

# Operating Instruction and Spare Parts List

# ROTARY HARROWS «HKE»

For ordering spare parts pls. read rear cover.





# **ROTARY HARROWS «HKE»**

#### Before use

Ensure operators have read, and are familiar with, the instructions contained in this manual, and the rotary harrow is not operated by untrained persons. The rotary harrow is a power-take-off driven implement for soil preparation and is designed for normal agricultural work. Use the rotary harrow only for the purpose for which it was designed and tested and in accordance with the instructions contained in this handbook.

**Caution**. Warranty will be invalid if the machine is improperly used, the indicated HP. limits (chart 1) are exceeded, or non-genuine parts are fitted.

Chart 1: Technical specifications and horse power limits (engine) approx.:

	Working	Weight incl.	rear roller-kg		Up to
Model	width	Bar-	Toothed	roller	kW
	cm	400 mm	440 mm	500 mm	(HP)
HKE 300	300	1405	1550	1665	
HKE 400	400	1755	1965	2150	150
HKE 450	450	1880	2110	2315	(200)
HKE 500	500	-	-	2485	
HKE 600	600	-	-	2880	200 (270)

Only authorized and skilled Rabe dealer technicians, national distributors and our own factory service engineers are allowed to undertake repairs under warranty.

#### Safety precautions



**Warning:** Make certain that all guards, covers, warning labels and safety devices are correctly fitted and operative.

Ensure the rotary harrow is standing on firm, level ground with the parking stand in lowered position and the work area is clear of bystanders.

# Safety Guards (Fig. 1)

According to UK. legal safety standards the rotary harrow is equipped with special front, rear and side guards (**1** Fig, **A2**, **A3**, **A4**). The rear roller on these machines acts as part of the guard. If for any reason it is operated without the roller, an extension to the original rear guard must be fitted.

Warning. All guards and safety devices must be kept in place and operative.

# Preparing for Work (Fig. 1)

Consult the tractor manufacturer's manual for instructions on mounting implements and safe working methods.

For mounting implements operate the tractor hydraulic lift in 'Position control'.



**Warning**. Never leave the tractor seat or carry out work unless the rotary harrow is fully lowered to the ground, the PTO. drive is disengaged, the gear shift in neutral, the hand brake applied, the engine stopped and the ignition key removed.

The rotary harrow is suitable for attachment to tractors equipped with Cat. II or Cat. III three point linkage. For Cat. III short use bushes.

Position the tractor lower link couplers at the same height and connect rotary harrow. Secure the lower link pins with lynch pins. Fit the tractor top link and secure with pins and lynch pins, then attach the PTO. drive shaft to the tractor. The parking stand (**1** Fig. **O**) must be raised.



**Warning**. Make sure the Walterscheid QS. lock fits tightly on the PTO. shaft. The QS. lock is fully engaged if collar can be rotated freely. Refer to separate Walterscheid operating instructions attached to PTO. shaft.

In work the tractor top links should be positioned only slightly up towards the headstock of rotary harrow. The lower link arms of the tractor and the top link should be **almost parallel to ensure quiet running of PTO. shaft.** 

Lift the rotary harrow until the knifetines are 10 - 20 cm above ground level and set the limit stop on the hydraulic lift control quadrant accordingly. Whenever the rotary harrow is lifted above that level the PTO. shaft should be disengaged.

# **Check That:**

- The oil level in the main gearbox and the gear transmission are at the correct levels.
- All bolts, nuts and fasteners have been tightened.

# Lower Link Mounting Arms (Fig. 1)

To compensate for the length of the PTO. drive shaft or to attach the rotary harrow closer to the tractor, the mounting arms (1 Fig. A) are adjustable in length.

By means of the floating action of the lower link arms an uniform depth can be maintained during work.

#### PTO. Drive Shaft (Fig. 2)

**Caution.** Use only the original supplied PTO. drive shaft and observe the detailed instructions in this manual and the instructions attached to the PTO. shaft.

To adjust the length, hold the half-shafts next to each other in the shortest and longest working position and mark them. Shorten if necessary by cutting off the guard tubes and sliding profiles on each half-shaft by the same length. With the rotary harrow in lowered position (at max. working depth) the minimum overlap of the sliding profiles must be at least 200 mm (**2** Fig. **X**).

Round off all sharp edges and remove burrs. Grease sliding profiles.



**Warning**. Attach restraining chains to the tractor and implement and keep them fitted at all times during operation.

#### Operation



**Warning**. Never allow people to stand or sit on rotary harrow during operation. Stay clear of operating area. Never touch any moving parts which may be hot from operation. Reverse with tractor only when the rotary harrow is raised.

