LEMKEN

Instruction Book

Power Harrows

Zirkon 7 and Zirkon 9

- EN -

CE Safety is our concern

Part No. 175 1204
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Dear customer!

We would like to thank you for the confidence in buying this implement.

The advantages of this implement will be shown, only, when operated and used with due care and attention.

When handing over this implement your dealer has already instructed you with regard to operation, adjustment and maintenance. But this short introduction requires an additional detailed study of the instruction book.

Therefore read this instruction book carefully before the first use. Please pay attention to the safety instructions mentioned in this instruction book.

Any changes and modifications carried out not being mentioned expressly in this instruction book, may only be carried out with a written agreement of the manufacturer.

Ordering spare-parts

When ordering spare-parts please state type and serial No. of the implement. This information will be found on the identification plate.

Put down this data on the following table so that it is always available.

Type of implement:
No.:

Only use genuine Lemken spare-parts. Spurious parts negatively influence the function of the implement, show a shorter lifetime and increase in nearly all cases additional maintenance.

We trust that you will understand that LEMKEN is unable to guarantee poor operation and damage caused by using spurious parts!

DEFINED USE

- Please familiarise yourself with the LEMKEN Zirkon and its operations before putting the implement to work. Therefore use this instruction book with the „General Health- and Safety precautions“!
- The LEMKEN Zirkon have been designed purely for the agricultural use!
  Any use beyond the one stipulated above is no longer considered as defined use!
  Under „defined use“ the manufacturer’s prescribed operation-, maintenance- and repair conditions are to be adhered to!
- The LEMKEN Zirkon 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 ad7vice as well as the generally accepted safety technical, working, medical and road traffic rules should be adhered to!

CONTENTS

1 SAFETY INSTRUCTIONS

General 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 balls 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 PT0.
- 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.

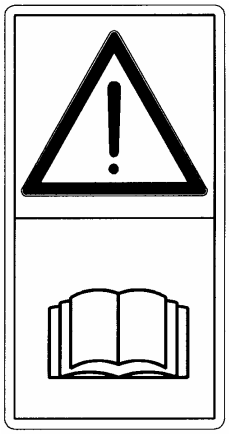
2 WARNING STICKERS

2.1 General Instructions

The LEMKEN Zirkon is equipped with all features to ensure safe operation. Where potential danger areas of the implement can not be fully safeguarded, warning stickers are fitted which draw attention to these.

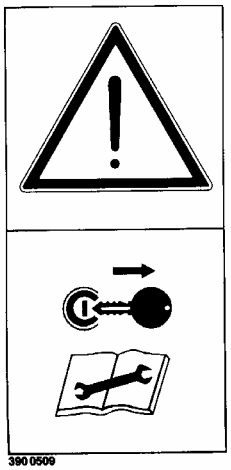
2.2 Meaning of the stickers

Familiarise with the meaning of the stickers. The following descriptions inform about them in detail.



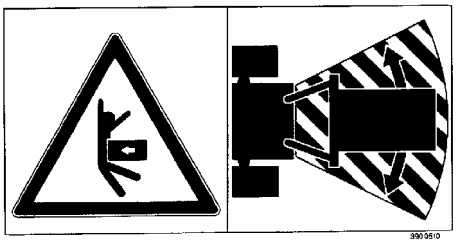
WARNING: Read and adhere to this Instruction book and these "General Health- and Safety precautions", before putting the implement to work!

390 0555



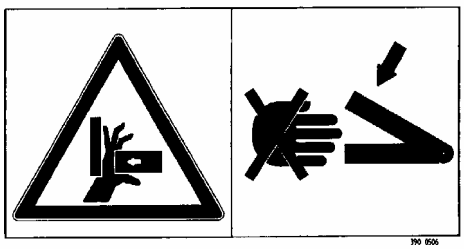
WARNING: Shut off engine and remove key before performing maintenance or repair work!

390 0509



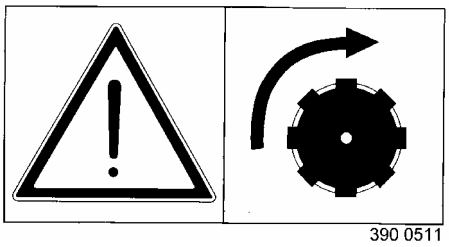
WARNING: Keep well clear of the working and swinging area of the implement!

390 0510



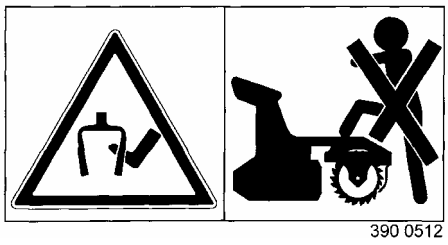
WARNING: Pinch Point!

390 0506



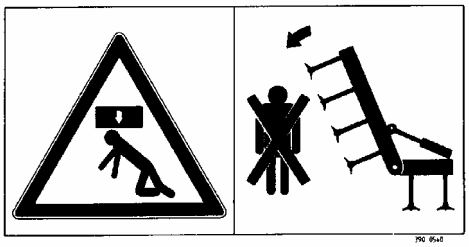
WARNING: Turning direction of the rear PTO = clockwise!

390 0511



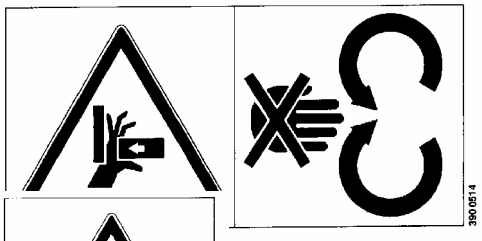
WARNING: Do not climb on the machine!

390 0512



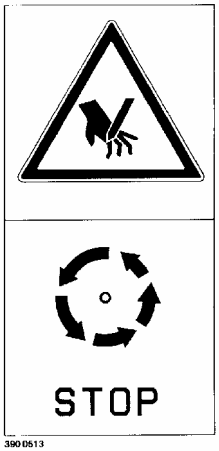
WARNING: Keep well clear of the folding area of the implement!

390 0540



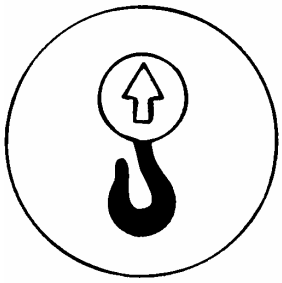
WARNING: Danger due to revolving parts!

390 0514



WARNING: Wait until all machine components have stopped completely before touching them!

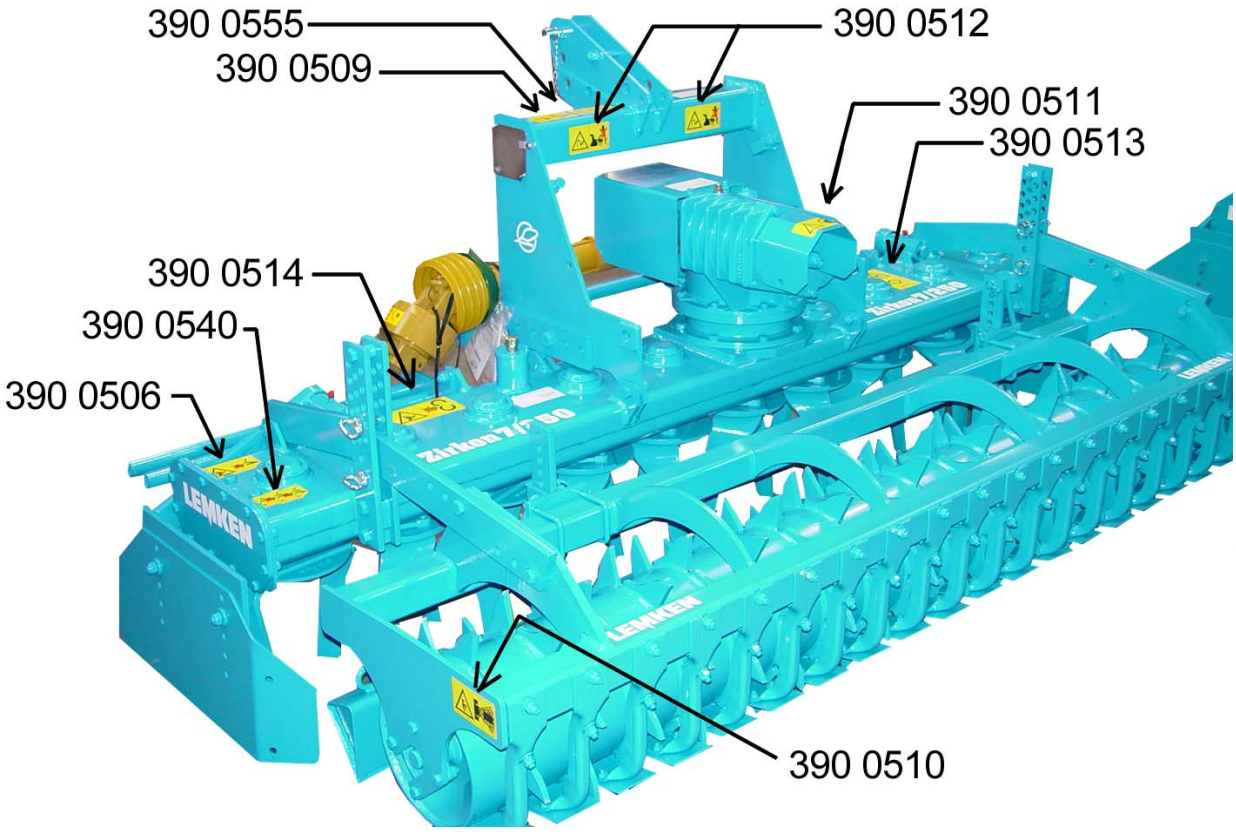
390 0513



WARNING: Suspend implement here!

390 0588

2.3 Position of warning stickers



3 COMPACT INFORMATION

The following adjustments must be done to use the Zirkon effective and optimal.

- **Top link and lower links**

The top link must be positioned as parallel as possible to the lower links.

- **Rotor RPM**

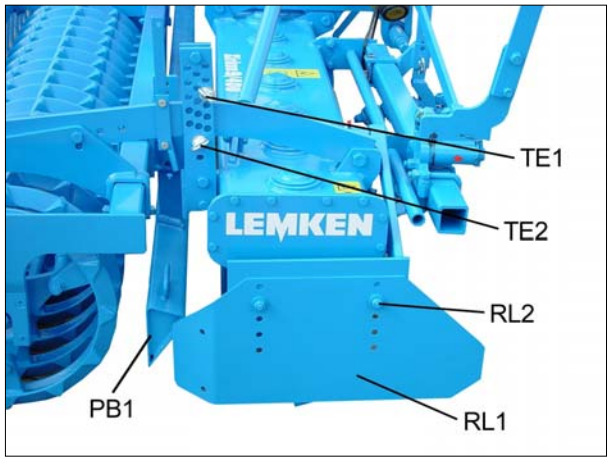
The rotor RPM must be adjusted to the desired working effect. As standard it is possible to adjust to approx. 360 1/min or approx. 444 1/min with a PTO shaft RPM of 1000 1/min.

- **Working depth**

The working depth should be adjusted as shallow as possible by means of the pins (TE1) and (TE2).

