

# 1 INTRODUCTION

Congratulations on your choice of an AgriMetal Tuff Vac Debris Vacuum to complement your operation. This equipment has been designed and manufactured to meet the needs of a discerning turf care industry.

Safe, efficient and trouble free operation of your AgriMetal Tuff Vac requires that you and anyone else who will be operating or maintaining the machine, read and understand the Safety, Operation, Maintenance and Trouble Shooting information contained within the Operator's Manual.



This manual covers the PTO powered 4000 model. Use the Table of Contents or Index as a guide to locate required information.

Keep this manual handy for frequent reference and to pass on to new operators or owners. Call your Agri-Metal Dealer or Distributor if you need assistance, information or additional copies of the manuals.

**OPERATOR ORIENTATION** - The directions left, right, front and rear, as mentioned throughout this manual, are as seen from behind the tractor driver's seat and facing in the direction of travel.

## 2 SAFETY

### SAFETY ALERT SYMBOL

This Safety Alert symbol means  
ATTENTION!  
BECOME ALERT!  
YOUR SAFETY IS INVOLVED!



The Safety Alert symbol identifies important safety messages on the AgriMetal Tuff Vac Debris Vacuum and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

Why is SAFETY important to you?

3 Big Reasons

Accidents Disable and Kill  
Accidents Cost  
Accidents Can Be Avoided

#### SIGNAL WORDS:

Note the use of the signal words DANGER, WARNING and CAUTION with the safety messages. The appropriate signal word for each message has been selected using the following guide-lines:

**DANGER** - Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations typically for machine components which, for functional purposes, cannot be guarded.

SI NO LEE INGLES, PIDA AYUDA  
A AIGUIEN QUE SI LO LEA PARA  
QUE LE TRADUZCA LAS  
MIDIDAS DE SEGURIDAD.

**WARNING** - Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

**CAUTION** - Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

If you have any questions not answered in this manual or require additional copies or the manual is damaged, please contact your dealer at AgriMetal Inc., 1006 Rue Principale, Wickham, Quebec, Canada, J0C 1S0. Phone (819) 398-6883 or fax (819) 398-5311.

## SAFETY

YOU are responsible for the SAFE operation and maintenance of your AgriMetal Tuff Vac Debris Vacuum. YOU must ensure that you and anyone else who is going to operate, maintain or work around the Tuff Vac be familiar with the operating and maintenance procedures and related SAFETY information contained in this manual. This manual will take you step-by-step through your working day and alerts you to all good safety practices that should be adhered to while operating the Tuff Vac.

Remember, YOU are the key to safety. Good safety practices not only protect you but also the people around you. Make these practices a working part of your safety program. Be certain that EVERYONE operating this equipment is familiar with the recommended operating and maintenance procedures and follows all the safety precautions. Most accidents can be prevented. Do not risk injury or death by ignoring good safety practices.

- Tuff Vac owners must give operating instructions to operators or employees before allowing them to operate the machine, and at least annually thereafter.
- The most important safety device on this equipment is a SAFE operator. It is the operator's responsibility to read and understand ALL Safety and Operating instructions in the manual and to follow these. Most accidents can be avoided.
- A person who has not read and understood all operating and safety instructions is not qualified to operate the machine. An untrained operator exposes himself and bystanders to possible serious injury or death.
- Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety and could affect the life of the equipment.
- Think SAFETY! Work SAFELY!

## 2.1 GENERAL SAFETY

1. Read and understand the Operator's Manual and all safety signs before operating, maintaining, adjusting or unplugging the Tuff Vac.



2. Have a first-aid kit available for use should the need arise and know how to use it.



3. Have a fire extinguisher available for use should the need arise and know how to use it.

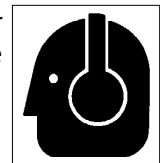


4. Wear appropriate protective gear. This list includes but is not limited to:

- A hard hat
- Protective shoes with slip resistant soles
- Protective glasses or goggles
- Heavy gloves
- Wet weather gear
- Hearing protection
- Respirator or filter mask
- Hearing Protection



5. Install and secure all guards before starting.
6. Do not allow riders.
7. Wear suitable ear protection for prolonged exposure to excessive noise.




8. Place all controls in neutral, stop engine, set park brake, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.
9. Clear the area of people, especially small children, before starting the unit.
10. Review safety related items annually with all personnel who will operating or maintaining the Tuff Vac.

## 2.2 EQUIPMENT SAFETY GUIDELINES

1. Safety of the operator and bystanders is one of the main concerns in designing and developing a machine. However, every year many accidents occur which could have been avoided by a few seconds of thought and a more careful approach to handling equipment. You, the operator, can avoid many accidents by observing the following precautions in this section. To avoid personal injury or death, study the following precautions and insist those working with you, or for you, follow them.
2. In order to provide a better view, certain photographs or illustrations in this manual may show an assembly with a safety shield removed. However, equipment should never be operated in this condition. Keep all shields in place. If shield removal becomes necessary for repairs, replace the shield prior to use.
3. Replace any safety sign or instruction sign that is not readable or is missing. Location of such safety signs is indicated in this manual.
4. Never use alcoholic beverages or drugs which can hinder alertness or coordination while operating this equipment. Consult your doctor about operating this machine while taking prescription medications.
5. Under no circumstances should young children be allowed to work with this equipment. Do not allow persons to operate or assemble this unit until they have read this manual and have developed a thorough understanding of the safety precautions and of how it works. Review the safety instructions with all users annually.
6. This equipment is dangerous to children and persons unfamiliar with its operation. The operator should be a responsible, properly trained and physically able person familiar with machinery and trained in this equipment's operations. If the elderly are assisting with work, their physical limitations need to be recognized and accommodated.
7. Use a tractor equipped with a Roll Over Protective Structure (ROPS).
8. Never exceed the limits of a piece of machinery. If its ability to do a job, or to do so safely, is in question - DON'T TRY IT.
9. Do not modify the equipment in any way. Unauthorized modification result in serious injury or death and may impair the function and life of the equipment.
10. In addition to the design and configuration of this implement, including Safety Signs and Safety Equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence, and proper training of personnel involved in the operation, transport, maintenance, and storage of the machine. Refer also to Safety Messages and operation instruction in each of the appropriate sections of the Tractor and machine Manuals. Pay close attention to the Safety Signs affixed to the Tractor and the machine.

## 2.3 SAFETY TRAINING

1. Safety is a primary concern in the design and manufacture of our products. Unfortunately, our efforts to provide safe equipment can be wiped out by a single careless act of an operator or bystander.
2. In addition to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of this equipment.
3. It has been said, "The best safety feature is an informed, careful operator." We ask you to be that kind of an operator. It is the operator's responsibility to read and understand ALL Safety and Operating instructions in the manual and to follow these. Accidents can be avoided.
4. Working with unfamiliar equipment can lead to careless injuries. Read this manual, and the manual for your tractor, before assembly or operating, to acquaint yourself with the machines. If this machine is used by any person other than yourself, or is loaned or rented, it is the machine owner's responsibility to make certain that the operator, prior to operating:
  - a. Reads and understands the operator's manuals.
  - b. Is instructed in safe and proper use.
5. Know your controls and how to stop tractor, engine, and machine quickly in an emergency. Read this manual and the one provided with your tractor.
6. Train all new personnel and review instructions frequently with existing workers. Be certain only a properly trained and physically able person will operate the machinery. A person who has not read and understood all operating and safety instructions is not qualified to operate the machine. An untrained operator exposes himself and bystanders to possible serious injury or death. If the elderly are assisting with work, their physical limitations need to be recognized and accommodated.

## 2.4 SAFETY SIGNS

1. Keep safety signs clean and legible at all times.
2. Replace safety signs that are missing or have become illegible.
3. Replaced parts that displayed a safety sign should also display the current sign.
4. Safety signs are available from your authorized Distributor or Dealer Parts Department or the factory.

### How to Install Safety Signs:

- Be sure that the installation area is clean and dry.
- Be sure temperature is above 50°F (10°C).
- Determine exact position before you remove the backing paper.
- Remove the smallest portion of the split backing paper.
- Align the sign over the specified area and carefully press the small portion with the exposed sticky backing in place.
- Slowly peel back the remaining paper and carefully smooth the remaining portion of the sign in place.
- Small air pockets can be pierced with a pin and smoothed out using the piece of sign backing paper.

## 2.5 PREPARATION

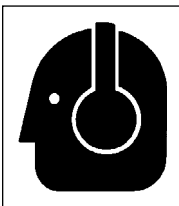
1. Never operate the tractor and machine until you have read and completely understand this manual, the Tractor Operator's Manual, and each of the Safety Messages found on the safety signs on the tractor and machine.

2. Personal protection equipment including hard hat, safety glasses, safety shoes, and gloves are recommended during assembly, installation, operation, adjustment, maintaining, repairing, removal, or moving the implement. Do not allow long hair, loose fitting clothing or jewellery to be around equipment.

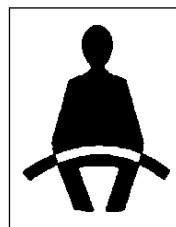


3. **PROLONGED EXPOSURE TO LOUD NOISE MAY CAUSE PERMANENT HEARING LOSS!**

Tractors with or without equipment attached can often be noisy enough to cause permanent, partial hearing loss. We recommend that you wear hearing protection on a full-time basis if the noise in the Operator's position exceeds 80db. Noise over 85db on a long-term basis can cause severe hearing loss. Noise over 90db adjacent to the Operator over a long-term basis may cause permanent, total hearing loss. NOTE: Hearing loss from loud noise (from tractors, chain saws, radios, and other such sources close to the ear) is cumulative over a lifetime without hope of natural recovery.



4. Operate the machine only with a tractor equipped with an approved Roll-Over-Protective Structure (ROPS). Always wear your seat belt. Serious injury or even death could result from falling off the tractor ---particularly during a turnover when the operator could be pinned under the ROPS or the tractor.
5. Clear working area of stones, branches or hidden obstacles that might be hooked or snagged, causing injury or damage.
6. Operate only in daylight or good artificial light.
7. Be sure machine is properly mounted, adjusted and in good operating condition.
8. Ensure that all safety shielding and safety signs are properly installed and in good condition.



## 2.6 OPERATING SAFETY

1. Please remember it is important that you read and heed the safety signs on the Tuff Vac. Clean or replace all safety signs if they cannot be clearly read and understood. They are there for your safety, as well as the safety of others. The safe use of this machine is strictly up to you, the operator.
2. All things with moving parts are potentially hazardous. There is no substitute for a cautious, safe-minded operator who recognizes potential hazards and follows reasonable safety practices. The manufacturer has designed this Tuff Vac to be used with all its safety equipment properly attached, to minimize the chance of accidents. Study this manual to make sure you have all safety equipment attached.
3. If a safety shield or guard is removed for any reason, it must be replaced before the machine is again operated.
4. When the use of hand tools is required to perform any part of assembly, installation, adjustment, maintaining, repairing, removal, or moving, be sure the tools used are designed and recommended by the tool manufacturer for that specific task.
5. Personal protection equipment including hearing protection, hard hat, safety glasses, safety shoes, and gloves are recommended during assembly, installation, operation, adjustment, maintaining, repairing, removal, or moving. Do not allow long hair, loose fitting clothing, or jewellery to be around moving parts.
6. Always use two people to handle heavy, unwieldy components during assembly, installation, removal or moving.
7. Never place any part of your body where it would be in danger if movement should occur during assembly, installation, operation, maintaining, repairing, removal or moving.
8. Never place yourself between the tractor and machine while implement is in operation.
9. Place all controls in neutral, stop engine, set park brake, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.
10. Do not walk or work under a raised machine, discharge door or attachment unless it is securely blocked or held in position. Do not depend on the tractor hydraulic system to hold the machine or attachment in place.
11. A heavy load can cause instability of the tractor. Use extreme care during travel. Slow down on turns and watch out for bumps. The tractor may need front counterweights to counterbalance the weight of the machine.
12. Never use alcoholic beverages or drugs which can hinder alertness or coordination while operating this equipment. Consult your doctor about operating this machine while taking prescription medications.
13. Do not allow riders on the machine or tractor at any time. There is no safe place for any riders.
14. Before you operate the machine, check over all pins, bolts, and connections to be sure all are securely in place. Replace any damaged or worn parts immediately.
15. Do not allow anyone who is not familiar with the safety rules and operation instructions to use this machine.
16. Never allow children to operate or be around this machine.
17. Do not reach into blower openings when the engine is running. Install and secure access covers before starting engine.
18. Clear the work area of objects which might be picked up and snagged or entangled in the machine.
19. Keep hands, feet, hair, jewellery, and clothing away from all moving and/or rotating parts.
20. Do not stand behind machine when the discharge door is open and blower is running.
21. Do not enter compartment unless lock pin is installed through frame.
22. Keep hands and feet away from pick-up head when engine is running. Keep others away.

