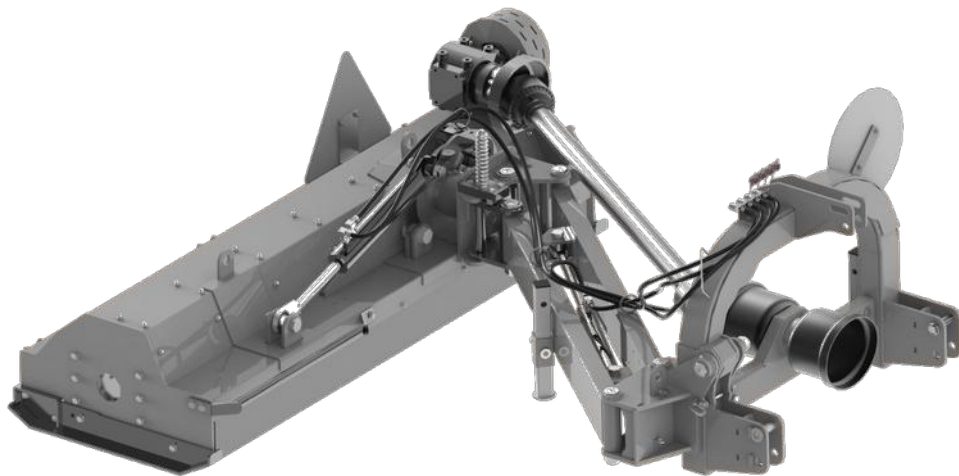




## **Operator's & Parts Manual**



**DITCH BANK MOWER**

**Rapier**



## CAUTION!

The safety regulations shall be followed while using the machine and this manual shall be read prior to the machine operation.

### **The manual is an integral part of the machine equipment!**

The manual shall be kept in a safe place and shall be available for user and an operator during the whole period of the machine operation.

If the manual is lost or destroyed, new manual shall be purchased in the machine retail outlet or at the distributor's office.

If the machine is sold or made available to other user, the manual and the declaration of conformity shall be attached to the machine.

The distributor reserves all rights to this manual.

Copying, processing the manual as a whole or its parts with no consent of the distributor is forbidden.

The notation "shredder" used in the manual refers to a flail mower.

Belco guarantees efficient operation of the machine, provided it is used in accordance with the technical and operating conditions specified in this INSTRUCTIONS MANUAL.

All faults revealed during the warranty period will be repaired by the Warranty Repairs Service. The expiration date of the warranty period is specified in the WARRANTY CARD.

The warranty does not cover parts and components of the machine subjected to wear and tear under normal operating conditions regardless of the warranty period, i.e.: bearings, cutting blades/hammers, aprons/protective covers, hydraulic hoses, etc.

The Warranty Service covers only instances such as mechanical damage not caused by a fault of the user, production defects, etc.

If any damage results from:

- mechanical damage caused by a fault of the user or a traffic accident,
- improper use, adjustment and maintenance, use of the machine for a purpose other than intended,
- operating a damaged machine,
- repairs conducted by unauthorized persons or improper repairs,
- unauthorized changes to the machine structure,

the user may invalidate its rights to the In-Warranty Services.

The user is obliged to immediately report all identified faults and have them repaired, regardless of whether the damage is covered by the warranty or not. Special warranty terms and conditions are laid out in the WARRANTY CARD attached to the newly purchased machine.

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## 1. Introduction

The manual shall be carefully read prior to the flail mower operations and all recommendations included in this manual shall be followed.



**CAUTION!**

This manual shall be read prior to the operation

The manual contains the description of hazards which can occur if the safety regulations are not followed while the operation and servicing of the flail mower. The manual includes all precautions which shall be followed to minimize or avoid hazards.

The manual also contains the rules of proper operation of the flail mower and informs what service action shall be made.

If any information included in the manual are incomprehensible, you are requested to turn to the distributor for explanation.



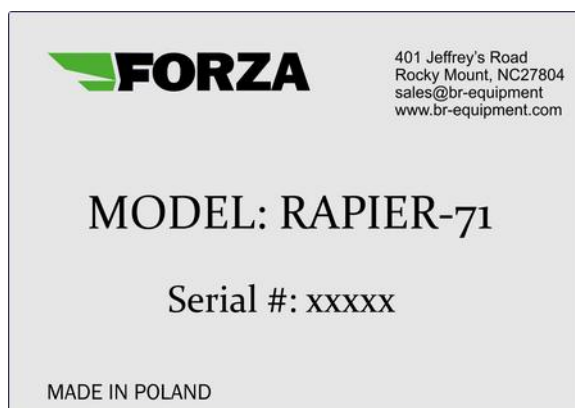
**CAUTION!**

This symbol indicates a hazard.

This warning symbol indicates important information about the hazard. You are requested to read the information carefully, Follow the recommendations provided and exercise special care.

## 2. Machine identification

Each mower is equipped with serial plate, which contains important identification data. Plate is located in easily accessible part of the machine. Information contained by the base plate confirm compliance with applicable safety regulations. Due to this reason it cannot be reused or removed



**Fig 1: Nameplate**

If in doubt, any information about the machine and explanations of the instruction manual should be provided by the dealer or distributor.

### **Distributor Address**

#### **Belco Resources Equipment**

401 Jeffrey's Road  
Rocky Mount, NC27804  
Tel.: (252) 822-7140  
e-mail: [sales@br-equipment.com](mailto:sales@br-equipment.com),  
[www.br-equipment.com](http://www.br-equipment.com)

### **3. Occupational safety regulations**

#### **3.1 User safety**

The flail mowers can be operated only by adults who familiarized with the contents of this manual and are qualified. The flail mowers shall be operated with special care and the following hints shall be followed:

- Follow general occupational health and safety regulations despite recommendations included in this manual.
- Follow warning symbols installed on the machine.
- People under the influence of alcohol or other narcotic drugs cannot operate the machine.
- Only an operator can drive the flail mower, other people cannot stay inside or close to the machine.
- The flail mower can be operated only by a qualified person who can drive a vehicle attached to it, according to the distributor's recommendations.
- A vehicle cabin to which a machine is attached is a workplace of an operator while working with the flail mower.
- It should be remembered that a flail mower has a lot of places which could injure a body (sharp edges, protruding construction elements etc.). Special care shall be kept while moving in the vicinity of mentioned critical places and personal protection equipment, such as the following, shall be worn:
  - protective clothes,
  - protective gloves,
  - protective shoes.
- Transport of people or items on the machine is forbidden.
- Bystanders who has not familiarized with the manual cannot operate the machine.
- An employee who operates the flail mower shall have a first-aid kit and its instruction manual.
- While moving with attached vehicle, but a flail mower in a standstill, safe transport height that is ~0,3m above the surface shall be maintained.
- Special care while driving on public roads shall be maintained and it is necessary to follow traffic regulations as well.
- Electric lighting shall be used in a whole vehicle while moving on public roads, checking its technical condition and visibility, and taking care of the cleanness. Triangular plate indicating low powered vehicles shall be installed on the machine or vehicle's back. It is necessary to take care of the cleanness and visibility of reflector lights and warning signs on the construction elements of the machine.
- Transport speed shall be adapted to the condition of roads and shall not exceed 20km/h.
- The vehicle and a flail mower cannot be left on slopes or other terrain inclination with no protection against accidental rolling. The flail mower shall be positioned on a flat surface. The chocks shall be put under a vehicle's wheel.
- The flail mower shall be adjusted for the operation while the assembly. The position can be adjusted from the operator's cabin, with no need to leave a cabin.




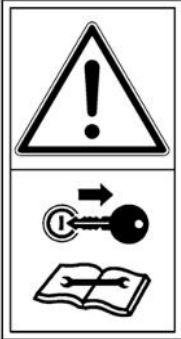





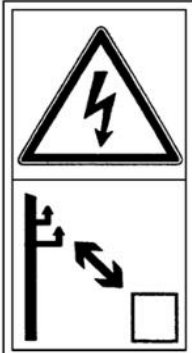

- All action connected with the preparation, assembly, disassembly or adjustment can be made only upon the driver shut-off, engine stop, stoppage of a vehicle and waiting until all movable elements of the machine shall be in a standstill.
- The condition of all temporary Hastings, screw connections shall be checked upon first hour of operation.
- The flail mower shall be stored on a flat, leveled and hardened surface that is unavailable for outsiders and animals. A supporting flange shall be applied for stable position of a flail mower.
- Special care shall be kept while assembly and disassembly of a flail mower paying special attention to construction elements responsible for linking on the rear of a vehicle.
- The technical condition of a flail mower and attached vehicle shall be verified prior to the operation. The unit, vehicle and flail mower shall be maintained in a good technical condition. Worn and damaged parts shall be replaced immediately.
- The flail mower shall be equipped with all protective covers (recommended by a distributor) against movable parts. The covers shall be complete and in good condition.
- It is necessary to read the manual, occupational safety regulations and recommendations on the servicing and adjustment prior to the operation.
- The flail mower's weight mounted on a vehicle can influence on the maneuverability. Special care shall be kept in this case.
- The manual shall be kept with the machine. If the machine is lent it shall be in a good technical condition and with the manual.
- Attaching additional transport means to the flail mower is forbidden.
- Check the machine operations and initial adjustment with no duty shall be made while the start-up.
- Assembly protection 3PL (three point linkage suspension system) of a flail mower bolts shall be done only with typical protections such as pins. Operation with other protection type is forbidden.
- Because of natural wear it is necessary to control the condition and completeness of cutting tools of the machine by observing recommendations described in a chapter „6. Service and maintenance activities”.
- The technical condition of the machine shall be checked while the reception and transport of the flail mower.
- Standing under lifted flail mower is forbidden as there is a hazard of getting caught by construction elements.
- Fingers and limbs cannot be inserted between construction elements of the machine while the adjustment.
- Vehicle operator who operates the flail mower shall be careful as nobody can stay close to the machine while operations and adjustment and **be closer than 50m from the flail mower**.
- While turning back, moving back or maneuver the machine the visibility shall be proper or qualified person shall assist in it.
- Service personnel cannot stay between a vehicle and the flail mower with engine operational.
- The operation on inclined terrain exceeding 15% is not allowed.
- While the operation on slopes special care shall be exercised.
- While turns PTO drive shall be switched off (power take off shaft).





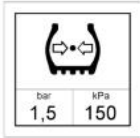




- The machine cannot be operated on public places such as parks and schools and on a stony terrain to avoid a hazard of throwing stones and other items.
- PTO revolutions cannot exceed 540rev/min while operation, and driving shall be adopted to required operation.
- The operation with damaged or incomplete telescopic jointed shaft is forbidden. The operation without covers of movable parts is especially forbidden.
- If the engine is operating it cannot be left unattended. If the drivers space (cabin) is left, the machine shall be positioned on the ground, a key taken out and the engine shut off and a hand-brake put on.
- Any unzipped or loose working clothes while the operation, assembly, disassembly and adjustment is forbidden. It shall be kept away from construction elements which can catch it.
- When the operation is completed it is advised to clean the flail mower in a wash equipped with waste treatment or a clarifier to the waste neutralization.
- Storage of the machine shall be made in places protected against outsiders and Animals to eliminate a risk of accidental hurt, on a leveled, hardened and canopied surface.
- In the event of damage a transmission drive shall be immediately shut off.
- During work with flail mower, operator is obligated to use ear protection to minimize exposure to noise. Moreover, it is recommended to close the doors and windows in the vehicle.



A failure to Follow the above rules can be a hazard to the operator and outsiders and can be a reason of flail mower damage.  
Any damage resulting out of a failure to Follow these rules shall be covered by a user.