- **Side shields**

The side shields (RL1) must be set so deep, that they are covering the lateral rotating tools completely.

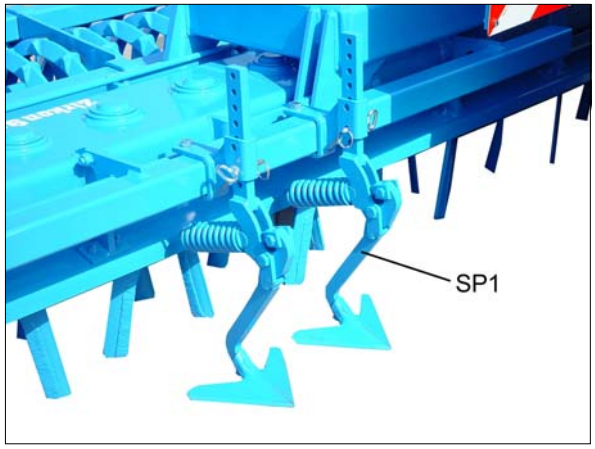


- **Rear levelling bar**

The rear levelling bar (PB1) must be adjusted so high that it is positioned approximately 2 cm above the ground. It must be positioned higher, if too much soil is built up.

- **Wheelmark eradicators**

The wheelmark eradicators (SP1) must be adjusted so deep that they work approximately 5 to 10 cm below the wheelmark surface. In any case they should be in a deeper position than the tines of the power harrow Zirkon.



- **Scrapers**

The scrapers of the packer roller, the trapeze packer roller or the trapeze disc roller must be adjusted equally. Certainly the hard-faced or hard metal scrapers must be adjusted as close as possible to the roller surface, but may not touch it.

4 REPARATION OF THE TRACTOR

4.1 Tyres

Ensure that rear tyre pressures are equal and correct! (Refer to the tractor handbook)

4.2 Lift rods

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

4.3 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.

4.4 Pendulum suspension

The pendulum suspension of the lift rods must be loosened, so that the power harrow can adapt to the soil conditions during working independently from the tractor.

4.5 Hydraulics

Whilst working the tractor hydraulics must be set to ‘floating position’ or ‘mixed control’. (Refer to the tractor handbook)

4.6 Spool valves

For the operation of each use the following tractor spool valves must be available:

	Single acting	**Double acting**
Hydraulic three point linkage, single acting	x	
Hydraulic three point linkage, double acting		x
Track markers	x	

4.7 Required sockets

For the electrical use of the Zirkon the following sources of electric power must be available:

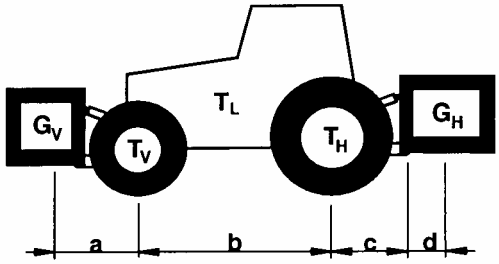
Use	**Voltage**	**Direct connection to the tractor battery**	**Socket**
Lighting equipment	12	-	According to DIN-ISO 1724
PTO shaft control	12	-	According to DIN 9680

4.8 Axle load

The attachment of implements to the front- and rear-three point linkage must not lead to exceeding the allowed total weight, the allowed axle load and the allowed tyre load of the tractor.

The tractor front axle must always be loaded with 20 % of the tractor dead weight at minimum.

How to calculate the minimum front ballast and the increasing of the rear axle load, is described in detail as follows:



G_V = Weigth of front ballast (front implement)

T_V = Front axle load of the tractor without mounted implement

T_L = Tractor dead weight

T_H = Rear axle load of the tractor without mounted implement

G_H = Weight of the implement combination

Calculation of the minimum front ballast G_V min:

$$G_{V\ \min} = \frac{G_H \bullet (c+d) - T_V \bullet b + 0{,}2 \bullet T_L \bullet b}{a+b}$$

Calculation of the increasing of the rear axle load:

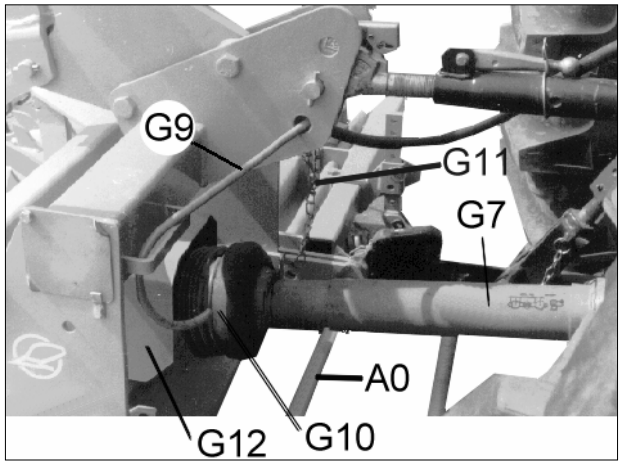
Minimum axle load increasing $= G_H + \frac{G_H \bullet (c+d)}{b}$

The calculation of the required minimum front ballast and the increasing of the rear axle load requires that all above mentioned measurements and weights are known. If they are unknown and cannot be found out, there will be only one way to avoid overloads:

Please weigh your tractor with mounted and lifted implement to find out the actual rear axle loading and front axle unloading and that in comparison with the axle loads of the tractor without implement!

5 ATTACHING AND DETACHING THE POWER HARROW

5.1 Attaching to the tractor



- Set tractor hydraulics to ‘position control’. Connect and secure the tractor lower links to the cross shaft respectively drawbar (A0) 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 (G7) from its mount (G9) and connect to the tractor PTO!
- Fit the chains (G11) of the PTO-shaft to a static part to prevent a spinning of the guard (G10)!
- Connect the hydraulic pipes of the hydraulic three point linkage (if fitted)!
- Swing mount (G9) upwards and secure.
- Fit marker boards and lighting equipment if the power harrow must be transported along public roads.
- Bring all control levers into such a position that unintentional lifting or lowering is impossible.
- If a seed drill is fitted to the hydraulic three point linkage, raise the seed drill until the lower links of the rear lift are fixed by the headstock.
- Close the lock valve of the hydraulic ram of the rear linkage.

5.2 Detaching from the tractor

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

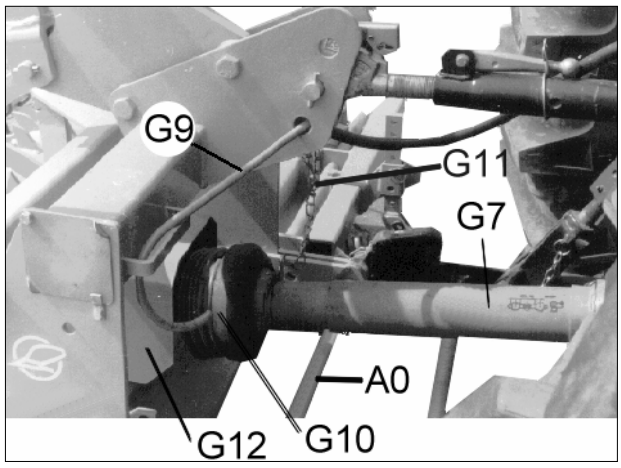
- Set tractor hydraulics to ‘position control’.
- Lower power harrow completely.
- Lower hydraulic three point linkage with mounted seed drill completely (if fitted).
- Disconnect hydraulic hose or hoses and fit protection caps.
- Detach top link.
- Swing down the mount (G9) of the PTO shaft (G7).
- Detach the PTO shaft from the tractor and put it into the mount (G9).
- Detach the drawbar (A0) from the lower links of the tractor.

- Read and adhere to the General Safety Instructions, to the Instructions “Hydraulic assembly” as well as to the Instructions “PTO shaft”!

6 PTO SHAFT

6.1 General

The Zirkon power harrows are equipped with a PTO shaft with cam-type clutch as overload safety device. It must be ensured that the PTO shaft guards (G10) of the PTO shaft are prevented from spinning by fixing the chain (G11) provided to a nearby static part.



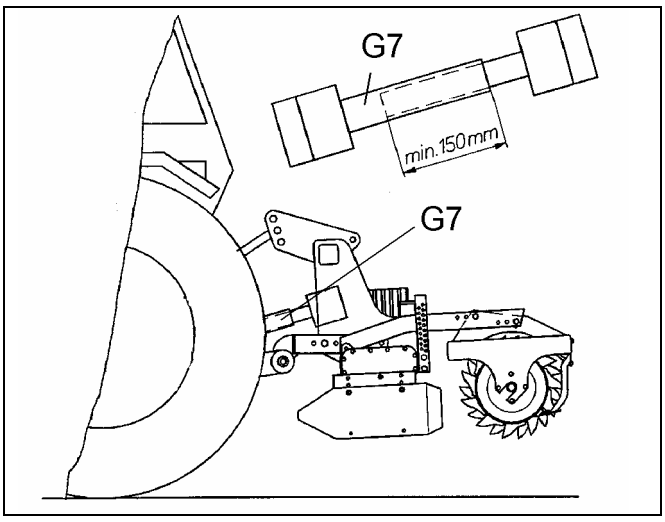
The chains must be fitted either to the shields (G12) or to other non turning components.

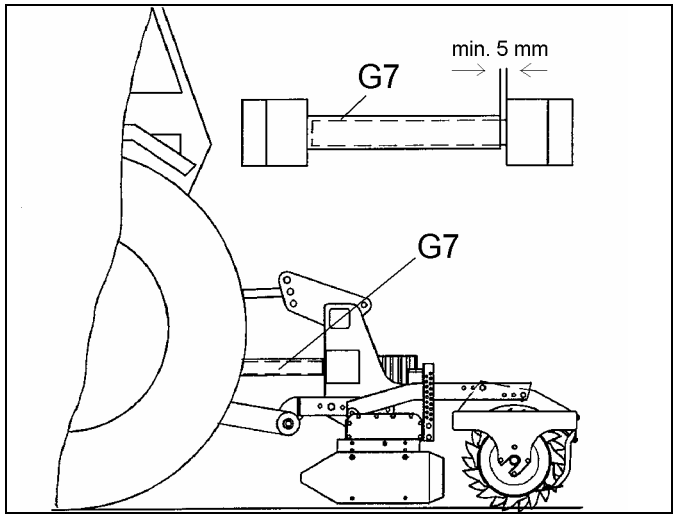
When assembled for work the PTO-shaft (G7) may not be longer than the shortest distance between the tractor and power harrow. Also with both raised and when in work at the deepest depth, the profile and protective tubes must still overlap by at least 150 mm!

If the PTO shaft (G7) is too long

1. the distance of the power harrow to the tractor must be increased or
2. the PTO shaft must be shortened.

But if the PTO shaft is too short, the distance of the power harrow to the tractor must be decreased or a longer PTO shaft of the same range must be used.

