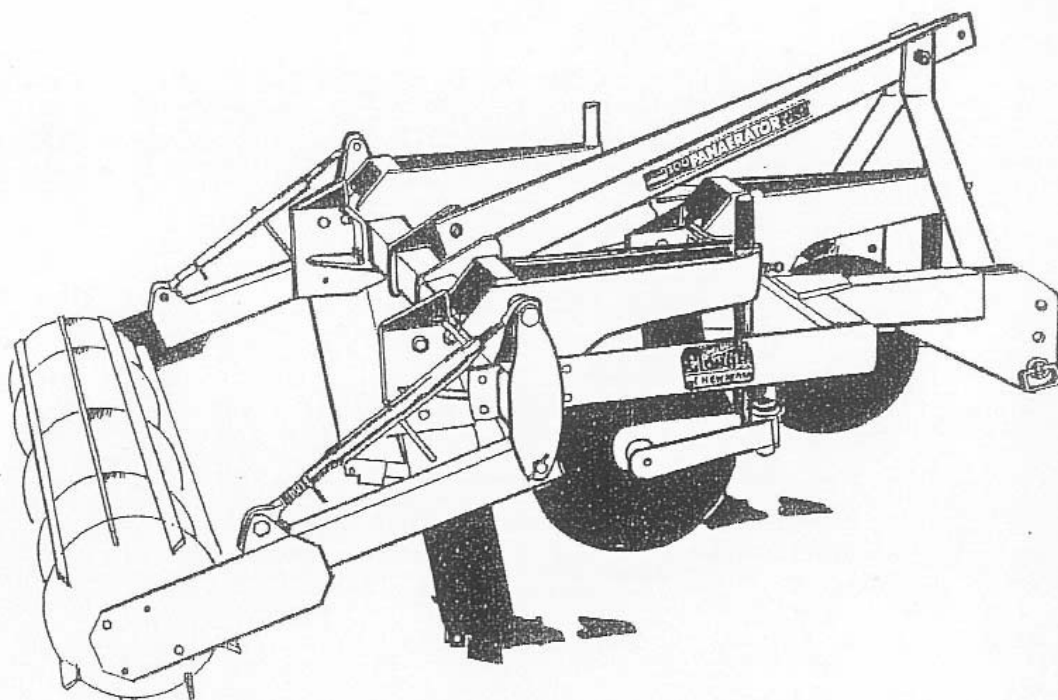


Owners Manual



300 Series Panaerator 'Winged Foot' Soil Aerator/Sub-Tillage Plough



Built to work.

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Introduction

Acquisition & Warranty

On delivery of your new Duncan Series 300 Panaerator, please check that the machine is not damaged. In cases of shipping damage, please ask your dealer to arrange for the appropriate claim to be lodged immediately. Assemble any parts supplied loose and inspect your machine with the aid of this manual to familiarise yourself with its features. If you have any queries ask your dealer straight away. The machine is covered by our 12 month warranty on faulty parts, subject to normal use.

Record below the serial number of your machine and keep it in a secure place to help trace the machine and assist

Model:
Serial No:
Owner:
.....
.....
Delivery Date:
Dealer:
.....
.....

us when you order parts.

The Owner's Manual

Your new Duncan Series 300 Panaerator will give long and efficient service if given normal care and operated properly.

This owner's manual is provided so that you can become thoroughly familiar with the design of the machine and to furnish information on correct operation, adjustment and maintenance. **Only persons well acquainted with these guidelines should be allowed to use the equipment.**

A separate illustrated parts section has been provided so that if any parts are required your dealer will be able to supply them by reference to part numbers.

The manual is considered as part of your machine and must remain with the machine when it is sold.

Right and left hand references in this manual are determined by standing behind the machine and facing in

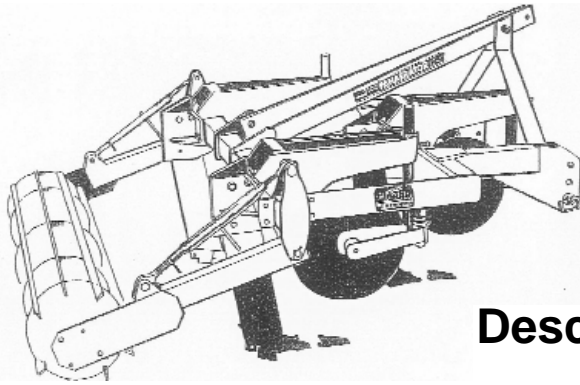


Disclaimer

Every effort has been made to ensure that the information in this manual was accurate and up to date at the time of going to press. Clough Agriculture reserves the right to make subsequent changes to the machine, where necessary, without notification.

The Company will not be responsible for any damage or consequential loss arising out of misinterpretation or failure to follow recommended procedures. Nor will it be liable for any damage caused by or arising out of modification or misuse of its product.

