

# ORBITAL SPREADER

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**INTRODUCTION**

The orbital spreader comes complete with the Keenan reputation for engineering excellence and unrivalled back up service. The Orbital is the answer to the most demanding spreading tasks and the only spreader available which can handle materials as diverse in their consistency as strawy manures, factory sludges, sewage cakes, poultry litters right through to lagoon slurry.

The simple flywheel design is the key to the machines ability; quite simply it can spread any material loaded into the machine and the smooth hydraulic pushing ensures consistent feed to the flywheel at all times.

With the majority of weight transfer on the drawbar, and the movement of the load from back to front, excellent pulling traction is afforded and low ground pressure tyres complete the formula to ensure minimum ground compaction.

Overall the Keenan Orbital Spreader's innovative design is a breakthrough in spreading technology, allowing the user to maximise the effectiveness of spreading operations. Please study the following guidelines to ensure that the machine potential can be fully utilised.

**SAFETY**

The Orbital Spreader has many safety features built into its design but its ultimate safe operation is down to the individual and his understanding of the potential safety problems.

The following points are guidelines only, please be vigilant at all times.

- 1 Use only a PTO shaft with a properly fitted safety guard, overrun clutch and shearbolt.
- 2 Do not permit any passengers on the spreader.
- 3 Always connect the PTO shaft with the shear bolt end to the tractor.
- 4 Always make sure that all covers/guards are fitted and locked closed.
- 5 Ensure all trailing leads, hoses etc. are well clear of the PTO.
- 6 Ensure the spreader and the immediate area surrounding it are clear of people before commencing operation.
- 7 Never remove chain guards or get into spreader when it is connected to the tractor.
- 8 Regularly inspect all chains, sprockets and moving parts for wear and check all nuts and bolts for tightness.
- 9 Do not exceed speeds of 15Km per hour.
- 10 Ensure slurry door is lowered and PTO disengaged when loading.

Please observe the recommendations of the Agricultural Code of Good Practice and any other local regulations with regard to environmental considerations.

Note: Incorrectly fitted tyres are dangerous. Please make sure tyre repairs are carried out by experienced tyre fitters.

**Keenan Orbital Warranty Policy**

Richard Keenan & Co. Ltd. Shall undertake to correct by repair or replacement at the companies option, any defect of material or workmanship, which occurs within the first 12 months after the date of commissioning, post - sale.

The warranty shall not apply to:

- i Machines used by a third party\*, who will not have had instruction in the correct use of the machines by an official company representative.
- ii Machines which have sustained damage through general wear and tear, neglect or use, for which the machines were not intended.
- iii Bearings, sprockets, chains, flywheel and components thereof, breaker tines, hammers and other wearing parts unless evidence of immediate working failure can be furnished.
- iv Any consumable or perishable parts such as knives, blades, rubber seals, hydraulic components, shearbolts, brake liners, electric components and running gear, unless evidence of immediate working failure can be furnished.
- v Any machine on which the identification marks have been removed or altered.
- vi Any machine that has not received effective routine maintenance using recommended Keenan products as laid down in the operators manual.
- vii Any machine that has received repairs or modifications by persons unauthorised by Richard Keenan & Co. Ltd which in the companies' judgement has affected the performance or reliability of the machine.
- viii Any machines fitted with spurious or non-genuine spare parts and attachments.
- ix Machines damaged in transit, whilst being loaded or unloaded on premises other than those owned by Richard Keenan & Co Ltd.

Parts, which may be defective or may have failed must be retained on site pending further investigation, as they may need to be inspected in situ by a company representative.

The sole and exclusive claim against Richard Keenan & Co Ltd, made by the first or subsequent user, shall be for the repair or replacement of defective parts. No other claim including, but not limited to incidental, indirect or consequential damages for lost profits, lost sales, injury, property loss or damage or any other loss sustained, shall be available.

Oral statements, made by any person(s) including dealers and representatives of Richard Keenan & Co Ltd., which are inconsistent or conflicting with these conditions, shall not constitute warranties unless given in writing and signed by a Director of Richard Keenan & Co Ltd.

**Product Changes and Improvements:**

Due to our policy of continuous improvement, Richard Keenan & Co Ltd. reserve the right to make changes in design, to add improvements or to otherwise modify any of its products without incurring any obligation on products previously supplied.

\* - In the event of the machine being loaned to or hired by a third party

**COMMISSIONING**

The following guidelines should be followed to initially prepare the machine for operation.

**PTO**

The machine is fitted with a heavy duty power take off shaft with overrun clutch as standard.

**NB: Never use a PTO without an overrun clutch.**

The shaft is located in the body cavity for transportation purposes; always connect shearbolt end of PTO to tractor. On the standard model this will be a T80 with 1 3/8", 6 spline input and 1 3/4", 6 spline output for operation at 540 r.p.m. The shaft may require shortening before use, depending on type of tractor used.

Please ensure that the PTO guards are securely in place, including safety chains, before operating the machine.

**Hydraulics**

Connect both hydraulic hoses to a double acting spool valve on the tractor. The pipes activate the rear Pushing Door and the up and down movement of the Slurry Door.

**Side door**

The side door is for safety and transport purposes. When spreading it should be locked back using the tap provided. To do this raise the slurry door fully, and close the tap fully in the direction indicated by the arrow. (See Figure 1).

**Electric solenoid**

The 'boost' facility is fitted as standard on all machines. This allows the operator to speed up the time taken to compress the load when spreading fine application materials such as sugar sludge or poultry litter. The red and black wires can be wired into the light if desired; the black should be connected to the centre pin and the red to the nearest available 'live' wire, (usually No. 4). The button can be carried in the cab, ready for use, if necessary. (See Figure 2).

**Brakes**

The hydraulic brakes should be coupled using the special fittings provided.

**Lights**

Independent rear lights are fitted, and should be used at all times.

**Handbrake**

The handbrake should be disengaged before operation. Pull tightly on lever to release.

Finally test all the above while empty to ensure correct functioning of the machine.

**OPERATION**

**Set-up**

**Speed control valve**

The hydraulic control adjustment valve is positioned on the front left side of the machine. By adjusting the valve on a scale of 1 through 12, the speed of the Pushing Door can be varied depending on application rates. The time taken to unload the machine can be varied from 50 seconds up to 4 minutes. (See Figure 2).

**Guide to application rate**

Application rate is determined by a combination of forward ground speed and pushing door speed.

As a general guide:

Material	Valve Setting
Poultry Litters, Factory Sludge	2
Sewage Cake	3
Stravy Manure	3
Rotten Manure	3-5
Slurry	7

**NB: These valve settings are intended as a general guide, as variables such as tractor hydraulic pressure, horsepower and material consistency will influence pushing speeds.**

**Safety valve**

To ensure no damage is done to the slurry door a safety valve is fitted to the pushing door. This prevents the pushing door from moving forward when the slurry door is in the down position. To open the slurry door the pushing door must be in the fully back position.

**Breaker adjustment**

The breaker tines, situated at the outlet can be adjusted to suit the particular material being spread. These tines will assist in breaking up any large lumps that may be present in the material. They should always be fixed in the closed position for transport. (See Figure 4)

**Loading**

Ensure that the pushing door is fully back to the rear of the machine. Check also that the slurry door is fully lowered. Load the machine from either side, ensuring an even load if possible from front to back.

**Spreading**

With the tractor at low revs engage the PTO at the 540-rpm setting. Bring the tractor engine up to peak power revs. Engage the hydraulics and open the Slurry Door fully. Use the Solenoid Switch at this point to allow the door to raise quickly. This should not be used once spreading has commenced. When this door is fully raised the rear Pushing Door will then start to move forward. As soon as material begins to appear from the outlet commence forward travel.

Spreading can be discontinued by simply disengaging the pushing system. If the machine is overloaded with farmyard manure, it is possible that a small amount of manure may become trapped between the top of the pushing door and the bottom of the slurry door. To release this, reverse the pushing door and any remaining manure will drop into the chamber.

**NB: It is recommended to spread first load of all material types at valve setting 1. For subsequent loads increase setting until correct spread pattern has been established.**

### Slurry

When spreading slurry it will not be necessary to use the pushing door. Sloppy material will flow into the flywheel using the slurry door as control. Forward travel should be engaged before opening the slurry door. Instead of raising the door fully, lift it approximately 6 inches (150mm) from the closed position. This allows the slurry to flow into the flywheel at a uniform quantity, thus ensuring a controlled application rate.

If it is necessary to clean the body out completely when spreading slurry, the pushing door can be engaged at full travel, but the slurry door must be fully raised before doing so.

### Long fibrous material

Remove hammers from 3 sections of the flywheel and replace with knife set attachment. (see fig. 14)

### Difficult to spread material

May add 3 chain link breaks to the hammers. (see fig. 14)

### Trouble shooting

Problem	Solution
1 Pushing door will not move	<ul style="list-style-type: none"> <li>▪ Insufficient hydraulic pressure from tractor.</li> <li>▪ Insufficient oil level</li> <li>▪ Control valve set to minimum (closed).</li> <li>▪ Faulty hydraulic couplings</li> <li>▪ Maladjusted or faulty sequence valve</li> </ul>
2 Material spreading too light or too heavy	<ul style="list-style-type: none"> <li>▪ Adjust flow valve setting and/or ground speed to suit</li> </ul>
3 Material spreading lumpy or inconsistent	<ul style="list-style-type: none"> <li>▪ Adjust breaker tines and/or flow valve setting to suit</li> </ul>
4 No material appears when pushing door is engaged	<ul style="list-style-type: none"> <li>▪ Use Solenoid button to compress material more quickly</li> </ul>
5 Excessive breakage of shearbolts	<ul style="list-style-type: none"> <li>▪ Drive chain too loose.</li> <li>▪ Flow valve setting too high. Feeding too much material to the flywheel</li> </ul>
6 Too much slurry appears initially	<ul style="list-style-type: none"> <li>▪ Slurry door raised to high.</li> </ul>
7 Slurry door will not raise or lower	<ul style="list-style-type: none"> <li>▪ Insufficient hydraulic pressure from tractor</li> <li>▪ Insufficient oil level</li> <li>▪ Faulty hydraulic couplings</li> <li>▪ Maladjusted or faulty sequence valve</li> </ul>

### MAINTENANCE

#### IMPORTANT SAFETY POINT

Disengage PTO and stop tractor before attempting to service the Orbital Spreader. See diagrams for position of grease points.

