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Introduction

Howard would like to thank you for purchasing this Rotavator and offer their support and assistance throughout its productive life.

This Rotavator has been designed and manufactured as a tractor driven, ground cultivator - no other use is intended.

Please read and understand this manual before operating the Rotavator.

Warranty

The warranty applicable to your machine is detailed on separate documentation which should accompany this manual. If this is missing, please contact your dealer.

Serial Number

The Serial Number and Model are stamped on the Identification Plate attached to your Rotavator. For future reference record this information below. Always quote them when ordering spare parts.

MODEL _____

SERIAL No. _____

Date Purchased: _____

SAFETY PRECAUTIONS



**PLEASE READ. IT MAY SAVE A LIFE.
SAFETY IS YOUR RESPONSIBILITY.**

The safety of operators and any other connected personnel is a major component of; machine design, manufacture, retailing, commissioning, operation and maintenance. Howard have designed and manufactured this Rotavator with as many safety features as possible. The retailer's responsibility is to ensure you have selected the correct Rotavator for your tractor/application and to commission this machine.

Your responsibilities as owner or operator are to ensure the safety of any personnel in connection with; the operation, transport, maintenance or storage of this Rotavator. Be aware of your responsibilities and carry them out. The owner or an appropriately designated officer, if the owner is a company or corporation, is responsible for all safety issues related to this Rotavator.

The most important safety device attached to this Rotavator is a Safety Conscious Operator whose training and experience must include:

- Correct and complete installation and commissioning of the machine to ensure safe and reliable operation in the intended application.
- Training in safety issues, operation and maintenance of this machine in its application prior to beginning work. This training is to be reviewed or repeated annually.
- Being aware of their environment to the extent that unforeseen safety issues that may arise are dealt with to ensure the safety of all personnel (including operators, maintenance personnel and bystanders).

This is the SAFETY ALERT symbol and means:



ATTENTION ! SAFETY ISSUE !

Failure to comply with the given instruction could result in severe injury or death.

If you have questions not answered in this manual please contact your dealer or distributor.

If you require more copies of this manual please contact your dealer. Alternatively you are welcome to copy and distribute this manual to the operators and maintenance personnel.

SAFETY DECAL LOCATION

Explanations of pictogram decals (Fig 1).

Note: Decals may differ slightly from those shown.

P/N 187250 Read Manual !

Prior to operating machine, read the operator's manual and observe all safety instructions.

P/N 629551 Shut off engine !

Shut off engine and remove key before performing maintenance or repair work.

P/N 629548 Flying Objects !

Keep safe distance from the machine as long as the engine is running.

P/N 624367 Revolving Rotor !

Stay clear of the rotor area as long as the tractor engine is running and the PTO connected.

P/N 209095260 Drive Shaft Entanglement !

Keep clear of and also keep loose clothing away from rotating PTO shaft to avoid entanglement.

- Ensure that these decals are always legible and that they are replaced immediately if they are damaged, lost or their supporting parts are replaced. Decals can be ordered from your dealer.

SAFETY DECAL CARE

- Keep safety decals clean and legible at all times. Replace any missing safety decals or any that have become illegible. Safety decals can be purchased from you dealer or distributor.
- If any part is replaced that supports a safety decal ensure that a decal is affixed to the replacement part.

ATTACHING SAFETY DECALS

1. Clean and dry the area where the decal is to be affixed. Warm soapy water is the best as some cleaning agents leave an oily film which may prevent the decal adhering.
2. Remove/fold back a small portion of the backing and affix the exposed portion of the decal in the desired position.
3. Peel back the remaining backing paper from under the decal and smooth down the decal with a rag, working any bubbles towards the edge of the decal.
4. Any bubbles that remain trapped can be pierced with a pin and smoothed down.

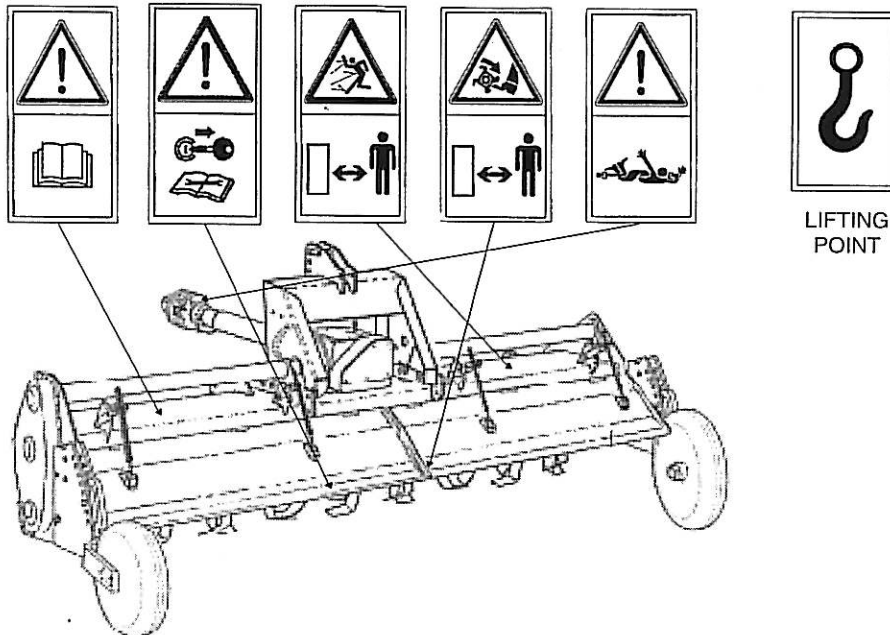


Fig. 1

AT ALL TIMES

- Use the Rotavator only for the purpose for which it has been designed, and in accordance with the instructions in this operators manual.
- Ensure that only responsible, properly instructed people operate this machinery. Inexperienced operators will require training, followed initially by careful supervision.
- Children are not permitted to operate this machinery.
- Keep children well clear and appropriately supervised when connecting/disconnecting the tractor, operating or maintaining this machinery.
- Do not wear clothes that are loose fitting or with drawstring ties which can catch in moving parts.
- Wear appropriate protective clothing and equipment. Boots are a minimum, however if your tractor is not fitted with a controlled environment cab you may also need protection from prolonged exposure either to noise, dust or sunlight.
- Interpret 'Left' and 'Right' as if seated in the operators seat and facing forward.

BEFORE OPERATION

- Read and understand this manual.
- The tractor to be connected to the Rotavator:
 - Must be the tractor that the Rotavator has been commissioned to operate with. Check that it has been correctly maintained and has not been re-configured (for example front weights removed etc) which may reduce stability and control.
 - Consult the Tractor Manufacturers Manual for instructions on mounting implements and safe working methods.
 - Is recommended to be fitted with a Roll Over Protection System (ROPS).
 - Must be one the operator is familiar with.
- Prior to starting the tractor ensure the PTO is disengaged and the tractor is in neutral.
- Do not allow anyone to stand between the tractor and Rotavator while backing the tractor up to attach it.
 - Quick hitch systems are recommended for both Safety and convenience.
 - Before attempting to connect the universal drive shaft to the tractor, lower the Rotavator to the ground, stop the tractor, apply the park brake and remove the key.
- Visually inspect the Rotavator and check:
 - Hitch pins and drive shaft are secure.
 - No components are excessively worn, cracked or otherwise defective and all bolts are tight.
 - Guards, covers, warning labels and safety devices are all correctly fitted and operative.
 - Maintenance as per schedule has been carried out.
 - No tools or other unsecured items have been left on the Rotavator.
- Practice operation of the tractor and Rotavator combination.
 - Take sufficient time to become completely familiar with all controls, particularly those required to bring both tractor and Rotavator to an emergency stop if so required.
 - Progress slowly initially and check stability, steering and braking are satisfactory.

- Ensure the work area is clear, especially of children or animals.
- Inspect the work area for hidden obstructions which may constitute a hazard.

