

Operating Instructions



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Rotary Harrow

KR 2512

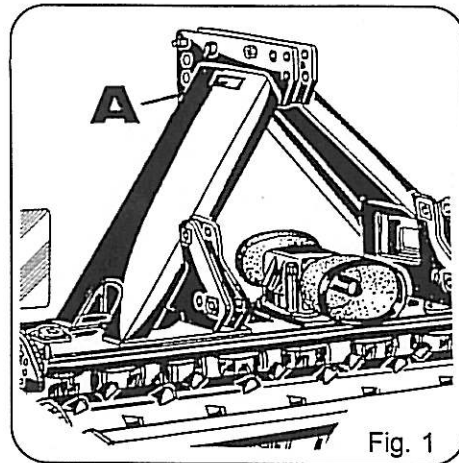
KR 3012

This Operating Instruction contains valuable and important information. Read this instruction before using the machine and observe the instruction provided in order for correct and safe working.

Keep this Operating Instruction in a safe place. Every user of the rotary harrow must first familiarize himself or herself with the contents before beginning work.

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Each machine is provided with a serial plate (see fig. 1, item A) which contains details of the model (fig. 2, item C) serial number (fig. 2, item D) and year of manufacture (fig. 2, item E).

This information must be communicated for customer service or when reordering spare parts.

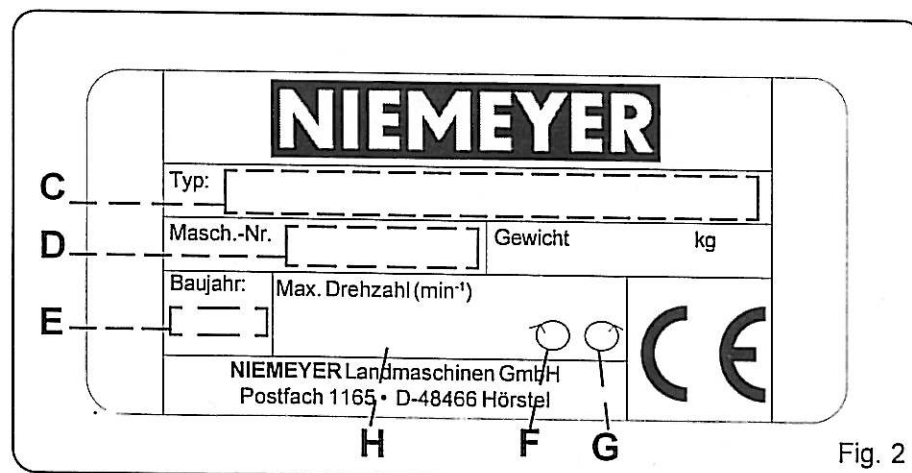
The weight given on the identification plate gives an indication of the type of lifting appliance required to raise the machine. The actual weight can be greater due to the addition of accessories.

Pos. F = Direction of rotation of the power take-off in driving direction, right (clockwise)

or

Pos. G = Direction of rotation of the power take-off in driving direction, left (anti clockwise).

Pos. H = The max. given power take-off of the tractor should not be exceeded.



Scope of Delivery

1 Rotary Harrow KR 2512
with levelling roller
or spiked roller
with front bounce bar

1 drive shaft
1 Operating Instructions
1 Declaration of Conformity

1 Rotary Harrow KR 3012
with levelling roller
or spiked roller
with front bounce bar

1 drive shaft
1 Operating Instructions
1 Declaration of Conformity

Technical Data

	<u>KR 2512</u>	<u>KR 3012</u>
Weight*1..... (Basic machine with levelling roller)	approx. 730 kg	approx. 835 kg
Weight*1..... (Basic machine with spiked roller)	approx. 905 kg	approx. 1065 kg
Max. drive speed (alternatively)	540 rpm	540 rpm
Noise emission value (under operating conditions)	< 70dB (A)	< 70dB (A)
Working width	approx. 2,50 m	approx. 3,00 m
Work depth	up to 20 cm	up to 20 cm
Transport width	approx. 2,50 m	approx. 3,00 m
Tractor drive output	up to 74 kW/100 hp	up to 88 kW/120 hp

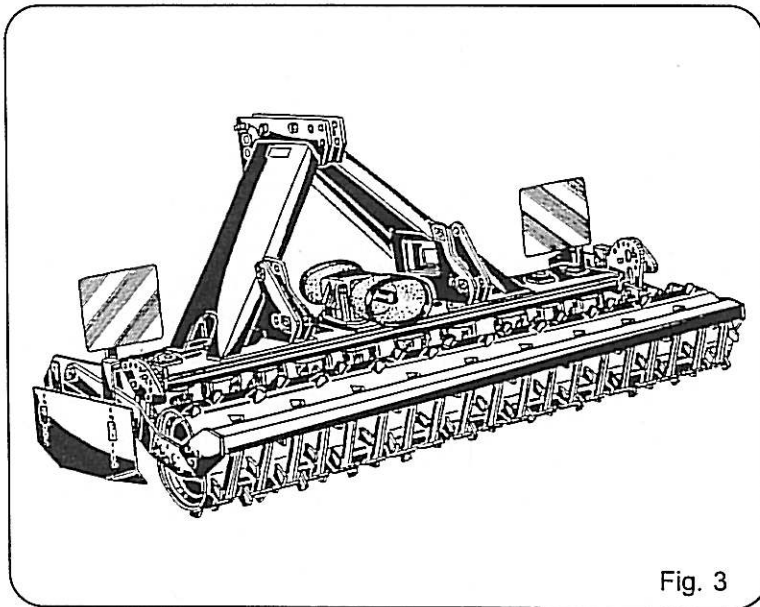
* The stated weights can be increased by using additional parts.

Safety instructions



We have indicated all those instances in these operating instructions involving your safety with this symbol. Please let other users also know about all these safety instructions.

Proper Use



The rotary harrow should only be used for its intended purpose (for fine crushing of arable soil). Otherwise the manufacturer accepts no liability whatsoever for resulting damage. Any other use or one extending beyond these limits, such as for example digging up hedges or breaking up paths, does not count as its intended purpose. Use of the machine in accordance with its intended purpose also includes observance of operating conditions specified by the manufacturer and the undertaking of necessary care and maintenance work at the specified intervals.

The rotary harrow should only be used, serviced and maintained by the people who are entrusted with this and are trained in the dangers. The appropriate accident prevention regulations as well as the other generally acknowledged rules on safety, medicine and road traffic are to be respected.

Road traffic regulations may stipulate that all machines are equipped with lighting when being transported on public roads and highways. The lighting device can be supplied by us if required.

Basic rule



Please read the operating and safety instructions prior to initial start-up (see warning Notice page 28, item C).

Check the implement for operation and road safety before each use.

Safety and Accident Prevention Regulations

General

1. As well as these Operating Instructions, also observe the generally valid safety and accident prevention regulations.
2. The attached warning signs and notices provide important information for safe operation; observance of the instructions contained on them is for your own safety!
3. When using public roads, observe all local road traffic regulations.
4. Before beginning work, familiarize yourself with all the features and control elements of the machine and their functions. It is too late to do this during operation !
5. The user's clothing should be tight-fitting. Avoid loose-fitting clothing!
6. To prevent the risk of fire, keep the machine clean!
7. Before the machine is lifted and the tractor sets off, check the immediate vicinity. Make sure you have sufficient visibility and watch out for children!
8. The carrying of passengers on the machine when working or in transit is not permitted.
9. Hitch the machine in accordance with regulations and only attach and secure it to the appliances for which it is intended.
10. When hitching and unhitching, set the support components to the appropriate positions! (stability!)
11. Particular care and attention is required when hitching and unhitching appliances to and from the tractor!
12. Always mount ballast weights in accordance with regulations and at the securing points provided!
13. Observe permissible axle loads and maximum laden weights!
14. Observe permissible transport dimensions!
15. Check and affix the necessary transport equipment, such as lighting, hazard warning signs and protective devices and guards!
16. Release cables for quick couplings must hang loose and should not trigger their own release to the down position!
17. Hydraulic hinged frames should only be operated when there is no one in the field of travel!
18. Never leave the driver's station whilst the machine is in motion!
19. The running speed of the machine must always be adapted to the environmental conditions! Avoid sudden cornering movements when driving up or down hill, or when driving transverse to the slope of the hill!
20. The handling, steering and braking characteristics of the tractor are affected by hitched machinery and ballast weights! You should therefore make sure of sufficient steerability and braking capability!
21. When cornering, take into account the overhang and the centrifugal mass of the machine!

22. The machine may only be started up when all protective devices and guards have been mounted and are in position!
23. Keep away from the working area and the danger areas of the machine!
24. Keep away from the rotating and swivelling areas of the machine!
25. Danger of crushing and shearing on (hydraulically) powered components!
26. Secure the machine before leaving the tractor! Fully lower all hitched appliances! Turn off the engine and remove the ignition key!
27. No one must enter the area between the tractor and the machine unless the vehicle is secured against rolling by means of the parking brake and/or chocks.
28. Where, when fitted with front-mounted appliances, the front mounting dimension of 3.5 m (measured from the center of the steering wheel to the front point of the machine) is exceeded, the operator must ensure that the restricted field of vision when exiting from farmyards, pulling onto roads and at crossroads is compensated by suitable measures. This may be achieved, for example, by an accompanying person acting as lookout for the driver in such situations.
29. Swing in and block the packer collecting arms!
30. Lock the channel rippers in the transport position!

Hitched appliances

1. Before hitching and unhitching to and from the three-point linkage, set the operating device to a position which guards against unintentional raising or lowering!
2. In three-point hitching, it is essential that the hitching categories of the tractor and the machine be identical or adapted to each other!
3. There is risk of injury resulting from crushing and shearing in the vicinity of the three-point linkage!
4. When the external control for the three-point hitching is operated, do not enter the area between the tractor and the machine!
5. In the transit position of the machine, always ensure sufficient lateral arresting of the tractor three-point linkage!
6. When driving on the road with the machine lifted, the operating lever for the three point hydraulic must be secured against lowering!

Towed machinery

1. Secure the machines against rolling!
2. Observe max. permissible support load of trailer coupling, drawbar or hitch!
3. With drawbar towing, ensure adequate mobility at the drawbar connection point!

Power take-off shaft operation

1. Only the powershafts specified by the manufacturer may be used!
2. The protective pipe and funnel guard of the powershaft and the power take-off shaft guard must always be fitted and fully functional!
3. In the case of powershafts, ensure observance of the specified pipe overlaps in transit and working positions!
4. The powershaft must only be mounted and removed with the power take-off shaft and the engine switched off, and with the ignition key removed!
5. When using powershafts with overload or freewheel clutches which are not covered by the protective guards on the tractor, overload or freewheel clutches must be attached on the machine side!
6. Always ensure correct assembly and securing of the powershaft!
7. Secure the powershaft guard against being pulled along by attaching the chain!
8. Before switching on the power take-off shaft, ensure that the selected speed and direction of rotation of the tractor power take-off shaft correspond to those of the machine, as shown on the serial plate!
9. Before switching on the power take-off shaft, ensure that no one is in the danger area of the machine!
10. Never switch on the power take-off shaft with the engine switched off!
11. When working with the power take-off shaft, no one must be allowed in the area of the rotating shaft or the powershaft!
12. Always switch off the power take-off shaft if excessive offset angles of the pto-shaft occur, or when it is not required!
13. Caution: when the power take-off shaft has been switched off, danger from running-on as a result of centrifugal mass! During this time the machine must not be approached too closely. Work may only be carried out on the machine when all machine parts have come to a standstill!
14. Cleaning, lubrication or setting of the power take-off shaft driven machine or of the powershaft only with the power take-off shaft and the engine switched off, and with the ignition key removed!
15. Place the decoupled powershaft on the mounting provided!
16. After removing the powershaft, push the protective sheath onto the stump of the power take-off shaft!
17. Damage to the machine is to be rectified immediately, and the machine should not be used until this has been done!
18. When using the travel power take off note that the rate of revolution is a function of the speed of travel and the direction of rotation reverses to go backwards.

