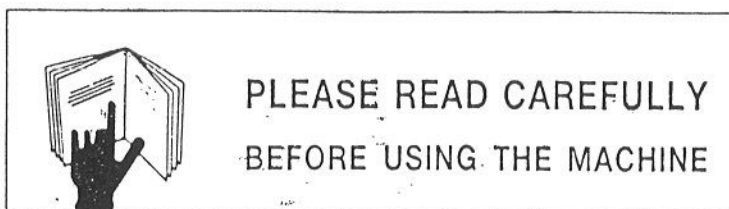




# OPERATORS MANUAL



## FERTILISER SPREADER ***PRECIS-KUHN*** **1500**



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Dear customer!

We are confident that your KUHN Fertiliser Spreader, with its many outstanding features, will justify the trust which, by your purchase, you have shown in the machine. We have made every effort to provide you with a high performance, reliable, precision machine.

It is very important that you read and thoroughly understand these instructions, taking careful note of the Safety Information, BEFORE operating the machine. This manual provides a comprehensive guide to the machine controls and all the information necessary for efficient and safe operation, maintenance and care of your machine.

**PLEASE NOTE:** *Any damage resulting from operator errors and/or misuse is excluded from our guarantee.*

**TYPE:**

**MACHINE No.:**

We recommend that you make a note of the machine type and serial number of your Fertiliser Spreader in the space above. You will find both on the type-plate fixed to the frame of machine.

Always quote this information when ordering spare parts, optional equipment and accessories or making any claims under the guarantee.

#### **TECHNICAL IMPROVEMENTS**

We are committed to a policy of constant improvement on all KUHN products. We therefore reserve the right to carry out, without prior notice, any improvements or changes which we feel will benefit our products without any obligation, on our part, to carry out such improvements or changes to machines which have already been sold.

If you have any questions about these, or any of our products, please do not hesitate to contact us.

With kind regards

**K U H N**  
Farm Machinery (U.K.) Ltd.

#### **N O T E: M A C H I N E D E L I V E R Y**

*Please check your machine thoroughly for any transport damage or missing parts. Claims can only be accepted if we are notified at the time of delivery. Please ask the haulier to acknowledge any transport damage. In case of doubt, contact your dealer or the factory direct.*

## ATTENTION!!!



*When this symbol appears in the manual, it means that the safety of the operator, assistants, bystanders, or the normal operation of the machine could be in danger. It is essential that you strictly observe all safety instructions. It is vitally important that you make sure that all users have the opportunity to read and thoroughly understand these instructions.*



## ACCIDENT PREVENTION AND SAFETY ISSUES



Most accidents connected with these machines happen because someone ignores the most elementary safety rules during operation, maintenance or transport operations. It is vital that every person who comes into contact with this machine - be it the purchaser himself, a member of his family, an employee, a bystander - must strictly obey the following main safety rules. Other safety instructions are to be found on the decals which are placed in various prominent parts of the machine. Only persons who are completely familiar with the machine, and who have been instructed in the dangers associated with it, should be allowed to maintain or repair the machine.

1. Please observe the safety notes contained in these operating instructions, and all current statutory safety and accident-prevention regulations!
2. Warning and instruction decals provide essential information concerning safe operation - observe them for your own safety!
3. Please check all nuts, bolts and other fixings for tightness, especially those on discs and disc blades.
4. Before using the machine, operators must familiarise themselves with all parts of the equipment and the function of all controls and adjustments. Finding out during operation may be too late!
5. Before using the spreader for the first time, check that the tractor/spreader combination is road-worthy and in a safe operating condition.
6. Before filling the hopper with fertiliser, make sure the shutter control is in the closed position, switch off tractor engine and remove key.
7. Before adjusting, lubricating, cleaning or carrying out any operations on the machine, switch off the tractor engine and wait until all moving parts have come to a complete stop. Before performing a calibration check or disc change-over, shut-off the oil supply to the disc drive-motors and set the flow control valve to 0.
8. Keep hands, feet and clothing well away from moving parts.
9. Keep the hopper free of any foreign matter.



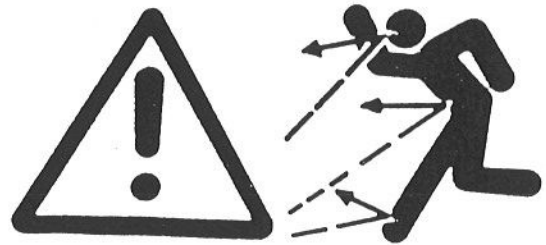
10. Before starting the machine, make sure that no person is present within the danger area around the fertiliser spreader. Make sure you have a good view all around! (Watch out for children!)
11. Only start up the fertiliser spreader when all safety devices and guards have been properly fitted (filling screens, metering-chamber covers, PTO guards, etc.)

**ATTENTION!!**

***SOME COMPONENTS CONTINUE RUNNING AFTER SWITCH OFF!!***

***FERTILISER IS THROWN FROM THE OUTLETS AT HIGH SPEED AND CAN BE DANGEROUS!***

***MAKE SURE THAT ALL PERSONS LEAVE THE SPREADING ZONE BEFORE STARTING THE SPREADER.***



12. Never leave the fertiliser spreader running unattended.
13. It is illegal to carry passengers when transporting or using the fertiliser spreader.
14. When checking, adjusting or repairing the machine, always make sure that the spreader cannot be switched on by mistake.
15. Before taking the fertiliser spreader onto public roads, ensure that the spreader conforms to Road Traffic regulations (check with the authorities what protective equipment, lights and warning signs are required).
16. Before leaving the tractor unattended lower the spreader to the ground, switch off engine and remove ignition key.
17. Never allow anyone to enter the space between tractor and implement without preventing the vehicle from unintentional rolling through the application of the parking brake and/or chocks!
18. Make sure that the weight of the spreader does not make the tractor unstable. In many cases it will be necessary to add suitable weights to the front of the tractor so that tractor/spreader stability, steering and safety (and braking and traction for 4wd tractors) is not affected by the weight of the fully loaded spreader.
19. The PRECIS-KUHN spreader has a maximum pay-load of 2500 kg. For easy reference the densities (weight per litre) of different fertiliser types are listed in the calibration charts.
20. We recommend that you arrange for your dealer to check the condition of your spreader at the end of every season. He will pay special attention to disc blades, hydraulic equipment and all fittings.
21. In the event of a mechanical, hydraulic or electrical failure during operation, switch off the spreader immediately. Stop tractor engine and remove the key before checking and repairing damage.

22. Before parking the spreader on its folding stands make sure the fertiliser hopper is empty and the ground is firm and level.



**ATTENTION!!! DANGEROUS AUGER!**

*The auger inside the hopper starts and stops automatically.*

*Never use the spreader without the hopper grids properly in place.*

*Before removing the hopper grids:*

- switch off hydraulic system!*
- switch off tractor engine!*
- remove ignition key!*

Observe the following rules when cleaning the spreader :

Even when the machine is switched off, never put your hands near the auger!

Always use appropriate cleaning tools.



**ATTENTION! DANGER FROM FERTILISER!**

*Improper selection and use of fertilisers can have serious effects on people, animals, plants and the environment in general.*

*Always select the correct fertiliser for your application. Always handle with care. Obey the fertiliser manufacturer's instructions to the letter.*

## PROPER USE

PRECIS-KUHN twin-disc fertiliser spreaders are designed to spread dry prilled, granular and crystalline fertilisers and seeds. The spreader is adapted for each application and its appropriate working width by changing discs, disc speed and application point (see calibration charts).

Any other use is inappropriate. Any defects arising therefrom will invalidate the manufacturers guarantee; any risk associated therewith is borne entirely by the user.

"Proper use" also entails the full compliance with all operating, maintenance and repair instructions issued by the manufacturer.

Your PRECIS-KUHN twin-disc fertiliser spreader should only be used, maintained and repaired by persons who are familiar with the machine and who have received instruction with regard to potential dangers.

All current, appropriate, accident prevention requirements, and all other generally recognised safety, technological, work-related and road traffic legislation must be observed.

Any guarantee claims against the manufacturer, for damage resulting from unauthorised alterations to the machine, will be ruled invalid.

## ESSENTIAL SAFETY NOTES - HYDRAULIC SYSTEM

- a) The hydraulic circuits contain oil under high pressure!
- b) When coupling hydraulic hoses, make sure that connections are made correctly.
- c) When connecting the hoses to the tractor hydraulic system, make sure that the hydraulic pressure in both the tractor and spreader circuits, has been relieved.
- d) Check the condition of hydraulic hoses regularly and if damage or excessive wear is found, renew the relevant part. All replacement hoses must conform to the technical requirements of the manufacturer.
- e) Use suitable protection when locating leaks (safety goggles, gloves, etc.) in order to avoid injury!. Hydraulic oil escaping under high pressure can penetrate the skin and cause serious injury. If this type of injury occurs, get medical help immediately as there is a serious risk of infection.
- f) Before working on the hydraulic system, lower the spreader, relieve the system pressure and switch off the engine; remove ignition key!
- g) The pressure relief valve of the tractor should be set to a maximum pressure of 200 bar.
- h) Carefully clean all hydraulic connections. When not in use, store couplers in the positions provided on the spreader.
- i) Check all hydraulic hoses regularly; At intervals of 6 months (or less), examine the surface of all hoses for mechanical defects, (eg. cuts and abrasions, crushed sections, kinks, tears, leaks). Replace all damaged lines immediately. The useful life of an undamaged hose should be limited to 5 years.

## TRANSPORTING PRECIS-KUHN TWIN-DISC FERTILISER SPREADERS ON PUBLIC ROADS

When driving on public roads and paths, ensure that the tractor/spreader combination complies with all relevant road traffic regulations (overall permissible weight, overall permissible axle weight, lighting, warning signs etc.)

### Lighting:

*The following notes apply in Germany. Please check the road traffic regulations in your country and carry out the necessary modifications before transporting the machine on public roads. If in doubt, consult your dealer for advice.*

If the tractor lights or number-plate are obstructed by the spreader, they must be repeated on the rear of the fertiliser spreader, even during daytime use.

If the fertiliser spreader protrudes more than 400mm (16") outside the width of the tractor side/rear lights, additional side lights must be fitted to the front of the spreader.

Make sure that the machine conforms to all road traffic regulations regarding proper traffic warning signs.

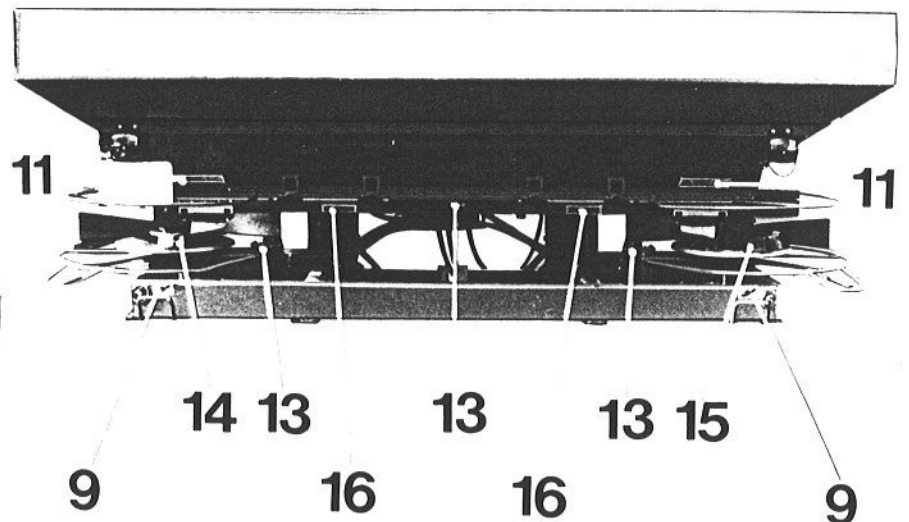
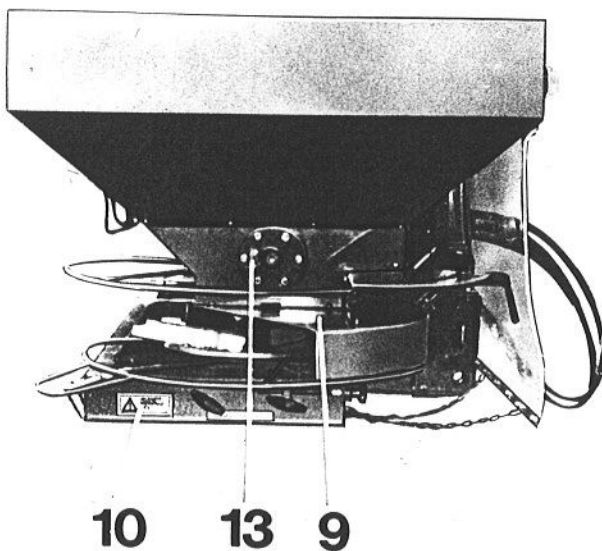
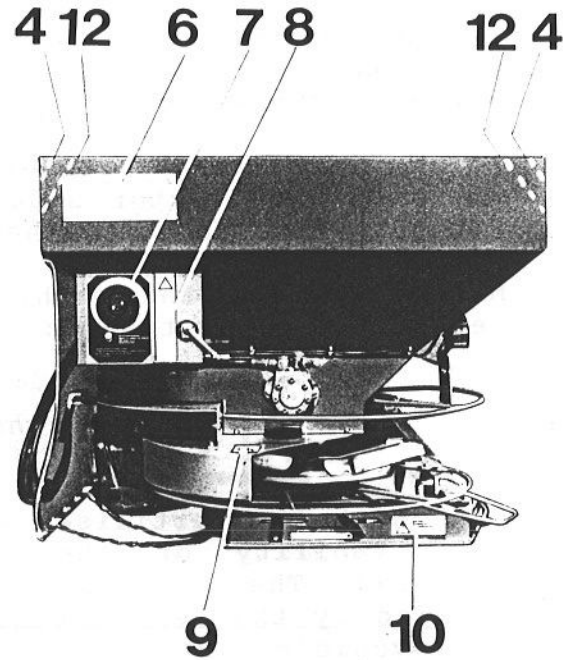
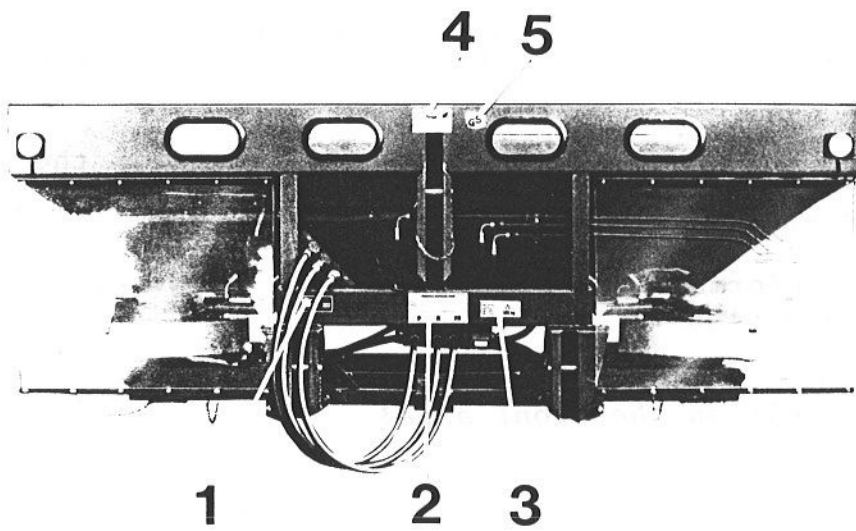


**Watch the weight on the front axle!**

Even with the fertiliser spreader fully loaded, the steering, braking and stability of the tractor/spreader combination must not be affected. The steered axle is sufficiently weighted when the load carried by the axle amounts to at least 20% of the unladen weight of the vehicle. Never exceed the permissible axle weight or the permissible overall weight of the tractor unit.

## WARNING AND INFORMATION DECALS ON THE PRECIS-KUHN TWIN-DISC FERTILISER SPREADER

- The decals on the machine are designed and positioned to increase the safety of all persons working with the machine.
- Please instruct anyone who works with the machine to obey all the warning and instruction information on these decals.
- Replacement decals are available through your dealer. Damaged or missing decals should be replaced in their original location immediately.
- All warning decals must be kept clean and readable at all times.





1



2

### HYDRAULIC CONNECTIONS

- Before connecting read carefully the instructions in the operators manual.
- If you do not follow the instructions damage can occur to the seals of the hydraulic motor.
- Clean carefully the hydraulic couplings/joints before connecting them to the tractor.
- Check the correct connection of the hydraulic hoses.

D/PK GB 01989-0

POSITION OF HYDRAULIC HOSES		
PRESSURE	RETURN	FREE RETURN
<b>P</b>	<b>R</b>	<b>FR</b>

3

**Max. Nutzlast:**  
**Charge utile max.:**  
**Max. payload:**  
**Max. inhoud:**  
**Max. nyttelast:** **2500 kg**

D/PK 01989

4

**ATTENTION! DANGEROUS AUGER CONVEYOR!**

The hopper screen must not be removed before the hydraulic system has been shut-off. Pull-out ignition key! The auger conveyor can start automatically!

