

ROTARY TEDDER RT815 Z Pro

Operator & Parts Manual

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IMPORTANT VERIFICATION OF WARRANTY REGISTRATION



DEALER WARRANTY INFORMATION & REGISTRATION VERIFICATION

It is imperative that the selling dealer registers this machine with Twose of Tiverton Limited before delivery to the end user – failure to do so may affect the validity of the machine warranty.

To register machines go to the Twose web site at www.twose.com, log onto 'Dealer Inside' and select the 'Machine Registration button' which can be found in the Service Section of the site. Confirm to the customer that the machine has been registered in the section below.

Should you experience any problems registering a machine in this manner please contact the Twose Office on 01884 253691.

Registration Verification

Dealer Name:
Dealer Address:
Customer Name:
Date of Warranty Registration:/...../..... Dealer Signature:

NOTE TO CUSTOMER / OWNER

Please ensure that the above section above has been completed and signed by the selling dealer to verify that your machine has been registered with Twose of Tiverton Limited.

IMPORTANT: During the initial 'bedding in' period of a new machine it is the customer's responsibility to regularly inspect all nuts, bolts and hose connections for tightness and re-tighten if required. New hydraulic connections occasionally weep small amounts of oil as the seals and joints settle in – where this occurs it can be cured by re-tightening the connection – *refer to torque settings chart below*. The tasks stated above should be performed on an hourly basis during the first day of work and at least daily thereafter as part of the machines general maintenance procedure.

TORQUE SETTINGS FOR HYDRAULIC FITTINGS

HYDRAULIC HOSE ENDS		
BSP	Setting	Metric
1/4"	18 Nm	19 mm
3/8"	31 Nm	22 mm
1/2"	49 Nm	27 mm
5/8"	60 Nm	30 mm
3/4"	80 Nm	32 mm
1"	125 Nm	41 mm
1.1/4"	190 Nm	50 mm
1.1/2"	250 Nm	55 mm
2"	420 Nm	70 mm

PORT ADAPTORS WITH BONDED SEALS		
BSP	Setting	Metric
1/4"	34 Nm	19 mm
3/8"	47 Nm	22 mm
1/2"	102 Nm	27 mm
5/8"	122 Nm	30 mm
3/4"	149 Nm	32 mm
1"	203 Nm	41 mm
1.1/4"	305 Nm	50 mm
1.1/2"	305 Nm	55 mm
2"	400 Nm	70 mm

WARRANTY POLICY

WARRANTY REGISTRATION

All machines must be registered, by the selling dealer with Twose of Tiverton Limited before delivery to the end user. On receipt of the goods it is the buyer's responsibility to check that the Verification of Warranty Registration in the Operator's Manual has been completed by the selling dealer.

1. LIMITED WARRANTIES

- 1.01. All machines supplied by Twose of Tiverton Limited are warranted to be free from defects in material and workmanship from the date of sale to the original purchaser for a period of 12 months, unless a different period is specified.
- 1.02. All spare parts supplied by Twose of Tiverton Limited are warranted to be free from defects in material and workmanship from the date of sale to the original purchaser for a period of 6 months.
- 1.03. The manufacturer will replace or repair for the purchaser any part or parts found, upon examination at its factory, to be defective under normal use and service due to defects in material or workmanship. Returned parts must be complete and unexamined.
- 1.04. This warranty does not apply to any part of the goods, which has been subjected to improper or abnormal use, negligence, alteration, modification, fitment of non-genuine parts, accident damage, or damage resulting from contact with overhead power lines, damage caused by foreign objects (e.g. stones, iron, material other than vegetation), failure due to lack of maintenance, use of incorrect oil or lubricants, contamination of the oil, or which has served its normal life. This warranty does not apply to any expendable items such as blades, flails, flap kits, skids, soil engaging parts, shields, guards, wear pads or pneumatic tyres.
- 1.05. Temporary repairs and consequential loss - i.e. oil, downtime and associated parts are specifically excluded from the warranty.
- 1.06. Warranty on hoses is limited to 12 months and does not include hoses which have suffered external damage. Only complete hoses may be returned under warranty, any which have been cut or repaired will be rejected.
- 1.07. Machines must be repaired immediately a problem arises. Continued use of the machine after a problem has occurred can result in further component failures, for which Twose of Tiverton Limited cannot be held liable, and may have safety implications.
- 1.08. Except as provided herein, no employee, agent, dealer or other person is authorised to give any warranties of any nature on behalf of Twose of Tiverton Limited.
- 1.09. For machine warranty periods in excess of 12 months the following additional exclusions shall apply:
 - 1) Hoses, external seals, exposed pipes and hydraulic tank breathers.
 - 2) Filters.
 - 3) Rubber mountings.
 - 4) External electric wiring.

N.B. Warranty cover will be invalid if any non-genuine parts have been fitted or used. Use of non-genuine parts may seriously affect the machine's performance and safety. Twose of Tiverton Limited cannot be held responsible for any failures or safety implications that arise due to the use of non-genuine parts.

2. REMEDIES AND PROCEDURES

- 2.01. The warranty is not effective unless the Selling Dealer registers the machine, via the Twose web site and confirms the registration to the purchaser by completing the Verification of Warranty Registration in the operator's manual.
- 2.02. Any fault must be reported to an authorised Twose dealer as soon as it occurs. Continued use of a machine, after a fault has occurred, can result in further component failure for which Twose of Tiverton Limited cannot be held liable.
- 2.03. Repairs should be undertaken within two days of the failure. Claims submitted for repairs undertaken more than 2 weeks after a failure has occurred, or 2 days after the parts were supplied will be rejected, unless the delay has been authorised by Twose of Tiverton Limited.
- 2.04. All claims must be submitted, by an authorised Twose Service Dealer, within 30 days of the date of repair.
- 2.05. Following examination of the claim and parts the manufacture will pay, at their discretion, for any valid claim the cost of any parts and an appropriate labour allowance if applicable.
- 2.06. The submission of a claim is not a guarantee of payment.
- 2.07. Any decision reached by Twose of Tiverton Limited is final.

3. LIMITATION OF LIABILITY

- 3.01. The manufacturer disclaims any express (except as set forth herein) and implied warranties with respect to the goods including, but not limited to, merchantability and fitness for a particular purpose.
- 3.02. The manufacturer makes no warranty as to the design, capability, capacity or suitability for use of the goods.
- 3.03. Except as provided herein, the manufacturer shall have no liability or responsibility to the purchaser or any other person or entity with respect to any liability, loss, or damage caused or alleged to be caused directly or indirectly by the goods including, but not limited to, any indirect, special, consequential, or incidental damages resulting from the use or operation of the goods or any breach of this warranty. Notwithstanding the above limitations and warranties, the manufacturer's liability hereunder for damages incurred by the purchaser or others shall not exceed the price of the goods.
- 3.04. No action arising out of any claimed breach of this warranty or transactions under this warranty may be brought more than one (1) year after the cause of the action has occurred.

4. MISCELLANEOUS

- 4.01. The manufacturer may waive compliance with any of the terms of this limited warranty, but no waiver of any terms shall be deemed to be a waiver of any other term.
- 4.02. If any provision of this limited warranty shall violate any applicable law and is held to be unenforceable, then the invalidity of such provision shall not invalidate any other provisions herein.
- 4.03. Applicable law may provide rights and benefits to the purchaser in addition to those provided herein.

EC DECLARATION OF CONFORMITY

Conforming to EEC Directive 89/392/EEC

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*) Tractor Mounted Rotary Tedder

Product Code RT815Z

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 Directive 89/392/EEC, and AMD 91/368/EEC, AMD 93/44/EEC, AMD 93/63/EEC and conforms with European Norm. BS EN 292.

Part 1: 1991 – Safety of Machinery – Terminology, methodology.

Part 2: 1991 – Safety of Machinery – Technical Specifications.

and other national standards associated with its design and construction as listed in the Technical File.

Signed *John Frank*
on behalf of TWOSE of TIVERTON LIMITED *Responsible Person*

Chief Design Engineer February 2011
Status *Date*

List of Contents

Page No.

Technical Data	2
Machine Record Plate	2
Description	3
Tedder Work Demonstration	4
Safety Information	5
Safety Decal Identification	7
Attaching the Machine	8
Moving into Transport	12
Moving into Work	13
Removal from Tractor	14
Operation	15
Maintenance and Lubrication	19

Technical Data

Type	RT815 Z Pro
Number of rotors	8
Diameter of rotors	1.3m
Number of tines / rotors	5 / 8
Angle of tines	16° - 20°
Working capacity	9.5 ha/h
Working width	7.85m
Transport width	2.95m
Width of the machine	8.17m
Transport height	2.95m
Length	2.05m
Working speed up to	12 km/h
Weight	1078kg
Necessary tractor power	60kW / 80PS
PTO shaft speed	450-540 rpm
Rotor speed at 540 rpm PTO	201 rpm
Tyres	16x6.50-6 / 16x6.50-10
Frame	Adjustable
Hitch frame 3 point flexible	Pull type
Lifting to transport position	Hydraulic
PTO Shaft:	
Length between the joints (pull type hitch)	1350 mm
Safety coupling	1020 Nm

Noise Level

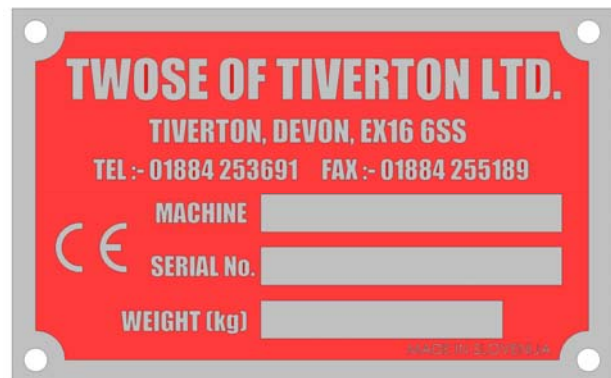
The noise level of the machine is below 70 dB

Machine Record Plate

The information stated on the plate is;

- Machine
- Serial No.
- Weight (kg).

Machine and Serial No. details should always be quoted in all correspondence and when ordering parts.



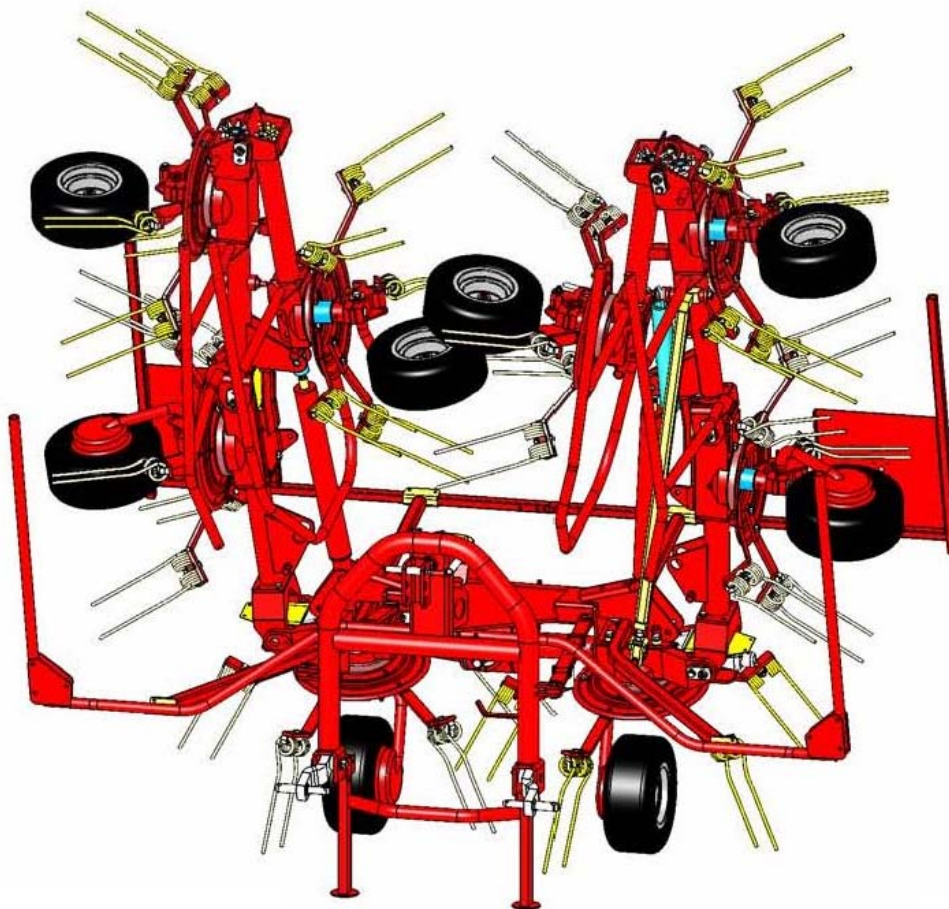
Description

RT815Z Rotary Tedders are specifically designed for forage tedding and spreading by means of rotating spring tines attached to rotors. Forward angled rotors contra-rotate against each other thus allowing the spring tines to gently rake, collect, turn and lay the forage behind the machine. Gentle airing and even scattering and tedding accelerate the drying process and reduce losses that result from plant crumbling. The need for extended drying time and dependency on spells of good weather is reduced to preserve valuable nourishing substances.

The tedder is constructed with support wheels so that the height of each rotor remains constant to the working surface; this allows the tedder to collect the forage cleanly and consistently in spite of its large working width and permits efficient operation on sloping or rough terrain. The spring tines are made of high quality steel and fixed in a manner that enables spring flexibility.

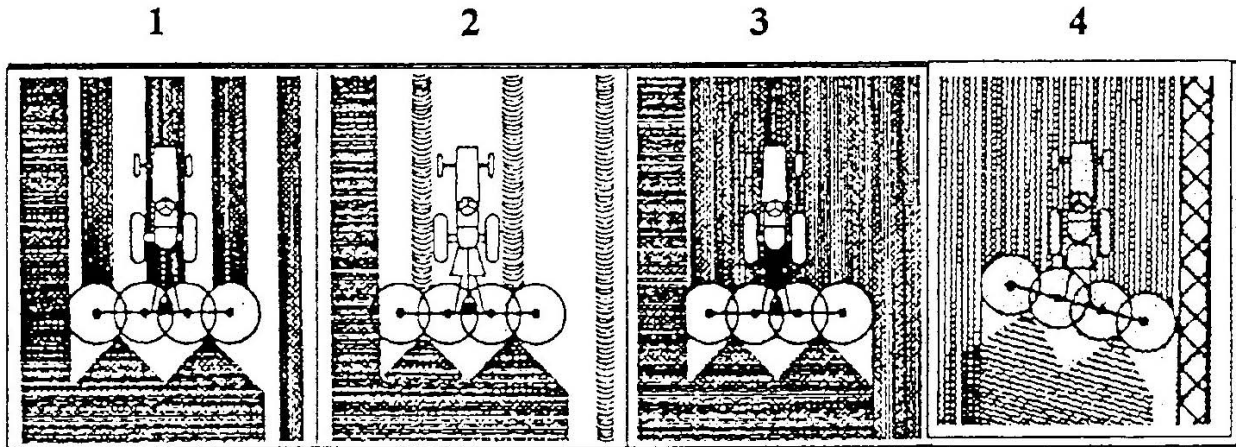
The machine, which is PTO shaft driven, can be attached to any type of tractor with three-point linkage and hydraulic connections.

Setting the tedder into working or transport position is a simple and fast operation by means of hydraulic rams operated from the tractor cab. Work with the tedder is simple, safe and straight-forward.

















Tedder Work Demonstration










1. Scattering of cut grass
2. Swath scattering
3. Tedding
4. Tedding or scattering in side position



Safety Information

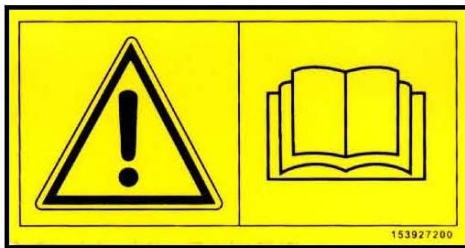
In the interest of safety it is important that great care is adopted at all times during the attachment, transportation, operation and maintenance of this machine. Both the owner and the operator of the machine should read and understand the following section to ensure the safety of themselves and all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

-  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.
-  Familiarize 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.

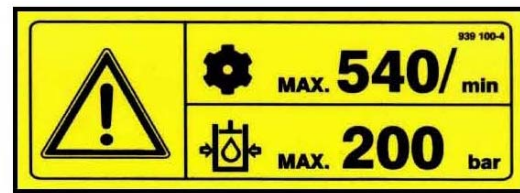
-  Always adjust the driving speed to suit the driving conditions. Avoid fast turning when driving uphill, downhill or across a slope. Braking performance and turning ability will be affected when implements are connected or mounted to the tractor - allow extra time for turning and braking.
-  Never 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.

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.

Safety Decal Identification



1



2



3



4



5



6

1. Read and observe the operator's manual.
2. Maximum PTO speed.
3. Never reach into the crushing danger area if risk of components moving.
4. Stay clear while engine is running.
5. Shut off engine and remove key before performing maintenance or repair work.
6. Stay clear of swinging area of implements.

