



# Operating Instructions

Power Harrow

## Zirkon 2500



Safety is our concern !

Art.Nr. 175 1244

K-1/05.96

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## 1 DEFINED USE



- Read and adhere to these „General Health- and Safety precautions“ before putting the power harrow to work!

The ZIRKON 2500 has been designed purely for the cultivation of agricultural soil!

Any use beyond the one stipulated above is no longer considered as defined use. The manufacturer does not accept any responsibility for damages resulting from this; the operator himself carries the full risk!

Under „defined use“ the manufacturer’s prescribed operation-, maintenance- and repair conditions are to be adhered to!

- The ZIRKON 2500 may only be operated, maintained and repaired by such persons who have been made acquainted with it and who have been advised about the dangers!
- The applicable accident prevention advice as well as the generally accepted safety technical, working, medical and road traffic rules should be adhered to!
- Any damages resulting from unauthorised changes to the machine rule out the responsibility of the manufacturer!

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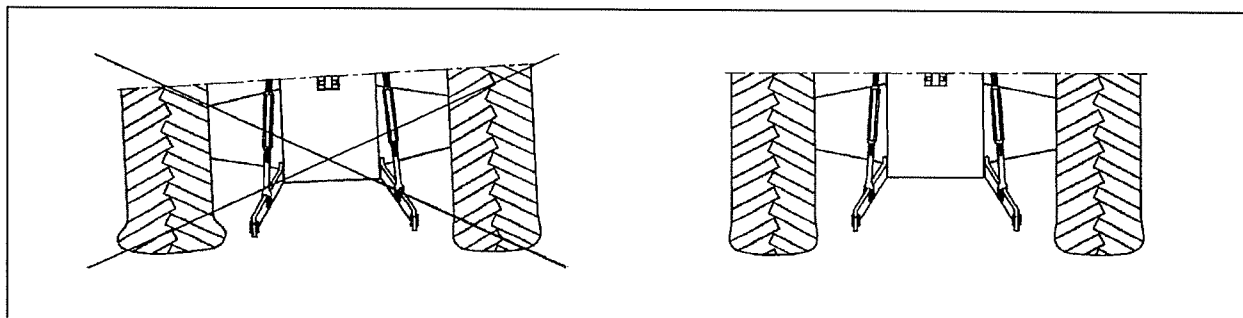
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## 3 PREPARATION OF THE TRACTOR

### 3.1 Tyres

Ensure that rear tyre pressures are equal and correct!



### 3.2 Lift rods

Ensure that the lift rods are of equal length! (Refer to the tractor handbook).

### 3.3 Check chains / sway blocks

Check chains or sway blocks must be adjusted so that the lower links are sufficiently free to move sideways during work.

### 3.4 Hydraulics

Whilst working the tractor hydraulics must be set to 'floating position' or 'mixed control'.

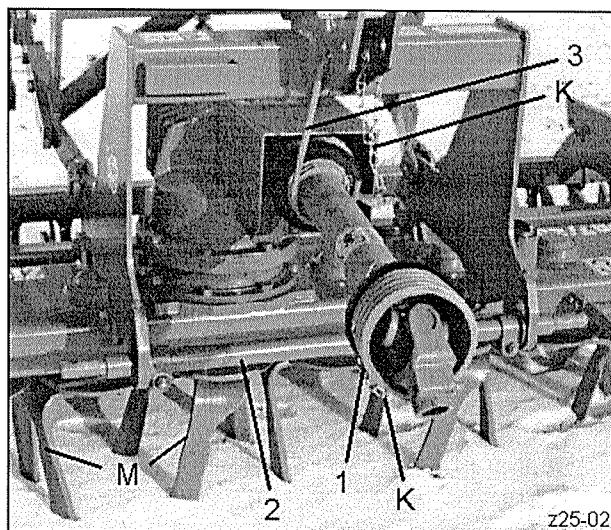
### 3.5 Front Weights

Fit manufacturer's standard front weight kit or equivalent. Extra front ballast may be required following a check on stability with the power harrow raised or whilst working with maximum weight transference. If at least 20 % of the tractor weight is on the tractor front axle with raised power harrow, a safe steerability to the tractor is ensured, when driving carefully.

## 4 ATTACHING AND DETACHING THE POWER HARROW

### 4.1 Attaching to the tractor

- Set tractor hydraulics to 'position control'. Connect and secure the tractor lower links to the cross shaft respectively drawbar (2) of the power harrow!
- Connect and secure the tractor top link to the headstock so that top link rises slightly towards the power harrow during work!
- Remove the PTO shaft (1) from its mount (3) and connect to the tractor PTO!
- Fit the chains of the PTO-shaft to a static part to prevent a spinning of the guard!
- Connect to the hydraulic pipes of the drill linkage (if fitted)!
- Swing mount (3) upwards and secure.
- Fit marker boards and lighting equipment if the power harrow must be transported along public roads.



z25-02

- Bring all control levers into such a position that unintentional lifting or lowering is impossible.
- If a seed drill is fitted to the rear linkage, raise the seed drill until the lower links of the rear lift are fixed by the headstock.
- Prevent PTO-guard from spinning by fixing the provided chain to a nearby static part.

## **4.2 Detaching from the tractor**

This is done in the opposite sequence to the above. The power harrow should be parked always on firm level ground. If a seed drill is fitted via the rear linkage, lower the seed drill fully before detaching the power harrow from the tractor.