Before engaging the PTO. shaft and commencing cultivation ensure that:

- Engage or disengage the PTO shaft only if the rotary harrow is not lifted higher than 10 - 20 cm above the ground.
- Sufficient front wheel weights are fitted to compensate the rear mounted implement.
- The area of operation is clear of bystanders.
- The selected PTO. speed of tractor is in accordance with the permitted revs/min. of the rotary harrow.
- The PTO. drive shaft tubes and sliding profiles do not separate at the longest working length, or jam at its shortest.

Adjust tractor linkage to level the rotary harrow laterally and longitudinally. The length of the toplink determines whether the input shaft of the gearbox is in a level position horizontalwise to avoid strain on gearbox.

#### Side Plates (Fig. 3)

The side plates (**3** Fig. **D**) prevent soil ridges and must be adjusted according to the working depth. Before lifting the side plates up or down, loosen bolts (**3** Fig. **D1**). The side plates should touch the ground with a maximum of 1 cm soil penetration.

#### **Depth control** (Fig. 3)

The tillage depth is regulated by the pin adjustment (**3** Fig. **C**). **Caution.** Select **"Float Position"** on the tractor hydraulic system during operation.

#### Stone protection springs (Optional) (Fig. 3)

The rotary harrow can be equipped with an unique floating spring system for stone protection, allowing the harrow to lift up and over large obstacles. In stoney ground the action of the springs (**3** Fig. **C2**) can increase flotation by tensioning them with the nuts until the depth control pins (**3** Fig. **C**) begin to move away from the packer arms (**3** Fig **C1**). Then slacken the springs until the pins (**3** Fig. **C**) are only slightly in contact with the packer roller arms.

If the rotary harrow is operated with a mounted seed drill, the flotation springs (**3** Fig. **C2**) need more tension.

#### Gear Set Options (Chart 2)

By varying the rotor speed and/or the forward travel speed of the tractor, the optimum soil tilth can be achieved to produce a perfect seedbed in one pass. The lowest possible recommended speed should be used to achieve a satisfactory tilth.

Caution. High rotor speed causes higher wear on knifetines.

The forward speed of the tractor must not exceed approx. 8 km/h (5 mph).

Chart 2

HKE 300 - 400 Gear Set Options: Colour & No. of Teeth

	yello	w	re	ed	gre	en	bl	ue	wh	nite	
PTO.	12	23	14	21	15	20	16	19	17	18	Input shaft
rpm.	23	12	21	14	20	15	19	16	18	17	Pinion shaft
1000	151		193	433	217	385	243	343	273	306	Rotor rpm.

HKE 300 and 400 are fitted standard with a pair of blue 16/19 change gears (15 teeth on input shaft).

# Exchange of Change Gears (Fig. 4)

Tilt rotary harrow forward by shortening the top link. Remove the cover plate (**4** Fig. **F**) taking care not to damage the gasket nor the shaft seal. Fit gears with the figure (indicating the nos. of teeth) which is stamped on gear pointing to the gearbox cover plate. Fit the gears with the shoulder pointing inwards to the gearbox housing (**4** Fig. **F1**).

#### Lever Change Gearbox (Fig. 5)

The gearbox has 3 speeds. Note. Shift gears only when the rotary harrow is stopped.

Chart 3: Lever Change Gearbox

PTO	Lever	HKE		
rpm	Position	300 - 500	HKE 600	
	1	258	249	Rotor
1000	2	343	344	rpm.
	3	408	402	

#### **Rear PTO through drive**

The speed of the PTO through shaft is equal to the tractor's PTO speed and is always engaged.

#### Rigid Rear 3-point linkage (Fig. 4)

For close attachment of secondary equipment such as seed drills the lower link arms (4 Fig. G) can be adjusted horizontally. The lower link arms can be fitted vice versa to adapt to Cat. I or II linkage. For lower link pins Cat. I use bushes.

To couple a secondary implement adjust the chains (**4** Fig. **G1**) so that the lower link arms are low enough to hitch the implement and will raise high enough in the lift position. The chains (**4** Fig. **G1**) should be slack in work to enable, for example, a seed drill to follow the ground contours independently.

Secure the links (4 Fig. G4) with locking pins.

Adjust Toplink (4 Fig. G5) to suit attached equipment.

#### Hydraulic Rear 3-point Linkage DRILL-LIFT (Fig. 6)

The DRILL LIFT enables the weight of the secondary implement to be transferred nearer to the tractor when it is transported. In the raised position it is lifted over the top of the rotary harrow. The vertically fixed hitch arms (**6** Fig. **H**) are adjustable in height and can be angled rearwards for more clearance.