The owner has a responsibility to protect himself and others by observing all safety information and by ensuring all operators are well acquainted with the safety information, trained in the correct use of the machine and applying safe work practices.



Description of Machine

The 300 Panaerator is designed for the breaking up and aeration of compacted ground which has been affected by cultivation, stock, water, tractor and machinery traffic. The machine can be set in various modes to effectively work on permanent pasture, stubble or cultivated ground.

Features

- Heavy duty RHS mainframe
- High tensile linkage stays
- High grade steel legs with two position adjustment and shear bolt protection
- High grade steel wings on foot with two position adjustment and shear pin protection
- Adjustable leg spacing

Specification

Weights & Dimensions

Machine	3 Tine	5 Tine	7 Tine	+ Crumbler
Length (mm)	1582	1582	1582	+930
Height (mm)	1240	1240	1240	-
Width (mm)	1532	2502	3622	+212



ATTENTION

On the machine important safety information is indicated by these symbols. These highlight general safety aspects in regard to the machine rather than specific hazards.



Do not ride or allow passengers on the machine.

Under no circumstances are passengers to be permitted on the machine while it is in operation or being transported. Any footboards and/or footsteps are provided solely for the purpose of preparing the machine for use.



Keep clothing and body extremities well clear of pinch points while the machine is operating (seeding or calibrating). Keep well clear of moving parts at all times.

These signs typically occur wherever trapping points exist. These include drive chains, sprockets, shafts, wheels, discs, pivot points, etc. Guards are provided with the machine for safety reasons (where practical without compromising machine performance). Ensure these are always fitted during operation.



Always exercise extreme caution in the vicinity of sharp edges and points.

Where possible guards are provided with the machine for safety reasons (where practical without compromising machine performance). Ensure these are always fitted during operation.



Footboards, footsteps, drawbars and other machine surfaces may be slippery when wet.

Apply extra caution in wet conditions and in the early morning when surfaces are wet.

KEEP CLEAR

Keep Clear. (It is dangerous to be in this area when the machine is operating.)

SAFETY - General

N.B. Throughout this manual important safety information is indicated by these symbols in the margin:



A **prohibition** should be observed under all circumstances.



A **warning** indicates a hazard that could cause death or injury if the warning is ignored.



A **caution** indicates a hazard that may cause damage to property if the caution is ignored.

This section of the manual offers general guidelines for the safe operation of machinery. It does not replace local safety regulations. These guidelines were current at the time of publication, but may be superseded by later regulations.

Clough Agriculture has made every effort to highlight all risks to personnel or property. Owners and operators have a responsibility to exercise care and safe work practices at all times in the vicinity of the machine.

Owners are advised to keep up to date on safety issues and to communicate these to all users of the machine.

Contact the Occupational Safety and Health Service (OSH) for further information about general safety aspects. If you have safety concerns specifically related to this machine, contact your dealer immediately.

Operator Safety

Read this manual carefully before operating new equipment. Learn how to use this machine safely. Be thoroughly familiar with the controls and the proper use of the equipment before using it.

Take careful note of all safety instructions both in this manual and on the machine itself. Failure to comply with instructions could result in personal injury and/or damage to the machine.

Replace missing or damaged safety signs on the machine and ensure that these remain clearly visible.

It is the owner's responsibility to ensure that anyone who operates, adjusts, lubricates, maintains, cleans or uses the machine in any way has had suitable instruction and is familiar with the information in this manual (particularly with regard to safety aspects).

Operators and other users of the machine should be aware of potential hazards and operating limitations.

Be Prepared for Emergencies

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance, hospital and fire department near your telephone.



SAFETY - General (Continued)



Appropriate Dress

Wear close fitting clothing and avoid rings or other forms of jewellery which could become caught in the machinery.

People with long hair must have it securely fixed and confined close to the head.

Refer to local safety standards for protective clothing and recommended safety equipment.



Transport This Machine Safely

Ensure that all linkage pins and security clips are fitted correctly. With trailing machines tow with the drawbar only, as this is the only safe towing point on the machine.

Always check that bystanders (especially children) are well clear (front and rear) before starting and moving the tractor and the machine.

Plan safe routes of travel, and be aware of power lines and other roadside hazards. Take particular care when towing implements on hillsides.

Do not ride or allow passengers on the machine.

This machine is not designed to carry passengers, and no riders are permitted.

Road transport

On public roads,

- A speed of 40km/h must not be exceeded.
- Do not operate during the hours of darkness unless standard lights are fitted and clearly visible. (This also applies when visibility is limited, e.g., in foggy conditions.)

See the *Vehicle Dimension and Mass Rule*, issued by the Land and Transport Safety Authority.

