	Manual Page/Qty
1	17802F	Control Box Cover	1
2	17805F	Switch Mounting Plate	1
3	18000	AV Mount M6 MF 20 14.5	4
4	17803F	Finger Plate	1
5	17803F	Finger Plate	1
6	2834	Av Mount VE Type	2
7	17927	Limit Switch	2
8	2804	Bush M10 Top Hat	4
9	17963	Bolt M10/160	1
10	18100	Washer M4 4.3 A BZP	2
11	18235	Nut M4 0.7 Nyloc P	6
12	3435	Nut M10 P Nyloc	1
13	NU142	Nut M6 P Nyloc	4
14	18168	Pan Head Pozi M4/35 BZP	4
15	WA839	Washer M10 C BZP	2
16	RI067	Rivet M5 12 All Pop	4
17	18100	Washer M4 10 C BZP	4





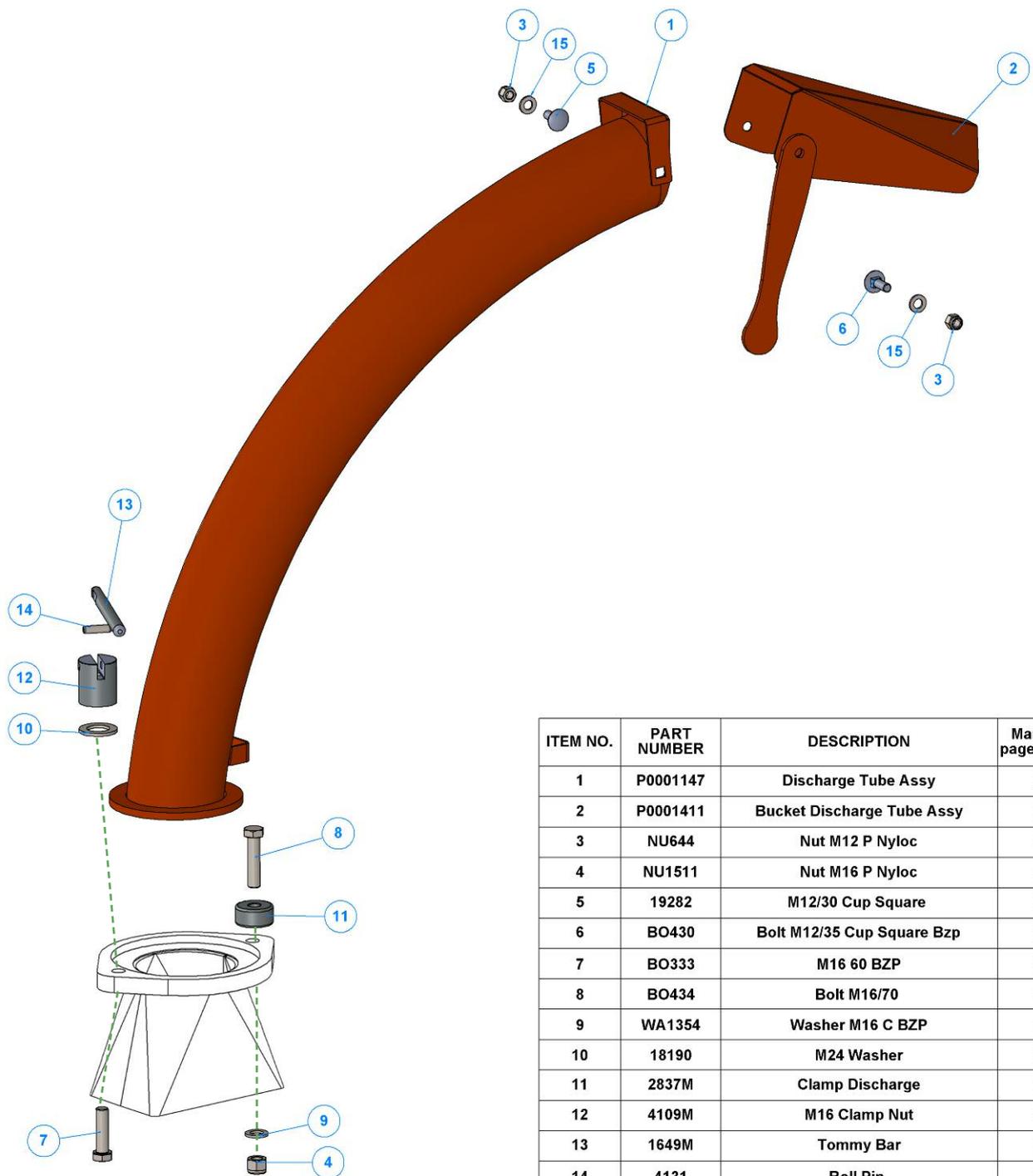
ITEM NO.	PART NUMBER	DESCRIPTION	Manual Page/QTY
1	1758	Profile Control Panel	1
2	0327	Hours Counter	1
3	Kubota Ignition Switch	Supp'd with engine	1
4	1470	Rubber Protector	1
5	1757	Amber LED	1
6	WA709	Washer M6 13.9 C BZP	4
7	BO438	Pan Head Pozl M6 1.0 16 BZP	4



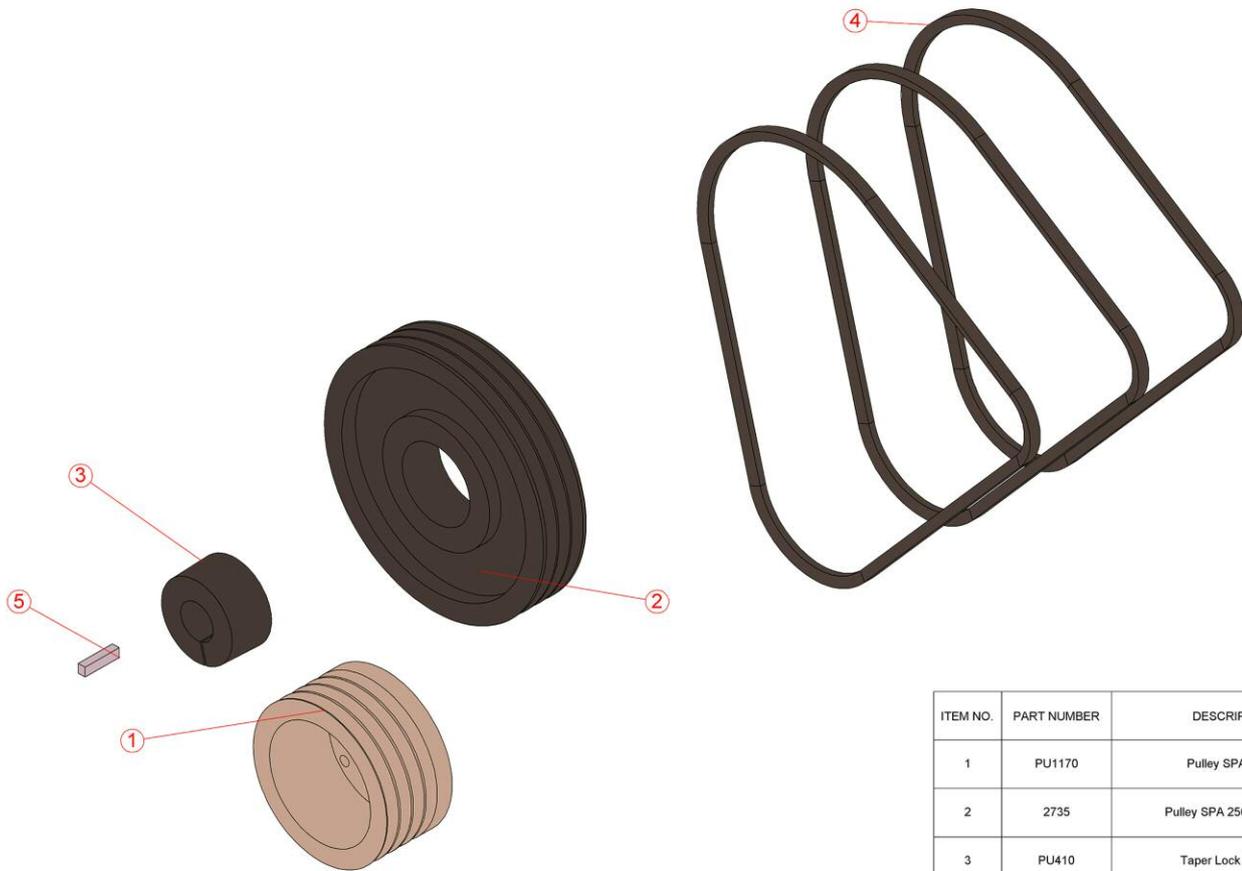
37 DISCHARGE



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TW 230DHB



ITEM NO.	PART NUMBER	DESCRIPTION	Manual page/QTY.
1	P0001147	Discharge Tube Assy	1
2	P0001411	Bucket Discharge Tube Assy	1
3	NU644	Nut M12 P Nyloc	2
4	NU1511	Nut M16 P Nyloc	1
5	19282	M12/30 Cup Square	1
6	BO430	Bolt M12/35 Cup Square Bzp	1
7	BO333	M16 60 BZP	1
8	BO434	Bolt M16/70	1
9	WA1354	Washer M16 C BZP	1
10	18190	M24 Washer	1
11	2837M	Clamp Discharge	1
12	4109M	M16 Clamp Nut	1
13	1649M	Tommy Bar	1
14	4131	Roll Pin	1
15	WA702	Washer M12 A BZP	2