### Agitator bearing check and replacement (see fig. 11)

- 1 Empty machine. Raise and secure Slurry Door.
- 2 Remove M16 bolt from center of the spinner disk.
- 3 Remove 90mm washer from the center of the spinner boss.
- 4 Using a bearing pullers remove spinner from shaft. Retain keybar (OS1210-30) for reassembly.
- 5 Open 4 x M16 locknuts on bearing housing.
- 6 The complete bearing-housing unit (OS1210-70) can now be removed to the workbench for servicing.
- 7 Check ring-gear teeth for any signs of damage or wear.
- 8 Place bearing housing in vice and using a 'C' spanner or stilson wrench open bearing retaining nut and locknut.
- 9 Tap shaft back through the bearing housing.
- 10 The front oil seal can now be removed along with the front bearing inner race.
- 11 Press off the rear bearing inner race from the shaft and remove the plate seal.
- 12 Both outer bearing races can now be pressed or tapped out of the bearing housing.
- 13 Clean all parts and commence reassembly ñ in reverse order to dismantling.
- 14 Place plate seal (701188) on shaft as shown in fig. 12.
- 15 Press new rear bearing (700836) inner race onto shaft.
- 16 Press in outer races of both bearings into housing. Liberally grease housing and shaft faces.
- 17 Insert shaft into housing and push front bearing (700864) inner race home.
- 18 Insert new oil seal (701190) into housing in front of bearing.
- 19 Screw on bearing retaining nut (701305) and tighten up fully. Then release until shaft turns freely but without any play.
- 20 Screw on locking nut (701426), apply some locking compound and tighten while holding bearing retaining nut in position.
- 21 Fill housing with grease through grease nipple in the end of the shaft.
- 22 The unit can now be placed back in the flywheel.
- 23 Replace new M16 locknuts and washers and tighten to 360Nm.
- 24 Before refitting spinner outer disk (OS1210-06), replace the 3 packing seal rings in the hub and lightly grease. With spinner outer disk in place insert key (OS1210-30).
- 25 Replace 90mm washer (701657) and screw M16 bolt (700273) into center of the spinner shaft. Tighten to 360Nm.

**MAINTENANCE CHECKLIST**

Daily

- Slurry Door: Check operation making sure it opens and closes properly.
- Flywheel: Check operation, and that hammers and chains are not broken or worn.
- Wheel nuts: check for tightness

Weekly (40 HRS)

- PTO input shaft: Grease the universal joints (2 nipples) and the sliding half shafts (smear them with grease on surface).
- Drive (gear) box: Grease the drive input-shaft bearings (2 nipples) (see fig. 5).
- Drive chains: Apply universal-type oil liberally. Check chain tension, there should be 13mm deflection of the chain when set properly (see fig. 5).
- Tyres: Check for wear and damage and that tyres are inflated to the recommended pressures.
- Grease slurry door lifting arm and ram pivots weekly - (Fig. 6)
- Grease pushing arms weekly - (Figure 7)
- Grease lower pushing system weekly - (Figure 7a)
- To grease flywheel Agitator remove inspection window located inside front cover. Rotate flywheel until spinner sprocket is visible. Grease nipple is located in recess in centre of sprocket. Apply approx. 20 pumps from an OMEGA 85 grease gun (weekly during regular use) - (Figure 8)
- Grease the inner ring-gear every 3 / 4 days. This is accessed through the grease nipple as in (Figure 9)
- Check rear door seal regularly and adjust as necessary - (figure 10)
- All nuts and bolts: check for tightness.

Yearly (end of season)

- Drive chains: Remove the chain; wash off all dirt and old oil, using paraffin; then dry. Soak both chains in oil overnight, or longer, if possible.
- Machine: Before storage, wash the complete machine, then grease or oil all weekly lubrication points as above. Also oil or grease the machine body as a prevention from rust. Never paint inside of body.
- Wheels: Remove and inspect hub units. Replace worn parts, regrease and refit.
- Agitator Bearings: Check and/or replace agitator bearings after every 500hrs work or at the end of the season.

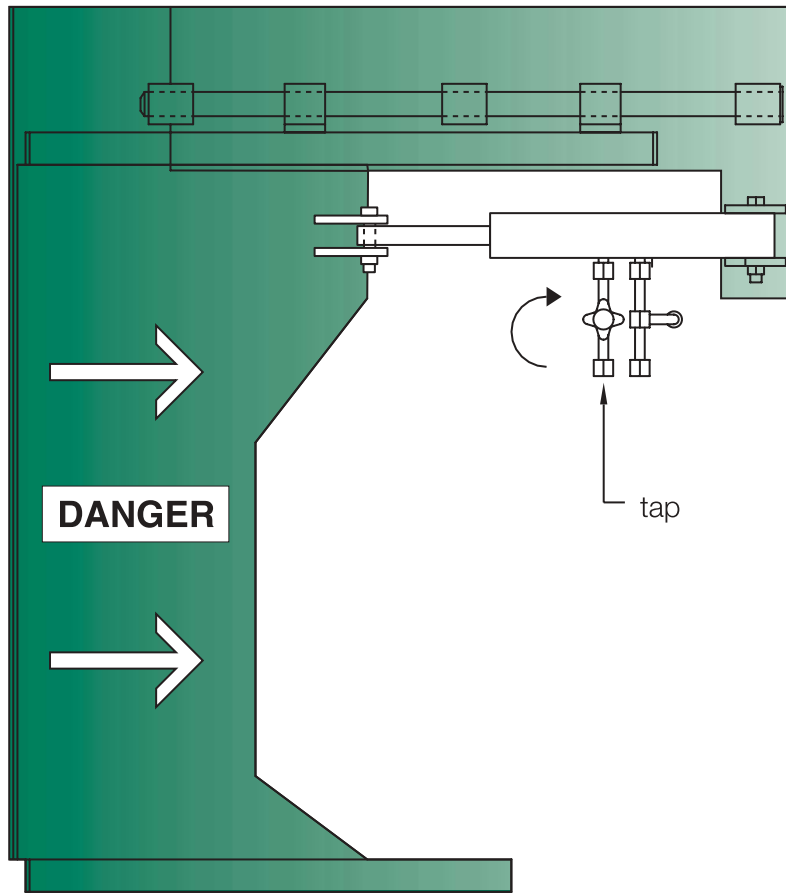
PLEASE CHECK WHEEL NUTS AT REGULAR INTERVALS

