

# ROTARY RAKES

*Models RR430/12 & RR470/13*

INSTRUCTION & PARTS MANUAL

*Publication 525*

*Part No.41571.25*



Twose of Tiverton Limited  
6 Chinon Court,  
Lower Moor Way,  
Tiverton Business Park,  
Tiverton,  
Devon. EX16 6SS.  
Telephone: (01884) 253691  
Fax: (01884) 255189  
Email [sales@twose.com](mailto:sales@twose.com)  
Web: [www.twose.com](http://www.twose.com)



**Revisions**

<i>Sept. 2007</i>	<i>First Issue</i>



We,

TWOSE OF TIVERTON LIMITED,  
6 Chinon Court, Lower Moor Way,  
Tiverton Business Park, Tiverton, Devon, EX16 6SS.

*Declare under our sole responsibility that:*

The product (type) *Rotary Rake*.....

Product Code *RR430/12, RR470/13*.....

Serial No. & Date ..... Type .....

Manufactured by the above company/\* .....

.....  
(\* insert business name and full address if not stated above)

Complies with the required provisions of the Machinery Directive 98/37/EC, \* previously Directive 89/392/EEC as amended by Directives 91/368/EEC, 93/44/EEC and 93/68/EEC.

For the relevant implementation of the safety and health requirements mentioned in the Directives, the following standards have been respected:

- EN 292-1/1991    EN292-2/1991    EN294/1992    EN349/1993
- EN 1553/1999    EN 1152/1994    EN 953/1997    EN 982/1996

Signed *John Frank*.....  
on behalf of *TWOSE OF TIVERTON* ..... *Responsible Person*

Status: Chief Design Engineer

Date: September 2007



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## TECHNICAL DATA

<b>SPECIFICATION</b>	<b>RR430/12 Model</b>	<b>RR470/13 Model</b>
Working width (m)	4.30	4.70
Rotor diameter (m)	3.335	3.56
Transport width (m)	2.2	2.2
Machine width (m)	3.51	3.72
Machine height (m)	1.58	1.57
No. of spring tine arms per rotor	12	13
No. of double spring tines per arm (per machine)	4 (48)	4 (52)
Tyres	16 x 6.50-8 4ply	16 x 6.50-8 4ply
Tractor power required (kW/HP)	22/30	30/41
PTO speed (rpm)	540	540
Depositing direction	left	left
PTO safety clutch adjustment (Nm)	60	60
Working speed (km/h)	Up to 14	Up to 14
Working capacity (ha/h)	Up to 5.5	Up to 6.2
Chassis type	Tandem axle	Tandem axle
Hitch type	3-point linkage	3-point linkage
Weight (kg)	564	575

## MACHINE SERIAL NUMBER PLATE

All machines will have a serial number plate fitted to them stating; the machine model, serial number of the machine, and the machine's weight. When ordering replacement parts or requesting service information always quote the machine model and serial number as stated on the serial number plate.

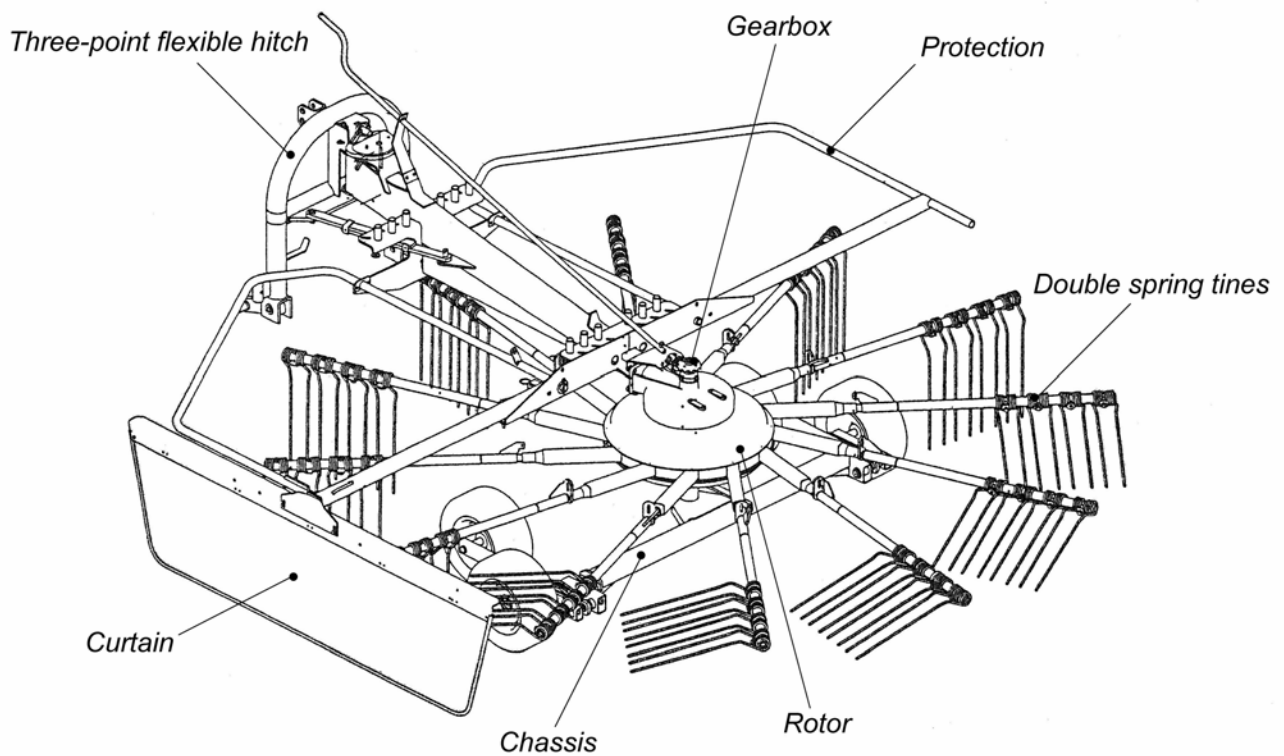
## DESCRIPTION

Twose Rotary Rakes are three-point linkage, tractor mounted, agricultural implements specifically designed for gathering into swaths dry or faded forage, grass, and clover. The machines are capable of producing single, double, multiple and semi-swaths. They may also be utilised for the turning of swaths.

These machines must only be used to perform the designated task for which they were designed. Use of these machines for any other function may cause damage to the machine and possible injury to the operator or other persons.

## GENERAL ARRANGEMENT

The diagram below shows the location of the machines main components



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## SAFETY INFORMATION

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In the interest of safety it is important that great care is adopted at all times during the attachment, transportation, operation and maintenance of this machine. Both the owner and the operator of the machine should read and understand the following section to ensure the safety of themselves and all other persons who enter into the close proximity of these machines.

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- ▲ In addition to the instructions stated here always abide by general safety and accident regulations.
- ▲ Safety and warning decals placed on the machine give important instructions for safe work - take them into consideration for your safety and the safety of others.
- ▲ While driving on public roads always abide by traffic signs and road regulations.
- ▲ Familiarise yourself with the controls and functions of the machine and practice them in a safe location before attempting to start work.
- ▲ Never approach this machine whilst it is working or running – switch off the machine and wait until it has stopped fully before approaching.
- ▲ Do not wear loose fitting clothes in the vicinity of this machine - clothes should fit tight to the user's body.
- ▲ Check no one is near to, or on, the machine before attempting to start or transport it. Ensure your visibility is kept clear at all times.
- ▲ Never permit anyone to ride on this machine.
- ▲ Implements should always be attached according to the manufacturer's instructions and fastened correctly to the prescribed devices using the correct components.
- ▲ When disconnecting the machine from the tractor select a firm level site and use the support leg.
- ▲ Take care when connecting or disconnecting the implement to the tractor – keep onlookers at a safe distance.
- ▲ Ensure controls for the machine are positioned such that the machine cannot accidentally be started during transport.
- ▲ For transportation on the road, prepare and secure the machine according to the manufacturer's instructions.
- ▲ Never leave the driver seat whilst the tractor or the machine is running.
- ▲ Always adjust the driving speed to suit the driving conditions. Avoid fast turning when driving uphill, downhill or across a slope. Braking performance and turning ability will be affected when implements are connected or mounted to the tractor - allow extra time for turning and braking.



- ▲ Never attempt to operate a machine without its safety devices fitted or incorrectly secured.
- ▲ Ensure all bystanders are kept at a safe distance from a moving or working machine.
- ▲ Even when the machine is unattached some hydraulic or mechanical components on the machine are able to be rotated or moved by hand and are therefore capable of causing injury to fingers or hands due to trapping. Wherever possible secure these components during storage to prevent accidental injuries.
- ▲ Always place the machine in a safe position before leaving the tractor - lower the implement completely, switch off the engine and remove the ignition key.
- ▲ Never permit anyone between the machine and the tractor whilst either is working or when the machine is in a raised position.
- ▲ Only use machines on a tractor that is capable of taking its weight - use weights or ballast as required ensuring stability of the unit.
- ▲ Be aware at all times of the width, height and length of any machinery you are operating – especially when transporting on the public highway or near obstructions.
- ▲ Ensure the work area is clear of obstructions before starting work – clear stones, wire, glass or any other dangerous objects from the work site before attempting to start work.

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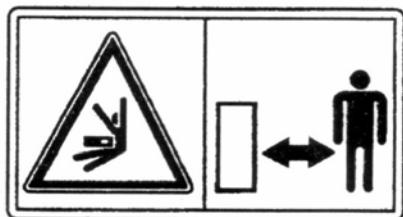
**Although the information given here covers a wide range of safety subjects it is impossible to predict every eventuality that can occur under differing circumstances whilst operating this machine. No advice given here can replace 'good common sense' and 'total awareness' at all times but will go a long way towards the safe use of your Twose machine.**

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## SAFETY DECALS



1.



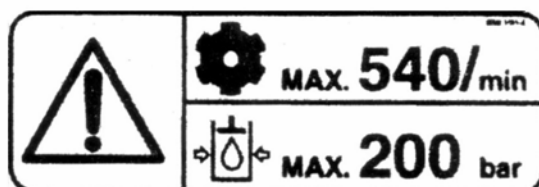
2.



3.



4.



5.

1. Read the book first.
2. DANGER – Keep a safe distance from working machine.
3. Lower protection rails before operating the machine.
4. DANGER – Moving parts, keep clear.
5. Maximum PTO speed 540 RPM.