## 2.7 TRANSPORT SAFETY

1. Comply with state and local laws governing highway safety and movement of machinery on public roads.
2. The use of flashing amber lights is acceptable in most localities. However, some localities prohibit their use. Local laws should be checked for all highway lighting and marking requirements.
3. At all times, when driving the tractor and equipment on the road or highway under 20 mph (32 kph) use flashing amber warning lights and a slow moving vehicle (SMV) identification emblem. Do not exceed 20 mph (32 kph). Reduce speed on rough roads and surfaces.
4. Plan your route to avoid heavy traffic.
5. Always use a tractor of more than 25 horsepower or utility vehicle of more than 2500 lbs. to transport machine.
6. Always install transport locks, pins or brackets before transporting.
7. Use a drawbar pin with provisions for a retainer. Install the retainer.
8. Do not drink and drive.
9. Attach safety chain between tractor and machine before transporting.
10. Be a safe and courteous driver. Always yield to oncoming traffic in all situations, including narrow bridges, intersections, etc. Watch for traffic when operating near or crossing roadways.
11. Turn into curves or go up or down hills only at a low speed and at a gradual steering angle. Make certain that at least 20% of the tractor's weight is on the front wheels to maintain safe steering. Slow down on rough or uneven surfaces.
12. Never allow riders on either tractor or machine.
13. Install lighting bar before transporting.

## 2.8 STORAGE SAFETY

1. Store the unit in an area away from human activity.
2. Do not permit children to play on or around the stored machine.
3. Store the unit in a dry, level area. Support the frame with planks if required.



## 2.9 MAINTENANCE SAFETY

1. Good maintenance is your responsibility. Poor maintenance is an invitation to trouble.
2. Follow good shop practices.

- Keep service area clean and dry.
- Be sure electrical outlets and tools are properly grounded.
- Use adequate light for the job at hand.

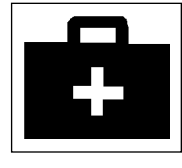


3. Make sure there is plenty of ventilation. Never operate the engine of the towing vehicle in a closed building. The exhaust fumes may cause asphyxiation.
4. Before working on this machine, shut off the engine, set the brakes, and remove the ignition keys.
6. Never work under equipment unless it is blocked securely.

7. Always use personal protection devices such as eye, hand and hearing protectors, when performing any service or maintenance work. Use heavy gloves when handling pick up blades.

8. Where replacement parts are necessary for periodic maintenance and servicing, genuine factory replacement parts must be used to restore your equipment to original specifications. The manufacturer will not be responsible for injuries or damages caused by use of unapproved parts and/or accessories.

9. A fire extinguisher and first aid kit should be kept readily accessible while performing maintenance on this equipment.

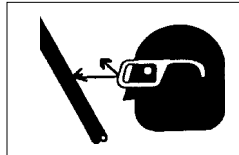


10. Periodically tighten all bolts, nuts and screws and check that all cotter pins are properly installed to ensure unit is in a safe condition.
11. When completing a maintenance or service function, make sure all safety shields and devices are installed before placing unit in service.

## 2.10 HYDRAULIC SAFETY

1. Always place all tractor hydraulic controls in neutral before disconnecting from tractor or working on hydraulic system.
2. Make sure that all components in the hydraulic system are kept in good condition and are clean.
3. Replace any worn, cut, abraded, flattened or crimped hoses.
4. Do not attempt any makeshift repairs to the hydraulic fittings or hoses by using tape, clamps or cements. The hydraulic system operates under extremely high-pressure. Such repairs will fail suddenly and create a hazardous and unsafe condition.

5. Wear proper hand and eye protection when searching for a high-pressure hydraulic leak. Use a piece of wood or cardboard as a backstop instead of hands to isolate and identify a leak.



6. If injured by a concentrated high-pressure stream of hydraulic fluid, seek medical attention immediately. Serious infection or toxic reaction can develop from hydraulic fluid piercing the skin surface.

## 2.11 TIRE SAFETY

1. Failure to follow proper procedures when mounting a tire on a wheel or rim can produce an explosion which may result in serious injury or death.
2. Do not attempt to mount a tire unless you have the proper equipment and experience to do the job.
3. Have a qualified tire dealer or repair service perform required tire maintenance.
4. When replacing worn tires, make sure they meet the original tire specifications. Never undersize.

## 2.12 BATTERY SAFETY

1. Keep all sparks and flames away from batteries, as gas given off by electrolyte is explosive.
2. Avoid contact with battery electrolyte: wash off any spilled electrolyte immediately.
3. Wear safety glasses when working near batteries.
4. Do not tip batteries more than 45 degrees, to avoid electrolyte loss.
5. To avoid injury from spark or short circuit, disconnect battery ground cable before servicing any part of electrical system.

## 2.13 SIGN-OFF FORM

AgriMetal follows the general Safety Standards specified by the American Society of Agricultural Engineers (ASAE) and the Occupational Safety and Health Administration (OSHA). Anyone who will be operating and/or maintaining the Tuff Vac Debris Vacuum must read and clearly understand ALL Safety, Operating and Maintenance information presented in this manual.

Do not operate or allow anyone else to operate this equipment until such information has been reviewed. Annually review this information before the season start-up.

Make these periodic reviews of SAFETY and OPERATION a standard practice for all of your equipment. We feel that an untrained operator is unqualified to operate this machine.

A sign-off sheet is provided for your record keeping to show that all personnel who will be working with the equipment have read and understand the information in the Operator's Manual and have been instructed in the operation of the equipment.

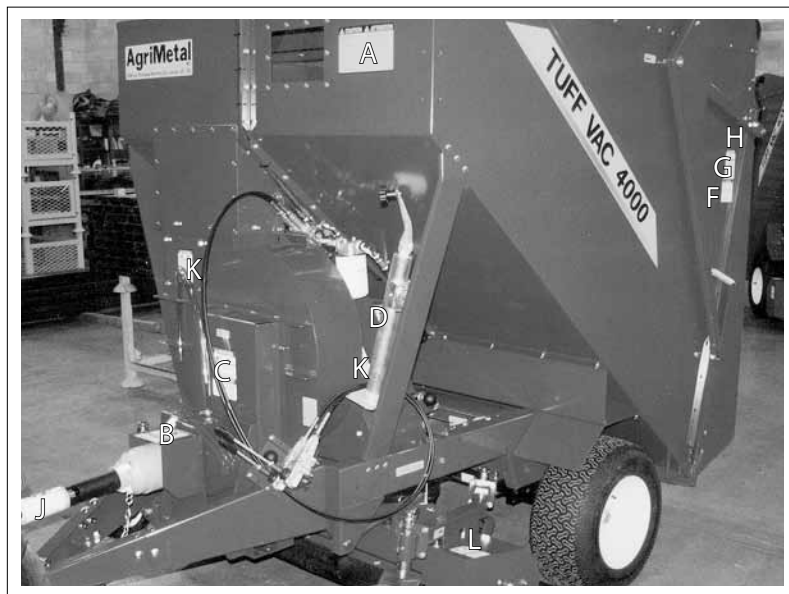
## SIGN-OFF FORM

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### 3 SAFETY SIGN LOCATIONS

The types of safety signs and locations on the equipment are shown in the illustrations that follow. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!



A

 <b>CAUTION</b>	 <b>ATTENTION</b>
<ol style="list-style-type: none"> <li>1. Read Operator's Manual before starting.</li> <li>2. Keep guards and shields in place and access doors closed.</li> <li>3. Keep hands, feet, hair and clothing away from moving parts.</li> <li>4. Stop engine, place all controls in neutral, set park brake, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging the machine.</li> <li>5. Do not climb on the machine or place hands in any opening when the engine is running.</li> <li>6. Keep people and pets a safe distance from the machine.</li> <li>7. Keep hydraulic lines and fittings tight, in good condition and free of leaks.</li> <li>8. Do not smoke when refuelling.</li> <li>9. Block up machine securely before working under it.</li> <li>10. Keep all electrical wires and connections dry and in good repair.</li> <li>11. Keep hands and feet away from pick-up head when engine running. Keep others away.</li> <li>12. Install lock pin through frame before entering compartment.</li> <li>13. Review safety instructions annually.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lire attentivement le manuel d'opération avant la mise en marche.</li> <li>2. Garder tous les écrans protecteurs in place.</li> <li>3. Garder les mains, pieds, cheveux et vêtements éloignés des éléments mobiles.</li> <li>4. Arrêter le moteur, placer tous les contrôles à la position "neutre", enlever la clé du contact et attendre que toutes les places soient au point mort avant de faire tout ajustement, réparation ou de débloquer la machine.</li> <li>5. Ne pas grimper sur la machine et ne jamais se placer les mains dans toute ouverture lorsque celle-ci est en marche.</li> <li>6. Garder les gens et les animaux à une distance sécuritaire de la machine.</li> <li>7. Garder tout boyau et fixation hydraulique en bonne condition et sans fissure.</li> <li>8. Ne jamais fumer lors du plein d'essence.</li> <li>9. Immobiliser la machine de façon sécuritaire avant de travailler sous celle-ci.</li> <li>10. Garder toute connection et fil électrique au sec et en bonne condition.</li> <li>11. Garder les mains et les pieds éloignés du bec d'aspiration lorsque le moteur est en marche. Garder les gens éloignés.</li> <li>12. Toujours installer la barrure de sécurité sur la porte de déchargement avant de se placer entre la porte et la machine.</li> <li>13. Reviser annuellement le manuel d'opération.</li> </ol>

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**REMEMBER** - If safety signs have been damaged, removed, become illegible or parts replaced without safety signs, new signs must be applied. New safety signs are available from your authorized dealer.

The types of safety signs and locations on the equipment are shown in the illustrations that follow. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!



B

 <b>DANGER</b>	
	
<p><b>ROTATING DRIVELINE HAZARD KEEP AWAY</b></p> <p>To prevent serious injury or death from rotating driveline:</p> <ol style="list-style-type: none"> <li>1. Keep all guards in place when operating.</li> <li>2. Operate at 540 RPM.</li> <li>3. Keep hands, feet, hair and clothing away from moving parts.</li> <li>4. Keep U joint angles equal and small as possible.</li> <li>5. Do not exceed driveline manufacturer's recommended operating length.</li> </ol>	<p><b>PRISE DE FORCE IN ROTATION RESTER ÉLOIGNÉ</b></p> <p>À défaut de suivre ces instructions, cela pourrait entraîner de sérieuses blessures ou même la mort.</p> <ol style="list-style-type: none"> <li>1. Garder tous les écrans protecteurs en place.</li> <li>2. Operer à 540 Tours/minute.</li> <li>3. Garder les mains, pieds, cheveux et vêtements éloignés des éléments mobiles.</li> <li>4. Garder les angles de joint en U égales et le plus petit possible.</li> <li>5. Ne pas excéder la longueur d'opération de la prise de force recommandé par le manufacturier.</li> </ol>
<small>01-60-0125</small>	





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- Think SAFETY! Work SAFELY!



C

 <b>WARNING</b>	 <b>AVERTISSEMENT</b>
 <p><b>ROTATING PART HAZARD KEEP AWAY</b></p> <p>To prevent serious injury or death from rotating parts:</p> <ol style="list-style-type: none"> <li>1. Place all controls in neutral or off, stop engine or motor, set park brake, remove ignition key or disable power source and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.</li> <li>2. Install and secure all guards before operating.</li> <li>3. Do not operate with rotating parts exposed.</li> </ol>	 <p><b>PIÈCES EN MOUVEMENT RESTER ÉLOIGNÉS</b></p> <p>À défaut de suivre ces instructions, cela pourrait entraîner de sérieuses blessures ou même la mort.</p> <ol style="list-style-type: none"> <li>1. Arrêter le moteur, placer tous les contrôles à la position "neutre" enlever la clé du contact et attendre que toutes les pièces soient au point mort avant de faire tout ajustement, réparation ou de débloquer la machine.</li> <li>2. Installer tous les écrans protecteurs avant de mettre la machine en fonction.</li> <li>3. Ne jamais opérer la machine sans écran protecteur.</li> </ol>

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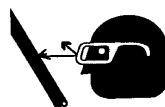
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- Think SAFETY! Work SAFELY!