Avoid tip-overs

Avoid holes, ditches and obstructions which may cause the machine to tip over, especially on hillsides. Never drive near the edge of a gully or steep embankment - it might cave in. Slow down for hillsides, rough ground and sharp turns.



SAFETY -General (Continued)

Handle Agricultural Chemicals Safely

All farm chemicals should be stored, used, handled and disposed of safely and in accordance with the supplier's/manufacture's recommendations.



Read the product label before using, noting any warnings or special cautions, including any protective clothing or equipment that may be required, ie. respirtor.

Do not eat or smoke while handling sprays, fertilisers, coated seeds, etc. Afterwards, always wash your hands and face before you eat, drink, smoke, or use the toilet.



Store sprays, fertilisers, coated seeds, etc. out of reach of children and pets, and away from food and animal feeds.

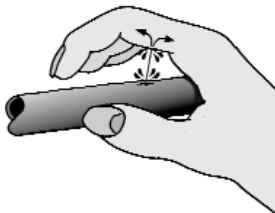
Any symptoms of illness during or after using chemicals should be treated according to the supplier's/manufacture's recommendations. If severe, **call a physician or get the patient to hospital immediately.** Keep the container and/or label for reference.

Avoid High Pressure Fluids

Avoid any contact with fluids leaking under pressure, because the fluids can penetrate the skin surface.



Any fluid which penetrates the skin, will need to be **removed immediately by a medical expert.** Seek specialist advice on this type of injury.



Relieve the pressure before disconnecting any hydraulic or other lines. Make all repairs and tighten all fittings before re-connection to pressurised fluid.

Keep your hands and body away from any pinholes or high pressure jets. Search for leaks with a piece of cardboard instead of using your hand directly.

Safe Work Practices

All farm machinery is potentially dangerous and should be treated with caution and respect.



Before starting the machine, ensure that all controls are placed in neutral and that bystanders are well clear. Check that the guards have been securely fitted and that any adjustments have been made correctly.

Where possible, disconnect or isolate the drive mechanism to the implement. Lower the machine onto the ground when not in use.

SAFETY - General (Continued)



Practise Safe Maintenance

Keep the machine in safe working condition. Routine maintenance and regular servicing will help reduce risks and prolong the life of the machine.

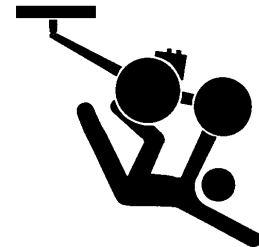
General Maintenance

Accidents occur most frequently during servicing and repair. The following general rules must be followed when maintaining or working with machinery:

- All operating and maintenance manuals must be read before and referred to while using or servicing any piece of equipment.
- Turn off all machinery power sources and isolate the machine before making adjustments, doing lubrication, repairs or any other maintenance on the machine.
- Ensure that the machine hydraulics are disconnected from the power source.
- Wear gloves when handling components with cutting edges, such as any ground cutting components.
- Beware of hazards created by springs under tension or compression when dismantling or maintaining the machine.
- It is recommended that you clean the machine with a water blaster or similar apparatus before commencing maintenance.

Make Sure the Machine is Well Supported

When machinery is fitted with hydraulics, do not rely on the hydraulics to support the machine. During maintenance or while making adjustments under the machine, always lock the hydraulics and support the machine securely. Place blocks or other stable supports under elevated parts before working on these.



Electrical Maintenance

Disconnect the electrical supply from the tractor before doing any electrical maintenance.



Welding

With electronic equipment in modern tractors it is advisable to disconnect the machine from the tractor, or at least disconnect the alternator and battery before attempting any welding.



Use Only Genuine Spare Parts

Unauthorised modifications or non-genuine spare parts may be hazardous and impair the safe operation and working life of the machine.

Excess lubricants must be disposed of safely so as not to become a hazard.

SAFETY - Machine Specific

This section gives specific guidelines for safe operation of the Panaerator.

These guidelines were current at the time of publication but may be superseded by later circumstances. They do not necessarily cover every possible hazard and must be read with the **SAFETY - General** section (Pages 4 - 8).

Hazard Points on the Panaerator

The lists below are not all-inclusive and serve only to highlight the more obvious areas of risk. The decals attached to the machine are a general reminder that there are hazardous areas, rather than specifically highlighting all possible hazards.

No Ride

Passengers are not permitted anywhere on the machine



Pinch Points/Moving Parts

Hazardous areas include:

- ✓ Coulters.
- ✓ Crumbler arms and crumbler.



Slippery When Wet

Hazardous areas include all smooth surfaces on the frame structure.