D/PK GB - 1190-5

5



6

### CAUTION! THINK SAFETY!

- Read and understand operators manual before operating the machine. Follow all service and operating safety instructions.
- Learn to operate this machine safely. Machine can be hazardous in hands of an untrained or complacent operator.
- The operator must make absolutely sure that no person or animal is in the projection zone of the machine before starting it and during its operation.
- **ATTENTION:** The auger conveyor can start automatically! The hopper screen must not be removed before the hydraulic system and the tractor are shut-off.
- Before opening the shutters for emptying the spreader turn-off the hydraulic system and the tractor.
- Before carrying out adjustments, greasing etc. turn-off the tractor. Ensure that no person starts the tractor or machine while carrying out the necessary work.
- Hydraulic system is under high pressure. Before working on the machines turn off the hydraulic system.
- Care should be taken when carrying out the calibration test to avoid injury from rotating elements.
- Wait for all moving parts to completely stop before approaching the machine.
- Do not permit anyone to ride on the machine.
- Always stop engine before leaving operators position, never allow the machine to run unattended. In any case make sure precautions are taken.
- Never stand between tractor and implement while engine is running.
- Make certain everyone is clear of machine before starting engine or operation.
- Never work on top or inside the hopper unless tractor engine is shut-off.
- Before driving in a public area, the driver must ensure that the machine is equipped with guards and safety indicators conforming to the highway code. Use a flashing warning light, when transporting on highways except where prohibited by law.
- **Attention - Safety!** Match tractor ballast to combine spreader and fertilizer weight. Do not load the machine beyond the capacity of the tractor or its tyre equipment.
- If you do not have a operators manual, please order one immediately from your dealer.

D/PK GB 01989-1

7

**Wurfscheibendrehzahl**  
*Regime de rotation des disques*  
**Disc speed (r.p.m.)**  
*Schijventoerental*

Tatsächliche Drehzahl der Anzeige entnehmen.  
Le regime réel des disques est celui affiché sur le boîtier de commande.  
Read the disc speed (r.p.m.) from the LCD-indicator.  
Juiste toerental aflezen!

8

**Before carrying out calibration test, adjustments or changing of discs close the hydraulic safety valve.**

D/PK GB 02290-3

9




10

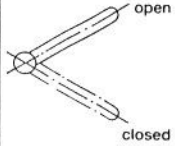
**Make sure that the swivel console is correctly engaged!**

D/PK GB 01989-2

11

 **Before carrying out calibration test, adjustments or changing of discs close the hydraulic safety valve.**

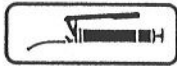
D/PK GB 01989-3



12



13




14

links – gauche – left

15

rechts – droite – right

16

 **Before opening the shutters for emptying the spreader turn-off the hydraulic system and the tractor.**

D/PK GB 01989-4

## 1. MACHINE SPECIFICATION

### 1.1 TECHNICAL DATA FOR THE PRECIS-KUHN SERIES

Length:	approx. cm	120
Width:	approx. cm	280
Filling height:	approx. cm	99
Unladen weight:	approx. kg	625
Capacity:	approx. l	1400 - 2500
Max. payload:	approx. kg	2500
Hydraulic connections:		1 double acting spool valve 1 free return to reservoir
Electrical connections:		1 DIN plug, 3 pin
Working width:	approx. m	12-24 m

### 1.2 DELIVERY

Before signing for the fertiliser spreader check that consignment is complete. The following are part of the standard machine:

- 1 Electrical remote control DT 2
- Calibration container with Calibration side rule
- 1 Operating instructions and Calibration charts
- 2 lower and 1 upper 3-point linkage pins
- 4 Hopper grids
- 1 threaded hydraulic coupling M 22 x 1.5
- 1 Socket, 3 pole
- 1 Fuse holder together with 25 amp fuse and 2 cable eyes
- 1 Complete lighting set
- 1 Set of spreading discs

Please also check any optional equipment which may have been ordered.

#### ATTENTION:

*Please check that the spreading discs are correctly installed: left hand disc (L) and right hand disc (R) when viewed in the direction of travel.*



*Check the correct seating and tightness of all fixing components especially those of discs and blades.*

Please check your machine thoroughly for any transport damage or missing parts. Claims can only be considered if we are notified at the time of delivery. Please ask the haulier to acknowledge any transport damage. In case of doubt, contact your dealer or the factory direct.

### 1.3 OPTIONAL EQUIPMENT

- Hopper extensions to 1500 - 2000 - 2500 lt
- Hopper cover
- Border spreading disc
- Wing wheel agitator for slug pellets, fine seed, etc.
- Electronic fertiliser metering QUANTRON D

## 2. COMMISSIONING

### 2.1 INSTALLATION AND SETTING UP

Before attaching/detaching a machine to/from the 3-point linkage, make sure the controls are set in such a way that it is impossible to lift or lower the implement by accident.

When using 3 point linkage, the linkage category of the tractor and of the implement must be identical or be modified accordingly! (eg: If the tractor is fitted with Category II linkage, the implement linkage must also be Category II (see Figs. 1 & 2)

Couple up fertiliser spreader according to instructions using the correct attachment points.

If the lower link pins are used in the upper-most holes then the top-link must also be connected to the upper top-link position. The same rule applies to the lower connecting point.

The 3 point linkage creates danger zones which could cause injury through cutting or crushing.

If using external controls for raising/lowering the 3-point linkage, never get between tractor and implement!

Adjust the 3-point linkage stabilisers / sway blocks / check-chains so that, when the implement is in the transport position, sideways movement is eliminated.

When travelling on public-roads with a raised implement, make sure the linkage height control lever is locked to prevent accidental lowering of the implement!

The machine should only be transported with stands folded up.

The PRECIS-KUHN spreader is designed to couple to either Category II or III 3-point linkage; Note the configuration of the lower link connecting brackets. To change category II to III (or III to II), change-over both brackets.

Figure 1: Category II

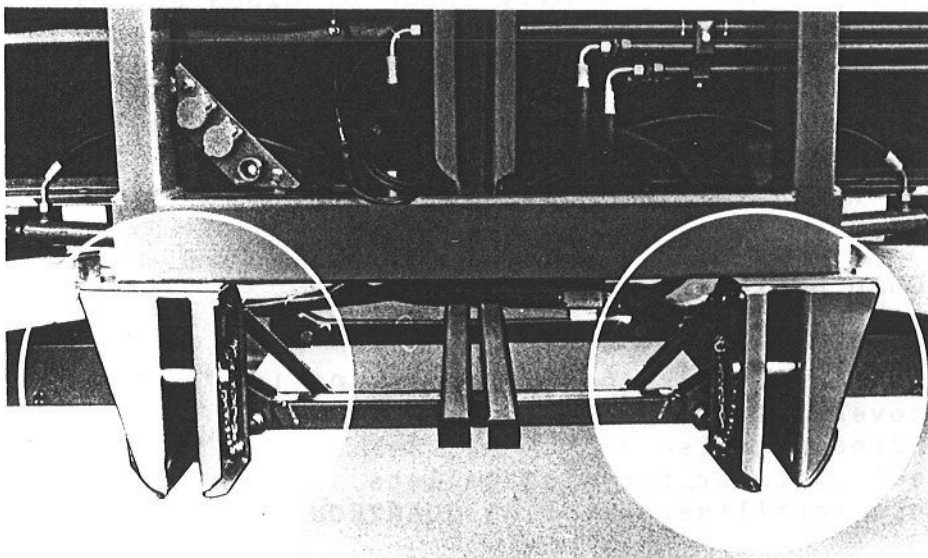
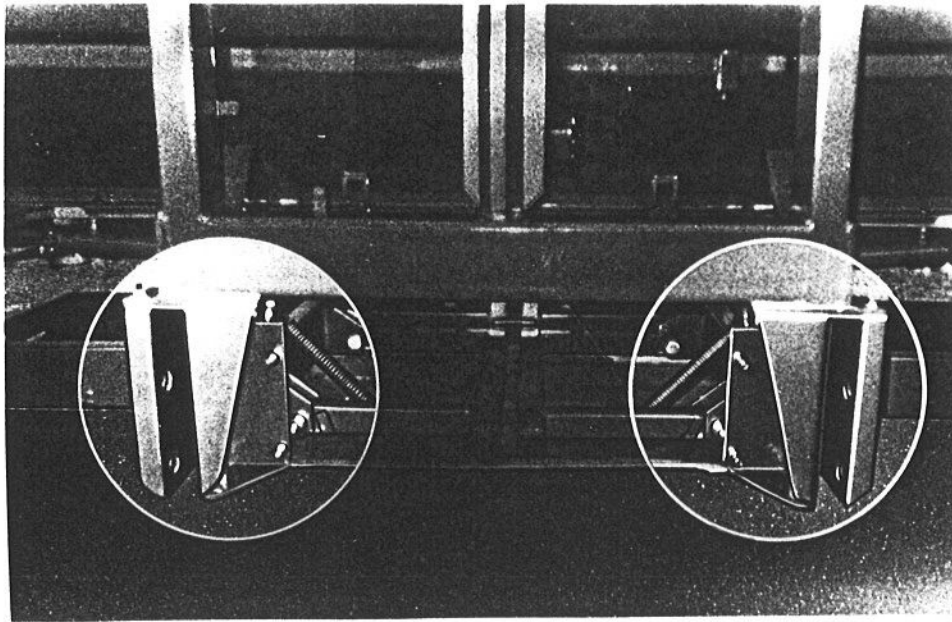


Figure 2: Category III



In order to ensure that the spread pattern is correct, the spreader must be mounted as per the dimensions given in the calibration charts.

Adjust the 3-point linkage to make sure that the spreader is level when viewed from the rear in the direction of travel, and adjust the tractor linkage check chains/struts to limit any sideways movement of the implement to a maximum of 5 cm during spreading.

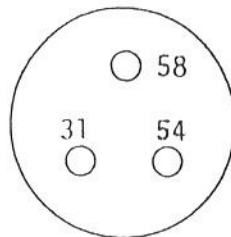
The PRECIS-KUHN spreader can be set down either directly onto the ground or onto the folding stands which are part of the standard equipment.

The spreader must only be parked on the folding stands when the hopper is empty. Check the machine is stable before detaching!

## 2.2 ELECTRICAL CONNECTION, CONTROL - DT-2

The socket provided must be connected to the tractor battery using 2 core cable (2 x 2.5 mm<sup>2</sup>). Connect to the battery using the cable connectors provided, and protect the installation with the supplied 25 amp fuse/fuse-holder on the live side of the supply.

Connect the right way round!!



Pin 31	- negative (earth) = wire No. 2	} to the socket
Pin 54	+ positive (live) = wire No. 1	

Before connecting the DT-2 remote control, set all toggle switches to 0.

Before connection, first switch the main switch to the ON position. If the LCD window lights up, the power connection has been successful. If the display remains dark, the power connection must be changed over at the socket.



**ATTENTION!**

*Ignoring the above instructions may lead to the failure of a diode - and loss of warranty.*

## 2.3 HYDRAULIC DRIVE

### 2.3.1 HYDRAULIC CONNECTION

The agitator, auger and spreading discs on the PRECIS-KUHN spreader are driven by hydraulic motors which are supplied with oil from the tractor system. The tractor's hydraulic system should be capable of operating at a maximum working pressure of 200 bar (have your dealer check the pressure relief valve) and must be equipped with an oil filter (20 micron). Please check that the oil filter is in good condition; maintain at least the prescribed intervals for filter changes or preferably change more frequently. When detaching the machine, attach hydraulic hoses to the fixings provided. Only join clean hydraulic couplings. The drive requires the following connections on the tractor side:

- 1 Double acting spool valve
- 1 free return (return to reservoir) without pressure

For the non pressurised return hose, a complete connection is supplied. The coupling (M22 x 1.5 thread) must be installed on the tractor.



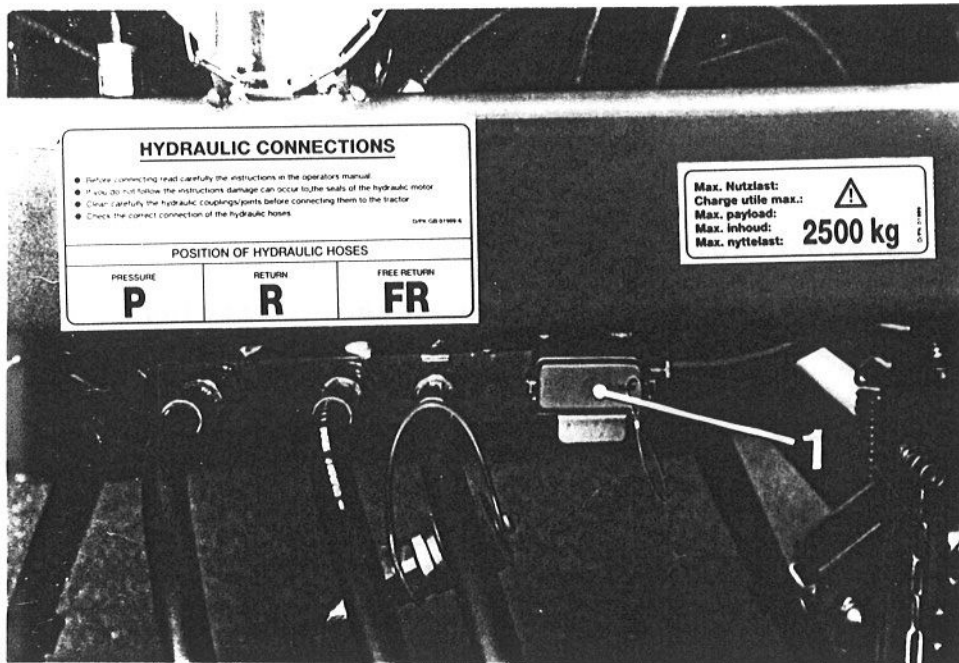
*We would like to stress that the special screw connection must be used exclusively for the non-pressurised return flow (labelled FR). Only this guarantees a perfect unpressurised connection to the tractor reservoir.*

*Every time the spreader is hitched to the tractor, check that the screw connection of the free return line is completely tight!*

If your tractor is already provided with a pressure-free oil return connection, but it is taken up by other devices, we recommend the parallel installation of our screw-type return coupling using a T-connector.

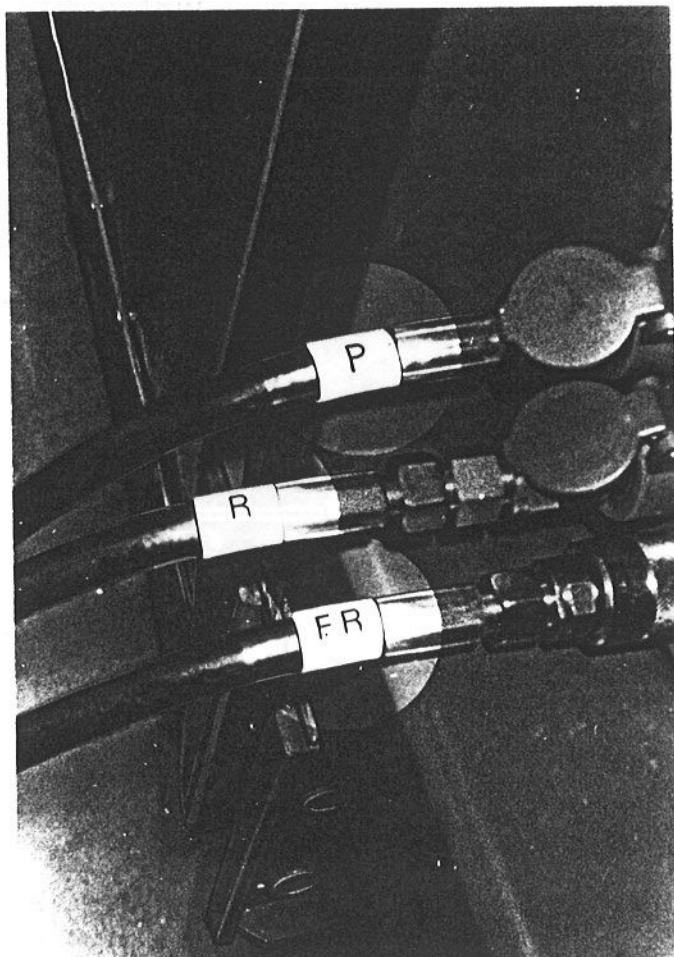
The hydraulic hoses are marked according to their function on the mounting plate and at their front end:





P - pressure  
 R - return (valve)  
 FR - unpressurised return  
 to the tractor reservoir

Figure 3:  
 Hose markings on the  
 spreader



Always connect the free return  
 (FR) first.