Stud Type	ft.lbs	Torque Nm
M18	250	337
M20	300	405
M22	400	540

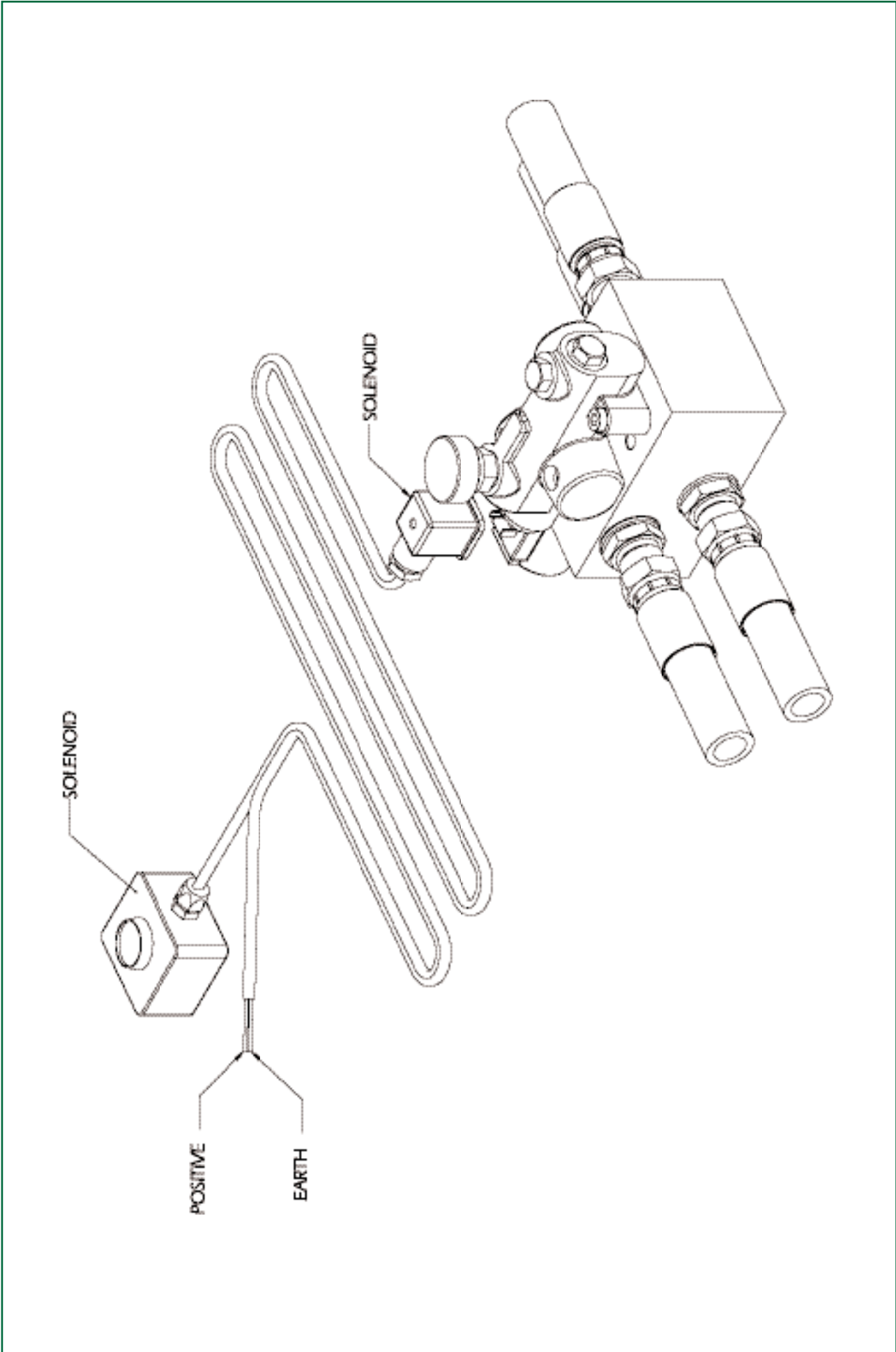
**SPECIFICATION**

- Dimensions as per Figure 13.
- **FLYWHEEL** Single 70mm shaft with main carrier bearings outside main chamber. Central agitator driven in reverse direction to flywheel by gear wheel running in ring-gear.
- **DRIVE SYSTEM** 54-tooth sprocket driven from 15-tooth sprocket ASA100 chain.
- **HYDRAULICS** Variable flow through flow valve with solenoid bypass facility. Sequence valve requires only one double acting spool valve.
- **AXLE** 100 x 100 x 2000, 8 stud. Hydraulic brakes with manual ratchet handbrake.
- **PTO** Heavy duty T80 shaft with shearbolt and over run protection.
- **SHEARBOLT** M12 x 70mm, 4.6 grade.
- **WHEELS** 550/60 R22.5, 8 stud. Low ground pressure.
- **LIGHTS** light kit with 7 pin plug.
- **HITCH** High tensile swivel hitch eye.

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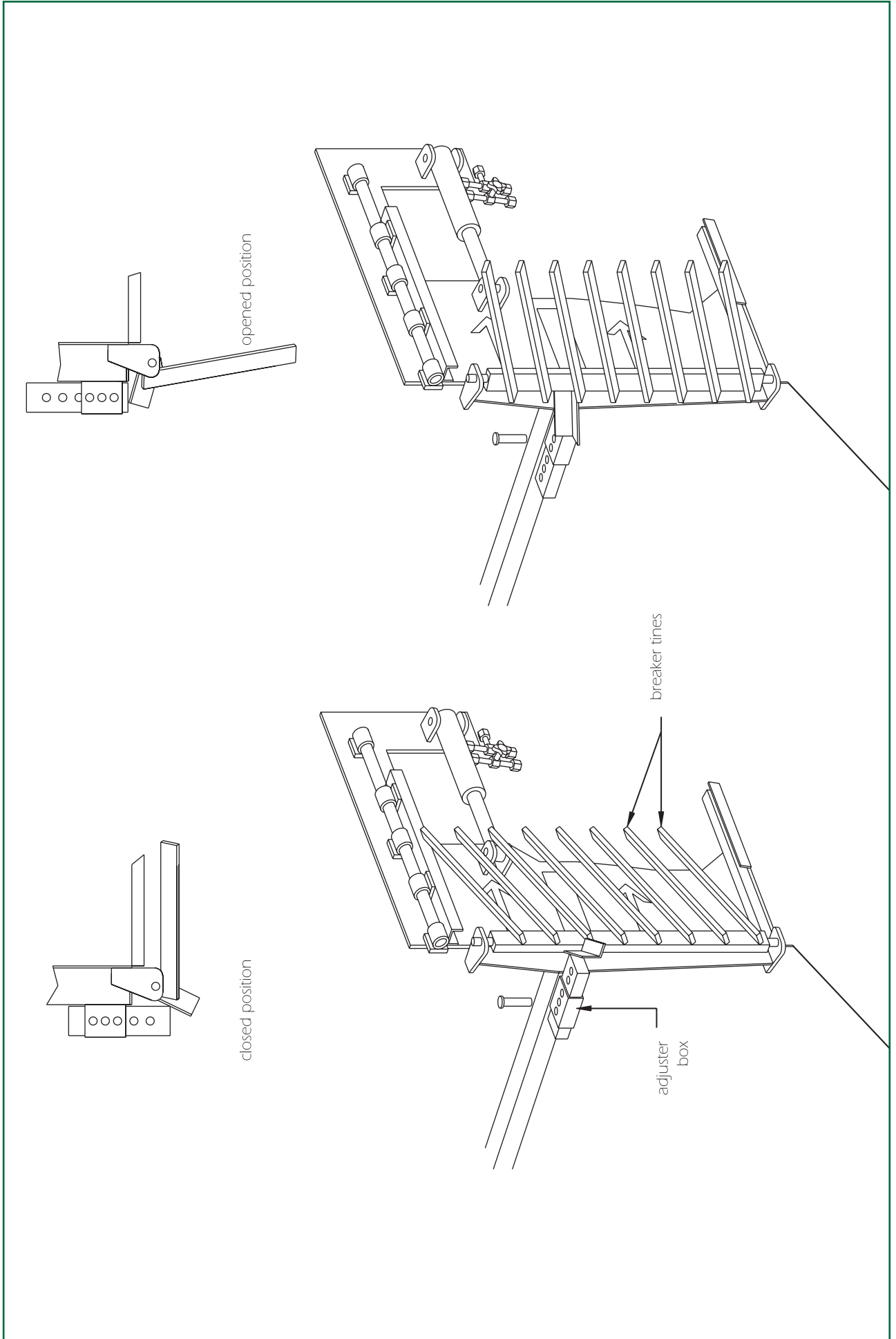




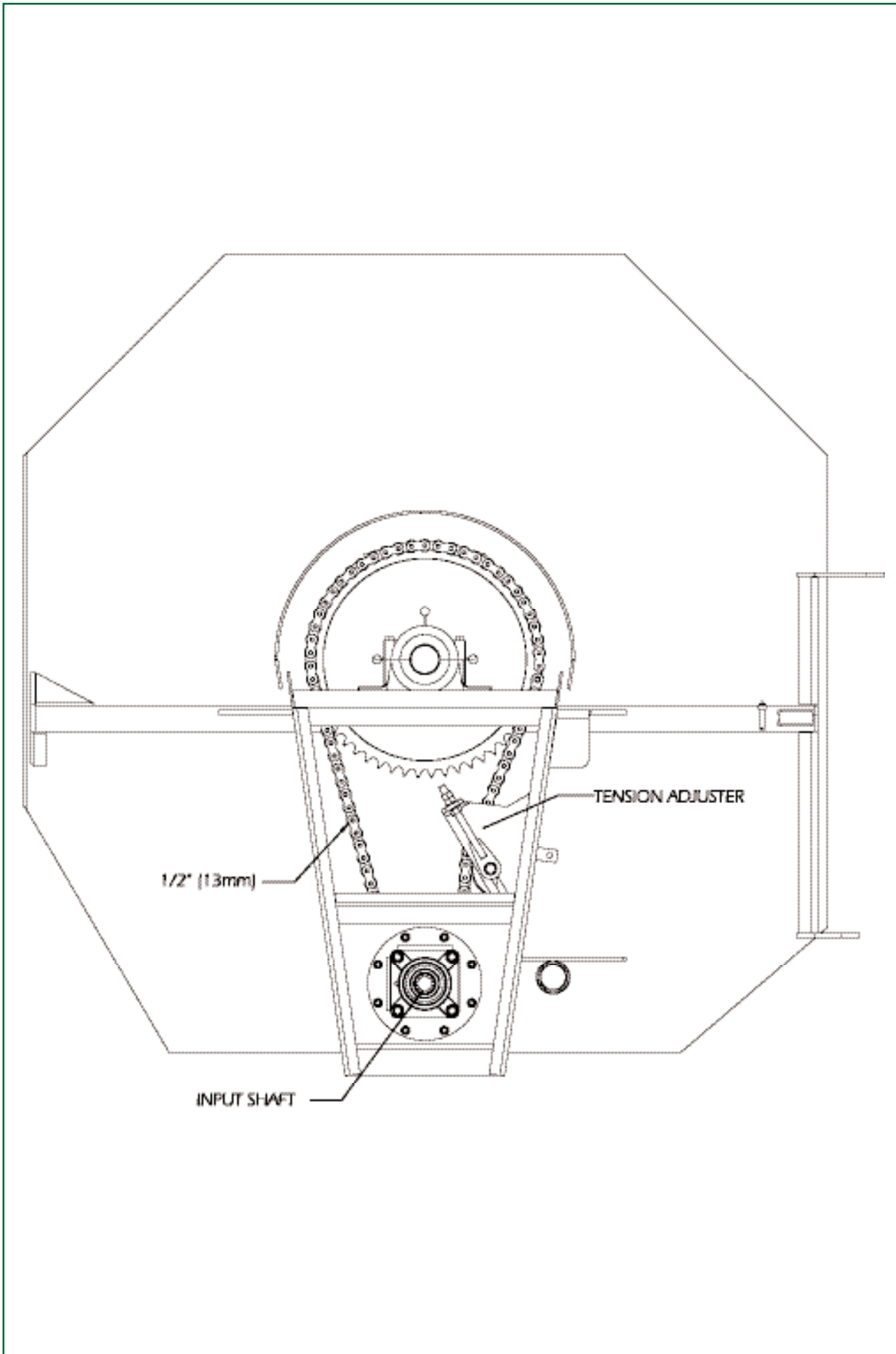
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Figure 3