DURING OPERATION

- Ensure the work area is clear, especially of children or animals.
- Do not attempt to start the tractor or engage the PTO until correctly seated in the driver's seat.
- Never leave the tractor running unattended.
- Do not allow passengers on the Rotavator. [Or on the tractor unless approved seating is available.]
- Never attempt to make adjustments or perform maintenance functions while the Rotavator is operating.
- Observe all safe driving procedures:
 - Reduce speed when working on sloping ground or during sharp turns.
 - Do not attempt to work on steeply sloping ground where there is a risk of the tractor overturning.
 - Do not attempt to work near the edge of drop-offs or banks.
 - Avoid sudden starts and stops.
- After striking an obstacle, stop the tractor and implement and inspect it for damage. Repair as necessary before continuing.
- Disengage the PTO when transporting the implement or when not in use.
- When halting operation, even temporarily, lower the Rotavator to the ground, stop the tractor, apply the park brake and remove the key.
- Allow the Rotavator sufficient time to cool down before performing any maintenance, or changing gears in the Selectaspeed gearbox. [Oil and other transmission components may be hot enough to inflict burns.]
- Note:
 - By virtue of its mode of operation it is not possible to totally enclose a Rotavator with guards.
 - Contact with the blades while operating can result in severe injury or death.
 - Do not allow anybody (operators, maintenance personnel, bystanders or especially children) anywhere near the blades whilst the implement is operating. Note that children will often be attracted to placing objects into the blades if you leave it running - this machine is not a toy.
 - Be aware that Rotavator blades will not only cut, but drag limbs etc. into further danger.
 - Ensure that all shielding is in place before operating. If guards are removed for maintenance work, ensure they are replaced correctly upon completion. Repair or replace any damaged guards.
 - NEVER place hands or feet under the Rotavator, nor endeavour to make any repairs or adjustments while the blades are rotating; they are capable of inflicting serious injury.
 - NEVER touch the blades or attempt to free any jammed obstacle while the tractor engine is running. The clutch may be slipping and removal of any obstruction may allow the blades to rotate, the result possibly being serious injury.

FOLLOWING OPERATION

- Visually inspect the Rotavator and check:
 - All bolts are tight.
 - That no components are excessively worn, cracked, damaged or otherwise defective.
- Note and organise any maintenance required.
- Allow the Rotavator sufficient time to cool down before performing any maintenance. The gearboxes, lubricant and other transmission components may be hot enough to inflict burns.
- Refer to TRANSPORT SAFETY and STORAGE SAFETY for issues related to travel to/from operation and disconnection of the Rotavator from the tractor.

STORAGE SAFETY

- When unhitching the Rotavator and before leaving the tractor to disconnect the universal drive shaft and remove hitch pins:
 - Check that the PTO drive has been disengaged.
 - Stop the tractor, apply the park brake and remove the key.
- Store the Rotavator away from human activity and in particular do not permit children to play around, or on, stored equipment.
- Store the Rotavator in a dry level area and ensure parkstands and wheels/roller are securely positioned to prevent it tipping, falling over or rolling onto any personnel (particularly children).

MAINTENANCE SAFETY

- Maintain the Rotavator as detailed in the given schedule and check for any damage after use. Poor maintenance is an invitation to trouble.
- Ensure that all shielding is correctly in place when maintenance is completed. Repair or replace any damaged guards. Warning or instruction decals are to be kept in a readable condition; unreadable decals must be replaced.
- NEVER place hands or feet under the Rotavator nor endeavour to make any repairs or adjustments, while the blades are rotating; they are capable of inflicting serious injury.
- If working on the implement whilst it is raised on the tractor's three-point linkage, ensure:
 - That the tractor is turned off and the ignition key is removed to prevent accidental starting.
 - The park brake is engaged and the wheels chocked to prevent the tractor moving.
 - The PTO drive is disengaged.
 - The Rotavator is properly supported by blocks or stands. DO NOT rely on the tractor's hydraulic system to support the implement.
- Modifications or fitment of non genuine replacement parts.
 - If the equipment is modified in any way from the original design, the manufacturer will not accept any liability for any injury or warranty as a result of their use or attempted fitment.
- Fasteners.
 - Fit only the correct replacement fasteners and tighten fasteners to the torque specified in the manual. Incorrect (too weak) fasteners may break when torqued

to the required setting or, if too strong, may induce failures in other components.

- Follow safe workshop practices during any maintenance:
 - Keep working area clean, dry and in particular free of oil spills.
 - Ensure the workshop is adequately ventilated. Do not run the tractor engine inside a closed building. The exhaust fumes can reduce mental alertness initially and will progressively cause death by asphyxiation.
 - Use tools, lifting or jacking equipment suitably capable of the intended task.
 - Ensure electrical equipment is safe to use before operating.
 - A fire extinguisher and first aid kit should be readily accessible during maintenance.
 - Tools, parts and other service equipment must be removed to appropriate storage locations prior to any test running.
 - Do not wear baggy, ill-fitting or frayed clothing when working around transmission components.
 - Wear suitable gloves when handling or working with sharpened cutting elements.
 - Ensure bystanders, especially small children, are kept clear during maintenance or while making any adjustments.
- Hydraulic fluid can be dangerous.
 - When disconnecting any hydraulic fluid line, shut off the hydraulic supply and relieve the hydraulic pressure.
 - Never use hands to locate hydraulic fluid leaks. Escaping hydraulic fluid is capable of cutting and penetrating skin. Use a small piece of cardboard or wood.
 - Minor cuts are susceptible to infection from hydraulic fluid. Gangrene can result. If injured by escaping hydraulic fluid or you suspect you have been infected, seek medical treatment immediately.

TRANSPORT SAFETY

- When transporting the implement on a tractor on public roads ensure that you comply with the relevant regulations.
 - Class of roads permitted for travel may be restricted.
 - Transport may be restricted to daylight or, off peak traffic hours.
 - Signs indicating width may be required.
 - Lights indicating vehicle width if transported within the hours of darkness may be required.

If in doubt, contact your government department responsible for road transport.

- Secure the Rotavator for transport.
 - Disengage the PTO when transporting.
 - Ensure all hitch pins are correctly fitted with retaining pins.
 - Mechanically secure hydraulic cylinders to prevent cylinders creeping.
- Observe the tractor manufacturers regulations and recommendations - specifically those relating to:
 - Maximum transport loads.
 - Maximum speed.
- Passengers

Rotavator 600 / Rotalabour 600

- Do not allow passengers to ride on the tractor unless a specific seat is provided.
- Do not allow anyone to ride on the implement when it is being transported.
- Consider other road users.
 - Plan your route to avoid heavy traffic and peak traffic periods.
 - Be a safe and courteous driver. Give way to oncoming traffic in all situations, including narrow bridges, intersections etc.
- Adopt safe driving practices:
 - Lock tractor brake pedals together. Never use independent braking at transport speeds.
 - Drive at a safe speed to ensure control and ability to stop in an emergency. Ensure the additional weight of the Rotavator on the linkage does not compromise steering and braking - for example front weights or repairs to the brakes may be required if the tractor is not safe to drive.
 - Reduce speed during turns. Tractors have not been designed for fast cornering.
 - Use engine braking when going down hills - do not coast.
 - Do not drink alcohol and drive.
- Watch for obstructions, particularly if over-width.
- Observe any load ratings applicable on bridges.

IDENTIFICATION OF HAZARDS

- Owners and operators must be prepared to assess their; equipment, operators, maintenance procedures and applications to identify safety hazards.
- Appropriate methods to reduce the hazards identified must then be applied.

MACHINE SUITABILITY TO APPLICATION

Rotavators have been designed and manufactured as a tractor driven, ground cultivator - no other use is intended. However over the years some models have been adapted for new uses, such as road-base preparation and semi-industrial mixing operations.

- Before beginning work it is necessary to assess the effect of the machine on the safety of both the operator and any potential bystanders. It is recommended that you contact the manufacturer or distributor for assistance in this area.