### 3.2. Safety signs are placed on a machine

 <p>1.0 - Prior to using the machine, read the Instruction Manual</p>	<p>C.2.26</p>  <p>1.1 - Switch off the engine and remove the ignition key before any servicing or maintenance procedures</p>	<p>C.2.36</p>  <p>1.2 - Keep a safe distance from the machine. Do not allow unauthorized persons within the range of 165 ft from the machine</p>
<p>+A.8.19</p>  <p>1.1.1 – Warning, belt transmission. Use extreme caution. Drawing-in of hand and arm.</p>	<p>+A.8.7</p>  <p>1.1.2 – Warning, possibility of being drawn-in by the machine</p>	<p>C.2.7</p>  <p>1.5 - Do not stand near the lift strands when controlling the lift</p>
<p>C.2.20</p>  <p>1.6 - Do not open or remove safety guards when the engine is running</p>	<p>C.2.30</p>  <p>1.7 - Keep a safe distance from power lines</p>	<p>C.2.44</p>  <p>1.8 - Avoid exposure to liquids flowing under pressure.</p>

<p>A.6.2 + B.2.6</p>  <p>1.2.1 – Keep a safe distance from the machine. Crushing of toes or foot – Force applied from above</p>	<p>C.2.27</p>  <p>1.4 - Do not ride on platforms or ladders</p>	 <p>2.1 - Lifting points on the mower during handling</p>  <p>2.5 – Warning message about pressure in the hydraulic system</p>
 <p>2.5.1 – Warning about the pressure present in the tyres</p>	 <p>2.3 – Use protective coverall</p>  <p>2.4 – Use safety gloves</p>	 <p>2.6 - Wear ear protectors</p>  <p>2.7 – Wear eye protection</p>

### 3.3. Hazards while using the flail mower

No.	Hazard	Hazard source (reason)	Protection measures against hazard
1	Overload of motion system (physical load)	Operation in a standing position, bowed – forced, walking, shifting	Reading the instruction manual, on-the-job training including the weight carrying standards while performing manual transport works, proper techniques of weights carrying, other person assistance, devices facilitating the transport i.e. lifting jack, hoisting winch
2	Fall at the same level (falter, slipping etc.)	Bumpy surface, disorder – laying and standing items, items on the passageways, slippery surfaces	Proper working shoes, plane surface, staying alerted, keeping it tidy, reading the instruction manual
3	Hitting fixe and projecting parts of the machine	Machine, its surrounding	Proper position of the machine, safe space for moving, proper organization of work, staying alerted, reading the instruction manual
4	Moving parts can hits you	Granulated plants, accidental parts of turf, stones thrown by the machine	Staying alerted, indicating hazardous area, Ban on moving while the machine is operating, staying at the distance less than 50m from the machine is forbidden, using personal protection means – protective helmet, goggles, reading the instruction manual
5	Sharp and dangerous edges	Projecting construction elements of the machine, using manual tools	Personal protection means – protective gloves, zipped working clothes, staying alerted
6	Belt transmission	Moving wheels and belts of the transmission, whirling telescopic joined shaft, no covers of movable parts	Ban on movement, approaching and adjusting machine operated, staying alerted, using covers for movable parts, reading the instruction manual
7	Weight of loaded standing machine	Improper assembly, aggregate, improper position of the machine, improper service, leasing loaded machine on the tractor	Staying alerted, using protective protection means – protective shoes, protective gloves, safe position of the machine, using other person assistance, using lifting jack, davits, reading the instruction manual
8	Micro climate – random Feather conditions	Work performed in random weather conditions	Proper working clothes, beverages, filter creams, rest, reading the instruction manual
9	Noise	Excessive revolutions of the machine, damaged, loose or vibrating parts	Operation with machine in a good technical condition, current inspections of the machine, proper revolutions of the machine, reading the instruction manual

## 4. Indicated use

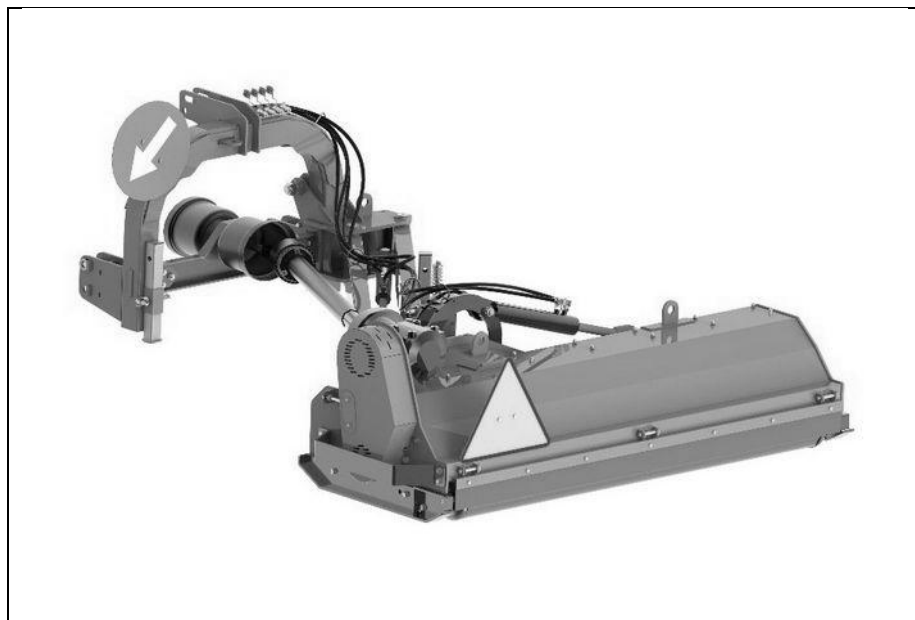
Flail side mower is intended to do works connected with maintaining community infrastructure, greens and for work in orchards and in the agriculture. The machines are used for mowing, granulating scrubs, undeveloped grass, roads shoulders and granulating fine branches in orchards. It is also used for meadow reclamation with the intention to leave the swath and destruction of remains left on fields upon cultivation. Flail mowers mow and granulate cut material at the same time and spread it evenly on mowed surface and it allows to get natural swath. The machine is attached to the vehicle with three point hitch suspension system. Working element is rotating shaft with rotational positioned knives and flails. The unit is driver from PTO through intersecting axis gear and belt transmission. Meeting requirements on the machine operations, that is service and repairs according to the distributor's recommendations and its precise observation is the condition for operating it according to its intended use. The machine shall be used, operated and repaired only by personnel who familiarized with characteristics of the machine and occupational health and safety regulations. The distributor has wide choice of agricultural machines. It also gives special advises in terms of proper equipment to meet user needs.



All obscurities concerning intended use of the devices hall are explained by contacting with the machine distributor. Proper selection of a machine and the conscious of its intended use shall increase the operation safety.

Using the machine for purposes other than accepted shall be understood as misuse.

## 5. Machine description



**Fig.1 General view of the machine Rapier**

The flail mowers Rapier 71 and 80 are built with two main construction units. First unit is **a supporting structure with working chamber**, which is made of steel elements connected using welding method. The construction is compact and resistant. Second element is **a driving unit of a flail mower**, which consists a shaft of power relay which transmit a torque directly from tractor shaft on direct shaft located in a machine. The next element is a wide-angle shaft transmitting a torque from direct shaft to a intersecting axis gear of the leverage 1:3. Both power take-off shafts are equipped with protective covers. It cannot be disassembled or any damaged parts cannot be used, besides the start of the machine with removed cover is not allowed. The next step is the transmission of a torque from toothed gear on the unit of working shaft. The belt transmission with the adjustment of the belt tension is used for this purpose. The belt transmission provides good shock absorption of the shock load both while the machine start and while meeting obstacles by flail or knife, in the form of a stone or other, it increase the life of toothed gear or other elements.

The machine is additionally equipped with drive shaft, which provides extra support and even distribution of machine weight while operation and the load of supporting structure is limited to a minimum. The control of working settings is carried out from an operator's cabin with 2 systems of power hydraulics (horizontal traveling, turn). It allows for very precise position of the machine while operation. The flail mowers have been equipped with curtains that protect against the throw of stones and hard items out of the flail mower chamber.

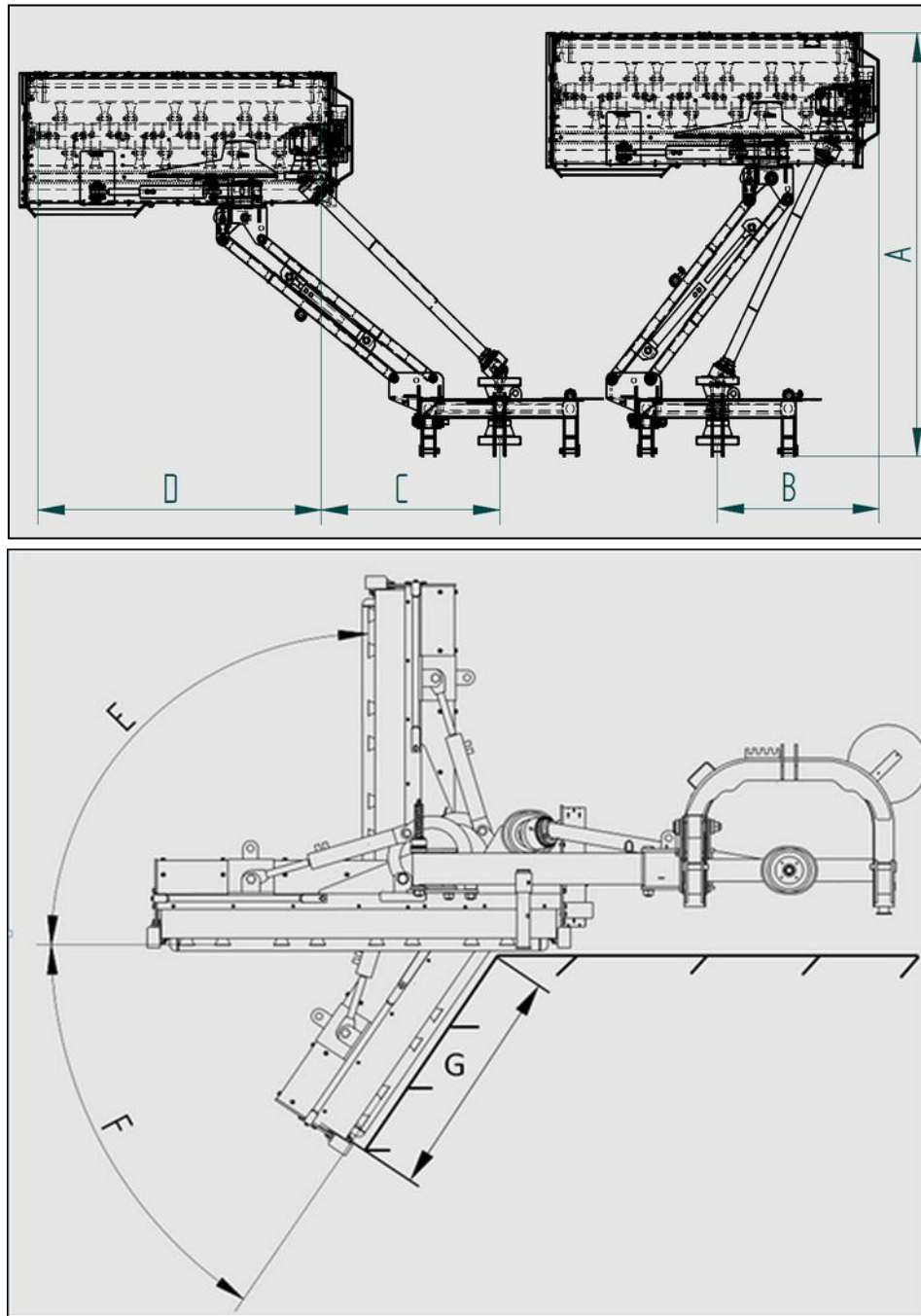


Fig. 2

Model	Dimensions						
	A	B	C	D working width	E	F	G (If F=45°)
Rapier-71	102"	42"	45"	67	90	45	47"
Rapier-80	102"	42"	45"	75"	90	45	55"



## **5.1. Equipment**

### **5.1.1. Basic equipment**

The basic equipment of the flail mower contains the following:

- Warning labels kit
- Warning signs („vehicles may pass it from left side”, „Road works”)
- PTO shaft 620 Nm L=1010mm
- Safety covers for driving shaft
- Stoppers for protecting suspension pins
- Base plate
- Drive shaft
- Instruction manual
- Warranty card



Warning plates, lights and triangle table for low powered trucks are basic equipment. It can be purchased for extra payment at the distributor or in a depot of agricultural equipment. Each user of the machine shall have proper plate for low powered trucks. Failure to install it for the transport can be a reason of accident. Machine user is responsible for any damage resulting from the accident.

#### Caution:

ALL ELEMENTS OF ADDITIONAL EQUIPMENT OF THE MACHINE ARE AVAILABLE AT THE DISTRIBUTOR'S STORAGE FOR EXTRA PAYMENT.