Hydraulic system

1. The hydraulic system is under high pressure!

2. When connecting hydraulic cylinders, ensure correct connection of the hydraulic hoses!
3. When connecting hydraulic hoses to the tractor hydraulics, ensure that pressure is switched off both on the tractor side and on the machine side!
4. On hydraulic functional links between the tractor and the machine, the coupling sleeve and coupler plug should be clearly marked in order to prevent incorrect operation! If the links are wrongly connected the reverse function results (e.g. raising/lowering) - danger of accidents!
5. Regularly check hydraulic hose lines and replace if damage or ageing has occurred! The replacement lines must meet the technical requirements of the machine manufacturer! The service life of the hose lines should not exceed 6 years, including a storage life of not more than 2 years.
6. When searching for leaks use the proper equipment, otherwise there is danger of injury!
7. Fluids emerging under high pressure (hydraulic oil) may penetrate the skin and cause serious injury! If an injury occurs, see a doctor immediately! Danger of infection!
8. Before working on the hydraulic system, lower all appliances/assemblies, remove the pressure and switch off the engine!

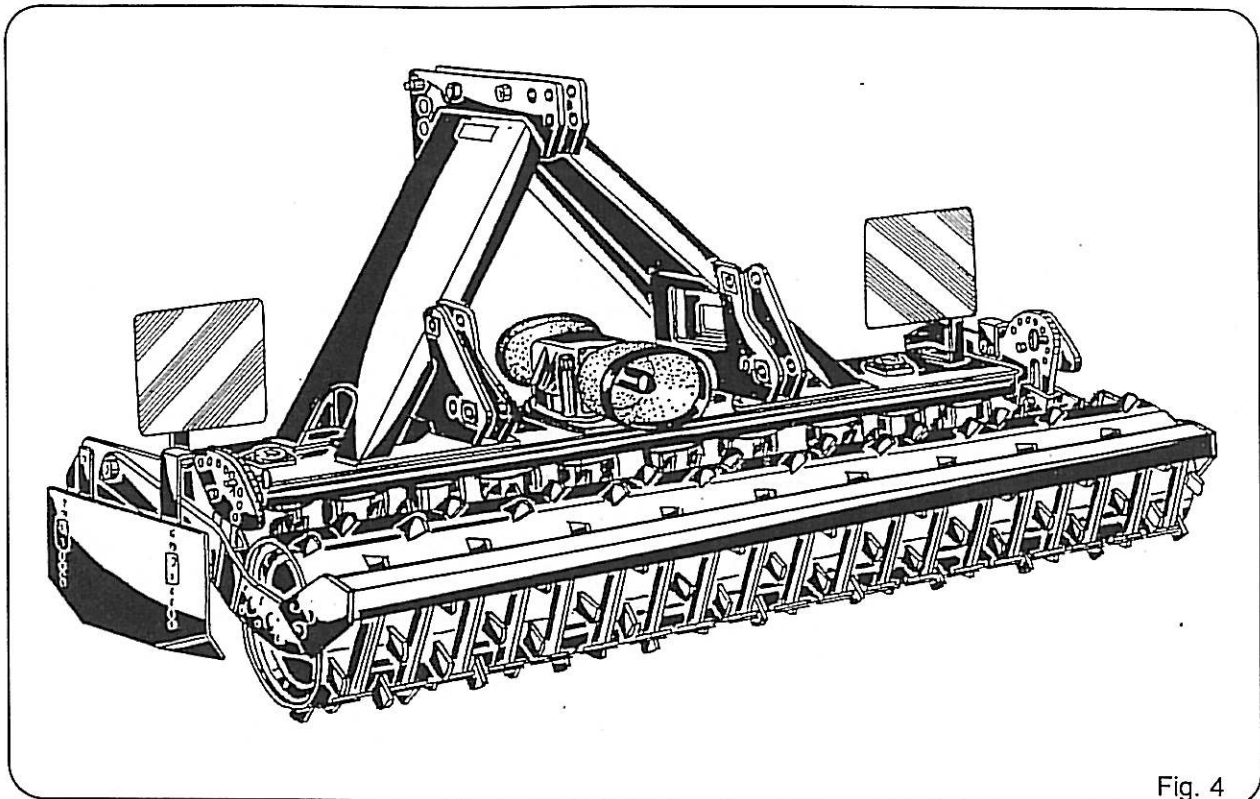
Tyres

1. When working on the tyres it should be ensured that the machine is safely parked and secured against rolling (chocks)!
2. The fitting of tyres and wheels requires adequate knowledge and the proper tools!
3. Repair work to tyres and wheels may only be carried out by specialists using the appropriate tools and equipment!
4. Regularly check the air pressure! Observe specified air pressure!

Maintenance

1. Repair, maintenance and cleaning work, as well as the rectification of malfunctions, should only be carried out with the drive switched off and the engine at a standstill!- Remove the ignition key!
2. Regularly check nuts and screws for tightness, and retighten as necessary!
3. During maintenance work on raised appliances/assemblies, always secure with suitable support elements!
4. When replacing working equipment, use suitable tools and gloves!
5. Properly dispose of oils, greases and filters!
6. Before working on the electrical system, always disconnect the power!
7. If protective guards are subject to wear, they must be checked regularly and replaced at the appropriate times!
8. Spare parts must at least meet the technical requirements specified by the machine manufacturer! This is ensured, for example, by the use of original spare parts!
9. When carrying out electrical welding work on the tractor and hitched appliances, detach cables on the alternator and battery!

Vor Inbetriebnahme beachten



The warning boards must be fitted as in Fig. 4.

The lighting device can be supplied by us on request.

Damaged or worn tines should be changed to prevent damage to the tine holder.

Direct people out of the danger area as there is a danger from foreign bodies and machine parts hurtling forward (e.g. broken tines) (see Warning Notices page 28, item A). Special care is to be taken on roads and paths.

Warning signs which have fallen off or become illegible must be replaced by the operator.



Only use ORIGINAL NIEMEYER SPARE PARTS. Incorporation of other marks may cause serious damage and lead to the guarantee being declared invalid.

Copied parts and special parts subject to wear rarely fall in line with the requirements made. Material quality cannot be tested visually.

This is why you should always only use ORIGINAL NIEMEYER spare parts!



Before initial use of the rotary harrow the following control and maintenance work is to be carried out :

Before any maintenance, repair or control work the tractor engine is to be shut off and the key removed (see Warning Notice page 27, item F).

The rate of revolution of the power take off of the tractor must conform to the prescribed rate of revolution of the drive of the rotary harrow (as indicated on the nameplate). If this is not the case, the pair of change gears must be exchanged (see page 16, Fig. 11 and 12).

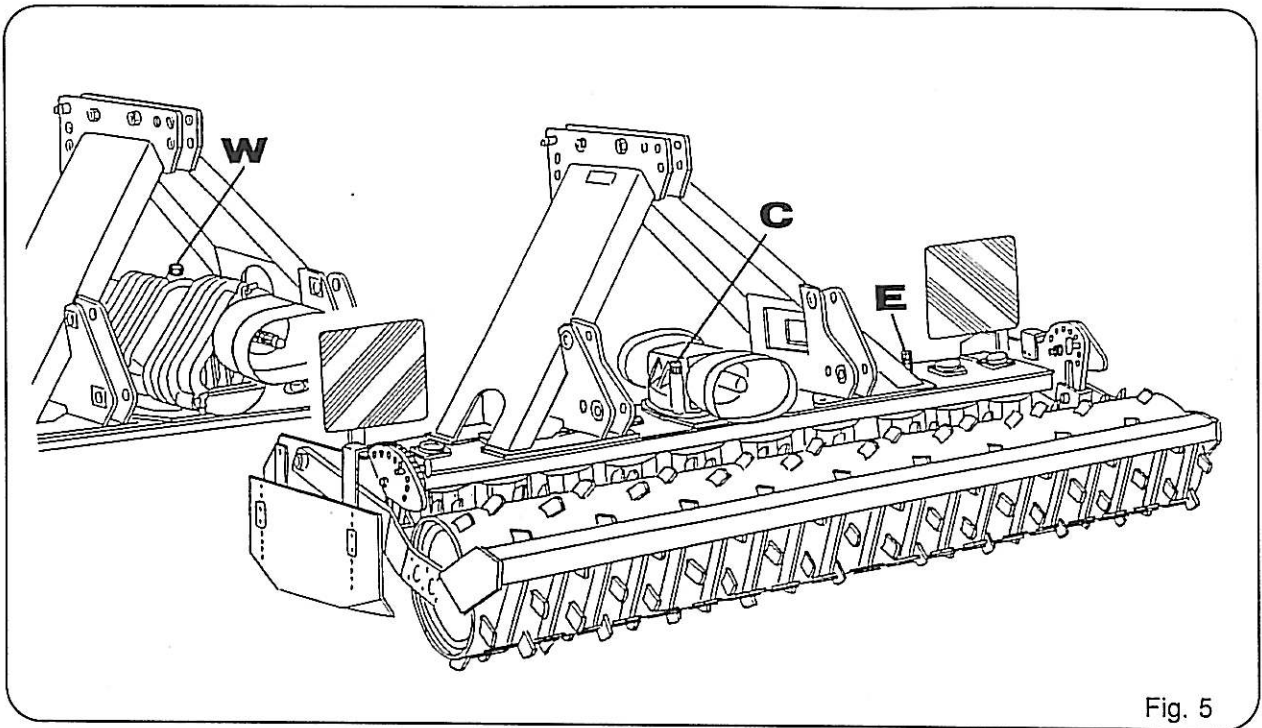


Fig. 5

The oil level in the gears should be checked using the dipstick (Fig. 5, item C) and in the change gears (Fig. 5, item W) before each time of use. If need be the respective gear can be topped up with gear oil SAE 90.

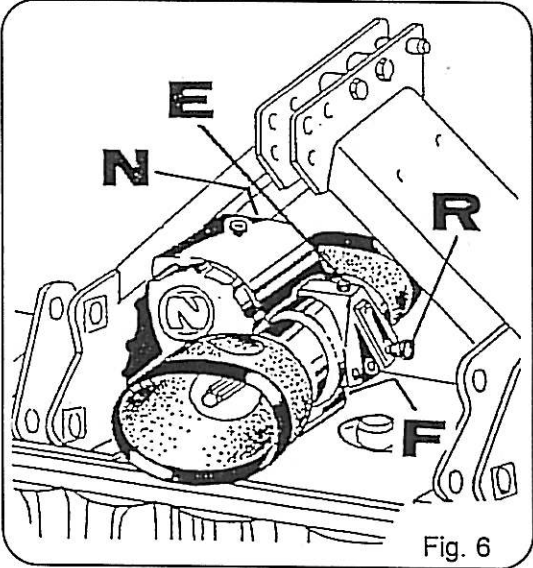


Fig. 6

The oil level of the switchgear is checked by means of the oil control screw (Fig. 6, item N). It must reach the lower edge of the oil control screw when the harrow is in the horizontal position.

Oil filling 5 litres, gear oil SAE 90 (oil discharge screw Fig. 6, item F).

Before the start of the season the state of the gear grease in the gear housing should be checked (Fig. 5, item E). It must be 2 - 3 cm above the housing floor. The check should be made with warm gears and with the harrow parked horizontally.