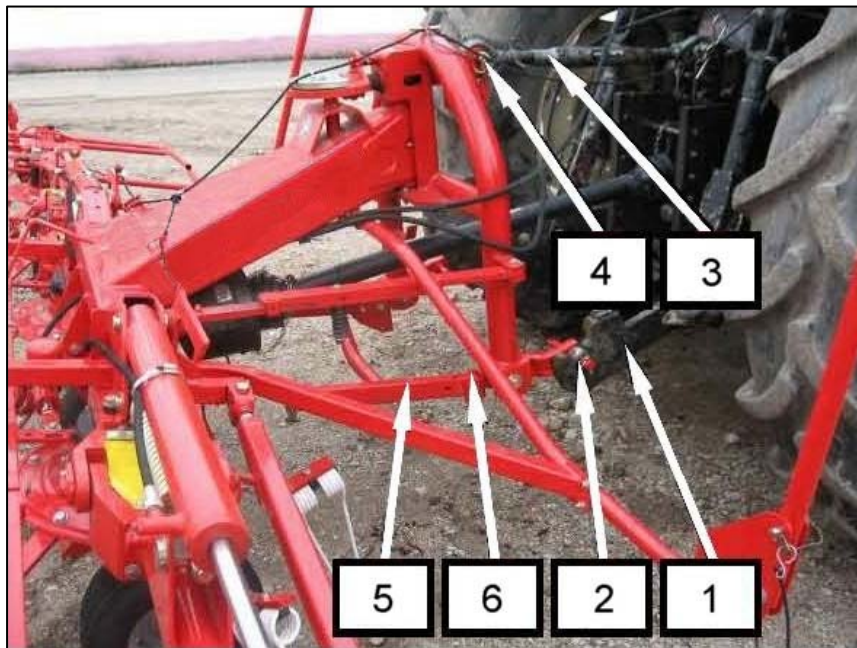
Attaching the Machine

Attachment of the machine should always be performed on a firm level site.

Position the tractor links at the correct height for machine attachment and reverse the tractor squarely up to the machine.

Attach lower linkage (1) and secure with locking pins (2). Note; in order to suit a wider range of tractor applications the machine is equipped with both Cat.1 and Cat.2 linkage.

Fit top link (3), secure with locking pins (4), adjust if required to place the machine vertical.



With the machine's weight supported on the tractor linkage, raise the support legs (5) and secure in the raised position with lock pin (6).

Attach the PTO shaft ensuring the slip clutch is fitted on the end nearest the machine. Fit torque chains to PTO guards to stop them from rotating with the shaft.

Note; on initial installation the PTO shaft will need to be measured, and if necessary cut to the correct length to suit the particular application - for details of measuring and cutting refer to the following page.

Secure lower links with check chains and/or stabilizer bars to prevent any sideways movement of the machine on the linkage.

After attachment of the machine check the PTO shaft has sufficient all round clearance to ensure it does not foul on tractor or machine components, especially when turning sharply.

PTO Driveshaft Installation

The PTO driveshaft attaches between the tractor and the machine gearbox to transfer the power required to run and operate the machine – it is important to achieve the correct shaft length to avoid risk of it ‘bottoming out’ when raising or lowering the machine.

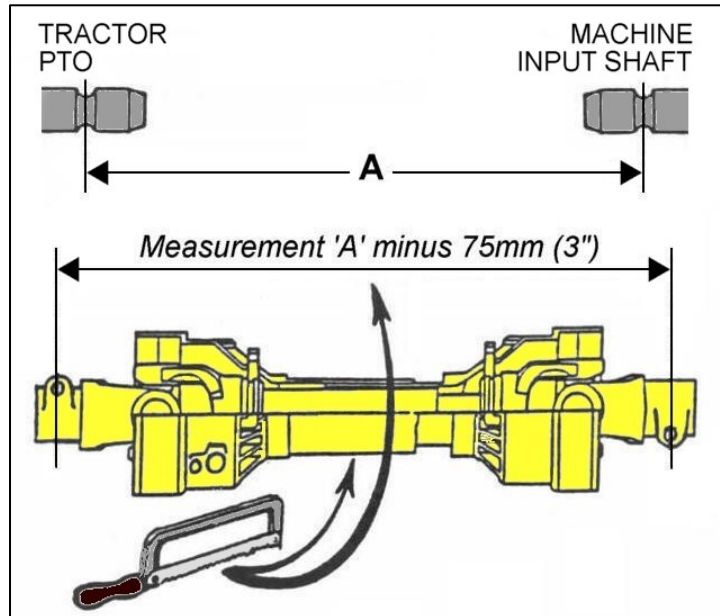
The procedure for measuring and cutting the shaft is as follows:

Measuring the PTO Shaft

With the machine attached to the tractor in the working position measure the horizontal distance ‘A’ from the tractor’s PTO to the input shaft on the machines gearbox and subtract 75mm (3”) – *this figure is the required shaft length.*

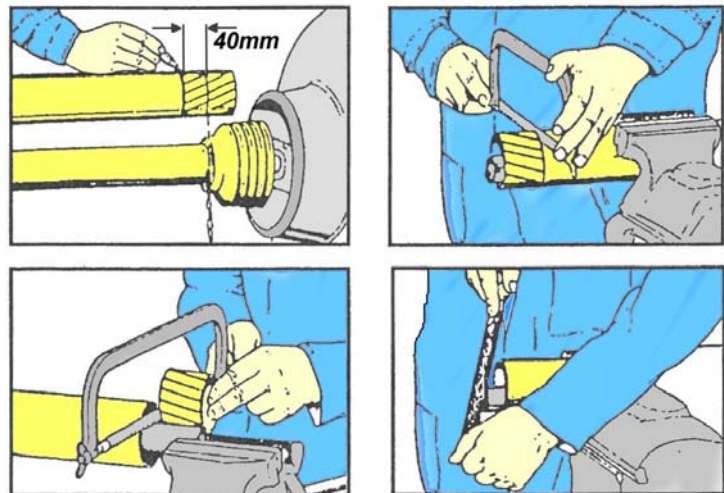
Place the fully closed PTO shaft on the ground and measure its overall length, if the shaft is shorter than the required length you can use it without the need to shorten - *providing it allows for a minimum 150mm (6”) overlap when fitted.*

If the shaft is longer subtract the required shaft length plus an additional 75mm (3”) - *the resulting figure is the excess length that will need to be removed from each half of the shaft.*



Cutting the PTO Shaft

Separate the two halves and using the measurement obtained above shorten both the plastic guarding and the inner steel profile tubes of each shaft by this same amount. De-burr the cut tubes with a file to remove rough or sharp edges and thoroughly clean to remove swarf before greasing, assembling and fitting the shaft.

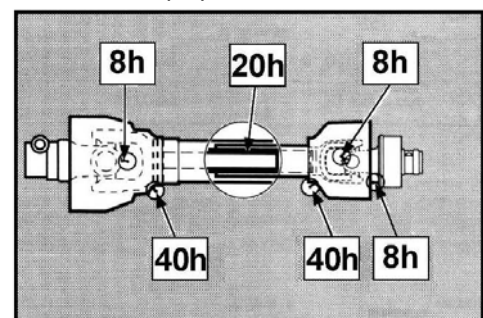


NOTE: For subsequent use with different tractors the shaft should be measured again to check suitability – *there must be a minimum shaft overlap of 150mm (6”).*

Maintenance

To increase the working life of the PTO shaft it should be periodically checked, cleaned and lubricated.

Routinely lubricate the PTO shaft using multipurpose grease at the time intervals indicated opposite ►



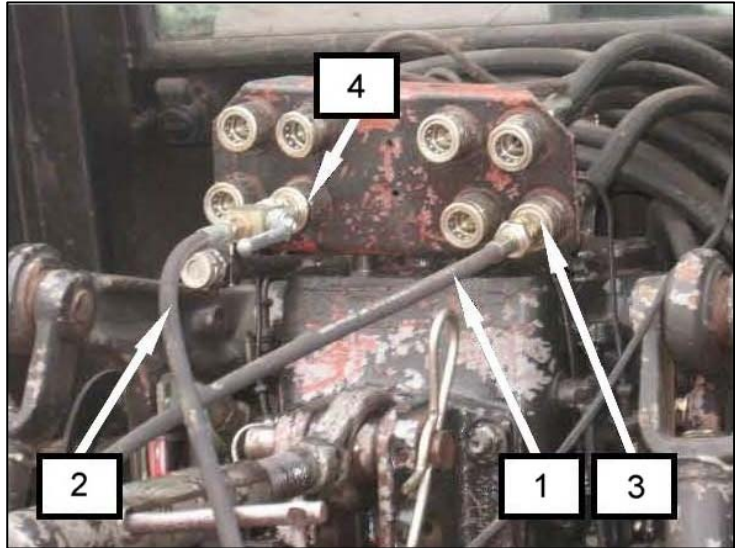
Hydraulic Connections

The machine requires two hydraulic connections to the tractor; *these are for operation of the rams that raise the machine into transport – one for each wing of the machine.*

Attach the machines hydraulic hoses (1,2) to the tractors hydraulic points (3,4) as illustrated opposite ►

Note: Before connecting the hoses, check both the tractor and machines hydraulic systems are free of residual pressure.

Ensure all hydraulic connections are kept clean as dirt contamination can cause damage and leaks.



Transport Lock (Wings)

The machine features a mechanical transport lock to secure the wings of the machine in the raised transport position; when fully raised the wings will automatically be locked by a spring loaded latching system.

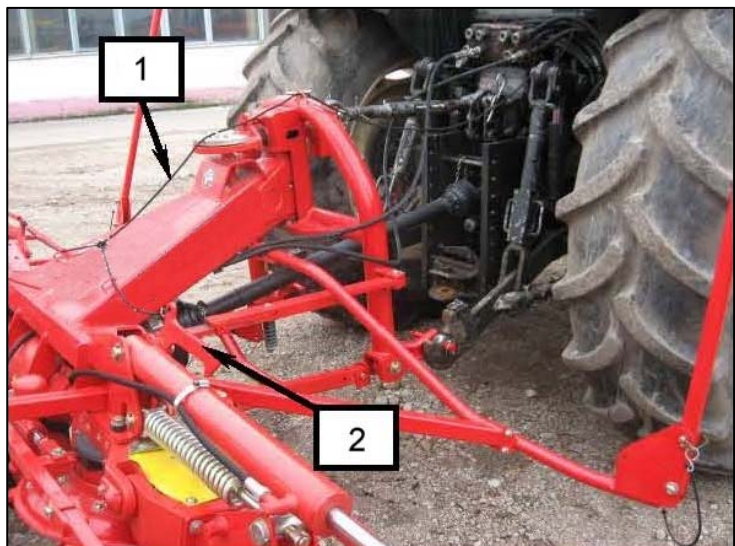
Releasing the transport lock is performed from the rear window of the tractor cab via a cord attached to the latch. Pulling the cord will release the latch to allow the wings to be lowered into the work position.

Operating Cord Installation

The cord (1) for operation of the transport lock (2) should be 'loosely' routed from the latch system to the tractor cab via the rear window. Ensure the cord is kept clear of any obstructions or components to avoid any risk of accidental or unintentional operation.

WARNING: Ensure operating cord is kept clear of rotating or moving components at all times.

To avoid accidental or unintentional operation ensure operating cord remains slack.



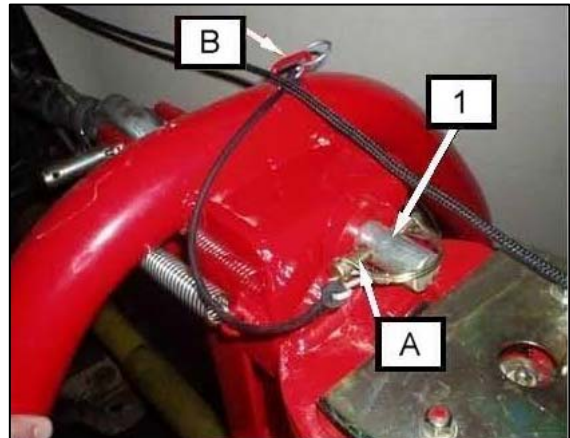
Flexible Hitch

The machine has a flexible hitch that allows the main frame freedom to move. The flexible hitch must always be locked for transport of the machine and only unlocked for work.

Locking of the flexible hitch is by means of a safety pin (1) that locates through the headstock pin at point 'A' as shown opposite.

For work mode the safety pin (1) is removed and stowed at point 'B'.

WARNING: Flexible Hitch must always be locked for transport and storage.



Tractor Ballast

Depending on the size and mass of the tractor being used the added weight of the machine on the rear of the tractor may make the combined unit unstable, especially during transportation.

In order to increase stability the use of ballast weights on the front of the tractor may be required. It is recommended that the overall weight on the front axle should equal to 20% of the unladen weight of the tractor. For further information on ballast weights and/or tractor suitability contact your local dealer or tractor manufacturer for specific advice on this subject.

Moving into Transport Position

The procedure for placing the machine into the transport position is as follows;

CAUTION: Keep bystanders at a safe distance from the machine when moving in or out of the transport position. Check there are no overhead obstructions before raising the machine.

- Ensure the flexible hitch is in the locked transport position.
- Raise machine on the tractor hydraulics until it is just clear of the ground.
- Slowly raise the right hand wing of the machine by operation of its hydraulic ram, continue raising the wing until it connects with, and latches into, the transport lock.
- Slowly raise the left hand wing of the machine by operation of its hydraulic ram, continue raising the wing until it connects with, and latches into, the transport lock.
- Check wings are fully latched into the transport lock and the release cord has ample slack to avoid accidental operation.
- Raise machine on the tractor hydraulics to a suitable height for transportation.
- Place and secure the transport reflector boards into vertical transport position.



Moving into transport position – raise right hand wing first. Ram speed can be altered with adjuster.



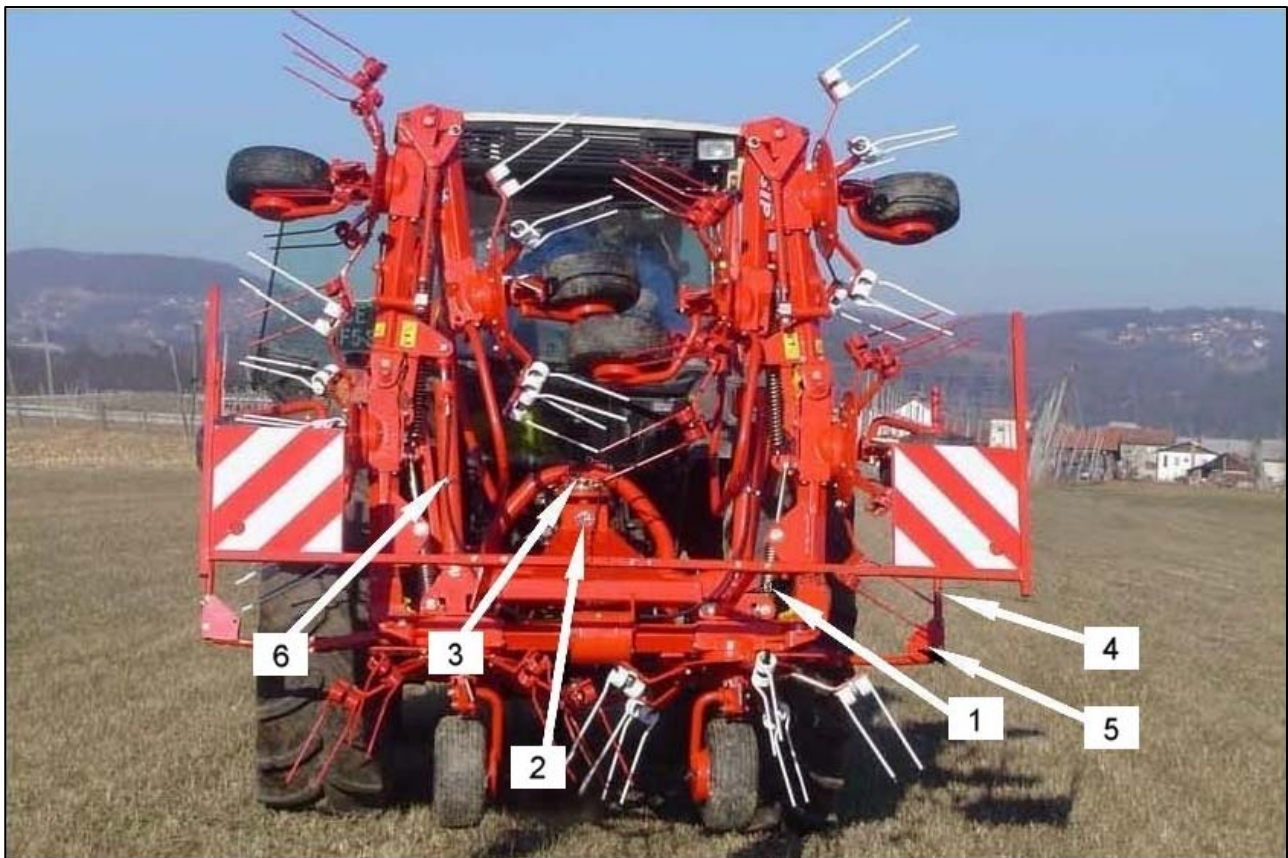
Transport Position – check wings are fully latched in the transport lock

Moving into Work Position

The procedure for placing the machine into the transport position is as follows;

CAUTION: Keep bystanders at a safe distance from the machine when moving in or out of the work position. Check there are no obstructions above or to the side before lowering the wings of the machine.

- Lower the machine on the tractor hydraulics until it is just clear of the ground.
- Operate the wing rams enough only to take remove pressure off the transport locks (1).
- Pull operation cord (2) to release transport locks (1).
- Operate the rams slowly to fully lower the wings of the machine.
- Lower the machine on the tractor hydraulics until it rests on the ground.
- Remove and stow the safety pin from the flexible hitch (3).
- Place and secure the transport reflector boards into horizontal work position.