## 5.2. Technical specification

Table No. 1

### TECHNICAL DATA FLAIL MOWER RAPIER

No.	Specification	Units	Rapier 71	Rapier 80
1.	Type Z-908	-	180	200
2.	Type of hitch		Mounted	Mounted
3.	Working width	[inch]	71"	79"
4.	Power requirement	[HP]	114*	127*
5.	Amount of working shafts	[pcs.]	1	1
6.	Amount of blades	[pcs.]	56	64
7.	Amount of flails	[pcs.]	28	32
8.	Class of tractor hitch	-	II	II
9.	Flail mower setting for shipping	-	horizontally	horizontally
10.	PTO Speed	RPM	540	540
11.	Work efficiency	[ha/h]	1,35	1,5
12.	Range of machine operation	[°]	+90 -45	+90 -45
13.	Operating speed	[mph]	5-6	5-6
14.	Transport speed	[mph]	12	12
15.	Operators required	[pcs.]	1	1
16.	Dimensions length width height	[inch]	106" 79" 41"	106" 87" 41"
17.	Weight	[lbs]	1874	1984
18.	Noise level emitted by the machine	L <sub>pA</sub>	92,3±1dB	92,7±1 dB
		L <sub>Amax</sub>	96,8±1,3dB	96,4±1,3 dB
		L <sub>Cpeak</sub>	127,1±1,3dB	127,1±1,3 dB

\*value of declared power guarantees proper weight of a tractor providing the stability while operations on maximal reach of the flail mower.

L<sub>pA</sub> - Noise exposure level related to 8 hours of work per 24 hours

L<sub>Amax</sub> – Maximum sound measurement value

L<sub>Cpeak</sub> – Peak sound value

## 6. Device use

The distributor guarantees that the machine is in a good technical condition and was verified according to the procedures of quality control and is accepted for usage. The user is obliged to verify the machine upon reception.



**Before the mower usage, it is necessary to check its technical condition, and especially the condition of cutting unit, driving system, hydraulic installation and covers.**



**The machine can be launched after placing on the ground. It is forbidden to turn on the drive when the machine is raised over the work surface, it does not rest on the ground. It is forbidden to lift the machine on the lift. Disconnect the drive before lifting and wait until the working shaft stop. The machine is safe when it rests on the ground and it is pulled on the skids during operation.**

### **6.1. Linking – flail mower assembly**



It is necessary to make sure that elements of a vehicle and machines are properly set to guarantee safe assembly and operation.  
If any obscurities occur turn to the vehicle or machine distributor.

#### **I. The assembly of the suspension system of the vehicle and machine.**

The machine is suspended on three-point suspension system of a tractor, vehicle. To facilitate the aggregation bottom springs shall be installed at the height of approx. 14". Upon machine suspension, adjust the length of upper connector in a way that the position of side slippers is parallel to the surface. The chain of bottom springs of tractor suspension shall be adjusted to minimize side deflection of the machine.

Depending on the type of three-point suspension system it is necessary to cafe for original protection. Check the wear of connecting elements upon each assembly: pins and pivots. Replace a part if it is worn.

**Pay special attention to verify if nobody is standing between while connecting the machine and the tractor.**

#### **II. The assembly of the driving shaft of the machine.**

When the machine is installed on three-point suspension system, we install driving shaft telescopic and jointed shaft on tractor's PTO and machine's PTO and lift supports in upper position and protect bolts with pins.



Only original telescopic and jointed shaft with overrunning clutch (OC) shall be used, (620Nm, L=1010mm) marked with CE sign and roof shields PTO and WPM. When ends of telescopic jointed shaft is inserted on PTO and WPM the catch fastener shall be checked. For power hydraulics only proper and tight cables finished with fitted connections shall be used.

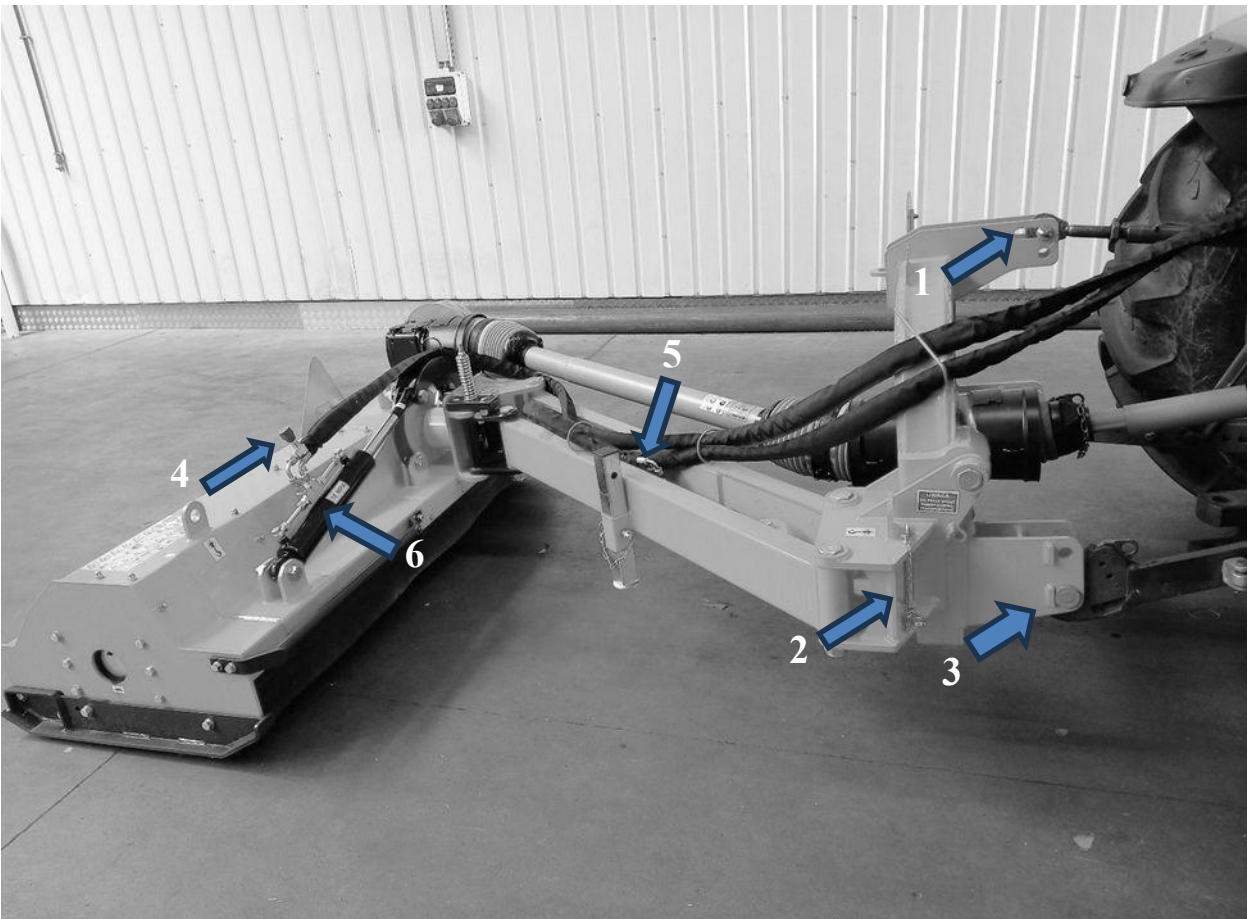
### III. Assembly of power hydraulics system

The flail mower has two systems of hydraulic control. The machine is equipped with stub-pipes which shall be connected with hydraulic cables with stub-pipes of vehicle power system. Special attention shall be paid to ducting and cleanness of hydraulic connections.

Machine disassembly shall be made the other way round with special care for the safety while disassembly of mechanic system which separates the machine and the vehicle.


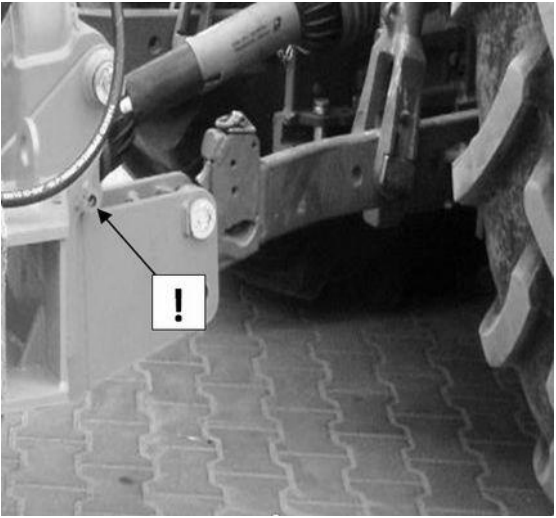
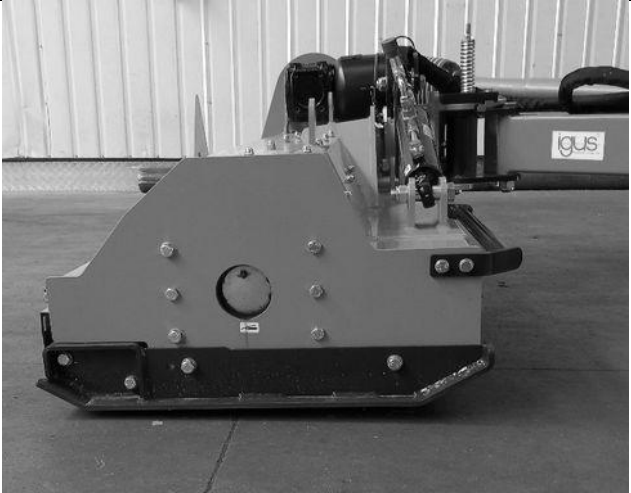
#### **6.2. Working position**

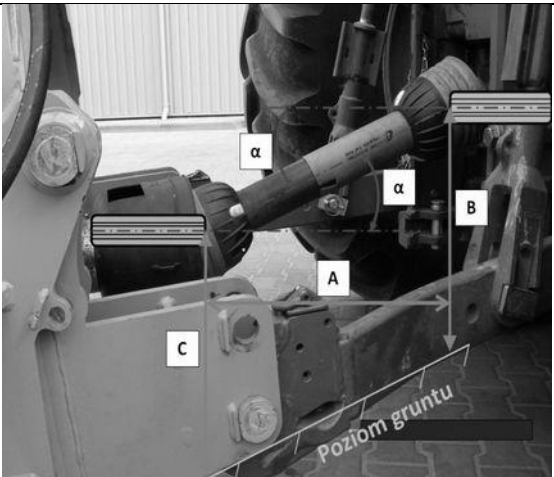

Before starting work, follow the instructions below to properly set the machine in the working position.



*Fig.3 General view of the Rapier machine in the working position*

A very important stage is the correct linking of the tractor with the shredder. To carry this out properly, follow the instructions below.