Filling quantities:	KR 2512.....	30,0 kg
	KR 3012.....	35,0 kg

Recommended grease e.g. ESSO, Fibrax 370.

Aerate the friction coupling of the drive shaft before initial use and before the start of the season.

To do this tighten the 4 nuts (spanner width 13 mm) equally until the friction facings are free. Then turn the coupling one full revolution and return the nuts to the start of the thread (Fig. 7).

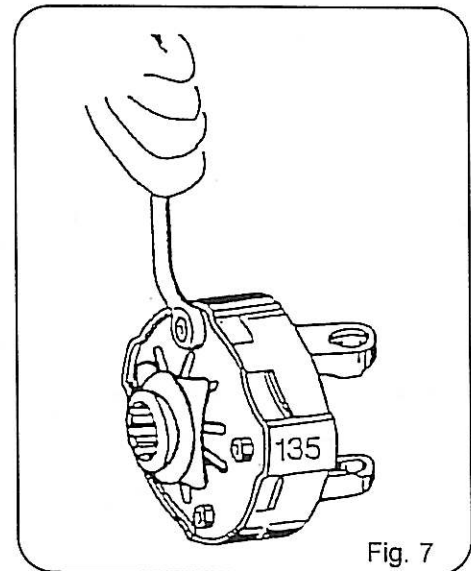


Fig. 7

Assembly

Maximum torque for hexagon head screws with standard metric ISO thread.

Thread diameter	Torque M in Nm				
	5,6	6,9	8,8	10,9	12,9
M 5	2,8	5	6	8,5	10
M 6	4,7	8,5	10	14	17
M 8	12	21	25	35	41
M 10	23	41	49	69	83
M 12	40	72	86	120	145
M 14	64	115	135	190	230
M 16	100	180	210	295	355
M 18	135	245	290	405	485
M 20	190	345	410	580	690
M 22	260	465	550	780	930
M 24	330	600	710	1000	1200
M 27	500	890	1050	1500	1800
M 30	670	1200	1450	2000	2400

To ensure screws and nuts sit correctly, these should be properly tightened. Use a torque wrench for this. The required screw torque should be read off the schedule. Example: An M 8 screw for fixing class 8.8 should be tightened to a torque of 25 Nm = 2.5 mkg. The screw strength of the screw is indicated at the top.

For safety, all screws and nuts should be tightened after 2 hours' use.

Later on all screws and nuts must be regularly tightened. This particularly applies to the castle nuts which are under the tine rotors.



The assembly and sequence of assembly described must be respected. If the rotary harrow is raised during assembly, then it must be secured against dropping accidentally.

Assembly of Drive Shaft



Only use the drive shafts fitted with the specified protection provided for the rotary harrow.

Only assemble or dismantle the drive shaft when the engine is shut off.

Make sure that the guard tubes and protective cone of the cardan shaft and the power take-off shaft safety chads are fixed to the tractor and the equipment.

For drive shafts make sure of the prescribed tube overlapping in the transport and work position.

Always ensure the correct assembly and safety of the drive shaft.

Secure drive shaft protection by suspending chains to counter following.

After the drive shaft is dismantled put the protection cover on the power take off stub.

After determination of the position of the lower guide on the unit the drive shaft length is adapted to the circumstances. Care must be taken here to ensure the sliding sections overlap in the transport position of the unit by at least 400 mm and when they are pushed together there remains some play so as to prevent damage to the gears.

Measures for shortening the drive shaft are described in the operating instructions accompanying the drive shafts.

The shortest distance between tractor and unit power take off is standard for the adaptation. The transport height of the rotary harrow, adjustable on the hoist strut of the three point linkage, is then adapted according to the remaining overlap of the sliding sections in the transport position.

The overload coupling of the drive shaft is always mounted on the unit side and preferably remains connected to the rotary harrow.



Never shorten plastic coated slider tubes using cutting off machines or similar (damaging heat effect) but with an iron saw. After the shortening process remove swarf and chips cleanly.

Lubrication: After the shortening process and during use lubricate the outer sliding tube regularly.

In the Operating Instructions for the drive shaft the manufacturer gives important instructions and tips on use the drive shaft.

Assembly of the Rotary Harrow Tines



If the rotary harrow is raised for the purpose of a tool change (e.g. tines) or repair and maintenance work, the harrow must be secured against accidentally dropping. Before carrying out maintenance and repair work on the equipment, turn off the tractor engine and remove the ignition key (see Warning Notice page 28, item N).

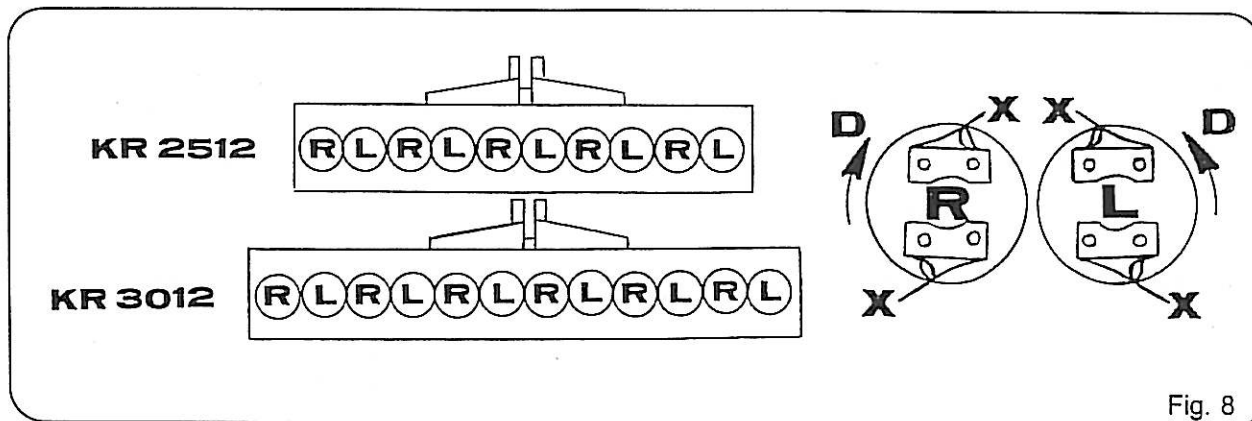


Fig. 8

Fig. 8 shows the rotary harrow from above.

The harrow tines are assembled as shown in Fig. 8:

The tines with the stamped identification "R034826" are mounted on the tine holder "R" with the cutting edge (item X) pointing in the direction of rotation (item D).

The tines with the stamped identification "L034825" are mounted on the tine holder "L" with the cutting edge (item X) pointing in the direction of rotation (item D).

Hooking onto and Unhooking from the Tractor



When hooking the rotary harrow onto and unhooking it from the tractor special care is necessary (see Warning Notice page 28, item N).

Make sure there is no stress on the front axle. Remaining load 20% of the tractor weight.

Before hooking up the harrow to or unhooking it from the three point attachment of the tractor bring the system lever of the tractor hydraulics to the "Position" position, so accidental raising or lowering of the three point linkage is prevented.

When doing the outside work on the three point attachment do not come between the tractor and unit.

No one should stay in between the tractor and unit with the vehicle being secured by the locking brake and/or chocks against rolling backwards or forwards.

Fasten the harrow with the prescribed attachments.

When using the three point attachment the attachment categories of tractor and rotary harrow must absolutely agree.

Couple up the rotary harrow as specified. The driving behaviour, the steering and braking capability of the tractor is affected by the rotary harrow, combination units and ballast weights. Hence make sure there is sufficient steering and braking capability.

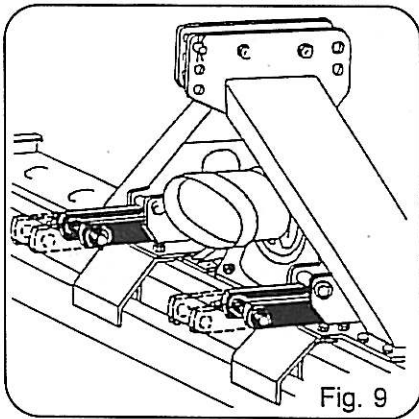
Only commission the rotary harrow when all protection devices have been fitted and are in the protection position.

In the unit's transport position also ensure there is sufficient lateral blocking of the tractor's three point linkage.

Fit and check transport devices, such as lighting, warning devices and any protection devices.

The rotary harrow as standard is suitable for connection to the tractor's three point linkage cat. 2 DIN 9674. For cat. 3 special connections are available if required.

Before connecting the rotary harrow the lower guide connecting points must be adjusted over the hoist strut of the three point linkage so that they are the same distance to the ground surface. Ensure the air pressure of the tractor tyres is the same!



The lower guide connections are longitudinally adjustable on the unit side and can be adapted to the free space on the tractor and the necessary front axle load (Fig. 9).

Basically the distance between tractor and unit should not be less than absolutely necessary in order to keep the drive shaft as long as possible and hence reduce distortion and wear.

The power take off rate of revolution of the tractor and the rate of revolution of the tines of the unit can be varied.

The front side of the rotary harrow indicates for which power take off rate of revolution the rotary harrow is equipped. This is the maximum drive rate of revolution which must not be exceeded.



There is a danger of tip over when the rotary harrow is disconnected with the combination unit. Hence the combination must be sufficiently secured.

Transport

The rotary harrow with a working width of up to 3 m can be driven in the raised position on public roads.



Passengers on the harrow are forbidden during the work or transport (see Warning Notice page 28, item G).

Use



Passengers on the harrow are forbidden during the work or transport (see Warning Notice page 28, item G).

Before switching on the power take off ensure that the selected power take off rate of revolution of the tractor agrees with the admissible rate of revolution of the rotary harrow (see nameplate rotary harrow).

Before switching on the power take off make sure that no one is in the danger area of the rotary harrow (see Warning Notice page 28, item A).

With the power take off switched on no one should stay in the vicinity of the power take off or drive shaft.

Never switch on the power take off with the engine switched off.

Always switch off the power take off if too much distortion occurs on the drive shaft or if it is not required.

For all work on the unit switch off the tractor engine, remove the key and switch off the power take off (see Warning Notice page 28, item F).



After switching off the power take off the connected unit can, according to its range of travel, follow on. Do not go too near the unit during this time. Only when it has stopped may work be done on it (see Warning Notice page 28, item E).

Staying in the work area of the rotary harrow is forbidden (see Warning Notice page 28, item A).

After connection of the harrow to the tractor a trial run should be carried out with the unit slightly raised.

The length of the upper guide of the three point linkage is chosen so that the tines of the rotary harrow are vertical to the surface for the work depth selected.