- Any drill etc. mounted on the power harrow must be completely lowered before detaching the power harrow!
- Special care should be taken when the implement is coupled to or uncoupled from the tractor!
- Adhere to the maximum permissible axle loads, total weights and transport measurements!
- The release ropes for quick coupler should hang freely and in the lowered position must not release the quick coupling by themselves!
- Mount the implement as described!
- Never leave the driver's seat whilst in motion! Handling characteristics, steerability and braking are influenced by mounted implements, trailers and ballast weights. Check sufficient steerability and braking!
- When fitting the hydraulic hoses to the tractor hydraulic sockets always ensure that the hydraulic system at the tractor's as well as at the implement side is without pressure!
- To avoid wrong hydraulic connection sockets and probes should be marked. This helps to prevent contrary function and reduces the danger of accident!
- Regularly check hydraulic hoses and pipings and exchange if found defective. The replacement hoses and pipings must meet with the implement manufacturer's technical standards!
- When fitting the machine to the three-point linkage of the tractor bring all control levers into such a position that unintentional lifting or lowering is impossible!
- When fitting to the three-point linkage the mounting categories at the tractor and the implement must be compatible or must be made compatible!
- There is a danger of being crushed in the area of the three-point linkage. Be careful!
- When actuating the control levers for the three-point linkage from outside the tractor cab never step between tractor and implement!
- Always minimise the sideways swing of the 3-point linkage when in transport!

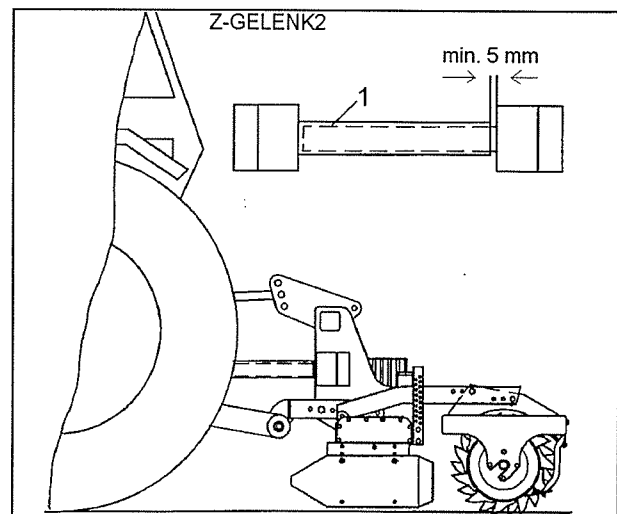
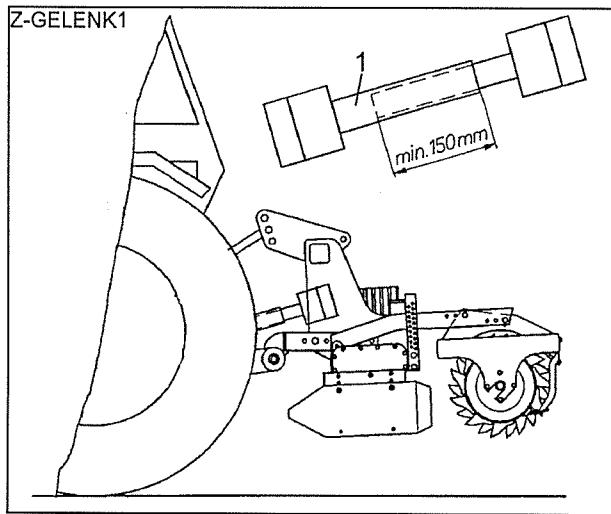
## **5 PTO SHAFT**

### **5.1 Length of PTO shaft**

Hitch the power harrow to the three point linkage of the tractor. Separate the two halves of the PTO shaft to the power harrow. Attach the other end of the tractor PTO. Hold the attached halves of the PTO shaft beside each other in a horizontal position (shortest distance)! When assembled for work the PTO shaft must be no longer than the shortest distance between the tractor and power harrow!

Also, when both raised and when in work at the greatest depth, the profile tubes must still overlap by at least 150 mm!

If the PTO shaft is too short, contact your dealer.



## 5.2 Shortening the PTO shaft

The PTO shaft (1) must be shortened if it does not fulfil the above requirements.

Shorten both halves of both the profile and protective tubes by the same amount!

De-burr the newly cut face! Lubricate the profile tubes slightly and push the two halves together, ensuring that they slide together and come apart freely!

Attach the PTO shaft!

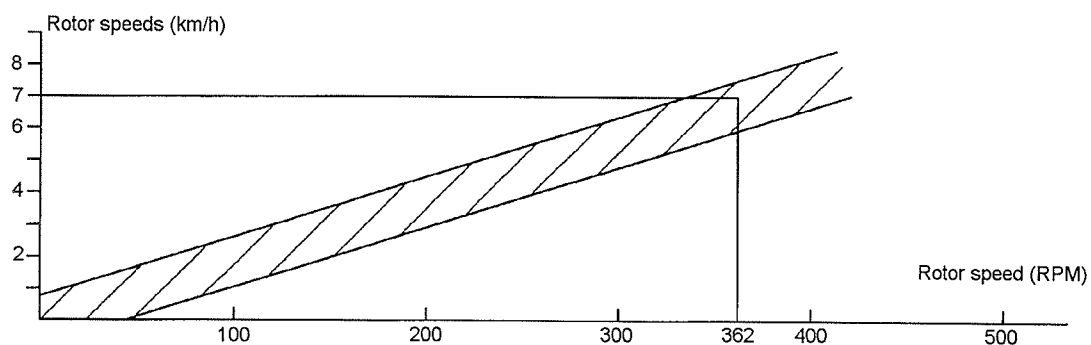


- Use only the PTO shaft supplied with the power harrow!
- The overload coupling end of the PTO shaft must be fitted to the power harrow!
- Regularly lubricate the PTO shaft and secure the outer tube to prevent rotation.
- Guard tube and cones of the PTO-shaft as well as the tractor and implement side PTO guard must be fitted and kept in a proper condition!
- At PTO-shaft always see to the advised tube overlapping in transport- and working position!
- Fit and remove the PTO-shaft, only when engine is stopped!
- Prevent PTO-guard from spinning by fixing the provided chain to a nearby static part.
- Before switching on the PTO-shaft ensure that the chosen PTO-speed of the tractor corresponds to the allowable implement input speed.

