

# ROTARY RAKES

***Models RR430 & RR471***

INSTRUCTION & PARTS MANUAL

*Publication 506*

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**Revisions**

|                  |                    |
|------------------|--------------------|
| <i>June 2006</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, RR471*.....

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: June 2006



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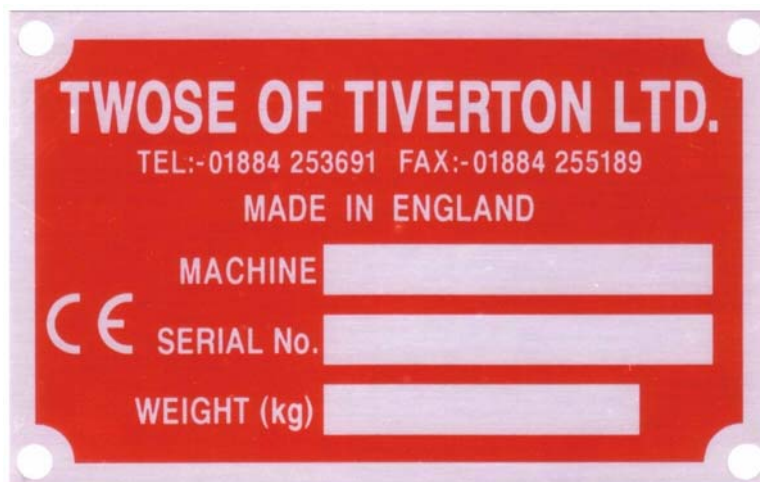
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**TECHNICAL DATA**

| <b>SPECIFICATION</b>                             | <b>RR430 Model</b> | <b>RR471 Model</b> |
|--|--------------------|--------------------|
| Working width (m)                                | 4.30               | 4.60               |
| Rotor diameter (m)                               | 3.33               | 3.60               |
| Transport width (m)                              | 1.64               | 2.23               |
| Machine width (m)                                | 3.45               | 3.70               |
| Machine height (m)                               | 1.42               | 1.60               |
| No. of spring tine arms per rotor                | 12                 | 12                 |
| No. of double spring tines per arm (per machine) | 4 (48)             | 4 (48)             |
| Tyres  | 15 x 6.00 4ply     | 16 x 6.50 4ply     |
| Tractor power required (kW/HP)                   | 22/30              | 30/41              |
| PTO speed (rpm)                                  | 540                | 540                |
| Length between PTO joints (mm)                   | 900                | 900                |
| PTO safety clutch adjustment (Nm)                | 600                | 900                |
| Working speed (km/h)                             | 14                 | 14                 |
| Working capacity (ha/h)                          | 5.5                | 6.2                |
| Chassis type                                     | tandem             | tandem             |
| Hitch type                                       | 3-point linkage    |                    |
| Weight (kg)                                      | 480                | 540                |

**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 it's serial number plate.

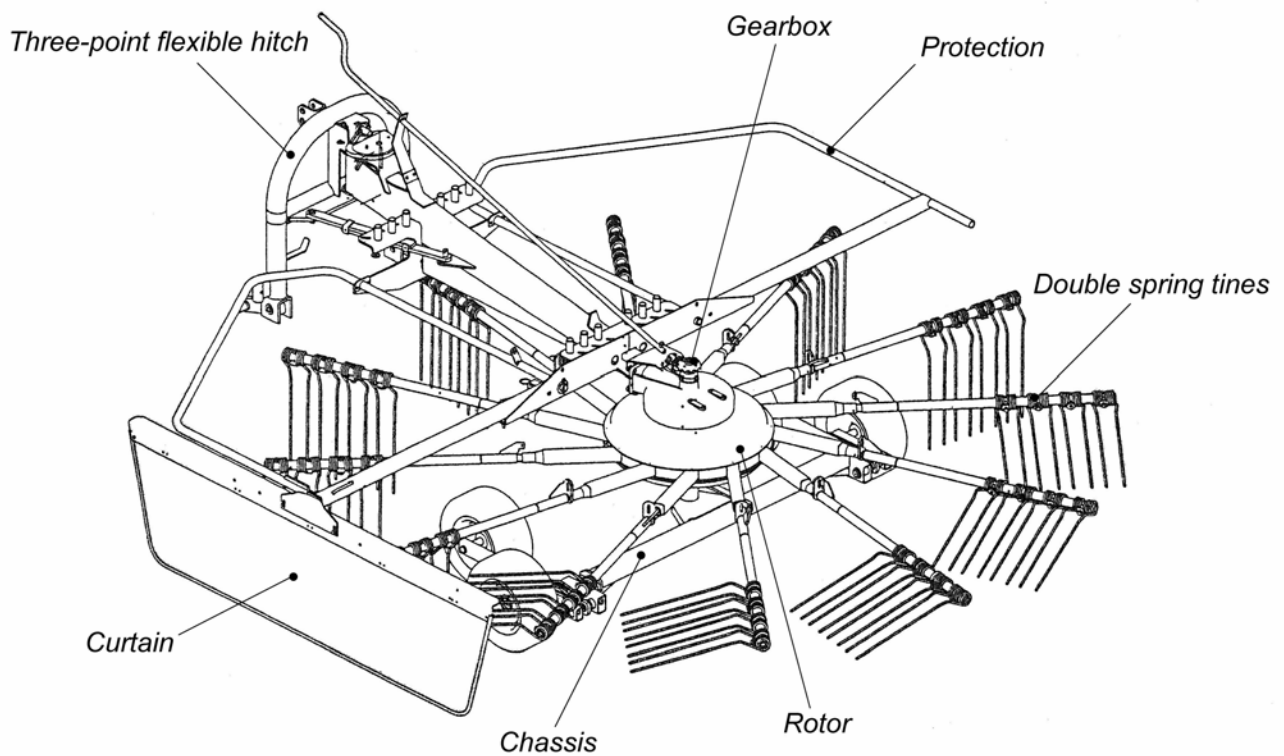
## DESCRIPTION

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



RR471 model illustrated

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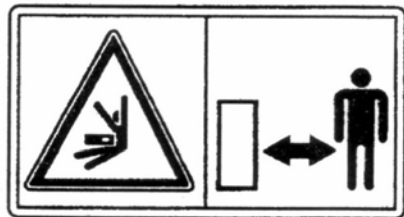
**Although the information given here covers a wide range of safety subjects it is impossible to predict every eventuality that can occur under differing circumstances whilst operating this machine. No advice given here can replace 'good common sense' and 'total awareness' at all times but will go a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

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## SAFETY DECALS



1.



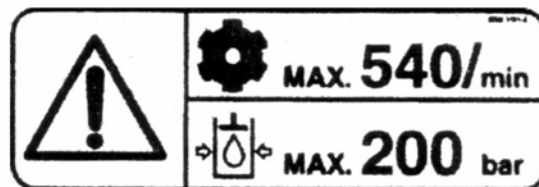
2.



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.

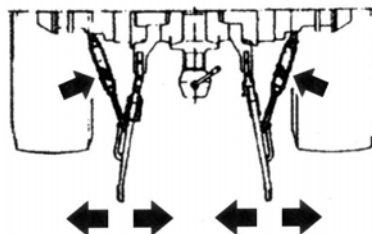
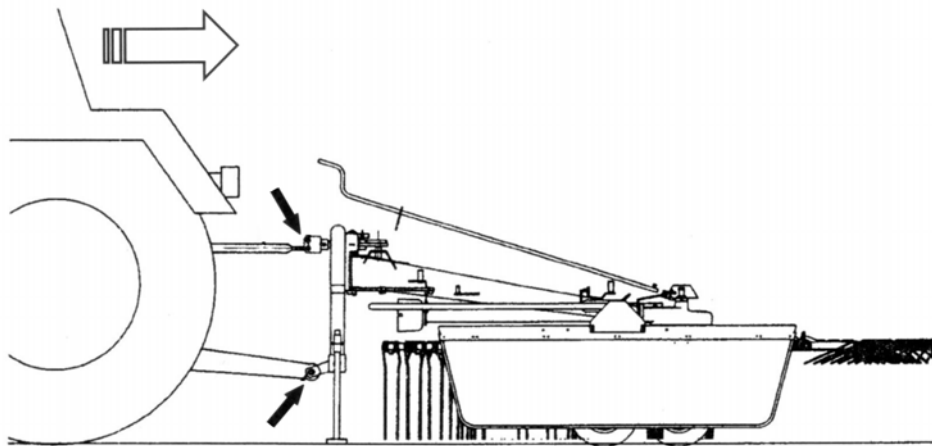
## ATTACHING THE MACHINE TO THE TRACTOR

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.



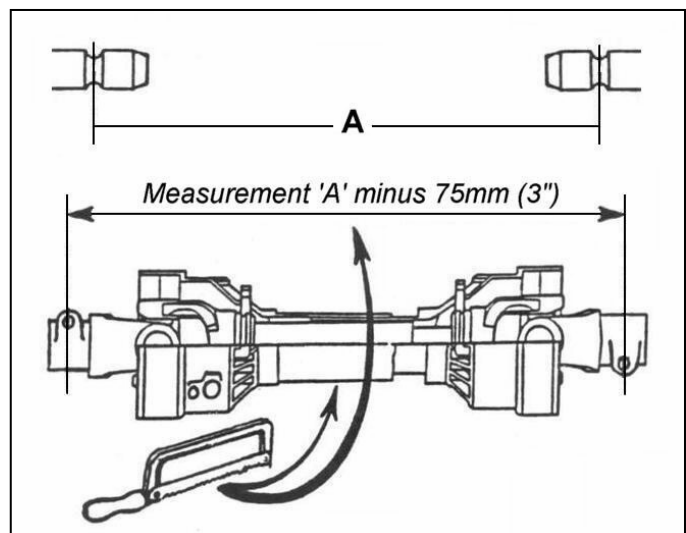
### Fit the PTO shaft

– 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*.

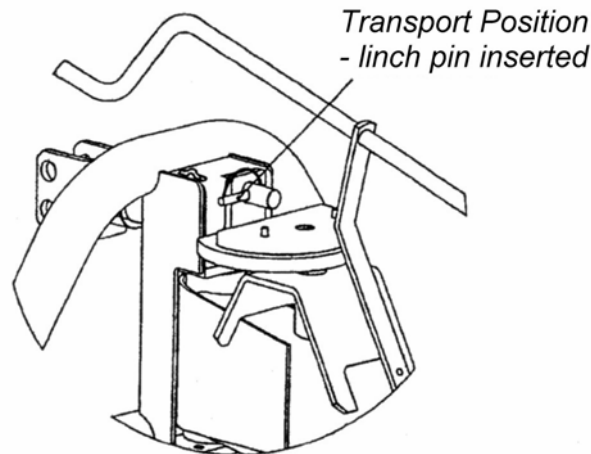
The finished length of the PTO shaft should be 75mm (3") less than the measured distance 'A' - between the tractor shaft and gearbox stub shaft - to enable correct fitting.

*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.



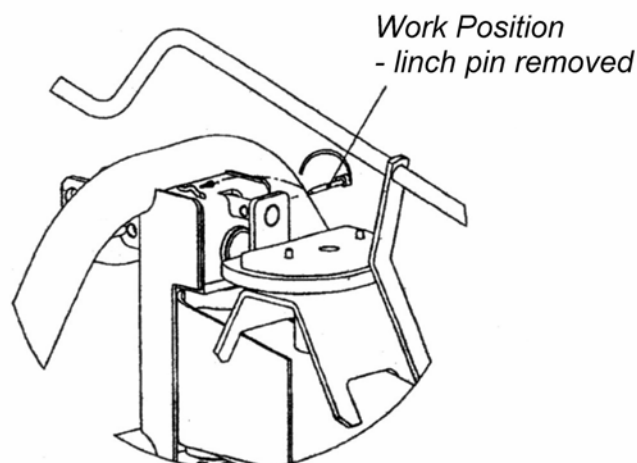
Transport speed should be adjusted to suit road conditions but under no circumstances should it ever exceed 25 km/h.

## 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.

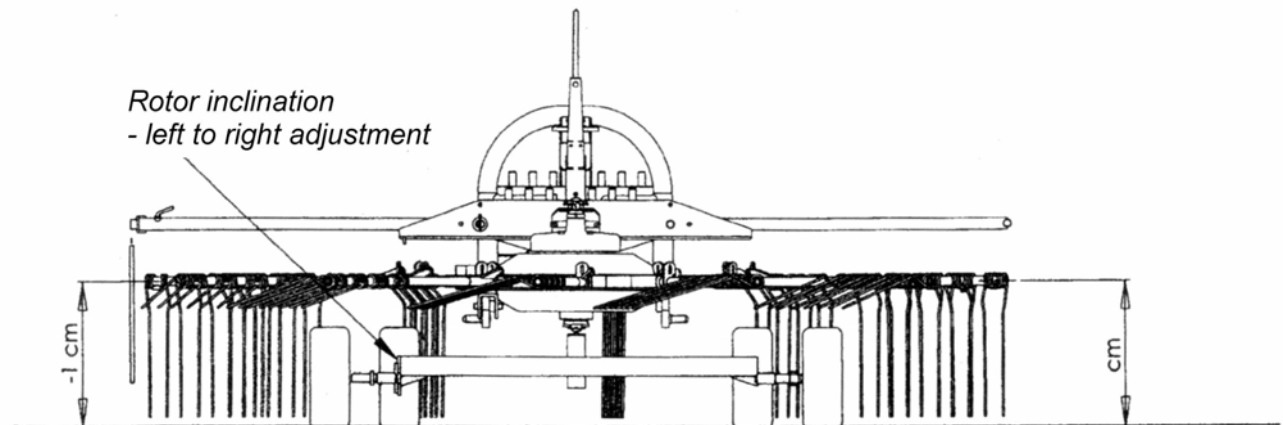


## WORKING WITH THE MACHINE

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*.



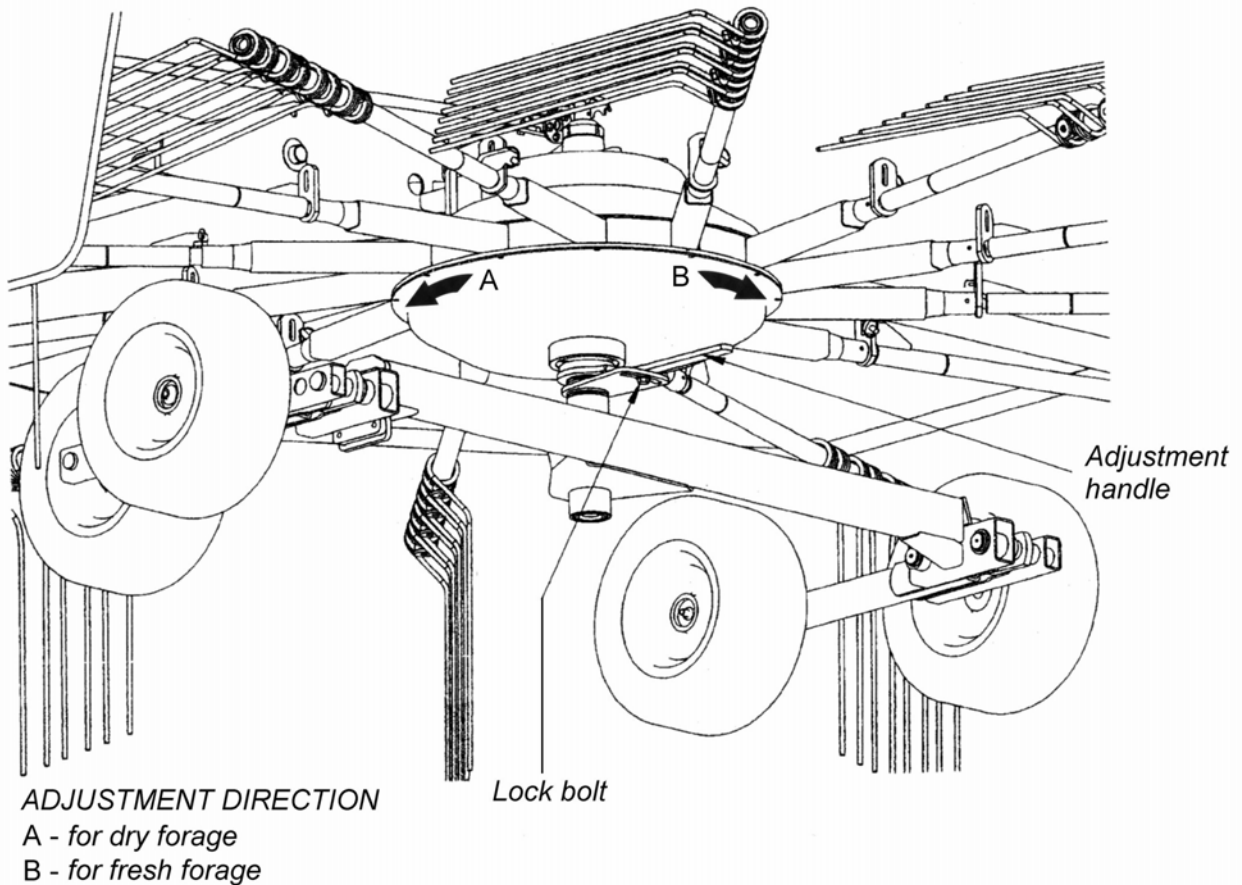
Ensure that the spring tines do not 'dig' into the soil during work as this may damage the tines and/or pollute the forage.