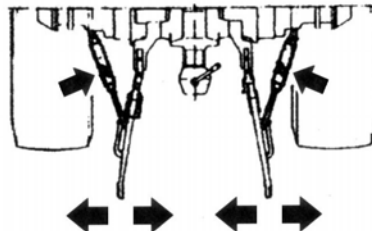
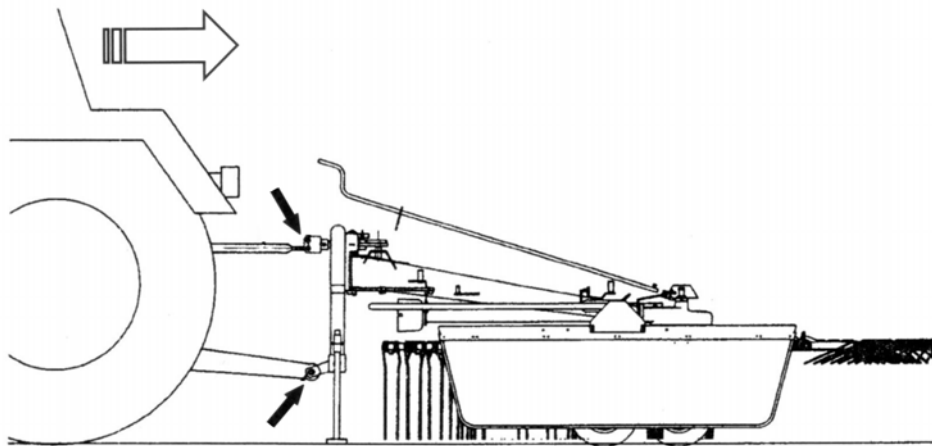
## ATTACHING THE MACHINE TO THE TRACTOR

Select a firm level site on which attach the machine to the tractor.

Reverse the tractor squarely up to the machine to a position where the tractor's lower links can be attached to the lower connection points of the machine and secure with lynch pins provided - fit check chains or rods to prevent sideways movement of the lower links.

Attach top link using pin and lynch pin provided.

Set the handle for the machine's height adjustment to a position where it is accessible from the tractor's driving seat whilst ensuring it is set such that does not come into contact with the tractor when the machine is raised or in the transport position.



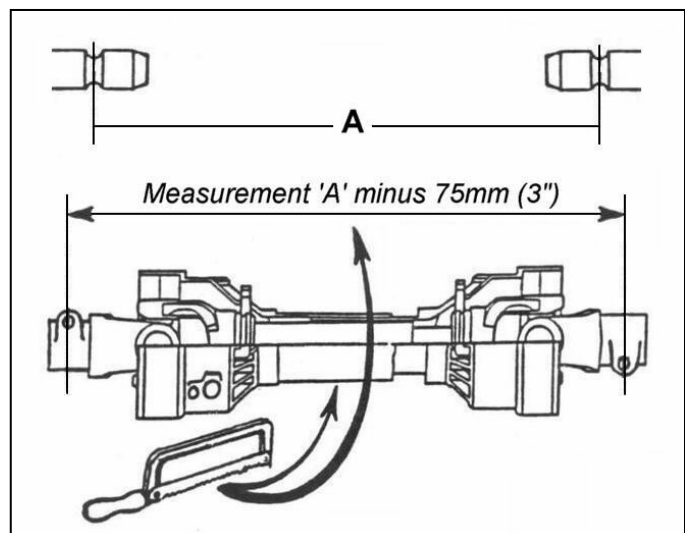
### Fit the PTO shaft

– On initial attachment this will need to be measured and adjusted to suit the tractor used.

Measure the PTO shaft and cut to the dimension shown - see *diagram opposite*.

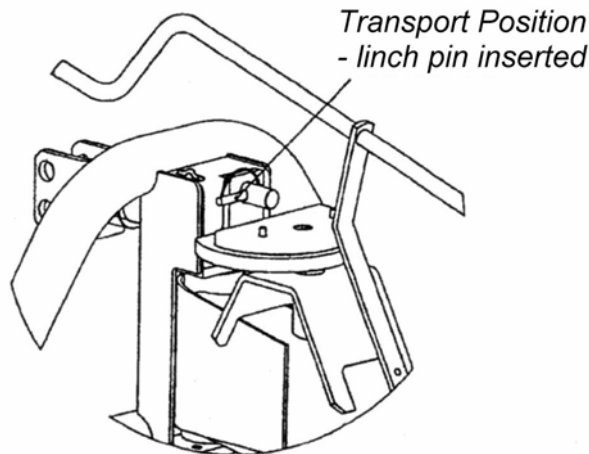
The finished length of the PTO shaft should be 75mm (3") less than the measured distance 'A' - between the tractor shaft and gearbox stub shaft - to enable correct fitting.

*Note: For subsequent use with different tractors measure again - there must be a minimum shaft overlap of 150mm (6").*



## TRANSPORT POSITION

For transportation of the machine on the tractor the rake arms must first be removed from their work position on the rotor and stowed upright in their transport position on the hitch, the curtain and protection rail must then be placed into their upright transport positions. Raise the machine using the tractor's hydraulics and manually place the support leg into the transport position. Lock linkage frame for transport using linch pin.



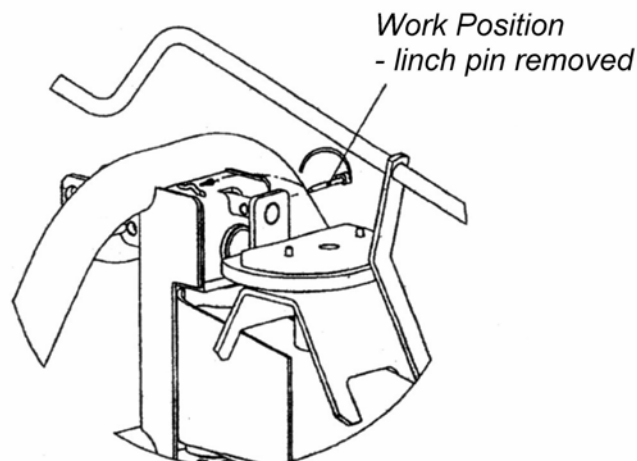
Transport speed should be adjusted to suit road conditions but under no circumstances should it ever exceed 25 km/h.

## WORK POSITION

For work the rake arms must be relocated from their transport position on the hitch to their work position on the rotor and secured in place by pins. The protection rail and curtain are then lowered into work position and the curtain extended out to approximately 200mm and fastened in position with its screw.

Set the inclination of the rotor by adjustment of the support bar on the three point linkage - *for work the rotor should be parallel to the ground or inclined slightly forward and the spring tines should be set to a height of approximately 25mm off the ground – adjustment to height can be made during work .*

With the machine raised remove the linch pin to unlock the linkage frame for work.

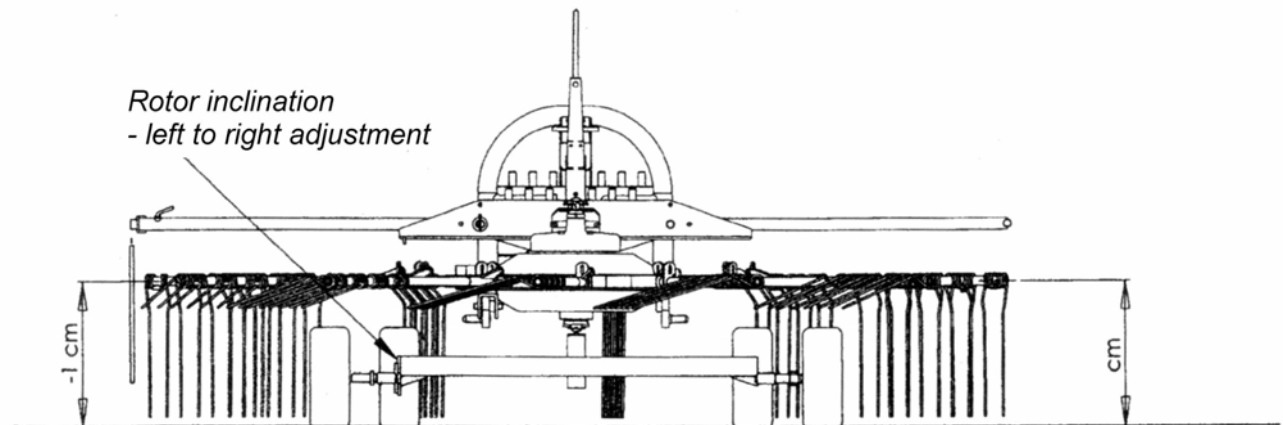


## WORKING WITH THE MACHINE

This machine will only work whilst driving in a forwards direction.

The machine is capable of making swaths from fresh, faded or dry forage but adjustments must be made to suit the differing types of work. The PTO shaft speed and driving speed needs to be adjusted to suit the type of forage and the ground condition. Make sure that the three point hitch bars are lowered before starting work, and that the machine is supported by the support bar for rotor adjustment. If the machine height is incorrect this can be adjusted from the tractor seat by means of the adjustment lever located on the machine above the hitch or by the spindle on the chassis if you have a machine with hydraulic lifting. Pull type and hydraulic lifting versions of the machine should only be operated in a 'lifted' position when driving over swaths or when turning. During transport whilst in the transport position these machines should be lowered.

Left to right inclination of the rotor can be adjusted on the chassis – see *diagram below*.



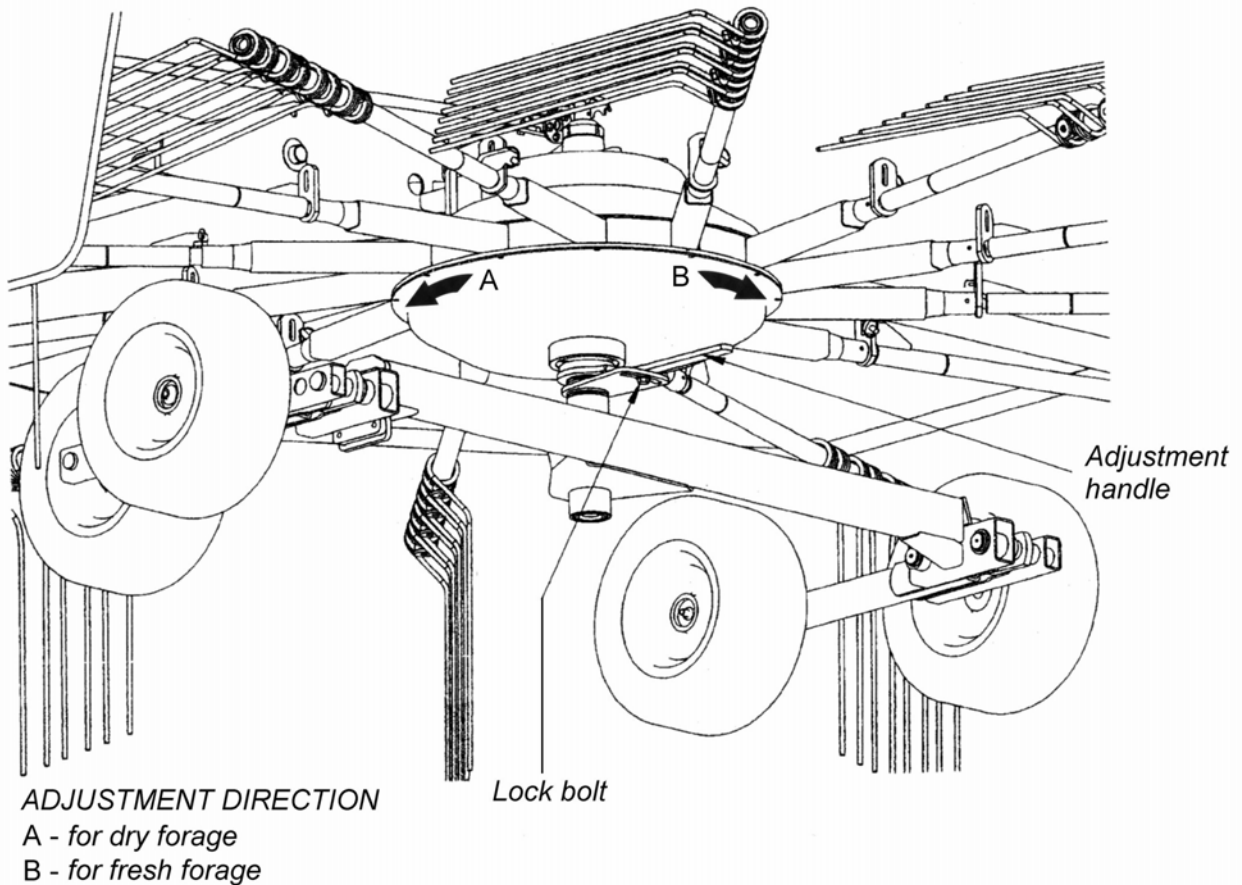
Ensure that the spring tines do not 'dig' into the soil during work as this may damage the tines and/or pollute the forage.