Slippery
When
Wet

Keep Clear

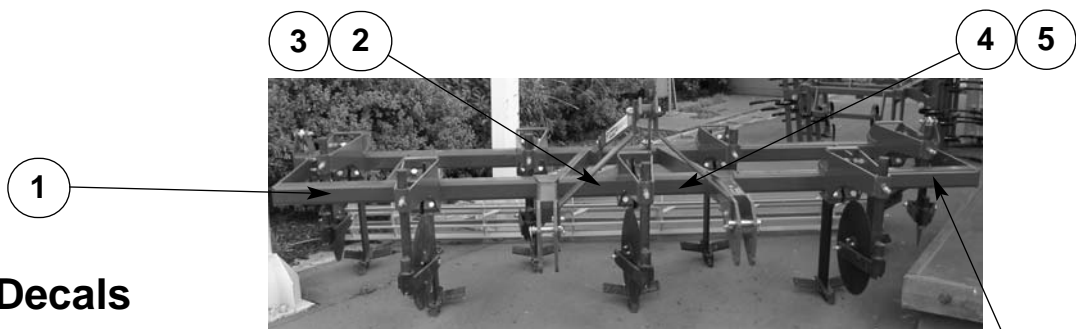
Hazardous areas include:

- ✓ Between the tractor and the cultivator.
- ✓ Immediately adjacent to the cultivator sides.
- ✓ The rear of the machine, including the revolving crumbler.

KEEP CLEAR

Sharp Points

Hazardous areas include all tine points.



Safety Decals

Item	Decal/Guard	Part No	Qty
1	'Keep Clear'	43904	2
2	'Pinch Point/Moving Parts'	43901	1
3	'No Ride'	43900	1
4	'Slippery When Wet'	43902	1
5	'Sharp Points'	43903	1



Transport

Transportation is by three-point linkage.

- 1 Raise the three point linkage as high as possible to maximise ground clearance. Ensure that ground clearance is sufficient.
- 2 Ensure that all linkage pins and security clips are fitted and operate correctly.
- 3 Ensure lighting and oversize warning requirements meet recommendations published by the Land Transport Authority or equivalent.
- 4 Ensure vehicle requirements are adequate for the linkage machine, e.g. mass, brakes. Refer to the recommendations published by the local Land Transport Authority or equivalent.

Operation

General Guidelines

- 1 Use a sufficiently powerful tractor which is heavy enough to operate the machine safely.
- 2 Typical travel speeds when cultivating range from 6 - 10km/hr in good conditions. Slower speeds may be more suitable in less ideal conditions.
- 3 Check that the cultivator is level during cultivation.
- 4 The crumbler is for rolling down pasture and assisting cultivation in worked ground. Excess crumbler loading will over stress the crumbler and framework, and will provide poorer performance in minimising ridging.
- 5 Raise the cultivator out of the ground before turning, to prevent tine breakages and excess stress on the framework.
- 6 **Recommended Hp.**
Tillage results will be affected by the Hp.
As a guideline, 25 Hp is required per leg.



Caution

Using a tractor with excessive Hp can overload the framework.

Operation (Continued)



Operating the Panaerator

Hitching

- 1 Connect the linkage arms of the tractor to the bottom links of the Panaerator. Of the three hitch holes, choose the one that will give the amount of transport clearance or working depth required. The tractor linkage lift setting can also be adjusted to achieve the overall balance required.
- 2 Attach the tractor top link assembly to the top link of the implement. The top link assembly should be adjusted to level the Panaerator front to rear when working.
- 3 To level the implement, side to side, use the tractor's adjustable linkage.

Fitting Replaceable Points to Foot Assembly

Fit the point onto the toe and drive it firmly up the taper until it is wedged tightly. This will adequately secure the point for most conditions.

Note

Wear on points will fluctuate with different ground conditions, in the same way that plough shares and cultivator points do. Check the points periodically, and when the dip is worn off the underside, remove, turn over and re-attach. Full dip will then be restored. Continue this pattern until the point is worn out.

Setting the Depth

When fitted with a crumbler/roller, the depth for working is set by simply adjusting the crumbler up or down, using the turnbuckles fitted. If your unit does not have a crumbler, the operator will need to control the depth by setting the tractor hydraulic linkage to suit. Tractors which do not have lower link sensing would need to be set on position control to ensure a constant working depth.

Coulters

If the machine is fitted with coulters (cutting discs), ensure that each coulters is set to cut in line with corresponding leg. Generally coulters are only used when aerating pastures, and in this application it is desirable to leave the pasture surface as tidy and undisturbed as possible. If the coulters is running off centre to the leg, it will produce a 'double cut' which is less tidy than the minimal disturbance achieved when the coulters and leg are in line.

Operation (Continued)

Operating the Panaerator (Continued)

Setting Angle of Winged Foot

The winged foot has two settings. Alteration is made by inserting the bolt which locates the rear of the foot, into the upper or lower hole provided on the rear edge of the leg. The upper hole sets the point to the most aggressive position. The lower hole provides the standard aggression setting.