WARNING: Ensure the flexible hitch is in the unlocked position before attempting to start work – failure to observe this may result in damage to machine components.

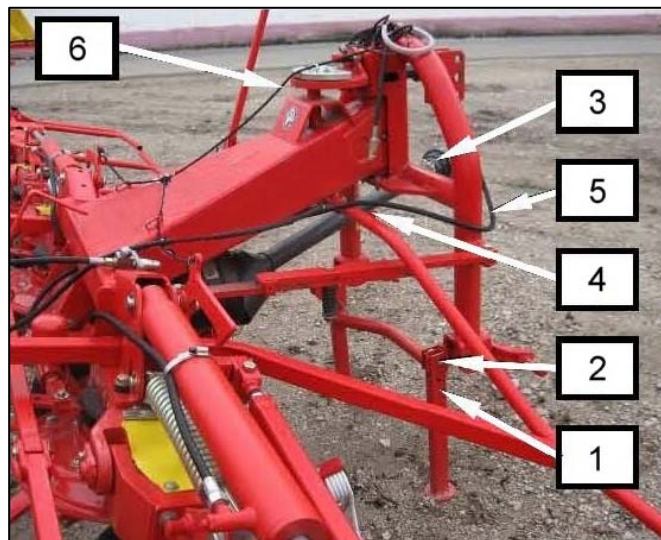
Removal from Tractor

The machine should be removed and stored with the wings in the lowered position and the flexible hitch securely locked.

CAUTION: Keep bystanders at a safe distance from the machine when disconnecting or connecting the machine to the tractor. Check there are no obstructions around the machine

The procedure for removal of the machine from the tractor is as follows;

- Select a firm level site for removal and storage of the machine.
- Lower support legs (1) and secure with locking pin (2).
- Lower the machine to rest on the ground ensuring it is positioned safely.
- Check and ensure the flexible hitch is securely locked.
- Disconnect the PTO shaft (3) and place it on its support (4).
- Disconnect the hydraulic hoses (5) from the tractor and stow neatly on the machine.
- Remove operating cord (6) from the tractor cab and stow neatly on the machine.
- Disconnect the top hitch point.
- Disconnect the lower links.
- Drive tractor carefully away from the machine.



Operation

When connecting the tedder on the tractor for the first time, check the length of the PTO shaft according to the PTO shaft manufacturer's manual. Use only PTO shafts with a built-in safety coupling.

Once the tedder has been attached to the 3 point linkage of the tractor do not forget to lift and secure the jack stand.

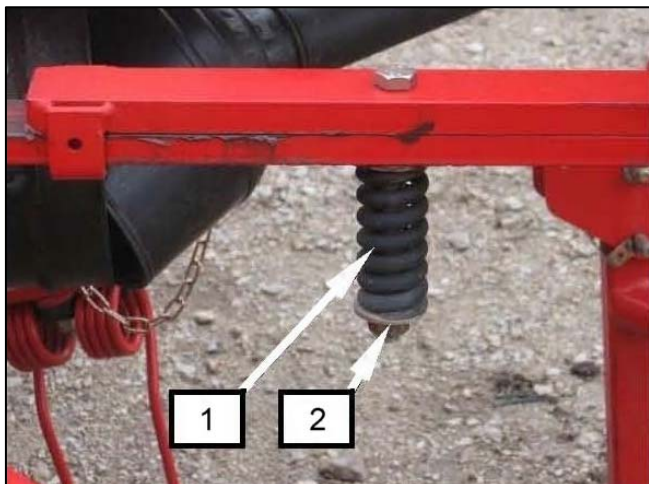
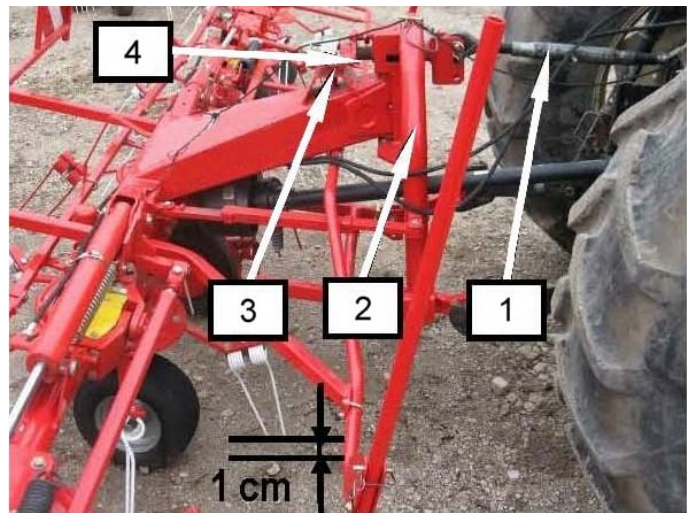
To place the machine into the working position it must be first lowered to the ground on the tractors linkage, pull the cord to release the transport locks and lower the outer wings on the hydraulic rams. The speed at which these rams operate can be altered by means of adjustment screws located on the ram cylinders – *it is advisable to keep the operating speed of the rams to a minimum in order to avoid damage.*

Before starting work always remember to pull out the transport safety pin on the flexible hitch; *failure to remove the safety pin may result in damage to the wheels and/or machine.*

Basic Set-up

For work, the tractor hydraulics should be set to the 'float' position on the control lever.

With the cylinder of flexible hitch (3) centralised to the headstock (4), adjust the top link (1) to vertically adjust hitch frame (2) until the front spring tines are positioned 1 cm above the ground.



Stabilizer

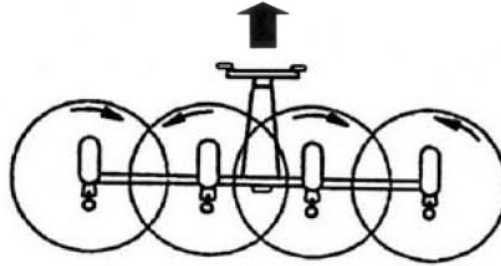
A stabilizer system ensures the machines movements are dampened for smooth operation when working and manoeuvring on uneven or sloping terrain. The stabilizer consists of a tensioned spring (1) and securing nut (2). Stabilizer tension is pre-set by the manufacturer and should not require any adjustment.

Working Positions

To suit the specific work required the machine can be operated in any of the positions illustrated below. The machine can be moved in and out of these positions by the operator from inside the tractor by activation of the hydraulic steering ram.

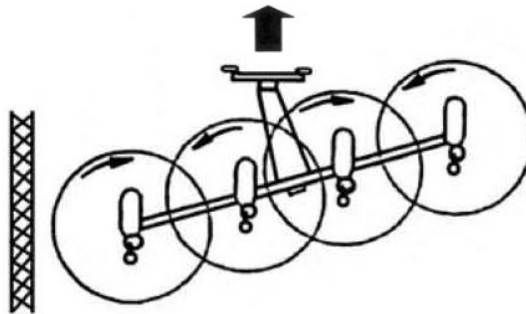
Normal Position

- for general tedding work



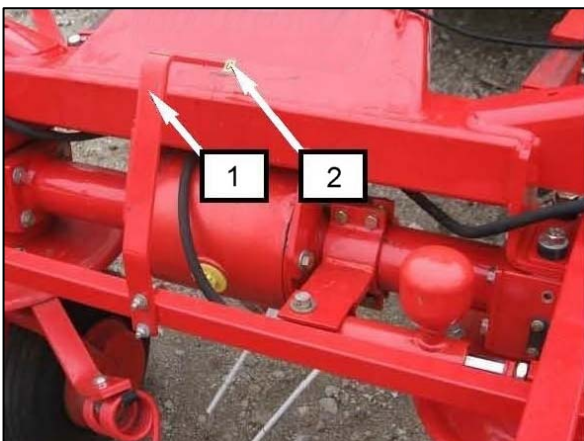
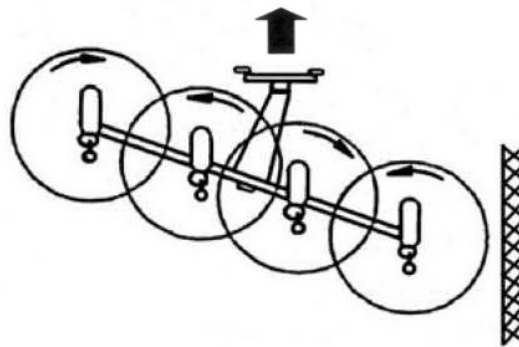
Working to Left

- for turning and collecting to the left



Working to Right

- for turning and collecting to the right



Position Indicator

The machine has an indicator on the steering mechanism to show when the machine is positioned squarely to the tractor in the normal work position; pointer (1) will be in line with the centre marker decal (2) as shown opposite.

Note; for tractors with low hydraulic pressure it may be advisable to place the machine into the desired working position then close the valve tap located on the quick fit coupling in order to retain the position.

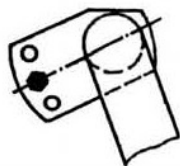
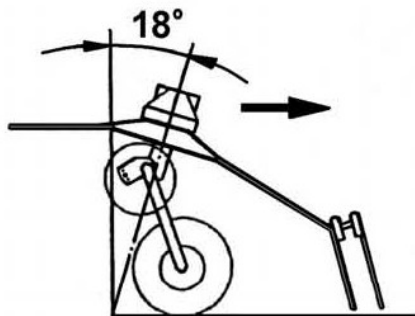
Ejection Angle

In order to suit differing work conditions the ejection angle of the machine can be adjusted by altering the pitch of the support wheels.

The ejection angle used will be dependent on the work materials, conditions and personal preference but as a general guide the following ejection angles are suggested;

A) Standard Angle (18°)

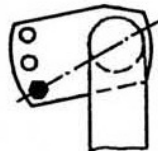
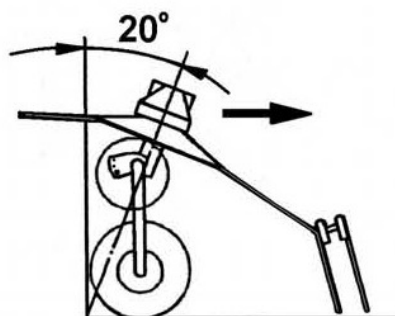
General work position.



A

B) Increased Angle (20°)

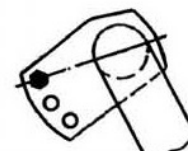
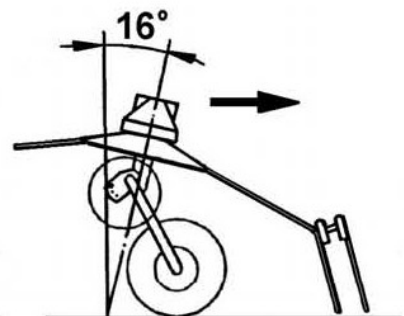
Long / heavier material.



B

C) Reduced Angle (16°)

Short / lighter material.

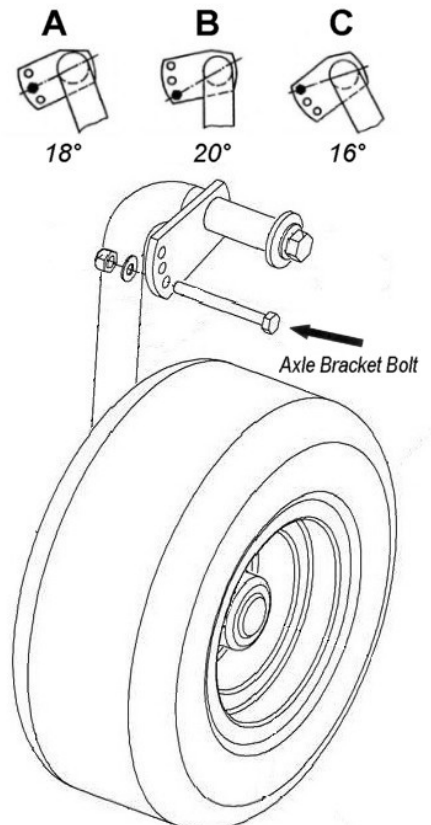


C

Setting the Ejection Angle

The procedure for setting the ejection angle is as follows;

- Raise the machine on the tractor hydraulics until the support wheels are clear of the ground.
- Release and remove axle bracket bolt (*shown opposite*).
- Locate and replace the bolt in the hole for desired angle.
- Secure bolt with its nut and washer.
- Repeat on each support wheel ensuring same hole position is selected for each.
- Lower machine on to the ground with tractor hydraulics.
- Adjust top link to reset to vertically position of the machines frame so the front spring tines are positioned 1 cm above the ground – *refer to basic set-up*.



Support Wheel (Optional Equipment)

An optional support wheel is available which, when fitted, increases the machines ability to follow surface contours; this is especially useful on undulating terrain as it reduces the risk of the tines catching on the ground.

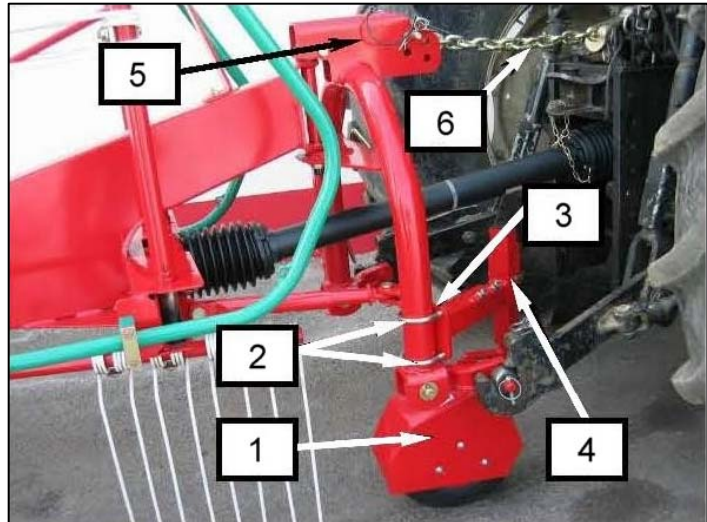
Support Wheel Fitment

Support wheel (1) attaches to the right-hand side of the hitch frame (3) with brackets (2).

Adjust to the height required and secure with pin (4).

Replace top link with the chain supplied (6) - *the chain must be slack to allow the machine freedom to move with the wheel.*

Note; for transport of a machine fitted with a support wheel, chain (6) must be removed and replaced with a fixed top link.



General Maintenance

The maintenance of the machine is not exacting but the following instructions should be applied in order to prolong the life of your machine.

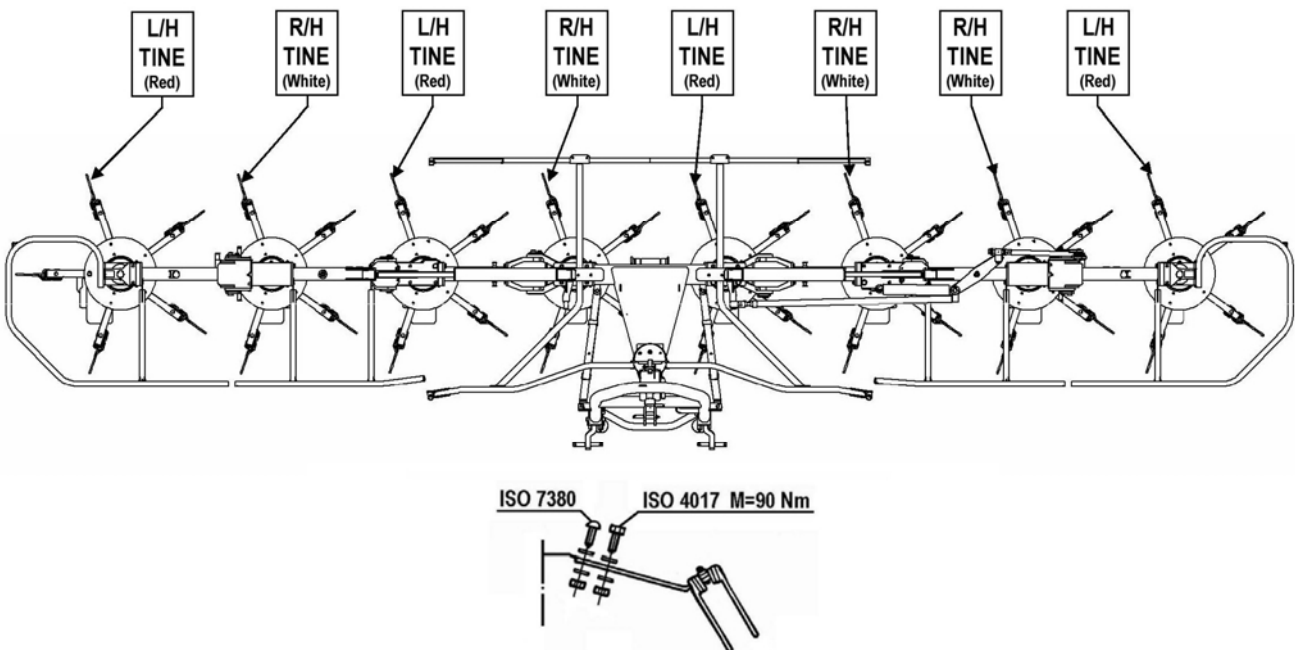
DANGER!

Never attempt to carry out any maintenance or lubrication whilst the machine is running – switch off the tractor’s engine and pocket the key before proceeding.