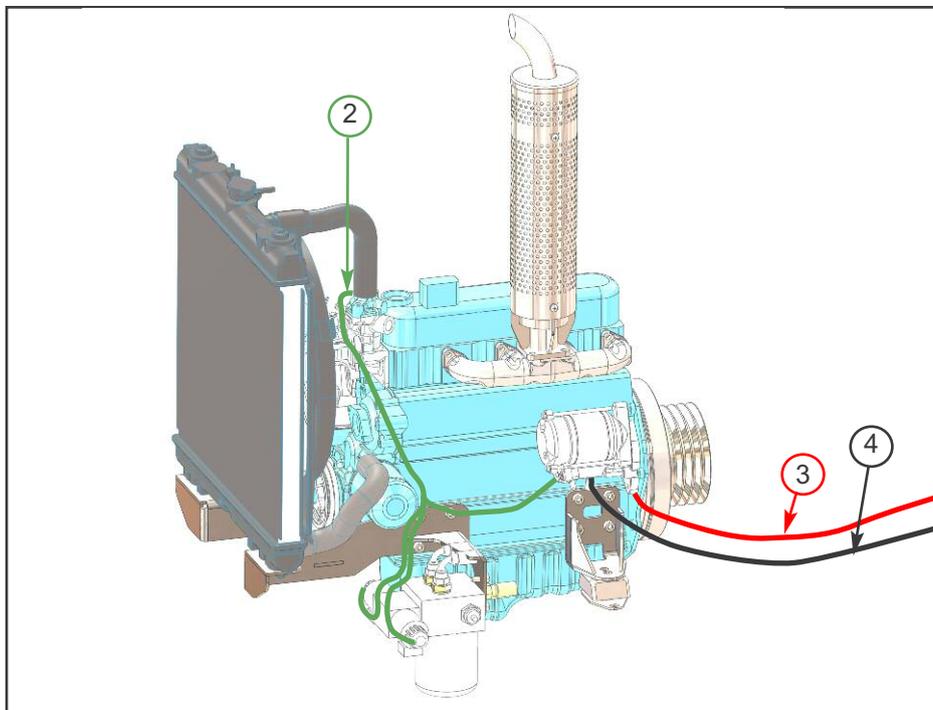
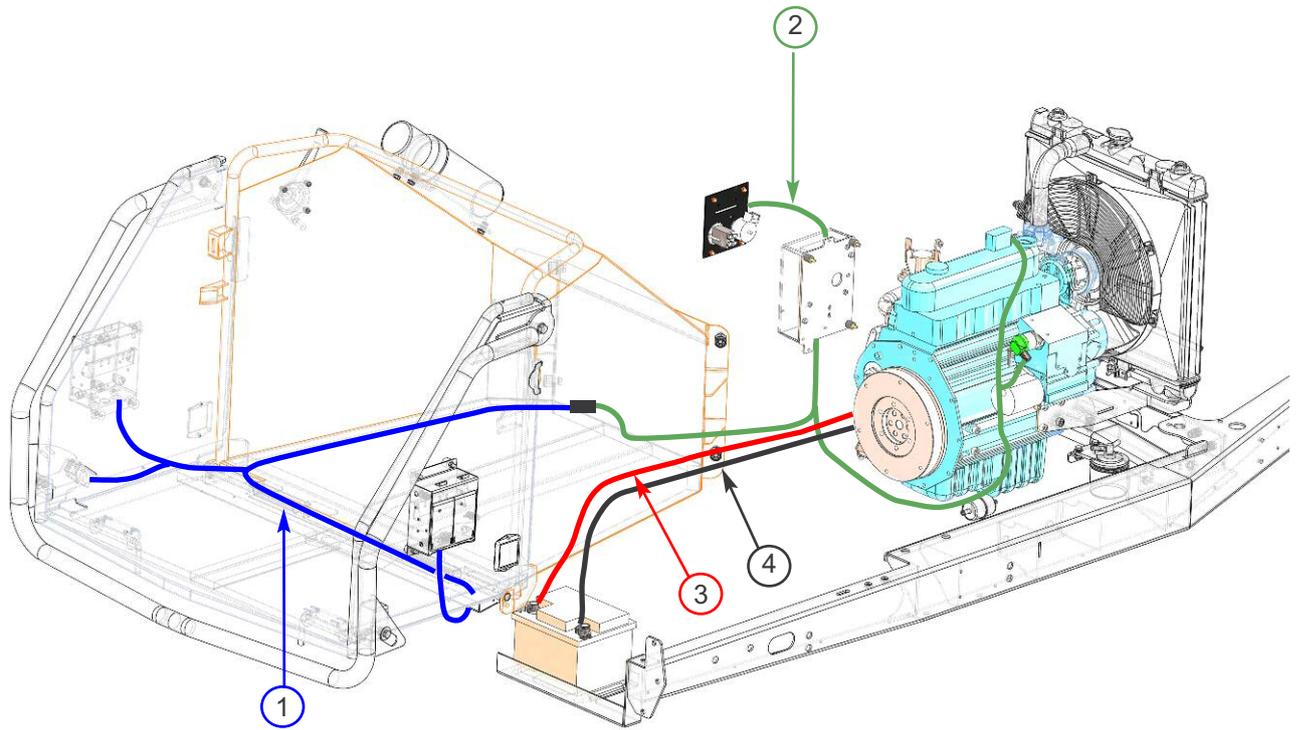


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	PU1170	Pulley SPA 4 156	1
2	2735	Pulley SPA 250 3 Spoked	1
3	PU410	Taper Lock 2517 38	1
4	17322	Belt SPA 1232	3
5	P0001412	Key 10x8x40	1

39 ELECTRICAL LAYOUT



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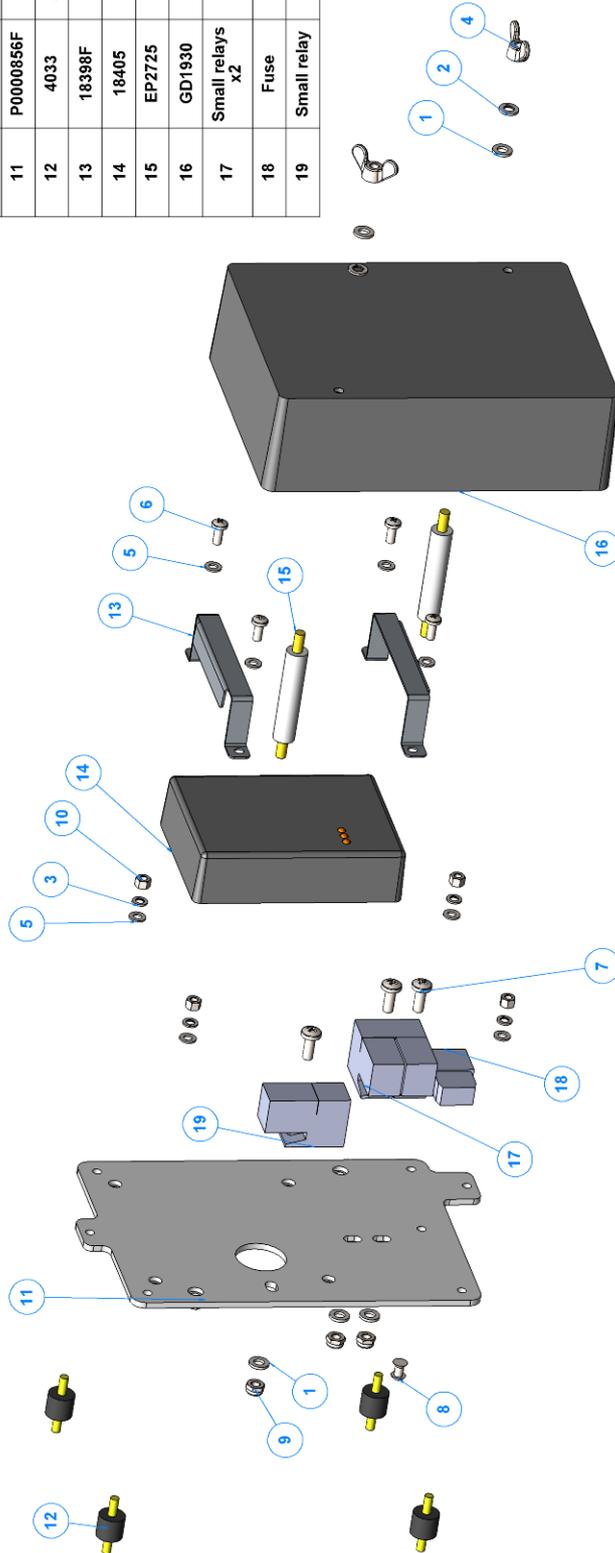
ITEM	PART NO	DESCRIPTION	QTY	ITEM	PART NO	DESCRIPTION	QTY
1	P*1335	Funnel Loom	1	4	1375	+VE Battery Cable	1
3	P*1337	Main Engine Loom	1	5	1376	-VE Battery Cable	1