Setting Angle of Leg

The leg has two settings also. The leg shear bolt (12mm) is also a locating bolt. By placing the shear bolt in the rear hole of the two provided, the leg is set in the standard mode. If the forward hole is used, the leg is set to the aggressive mode.

Note

By using a combination of the various angle settings for the leg and foot, the operator can tune the unit to the performance required in different areas and soil types, in effect controlling the amount of aggression or shattering produced. For instance, in pasture where the object is to shelter the compaction or pan but keep the surface disturbance to a minimum, the standard setting for foot and leg is generally used. In ground that is to be cultivated, the aggressive setting is generally used, as this produces stronger shattering with more fissures and cracks, and as a result reduces the cultivation needed afterwards. However, any combination of settings between 'standard' or 'most aggressive' can be used should the nature of the ground or other factors make this desirable.

Leg Spacing

Panaerators leave the factory with legs spaced 21 inches apart. This is a good norm for both pasture and cultivation work. However, the frame is designed to allow the legs to be spaced from 18 inches to 22 inches apart. If used in the most aggressive setting in ground that is to be cultivated, and even more shattering is desired by the operator, this can be achieved by reducing the spacing and bringing the legs closer together. To do this, loosen the leg clamp plate bolts, move the leg to the required spacing, and retighten the bolts firmly.

Operation (Continued)

Operating the Panaerator (Continued)

Functional Performance of Roller/Crumbler

The functional purpose of the roller/crumbler is to roll down pasture and assist cultivation in worked ground. Set correctly, it will achieve both objectives. The impact bars of the crumbler are set at an angle to the axis.

When aerating pasture, the angle should be leaning forward. In this case, the impact bar will be vertical to the ground when it makes contact with the surface, pressing the ground with the same effect as a roller.

When working in ground to be cultivated, the crumbler is turned end to end, so that the lead on the impact bars is rearward. In this setting, when the bar comes in contact with the ground, it is sloped forward and downwards, and produces a digging action as it moves through the ground.

If the draft is set correctly, this will allow some linkage float. If draft is not available, then a sliding top link is recommended to prevent excess crumbler loading.

Functional Sliding Top (Optional)

Unlike a normal link assembly, the sliding top link has one end threaded for setting adjustment, and the other end slides. Its purpose is to allow the Panaerator to lean back when lifting it out of the ground at the end of a run. This allows the foot assemblies to plane out of the ground pointing upwards, giving a clean exit. When going back in on the next run, the ground pressure on the points closes the sliding top link as far as the setting originally chosen by the operator.

Maintenance & Care



General Safety and Accident Prevention

- 1 Make sure that if the tractor remains attached to the drill that the ignition key is removed.
- 2 During maintenance the implement should be supported in such a manner that if hydraulic failure was to occur the machine would still be adequately supported.
- 3 Wear gloves when handling components with cutting edges such as worn discs.
- 4 Disconnect the electrical supply from the tractor before doing any electrical maintenance.
- 5 Refer to safety sections for more safety information.



General Cautionary Maintenance

1 Electric Welding

With the electronic equipment in modern tractors and on implements, it is advisable to completely disconnect the implement from the tractor, or at the very least disconnect the alternator before attempting any welding.



2 Hydraulics

Ensure hydraulic couplings (male and female) are clean before connecting. Dirty couplings will result in hydraulic oil contamination, hydraulic cylinder seal damage and bore scores. This in turn will result in oil leakage past the piston seals.

No filter is fitted to the hydraulic system. If hydraulic fittings and oil supply are not going to be kept clean it is recommended that a filter be fitted to prevent hydraulic cylinder damage.



3 Water Blasting

Water blasting, steam cleaning or other pressurised cleaning processes can force dirt etc. into undesirable places that may cause damage or rapid part wear to items such as bearings, seals, chains, bushes. Caution must be exercised.

Maintenance & Care (Continued)

Your new Series 300 Panaerator will give long and efficient service if given normal care and maintained properly.

Maintenance Schedule

1 Bolted Connections

All bolted connections on the machine should be checked after the first use (or 50Ha) and retightened if necessary. Thereafter, check the connections at regular intervals to minimise equipment damage and accidents resulting from loosening of the fasteners. It is suggested that this check is done annually or after every 500Ha (whichever occurs first).

2 Leg and Coulter Assemblies

Prior to daily operation, check that all leg and coulter assembly components are tight.

3 Framework

The framework structure should be inspected annually for defects, i.e. cracks in members or welded connections. The framework should be cleaned prior to inspection.

4 Lubrication

Crumbler bearings are prepacked and sealed. However, the housings require greasing weekly or every 250Ha (whichever occurs first). Coulter hubs also require greasing weekly or every 250 Ha. Castrol MP grease is recommended.