## 6 ROTOR SPEEDS

The desired working effect depends, among other things, on the forward speed and the rotor speed. The lowest rotor speed possible should be used at which the required result is achieved. Excessively high rotor speeds mean high wear and commensurate fuel consumption.

The Zirkon power harrow should not be driven faster than 7 - 9 km/h. The working speed recommended for the rotor speeds is shown in the diagram below.



The Zirkon 2500 power harrow is delivered as standard with the pair of toothed gears 23/21 (output/drive).

Thus a rotor speed of 197 RPM is obtained at 540 RPM PTO and 365 RPM at 1000 RPM PTO.

Other rotor speeds can be obtained interchanging pairs of gears. See table.

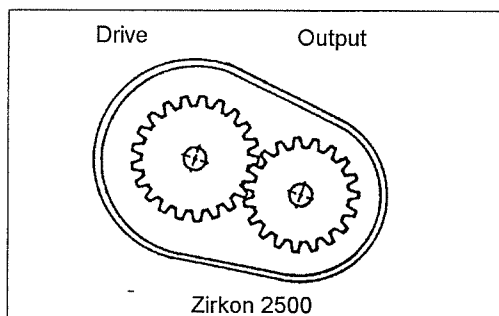
Only rotor speeds which are listed in the table may be selected.

Change the gear as follows:

- To change the gear, switch off the PTO and also the tractor engine.
- Remove the ignition key.
- Remove cover (6), paying particular attention to the seal. Exchange the pairs of gears according to the table.
- Replace the cover (6), ensuring that the seal is positioned correctly.
- Tighten the studs carefully.

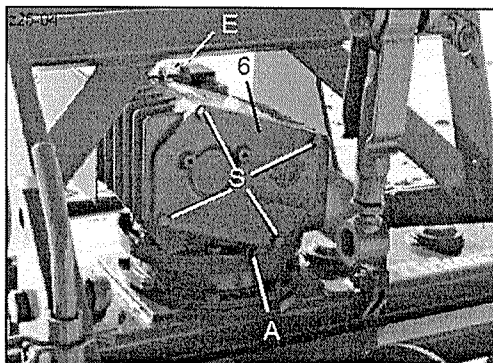


- Only clean, lubricate or adjust the power harrow or PTO shaft when the PTO shaft is disconnected, the tractor engine is switched off and the ignition key removed.
- Change gears with completely lowered power harrow and seed drill (if fitted) only.



No. of teeth		PTO RPM		
Drive	Output	540	750	1000
18	26	149	207	276
19	25	164	228	304
21	23	197	273	365
23	21	237	328	438
25	19	284	394	526
26	18	312	433	577

\* = serienmäßig montiert



## 7 SETTINGS

### 7.1 Horizontal position

When in work the power harrow should be horizontal fore/aft. Adjustment is made by altering the tractor top link length.

### 7.2 Working depth

The working depth of the power harrow depends on the tith required. In general the power harrow should work as level as possible. The depth of work is determined by the position of the upper pin (7), the higher the pin, the deeper the work. The clearance between the roller and the ground when the power harrow is lifted is determined by the position of the lower pin (8). The pin should be positioned as low as possible and as high as necessary to maintain clearance.

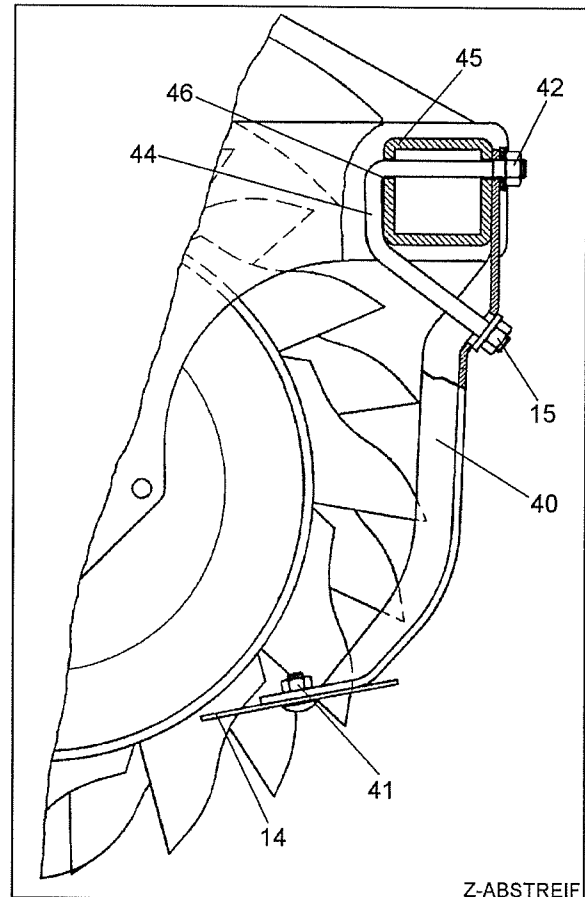
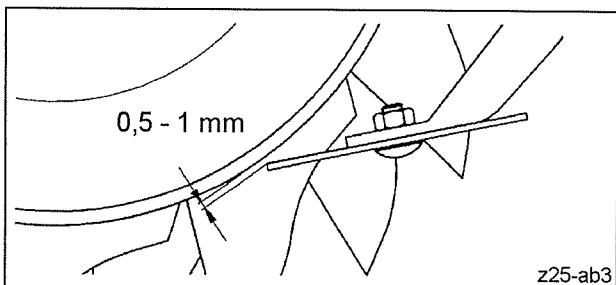
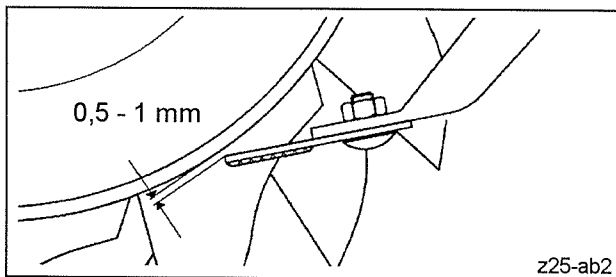
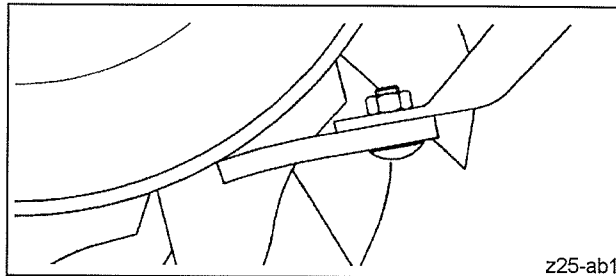