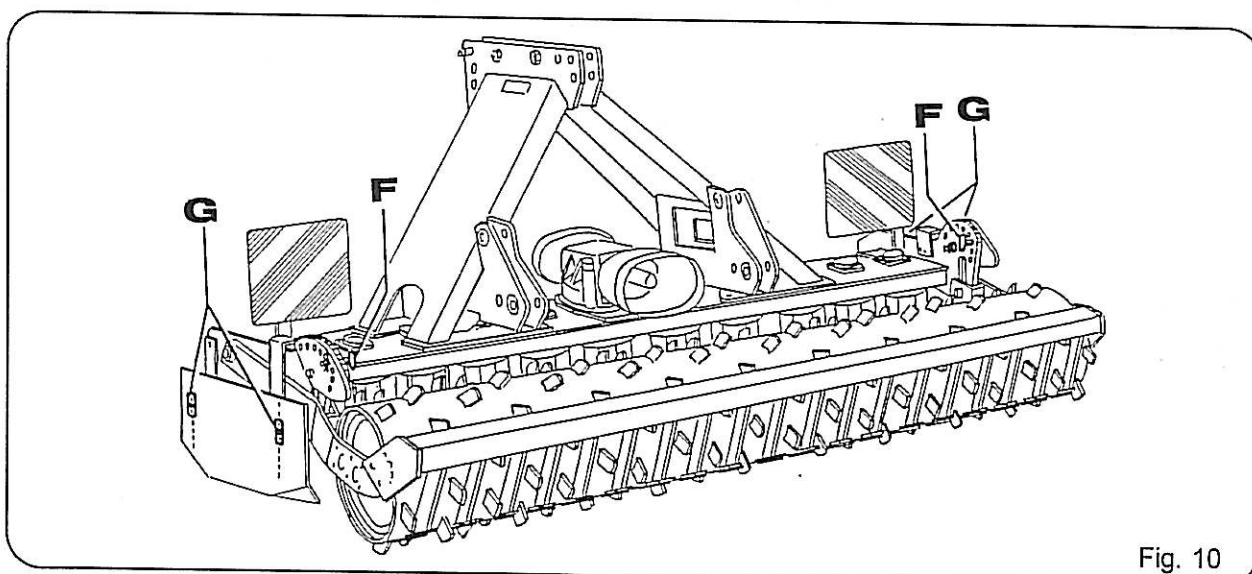


Fig. 10

The work depth, maximum 20 cm, is set using both tommy bars on the outer side of the follower roller (Fig. 10, item F).

Particular care should be taken when setting the working depth using the tommy bar and when lowering the roller to the ground (danger of crushing).

The side plates (Fig. 10, item G) are height adjustable and can hence be adapted to the work depth. They should run when the work is about 2-3 cm deep in the ground.

The rotary power take off shaft should be connected only after the equipment has been lowered to the ground.

Do not switch on the power take off when the rotary harrow is in the transport position or the tines are on the ground.

The best speed of travel depends on the ground conditions, the required friable structure, the tines rate of revolution etc. As a rule the speed is 6 km/h with full power take off rate of revolution.

Changing the Rate of Revolution of the Rotors

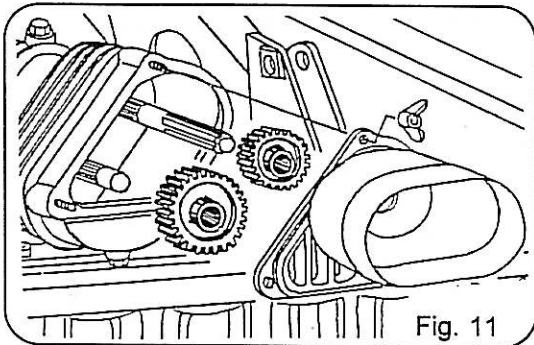
The rate of revolution of the rotors and hence the work intensity can be slightly changed on the change gears by changing the change gear cogwheels.



Before changing the cogwheels shut off the tractoris engine and remove the key (see Warning Notice page 28, item F).

Changing the cogwheels should be done with cool gears (danger of burns).

Changing the cogwheels should be very carefully carried out as follows (wrong assembly = broken gear).



Pitch the rotary harrow slightly forward by shortening the upper guide of the three point linkage, clean the back cover and after loosing the wingnuts take it off (Fig. 11). Remove the left and right hand cogwheel by hand.

Put on both pre-selected exchange cogwheels so the flat side of the cogwheels points in the direction of travel and the side with the edge points backwards. Put the cover back on. When doing this make sure the seal is not damaged.

Fig. 12 shows which rotor rate of revolution belongs to which change gear combination. The rotary harrow can now be seen in its direction of travel.

Wechsel-Zahnräder für unterschiedliche Drehzahlen:				Change gears for different rotor speeds:							
Changer les pignons pour obtenir différents régimes:				Wisselstandwielen voor verschillende toerentallen:							
Zapfwelldrehzahl U/min.	PTO-RPM	Zähnezahlen Wechselräder		Number of teeth change gears							
		Rechtes Zahnrad	R. H. gear	Aantal tanden wisselstandwielen.							
Régime prise de force	Altakastorental omw/min.	Pignon droit	Rechter tandwiel	13	14	15	23	17	21	18	20
		Linkes Zahnrad	L. H. gear	25	24	23	15	21	17	20	18
540	750	Kreiseldrehzahlen U/min.	Rotor speeds rpm.	146	163	182	429	226	345	252 x	311
		Vitesse tambour Tours/min.	Rotortoerentallen omw/min.	203	226	253 x	-	314	-	350	432
1000		269	302 x	338	-	419	-	-	-	-	-

Fig. 12

x = Standard model

Three Speed Switch Gear

		Kreiseldrehzahl ca. U/min.		Vitesse environ tambour			
		Rotor speed appr. rpm		Rotortoerental circa omw/min			
PTO-RPM	Altakastorental omw/min.	1. Gang	1. vitesse	2. Gang	2. vitesse	3. Gang	3. vitesse
		1. gear	1. ver-sneling	2. gear	2. ver-sneling	3. gear	3. ver-sneling
540/750/1000		260		345		410	

Fig. 13

With 3 speed switch gears the rotor rate of revolution for the individual speeds can be seen in Fig. 13. Only switch on when not moving. If the speed does not come in, the rotor is still moving slightly.



Switching should only be done from the front (tractor side).

Follower Roller



The installation of different makes of follower rollers is not allowed and leads to loss of our guarantee.

Follower rollers as well as spiked rollers and levelling rollers are available for the various conditions of use.



Caution Danger of Crushing!

When turning the roller do not come into the vicinity of the spikes and the scraper (see Warning Notice page 27, item E).

Staying between the rotary harrow and the follower roller is forbidden when the harrow is raised and when the tractor engine is running (see Warning Notice page 27, item E).

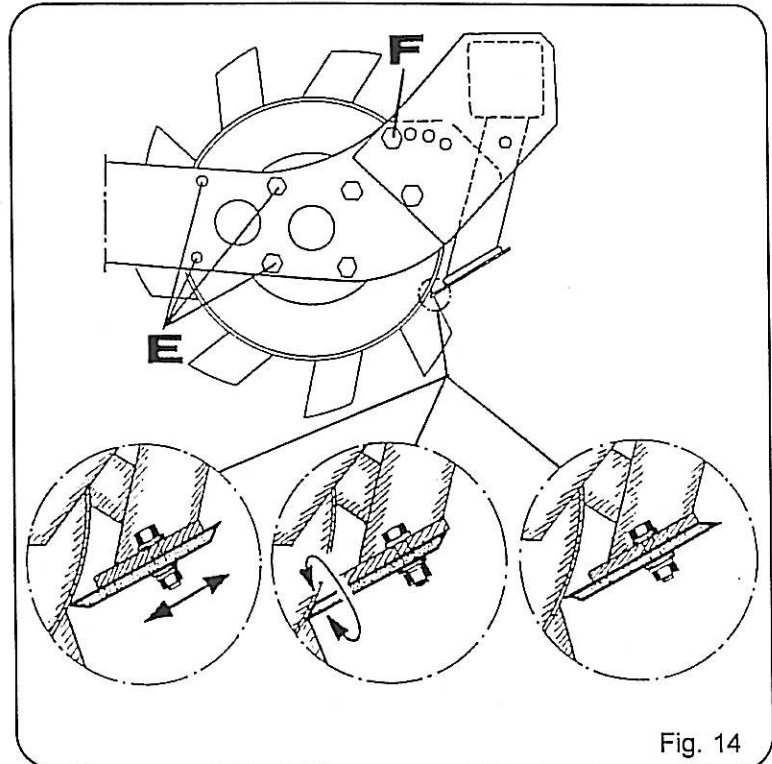


Fig. 14

The production roller as standard is fitted with adjustable scrapers. To ensure the scraping effect, they must be properly adjusted (Fig. 14). It is important to make sure that the scrapers are not only shifted back but also that there is a sufficient pitch outwards in the scraping area. If they are worn due to several re-adjustments, the scraper is blunt and must be turned round, i.e. the part worn by the follower roller faces outwards (Fig. 14). This way it gets a good grip again and prevents any unnecessary stress on the scraper spars.

The scraper can also be used on both sides. If it has worn right up to the oblong hole on one side, it can be turned round so that the pitch points outwards.

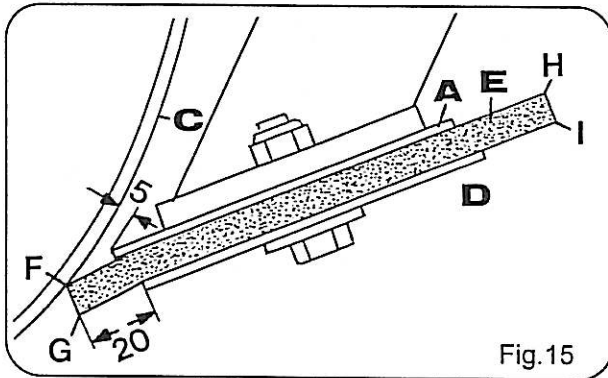
When adjusting the scrapers take care that they do not come into contact with the roller sleeve. This is why the roller should be slowly moved to the raised position.

If the rotary harrow is not fitted with a rear bounce bar, the follower roller can be mounted about 100 mm further forwards (Fig. 14, item E) to reduce stress on the tractor during transport. The tightener in the centre of the harrow (if any) must then be re-adjusted and adapted to the scraper spars.

By shifting the complete scraper spar with the scrapers in the pinholes of the side plates (Fig. 14, item F) the spar can be re-adjusted as a whole.

Plastic cleaner for tined roller (special design)

Each cleaner must be set individually as shown in Fig. 15.



When the roller is rotating, the distance between the roller shell (C) and the plate (A) must not exceed 5 mm in the most extreme case (circularity error of roller).

The plastic cleaner (E) is fixed against the roller shell with light pressure, allowing an initial cleaner contact of 20 mm.

The contact pressure of the cleaner on the roller shell can be altered by adjusting the plate (D) (for different types of ground).

When the edge of the cleaner becomes slightly blunt (F), the rubbing surface is turned round and the edge (G) is used.

Once both of these edges have become blunt, the two opposite edges are used (H and I).

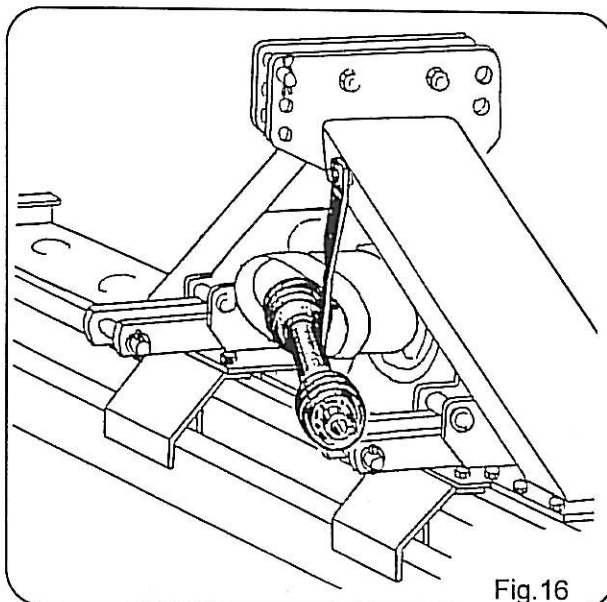


If the plastic cleaners are correctly set on the tined roller, the roller shell will be rubbed bare across its full width.
If this is not the case, the setting operation must be repeated.

Special care must be exercised in setting the cleaners, as the operation involves the risk of crushing and impact injury.

Parking the Rotary Harrow

The rotary harrow should be parked on firm, even ground.



Remove the cardan shaft from the tractor and place it in the bracket provided on the support block (Fig. 16).