**IMPORTANT!!** 

*Under no circumstances connect  
 the free return (FR) and the  
 return (R) to the same return  
 port.*

*Ignoring the above instructions  
 can lead to serious damage to  
 the gaskets and disc drive  
 motors*

Figure 4 :  
 Hose markings at the tractor  
 end

## IMPORTANT NOTES FOR TRACTORS WITH VARIABLE OIL FLOW (CLOSED CENTRE) HYDRAULIC SYSTEM

*John-Deere 30 and 40 series tractors, the use of a 3rd line return kit is recommended. Contact your John-Deere dealer.*

*John-Deere 50 series tractors, no other fittings are necessary providing the tractor is fitted with a return function filter.*

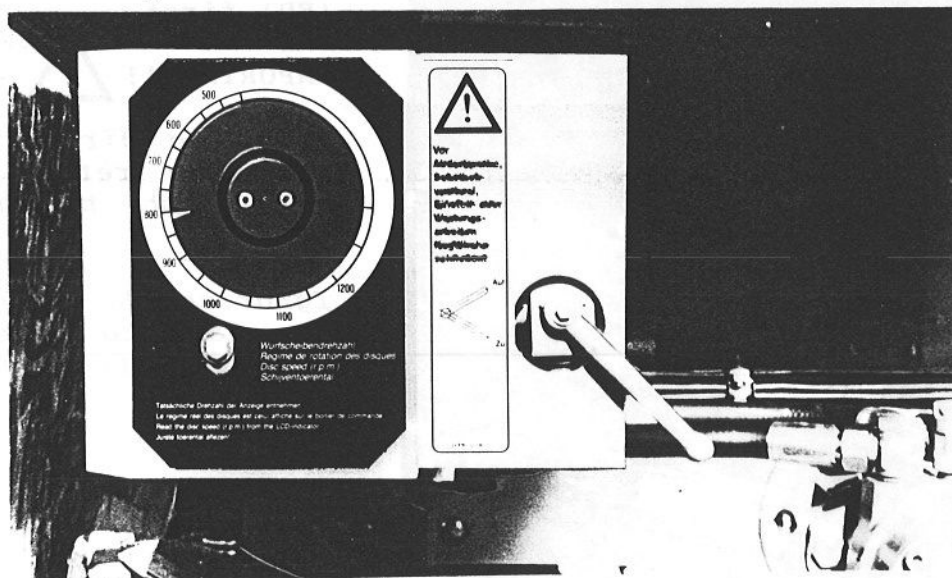
*Case IH Maxxum tractors, the use of a motor return kit is recommended. Contact your Case IH dealer.*

*The free return line must be connected directly to the tractor hydraulic reservoir and be free of back-pressure on all tractors.*

### 2.3.2 FUNCTION OF THE HYDRAULIC SYSTEM

The oil flow from the tractor is diverted by a distribution valve to the agitator and disc drive. The disc speed can be adjusted via a flow valve and turned off completely using a shut-off valve.

Figure 5: Disc speed control and shut-off valve



In front of the distribution valve are the solenoid valves for the electro-hydraulically activated part-width control.

The auger and agitator are driven separately on the same circuit. The transport auger is driven by a hydraulic motor positioned centrally below the hopper. The hydraulic motor control is designed so that the auger will only operate when fertiliser is required over the outlet. If sufficient fertiliser is available above the fertiliser outlets, the auger stops automatically. This arrangement avoids unnecessary grinding of the fertiliser.

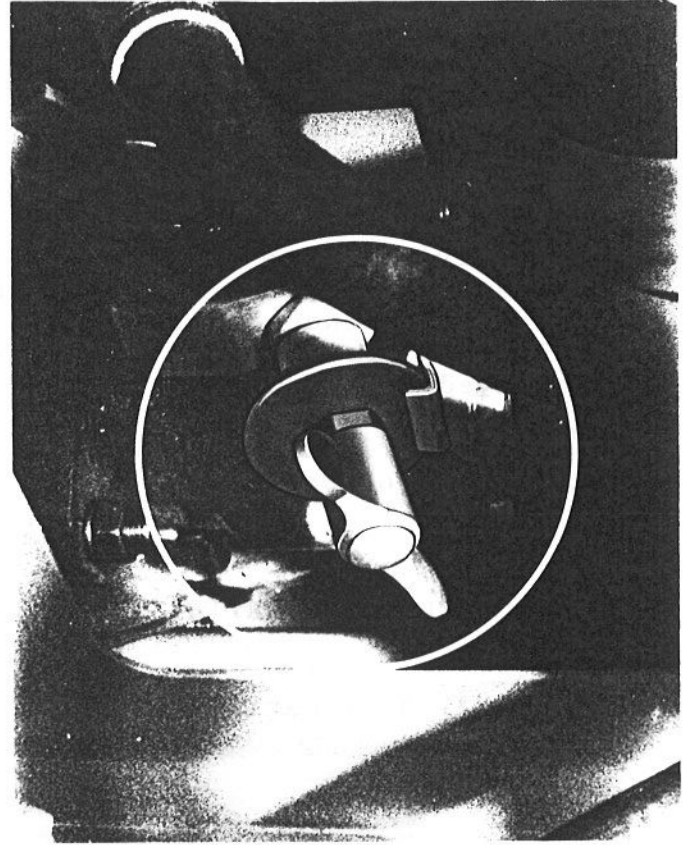
For special operating conditions the point at which the auger is activated can be set via a valve on the hydraulic motor.

This valve has 4 settings corresponding to 4 turns. The normal position is set by the factory at position 3.

To check the valve setting, turn the handle clockwise to its limit and then 1 full turn anticlockwise. Now the valve has been returned to its factory setting (position 3).

Figure 6: Control valve for setting auger activation point

By turning the handle one turn clockwise from the factory setting, the activation point is advanced (position 4). This is necessary when the auger starts operating too late and the outlet is no longer covered by fertiliser (eg. high application rates of slow-flowing fertiliser). For pressure sensitive types of fertiliser (granules easily broken down), the activation of the auger can be delayed by turning the handle anticlockwise (1 turn to position 2). For extremely pressure sensitive types of fertiliser (eg. prilled urea) the activation point of the auger can be further delayed by an extra anticlockwise turn of the handle (1 turn to position 1). When adjusting the valve position please note that the handle is positively located by a pressure spring which prevents unintentional movement.



Control positions at pressure-limit valve

Pressure reading at tractor/machine pressure line

4	90
Base position 3	70
2	50
1	40

**PLEASE NOTE:**

- 1. Handle turned clockwise to its limit: auger is activated very early; suitable for high application rates of fertiliser with poor flow characteristics
- 2. From the end stop, turn the handle one turn anticlockwise (1 click) - base position - suitable for normal spread rates of fertiliser with good flow characteristics (eg. NPK).
- 3. Turn handle from base position one turn anticlockwise (click) - suitable for low spread rates of fertiliser with good flow characteristics.
- 4. Turn handle two turns (clicks) anticlockwise from the factory position - setting suitable for low spread-rates of pressure sensitive fertiliser (eg. urea).

**WARNING!**



*The auger is automatically activated. Before removing hopper grids and working inside the hopper, switch off the hydraulic system! Switch off tractor engine and remove ignition key!!*

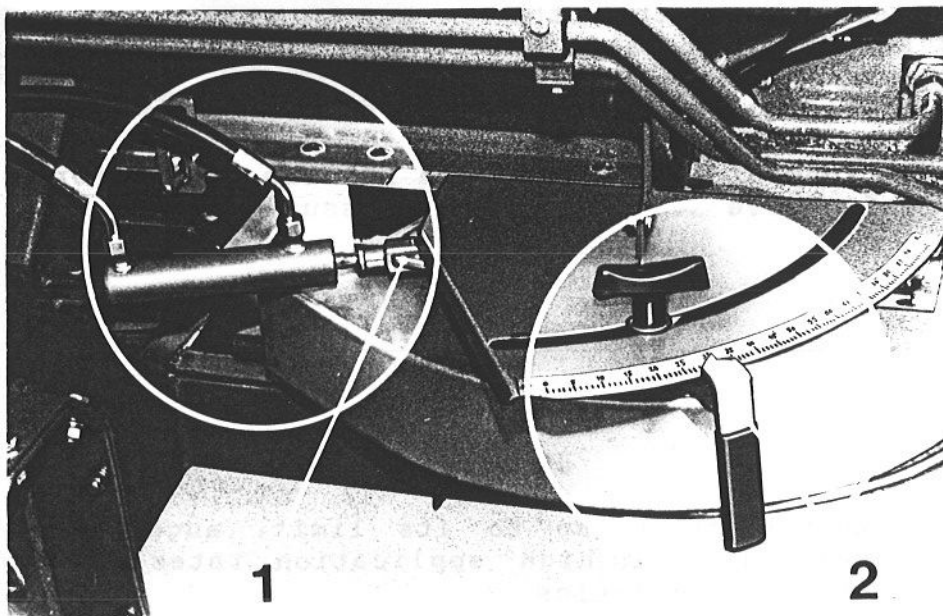
For working widths below 24m (disc speed: 1000 rpm) and at normal application rates, an oil flow of approx. 30 l/min at 160 bar will be required. For maximum working widths approx. 40 l/min is required. Excess flow is returned via the free return line directly to the tractor oil reservoir. If the tractor hydraulic system is not capable of supplying these flow rates, the spreader may not be able to reach maximum disc speed. Set the disc speed on the flow control valve according to the calibration charts. Before doing this, increase tractor engine speed to nominal (PTO) speed. The disc speed is displayed on the DT-2 unit and can therefore be accurately set.



*Regularly check hydraulic hoses for possible damage and replace where necessary.ü*

#### 2.4 CONTROL OF FERTILISER APPLICATION RATE

Figure 7: Application Rate Control



The PRECIS-KUHN spreader meters fertiliser using the aperture metering principle. Each aperture has 2 control slides. The working slide (1) is electro-hydraulically remote controlled to move to both its end positions - "open" or "closed".

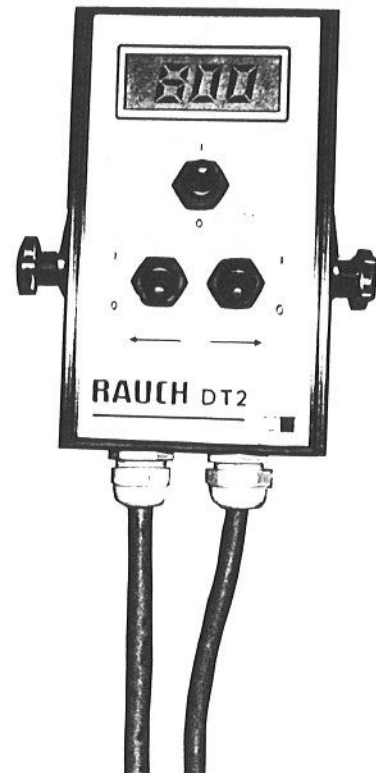
The second slide, the manually-operated metering slide (2) operates in conjunction with a precision scale to set the fertiliser application rate. Set the metering slides on both sides equally, according to the calibration check and lock the slides with the T-bolt.



## 2.5 HALF-WIDTH CONTROL

When spreading on one side only - at field boundaries or in wedge-shaped fields - the electronic remote-control DT-2 can shut-off either the left or right-hand working slide. Despite the low speed of the agitators and the auger, some pressure-sensitive types of fertiliser can, during long spells of one sided applications, suffer from grinding. This grinding effect can be reduced by delaying the activation point of the auger (see 2.3).

Figure 8: Electrical remote control DT-2



## 2.6 CHANGING DISCS

Figure 9:  
Swivelling the motor guard out of the way

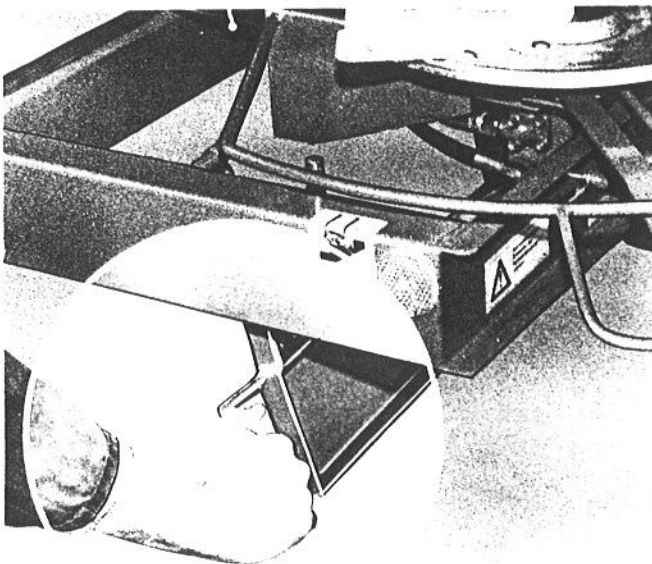


Figure 10:  
Swivelling the disc panel out of the way

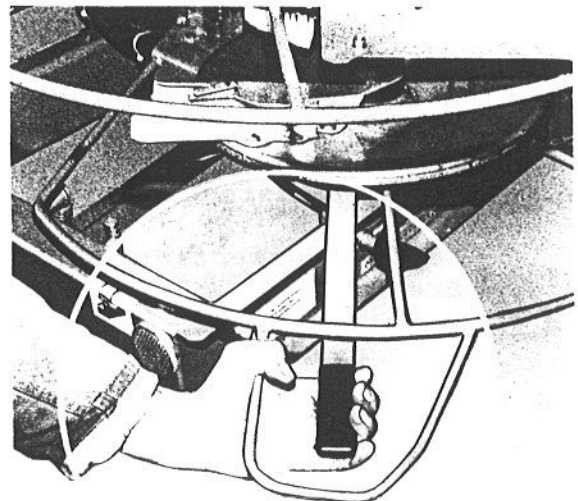
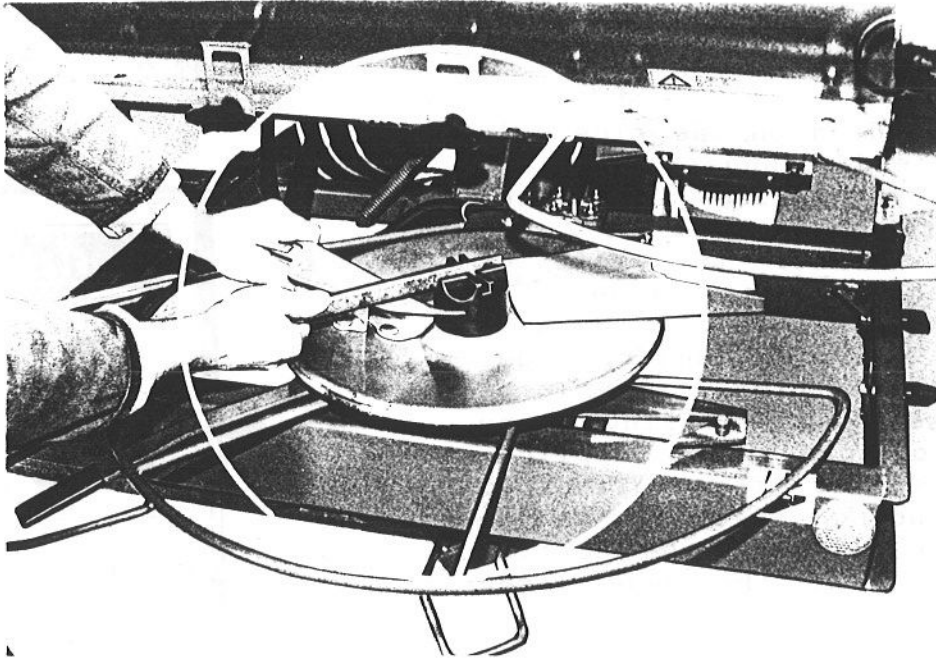


Figure 11: Disc lock



All discs are manufactured from stainless steel with two twin blades (except the DG boundary spreading discs ) designed to achieve precision spread patterns right up to the maximum working widths and highest application rates.



*Before working on the discs, close the shut-off valve! Switch off hydraulic system and tractor engine and remove ignition key.*

In order to change discs, first swivel the motor protection panel downwards. Swing discs to the rear and slacken the cap-nuts. The discs have been dynamically balanced, therefore treat with care.



*Be careful not to confuse the left and right hand discs when replacing them on their respective hubs.*

*Locate each disc exactly in the centre of their mountings.*

Refit plastic cap-nut, turn to the left to locate the starting thread and then turn to the right. Be careful not to cross-thread! Lightly tighten plastic cap nut with screwdriver or flat strip. Do not overtighten! Check cap nut for tightness after the first few hours of operation. Occasionally grease the steel hub.



*Replace defective cap-nuts immediately (damaged thread, cracks, breakages.)*

*Spreading discs rotate at high speed.*

After any disc change, turn the new disc by hand to check that they run true. Check the clearance between the left-hand disc and the speed sensor (2-5mm).



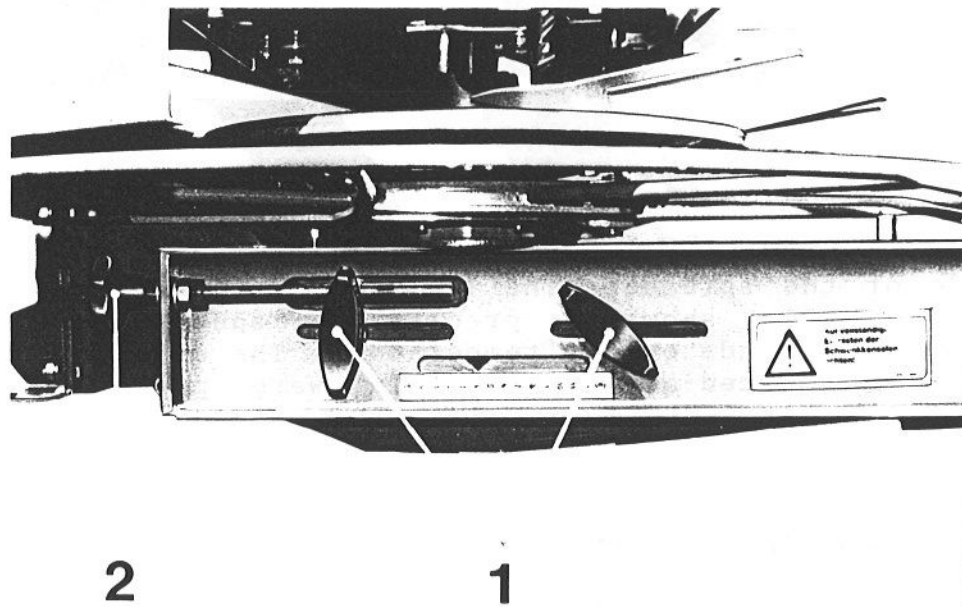
When moving the discs back underneath the hopper outlet, make sure that the disc blades do not hit the outlet. Similarly when swivelling the discs outwards. The easiest way to prevent accidental damage is to rotate the blades across the direction of travel when swivelling them inwards or outwards.