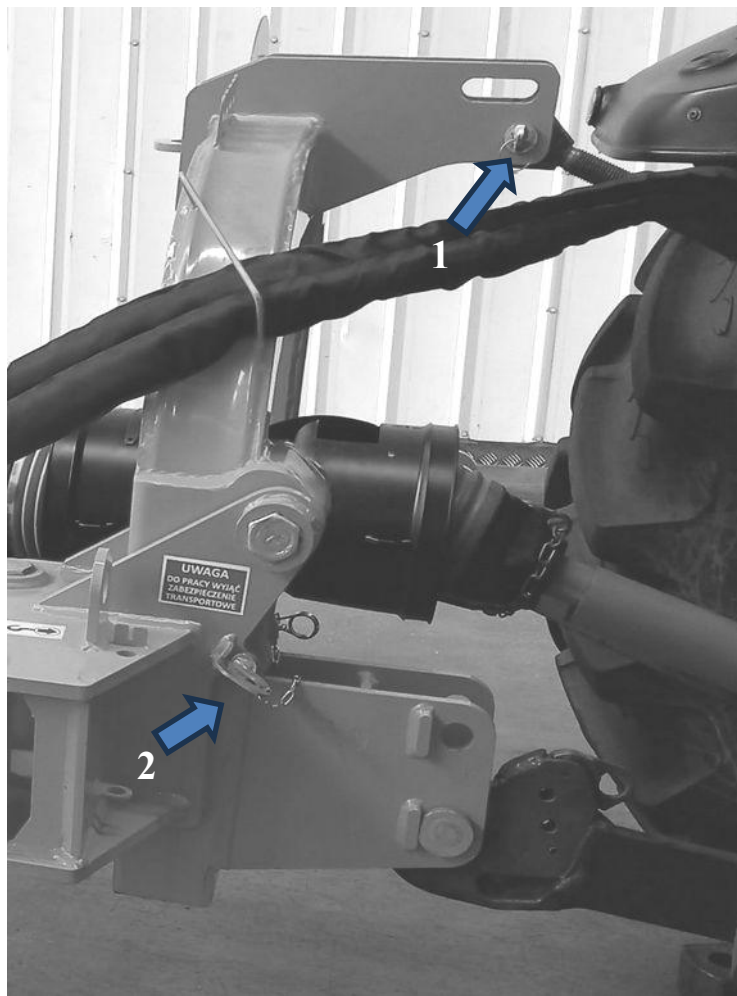
No	Mounting instructions	Picture
1	<p>During operation, the central connector should be fastened in the correct hole ensuring smooth free movement of the pin,</p>	
2	<p>The lower links should be secured at the same height in one of the two positions (lower or upper); the correct position is when the machine rests on the ground with the drive shaft and the PTO shaft, which transmits the drive from the tractor to the machine, in the working position is inclined at an angle <math>\alpha &lt; 16^\circ</math>. <b>It is absolutely necessary to remove the transport lock before starting work (marked in the picture beside!).</b> It is also very important to choose the right shaft length for a given type of tractor.</p> <p>If the PTO shaft is too long, it should be shortened to the correct size. These activities should be carried out strictly according to the instructions attached to the PTO shaft.</p>	
3	<p>For proper functioning of the mover, it is necessary to set the machine so that the copy shaft rests on the ground and the glides are parallel to the ground</p>	

4	<p>The correct setting of the machine is when the angle <math>\alpha</math> DOES NOT EXCEED <math>16^\circ</math> at <math>540\text{min}^{-1}</math> throughout the entire operating range of the PTO shaft.</p>	
5	<p>Adjust the throttling valve (fig. 3 pos. 4) to suit your needs.</p>	

### 6.3. Transport position

For safe and proper transportation of the mower, follow the instructions below:

- Fasten the lower suspension links at an equal height in one of two positions (lower or upper)
- Insert the pin of the center connector into the transport hole (fig. 4 pos. 1)
- Lock the position of the suspension frame using the transport pin (fig. 4 pos. 2)
- Lift the machine to a height of approximately 50 cm using the tractor's hitch
- Adjust the minimum side tilt of the mower using the side tilt cylinder (fig. 3 pos. 5)
- Raise the mower to a vertical position using the tilt adjustment cylinder (fig. 3, pos. 6)



**Fig.4** Position of the pins in the transport position



*Fig.5 General view of machine in transport position*

**Convert the mower from the transport position to the working position in reverse order. It is crucial to remember to adjust the center link pin and remove the transport locking pin and place it in the prepared holder.**

## **7. Service and maintenance activities**

All activities connected with the machine operations can be made only by the vehicle's operator if he is authorized for this vehicle operation.

Prior to the connection of machine and tractor, the machine operator shall check technical condition of the machine and prepare it for trial start-up, for this purpose it is necessary to do the following:

- Read this manual and Follow recommendations included in it.
- Learn the construction and understand the rule of machine operation.
- Inspect all elements of the machine for mechanical damages.
- Lubricate the machine according to recommendations.
- Check technical condition of pins of catching system and protective stoppers.
- Check the oil level in a transmission.
- Make visual inspection of transmission covers and condition of driving shafts covers



If all above activities were made and technical condition of the machine is good, it can be attached to the tractor.

- Position the machine for operation.
- Adjust the length of telescopic and jointed shaft for a tractor according to the shaft manual.
- Connect telescopic and jointed shaft for a tractor and flail mower.
- Start a drive.

Start a drive of working shaft for 3 min. While this time check the following:

- Taps in driving system.
- Any vibrations in cutting unit.

### 7.1 Adjustment of belts tension

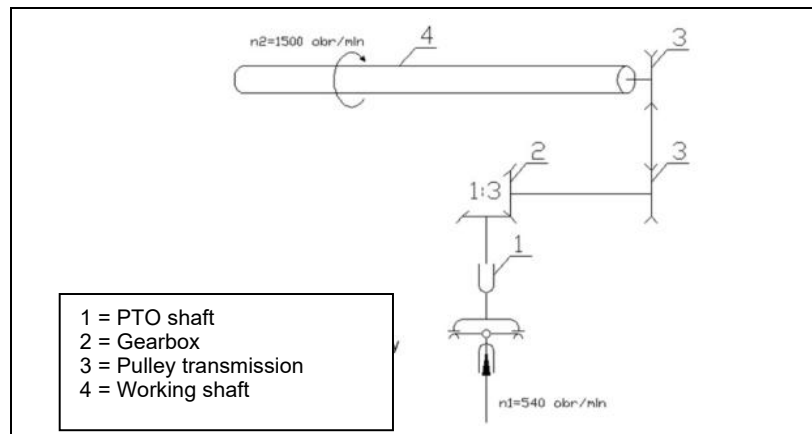


Fig.6 Drive diagram of Rapier flail mower

The adjustment of driving belts tension of the flail mower transmission is done with machine and engine switched off. See fig.4. Optimal tension of belts – with the 100N (10kgG) thrust, the belt bends 1,5- 2,5cm. The following activities shall be done:

- I. Disassembly the cover of inspection glass (2) by unscrew a bolt (1),
- II. Loosen screw M14 (3) located inside of inspection glass with tabular spanner,
- III. Loosen a nut (4) and tighten a nut (5) afterwards thus increasing the tension,
- IV. Tighten a nut (4) for additional protection against loosening,
- V. Install a diaphragm (2) of inspection glass with screws and spring washers (1)

It is advise to remove main cover before and while the season (6) and perform precise inspection of mechanical condition of v-belts, wheels and tensioner, pay special attention to condition of working surfaces of belt and wheels. If any mechanical damage occurs it is recommended to replace damaged parts; besides, the tension of belts shall be checked (optimal tension of belts – at thrust 100N (10kgG) belt is bending 1,5- 2,5cm), Belts shall be tensioned so that a slipper on a wheel does not exceed 1%. Insufficient tension is a reason of belts slipper, excessive decrease of belts life and excessive wear of bearings.

The belts tension while machine storage shall be reduced.

- VI. Upon adjustment and control works completion main cover shall be installed (6)



It is forbidden to lift the machine on the lift. Disconnect the drive before lifting and wait until the working shaft stop. The machine is safe when it rests on the ground and it is pulled on the skids during operation.

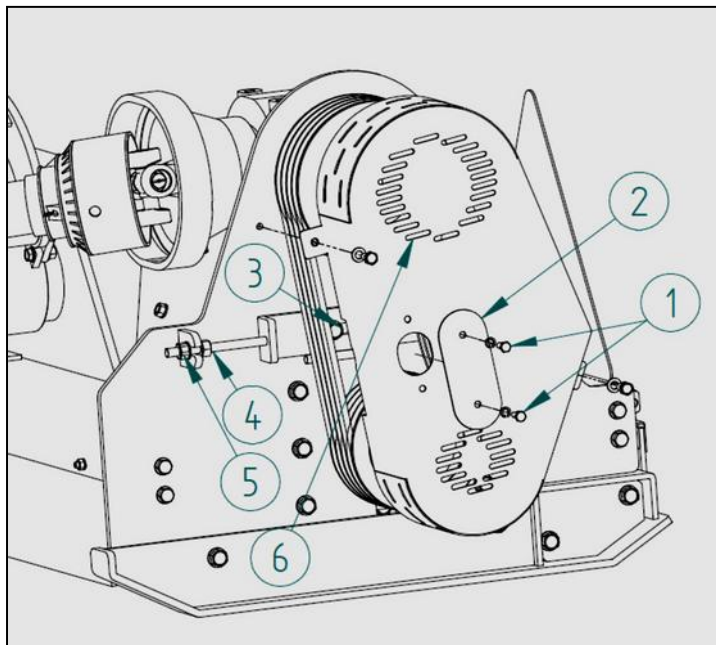


Fig.7. Adjustment of transmission belts tension

## 7.2 Replacement of blades or flails

Depending on customer requirements, working shaft is equipped with proper equipment that is granulating tools - knives 2.16 (Z-908) or beaters 2.17 (Z-908) Fig.8.

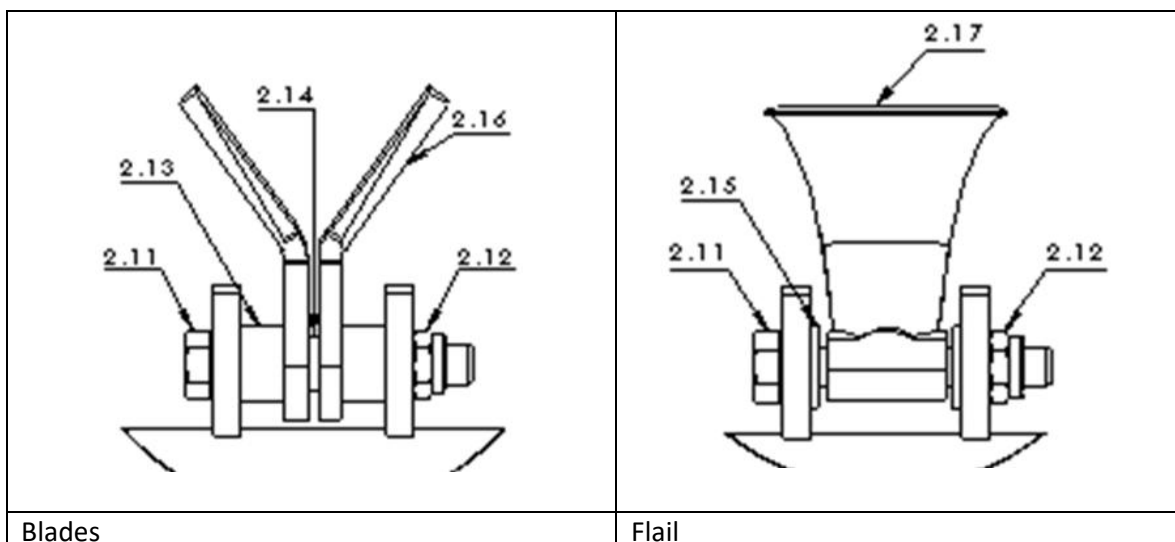


Fig. 8 Drawing of knives and beaters assembly



Granulating tools shall be replaced if any defects, visible wear, blunt of cutting edges, lack of knives or beaters or excessive loose of installed tools occur.

Table No. 2 **RANGE OF MAX PLAY OF BLADES / FLAILS**

Play	Nominal [mm]		Maximum [mm]	
	Blade	Blade	Knife	Flail
Axis transverse	0,2	0,3	0,5	0,6
Axis longitudal	0,1	0,2	0,4	0,6

Shredding tools shall be replaced keeping in mind special safety regulations.

1. Only original and operable cutting parts shall be used
2. The replacement covers the whole set of tools. It shall be remembered that the distribution of vibrating weight must be even and wear of tools shall be regular as well.
3. Screw connections shall be replaced each time with tools keeping in mind that the class of screw resistance and locknut is 10.9.
4. While screw tightening it is necessary to pay attention to loose of cutting tool turn but with no excessive loose (beater or knife set) with regard to screw axis.



**It is forbidden to lift the machine on the lift. Disconnect the drive before lifting and wait until the working shaft stop. The machine is safe when it rests on the ground and it is pulled on the skids during operation.**

### 7.3 Maintenance after work

The machine shall be cleaned and positioned on a even and hard surface after operation. The inspection of parts and elements connections shall be done. Damaged and worn parts shall be replaced. Check all screw connections and tighten loose connections according to table no. 3 – tightening torque value for screws and nuts.