The width of the swath is set by the adjustment of the curtain which can be moved inwards or outwards and is locked to the desired position by means of a screw.

## ROTARY RAKE TIMING

If it is found that the spring tines of the rake are lifting too early or too late and failing to produce a proper swath this can be corrected by an adjustment on the underside of the rotor – raise the machine on the tractors hydraulics and loosen the lock bolt on the base of the rotor body, the tine lifting timing can then be adjusted by turning the adjustment handle in a clockwise or anti-clockwise direction to advance or retard the lifting of the tines. The cam has an adjustment of approximately 35°. Ensure that the lock bolt is tightened fully after adjustment has been made. This adjustment can be used to set the machine for more efficient raking of the particular forage types – adjust the rotor anti-clockwise when viewed from below for dryer forage and clockwise for fresher forage. Practice at the different settings will determine the best work results.

*Refer to the diagram below for the location of the adjustment components and suggested adjustment direction.*

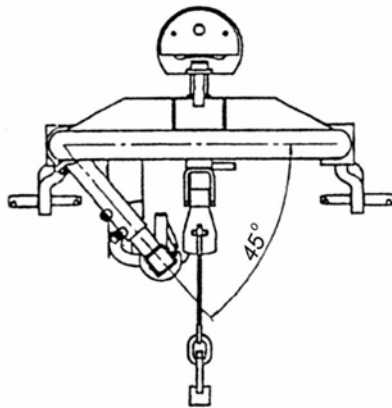
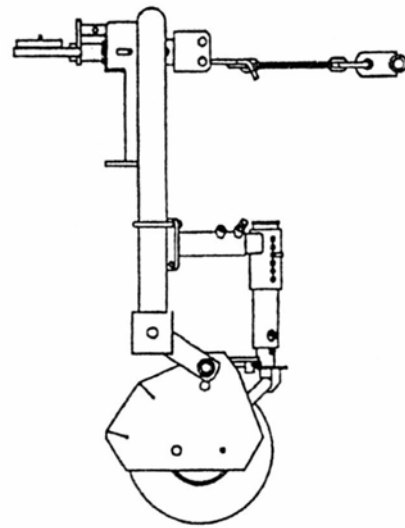
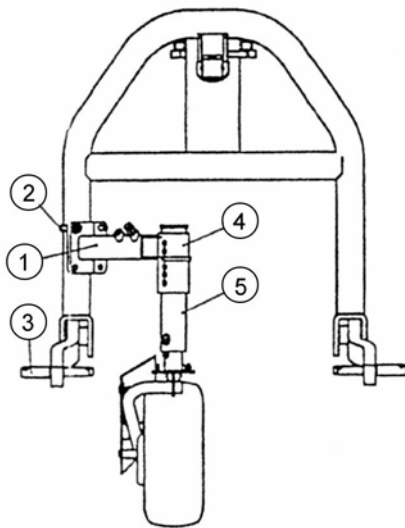


### ADDITIONAL EQUIPMENT

#### Additional Wheel and Chain Upper Link for perfect soil adaptability

The additional wheel mounts on the three point hitch frame as shown in the diagram below. Attach bracket (1) with clamp (2) onto the three point hitch frame. The bracket must be positioned at 45° towards the centre of the machine to avoid the wheel 'fouling' lower hitch point (3). The height of the additional wheel is adjusted at location (4) by selection of a suitable hole at the desired height.

The additional wheel uses the added chain in place of the classic upper link – in work position the chain must be loose to allow the wheel to adapt to the contours of the ground. In transport position the chain adopts the role of the classic upper link.



**For road transportation  
always use  
Classic Upper Link**

## MAINTENANCE

Maintenance of the Rotary Rake is as follows:

### Tyres

Tyre pressure should be checked on a regular basis – the recommended tyre pressure for work is 1.5bars (*approx 22 lb/in*).

### Gearbox

The gearbox which consists of two cone gears must be lubricated with grease every 10 to 15 working hours – as the gearbox is not fully filled with grease a couple of pumps of the grease will be sufficient to lubricate it. The lubrication point is located on the top of the gearbox.

### Bearings

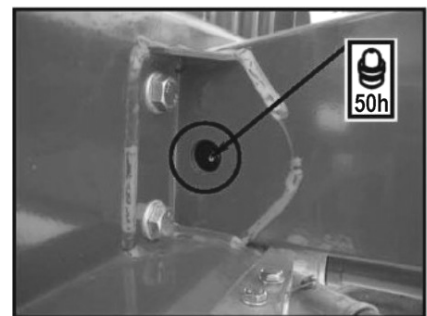
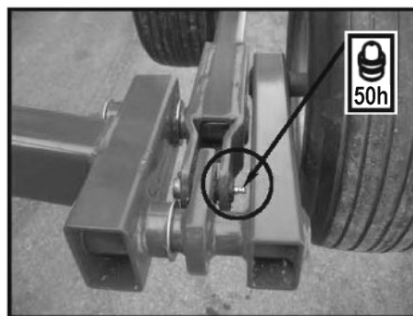
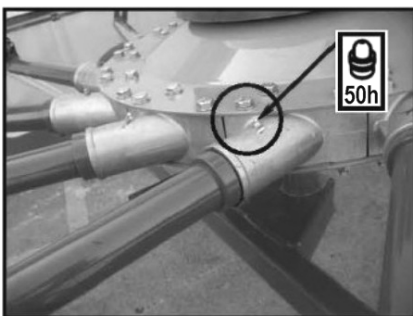
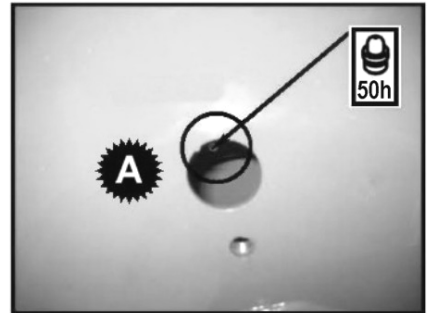
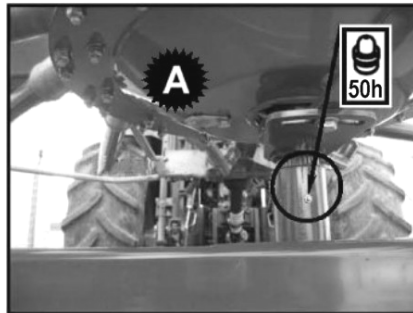
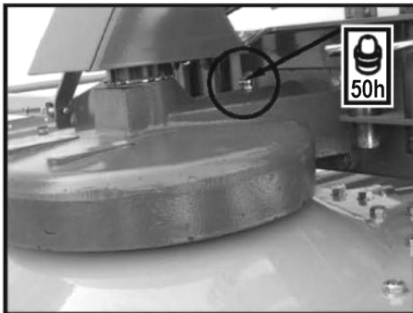
The bearings in the wheels, rotor, and gearbox are all factory sealed and maintenance free therefore they will not require additional lubrication.

### Rotor

The rotor is hermetically sealed and filled with 7 litres of fluid grease.

### Lubrication Points

Lubricate the locations indicated below every 50 hours during use.

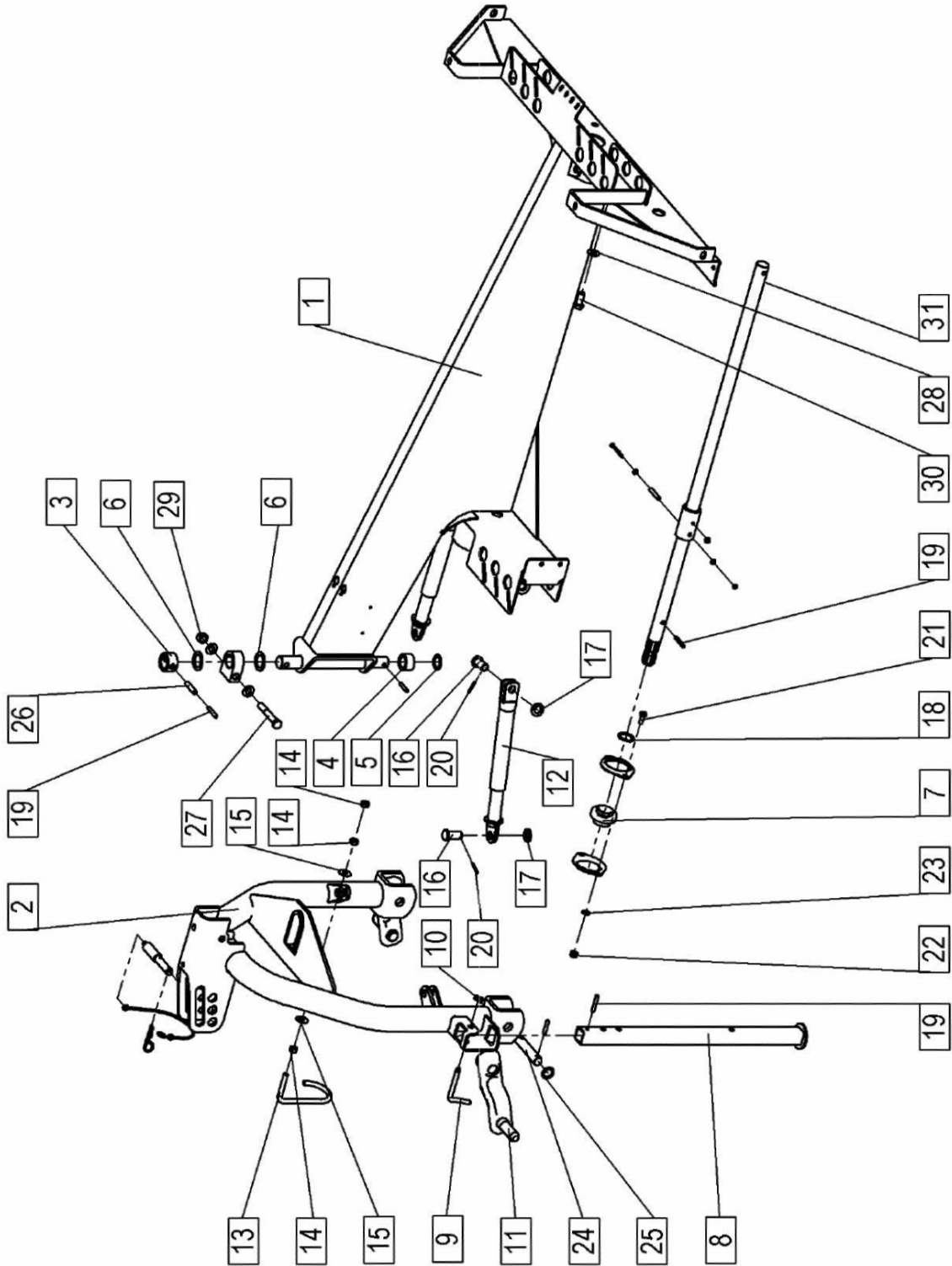


It is recommended that the machine is cleaned and lubricated prior to storage at which time a thorough check of all components should be made to identify any worn or damaged components so that replacements can be ordered in preparation for the next seasons work.