AUTHORISED OPERATORS & TRAINING

If you are an employer, do not assume an operator is trained for use of this equipment, (you would not let an unlicensed driver borrow your car!).

- Ask to see licences if applicable, and record numbers and validity dates.
- Request details of previous experience, in writing and check them out if appropriate and ensure such records are retained.
- Devise a suitable training course for operators if appropriate, and ensure records of their completion are retained.

MAINTENANCE RECORDS

Recommended maintenance is detailed in the Lubrication & Maintenance section. Failure to follow these may jeopardise safety as well as economic operation.

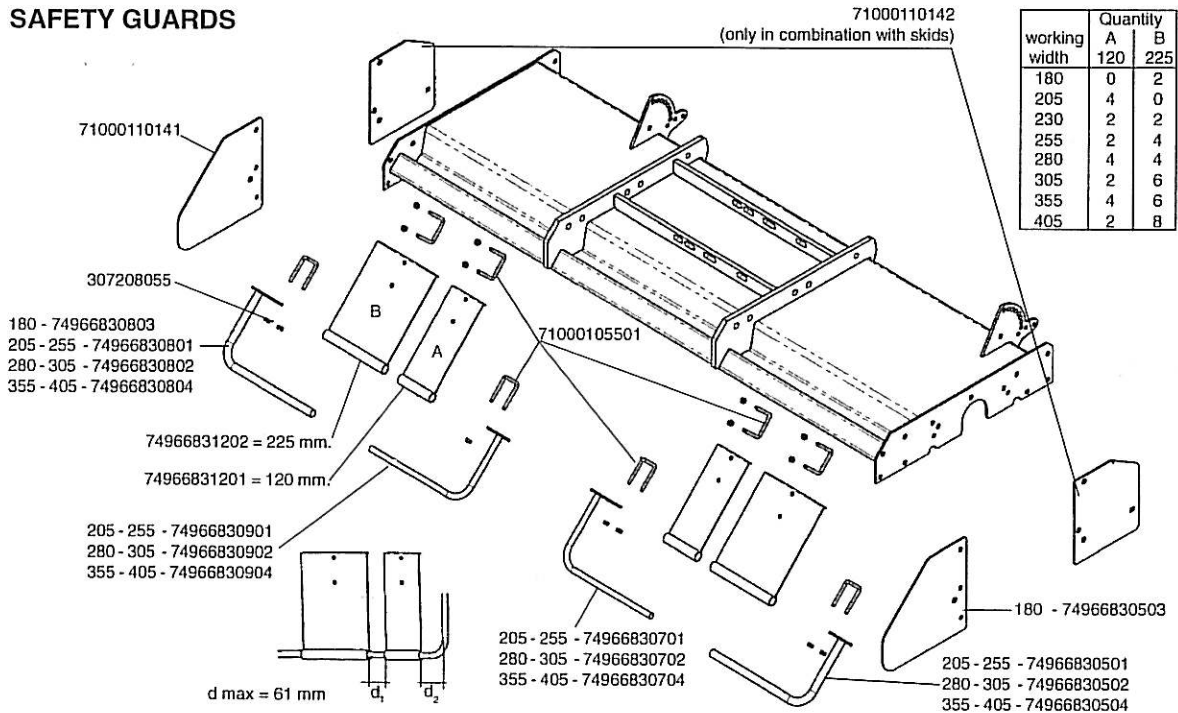
Records of periodic maintenance are important as they detail when and who carried out the last maintenance and inspection. Appropriate checklists should include maintenance as detailed and in particular the following safety aspects:

- SAFETY DECALS AFFIXED & LEGIBLE.
- GUARDING - All fitted and secure.
- CRITICAL FASTENERS SECURE

ENGLISH

! Fit all safety guards before operating. Operation is not permitted without safety guards fitted. These are not fitted at the factory due to freight limitations.

SAFETY GUARDS



NEVER

- Touch any moving parts of the Rotavator or parts which may be hot from operation.
Check oil levels whilst the Rotavator is running.
- Carry out adjustments or repairs to a mounted Rotavator unless the tractor engine is stopped and the Rotavator firmly supported or lowered to the ground.
- Leave the tractor seat unless the Rotavator is lowered, the pto drive disengaged, the gear shift in neutral, the brake applied, the engine stopped and the ignition key removed

**BE A SAFE OPERATOR BY THINKING –
BEFORE ACTING**

PTO DRIVE SHAFT GUARDS

HOWARD PRODUCTS are supplied with non-rotating PTO Drive Shaft which must be correctly fitted and well maintained.

Before and after each use PTO driven implements should be examined to ensure the Drive Shaft rotates freely in the guards, the guards are undamaged, securely fitted, correctly seated on the shaft grooves and the restraining chains attached to the tractor and implement.

Should the guards be broken, damaged or badly fitted the implement must not be used damaged parts have been replaced and/or bad fitting corrected.

Always ensure the guard tubes do not separate at the PTO Drive Shaft's longest working or transport length, or at its shortest.

Avoid damage to guards when the PTO Drive Shaft is being connected or disconnected from the tractor by resting it on a support.

Never allow PTO Drive Shaft Guards to fall into the implement or drop to the ground: damage will almost certainly occur.

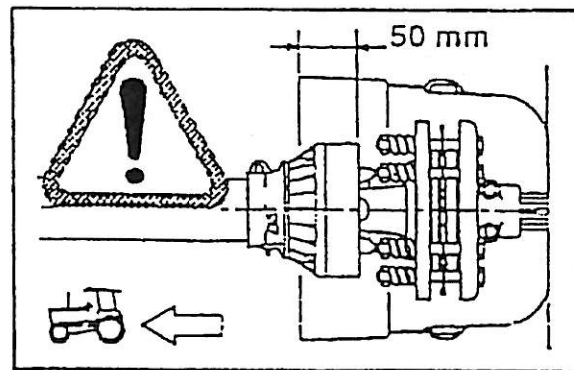
Always ensure the sliding surfaces of the guard tubes are clean and the guard bearings lubricated.

When replacing worn or damaged sections of the Guard, use special tools available from the makers.

Always follow the fitting, lubrication and maintenance instructions supplied by the makers of the PTO Drive Shaft Guard.



