Dutchman

I N D U S T R I E S

U.S Patent Number: 6244643

DIVISION OF

Dutchmaster Nurseries Ltd.

Truck Spade
O w n e r s M a n u a l

Manufactured and Sold by
Dutchman Industries Inc.
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Ontario, Canada L0H 1A0

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Serial Number:_____
Date Of Purchase:_____

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1. SAFETY INSTRUCTIONS

The safety of the operator is of great importance to Dutchman Industries Inc. We have provided decals and other safety features for your protection. In addition, we ask you to be a careful operator and to properly use and service your Dutchman equipment.

➔ ***ATTENTION: This ARROW symbol is used throughout this manual to call attention to the safety instructions.***
➔ ***WARNING:*** **Before attempting to operate the Truck Spade, carefully read and follow the instructions given below and contained else-where in this manual.**

1.1 Before Operating

1. Read and follow all instructions contained in:
    a. This Truck Spade Operator's Manual
    b. Truck Operator's Manual
    c. Decals placed on the Truck Spade.

2. Note: Additional copies of the above mentioned materials can be obtained from your Dutchman dealer.

3. Be careful to avoid underground gas lines, water lines, power lines, and other installations. Check with reliable authorities regarding their location.

4. Be sure the unit is in good operating condition and that all safety devices are in place and secured. If they must be removed for service or maintenance, reinstall them before starting the truck engine.

5. Check overhead for electrical power lines or other obstructions and be certain there is adequate clearance.

6. Be sure truck tires are properly inflated.

7. A fire extinguisher with at least a 4A-10BC rating should be carried at all times, in case of fire.

1.2 During Operation

1. Do not allow anyone to ride on the machine.

2. Be conscious of all height clearances, especially when moving the tree spade to or from its vertical position.

3. Do not attempt to move trees with a diameter in excess of 12 inches (30cm).

4. Keep all others, especially children, away from the machine.

5. Be sure everyone is clear before opening or closing rear of the tree spade.

6. Keep hands, feet, and clothing away from all moving parts.

7. Whenever digging on a slope, the truck should face up or down the slope. Do not attempt to dig with truck facing across slope. The truck may become unstable and rollover.

8. Never allow anyone to work under raised tree spade. It could drop unexpectedly resulting in severe personal injury or death if you are trapped beneath it.

9. Refer to page 8 for instructions concerning normal shut-down procedure.

1.3 During Service and Maintenance

1. Before working on or near tree spade for any reason, including servicing, cleaning or inspecting machine, use normal shutdown procedure (page 8) unless instructed differently in this manual.

2. Check periodically and tighten or replace any loose or cracked bolts, hoses, or connections.

3. Use only parts authorized by Dutchman Industries for repair or replacement.

4. Hydraulic fluid escaping under pressure can be invisible and can have sufficient force to penetrate the skin. When searching for suspected leaks, use a piece of wood or cardboard rather than your hands. If injured, seek medical attention immediately to prevent serious infection or reaction.

5. Cycle all hydraulic controls to relieve all pressure in the hydraulic controls to relieve all pressure in the hydraulic system before disconnecting the lines or performing other work on the system. Some residual pressure will probably remain in the tilt cylinders which are equipped with lock-out valves. When loosening lock cartridges of fittings in lines where residual pressure may exist, slowly loosen lock cartridge or fitting until oil begins to leak. Wait for leaking to stop before disconnecting lock cartridge or fitting. Make sure all connections are tight and that hoses and lines are in good condition before applying pressure to the system.

6. Blades will drop if hydraulic lines, are disconnected when blades are raised. Before disconnecting or loosening any part of the spade hydraulic system, lower spade to ground to prevent falling.

1.4 When Transporting

1. Be courteous and obey all applicable laws governing road use.

2. Be sure to properly confine tree branches. In some cases, limbs may have to be removed. Check with proper authorities regarding maximum width and height limitations.

3. Be conscious of all height clearances.

➔ ***WARNING:*** Failure to comply with the above safety instructions or those that follow within this manual could result in severe personal injury or death.

This truck spade attachment is not to be used for any purpose other than that for which it is intended as explained in the operator's manual, advertising literature or other Dutchman written material pertaining to the truck spade.

1.5 Safety Decals

Safety decals located on your machine contain important and useful information that will help you operate your equipment safely. Each of these safety decals are shown below and in the parts book under “decal assembly”. All safety decals also appear elsewhere in parts manual where they are displayed with other assemblies of which they are a part.

To assure that all decals remain in place and in good condition, follow the instructions given below:

1. Keep decals clean. Use soap and water – not mineral spirits, adhesive cleaners or other similar cleaners that will damage the decal.

2. Replace any damaged or missing decals. When attaching decals, surface temperature of the metal must be at least 40°F (5°C). The metal must also be clean and dry.

3. When replacing a machine component to which a decal is attached, be sure to also replace the decal.

4. Replacement decals can be purchased from your Dutchman industrial equipment dealer.

2. INTRODUCTION

Every effort has been made to ensure that the information contained in this manual is correct at the date of publication; but, due to continuous improvement, Dutchman Industries Inc. reserves the right to make changes in the contents without notice or obligation.

This manual is shipped with each machine to familiarize the operator with the proper operating, maintenance and lubrication instructions to insure the best possible performance and service from the machine. Study and understand these instructions thoroughly before operating the machine. We recommend that this manual be readily available for reference at all times. Consult your Dutchman dealer if any instructions in this manual are not understood.

This Truck Spade was designed and manufactured by Dutchman Industries Inc., Ontario, Canada. Dutchman Industries Inc. reserves the right to make changes in engineering, design and specifications, add improvements, or discontinue manufacture at any time without notice or obligation.

2.1 Ordering Parts

When ordering parts always specify your model number, serial number, and the number of parts you wish to order.

➔ ***IMPORTANT:*** When replacement parts are needed, use the listed parts numbers and descriptions to insure fast and accurate shipment of your order.

Only authorized parts should be used for repair and/or replacement.

2.2 Identification Plate

The serial number is stamped on an identification plate, Figure 1, with the machine model number. The model number and serial number are important when service and/or parts required.