### 7.3 Side plates

The side plates (12) must be set so that they are always in contact with the ground during work. The lower edge of the side plates should penetrate no more than 1 - 2 cm into the ground. After adjustment, securely tighten the bolts (13).

### 7.4 Power take off

The PTO must only be engaged when the power harrow has been lowered to within a few centimetres of the ground and the side plates are in their working position. It must be disengaged when the power harrow is more than a few centimetres above the ground.



### 7.5 Packer roller scrapers

The scrapers (14) must be adjusted regularly. They should be positioned to the surface of the roller by the adjuster nuts (15) as shown in the sketch below.

After one end has worn, the scrapers can be turned round. Worn scrapers must be changed in good time. When doing so it is recommended that the scraper holder (40) is removed in order to gain access to the scraper bolts (41) more easily.

To do this nut (42) must be loosened slightly and then nut (15) and ensure that the upper section of the scraper holder (40) and the front of the strap bolt (44) are lying flat on the frame (45) and that the scraper is central between the rows of teeth.

Subsequently, first fully tighten the nut (42) and then adjust the distance of the scrapers from the roller with the nut (15) as shown in the sketches.





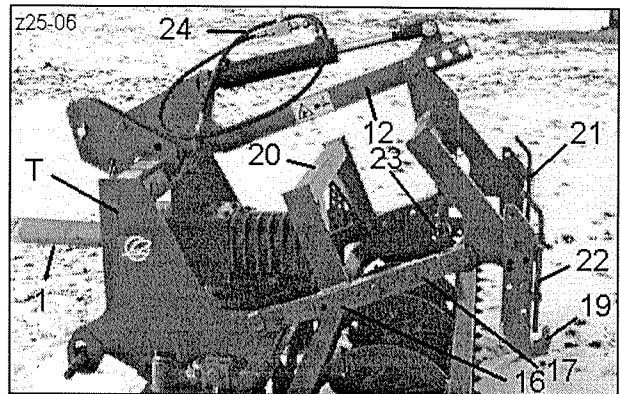
- Do not ride on the power harrow during work or transport!
- Do not stand in the working area of the power harrow!
- Only start the power harrow when all guards and protective devices are in position
- Do not leave the tractor without first lowering the power harrow to the ground, disconnecting the PTO, switching off the tractor engine and removing the ignition key!
- Repair-, maintenance-, cleaning operations and adjustments should be carried out with tractor brakes applied and engine switched off! Remove ignition key!

Further instructions regarding the safe operation of the power harrow are listed in the „safety instructions“ section of this book.

## 8 HYDRAULIC DRILL LINKAGE

### 8.1 Assembling the linkage

The linkage is mounted onto the headstock of the power harrow by means of bolts - which must be tightened carefully. The hydraulic ram mounting plate must also be fitted as shown and the bolts fully tightened. In order to keep the centre of gravity of any power harrow / drill combination as close to the rear of the tractor as possible, adjustment is provided in the form of holes (16) in the lower connecting links (17) and the upper connecting link (12). The lengths of the upper and lower connecting links must be kept equal, thus maintaining a parallel lift for the drill. The catch hooks (19) are adjustable vertically and are connected to the mounting frame (20); their position from the roller is adjustable.



### 8.2 Attaching a mounted implement e.g. drill

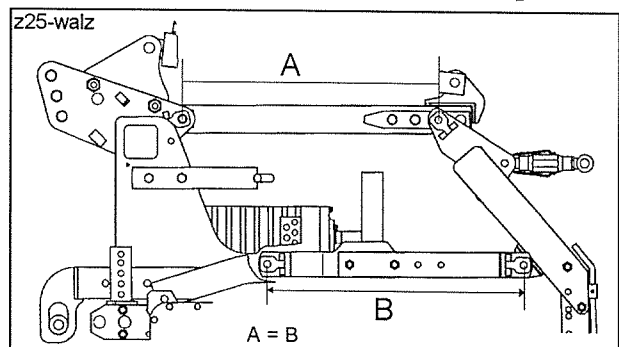
To attach a mounted implement the spring clips (21) are removed, and the locking bars (22) are lifted and locked by means of the spring clips. After mounting the implement the locking bars are once again lowered and secured. The bolt (23) is used to connect the implement top link. During work the check valve (24) must be opened. If a double acting ram is fitted, the tractor hydraulics must be set in the „float“ position. If, on the other hand, a single acting ram is fitted, the tractor hydraulics must be set in the „lower“ position.

For transport with the mounted implement raised, the check valve (24) must be closed. When doing so, ensure that the lower connecting links (17) are pressed firmly against the headstock (T). The forward position must be selected for the double acting ram and the rearward position for the single acting ram.