**UNLESS CORRECTLY GUARDED
PTO DRIVE SHAFTS CAN KILL**



Minimum overlap in straight position

Rotavator 600 / Rotalabour 600

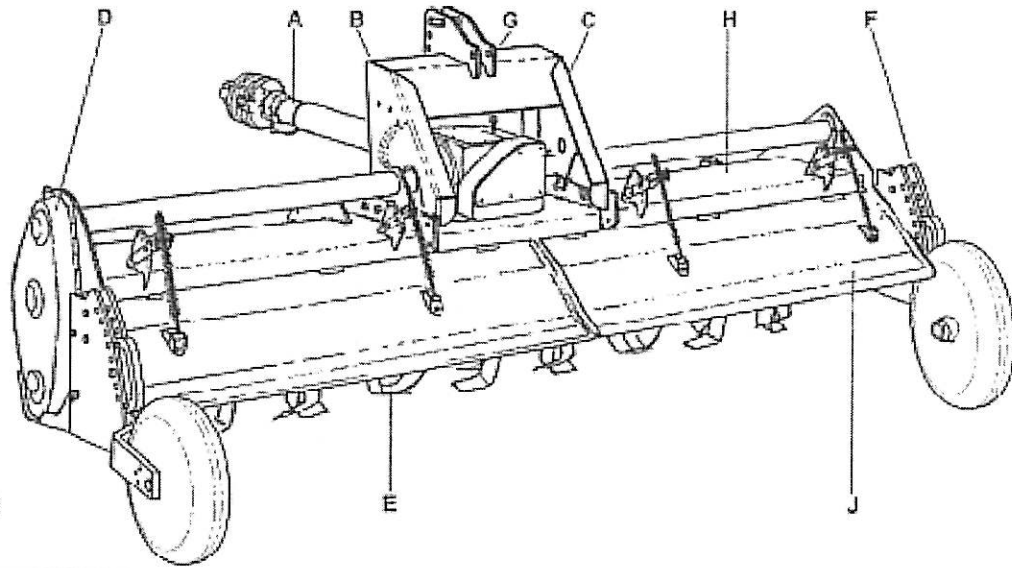


Fig. 2

ENGLISH

Model	Working width cm	Transport width cm with roller	Speed rpm	Weight Kg	No. of blades Rotavator	No. of blades Rotalabour 2 bolts	No. of blades Rotalabour F1	Tractor engine Power HP
R600B-180S	180	210	200 / 220 245 / 270	700	42	54	42	80-120
R600B-205S	205	235		750	48	62	48	90-120
R600B-230S	230	260		850	54	70	54	100-120
R600B-255S	255	285		900	60	78	60	100-130
R600B-280S	280	300		950	66	86	66	115-140
R600B-305S	305	335		1000	72	94	72	125-140
R600S-180S	180	210	219 / 237 278 / 302	750	42	54	42	80-130
R600S-205S	205	235		820	48	62	48	90-140
R600S-230S	230	260		925	54	70	54	100-150
R600S-255S	255	285		1000	60	78	60	100-160
R600S-280S	280	300		1075	66	86	66	110-170
R600S-305S	305	335		1125	72	94	72	120-180
R600S-355S	355	385	219 / 246 / 277	1250	84	110	84	130-180
R600S-405S	405	435		1270	*	126	96	130-180
R600S-255D	255	285		1060	60	78	60	100-160
R600S-280D	280	300	1110	66	86	66	110-170	
R600S-305D	305	335	1190	72	94	72	120-180	
R600S-355D	355	385	1310	84	110	84	130-180	
R600S-405S	405	435	1430	*	126	96	130-180	

*not available

SPECIFICATION

The above list shows the standard range of Rotavator 600 together with working widths, power requirements and weights.

Rotavator 600S-305S

- 1 Type: Rotavator / Rotalabour
 2 Series: 600
 3 Version: B (Basic): Basic gearbox
 S (Super): Reinforced gearbox
 4. Working width in cm
 5. Gearbox: S: 4 speed Selectatilt
 D: Lever change gearbox

Description

Fig. 2 indicates assemblies referred to in the text of this manual which are named below :

- A = PTO shaft
- B = Overload Clutch
- C = Gear box
- D = Side Drive
- E = Rotor
- F = Depth control wheels
- G = Topmast
- H = Hull
- J = Trailing board

Rotavator 600 are designed for 80 to 180 HP tractors with cat. II or III linkage. The drive is by a PTO shaft from a 1000 rpm tractor PTO to a multi-speed gear box. The jackshaft transmit power from the gearbox via the side drive (with three gears) to the rotor.

An overload clutch provides protection for the transmission. The normal tillage depth of 5-20 cm is adjusted by depth control wheels, skids, or by a roller when used in the Rotavator 600.

The Rotavator 600 is ideal for general work, such as weed destruction, incorporation of green fertilizers, crop residus, scalping, and vegetal production.

Working widths suit large acreage farms for seed bed preparation.

The Rotalabour 600 is ideal for:

- Preparation of spring seed beds
- Pasture renovation
- Stubble breaking
- Direct seed bed preparation

In view of these characteristics the Rotavator 600 is the ideal machine for the wide acres and for contractors.

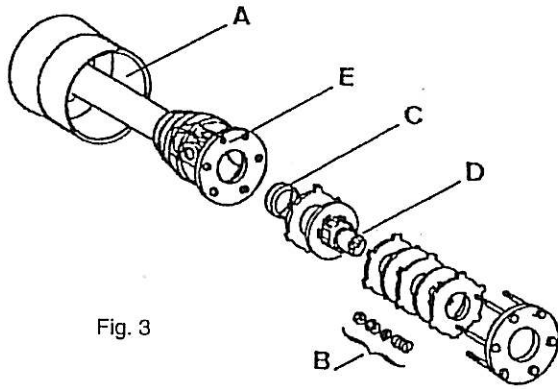


Fig. 3

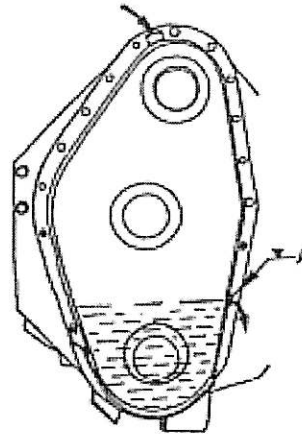


Fig. 4

NEW MACHINE

PTO Drive Shaft and Clutch

For transport purposes PTO Shafts are dismantled from the machine and must be re-fitted as instructed below.

Fitting PTO Drive Shaft to Clutch

Refer to Fig 3. Remove the guard (A) from the gearbox. Remove the 6 clutch locknuts, nuts, washers and springs. Fit the PTO Drive Shaft Clutch Plate (E) over the studs and re-fit the springs, washers, nuts and locknuts. Ensure all components are correctly seated then adjust clutch - refer ADJUSTMENTS section. Refit guard (A).

Lubrication & General

With the machine standing level ensure the following preparatory work has been done:

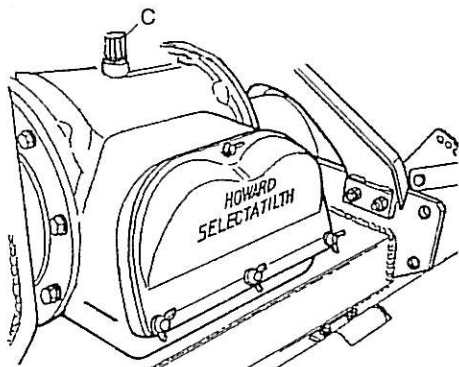
1. Side Drive - See Fig 4
The gearcase is filled to the oil level plug A.
Oil: SAE 85W140 EP - 4 litres.
Drain Plug - At bottom - remove protection skid for access.
2. Main Gearbox - See Fig 5
The gearbox is filled to the mark on the dipstick C.
Oil: SAE 85W140 EP - 600B-S 4 litres
600S-S 9 litres.
600S-255D = 15 l.
600S-280D = 15,5 l.
600S-305D = 16 l.
600S-355D = 17 l.
600S-405D = 18 l.

Drain Plug - At bottom, front of gearbox.

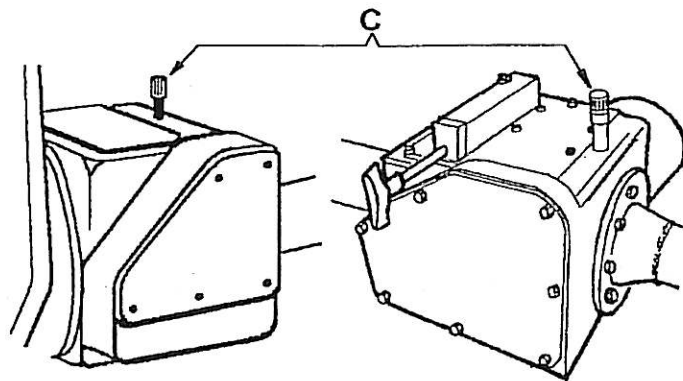
3. Rotor Bearing - Non Drive End
The housing is filled to the oil level plug.
Oil: SAE 85W140 EP - 0.25 litre.
4. All oil and grease points as shown in the LUBRICATION & MAINTENANCE CHART have been lubricated.
5. All nuts and bolts tightened (re-tighten after first hours work).



NOTE: SERIOUS DAMAGE CAN RESULT FROM FAILURE TO CARRY OUT ABOVE PROCEDURES.