Figure 1- Dutchman License Plate

3. MOUNTING TO TRUCK FRAME

Figure 2 & 3- Mounting Setup between Truck Frame and Spade Superstructure
(*Ensure nuts & bolts are tight*)

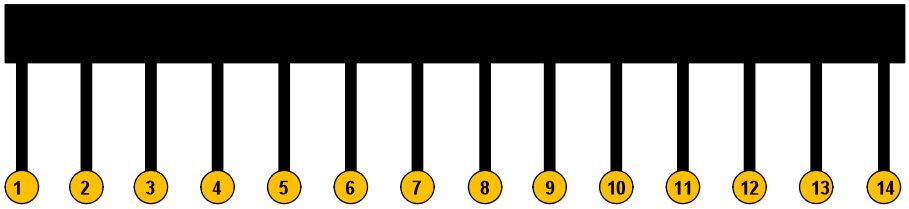
4. CONTROLS

4.1 Controls Orientation

➔ ***NOTE:*** Left and right sides of the machine and the direction of travel are determined by facing the machine from the spade end.

4.2 Identification of Controls

1. Mast – Lock
2. Mast – Lift
3. Mast – Tilt
4. Blade 1 – Up and Down Control
5. Blade 2 – Up and Down Control
6. Blade 3 – Up and Down Control
7. Blade 4 – Up and Down Control
8. Gates – Lock
9. Gates – Left
10. Gates – Right
11. Push Pads
12. Stabilizer/Outrigger – Left
13. Stabilizer/Outrigger – Right



WATER PUMP	MAST			BLADES				GATES			PUSH PADS	STABILIZERS	
	LOCK	LIFT	TILT	1	2	3	4	LOCK	LEFT	RIGHT		LEFT	RIGHT

Figure 3: Control Layout

4.3 Normal Shut-Down Procedure

For your own safety and the safety of others, you must use the following normal shut-down procedure before leaving the controls unattended for any reason, including servicing, cleaning or inspecting the truck or tree spade. A variation of the following procedure may be used if so instructed within this manual or if an extreme emergency requires it.

A. Lower tree spade to ground or into transport position.

B. Disengage Power Take-Off (PTO).

C. Set park brake.

D. Shut off engine and remove key.

5. PRE-STARTING INSTRUCTIONS

To insure long life and economical operation; we highly recommend the operator of the tree spade be thoroughly instructed in maintenance and operations of the machine. There is no substitute for a sound, preventative maintenance program and a well-trained operator.

Prior to starting the engine, we recommend the operator make a visual inspection of the machine and make any necessary adjustments and repairs. This can be done as the lubrication is being carried out.

➔ ***WARNING:*** Before inspecting machine use normal shutdown procedure on page 8 unless instructed differently below.

➔ ***WARNING:*** Hydraulic fluid escaping under pressure can be almost invisible and can have sufficient force to penetrate the skin. When searching for suspected leaks, use a piece of wood or cardboard rather than your hands. If injured, seek medical attention immediately to prevent serious infection or reaction.

Check the following on the truck spade:

1. Frame and superstructure for signs of wear or fatigue.

2. Mast and Neck for signs of wear or fatigue.

3. Locking Device when in transport position. Ensure lock is fully closed.

4. Blades for signs of wear or fatigue.

5. Blade cylinder trunnion mounts and two lower pins.

6. Spade bolts of tightness.

7. Check for operation of lock-out valves in stabilizer, lift, and tilt cylinders.

8. Hydraulic fluid level in reservoir.

9. Hydraulic components for leaks.

10. Installation and condition of shields.

11. Condition of decals.

12. All grease fittings hold grease.

DIGGING SEQUENCE

TRUCK SPADE

[1] The truck spade is positioned in an up-right position with blades raised and gate in an open position

[2] With blades up, hydraulically open gate. Reverse into the tree so that the entire unit is backed into position

[3] Close the gate, lock the gate lock, and ensure that the spade is completely centered around the trunk of the tree

[4] Place the spade downward onto the ground, activate rear stabilizers which will apply the necessary down pressure.

[5] Insert blade (one at a time) until spade starts to rise upward. Then retract blade until frame settles back down. Then activate another blade and repeat until you come back to the first blade started.

[6] Repeat step 5 until all blades are inserted to their fullest depth

[7] Retract stabilizers and slowly lift the tree spade out of the hole. The tree roots will be completely enclosed within the pod blades of the tree spades

[8] After the tree is raised from the hole, the tree is tilted into a horizontal position. The tree is ready for transporting to it's new location.

6. OPERATING INSTRUCTIONS

➔ ***WARNING:*** Before attempting to operate this tree spade, refer again to pages 2-5 for important safety information.

6.1 Digging the Receiving Hole

Position the tree spade over the approximate location for the receiving hole. Engage the hydraulic pump. Do not run the pump while machine is in transport. Set the truck engine at the proper rpm for the hydraulic pump to deliver 18 gallons per minute (68 L/min.)

The control levers are clearly marked as to their function. Permit no one to operate the spade without proper instruction.

Push the two outrigger control levers to lower the outriggers for support and to level the spade. The outriggers will prevent the front of the truck from rising.

Release the transport lock and using the tilt control lever move the tree spade frame to a vertical position. Using the spade control levers, raise all four blades.

➔ ***DANGER:*** This machine will conduct electricity. Maintain adequate clearances from electrical power lines to avoid accidental contact. Death or serious injury may result if such contact is made.

Push the lift control level to lower the spade to the ground.

Use the shift extension and side shift control levers, if equipped, to precisely locate the tree spade.

If equipped with a gate locking device, engage the lock lever at this point. Continue to lower the spade frame to the ground exerting enough pressure to raise the truck frame slightly. Open the water valve (if equipped). Insert each spade into the ground until the rear frame starts to lift. Raise each spade about 2” (5 cm) to allow water to run into the cavity left by each spade. This provides more lubrication for the next sequence. Continue to insert the blades into the ground at about 10” (25 cm) intervals, keeping the blades even until all blades are completely into the ground. Shut off the water flow to the blades. It is sometimes beneficial to push two opposing blades simultaneously.

Pull the lift control lever to raise the tree spade completely. Tilt the load forward to transport position ensuring that the spade is approximately five inches lower from the full mast maximum. Then raise the load forward towards maximum on the mast to lock the lift-mast lock

Raise the right and left outriggers by pulling the levers so marked. Disengage the hydraulic pump drive.

6.2 Digging the Receiving Hole

In general a tree will require 10” (25 cm) of ball diameter for every 1” (2.5 cm) of trunk diameter, measured 12” (30 cm) above the ground. A larger ball may be needed for certain types of trees which are hard to transplant or for trees expected to receive minimal care.

Position the truck with the rear of the spade frame about 10 feet (3 m) from the tree. Engage the hydraulic pump. Set engine rpm at the proper rpm for hydraulic pump to deliver 18 gallons per minute (68 L/min.).

Unlock spade from transport position.