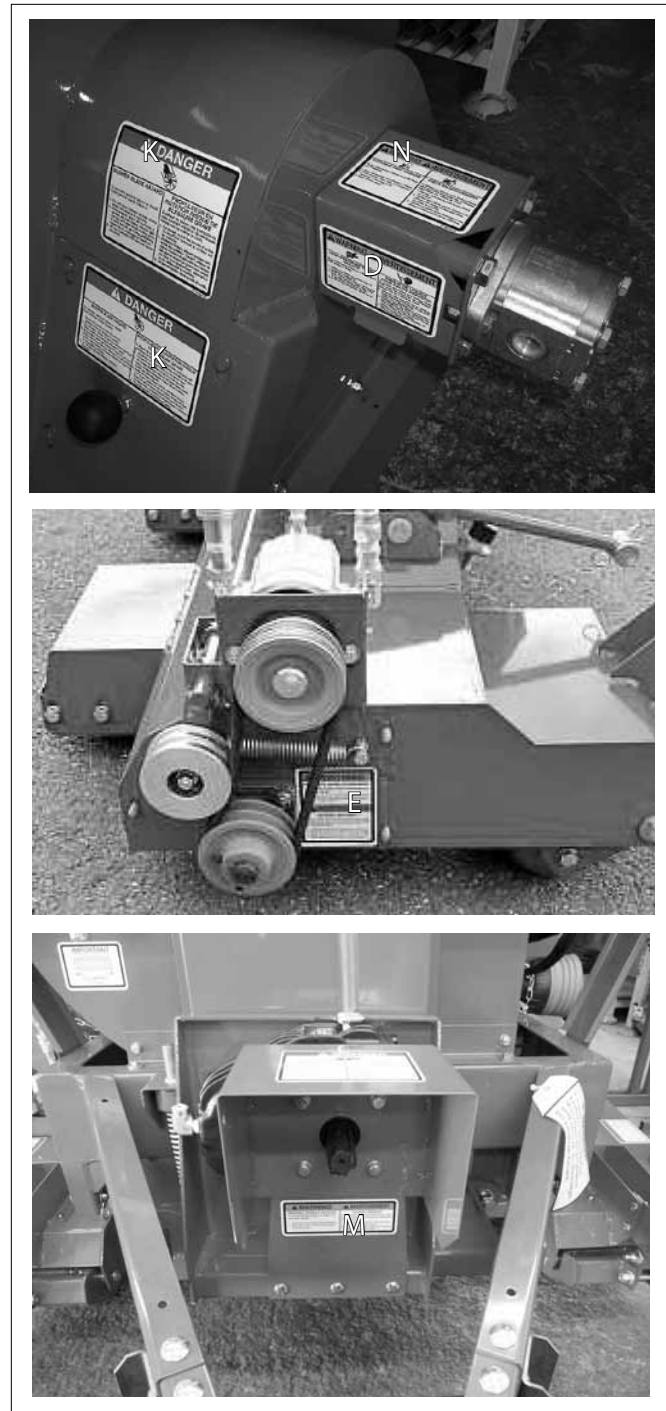
D

 <b>WARNING</b>	 <b>AVERTISSEMENT</b>
	
<p align="center"><b>HIGH PRESSURE FLUID HAZARD</b></p> <p>To prevent serious injury or death from high-pressure fluid:</p> <ol style="list-style-type: none"> <li>1. Relieve pressure on system before repairing or adjusting.</li> <li>2. Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.</li> <li>3. Keep all components in good repair.</li> </ol>	<p align="center"><b>RISQUE DE LIQUIDE SOUS HAUTE-PRESSION</b></p> <p>À défaut de suivre ces instructions, cela pourrait entraîner de sérieuses blessures ou même la mort.</p> <ol style="list-style-type: none"> <li>1. Éliminer toute pression sur le système hydraulique avant d'effectuer une réparation ou un ajustement.</li> <li>2. Toujours porter des gants et des lunettes de sécurité lorsque vous recherchez une fuite. Utiliser un morceau de bois ou de carton au lieu de vos mains.</li> <li>3. Garder toutes les composantes en bonnes conditions.</li> </ol> <p align="right">15-60-0010</p>

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- Think SAFETY! Work SAFELY!



E

	<h2>WARNING</h2>
	<p><b>MISSING SHIELD HAZARD</b></p> <p>To prevent serious injury or death from exposed hazard:</p> <ol style="list-style-type: none"> <li>1. Install and secure shields before operating.</li> <li>2. Keep hands, feet, hair and clothing away from moving parts.</li> </ol>
	<h2>AVERTISSEMENT</h2>
	<p><b>GARDE ABSENT</b></p> <p>À défaut de suivre ces instructions, cela pourrait entraîner de sérieuses blessures ou même la mort.</p> <ol style="list-style-type: none"> <li>1. Installer les gardes de façon sécuritaire avant la mise en marche de la machine.</li> <li>2. Garder les mains, pieds, cheveux et vêtements éloignés des éléments mobiles.</li> </ol> <p style="text-align: right;">01-60-0070</p>





**REMEMBER** - If safety signs have been damaged, removed, become illegible or parts replaced without safety signs, new signs must be applied. New safety signs are available from your authorized dealer.




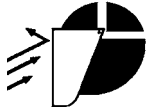

The types of safety signs and locations on the equipment are shown in the illustrations that follow. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!

F

 <b>WARNING</b>  <b>AVERTISSEMENT</b>	
	
<p><b>PINCH POINT HAZARD</b></p> <p>To prevent serious injury or death from pinching:</p> <ol style="list-style-type: none"> <li>1. Stay away from rear gate and side compartment when engine is running. Components can move unexpectedly.</li> <li>2. Install lock pin through frame before entering compartment.</li> <li>3. Keep others away.</li> </ol>	<p><b>RISQUE DE BLESSURES GRAVES</b></p> <p>À défaut de suivre ces instructions, cela pourrait entraîner de sérieuses blessures ou même la mort.</p> <ol style="list-style-type: none"> <li>1. Ne jamais être derrière ou sur les côtés de la porte lorsque le moteur est en marche. À tout moment, la porte peut s'ouvrir rapidement.</li> <li>2. Toujours installer la barrure de sécurité sur la porte de déchargement avant de se placer entre la porte et la machine.</li> <li>3. Garder les gens éloignés de la machine.</li> </ol> <p style="text-align: right;">NC 13-33-0096</p>

G

 <b>DANGER</b>	
	
<p><b>THROWN OBJECT HAZARD</b></p> <p>To prevent serious injury or death from a thrown object:</p> <ol style="list-style-type: none"> <li>1. Do not open unloading door while machine is running.</li> <li>2. Shut off engine and place all controls in neutral before opening door.</li> <li>3. Keep others away.</li> </ol>	<p><b>RISQUE D'OBJETS PROJETÉS</b></p> <p>À défaut de suivre ces instructions, cela pourrait entraîner de sérieuses blessures ou même la mort.</p> <ol style="list-style-type: none"> <li>1. Il est strictement interdit de vous placer derrière la machine lorsque la porte est ouverte et que le moteur est en marche.</li> <li>2. Le souffleur peut propulser des objets à une vitesse telle qu'elle pourrait blesser une personne lorsque la porte est ouverte.</li> <li>3. Garder les gens éloignés de la machine.</li> </ol> <p style="text-align: right;">16-60-0020</p>

**REMEMBER** - If safety signs have been damaged, removed, become illegible or parts replaced without safety signs, new signs must be applied. New safety signs are available from your authorized dealer.

The types of safety signs and locations on the equipment are shown in the illustrations that follow. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.

- Think SAFETY! Work SAFELY!

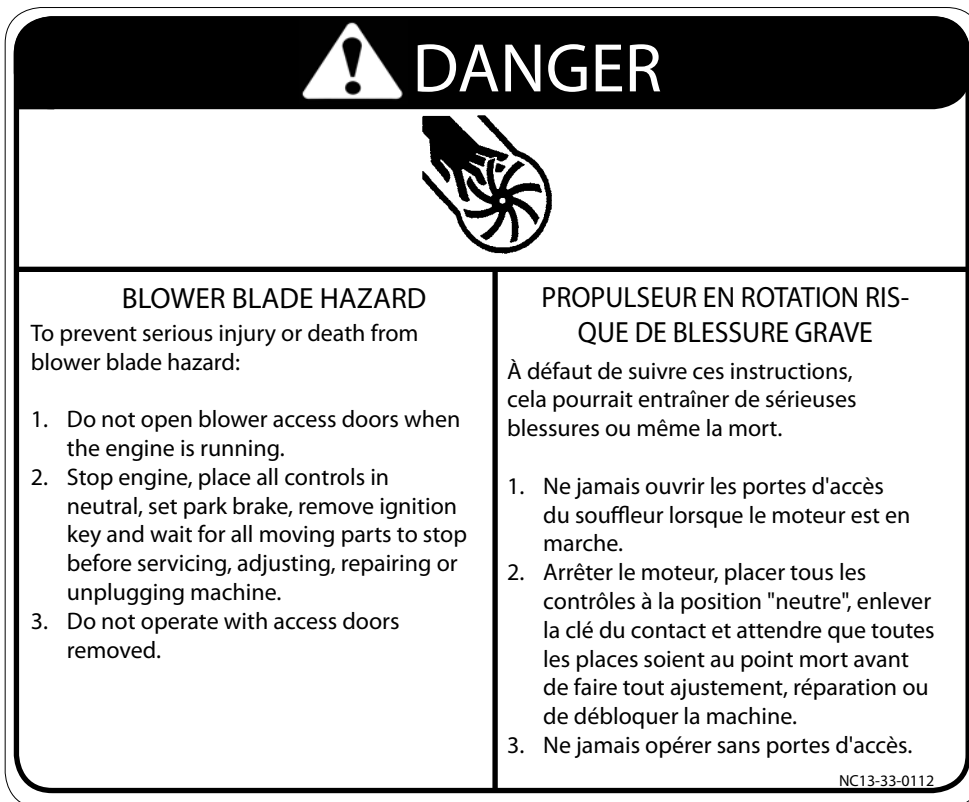
H



J



K



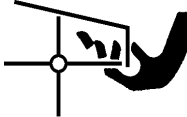
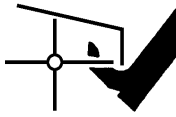


REMEMBER - If safety signs have been damaged, removed, become illegible or parts replaced without safety signs, new signs must be applied. New safety signs are available from your authorized dealer.

The types of safety signs and locations on the equipment are shown in the illustrations that follow. Good safety requires that you familiarize yourself with the various safety signs, the type of warning and the area, or particular function related to that area, that requires your SAFETY AWARENESS.



- Think SAFETY! Work SAFELY!

**L**

 <b>WARNING</b>	 <b>AVERTISSEMENT</b>
	
<b>ROTATING BLADE HAZARD</b> To prevent serious injury or death from rotating blade hazard: <ol style="list-style-type: none"> <li>1. Keep hands and feet away from pick-up head when engine is running. Keep others away.</li> <li>2. Stop engine, place all controls in neutral, set park brake, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging machine.</li> </ol>	<b>BROSSE ROTATIVE EN MOUVEMENT</b> À défaut de suivre ces instructions, cela pourrait entraîner de sérieuses blessures ou même la mort. <ol style="list-style-type: none"> <li>1. Garder les mains et les pieds éloignés du bec d'aspiration lorsque le moteur est en marche. Garder les gens éloignés.</li> <li>2. Arrêter le moteur, placer tous les contrôles à la position "neutre", enlever la clé du contact et attendre que toutes les places soient au point mort avant de faire tout ajustement, réparation ou de débloquer la machine.</li> </ol>





NC13-33-0098

**M**

 <b>WARNING</b>	 <b>AVERTISSEMENT</b>
<b>MISSING SHIELD HAZARD</b> To prevent serious injury or death from exposed hazard: <ol style="list-style-type: none"> <li>1. Install and secure shields before operating.</li> <li>2. Keep hands, feet, hair and clothing away from moving parts.</li> </ol>	<b>GARDE ABSENT</b> À défaut de suivre ces instructions, cela pourrait entraîner de sérieuses blessures ou même la mort. <ol style="list-style-type: none"> <li>1. Installer les gardes de façon sécuritaire avant la mise en marche de la machine.</li> <li>2. Garder les mains, pieds, cheveux et vêtements éloignés des éléments mobiles.</li> </ol>

NC-13-33-0113

**N**

 <b>WARNING</b>	 <b>AVERTISSEMENT</b>
	
<b>ROTATING PART HAZARD KEEP AWAY</b> To prevent serious injury or death from rotating parts: <ol style="list-style-type: none"> <li>1. Place all controls in neutral or off, stop engine or motor, set park brake, remove ignition key or disable power source and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.</li> <li>2. Install and secure all guards before operating.</li> <li>3. Do not operate with rotating parts exposed.</li> </ol>	<b>PIÈCES EN MOUVEMENT RESTER ÉLOIGNÉS</b> À défaut de suivre ces instructions, cela pourrait entraîner de sérieuses blessures ou même la mort. <ol style="list-style-type: none"> <li>1. Arrêter le moteur, placer tous les contrôles à la position "neutre" enlever la clé du contact et attendre que toutes les pièces soient au point mort avant de faire tout ajustement, réparation ou de débloquer la machine.</li> <li>2. Installer tous les écrans protecteurs avant de mettre la machine en fonction.</li> <li>3. Ne jamais opérer la machine sans écran protecteur.</li> </ol>

01-60-0110

**REMEMBER** - If safety signs have been damaged, removed, become illegible or parts replaced without safety signs, new signs must be applied. New safety signs are available from your authorized dealer.

## 4 ASSEMBLING

### 4.1 MACHINE ASSEMBLY

The machine is shipped from the factory in a partially disassembled configuration and attached to a pallet that provides for easy moving and handling. Always use tools, equipment and forklifts of appropriate size and capacity for the job. Always use 2 men when lifting, moving and assembling the machine.

When the machine is shipped, follow this procedure when preparing for the customer:

1. Clear the area of bystanders especially small children before starting.
2. Remove the pallet tie-downs.
3. Use a forklift to lift the pallet/machine from the truck. Carry the load close to the ground as it is moved to the assembly area and positioned.
4. Support the front of the frame using a jack, hoist, forklift or crane. Relieve the load on the front axle.
5. Remove hitch and axle tie-downs.



Fig. 1 LAY-OUT



Front



Axle Straps

Fig. 2 LAY-OUT

6. Remove hitch support frame.



Fig. 3 HITCH SUPPORT FRAME

7. Attach the hitch to the frame and tighten fasteners to their specified torque.



Mounting



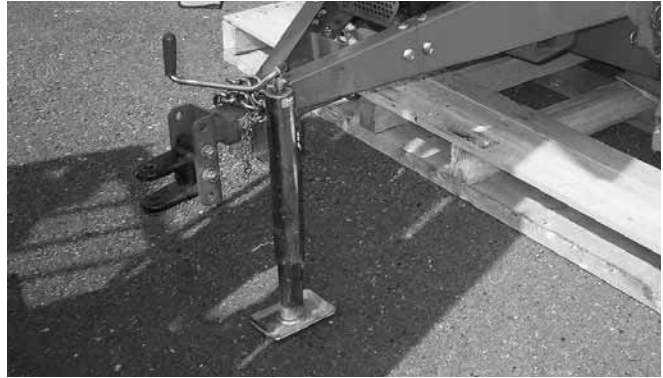
Mounted

Fig. 4 HITCH

8. Attach the Jack to the hitch.



Shipping



Attached

Fig. 5 JACK

9. Pull the machine off the pallet and remove pallet.



Moving



Removal

Fig. 6 REMOVING PALLET

10. Open the rear compartment above the discharge door.



Fig. 7 REAR COMPARTMENT

11. Remove both screens from their channels.

#### NOTE

A 1/4 inch and 1/2 inch screen is supplied with each unit. Select the spacing size appropriate for your application.