600 B-S



600 S-S

600 S-D

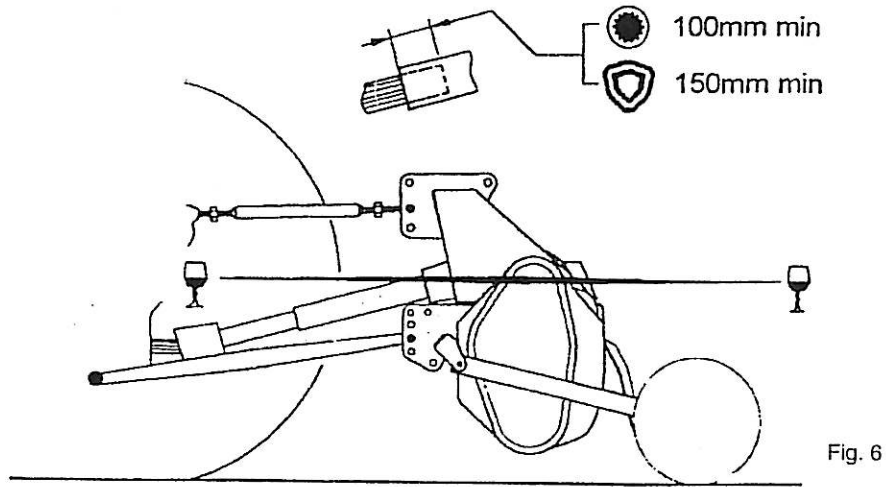


Fig. 6

ATTACHING THE ROTAVATOR TO THE TRACTOR

Check Commissioning &/or Maintenance

- The Rotavator should have been commissioned and/or required maintenance completed. Refer to 'NEW MACHINE' and 'LUBRICATION & MAINTENANCE' sections as required.

Attach Rotavator to Tractor Linkage

- Select the linkage points on the Rotavator and adjust the top link such that the Rotavator input shaft is horizontal when in the working range and remains as close to horizontal when raised. See Fig 6.
- Adjust lower links to ensure Rotavator is horizontal laterally. See Fig 7.
- Adjust stabilisers to limit sway to 50mm (2").

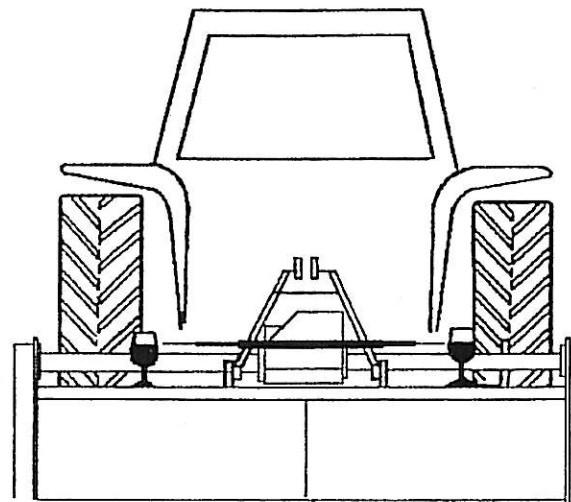


Fig. 7

Connect Drive Shaft To Tractor PTO

Check the following before engaging the PTO drive:

- Drive shaft is not too long at any point over the lift range. (ie - the sliding members do not bottom out.)
- Drive shaft is not too short. The minimum engaged length of the sliding sections is:
100 mm for splined bar.
150 mm for tribolobal or star profile tubes. See Fig 6.
- Drive shaft does not foul any part of the Rotavator or tractor.
- Working angle should be less than 20°.
- Angle when lifted does not exceed 40°. See Fig 8. (Limit lift if necessary to prevent this.)

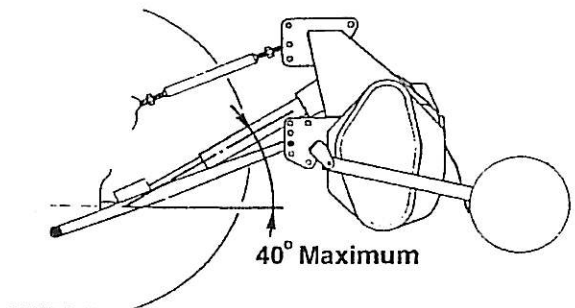

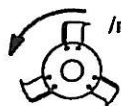
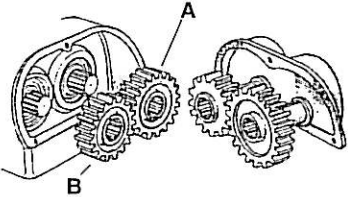
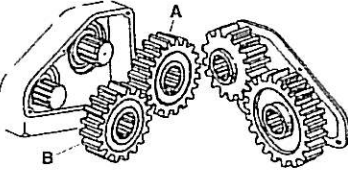
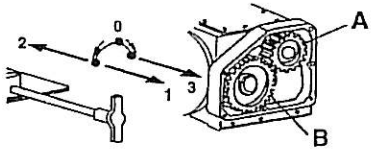


Fig. 8

Attach Drive Shaft Guard Chains

Affix chains each end of the drive shaft guard to the Rotavator/tractor to prevent guard from rotating.

	 min.	B	A	 /min			Rotavator	Rotalabour	
 <p>R600B-S</p>	1000	23	18	160			o	•	
		22	19	175			•	•	
		21	20	195			•	o	
		20	21	215			•	o	
		19	22	235			•	•	
		18	23	260			o	•	
	540	16	25	170			o	o	
		15	27	200			o	o	
 <p>R600S-S</p>	1000	30	20	171			o	o	
		29	21	186			o	o	
		28	22	202			o	o	
		27	23	219			•	•	
		26	24	237			•	•	
		24	26	278			•	•	
		540	22	28	176			o	o
			21	29	191			o	o
			20	30	208			o	o
 <p>R600S-D</p>	1000		B	A	1	2	3		
		29	21	186	209	236	o	o	
		27	23	219	246	277	•	•	
		23	27	302	330	(382)	o	o	
	21	29	355	-	-	o	o		
		540	23	27	163	183	206	o	o
			21	29	192	215	242	o	o

• Standard o Optional

Fig. 11

SELECTATILTH GEARBOX 600 B-S / 600 S-S

The Selectatilt gearbox enables rotor speeds to be altered by transposing the Pick-Off-Gears in the rear of the gearbox.

Refer to Fig 11.



BEFORE CHANGING GEARS, STOP THE TRACTOR & DISENGAGE PTO. BE AWARE THAT OIL & COMPONENTS MAY BE HOT.

NOTE:

Gears must be fitted with protruding boss to front.

Never operate the Rotavator without the spare pair of gears fitted to the cover.

LEVER CHANGE GEARBOX 600 S-D

The 3 speed, lever change gearbox permits easy changing of the rotor speed. Alternative speeds are possible by transposing or exchanging the 2 gears in the rear of the gearbox.

Refer to Fig 11 for details.

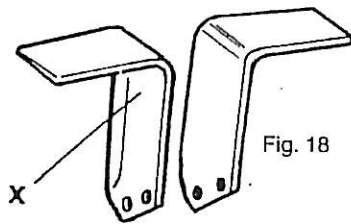


BEFORE CHANGING GEARS, STOP THE TRACTOR & DISENGAGE PTO. BE AWARE THAT OIL & COMPONENTS MAY BE HOT.

WHEN TRANSPOSING GEARS:

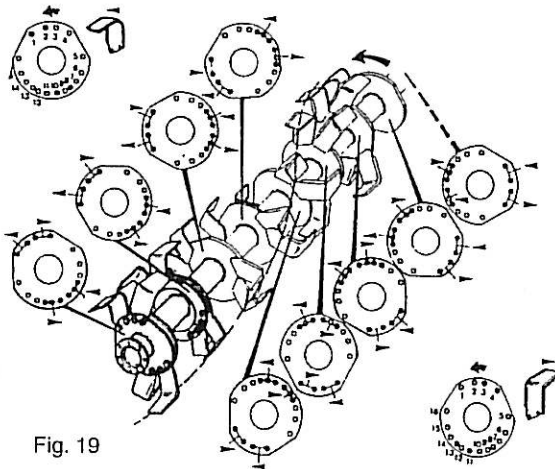
Gears must be fitted with protruding boss to front and retained with circlip.