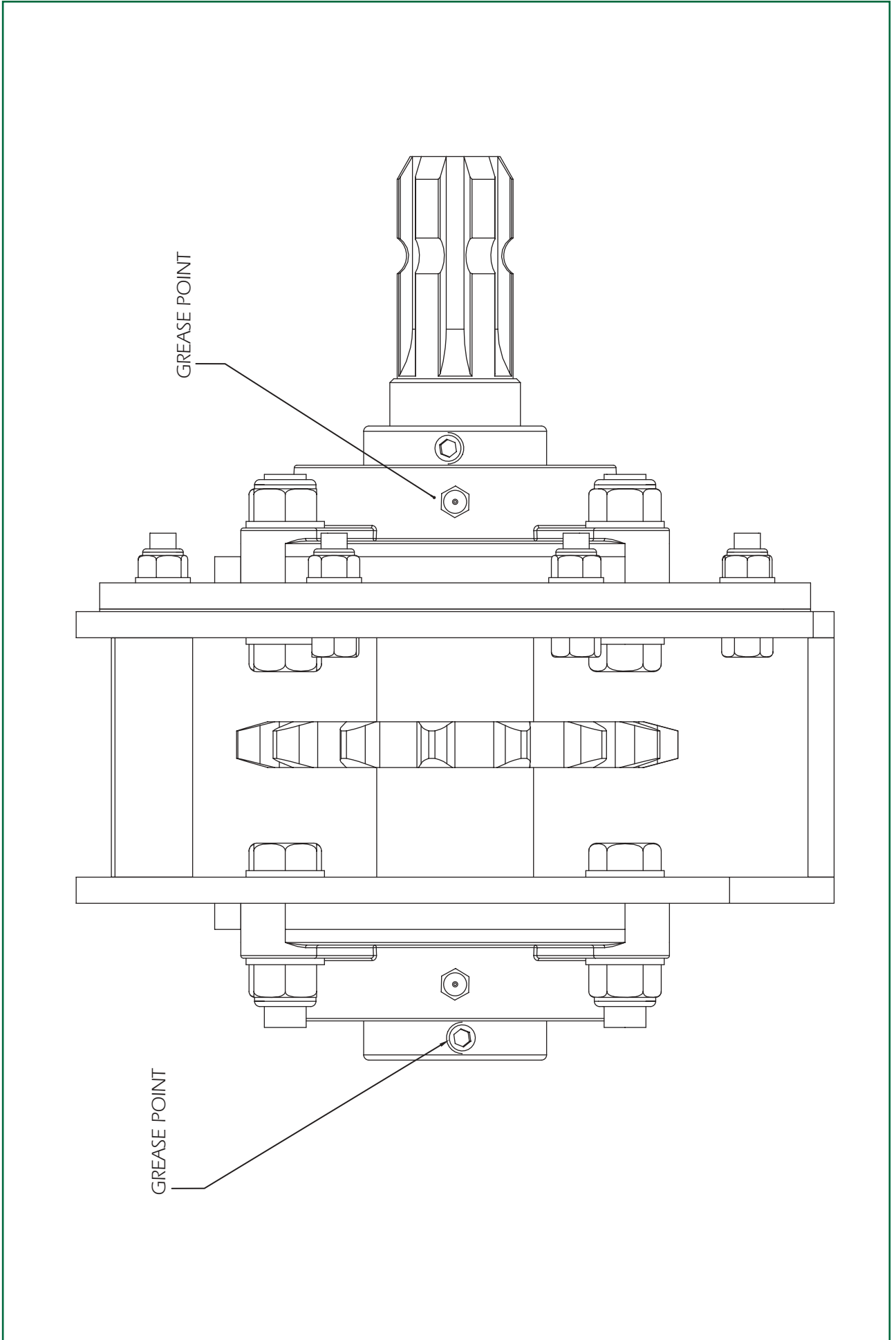


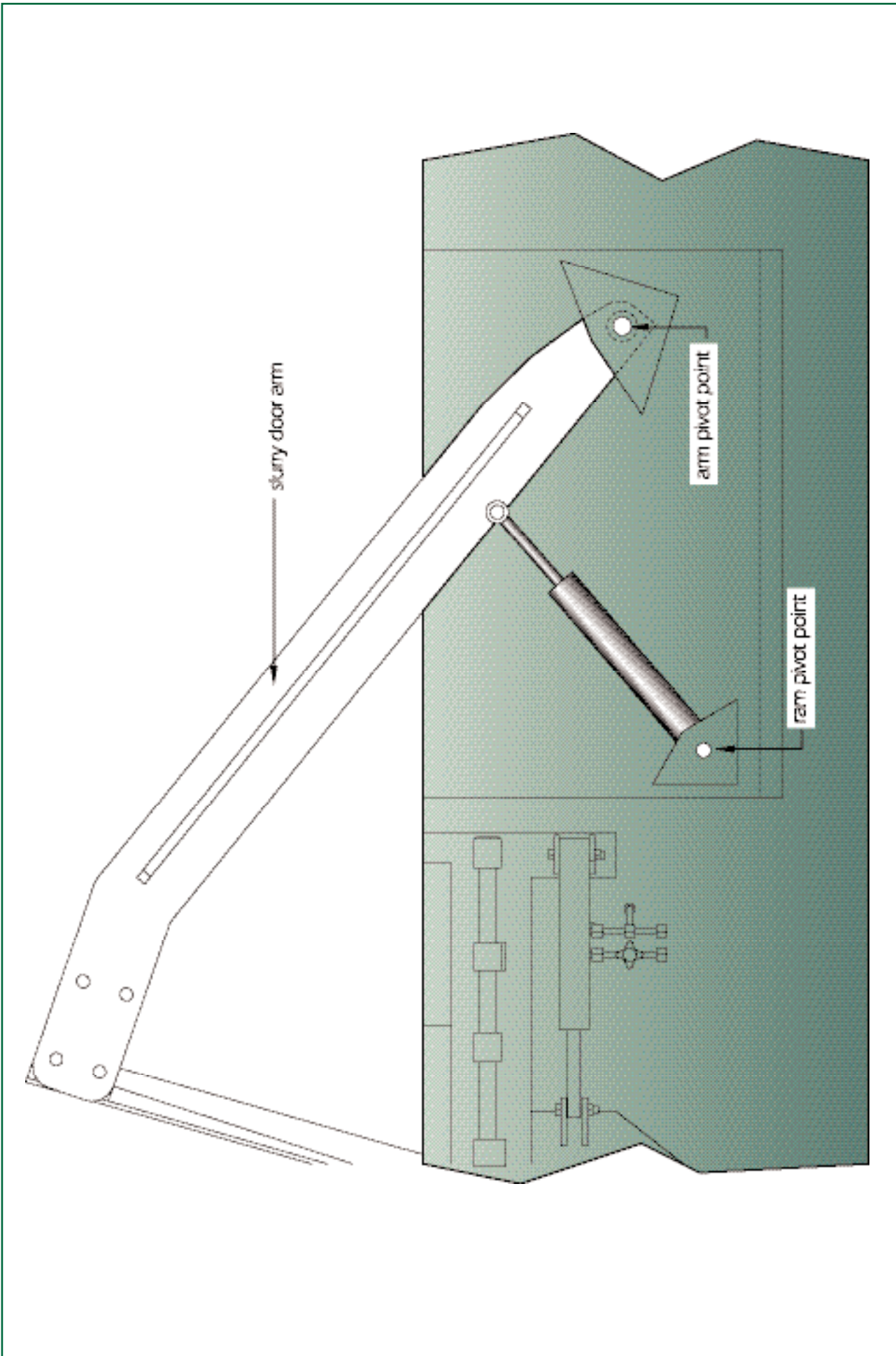




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Figure 5