### 8.3 Lowering the drill machine

The drill machine must be lowered as follows:

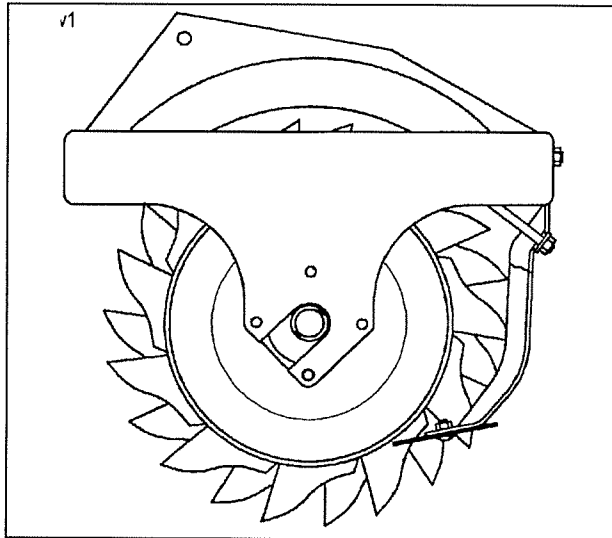
- Open the check valve (24) when tractor spool valve is closed.
- Then set tractor spool valve to „lower“ position and lower the drill machine appropriately.



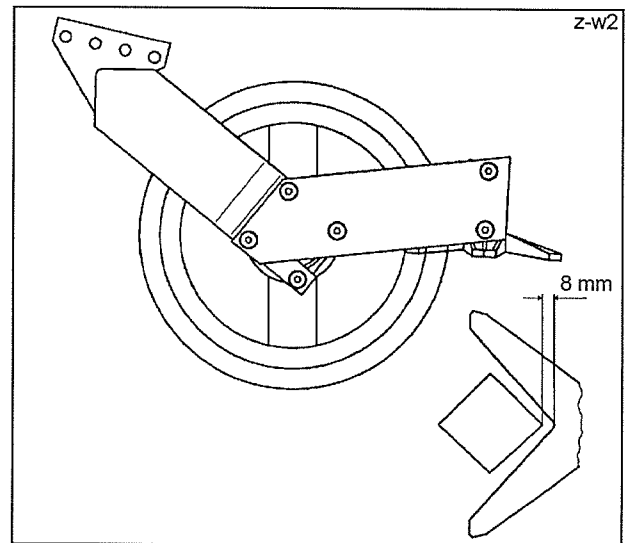
**Attention:** Counter nut of the rear top link must be tightened securely after each adjustment.

## 9 ROLLERS

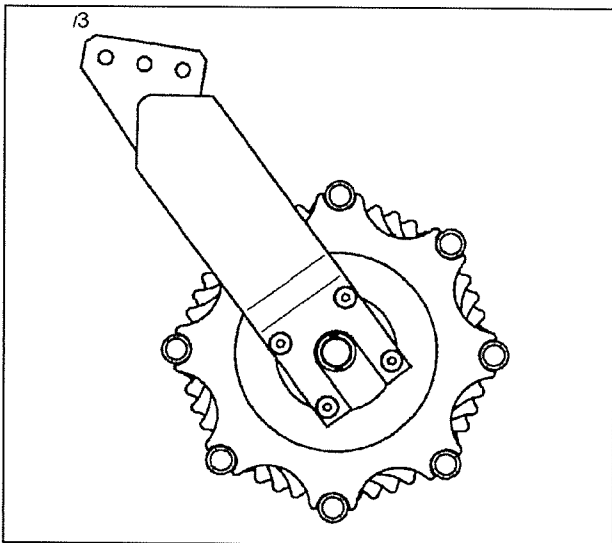
The Zirkon power harrows are available with tube bar roller; Flexi-Coil rollers; packer rollers and Trapezring rollers. Due to that a wide range of rollers are available for different requirements.



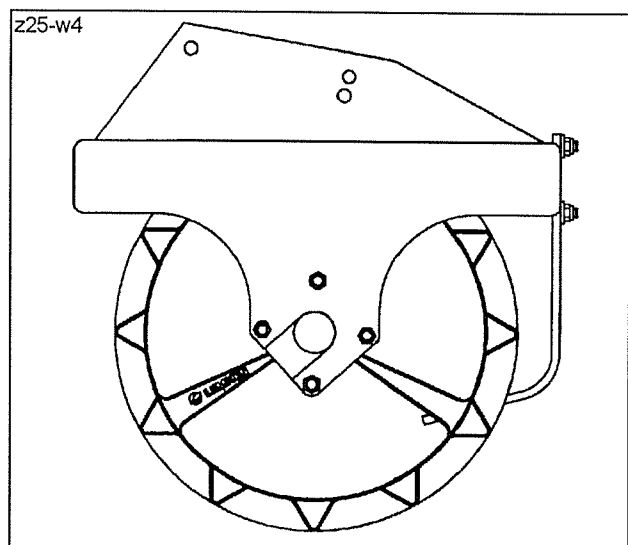
Packer roller ZPW with standard scrapers, hard faced scrapers or synthetic scrapers. The scrapers must be adjusted carefully to prevent a clogging of the roller.



Flexi-Coil rollers with scrapers. The scrapers must be adjusted so that the inner edge shows a distance to the outer edge of the roller of 8 mm. Ensure that the scrapers can turn always easily.



Tube bar roller RSW



Trapezring roller

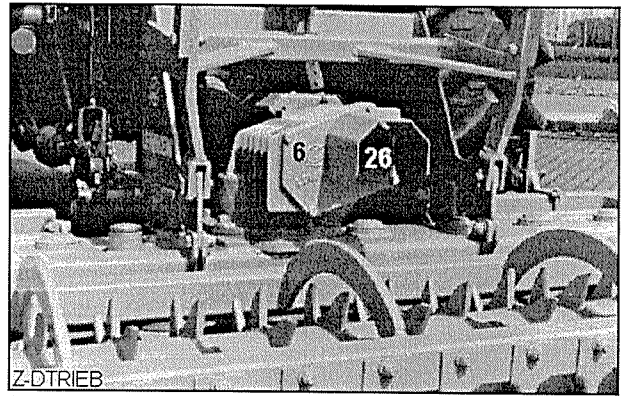
After the daily work, clean the rollers carefully by removing the soil. Only this will ensure a proper function and a long life time.