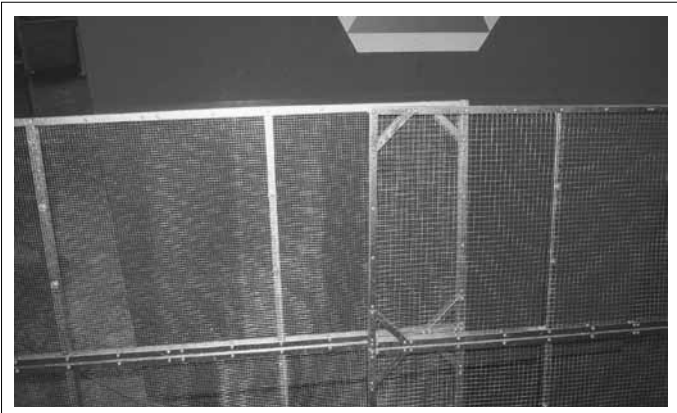


Fig. 8 SCREENS

12. Install the selected screen into the bottom channel.



Bottom Channel

13. Close and latch the screen access door.



Access Door

Fig. 9 SCREEN COMPARTMENT

## 4.2 ASSEMBLY OF OPTIONAL HOSE INTAKE

1. Clear the area of bystanders especially small children before starting.
2. Move the shipping box next to the machine and remove the contents.

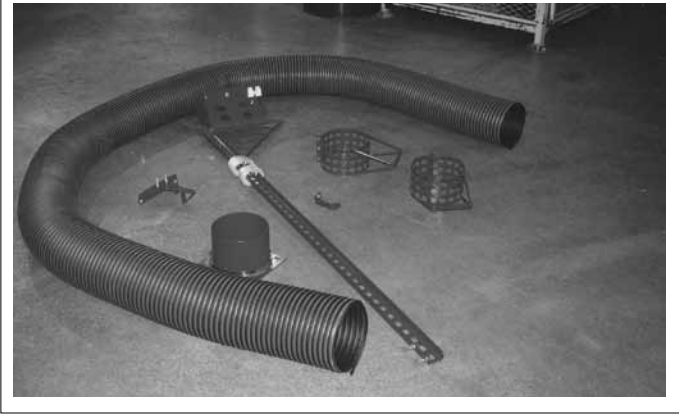


Fig. 10 HOSE ASSEMBLY COMPONENTS

3. Remove 2 bolts on the left side of the debris box.
4. Install the arm anchor bracket and tighten mounting bolts to their specified torque.



Fig. 11 ANCHOR BRACKET



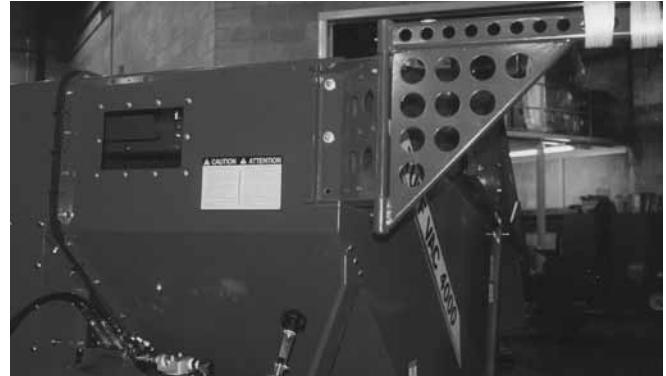
5. Mount the support arm to the left front cover of the box.

**NOTE**

Do not install the front lower bolt.



Side



Front

Fig. 12 SUPPORT ARM

6. Mount the handle anchor bracket in the bottom support mounting hole.

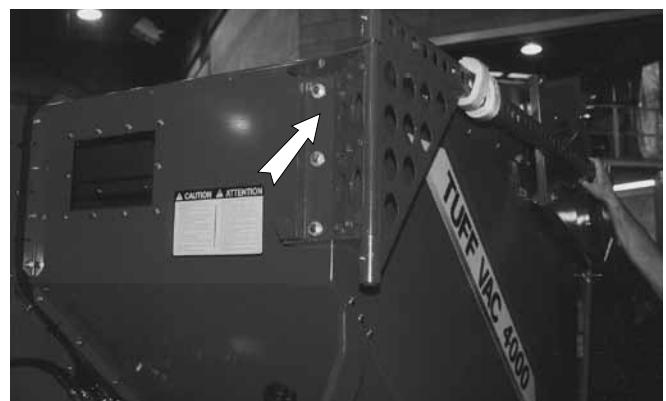


Fig. 13 HANDLE ANCHOR BRACKET

7. Slide the 2 clamps over the hose.
8. Insert the mounting tube into the same end of the hose.

**NOTE**

It may be helpful to apply a little lubricant to the tube to help with installation.



Fig. 14 MOUNTING TUBE

9. Loosen the nylon straps from the support arm by removing the wrapping tape.



Fig. 15 STRAPS

10. Slide the clamps to the intake end of the tube and tighten.



Fig. 16 CLAMPED

11. Remove the blower intake cover by sliding it up and lifting away.



Cover

12. Place the mounting tube over the blower intake opening and slide into position.



Mounted

Fig. 17 TUBE ANCHOR

13. Slide the hose through the nylon straps.
14. Position the first strap between 51 and 53 inches (1300 and 1350 mm) from the blower attachment.
15. Position the second strap 48 inches (1220 mm) further along the hose.



Fig. 18 HOSE INSTALLATION

16. Loosen the clamps on the strap and slide the clamps toward the hose. Tighten fastener to secure strap around hose.

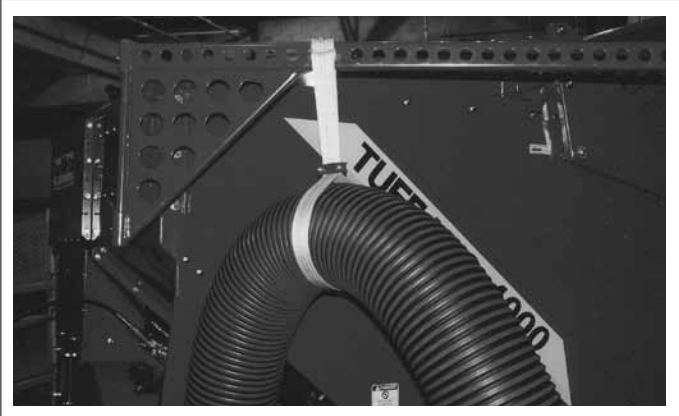


Fig. 19 CLAMPS

17. Swing the loose end of the hose out.
18. Slide both handles over the hose.



Fig. 20 HANDLES

19. Position them at 90° to each other with the end one 3 to 4 feet (1 to 1.3 m) from the intake end of the hose.

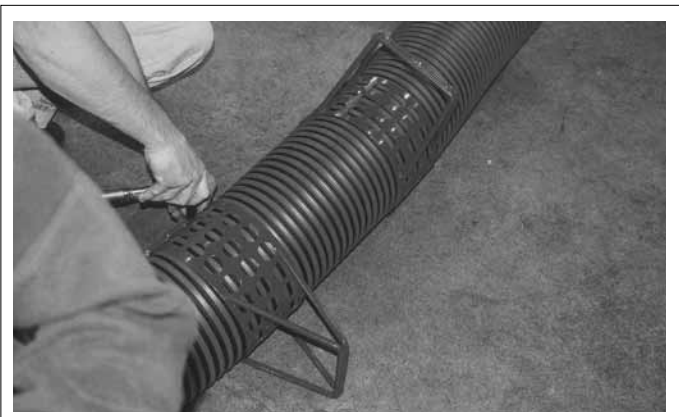


Fig. 21 POSITIONED

20. Position them to provide a comfortable configuration for your use. Try moving and swinging the end. Move the handle as required to be comfortable when using.
21. Tighten handle clamps.



Fig. 22 TIGHTENED

22. Swing the support arm into the machine and secure with the latch.
23. Pull the hose with the outer handle around the front corner and hang on the handle anchor bracket.



Fig. 23 STOWED

## 5 OPERATION



### OPERATING SAFETY

- Please remember it is important that you read and heed the safety signs on the Tuff Vac. Clean or replace all safety signs if they cannot be clearly read and understood.
- If a safety shield or guard is removed for any reason, it must be replaced before the machine is again operated.
- Always use two people to handle heavy, unwieldy components during assembly, installation, removal or moving.
- Place all controls in neutral, stop engine, set park brake, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.
- Do not allow riders on the machine or tractor at any time. There is no safe place for any riders.
- Do not allow anyone who is not familiar with the safety rules and operation instructions to use this machine.
- Never allow children to operate or be around this machine.
- Do not reach into blower openings when the engine is running. Install and secure access covers before starting engine.
- Clear the work area of objects which might be picked up and snagged or entangled in the machine.
- Keep hands, feet, hair, jewellery, and clothing away from all moving and/or rotating parts.
- Do not stand behind machine when the discharge door is open and blower is running.
- Do not enter compartment unless lock pin is installed through frame.
- Keep hands and feet away from pick-up head when engine is running. Keep others away.

### 5.1 TO THE NEW OPERATOR OR OWNER

AgriMetal Tuff Vac Debris Vacuums are designed to efficiently pick up material from the ground and collect it in the machine compartment. A variety of material can be gathered and transported to the unloading area. Grass clippings, leaves and others debris can easily be picked up.

In addition to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of equipment. It is the responsibility of the owner or operator to read this manual and to train all other operators before they start working with the machine.

Follow all safety instructions exactly. Safety is everyone's business. By following recommended procedures, a safe working environment is provided for the operator, bystanders and the area around the worksite. Untrained operators are not qualified to operate the machine.

Many features incorporated into this machine are the result of suggestions made by customers like you. Read this manual carefully to learn how to operate the machine safely and how to set it to provide maximum field efficiency. By following the operating instructions in conjunction with a good maintenance program, your Tuff Vac Debris Vacuum will provide many years of trouble-free service.

## 5.2 MACHINE COMPONENTS

The AgriMetal Tuff Vac Debris Vacuum is a large trailer with a blower on the front. The blower creates a vacuum to pick up debris through the pick-up head or a flexible hose. The material is blown into the containment chamber at the rear. The unit is unloaded by opening the rear door and allowing the debris to fall out.

Power is provided through a PTO from the tractor. A hydraulic pump behind the blower supplies pressurized oil to turn the pick-up head, raise and lower pick-up head and position the discharge door.

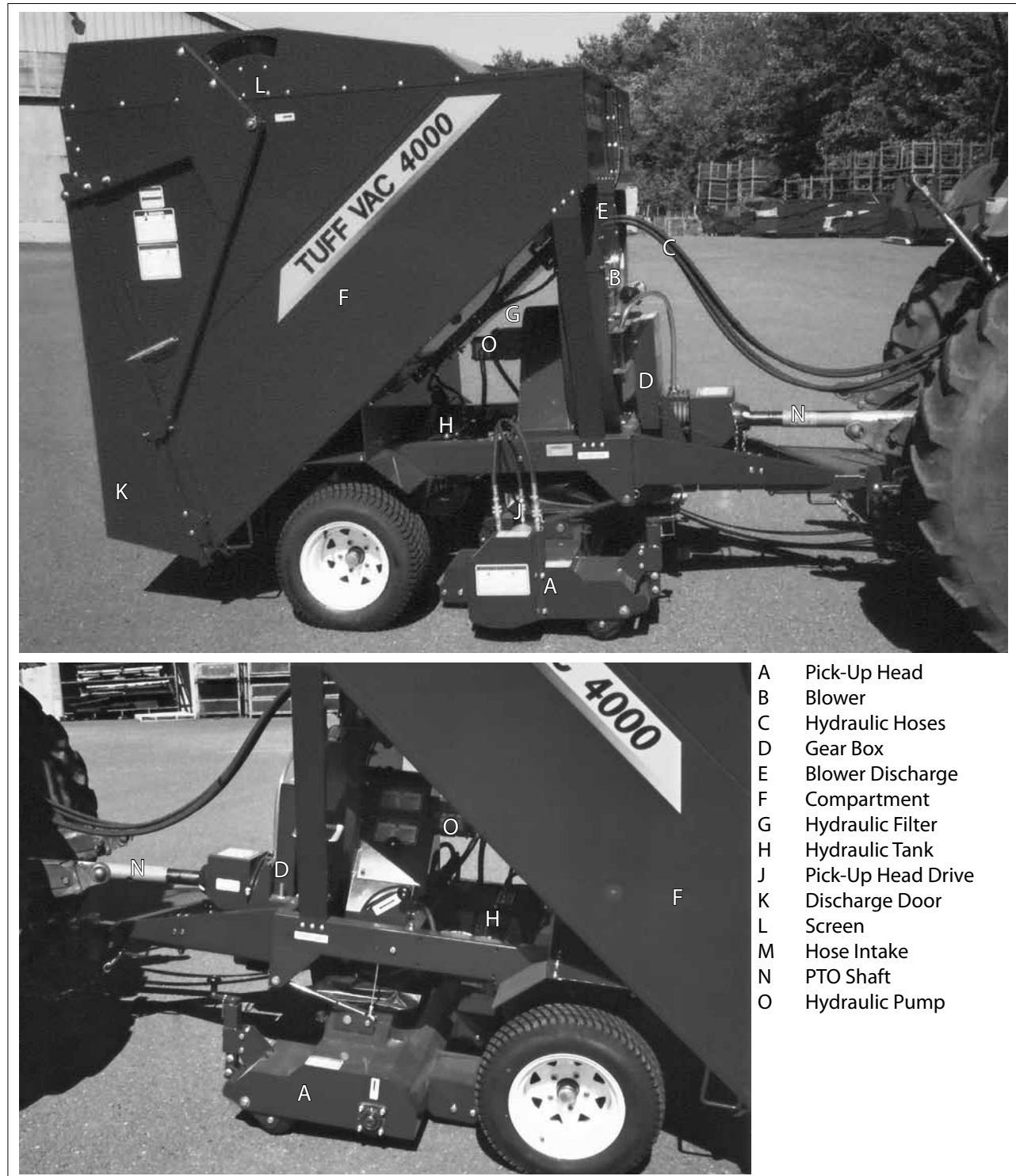


Fig. 24 PRINCIPLE COMPONENTS

## 5.3 BREAK-IN

Although there are no operational restrictions on the Vacuum when it is used for the first time, it is recommended that the following mechanical items be checked:

### A. After operating for 1 hour:

1. Check alignment of pulleys and sprockets. Align as required.
2. Check belt and chain tension. Adjust as required.
3. Torque all fasteners and hardware.
4. Check that the PTO driveline shield turns freely.
5. Check condition of blower bearings.
6. Check the pick-up head rotor for entangled material. Remove any entangled material.
7. Check tire pressure. Inflate as required.
8. Check oil level in hydraulic reservoir. Top up as required.