Table no. 3

TIGHTENING TORQUE VALUE FOR SCREWS AND NUTS

Strength	6.8	8.8	10.9	12.9
Metric thread	Torque [Nm]			
M5	4,5	5,9	8,7	10
M6	7,6	10	15	18
M8	18	25	36	43
M10	37	49	72	84
M12	64	85	125	145
M14	100	135	200	235
M16	160	210	310	365
M18	220	300	430	500
M20	310	425	610	710
M22	425	580	820	960
M24	535	730	1050	1220

All safety signs placed on the machine, triangle plate for low powered trucks shall be kept clean.

The oil level in axis gear shall be checked at least once a year. Gear oil of GL 4 80W90 specification shall be used. Replacement period is 550h.

It is also necessary to check the tension of transmission belts, damaged parts shall be replaced, the unit shall be adjusted according to the manual - 6.1 Adjustment of belts tension. It is important to check the clearance of axis and shafts. If any clearance is noticed, bearings of axis or shaft shall be replaced (pairs) according to the spare parts catalog. All bearings have rings protecting against soil.

## 7.4 Lubrication

For the purpose of providing proper operation, the machine shall be carefully lubricated, according to the lubrication diagram.

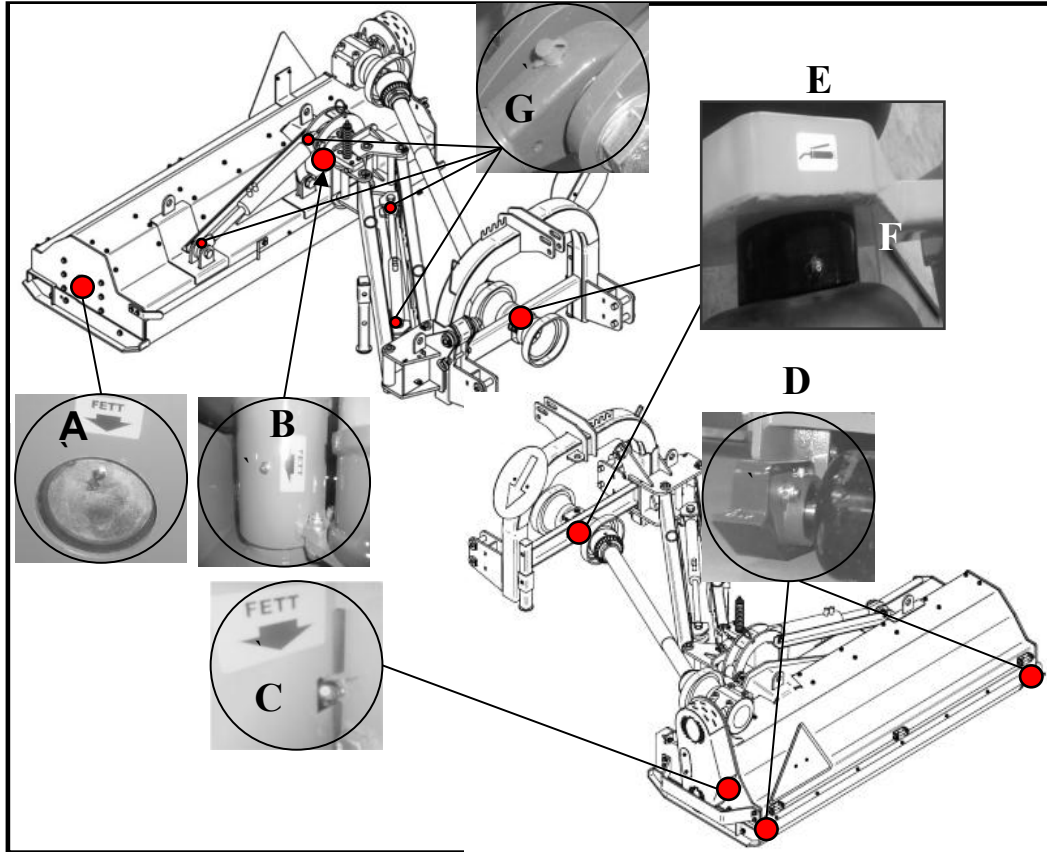


Fig. 9. Lubrication diagram

Table No. 4 Lubrication points

Item	Description	Lubricate	Lubrication periods
A,C	Bearing of working shaft	Grease	daily, before operation
B	Turnover device	Grease	30h
D	Bearing of driving shaft	Grease	30h
E,F	Bearing of transmission shaft	Grease	daily
G	Self-aligning bearing of servo-motor fitting	Grease	30h
Lubrication of telescopic jointed shafts		Grease	according to manual attached to shafts
Oil replacement in a transmission		GL 4 80W90	550h
*Sleeves of flail mower arms are equipped with maintenance free Igus slide bearings which do not require lubrication			

All points described in fig. 9 are equipped with ball grease fittings, it shall be filled with solid oil. Telescopic jointed shaft shall be lubricated upon disassembly of the machine according to the manual.

### ***7.5 Post-season maintenance***

It covers all activities mentioned in the point: after operations service. Additionally, the machine shall be kept under the roof on even and hard surface. It is necessary to Follow the tightness of varnish coat. If any defects are present, these places shall be filled through application of fresh layer of protective paint.

### ***7.6 Withdrawal from use, environment***

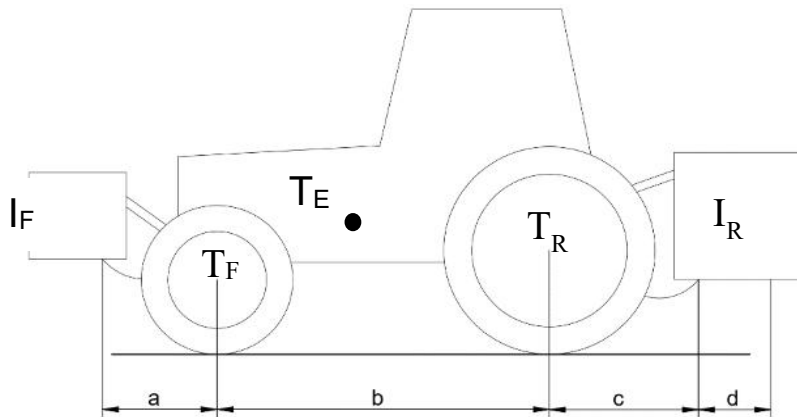
If the machine is worn and cannot be operated any more, it shall be withdrawn from use. It also concerns ongoing repairs and the replacement of damaged parts. For this purpose the machine shall be cleaned. Drain operating oils and send to disposal. Disassembly the machine and segregate parts according to the type of materials applied. Segregated parts shall be delivered to the strap yard or disposal.

The machine is environment friendly. 97% of materials used for the production can be recycled. Worn parts of the machine shall be disposed according to local regulations of environmental protection. Thorough the whole period of operation it is necessary to try to avoid oil spill, which can contaminate environment.

### 7.7 Stability of tractor-machine unit suspended

To verify the overall stability, the following equation can be used to calculate the minimum front load  $I_{F,min}$ , expressed in kg, to achieve a front axle load equal to 20% of the tractor's empty weight..

$$I_{F,min} = \frac{[I_R \times (c+d)] - (T_F \times b) + (0,2 \times T_E \times b)}{a+b}$$



Explanation:

$T_E$ -tractor empty mass[kg]

$T_F$ - Front axle load of an unloaded tractor [kg]

$T_R$ - Rear axle load of an unloaded tractor [kg]

$I_F$ - weight of the front mounted machine/front weights [kg]

$I_R$ - weight of the rear mounted machine/rear weights [kg]

a- The distance between the center of gravity of the front-mounted machine/front weights and the center of the front axle [m]

b- tractor wheelbase [m]

c- The distance from the center of the rear axle to the center of the rear suspension ball joints[m]

d- The distance between the center of the rear suspension ball joints and the center of gravity of the rear-mounted machine / rear weights [m]

## 8. Spare parts catalog

### SPARE PARTS ORDERING PROCEDURE

Each order form should include the following:

- address of the buyer;
- exact shipping address (place where machine is located or other means for delivery collection);
- terms of payment;
- serial number of the machine and the year of manufacture (acc. to the nameplate on the machine);
- spare part number;
- spare part name;
- number of parts ordered.



Spare parts must be ordered at the points of sale of the machines or from the manufacturer. Use only the original spare parts provided by the manufacturer, to guarantee safe and reliable operation of the machine. The use of not original spare parts or parts, which have been repaired, will render the warranty void.

The manufacturer reserves the right to introduce changes to the design of parts presented in the particular assembly drawings in this spare parts catalog. Such changes may not always be updated in the manual and the spare parts catalog. Individual drawings may differ from the actual look of the parts.

### **Distributor Address**

#### **Belco Resources Equipment**

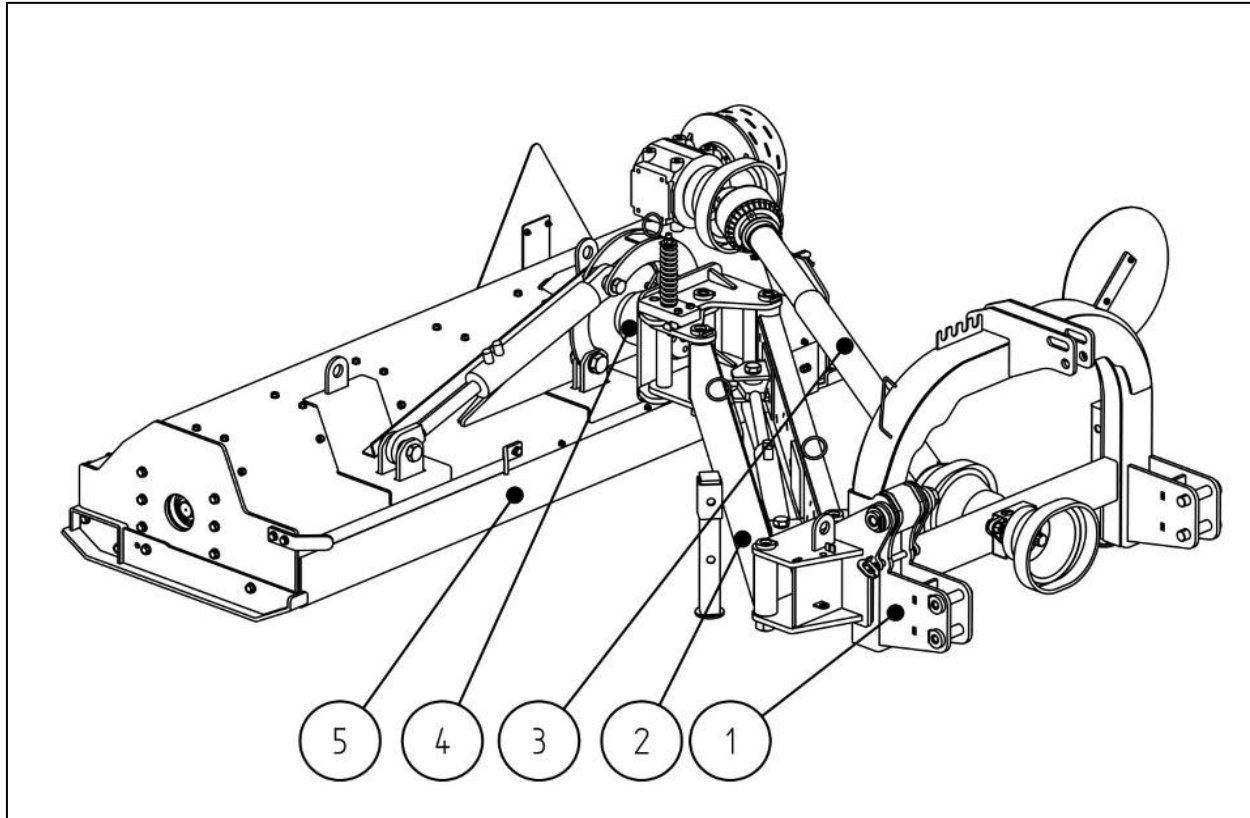
401 Jeffrey's Road

Rocky Mount, NC27804

tel.: (252) 822-7140

e-mail: [sales@br-equipment.com](mailto:sales@br-equipment.com),  
or [www.br-equipment.com](http://www.br-equipment.com)