Tilt Rotavator forward to prevent excessive oil loss.



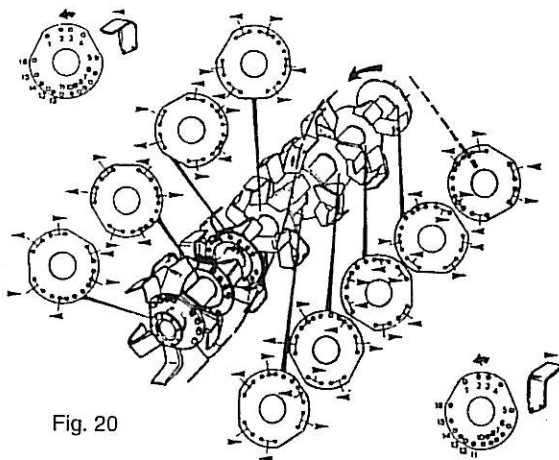
ROTORS

Badly bent, worn or broken blades will impar efficiency and should be replaced immediately using genuine HOWARD BOLT ASSEMBLIES which are specially manufactured to a high strength specification.



Blading standard rotors

Firstly identify left and right hand blades. Blades X on Fig. 18 is a left hand blade. Use only ORIGINAL-HOWARD-BLADES and HOWARD-BLADE-BOLTS. Always attach blades and clamping rings to the left of the rotor flanges. To blade a rotor to the 2-Blade system refer to Fig.19 and to Fig.20 for the 3-Bladed system proceeding as follows: When correctly fitted, the blades must form a "scroll" pattern. This ensures that they enter the soil at regular intervals to even out the load on the transmission. **When replacing worn blades, remove one blade and fit the new one in it's place before proceeding to the next.** This will ensure



that the blade "scroll" pattern is maintained.

Use only HOWARD blade bolts which have the correct shank length and tensible strength. Fit the bolt head against the blade and the clamping ring and the spring washer and nut against the flange. Tighten the nuts to a torque of 240 Nm.

To help provide alternative tilths the flanges are drilled for either 2 or 3 blade formation which allows for a rougher cloddy finish for overwintering or a finer tilth suitable for spring seed beds.

To simplify changing from one formation to another, each blade bolt hole has a number and the blades are fitted in the following fashion: (see Fig. 19 and 20).

Left hand blades

2 blade formation 1+2; 8+10

3 blade formation 1+2; 5+6; 12+14

Right hand blades

2 blade formation 3+4; 11+13

3 blade formation 3+4; 7+9; 15+16

Note that a left hand blade must preceede a right hand on the rotor flanges.

Blading Rotalabour rotors

Firstly identify left and right blades. Blade (x) is a left hand blade and (Y) right hand. (see fig.21)

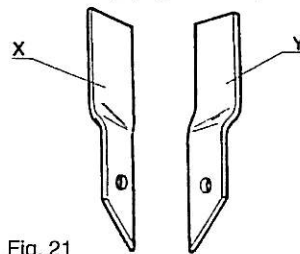


Fig. 21

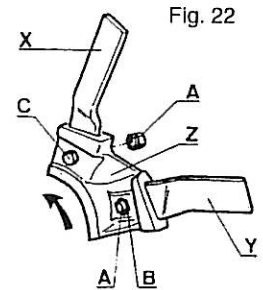


Fig. 22

Changing rotors

To change rotors, the ROTAVATOR should be lifted above the ground on the 3-point linkage and firmly supported for safety.

Take out the 9 bolts (A) securing the rotor to the drive shaft on the left hand side of the machine and the 4 bolts (B) securing the rotor to the stub axle on the right hand side of the machine.

To fit an alternative rotor reverse the sequence of operations (see fig.23)

In a bracket (Z) for 2 blades (see fig.22), fit the L.H. blades in the first housing in direction of rotation.

NOTE: be carefull to put the nut into the hexagonal housing (B) against the blade.

Tightening torque: 200 N-m

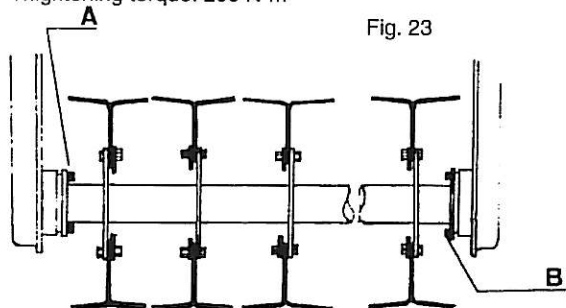


Fig. 23

ENGLISH

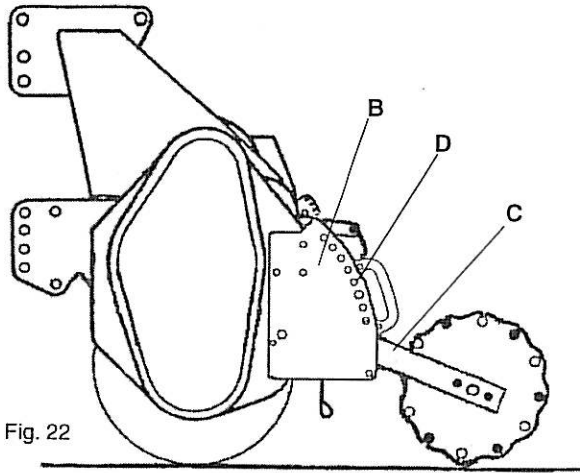


Fig. 22

DEPTH CONTROL

Tillage depth is regulated by either, Depth Control Wheels, Crumble Roller or Skids.

Depth Control wheels

Fig 22 illustrates the depth control wheels. Adjust the position control pins (D) to give the required working depth. Ensure scraper is fitted above the wheel.

NOTE: To prevent sticky soils adhering to the wheel, a pneumatic wheel will often perform better. Refer to your dealer or distributor for assistance.

Crumble Roller

Rear mounted crumble rollers can be readily fitted by removing wheels from the machine and affixing the crumble roller arms (C) to the existing depth control assemblies (B). Adjust the position control pins (D) to give the required working depth.

The type, size and width of crumble rollers vary considerably depending on soil types, local techniques and preferences. Refer to your dealer or distributor for assistance if required.

Skids

Fig 24 illustrates the attachment of skids. Reposition adjusting bar B by removing and reaffixing fastener A to give the required working depth.

PROTECTION SKIDS

To protect the side drive cover and rotor right hand bearing housing, replaceable wear skids are fitted to both sides of the Rotavator. Refer to Fig 25 and 25-A.

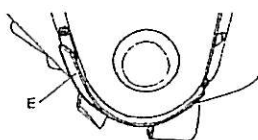


Fig. 25

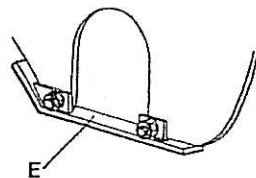


Fig. 25-A

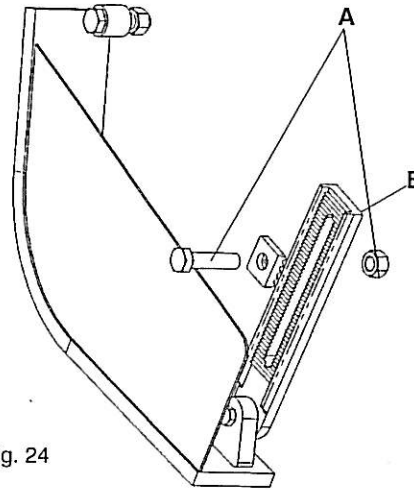


Fig. 24

PARKING STAND

The parking stands affixed to the front frame tube must be used to prevent the Rotavator falling forwards when it is not attached to the tractor.