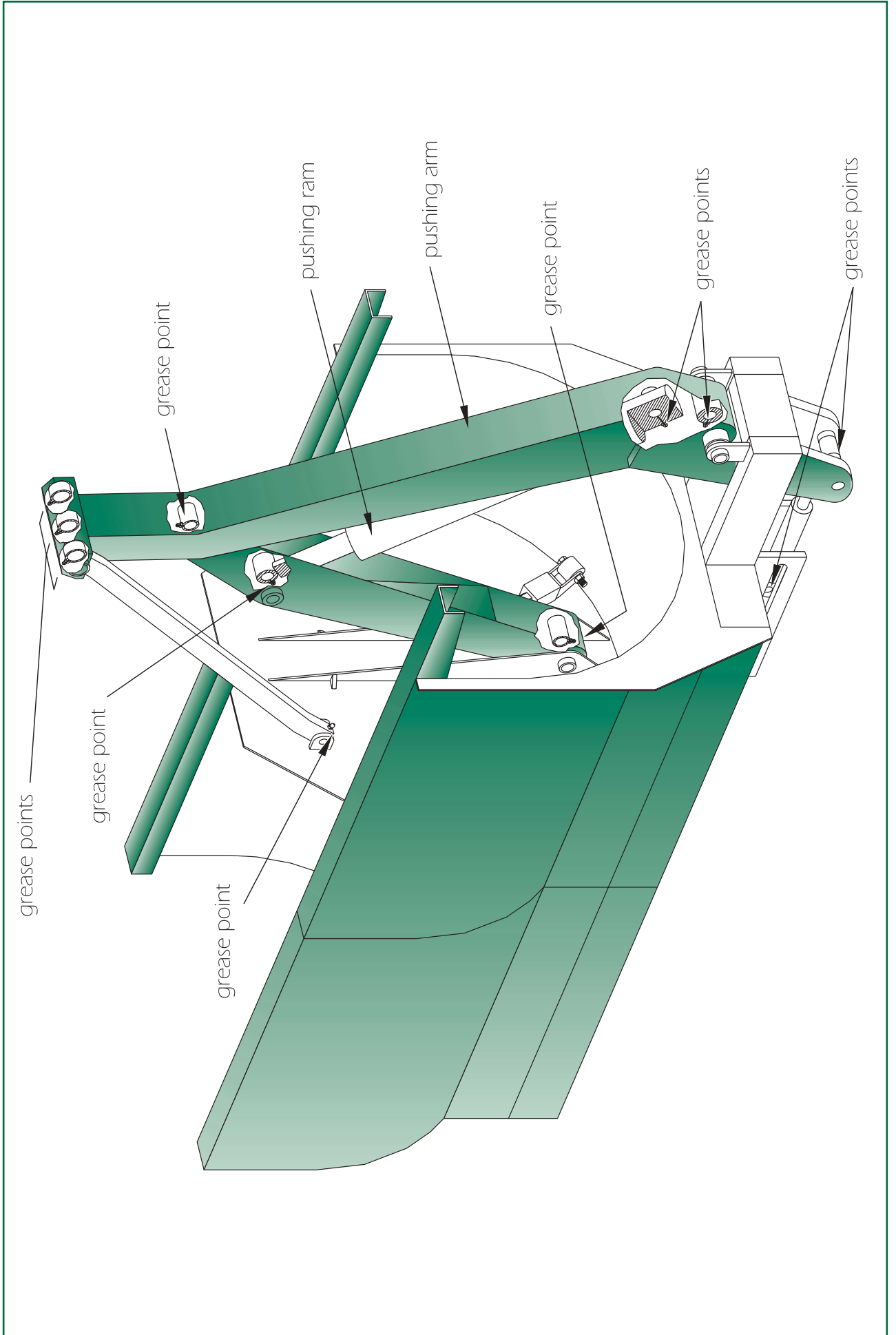




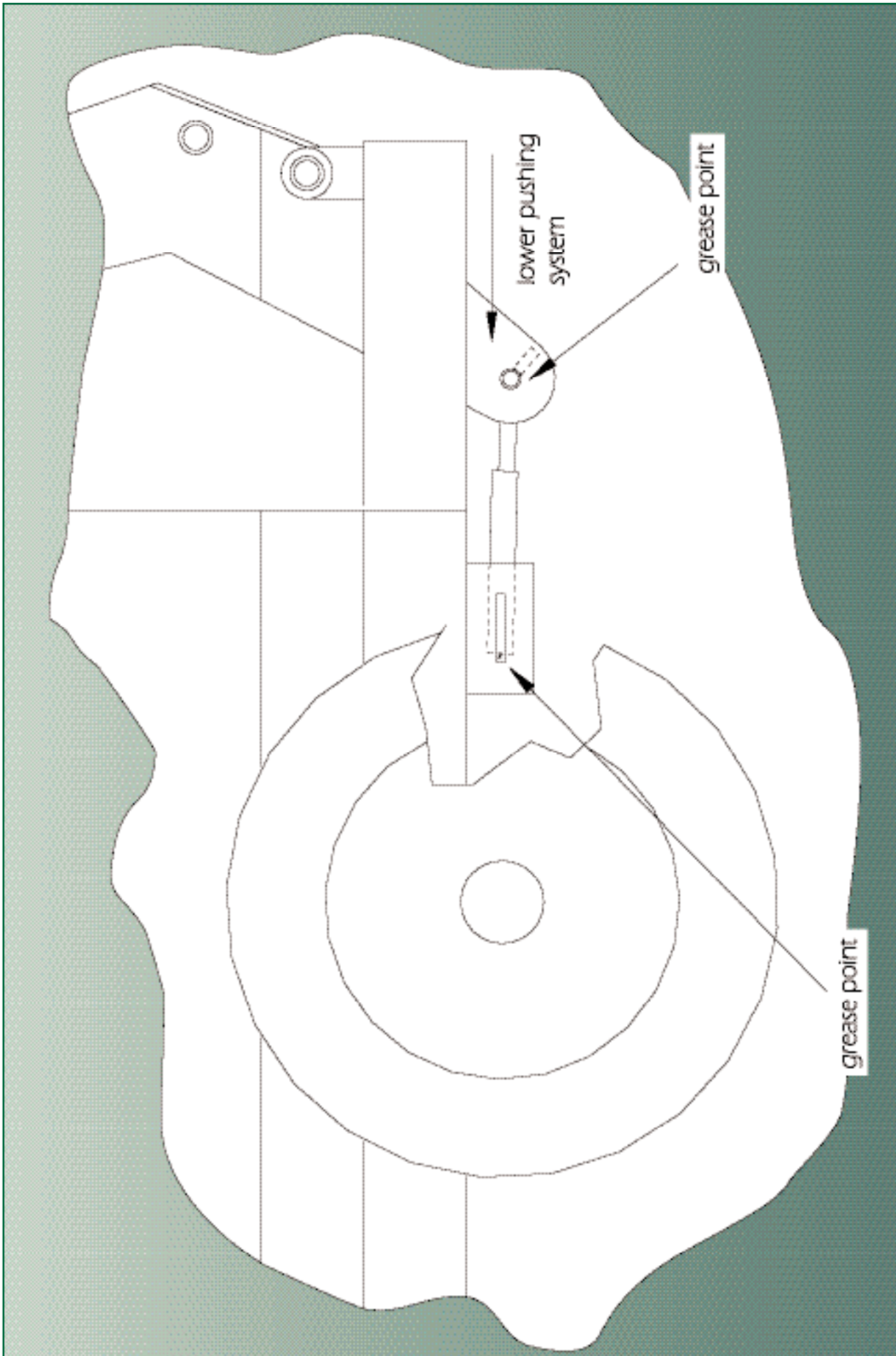
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Figure 7