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.*

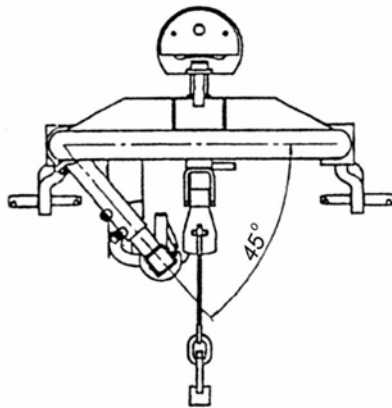
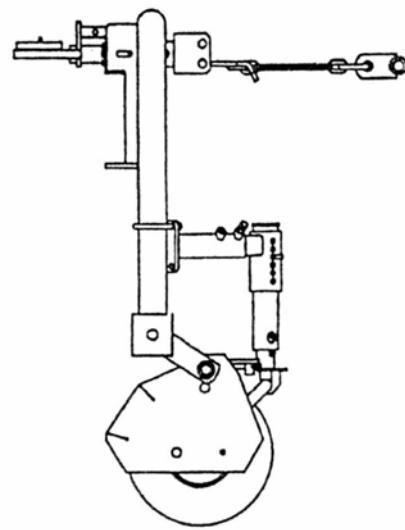
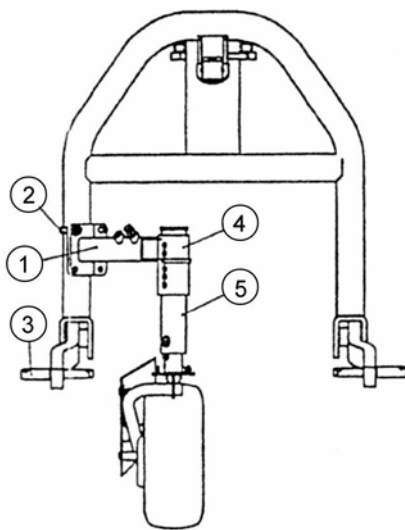


### ADDITIONAL EQUIPMENT

#### 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

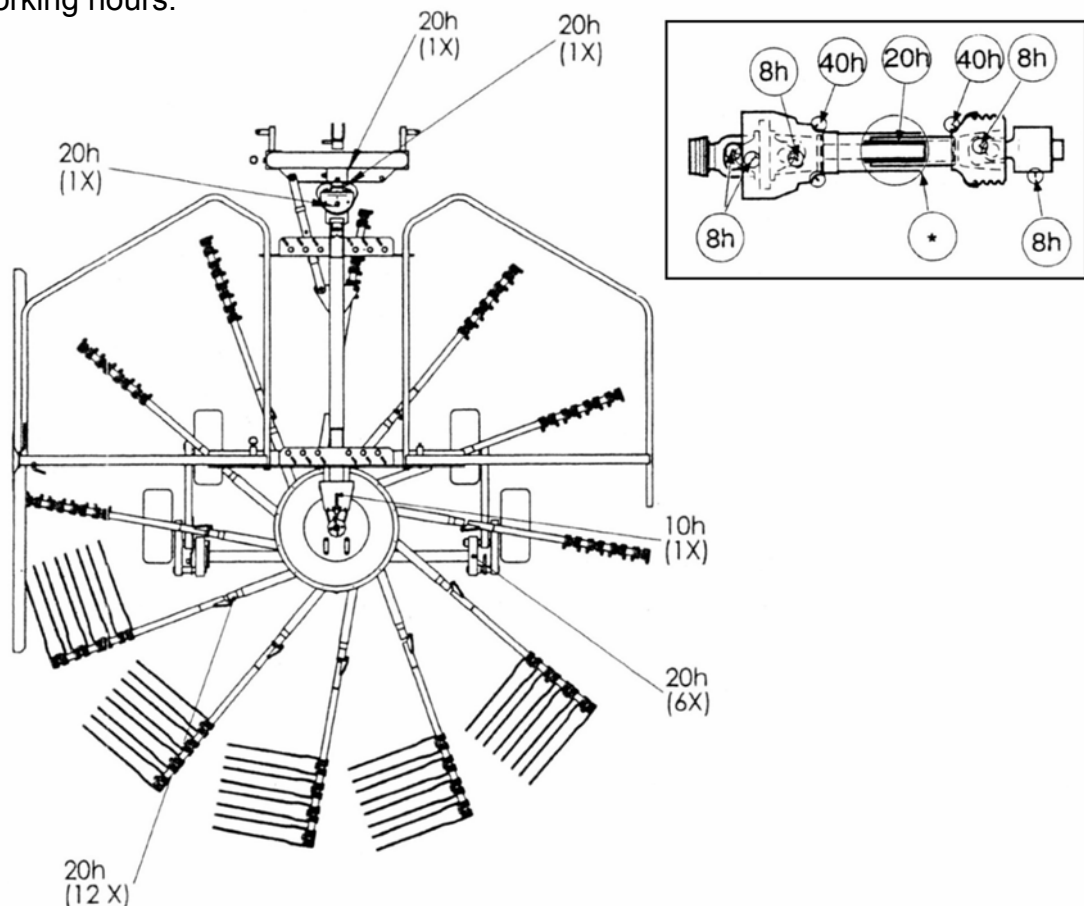
The bearings in the wheels, rotor, and gearbox are all factory sealed and maintenance free therefore they will not require additional lubrication.

### Rotor

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

### Lubrication Points

Refer to the diagram below for the location of the lubrication points and the frequency of lubrication in working hours:

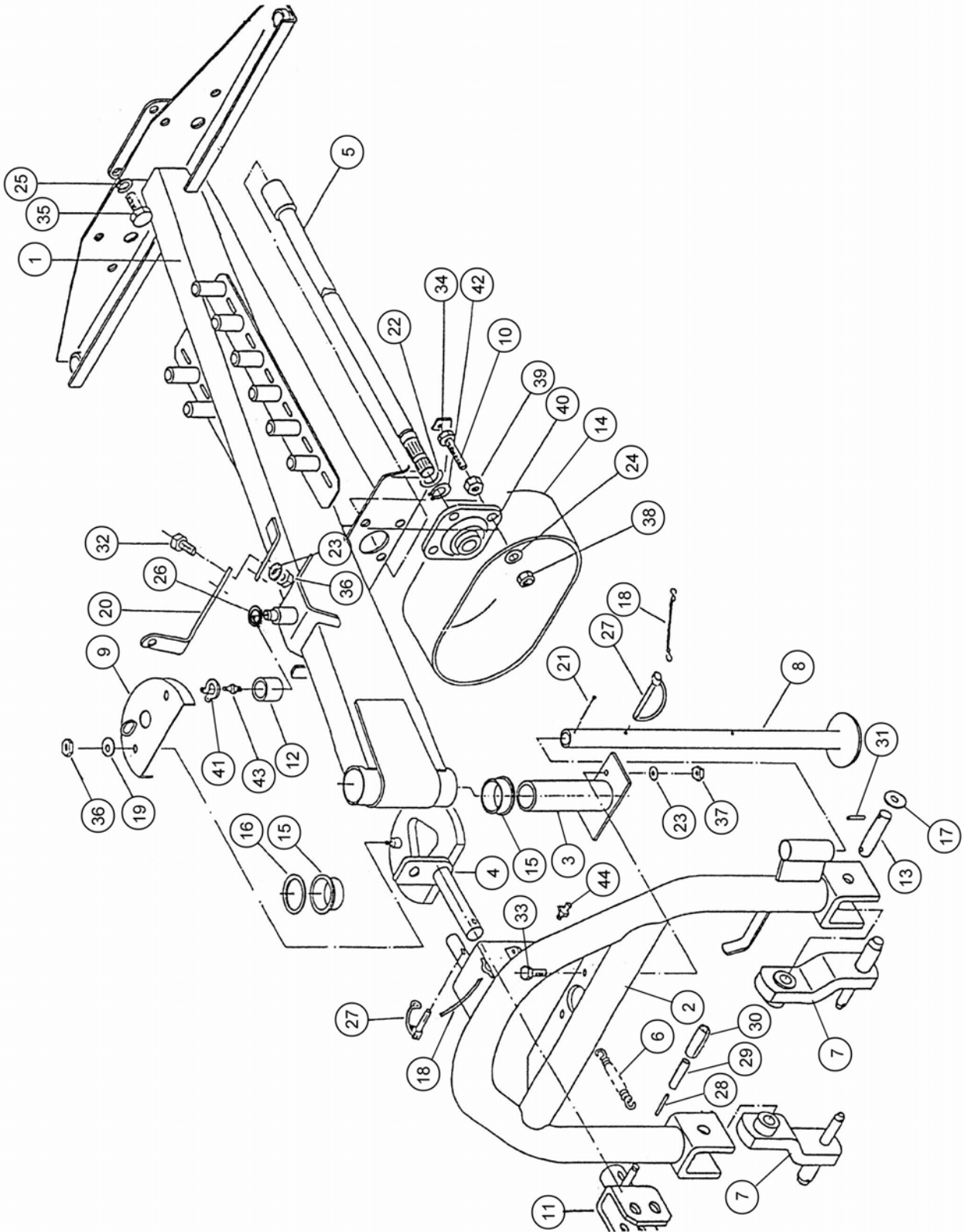


It is recommended that the machine is cleaned and lubricated prior to storage at which time a thorough check of all components should be made to identify any worn or damaged components so that replacements can be ordered in preparation for the next seasons work.



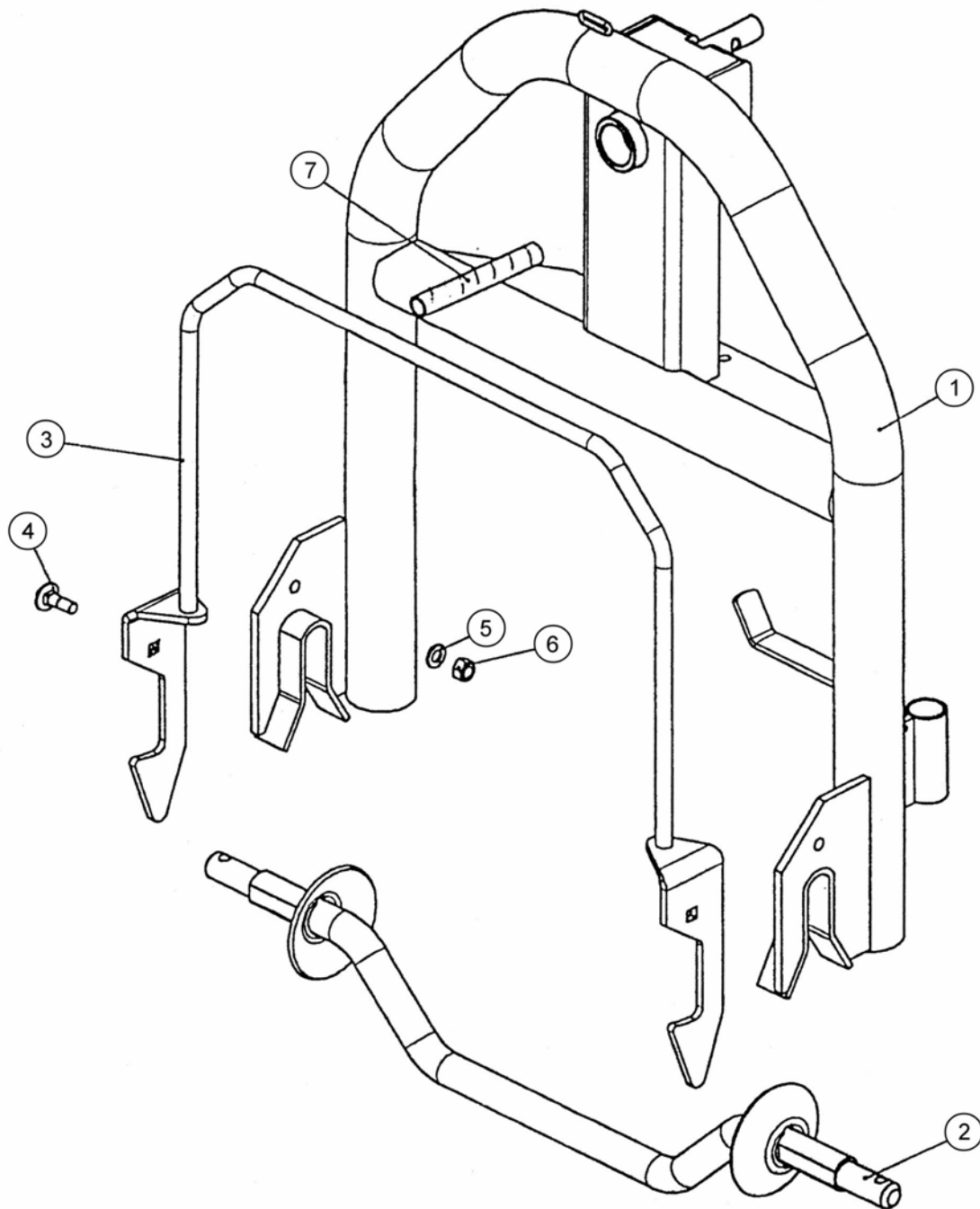
**PARTS SECTION  
RR430 & RR471  
Rotary Rakes**