Using the tilt control lever, move the tree spade to a vertical position. Raise all four blades. Push the lift control lever to lower the tree spade to approximately 4” (10 cm) from the ground.

➔ ***WARNING:*** Be sure everyone is clear before opening or closing rear of tree spade.

Push to unlock the gates, and then open left and right gates. Back the tree spade around the tree so the tree is centered between the four blades. Close both gates using the left and right control levers then lock both gates using the lock lever.

➔ ***IMPORTANT:*** Severe damage may result if rear gates are not locked into position.

Push the two outrigger control levers to lower the outriggers for support and to level the spade. The outriggers will prevent the front of the truck from rising when the tree is lifted out of the ground.

Use the shift extension and side shift control levers, if equipped, to precisely locate the tree spade. Lower the spade from to the ground, exerting enough down pressure to raise the truck frame slightly.

➔ ***NOTE:*** For ease of operation, level the spade frame as much as possible to dig a vertical hole.

Refer to “Digging Receiving Hole” for proper digging procedure. After the blades have been extended into the ground, shut off the water valve (if equipped).

Pull the lift control lever to lift the spade completely. Tilt the spade frame forward to transport position. Pull the lift lever to engage the transport lock. Some models have a secondary locking pin which is activated by the lock lever.

Pull the outrigger control lock levers to raise the right and left outriggers. Disengage the hydraulic pump drive.

The tree branches should be tied in to prevent damage to the tree and so branches do not exceed the legal limits of height and width of the state/province/country in which the operation takes place.

6.3 Planting the Tree

Assuming the receiving hole has been dug, back the unit until the tree is centered over the receiving hole. Engage the hydraulic pump drive. Lower both outriggers to support the truck. Be sure they are firmly on the ground.

Remove the ties that hold the tree branches in. Tilt the spade frame to vertical position.

Push the lift control lever gently and lower the tree into the hole to where the tree rests firmly in the center and in the bottom of the hole.

Starting with #1 spade, raise each spade about 12” (30 cm) at a time until all four blades are completely out of the ground. Now pull the lift control lever and raise the spade frame about 8” (20 cm) above the ground.

Unlock and open the rear gates. Raise both the right and left outriggers and drive the truck forward away from the tree. Close and lock the rear gates.
Raise the spade frame high enough and lower all four blades. Tilt the spade frame forward to transport position. Engage the transport lock. Disengage the pump drive.

When planting a tree, it is a good practice to have 15” – 18” of water in the receiving hole. This will allow the ball to settle into the bottom of the receiving hole, as well as seal out air.

➔ ***IMPORTANT:*** Drain the water system if freezing temperatures are expected.

7. STORAGE INSTRUCTIONS

7.1 Planting the Tree

➔ ***WARNING:*** When preparing machine for storage use normal shutdown procedure (page 8).

Clean all mud, dirt, grease and other foreign material from the exterior of the Dutchman Spade. Wash the complete machine. Repaint places where bare metal is exposed – this will inhibit rusting. Drain the water from the water tank and lines.

Clean the blades and coat them with a rust preventative compound.

If possible, store the truck spade in a dry, protected place.

Lubricate thoroughly according to lubrication instructions.

Take load off of all hydraulic cylinders by working the valve controls back and forth. Oil all control valve linkage with a light oil to prevent seizing. Protect exposed cylinder rods with a light coat of grease.

Check the truck spade structure for any worn or broken parts, or decals. By ordering parts now, you will avoid delays when it is time to remove the tree spade from storage. When ordering parts; always specify machine serial number and the replacement part numbers.

7.2 Removing From Storage

Remove all protective coverings.

Lubricate machine in accordance with lubrication instructions found in manual.

Check all hydraulic hoses for deterioration and, if necessary, replace. Tighten any loose bolts, nuts and hydraulic fittings.

8. LUBRICATION INSTRUCTIONS

All Dutchman Tree Spades are completely serviced at the factory before shipping. However, the operator should review the service schedule before operating the tree spade.

➔ ***WARNING:*** Use normal shut-down procedure (page 8) before lubricating machine.

Use only a high quality, multi-purpose grease when lubricating the unit.

Lift Tower

1. Brush grease on lift tower daily.
2. Grease all Cylinders, Gate Hinges, Sliders, and Trunnion Mounts located in towers.
1. Lubricate Towers when new to reduce possible friction.
2. Grease all wear points daily.

Control Valve

1. Oil linkage on control valve weekly.

9. SERVICE AND MAINTENANCE INSTRUCTIONS

➔ ***WARNING:*** Before servicing machine, use normal shut-down procedure (page 8) unless instructed differently in this section.

SPADES

The blades should be kept sharp, and care should be exercised to keep the blades from bending out of shape, or having the point of the blades turning over. This can happen when trying to dig where large stones or boulders are a problem. This can also happen when trying to cut tree roots which are too large for the machine to handle.

Keep the spade bolts and grid plates tight. If these become loose the alignments of the blade will get misadjusted and it will be necessary to align them again. Make sure all blades (top and bottom) are concentric with tower when in the "up" position.

The spade slides should be kept as clean as possible and freely lubricated as needed. Premature wear can be avoided this way.

Keep the machine lubricated as per instructions, and constantly watch for loose bolts, pins and pivots.

SPADE ALIGNMENT

This truck spade features adjustable grid plates to compensate for excessive gaps between the blades.

To align the spade, tilt the tree spade upright and lower all of the blades completely. Lower the spade frame until the blades are just clear of the ground.

To raise a blade tip loosen bolts on upper rid grid plates and tilt blade in or out so the blade is concentric with the tower. It is recommended the blade tip be tilted slightly inwards.

To lower a blade tip, reverse the above procedure.

➔ ***WARNING:*** Blades will drop if hydraulic lines are disconnected when blades are raised. Before disconnection or loosening any part of the spade hydraulic system, lower spade to ground to prevent falling.

GATE PIVOT BEARINGS

The Gate pivot bearings and spacers are a matched set and must be replaced as a set.

HYDRAULIC COMPONENTS

➔ ***WARNING:*** Hydraulic fluid escaping under pressure can be invisible and can have sufficient force to penetrate the skin. When searching for suspected leaks, use a piece of wood or cardboard rather than your hands. If injured, seek medical attention immediately to prevent serious infection or reaction.

➔ ***WARNING:*** Cycle all hydraulic controls to relieve all pressure in the hydraulic system before disconnecting the lines or performing other work on the system. Some residual pressure will probably remain in the tilt, and cylinders which are equipped with lock-out valves. When loosening lock cartridges of fitting lines where residual pressure may exist, slowly loosen lock cartridge or fitting until oil begins to leak. Wait for leaking to stop before disconnecting lock cartridge or fitting. Make sure all connections are tight and that hoses and lines are in good condition before applying pressure to the system.