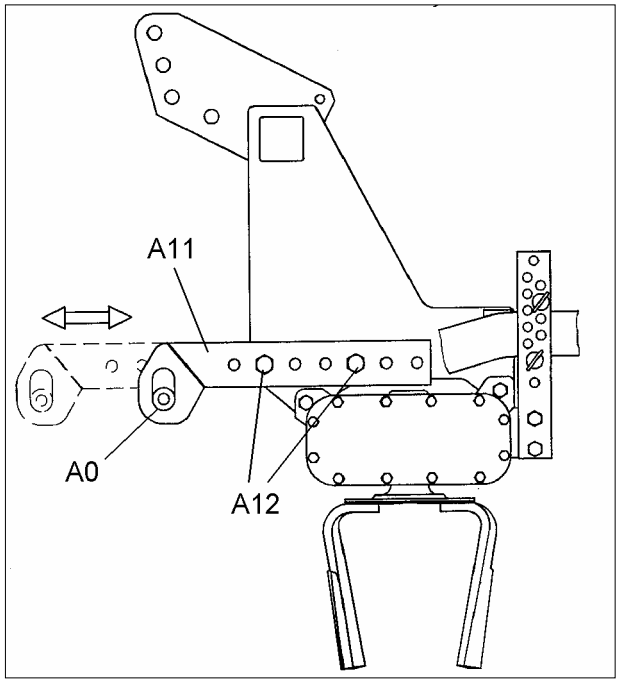




6.2 Changing the distance between the power harrow and the tractor

If the PTO-shaft (G7) does not fulfil the mentioned requirements and a shortening of the PTO-shaft is not desired, the distance between the power harrow and the tractor can be increased by means of moving the carrier (A11) and drawbar (A0). Keeping the power harrow close to the tractor reduces the lift requirement and results in a more stable combination.

The nuts of the fastening bolts (A12) must be tightened carefully and secured additionally with Loctite.



6.3 Shortening the PTO shaft

The PTO shaft (G7) must be shortened if the shaft is too long and an increase of the distance between the power harrow and the tractor is not desired. If necessary shorten the PTO shaft as follows:

- Shorten both halves of both, the profile and protective tube, 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!

ATTENTION: The overload safety clutch may only be fitted at the implement side!

- Read and adhere to the General Safety Instructions as well as to the Instructions “PTO drive shaft”!
- Repair-, maintenance- and cleaning operations as well as adjustments should principally be conducted with engine stopped and parking brake applied. Remove ignition key!

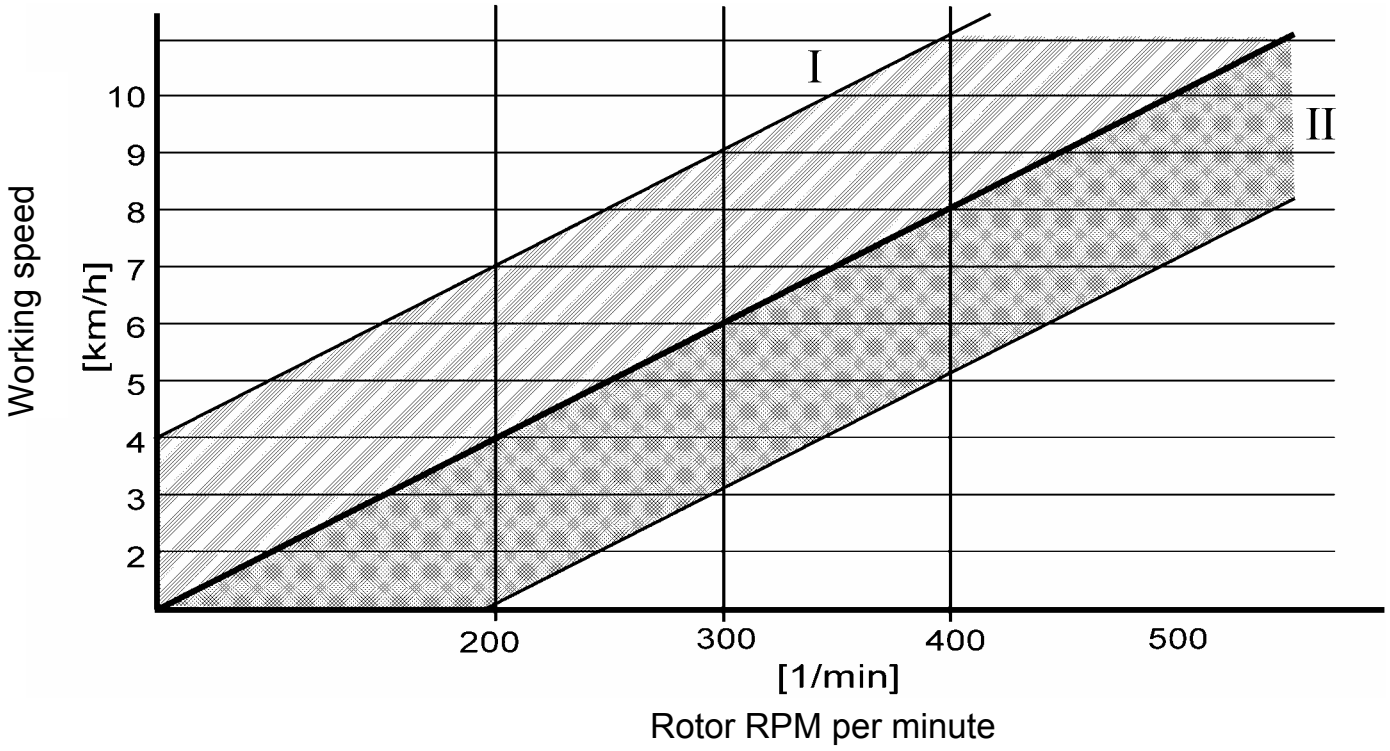
7 ROTOR SPEEDS

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 working speed recommended for the rotor speeds is shown in the following diagram.

The Zirkon 7 power harrows are delivered as standard with the pair of gears 21/23 (drive/output) and the Zirkon 9 with the pair of gears 19/21 (drive/output). Thus a rotor speed of approx. 360 RPM is obtained at 1000 RPM PTO.

Recommended working speeding in dependence of the rotor ROM



If another pair of gears is fitted, then this is marked correspondingly on the sticker 390 4142, 390 4143, 390 4144 or 90 4145. The diagram area I is valid for light to medium soils and diagram area II for heavy to heaviest soils.

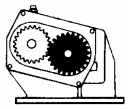
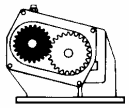
During work the rotor RPM can be modified by means of changing the gears or by means of using another pair of gears.

ATTENTION! The PTO drive shaft RPM of 1000 should always be chosen. When working with 540 or 750 RPM, the drive shaft torque increases by 85 % respectively by 33 % and that with the same rotor speed.

ATTENTION! If the overload safety clutch in non-stony conditions to frequently with 540 or 750 tractor RPM, then 1000 tractor RPM with an adapted choice of change gears must be chosen!

Tables with possible rotor speeds

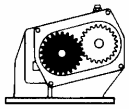
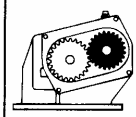
Zirkon 7/250

(1/min) 540	750	1000	(1/min)		
18	26	150	207	277
19	25	164	228	304
21	23	197	274	365
23	21	237	328	438
25	19	284	395	526
26	18	312	433	–

390 4142

Zirkon 7/300 + 7/400

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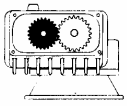
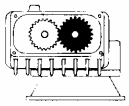
390 4143

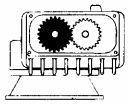
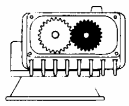
Zirkon 9/300 + 9/400

(1/min) 540	750	1000	(1/min)		
16	24	144	200	267
17	22	167	232	309
19	21	195	272	362
21	19	239	332	442
22	17	279	388	517
24	16	324	450	–

390 4144

Zirkon 9/450

(1/min) 540	750	1000	(1/min)		
24	16	144	200	267
22	17	167	232	309
21	19	195	272	362
19	21	239	332	442
17	22	279	388	517
16	24	324	450	–

390 4145

7.1 Changing the rotor speeds / Changing the gears

Other rotor speeds can be obtained by interchanging the change gears or by using another set of gears. See previously mentioned tables. Only rotor speeds which are listed in the table may be selected.

- To change the gear, switch off the PTO drive shaft and also the tractor engine.
- Remove the ignition key.
- Remove cover (GG0), paying particular attention to the seal.
- Exchange the pairs of gears according to the table.
- Replace the cover (GG0), ensuring that the seal is positioned correctly.
- Tighten the bolts carefully.

- Read and adhere to the General Safety Instructions as well as to the Instructions “PTO drive shaft”!
- 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.
- Changing the gears requires sufficient knowledge and correct tools.
- 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!

8 ADJUSTMENTS

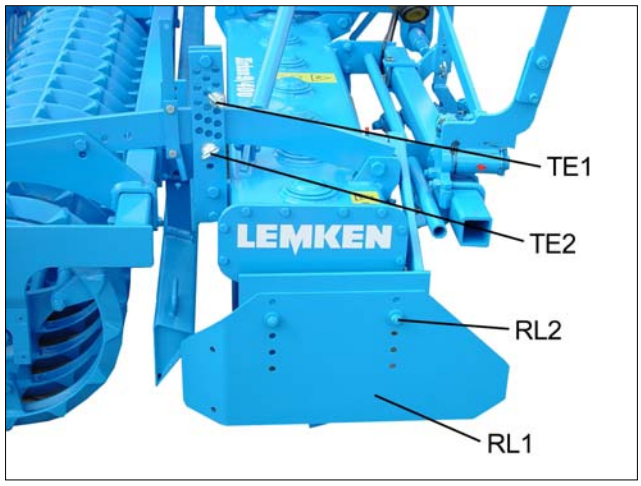
8.1 Horizontal position

When in work the power harrow should be horizontal fore/aft. Adjustment is made by altering the tractor top link length. If the tractor PTO drive shaft is not parallel to the ground, but oblique sloping or rising, the power harrow must be adjusted by means of the tractor top link so that gearbox entrance shaft in lowered working position is parallel to the PTO drive shaft.

ATTENTION! When the PTO drive shaft and the gearbox entrance shaft are not parallel to each other, the PTO shaft vibrates. This leads to wearing and damage of the PTO shaft, the gearbox and the PTO drive shaft. This leads also to an early actuation of the overload safety device of the PTO shaft.

8.2 Working depth

The working depth of the power harrow depends on the tilth required. In general the power harrow should work as level as possible. The depth of work is determined by the position of the upper pins (TE1), 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 pins (TE2). The pin should be positioned as low as possible and as high as necessary to maintain clearance.

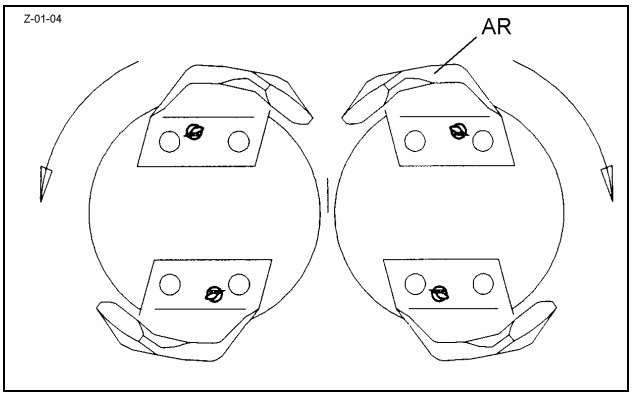


If the tines show a minimum length of 12 cm, only, they must be exchanged.