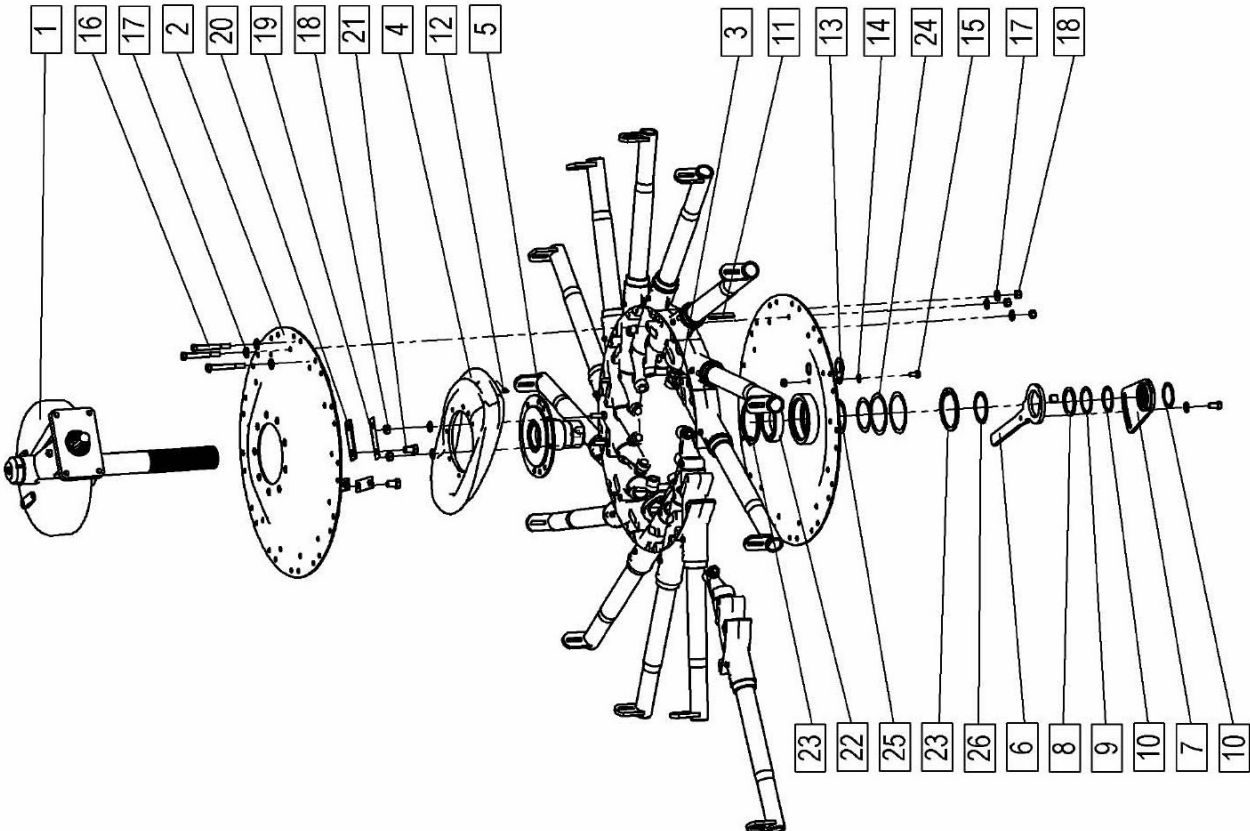
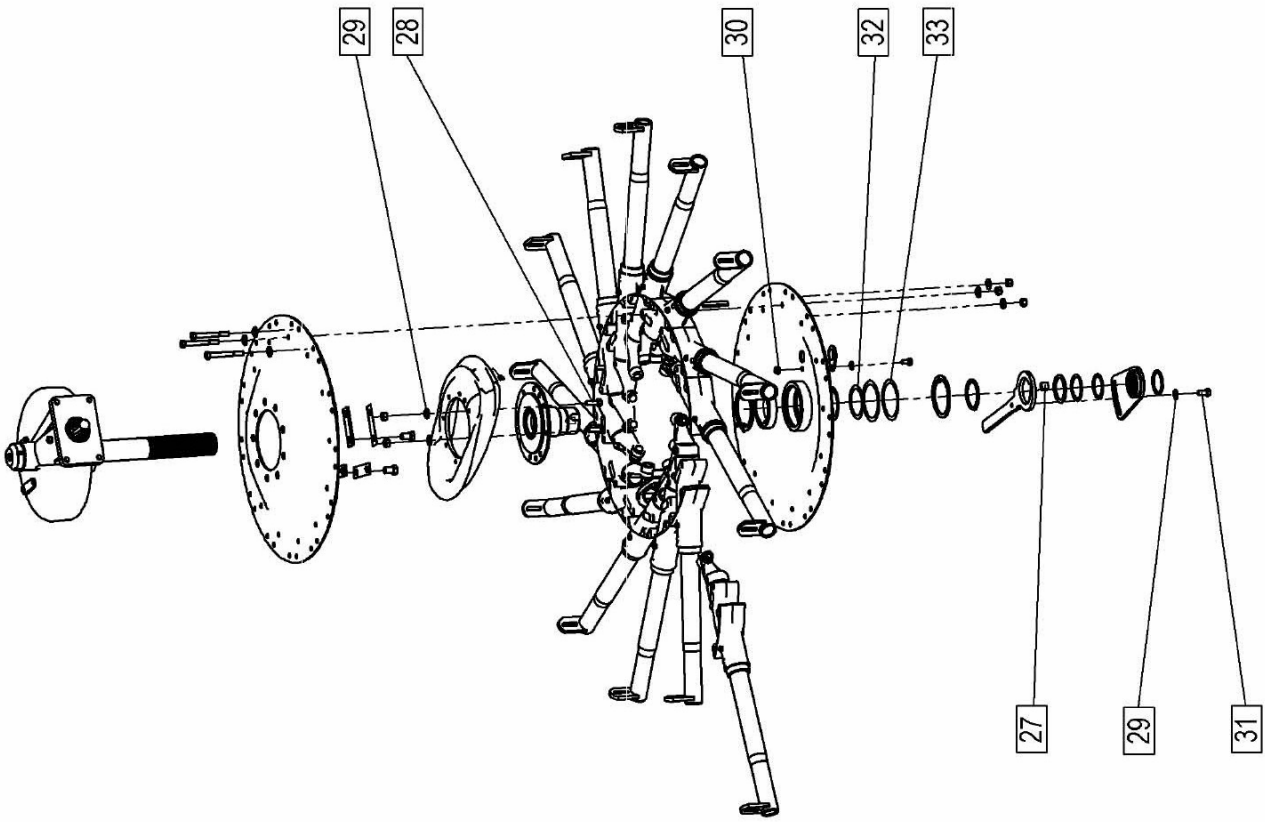
**PARTS SECTION**  
**RR430/12 & RR470/13**  
**Rotary Rakes**

## MAIN FRAME ASSEMBLY



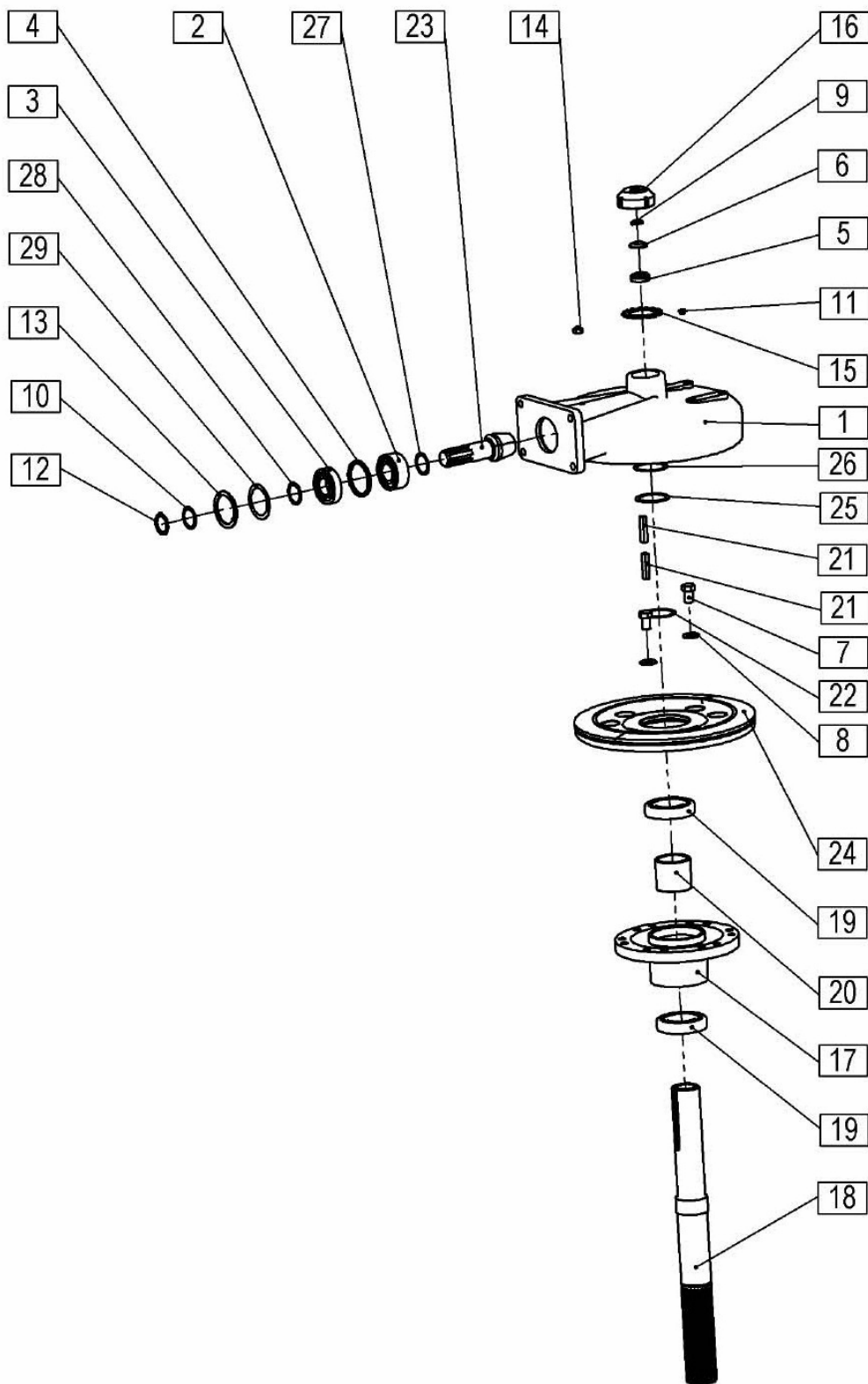
REF.	QTY.	PART No.	DESCRIPTION
<b>MAIN FRAME ASSEMBLY</b>			
1	1	1022556	HOLDER (RR430/12 Model)
	1	1022557	HOLDER (RR470/13 Model)
2	1	1022558	HITCH BOW
3	1	1022559	SLEEVE
4	1	1022560	RUN SLEEVE
5	2	1022561	WASHER
6	2	1021927	WASHER
7	1	1022562	FLANGE BEARING
8	1	1022563	SUPPORT LEG
9	1	1022564	LOCK PIN
10	1	1022565	PIN
11	2	1022566	BOLT
12	2	1022567	STABILIZER BAR
13	1	1022568	PTO SHAFT HOLDER
14	3	1022419	NUT
15	2	1022569	OVAL SPRING
16	4	1022570	HEAD BOLT
17	4	1021901	WASHER
18	1	1022571	WASHER
19	3	1022572	PIN
20	4	1022222	PIN
21	2	1021936	SCREW
22	2	1021829	NUT
23	2	1021067	WASHER
24	2	1021058	BOLT
25	4	1022573	WASHER
26	1	1022574	PIN
27	1	1022575	SCREW
28	4	1021072	WASHER
29	1	1021224	NUT
30	4	1022576	SCREW
31	1	1022578	DISTRIBUTER SHAFT (RR430/12 Model)
	1	1022579	DISTRIBUTER SHAFT (RR470/13 Model)
32	1	1022580	CLUTCH COUPLING
33	1	1022581	SCREW
34	2	1021148	WASHER
35	1	1022582	NUT
36	1	1021064	NIPPLE
37	1	1022583	SLEEVE HITCH
38	5	1021059	PIN
39	1	1022584	PIN
40	1	1022505	TOP LINK PIN
41	1	1021730	SAFETY WIRE
42	1	1022585	RUBBER CORD
43	1	1022586	HAKE
44	2	1022412	WASHER