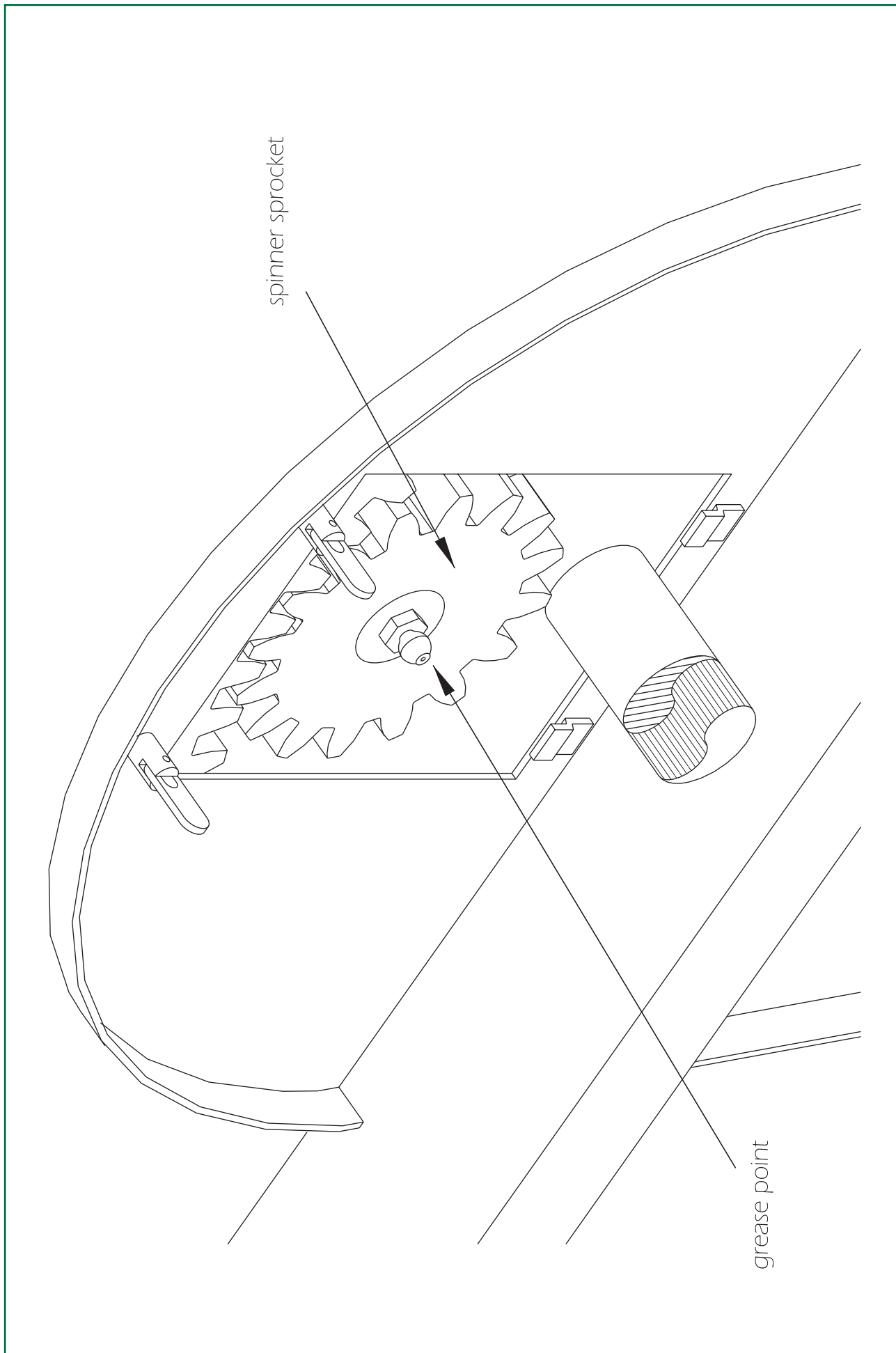




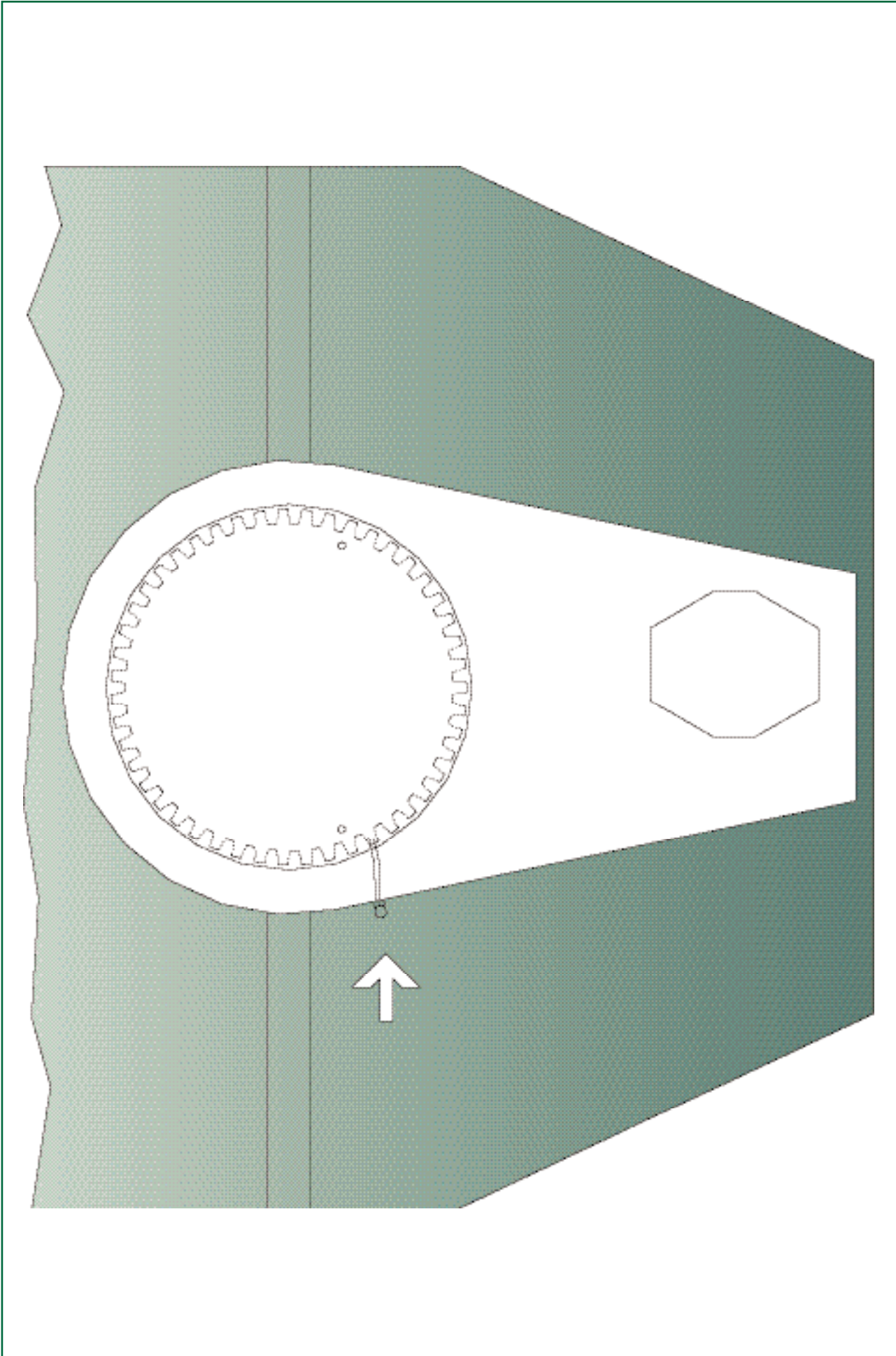


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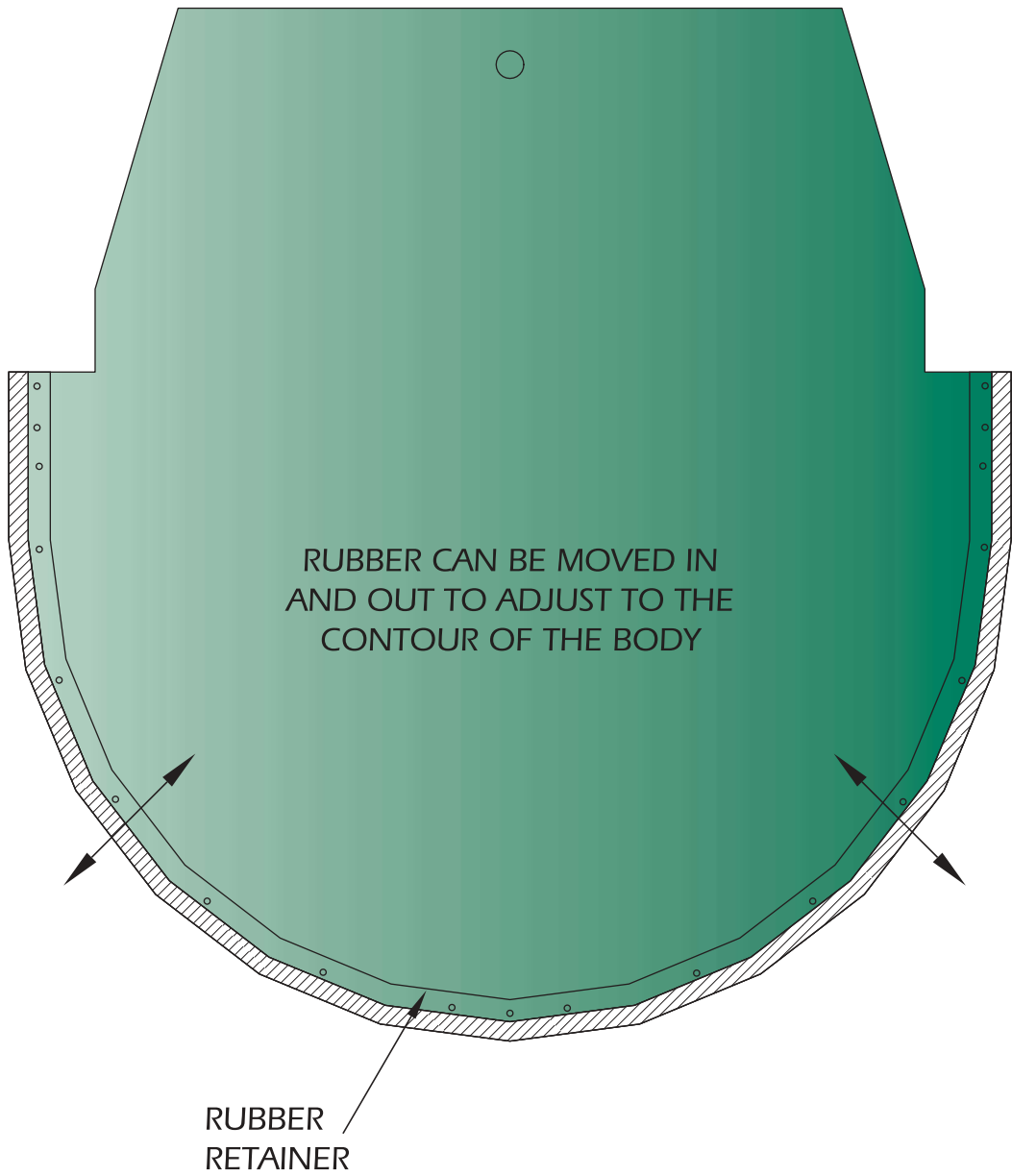