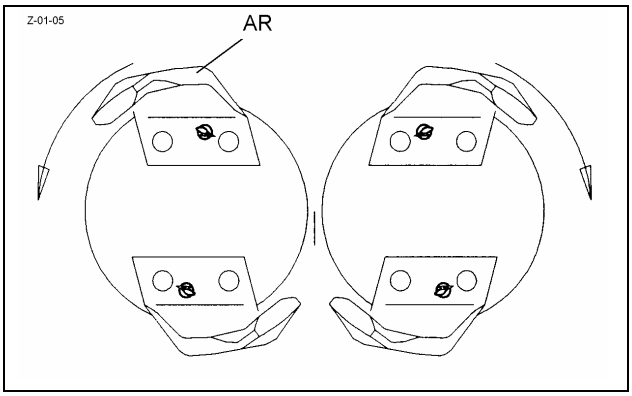
8.3 "Allround" tines – only with Zirkon 9

The „Allround" tines (AR) in special hardened version can either be fitted in drag or grade position to the rotor.

When the working position of the tines (AR) should be changed from „drag" to „grade" position and the other way round, the tines of a rotor must be fitted to the neighboured rotors. After changing the tines, all bolts must be tightened by means of a tightening torque of 400 Nm. After that it must be checked, whether all tines are fitted correctly by means of turning the rotors manually. When this is possible without problems, all tines are fitted correctly.

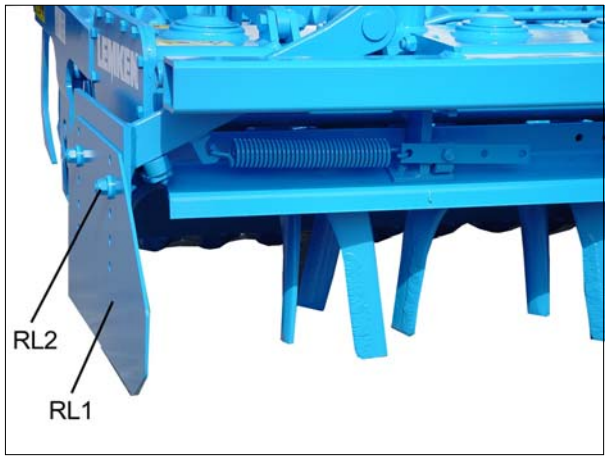


Tines in „drag" position



Tines in „grade" position

Hard-faced „Allround" tines are available which are hard-faced on the drag- or grade side as desired. Each contrary cutting side of the tines (AR) is not hard-faced, but special hardened.

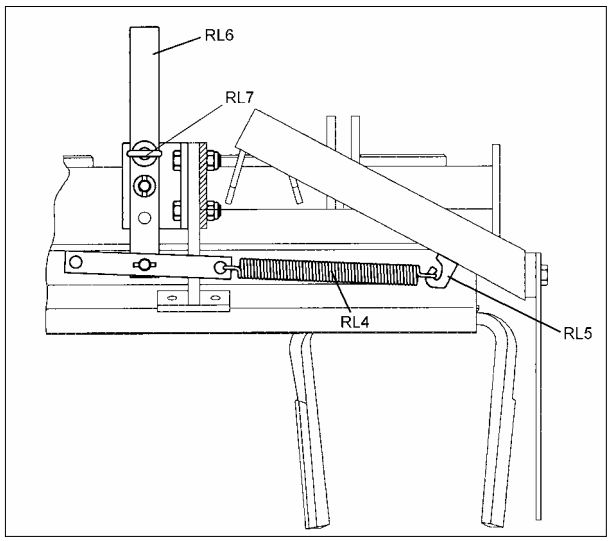


8.4 Side shields

The side shields (RL1) must be adjusted in height so that the rotating tools are covered completely. When worn they must be set deeper correspondingly. After each adjustment, they bolts (RL2) must be tightened again.

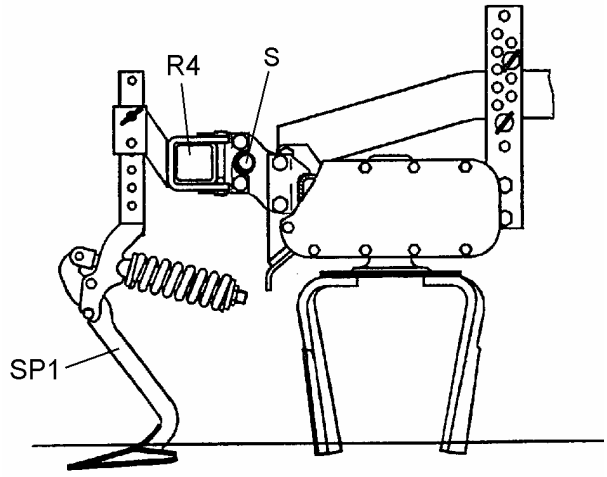
For transport on public roads the side plates of the power harrows Zirkon 7/300 and Zirkon 9/300 must be swung-in, in order to observe the maximum allowed transport width. Therefore the tension of the springs (RL4) must be released and the springs removed from the hook (RL5).

Before next use, the springs must be fitted and tensioned again by means of the lever (RL6). Secure lever by means of the pin (RL7) and secure pin.

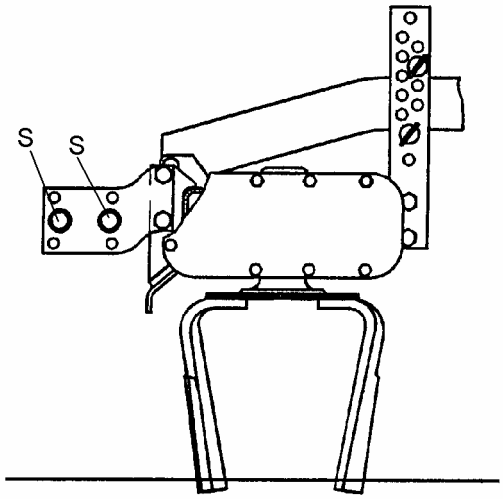


8.5 Safety Device

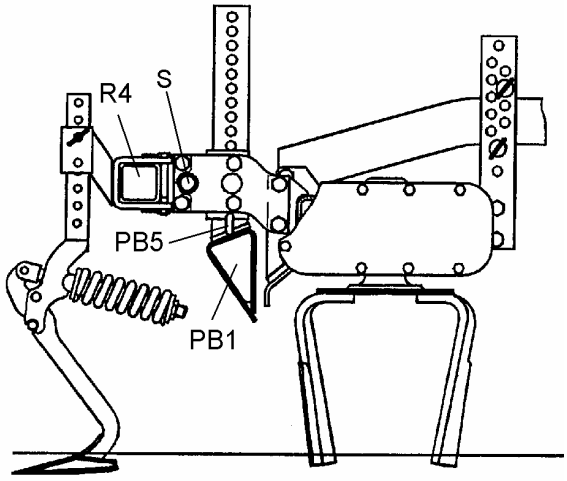
Depending on the equipment, there are different safety devices available. It must be ensured that a safety device in accordance to the following drawings is fitted.



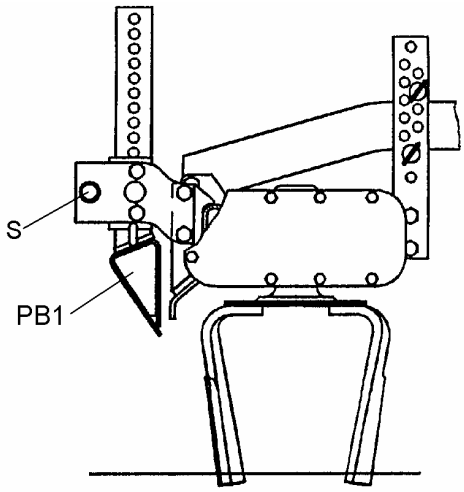
1. Version with carrier (R4) for wheelmark eradicators and protection tube (S).



2. Version with two protection tubes (S).



3. Version with carrier (R4), protection tube (S) and levelling bar (PB1).



4. Version with levelling bar (PB1) and protection tube (S).

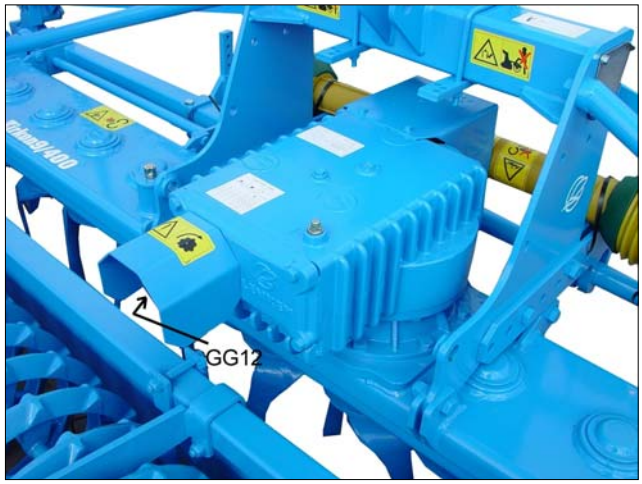
The drawings show different safety devices of the Zirkon 7. The arrangement and the structure of the safety devices for the Zirkon 9 are similar.

For illustration purposes the headstock, the side plates and the following rollers are not shown. Without this equipment the power harrow must not be operated.

Attention: If the front levelling bar (PB1) is removed or fitted at the rear, an alternative protection device must be fitted.The Zirkon may never be used without front levelling bar or protection device. The Lemken Zirkon must not be used without a following roller!

8.6 Rear PTO drive

The profile of the rear PTO drive (GG12) is 1 3/8“ with 6 splines. The rotation direction is clockwise.
Never connect implements which require an anti-clockwise rotation.



- Read and adhere to the General Safety Instructions as well as to the Instructions “PTO drive shaft” and “Maintenance”!

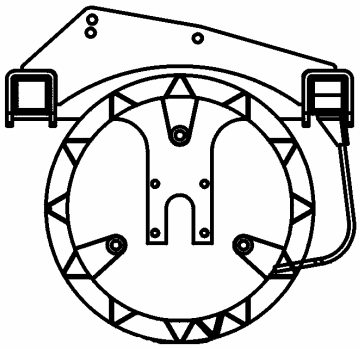
9 OPTIONS

9.1 Rollers

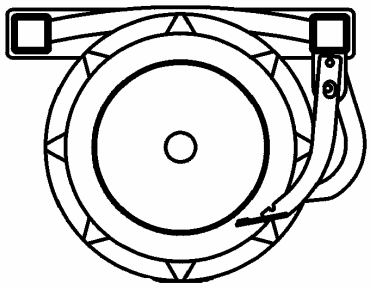
9.1.1 General Instructions

The Zirkon can be equipped with a number of rollers (W0):
Tube bar roller RSW 540, Trapeze ring roller TRW 500, Trapeze packer roller TPW 500, Trapeze disc roller TSW 500 or Packer roller ZPW 500.