## RR430 MAIN FRAME



| REF. | QTY. | PART No. | DESCRIPTION                        |
|------|------|----------|------------------------------------|
|      |      |          | <b>RR430 - MAIN FRAME ASSEMBLY</b> |
| 1    | 1    | 1021200  | HOLDER                             |
| 2    | 1    | 1021201  | BOW                                |
| 3    | 1    | 1021276  | SHAFT                              |
| 4    | 1    | 1021049  | CURVE                              |
| 5    | 1    | 1021202  | SHAFT                              |
| 6    | 1    | 1021308  | SPRING                             |
| 7    | 2    | 1021203  | BOLT                               |
| 8    | 1    | 1021056  | SUPPORT LEG                        |
| 9    | 1    | 1021069  | PROTECTION                         |
| 10   | 1    | 1021052  | BOLT                               |
| 11   | 1    | 1021053  | EYE                                |
| 12   | 1    | 1021061  | SLEEVE                             |
| 13   | 2    | 1021058  | BOLT                               |
| 14   | 1    | 1021204  | PTO SHAFT PROTECTION               |
| 15   | 2    | 1021205  | PLASTIC SLEEVE                     |
| 16   | 1    | 1021104  | WASHER                             |
| 17   | 4    | 1021057  | WASHER                             |
| 18   | 2    | 1021081  | PLASTIC STRING                     |
| 19   | 2    | 1021099  | WASHER                             |
| 20   | 1    | 1021149  | HOLDER                             |
| 21   | 1    | 1021079  | COTTER                             |
| 22   | 6    | 1021206  | WASHER                             |
| 23   | 4    | 1021067  | WASHER                             |
| 24   | 4    | 1021100  | WASHER                             |
| 25   | 4    | 1021072  | WASHER                             |
| 26   | 1    | 1021082  | WASHER                             |
| 27   | 2    | 1021060  | SAFETY PIN                         |
| 28   | 2    | 1021077  | SAFETY PIN                         |
| 29   | 2    | 1021076  | SAFETY PIN                         |
| 30   | 2    | 1021075  | SAFETY PIN                         |
| 31   | 4    | 1021059  | SAFETY PIN                         |
| 32   | 2    | 9313055  | SCREW                              |
| 33   | 2    | 9313065  | SCREW                              |
| 34   | 4    | 1021207  | SCREW                              |
| 35   | 4    | 9313077  | SCREW                              |
| 36   | 2    | 1021173  | NUT                                |
| 37   | 2    | 9113005  | NUT                                |
| 38   | 4    | 1021178  | NUT                                |
| 39   | 8    | 1021169  | NUT                                |
| 40   | 1    | 1021003  | BEARING                            |
| 41   | 1    | 1021062  | CIRCLIP                            |
| 42   | 1    | 1021080  | CIRCLIP                            |
| 43   | 1    | 1021063  | GREASE NIPPLE                      |
| 44   | 2    | 1021034  | GREASE NIPPLE                      |

## RR430 BOW FRAME ASSEMBLY

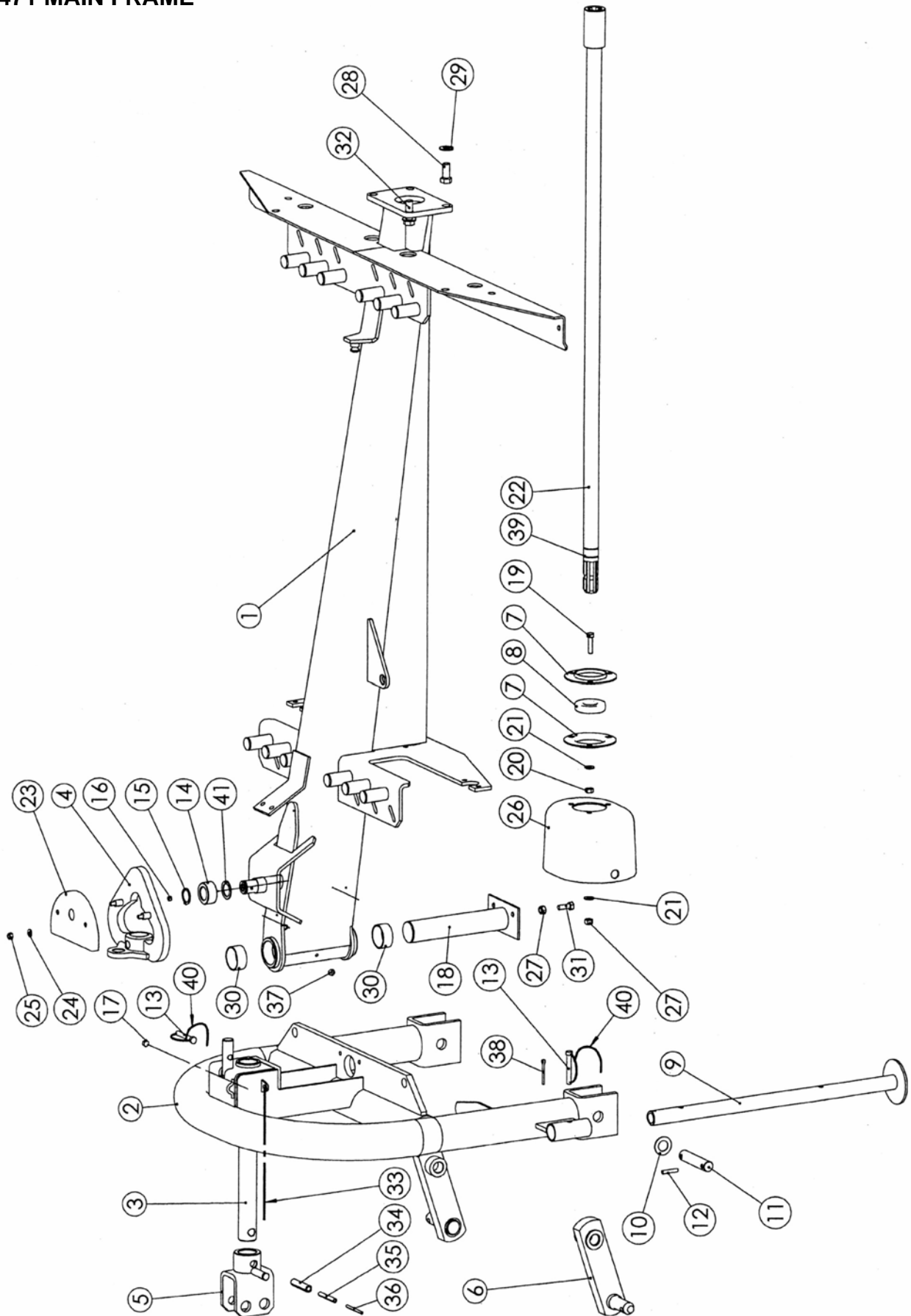




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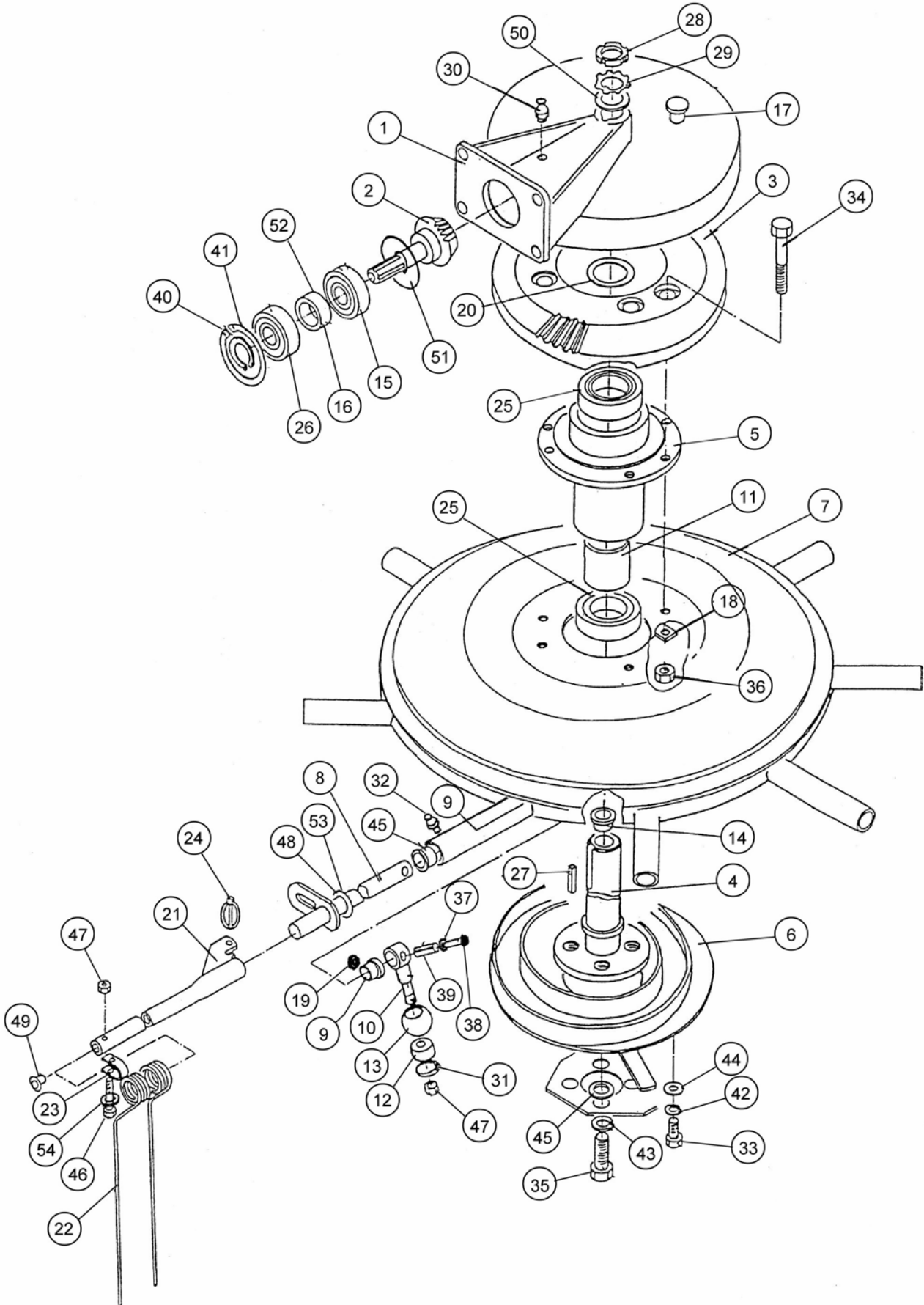
| REF. | QTY. | PART No. | DESCRIPTION                       |
|------|------|----------|-----------------------------------|
|      |      |          | <b>RR430 - BOW FRAME ASSEMBLY</b> |
| 1    | 1    | 1021600  | BOW                               |
| 2    | 1    | 1021601  | LINK                              |
| 3    | 1    | 1021602  | HOLDER                            |
| 4    | 2    | 1021603  | SCREW                             |
| 5    | 2    | 1021604  | WASHER                            |
| 6    | 2    | 1021178  | NUT                               |
| 7    | 1    | 1021605  | SPRING                            |

## RR471 MAIN FRAME



| REF. | QTY. | PART No. | DESCRIPTION                        |
|------|------|----------|------------------------------------|
|      |      |          | <b>RR471 - MAIN FRAME ASSEMBLY</b> |
| 1    | 1    | 1021050  | HOLDER                             |
| 2    | 1    | 1021051  | HEADSTOCK                          |
| 3    | 1    | 1021052  | BOLT                               |
| 4    | 1    | 1021049  | CURVE                              |
| 5    | 1    | 1021053  | EYE                                |
| 6    | 2    | 1021054  | HITCH FRAME EYE                    |
| 7    | 2    | 1021055  | HOUSING                            |
| 8    | 1    | 1021028  | BEARING                            |
| 9    | 1    | 1021056  | SUPPORT LEG                        |
| 10   | 4    | 1021057  | WASHER                             |
| 11   | 2    | 1021058  | BOLT                               |
| 12   | 4    | 1021059  | SAFETY PIN                         |
| 13   | 2    | 1021060  | SPRING CLIP                        |
| 14   | 1    | 1021061  | SLEEVE                             |
| 15   | 1    | 1021062  | CIRCLIP                            |
| 16   | 1    | 1021063  | GREASE NIPPLE                      |
| 17   | 1    | 1021064  | GREASE NIPPLE                      |
| 18   | 1    | 1021065  | BOLT                               |
| 19   | 3    | 1021066  | SCREW                              |
| 20   | 3    | 1021179  | NUT                                |
| 21   | 6    | 1021067  | WASHER                             |
| 22   | 1    | 1021068  | SHAFT                              |
| 23   | 1    | 1021069  | PROTECTION                         |
| 24   | 2    | 1021070  | WASHER                             |
| 25   | 2    | 1021173  | NUT                                |
| 26   | 1    | 1021071  | PTO SHAFT PROTECTION               |
| 27   | 5    | 9113005  | NUT                                |
| 28   | 2    | 9313077  | SCREW                              |
| 29   | 4    | 1021072  | WASHER                             |
| 30   | 2    | 1021073  | SLEEVE                             |
| 31   | 2    | 9313065  | SCREW                              |
| 32   | 2    | 9313097  | SCREW                              |
| 33   | 1    | 1021074  | SPRING                             |
| 34   | 2    | 1021075  | TENSION PIN                        |
| 35   | 2    | 1021076  | TENSION PIN                        |
| 36   | 2    | 1021077  | TENSION PIN                        |
| 37   | 1    | 1021078  | GREASE NIPPLE                      |
| 38   | 1    | 1021079  | COTTER PIN                         |
| 39   | 2    | 1021080  | CIRCLIP                            |
| 40   | 2    | 1021081  | PLASTIC STRING                     |
| 41   | 1    | 1021082  | WASHER                             |