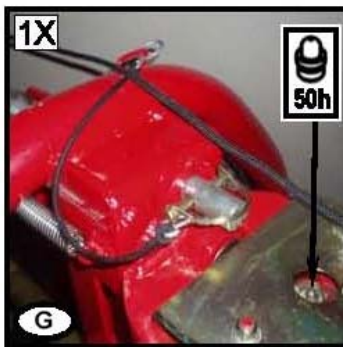
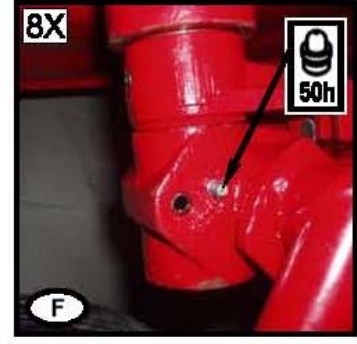
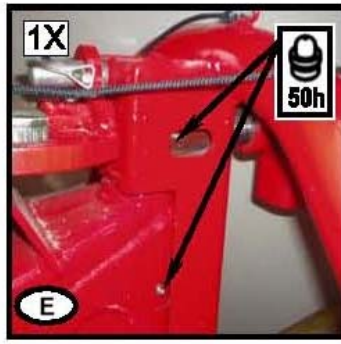
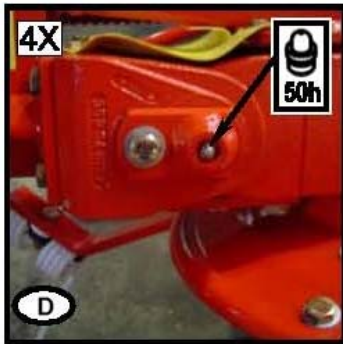
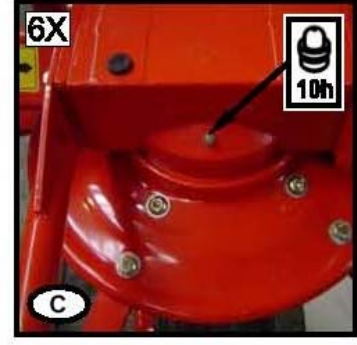
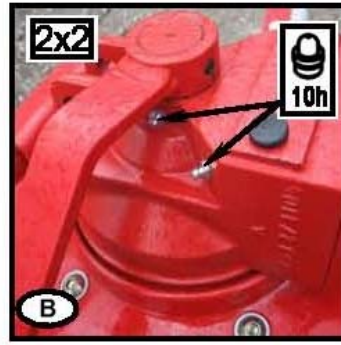
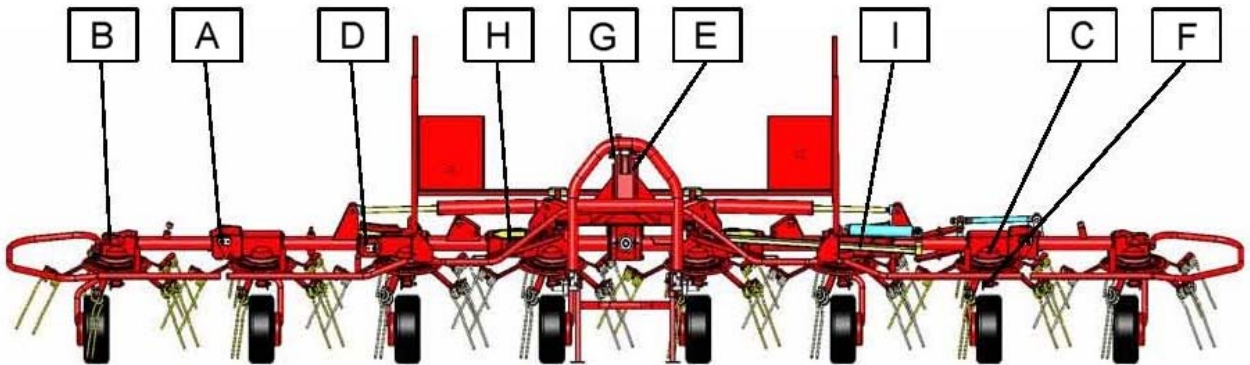
- Check, and tighten if required, all nuts, bolts and fixings after the first few hours of work and at regular intervals thereafter.
- Check daily that the spring tines and their holders are securely fastened.
- Lubricate the PTO shaft as per stated in the manufacturer’s handbook.
- Lubricate rotor drives using LIS 2 grease (or equivalent) every 10 working hours.
- Gearbox uses EP-00 semi liquid grease and should be filled up to the stopper – check levels on a regular basis and top up as required.
- The rotor gear boxes must be lubricated every 10 working hours.
- Check tyre pressures on a regular basis, the correct pressures are;
Tyres 16 x 6,50 -10 (*Centre wheels*) = 2,5 bar.
Tyres 16 x 6,50 - 6 (*Outer wheels*) = 1,5 bar.

Tine Replacement

The illustration below shows the locations and settings of the spring tines. For ease of identification left-hand tines are red and right-hand tines are white.

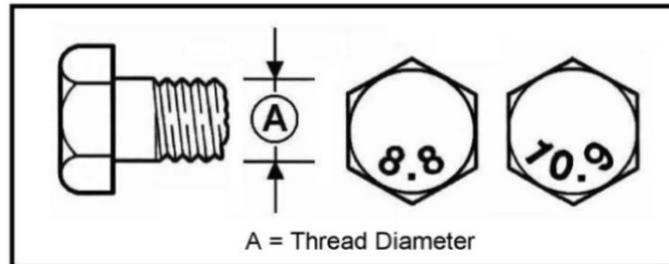


Lubrication Points and Lubrication Frequency



Torque Settings

Unless otherwise stated, nuts and bolts should be torqued to the settings detailed in the chart below. On initial use of a new machine all nuts and bolts should be checked every couple of hours and retightened as necessary, thereafter they should be checked at 50 hour intervals.



A Ø	8.8	10.9	12.9
	M _A (Nm)		
M 5	5,9	8,7	10
M 6	10	15	18
M 8	25	36	43
M 10	49	72	84
M 12	85	125	145
M 14	135	200	235
M 16	210	310	365
M 20	425	610	710
M 24	730	1050	1220
M 27	1100	1550	1800
M 30	1450	2100	2450

Machine Storage

The machine should be stored on a firm level site, preferably in a clean and dry location protected from the elements.

It is advisable that prior to storage at the end of the seasons work that the machine be lubricated thoroughly and the opportunity taken to check the machine for worn or damaged parts; replacements can then be ordered and duly fitted so that the machine is ready and prepared for the next seasons work.

ROTARY TEDDER

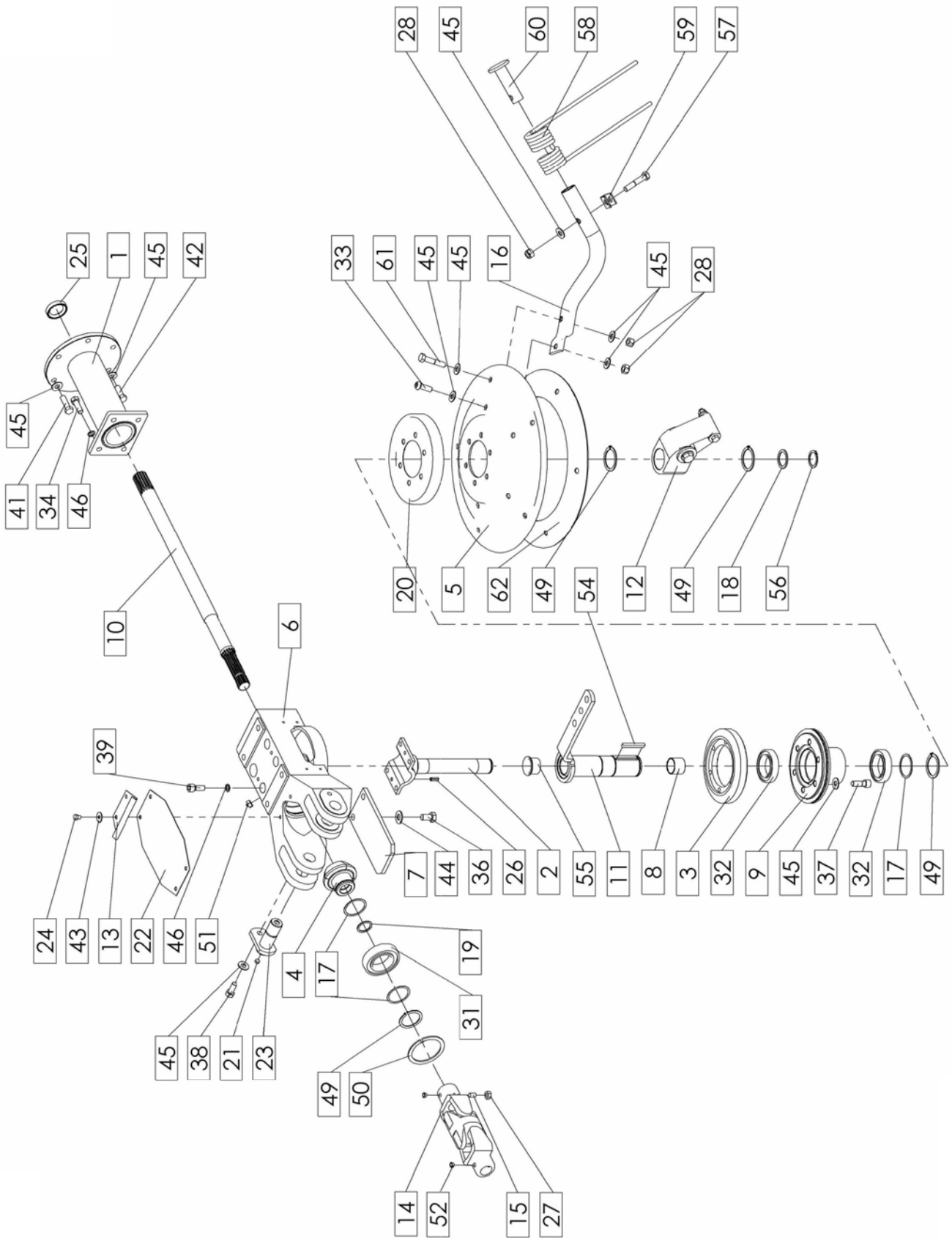
Model: RT815Z

Parts Manual

CONTENTS

Rotor & Drive Assembly (Inner Pair)	1
Gearbox Assembly	5
Shock Absorber	6
Main Frame Assembly	7
Protection Assembly	9
Wheels & Axles	11
Wheel Assembly	13
Rotor & Drive Assembly (Intermediate Inner Pair)	15
Rotor & Drive Assembly (Intermediate Outer Pair)	19
Rotor & Drive Assembly (Outer Pair)	23
Steering Assembly	27
Steering Linkages	29
Steering System	31
Hydraulic System	33
Hydraulic Hoses	35
Guide Wheel Attachment	37

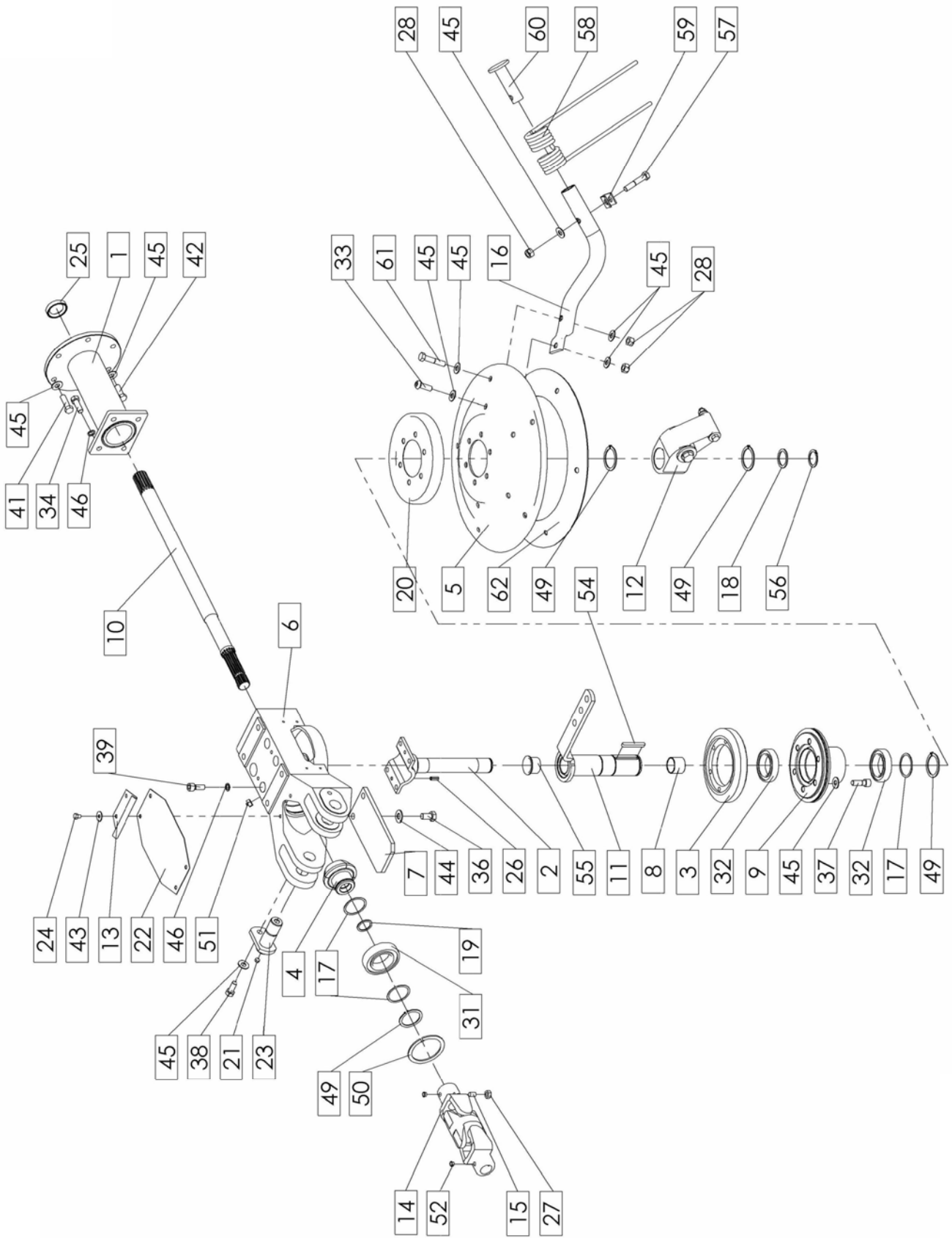
ROTOR & DRIVE ASSEMBLY (Inner Pair)



ROTOR & DRIVE ASSEMBLY (Inner Pair)

REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - DRIVE & ROTOR (1)
1	1	1023197	TUBE - LH
	1	1023198	TUBE - RH
2	1	1022312	AXLE
3	1	1022313	BEVEL GEAR
4	1	1021266	BEVEL GEAR
5	1	1022456	ROTOR PLATE
6	1	1022316	GEARBOX HOUSING 1
	1	1022317	GEARBOX HOUSING 2
7	1	1022146	PLATE
8	1	1022325	SLEEVE
9	1	1022319	FLANGE
10	1	1023199	SHAFT - LH
	1	1023200	SHAFT - RH
11	1	1022318	STEERING TUBE
12	1	1022934	WHEEL HOLDER
13	1	1022181	FIXING PLATE
14	1	1021257	DOUBLE JOINT
15	1	1022160	SCREW
16	5	1022847	SPRING TINE ARM
17	- - -	1021703	SHIM SET
18	1	1021618	SHIM SET
19		1021511	SHIM SET
20	1	1022935	PROTECTION
21	2	1021063	GREASE NIPPLE
22	1	1022297	DUST COVER
23	2	1022178	PIN
24	4	1022182	SCREW
25	1	1022335	OIL SEAL (35x52x10)
	1	1022336	OIL SEAL (50x65x8)
26	2	1022167	ROLL PIN
27	1	1021179	NUT
28	15	1021178	NUT
29	1	1022661	NUT
30	1	1021067	WASHER
31	1	1021253	BEARING
32	2	1022936	BEARING
33	5	1021787	SCREW
34	4	1021990	SCREW
35	1	1022214	SCREW
36	1	1022158	SCREW
37	1	1022327	SCREW
38	2	1022329	SCREW
39	1	1022330	SCREW