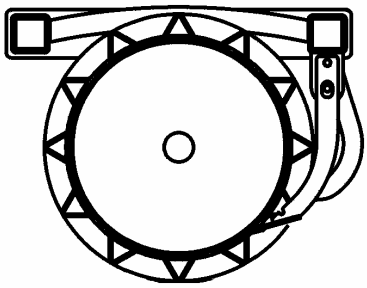
The tube bar roller and the trapeze ring roller are free of maintenance.
The trapeze disc roller, the trapeze packer roller and the packer roller are equipped with adjustable scrapers, which must be re-adjusted from time to time.



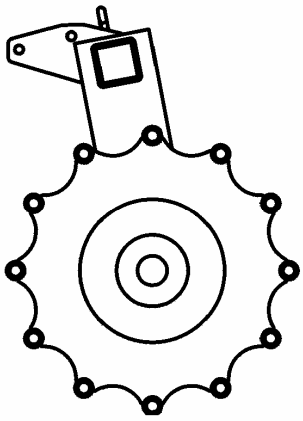
TRW 500



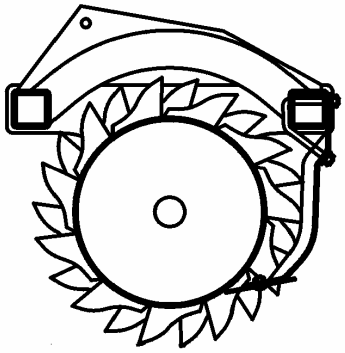
TSW 500



TPW 500



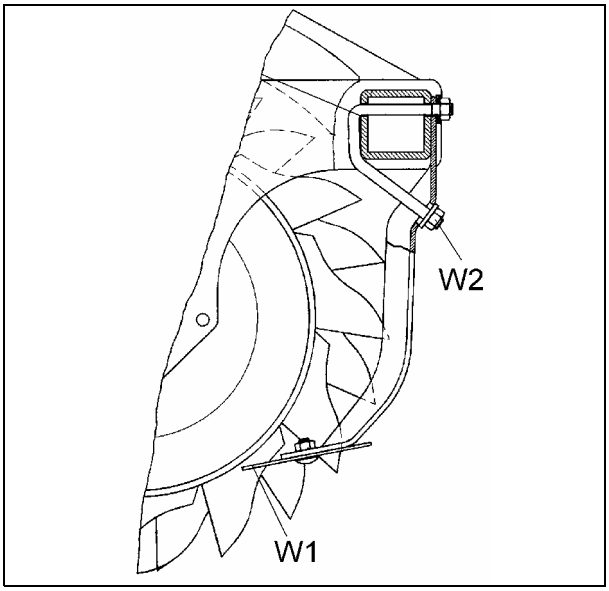
RSW 540

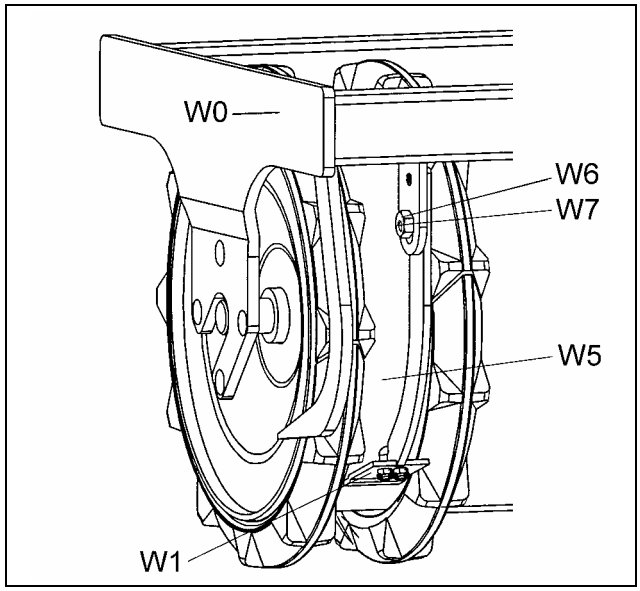


ZPW 500

9.1.2 Adjustment of the scrapers

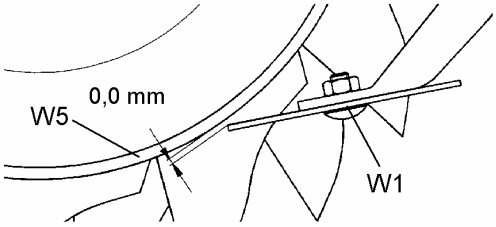
The adjustable scrapers (W1) of the 500 mm rollers will be adjusted by means of the adjuster nut (W2) and the eccentric nut (W5).
The adjuster nuts (W2) of the packer rollers will be adjusted by means of a 19 mm spanner and the eccentric nuts (W6) with a 24 mm spanner.
Before adjusting, the screw (W7) belonging to it, must be loosened by means of a 19 mm spanner and after that tightened again.



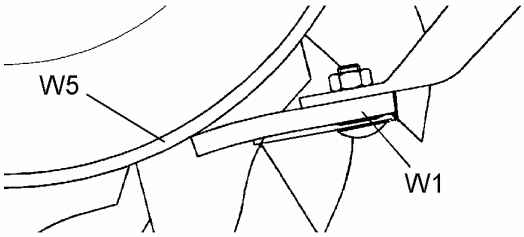


9.1.3 Distance of the scraper to the roller surface sleeve

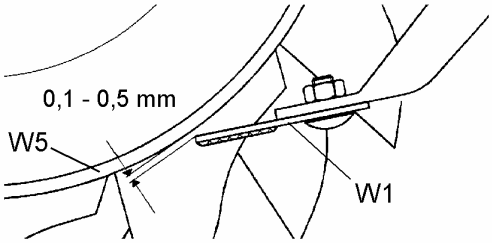
The distance between scraper (W1) and roller surface (W5) must be adjusted as follows. The setting instructions are valid for all packer rollers, trapeze packer rollers and trapeze disc rollers.



Heat-treated scrapers



Synthetic scrapers
(fitted to the roller surface (W5) with a little pre-tension)

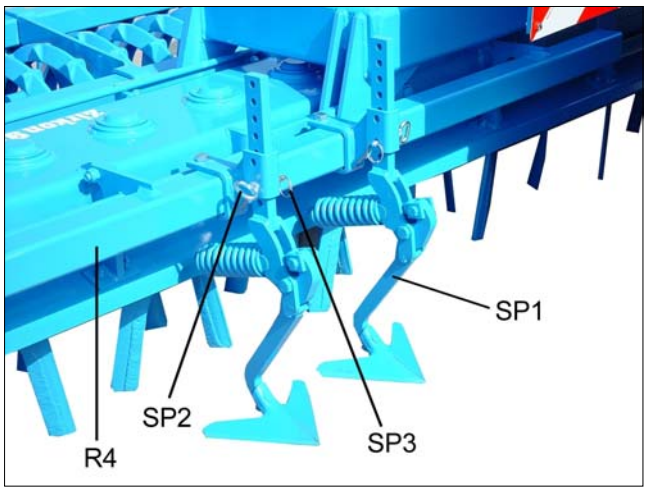


Hard-faced scrapers
or scrapers with hard metal plates

9.2 Wheelmark eradicators

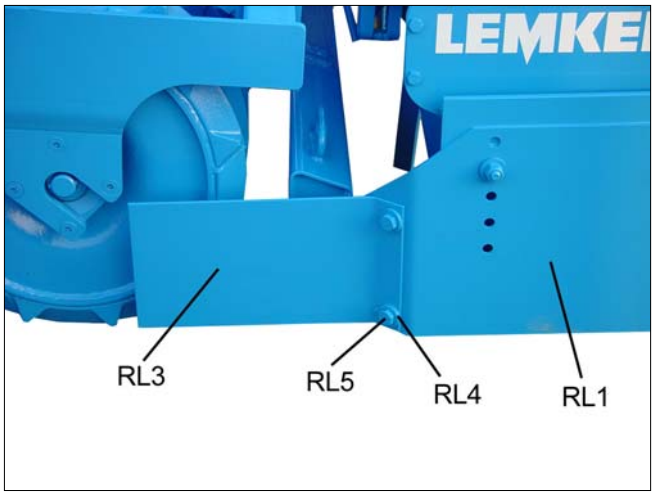
One pair or two pairs of wheelmark eradicators (SP1) can be fitted to the Zirkon.

The eradicators can be positioned laterally and are vertically adjustable by means of pins (SP2). Secure pins (SP2) by means of the securing ring (SP3).



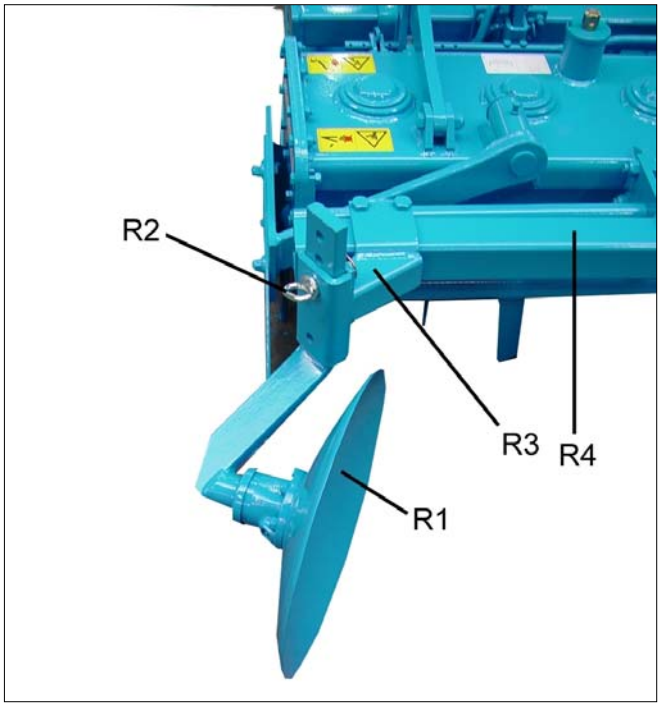
9.3 Side shield extension

In order to prevent dam formation caused by the following roller, side shield extensions (RL3) are available, which are fitted at the rear of the side shields (RL1). They show slotted holes, which are covered by washers (RL4). After loosening the bolts (RL5), each side shield extension can be moved to the front and rear to adjust the required distance to the roller. This distance should be as small as possible. After the adjustment the bolts (RL5) must be tightened again.



9.4 Feed discs

For an especially level work feed discs (R1) are available. They are fitted to the outside of the carrier (R4) by means of the brackets (R3). The feed discs (R1) shall work so deep that no ridges are visible. The working depth will be adjusted by means of a pin adjustment with pin (R2). After a depth adjustment the pin (R2) must be secured. The side discs can also be adjusted laterally to reach the exact working width, for example 4 m.