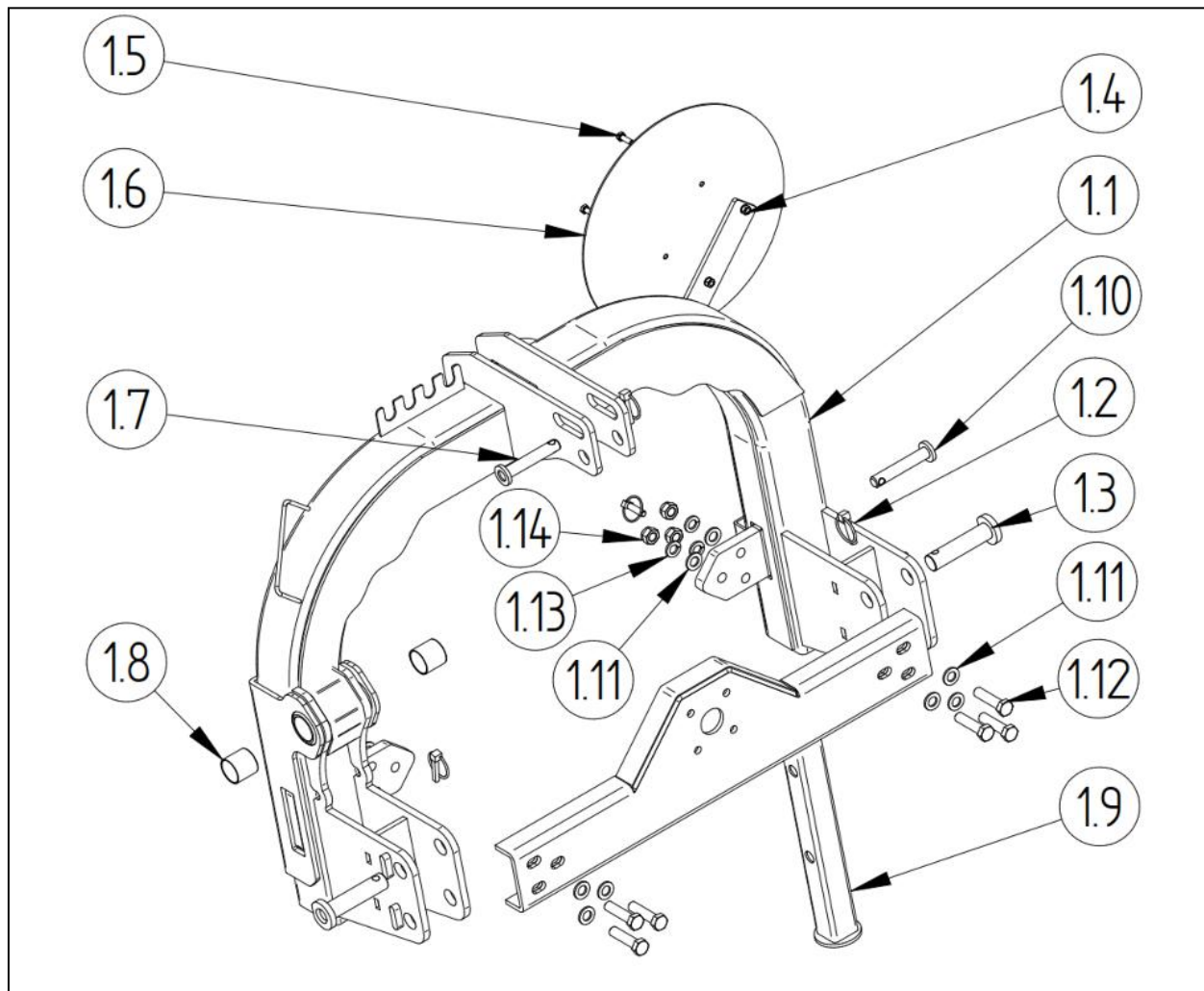




**Fig. 10 Demonstrative view of Rapier flail mower**

Table No. 5 Distribution of the machine on parts

Item	Description	Figure no.
1	3-point linkage	Fig. 11
2	Arms unit	Fig. 12
3	Drive unit	Fig. 13
4	Turning device and arms fitting	Fig. 14
5	Working chamber unit	Fig. 15
6	Hydraulic unit	Fig. 16



**Fig. 11 Unit of 3- point suspension**

Table No. 6 Unit of 3- point suspension

Pos.	Description	Index	Quantity
1.1	3-point hitch; Rapier	FZ10232	1
1.2	Universal cotter	FZ10119	4
1.3	Bottom link pin; Rapier	FZ10233	2
1.4	M8 self-stop nut/M8 washer	LN08125/FW08	2/2
1.5	M8x20 8.8 bolt	BM0812525	2
1.6	Keep left sign	FZ10234	1
1.7	Top link pin	FZ10235	1
1.8	Sliding bush	FZ10236	2
1.9	Support jack	FZ10237	1
1.1	Support jack pin	FZ10238	1
1.11	M16 galv. flat washer	FW16	12
1.12	M16x60 8.8 bolt	BM161560	6
1.13	M16 spring washer	LW16	6
1.14	M16 self-stop nut	LN16115	6

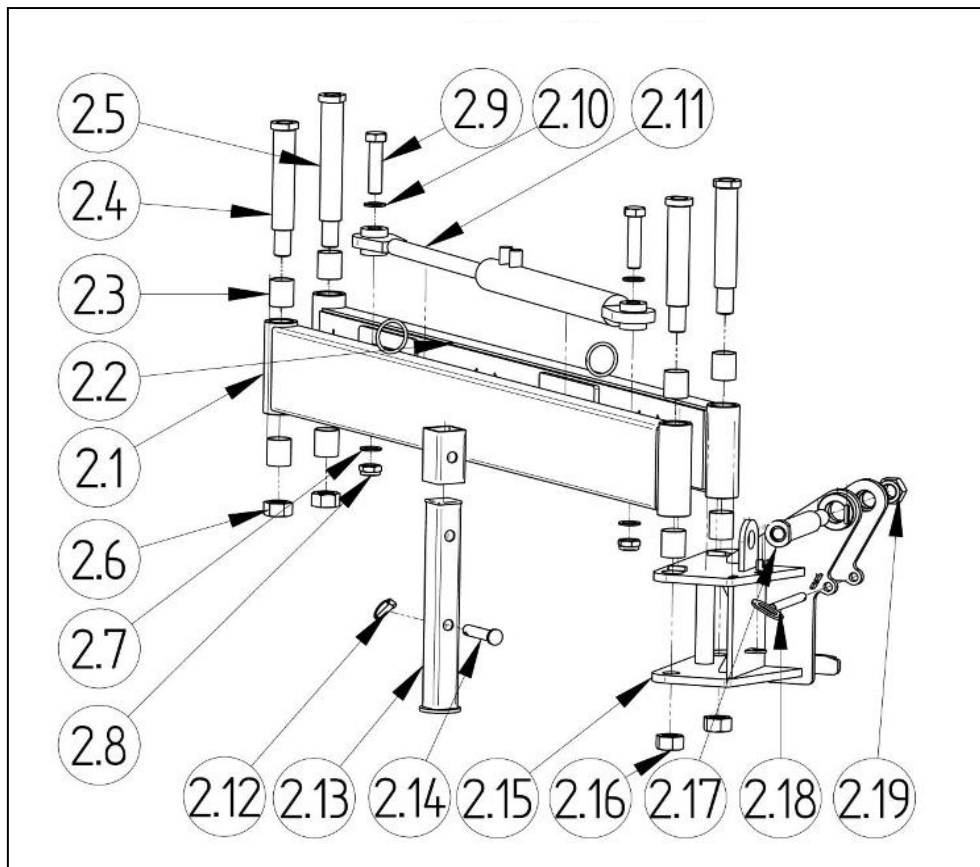
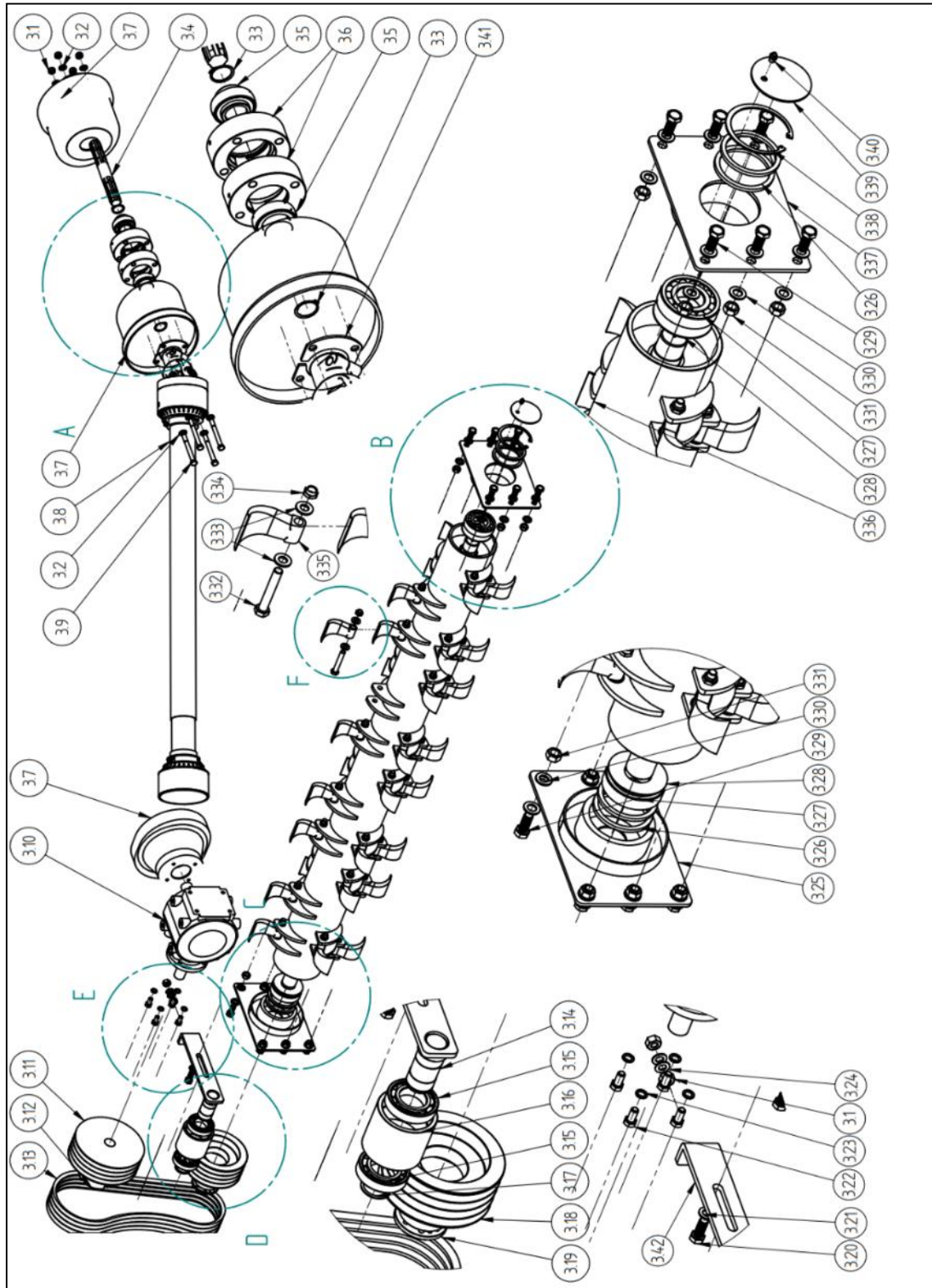


Fig. 12 Arms unit

Table No. 7 Arms unit

Pos.	Description	Index	Quantity
2.1	Arm1 ; Rapier	FZ10239	1
2.2	Arm2 ; Rapier	FZ10240	1
2.3	Slide bearing GSM 4044-50	FZ10241	8
2.4	Arm's pin 1 ; Rapier	FZ10242	3
2.5	Arm's pin 2; Rapier	FZ10243	1
2.6;16;19	Self-locking nut M30x2 OC	LN302	5
2.7; 2.10	Flat washer ZW 25 OC	FW24	4
2.8	Self-locking nut M24	LN2415	2
2.9	Screw M24 x110 8.8 OC	BM2420110	2
2.11	Hydraulic servo-motor 50/30H355L	FZ10244	1
2.12	All purpose plug 42/37-038/1	FZ10119	4
2.13	Support base	FZ10245	1
2.14	Support pin	FZ10246	1
2.15	Suspension cross	FZ10247	1
2.17	Pin of suspension cross	FZ10248	1
2.18	Safety pin for transport	FZ10249	1