ELECTRICAL PANEL



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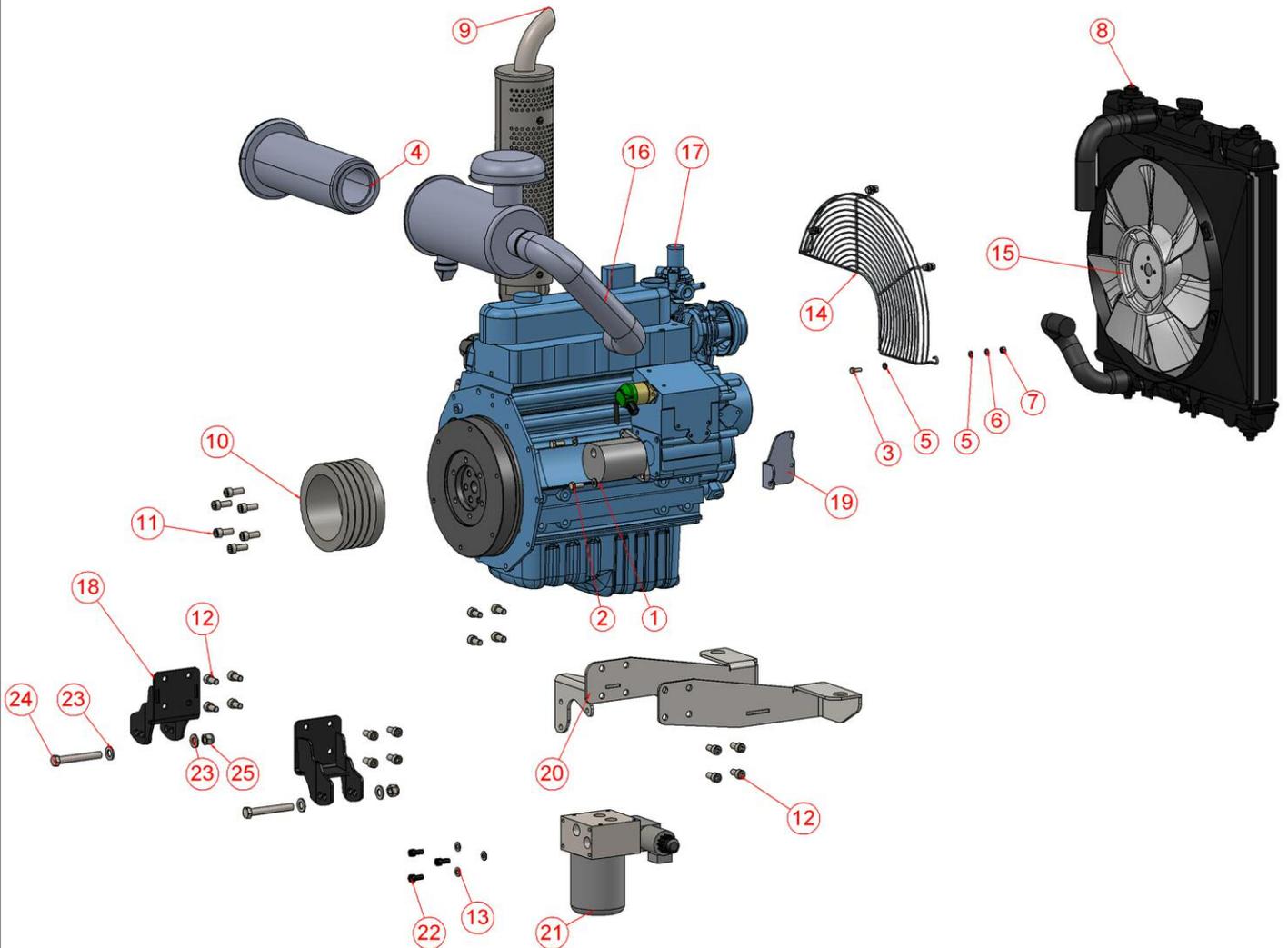
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	WA709	Washer M6 13.9 C BZP	5
2	18106	Washer M6 Spring BZP	2
3	3024	Washer M5 Spring BZP	4
4	18107	M6 Wing Nut	2
5	WA857	Washer M5 5.3 A BZP	8
6	18104	Pan Head Pozi M5 0.8 12 BZP	4
7	BO438	Pan Head Pozi M6 1.0 16 BZP	3
8	1151	Countersunk Pop Rivet	1
9	NU391	Nut M6 1.0 Nyloc T	3
10	18291	Nut M5 0.8 Plain BZP	4
11	P000856F	Plate H-Box Assy	1
12	4033	AV Mount M5 x 13mm Green Spot	4
13	18398F	Bracket H-Box	2
14	18405	H-Box	1
15	EP2725	Stand Off Nylon M6 62mm	2
16	GD1930	Cover Electrical General Short	1
17	Small relays x2	Supp'd with loom	1
18	Fuse	Supp'd with loom	1
19	Small relay	Supp'd with loom	1