### B. After operating for 10 hours:

1. Repeat steps 1 through 8 listed above. (Section A).
2. Go to the normal servicing and maintenance schedule as defined in the Maintenance Section.

## 5.4 PRE-OPERATION CHECKLIST

Efficient and safe operation of the AgriMetal Tuff Vac Debris Vacuum requires that each operator reads and understands the operating procedures and all related safety precautions outlined in this section. A pre-operation checklist is provided for the operator. It is important for both personal safety and for maintaining the machine in good mechanical condition that this checklist be followed.

Before operating the Vacuum and each time thereafter, the following areas should be checked off:

1. Lubricate the machine per the schedule outline in the Maintenance Section.
2. Check the tension and alignment of all belts and pulleys. Adjust tension and align as required.
3. Check the pick-up head rotor. Remove any twine, wire or other material that has become entangled.
4. Check that all bearings turn freely. Replace any that are rough or seized.
5. Make sure that all guards and shields are in place, secured and functioning as designed.
6. Check for hydraulic leaks. Tighten any leaking fittings.
7. Check that the PTO driveline turns freely and that the driveline can telescope easily.
8. Check the oil level in the gear box and hydraulic reservoir, add as required.

## 5.5 EQUIPMENT MATCHING

The Tuff Vac PTO model is designed to be used with a turf tractor and operated at a speed of 540 PTO RPM. The gas engine powered model requires a utility vehicle of more than 1200 lbs to operate. The following tractor specifications must be maintained when selecting a power unit.

1. Horsepower:

It is recommended that the turf tractor have a minimum of 30 PTO horsepower when used on the PTO model. This will provide sufficient power for the blower with enough power remaining for tractive needs. When operating in soft or hilly conditions, it is recommended that the power level be increased by 25%.

2. Drawbar:

The drawbar must be set to provide a dimension of 14 inches between the end of the tractor shaft and the center of the drawpin on the PTO powered model. Consult the tractor manual on adjustment procedures.

3. Tires:

Use only turf tires on the power unit to prevent marking the surface.

4. PTO Shaft:

The turf tractor must be equipped with a 6 spline 1 3/8 inch PTO shaft when used with a PTO powered machine. It should never be operated faster than 540 RPM. Use an accurate hand-held tachometer to check the speed if there is doubt about RPM. Never operate the tractor at maximum RPM but only at rated PTO speed.

Do not use shaft adapters when operating. It changes the drawbar dimensions and can lead to over speeding. It is not recommended that the machine be used with imported tractors that have a variable speed PTO. This can also lead to over speeding.

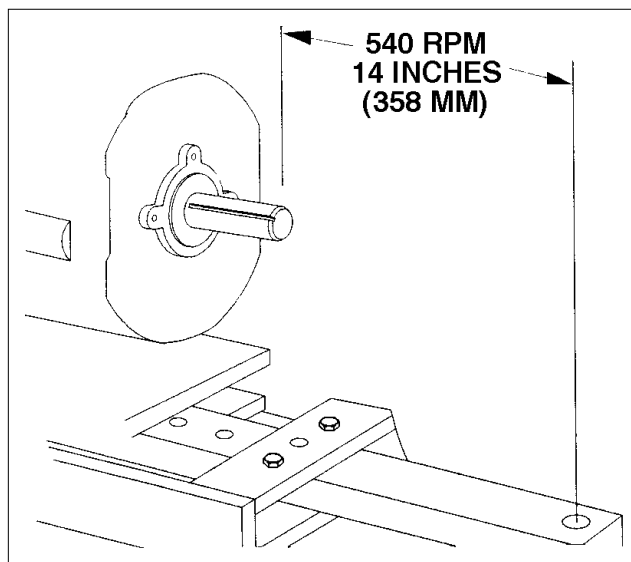


Fig. 25 DRAWBAR DIMENSION



## 5.6 MACHINE SETTINGS

The Tuff Vac pick-up head assembly must be set prior to using in order to obtain the best performance in the field.

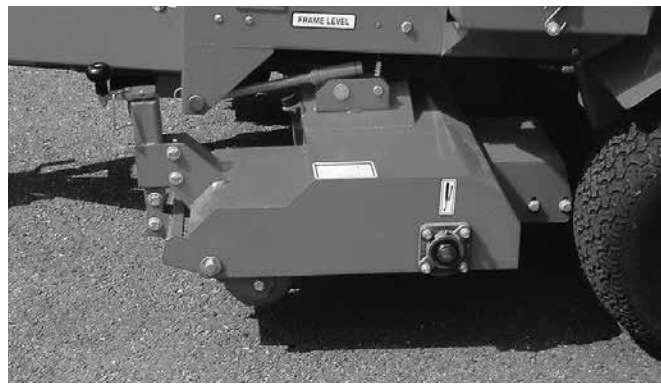
To set pick-up head assembly height, follow this procedure:

1. Move the machine to a hard level surface such as concrete or pavement to provide an even surface.
2. Use the gage wheel adjuster on the front of the pick-up head to set the rotor finger height above the ground.
3. Select the operating height appropriate for your application.

### NOTE

Set the gage roller height on both sides so the rotor finger tips just disturb the surface and break the debris loose so it will be picked up by the flow of air.

- a. On a surface with long coarse grass, set up to a couple of inches (50 mm) above the surface.
- b. On a short firm surface, set to just contact the surface.
- c. Set appropriate for the operating conditions.



Highest



Lowest



Middle



Right Side

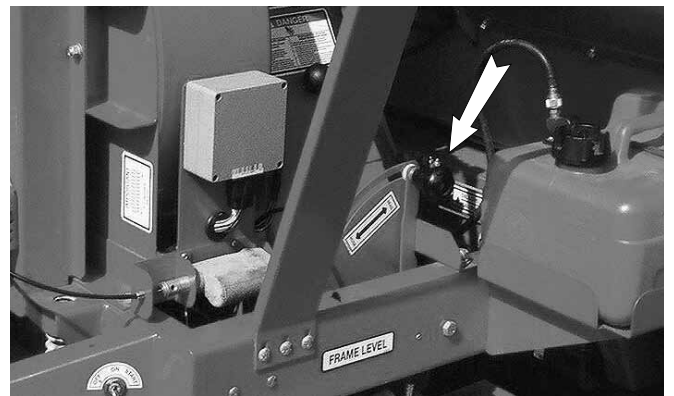
Fig. 26 GAGE ROLLERS / ROTO FINGERS HEIGHT

## 5.7 CONTROLS

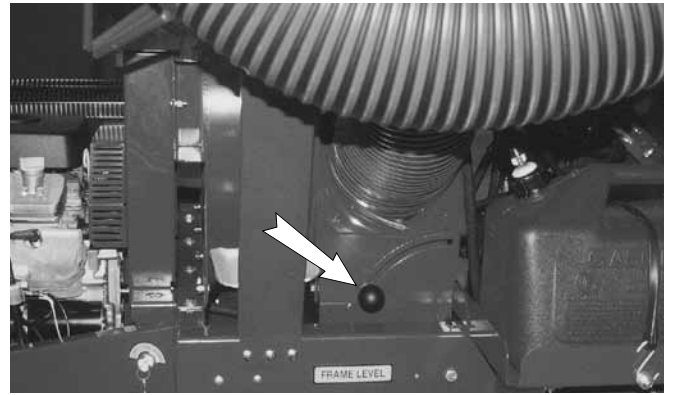
Before starting to work, all operators should familiarize themselves with the location and function of the controls.

### 1. Blower Air Intake:

This sliding knob controls the internal baffle that directs the flow of air into the blower. Move the knob to the vertical position to select the air flow from the pick-up head and horizontal for the flexible hose. Turn the knob clockwise to secure in position and counter-clockwise to loosen.



Pick-Up Head



Hose

Fig. 27 BLOWER AIR INTAKE

## 5.8 ATTACHING/UNHOOKING

The Tuff Vac should always be located on a level, dry area that is free of debris and other foreign objects. When attaching the machine to a tractor or a utility cart, follow this procedure:

1. Clear the area of bystanders, especially small children.
2. Make sure there is enough room and clearance to safely back up to the machine.
3. Attach the PTO driveline to the machine if it was removed for storage (PTO drive model only).
4. While backing up, align the hitch with the drawbar.
5. Extend the hitch when attaching to a utility cart.

### NOTE

The CV joint is always next to the tractor.

6. Be sure the drawbar dimension is set at 14 inches (358 mm) between the end of the tractor PTO shaft and the center of the drawbar pin.

Refer to the tractor manual for adjustment procedures.

7. Stop tractor, set park brake, remove ignition key and wait for all moving parts to stop before dismounting.

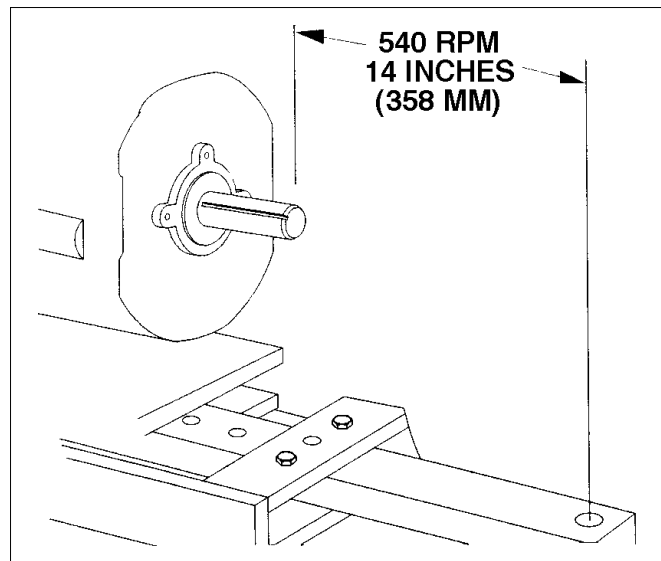


Fig. 28 DRAWBAR DIMENSION

8. Use a drawbar pin with provisions for a mechanical retainer. Install the retainer.

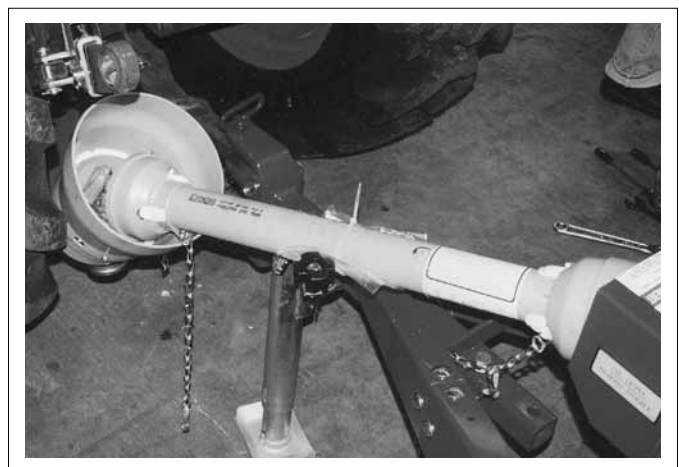


Fig. 29 DRAWBAR PIN



9. Attach the PTO Driveline:

- a. Check that the driveline telescopes easily and that the shield rotates freely.
- b. Attach the driveline to the tractor by twisting the lock ring retracting the lock pin, slide the yoke over the shaft and push on the yoke until the lock pin clicks into position. Pull on the yoke to be sure it is locked in position.
- c. Attach PTO shaft guard anchor chain to the tractor frame to prevent the shield from turning.