Care and Maintenance

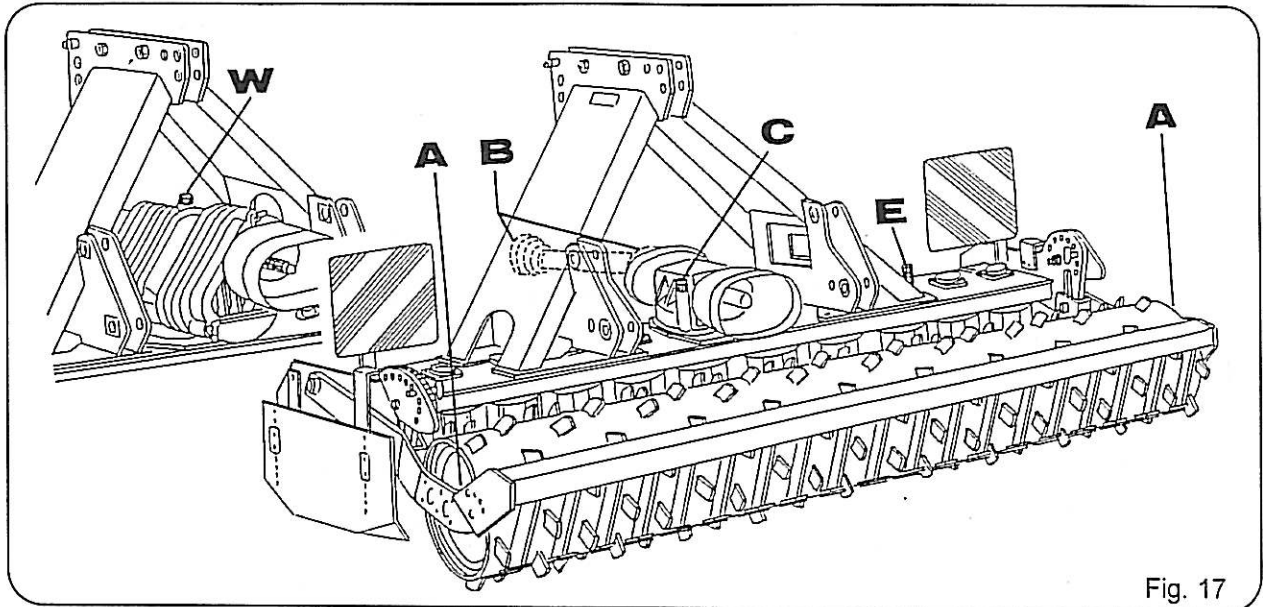


Fig. 17



Switch off the tractor engine and remove the key before any maintenance or repair work (see Warning Notice page 27, item F).
If the rotary harrow is raised then it must be secured against accidental dropping.

The oil level in the gears should be checked using the dipstick (Fig. 17, item C) and in the change gears (Fig. 17, item W) before each time of use. If need be the respective gear can be topped up with gear oil SAE 90.

The oil level on the switch gear is checked by means of the oil control screw (Fig. 18, item N). It should reach the lower edge of the oil control screw when the harrow is in the horizontal position.

For the switch gear we recommend an oil change after the first 40 operating hours, oil fill 5 litres gear oil SAE 90 (oil discharge screw Fig. 18, item F).

Oil, grease and filters must be disposed of properly. Missing or illegible warning symbols must be replaced.

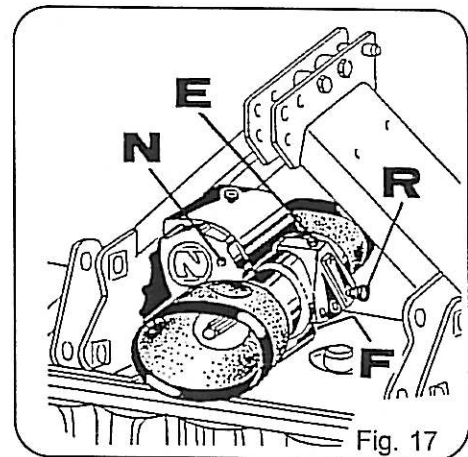


Fig. 17

The bearings of the follower roller (Fig. 17, item A) should each be lubricated with ball bearing grease after 30 operating hours.

The joints of the universal joint shaft (Fig. 17, item B) should each be lubricated with ball bearing grease after 8 operating hours.

After the first use all screws should be checked for tightness and if need be tightened up. This same procedure should be repeatedly regularly.

Before the start of the season the state of the gear oil in the gear housing (Fig. 17, item E) should be checked. It must be 2 - 3 cm above the housing floor. The check should be made with warm gears and with the harrow horizontal.

Filling quantities: KR 2522..... 30,0 kg
KR 3022..... 35,0 kg

Recommended grease e.g. ESSO, Fibrax 370.

Accessories
Combination Three Point Linkage
 (Also used as Front Attachment Block)

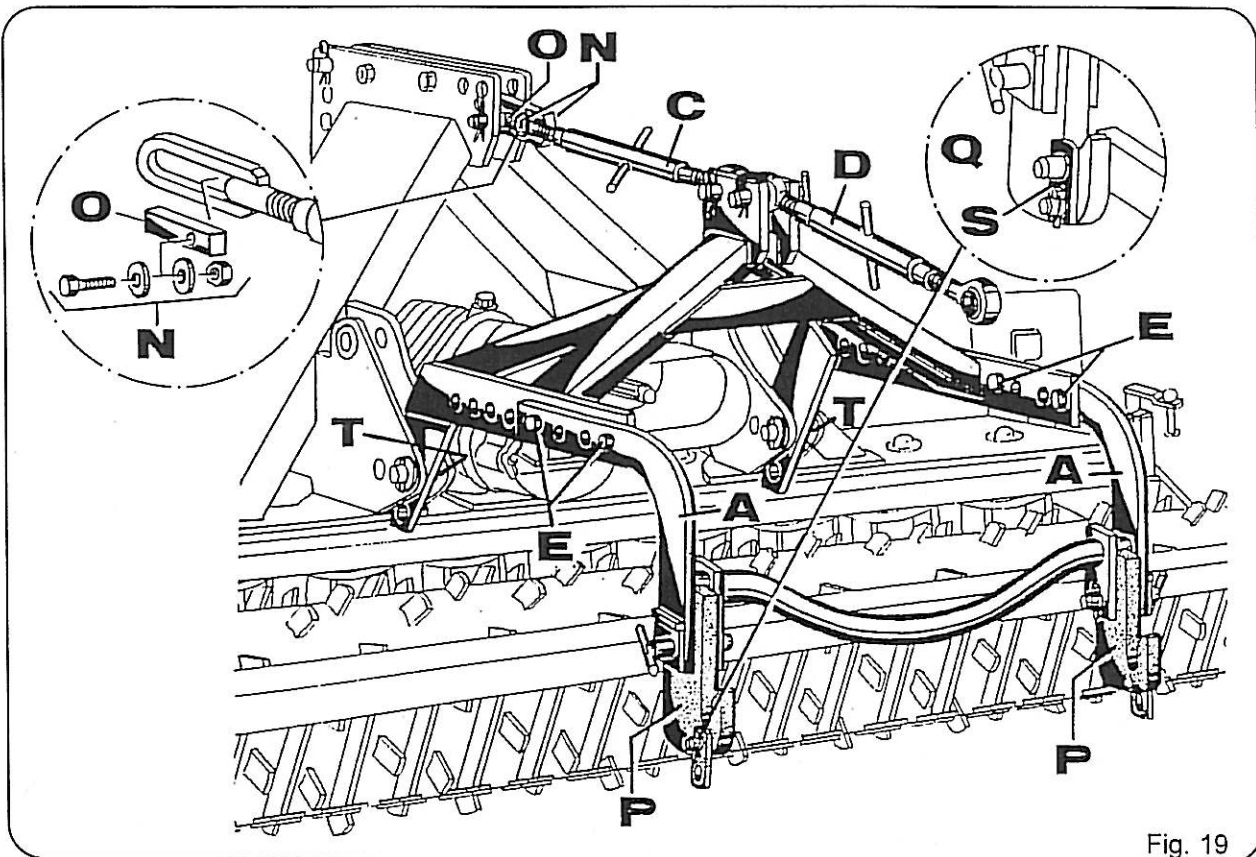


Fig. 19

The jibs should not be disturbed during coupling and uncoupling. Danger of crushing (see Warning Notice page 28, item N).

Watch the front axle load! Remaining load at least 20% of the tractor weight.

When coupling/fitting the following units there is a danger of crushing and shearing (see Warning Notice page 28, item N).

If the combination three point guide is fitted at the back, then make sure both screws and discs (Fig. 19, item N) and also the distance piece (Fig. 19, item O) are removed.

The catching hooks (Fig. 19, item P) must be fitted.

The jibs (Fig. 19, item A) can be adjusted by changing the screws (Fig. 19, item E) along the follower roller and the following unit.

The height of the lower guide quick coupling catching hook is set using the tightener (Fig. 19, item C).

The lateral, rigid connection of both jibs prevents the lateral movement of the following units, e.g. in suspension positions.

The pitch of the following unit can be set using the tightener (Fig. 19, item D).

When coupling the following unit remove the safety straps. After the coupling process put the safety straps on the lower guide bolts and locking screws and secure (see detail "Q" item S).

If the combination three point attachment is used as a front attachment block, the distance piece must be used with discs and nuts (See Fig. 19, item N and O).

The catching hooks (Fig. 19, item P) must be taken off for this purpose.

On subsequent attachment of the combination three point guide the frame on the lower guide (Fig. 19, item T) must be secured against lateral displacement with the discs.

Hydraulic Lift Three Point Linkage (from 97season)