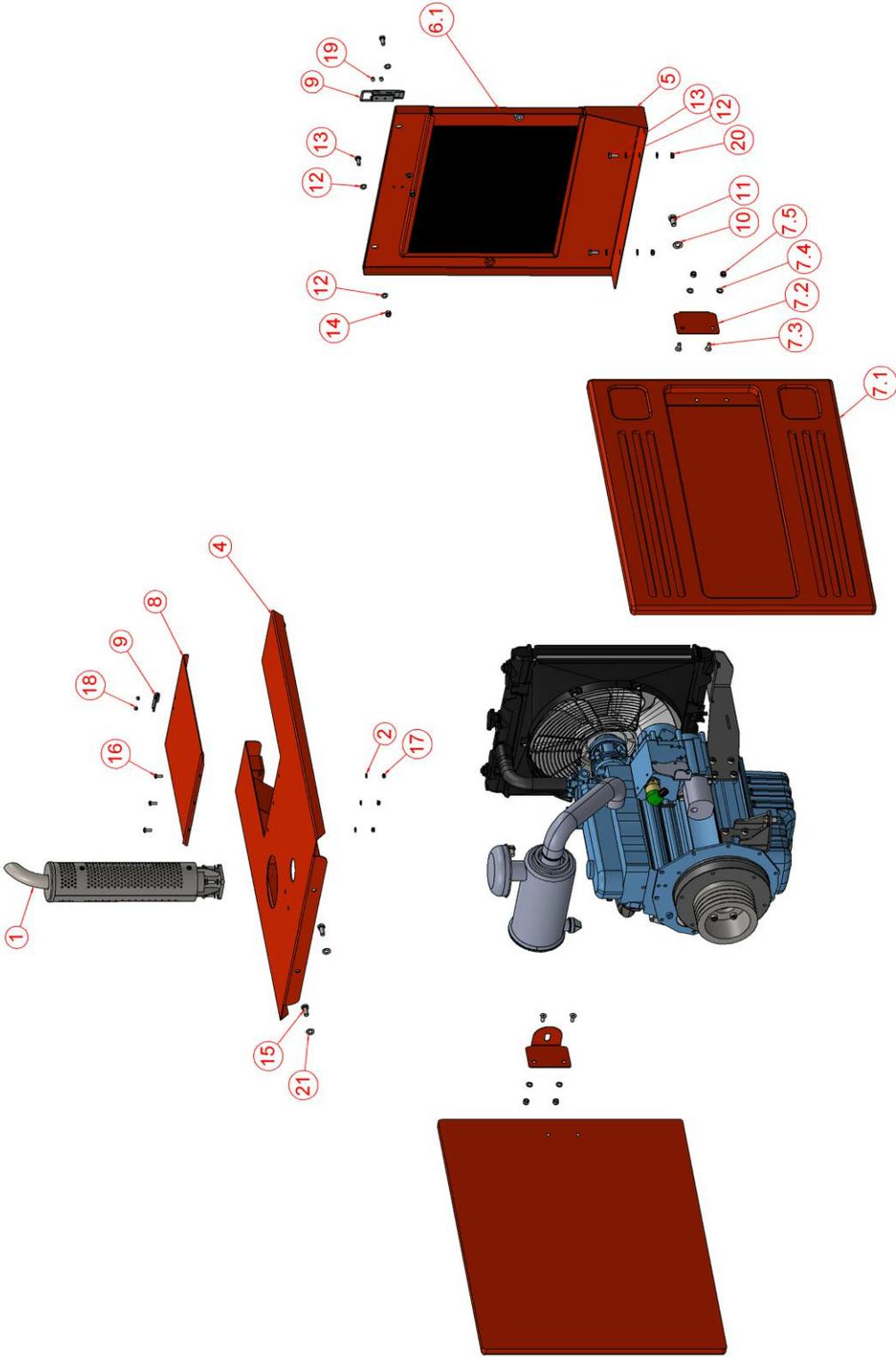
41 ENGINE



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ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	MO1660	Pump Hydraulic Engine Driven 6.61Cc	1	13	WA711	Washer M8 A BZP	5
2	BO0346	Set Screw M8 1.25 20 BZP	2	14	4335	Radiator Fan Guard	1
3	BO347	Set Screw M6 16 BZP	4	15	Supp'd with engine	Fan	1
4	0086	Air Filter	1	16	Supp'd with engine.	Air Filter Hose	1
5	WA709	Washer M6 13.9 C BZP	8	17	1505	Engine Complete With Simple Block	1
6	18106	Washer M6 Spring BZP	4	18	P0001636F	Bracket Engine Rear Upper	2
7	NU392	Nut M6 1 Plain BZP	4	19	P0000756	Throttle Cable Bracket	1
8	4319	Radiator Kit	1	20	P0000625	Bracket Engine Front Upper	1
9	18327FB	Exhaust St. Steel 1505	1	21	P0000553	Valve Cee-Top with Filter	1
10	PU1170	Pulley SPA 4 156	1	22	BO345	Socket Head Cap M8 1.25 18 BZP	3
11	BO1629	Socket Head Cap M10 1.25 25	6	23	WA702	Washer M12 A BZP	4
12	P0000369	Socket Head Cap M10 1.25 20 (Fine Thread)	16	24	BO332	Bolt M12 1.75 90 BZP	3
				25	NU644	Nut M12 P Nyloc	2



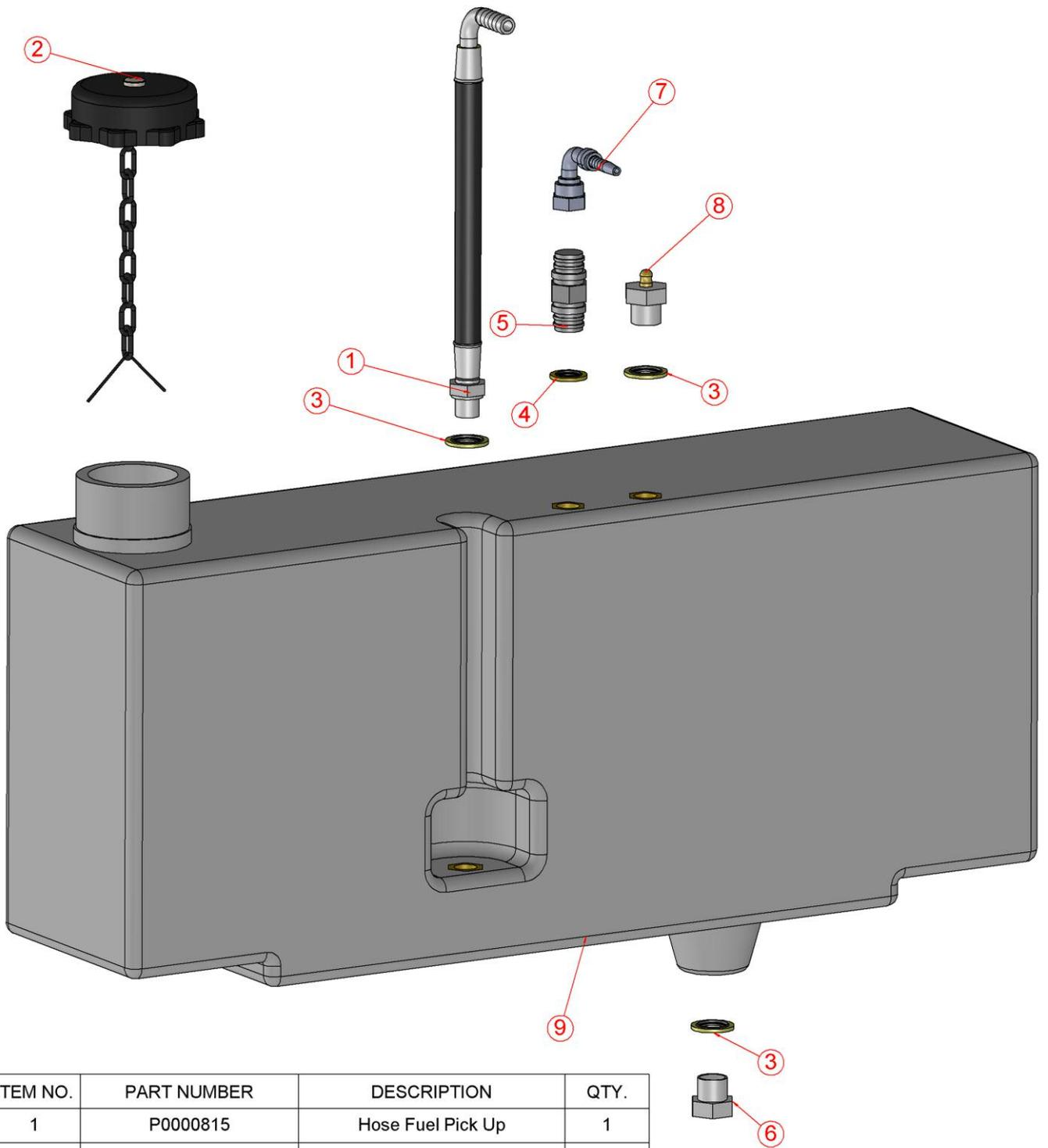
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
19	RI067	Rivet M5 12 All Pop	2
20	NU481	Nut M8 Nyloc T	2
21	WA839	Washer M10 C BZP	2

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
8	0607FO	Access Cover	1
9	0235	Catch	1
10	WA704	Washer M12 C BZP	5
11	BO318	Set Screw M12 1.75 20 BZP	2
12	WA712	Washer M8 16 C BZP	8
13	BO0346	Set Screw M8 1.25 20 BZP	8
14	NU0479	Nut M8 1.25 Nyloc P	2
15	BO360	Set Screw M10 25 BZP	2
16	BO438	Pan Head Pozi M6 1.0 16 BZP	3
17	NU391	Nut M6 1.0 Nyloc T	3
18	RI066	Pop Rivit 5 x 6	2
1	18327FB	Exhaust St. Steel 1505	1
2	WA709	Washer M6 13.9 C BZP	3
4	P0001043F	Top Bonnet	1
5	18580	Guard Front Engine Bay	1
6.1	18581	Guard Front Grille	1
7	Side Panel assembly		
7.1	0765	Panel Side Plastic	2
7.2	0825	Side Panel Bracket Profile	2
7.3	BO348	Screw M8 20 Csk Socket Plain	4
7.4	WA712	Washer M8 16 C BZP	4
7.5	NU0479	Nut M8 1.25 Nyloc P	4