Grease the bearings regularly.

This working effect of the rollers will be improved in combination with a levelling bar which is fitted between the power harrow and roller.

## 10 REAR PTO DRIVE

The rear PTO drive is available as optional equipment. The profile of the rear PTO drive is 1,3/8 with 6 splines. The rotation direction is clockwise. Never connect implements which require an anti-clockwise rotation.

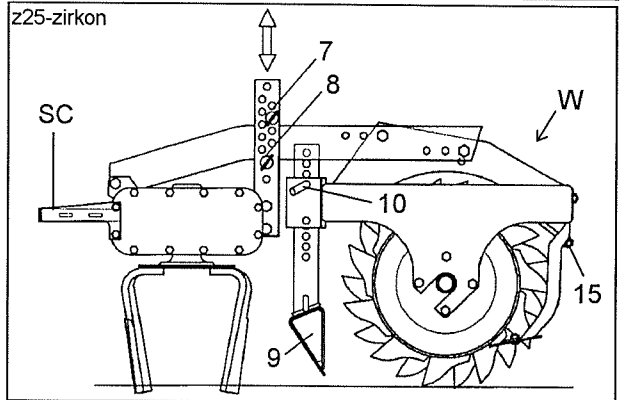


## 11 LEVELLING BAR

The Zirkon 2500 can be equipped with a levelling bar in the rear.

The depth adjustment of the levelling bar (9) will be carried through by means of the pin adjustment with pin (10).

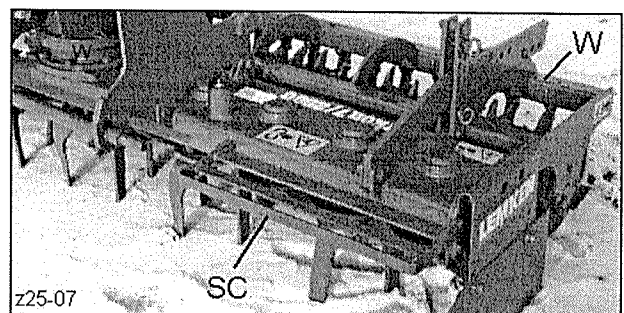
For adjustment the lower edge of the levelling bar should be set 2 cm above the surface. If the levelling bar feeds too much soil into the rotation blades, it must be set into a higher position.



- If a fitted levelling bar will be removed, provide alternative guards.
- The levelling bar is suspended in a floating position - there is danger of being pinched or crushed.
- Only adjust the power harrow when the PTO shaft is disconnected, the tractor engine is switched off and the ignition key removed.!

## 12 SAFETY DEVICE

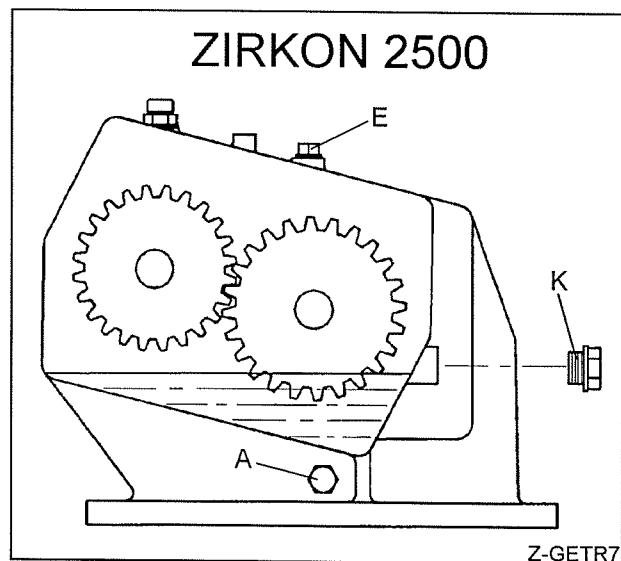
The Zirkon 2500 is fitted with safety device (SC) in the front. This safety device guards for 'getting in' the working area of the rotors and blade tines. Don't operate the implement without this safety device.



## 13 MAINTENANCE / SERVICING

### 13.1 Changing the oil

The trough contains special long-life low-viscosity grease which must not be mixed with a different type of grease and which must be changed after 4,000 hours, or in the event of it becoming heavily contaminated with condensation. This will be recognised by a white discoloration. The condition of the grease must be checked annually and can be done having first unscrewed the cap (33). Check level of grease only with a 'run up' machine. The level must reach the centre of the teeth on the gears. Do not mix low-viscosity grease with



other greases or oils.

The oil in speed-change gearbox must be changed after the first 30 hours use and, subsequently every 200 hours. This oil should at the very least be changed annually.

To drain the oil, of which there is about 2,8 litres in the Zirkon.2500, tip the power harrow rearwards by extending the top link. The drain plug is located at the rear right-hand side of the base of the gearbox.

Fill with fresh oil, the filler plug being located at the rear left-hand side of the gearbox.

Check the oil level regularly. This must reach a level to the upper edge of the oil level plug.