**IMPORTANT**

Always attach both the CV joint and shaft tube anchor chains to the frame to secure the guards.

10. Check that there is sufficient clearance between the PTO driveline and the top of the drawbar pin to allow the shaft to move down when the unit goes over the crest of a hill.
11. Attach the safety chain around the drawbar cage to prevent unexpected separation.

	
<b>WARNING</b>	<b>AVERTISSEMENT</b>
<b>HIGH PRESSURE FLUID HAZARD</b>	<b>RISQUE DE LIQUIDE SOUS HAUTE-PRESSION</b>
<p>To prevent serious injury or death from high-pressure fluid:</p> <ol style="list-style-type: none"> <li>1. Relieve pressure on system before repairing or adjusting.</li> <li>2. Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.</li> <li>3. Keep all components in good repair.</li> </ol>	<p>À défaut de suivre ces instructions, cela pourrait entraîner de sérieuses blessures ou même la mort.</p> <ol style="list-style-type: none"> <li>1. Éliminer toute pression sur le système hydraulique avant d'effectuer une réparation ou un ajustement.</li> <li>2. Toujours porter des gants et des lunettes de sécurité lorsque vous recherchez une fuite. Utiliser un morceau de bois ou de carton au lieu de vos mains.</li> <li>3. Garder toutes les composantes en bonnes conditions.</li> </ol>

12. Connect the Hydraulic System:

- a. Use a clean cloth or paper towel to clean the dirt and build-up from around the couplers and male tips.
- b. Connect the hoses to the tractor couplers. Be sure the couplers are securely seated.
- c. Route and secure hoses along the hitch with clips, tape or plastic ties to prevent binding and pinching.

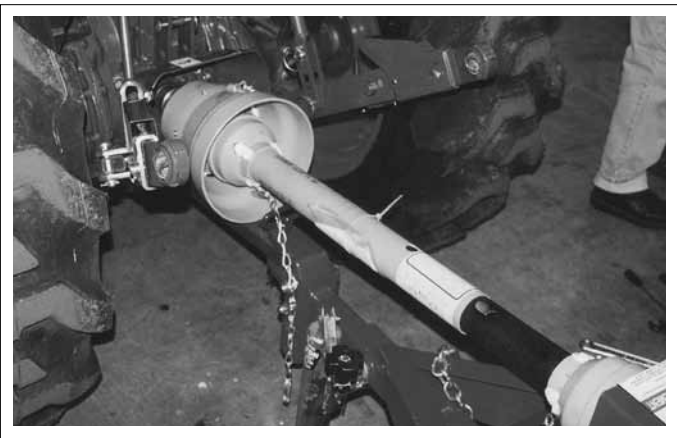


Fig. 30 DRIVELINE

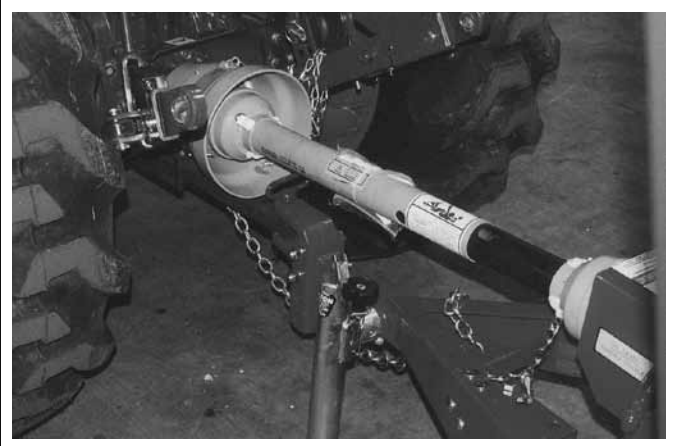


Fig. 31 ATTACHED



First Circuit



Second Circuit

Fig. 32 HYDRAULICS

13. For applications where the tractor has only one set of hydraulic valves, use the remote control to open and close the unloading door. Use the available control valve for the raising and lowering of the pick-up head.



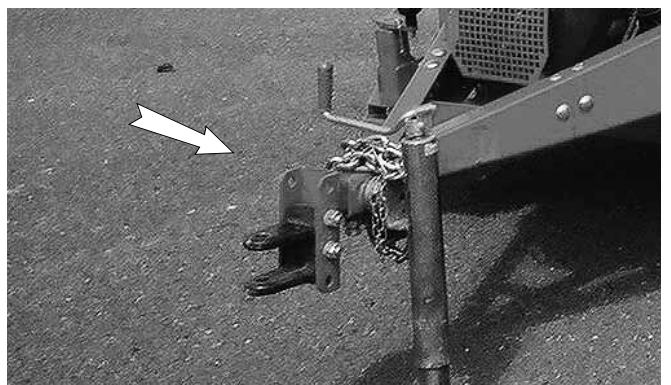
Fig. 33 REMOTE CONTROL (Optional)

14. Pull anchor pin on jack, remove jack and mount to storage bracket.



Fig. 34 STOWED

15. Use a level on the side to level the frame. Remove the hitch clevis to change frame angle. Tighten mounting bolts to their specified torque if the clevis position is changed.



Mid



High

16. Reverse the above procedures when unhooking from tractor.

Fig. 35 CLEVIS POSITIONS

## 5.9 FIELD OPERATION



### OPERATING SAFETY

- Please remember it is important that you read and heed the safety signs on the Tuff Vac. Clean or replace all safety signs if they cannot be clearly read and understood.
- If a safety shield or guard is removed for any reason, it must be replaced before the machine is again operated.
- Always use two people to handle heavy, unwieldy components during assembly, installation, removal or moving.
- Place all controls in neutral, stop engine, set park brake, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.
- Do not allow riders on the machine or tractor at any time. There is no safe place for any riders.
- Do not allow anyone who is not familiar with the safety rules and operation instructions to use this machine.
- Never allow children to operate or be around this machine.
- Do not reach into blower openings when the engine is running. Install and secure access covers before starting engine.
- Clear the work area of objects which might be picked up and snagged or entangled in the machine.
- Keep hands, feet, hair, jewellery, and clothing away from all moving and/or rotating parts.
- Do not stand behind machine when the discharge door is open and blower is running.
- Do not enter compartment unless lock pin is installed through frame.
- Keep hands and feet away from pick-up head when engine is running. Keep others away.

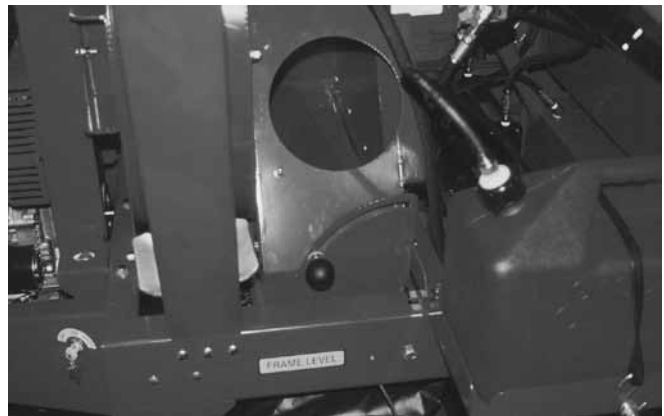
Although the Tuff Vac is easy to use, each operator should review this section to familiarize himself with the detailed safety and operating procedures. When using the machine, follow this procedure:

1. Clear the area of bystanders, especially small children.
2. Review and follow the Pre-Operation Checklist (see Section 5.4).
3. Attach the machine to the tractor (see Section 5.8). Be sure the frame is level.

#### 4. Starting Machine:

##### PTO Drive Model:

- a. Use the duct baffle to select the operating mode: hose or pick-up head.
  - b. Start tractor engine.
  - c. Place throttle at low idle.
  - d. Slowly engage PTO.
  - e. Increase engine speed to the rate PTO speed of 540 RPM.
  - f. Move forward to pick up debris or set park brake and use the hose.
5. Close the rear door to be sure the door is securely latched before starting to work.
  6. Raise the pick-up head to its fully up position.
  7. Be sure the hose is attached to its anchor bracket if so equipped.
  8. Transport to the working area (refer to Section 5.13).



Hose



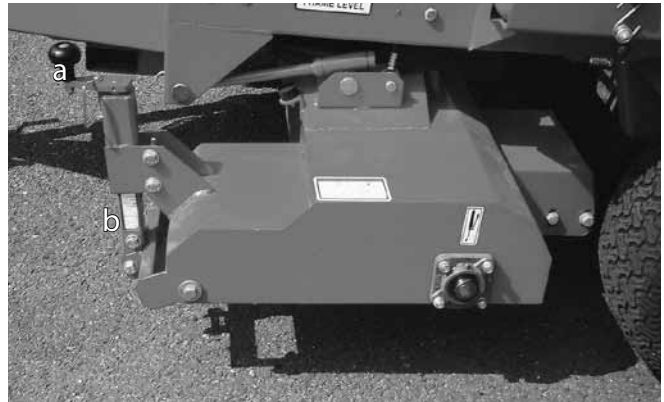
Pick-Up Head

Fig. 36 DUCT BAFFLE

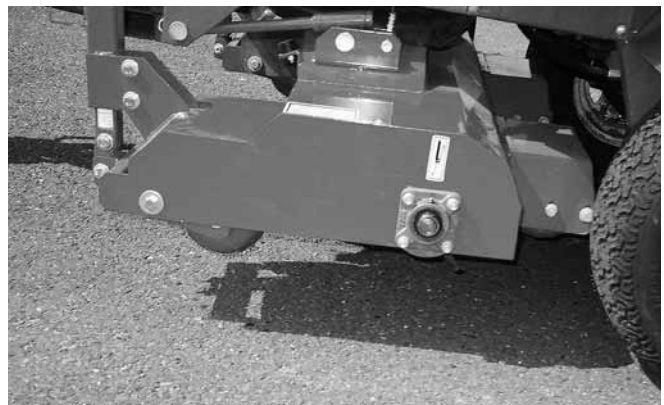
9. Be sure the pick-up head is set at a height appropriate for the application.
10. Travel Speed:  
Set the travel speed appropriate for the job being done. Travel faster if all the debris is being picked up. Slow down if some debris is not being picked up.
11. Pick-Up Head Height:
  - a. Use the crank on the front of each side of the pick-up head to position the gage wheel roller.
  - b. Use the scale on the side of the roller linkage to position the roller. Set both sides the same.
  - c. Set the height so the fingers just touch the debris and break it loose so it can be picked up.



High



Low



Middle - Left Side



Middle - Right Side

Fig. 37 GAGE ROLLER POSITIONS

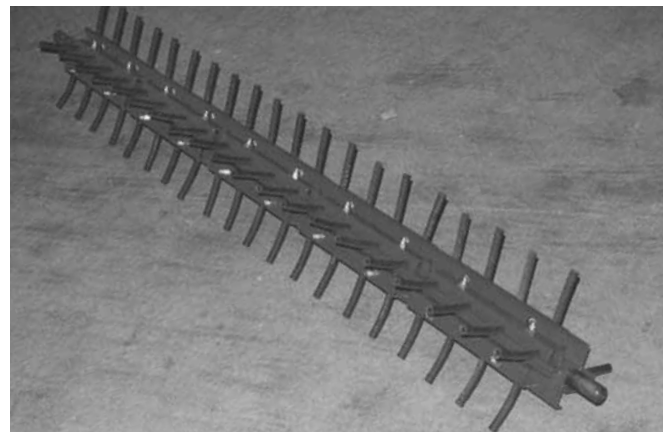


12. Rotors:

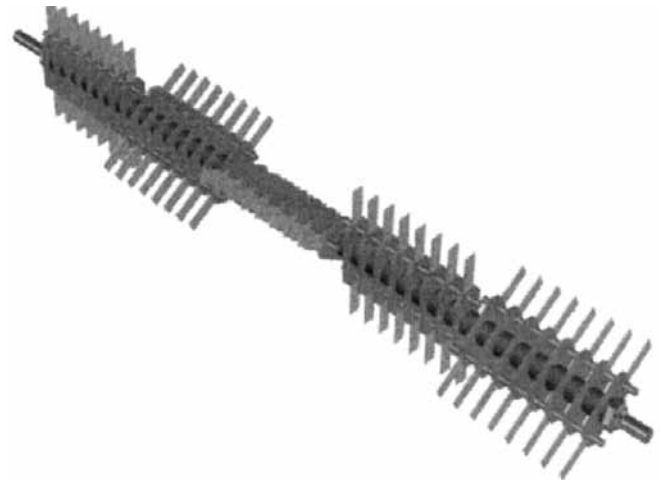
Wire impregnated sweeping brushes are supplied from the factory as standard equipment. To pick up leaves and debris.

An optional dethatching rotor is also available for spring clean up and dethatching application.

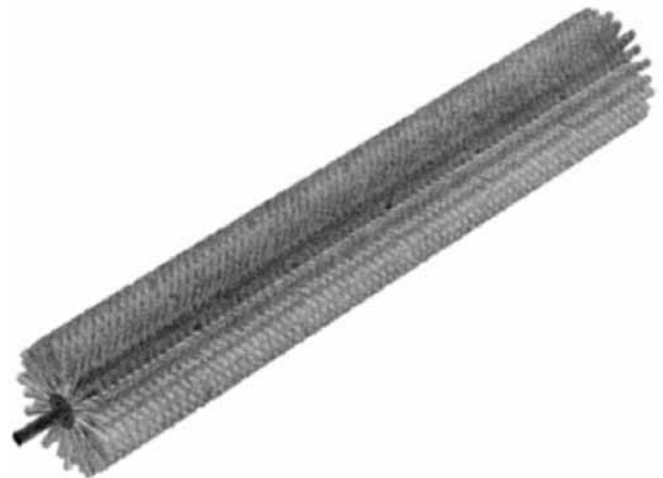
Optional nylon brush is also available for the most gentle sweeping over chort cut fairways.