43 FUEL TANK



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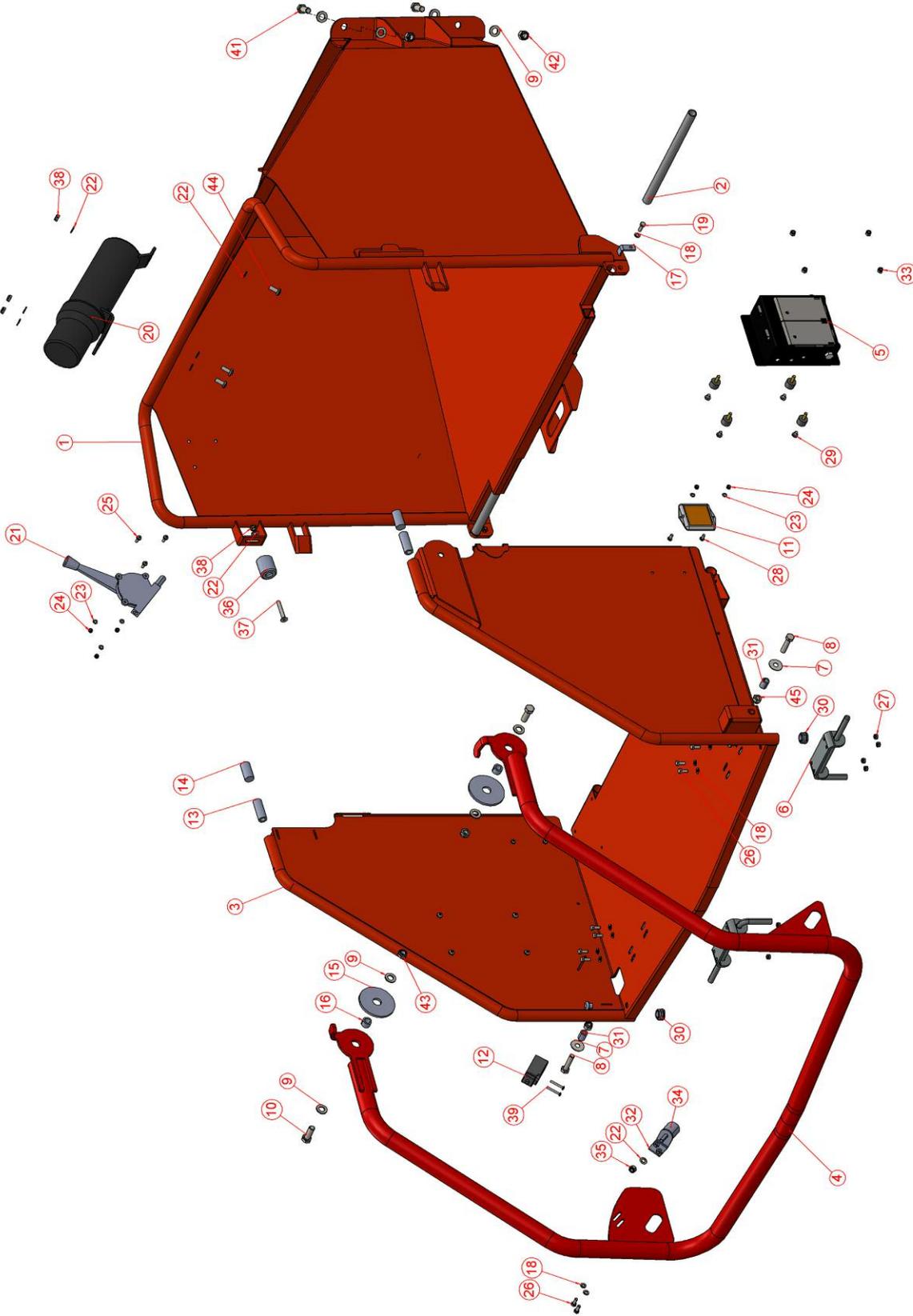
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	P0000815	Hose Fuel Pick Up	1
2	P0000611	Fuel Cap Non Locking	1
3	HY396	Washer Dowty 38	3
4	HY795	1/4" Dowty Washer	1
5	18883	1/4" Adapter	1
6	HY211	3/8" Drain Plug	1
7	19430	1/4" BSP Tail	1
8	P0001429M	Breather	1
9	1566	Fuel Tank	1

FUNNEL



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44



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
37	0353	M8x50 Csk Soc	1
38	NU481	Nut M8 Nylon T	4
39	BO1006	Pan Head Pozl M4 0.7 30 BZP	2
40	2483	Rubber Cap	2
41	BO321	Set Screw M12 30 BZP	4
42	NU644	Nut M12 P Nylon	4
43	NU045	Nut M12 1.75 Nylon T	2
44	BO347	Screw M8x20 Button Head Plain	3
45	3435	Nut M10 P Nylon	2

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
25	BO435	Pan Head Pozl M5 0.8 16 BZP	3
26	BO347	Set Screw M6 16 BZP	10
27	NU391	Nut M6 1.0 Nylon T	8
28	18104	Pan Head Pozl M5 0.8 12 BZP	4
29	18105	Pan Head Pozl M6 1.0 8 BZP	6
30	1337	Rubber Cap	2
31	1591	Nylon Spacer	2
32	2727FS	Bracket Actuator	1
33	NU142	Nut M6 P Nylon	8
34	0178	Rubber End Stop	1
35	NU0479	Nut M8 1.25 Nylon P	1
36	4206	Nylon Bush	1

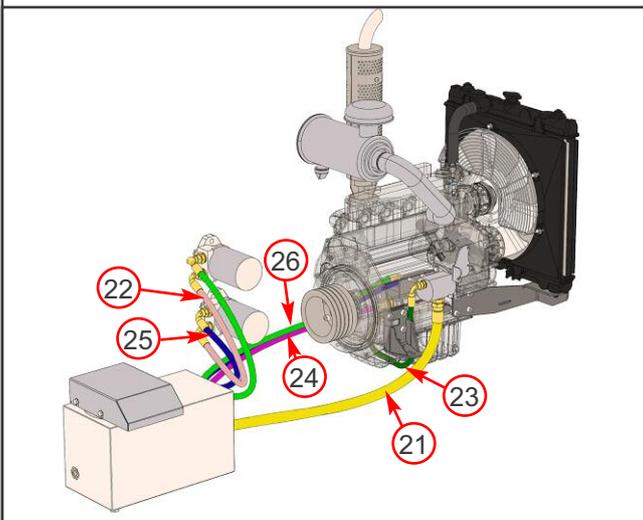
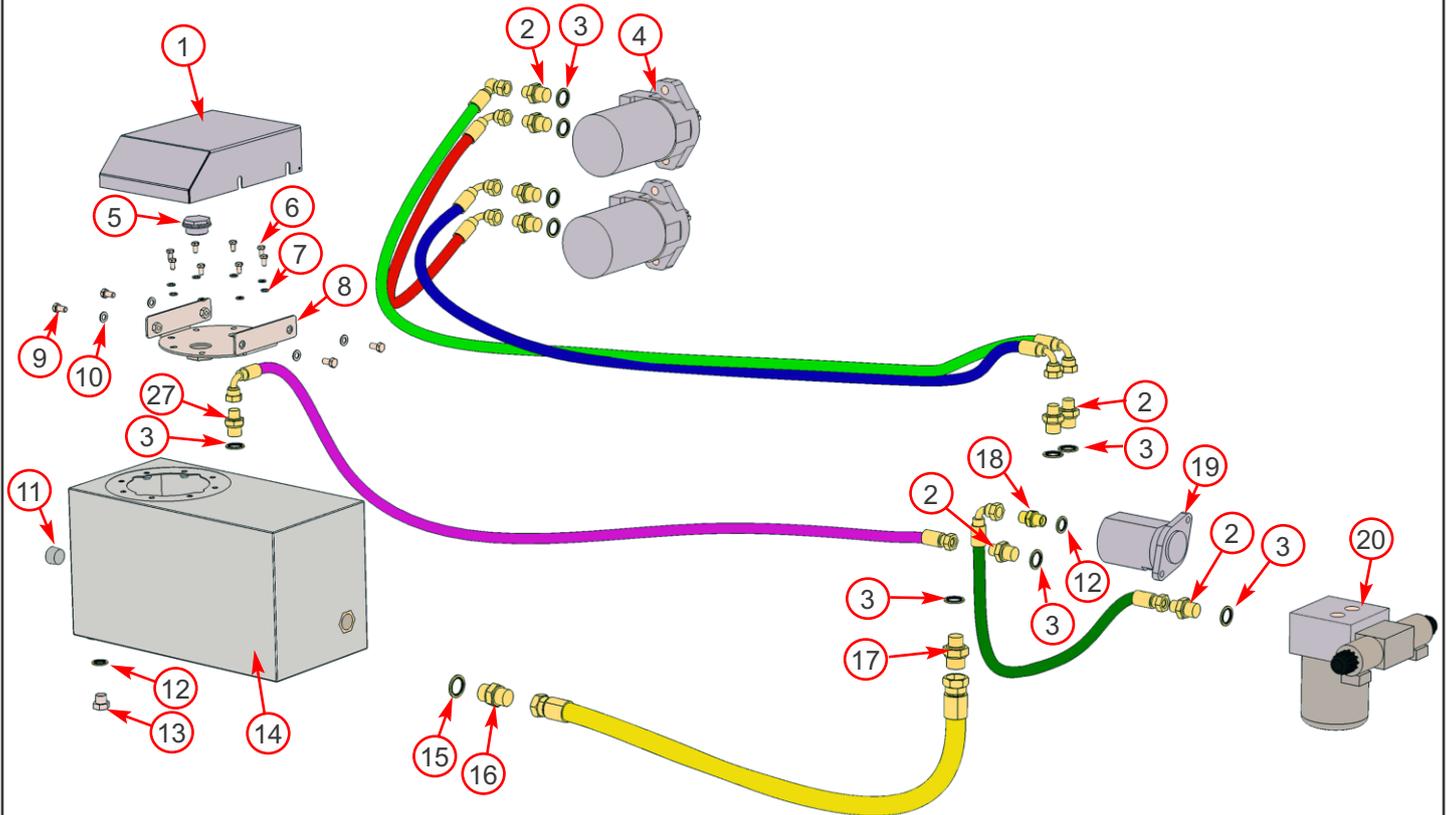
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
2	1603	Spring	2
14	1900	Safety Piston	2
15	1599	Bearing Washer	2
16	1605	Stainless Spacer	2
17	4018F	Hinge Pin Securing Bracket	2
18	WA709	Washer M6 13.9 C BZP	12
19	1236	Set Screw M6 20 BZP	2
20	P000144	Operator's Manual Camlster	1
21	P0000638	Remote Throttle	1
22	WA712	Washer M8 16 C BZP	8
23	WA6857	Washer M5 5.3 A BZP	10
24	18102	Nut M5 0.8 Nylon T	7