### 13.1.1 Oil for the speed-change gearbox of the Zirkon

2,8 litres oil

Mobilube HD 85W-140 (Mobil)

or

BP Energear FE SAE 80W-90 / API-GL-5

Deagear EP-C SAE 85W-140 (DEA)

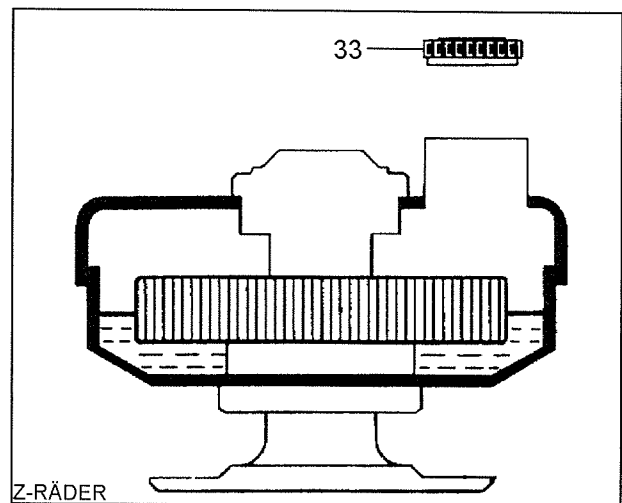
Shell Spirax HD 85W-140 (Shell)

**Attention:** Dispose of oil and grease as prescribed by law. Use only clean oil of the above stated specifications. Stop tractor engine before checking the oil level!

### 13.2 Trough

The grease in the trough is a long life grease. A change is first necessary after 4000 working hours. Within the trough of the Zirkon 2500 are 20 l grease. It is only allowed to use Olit 00 of the company Optimol.

**Attention:** Dispose of oil and grease as prescribed by law. Use only clean grease of the above stated specifications. Stop tractor engine before checking the grease level.



### 13.3 Lubrication

Lubricate the grease points of the side plate supports annually, and of the following roller every 50 working hours with a universal grease.

### 13.4 Bolts

All the nuts and bolts must be tightened after the first few hours of use, certainly within the first 8 hours and checked, and tightened if necessary, regularly after that.

### 13.5 Blades

Worn blades must be changed in good time. Blades 337 7022 (337 7024) must be used for clockwise rotors and blades 337 7023 (337 7025) for anticlockwise rotors. The tightening torque of the bolts is 200 Nm.

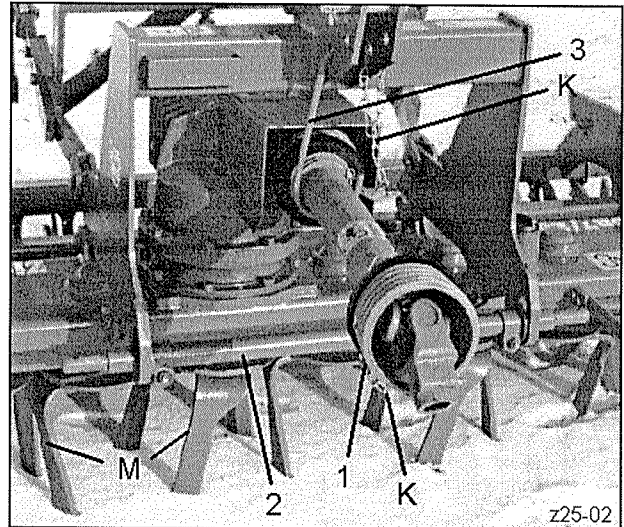
### 13.6 PTO drive shaft

Regularly check the PTO drive shaft to ensure that it slides in and out smoothly. Regularly grease the shaft and universal joints.

### 13.7 Hydraulic drill linkage

Regularly check the hydraulic pipes for damage and leaks. Replace any that are defective. All hydraulic pipes must be exchanged after 6 years.

The pivot points of the linkage are bushed. These bushes must be replaced when worn.



## 14 TRANSPORT ON PUBLIC ROADS

If it is required to drive on public roads with this cultivator, fit warning boards and lighting equipment.

The regulations and laws concerned must be abided by.

## 15 NOTES

It must be stated that these instructions apply only to the current design.

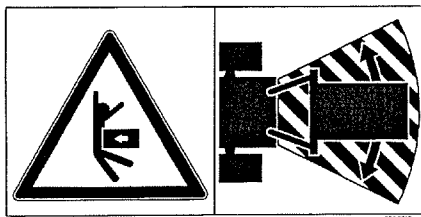
## 16 NOISE, AIRBORNE SOUND

The noise level of the Power Harrows ZIRKON 2500 does not exceed 70 dB (A) during work.

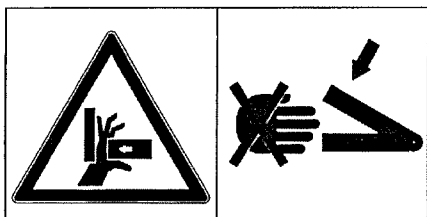
## 17 WEIGHTS

		Working width	Weight
Zirkon 2500	with Tube bar roller	250 cm	1.095 kg
Zirkon 2500	with Packer roller tooth type 420	300 cm	1.225 kg
Zirkon 2500	with Packer roller tooth type 500	400 cm	1.558 kg
Zirkon 2500	with Trapeze ring roller	300 cm	1.305 kg
Zirkon 2500	with Flexicoil roller	400 cm	1.722 kg

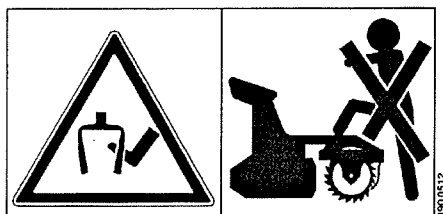
## 18 WARNING STICKERS



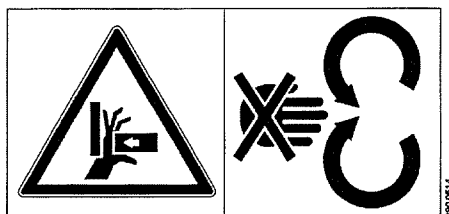
**WARNING: KEEP WELL CLEAR OF THE WORKING AND SWINGING AREA OF THE IMPLEMENT!**



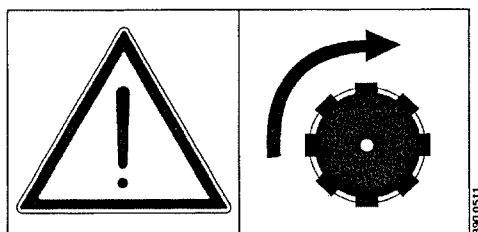
**WARNING: PINCH POINT!**



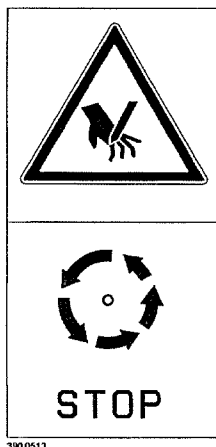
**WARNING: DO NOT CLIMB ON THE MACHINE!**