9.1 Hydraulic Pressure Check

The pressure available in the hydraulic system must be known to quickly and accurately troubleshoot the system.

Hydraulic pressure can be checked by installing a pressure gauge. A ¼" pipe plug is located in the inlet fitting of the tree spade valve bank for this purpose.

➔ ***NOTE:*** A liquid filled pressure gauge capable of 5000 psi should be used for checking hydraulic pressure.

With the pressure gauge installed and the engine running at recommended RPM, pull a spade control lever until the cylinder has reached the end of its stroke. The pressure should read 3000 - 3500 psi depending on your model.

If the pressure should read less than the recommended psi it could be that a particle of dirt or a chip is lodged under the poppet of the relief valve. This would case the valve to malfunction. This can be corrected by removing the poppet body from the valve housing, disassembling the poppet and thoroughly cleaning it. Also note the fit of the poppet in the relief valve body. If the poppet does not fit tightly, the seal around the poppet must be replaced.

If the pressure is still too low, shims can be added under the valve spring. Refer to the following control valve section for the relief valve adjustment procedure.

If these steps do not increase the pressure, a worn pump is indicated. A flow meter would give a more reliable check, however.

CONTROL VALVES

One, or more, control valves are used for the hydraulic operations on the Dutchman Truck Spade. The control valve incorporates a relief valve set at 3500psi. (models 66" – 100"). The relief valve is located near the outlet port of the valve bank.

The relief valve is adjustable to allow for increasing or decreasing pressures by turning in or out. Ensure the pressure does not exceed the manufacturer's relief rating of 3500 psi.

➔ ***NOTE:*** Do not change pressure setting unless hydraulic operations are not satisfactory. Do not guess at the pressures, use a pressure gauge.

If you replace a section in the control valve remove the entire valve bank and use a flat surface for aid in re-alignment. Be sure to use "O" rings between the sections and torque the three through bolts equally to 18-22 ft. lbs. (24-30 Nm). If the bolts are over tightened, the valve spools may bind or stick. *<u>Note:</u> Solenoid operated units require a different torque and should be verified by manufacturer.*

The control valve linkage on the operating handles should be kept lubricated with a light oil to prevent linkage from seizing, which would cause difficulty in operating.

Cylinder rods should not be damaged in any way, and if the machine is not to be used for some time, we recommend the cylinder rods to be coated with grease to prevent rusting. Rusty rods will soon ruin o-rings and seals.

When installing a tilt cylinder that has no oil in it, the cylinder must be filled with oil before installation.

➔ ***WARNING:*** Due to the lockouts, air may become trapped in the tilt cylinders while being filled with oil. The lock valve cartridge will be released with great force when loosened due to the large volume of highly compressed air behind it. Use extreme caution when loosening lock valve cartridge and point in a direction which will minimize any potential injury or damage.

The hydraulic cylinders used on the tree spade are all of the same basic design, except for the two stage telescoping blade cylinders and optional shift cylinder. Repair kits are available for all the cylinders used on the Dutchman Spade.

FITTINGS

The hydraulic system on the Dutchman Spade uses primarily JIC fittings. These fittings use large conical mating surfaces for sealing, not O-rings or pipe threads. The JIC fittings can be over tightened, which will damage the fitting. Figure II shows the number of flats to tighten each fitting after it is hand tightened. One flat equals 1/6 of a turn.

FITTING SIZE	NUMBER OF FLATS
4 (1/4")	2 ½
6 (3/8")	2
8 (1/2")	2
10 (5/8")	1 ½
12 (3/4")	1
16 (1")	¾ to 1

Figure 4 – JIC Tightening Chart

FILTER

A 10 micron filter (figure 5) is located in the return line to filter the oil before entering the pump. This filter head has a built-in relief, which can open and by-pass the filter element if the oil is cold or the filter becomes clogged or dirty. If the filter head should need to be replaced, be sure to replace the filter head so the direction of oil flow indicated by the arrow is into the reservoir.

The filter element on a new machine should be changed after the first 50 hours of operation and every 500 hours of operation thereafter.

➔ ***IMPORTANT:*** To prevent pump failure be sure the shut-off valve is open whenever the pump is operated.

Figure 5: 10 Micron Filter

HYDRAULIC OIL RECOMMENDATIONS

We recommend the use of AW32.

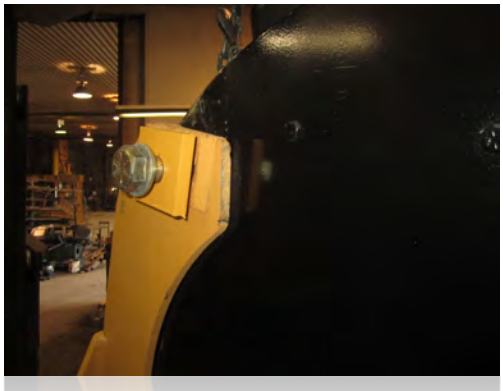
Clean hydraulic oil is very important for longer life and good operation of the hydraulic components. The filter should be replaced as per directions, and care should be exercised that dust and dirt do not spill into the reservoir while checking oil level or adding oil.

The hydraulic oil should be changed each 1000 to 1200 hours or sooner if oil appears to be contaminated. Drain the oil by removing the suction hose to the pump. Fill reservoir according to level on the glass located on the side of the oil reservoir. The reservoir holds 45 gallons of hydraulic oil.