*When re-positioning the disc back into its working position, ensure that the safety catch locks properly.*

## 2.7 SETTING THE FERTILISER APPLICATION POINT ON THE SPREADING DISCS

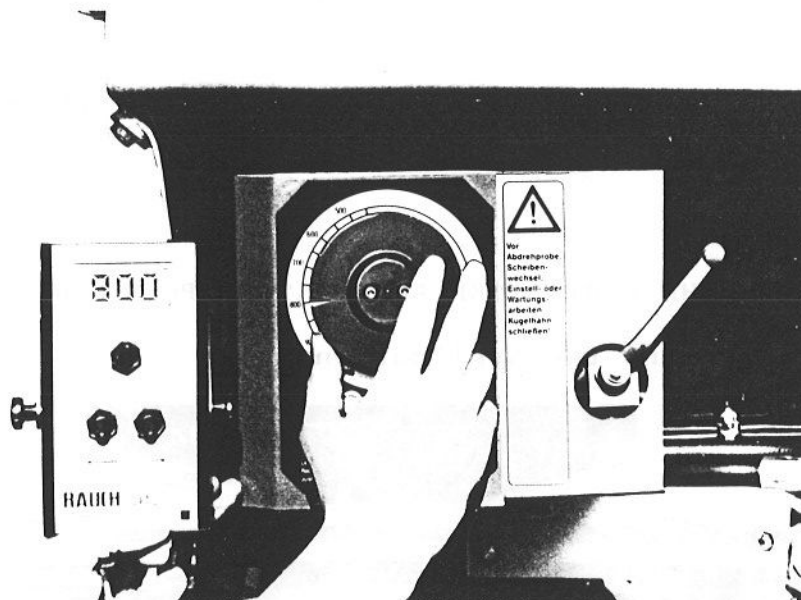
Figure 12: Setting the application point



After slackening both handles (1) the application point can be precisely adjusted using the screws (2). Adjusting the application point changes the working width and allows for different types of fertiliser granule. Adjusting the control towards higher numbers increases the quantity of fertiliser applied immediately behind the tractor and thereby reduces the working width. For each type of fertiliser and working width, the application-point is adjusted (left and right) according to the calibration chart (except for headlands - see calibration charts). After adjustment of the application point, retighten both knobs (1).

## 2.8 ADJUSTING THE DISC SPEED

Figure 13: Adjusting the disc speed



The disc speed is adjusted using the flow control valve on the left-hand side of the spreader. The scale acts as a rough guide. The LCD display on the DT-2 shows the precise disc speed. The viscosity of the hydraulic oil depends on its temperature. The disc speed may therefore need to be readjusted after the initial warm-up period. The oil supply to the disc motors is interrupted by closing the shut-off valve.

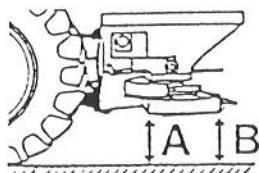
## 2.9 ADJUSTING THE SPREADER

### 2.9.1 USING CALIBRATION CHARTS

The values given in the calibration charts are derived from practical tests in the test hall. The spreader settings were achieved with fertiliser in perfect condition from each respective manufacturer.

Mount the fertiliser spreader onto the tractor according to the instructions in the calibration chart. The mounting height is always measured from the top of the crop to the lower edge of the framework.

- ie. For normal spreading: clearance  $a = 50$  cm /  $b = 50$  cm.  
For late-season top-dressing: distance  $a = 0$  /  $b = 6$  cm.



We would particularly like to emphasise the fact that physical characteristics of fertilisers can vary - even within the same type and brand - due to differences in the quality of the granules, density, size of particles, the texture of the particles etc.



*These variations in the fertiliser can influence the spreading characteristics quite markedly and, as a result, you may find that the fertiliser application rate may differ slightly from the rates predicted by the calibration charts. Changes in the quality of the fertiliser can also affect a change of the spread pattern and the application rate.*



*The data provided in the calibration chart cannot be totally reliable and, to make sure, the machine should be recalibrated for application rate and the spread pattern should be checked in every case.*

We cannot guarantee that your fertiliser has the same spreading characteristics as the fertiliser tested in our plant, even if it is from the same manufacturer and of the same type. In order to achieve the desired spread pattern, it may therefore be necessary to change to a different spreader setting if the flow characteristics of the fertiliser being applied varies from the fertilisers we have tested. Careful calibration of the settings on long test runs is always more accurate than guess-work.

Please set the machine up carefully. Even the smallest mistake in the settings can cause substantial errors in the spread pattern.

We therefore recommend you to use only granular fertilisers from well known manufacturers and, where possible, only those fertilisers listed in our calibration chart. Should some types of fertiliser be missing from our chart please let us know.

#### Spreading urea:



*This highly concentrated nitrogen fertiliser is, due to its importation from various sources, extremely variable in quality. Different spreader settings to those given in our charts may therefore be required.*



*Please also note the greater sensitivity of urea, because of its concentration, to the precision of the spread pattern and the need for increased accuracy, especially when spreading over the larger working widths.*

## 2.9.2 CHECKING THE SPREAD PATTERN



*Before setting, or any other operation on the machine, switch off the hydraulic system, the tractor engine and remove the ignition key.*

*Please wait until all rotating components have stopped completely before doing any work on the machine.*

We recommend the regular checking of the spread pattern of your PRECIS-KUHN spreader and to pick up obvious setting errors. Precise measurement of the spread pattern can only be achieved on level ground using a continuous row of calibration trays. Specialized companies offer this service.

Because the spreading characteristics of fertilisers can vary so much - even fertilisers of the same type can spread differently - it is essential to check the settings given in the calibration charts.

If the fertiliser that you wish to spread is not covered by the calibration charts, testing can be used to find the correct spreader settings and so avoid significant spreading errors. In order to establish the initial settings for a new type of fertiliser, the following table can be used as a guide.

Working widths (m)	Fertiliser round-smooth eg. Ammonitrates, NPK			Fertiliser round/angular eg. Potash, PK			Fertiliser fine granules or prilled (urea)		
	Disc- Type	Speed	AP*	Disc- Type	Speed	AP*	Disc- Type	Speed	AP*
12	D1	500-600	8-10	D1	500-700	8,5-9,5	D1	600-800	5-7
15 16	D1	600-700	6-8	D1	600-800	7,5-9,5	D1	800-1000	4,5-6,5
18	D1	700-800	5-7	D1	700-800	7-9	D1	900-1100	4-6
20 21	D1	800-900	4-6	D1	800-900	6-8	D1	900-1100	4-6
24 25	D1	900-1000	3-5	D1	900-1000	5-7	D1	1000-1100	

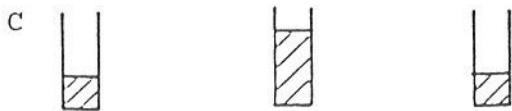
Possible spread pattern results are as follows:



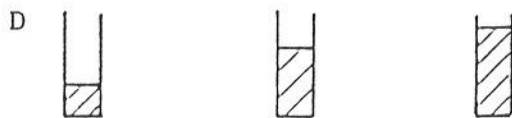
The same quantity in all three tubes.  
The spreader setting is acceptable.



Too much fertiliser in overlapping zone.



Too little fertiliser in the overlapping zone.



Lopsided spread-pattern.

### Disc Speed

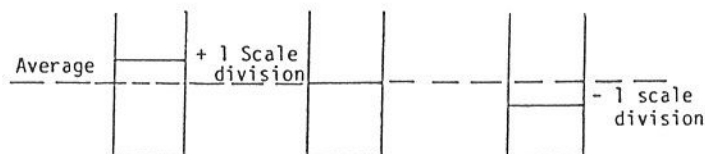
Increasing the disc speed causes an increase in the spread width and, at the same time, increases the quantity spread behind the tractor. A reduction in disc speed causes a decrease in spread width and simultaneously decreases the quantity of fertiliser spread behind the tractor.

### Fertiliser application point (Disc Position):

The point at which fertiliser drops onto the disc can be adjusted manually with reference to a scale on the side of the spreader. Moving the adjuster towards the higher numbers means the fertiliser is thrown off earlier; ie. more fertiliser is applied directly behind the machine. Moving the pointer towards the lower numbers throws fertiliser off the disc at a later point so that more fertiliser is projected outwards into the overlapping zone.

Hints for the correction of faults in the Spread-Pattern:

to A: The spreader is applying the same quantity at the centre and at the left and right extremities. The spreader is set correctly for this fertiliser.



to B: Too little fertiliser is applied at the centre of the spread-pattern. The pointer should be adjusted to a higher scale number (eg: AGP 4 to AGP 5). If changing the setting by 3 units is insufficient to correct the problem, then, as an additional measure, increase the disc speed by 100 RPM.

to C: Too little fertiliser is being applied into the right hand and left hand overlapping zones. The transfer pointer must be adjusted to a lower scale number (eg AGP 9 - AGP 8).

to D: The application rate decreases from left hand to right hand (or vice versa). Check that the pointer settings are exactly the same on left and right, and also check that both left and right metering slides are adjusted properly. Has there been any cross wind during the test runs?

### 2.9.3 CALIBRATION CHECK

To ensure accurate application rate we recommend that a new static calibration test is carried out each time a new type, batch of fertiliser is used.

The calibration check is usually only carried out on one outlet. However the fertiliser quantity required is calculated for both outlets (total working width) ie. The calculated quantities have to be halved. If the calibration run cannot be extended over a full minute then the reduction in quantity required must be reduced accordingly.

To calculate the required fertiliser output per minute:

$$\frac{\text{Tractor speed km/h} \times \text{working width m} \times \text{application rate kg/ha}}{600}$$

$$\frac{\text{Tractor speed m.p.h.} \times \text{working width ft} \times \text{application rate lbs/acre}}{494}$$

= amount required kg/min resp. lbs/min

Example:

$$\frac{7.5 \text{ km/hr} \times 24 \text{ m} \times 300 \text{ kg/ha}}{600} = 90 \text{ kg/min (both outlets. Divide by 2 for one outlet)}$$

Therefore 45 kg of fertiliser must be deposited through one outlet in 60 sec - or 15kg in the space of 20 sec.

The aperture position is then set according to the guidelines provided in the calibration chart.

Application rate figures for a selection of outputs and tractor speeds are already provided in the calibration chart.

However, the calculation can also be carried out using the calibration slide rule supplied.

For instance, if you position the 300kg/ha mark below 24m on the working width scale, and then read the value for kg/min off above 7.5km/hr on the speed scale, you get 90kg/ha as the required fertiliser quantity for both outlets.

To check the tractor forward speed, drive the tractor across a field, with the spreader half-full, for a measured distance of 100m and record the time taken.

Tractor speed

Tractor speeds which are not shown on the above scale can be calculated according to the following formula.

$$\text{Tractor speed} = \frac{360}{\text{time recorded over 100m}}$$

Example:  $\frac{360}{36 \text{ sec.}} = 10 \text{ km per hr.}$



Now carry out the calibration check as follows:

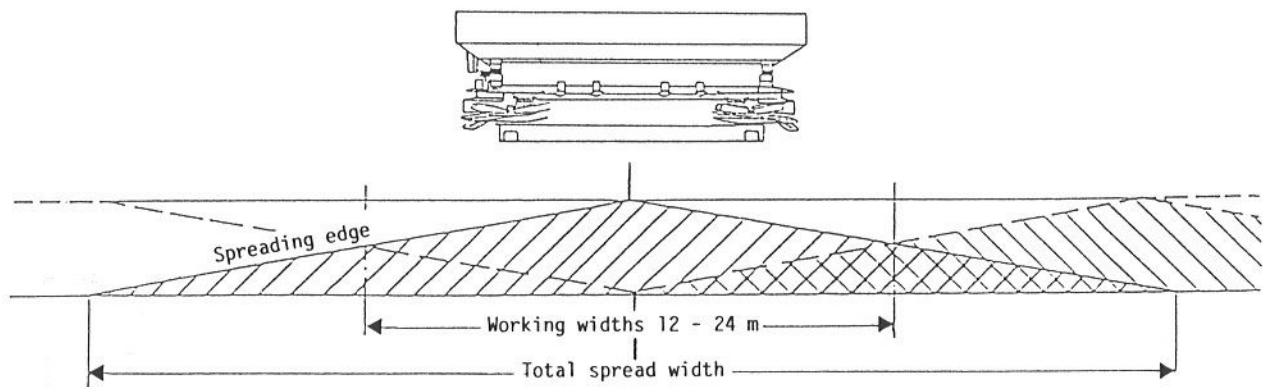
- A Switch off the disc drive on the left hand side of the spreader using the shut-off valve; turn the disc speed control valve to 0 - otherwise someone might get hurt by the rotating discs.
- B Set the metering slide to the value recommended in the calibration chart - or otherwise according to your experience - and lock the slide in position.
- C Swivel the motor guard downwards and the spreading discs to the rear and lock into position. Ensure that the disc blades and outlet are not damaged whilst swivelling the discs out of the way.
- D Place collecting container underneath the outlet.
- E Operate the tractor hydraulic valve and set the engine to a medium speed.
- F Switch on the part width control on the DT-2 and carry out a calibration check precisely for 1 minute (or 30, 20, or 15 sec.)
- G Compare the quantity of fertiliser collected with the quantity expected from your previous calculations. If too much or too little fertiliser was collected, readjust the metering slide setting and keep repeating the calibration check until the quantity of fertiliser collected is the same as the calculated quantity.
- H Shut off the tractor hydraulic valve, switch off the engine and remove the ignition key. Then return the spreading disc and motor guard into their working positions.
- I Adjust the second metering slide to the same setting and lock into position.
- J Set the fertiliser application point to the disc according to the calibration chart (l.h. and r.h. side).
- K Set the height of the spreader above crop level according to the calibration chart.
- L Open the shut-off valve.
- M Set the disc speed using the flow control valve according to calibration chart and you are ready to start spreading.



### 3. PRACTICAL USE

#### 3.1 SPREADING

At the beginning of the field, first switch on the hydraulic system and then select the correct disc speed. Only now open one or both slides using the remote control. The PRECIS-KUHN has been designed as a modern twin-disc fertiliser spreader. In order to minimise the sensitivity of the spread pattern to different textures and particle sizes, a wide spread pattern which tails off gradually on the ends was developed over many test-runs. When spreading wedge shaped fields, turn off the relevant side using the DT-2 remote control in order to avoid double application or spreading onto neighbouring areas.



By changing the tractor forward speed, limited adjustment of the application rate (kg/ha) can be made. Slowing down increases the application rate, and a higher speed reduces the output per area. However, the tractor engine speed can only be varied to a limited degree so that the disc speed, as shown in the digital display, is maintained at the required setting.

#### 3.2 SPREADING ON HEADLANDS USING THE BOUNDARY DISC (OPTIONAL)

KUHN offers the option of a Boundary spreading disc DG. This is mounted on the right hand side and gives a spread pattern which is steeply raked at the edges. Over-application of fertiliser at the headland or under-application within the field are reduced to a minimum. Due to the strong influence exerted by different fertilisers on spread patterns, the same precision cannot always be achieved with this disc as during normal spreading.

Two adjustable blades DGR 0 (Dia 150 mm) are mounted onto the disc and one disc DGR 2 (200 mm) is supplied separately. As an option, blade sizes DGR 1 (Dia. 165 mm) is also available for special applications. The blades must be set for the required working width and the fertiliser to be applied as per the data provided in the calibration chart. Slacken the blade fixing screws on the base of the disc and fit the new blades in one of the five positions C to G as per the calibration chart.



*Check nuts for tightness!*

Figure 16:  
Boundary spreading disc DG

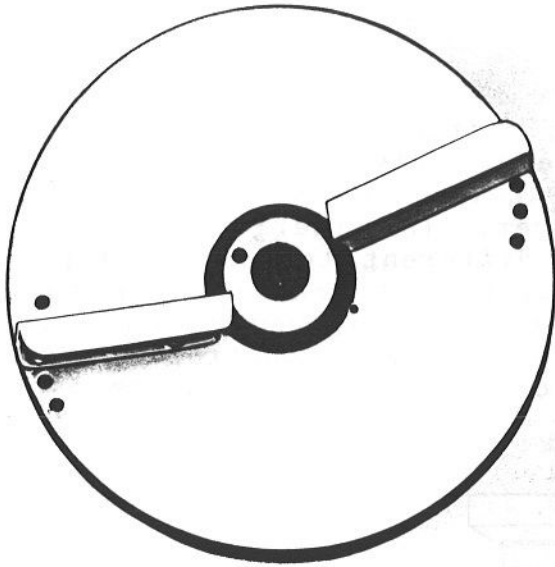


Figure 17:  
Settings for the spreading blades



	DG	1000	1 : D 1 : E
			2

Details of "Boundary spreading" : calibration chart: 1 D / 1E = 1 of each blade on the DGR 1 boundary disc must be fitted in positions D and E.

The values for the fertiliser application point are provided in the line "Boundary spreading" in the calibration chart. This value must be set on the right hand side of the spreader (DG-disc) whilst the left hand point is set according to the line "Normal spreading" or "late top-dressing".

Settings for the disc speed and the metering slide must be the same on left hand and right hand sides.