## RR430 ROTOR & GEARBOX ASSEMBLY

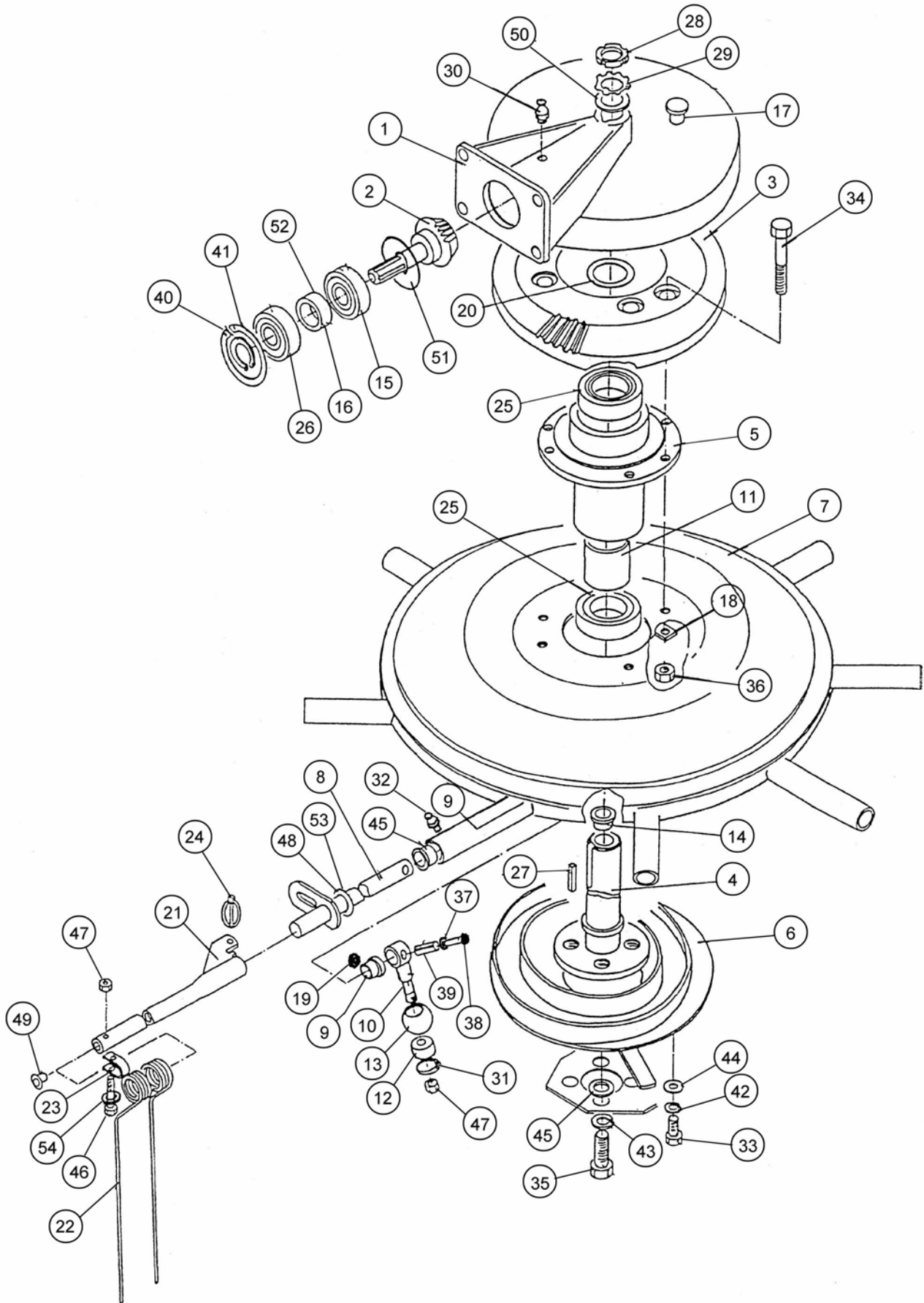




| REF. | QTY. | PART No. | DESCRIPTION                                 |
|------|------|----------|---|
|      |      |          | <b>RR430 - ROTOR &amp; GEARBOX ASSEMBLY</b> |
| 1    | 1    | 1021208  | HOUSING                                     |
| 2    | 1    | 1021030  | PINION                                      |
| 3    | 1    | 1021029  | PINION                                      |
| 4    | 1    | 1021209  | TUBE  |
| 5    | 1    | 1021210  | HOUSING                                     |
| 6    | 1    | 1021211  | CAM   |
| 7    | 1    | 1021212  | ROTOR                                       |
| 8    | 12   | 1021213  | BAR   |
| 9    | 12   | 1021214  | SLEEVE                                      |
| 10   | 12   | 1021215  | HANDLE                                      |
| 11   | 1    | 1021128  | SLEEVE                                      |
| 12   | 12   | 1021007  | BEARING                                     |
| 13   | 12   | 1021111  | ROLLER                                      |
| 14   | 2    | 1021216  | SLEEVE                                      |
| 15   | 1    | 1021025  | BEARING                                     |
| 16   | 1    | 1021217  | SLEEVE                                      |
| 17   | 4    | 1021125  | PLUG  |
| 18   | 3    | 1021096  | BAND  |
| 19   | 12   | 9113003  | NUT   |
| 20   | 3    | 1021008  | WASHER                                      |
| 21   | 12   | 1021218  | SPRING TINE ARM                             |
| 22   | 48   | 1021019  | SPRING TINE                                 |
| 23   | 48   | 1021010  | PLATE                                       |
| 24   | 12   | 1021131  | PIN   |
| 25   | 2    | 1021022  | BEARING                                     |
| 26   | 1    | 1021023  | BEARING                                     |
| 27   | 2    | 1021219  | COTTER                                      |
| 28   | 1    | 1021220  | NUT   |
| 29   | 1    | 1021221  | WASHER                                      |
| 30   | 2    | 1021222  | LUBRICATOR                                  |
| 31   | 12   | 1021112  | CIRCLIP                                     |
| 32   | 12   | 1021064  | LUBRICATOR                                  |
| 33   | 1    | 9313045  | SCREW                                       |
| 34   | 6    | 1021223  | SCREW                                       |
| 35   | 4    | 9313067  | SCREW                                       |
| 36   | 6    | 1021224  | NUT   |
| 37   | 24   | 1021148  | WASHER                                      |
| 38   | 12   | 1021225  | SCREW                                       |
| 39   | 12   | 1021021  | PIN   |
| 40   | 1    | 1021080  | CIRCLIP                                     |

*continued*

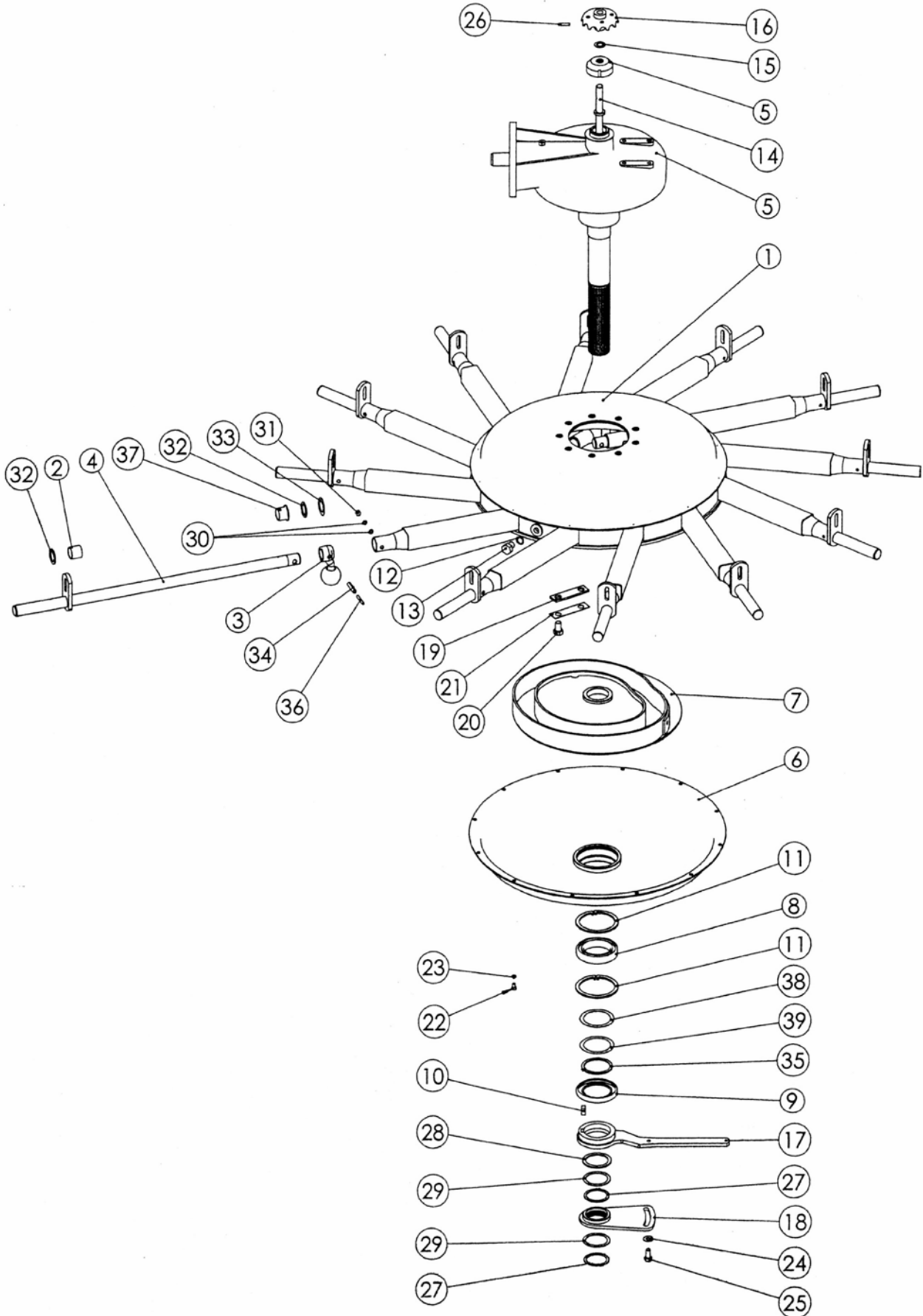
## RR430 ROTOR & GEARBOX ASSEMBLY (Continued)



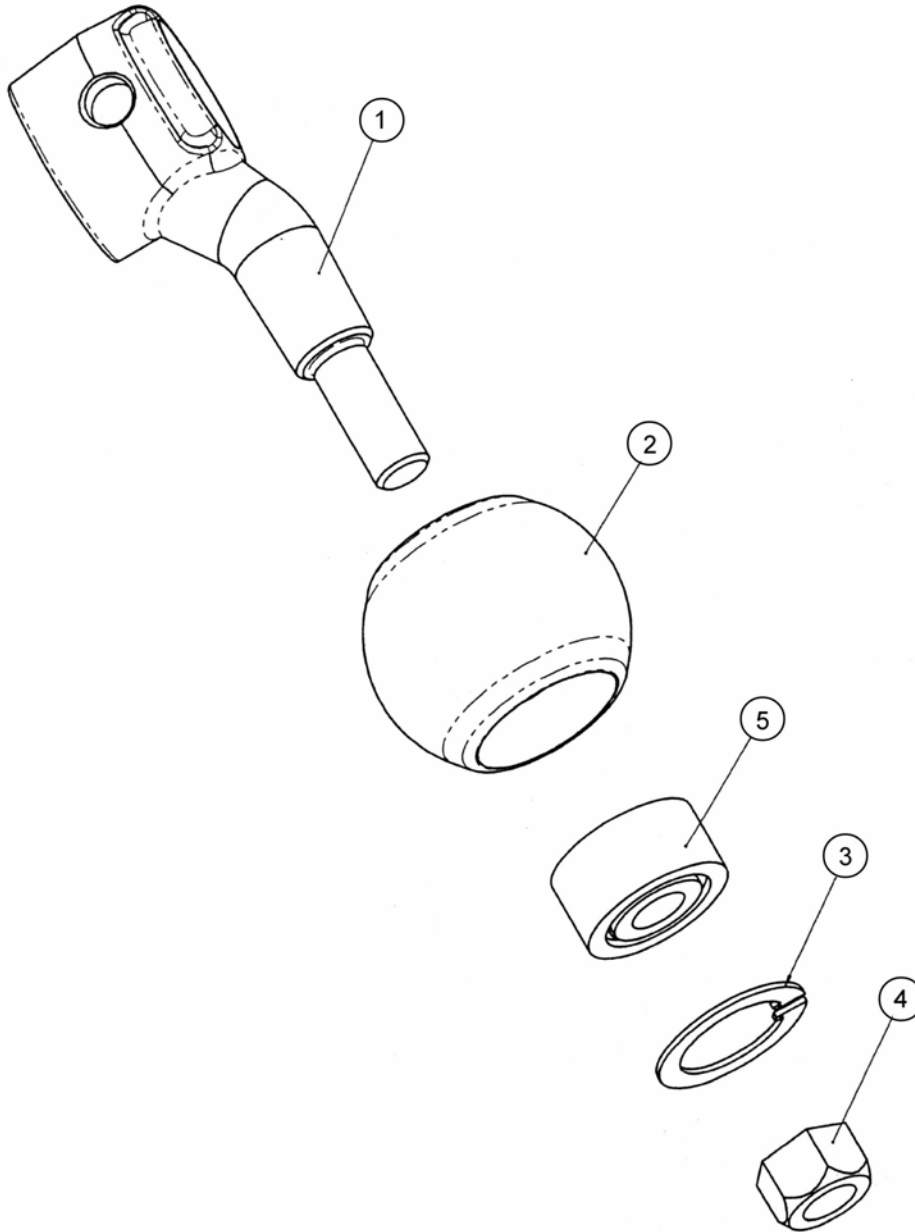
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| REF. | QTY. | PART No. | DESCRIPTION                                 |
|------|------|----------|---|
|      |      |          | <b>RR430 - ROTOR &amp; GEARBOX ASSEMBLY</b> |
| 41   | 1    | 1021126  | CIRCLIP                                     |
| 42   | 1    | 1021226  | WASHER                                      |
| 43   | 4    | 1021072  | WASHER                                      |
| 44   | 1    | 1021067  | WASHER                                      |
| 45   | 12   | 1021229  | SLEEVE                                      |
| 46   | 48   | 9313146  | SCREW                                       |
| 47   | 12   | 1021178  | NUT   |
| 48   | 12   | 1021227  | WASHER                                      |
| 49   | 12   | 1021132  | PLUG  |
| 50   | 1    | 1021228  | WASHER                                      |
| 51   | 1    | 1021124  | WASHER SET                                  |
| 52   | 1    | 1021115  | WASHER                                      |
| 53   | 12   | 1021106  | WASHER                                      |
| 54   | 48   | 1021130  | WASHER                                      |

## RR471 ROTOR & GEARBOX ASSEMBLY

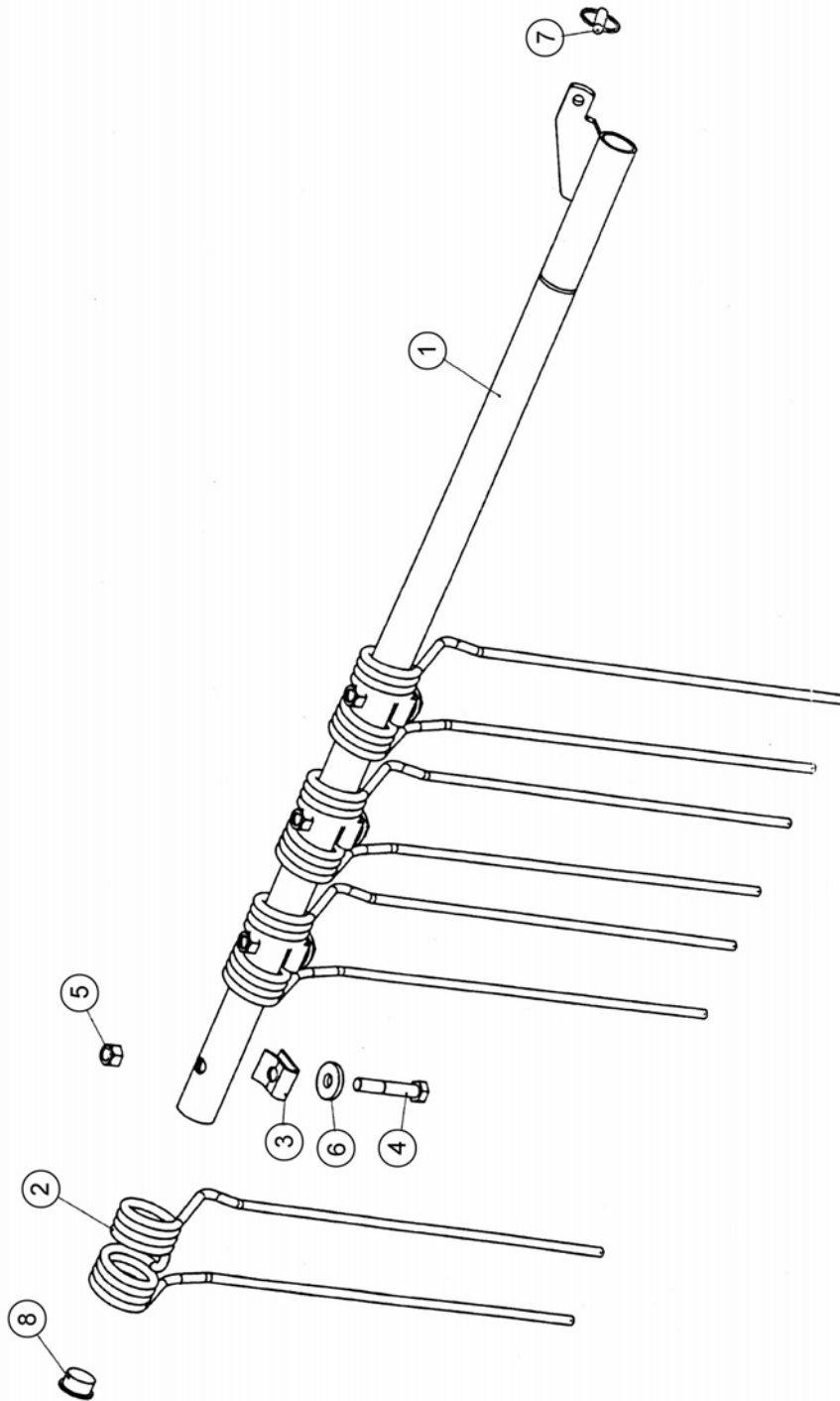


| REF. | QTY. | PART No. | DESCRIPTION                                 |
|------|------|----------|---|
|      |      |          | <b>RR471 - ROTOR &amp; GEARBOX ASSEMBLY</b> |
| 1    | 1    | 1021032  | ROTOR                                       |
| 2    | 12   | 1021026  | SLEEVE                                      |
| 3    | 12   | 1021083  | STEERING ARM WITH SPHERE CPL.               |
| 4    | 12   | 1021035  | BAR   |
| 5    | 1    | 1021084  | GEARBOX CPL.                                |
| 6    | 1    | 1021033  | RESERVOIR                                   |
| 7    | 1    | 1021085  | CAM   |
| 8    | 1    | 1021086  | BEARING                                     |
| 9    | 1    | 1021087  | OIL SEAL                                    |
| 10   | 1    | 1021088  | COTTER                                      |
| 11   | 2    | 1021089  | CIRCLIP                                     |
| 12   | 1    | 1021090  | GASKET                                      |
| 13   | 1    | 1021091  | SCREW                                       |
| 14   | 1    | 1021039  | SPINDLE                                     |
| 15   | 1    | 1021092  | WASHER                                      |
| 16   | 1    | 1021093  | GEAR  |
| 17   | 1    | 1021094  | ADJUSTING LEVER                             |
| 18   | 1    | 1021095  | ADJUSTING PLATE                             |
| 19   | 3    | 1021096  | BAND  |
| 20   | 6    | 1021097  | SCREW                                       |
| 21   | 3    | 1021098  | BAND  |
| 22   | 12   | 9313024  | SCREW                                       |
| 23   | 12   | 1021099  | WASHER                                      |
| 24   | 1    | 1021100  | WASHER                                      |
| 25   | 1    | 9313056  | SCREW                                       |
| 26   | 1    | 1021101  | TENSION PIN                                 |
| 27   | 2    | 1021102  | CIRCLIP                                     |
| 28   | 1    | 1021103  | WASHER                                      |
| 29   | 2    | 1021104  | WASHER                                      |
| 30   | 36   | 1021105  | GASKET                                      |
| 31   | 12   | 1021064  | GREASE NIPPLE                               |
| 32   | 12   | 1021082  | WASHER                                      |
| 33   | 12   | 1021106  | WASHER                                      |
| 34   | 12   | 1021020  | TENSION PIN                                 |
| 35   | 1    | 1021107  | CIRCLIP                                     |
| 36   | 12   | 1021021  | TENSION PIN                                 |
| 37   | 12   | 1021108  | SLEEVE                                      |
| 38   | 2    | 1021109  | WASHER                                      |
| 39   | 1    | 1021110  | WASHER                                      |