Fig. 13 Driving unit



Pos.	Description	Index	Quantity
3.1	Self-locking nut M12	LN1215	6
3.2	M12 OC flat washer	FW12	10
3.3	Z35 lock ring	SRI-35	2
3.4	Shaft – double sided spline	FZ10250	1
3.5	UC 207 bearing	BUC207	2
3.6	Bearing housing	FZ10251	2
3.7	Shaft cover	FZ10252	3
3.8	Wide angle shaft 1500 Nm L-1190	FZ10253	1
3.9	Bolt M12x120 8.8	BM1215120	4
3.10	Gearbox	FZ10210	1
3.11	TB SPB 224/4 pulley	FZ10254	1
3.12	TB 3020/33 clutch	FZ10255	1
3.13	V-belt B1375	FZ10256	4
3.14	Tensioner base	FZ10257	1
3.15	6209 RS bearing	B6209RS	2
3.16	Tensioner roller	FZ10194	1
3.17	Lock ring Z45	SRI-45	1
3.18	Pulley Ø189	FZ10258	1
3.19	Clampex 225-45x80 clutch	FZ10259	1
3.20	Bolt M14x35 8.8 galv.	BM141535	1
3.21	Flat washer M14 galv.	FW14	1
3.22	Bolt M12x35 8.8 galv.	BM1212535	4
3.23	Spring washer M12 galv.	LW12	4
3.24	Large washer M12 galv.	LFW12	2
3.25	Shaft bearing housing	FZ10260	1
3.26	Spacer	FZ10261 / FZ10262	4
3.27	1309 Bearing	FZ10263	2
3.28	Spacer	FZ10264	2
3.29	M14x35 8.8 galv. bolt	BM141535	12
3.30	M14 flat washer	FW14	12
3.31	M14 self-stop nut	LN1415	12
3.32	Screw M14x90 10.9 (Quantity depends on the type of shredder Rapier 71/80)	FZ10141	28/32
3.33	Hammer washer (The amount depends on the type of shredder Rapier 71/80)	FZ10142	56/64
3.34	Self-locking nut M14 (Quantity depends on the type of shredder Rapier 71/80)	LN1415	28/32
3.35	Hammer RM 33 5151-221333 (quantity depends on the type of shredder Rapier 71/80)	FZ10143	28/32
3.36	Working shaft		1
		Rapier 71	
		Rapier 80	
3.37	Shaft bearing housing	FZ10267	1
3.38	100 int. Lock ring	FZ10268	1
3.39	Plug	FZ10269	1
3.40	M10 grease nipple	GN1015	1
3.41	Shaft covers bracket	FZ10270	2
3.42	Tensioner arm	FZ10271	1

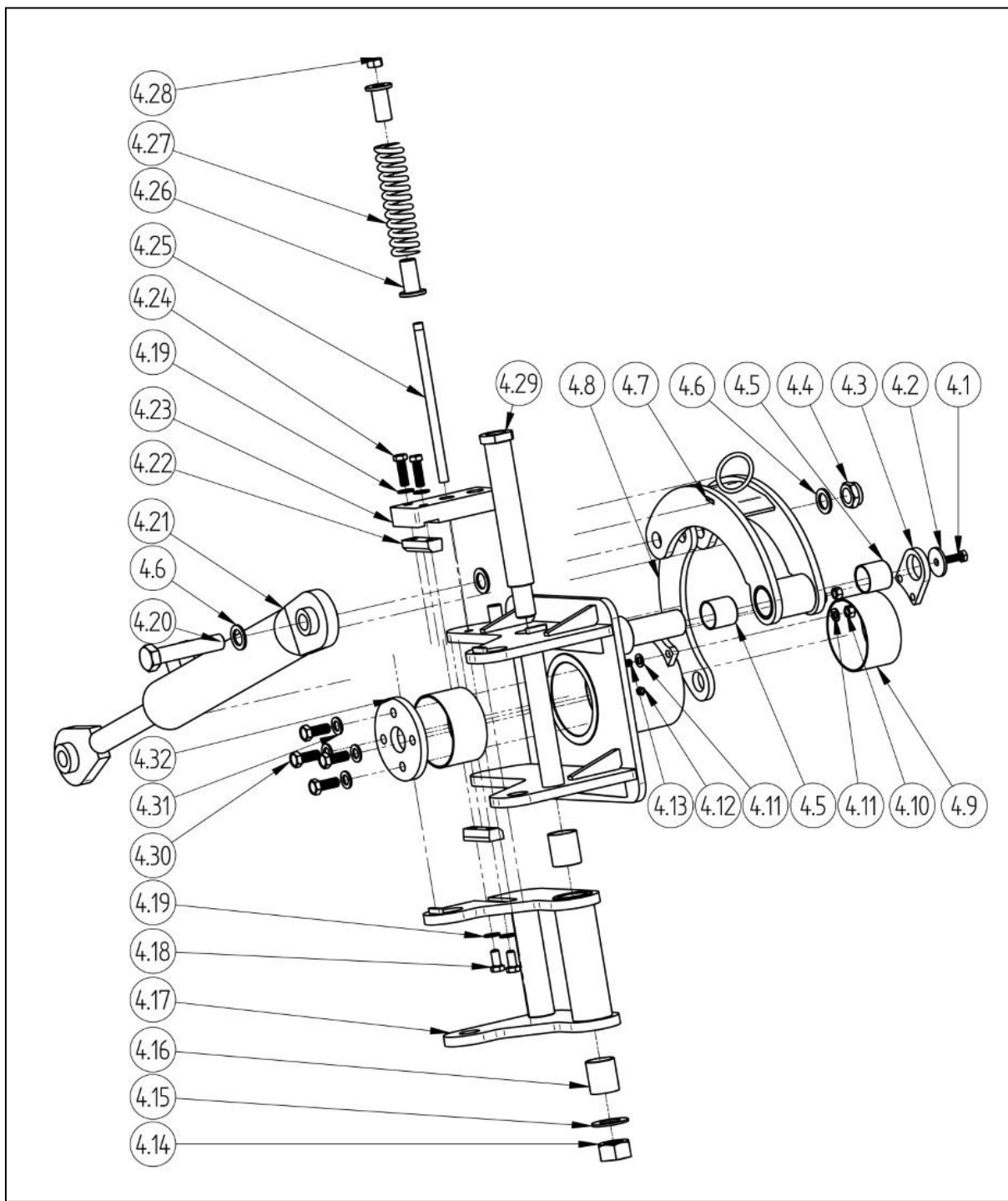


Fig. 14 Turnover device

Table No. 9 Turning unit

Item	Description	Index	Quantity
4.1	Screw M10x30 8.8 OC	BM101530	1
4.2	Washer	FZ10310	1
4.3	Housing flange	FZ10272	1
4.4	Self-locking nut M24	LNM2415	1
4.5	Slide bearing Igus	FZ10273	8
4.6	Flat washer ZW 25 OC	FW24	3
4.7	Turn arm	FZ10274	1
4.8	Tension member	FZ10275	1
4.9	Slide bearing 110x60	FZ10276	2
4.10	Self-locking nut M10	LNM10125	2
4.11	Washer ZW 10 OC	FW10	4
4.12	Grease fittings M10	GN101S	1
4.13	Screw M10x35 8.8 OC	BM101535	2
4.14	Self-locking nut M30x2 OC	LNM302	1
4.15	Washer ZW 30 OC	FW30	1
4.16	Slide bearing GSM 4044-50	FZ10277	2
4.17	Arm coupling	FZ10278	1
4.18	Screw M12x25 8.8 OC	BM1212525	2
4.19	Washer ZW 12 OC	FW12	4
4.20	Screw M24 X110 8.8 OC	BM1215110	1
4.21	Hydraulic servo-motor 70/36 H285L	FZ10279	1
4.22	Fuse block	FZ10280	2
4.23	Safety device	FZ10281	1
4.24	Screw M12x40 8.8 OC	BM121540	2
4.25	Winding rod M14 of a spring	FZ10282	1
4.26	Spring foundation	FZ10283	2
4.27	Fuse spring 5036/02-0.35 galvanized	FZ10284	1
4.28	Nut M14	LNM1415	2
4.29	Pin	FZ10285	1
4.30	Screw M14x35 8.8 OC	BM141535	4
4.31	Washer ZW 14 OC	FW14	4
4.32	Flange	FZ10286	1