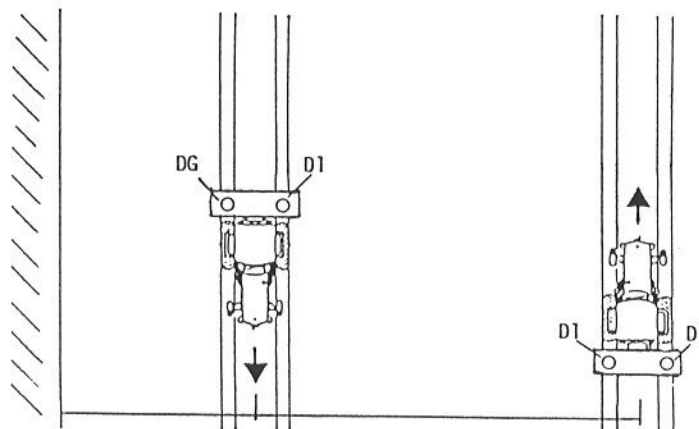


***When the boundary spreading disc is changed over again, do not forget to reset the fertiliser application point accordingly.***

***Before each disc change, lower the spreader to the ground. Switch off the hydraulic system and the tractor engine and remove the ignition key.***

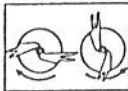



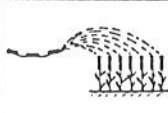
***Wait until all moving components have stopped!***

***Replace cap-nut carefully and secure, do not overtighten.***



### 3.3 LATE TOP-DRESSING

The modern design of the PRECIS-KUHN spreader components caters for late top-dressing through adjustment of the application point, disc speed, height above crop and spreader pitch, without needing extra discs.

			
	D 1 Red	500	A: 0" B: 2" 8

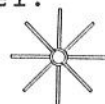
Settings are provided in the calibration chart alongside the fertilisers used for late top dressing. The mounting height is always measured above the top of the crop.

### 3.4 SPREADING OF SLUG PELLETS, MICRO-GRANULES AND FINE SEEDS

Difficulties can arise when setting rates for the above due to their low density and application rates. The high throw-off speeds required - and correspondingly fast rotation of the spreading discs, create a suction effect in the outlet channel. The actual quantity applied is therefore greater than that measured during a calibration check (without suction effect because the disc is not revolving.)

In order to achieve a constant output of the substance to be spread when using small aperture positions, and also to reduce the suction effect, a paddle wheel agitator must be mounted on the spindle of the standard agitator, directly above the outlet.



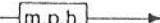


The calibration chart identifies all the materials for which the paddle wheel agitator is required, with the symbol of a paddle wheel.



In the column marked  $\text{lbs/min.}$  the flow rates required from the calibration check (without suction effect) are given (kg/min) whilst the figures

given in the column marked  $\text{m.p.h.}$  represent the actual application rates in kg/ha with suction effect. In these circumstances the calibration slide rule cannot be used.

In order to find the correct metering aperture position use the following steps:

	$\text{lbs/min.}$	 $\text{m.p.h.}$ 						 $\text{m.p.h.}$ 					
		3.75	4.33	5.00	5.63	6.25	7.50	3.75	4.33	5.00	5.63	6.25	7.50
② 12	33.8	③ 14	98	86	76	68	86	73	64				
14	41.2	139	119	104	93	83	104	89	78	70	63		
16	48.9	165	141	124	110	99	124	106	93	82	74	62	
18	56.8	192	164	144	128	115	144	123	108	96	86	72	
20	64.8	218	187	164	146	131	164	140	123	109	98	82	
22	78.3	264	226	198	176	158	198	170	149	132	119	99	
24	91.9	310	266	232	207	186	232	199	174	155	139	116	
26	107.0	361	309	271	240	216	271	232	203	180	162	135	



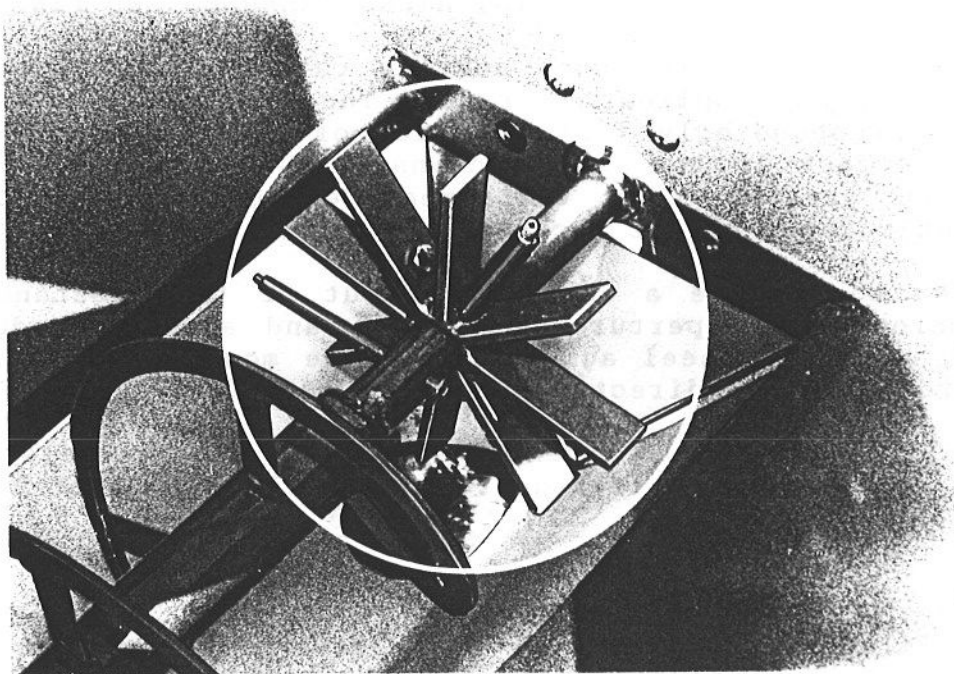
Select the application rate figure (1) required by looking down the appropriate column relative to required working width and forward speed. Cross reference this to the outlet position setting (2). Set the outlet slides to this position and carry out a static calibration test. The amount collected from one outlet should correspond to half the quantity given at (3). This will then give the application rate as given as (1) with suction effect.

During spreading, carefully monitor the level of the hopper contents in relation to the area covered because it is possible that the suction effect will lead to different variations in actual flow rate.

#### Installation instructions for paddle wheel

Place each paddle wheel segment onto the central guides as per the illustration and lock on to the agitator spindle using the 2 fixings provided.

**Figure 18: Paddle wheel**



*Before removing the hopper grids, switch off the machine, switch off the hydraulic system and the tractor engine and remove the ignition key. Do not use paddle wheel for fertiliser. This would lead to an increase in granule damage.*



### 3.5 EMPTYING AND CLEANING

In order to protect the value of your investment we recommend that you clean your spreader daily. It is a particularly easy operation and takes little time.

After closing the shut-off valve, swivel both disc panels to the rear and lock into position. Place a wheelbarrow or similar underneath the outlets, open slides and empty the hopper with the assistance of the auger. All material remaining in the hopper can be cleared through the removable floor plates.

#### WARNING!

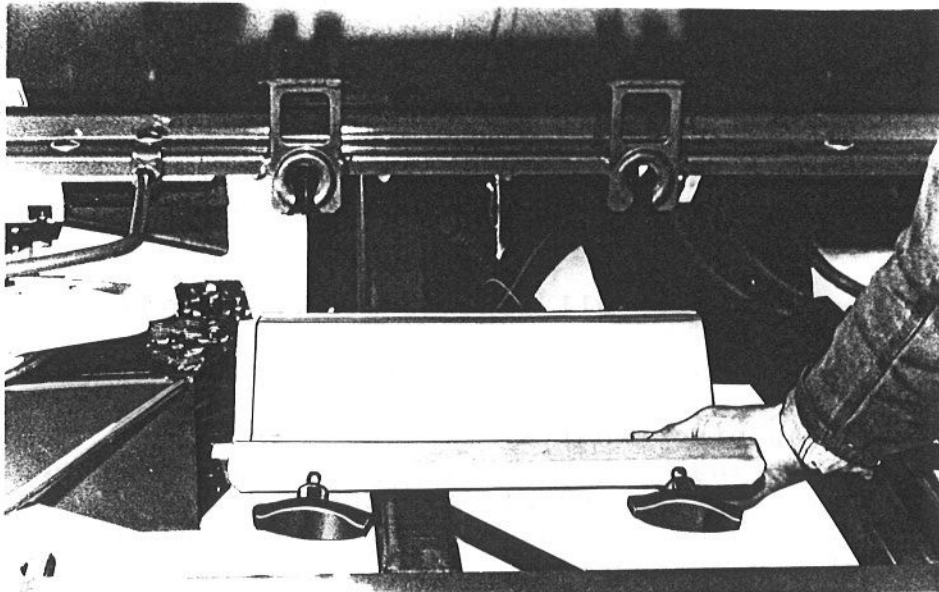
*The auger starts up automatically! Never remove the hopper grids before switching off the hydraulic system and the tractor engine. Remove the ignition key!!*



*Even when the system is switched off, never put your hands into the auger working area!*

*For your own safety always use suitable tools to clean the hopper.*

Figure 19: Removable floor plates



Clean the spreader using a normal water-hose (clean lubricated components only in locations where the oil can be separated from the wash water). Pay particular attention to cleaning the outlet channels from below and make sure all caked on residues are completely removed.



*When using a pressure washer, never direct the water jet directly at electrical equipment, hydraulic components or bearings.*

Following the cleaning operation we recommended that you coat the dry spreader with anti-corrosion protection (only use biologically degradable material).

#### 4. MAINTENANCE AND CARE

*As a general rule, carry out maintenance, fault diagnosis, repairs and cleaning operations with drive and engine switched off! Remove ignition key!*

*When carrying out maintenance work with the spreader in a raised position, always secure with suitable jacks or blocks!*

*All spare parts must meet the technical requirements set by the equipment manufacturer! This can only be ensured by using original spare parts.*

*Regularly check fixing components for tightness and retighten where necessary.*

*During electrical welding on the tractor or attached spreader, disconnect the wiring from alternator and battery.*

*Before working on the electrical system, always interrupt the power supply.*

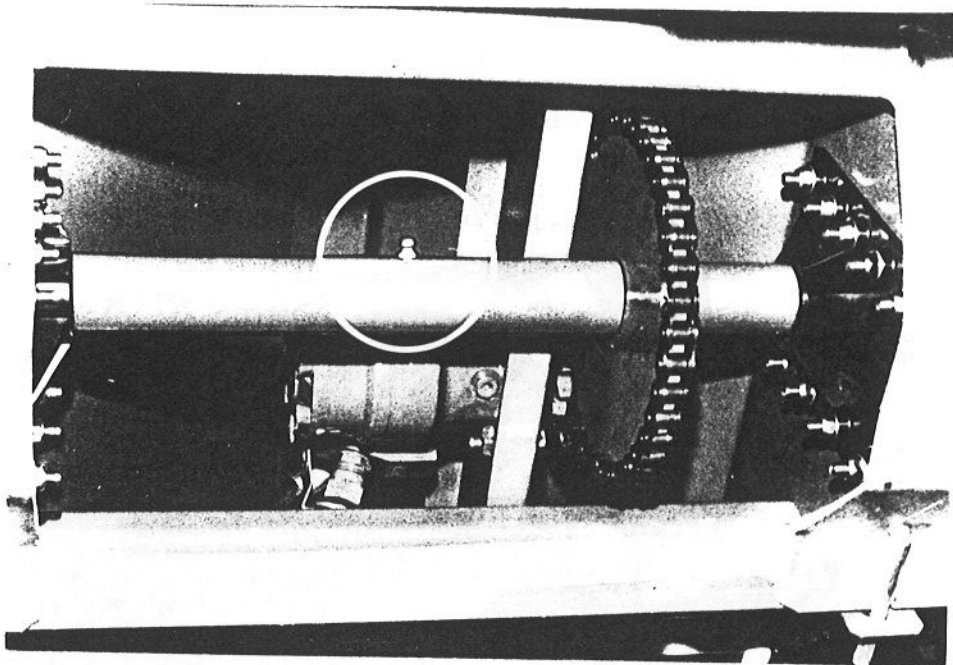
*Safety guards which are removed during repair, maintenance and cleaning operations must be refitted in their original, safe position before using the fertiliser spreader again.*

After the first 20 hours all fixings must be checked for tightness.

Following cleaning, always relubricate all grease nipples.

- ◆ Disc housing pivot shafts: 2 x
- ◆ Agitator bearing - extreme right hand side of hopper: 1 x
- ◆ Auger: 3 x (1 grease nipple and the auger drive chain are reached following removal of the lower base plate at the centre of the spreader).
- ◆ Grease drive chain, disc hub thread and transfer point adjuster regularly, but at least once a year.

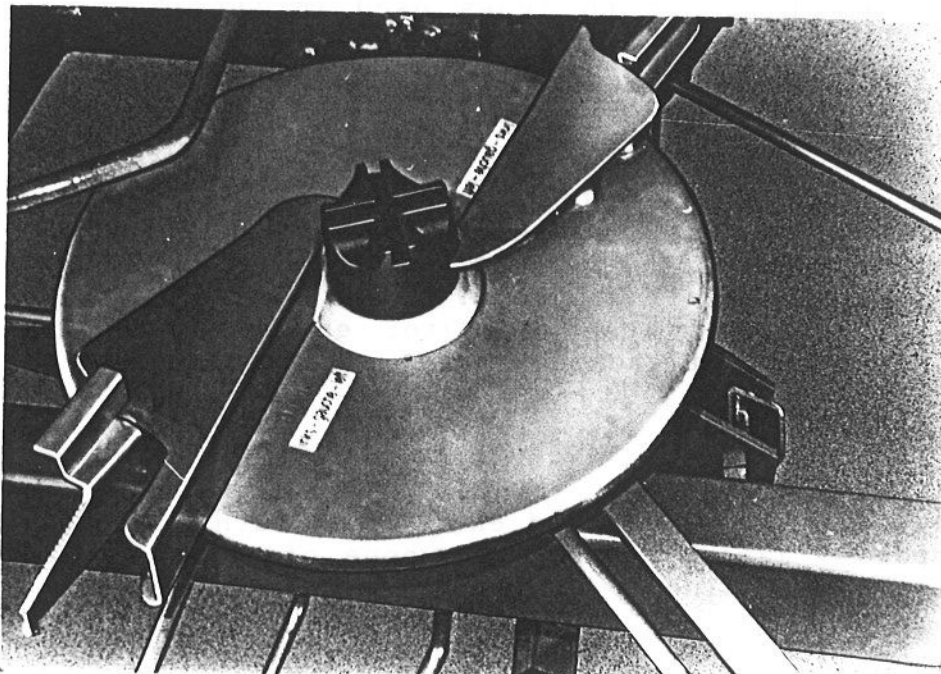
Figure 20: Auger drive



*Check all hydraulic lines regularly and change if defective or altered! Replacement lines must meet the technical requirements of the equipment manufacturer!*

Moist fertiliser can lead to build up of residues on outlets (especially around the double-chamber and sealing brushes) and disc blades. This can lead to reduced spreading accuracy and operating safety. We therefore recommend that these components are regularly inspected and cleaned.

Figure 21: Spreading disc



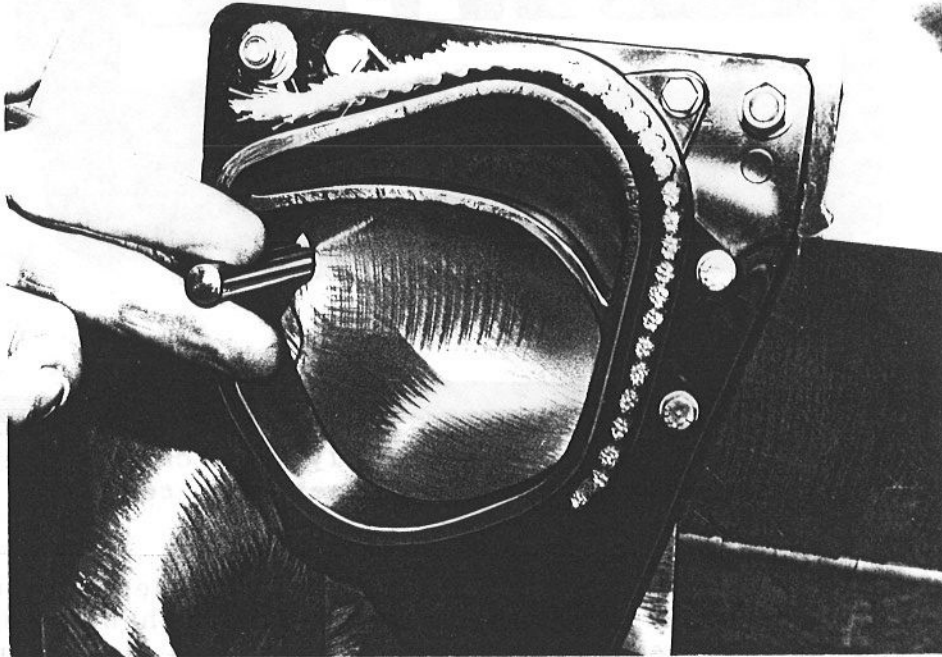
*Regularly check the disc and disc blades for tightness.*

*Change defective cap-nuts (damaged threads, cracks or breakages)!*

#### 4.1 SETTING THE METERING SLIDE

In order to guarantee an even flow to both spreading discs, the slide opening was factory set at position 0 using a setting pin of 10mm ■. Should any faults occur check the slide opening, and readjust if necessary. During this operation, hold adjusting pin absolutely vertical.

Figure 22: Metering slide adjustment



#### 5. FAULT DIAGNOSIS AND TROUBLE-SHOOTING

Working slide will not open

**Special note:** There are no fuses used in the DT 2 electrical remote control.

Check whether there is input and output voltage. Check whether voltage is available at the solenoid.