Rubber Wire Impregnated Finger Brushes



Detaching Rotor Knife



Nylon Brushes

Fig. 38 ROTOR

### 13. Changing Pick-Up Heads:

To change pick-up heads, follow this procedure:

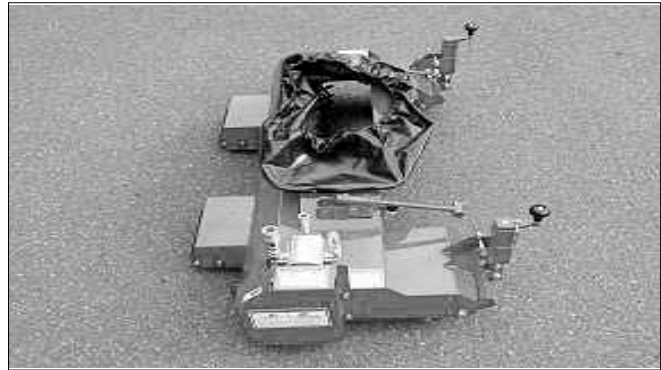
- a. Stop engine, set park brake, remove ignition key and wait for all moving parts to stop.
- b. Remove lift cable anchor on left side.
- c. Remove lift pins.
- d. Remove duct anchors.
- e. Remove lift cable anchor on right side.
- f. Remove lift pins.
- g. Remove duct anchors.
- h. Remove pins through pivot rods.
- i. Disconnect 3 quick couplers to hydraulic motor.
- i. Roll the head out from under the machine and slide the new one in.
- k. Reverse the above procedure to attach the replacement head.



Left Side



Right Side



Replacement Head

Fig. 39 HEAD REPLACEMENT

14. Screens:

Each machine is equipped from the factory with a 1/4 inch and 1/2 inch screen mounted in the channels above the compartment.

Determine the screen size required for the application.

- a. Use the large screen for wet conditions or when picking up leaves.
- b. Use the small screen for dry conditions or when the debris is small and fine.

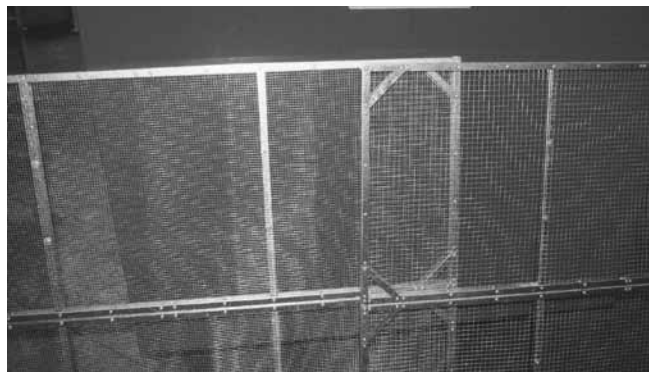
Open the rear access door above the discharge door to access the screens.

**IMPORTANT**

Never open rear door when access door is open to prevent damaging access door.

Always install the screen being used in the bottom channel.

Always close and latch the rear access door before starting to work.



Screens



Access Door



Screen




Latches


Fig. 40 SCREEN

#### 15. Discharge Door:

Do not open the discharge door if anyone is next to the back of the machine. The blower moves a large amount of air through the machine that carries trash and debris with it. This debris can be propelled fast to injure anyone in its path.

Stop the blower whenever anyone must be next to discharge door or inside compartment.


**DANGER**

**THROWN OBJECT HAZARD**

To prevent serious injury or death from a thrown object:

1. Do not open unloading door while machine is running.
2. Shut off engine and place all controls in neutral before opening door.
3. Keep others away.


**DANGER**

**RISQUE D'OBJETS PROJÉTÉS**


À défaut de suivre ces instructions, cela pourrait entraîner de sérieuses blessures ou même la mort.

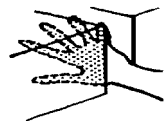
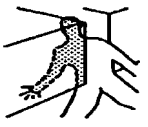
1. Il est strictement interdit de vous placer derrière la machine lorsque la porte est ouverte et que le moteur est en marche.
2. Le souffleur peut propulser des objets à une vitesse telle qu'elle pourrait blesser une personne lorsque la porte est ouverte.
3. Garder les gens éloignés de la machine.

#### 16. Door Lock:

The rear frame is equipped with a retainer to lock it in the open position should a person want to enter the compartment.

Raise the door to its fully up position and install the retainer before entering the compartment.



**WARNING**

**PINCH POINT HAZARD**

To prevent serious injury or death from pinching:

1. Stay away from rear gate and side compartment when engine is running. Components can move unexpectedly.
2. Install lock pin through frame before entering compartment.
3. Keep others away.


**AVERTISSEMENT**

**RISQUE DE BLESSURES GRAVES**

À défaut de suivre ces instructions, cela pourrait entraîner de sérieuses blessures ou même la mort.

1. Ne jamais être derrière ou sur les côtés de la porte lorsque le moteur est en marche. À tout moment, la porte peut s'ouvrir rapidement.
2. Toujours installer la barrure de sécurité sur la porte de déchargement avant de se placer entre la porte et la machine.
3. Garder les gens éloignés de la machine.

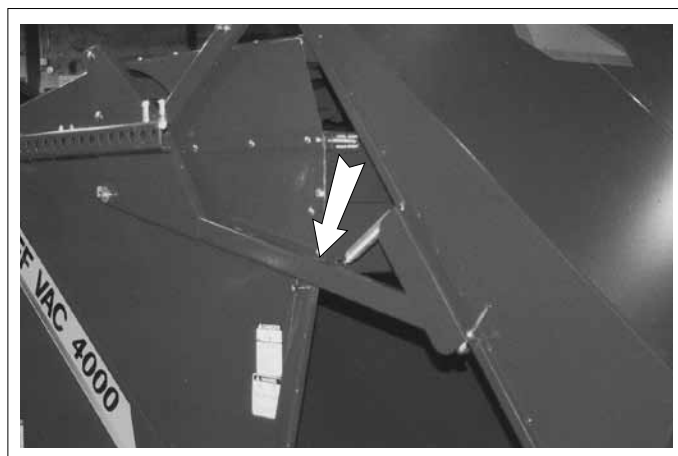
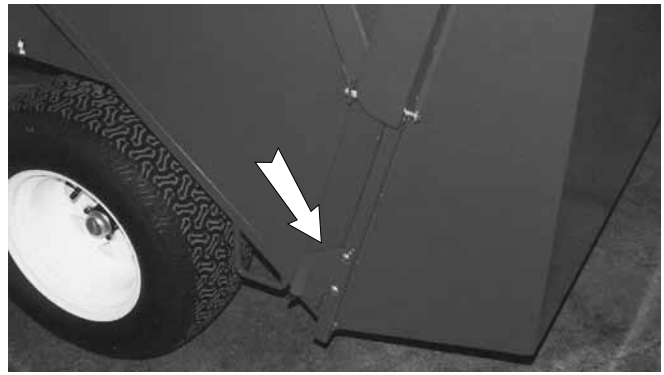


Fig. 41 DOOR LOCK

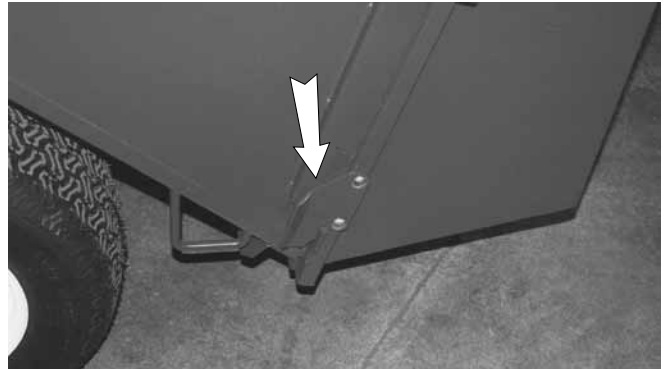
17. Door Latch:

The discharge door is opened and closed with a hydraulic cylinder. The door is secured in the closed position with a latch on door itself.

Hold the control lever for a few seconds after the door closes to completely engage the latch. Be sure that the engine is running at 1/4 throttle position to provide sufficient hydraulic oil to engage the latch.



Closed



Latched

Fig. 42 DOOR LATCH

18. Hose:

Set the engine to run at rated PTO RPM.

- a. Always set the park brake on the tow tractor before using the hose.
- b. Remove the hose end from its storage position.
- c. Use the handles to direct the hose as required.
- d. Latch the support arm and stow the hose when the work is done.



Stowed



Using

Fig. 43 HOSE

19. Slopes:

The machine can have a high center of gravity that can lead to tipping on slopes or hills. It is recommended that the machine always be operated up or down slopes rather than across. On steep slopes with a machine that is almost full, it is recommended that additional loading be done when driving down the hill. Do not risk getting stuck or tipping over.

20. Turning:

The PTO powered model is designed with a constant velocity (CV) universal joint in the driveline. The CV joint allows turns of up to 45° during operation. Sharper turns will overload the joint and destroy the driveline. Do not turn sharper than 45°.

## IMPORTANT


This machine is equipped with a constant velocity PTO shaft which allows turns of up to 45° with the PTO engaged. Sharper turns will destroy the PTO shaft.


Cette machine est équipée d'une prise de force munie d'un joint double qui permet des virages jusqu'à un angle de 45°. Un braquage plus prononcé que 45° lorsque celle-ci est engagée endommagera la prise de force.

21. Unplugging:

Follow this procedure when unplugging.


- a. Stop engine, set park brake, remove ignition key and wait for all moving parts to stop moving.
- b. Remove access doors and clean out ducts and blower.
- c. Install and secure access doors.

**DANGER**



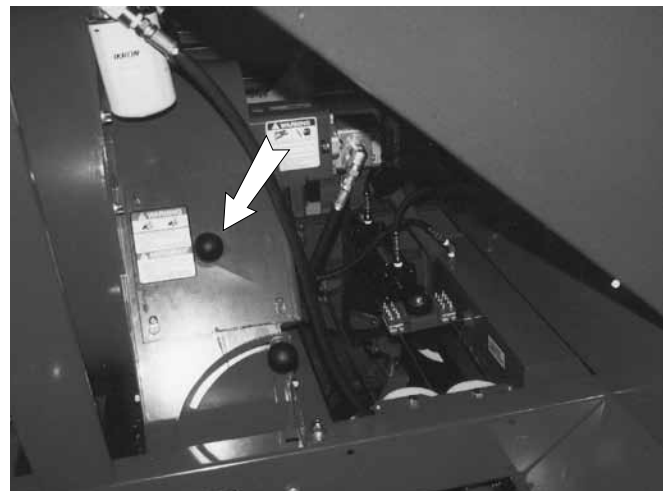
**BLOWER BLADE HAZARD**  
To prevent serious injury or death from blower blade hazard:

1. Do not open blower access doors when the engine is running.
2. Stop engine, place all controls in neutral, set park brake, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging machine.
3. Do not operate with access doors removed.

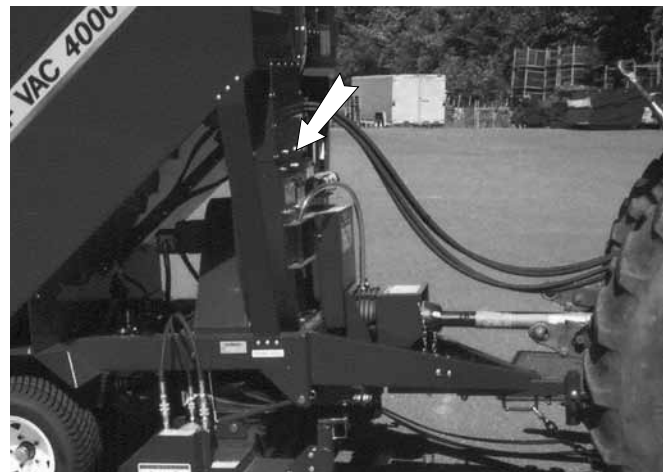
**DANGER**

**PROPULSEUR EN ROTATION RIS-  
QUE DE BLESSURE GRAVE**  
À défaut de suivre ces instructions, cela pourrait entraîner de sérieuses blessures ou même la mort.

1. Ne jamais ouvrir les portes d'accès du souffleur lorsque le moteur est en marche.
2. Arrêter le moteur, placer tous les contrôles à la position "neutre", enlever la clé du contact et attendre que toutes les places soient au point mort avant de faire tout ajustement, réparation ou de débloquer la machine.
3. Ne jamais opérer sans portes d'accès.



Intake



Outlet

Fig. 44 ACCESS DOORS

22. Filled:

The operator will know when the compartment is full. The sound of the machine will change and it will not pick up more debris. Take to the unloading area.