Schedule Summary

Components	Daily (or after 50Ha)	Weekly (or after 250Ha)	Annually (preseason)
Leg Assembly	●	●	●
Coulter Assembly	●	●	●
Crumbler Pivot Pin Fasteners		●	●
Bolted Connections		●	●
Framework			●

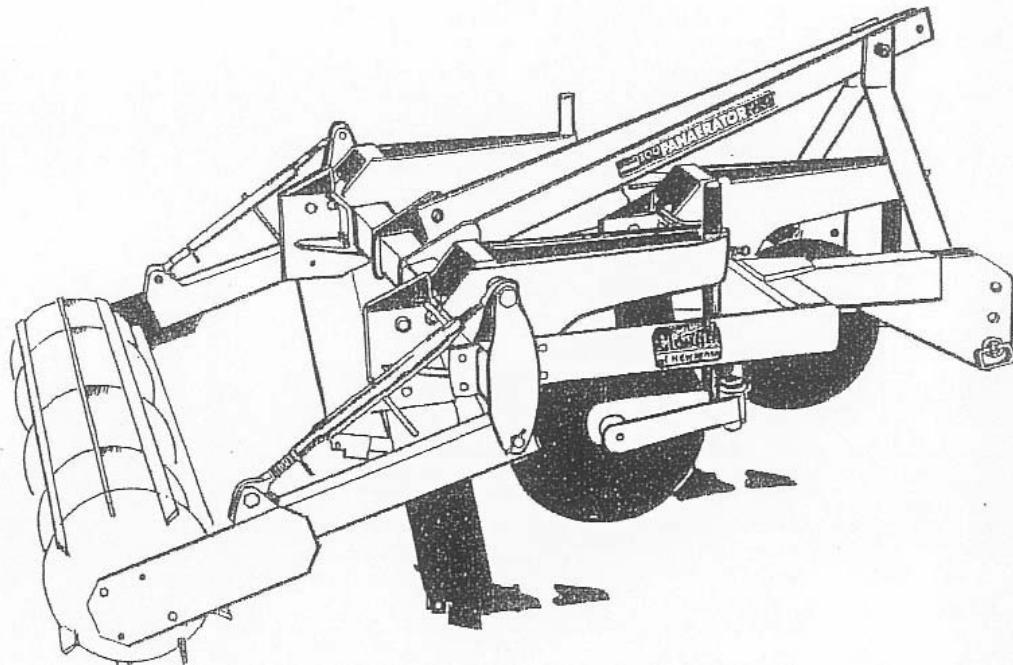
Storage

Before long-term storage, water blast the machine and remove mud and excess soil.