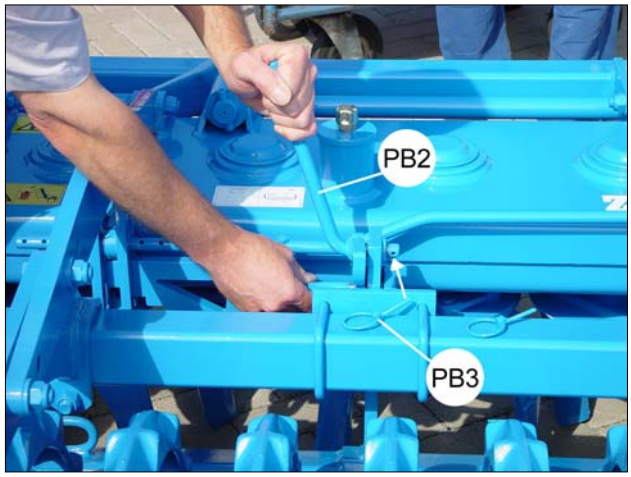


10 LEVELLING BAR

10.1 General Instructions

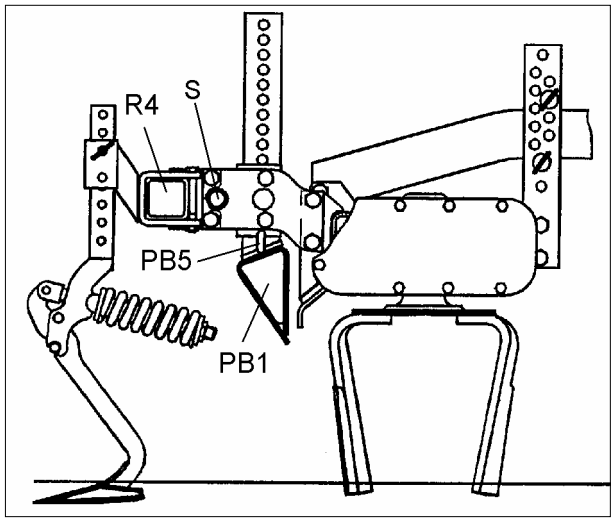
The Zirkon can be equipped with a levelling bar (PB1) in the front or in the rear. But it can only be used with one levelling bar, either in the front or in the rear.

By means of the eccentric lever (PB2) the solid levelling bar can be adjusted without high effort. The eccentric lever must be secured by means of the linch pin (PB3), so that the lever cannot slip off. The pin (PB4) must be unsecured before the adjustment and may be re-fitted only, when the levelling bar is hold safely by the eccentric lever (PB2).



10.2 Levelling bar (front)

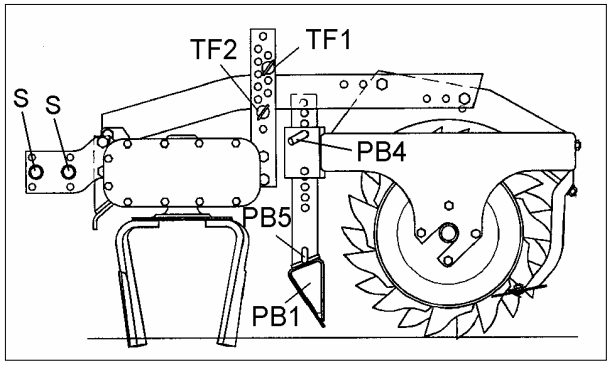
The levelling bar (PB1) should be set deep enough so that a slight bank forms in the middle centre whilst working. Thus a good lateral distribution and levelling of soil is guaranteed.



10.3 Levelling bar (rear)

If fitted in the rear, the lower edge of the levelling bar (PB1) should be set 2 cm above the soil surface. If the levelling bar feeds too much soil into the tines, it must be set into a higher position.

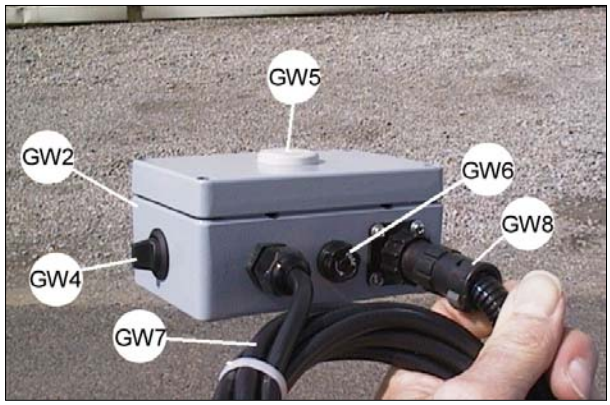
The rear levelling bar is fitted to the roller frame. Due to that a re-adjustment of the levelling bar after changing the working depth of the power harrow is unnecessary.



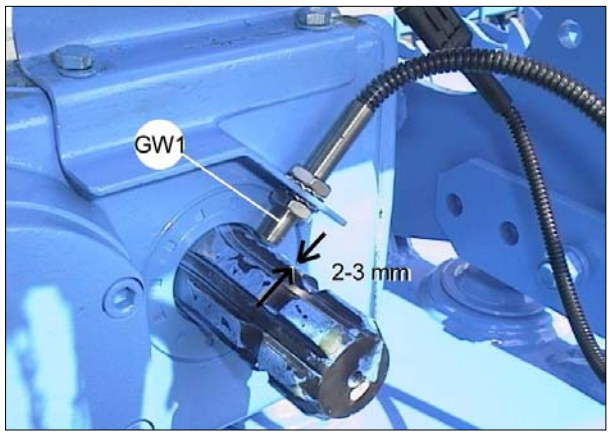
- Read and adhere to the General Safety Instructions!
- If a fitted levelling bar is removed, provide alternative guards.
- The levelling bar is suspended in a floating position - there is danger of being pinched or crushed.
- Never adjust the levelling bar with PTO shaft switched on.

11 PTO SHAFT CONTROL

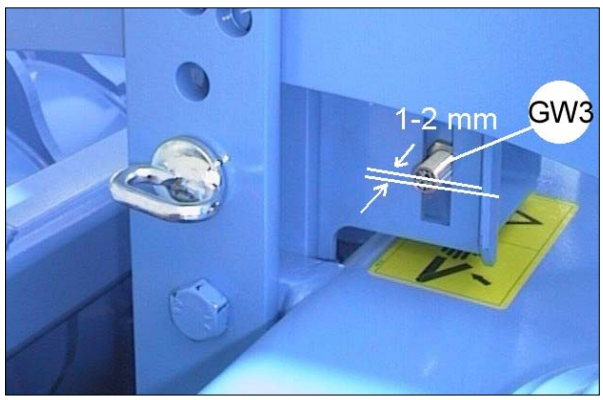
The power harrows are available with PTO shaft control. With its tractor connection cable (GW7) it must be connected to a plug according to DIN 9685.
The switch (GW4) is provided at the left hand of the warning box (GW2). By means of the PTO shaft control with RPM sensor (GW1), switch off sensor (GW3) and warning box (GW2) the PTO shaft will be controlled.



When in working position the shaft stops, an alarm appears immediately, as the overload clutch of the PTO shaft has operated. Then the PTO shaft must be switched off, to minimise the wear of the overload clutch. When the PTO shaft will be switched on again and the alarm appears again, work must be interrupted again and the reason of malfunction eliminated, e.g. a clamped stone between the tines of the power harrow. Via a fuse inside the fuse carrier (GW6) the system is secured electrically.



Warning: Before eliminating the problem, switch off the PTO shaft, stop engine and remove ignition key! Never use the power harrow without PTO guard!



GW2 = warning box

GW4 = ON / OFF switch

GW5 = horn

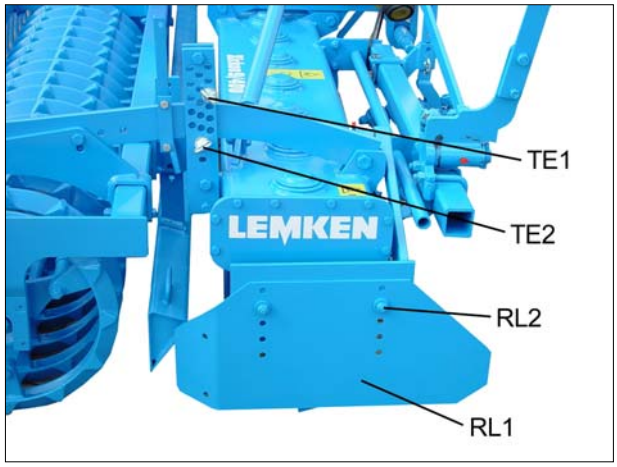
GW6 = cap with fuse

GW7 = tractor connection cable

GW8 = connection cable warning box/collecting box

11.1 Tractor PTO

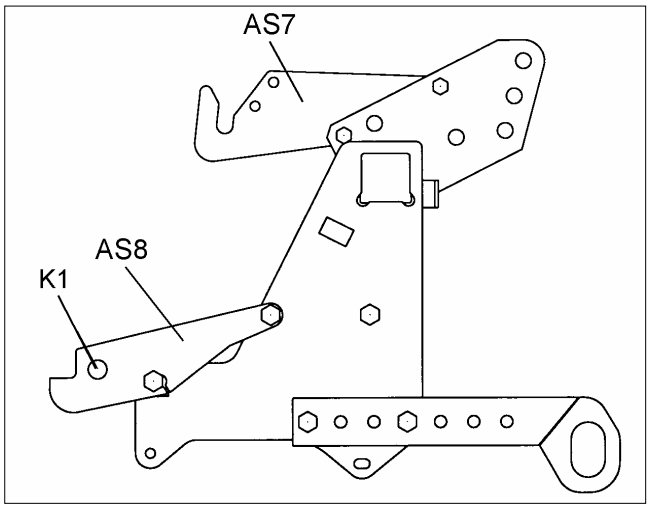
The PTO may only be engaged when the power harrow has been lowered to within a few centimetres of the ground and the side plates are in their working position. It must be disengaged when the power harrow is more than a few centimetres above the ground.



- Read and adhere to the General Safety Instructions as well as to the Instructions “Maintenance”!
- Switch PTO drive shaft on only, when the implement is lowered and the side shields are in protection position!

12 MOUNTING KIT FOR A SOLITAIR SEED DRILL

The Zirkon power harrows are available with mounting parts for attaching a Lemken Solitair seed drill.



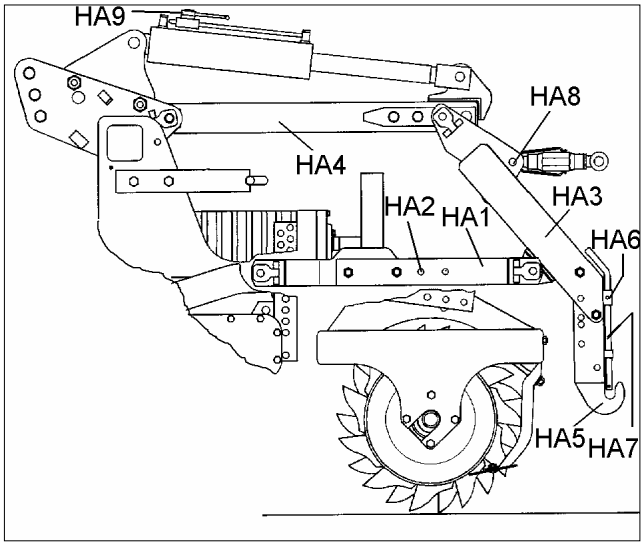
The mounting parts include a top hook (AS7) and two lower supporting plates (AS8), which - as shown in the drawings - can be fitted to the headstock of the Zirkon. With these mounting parts the Lemken Solitair seed drill can be mounted easily on a power harrow.