NOTE:

- Position the wheel or crumble roller depth control pins to prevent the Rotavator tipping over rearwards.
- if ground conditions are soft, additional footings may be required under park stands.
- Once the Rotavator is attached to the tractor, the parking stands must be secured in the raised position.

PACKER ROLLER

The scraper frame from the packer roller can be fixed on in two positions - See Fig 26.

When working ploughed fields, the lower position (A) is recommended. The upper position (B) is recommended when working in crop residues.

Periodic adjustment of the scrapers (C) is important. To do this, set the roller on level ground and adjust the scrapers until they are almost touching the roller.

To obtain the best performance from the roller, clean and spray any unpainted roller surfaces with rust preventative after use.

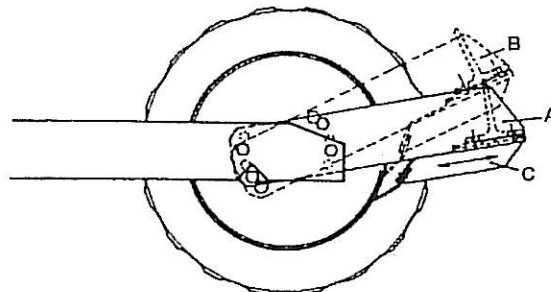


Fig. 26

LUBRICATION & MAINTENANCE CHART

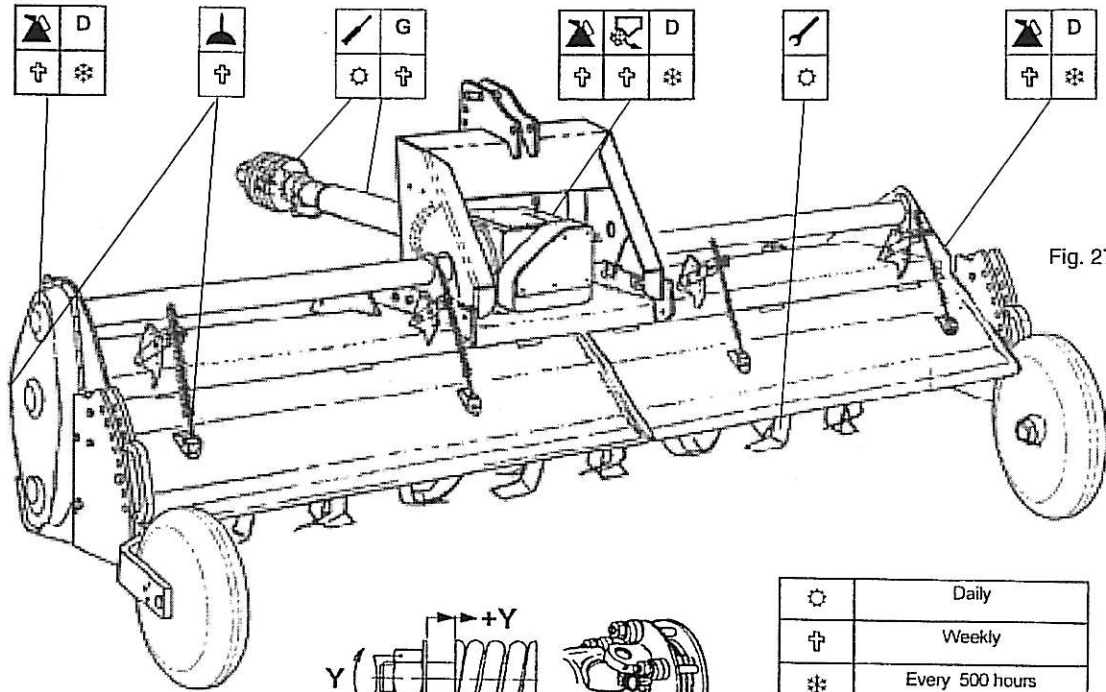


Fig. 27

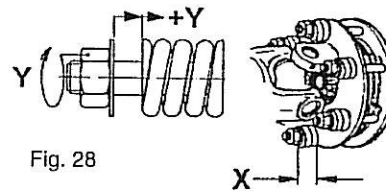


Fig. 28

Fig. 29

1000/min	1000/min		
	80 HP	100 HP	125+HP
Y	0.75	1.00	1.25
Xmm	30.7	30.4	29.9

	Daily
	Weekly
	Every 500 hours
	Lubricate with oil
	Check/Top up with Oil SAE 65W140 EP
	Lubricate with grease
D	Drain, flush and refill
G	Graphite or Molybdenum Disulphide Grease
	Tighten Fasteners
	Clean filter

ADJUSTMENTS

Weed Cutters

These are fitted to each end of the machines which have type 'S' or 'F' Rotors and are designed to cut grass and weeds that otherwise will wrap around the end of the rotor. The weed cutters are slotted to allow adjustment and should be positioned to just clear blades bolts to provide a shearing or cutting action.

Clutch

The friction plate clutch is to be set such that it will not slip in normal working conditions, but will slip should any obstacle be struck.

UNDER-TIGHTENING of the clutch springs will cause unnecessary slippage of the clutch, resulting in excessive wear of plates. In normal, obstacle free operation, the clutch should be no hotter than the gearbox. If the clutch overheats, increase clutch spring compression by 1/6 turn on each nut and re-check the clutch temperature in 0.5 hrs operation and re-adjust if necessary. Do not over-tighten clutch.

OVER-TIGHTENING of the clutch springs will not allow the clutch to function correctly, possibly resulting in torque induced shear failure of drive fine componentry, should an obstacle be encountered.

DURING INITIAL USE, CHECK CLUTCH REGULARLY FOR EXCESSIVE HEAT (which is an indicator of excessive slippage). The clutch will 'bed in' and require re-setting after a short period of use.

During storage, clutch plates may rust and seize together. When beginning work - reduce clutch setting to almost zero and ensure clutch slips (this will also polish clutch plate facings) then reset clutch.

To set or adjust the clutch:

1. Remove clutch guard if springs are to be set by length or, for ease of access if required .
2. Slacken the C locking nuts and make the required adjustments to all springs.. Refer to Fig 28 and Fig 29 for initial settings.
3. Retighten the locknuts and re-affix clutch guard.

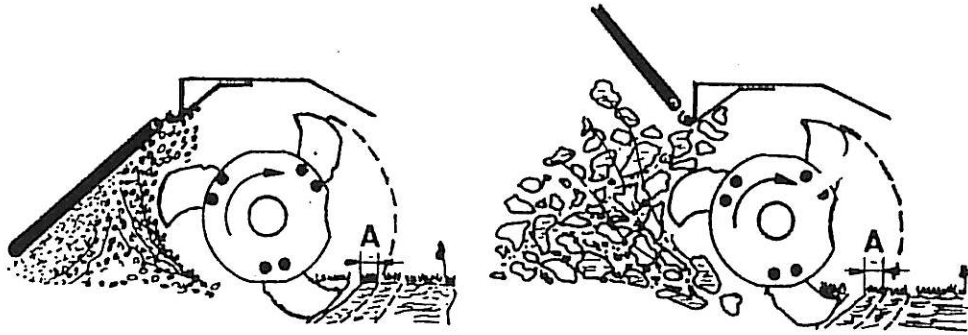


Fig. 30

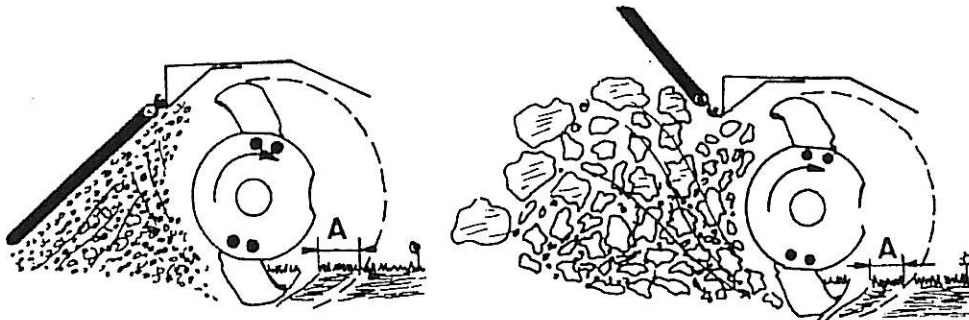


Fig. 31

OPERATING INSTRUCTIONS

Operational Information

By simple adjustments the Rotavator 600 will produce a range of tilths in most soil types and handle various cultivation techniques e.g. weed control, seedbed preparation, trash and chemical incorporation etc.