Parts List



300 Series Panaerator 'Winged Foot' Soil Aerator/Sub-tillage Plough

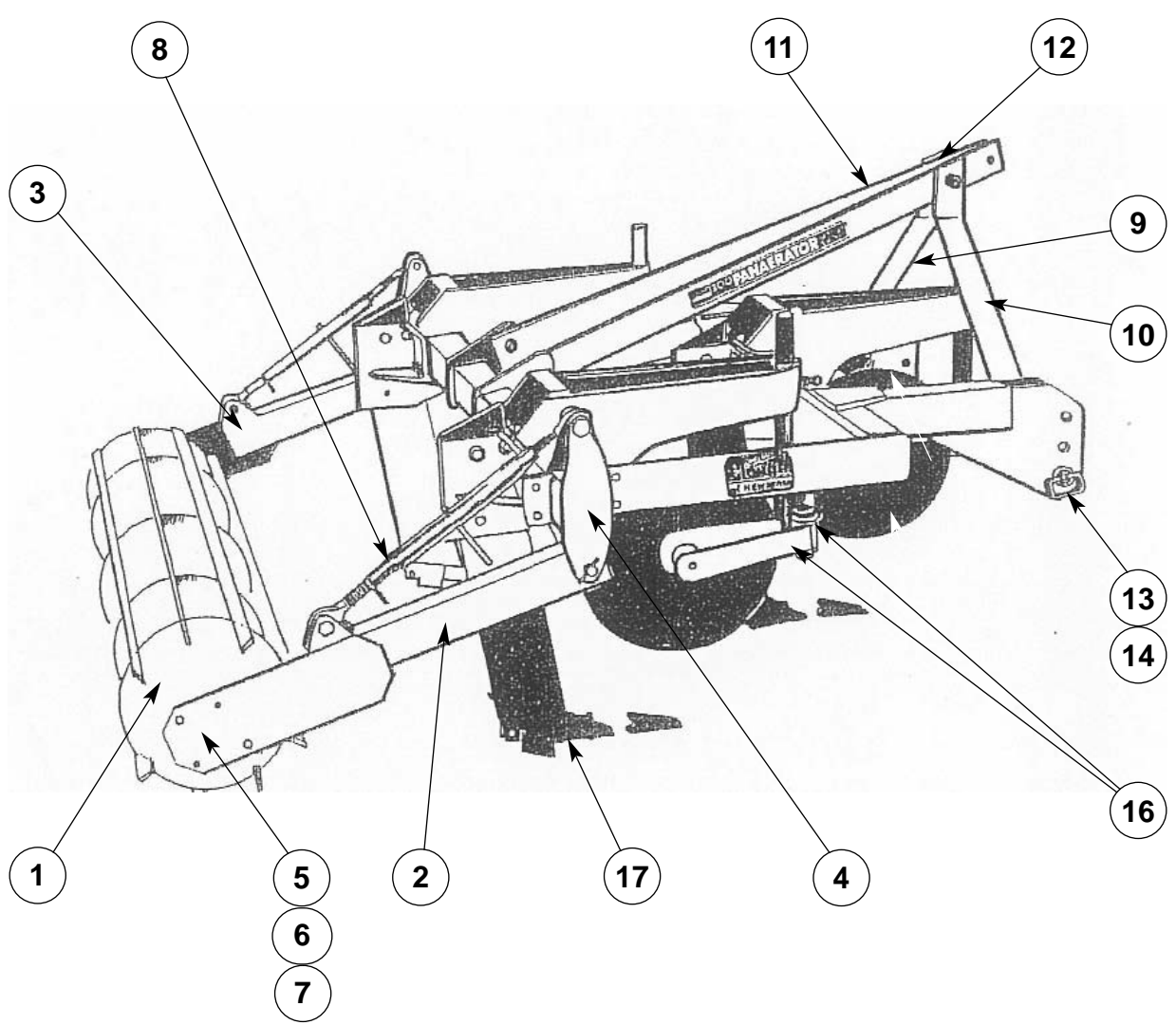


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300 Series Panaerator

Main Frame & Crumbler Assembly

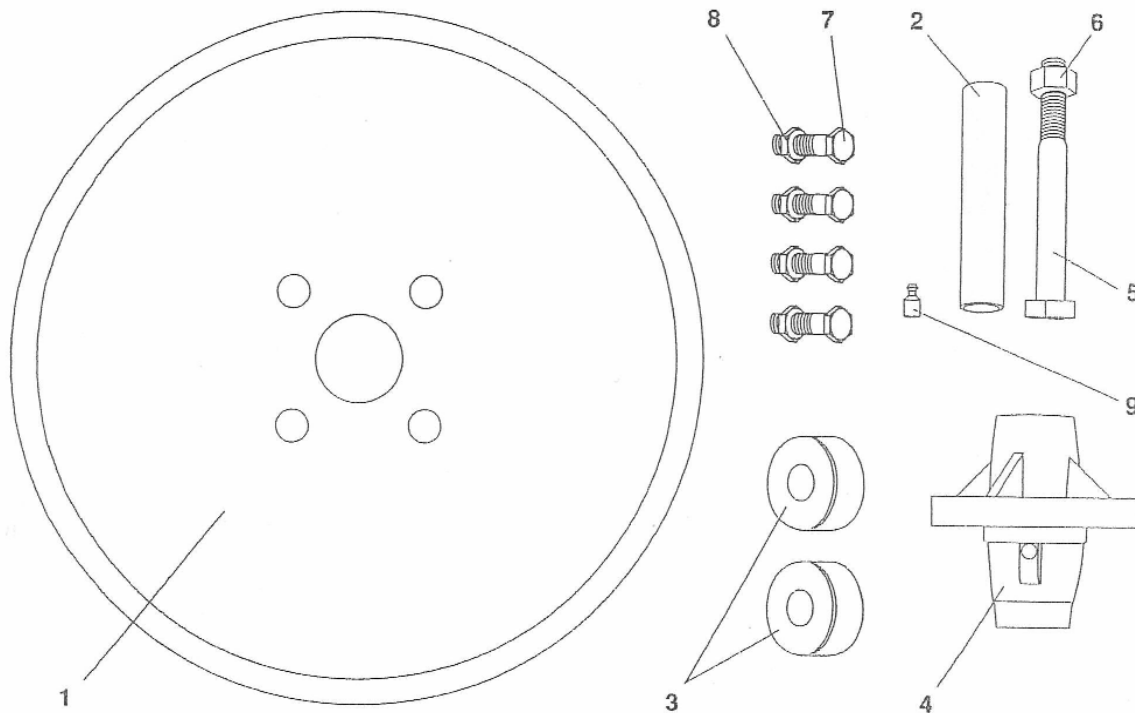
Item	Part No.	Description	Qty
1	300093	3 Leg Crumbler Bare	1
1	300096	5 Leg Crumbler Bare	1
1	300098	7 Leg Crumbler Bare	1
2	300083	RH Crumbler Arm Assembly	1
3	300084	LH Crumbler Arm Assembly	1
4	300078	Pivot Support Assembly	2
5	43145	Crumbler Bearing	2
6	43061	Bearing Housing	2
7	4920650	Crumbler Spacer	2
8	4800174	Turnbuckle	2
9	300045	LH Front Support Stay	1
10	300046	RH Front Support Stay	1
11	300047	Rear Link Support Stay	2
12	4950073	Top Link Spacer	1
13	45295	Lower Link Pin	2
14	45292	Lynch Pin	2
15	300112	Sliding Top Link (Not Shown)	
16	Refer Page 4	Coulter Assembly	1*
17	Refer Page 5	Leg Assembly	1*