**RR471 STEERING ARM & SPHERE ASSEMBLY**

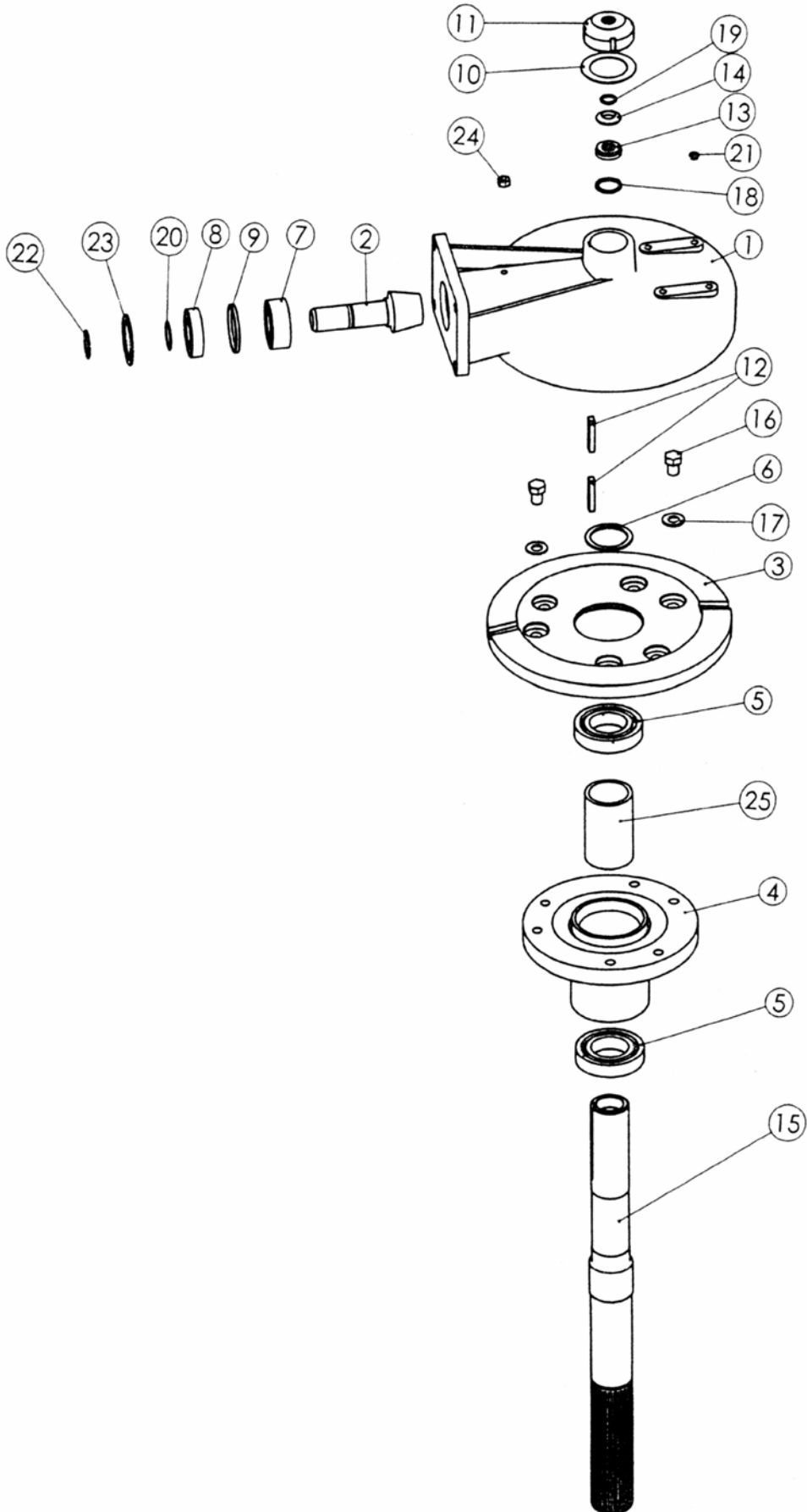
| REF. | QTY. | PART No. | DESCRIPTION                                       |
|------|------|----------|---|
|      |      |          | <b>RR471 - STEERING ARM &amp; SPHERE ASSEMBLY</b> |
| 1    | 1    | 1021036  | LEVER   |
| 2    | 1    | 1021111  | SPHERE  |
| 3    | 1    | 1021112  | CIRCLIP   |
| 4    | 1    | 1021178  | NUT   |
| 5    | 1    | 1021007  | BEARING   |

**RR471 SPRING TINE BAR ASSEMBLY**



| REF. | QTY. | PART No. | DESCRIPTION                             |
|------|------|----------|---|
|      |      |          | <b>RR471 - SPRING TINE BAR ASSEMBLY</b> |
| 1    | 1    | 1021038  | SPRING TINE HOLDER                      |
| 2    | 4    | 1021031  | SPRING TINE                             |
| 3    | 4    | 1021129  | CLIP                                    |
| 4    | 4    | 9313146  | SCREW                                   |
| 5    | 4    | 1021178  | NUT                                     |
| 6    | 4    | 1021130  | WASHER                                  |
| 7    | 1    | 1021131  | LINCH PIN                               |
| 8    | 1    | 1021132  | PLASTIC PLUG - INNER                    |

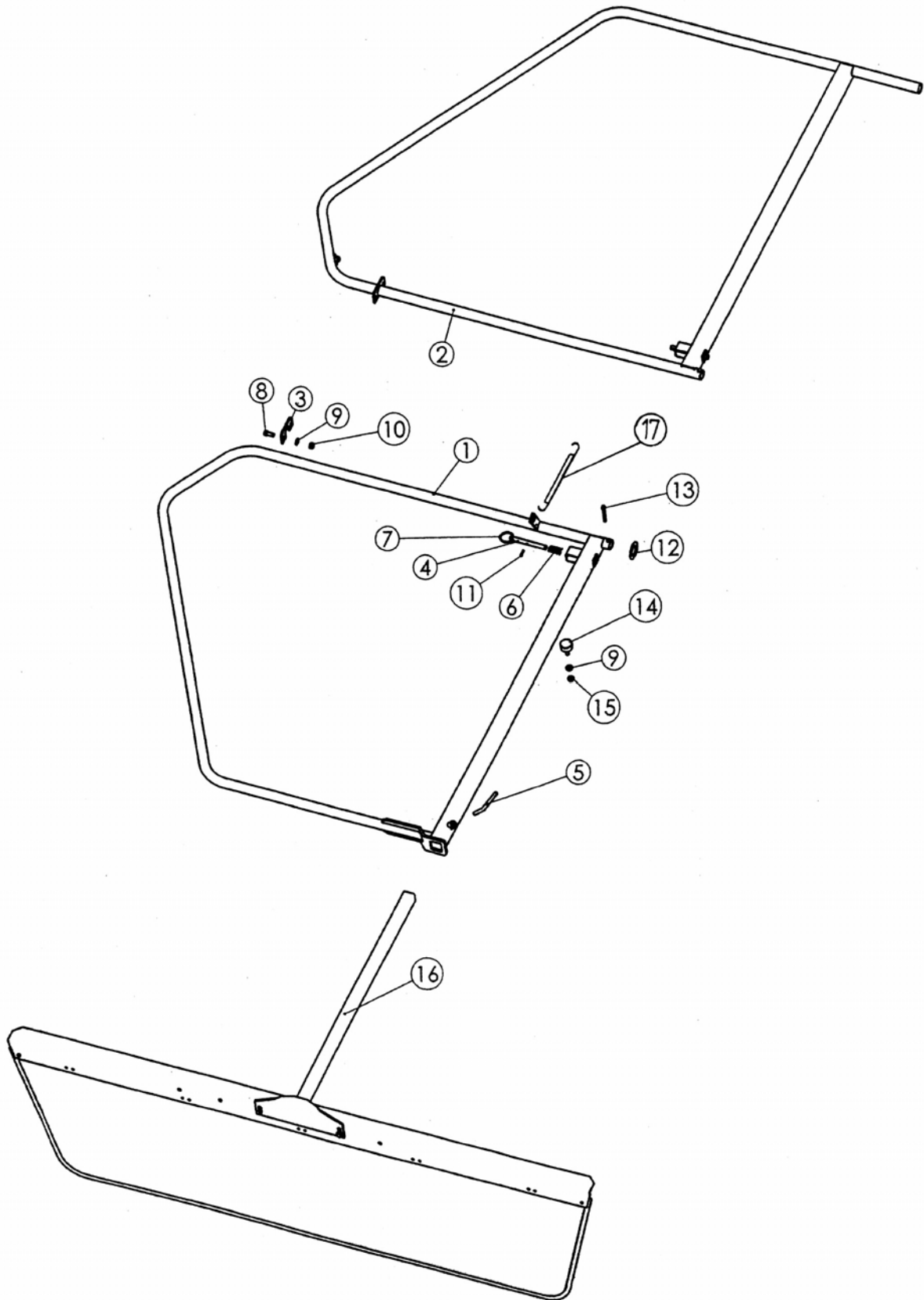
## RR471 GEARBOX ASSEMBLY





| REF. | QTY. | PART No. | DESCRIPTION                     |
|------|------|----------|---------------------------------|
|      |      |          | <b>RR471 - GEARBOX ASSEMBLY</b> |
| 1    | 1    | 1021113  | HOUSING                         |
| 2    | 1    | 1021030  | PINION                          |
| 3    | 1    | 1021029  | PINION                          |
| 4    | 1    | 1021114  | HOUSING                         |
| 5    | 2    | 1021022  | BEARING                         |
| 6    | 1    | 1021008  | WASHER SET                      |
| 7    | 1    | 1021025  | BEARING                         |
| 8    | 1    | 1021023  | BEARING                         |
| 9    | 1    | 1021115  | WASHER                          |
| 10   | 1    | 1021116  | PROTECTION WASHER               |
| 11   | 1    | 1021117  | NUT                             |
| 12   | 2    | 1021118  | KEY                             |
| 13   | 1    | 1021119  | AXLE BEARING CPL.               |
| 14   | 1    | 1021120  | SPHERE WASHER                   |
| 15   | 1    | 1021034  | SHAFT                           |
| 16   | 6    | 1021121  | SCREW                           |
| 17   | 6    | 1021072  | WASHER                          |
| 18   | 1    | 1021122  | WASHER                          |
| 19   | 1    | 1021123  | O RING                          |
| 20   | 1    | 1021124  | WASHER SET                      |
| 21   | 4    | 1021125  | PLUG                            |
| 22   | 1    | 1021080  | CIRCLIP                         |
| 23   | 1    | 1021126  | CIRCLIP                         |
| 24   | 1    | 1021127  | LUBRICATOR                      |
| 25   | 1    | 1021128  | SLEEVE                          |

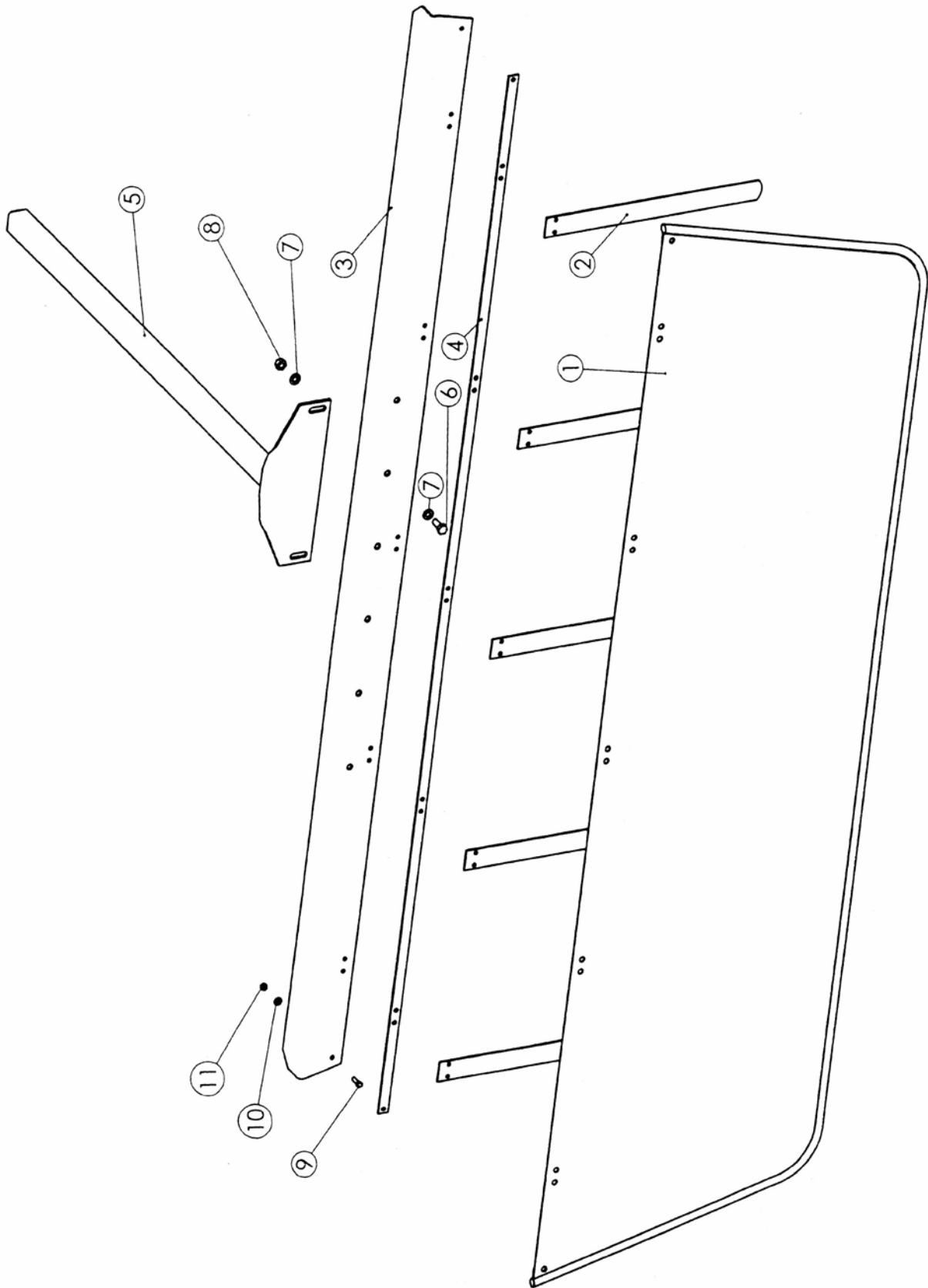
## RR430 & RR471 CURTAIN & PROTECTION RAILS ASSEMBLY