SUMMARY OF REGULAR MAINTENANCE

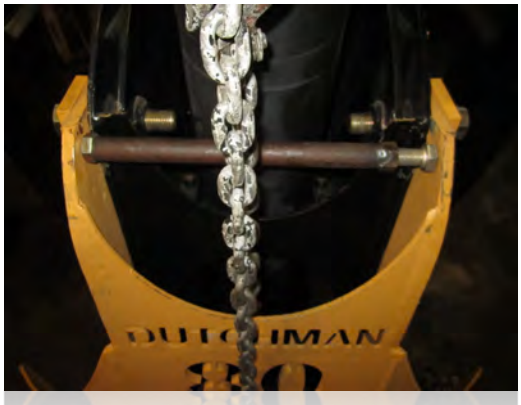
	Daily	500 Hours	1000 Hours
Visual Inspection of Machine (Refer to Pre-starting Inspection Instructions)	X		
Lubricate according to instructions	X		
Change hydraulic filter		X	
Change hydraulic oil			X

10. BLADE MOUNTING AND REMOVAL INSTRUCTIONS



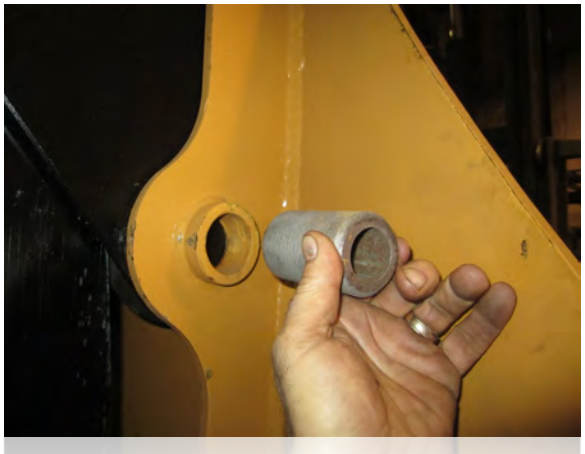
STEP 1

Enclosed in your shipment you will find a spreading device. It can be used to spread flanges on the blade in order to position it on the back of the housing. First, hook a chain through the cutout on the back of the blade.



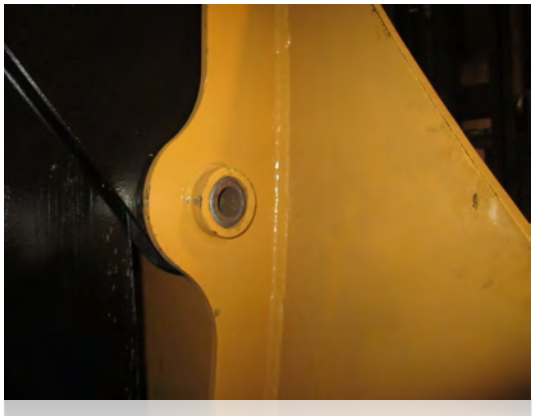
STEP 2

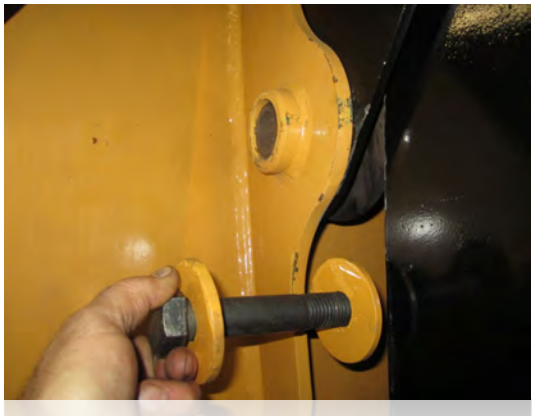
Using a lifting device raise and manipulate the blade until it is aligned to the insert grid plate then use the 1 X 5” bolt to lock and secure the blade.



STEP 3

Align bottom holes on blades to line up with bottom holes on slider then insert holding bushings.





STEP 5

Insert the 1X6” bolts – with washers provided. Then proceed to tighten the bolts.

STEP 6

To align the blade, measure from inside of blade to the front of tower on the topside of the blade then repeat the same for the bottom of the blade. Bottom measurements should be ½” x ¾” inward from the top (Blades should be toed in towards tower).

STEP 7

Line grid plates up accordingly and then tighten top bolts. Cycle each blade then align scrapper plates on bottom of towers with approx. ½” of clearance to scrap dirt off blade.

11. INSTALLATION INSTRUCTIONS IF MOUNTING YOUR OWN TRUCK

Approximate Installation Time 2 to 3 Days

Personal Needed:
Certified Welder
Hydraulic Specialist if chassis has no pto
General mechanic with basic electrical experience
Two to three general laborers
Equipment to lift approx. 10,000 kgs

Below is a link showing general Chelsea pto installations

http://drivetec.ca/hotshift%2010%20owners%20manual.pdf

General pto installations minimum 20 gpm for pump at a working pressure of 3200 psi or 220.63 bar pressure. You will need a qualified hydraulic technician to do the installation of power take off. The power take off can be activated by the air supply on the truck of electronically which is referred to as “hot shift”. The pump can be installed by someone with minimal hydraulic experience. The return line should be at least 1 ¼” inside diameter with a working pressure no less than 1,800 psi or 124.10 bar. The suction hose should be 1 ½” ID with a working pressure no less than 200 psi or 13.78 bar. There will be a valve installed on the bottom of the hydraulic tank before the pump so if the pump needs to be repaired the fluid can be closed off. The pressure line coming off the pump should be 1” ID with a working pressure no less than 3400 PSI or 234.42 bar. Once the pump is installed it is time to install the headache rack. The headache rack will have a hydraulic side and a water side, generally the headache rack is secured to the chassis using 2 flanges per side with certified bolts going through existing holes in the chassis. No material is required between the bottom frame of the headache rack and the top rail of the frame. Bolt flanges to chassis then torque bolts. If chassis bolts are 16mm torque to 200 neuton meters +/-25, if bolts are 19mm torque bolts to 360 neuton meters +/-50.

Now you are ready to place headache rack on chassis, using 4 straps or chains. Straps are preferred. Position two straps on the lower deck at both corners, then place 2 straps in the tubes on the upper deck about ½ meter from the corner where the back of the cab would be. Now lower headache rack on to chassis and have welder burn all the way around flanges, paint.

The next step required will be to cut the back of the frame off. The attached drawings will show exact cab to rear of frame measurements. Once the chassis has been shortened you will need to cap the end of each frame rail with 13mm mild steel. Weld plates in solid and paint. Then you will remove existing frame bolts where flange plates will go and mark the holes to be drilled. Once drilled, you will require longer bolts to secure flange plates on to frame rails. Torque to require specs.

Now you are ready to lift spade/deck assembly onto chassis. This is done simplest using two forklifts with one on either side. Position forklifts under main deck tubes (4" x 6" Tubes). Make sure deck is balanced properly and lifted high enough so truck chassis can be reversed under deck. At the rear of the spade deck you will notice two pieces of tube cut on a 45 degree angle with a 1" nut and bolt. These are used to lock the deck onto the chassis from the bottom of the frame rails. Reverse the chassis under the deck stopping about 100mm away rear of spade deck. Lower onto frame rails in between flanges which are already mounted. Then place a piece of wood on lower bumper of deck to be used as a bumper so you don't scratch paint then slide forward until back of truck frame touches the rear of the spade deck. Ensure the spade deck is tight to chassis then weld bolted flanges to the spade sub frame all the way around flanges, then paint. Tighten bolts at rear of spade deck to bottom of chassis using medium grade thread locker. No material is required between chassis frame and tree spade sub frame.