Disc speed shown on the LCD display is substantially lower than the flow control valve dial. (Eg. setting: 1000 rpm, display: 800rpm).

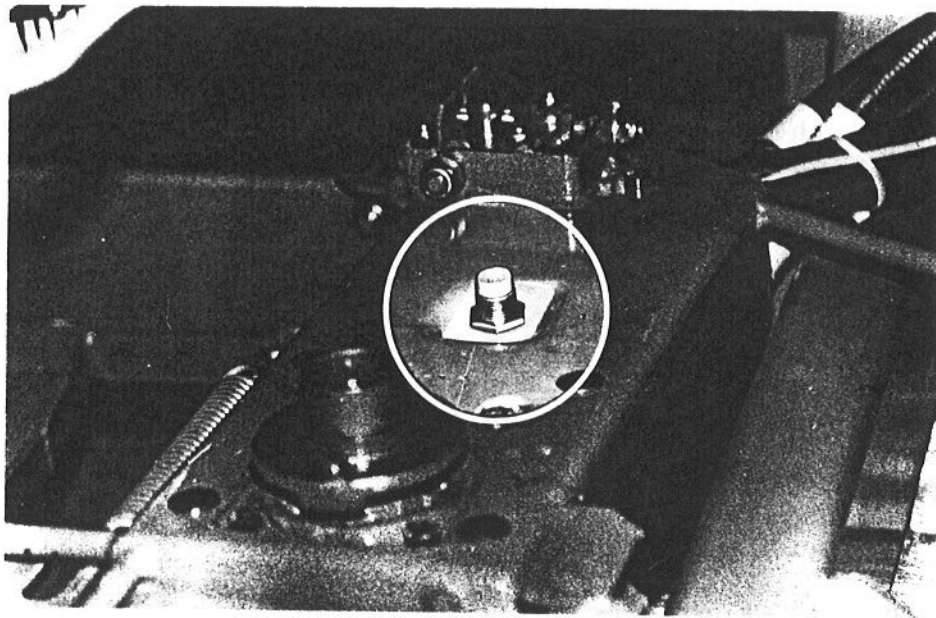
**Cause:** The sensor on the left hand spreading disc does not detect one of the six contacts.

**Remedy:** Turn disc by hand (tractor engine switched off) and check clearance of each contact (2-5mm).

##### Fluctuating disc speed

The DT2 electrical remote control shows wildly changing disc speed readings. Check sensor clearance (approx. 2-5mm) on the left hand disc. Shut down hydraulics and engine and turn disc by hand. Check oil flow (approx 35 l/min). Check that none of the 6 contacts on the base of the disc are missing.

Figure 23: Disc speed sensor



The required disc speed cannot be achieved or it slows during spreading.

- Get your authorised dealer to check the tractor oil supply flow rate. Minimum flow rate is 30 l/min for approx. 1000 rpm, 40 l/min for approx. 1150 rpm at 180 bar.
- Set a somewhat higher idle speed on the speed control valve.
- Get your authorised dealer to check the hydraulic system pressure on your tractor. For higher application rates at bigger working widths, the oil flow should be approx. 40 l/min with a pressure of 180 bar. - Check with the tractor manufacturer.
- Reduce tractor speed and select a smaller aperture position to reduce the fertiliser flow rates and reduce the load on the hydraulic system.

#### Uneven distribution of fertiliser

Remove any fertiliser build-up from discs, disc blades and outlet channels.

Hopper empties unevenly despite equal settings on left hand and right hand side.

Check slide opening as per section 4 above.

#### Spreading discs do not run true.

Check that disc is seating properly and the thread of plastic cap-nut and replace if necessary. Check disc balance and replace if necessary.

Insufficient fertiliser above hopper outlet even though there is plenty of fertiliser in the hopper.

Cause: Auger operates too late or not at all.

Remedy: Advance the auger control (pressure must be set higher) - covered in section 2.3 -



**Excessive grinding of fertiliser - fertiliser dust is created when spreading low rates of fragile fertiliser**

**Cause:** The auger operates much too early and over-compresses the fertiliser inside the agitator chamber.

**Remedy:** Delay the auger control (valve pressure must be reduced) - see section 2.3 -

**Slides open and close by themselves during tractor movement.**

**Remedy:** Check electrical connections and solenoids for dirty or corroded contacts.

**Slides cannot be moved.**

- a) Check that hydraulic couplings are properly connected.
- b) Check the non-return valve on the return hose marked "R".

Slides cannot be operated when the fertiliser hopper is empty and the discs are stopped.

**Remedy:** Discs must be turning.

**The hydraulic system of the entire spreader has blocked, ie. despite correct hydraulic connection, neither agitators, auger nor discs are rotating, but the slides can still be operated.**

**Cause:** Agitators are requiring extremely high power.

**Remedy:**

1. Select a more delayed auger operation point for which the valve pressure must be reduced (also turn anticlockwise).
2. Briefly open working slide to reduce any fertiliser compression.

**Power cable fuse burns out when activating the DT 2**

- Check power cable
- DT-2 defect.



## LIMITED WARRANTY

**K U H N** warrants in accordance with the provisions below, to each original retail purchaser of KUHN new equipment of its own manufacture, from an authorized KUHN dealer, that such equipment is, at the time of delivery to such purchaser, free from defects in material and workmanship and that such equipment will be warranted for a period of one year from the date of delivery to the end user, providing the machine is used and serviced in accordance with the recommendations in the Operators Manual.

### **These conditions are subject to the following exceptions :**

1. Parts manufactured from wood are not in any way covered by this limited warranty.
2. Parts of the machine which are not of KUHN manufacture (tires, belts, PTO shafts, clutches, etc.) are not covered by this limited warranty but are subject to the limited warranty of the original manufacturer. Any claim falling into this category will be taken up with the manufacturer concerned.
3. This limited warranty will be withdrawn if any equipment has been used for purposes other than for which it was intended or if it has been misused, neglected or damaged by accident or let out on hire. Nor can claims be accepted if parts other than those manufactured by us have been incorporated in any of our equipment. Further, the Company shall not be responsible for damage in transit or handling by any common carrier and under no circumstances within or without the warranty period will the Company be liable for damages for loss of use, or damages resulting from delay or any consequential damage.

We cannot be held responsible for loss of earnings caused by a breakdown or for injuries either to the owner or to a third party, nor can we be called upon to be responsible for labor charges, other than originally agreed, incurred in the removal or replacement of components.

### **The customer will be responsible for and bear the costs of :**

1. Normal maintenance such as greasing, maintenance of oil levels, minor adjustments etc.
2. Transportation of any kind of any KUHN product to and from the place the warranty work is performed.
3. Dealer travel time to and from the machine or to deliver and return the machine from the service workshop for repair.

**4. Dealer travelling costs.** Parts defined as normal wearing items are listed as follows and are not in any way covered under this Limited Warranty :

"V" belts, discs, knives, wear plates, stone guards, tires, slip clutches, pitman shafts, swath sticks, blades, tines and tine holders.

KUHN limited warranty will not apply to any product which is altered or modified without the expressed permission of the Company and / or repaired by anyone other than Authorized Service Distributors or Authorized Service Dealers.

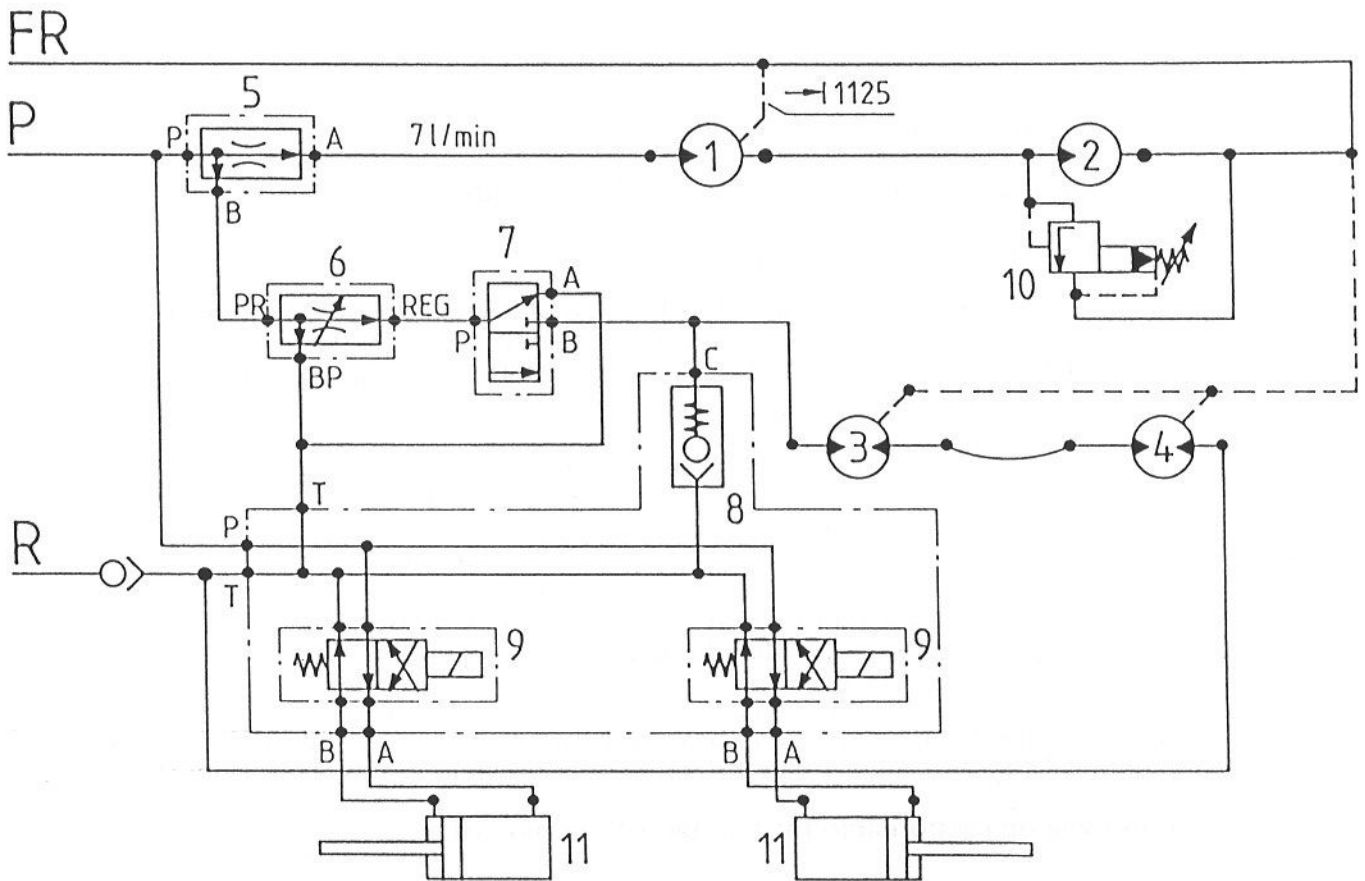
Limited warranty is dependent on the strict observance by the purchaser of the following provisions :

That all safety instructions in the Owners Manual shall be followed and all safety guards regularly inspected and replaced where necessary.

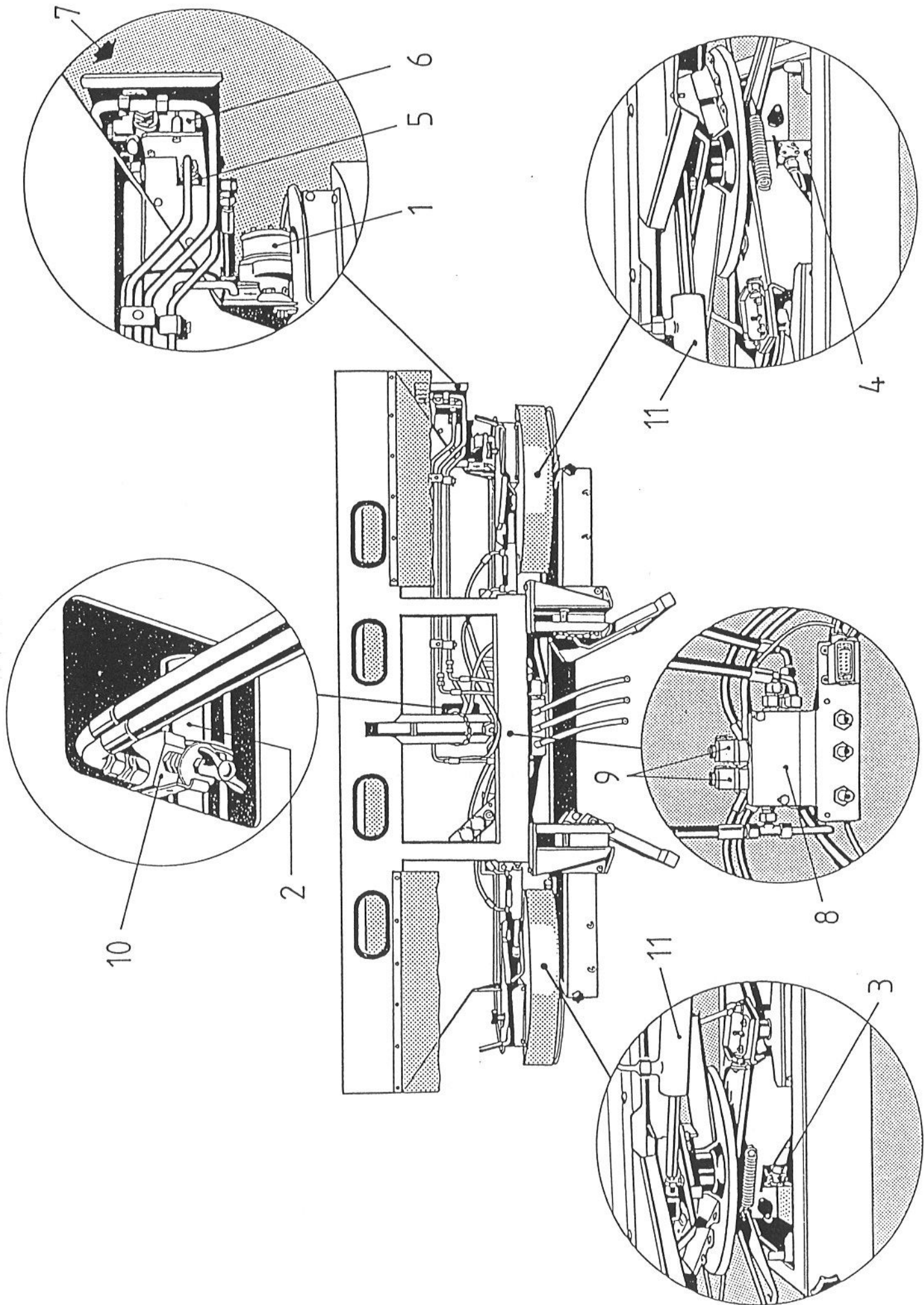
No Warranty is given on second-hand products and none is to be implied. Persons dealing in the Company's products are in no way legal agents of the Company and have no right or authority to assume any obligation on their behalf, express, implied or to bind them in any way.

KUHN S.A. reserves the right to incorporate any change in design in its products without obligation and to make such changes on units previously manufactured.

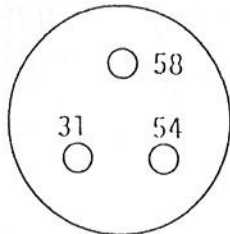
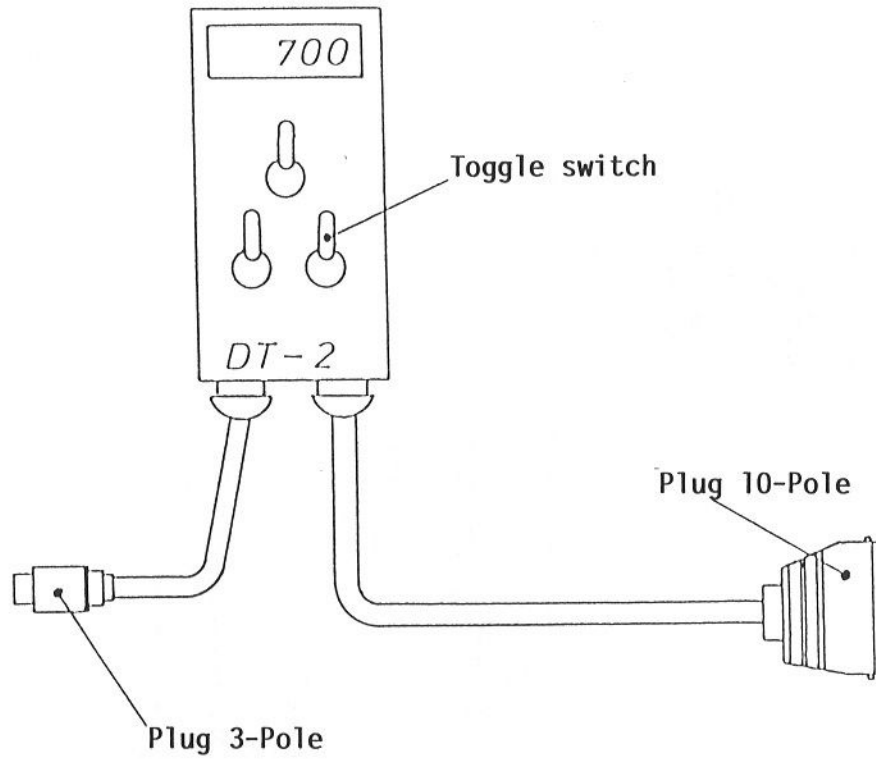
**Disclaimer of further Warranty** There are no warranties, expressed or implied, except as set forth above. There is no warranty of merchantability. There are no warranties which extend beyond the description of the product contained herein. In no event shall the company be liable for indirect, special or consequential damages (such as loss of anticipated profits) in connection with the retail purchaser's use of the product.