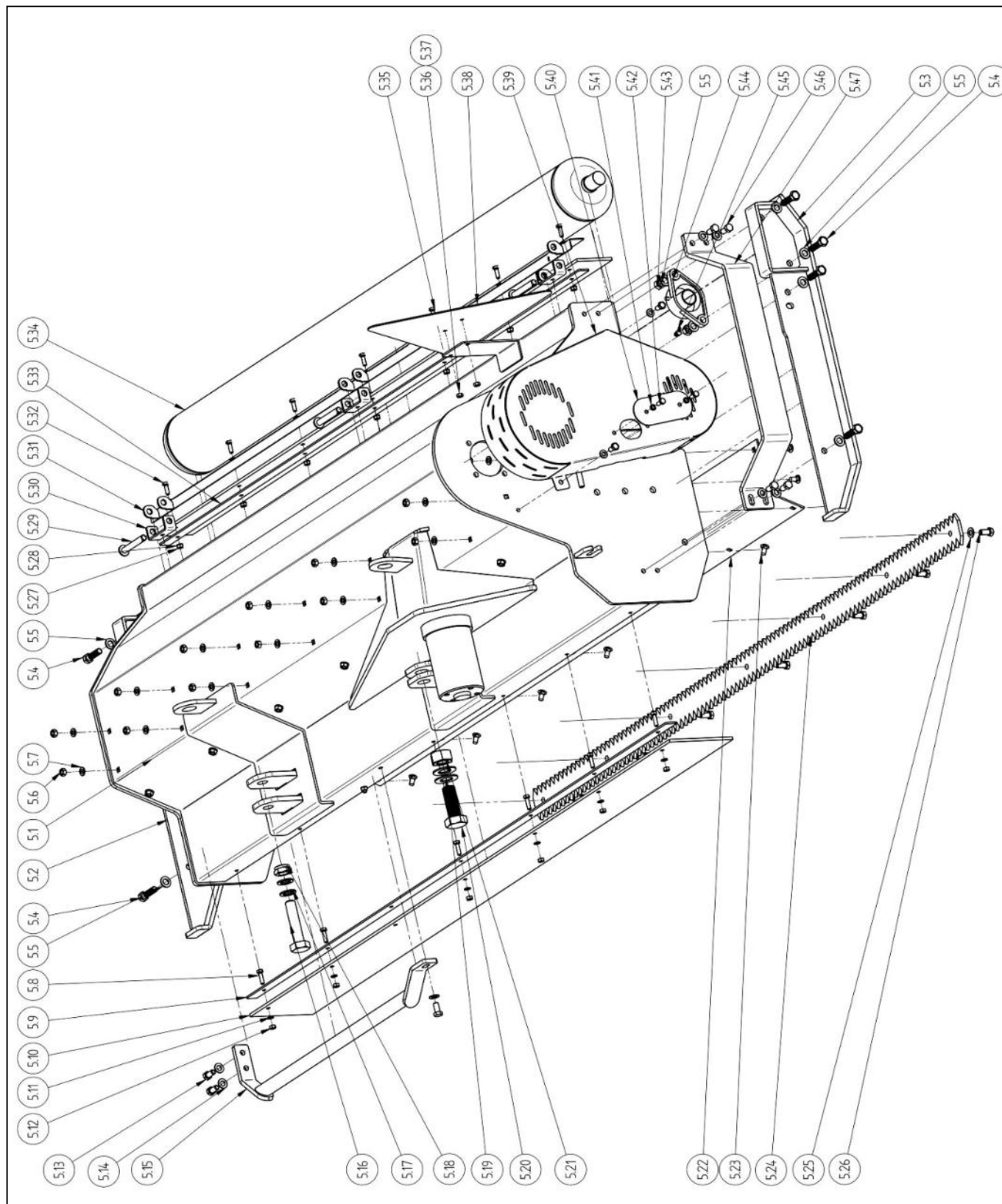


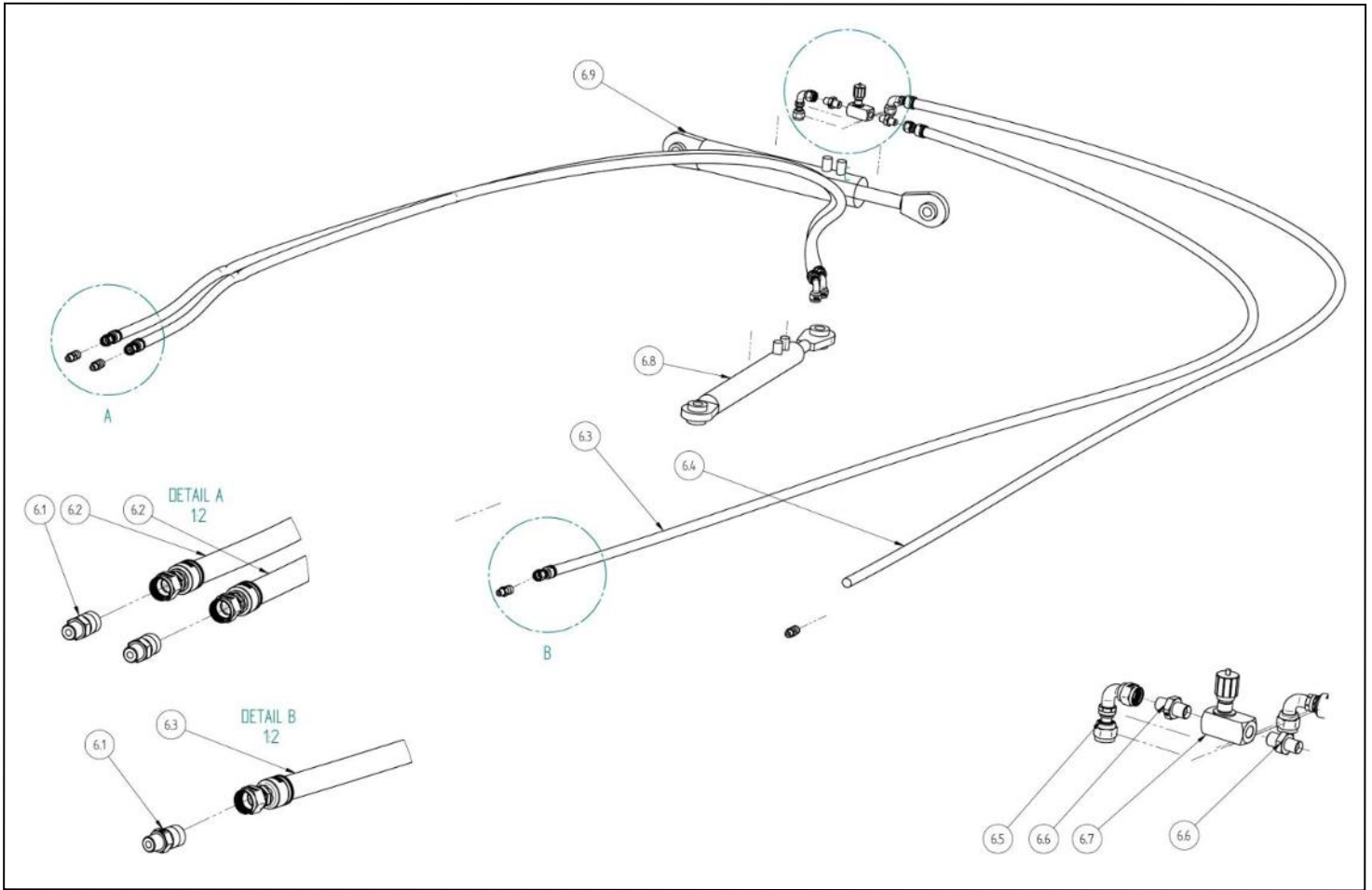
Fig. 15 Flail mowers working chamber unit



Table No. 10 Flail mower working chamber unit

Pos.	Description		Index	Quantity
5.1	Body			1
		71"	FZ10287	
		80"	FZ10288	
5.2	Right skid		FZ10289	1
5.3	Left skid		FZ10290	1
5.4	Bolt M14x40 8.8 galv. / Bolt M14x35 8.8 galv.		BM141540 8.8 / BM141535	4/4
5.5	M14 flat washer		FW14	20
5.6	M10 cap nut		CNM1015	20
		Rapier-71		
		Rapier-80		
5.7	M10 galv. washer		FW10	20
5.8	M8x30 8.8 galv. bolt		BM0812530	7
5.9	Strip for fastening the front elastic curtain			1
		Rapier-71	FZ10291	
		Rapier-80	FZ10292	
5.10	Rubber apron			1
		Rapier-71	FZ10293	
		Rapier-80	FZ10294	
5.11	M8 galv. washer		FW08	14
5.12	M8 self-stop nut		LN08125	7
5.13	M12x35 8.8 galv. bolt		BM1212535	3
5.14	M12 galv. washer		FW12	3
5.15	Front bumper			1
		Rapier-71	FZ10295	
		Rapier-80	FZ10295	
5.16	M24x110 8.8 galv. bolt		BM1215110	1
5.17	M25 galv. thin washer		FW24	1
5.18	M24 self-stop nut		LN02415	1
5.19	M30 galv. flat washer		FW30	2
5.20	M30x70 8.8 galv. bolt		BM303570	1
5.21	M30 self-stop nut		LN03035	1
5.22	Protective plate			1
			FZ10296	
			FZ10297	
5.23	M10x20 8.8 lock bolt		CBM101520	20
5.24	Flat tooth bar (counter-blade)			1
		Rapier-71	FZ10298	
		Rapier-80	FZ10299	
5.25	M12 galv. spring washer		LW12	7
5.26	M12x35 8.8 galv. bolt		BM1212535	7
5.27	M8 self-stop nut		LN08125	7

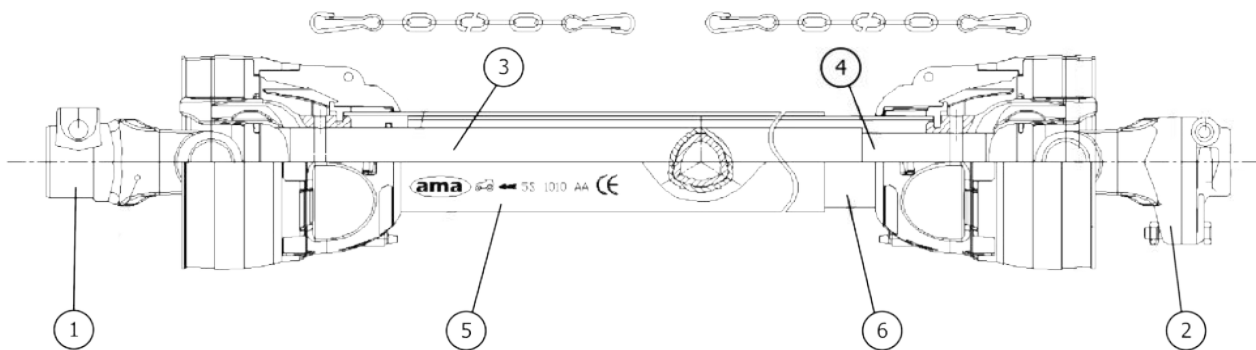
5.28	M8 galv. flat washer		FW08	14
5.29	5x40 hinge pin with cotter		FZ10311	3
5.30	Curtain hinge (including M8x25 8.8 galv. bolt and M8 spring washer)		FZ10300	3
5.31	Rear curtain profile			1
		Rapier-71	FZ10301	
		Rapier-80	FZ10302	
5.32	M8x20 8.8 galv. bolt		BM0812525	7
5.33	Strip for fastening the front elastic curtain			1
		Rapier-71	FZ10303	
		Rapier-80	FZ10304	
5.34	Roller shaft			1
		Rapier-71	FZ10305	
		Rapier-80	FZ10306	
5.35	M8x20 8.8 bolt		BM0812525	2
5.36	M8 galv. flat washer		FW08	2
5.37	M8 self-stop nut		LN08125	2
5.38	„ROAD WORKS“ warning sign		FZ10307	1
5.39	Belt drive cover		FZ10308	1
5.40	Inspection hole cover		FZ10309	1
5.41	M8 flat washer		FW08	2
5.42	M8x16 8.8 galv. bolt		BM0812516	2
5.43	M14 self-stop nut		LN1415	4
5.44	UCFL207 SNR bearing		BUCFL207SNR	2
5.45	M10x1 angled grease nipple		GN101A	1
5.46	M12x35 8.8 galv. bolt + galv. flat washer		BM1212535 / FW12	4/4
5.47	Side bumper		FZ10312	1
5.48	Rubber apron			1
		Rapier-71	FZ10313	
		Rapier-80	FZ10314	



**Fig. 16 Hydraulic unit**

Table No. 11 Hydraulic unit

Item	Description	Index	Quantity
6.1	½" quick fit coupling plug*	FZ10092	4
6.2	Hydraulic cable ½/P52 1SN DN10 L-3400	FZ10315	2
6.3	Hydraulic cable ½/P51/211/10 L-4100	FZ10316	1
6.4	Hydraulic cable ½/P52/211/10 L-4100	FZ10317	1
6.5	Angle connection AA M18x1,5 12L	FZ10080	1
6.6	Straight coupling Zn-140 G3/8	FZ10076	2
6.7	Throttle valve VRFV90°	FZ10154	1
6.8	Hydraulic servo-motor 50/30H355L	FZ10318	1
6.9	Hydraulic servo-motor 70/36 H285L	FZ10319	1
6.10	Cable guard – weaved cover DN40-set	FZ10320	8m



PTO Driveline

Item	Description	Index	Quantity
1	Yoke assembly (implement end)	FZ10321	1
2	Yoke assembly (tractor end)	FZ10322	1
3	Inner guard tube	FZ10323	1
4	Outer guard tube	FZ10324	1
5	Outside tube	FZ10325	1
6	Inside tube	FZ10326	1
-	PTO complete Nm620 L=1010 w/shear bolt	FZ10330	1

## **9. LIMITED WARRANTY**

Belco Resources Equipment warrants to the original purchaser of any new piece of machinery from Belco Resources Equipment, purchased from an authorized Belco Resources Equipment dealer, that the equipment be free from defects in material and workmanship for a period of one (1) year for non-commercial, state, and municipalities' use, ninety (90) days for commercial use from date of retail sale. Warranty for rental purposes is thirty (30) days. The obligation of Belco Resources Equipment to the purchaser under this warranty is limited to the repair or replacement of defective parts.

**Replacement or repair parts installed in the equipment covered by this limited warranty are warranted for ninety (90) days from the date of purchase of such part or to the expiration of the applicable new equipment warranty period, whichever occurs later. Warranted parts shall be provided at no cost to the user at an authorized Belco Resources Equipment dealer during regular working hours. Belco Resources Equipment reserves the right to inspect any equipment or parts, which are claimed to have been defective in material or workmanship.**

**This limited warranty does not apply to and excludes wear items such as shear pins, tires, tubes knives, blades or other wear items. Oil or grease is not covered by this warranty.**

**All obligations of Belco Resources Equipment under this limited warranty shall be terminated if:**

**Proper service is not performed on the machine.**

**The machine is modified or altered in any way.**

**The machine is being used or has been used for purposes other than those for which the machine was intended.**

## **DISCLAIMER OF IMPLIED WARRANTIES & CONSEQUENTIAL DAMAGES**

**Belco Resources Equipment obligation under this limited warranty, to the extent allowed by law, is in lieu of all warranties, implied or expressed, including implied warranties of merchantability and fitness for a particular purpose and any liability for incidental and consequential damages with respect to the sale or use of the items warranted. Such incidental and consequential damages shall include but not be limited to: transportation charges other than normal freight charges; cost of installation other than cost approved by Belco Resources Equipment; duty; taxes; charges for normal service or adjustment; loss of crops or any other loss of income; rental of substitute equipment, expenses due to loss, damage, detention or delay in the delivery.**

## **REGISTRATION**

**The online Warranty Registration must be completed in order to qualify for coverage on this Limited Warranty. Visit [br-equipment.com](http://br-equipment.com), click on "Warranty Registration" and completely fill out the form to register the new piece of equipment.**

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