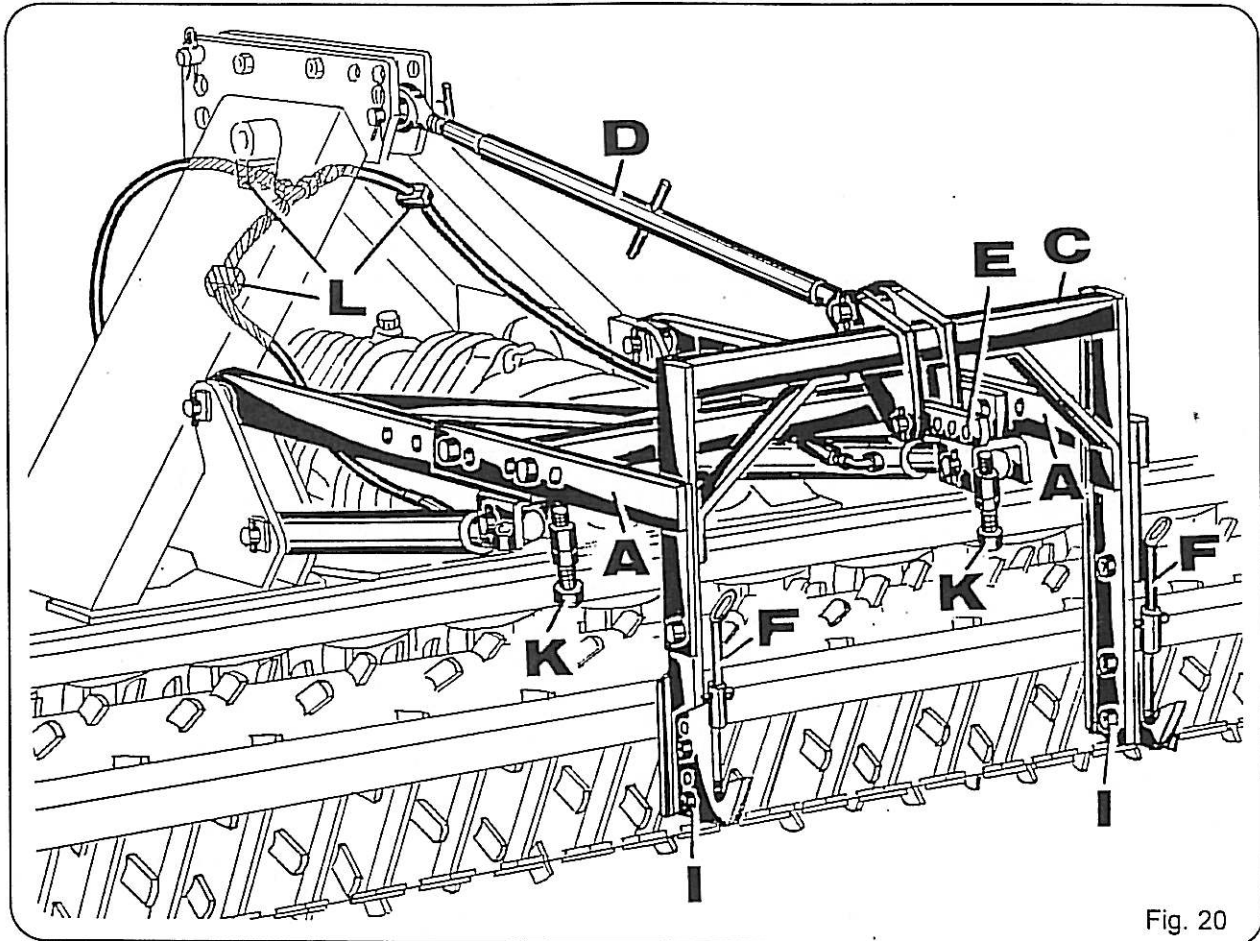


Fig. 20



When coupling and uncoupling as well as during work the lift three point linkage should not come into contact with. Danger of crushing (see Warning Notice page 28, item N).

Watch front axle load! Remaining load at least 20% of the tractor weight.

With this hydraulic lift three point linkage combination units can be raised for transport above the rotary harrow to keep the front axle load as small as possible.

The linkage coupling can be seen in Figure 20. The hydraulic hoses are fixed under the bearing block plate and on the distance tube with clamps (Fig. 20, item L). The connection is made to a single-acting control unit of the tractor.

The length of the lower guide struts (Fig. 20, item A) and also the position of the coupling triangle (Fig. 20, item C) must be adapted to the respective free space for the follower roller. The coupling triangle (Fig. 20, item C) should be able to move freely behind the follower roller and the scraper spars. The perforations in the jibs are used for adjustment (Fig. 20, item A). With the upper guide (Fig. 20, item E) the coupling triangle and with it the following unit can be adjusted for pitch.

The upper link (Fig. 20, E) has a row of holes so that the length can be adapted to the following unit.

The height adjustment of the lower guide catching hooks for adaptation to the following unit is done on initial coupling, with the hydraulic cylinder extended, by means of the row of holes (Fig. 20, item I).

Before the following unit is coupled, the connectors must be set in the lower bore (Fig. 20, F). Following coupling, the connectors must be lowered and secured to lock the lower link connections.

During work the hydraulic cylinder must be driven in the floating position, so the lift attachment can move freely.

Should a following unit be combined with the power take off, the hydraulic lift attachment should only be operated when the drive shaft to the following unit is dismantled beforehand, as otherwise there is a danger of breakage.

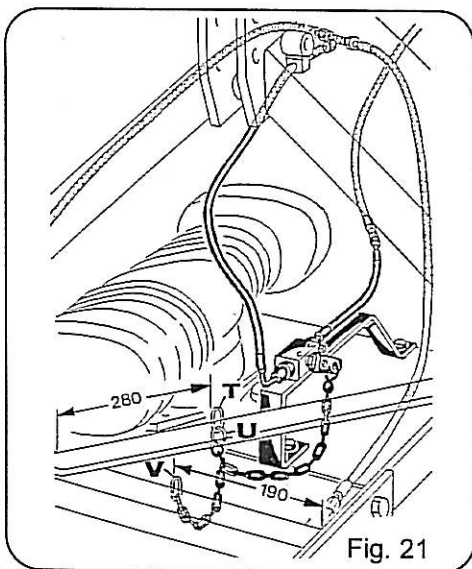


The stop screw (Fig. 20, X) must be set very carefully prior to initial operation.

- Slacken the lock nut before fully screwing in the stop screw.
- Fully extend the two lift cylinders to raise the three-point linkage over the machine.
- Slacken the stop screws until coupling triangle locks and secure with lock nuts.

To park the combination the hydraulic lift three point guide is lowered until the following unit rests safely on the ground.

Stroke limitation for the "hydraulic lift-up three-point linkage"



Operation as shown in Fig. 21

The stroke of the two cylinders is limited by hanging the S-hook (U) in the chain link (V).



The clearance and angle of the articulated shaft must be checked when the lift-up mechanism is operated for the first time.

The height of the stroke can be adjusted by repositioning the S-hook (U) in the chain and then re-hanging in the chain link (V).



For transport, the S-hook (U) must be set into the chain link (T). The three-point linkage can then be moved to the stop point.

Hydraulic diagram

Fig. 22 = Without stroke limitation

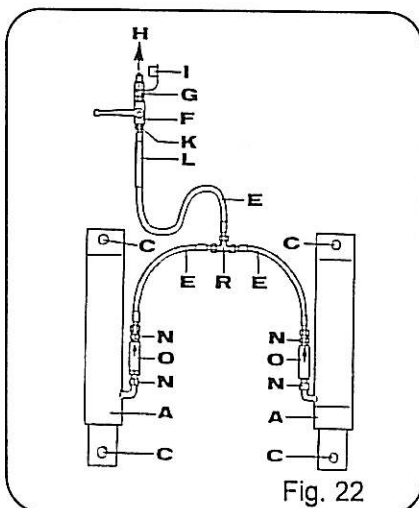
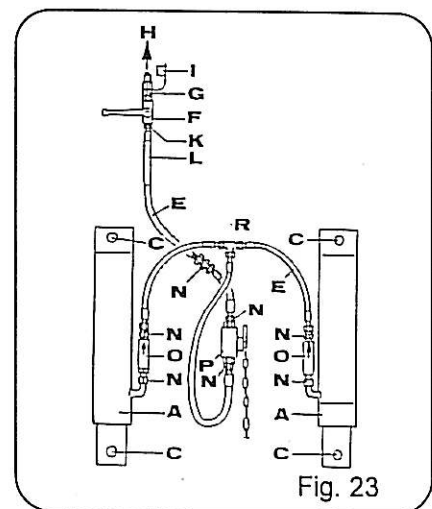


Fig. 23 = With stroke limitation

- A = Hydraulic cylinder
- C = Equipment connection
- E = Hydraulic hose
- F = Absperrhahn
- G = Coupling connector
- H = Tractor
- I = Dust sleeve
- K = Sharp-edged orifice
- L = Protective hose
- N = Screws
- O = Self closing valve
- P = Valve



Hydraulic Lift Three Point Linkage (Until 96/97 season)



When coupling and uncoupling as well as during work the lift three point linkage should not be come into contact with. Danger of crushing (see page 28, item N).

Watch front axle load! Remaining load at least 20% of the tractor weight.

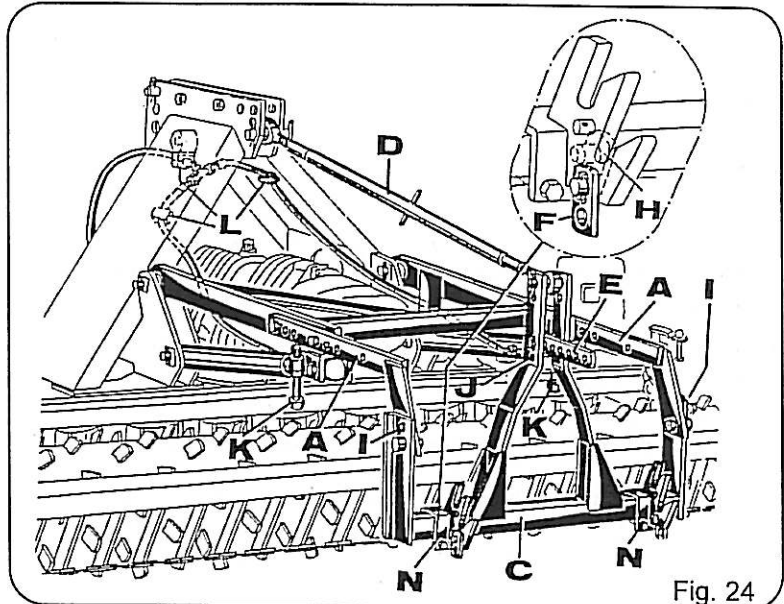


Fig. 24

With this hydraulic lift three point linkage combination units can be raised for transport above the rotary harrow to keep the front axle load as small as possible.

The linkage coupling can be seen in Figure 24. The hydraulic hoses are fixed under the bearing block plate and on the distance tube with clamps (Fig. 24, item L). The connection is made to a single-acting control unit of the tractor.

The length of the lower guide struts (Fig. 24, item A) and also the position of the coupling triangle (Fig. 24, item C) must be adapted to the respective free space for the follower roller. The coupling triangle (Fig. 24, item C) should be able to move freely behind the follower roller and the scraper spars. The perforations in the jibs are used for adjustment (Fig. 24, item A). With the upper guide (Fig. 24, item B) the coupling triangle and with it the following unit can be adjusted for pitch.

The bottom links catching hooks (Fig. 24, item N) must be the same distance as the connection distance of the bottom links of the following unit. The upper guide (Fig. 24, item E) makes length adjustment to the following unit easier with its row of holes. For low coupling heights there is another borehole (Fig. 24, item F).

The height adjustment of the lower guide catching hooks for adaptation to the following unit is done on initial coupling, with the hydraulic cylinder extended, by means of the row of holes (Fig. 24, item I).

For coupling see page 24 "Combination Three Point Linkage".

During work the hydraulic cylinder must be driven in the floating position, so the lift attachment can move freely.

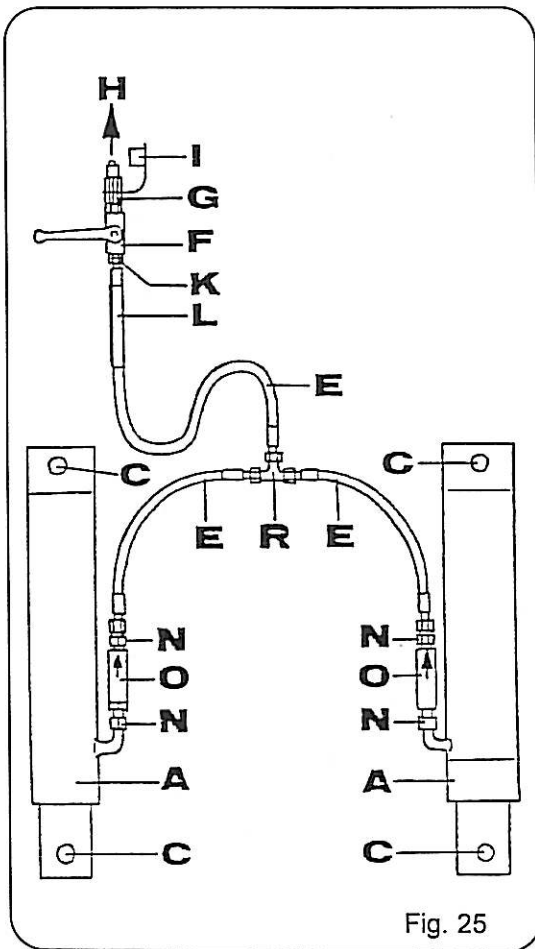
Should a following unit be combined with the power take off, the hydraulic lift attachment should only be operated when the drive shaft to the following unit is dismantled beforehand, as otherwise there is a danger of breakage.