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	P000809F	Funnel	1
2	2922F	Hinge Pin	2
3	2919FO	Feed Tray	1
4	1570FR	Safety Bar	2
5	Paddle Box Assy 1		2
6	2866	Spring ball	2
7	WA4344	Washer M10 29.75 Penny BZP	2
8	BO1520	Bolt M10 1.5 46 BZP	2
9	WA704	Washer M12 C BZP	12
10	BO0429	Set Screw M12 35 BZP	2
11	18924	Square Reflector	2
12	1692	Limit Switch	1

45 HYDRAULICS



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ITEM	PART NO	DESCRIPTION	QTY	ITEM	PART NO	DESCRIPTION	QTY
1	P*816F	Hose Guard	1	15	0152	Washer Dowty 3/4"	1
2	0026	Adaptor mm 1/2"- 3/8" BSP	8	16	1766	Adapter 3/4" - 3/4" BSP	1
3	0398	Washer Dowty 1/2"	8	17	1583	Adaptor 1/2"- 3/4" BSP	1
4	2982B	Hydraulic Motor	2	18	0161	Adaptor mm 3/8"- 3/8" BSP	1
5	19272	Filler Cap	1	19	1660	Hydraulic Pump	1
6	1658	M6/12 Bolt	8	20	P*553	Directional Control Valve (DCV)	1
7	0709	M6 C Washer	8	21	P*1115	3/4" Hose	1
8	P*1079F	Top Plate	1	22	P*1118	3/8" Hose	1
9	0344	M8/16 Bolt	4	23	P*1116	3/8" Hose	1
10	0712	M8 C Washer	4	24	P*1120	3/8" Hose	1
11	4219	3/4" Tapered Blanking Plug	1	25	P*1117	3/8" Hose	1
12	0396	Washer Dowty 3/8"	2	26	P*1119	3/8" Hose	1
13	0211	3/8" BSP Plug	1	27	P*1454	Return Pipe	1
14	P*1703	Hydraulic Oil Tank	1				