- 1 Motor - agitator (315 m<sup>3</sup>)
- 2 Motor - auger (160 m<sup>3</sup>)
- 3 Motor - r.h. spreading disc (22.5 cm<sup>3</sup>)
- 4 Motor - l.h. spreading disc (22.5 cm<sup>3</sup>)
- 5 3-way flow control valve - fixed setting
- 6 3-way flow control valve - adjustable
- 7 3-way shut-off valve
- 8 Non-return valve
- 9 4/2-way valve
- 10 Pressure relief valve - adjustable
- 11 Double acting cylinder



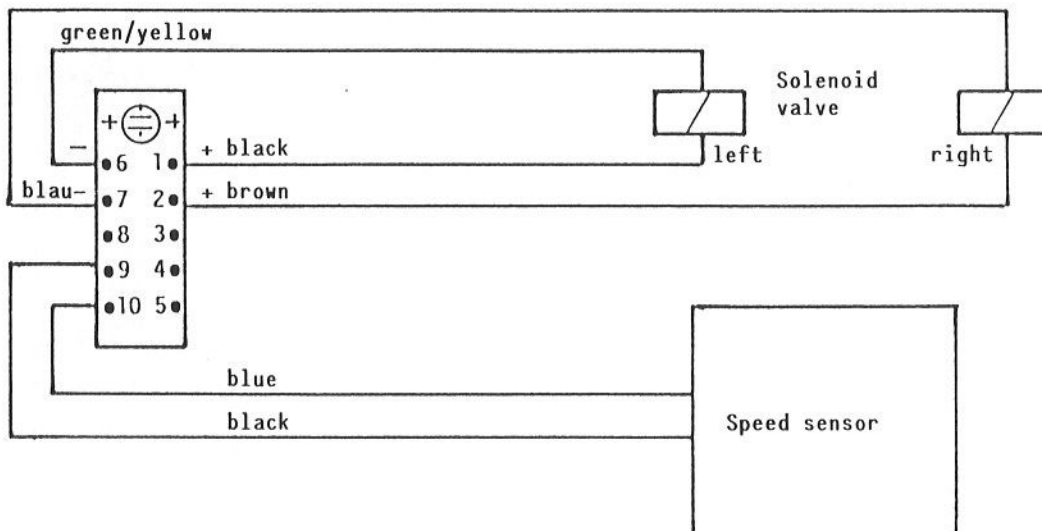
WIRING DIAGRAM



Connecting socket 3-Pole (tractor)

- Pin 31 - Earth (-)
- Pin 54 - Live (+)

Connecting socket 10-Pole (spreader)






# CALIBRATION CHART



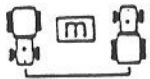
**PLEASE READ CAREFULLY  
BEFORE USING THE MACHINE**



**KUHN FARM MACHINERY (U.K.) LTD.**  
STAFFORD PARK 7, TELFORD, SALOP TF3 3BQ  
Telephone: Telford (STD 0952) 290991  
Telefax: (0952) 290091

PK1500-0793-GB-3

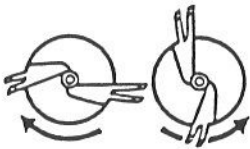
EXPLANATION OF SYMBOLS IN THE CALIBRATION CHART



Working width (m)  
Distance of tramlines



Base dressing



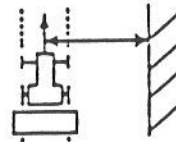
Typ of disc



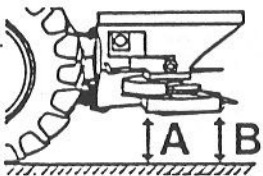
Late top dressing



r.p.m. of disc



Boundary spreading



Point A + B for measuring  
the necessary height over the  
bottom/cereal (measured as seen  
on sketch).



kg/min

Quantity kg/min with  
corresponding scale no.  
(calibration test)



Application point



Position of outlet



km/h

Driving speed (km/h)

<b>ACHTUNG!!!</b>	<b>ATTENTION!!!</b>
Flügel	DG 0 = DG 70
Palette	DG 1 = DG 71
Blade	DG 2 = DG 72



# EXTRAN HYDRO FERTILISER, 34,5 % N, 1,0 kg/l

kg/ha

kg/min	12 m				16 m				18 m				20 m				21 m				24 m												
	D 1		Red		D 1		Red		D 1		Red		D 1		Red		D 1		Red		D 1		Red		D 1		Red		D 1		Red		
	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	
12	15.4	128	96	77	64	104	78	62	52	111	83	67	55	106	79	63	53	106	79	63	53	106	79	63	53	106	79	63	53	106	79	63	53
14	18.7	156	117	94	78	123	92	74	62	129	97	77	64	123	92	74	61	123	92	74	61	123	92	74	61	123	92	74	61	123	92	74	61
16	22.2	185	139	111	92	143	107	86	72	147	110	88	73	140	105	84	70	140	105	84	70	140	105	84	70	140	105	84	70	140	105	84	70
18	25.8	215	161	129	107	163	122	98	82	163	122	98	82	163	122	98	82	163	122	98	82	163	122	98	82	163	122	98	82	163	122	98	82
20	29.4	245	184	147	122	184	138	110	92	184	138	110	92	184	138	110	92	184	138	110	92	184	138	110	92	184	138	110	92	184	138	110	92
22	36.2	302	226	181	151	226	170	136	113	226	170	136	113	226	170	136	113	226	170	136	113	226	170	136	113	226	170	136	113	226	170	136	113
24	43.1	359	269	215	179	269	202	162	135	269	202	162	135	269	202	162	135	269	202	162	135	269	202	162	135	269	202	162	135	269	202	162	135
26	49.9	416	312	250	208	312	234	187	156	312	234	187	156	312	234	187	156	312	234	187	156	312	234	187	156	312	234	187	156	312	234	187	156
28	56.8	473	355	284	236	355	266	213	177	355	266	213	177	355	266	213	177	355	266	213	177	355	266	213	177	355	266	213	177	355	266	213	177
30	63.6	530	397	318	265	397	298	238	199	397	298	238	199	397	298	238	199	397	298	238	199	397	298	238	199	397	298	238	199	397	298	238	199
32	73.6	613	460	368	307	460	345	276	230	460	345	276	230	460	345	276	230	460	345	276	230	460	345	276	230	460	345	276	230	460	345	276	230
34	83.6	697	522	418	348	522	392	313	261	522	392	313	261	522	392	313	261	522	392	313	261	522	392	313	261	522	392	313	261	522	392	313	261
36	93.6	780	585	468	390	585	439	331	292	585	439	331	292	585	439	331	292	585	439	331	292	585	439	331	292	585	439	331	292	585	439	331	292
38	103.6	863	647	518	432	647	486	388	324	647	486	388	324	647	486	388	324	647	486	388	324	647	486	388	324	647	486	388	324	647	486	388	324
40	113.6	947	710	568	473	710	532	426	355	710	532	426	355	710	532	426	355	710	532	426	355	710	532	426	355	710	532	426	355	710	532	426	355
42	125.7	1047	785	628	524	785	589	471	393	785	589	471	393	785	589	471	393	785	589	471	393	785	589	471	393	785	589	471	393	785	589	471	393
44	137.8	1148	861	689	574	861	646	517	430	861	646	517	430	861	646	517	430	861	646	517	430	861	646	517	430	861	646	517	430	861	646	517	430
46	149.8	1249	936	749	624	936	702	562	468	936	702	562	468	936	702	562	468	936	702	562	468	936	702	562	468	936	702	562	468	936	702	562	468
48	161.9	1349	1012	810	675	1012	759	607	506	1012	759	607	506	1012	759	607	506	1012	759	607	506	1012	759	607	506	1012	759	607	506	1012	759	607	506
50	174.0	1450	1087	870	725	1087	816	652	544	1087	816	652	544	1087	816	652	544	1087	816	652	544	1087	816	652	544	1087	816	652	544	1087	816	652	544
52	187.2	1560	1170	936	780	1170	877	702	585	1170	877	702	585	1170	877	702	585	1170	877	702	585	1170	877	702	585	1170	877	702	585	1170	877	702	585
54	200.4	1670	1252	1002	835	1252	939	751	626	1252	939	751	626	1252	939	751	626	1252	939	751	626	1252	939	751	626	1252	939	751	626	1252	939	751	626
56	213.6																																
58	226.8																																
60	240.0																																

# NITRAM ICI ENGLAND, 34,5 % N, 1,04 kg/l

kg/ha

kg/min	12 m			16 m			18 m			20 m			24 m			24 m									
	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12					
8	12.3	103	77	62	51	107	81	64	54	96	72	57	48	110	83	66	55	374	280	224	187	112	84	67	56
10	17.2	143	107	86	72	138	103	83	69	123	92	74	61	135	101	81	67	420	315	252	210	132	99	79	66
12	22.1	184	138	110	92	168	126	101	84	150	112	90	75	159	119	95	79	477	358	286	238	152	114	91	76
14	27.0	225	168	135	112	198	149	119	99	176	132	106	88	182	137	109	91	534	400	320	267	172	129	103	86
16	31.8	265	198	159	132	228	171	137	114	203	152	122	101	206	154	124	103	590	443	354	295	204	153	123	102
18	36.5	304	228	182	152	257	193	154	129	229	172	137	114	245	184	147	123	647	485	388	324	237	178	142	118
20	41.2	343	257	206	172	284	213	171	142	272	204	163	136	284	213	171	142	704	528	422	352	273	204	164	136
22	45.0	409	306	245	204	306	230	184	153	316	237	190	158	327	245	196	164	765	574	459	382				
24	56.9	474	355	284	237	355	267	213	178	364	273	218	182					765	574	459	382				
26	65.4	545	409	327	273	409	307	245	204									765	574	459	382				
28	74.7	623	467	374	311	467	350	280	233									765	574	459	382				
30	84.0	700	525	420	350	525	394	315	263									765	574	459	382				
32	95.4	795	596	477	397	596	447	358	298									765	574	459	382				
34	106.7	889	667	534	445	667	500	400	333									765	574	459	382				
36	118.1	984	738	590	492	738	553	443	369									765	574	459	382				
38	129.4	1079	809	647	539	809	607	485	404									765	574	459	382				
40	140.8	1173	880	704	587	880	660	528	440									765	574	459	382				
42	153.0	1275	956	765	637	956	717	574	478									765	574	459	382				
44	165.1	1376	1032	826	688	1032	774	619	516									765	574	459	382				
46	177.3	1477	1108	886	739	1108	831	665	554									765	574	459	382				
48	189.4	1579	1184	947	789	1184	888	710	592									765	574	459	382				
50	201.6	1680	1260	1008	840	1260	945	756	630									765	574	459	382				
52	213.8					1336	1002	802	668									765	574	459	382				
54	225.9																	765	574	459	382				
56	238.1																	765	574	459	382				
58	250.2																	765	574	459	382				

# NITRAPRILL KEMIRA, 34,5 % N, 1,02 kg/l

kg/ha

kg/min	12 m			16 m			18 m			20 m			20 m			24 m			24 m						
	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	
8	40.7	67	54	45	82	62	49	41	94	71	57	47	344	258	207	172	96	72	57	48	287	215	172	143	
10	14.8	123	92	74	62	105	79	63	52	115	86	69	57	392	294	235	196	113	85	68	57	327	245	196	163
12	18.9	157	118	94	79	128	96	77	64	136	102	82	68	449	337	270	225	132	99	79	66	374	281	225	187
14	23.0	191	143	115	96	151	113	91	76	159	119	95	79	506	380	304	253	151	113	90	75	422	316	253	211
16	27.2	227	170	136	113	176	132	106	88	181	136	109	90	564	423	338	282	181	136	109	91	470	352	282	235
18	31.7	264	198	159	132	198	149	119	99	218	163	131	109	621	466	372	310	212	159	127	106	517	388	310	259
20	36.2	302	226	181	151	226	170	136	113	255	191	153	127	678	508	407	339	247	185	148	124	565	424	339	282
22	43.6	363	272	218	181	272	204	163	136	297	223	178	148	741	556	445	371					618	463	371	309
24	50.9	424	318	255	212	318	239	191	159					804	603	483	402					723	542	434	361
26	59.4	495	371	297	247	371	278	223	185					868	651	521	434					776	582	465	388
28	68.9	574	430	344	287	430	323	258	215					931	698	558	465					828	621	497	414
30	78.4	653	490	392	327	490	367	294	245					1034	776	621	517					881	661	529	440
32	89.8	749	561	449	374	561	421	337	281					1104	828	663	552					934	700	560	467
34	101.3	844	633	506	422	633	475	380	316					1184	888	710	592					986	740	592	493
36	112.7	939	704	564	470	704	528	423	352													1039	779	623	519
38	124.2	1035	776	621	517	776	582	466	388																
40	135.6	1130	847	678	565	847	636	508	424																
42	148.2	1235	926	741	618	926	695	556	463																
44	160.9	1341	1005	804	670	1005	754	603	503																
46	173.5	1446	1084	868	723	1084	813	651	542																
48	186.2	1551	1163	931	776	1163	873	698	582																
50	198.8	1657	1242	994	828	1242	932	745	621																
52	211.4					1321	991	793	661																
54	224.1																								
56	236.7																								
58	249.4																								

# IFI SUPER SPREAD GRANULAR UREA, 46 % N, 0,76 kg/l

kg/ha

kg/min	12 m				16 m				18 m				20 m				21 m				24 m			
	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12
12	88	66	53	44	81	61	49	41	86	64	51	43	90	67	54	45	85	64	51	43	85	64	51	42
14	108	81	65	54	96	72	58	48	100	75	60	50	102	76	61	51	97	73	58	49	103	77	62	52
16	129	96	77	64	112	84	67	56	113	85	68	57	124	93	74	62	118	89	71	59	122	91	73	61
18	149	112	90	75	127	96	76	64	138	103	83	69	146	109	88	73	139	104	83	70	143	107	86	72
20	170	127	102	85	155	116	93	77	162	122	97	81	172	129	103	86	164	123	98	82	168	126	101	84
22	207	155	124	103	182	137	109	91	191	143	115	95	201	151	121	101	192	144	115	96	192	144	115	96
24	243	182	146	122	215	161	129	107	224	168	134	112	231	173	139	115	220	165	132	110	223	167	134	111
26	286	215	172	143	252	189	151	126	257	192	154	128	267	200	160	134	254	191	153	127	253	190	152	126
28	336	252	201	168	289	217	173	144	297	223	178	148	303	228	182	152	289	217	173	144	289	217	173	144
30	385	289	231	192	334	250	200	167	337	253	202	169	340	255	204	170	323	243	194	162	323	243	194	162
32	445	334	267	223	379	284	228	190	377	283	226	189	376	282	225	188	358	268	215	179	358	268	215	179
34	506	379	303	253	424	318	255	212	418	313	251	209	412	309	247	206	392	294	235	196	392	294	235	196
36	566	424	340	283	470	352	282	235	458	343	275	229	452	341	273	227	433	325	260	216	433	325	260	216
38	626	470	376	313	515	386	309	257	503	379	303	252	497	373	298	248	473	355	284	237	473	355	284	237
40	687	515	412	343	568	426	341	284	552	414	331	276	539	404	324	270	514	385	308	257	514	385	308	257
42	757	568	454	379	621	466	373	310	599	449	359	300	582	436	349	291	554	415	332	277	554	415	332	277
44	828	621	497	414	674	505	404	337	646	485	388	323	624	468	374	312	594	446	357	297	594	446	357	297
46	899	674	539	449	727	545	436	363	693	520	416	347	672	504	403	336	640	480	384	320	640	480	384	320
48	969	727	582	485	780	585	468	390	747	560	448	373	720	540	432	360	686	514	411	343	686	514	411	343
50	1040	780	624	520	840	630	504	420	800	600	480	400	768	576	461	384	731	549	439	366	731	549	439	366
52	1120	840	672	560	900	675	540	450	853	640	512	427	816	612	490	408	777	583	466	389	777	583	466	389
54	1190	890	710	590																				
56	1260	940	750	620																				
58	1330	990	790	650																				
60	1400	1040	830	680																				