Both stop screws (Fig. 24, item K) must sit firmly in the transport position.



To park the combination the hydraulic lift three point guide is lowered until the following unit rests safely on the ground.

Hydraulic diagram
Hydraulic Lift Three Point Linkage
(until 96/97 season)



- A = Hydraulic cylinder
- C = Equipment connection
- E = Hydraulic hose
- F = Absperrhahn
- G = Coupling connector
- H = Tractor
- I = Dust sleeve
- K = Sharp-edged orifice
- L = Protective hose
- N = Screws
- O = Self closing valve

Fig. 25

Drive Shaft with Camshaft Coupling

If the camshaft coupling is tripped on overload, there is no torque transmission from the tractor.

To allow the cams to be engaged the rate of revolution of the power take off must be reduced to under 200 r.p.m. When the resistance in the vicinity of the harrow tines is removed, the drive becomes fully functional again after the cams are engaged.

Track Scrapers

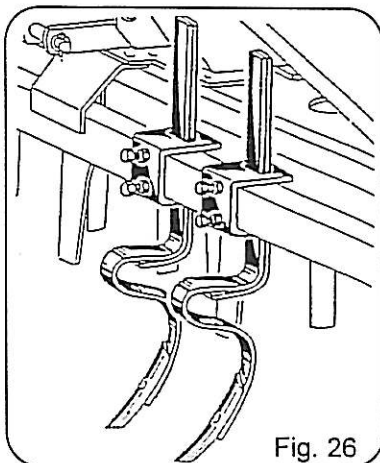


Fig. 26

The sprung track scrapers (Fig. 26) are adjustable in height and sideways movement so the scrapers can be best adapted to the tractor tyres and the necessary working depth.

Rear Bounce Bar

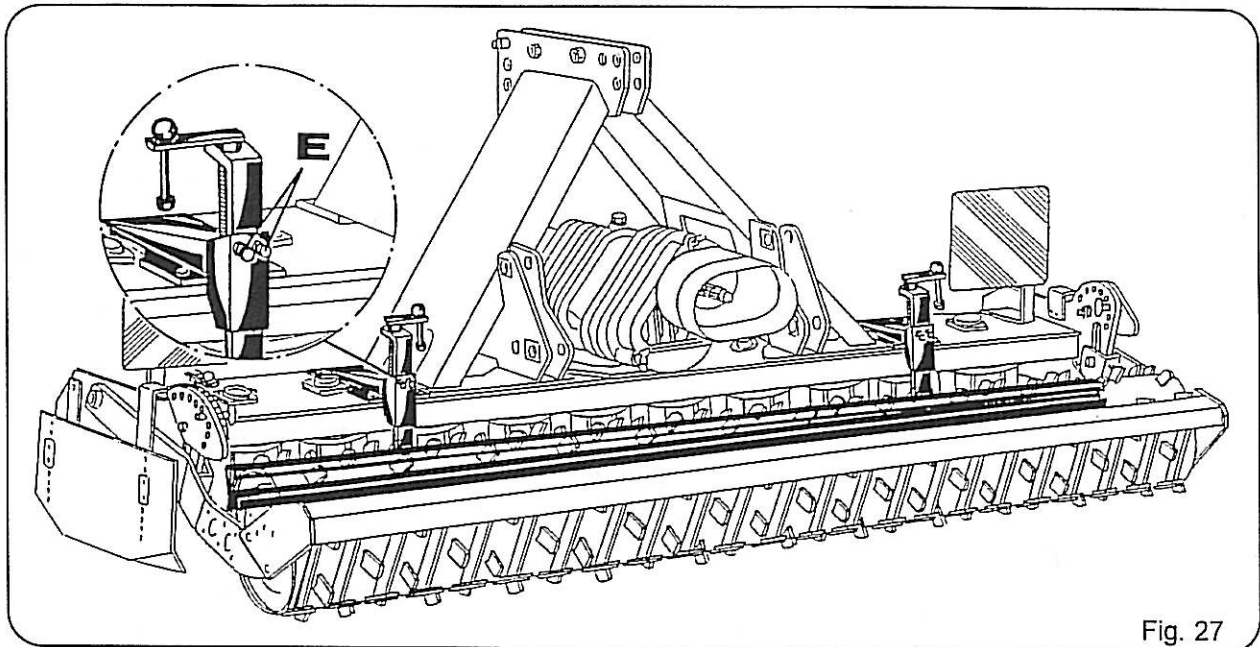


Fig. 27

The rear bounce bar (Fig. 27) is height adjustable and should be adapted to the working depth and the tine length of the rotary harrow to achieve the advantage of fine crumbling of clay soil.

After the height of the bounce bar has been adjusted the screws and counternuts are tightened up again (Fig. 27, item E).



Before adjusting the bounce bar shut off the tractor engine and remove the key (see Warning Notice page 28, item F).

Set Up for Pneumatic Accord Pivot Coupling Drilling Machine

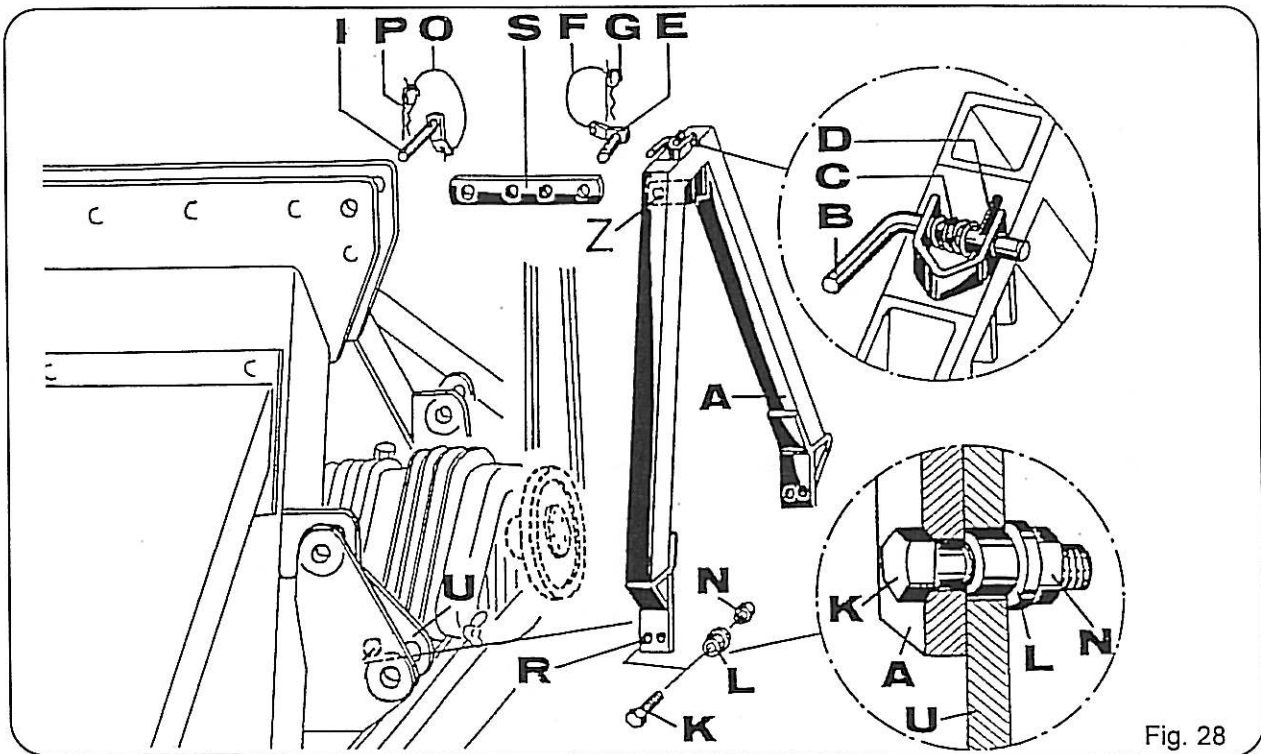


Fig. 28

Assembly Pivot Coupling Triangle (Fig. 28)

The frame (item A) has 2 holes in each of the lower fixing points.
For rotary harrows the front drillholes are to be used with regard to the machine (item R).

The assembly should be carried out in the following sequence as in Fig. 28.

- Insert the sleeves (item L) into the drillholes of the inner bars of the bottom part of the bearing block (item U).
- Guide the frame (item A) over the bars. The rounding of the holder (item Z) for the support bar (item S) points in the direction of travel.
- Guide the screws (item K) through the corresponding drillholes in the frame (item A) and the sleeves (item L). With nut (item N) temporarily just tighten by hand.
- Join up the frame and the upper part of the bearing block by means of the support bar and bolts (items S, E and I). The frame should be vertical here.

Secure the bolts (Fig. 28, item E and I) using spring pins (items F and P). Firmly tighten up the lower fixing (item K and N).



The pivot coupling triangle is now loaded with the full weight of the drilling machine! Insufficient or fault fixing can lead to accidents and damage to the combination!

Watch the front axle load. Remaining load at least 20% of the tractor weight.

Insert the bolt (item B) into the top of the frame as shown in Fig. 28 (if not already assembled).

Fix the tensioning pin (item D) and pressure spring (item C) so when the spring is relaxed the bolt protrudes about 20 mm behind the guide in order to guarantee secure fixing of the drilling machine. To uncouple the drilling machine pull and at the same time waggle the bolt to secure it in the retracted state.

Integrated Series Cultivator with Feed discs

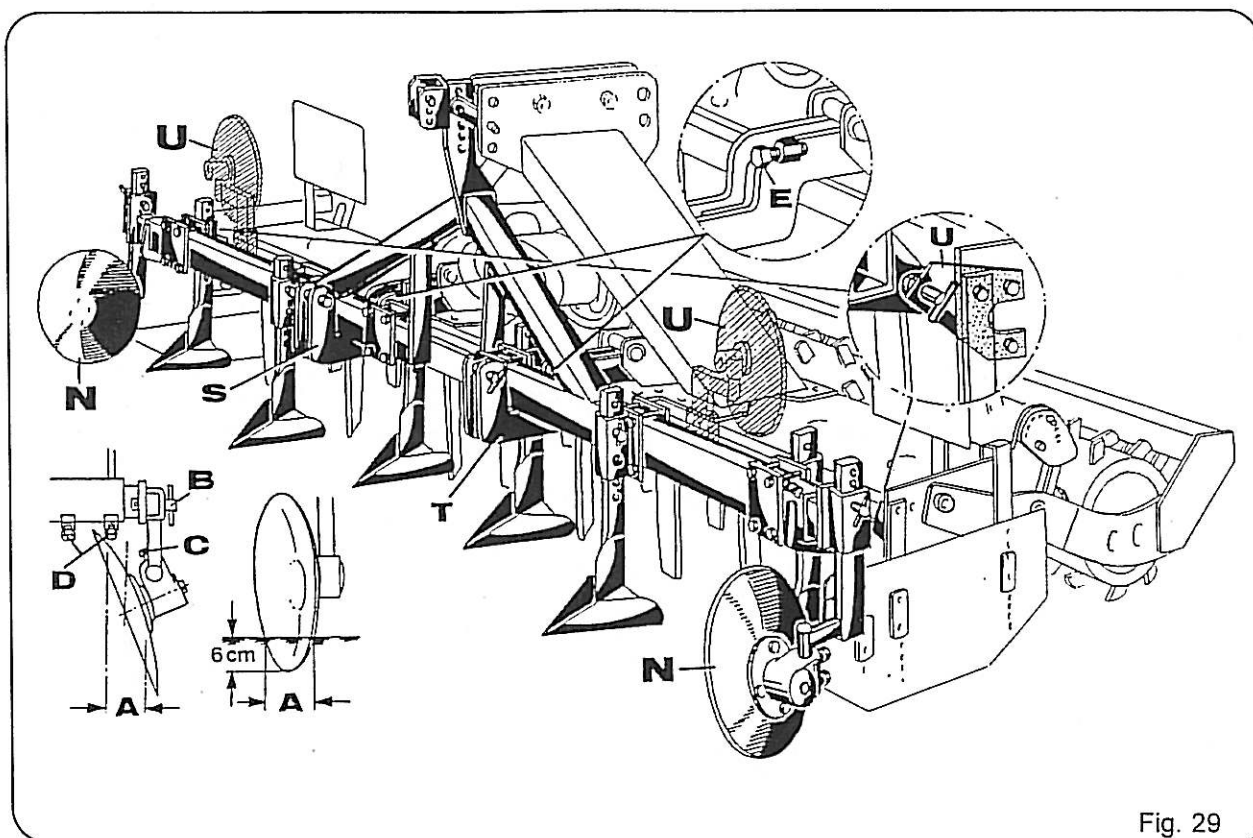


Fig. 29

Assembly afterwards is done as follows :