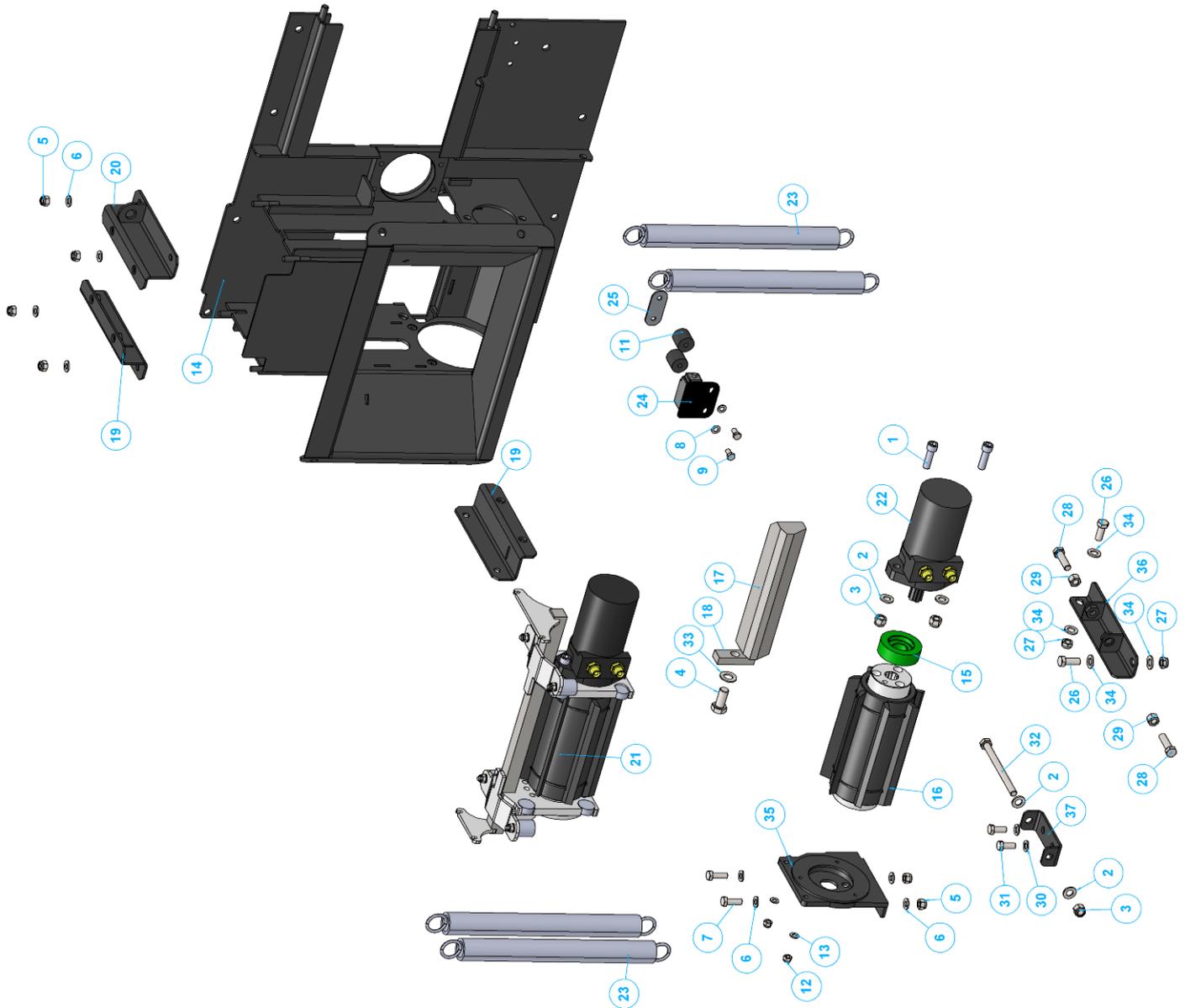
ROLLER BOX



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TW 230DHB

46

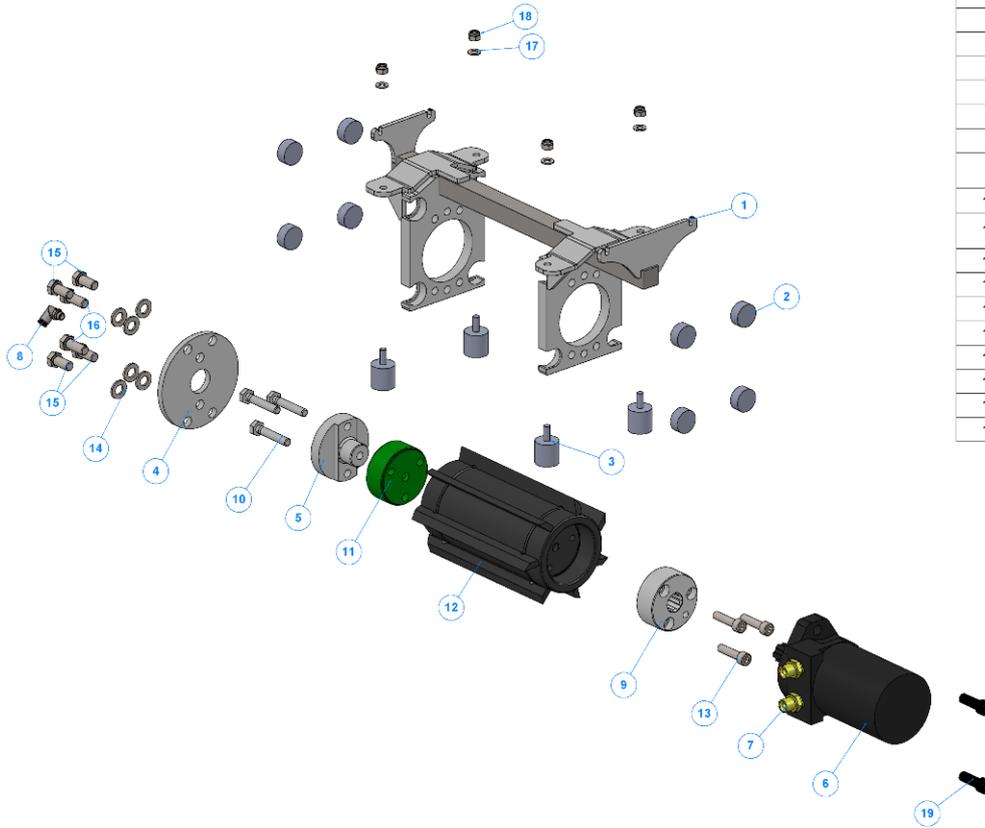
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	BO1517	Boit M12/40 Cap Screw	2
2	WA702	Washer M12 A BZP	4
3	NU644	Nut M12 P Nyloc	3
4	BO1628	Boit M16/35 Hex Set	1
5	3435	Nut M10 P Nyloc	6
6	WA701	Washer M10 A BZP	8
7	BO382	Set Screw M10 30 BZP	2
8	WA712	Washer M8 C BZP	2
9	BO344	Set Screw M8 16 BZP	2
10	HY161	Adaptor Mm 3/8 - 3/8	2
11	P0001375	AV Mount M8 FF 30x30 60 (3030DD08-60)	2
12	NU0479	Nut M8 1.25 Nyloc P	2
13	WA711	Washer M8 A BZP	2
14	P0000664F_1	Roller Box Assembly	1
15	P0001042M	Spacer Roller Drive Ø74.9 - 23.5	1
16	SA P0001558 Roller Bottom Sub Assy		1
17	P0000706M	Anvil	1
18	P0000704M	Retainer Anvil	1
19	P0001082F	Bracket Roller Box Guard Assy	2
20	P0001322F	Bracket Roller Box Guard Mount	1
21	SA P0001560 Top Slide Sub Assy		1
22	2982B	Parker Motor	1
23	19052	Spring Ø40	4
24	SA P0001559 Switch Mounting Roller Box Sub Assy		1
25	P0000993	Profile Roller Box Hatch Switch Mount	1
26	BO321	Set Screw M12 30 BZP	2
27	NU045	Nut M12 1.75 Nyloc T	2
28	18172	M12 X 45 Ht Set ZIP	2
29	NU046	Nut M12 1.75 Plain BZP	2
30	WA839	Washer M10 C BZP	2
31	BO360	Set Screw M10 25 BZP	2
32	P0001395	Boit M12 1.75 150 BZP	1
33	WA1143	Washer M16 A BZP	1
34	WA704	Washer M12 C BZP	4
35	P0002176F	Lower Roller and Anvil Support Assembly	1
36	P0000868F	Bracket Spring Carrier Roller	1
37	P0001083F	Bracket Spring Carrier Roller 116-40	1



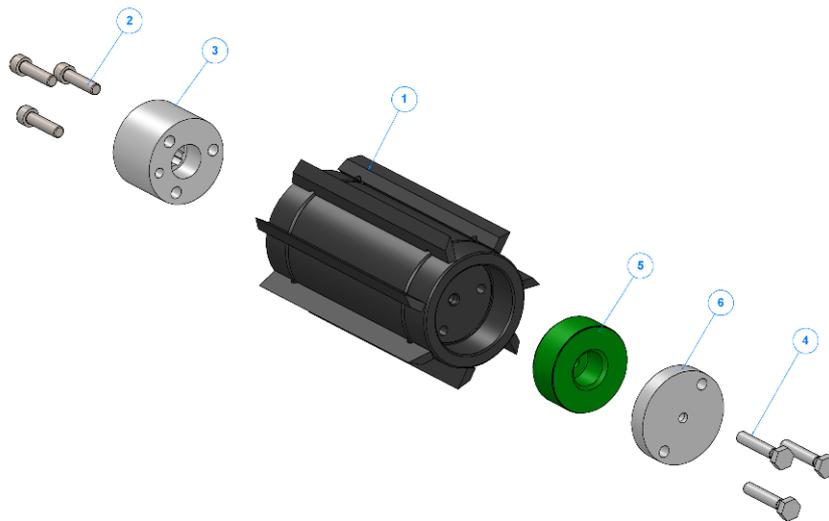
47 ROLLER SLIDES



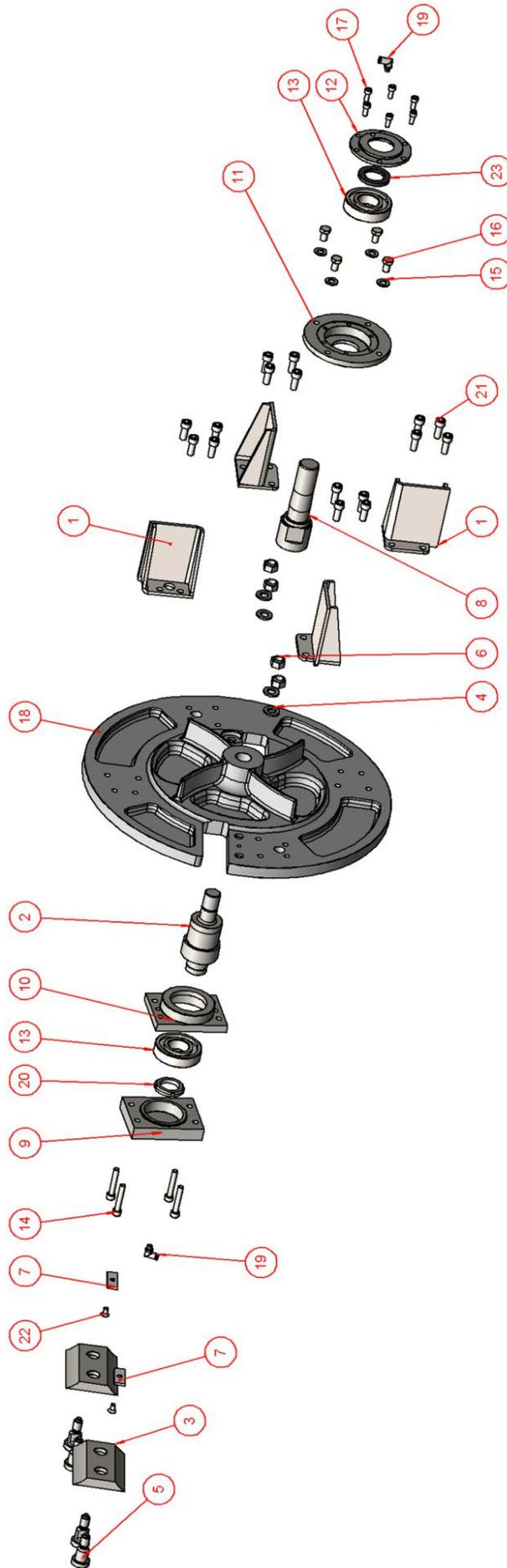
TIMBERWOLF
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ITEM NO.	PART NUMBER	DESCRIPTION	Default/QTY.
1	P0000964F	Top Slide Roller Box	1
2	3009	Slide Plug	8
3	CO1768	Av Mount 30 X 30 M8 70 Shore	4
4	P0000668	Mounting Plate Stub Shaft	1
5	P0000675M	Shaft Top Roller Stub Ø82 - 22	1
6	2982B	Parker Motor	1
7	HY161	Adaptor Mm 3/8 - 3/8	2
8	18474	Fitting Grease Point Right Angle	1
9	1361M	Bush Spline Top Roller Drive Ø74.9 - 29.5	1
10	P0001401	Bolt Shear M10 1.5 55 BZP	3
11	P0001327M	Bush Top Roller Ø76 - 30.5	1
12	P0001502F	Roller Infeed	1
13	BO299	Socket Head Cap M10 1.5 40 BZP	3
14	WA702	Washer M12 A BZP	6
15	BO277	Set Screw M12 1.75 25 BZP	4
16	BO321	Set Screw M12 30 BZP	2
17	WA711	Washer M8 A BZP	4
18	NU0479	Nut M8 1.25 Nyloc P	4
19	19730	Bolt M12 1.75 35 BZP	2