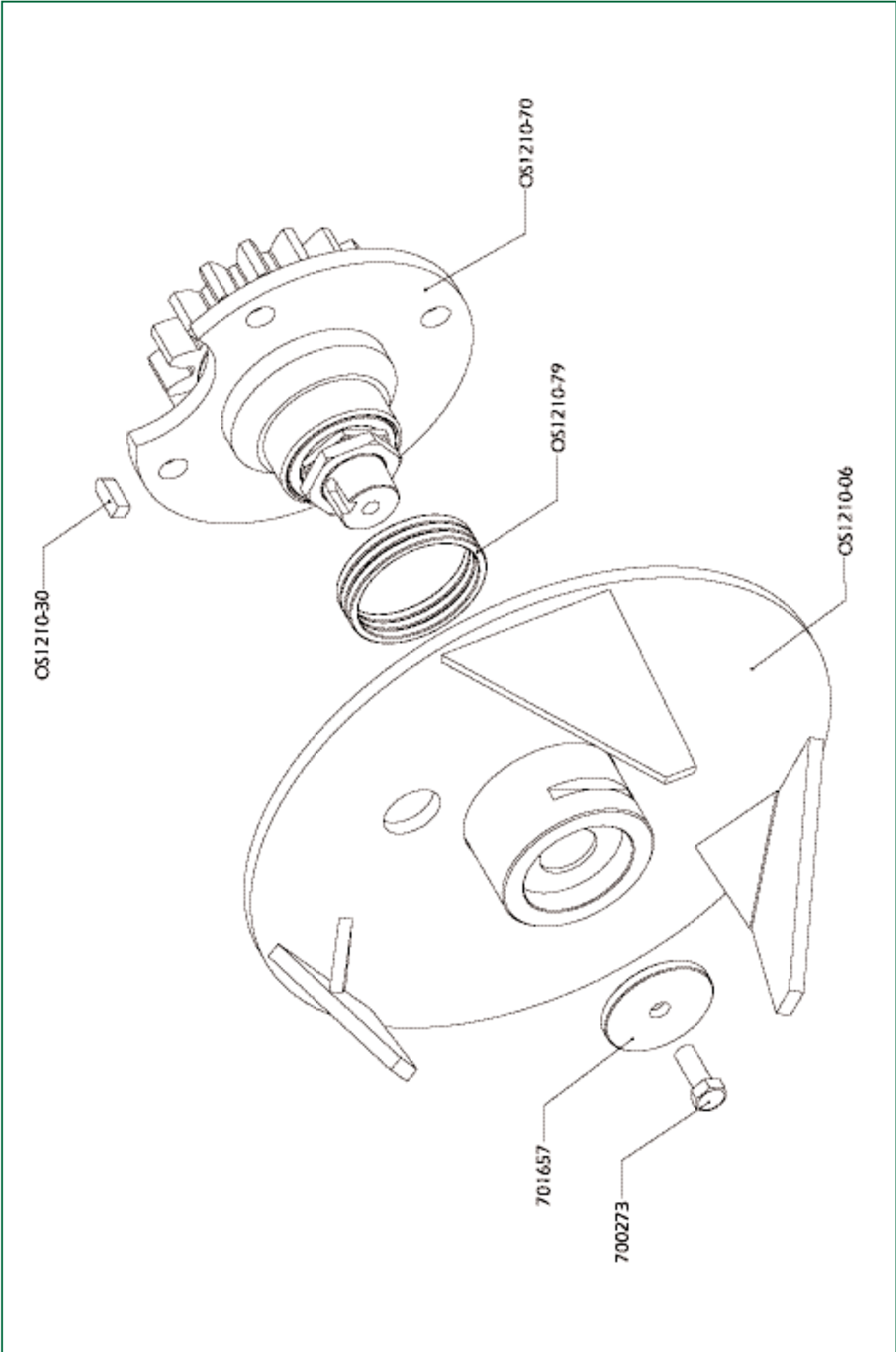




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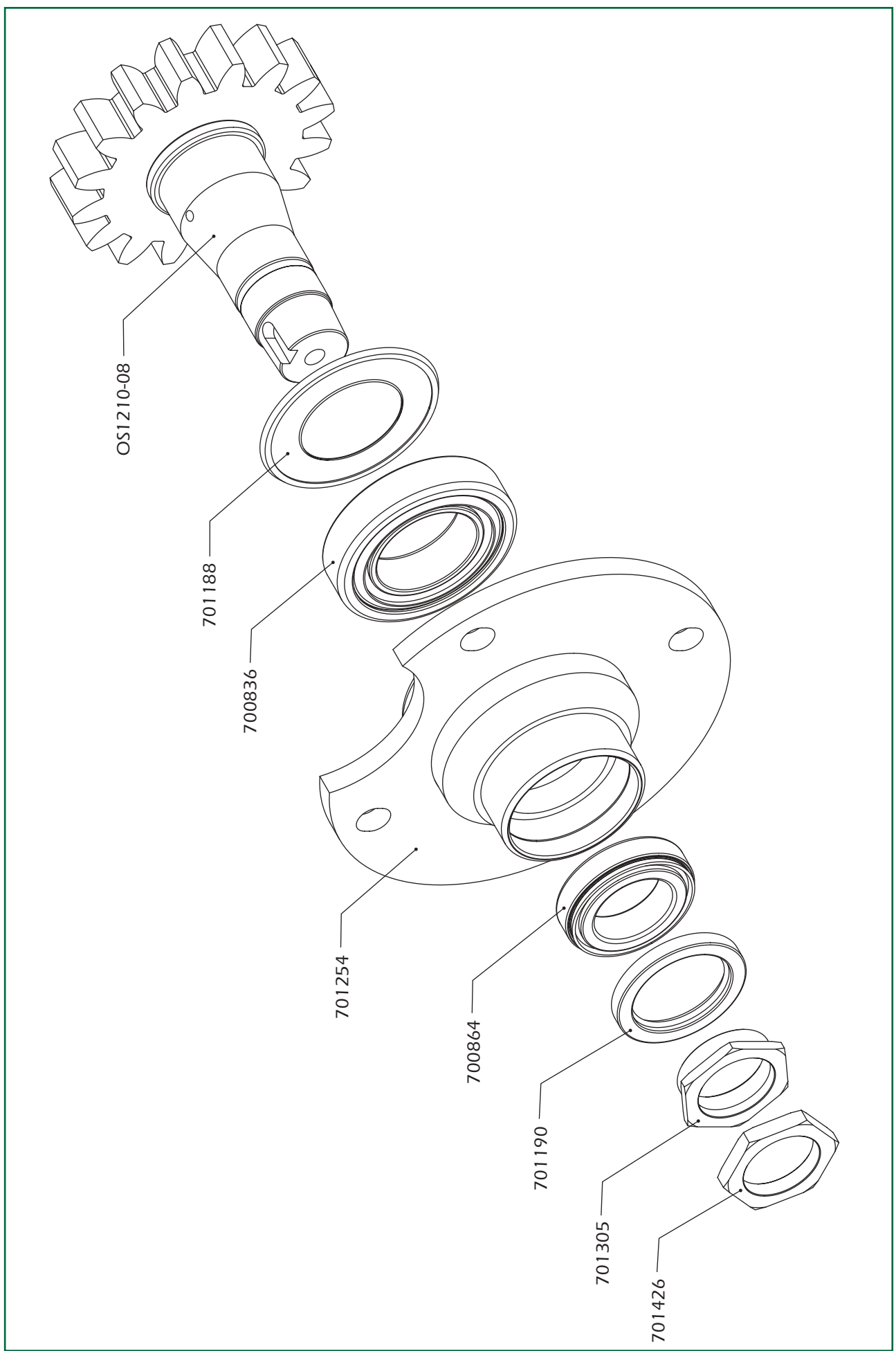
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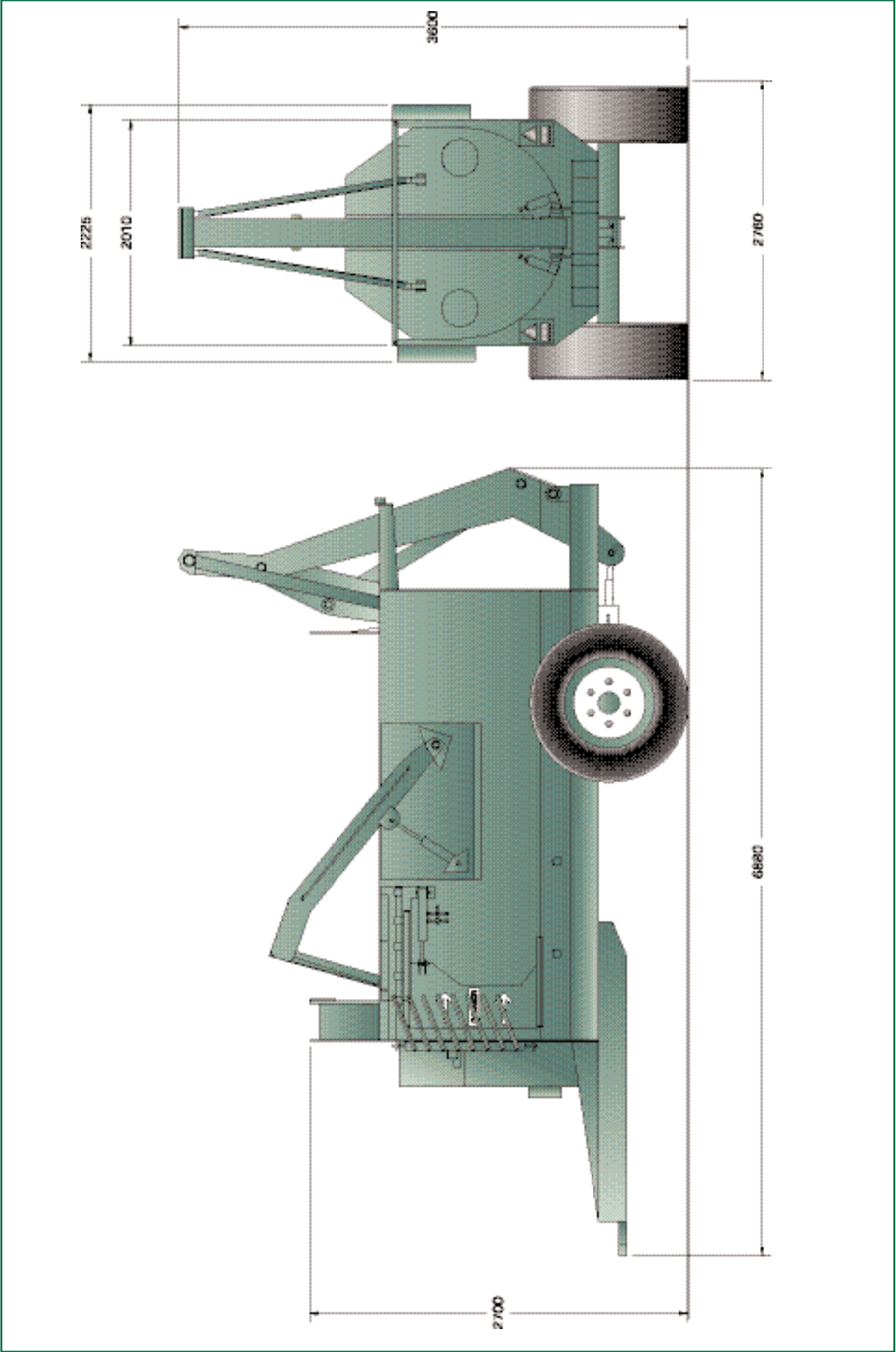