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| REF. | QTY. | PART No. | DESCRIPTION  |
|------|------|----------|--|
|      |      |          | <b>RR430 &amp; RR471 - CURTAIN &amp; PROTECTION RAIL</b> |
| 1    | 1    | 1021198  | L/H PROTECTION - <i>RR430 Models</i>                     |
|      | 1    | 1021133  | L/H PROTECTION - <i>RR471 Models</i>                     |
| 2    | 1    | 1021199  | R/H PROTECTION - <i>RR430 Models</i>                     |
|      | 1    | 1021134  | R/H PROTECTION - <i>RR471 Models</i>                     |
| 3    | 2    | 1021135  | STRAP  |
| 4    | 2    | 1021136  | BOLT   |
| 5    | 1    | 1021137  | SCREW  |
| 6    | 2    | 1021138  | SPRING   |
| 7    | 2    | 1021139  | KARABINER  |
| 8    | 4    | 9313055  | SCREW  |
| 9    | 8    | 1021067  | WASHER   |
| 10   | 4    | 9113005  | NUT  |
| 11   | 2    | 1021140  | TENSION PIN  |
| 12   | 4    | 1021141  | WASHER   |
| 13   | 2    | 1021142  | COTTER PIN   |
| 14   | 2    | 1021143  | REFLECTOR TIP  |
| 15   | 2    | 1021179  | NUT  |
| 16   | 1    | 1021144  | SWATH CURTAIN  |
| 17   | 1    | 1021145  | SPRING   |

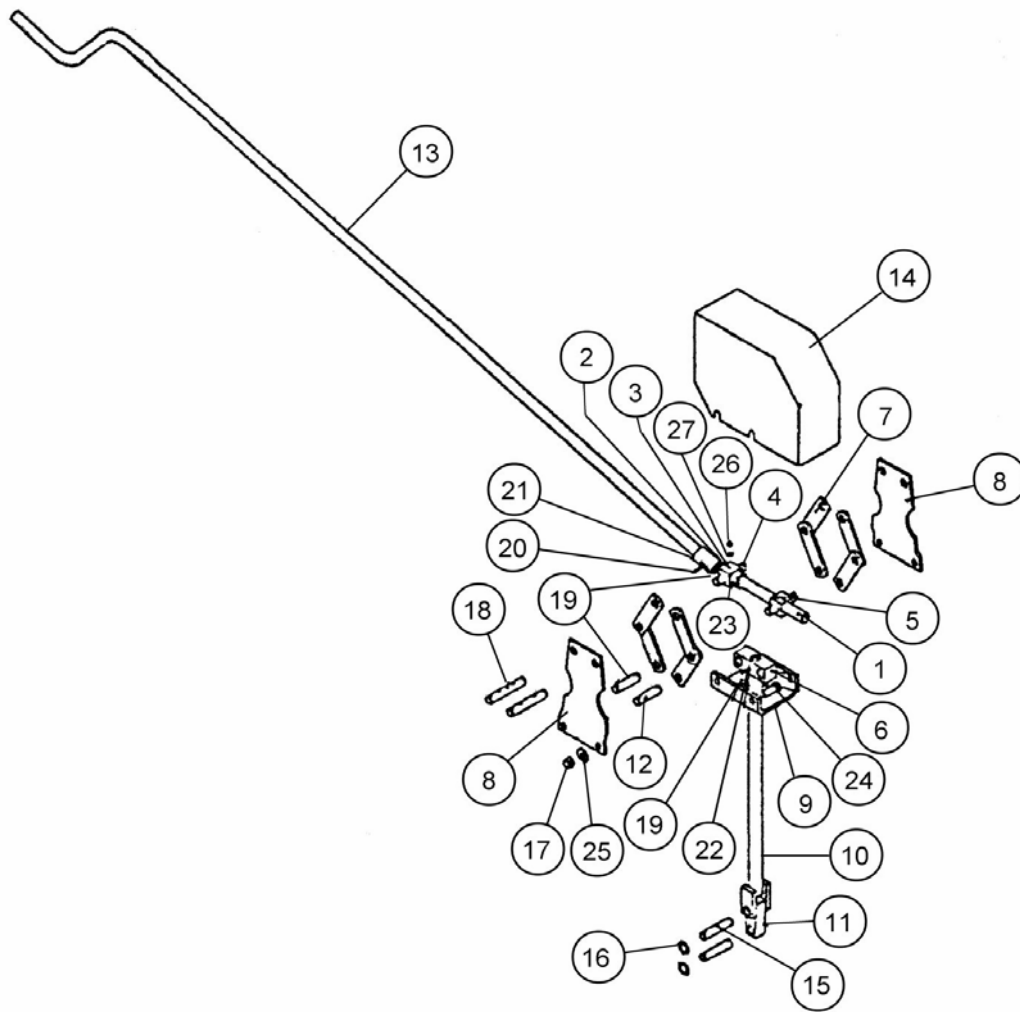
## RR430 & RR471 CURTAIN ASSEMBLY



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| REF. | QTY. | PART No. | DESCRIPTION                                 |
|------|------|----------|---|
|      |      |          | <b>RR430 &amp; RR471 - CURTAIN ASSEMBLY</b> |
| 1    | 1    | 1021046  | CURTAIN                                     |
| 2    | 5    | 1021045  | SPRING                                      |
| 3    | 1    | 1021044  | CURTAIN HOLDER                              |
| 4    | 1    | 1021146  | LINK  |
| 5    | 1    | 1021043  | CURTAIN HOLDER                              |
| 6    | 2    | 9313055  | SCREW                                       |
| 7    | 4    | 1021147  | WASHER                                      |
| 8    | 2    | 9113005  | NUT   |
| 9    | 12   | 9313043  | SCREW                                       |
| 10   | 12   | 1021148  | WASHER                                      |
| 11   | 12   | 9113003  | NUT   |

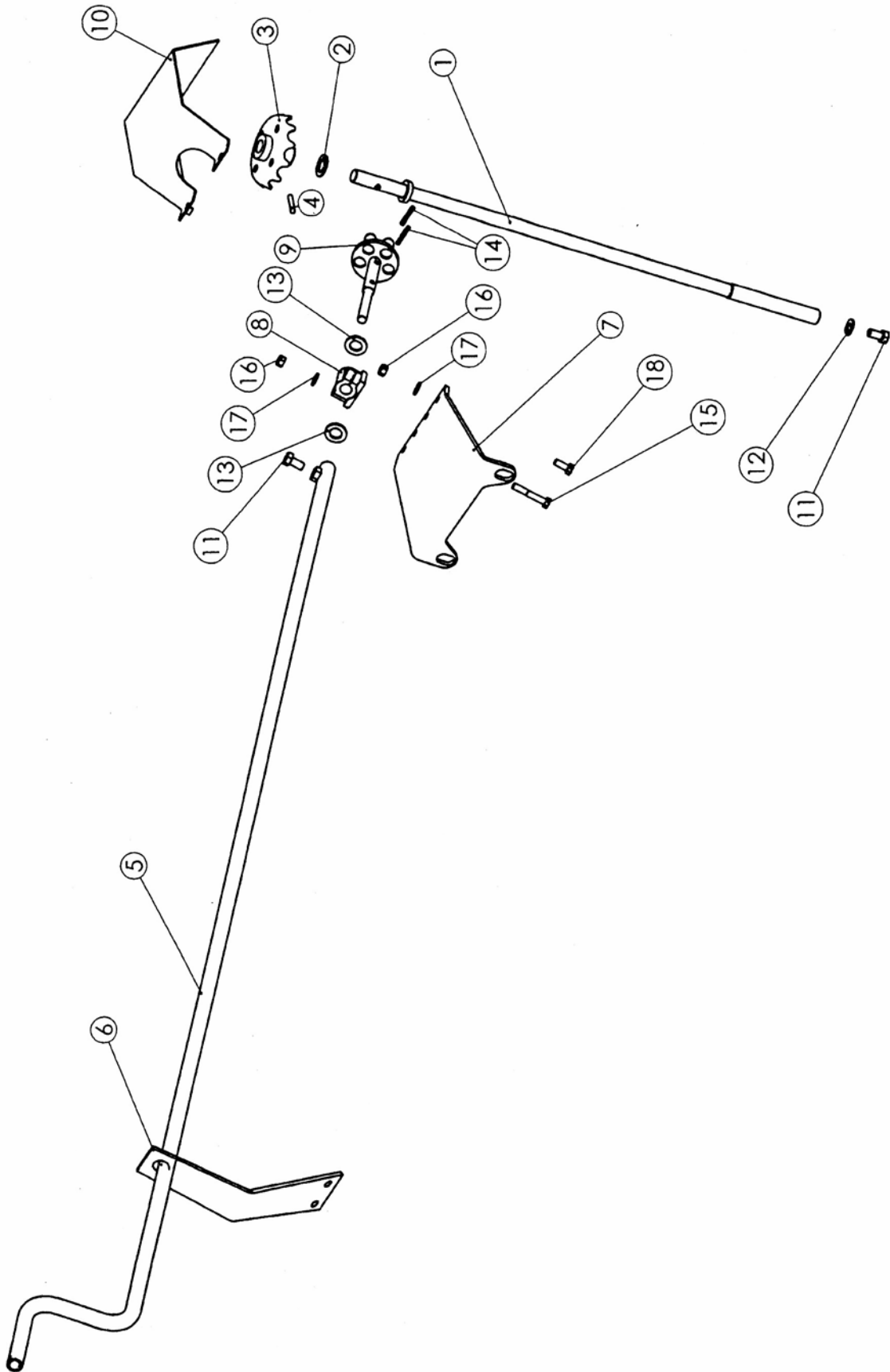
## RR430 HEIGHT ADJUSTMENT ASSEMBLY



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| REF. | QTY. | PART No. | DESCRIPTION                               |
|------|------|----------|---|
|      |      |          | <b>RR430 - HEIGHT ADJUSTMENT ASSEMBLY</b> |
| 1    | 1    | 1021571  | SPINDLE c/w GUIDE                         |
| 2    | 1    | 1021572  | WASHER                                    |
| 3    | 1    | 1021573  | GUIDE                                     |
| 4    | 1    | 1021574  | SLEEVE                                    |
| 5    | 1    | 1021575  | TURNBUCKLE                                |
| 6    | 1    | 1021576  | TIEPIECE                                  |
| 7    | 8    | 1021577  | TIEPIECE                                  |
| 8    | 2    | 1021578  | BRACKET                                   |
| 9    | 1    | 1021579  | SUPPORT                                   |
| 10   | 1    | 1021580  | BAR                                       |
| 11   | 1    | 1021581  | BAR                                       |
| 12   | 2    | 1021582  | BOLT                                      |
| 13   | 1    | 1021583  | WINCH                                     |
| 14   | 1    | 1021584  | CAP                                       |
| 15   | 2    | 1021585  | BOLT                                      |
| 16   | 6    | 1021586  | WASHER                                    |
| 17   | 4    | 1021178  | NUT                                       |
| 18   | 2    | 1021587  | BOLT                                      |
| 19   | 21   | 1021588  | TENSION PIN                               |
| 20   | 1    | 1021589  | TENSION PIN                               |
| 21   | 1    | 1021590  | TENSION PIN                               |
| 22   | 1    | 1021591  | TENSION PIN                               |
| 23   | 1    | 1021592  | TENSION PIN                               |
| 24   | 4    | 9313066  | SCREW                                     |
| 25   | 4    | 1021100  | WASHER                                    |
| 26   | 2    | 1021593  | WASHER                                    |
| 27   | 1    | 1021594  | GREASE NIPPLE                             |