* Quantity per leg

300 Series Panaerator Coulter Assembly

Item	Part No.	Description	Qty*
1	4800304	18" Plain Coulter	1
1	4800318	18" Fluted Coulter (Optional)	1
1	4104430	Coulter Centre (Complete Assembly), Incl. Items 2 - 9	1
2	4104405	Coulter Axle	1
3	4104415	Sand Washer	2
4	4104425	Coulter Centre (Bare)	1
5	45476	Coulter Axle Bolt	1
6	45132	Coulter Axle Nut	1
7	45420	Coulter Blade to Hub Bolt	4
8	45138	Nyloc Nut	4
9	43008	Grease Nipple	1
10	300028	Coulter Fork Assembly (Not Shown)	1
11	300033	Coulter Stalk Assembly (Not Shown)	1

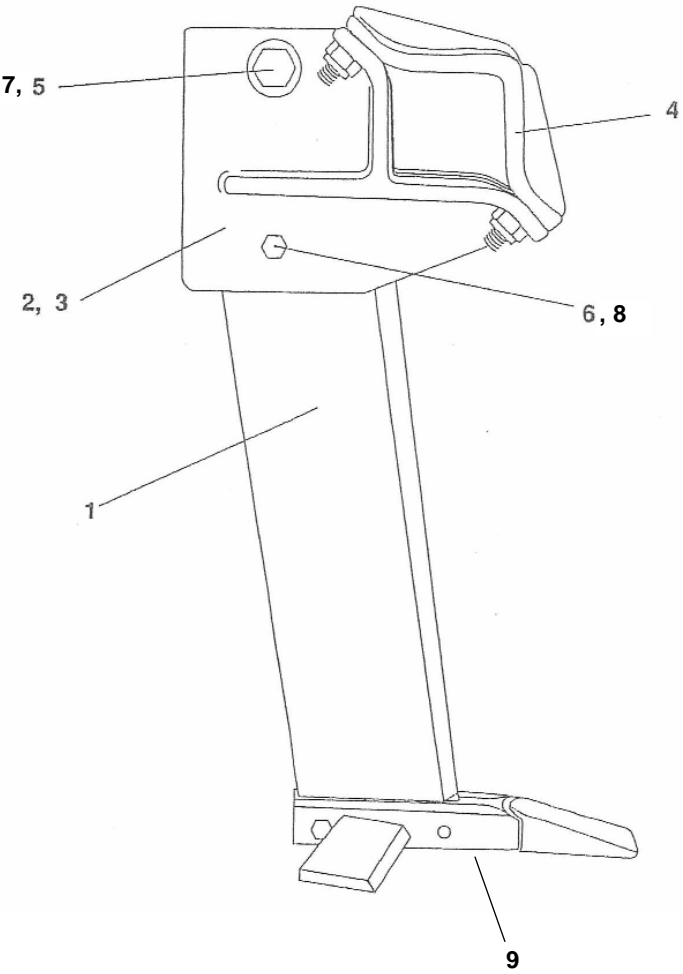
* Quantity per leg



300 Series Panaerator Leg Assembly

Item	Part No.	Description	Qty*
1	300020	Bare Leg	1
2	300012	RH Leg Clamp Support Assembly	1
3	300014	LH Leg Clamp Support Assembly	1
4	300016	Leg Mount Clamp Plates	2
4	300042	Coulter Support Extension Assembly (Not Shown)	1
5	45065	Leg Mounting Bolt	1
6	45026	Leg Protection Shear Bolt	1
7	45141	M20 Nut	1
8	45139	M12 Nyloc Nut	1
9	Refer Page 6	Wing Foot Assembly	1
	300162	Standard Leg Kit Assembly (Including Mounting Plates)	
	300160	Coulter and Leg Kit Assembly (Including Mounting Plates)	

* Quantity per leg



300 Series Panaerator Foot Assembly

Item	Part No.	Description	Qty*
1	300006	Foot Assembly	1
2	4800411	RP Tip	1
3	3001711	RH Wing Assembly (Replacement Part)	1
4	300172	LH Wing Assembly (Replacement Part)	1
5	300004C	RP Toe Casting	1
6	45290	Shear Pin (Roll Pin)	1
7	45026	Foot Adjustment Bolt	1
8	45139	M12 Nyloc Nut	1

* Quantity per leg