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	P0001502F	Roller Infeed	1
2	BO299	Socket Head Cap M10 1.5 40 BZP	3
3	2731M	Spline Drive Bottom Roller Ø74.9 - 52	1
4	P0001401	Bolt Shear M10 1.5 55 BZP	3
5	P0001327M	Bush Top Roller Ø76 - 30.5	1
6	P0002175M	Shaft Bottom Roller Stub	1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
17	BO372	Socket Head Cap M8 1.25 20	6
18	P0001244M	Rotor Disc	1
19	18474	Fitting Grease Point Right Angle	2
20	P0001320	Nut Rotor Shaft M40 x 1.5	1
21	BO1985	Socket Head Cap M12/30	16
22	BO3655	Bolt M8 1.25 16 CSK	2
23	P0001318	Seal 40 X 60 X 7	1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
9	P0000921M	Bearing Cap Front	1
10	P0000920M	Bearing Cup Front	1
11	P0000922M	Bearing Housing Rear	1
12	P0000923M	Rear Bearing Cap	1
13	P0001319	Bearing 6308 C3	2
14	P0001398	Socket Head Cap M10 1.25 60 (Fine Thread)	4
15	WA702	Washer M12 A BZP	4
16	BO318	Set Screw M12 1.75 20 BZP	4

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	P0001067	Paddle Rotor	4
2	P0000615M	Shaft Nose	1
3	P0000763	Blade Cutter 135	2
4	WA1218	Washer M16 30 Hard.SLDPRT	4
5	18712M	Bolt M16 Blade	4
6	1284	Nut M16 Nyloc T. 1.50 Fine Bzp	4
7	P0000924M	Plate Blade Bolt Anti Rotation	2
8	P0000925M	Shaft Rotor	1



TIMBERWOLF V-BELT TENSIONING DATA TABLE

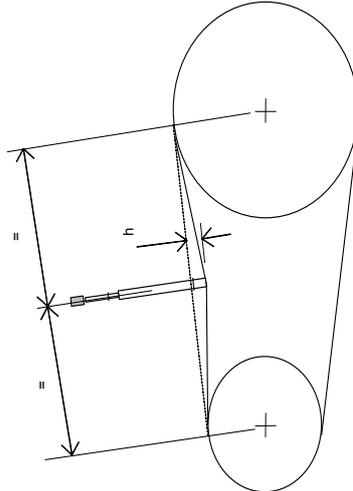
METHOD:

1. SET THE DEFLECTION DISTANCE ON THE LOWER SCALE OF THE TENSION GAUGE SO THAT THE UNDERSIDE OF THE 'O'-RING EQUALS THE 'h' VALUE GIVEN IN THE TABLE BELOW
2. ENSURE THAT THE DEFLECTION FORCE SCALE IS ZERO'D BY PUSHING THE UPPER 'O'-RING ALL THE WAY DOWN
3. PLACE THE TENSION GAUGE IN THE CENTRE OF THE BELT SPAN AS SHOWN IN THE DIAGRAM LEFT
4. PRESS DOWNWARDS ON THE RUBBER BUFFER, DEFLECTING THE BELT UNTIL THE UNDERSIDE OF THE LOWER 'O'-RING IS LEVEL WITH THE BELT BEHIND (USE A STRAIGHT EDGE IF THERE IS ONLY 1 BELT)
5. TAKE THE READING FROM THE DEFLECTION SCALE OF THE TENSION METER (READ AT THE LOWER EDGE OF THE 'O'-RING) & COMPARE THIS VALUE WITH THAT GIVEN IN THE TABLE BELOW
6. TIGHTEN OR LOOSEN BELTS AS REQUIRED FOLLOWING PROCEDURE GIVEN IN THE OPERATOR'S MANUAL

TENSION GAUGES ARE AVAILABLE FROM TIMBERWOLF SPARES, QUOTING PART No. 18091

TIPS ON BELT TIGHTENING:

- A) THERE WILL NORMALLY BE A RAPID DROP IN TENSION DURING THE RUN-IN PERIOD FOR NEW BELTS. WHEN NEW BELTS ARE FITTED, CHECK THE TENSION EVERY 2-3 HOURS & ADJUST UNTIL THE TENSION REMAINS CONSTANT
- B) THE BEST TENSION FOR V-BELT DRIVES IS THE LOWEST TENSION AT WHICH THE BELTS DO NOT SLIP OR RATCHET UNDER THE HIGHEST LOAD CONDITION
- C) TOO MUCH TENSION SHORTENS BELT & BEARING LIFE
- D) TOO LITTLE TENSION WILL AFFECT THE PERFORMANCE OF YOUR MACHINE ESPECIALLY IN RESPECT OF NO-STRESS DEVICES
- E) ENSURE THAT BELT DRIVES ARE KEPT FREE OF ANY FOREIGN MATERIALS
- F) IF A BELT SLIPS - TIGHTEN IT!



TW MODEL No.:		13/75G	18/100G	126PH	230DHB	190TDHB	230VTR	190TFTR	190TVGTR	360DHB(h)	PTO100	PTO160	S426 SHREDDER	S426TFTR SHREDDER	PTO S426 SHREDDER	SX200 - ALL MODELS
Belt Mfr / Type		Gates Super HC-MN														
Belt Pitch Designation		SPA														
Belt Length		900.0	1060.0	1060.0	1232.0	1232.0	1232.0	1232.0	1232.0	2530.0	900.0	900.0	2120.0	2120.0	1700.0	1272.0
Belt deflection	= h	4.0	3.5	3.5	4.0	4.0	4.0	4.0	4.0	8.0	4.0	4.0	8.0	8.0	6.0	5.0
Force reading (Kgf)	New belt	3.4 - 3.6	3.1 - 3.3	3.3 - 3.6	3.9 - 4.1	3.3 - 3.6	3.3 - 3.5	3.8 - 4.0	3.3 - 3.5*	3.3 - 3.5	6.5 - 6.9	1.9 - 2.1				
	Used belt	3.0 - 3.2	2.8 - 3.0	2.8 - 3.1	3.4 - 3.6	3.4 - 3.6	3.4 - 3.6	3.4 - 3.6	3.4 - 3.6	2.9 - 3.1	2.9 - 3.0	3.3 - 3.5	2.9 - 3.1*	2.9 - 3.1	5.6 - 6.0	1.7 - 1.8
Belt Mfr / Type		N/A	N/A	Gates Super HC-MN	N/A	N/A	Gates Super HC-MN	Gates Super HC-MN	Gates Super HC-MN	N/A	N/A	Gates Super HC-MN	N/A	Gates Super HC-MN	N/A	N/A
Belt Pitch Designation				SPA			SPA	SPA	SPA			SPA		SPA		
Belt Length				950.0			850.0	925.0	950.0			925.0		1060.0		
Belt deflection	= h			4.0			4.0	4.0	4.0			4.0		4.0		
Force reading (Kgf)	New belt			1.9 - 2.0			2.3 - 2.4	2.3 - 2.4	2.3 - 2.4			2.0 - 2.2		2.7 - 2.9		
	Used belt			1.7 - 1.8			2.0 - 2.1	2.0 - 2.2	2.0 - 2.2			1.8 - 2.0		2.3 - 2.5		