# IFI EEC PRILLED NET UREA, 46 % N, 0,76 kg/l

kg/ha

kg/min	12 m				16 m				18 m				18 m															
	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12												
10	8.1	67	51	40	34	89	71	60	45	119	89	71	60	45	132	99	79	66	150	112	90	75	165	123	99	82		
11	9.3	78	58	47	39	130	98	78	65	49	150	112	90	75	59	167	126	100	84	66	180	135	108	90	196	147	118	98
12	10.6	88	66	53	44	142	106	85	71	53	167	126	100	84	66	185	139	111	93	74	203	152	122	101	214	161	129	107
13	11.8	98	74	59	49	153	115	92	77	57	176	132	105	88	62	199	150	120	100	79	221	165	132	110	232	174	139	116
14	13.1	109	82	65	54	164	123	99	82	62	185	139	111	93	66	211	165	132	110	84	241	181	145	120	250	188	150	125
15	14.3					176	132	105	88		199	150	120	100		223	167	134	112		241	181	145	120	250	188	150	125
16	15.7					187	141	111	93		211	165	132	110		232	174	139	116		250	188	150	125	259	201	161	134
17	17.0					199	150	120	100		223	167	134	112		241	181	145	120		259	201	161	134	268	215	172	143
18	18.4					211	165	132	110		232	174	139	116		250	188	150	125		268	215	172	143	277	230	184	154
19	19.7					223	167	134	112		241	181	145	120		259	201	161	134		277	230	184	154	286	246	197	164
20	21.1					232	174	139	116		250	188	150	125		268	215	172	143		286	246	197	164	295	261	209	174
21	23.9					241	181	145	120		259	201	161	134		277	230	184	154		295	261	209	174	304	276	221	184
22	26.8					250	188	150	125		268	215	172	143		286	246	197	164		304	276	221	184	313	289	233	194
23	29.6					259	201	161	134		277	230	184	154		295	261	209	174		313	289	233	194				
24	32.5					268	215	172	143		286	246	197	164		295	261	209	174									
25	35.3					277	230	184	154		295	261	209	174		304	276	221	184									
26	38.6					286	246	197	164		304	276	221	184		313	289	233	194									
27	41.8					295	261	209	174		313	289	233	194		322	302	242	201									
28	45.1					304	276	221	184		322	302	242	201		331	311	251	210									
29	48.3					313	289	233	194		331	311	251	210		340	320	260	219									
30	51.6					322	302	242	201		340	320	260	219		349	329	269	228									
31	55.3					331	311	251	210		349	329	269	228		358	338	278	237									
32	59.0					340	320	260	219		358	338	278	237		367	347	287	246									
33	62.6					349	329	269	228		367	347	287	246		376	356	296	255									
34	66.3					358	338	278	237		376	356	296	255		385	365	305	264									
35	70.0					367	347	287	246		385	365	305	264		394	374	314	273									





# 8 EASI CUT ICI ENGLAND, NPK 20-8-14, 1,13 kg/l

kg/ha

kg/min	12 m			16 m			18 m			20 m			21 m			24 m									
	D 1			D 1			D 1			D 1			D 1			D 1									
	A: 50cm	B: 50cm	0 : C	A: 50cm	B: 50cm	0 : C	A: 50cm	B: 50cm	0 : C	A: 50cm	B: 50cm	0 : C	A: 50cm	B: 50cm	0 : C	A: 50cm	B: 50cm	0 : D							
18	175	131	105	87	149	112	89	74	164	123	98	82	148	111	89	74	141	105	84	70	147	110	88	73	
20	198	149	119	99	184	138	111	92	196	147	117	98	176	132	106	88	168	126	101	84	171	128	102	85	
22	246	184	148	123	220	165	132	110	228	171	137	114	205	154	123	102	195	146	117	98	194	146	117	97	
24	35.2	294	220	176	147	117	92	110	259	194	156	130	233	175	140	117	222	167	133	111	218	164	131	109	
26	41.0	341	256	205	171	137	114	128	259	194	156	130	262	196	157	131	250	187	150	125	257	193	154	128	
28	46.7	389	292	233	194	156	130	146	291	218	175	146	308	231	185	154	294	220	176	147	296	222	177	148	
30	52.4	437	327	262	218	175	146	164	327	246	196	164	355	266	213	177	338	253	203	169	334	251	201	167	
32	61.7	514	385	308	257	193	156	193	343	257	206	171	382	287	229	191	382	287	229	191	373	280	224	186	
34	71.0	591	443	355	296	222	187	222	394	296	237	197	401	301	241	201	382	287	229	191	373	280	224	186	
36	80.2	669	501	401	334	266	222	251	446	334	267	223	448	336	269	224	426	320	256	213	412	309	247	206	
38	89.5	746	559	448	373	298	249	280	497	373	298	249	494	370	296	247	470	353	282	235	458	344	275	229	
40	98.8	823	617	494	412	329	274	309	549	412	329	274	550	412	330	275	524	393	314	262	504	378	303	252	
42	109.9	916	687	550	458	366	305	344	611	458	366	305	605	454	363	303	577	432	346	288	551	413	331	275	
44	121.1	1009	757	605	504	404	336	378	673	504	404	336	661	496	397	331	630	472	378	315	597	448	358	299	
46	132.2	1102	826	661	551	441	367	413	735	551	441	367	717	538	430	358	683	512	410	341	597	448	358	299	
48	143.4	1195	896	717	597	478	398	448	796	597	478	398	772	579	463	386	736	552	441	368	644	483	386	322	
50	154.5	1287	966	772	644	515	429	483	858	644	515	429	835	626	501	418	795	597	477	398	696	522	418	348	
52	167.0	1392	1044	835	696	557	464	522	928	696	557	464	898	673	539	449	855	641	513	428	748	561	449	374	
54	179.6	1496	1122	898	748	600	500	561	998	748	600	500	961	720	576	480	915	686	549	457	800	600	480	400	
56	192.1	1601	1201	961	800	640	534	600	1067	800	640	534	1023	767	614	512	975	731	585	487	853	640	512	426	
58	204.7	1729	1329	1029	858	682	568	640	1137	853	682	568	1086	814	652	543	1034	776	621	517	905	679	543	452	
60	217.2	1857	1457	1107	927	735	603	679	1207	905	724	603	1145	859	687	573	1091	818	654	545	954	716	573	477	
62	229.0	1985	1585	1187	997	783	640	724	1279	959	767	640	1207	905	687	573	1091	818	654	545	954	716	573	477	
64	240.9	2113	1713	1267	1067	814	679	724	1357	1018	814	679	1279	959	687	573	1091	818	654	545	954	716	573	477	

# KEMIRA, 20-10-10, 1,1 kg/l

kg/ha

kg/min	12 m			16 m			18 m			20 m			21 m			24 m								
	D 1	A: 50cm	B: 50cm	D 1	A: 50cm	B: 50cm	D 1	A: 50cm	B: 50cm	D 1	A: 50cm	B: 50cm	D 1	A: 50cm	B: 50cm	D 1	A: 50cm	B: 50cm						
18	171	128	102	85	147	110	88	73	163	122	98	81	146	110	88	73	140	105	84	70	146	110	88	73
20	196	147	117	98	183	137	110	92	195	146	117	97	175	132	105	88	167	125	100	84	170	128	102	85
22	244	183	146	122	219	165	132	110	227	170	136	114	204	153	123	102	195	146	117	97	195	146	117	97
24	292	219	175	146	256	192	153	128	259	195	156	130	233	175	140	117	222	167	133	111	219	164	131	109
26	341	256	204	170	328	246	197	164	292	219	175	146	263	197	157	131	250	188	150	125	259	194	156	130
28	389	292	233	195	389	292	233	194	346	259	207	173	311	233	187	158	296	222	178	148	300	225	180	150
30	438	328	263	219	449	337	270	225	399	300	240	200	360	270	216	180	342	257	205	171	340	255	204	170
32	487	369	311	259	510	382	306	255	453	340	272	227	408	306	245	204	389	291	233	194	340	255	204	170
34	536	408	349	300	569	421	337	281	507	380	304	254	456	342	274	228	435	326	261	217	380	285	228	190
36	585	449	380	340	618	456	380	316	561	421	337	281	507	379	303	252	481	361	289	240	421	316	252	210
38	634	487	417	370	667	491	417	342	610	456	373	311	560	420	336	280	533	400	320	267	466	350	280	233
40	683	526	446	400	716	526	420	350	660	491	417	342	610	461	369	307	585	439	351	293	512	384	307	256
42	732	565	475	423	765	565	446	373	709	526	446	373	659	502	401	335	637	478	382	319	558	418	335	279
44	781	604	504	446	814	604	475	400	758	565	475	400	716	543	434	362	689	517	414	345	603	452	362	302
46	830	643	533	469	863	643	504	423	807	604	504	423	778	584	467	389	741	556	445	371	649	487	389	324
48	879	682	562	492	912	682	533	446	856	643	533	446	836	627	504	420	801	601	480	400	701	525	420	350
50	928	721	591	515	961	721	562	469	905	682	562	469	885	666	526	446	841	631	504	420	753	564	452	376
52	977	760	620	538	1010	760	591	492	954	721	591	492	934	707	542	452	860	645	516	430	753	564	452	376
54	1026	799	649	565	1059	799	620	515	1003	760	620	515	984	746	579	483	919	690	552	460	804	603	483	402
56	1075	838	678	589	1108	838	649	538	1052	800	649	538	1032	785	617	514	979	734	587	489	856	642	514	428
58	1124	877	707	613	1157	877	678	562	1101	838	678	562	1081	824	646	545	1038	779	623	519	908	681	545	454
60	1173	916	736	637	1206	916	707	585	1150	877	707	585	1130	863	689	574	1094	820	656	547	957	718	574	479
62	1222	955	765	661	1255	955	736	609	1199	916	736	609	1179	901	721	606	1149	862	690	575	1006	754	604	503
64	1271	994	794	685	1304	994	765	633	1248	955	765	633	1228	942	754	633	1199	894	721	606	1055	793	633	532

# HUMBER 12 ORGANIC BASED, NPK 12-6-6, 0,96 kg/l

kg/ha

kg/min	12 m			16 m			18 m			20 m			21 m			24 m				
	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12
22	158	118	95	79	144	108	86	72	151	113	91	75	149	112	89	74	147	111	88	74
24	23.0	192	144	115	170	127	102	85	174	130	104	87	169	126	101	84	175	131	105	88
26	27.2	226	170	136	195	147	117	98	197	147	118	98	200	150	120	100	202	152	121	101
28	31.3	261	195	156	221	166	133	111	221	166	133	111	231	174	139	116	230	172	138	115
30	35.4	295	221	177	263	197	157	131	270	202	162	135	243	182	146	121	257	193	154	129
32	42.0	350	263	210	304	228	182	152	307	230	184	153	276	207	166	138	294	221	177	147
34	48.6	405	304	243	345	259	207	172	343	257	206	172	309	232	185	154	322	241	193	161
36	55.2	460	345	276	386	290	232	193	386	289	232	193	342	256	205	171	368	276	221	184
38	61.8	514	386	309	427	321	256	214	429	322	257	214	386	289	232	193	410	307	246	205
40	68.4	570	427	342	482	362	289	241	478	358	287	239	430	322	258	215	451	339	271	226
42	77.2	643	482	386	537	403	322	269	527	395	316	263	474	355	284	237	481	359	296	237
44	86.0	717	537	430	592	444	355	296	576	432	345	288	518	388	311	259	493	370	296	247
46	94.8	790	592	474	647	486	388	324	624	468	375	312	562	421	337	281	535	401	321	268
48	103.6	863	647	518	702	527	421	351	684	513	410	342	615	461	369	308	586	439	352	293
50	112.4	937	702	562	769	577	461	384	743	557	446	371	668	501	401	334	637	477	382	318
52	123.0	1025	769	615	835	627	501	418	802	601	481	401	722	541	433	361	687	515	412	344
54	133.7	1114	835	668	902	676	541	451	861	646	517	430	775	581	465	387	738	553	443	369
56	144.3	1203	902	722	968	726	581	484	920	690	552	460	828	621	497	414	789	591	473	394
58	155.0	1291	968	775	1035	776	621	517	980	735	588	490	882	661	529	441	840	630	504	420
60	165.6	1380	1035	828	1102	826	661	551	1039	779	623	520	935	701	561	468	891	668	534	445
62	176.3	1469	1102	882	1169	877	701	584	1099	824	655	549	989	742	593	494	942	706	565	471
64	187.0	1559	1169	935	1236	927	742	618	1158	869	695	579	1042	782	625	521	993	745	596	496
66	197.8																			
68	208.5																			
70	219.2																			
72	230.8																			
74	242.4																			

# CROPSTART TRIPLE SUPERPHOSPHAT ICI, 46 % P, 1,03 kg/l

kg/ha

kg/min	12 m				16 m				18 m				20 m				21 m				24 m					
	D 1		A: 50cm		D 1		A: 50cm		D 1		A: 50cm		D 1		A: 50cm		D 1		A: 50cm		D 1		A: 50cm			
	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12		
16	17.9	149	112	89	74	130	97	78	65	132	99	79	66	118	89	71	59	140	105	84	70	123	92	74	61	
18	20.8	173	130	104	87	148	111	89	74	164	123	98	82	147	111	88	74	168	126	101	84	147	110	88	74	
20	23.7	197	148	118	99	184	138	111	92	221	165	132	110	176	132	106	88	196	147	117	98	171	128	103	86	
22	29.5	246	184	147	123	221	165	132	110	257	193	156	130	234	176	141	117	223	167	134	112	195	147	117	98	
24	35.3	294	221	176	147	257	193	156	130	293	220	176	146	263	198	158	132	251	188	151	125	220	165	132	110	
26	41.1	342	257	205	171	293	220	176	147	329	247	198	165	293	220	176	146	295	221	177	147	258	193	155	129	
28	46.9	391	293	234	195	329	247	198	165	387	290	232	193	344	258	206	172	338	254	203	169	296	222	178	148	
30	52.7	439	329	263	220	387	290	232	193	444	333	266	222	395	296	237	197	382	287	229	191	334	251	201	167	
32	61.9	516	387	309	258	444	333	266	222	501	376	301	251	446	334	267	223	426	319	255	213	373	279	224	186	
34	71.1	592	444	355	296	501	376	301	251	559	419	335	279	497	373	298	248	426	319	255	213	373	279	224	186	
36	80.2	669	501	401	334	559	419	335	279	616	462	370	308	548	411	329	274	470	352	282	235	411	308	246	205	
38	89.4	745	559	447	373	616	462	370	308	685	514	411	343	609	457	366	305	548	411	329	274	470	352	282	235	
40	98.6	822	616	493	411	685	514	411	343	754	566	453	377	671	503	402	335	604	453	362	302	522	392	313	261	
42	109.7	914	685	548	457	754	566	453	377	824	618	494	411	732	549	439	366	659	494	395	329	628	471	377	314	
44	120.7	1006	754	604	503	824	618	494	411	893	670	536	446	794	595	476	397	714	536	429	357	680	510	408	340	
46	131.8	1098	824	659	549	893	670	536	446	962	721	577	481	855	641	513	427	769	577	462	385	733	550	440	366	
48	142.8	1190	893	714	595	962	721	577	481	1033	775	620	516	918	689	551	459	826	620	496	413	787	590	472	394	
50	153.9	1282	962	769	641	1033	775	620	516	1104	828	662	552	981	736	589	491	883	662	530	442	841	631	505	421	
52	165.3					1104	828	662	552	1175	881	705	588	1045	783	627	522	940	705	564	470	895	672	537	448	
54	176.7					1175	881	705	588	1171	878	703	586	1045	783	627	522	940	705	564	470	895	672	537	448	
56	188.0																									
58	199.4																									
60	210.8																									
62	222.2																									
64	233.6																									



# CLEVELAND MURIATE OF POTASH, 50 % K, 1,15 kg/l

kg/ha

kg/min	12 m				16 m				18 m				20 m				21 m				24 m				
	D 1		Red		D 1		Red		D 1		Red		D 1		Red		D 1		Red		D 1		Red		
	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	
16	179	135	108	90	155	117	93	78	157	118	94	78	141	106	85	71	134	101	81	67	145	109	87	72	
18	24.9	207	155	124	104	176	132	106	88	193	145	116	97	174	130	104	87	166	124	99	83	172	129	103	86
20	34.8	290	217	174	145	217	163	130	109	229	172	138	115	206	155	124	103	197	147	118	98	199	149	120	100
24	41.3	344	258	206	172	258	194	155	129	266	199	159	133	239	179	143	120	228	171	137	114	227	170	136	113
26	47.8	399	299	239	199	299	224	179	149	302	227	181	151	272	204	163	136	259	194	155	129	254	190	152	127
28	54.4	453	340	272	227	340	255	204	170	338	254	203	169	304	228	183	152	290	217	174	145	297	223	178	148
30	60.9	507	381	304	254	381	285	228	190	396	297	238	198	356	267	214	178	339	254	204	170	340	255	204	170
32	71.3	594	445	356	297	445	334	267	223	453	340	272	227	408	306	245	204	389	291	233	194	340	255	204	170
34	81.6	680	510	408	340	510	383	307	255	511	383	307	255	460	345	276	230	438	328	263	219	383	287	230	192
36	92.0	766	575	460	383	575	431	345	287	569	426	341	284	512	384	307	256	487	365	292	244	426	320	256	213
38	102.3	853	640	512	426	640	480	384	320	626	470	376	313	563	423	338	282	537	402	322	268	470	352	282	235
40	112.7	939	704	563	470	704	528	423	352	695	521	417	347	625	469	375	313	596	447	357	298	521	391	313	261
42	125.1	1042	782	625	521	782	586	469	391	764	573	458	382	688	516	413	344	655	491	393	327	573	430	344	286
44	137.5	1146	859	688	573	859	645	516	430	833	625	500	416	749	562	450	375	714	535	428	357	625	468	375	312
46	149.9	1249	937	749	625	937	703	562	468	902	676	541	451	811	609	487	405	773	580	464	386	676	507	406	338
48	162.3	1352	1014	811	676	1014	761	609	507	971	728	582	485	873	655	524	437	832	624	499	416	728	546	437	364
50	174.7	1456	1092	873	728	1092	819	655	546	1051	788	631	525	946	709	567	473	901	676	540	450	788	591	473	394
52	189.2	1576	1182	946	788	1182	887	709	591	1131	848	679	566	1018	764	611	509	970	727	582	485	848	636	509	424
54	203.6									1212	909	727	606	1090	818	654	545	1038	779	623	519	909	681	545	454
56	218.1																								
58	232.5																								
60	247.0																								