Under the spade deck on the left side there will be two hydraulic lines which will be capped. One line will be fluid in and the other will be return fluid line. You will have to have hydraulic lines custom made to join pressure line coming off of pump and return line which will join line going to tank. The hydraulic system is a basic loop, fluid goes from tank to pump then from pump to tree spade, then back through filter before returning to tank. Once lines are secured, you can fill hydraulic tank until fluid reaches top of sight glass located on side of tank. Make sure all valves are open before starting truck and that all hydraulic connections are tight. The tree spade hydraulic system will already be filled with fluid. So once the tank is filled to sight glass, no more hydraulic fluid should be needed.

Your truck spade will also have a water system to lubricate blades and water trees. You will need to run the wires provided to your truck battery. A fuse will be provided which will be mounted as close to the battery as possible. The water pump is located on the left side underneath the deck. All that is required is to attach the water line provided from the tank to the pump and secure with the clamps provided. The switch to activate the water pump will be located beside the tree spade controls closest to the cab of the truck. It is a 12 volt pump so be sure no to hook it up to a 24 power supply.

At the rear of the tree spade deck in the center of the frame rails will be a junction box for you lights. The box will be black with all the deck lights pre-wired. All that is required is to use the existing wiring harness from the chassis and run that wire into the box and make the proper connections. You will need #10 ring terminals to connect to posts in junction box.

TREE SPADE DECK WIRING

Red Wire = Stop
Brown Wire = Marker Lights
Yellow Wire = Left turn signal
Green Wire = Right turn signal
White Wire = Back-up lights

Once wiring has been checked, close the junction box making sure it is waterproof and ensure the wires are tied up and out of the way of moving parts.

You will want to double check all chassis bolts to ensure they are all torqued to proper specs.

The tree spade controls are as follows starting from first handle closest to the cab:

Lift
Tilt
Blade #1
Blade #2
Blade #3
Blade #4
Left Gate
Right Gate
Gate Lock
Left inner spade push pad
Right inner spade push pad
Right stabilizer
Left stabilizer

➔ ***IMPORTANT:*** You will always have to make sure to use the lift function first to lower spade out of manual locking system before mast can be lifted. When folding spade down, ensure mast is all the way down on deck before using lift function to engage locking system.

Any questions call 1-800-292-0070

12. TROUBLESHOOTING

12.1 Manual Valve Troubleshooting

Condition: Hydraulic System Inoperative

PROBLEM CAUSE	REMEDY
PTO not engaged	Engage PTO
Insufficient hydraulic oil in reservoir	Add hydraulic oil to proper level
Shut off valve under reservoir closed	Open shut off valve
Relief valve stuck open	Repair relief valve
Pump worn out	Rebuild or replace pump
Relief valve stuck or weak	Check system pressure. Repair or adjust relief valve

Condition: Water System Inoperative

PROBABLE CAUSE	REMEDY
No water in tank	Fill tank with water
Water valve not on	Turn water valve on
Water lines plugged	Clean nozzles, flush lines
Inline pump not operating	Check inline fuse of battery or switch at rear

Condition: Valve leaks Hydraulic Fluid

PROBABLE CAUSE	REMEDY
Fittings on valve not tight	Tighten fittings
Valve improperly assembled	Reassemble valve. Check placement of O-rings. Torque bolts properly
O-rings worn out or damaged	Replace O-rings

Condition: Gate will not lock

PROBABLE CAUSE	REMEDY
System pressure to low	Adjust to 3500psi
Sequence not correct	Adjust sequence valve
Lock pin jammed	Disengage using pry-bar. Check seals in cylinder

12.2 Electric Valve Troubleshooting (Optional)

If your tree spade has lost one or more of its functions, it may be due to a variety of reasons that can be isolated by reviewing the following trouble shooting tips.

- Check the fuse located by the controller. The fuse is a standard 5-amp that can easily be replaced.

- Turn the key for the loader unit on in order to energize the spade electronics. ***Turn the key to accessory mode if possible.**

- Find and open the "Circuit Board" box, which is located directly above the valve bank attached to the tree spade.

- Check to make sure the circuit board "Power" light is on. This will insure that electric current is flowing to the circuit board.

- Activate all available circuits on the control box or pistol grip. This should be done one at a time so as to avoid confusion.

- The circuit board contains lights that correspond to the functions on the controller.
Therefore, by pressing or moving a switch, the top row of lights and the bottom row of lights should light up.

POSSIBLE ISSUES

1. **The "Power Light" stays on but no other indicator lights light up.**

   -This would indicate that a ground wire from the controller is not secured properly or that the ground wire has fallen off from its contact.

   -Retrace the ground wire coming from the control box and make certain that the ground lead is fastened to a proper ground that reads "0-volts". Check to ensure that the positive and negative "butt plugs" coming out of the controller are fastened together. Also check that the ground wire from the controller is not severed or spliced into the positive wire.

2. **One or more of the top indicator lights do not light up.**

   - This would indicate that there is a wire coming from the controller to the circuit board that has been severed, pinched, or fallen off of contact from the plug.

   - With the use of a test-light, test all plug-ends by having another person press or move the functions. One power light will stay on constantly and the others will light up when activated. (See diagram 1-2 to locate plug schematics). If there is a function(s) that does not light up when activated, examine the cord and plug

connections from the circuit board to the controller and be sure that the cord has not been pinched or cut. Also check the ends of the plug to be sure that the wires are securely fastened to the plug ends.

- If a wire “break” can be detected, then turn off the power from the loader. Using a small knife, make a small, lengthwise incision in the cable being careful not to cut into another wire. Locate the wire “break” and splice it back together if possible. Using the test light again, test to see if all functions work.

-If the functions are working again. Tape the repaired cable using electrical tape.

3. **One or more of the bottom lights do not light up.**

-This would indicate that a ground from the controller is not secured properly or that the ground wire has fallen off from its contact.

-Retrace the ground wire coming from the control box and make certain that the ground lead is fastened to a proper ground that reads “0-volts”. Check to ensure that the positive and negative “butt plugs” coming out of the controller are fastened together. Also check that the ground wire from the controller is not severed or spliced into the positive wire.

-

4. **The indicator lights light up but none of the functions operate.**

- This would most likely indicate that the “Main Solenoid”, which is located on the top of the tree spade valve, is not functioning.

-Check the wire harness connections on the bottom of the circuit board and be certain that they are fastened securely.