Therewith the Solitair will be caught by means of the hooks (AS7) and supports with its rear supporting pins on the supporting plates (AS8). The free holes (K1) of the supporting plates are used for the connecting pin (front pin) of the seed drill.

See operators instructions of the LEMKEN seed drill Solitair.

13 HYDRAULIC THREE POINT LINKAGES

13.1 Adjustment of the linkage



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 (HA2) in the lower connecting links (HA1) and the upper connecting link (HA4).
The lengths of the upper and lower connecting links must be kept equal, thus maintaining a parallel lift for the drill.
The catch hooks (HA5) are adjustable vertically and are connected to the mounting frame (HA3); their position from the roller is adjustable.
It is recommended to use the lift linkage in combination with a lift limiter, so that the lift height can be limited in accordance to the requirements.

13.2 Attaching a mounted implement

To attach a mounted implement the spring clips (HA6) have to be removed, and the locking bars (HA7) lifted and locked by means of the spring clips. After mounting the implement the locking bars (HA7) have to be lowered again and secured.
Fit top link (HA8) and secure.
During work the lock valve (HA9) must be opened and 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 lock valve (HA9) must be closed.

13.3 Lowering the seed drill

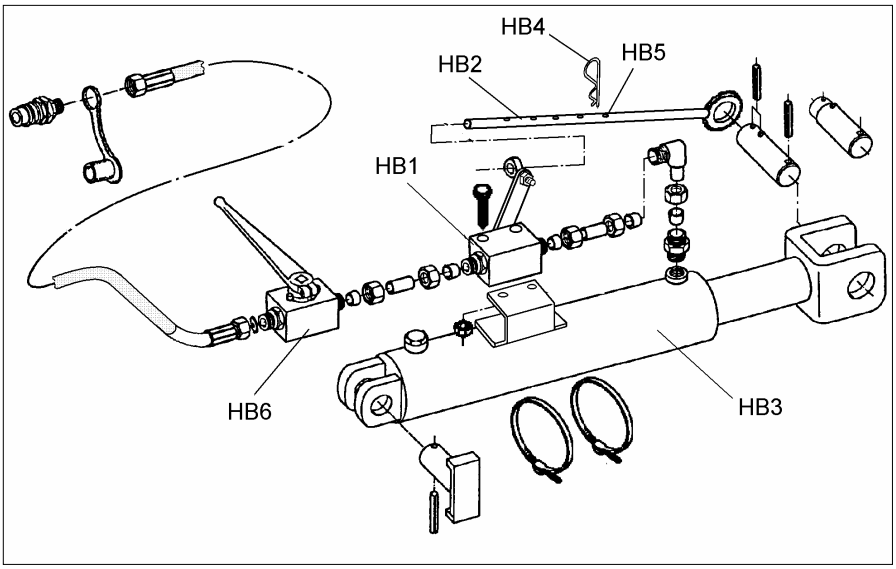
The seed drill will be lowered as follows:
- Open lock valve (HA9) with closed tractor spool valve.
- Set tractor spool valve from the tractor seat to ‘Lowering’ and lower the seed drill as required.

Warning: Tighten nut of the rear top link after each adjustment!

13.4 Lift limiter

The lift height of the implement mounted to the power harrow can be limited. Therefore a lift limiter for the hydraulic rear linkage is available. The lift limiter includes a switch valve (HB1) and a steering rod (HB2), which are fitted to the hydraulic ram (HB3) of the rear linkage.

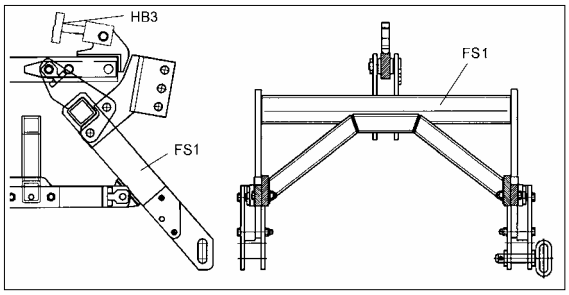
The steering rod operates the switch ram (HB1) during the lifting procedure and interrupts the oil flow to the hydraulic ram. The lifting height will be limited by means of a spring pin (HB4), which can be fitted to one of the holes (HB5) depending on the requirement. For transport the hydraulic rear linkage with attached seed drill must be lifted as high as possible, but not too high as otherwise the folding parts of the power harrow will touch and damage the seed drill. The maximum allowed lift height must be limited by means of the lift limiter. Close lock valve (HB6) for transport.



- Read and adhere to the General Safety Instructions as well as to the Instructions “Hydraulic Assembly”!
- In the area of the three point linkage are pinch points!
- In hilly conditions in connection with a single acting lift linkage lowering the seed drill can be difficult. In such cases it must never be tried to lower the lift linkage or the seed drill by hand.
- With single acting lift linkage it must be ensured that the seed drill will always be lowered automatically! In extreme hilly conditions a lift limiter or a double acting lift linkage must be used.

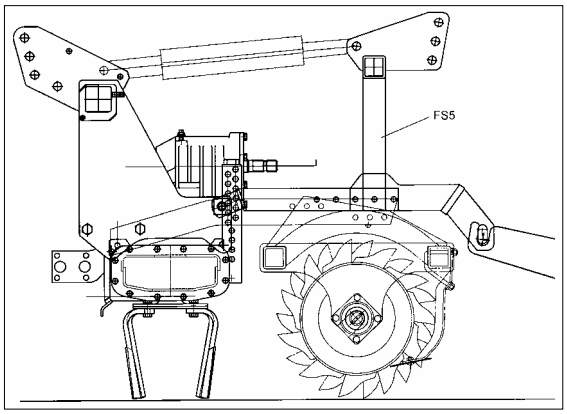
14 FRONT MOUNTING

14.1 Push linkage



The Zirkon can also be used as front mounted version. Therefore a push linkage (FS1) is required, which must be fitted to an available hydraulic three point linkage.
The front push linkage is recommended when the power harrow is to be used either in front or in the rear. The hydraulic ram (HB3) of the hydraulic three point linkage must be equipped with two lock valves, which must be locked for work.

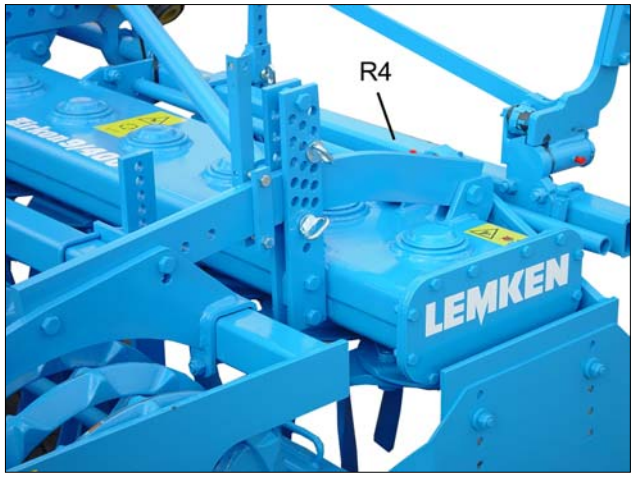
14.2 Front headstock



Alternatively to the push linkage a front headstock (FS5) is available, which can be fitted behind the headstock. The front headstock is recommended when the power harrow is used as front implement, only.

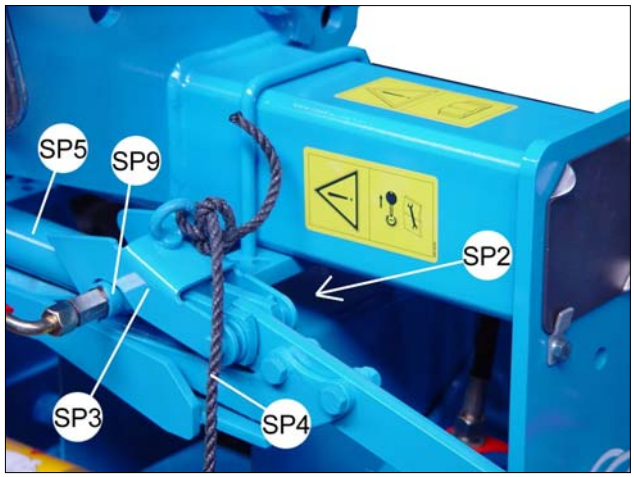
15 TRACK MARKERS

For a precise subsequent working pass of the Zirkon, especially in connection with seed drills, track markers (SP1) are available, which will be fitted to the carrier (R4) of the track scrapers.



The track markers will be operated hydraulically. The alternately lowering of the track markers will be controlled via a mechanical locking bar system.

For driving on public roads the track marker arms must be folded-in and secured against swinging back. This will be done by a hook (SP3), which is connected to the hydraulic ram (SP5) by means of the hose connection (SP9). By means of the draw rope (SP4) the securing hook (SP3) can be unlocked from the tractor seat.

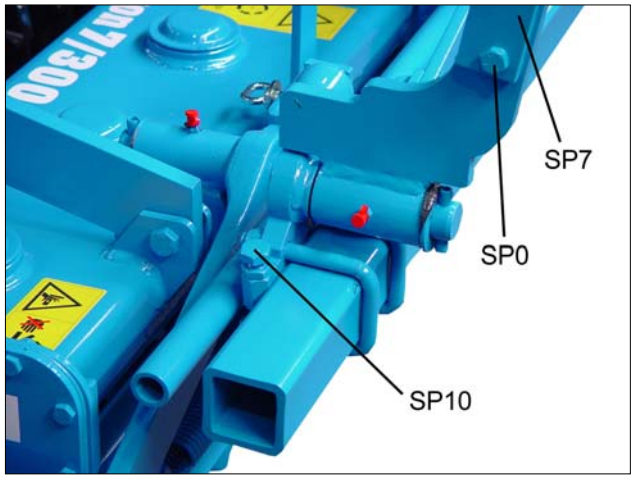


15.1 Shearbolt device

The track markers are protected against overload by means of a shearbolt (SP0).

After break of a shearbolt the shearbolt remains must be removed and after that a new shearbolt fitted.

Use only the shearbolts M10x45 / 8.8 with the part No.: 301 3240.

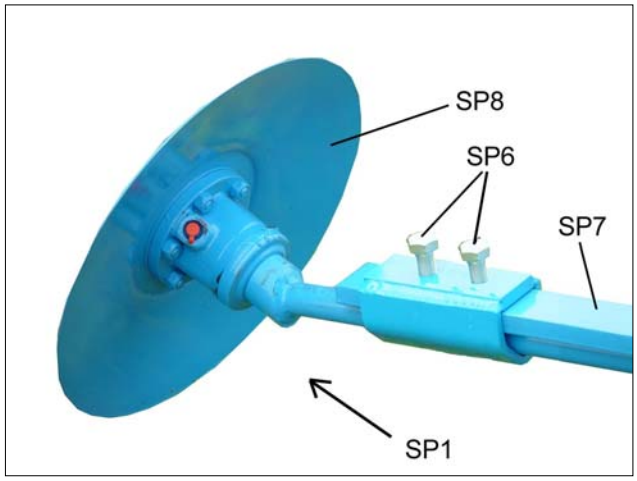


15.2 Adjustments

By means of the stop screw (SP10) the depth of the track marker disc (SP8) will be adjusted.