## GEARBOX & ROTOR ASSEMBLY



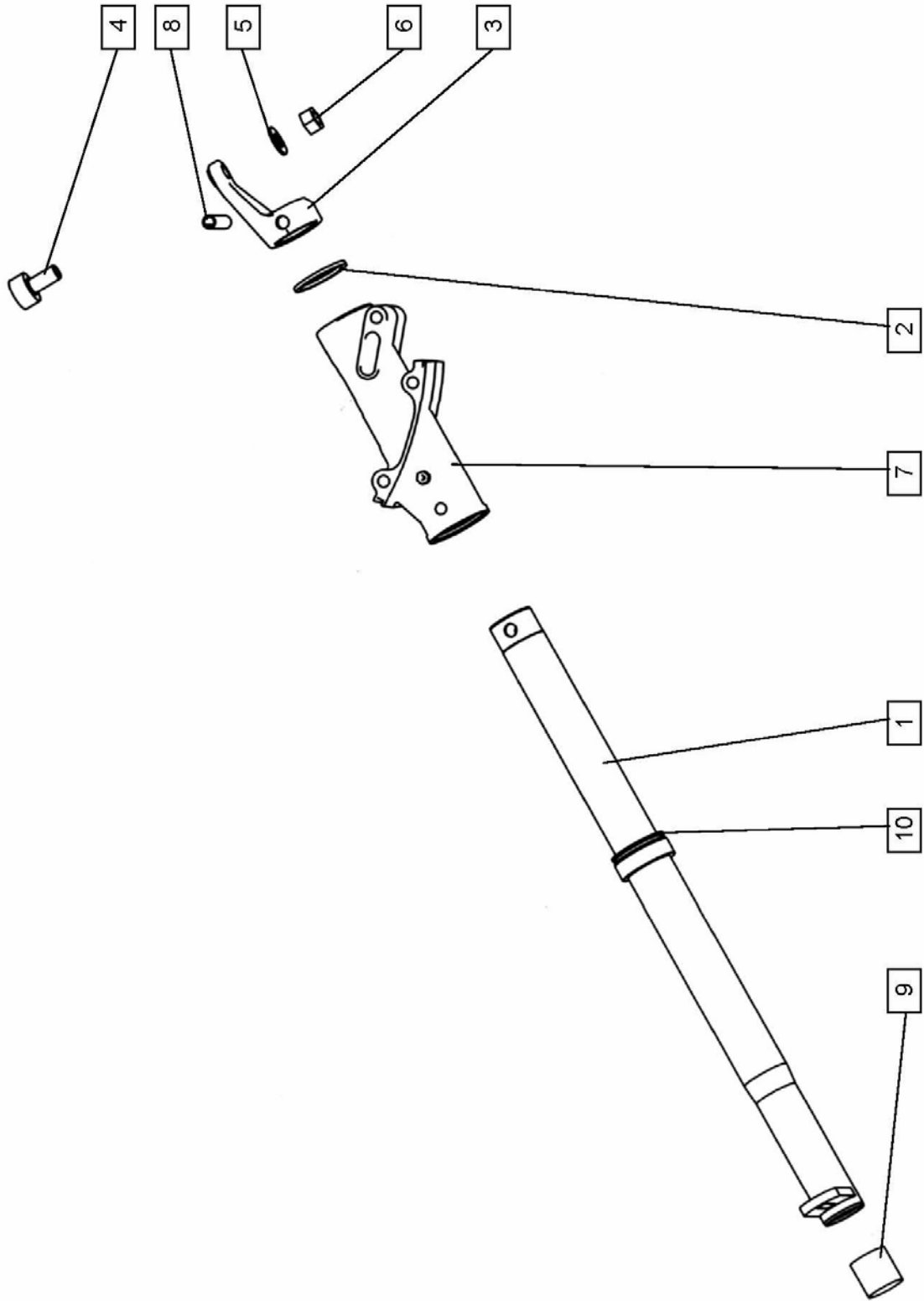
REF.	QTY.	PART No.	DESCRIPTION
<b>GEARBOX &amp; ROTOR ASSEMBLY</b>			
1	1	1022513	GEARBOX
2	1	1022516	PLATE - UPPER ( <i>RR430/12 Model</i> )
	1	1022517	PLATE - UPPER ( <i>RR470/13 Model</i> )
3	12	1022499	BEARING TUBE - <i>13x on RR470/13 Model</i>
4	1	1022518	CURVE
5	1	1022519	HUB
6	1	1021094	ADJUSTING LEVER
7	1	1021095	ADJUSTING LEVER
8	1	1021103	WASHER
9	1	1022520	WASHER
10	2	1021102	CIRCLIP
11	12	1022523	CLOSING PART ( <i>RR430/12 Model</i> )
	13	1022524	CLOSING PART ( <i>RR470/13 Model</i> )
12	1	1022525	NIPPLE
13	1	1022526	CLOSING PART
14	1	1021067	WASHER
15	1	1022055	SCREW
16	39	1022527	SCREW
17	78	1021604	WASHER
18	47	1021178	NUT
19	3	1021098	BAND
20	3	1021096	BAND
21	6	1021097	SCREW
22	1	1021086	BEARING
23	2	1021089	CIRCLIP
24	1	1022528	WASHER
25	1	1021110	WASHER
26	1	1021107	CIRCLIP
27	1	1021088	COTTER
28	8	1021990	SCREW
29	9	1022417	WASHER
30	1	1022531	PLATE - LOWER ( <i>RR430/12 Model</i> )
	1	1022532	PLATE - LOWER ( <i>RR470/13 Model</i> )
31	1	1022225	SCREW
32	1	1021109	WASHER
33	1	1022533	WASHER

## DRIVE ASSEMBLY



REF.	QTY.	PART No.	DESCRIPTION
			<b>DRIVE ASSEMBLY</b>
1	1	1021113	HOUSING
2	1	1021025	BEARING
3	1	1021023	BEARING
4	1	1021115	WASHER
5	1	1021119	BEARING
6	1	1021120	WASHER
7	6	1021097	SCREW
8	6	1021072	WASHER
9	1	1021123	O RING
10	1	1022543	WASHER
11	4	1021125	INNER PLASTIC PLUG
12	1	1021080	CIRCLIP
13	1	1021126	CIRCLIP
14	1	1021127	NIPPLE
15	1	1021116	PROTECTION WASHER
16	1	1021117	NUT
17	1	1022544	BEARING HOUSING
18	1	1022545	SHAFT
19	2	1021022	BEARING
20	1	1022546	SLEEVE
21	2	1021118	COTTER
22	2	1022547	WASHER
23	1	1022548	BEVEL GEAR WHEEL
24	1	1022549	BEVEL GEAR WHEEL
25	1	1022550	WASHER
26	2	1022551	WASHER
27	1	1022552	WASHER
28	2	1022553	WASHER
29	1	1022554	WASHER