## RR471 HEIGHT ADJUSTMENT ASSEMBLY

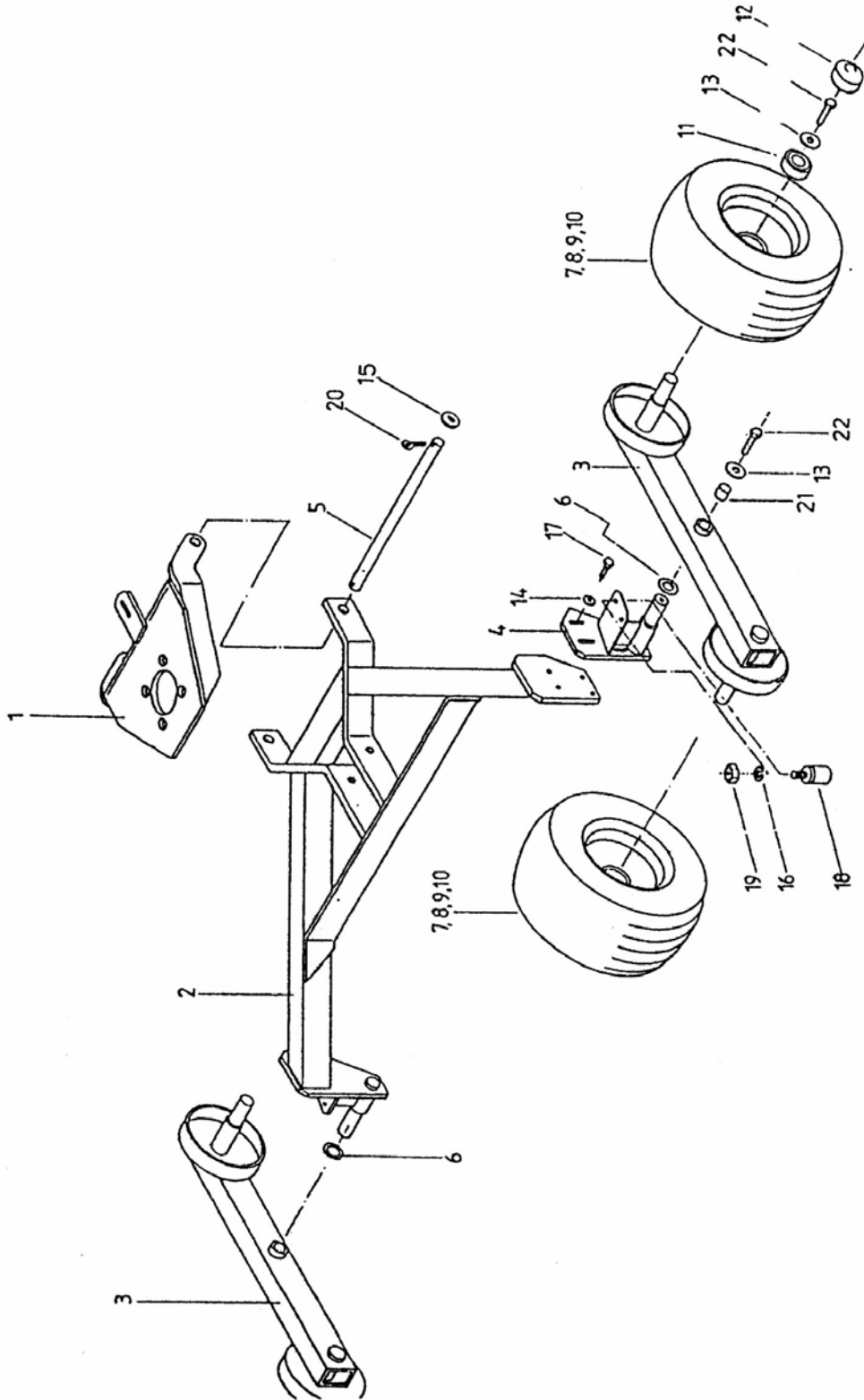




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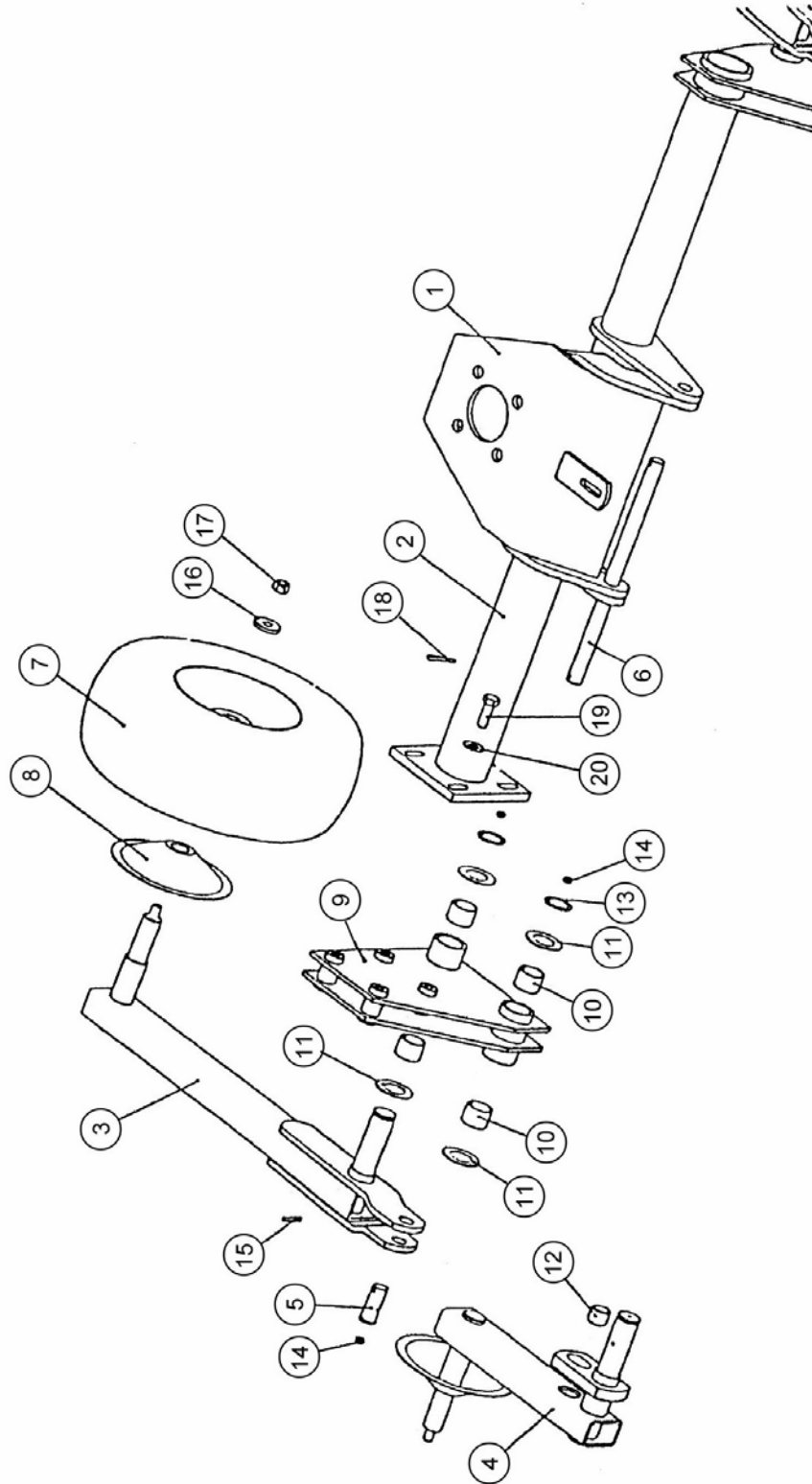
| REF. | QTY. | PART No. | DESCRIPTION                               |
|------|------|----------|---|
|      |      |          | <b>RR471 - HEIGHT ADJUSTMENT ASSEMBLY</b> |
| 1    | 1    | 1021039  | SPINDLE                                   |
| 2    | 1    | 1021092  | WASHER                                    |
| 3    | 1    | 1021093  | GEAR                                      |
| 4    | 1    | 1021101  | TENSION PIN                               |
| 5    | 1    | 1021047  | HANDLE                                    |
| 6    | 1    | 1021149  | HOLDER                                    |
| 7    | 1    | 1021150  | HOLDER                                    |
| 8    | 1    | 1021040  | BEARING PVC                               |
| 9    | 1    | 1021151  | GEAR                                      |
| 10   | 1    | 1021152  | CAP                                       |
| 11   | 2    | 9313045  | SCREW                                     |
| 12   | 3    | 1021067  | WASHER                                    |
| 13   | 3    | 1021153  | WASHER                                    |
| 14   | 2    | 1021154  | TENSION PIN                               |
| 15   | 2    | 1021155  | SCREW                                     |
| 16   | 4    | 1021173  | NUT                                       |
| 17   | 4    | 1021070  | WASHER                                    |
| 18   | 2    | 9313054  | SCREW                                     |

## RR430 WHEEL & FRAME ASSEMBLY



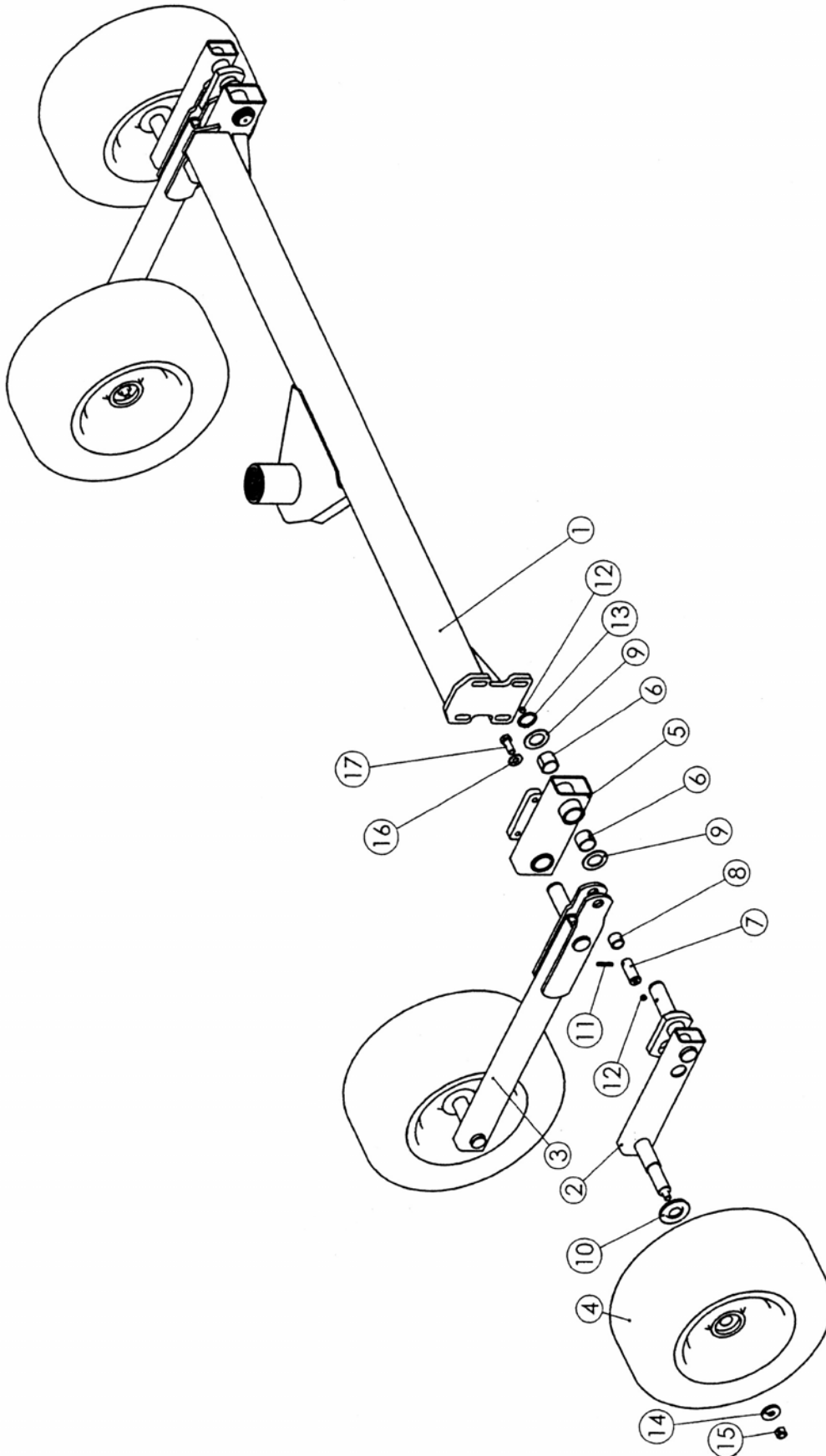
| REF. | QTY. | PART No. | DESCRIPTION                                |
|------|------|----------|--|
|      |      |          | <b>RR430 - WHEELS &amp; FRAME ASSEMBLY</b> |
| 1    | 1    | 1021230  | LINK UPPER                                 |
| 2    | 1    | 1021231  | FRAME                                      |
| 3    | 2    | 1021232  | SWINGING BAR                               |
| 4    | 1    | 1021233  | BRACKET                                    |
| 5    | 1    | 1021234  | BAR  |
| 6    | 2    | 1021235  | WASHER                                     |
| 7    | 4    | 1021256  | WHEEL                                      |
| 8    | 4    | 1021004  | TYRE                                       |
| 9    | 4    | 1021005  | TUBE                                       |
| 10   | 4    | 1021236  | RIM  |
| 11   | 8    | 1021002  | BEARING                                    |
| 12   | 4    | 1021237  | COVER                                      |
| 13   | 6    | 1021163  | WASHER                                     |
| 14   | 4    | 1021067  | WASHER                                     |
| 15   | 2    | 1021181  | WASHER                                     |
| 16   | 4    | 1021070  | WASHER                                     |
| 17   | 4    | 9313045  | SCREW                                      |
| 18   | 4    | 1021238  | BUMPER                                     |
| 19   | 4    | 1021239  | NUT  |
| 20   | 2    | 1021240  | COTTER                                     |
| 21   | 4    | 1021241  | SLEEVE                                     |
| 22   | 6    | 9313056  | SCREW                                      |

## RR430 15" & 16" WHEEL ASSEMBLIES



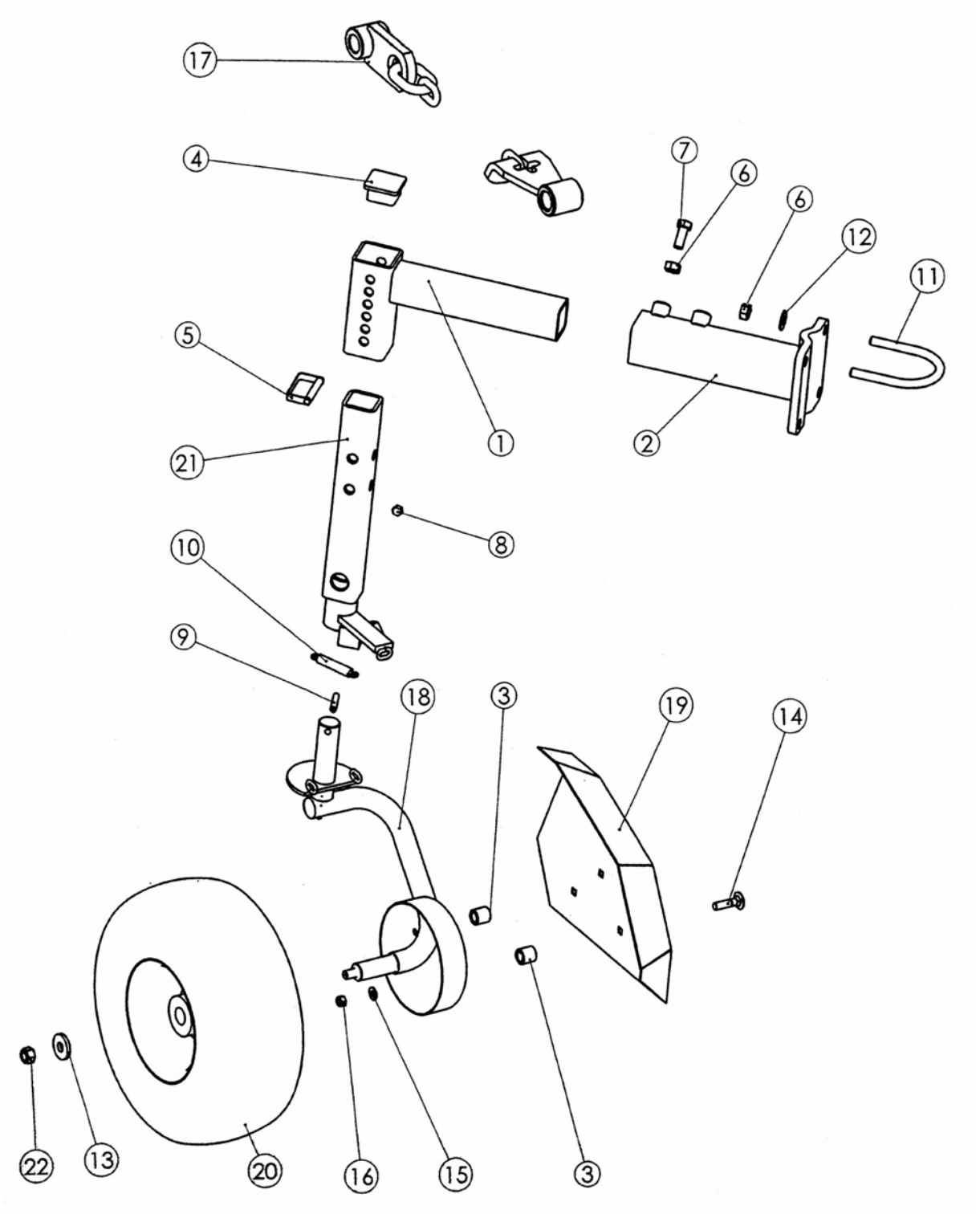
| REF. | QTY. | PART No. | DESCRIPTION  |
|------|------|----------|--|
|      |      |          | <b>RR430 - 15" &amp; 16" WHEELS &amp; FRAME ASSEMBLY</b> |
| 1    | 1    | 1021230  | PLATE - UPPER  |
| 2    | 1    | 1021242  | HOLDER - <i>15" Wheel Models</i>                         |
|      | 2    | 1021248  | HOLDER - <i>16" Wheel Models</i>                         |
| 3    | 2    | 1021143  | OSCILATING ARM - INNER                                   |
| 4    | 2    | 1021247  | OSCILATING ARM - OUTER                                   |
| 5    | 2    | 1021158  | BOLT   |
| 6    | 1    | 1021244  | BAR  |
| 7    | 4    | 1021256  | 15" WHEEL - <i>15" Wheel Models</i>                      |
|      | 4    | 1021024  | 16" WHEEL - <i>16" Wheel Models</i>                      |
| 8    | 4    | 1021245  | HUB COVER - <i>15" Wheel Models</i>                      |
|      | 4    | 1021237  | HUB COVER - <i>16" Wheel Models</i>                      |
| 9    | 1    | 1021246  | L/H BRACKET - <i>15" Wheel Models</i>                    |
|      | 1    | 1021249  | L/H BRACKET - <i>15" Wheel Models</i>                    |
| 10   | 8    | 1021157  | SLEEVE   |
| 11   | 8    | 1021160  | WASHER   |
| 12   | 2    | 1021159  | INNER RING   |
| 13   | 4    | 1021162  | CIRCLIP  |
| 14   | 6    | 1021063  | GREASE NIPPLE  |
| 15   | 2    | 1021054  | TENSION PIN  |
| 16   | 4    | 1021163  | WASHER   |
| 17   | 4    | 1021178  | NUT  |
| 18   | 2    | 1021240  | COTTER PIN   |
| 19   | 4    | 9313076  | SCREW  |
| 20   | 4    | 1021100  | WASHER   |