After loosening the clamp screws (SP6) the length of the track marker arm (SP7) and the angle of the track marker discs (SP8) can be adjusted.

The track markers must be adjusted to the middle of the tractor track and that according to the following table.

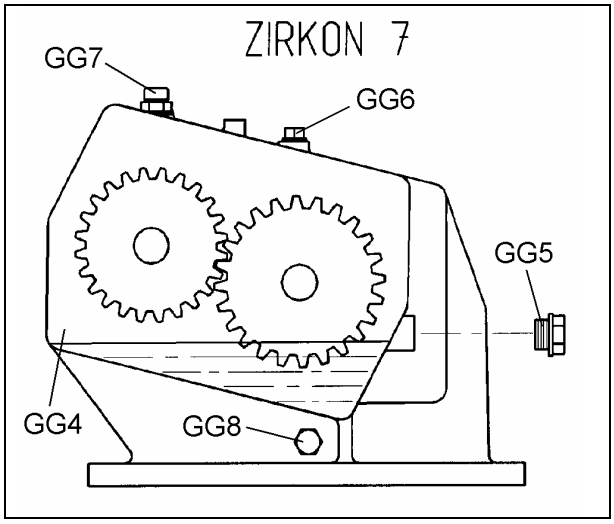


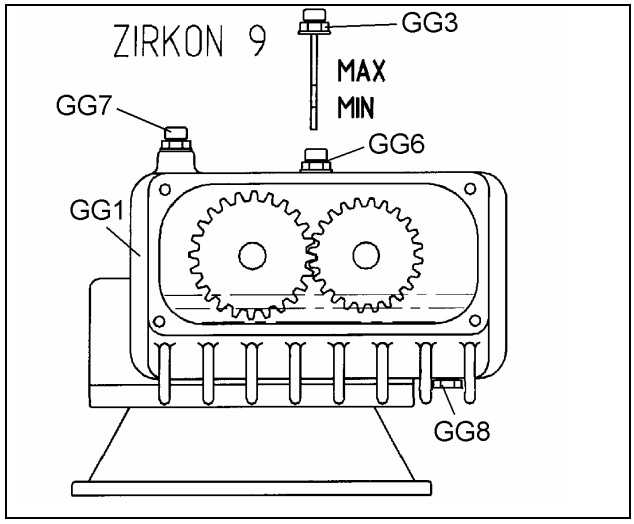
Zirkon	Distance from the centre of the seed drill to the track groove	Distance from the outer seeding coulter
7/250	**250 cm**	**125 cm + ½ row distance**
7/300	**300 cm**	**150 cm + ½ row distance**
7/400	**400 cm**	**200 cm + ½ row distance**
9/300	**300 cm**	**125 cm + ½ row distance**
9/400	**400 cm**	**200 cm + ½ row distance**
9/450	**450 cm**	**225 cm + ½ row distance**

After the adjustment the clamp screws (SP6) must be tightened again carefully.

- Read and adhere to the General Safety Instructions as well as to the Instructions “Hydraulic Assembly”!
- Check clamping screws (SP6) regularly and tighten if required!

16 MAINTENANCE / SERVICING





16.1 Changing the oil

Before changing the oil or checking the oil level the power harrow must be parked on level and firm ground. Check the oil level of the gear box (GG1) or (GG4) with change gears daily. The oil level must always stand with the Zirkon 9 between the marks of the scale (GG3). With the Zirkon 7 the oil level must stand until the hole of the control plug (GG5). The centre gearbox has 2 holes with plugs at the back. The oil level must reach the bottom edge of the upper hole.

GG6 = filler plug
GG7 = vent screw
GG8 = drain plug

Intervals of oil changing

- first change after 50 working hours
- all further changes after 500 working hours, but once a year at least!

16.1.1 Oil for the speed-change gearbox of the Zirkon 7

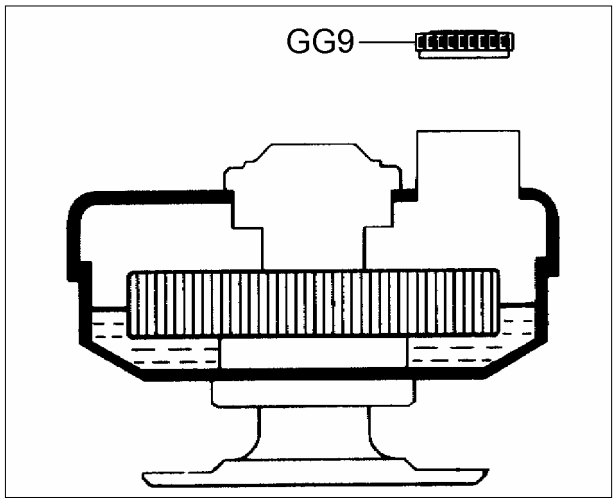
2,8 litres oil
Mobilube HD 85W-140 (Mobil)
or
BP Energear FE SAE 80W-140 (BP)
Deagear EP-C SAE 85W-140 (DEA)
Shell Spirax HD 85W-140 (Shell)

16.1.2 Oil for the speed-change gearbox of the Zirkon 9

5 litres oil
Mobilube HD 85W-140 (Mobil)
or
BP Energear FE SAE 80W-140 (BP)
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.

16.2 Trough



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 (GG9).

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.

Long-life low-viscosity grease

Only the below stated grease may be used in the trough. The table shows the quantity required for the different machines.

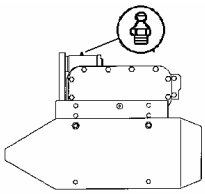
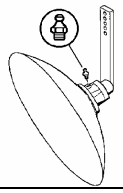
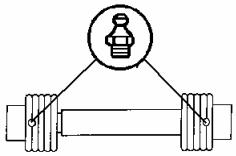
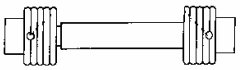
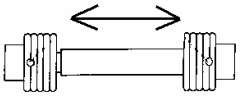
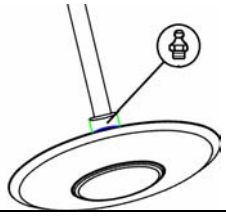
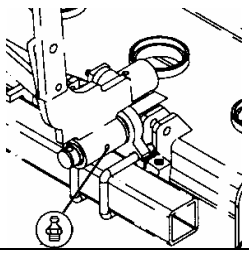
Zirkon 7/250 = 20 litres Olit 00 (Optimol)
Zirkon 7/300 = 23 litres Olit 00 (Optimol)
Zirkon 7/400 = 30 litres Olit 00 (Optimol)
Zirkon 9/300 = 35 litres Olit 00 (Optimol)
Zirkon 9/400 = 45 litres Olit 00 (Optimol)
Zirkon 9/450 = 50 litres Olit 00 (Optimol)

Attention: Dispose of oil and grease as prescribed by law. Use only clean grease of the above stated specifications. Do not mix this grease with other grease!

16.3 Lubrication

Lubricate the grease points with an universal grease according to the following lubrication diagram.

Lubrication diagram

	All 8 working hours	All 25 working hours	All 250 working hours	Before and after a long working break
		X	X	X
		X	X	X
	X			X
 Power Drive			X	X
	X			X
		X	X	
	X			X

16.4 Rotor bearings

The bearings of the rotors must be checked with regard to the play. They must be checked after the first 100 hours of use and then every 20 hours of use. With too much play the corresponding bearings must be replaced, in order to prevent damage to the gear wheels and trough.

16.5 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. At least every 100 hours all bolts must be checked and tightened if necessary.

16.6 "Allround" tines

Worn tines must be changed in good time.

16.7 Scrapers

The scrapers must be adjusted regularly. Worn scrapers must be changed in time.

16.8 PTO shaft

Regularly check the PTO shafts to ensure that it slides in and out smoothly. Regularly grease the shafts and universal joints. Always secure guards from spinning by fitting the chains to a nearby static part. PTO-shafts may only be repaired by experts, only.

16.9 Hydraulic pipes

Regularly check the hydraulic pipes for damage and leaks. Replace any that are defective. All hydraulic hoses must be renewed after 6 years. Use genuine replacement parts, only.

Important:
Do not clean this implement with a Pressure Washer during the first 6 weeks. After this time a minimum nozzle distance of 60 cm must be observed with a maximum 100 bar pressure and 50° C temperature.

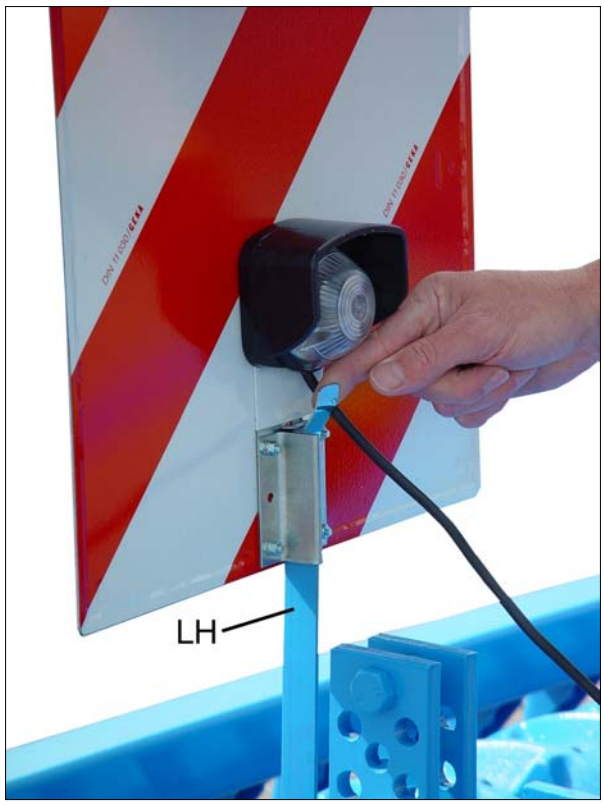
- Read and adhere to the General Safety Instructions as well as to the Instructions "Maintenance"!

17 DRIVING ON PUBLIC ROADS

When driving on public roads lighting equipment with warning boards must be fitted, which is available as option.

For fixing this lighting equipment carrier for lights according to DIN 11027 are available.

Pay attention to relevant regulations for transport on public roads.



18 WEIGHTS

	Working width	Weight	Width	Centre of gravity
Zirkon 7/250	250 cm	1.053 kg	258 cm	610 mm
Zirkon 7/300	300 cm	1.192 kg	300 cm	610 mm
Zirkon 7/400	400 cm	1.515 kg	408 cm	610 mm
Zirkon 9/300	300 cm	1.272 kg	300 cm	615 mm
Zirkon 9/400	400 cm	1.679 kg	408 cm	615 mm
Zirkon 9/450	450 cm	1.836 kg	458 cm	615 mm

(Weights: power harrow with packer roller ø 500 mm).

19 NOISE, AIRBORNE SOUND

The noise level of the Power Harrows ZIRKON 7 and ZIRKON 9 does not exceed 70 dB (A) during work.

20 NOTES

As the version of equipment is depending from the order, the equipment of your implement and its description concerned may deviate in some cases. To ensure a continuously updating of the technical features, we reserve the right to modify the design, equipment and technique.

21 PRODUCT REGISTRATION / GUARANTEE

We would like to point out that the guarantee period starts, only when the completely filled-in and signed product registration has been returned to us .