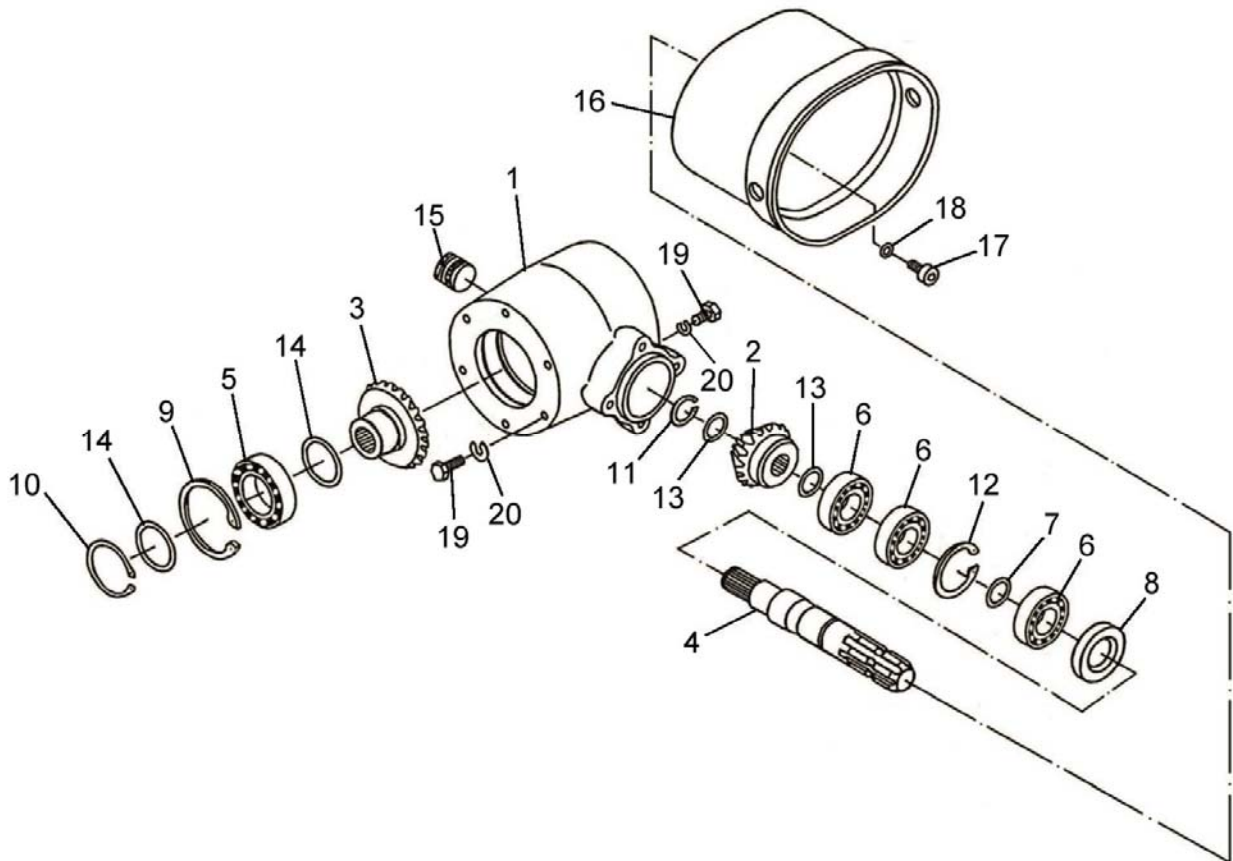
ROTOR & DRIVE ASSEMBLY (Inner Pair)



ROTOR & DRIVE ASSEMBLY (Inner Pair)

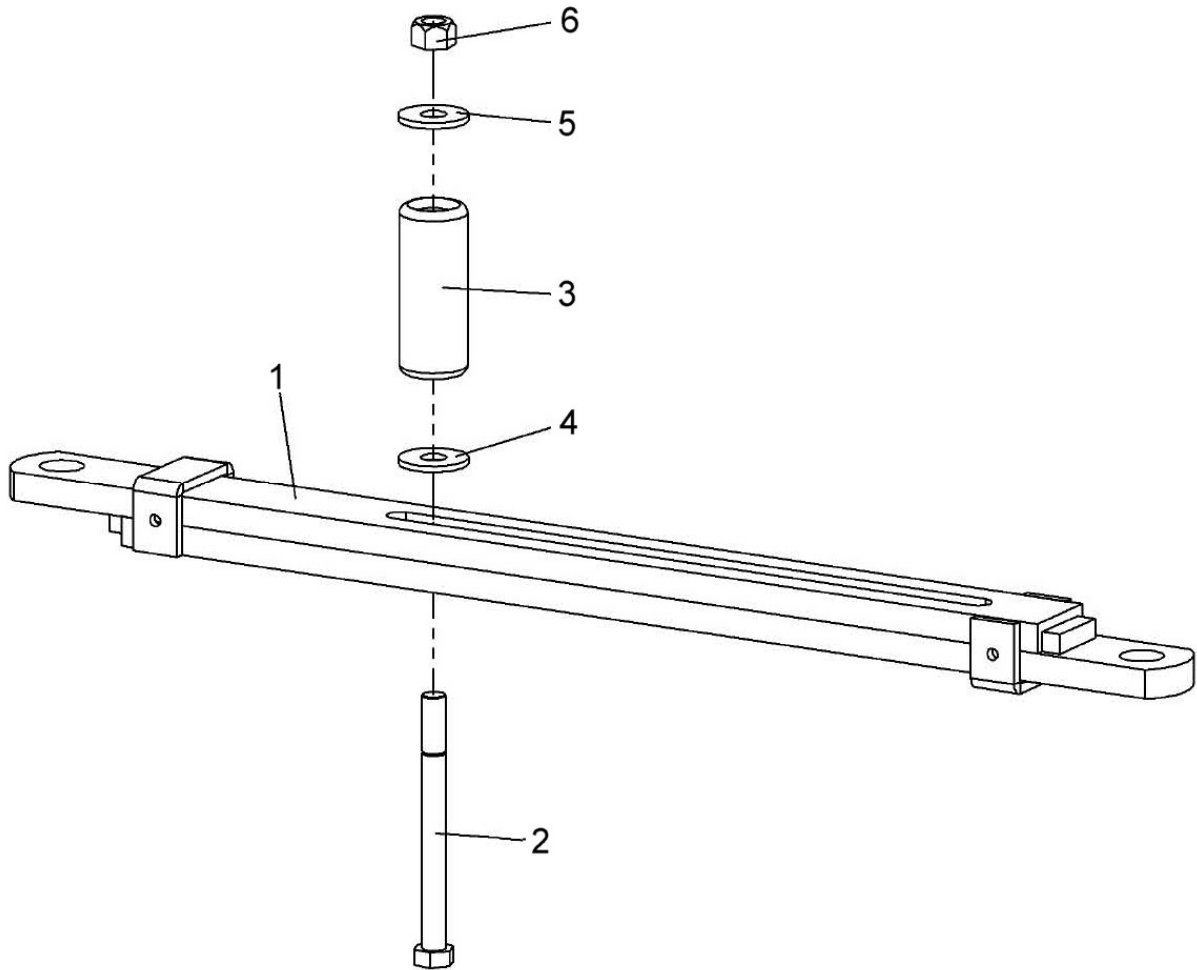
REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - DRIVE & ROTOR (1)
40	1	1021733	SCREW
41	1	1022382	SCREW
42	1	1023201	SCREW
43	1	1022036	WASHER
44	1	1022162	WASHER
45	30	1022417	WASHER
46	5	1022332	WASHER
47	1	1022139	WASHER
48	1	1022217	WASHER
49	4	1022170	CIRCLIP
50	1	1022169	CIRCLIP
51	1	1021222	GREASE NIPPLE
52	1	1022172	PLUG
53	1	1022173	PLUG
54	1	1023202	KEY
55	1	1022323	SLEEVE
56	1	1021080	CIRCLIP
57	5	9213136	SCREW
58	5	1022844	SPRING TINE - LH (RED)
	5	1022845	SPRING TINE - RH (WHITE)
59	5	1021129	TINE CONNECTOR
60	5	1022846	CAP
61	5	1022286	SCREW
62	1	1022933	PLATE

GEARBOX ASSEMBLY



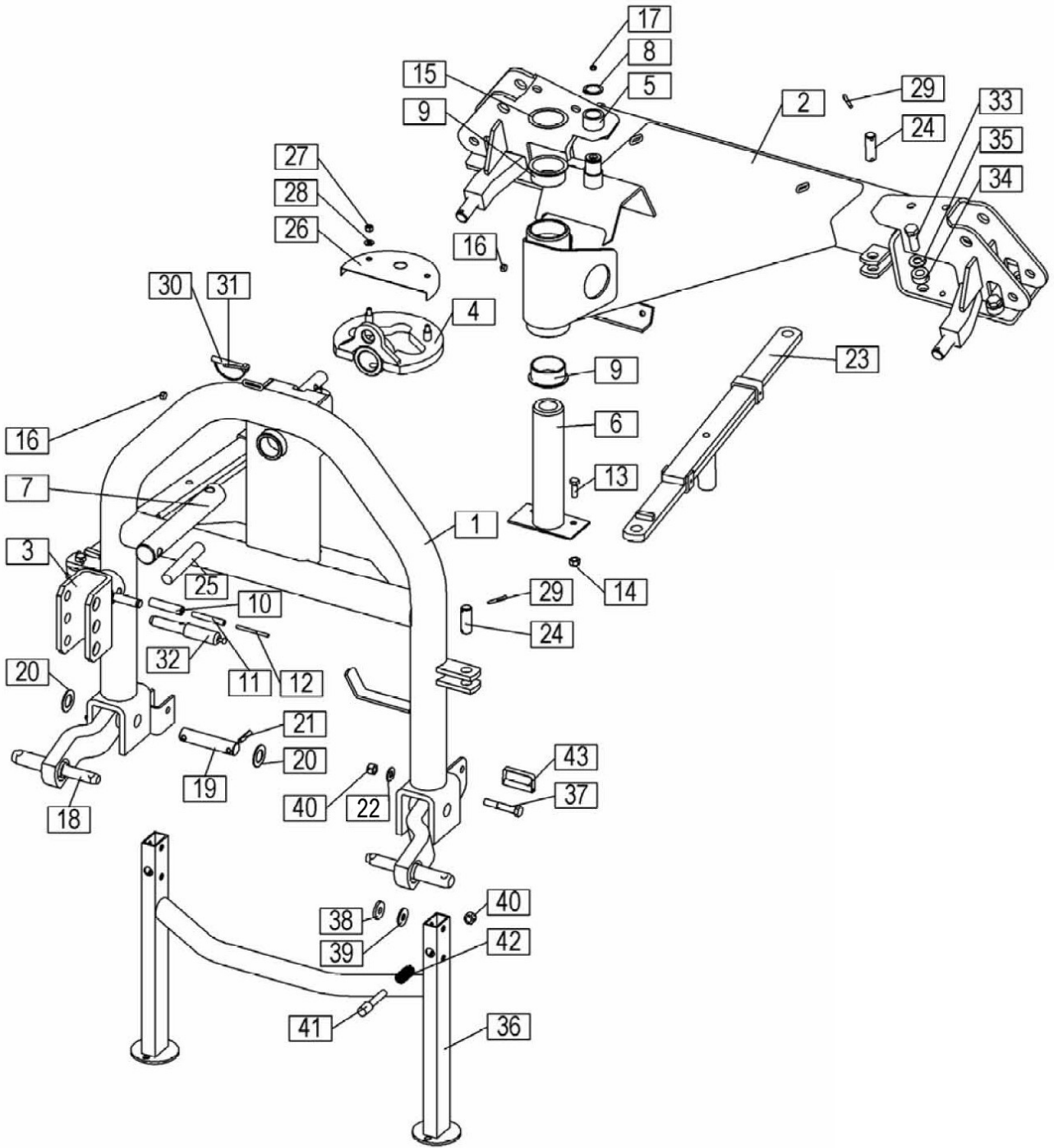
REF.	QTY.	PART No.	DESCRIPTION
RT815Z GEARBOX ASSEMBLY			
1	1	1022364	GEARBOX HOUSING
2	1	1022365	PINION
3	1	1022366	PINION
4	1	1022367	SHAFT
5	1	1022373	BEARING
6	3	1022374	BEARING
7	1	1022377	SLEEVE
8	1	1022375	OIL SEAL
9	1	1022371	CIRCLIP
10	1	1022170	CIRCLIP
11	1	1022372	CIRCLIP
12	1	1021930	CIRCLIP
13	2	1022369	WASHER SET
14	2	1021703	WASHER SET
15	1	1022370	SCREW
16	1	1022483	PTO SHAFT PROTECTION
17	4	1023129	SCREW
18	4	1021070	WASHER
19	8	1023201	SCREW
20	8	1022417	WASHER

SHOCK ABSORBER



REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - SHOCK ABSORBER
1	1	1021280	SHOCK ABSORBER
2	1	1021185	SCREW
3	1	1021184	SPRING
4	1	1021186	WASHER
5	1	1021187	WASHER
6	1	1021178	NUT

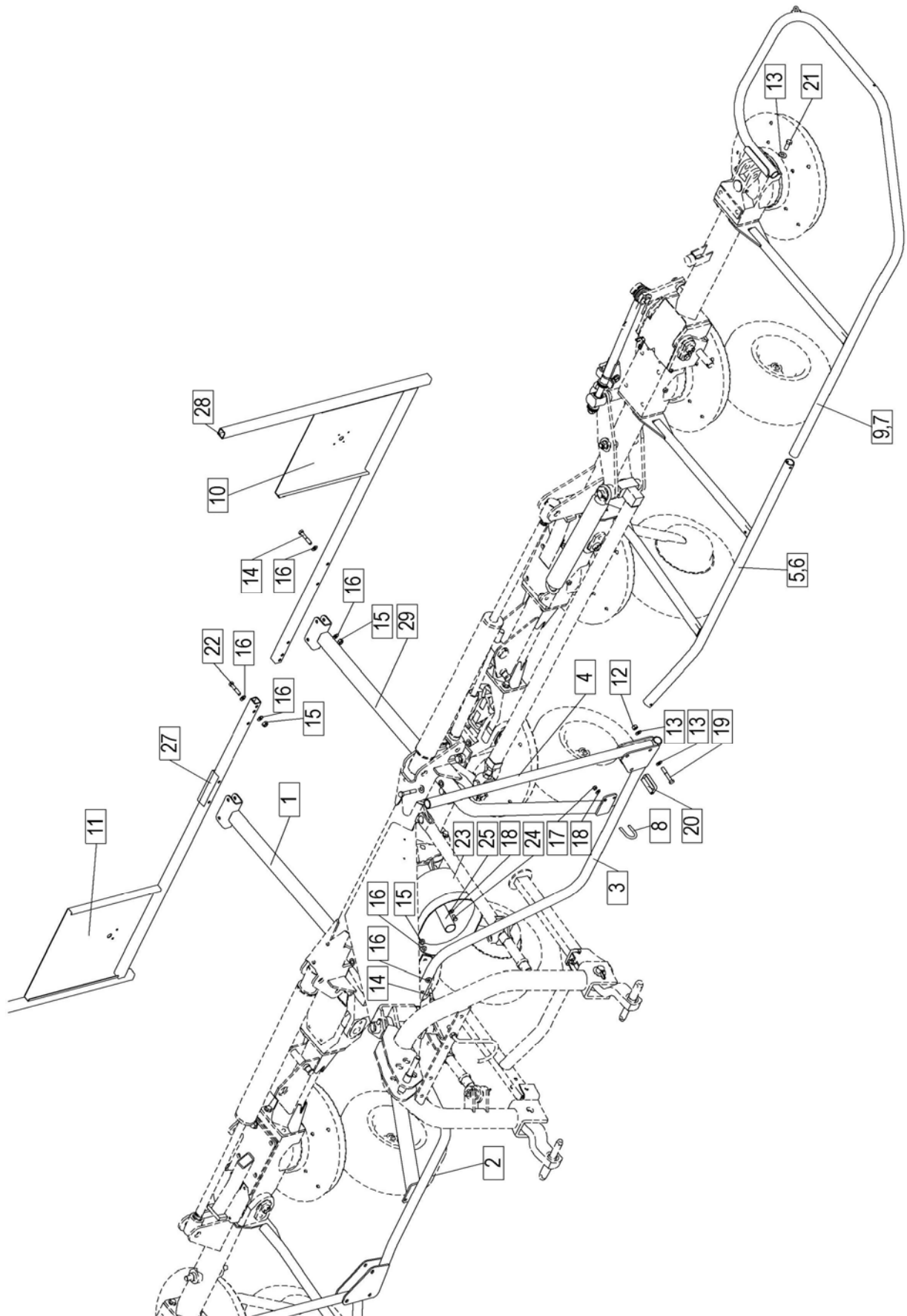
MAIN FRAME ASSEMBLY



MAIN FRAME ASSEMBLY

REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - MAIN FRAME ASSEMBLY
1	1	1023203	HEADSTOCK
2	1	1023204	SUPPORT
3	1	1022460	STRAP
4	1	1021278	GUIDE PLATE
5	1	1022209	SLEEVE
6	1	1021276	SHAFT
7	1	1022210	PIN
8	1	1021062	CIRCLIP
9	2	1021608	PLASTIC SLEEVE
10	2	1021075	TENSION PIN
11	2	1021076	TENSION PIN
12	2	1021077	TENSION PIN
13	2	1021933	SCREW
14	2	1022661	NUT
15	1	1021104	WASHER
16	2	1022647	GREASE NIPPLE
17	1	1021063	GREASE NIPPLE
18	2	1021203	PIN
19	2	1021058	PIN
20	4	1031057	WASHER
21	4	1021059	TENSION PIN
22	2	1022417	WASHER
23	2	1022461	STABILISER COMPLETE
24	4	1022392	PIN
25	1	1021074	SPRING
26	1	1021069	COVER
27	2	1021173	NUT
28	2	1021070	WASHER
29	8	1021240	COTTER PIN
30	1	1021060	LINCH PIN
31	1	1021081	ROPE
32	1	1021729	BOLT & SPRING CLIP
33	8	1021995	SCREW
34	8	1023205	SLEEVE
35	8	1021072	WASHER
36	1	1023206	JACK STAND
37	2	1022484	SCREW
38	2	1021130	WASHER
39	2	1021187	WASHER
40	4	1021178	NUT
41	1	1023207	SPRING PIN
42	1	1023208	SPRING
43	1	1021168	LINCH PIN