**WARNING: WAIT UNTIL ALL MACHINE COMPONENTS HAVE STOPPED COMPLETELY BEFORE TOUCHING THEM!**



**WARNING: CLOCKWISE DIRECTION!**



**WARNING: DANGER DUE TO REVOLVING PARTS**

## 19 SAFETY INSTRUCTIONS



- Before using the machine, always check both it and the tractor for roadworthiness and operational safety.
- As well as the notes in these instructions the operator is advised to comply with the generally applicable safety at work regulations and those relating to use of the public highway.
- Do not wear loose clothing.
- Before starting work, familiarise yourself with all equipment and working parts as well as their functions. It is too late for this when you are working.
- Keep the machine clean.
- Couple the power harrow as instructed only using the stipulated fixings.
- Special care is required when coupling and uncoupling implements to or from the tractor.
- Release cables for quick-action three point linkage couplings must hang loosely and must not release themselves at the lowest point.
- Before starting the engine and engaging the PTO check the area around the machine (e.g. children).
- Riding on the power harrow both during work and during transport is not allowed.
- Never leave the drivers seat whilst the tractor is in motion.
- Driving conditions, steerage and braking are affected by mounted or towed implements and ballast weighs. Therefore, ensure sufficient front end weight for steering and braking!
- When cornering, take into account the wide overhang and/or the centrifugal effect of the power harrow.
- Only engage the power harrow if all the protective fixtures are attached and are in the working position!
- Do no stand in the working area!
- Do not stand in the turning and swinging area of the power harrow.
- Hydraulic devices must be operated only if nobody is standing in the swinging area!
- Before leaving the tractor, lower the power harrow onto the ground, switch off the engine and remove the ignition key!
- Nobody must stand between the tractor and power harrow unless the tractor is secured to prevent it rolling away by the parking brake and/or by wheel chocks.
- Lock the wheel track eradicators in the transport position!

### **Mounted implements**

- Before mounting and dismounting implements on/from the three-point linkage, move the raise / lower control to the position at which unintentional raising or lowering cannot take place!
- In the case of three-point linkage, ensure that the tractor bolts and power harrow pins are of the same category.
- There is the risk of injury from pinch and shear points in the three-point linkage area!
- When operating the external lift controls for the three-point linkage, do not stand between the tractor and power harrow.
- Always ensure sufficient lateral limitation for the three-point linkage of the tractor in the transport position of the power harrow.
- When driving on roads with the power harrow raised, the raise/lower control must be locked to prevent lowering.

### **Power take-off shaft operation**

- Only drive shafts stipulated by the manufacturer may be used!
- Both halves of the protective tube of the PTO shaft must be anchored to prevent rotation - and be in working order!
- Fit and remove the PTO shaft only when the power take-off drive is disconnected, the engine is switched off and the ignition key has been removed!
- Always ensure the correct assembly and safety of the PTO shaft!
- Before engaging the power take-off drive, ensure that the selected speed of the tractor's power take-off shaft matches the permissible speed of the power harrow!
- Before engaging the power take-off drive, ensure that nobody is standing in the hazard area of the power harrow!
- Never connect the power take-off shaft when the engine is switched on!
- When working with the power take-off shaft, nobody must stand in the area of the rotating power take-off shaft.
- Always disconnect the power take-off shaft if excessive angular displacements occur.
- Caution: After disengaging the power take-off drive, the rotors take a few seconds to come to rest. Do not approach the power harrow too closely during this time. Work must not be carried out upon it until it comes to a complete standstill!
- Clean, lubricate or adjust the appliance driven by the power take-off shaft only when the power take-off shaft is disconnected, the engine is switched off and the ignition key has been removed!
- Retain the uncoupled PTO shaft on the mount provided!
- After removing the PTO shaft replace the screw-on guard over the tractor PTO.
- In the event of damage, rectify it prior to continuation of work.

### **Hydraulic equipment**

- The hydraulic pipes are under pressure.
- When connecting hydraulic rams, the pipes must be connected as directed.
- When connecting hydraulic pipes to the tractor ensure that incorrect use is avoided. If the connections are reversed, the opposite function is carried out (e.g. raising/lowering) and there is a risk of accidents!
- Regularly check the hydraulic pipes and replace them in the event of damage or signs of ageing. The replacement pipes must comply with the technical specification as laid down by Lemken.
- Hydraulic oil escaping at high pressure can penetrate the skin and cause serious injury!
- Before working on any hydraulic equipment - lower all implements/attachments, release hydraulic pressure where possible and switch off the tractor engine.

### **Maintenance**

- Whenever possible, only carry out work on the power harrow when it is lowered onto the ground with the PTO drive disengaged, and the tractor engine at rest with the ignition key removed.
- Always ensure safety when working on a raised machine by the use of suitable, secure supports.
- Regularly check all nuts and bolts, and tighten these if necessary.
- Dispose of oil and grease properly.
- In the event of welding being required on the power harrow ensure that, if a tractor has to be attached, its battery/alternator is disconnected.
- Only use genuine or approved replacement parts when repairing the power harrow. The warranty could be declared null and void if this is not done.