## RAKE ARM ASSEMBLY

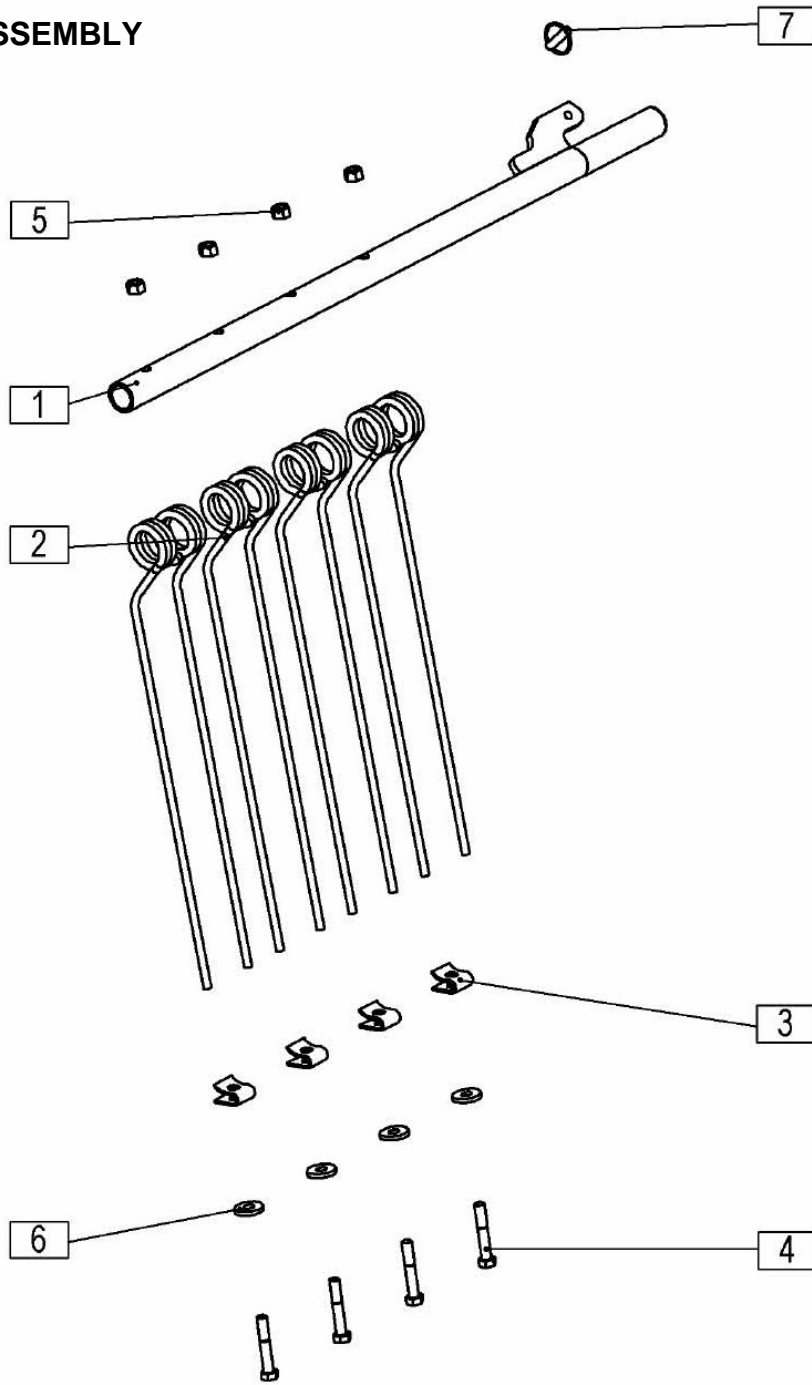






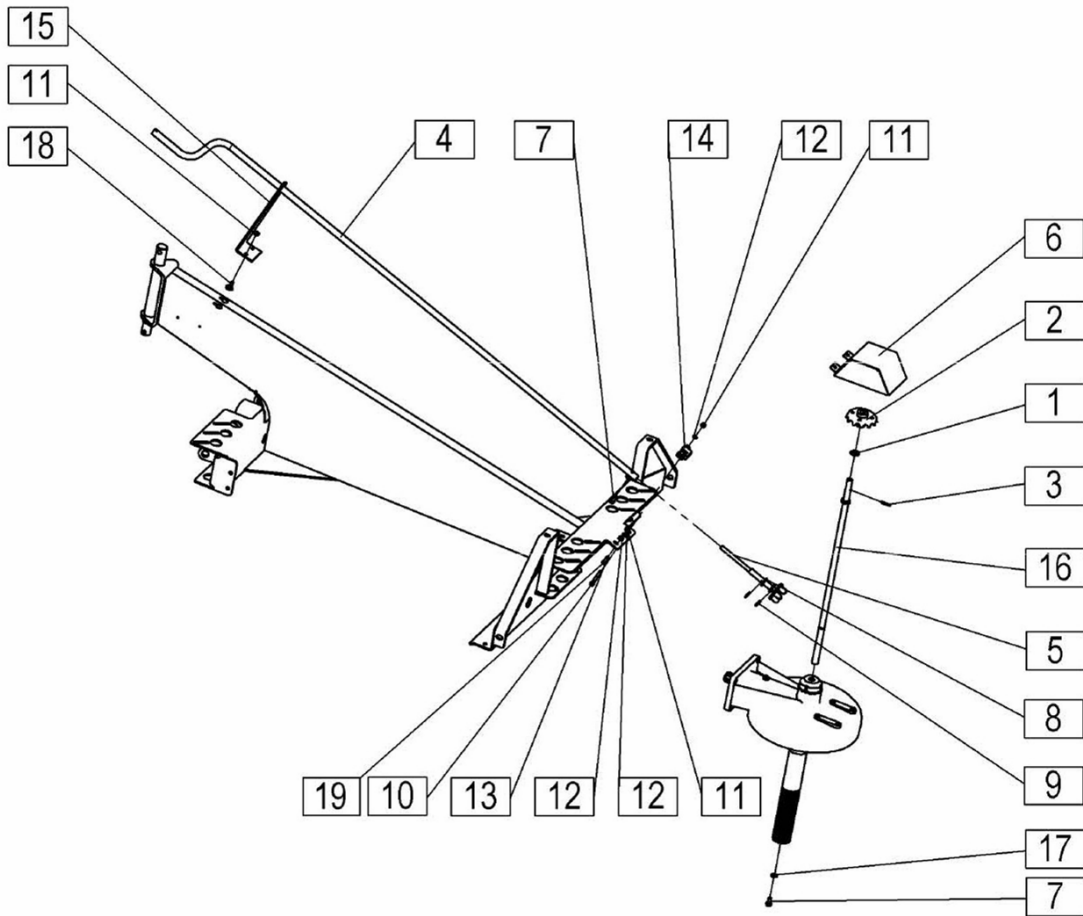
REF.	QTY.	PART No.	DESCRIPTION
			<b>RAKE ARM ASSEMBLY</b>
1	1	1022534	TUBE
2	2	1022535	WASHER
3	1	1022536	LEVER
4	1	1022537	SPHERE
5	1	1021072	WASHER
6	1	1022538	NUT
7	1	1022539	TUBE
8	1	1022540	TENSION PIN
9	1	1022541	PLUG
10	1	1022542	O RING

## SPRING TINES ASSEMBLY



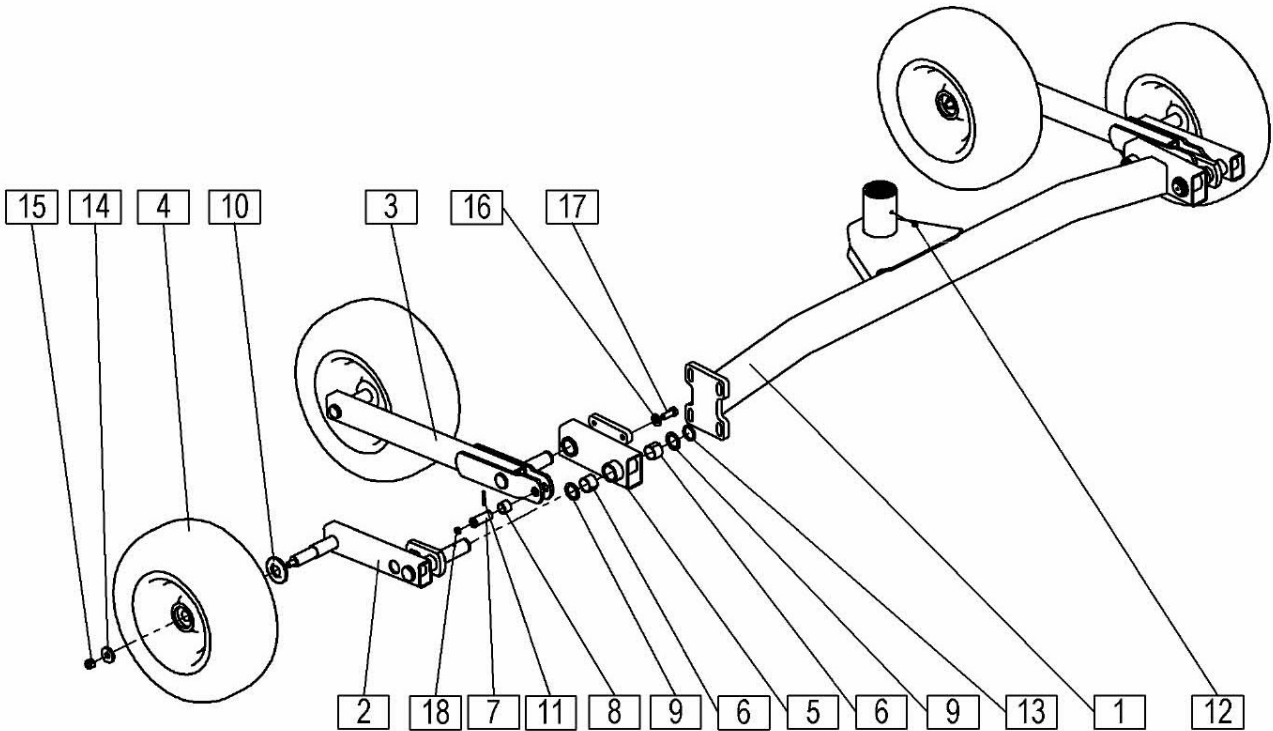
REF.	QTY.	PART No.	DESCRIPTION
<b>SPRING TINES ASSEMBLY</b>			
1	1	1022498	TINES ARM (RR430/12 Model)
	1	1022497	TINES ARM (RR470/13 Model)
2	4	1021031	SPRING TINE
3	4	1021129	TINE CONNECTOR
4	4	1022484	SCREW
5	4	1021178	NUT
6	4	1021130	WASHER
7	1	1021131	LINCH PIN