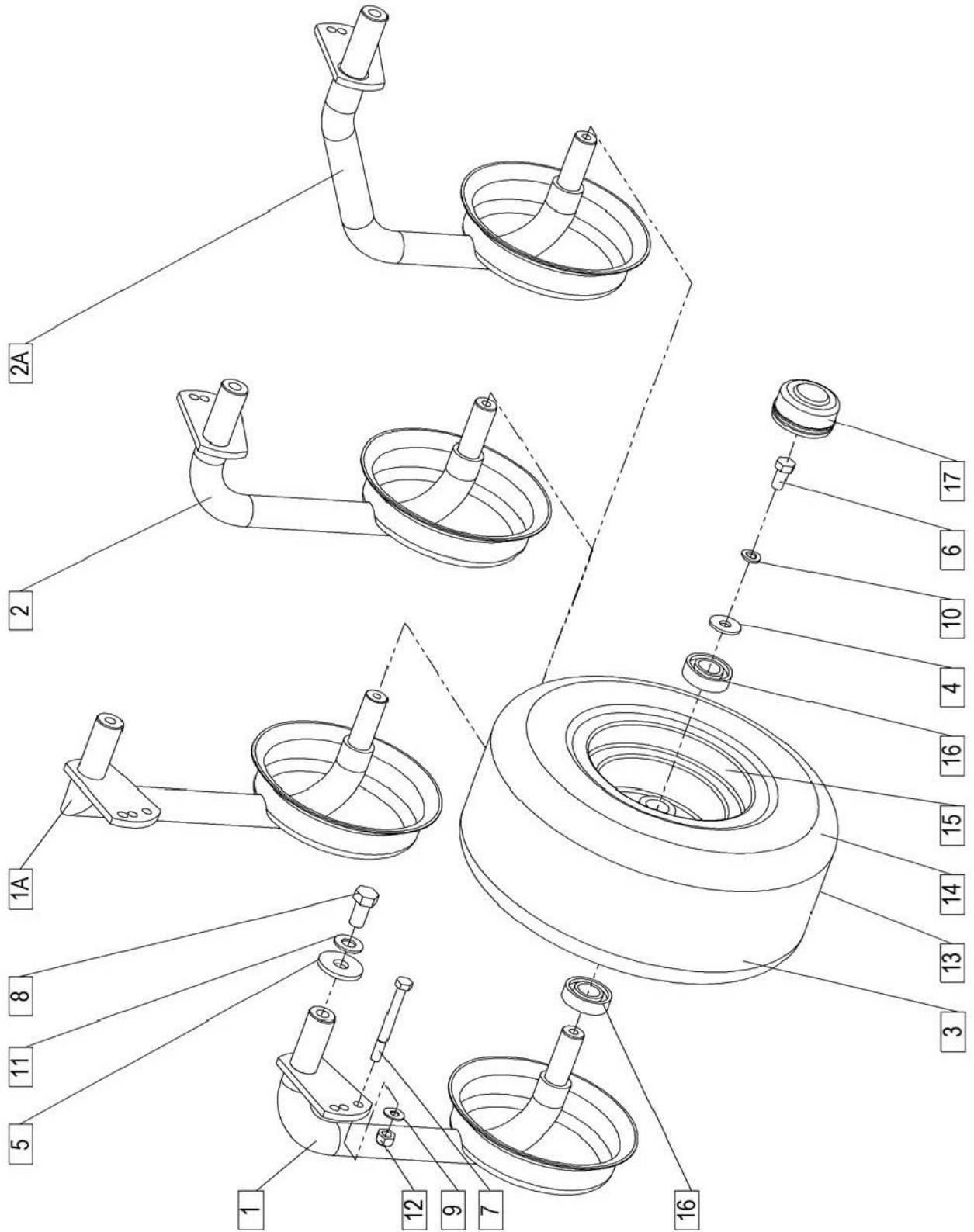
PROTECTION ASSEMBLY



PROTECTION ASSEMBLY

REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - PROTECTION ASSEMBLY
1	2	1022478	TUBE
2	1	1022480	PROTECTION - FRONTSIDE
3	1	1022479	PROTECTION - FRONTSIDE
4	1	1022481	TUBE
5	1	1023209	INNER GUARD
6	1	1023210	INNER GUARD
7	1	1023211	OUTER GUARD
8	2	1022486	CLAMP
9	1	1023212	PROTECTION
10	1	1021298	HOLDER LH
11	1	1021299	HOLDER RH
12	4	1021178	NUT
13	8	1021100	WASHER
14	8	1022288	SCREW
15	12	1022661	NUT
16	24	1021067	WASHER
17	4	1021173	NUT
18	8	1021070	WASHER
19	2	1022286	SCREW
20	2	1021168	LINCH PIN
21	4	1021935	SCREW
22	2	1022090	SCREW
23	1	1022483	PTO SHAFT PROTECTION
24	4	1023129	SCREW
25	1	1022488	HOLDER
26	2	1021856	CABLE TIE
27	2	1022487	U STEEL PROFILE
28	4	1022425	PLUG
29	1	1022477	TUBE

WHEELS & AXLES

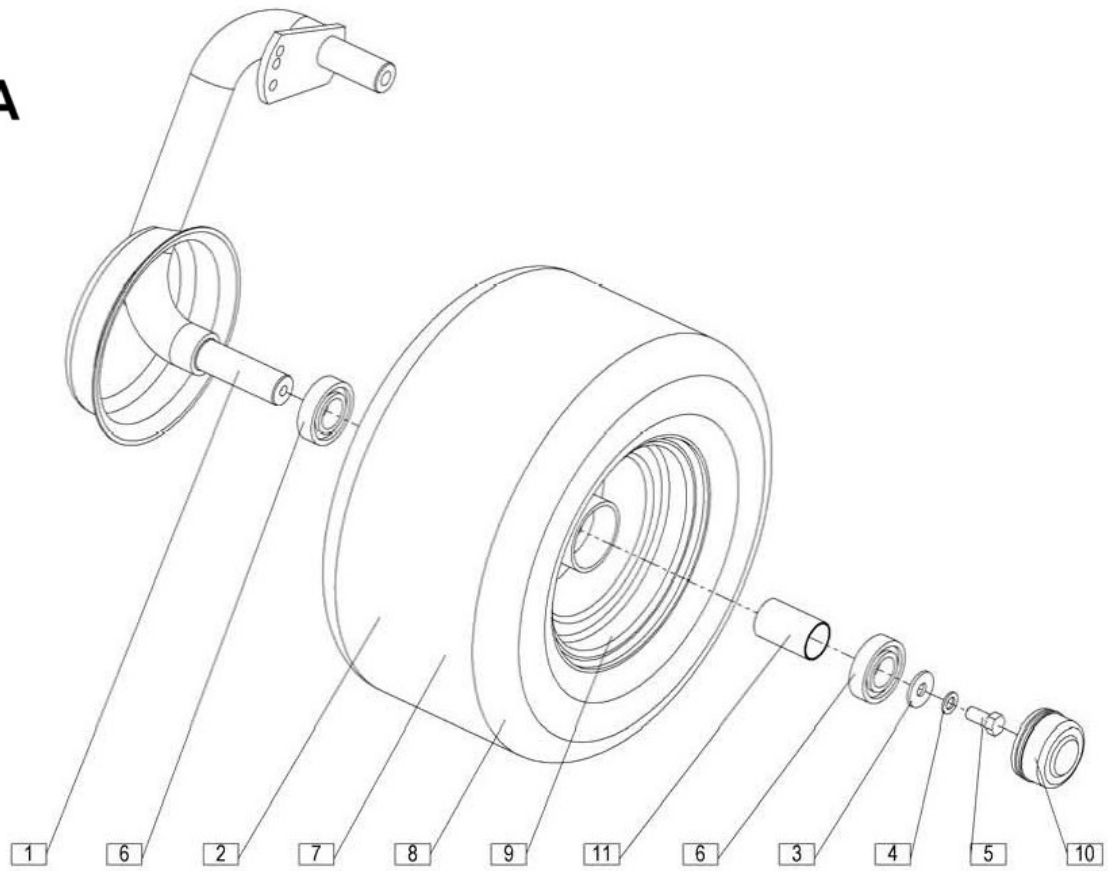


WHEELS & AXLES

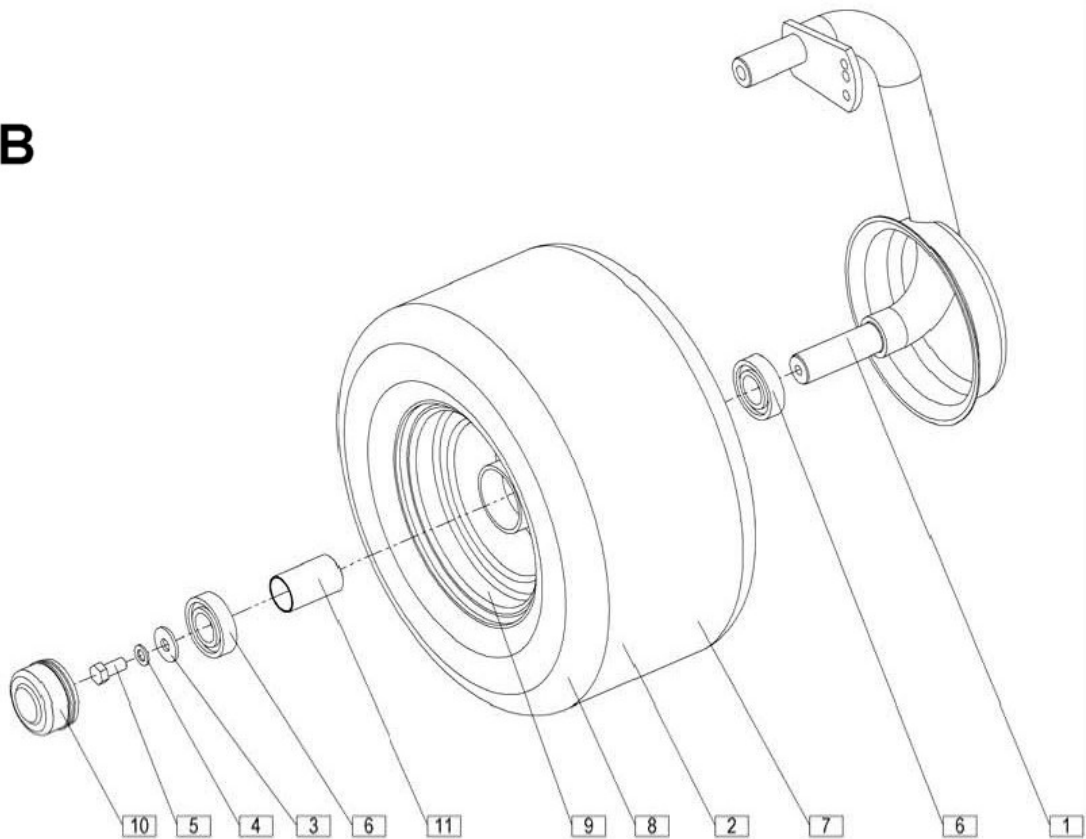
REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - AXLE ASSEMBLY
1	3	1021289	AXLE - R/H
1A	1	1023213	AXLE
2	3	1021290	AXLE - L/H
2A	1	1023214	AXLE
3	6	1021024	WHEEL CPL.
4	6	1021187	WASHER
5	6	1022139	WASHER
6	6	1022225	SCREW
7	6	1021733	SCREW
8	6	1022214	SCREW
9	6	1021067	WASHER
10	6	1021806	WASHER
11	6	1021072	WASHER
12	6	1022661	NUT
13	6	1022438	TYRE
14	4	1021005	TUBE (15x6.00)
	6	1022439	TUBE (16x6.50)
15	6	1022440	RIM
16	12	1021002	BEARING
17	6	1021237	COVER

WHEEL ASSEMBLY

A



B



WHEEL ASSEMBLY

REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - WHEEL ASSEMBLY
1A	1	1023215	AXLE RH
1B	1	1023216	AXLE LH
2	1	1023217	WHEEL
3	1	1021187	WASHER
4	1	1021806	SPRING WASHER
5	1	1022225	SCREW
6	4	1023218	BEARING
7	2	1023219	TYRE
8	2	1023220	TUBE
9	2	1023221	RIM
10	2	1023222	COVER
11	2	1023223	SLEEVE

ROTOR & DRIVE ASSEMBLY (Intermediate Inner Pair)

REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - DRIVE & ROTOR (2)
1	1	1022937	TUBE - MIDDLE
2	1	1022312	AXLE
3	1	1022313	BEVEL GEAR
4	1	1022314	BEVEL GEAR
5	1	1022456	ROTOR PLATE
6	1	1022340	GEARBOX HOUSING - L/H
	1	1022339	GEARBOX HOUSING - R/H
7	1	1022341	LIMITER PLATE
8	1	1022325	SLEEVE
9	1	1022319	HUB
10	1	1023224	SHAFT
11	1	1022318	STEERING TUBE
12	1	1022934	WHEEL HOLDER
13	1	1022349	JOINT
14	5	1022847	SPRING TINE ARM (RED)
15		1021618	WASHER
16		1021511	WASHER SET
17		1022935	PLATE
18		1022176	FORK
19	5	1021072	WASHER
20	2	1022167	TENSION PIN
21	1	1021179	NUT
22	15	1021178	NUT
23	1	1022661	NUT
24	2	1021253	BEARING
25	2	1022936	BEARING
26	1	1021250	BEARING
27	5	1021787	SCREW
28	5	1022214	SCREW
29	2	1022158	SCREW
30	6	1022327	SCREW
31	8	1021990	SCREW
32	4	1022330	SCREW
33	1	1021733	SCREW
34	4	1022182	SCREW
35	1	1022160	SCREW
36	2	1022162	WASHER
37	31	1021100	WASHER
38	12	1022332	WASHER
39	1	1022139	WASHER
40	1	1022036	WASHER
41	1	1021067	WASHER

ROTOR & DRIVE ASSEMBLY (Intermediate Inner Pair)

REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - DRIVE & ROTOR (2)
42	5	1022170	CIRCLIP
43	2	1022169	CIRCLIP
44	1	1022923	CIRCLIP
45	1	1021222	GREASE NIPPLE
46	1	1023225	SLEEVE
47	1	1023226	SLEEVE
48	2	1021108	SLEEVE
49	2	1021026	SLEEVE
50	1	1023227	LIMITER - RH
	1	1023228	LIMITER - LH
51	1	1022344	DUST PROTECTION
52	2	1021703	WASHER SET
53	1	1022326	KEY
54	1	1021080	CIRCLIP
55	1	1022323	SLEEVE
56	5	9213136	SCREW
57	5	1022845	SPRING TINE - R/H (WHITE)
	5	1022844	SPRING TINE - L/H (RED)
58	5	1021129	TINE CONNECTOR
59	5	1022846	CAP
60	5	1022286	SCREW
61	1	1022933	LOWER PLATE

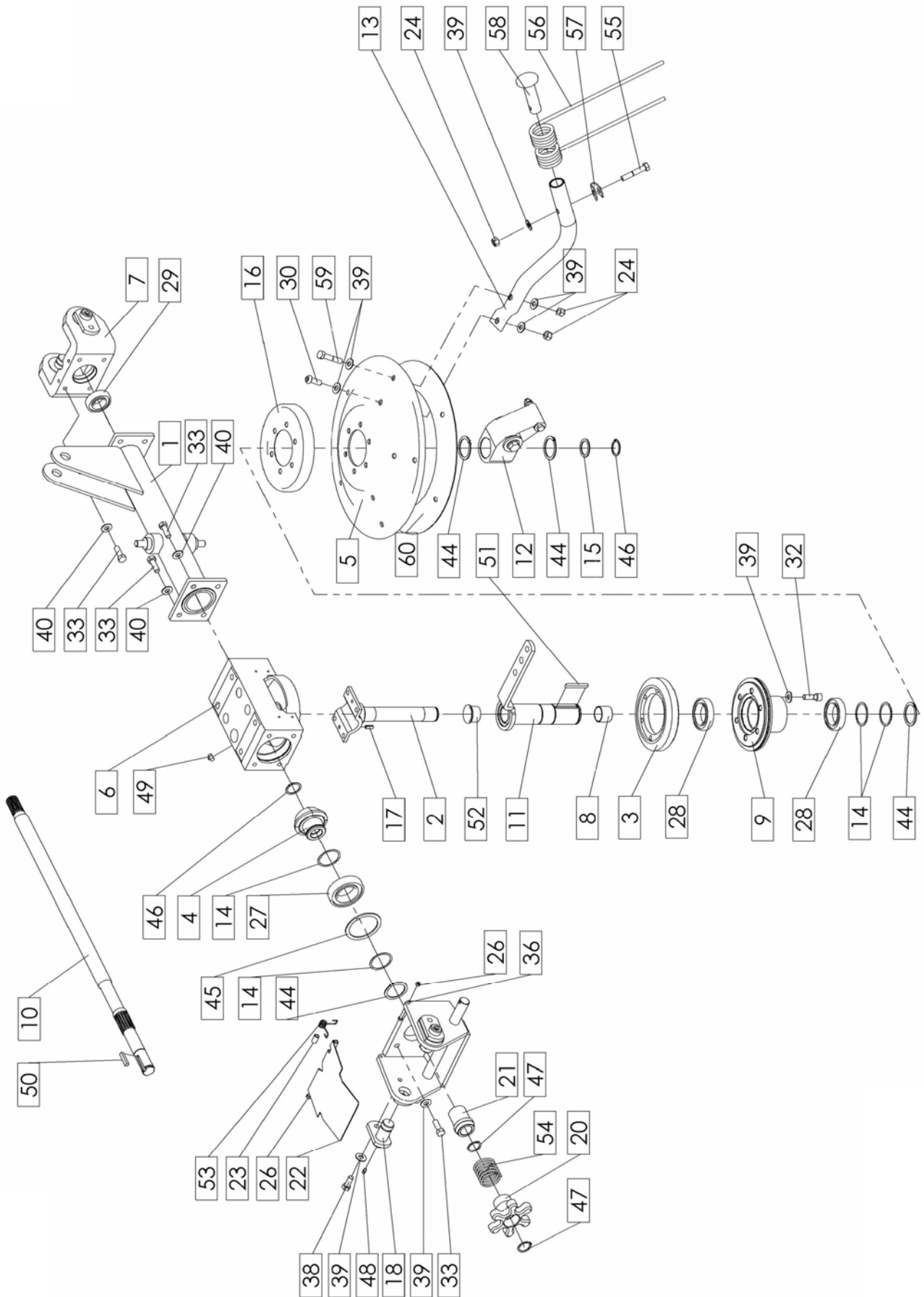
ROTOR & DRIVE ASSEMBLY (Intermediate Outer Pair)

REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - DRIVE & ROTOR (3)
1	1	1023229	TUBE
2	1	1022312	AXLE
3	1	1022313	BEVEL GEAR
4	1	1022314	BEVEL GEAR
5	1	1022456	ROTOR PLATE
6	1	1023230	GEARBOX HOUSING
7	1	1022354	FORK
8	1	1022325	SLEEVE
9	1	1022319	FLANGE
10	1	1023231	SHAFT
11	1	1022318	STEERING TUBE
12	1	1022934	WHEEL HOLDER
13	5	1022847	SPRING TINE ARM (RED)
14	- - -	1021703	WASHER SET
15	1	1021618	WASHER
16	1	1022935	PROTECTION PLATE
17	1	1022167	TENSION PIN
18	4	1022361	PIN
19	1	1023234	FORK
20	1	1023235	FORK
21	1	1023236	SLEEVE
22	1	1023237	FORK PROTECTION
23	1	1023238	SLEEVE
24	15	1021178	NUT
25	1	1021829	NUT
26	2	1022582	NUT
27	1	1021253	BEARING
28	2	1022936	BEARING
29	1	1021250	BEARING
30	5	1021787	SCREW
31	1	1022214	SCREW
32	1	1022327	SCREW
33	12	1021990	SCREW
34	4	1022330	SCREW
35	1	1021733	SCREW
36	1	1022581	SCREW
37	1	1023229	SCREW
38	4	1022157	SCREW
39	39	1022417	WASHER
40	12	1022332	WASHER
41	1	1022139	WASHER

ROTOR & DRIVE ASSEMBLY (Intermediate Outer Pair)

REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - DRIVE & ROTOR (3)
42	1	1022217	WASHER
43	1	1021067	WASHER
44	4	1022170	CIRCLIP
45	1	1022169	CIRCLIP
46	2	1022923	CIRCLIP
47	2	1023230	CIRCLIP
48	4	1021063	GREASE NIPPLE
49	1	1021222	GREASE NIPPLE
50	1	1023231	KEY
51	1	1022326	KEY
52	1	1022323	SLEEVE
53	1	1023232	SPRING
54	1	1023233	SPRING
55	5	9213136	SCREW
56	5	1022844	SPRING TINE - L/H (RED)
	5	1022845	SPRING TINE - R/H (WHITE)
57	5	1021129	TINE CONNECTOR
58	5	1022846	CAP
59	5	1022286	SCREW
60	1	1022933	LOWER PLATE

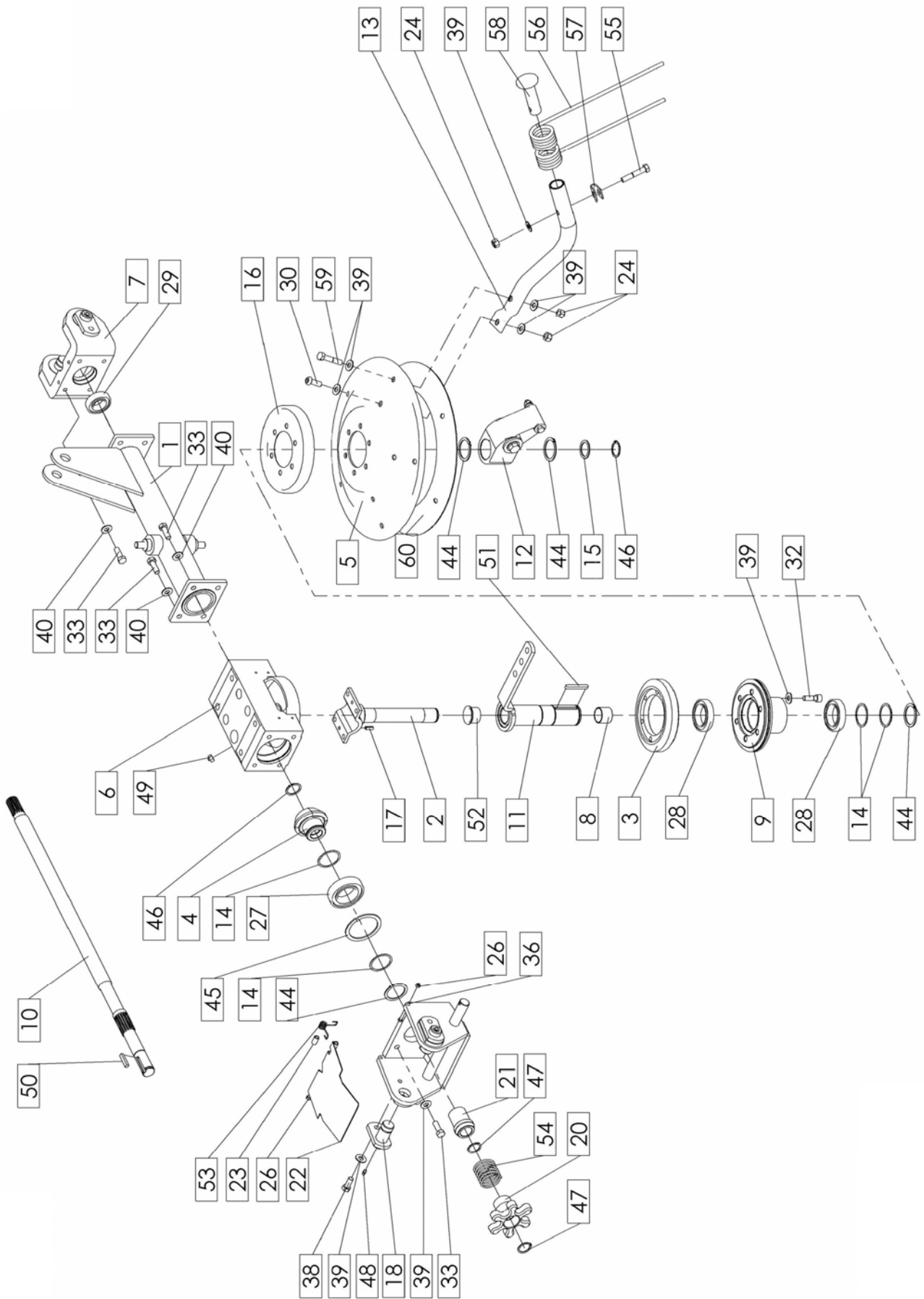
ROTOR & DRIVE ASSEMBLY (Outer Pair)



ROTOR & DRIVE ASSEMBLY (Outer Pair)

REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - DRIVE & ROTOR (4)
1	1	1023234	HOLDER LH
	1	1023235	HOLDER RH
2	1	1022352	AXLE
3	1	1023236	SHAFT
4	1	1022355	GEARBOX HOUSING
5	1	1021260	BEVEL GEAR
6	1	1022314	BEVEL GEAR
7	1	1021285	ROTOR PLATE
8	1	1022122	FLANGE
9	1	1022939	WHEEL HOLDER
10	1	1022358	SLEEVE
11	1	1021703	WASHER SET
12	1	1021124	WASHER SET
13	1	1022154	PROTECTION
14	15	1021178	NUT
15	5	1022847	SPRING TINE ARM (RED)
16	1	1023237	SPACER
17	1	1023238	BEARING
18	1	1021253	BEARING
19	2	1022193	BEARING
20	1	1022166	TENSION PIN
21	1	1022360	TENSION PIN
22	1	1022165	TENSION PIN
23	1	1022168	TENSION PIN
24	1	1022214	SCREW
25	1	1021733	SCREW
26	6	1022156	SCREW
27	4	1021990	SCREW
28	5	1021787	SCREW
29	1	1021829	NUT
30	35	1021100	WASHER
31	1	1021067	WASHER
32	1	1021072	WASHER
33	1	1022139	WASHER
34	1	1022170	CIRCLIP
35	1	1022169	CIRCLIP
36	1	1023230	CIRCLIP
37	2	1023239	SLEEVE
38	1	1023240	FORK
39	1	1023241	KEY
40	1	1023242	REFLECTOR
41	2	1021222	GREASE NIPPLE

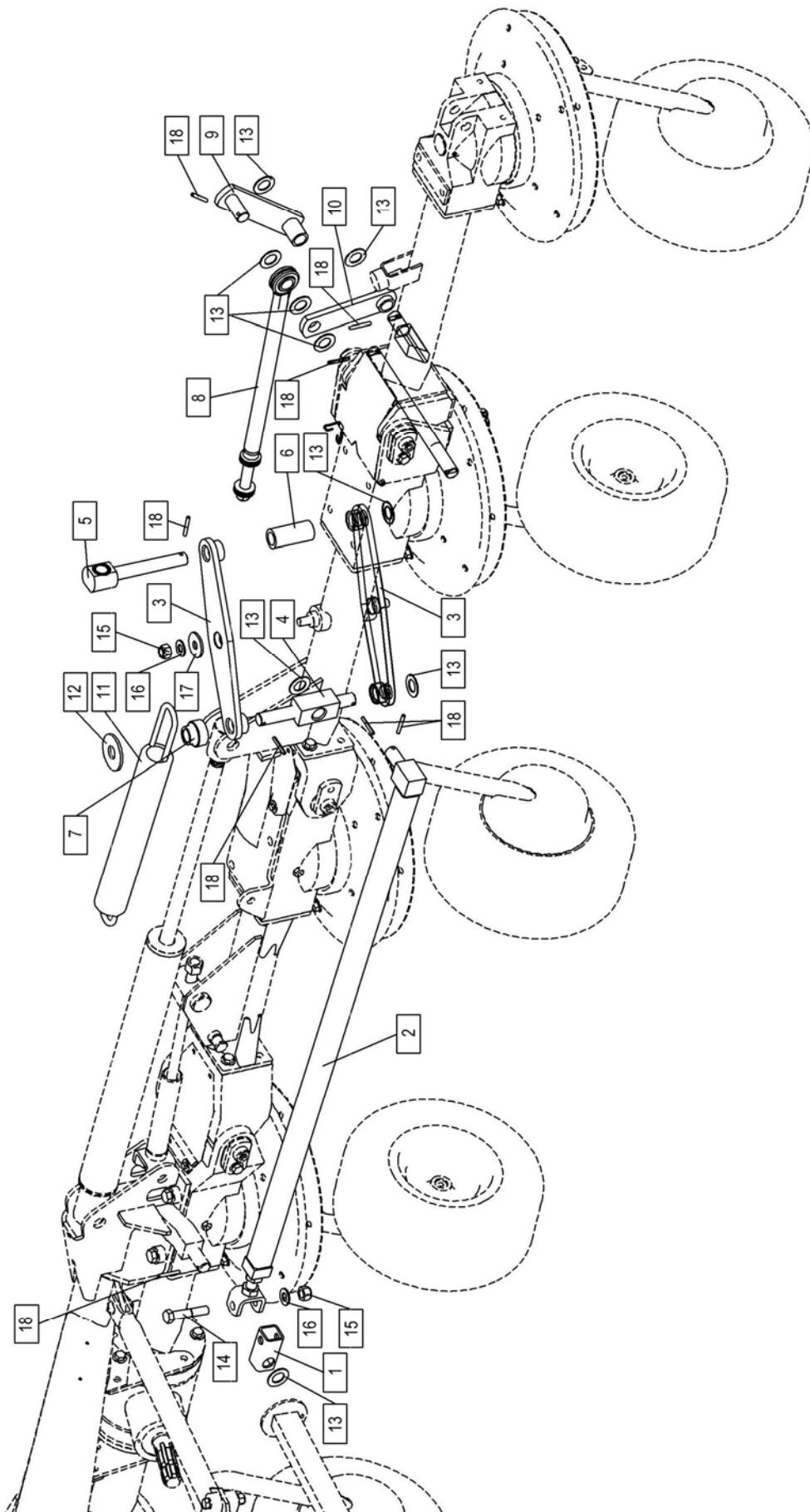
ROTOR & DRIVE ASSEMBLY (Outer Pair)



ROTOR & DRIVE ASSEMBLY (Outer Pair)

REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - DRIVE & ROTOR (4)
42	1	1023243	CIRCLIP
43	1	1022357	PLATE
44	1	1022362	OIL SEAL
45	5	9213136	SCREW
46	5	1022845	SPRING TINE - R/H (WHITE)
	5	1022844	SPRING TINE - L/H (RED)
47	5	1021129	TINE CONNECTOR
48	5	1022846	CAP
49	5	1022286	SCREW
50	1	1022933	LOWER PLATE

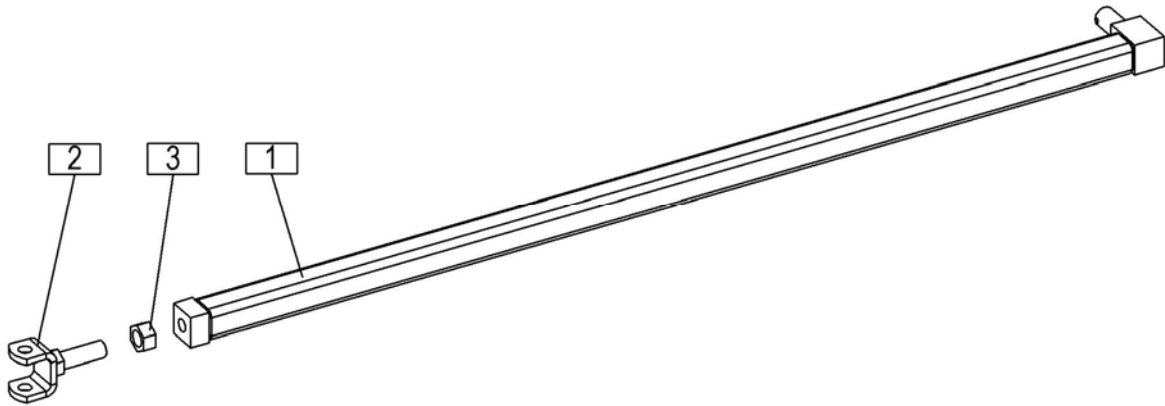
STEERING ASSEMBLY



STEERING ASSEMBLY

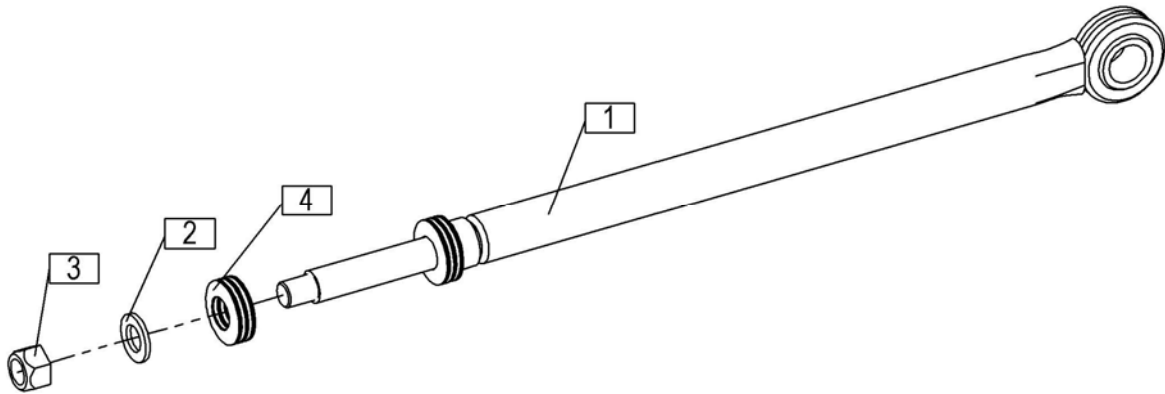
REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - STEERING ASSEMBLY
1	1	1022470	STEERING ROD 1
2	1	1022471	STEERING ROD 2
3	1	1023267	STEERING ROD 3
4	1	1023268	STEERING ROD 4
5	1	1022426	PIN
6	4	1021125	PLASTIC PLUG
7	4	1022331	PROTECTION BRUSH CPL.
8	1	1022429	STEERING CYLINDER
9	1	1022430	STEERING CYLINDER HOLDER
10	5	1021153	WASHER
11	1	1022413	PIN
12	6	1022414	TENSION PIN
13	1	1022431	CLIP
14	1	1021803	SCREW
15	1	1022333	WASHER
16	1	1022433	SCREW
17	1	1022661	NUT
18	1	1022949	PIN
19	1	1021629	WASHER
20	1	1022474	INDICATOR
21	2	1021586	WASHER
22	1	1022425	PLASTIC PLUG
23	1	1022475	CLAMP
24	1	1022476	NUT
25	1	1022432	SLEEVE
26	1	1022435	PACKING
27	1	1022473	FORK
28	1	1022434	TUBE
29	1	1022398	TAP
30	1	1021963	CLIP
31	1	1022428	NUT