- Also check to see that there is adequate oil flow coming from the loader to the tree spade.

- If there is not proper oil flow, it may be attributed to poor loader pump sender and/or restricted coupler connections

5. **The indicator lights light up but one or more function(s) do not operate.**

- This would most likely indicate that there is problem at the valve body on the tree spade.

- Check the wire harness connections on the bottom of the circuit board and be certain that they are fastened securely.

- If all wires are fastened securely then check the wires that lead into the coils of the valve.

- Listen to hear if the coils are “clicking”. This insures that there is power going to the coils.

- Using a metal end (i.e. pocketknife or screwdriver), check to see that the nut that holds the coil in place has magnetism. The metal end should stick to the nut when the function is activated.

- With a plastic end, lightly tap the nut to see if it releases the function. This would likely indicate that a valve actuator has become stuck and needs a replacement.

6. **One of more of the functions are operating backwards**

   - This likely means that there is too much pressure applied to the "Tie Rods". **The tie rods are the three long bolts that run vertically between all valve sections. The purpose is to hold all the valve sections in place.**

   - Using a "Torque Wrench", re-adjust the tie rods to **8-foot pound pressure.** If a torque wrench is not available, re-adjust the tie rods so that they are a quarter to half past hand tight.

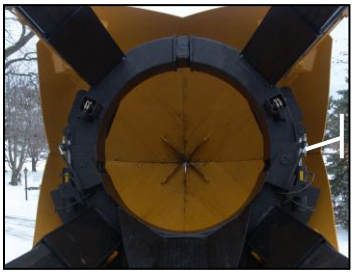
If the above tips do not help the problem, then unplug the wire harnesses on the circuit board itself and remove it from its housing by unscrewing the bolts located on the corners and check to see if there is any discolor on the back of the board.

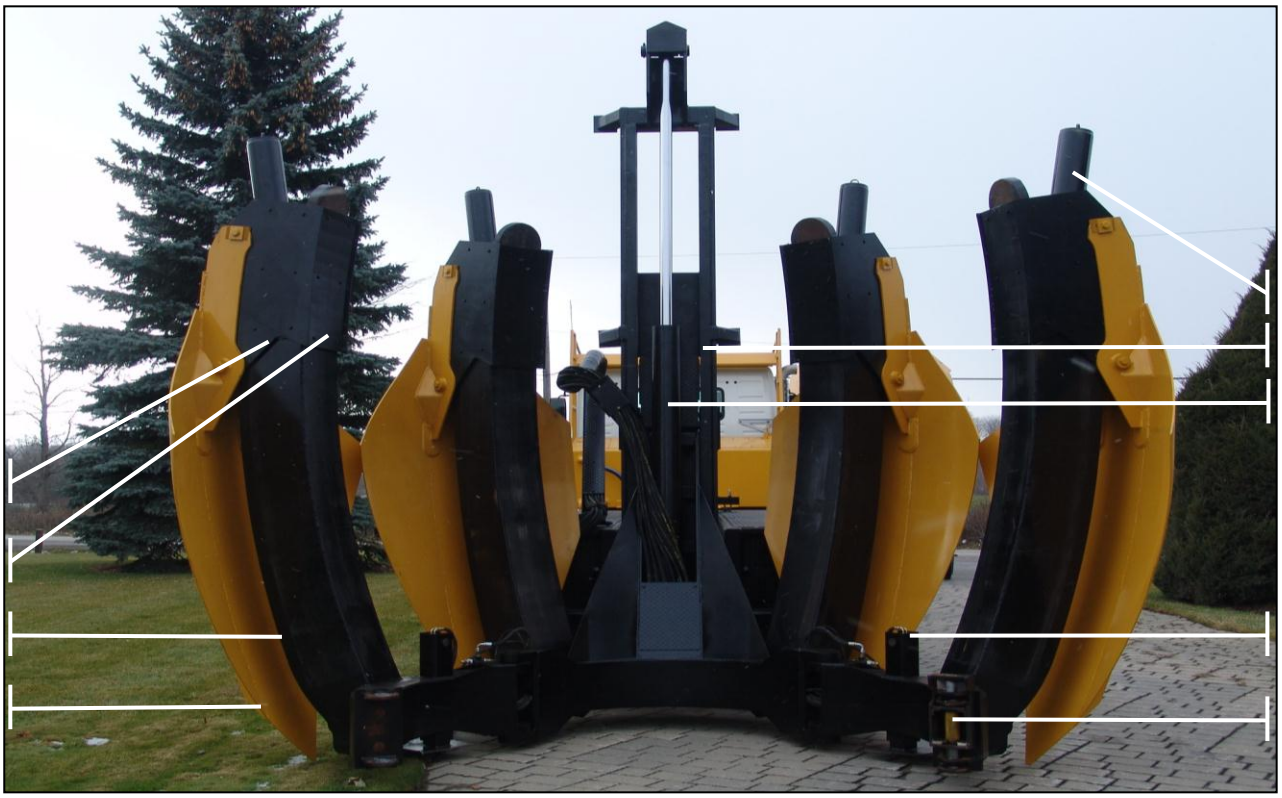
If there is discoloration on the back of the circuit board, it is advised that you call for technical support from the manufacturer.

13. TOWER AND BLADE ASSEMBLY DIAGRAMS / PURCHASING SPARE PARTS

CYLINDERS AND SEAL KITS:

	Part #	Cylinders (Qty.)	Seal Kit (Qty.)
1. Blade Cylinders	*DMCY-T0078*	16	16
2. Lift Cylinders	*DMCY-60086*	2	2
3. Tilt Cylinders	*DMCY-45065*	2	2
4. Tilt Pusher Cylinders	*DMCY-30012*	1	1
5. Gate Cylinders	*DMCY-45010*	2	2
6. Gate Lock Cylinders	*DMCY-20002*	1	1
7. Pusher Pad Cylinders	*DMCY-20012*	2	2
8. Stabilizer Cylinders	*DMCY-30026*	2	2





WEAR PADS:

	Part #	Qty.
9. Lift Mast (Nylatron)	*DMWP-LM102*	4
10. Tower (Teflon)	*DMWP-TW102*	4
11. Slider (Teflon)	*DMWP-SL102*	12

STEEL PARTS:

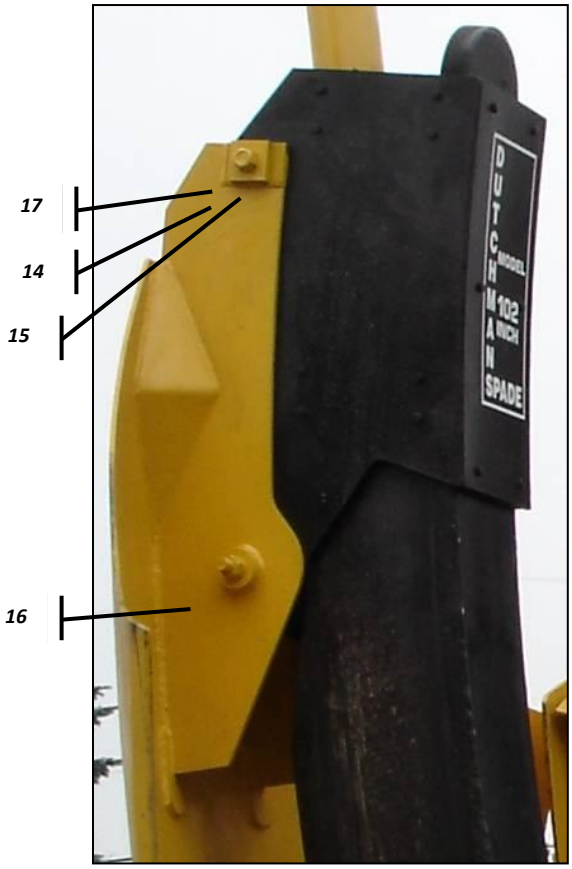
	Part #	Qty.
12. Slider Front Wall		4
13. Size 102" Blade		4

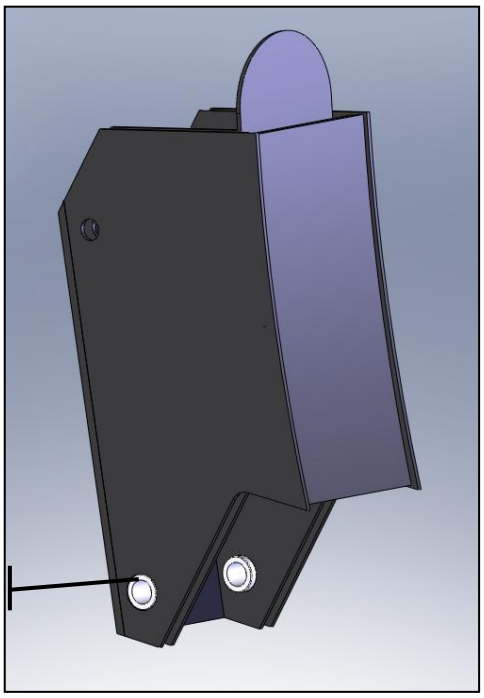
SLIDER/BLADE ASSEMBLY PARTS:

	Part #	Qty.
14. Grid Plate (Male)		8
15. Grid Plate (Female)		8
16. Bolt System (Blades)		8
17. Bolt System (Grid Plates)		8
18. Washers for Bolts		16
19. Bushings		8

HOSES:

	Part #	Qty.
20. Grid Plate (Male)		8
21. Grid Plate (Female)		8
22. Bolt System (Blades)		8
23. Bolt System (Grid Plates)		8
24. Washers for Bolts		16
25. Bushings		8



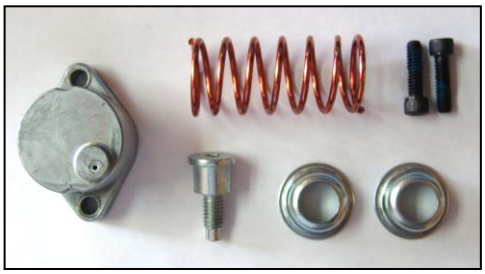


Detached View of Slider

HYDRAULIC VALVE:

	Qty.
xx. Gresen V20 Valve Assembly	1
xx. Gresen V20 Seal Kit	13
xx. Greson V20 Inlet Section	1
xx. Gresen V20 End Caps	13
xx. Gresen V20 Springs	13
xx. Gresen V20 Washers	26
xx. Gresen V20 Handle Assembly	13

V20 Gresen Valve (Single Section Shown)



Spring/Spool Kit for V20 Valve Section

Retainer/Washer Kit

Standard 13 Section (V20) Manual Valve Assembly

Manual Valve Handle (V20) With Spring Clip Kit

W A R R A N T Y

Dutchmaster Nurseries Limited, herein referred to as DMN, warrants each new industrial product of its own manufacture to be free from defects in material and workmanship, under normal use and service for one(1) full year after delivery to the owner.

During the warranty period, the authorized selling DMN Dealer shall furnish parts without charge for any DMN product that fails because of defects in material and/ or workmanship. This warranty and any possible liability of DMN hereunder is in lieu of all other warranties express, implied or statutory, including but not limited to any warranties of merchantability or fitness for a particular purpose.

The parties agree that the Buyers SOLE AND EXCLUSIVE REMEDY against DMN, whether in contact or arising out of warranties, representations, instructions, or defects shall be for the replacement or repair of defective parts as provided herein. The Buyer agrees that no other remedy (including, but not limited to, incidental or consequential loss) shall be available to him. If, during the warranty period, any product becomes defective by reason of material or workmanship and Buyer immediately notifies DMN of such defect, DMN shall, at its option, supply a replacement part or request return of the product to its plant in Brougham, Ontario, Canada. No parts shall be returned without prior written authorization from DMN, and this warranty does not obligate DMN to bear any transportation charges in connection with the repair or replacement of defective parts. DMN will not accept any charges for labour and/or parts incidental to the removal or remounting of parts repaired or replaced under this Warranty. **A formal, faxed estimate to DMN is required prior to any foreseen warranty repairs, alterations and/or labor.**

This Warranty shall not apply to any part or product which shall have been installed or operated in a manner not recommended by DMN, nor to any part or product that has been neglected, or used in any way which, in the Manufacturers opinion, adversely affects its performance; not negligence of proper maintenance or other negligence, fire or other accident; not with respect to wear items included but not limited to items such as tree spade blades and wear strips; nor if the unit has been altered or repaired or repaired outside of a DMN authorized dealership in a manner of which, in the sole judgment of DMN affects its performance, stability or reliability. Equipment and accessories not of our manufacture are warranted only to the extent of the original Manufacturers Warranty and subject to their allowance to us, if found defective by them.

DMN reserves the right to modify, alter and improve any product or part without incurring any obligation to replace any product or parts previously sold with such modified, altered, or improved product or part.

No person is authorized to give any other Warranty or to assume any additional obligation on the Manufacturers behalf unless made in writing and signed by an officer of the Manufacturer.