As a general principle fine tilths are produced by a combination of slow tractor speeds, fast rotor speeds and a lowered trailing board. Conversely, coarse tilths are produced by fast tractor speeds, slow rotor speeds and a raised trailing board (see Fig.30).

As an alternative to the standard 3-blade a 2-blade rotor configuration can be used which reduces the tendency for clogging and soil balling (see Fig. 31). The 2-blade configuration is specially suited to sticky soil conditions, trash incorporation and the production of a rough cloddy finish.

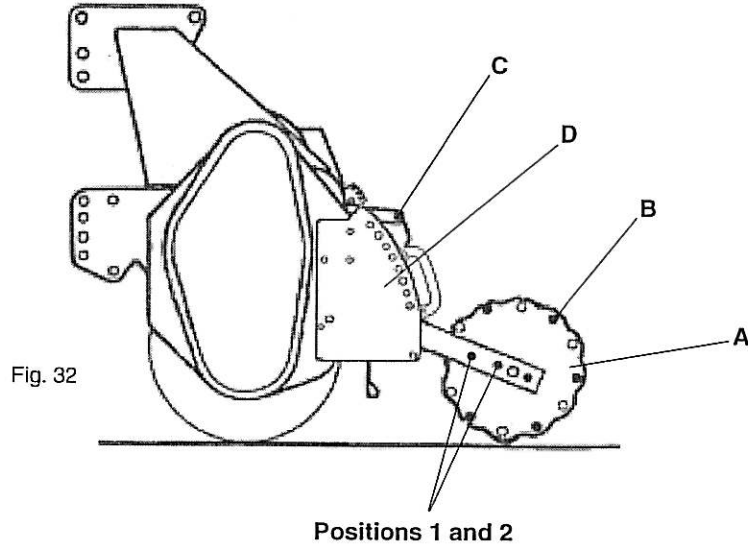
Intermediate grades of tilth from coarse to fine can be obtained by:

1. Varying the rotor speed with a Lever change Gearbox (see page 11 for detailed instructions).
2. Adjusting the height of the trailing board which by impact shatters the blade-cut "clods" (A). Raised trailing boards also deposit weeds and trash on the surface to wither, whilst lowered trailing boards bury trash as well as having a levelling effect on the soil.
3. Increasing or decreasing the tractor travel speed which alters the size of blade-cut "clods" (A). Higher travel speeds may also be used for shallow work on previously broken ground or scalping passes for weed control.

Working Instructions

Set the depth control equipment to the required tillage depth (page 15 a 17). Select a trial trailing board position and rotor speed (Level change Gearbox) to give the type of tilth required. Engage the tractor PTO and drive forward, progressively lowering the Rotavator into the ground. Proceed for a short distance and check whether the resultant tilth is satisfactory and the tillage depth is uniform across the rotor width. If not, make the appropriate adjustments to produce the required tilth utilising the slowest rotor speed which allows for a reasonable ground coverage. Fast rotor speeds demand more power and increase blade wear leading to less economic operation.

If in doubt consult the Operators Checklist page 25 which provides remedies for most operational problems.



ROTALABOUR USE

The ROTALABOUR is equipped with a special rotor fitted with twisted blades and a rear crumble roller (A) which also serves as a depth control (D).

The principal use of this implement is soil preparation, levelling and seed bed preparation in one pass. This is achieved by the combination of : rotor, blades, articulated trailing board (C) and roller, which break down and gauge the clod size and distribution to obtain a seed bed suitable for the crop to be sown.

NOTE: When using this machine in wet or heavy soil conditions, it is advisable to remove the alternative bars(B) on the roller to avoid balling-up.

See Fig. 32. Crumble roller with two positions 1 and 2.

OPTIONAL EQUIPMENT

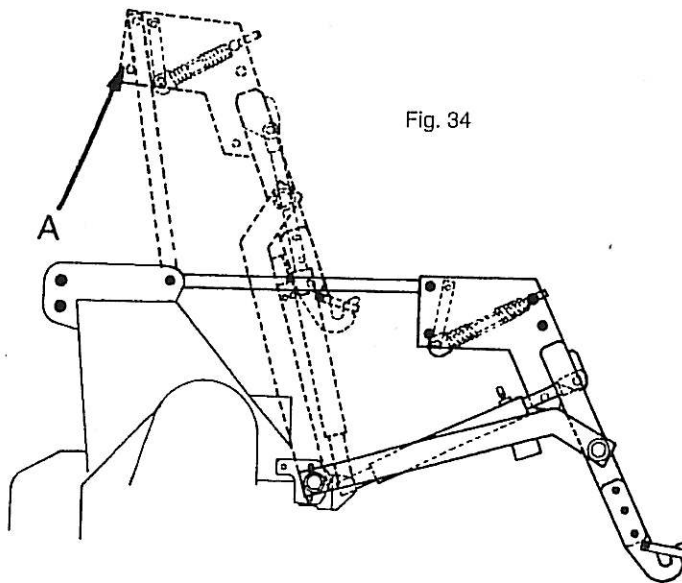
Hydraulic Combi-Hitch

The Rotavator can be fitted with a hydraulic combi hitch as an option, this enables the weight of the mounted implement to be transferred nearer the tractor when is transported, in the raised position the mounted implement is lifted over the top of the Rotavator.

Care has to be taken when attaching the implement to the combi hitch that the rams do not foul any bracketry. A safety pin (A) can be fitted to securely lock the hitch when in the raised transport position. See Fig. 34.

Rear PTO

The rear PTO enables the turbine of gear mounted seed drills and other equipment to be driven.



Operational advice

Insufficient Depth Obtained

- A) adjust depth control equipment
- B) insufficient power : use lower tractor gear, reduce rotor speed
- C) chaincase on hard soil. Further passes required
- D) blades "trowelling" (rolling over ground), increase rotor speed or use lower tractor gear
- E) blades incorrectly mounted

Tilth too fine

- A) raise trailing boards
- B) reduce rotor speed
- C) use a faster tractor gear
- D) convert to 2-blade configuration

Tilth too coarse

- A) lower trailing boards
- B) increase rotor speed
- C) use lower tractor gear
- D) wait until soil is drier if sticks
- E) convert to 3-blade configuration

Blades "Balling up" with soil

- A) ground too sticky for working
- B) increase rotor speed
- C) raise trailing boards
- D) decrease tractor speed
- E) convert to 2-blade configuration

Excessive Blade Wear

- A) reduce rotor speed
- B) replace loose or bent blades

Rotavator "Bumping" on Ground

- A) obstacles entangled in blades
- B) blades incorrectly mounted with no scroll effect or blades fitted with blunt edge leading or broken blades

Obvious Points

- A) ROTAVATOR not level - cutting too deep on right side. Shorten right hand tractor lift rod or adjust depth control wheel (b) Not overlapping - drive closer to last run
- C) Working on hillsides. Work up the slope if possible. If lateral work cannot be avoided, work from the top to the bottom in order to limit any terracing effect.

Rotavating

1. When operating the Rotavator the most suitable practice is to work in "lands"
2. The ROTAVATED ground should always be to the right of the driver.
3. ROTAVATING the field headlands should not be carried out until the "lands" have been completed.
4. Always raise the Rotavator before turning.



THE ROTAVATOR SHOULD NEVER BE LOWERED WHILST THE TRACTOR IS TURNING.