- Dismantle the front bounce bar and both lower guide connections.
- Fix the new lower guide connections on the bearing block (Fig. 29, item S and T).
- Screw the holders (Fig. 29, item U) with the bounce bar screws onto the bearing block (with the bush pointing towards the centre of the machine).
- Now fit the series cultivator onto the harrow as in Fig. 29.
- Now tighten up the screws (Fig. 29, item E) until the screw head presses firmly against the cultivator bar.

The tines of the cultivator can be adjusted for height (work depth) and sideways.

The feed discs fitted each side can be adjusted for height (Fig. 29, item B), angle of attack (Fig. 29, item A) and working width (Fig. 29, item C). Make the angle of attack as acute as possible (see measurement "A"). The working depth is usually about 6 cm.

To transport the unit the feed discs must first be raised from the work position (Fig. 29, item N) to the transport position (Fig. 29, item U). Otherwise there is a danger of injury and the admissible transport width of 3 m is exceeded.



Watch front axle load! Remaining load at least 20% of the tractor weight.

There is a danger of crushing during adjustment of the feed disc (see Warning Notice page 28, item N).

Warning symbols (pictograms)

The operator must replace any warning symbols which have fallen off or become illegible. The pictograms can be reordered using the identification numbers shown next to the symbols. Final digit even (e.g. 646404) = high format. Final digit odd (e.g. 646405) = crosswise format.

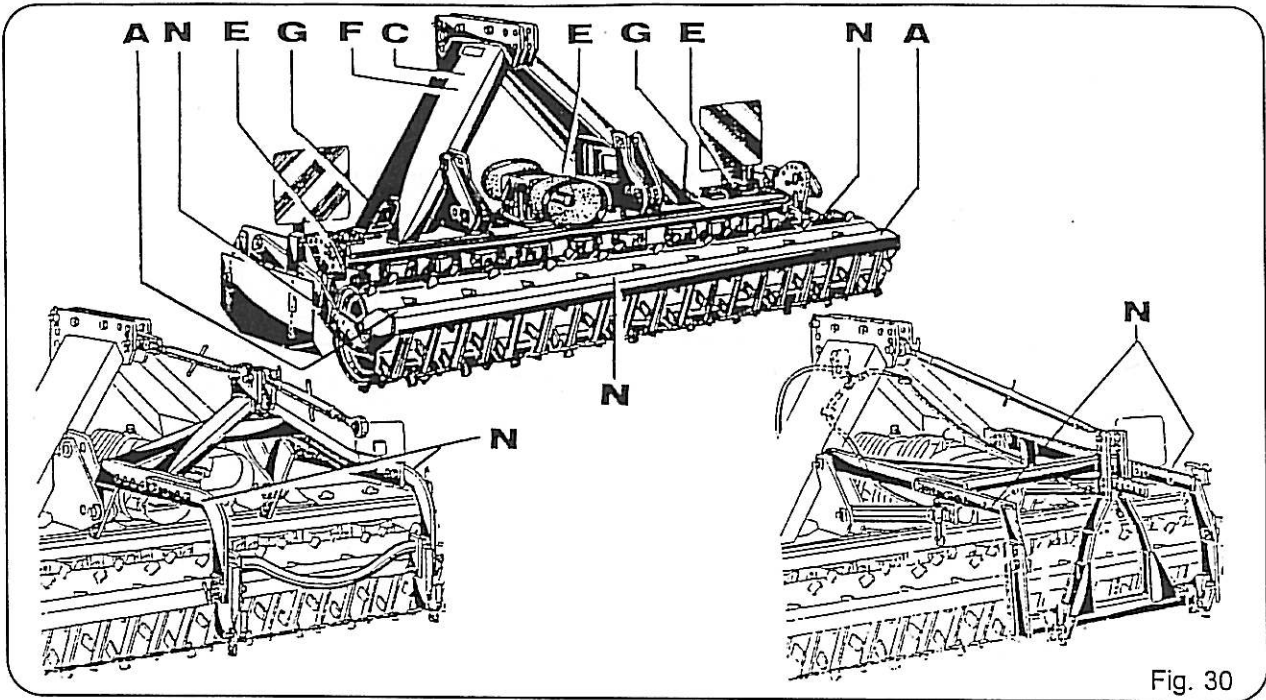
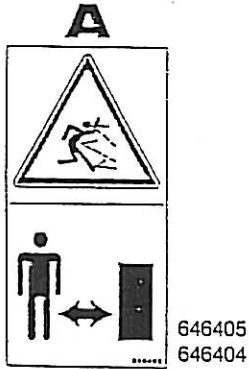
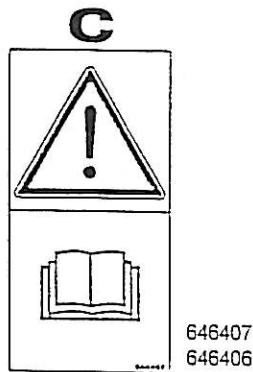


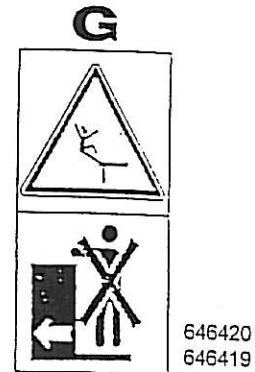
Fig. 30



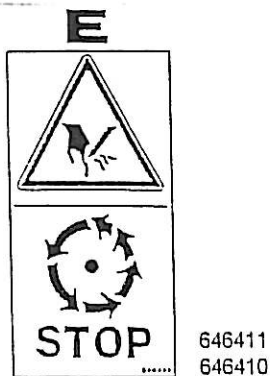
Keep distance with motor running.



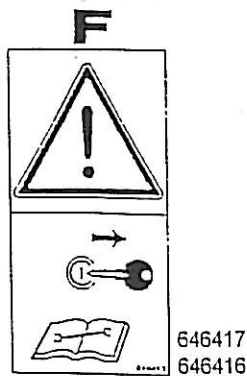
Read and pay attention to operating instructions and safety information before starting for the first time.



Do not ride on the platform.



Do not touch any moving machine parts. Wait until they have come to a complete standstill.



Before maintenance and repair work, stop the motor and remove the key.



Never reach into the crushing danger zone as long as parts are moving there.

Warning symbols (pictograms)

The operator must replace any warning symbols which have fallen off or become illegible.
The pictograms can be reordered using the identification numbers shown next to the symbols.
Final digit even (e.g. (646404) = high format. Final digit odd (e.g. 646405) = crosswise format.

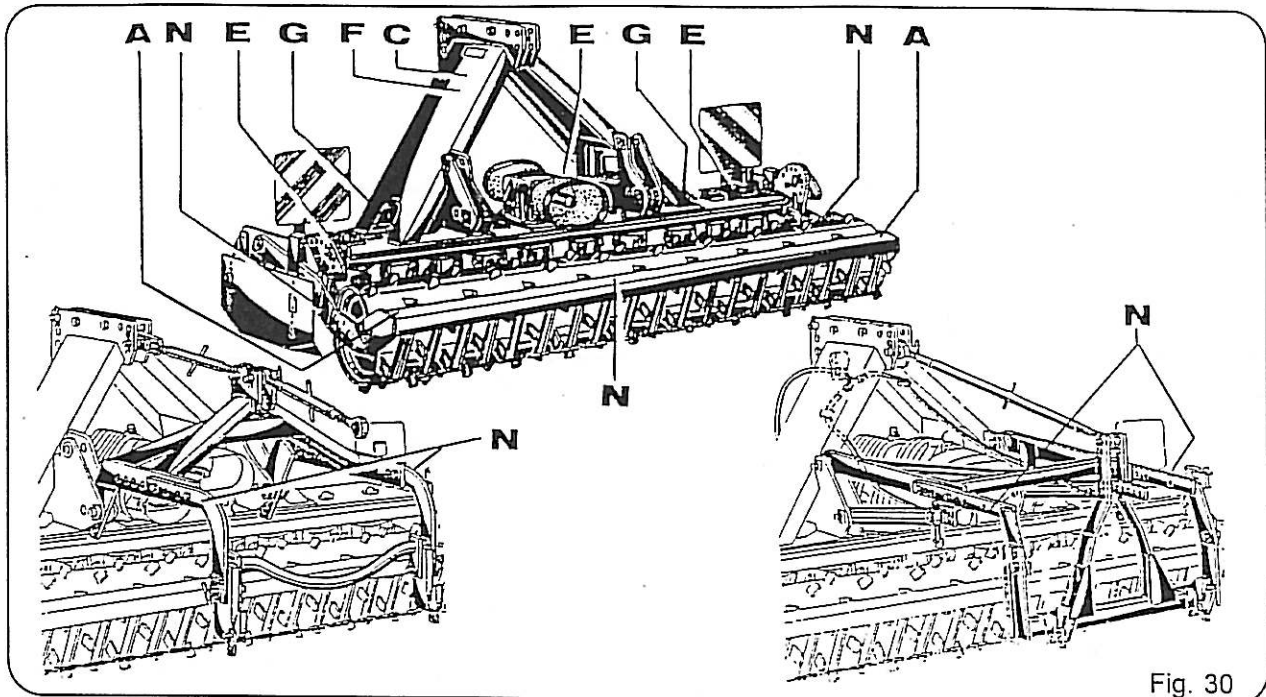
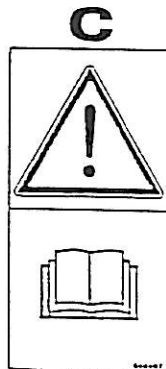


Fig. 30



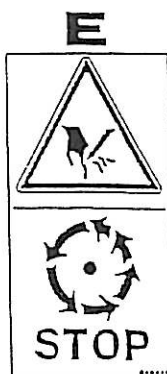
Keep distance with motor running.



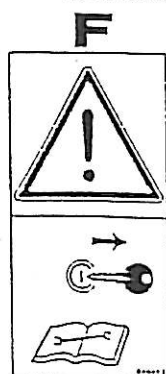
Read and pay attention to operating instructions and safety information before starting for the first time.



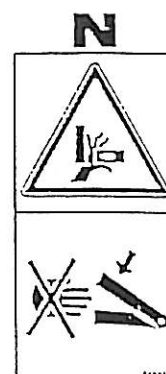
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