## RR471 WHEELS & AXLE ASSEMBLY



| REF. | QTY. | PART No. | DESCRIPTION                               |
|------|------|----------|---|
|      |      |          | <b>RR471 - WHEELS &amp; AXLE ASSEMBLY</b> |
| 1    | 1    | 1021048  | FRAME                                     |
| 2    | 2    | 1021156  | OSCILATING ARM                            |
| 3    | 2    | 1021042  | WHEEL ARM - INNER                         |
| 4    | 4    | 1021024  | WHEEL                                     |
| 5    | 1    | 1021041  | TANDEM HOLDER                             |
| 6    | 8    | 1021157  | SLEEVE                                    |
| 7    | 2    | 1021158  | BOLT                                      |
| 8    | 2    | 1021159  | BUSH                                      |
| 9    | 8    | 1021160  | WASHER                                    |
| 10   | 4    | 1021161  | PROTECTION WASHER                         |
| 11   | 2    | 1021154  | TENSION PIN                               |
| 12   | 6    | 1021063  | GREASE NIPPLE                             |
| 13   | 4    | 1021162  | CIRCLIP                                   |
| 14   | 4    | 1021163  | WASHER                                    |
| 15   | 4    | 1021178  | NUT                                       |
| 16   | 4    | 1021100  | WASHER                                    |
| 17   | 4    | 9313066  | SCREW                                     |

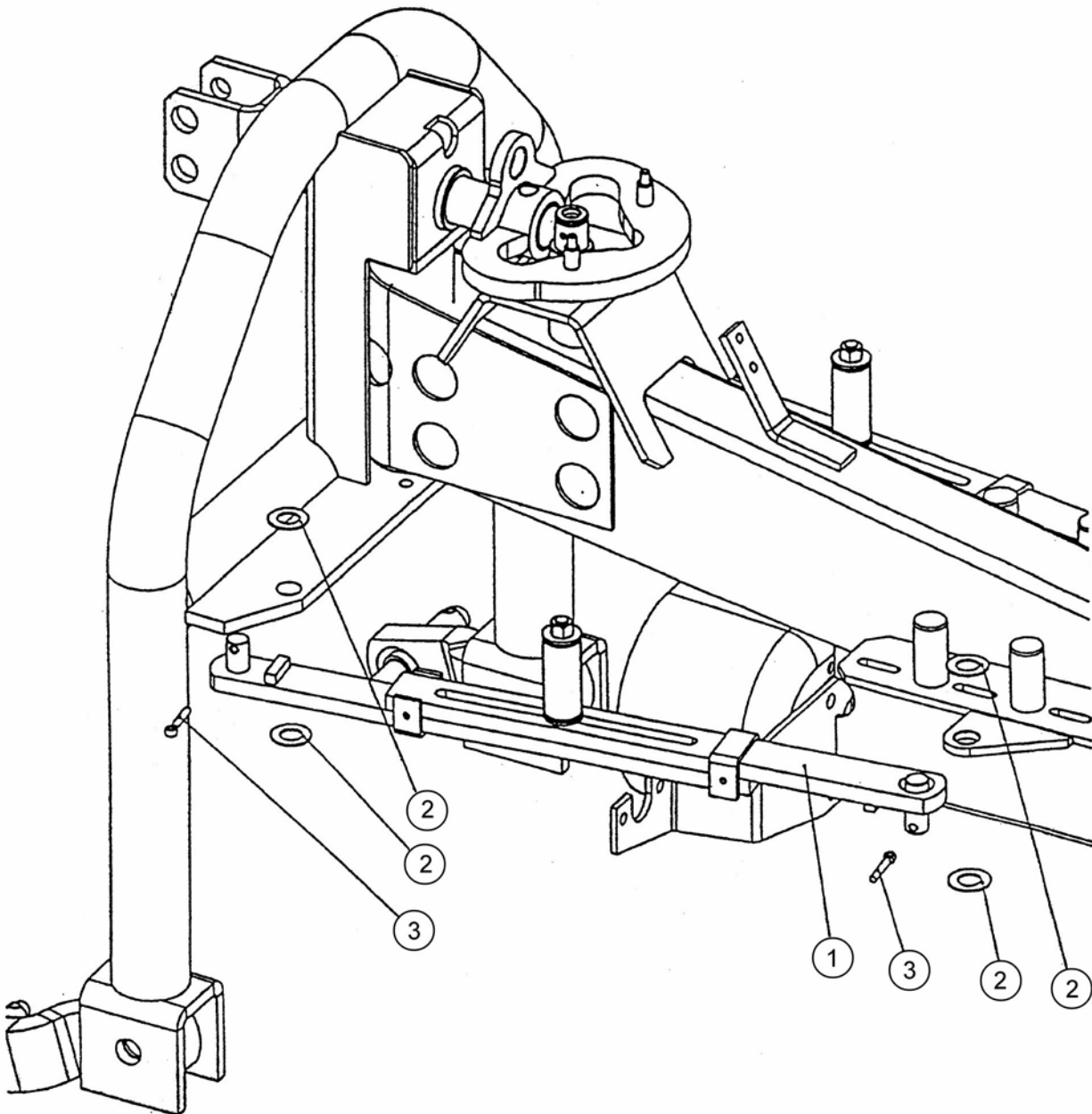
## RR430 & RR471 - AUXILIARY WHEEL ASSEMBLIES





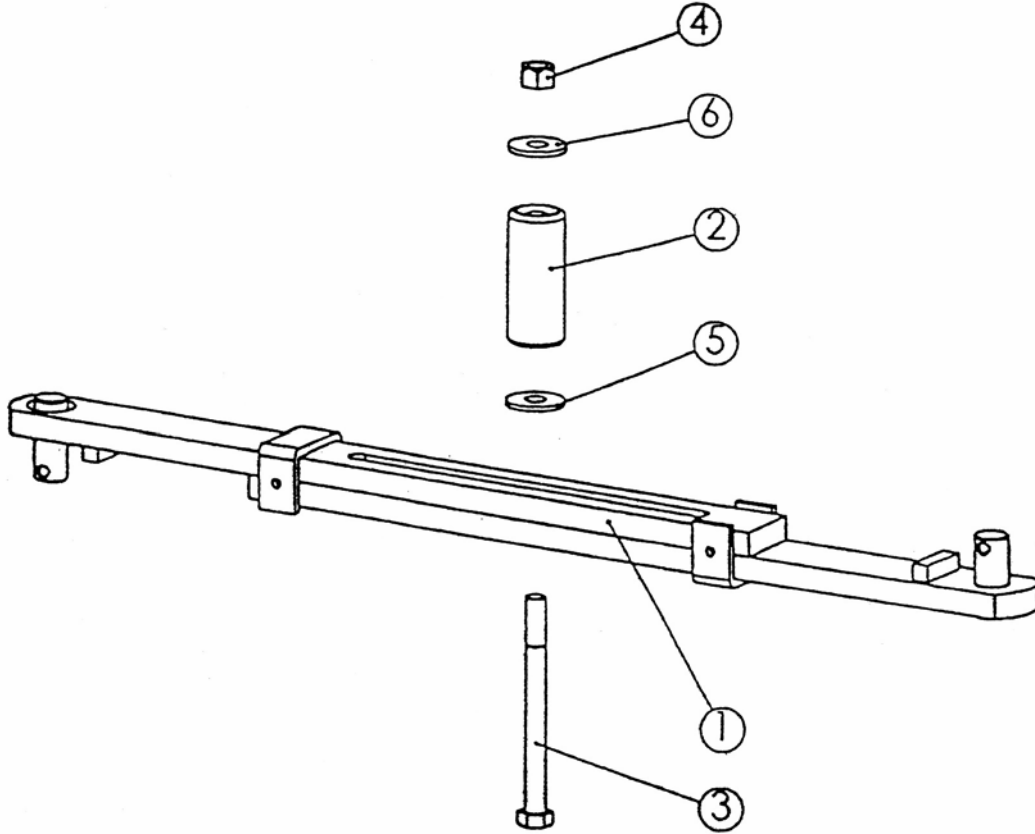
| REF. | QTY. | PART No. | DESCRIPTION   |
|------|------|----------|---|
|      |      |          | <b>RR430 &amp; RR471 - AUXILIARY WHEEL ASSEMBLIES</b> |
| 1    | 1    | 1021164  | BRACKET   |
| 2    | 1    | 1021595  | TUBE - <i>RR430 Models</i>                            |
|      | 1    | 1021165  | TUBE - <i>RR471 Models</i>                            |
| 3    | 3    | 1021596  | SLEEVE - <i>RR430 Models</i>                          |
|      | 3    | 1021166  | SLEEVE - <i>RR471 Models</i>                          |
| 4    | 1    | 1021167  | PLASTIC CAP   |
| 5    | 1    | 1021168  | LINCH PIN   |
| 6    | 6    | 1021169  | NUT   |
| 7    | 2    | 9313086  | SCREW   |
| 8    | 1    | 1021064  | NIPPLE  |
| 9    | 1    | 1021170  | TENSION PIN   |
| 10   | 2    | 1021171  | SPRING  |
| 11   | 2    | 1021597  | CLAMP - <i>RR430 Models</i>                           |
|      | 2    | 1021172  | CLAMP - <i>RR471 Models</i>                           |
| 12   | 4    | 1021100  | WASHER  |
| 13   | 1    | 1021163  | WASHER  |
| 14   | 3    | 1021598  | SCREW - <i>RR430 Models</i>                           |
|      | 3    | 9313084  | SCREW - <i>RR471 Models</i>                           |
| 15   | 3    | 1021070  | WASHER  |
| 16   | 3    | 1021173  | NUT   |
| 17   | 1    | 1021599  | TOP LINK CHAIN - <i>RR430 Models</i>                  |
|      | 1    | 1021174  | TOP LINK CHAIN - <i>RR471 Models</i>                  |
| 18   | 1    | 1021175  | WHEEL AXLE  |
| 19   | 1    | 1021176  | PROTECTION  |
| 20   | 1    | 1021256  | WHEEL ASSEMBLY  |
| 21   | 1    | 1021177  | WHEEL BRACKET   |
| 22   | 1    | 1021178  | NUT   |

## RR430 & RR471 SHOCK ABSORBER FITTINGS



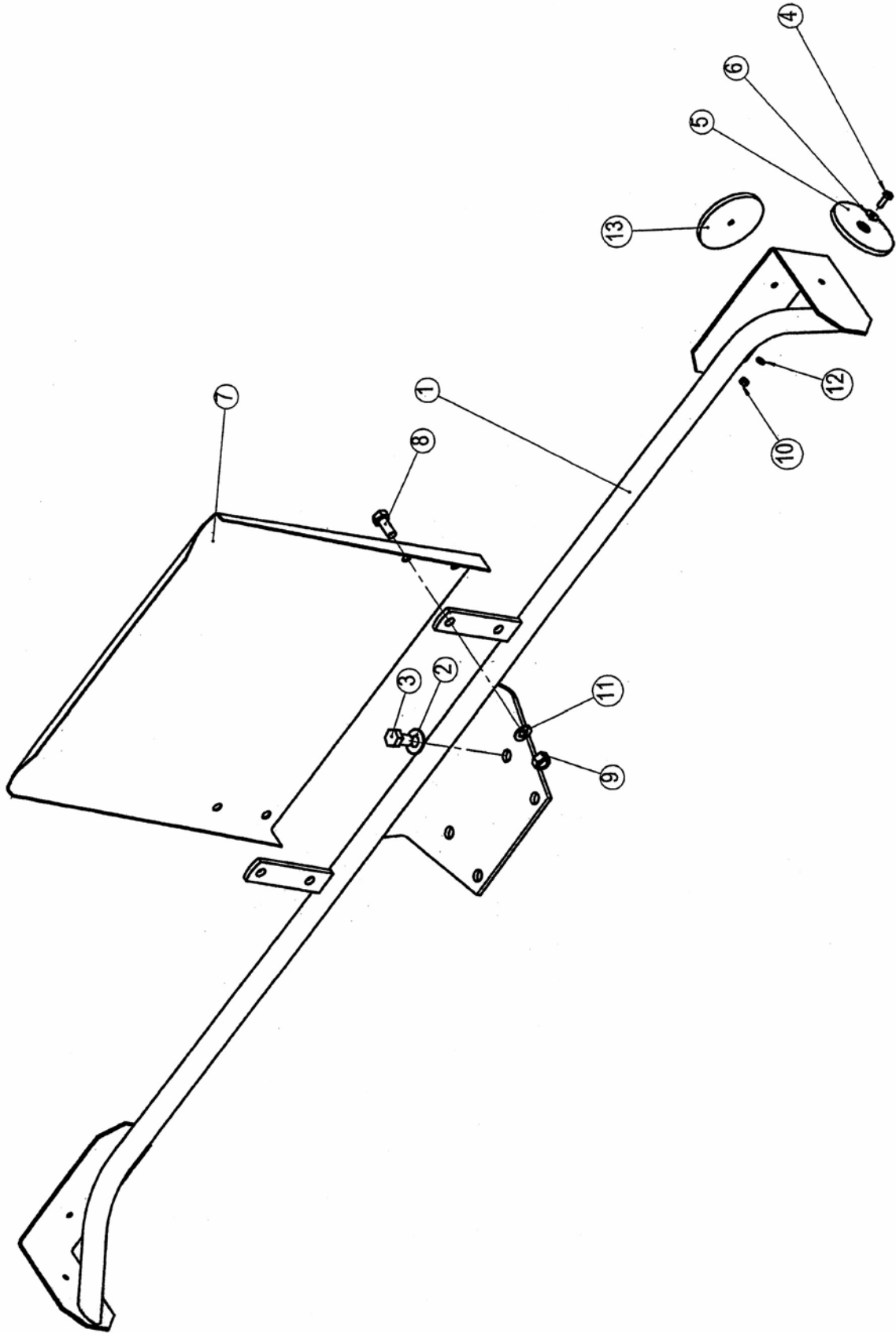
| REF. | QTY. | PART No. | DESCRIPTION  |
|------|------|----------|--|
|      |      |          | <b>RR430 &amp; RR471 - SHOCK ABSORBER FITTINGS</b> |
| 1    | 2    | 1021180  | SHOCK ABSORBER ASSEMBLY                            |
| 2    | 8    | 1021181  | WASHER   |
| 3    | 4    | 1021182  | COTTER PIN   |

RR430 & RR471 SHOCK ABSORBER ASSEMBLY



| REF. | QTY. | PART No. | DESCRIPTION  |
|------|------|----------|--|
|      |      |          | <b>RR430 &amp; RR471 - SHOCK ABSORBER ASSEMBLY</b> |
| 1    | 1    | 1021183  | SHOCK ABSORBER                                     |
| 2    | 1    | 1021184  | SPRING   |
| 3    | 1    | 1021185  | SCREW  |
| 4    | 1    | 1021178  | NUT  |
| 5    | 1    | 1021186  | WASHER   |
| 6    | 1    | 1021187  | WASHER   |

## RR430 & RR471 TRAFFIC BAR ASSEMBLY



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| REF. | QTY. | PART No. | DESCRIPTION                                     |
|------|------|----------|---|
|      |      |          | <b>RR430 &amp; RR471 - TRAFFIC BAR ASSEMBLY</b> |
| 1    | 1    | 1021188  | TRAFFIC ILLUMINATION HOLDER                     |
| 2    | 1    | 1021100  | WASHER  |
| 3    | 1    | 9313046  | SCREW   |
| 4    | 1    | 1021189  | SCREW   |
| 5    | 1    | 1021190  | REFLECTOR - ORANGE                              |
| 6    | 1    | 1021191  | WASHER  |
| 7    | 1    | 1021192  | PLATE   |
| 8    | 1    | 9313055  | SCREW   |
| 9    | 1    | 1021193  | NUT   |
| 10   | 1    | 1021194  | NUT   |
| 11   | 1    | 1021195  | WASHER  |
| 12   | 1    | 1021196  | SPRING WASHER                                   |
| 13   | 1    | 1021197  | REFLECTOR PLATE - RED                           |