STEERING LINKAGE ROD



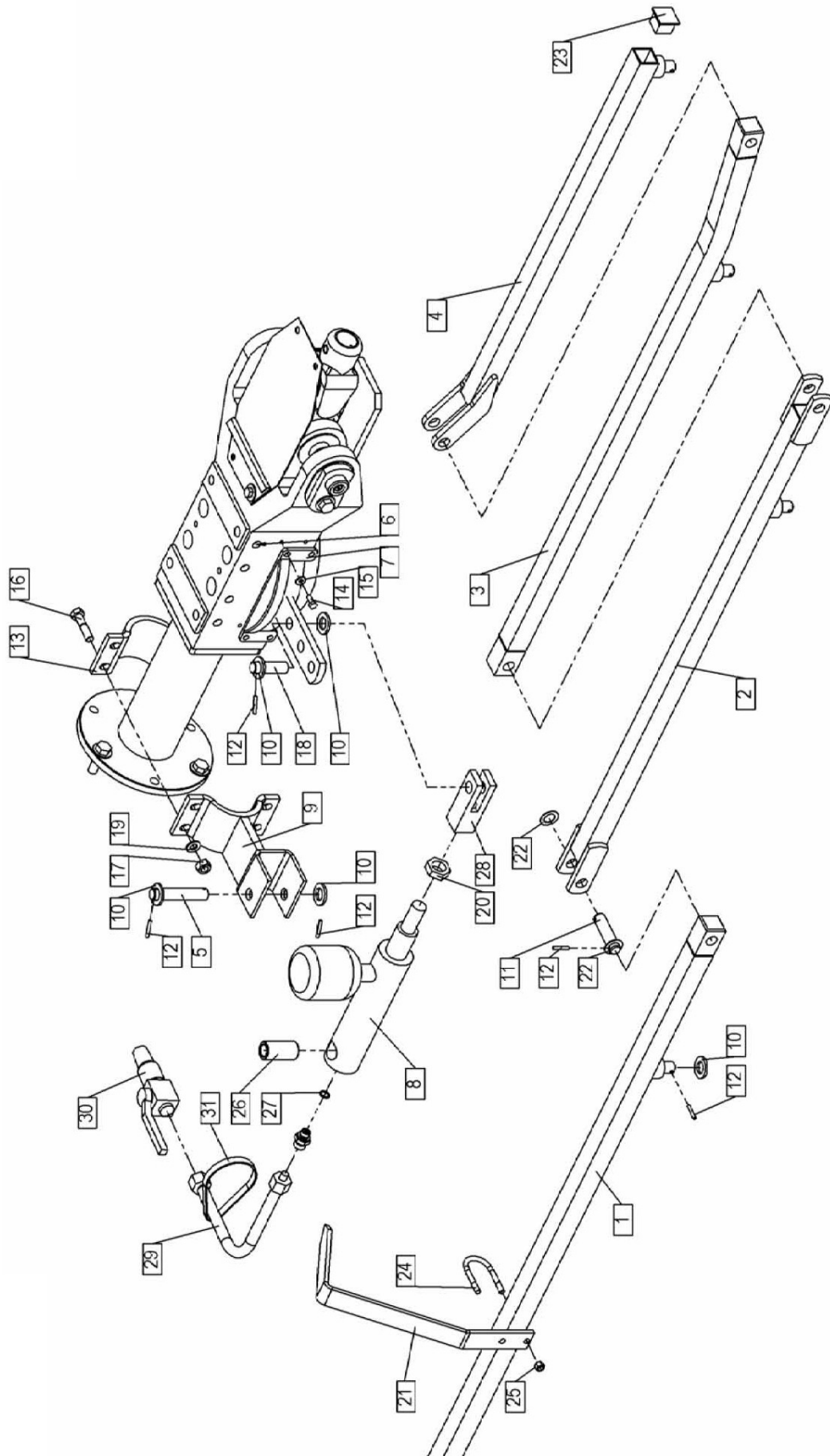
REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - LINK ROD ASSEMBLY
1	1	1023259	LINK BAR
2	1	1023260	U STRAP
3	1	1021902	NUT

STEERING LINKAGE BAR



REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - LINK BAR ASSEMBLY
1	1	1023261	LINK END
2	1	1021153	WASHER
3	1	1021224	NUT
4	12	1023262	SPRING PLATE

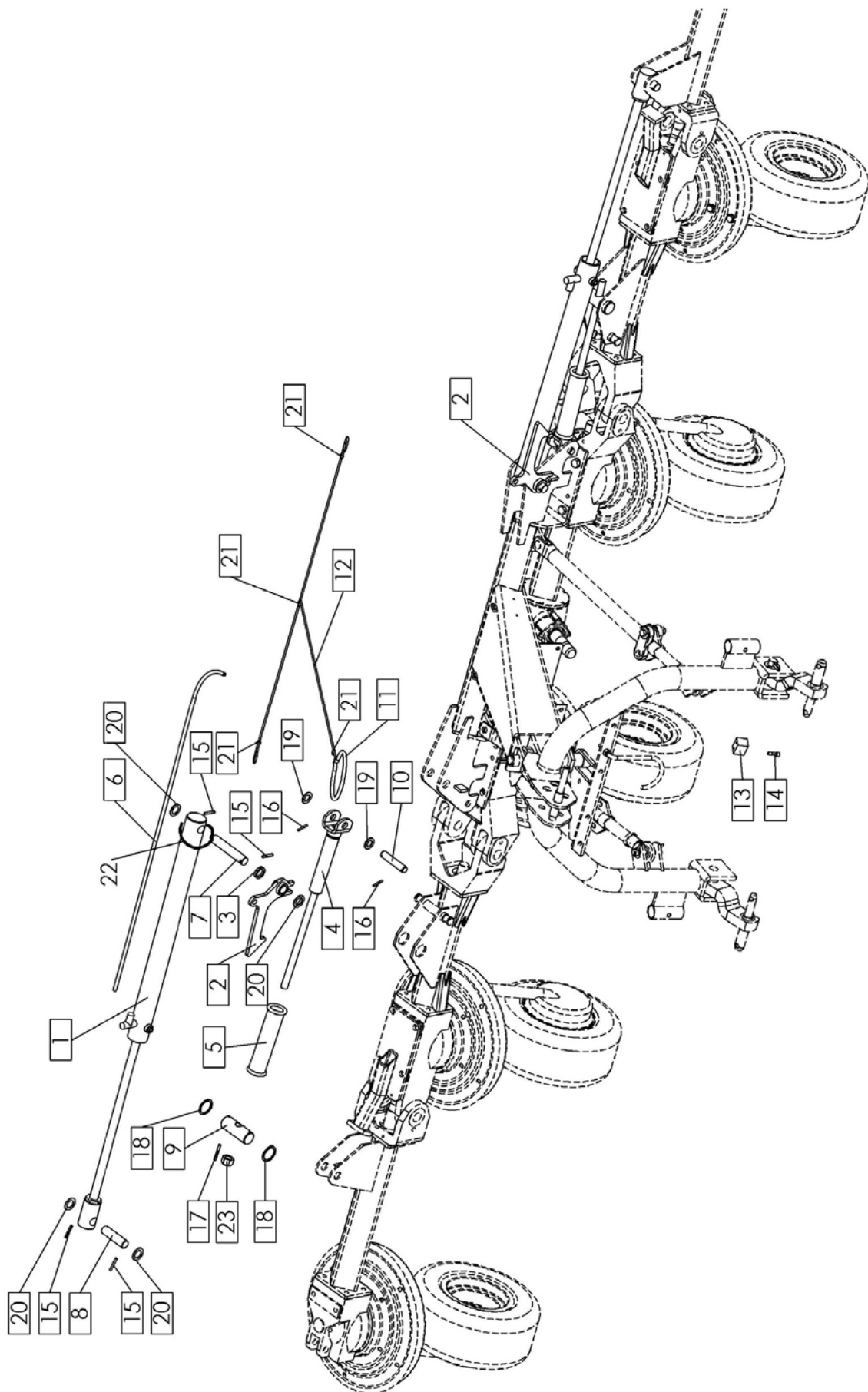
STEERING SYSTEM



STEERING SYSTEM

REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - STEERING ASSEMBLY
1	1	1022470	STEERING ROD 1
2	1	1022471	STEERING ROD 2
3	1	1023267	STEERING ROD 3
4	1	1023268	STEERING ROD 4
5	1	1022426	PIN
6	4	1021125	PLASTIC PLUG
7	4	1022331	PROTECTION BRUSH CPL.
8	1	1022429	STEERING CYLINDER
9	1	1022430	STEERING CYLINDER HOLDER
10	5	1021153	WASHER
11	1	1022413	PIN
12	6	1022414	TENSION PIN
13	1	1022431	CLIP
14	1	1021803	SCREW
15	1	1022333	WASHER
16	1	1022433	SCREW
17	1	1022661	NUT
18	1	1022949	PIN
19	1	1021629	WASHER
20	1	1022428	NUT
21	1	1022474	INDICATOR
22	2	1021586	WASHER
23	1	1022425	PLASTIC PLUG
24	1	1022475	CLAMP
25	1	1022476	NUT
26	1	1022432	SLEEVE
27	1	1022435	PACKING
28	1	1022473	FORK
29	1	1022434	TUBE
30	1	1022398	TAP
31	1	1021963	CLIP

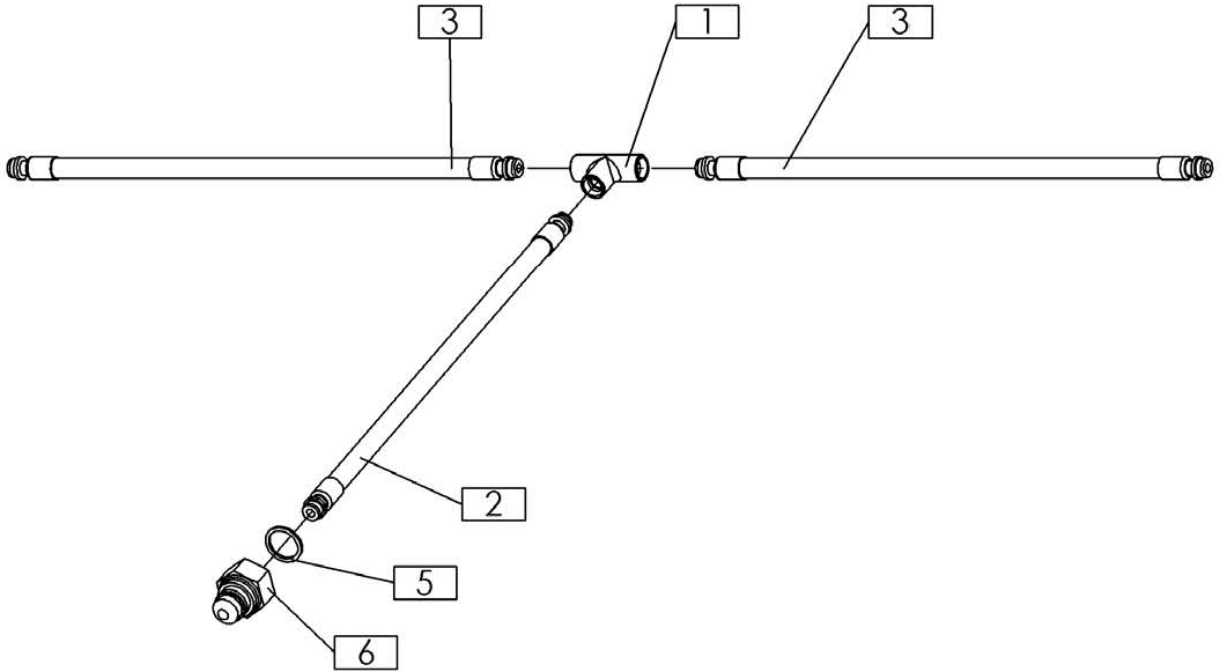
HYDRAULIC SYSTEM



HYDRAULIC SYSTEM

REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - HYDRAULIC SYSTEM
1	2	1023263	HYDRAULIC RAM
2	1	1023264	HOOK
3	2	1022941	SLEEVE
4	2	1023265	SPRING GUIDE
5	2	1021284	SPRING
6	1	1022463	HOSE SET
7	2	1021295	PIN
8	2	1021296	PIN
9	2	1021297	PIN
10	2	1022464	PIN
11	1	1021863	HOSE PLASTIC
12	4900mm	1022465	ROPE
13	2	1022942	HOSE CLAMP
14	4	1023266	SCREW
15	8	1022350	TENSION PIN
16	4	1022222	TENSION PIN
17	4	1022466	TENSION PIN
18	4	1022467	WASHER
19	4	1021181	WASHER
20	8	1021906	WASHER
21	4	1022422	CLAMP
22	2	1022975	BINDING CLIP
23	2	1022469	NUT

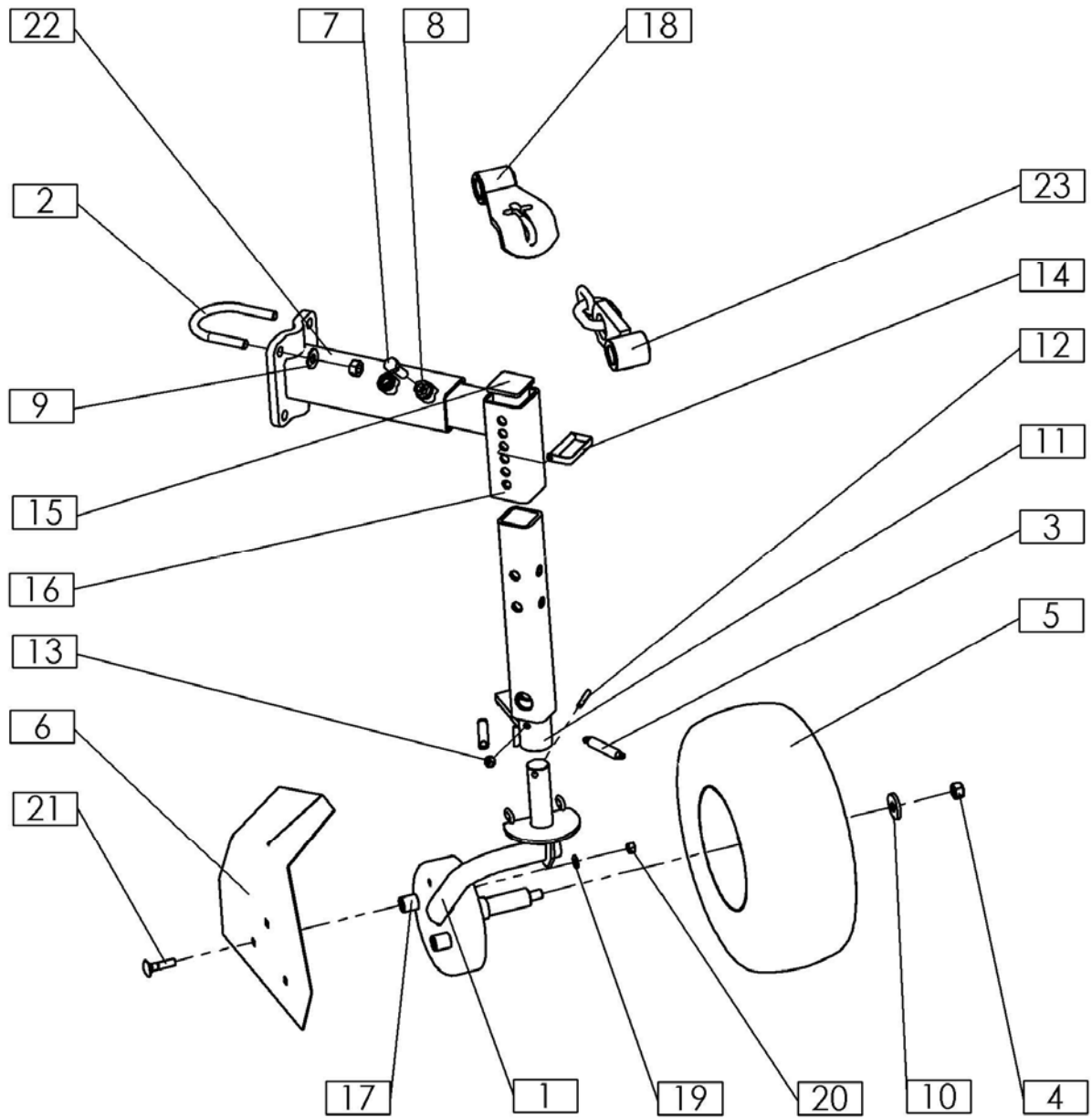
HYDRAULIC HOSES



HYDRAULIC HOSES

REF.	QTY.	PART No.	DESCRIPTION
			RT815Z - HYDRAULIC HOSES
1	1	1022818	T CONNECTION
2	1	1022947	HOSE
3	2	1021301	HOSE
4	1	1021741	WASHER
5	1	1021742	PLUG

GUIDE WHEEL ATTACHMENT



GUIDE WHEEL ATTACHMENT

REF.	QTY.	PART No.	DESCRIPTION
			GUIDE WHEEL ATTACHMENT
1	1	1021175	WHEEL BOW
2	1	1021597	CLAMP
3	2	1021171	SPRING
4	1	1021178	NUT
5	1	1021256	WHEEL ASSEMBLY
6	1	1021176	PROTECTION
7	1	1022236	SCREW
8	2	1022419	NUT
9	1	1021100	WASHER
10	1	1021163	WASHER
11	1	1021177	HOLDER
12	1	1022630	PIN
13	1	1021064	GREASE NIPPLE
14	1	1021168	SPRING PIN
15	1	1021167	PLASTIC 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	1021595	TUBE
23	1	1022633	CHAIN