**HEIGHT ADJUSTER ASSEMBLY**



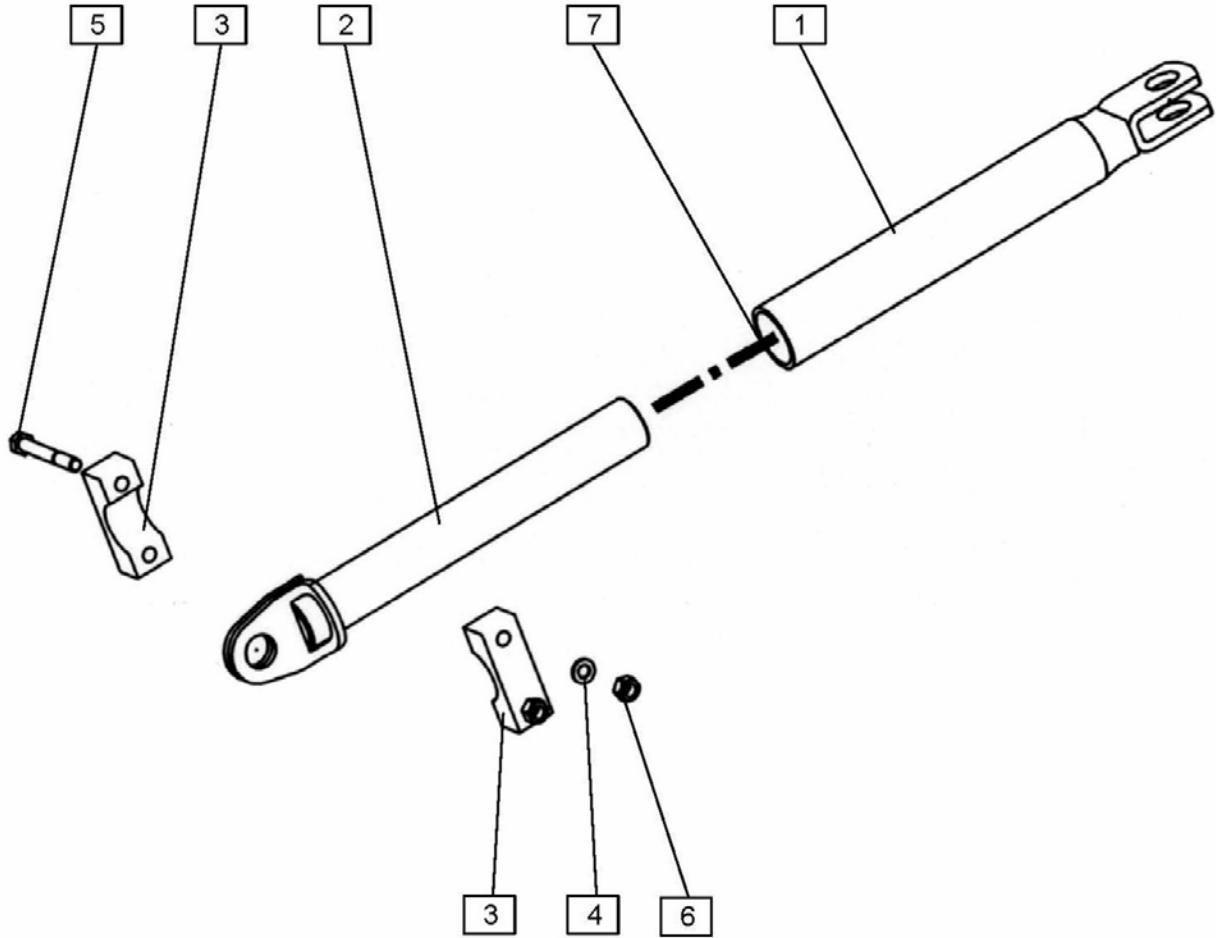
REF.	QTY.	PART No.	DESCRIPTION
<b>HEIGHT ADJUSTER ASSEMBLY</b>			
1	1	1021092	WASHER
2	1	1021093	GEAR SEGMENT
3	1	1021101	PIN
4	1	1022616	SECURITY LEVER
5	1	1022617	GEAR WHEELS
6	1	1022618	PROTECTION
7	2	1022055	SCREW
8	3	1022412	WASHER
9	2	1022222	PIN
10	2	1022619	SCREW
11	6	1021173	NUT
12	16	1021965	WASHER
13	2	1022620	SCREW
14	1	1021040	BEARING
15	1	1022621	HITCH
16	1	1022622	SPINDLE
17	1	1021067	WASHER
18	2	1021763	SCREW
19	1	1022623	LINING

**CHASSIS ASSEMBLY**



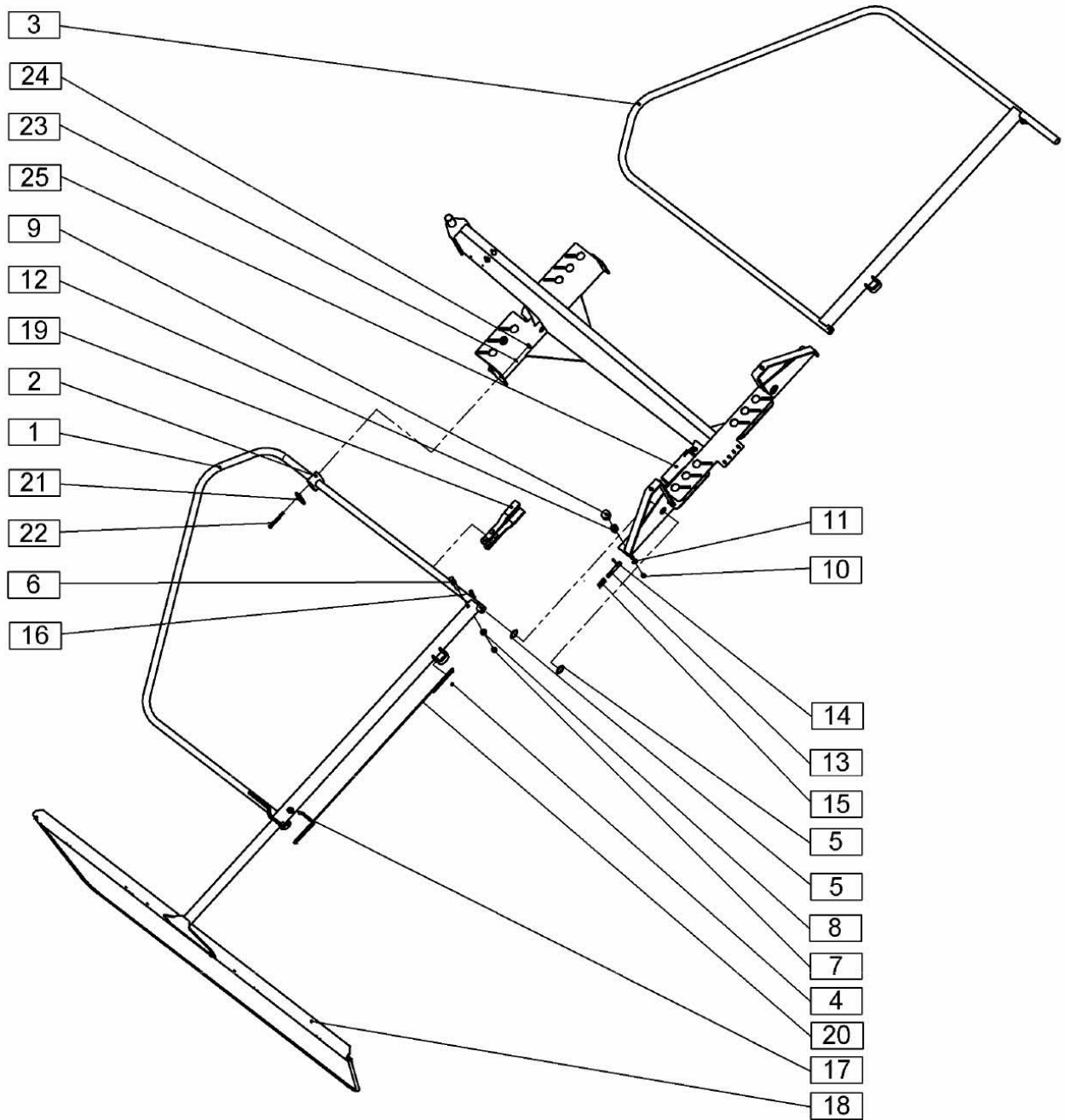
REF.	QTY.	PART No.	DESCRIPTION
			<b>CHASSIS ASSEMBLY</b>
1	1	1022626	CHASSIS HOLDER
2	2	1022627	OSCILLATOR ARM - OUTER
3	2	1022628	WHEEL ARM - INNER
4	4	1021024	WHEEL
5	1	1022629	ARM HOLDER
6	8	1021157	SLEEVE
7	2	1021158	BOLT
8	2	1021159	RING INNER
9	8	1022561	WASHER
10	4	1021161	BEARING PROTECTION
11	2	1022222	PIN
12	2	1021063	NIPPLE
13	4	1021162	CIRCLIP
14	4	1021163	WASHER
15	4	1021178	NUT
16	4	1022417	WASHER
17	4	1022329	SCREW
18	1	1021064	NIPPLE

**SHOCK ABSORBER ASSEMBLY**



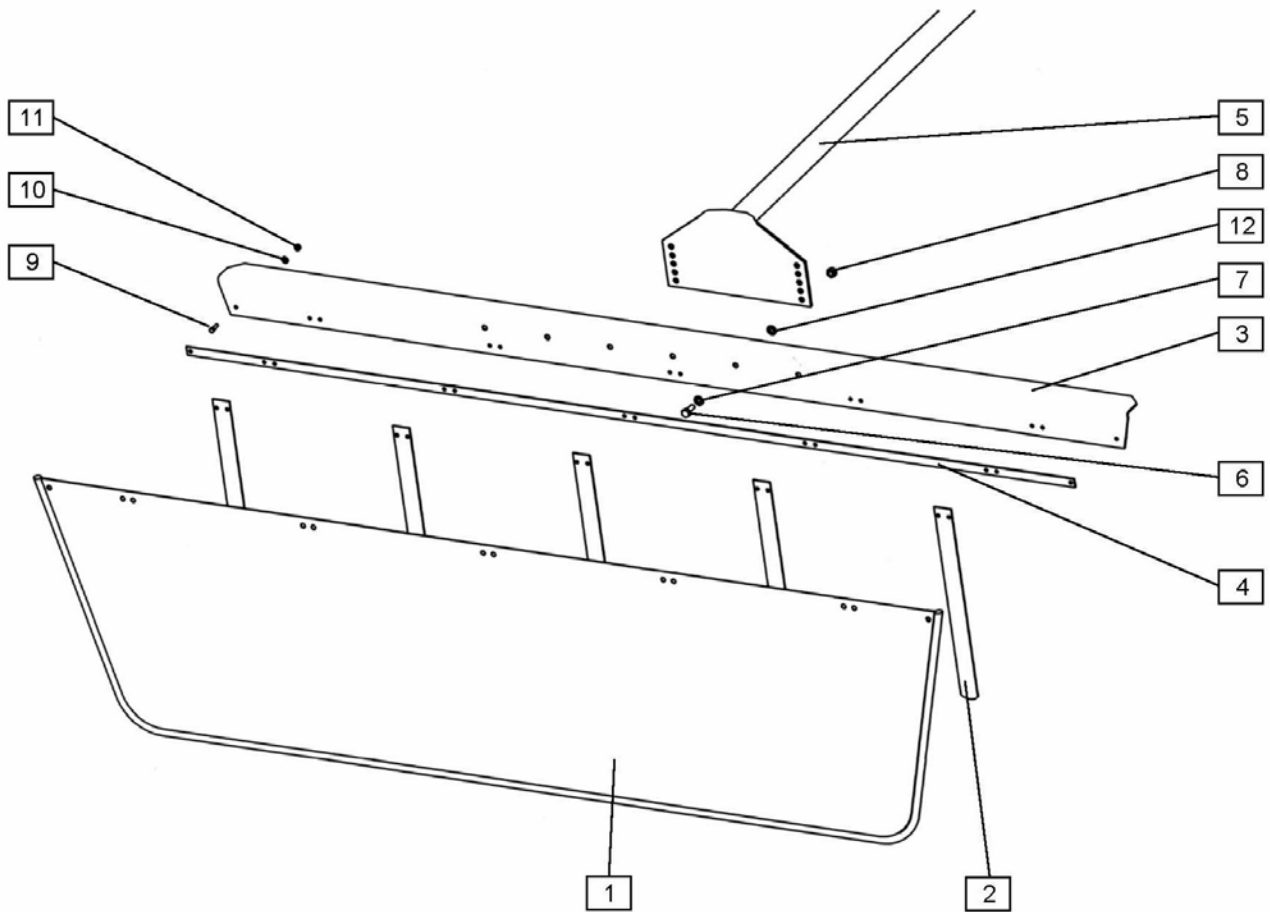
REF.	QTY.	PART No.	DESCRIPTION
			<b>SHOCK ABSORBER ASSEMBLY</b>
1	1	1022587	SHOCK ABSORBER TUBE
2	1	1022588	SHOCK ABSORBER TUBE
3	2	1022589	LIMITER
4	2	1021965	WASHER
5	2	1022590	SCREW
6	2	1021173	NUT
7	1	1022591	SPRING