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Figure 12

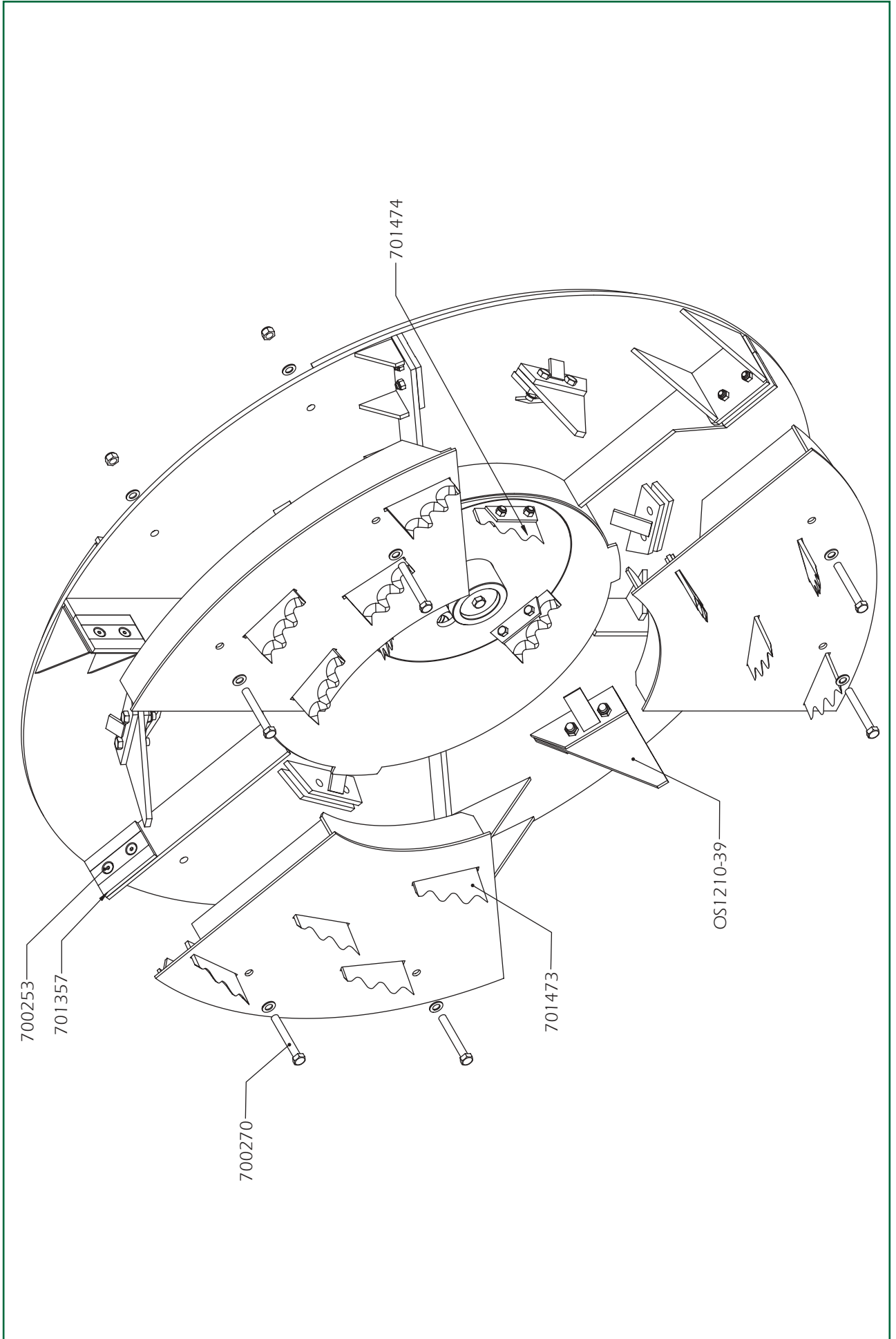




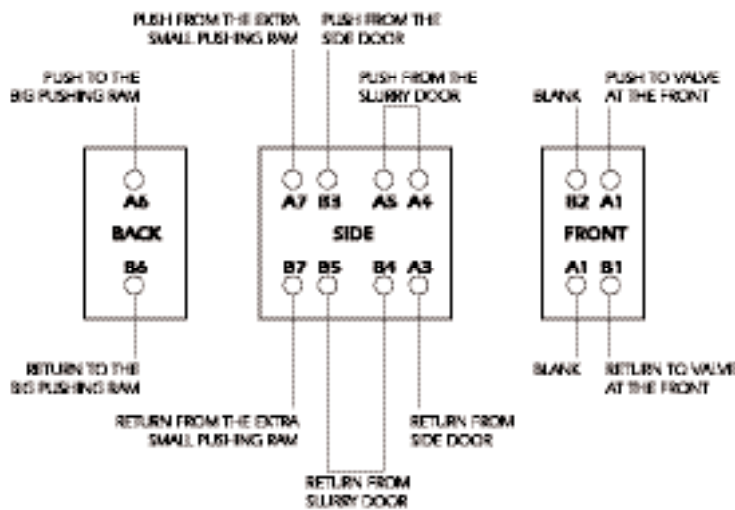
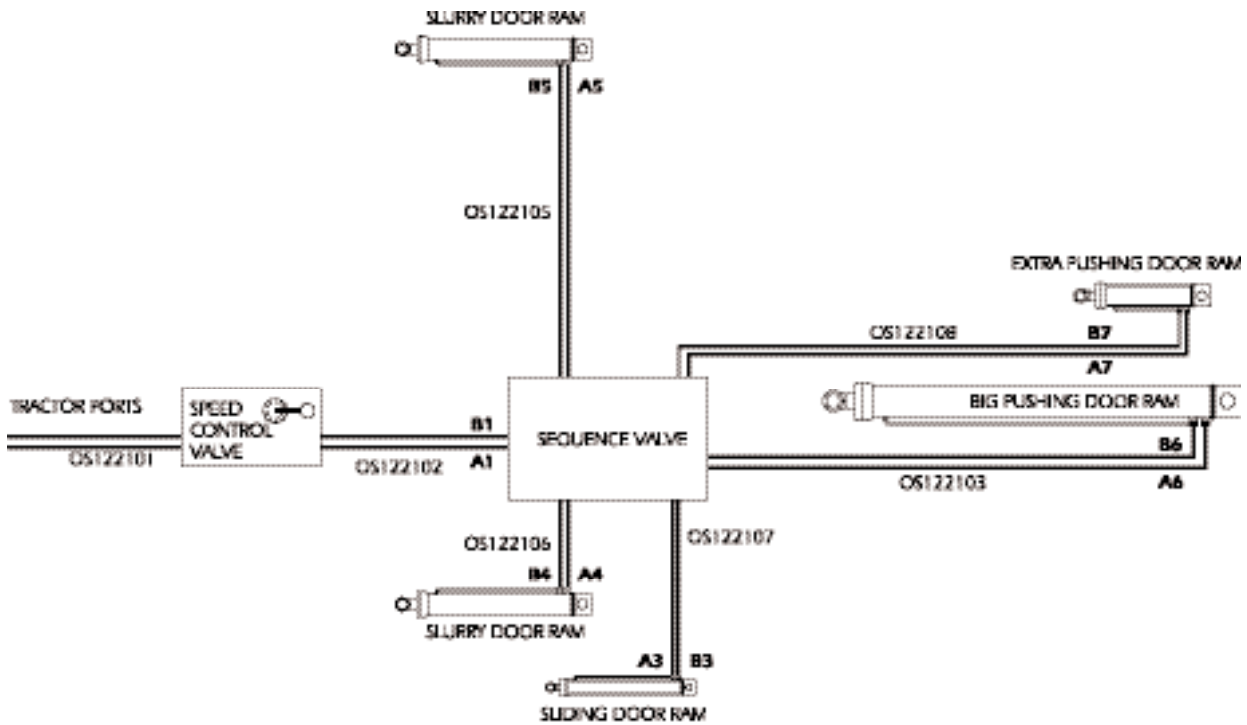
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Figure 14







ORBITAL SPREADER SEQUENCE VALVE

Component description	Part number
<b>HYDRAULICS</b>	
Pushing door flow valve	701793
Flow valve solenoid cartridge	701796
Flow valve solenoid magnetic coil	701797
Sequence valve	701794
Sequence valve pressure relief cartridge	701795
Slurry door shut-off valve	701224
Solenoid switch and cable	700685
Main pushing ram	701068
Pushing arm lower assist ram	701067
Slurry door ram	701069
Side door ram	701435
Tractor to flow valve hydraulic hose	OS1210-01
Flow valve to sequence valve hydraulic hose	OS1210-02
Sequence valve to assist ram hydraulic hose	OS1210-03
Sequence valve to right slurry door ram hydraulic hose	OS1210-05
Sequence valve to left slurry door ram hydraulic hose	OS1210-06
Sequence valve to side door ram hydraulic hose	OS1210-07
Sequence valve to side door ram hydraulic hose	OS1210-08
Hydraulic brake hose	OS1210-09
<b>DRIVE</b>	
ASA 100 Drive chain	OS1223-11
ASA 100 Joiner link	702423
ASA 100 cranked joiner link	702422
Spline shaft oil seal, 90 x 50 x 10	701749
Gearbox flange gasket	701751
1 3/4" spline shaft with 15 tooth sprocket	OS1223-03a
54 Tooth sprocket	700761
Chain tensioner half-pulley	701970b
Chain tensioner adjuster assembly	OS1223-26
<b>BEARINGS</b>	
Spline shaft bearing	700854
SNX 516 Bearing housing	701251
222 16K Bearing	700847
H316 Taper lock insert	701457
12/180 Spacer ring	701258
HR32214J Spinner bearing	700836
HR32011XJ Spinner bearing	700864
Spinner oil seal, 90 x 65 x 10	700864
Spinner plate seal	701188
Spinner carbon packing seal	OS1210-79
UCF X14 bearing insert	700853
UCF X14 Steel housing bearing unit	701520
<b>PTO</b>	
Complete T80 PTO shaft (1 3/4" output)	702821
Over-run clutch (T80, 1 3/4")	702361
PTO Cover (T80)	702095
Universal joint (T80)	702078
M12 x 70mm, 4.6 shear bolt	702869
<b>AXLE &amp; WHEELS</b>	
100 x 100 2000, 8 stud axle	701378
Brake ram	700835
Hand brake cable	OS1214-71
Wheel nut (M 18)	700284
Wheel stud (M 18)	700868
550/60 R22.5, 8 Stud wheel & tyre	701384
<b>PUSHING DOOR</b>	
Pushing door rubber seal	701193
Pushing door rubber seal side retainer	OS1211-23
Pushing door rubber seal centre retainer	OS1211-24
Pushing door rollers	701585
Pushing door top guides	OS1211-22
<b>FLYWHEEL</b>	
Flywheel hammers	OS1210-39
Spinner complete	OS1210-07
Paddle tips	701357
<b>MISCELLANEOUS</b>	
Breaker	OS1219-20a
Breaker adjuster plate	OS1219-07
Light unit	700701