Horizontal adjustment by hole positions (**6** Fig. **H1** + H2) of the mounting arms should always be the same length.

An adjustable top link (6 Fig. H3) is part of the standard specification.



**Warning**. The safety locking plates (**6** Fig. **H4**) must be fitted to securely lock the mounted implement. In transport (raised position) the attached chain (**6** Fig. **H5**) must be fixed.

**Note**. A mounted seeddrill must be able to float independently from the rotary harrow. Therefore make sure that the tractor's hydraulic system always remains in the FLOAT POSITION during work.

There is a hydraulic lift restricter available to be used for PTO driven seed drills to be carried in the Drill Lift.

Clod Bar (Fig. 7)

The bolts (**7** Fig. **B**) are limiting the working depth. Do not adjust the clod bar too deep. The clod bar can give way upwards.

# Front Mounting of Rotary Harrow

By means of PTO. through drive ( $\emptyset$  1  $\frac{3}{4}$  ") and an additional 3-point linkage fitted to the rear of the headstock, the front linkage of the tractor can be utilised (not pictured). The front PTO of the tractor must turn to the right (in travelling direction).

# Wheel Mark Track Eradicator (Fig. 8)

Adjust position according to wheel setting and depth with bolts (8 Fig. E). In case of too much play remove some of the spacers (8 Fig. E1).

Replacement of Knifetines (Fig. 12 + 13)

Worn, bent or broken knifetines should be replaced immediately. When correctly fitted the knifetines are dragging rearwards in the direction of rotation (Fig. **12**).

Right	rotating rotors	-	2 righthand	knifetines
Left	rotating rotors	-	2 lefthand	knifetines

Lefthand blades can be recognised by the "L" stamped in the blade. **Caution.** Tighten knifetines retaining bolts to a torque of 380 Nm by using a torque wrench. Fit them with the bolthead pointing to the bottom.

Under very abrasive conditions use RABID hard coated knifetines for a significantly longer working life.

# Maintenance

After the first working hour, check and re-tighten all hardware.

To tighten fixing bolts of tines use torque wrench at 380 Nm. Torque long traction bolt through tineholder (**13** Fig. **S**) with 610 Nm.

Tighten clamping bolts (4, 7, 10 Fig. R1)

M 16/8.8 with 210 Nm M 20/8.8 with 425 Nm. Check oil level daily:

Standard gearbox:	Dipstick ( <b>10</b> Fig. <b>M</b> )
Lever change gearbox:	Oil level plug (5 Fig. M)
Trough:	Dipstick ( <b>5</b> Fig. <b>10</b> )

Grease all grease nipples on packer roller, hydraulic Drill Lift and PTO. drive shaft. Adjust scrapers on toothed packer roller close to the roller if necessary. Ensure when tightening bolts that all scrapers remain adjacent to the roller.

After use the toothed roller should be cleaned and coated with oil.

Oil Change (Fig. 4, 10, 11 and Chart 4) Standard and Lever change gerabox:

After approx. 50 hours of work, drain the gearbox oil while it is still warm. Then change every 500 hours or once a year.

Tilt rotary harrow forward to enable oil to be completely drained. Replace drainplug (**10** Fig. **N**). For refilling of standard gearbox remove rear cover (**5** Fig. **F**) or through breather and refill gearbox housing with correct type and quantity of oil (Chart 4), and check with machine standing level.

On Lever change gearboxes is the drainplug up to 5 m at the front of the gearbox housing and on 6 m models at the rear. Use Allen-key to remove.

# Gear Through

The gear transmission in the gear trough is running in the same 90 grade gearbox oil as the centre gearbox. Please take care of correct specifications (non-foamy!) as described in chart 4.

#### Chart 4: Lubrication

Gearoil	SAE 90 / API - GL - 5 For example: Esso GX-D 90						
	Gear trough Standard gearbox Lever change gearbox						
HKE 300	23	71					
HKE 400	30						
HKE 450	34		6,5 I				
HKE 500	38	-					
HKE 600	45		12				

The oil must be changed also after approx. 500 working hours and thereafter every 1000 hours or every 3 years. Tilt gear trough to one side and remove trough lid (**11** Fig. **N1**) to drain oil.

Both magnet plugs (**11** Fig. **N2**) must be removed and cleaned after the initial 50 operation hours. Thereafter once a season. Tilth trough to one side to avoid oil running out.

# **НКЕ** No. 134-5-94



C2 C C1 C C1 P1 P1 Fig.3





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Fig.5

Fig.6