## PROTECTION ASSEMBLY



REF.	QTY.	PART No.	DESCRIPTION
			<b>PROTECTION ASSEMBLY</b>
1	1	1022593	PROTECTION - LEFT ( <i>RR430/12 Model</i> )
	1	1022594	PROTECTION - LEFT ( <i>RR470/13 Model</i> )
2	2	1022595	BRACKET
3	1	1022597	PROTECTION - RIGHT ( <i>RR430/12 Model</i> )
	1	1022598	PROTECTION - RIGHT ( <i>RR470/13 Model</i> )
4	1	1022599	CONNECTOR
5	8	1022571	WASHER
6	6	1022600	BOLT
7	1	1021169	NUT
8	1	1022417	WASHER
9	1	1021143	OVAL BUFFER
10	2	1021179	NUT
11	2	1021067	WASHER
12	2	1022601	SLEEVE
13	2	1022602	BOLT
14	2	1021140	PIN
15	2	1021138	SPRING
16	2	1021142	COTTER PIN
17	2	1021137	SCREW
18	1	1021144	CURTAIN
19	1	1022603	LIMITER
20	2	1022605	STEEL CABLE
21	2	1022606	COVER
22	4	1022607	SCREW
23	4	1021147	WASHER
24	4	1021829	NUT
25	1	1022608	SPRING

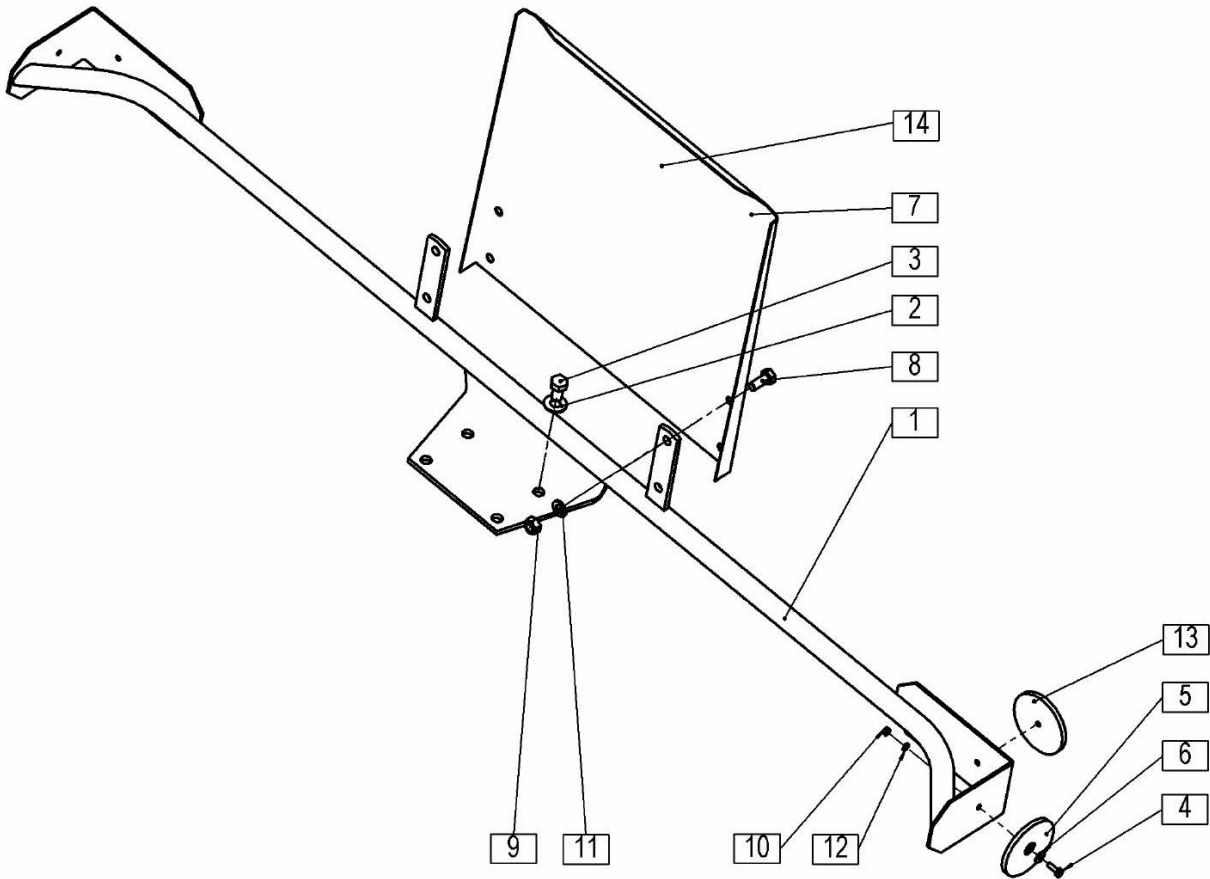
**CURTAIN ASSEMBLY**



REF.	QTY.	PART No.	DESCRIPTION
<b>CURTAIN ASSEMBLY</b>			
1	1	1021046	CURTAIN
2	5	1021145	SPRING
3	1	1021044	CURTAIN HOLDER
4	2	1022609	LINK
5	1	1022610	CURTAIN HOLDER
6	2	1021933	SCREW
7	4	1021147	WASHER
8	2	1021829	NUT
9	12	1022611	SCREW
10	12	1021148	WASHER
11	12	1022582	NUT
12	2	1022612	WASHER

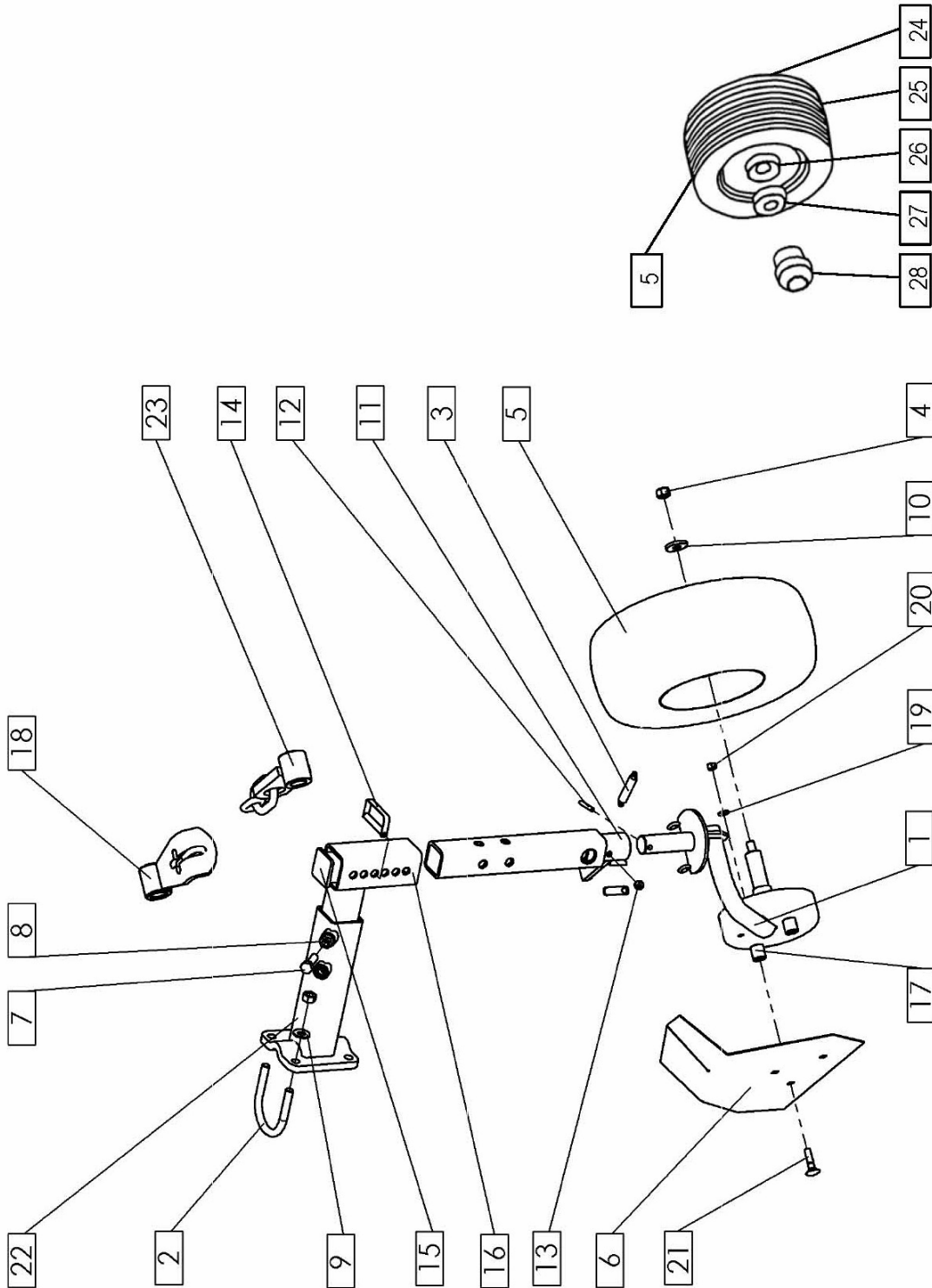


**TRAFFIC BAR ASSEMBLY**



REF.	QTY.	PART No.	DESCRIPTION
			<b>TRAFFIC BAR ASSEMBLY</b>
1	1	1021188	LIGHT HOLDER
2	4	1022417	WASHER
3	4	1021935	SCREW
4	4	1021189	SCREW
5	2	1021190	REFLECTOR - ORANGE
6	4	1021191	WASHER
7	1	1021192	LABEL PLATE
8	4	1021936	SCREW
9	4	1021876	NUT
10	4	1021194	NUT
11	4	1021195	WASHER
12	4	1021196	SPRING WASHER
13	2	1021197	REFLECTOR - RED
14	2	1022281	REFLECTOR - SELF ADHESIVE

## AUXILLIARY WHEEL ASSEMBLY



REF.	QTY.	PART No.	DESCRIPTION
			<b>AUXILIARY WHEEL ASSEMBLY</b>
1	1	1021175	WHEEL BOW
2	1	1021597	STIRRUP
3	2	1021171	SPRING
4	1	1021178	NUT
5	1	1021256	WHEEL
6	1	1021176	PROTECTION
7	1	1022236	SCREW
8	2	1021169	NUT
9	1	1022417	WASHER
10	1	1021163	WASHER
11	1	1021177	HOLDER
12	1	1022630	PIN
13	1	1021064	NIPPLE
14	1	1021168	SPRING PIN
15	1	1021167	TUBE PLUG
16	1	1021164	HOLDER
17	2	1021166	SLEEVE
18	1	1022631	CHAIN HOLDER
19	1	1021070	WASHER
20	1	1021173	NUT
21	1	1022632	SCREW
22	1	1021259	TUBE
23	1	1022633	CHAIN
24	1	1022634	TYRE
25	1	1021005	TUBE
26	1	1022226	RIM
27	2	1021002	BEARING
28	1	1021237	COVER