22. Replaceable Wear Liner:

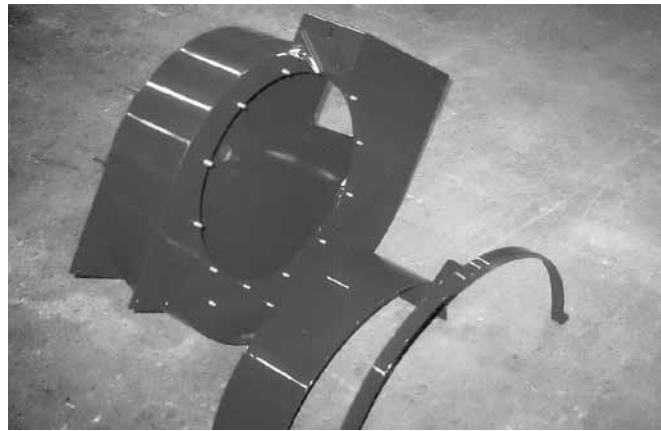
The blower housing is designed with a replaceable wear liner to go around the blower housing. Replace the liner when dust starts to come out through the liner.

**NOTE**

It is recommended that the blower housing and the impeller be replaced when the liner is being replaced for the 3rd time.

**IMPORTANT**

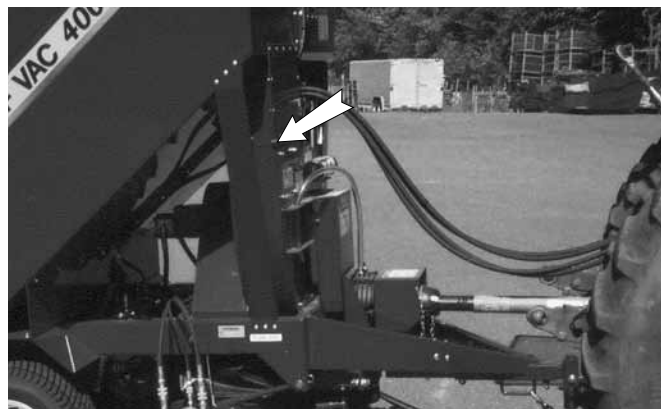
It is not recommended that the machine be used to pick up aeration cores. Cores contain large amounts of soil and sand that is very abrasive and dramatically increases wear. When used to pick up cores, it will void the warranty.



Liner Kit



Left Side



Right Side

Fig. 45 REPLACEABLE WEAR LINER



## 5.10 UNLOADING MATERIAL

The operator will know when the compartment is full from the change in the sound of the blower and the fact that the machine will stop picking up material.

Follow this procedure when unloading the compartment:

1. Slow the engine speed to 1/4 throttle.
2. Raise the pick-up head to its fully up position.
3. Slow engine to low idle if gas engine model.
4. Transport to the unloading area.
5. Stop the tractor forward motion.
6. Increase engine speed to 1/4 throttle.

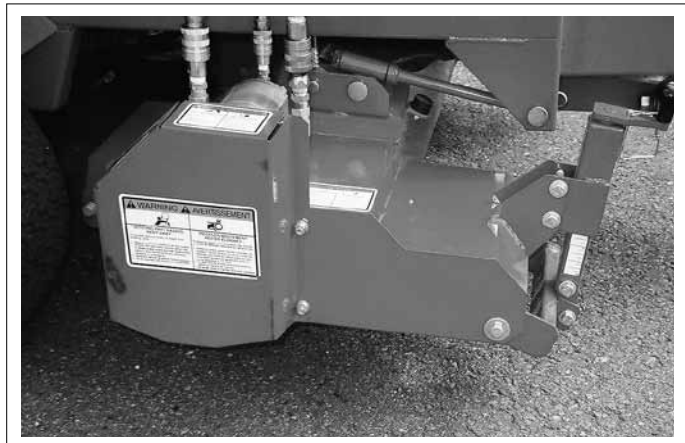


Fig. 46 UP POSITION

7. Use short hydraulic lever to open discharge door. Hold lever until discharge door is fully open.
8. Monitor debris discharge and move ahead if necessary to provide space for the debris to slide out of the compartment.
9. Increase throttle to rated PTO speed of 540 RPM for at least 30 seconds to clean debris from filter screen.

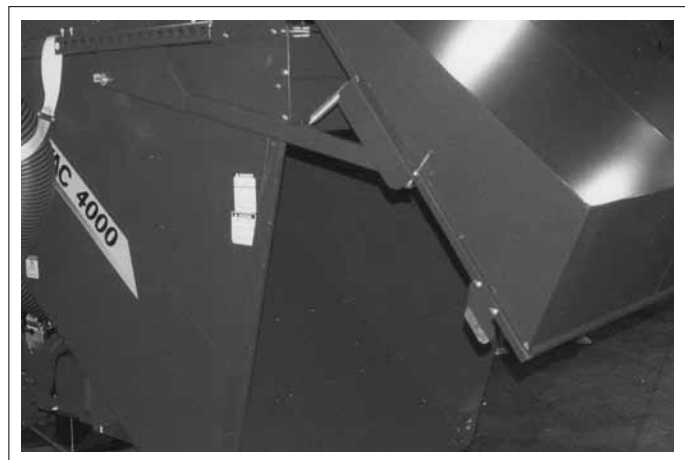


Fig. 47 DISCHARGE DOOR

11. Reduce engine speed to 1/4 throttle.

12. Close discharge door.

13. Hold hydraulic lever until door is fully latched and secured.

14. Transport back to the working area (refer to Section 5.11 Transporting).



Closed



Latched

Fig. 48 EMPTIED

## 5.11 TRANSPORTING



### TRANSPORT SAFETY

- Comply with state and local laws governing highway safety and movement of machinery on public roads.
- The use of flashing amber lights is acceptable in most localities. However, some localities prohibit their use. Local laws should be checked for all highway lighting and marking requirements.
- At all times, when driving the tractor and equipment on the road or highway under 20 mph (32 kph) use flashing amber warning lights and a slow moving vehicle (SMV) identification emblem. Do not exceed 20 mph (32 kph). Reduce speed on rough roads and surfaces.
- Plan your route to avoid heavy traffic.
- Always use a tractor of more than 30 horsepower to transport machine.
- Always install transport locks, pins or brackets before transporting.
- Use a drawbar pin with provisions for a retainer. Install the retainer.
- Do not drink and drive.
- Attach safety chain between tractor and machine before transporting.
- Be a safe and courteous driver. Always yield to oncoming traffic in all situations, including narrow bridges, intersections, etc. Watch for traffic when operating near or crossing roadways.
- Turn into curves or go up or down hills only at a low speed and at a gradual steering angle. Make certain that at least 20% of the tractor's weight is on the front wheels to maintain safe steerage. Slow down on rough or uneven surfaces.
- Never allow riders on either tractor or machine.
- Install lighting bar before transporting.

When transporting the machine, review and follow these instructions:

1. Clear the area of bystanders, especially small children.
2. Be sure that the towing unit has sufficient size and mass to control the Tuff Vac during transport. For the PTO powered model, always use a small agricultural tractor of more than 25 horsepower when transporting.
3. Insure that the machine is securely attached to the tractor with a mechanical retainer through the drawbar pin. Always use a safety chain between the tractor and machine.
4. Make sure the SMV (Slow Moving Vehicle) emblem and all the lights and reflectors that are required by the local highway authorities are in place, are clean and can be seen clearly by all overtaking and oncoming traffic. Install the optional lighting bar before transporting on a public road.

5. Always use hazard flashers on the tractor when transporting unless prohibited by law.
6. Raise the pick-up head.

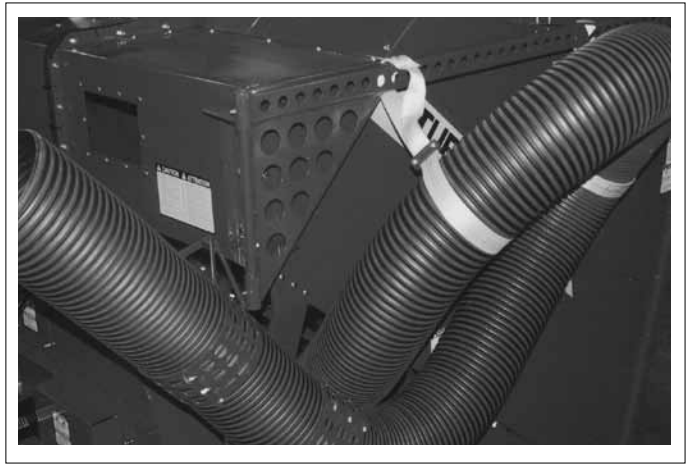


Fig. 49 PICK-UP HOSE STORAGE RACK

7. Secure the hose support arm under its frame latch before transporting if equipped with the optional pick-up hose.
8. Secure the flexible hose handle on the flexible hose storage bracket.
9. Do not allow riders.

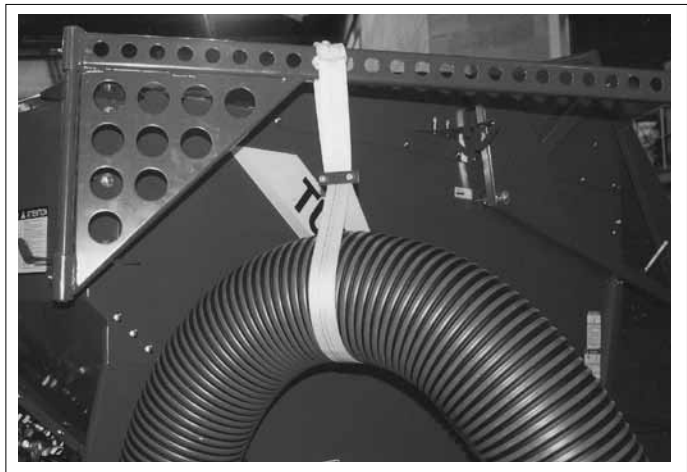


Fig. 50 FRAME LATCH

10. Never exceed a safe travel speed. Never travel faster than 20 mph (32 km/h). The ratio of the tractor weight to the loaded machine weight plays an important role in defining acceptable travel speed. The following table summarized the weight ratio to travel speed.
11. Always shift to a lower gear when going down hill to use the engine as a restraining force.
12. Apply the brakes carefully to prevent jack-knifing.
13. Never disengage tractor drivetrain and coast down hills. Always keep tractor in gear.

Table 1 Travel Speed vs. Weight Ratio

Road Speed	Weight of fully equipped or loaded implement(s) relative to weight of Towing machine
Up to 32 km/h (20 mph)	1 to 1, or less
Up to 16 km/h (10 mph)	2 to 1, or less
Do not tow	More than 2 to 1

## 5.12 STORAGE



### STORAGE SAFETY

- Store the unit in an area away from human activity.
- Do not permit children to play on or around the stored machine.
- Store the unit in a dry, level area. Support the frame with planks if required.

At the end of the season, the machine should be thoroughly inspected and prepared for storage. Repair or replace any worn or damaged components to prevent any unnecessary down time at the beginning of the next season. Follow this procedure:

1. Thoroughly wash the machine with a pressure washer or water hose to remove all dirt, mud, debris or residue.
2. Make sure all the water drains out of the compartment.
3. Lubricate all grease points to remove any water residue from washing.
4. Coat the roller chain, coupler between the blower and hydraulic pump with a good quality chain lubricant to prevent rusting.
5. Remove any material that has become entangled around any moving part.
6. Run the machine for a couple of minutes at low RPM to dry the inside of the blower. Direct the intake air to flow through the pick-up head and hose (if so equipped) to dry them also.
7. Touch up all paint nicks and scratches to prevent rusting.
8. Move the machine to its storage area.
9. Store in a dry, level spot.
10. Store in an enclosed building if possible. If space is not available, cover with a water-proof tarpaulin and tie down securely.
11. Unhook from the tractor (see Section 5.8).



Fig. 51 STORED

12. Place planks under the jack for added support if required.
13. Store in an area away from human activity.
14. Do not allow children to play around the stored unit.

## 6 SERVICE AND MAINTENANCE



### MAINTENANCE SAFETY

- Review the Operator's Manual and all safety items before working with, maintaining or operating the machine.
- Place all controls in neutral, stop engine, set park brake, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.
- Follow good shop practices.
  - Keep service area clean and dry.
  - Be sure electrical outlets and tools are properly grounded.
  - Use adequate light for the job at hand.
- Before applying pressure to a hydraulic system, make sure all components are tight and that hoses and couplings are in good condition.
- Relieve pressure from hydraulic circuit before servicing or disconnecting from tractor.
- Keep hands, feet, hair and clothing away from moving and/or rotating parts.
- Clear the area of bystanders, especially small children, when carrying out any maintenance and repairs or making any adjustments.
- Place stands or blocks under the frame before working beneath the machine.
- Before resuming work, install and secure all guards when maintenance work is completed.
- Do not enter compartment unless lock pin is installed through frame.
- Keep safety signs clean. Replace any sign that is damaged or not clearly visible.

### 6.1 SERVICE

#### 6.1.1 FLUIDS AND LUBRICANTS

1. Grease:  
Use an SAE multipurpose high temperature grease with extreme pressure (EP) performance. Also acceptable is an SAE multipurpose lithium base grease.
2. Hydraulic Oil:  
Use an Armory 32 type oil or any equivalent hydraulic oil.  
  
Reservoir: 8 US gal (30.4 liter)
3. Storing Lubricants:  
Your machine can operate at top efficiency only if clean lubricants are used. Use clean containers to handle all lubricants. Store them in an area protected from dust, moisture and other contaminants.
4. Gear Box Oil:  
Use an SAE 85W90 multi-viscosity oil meeting the American Petroleum Institute (API) classification of SF, SG, SH or SJ for normal operating temperatures.  
  
Gear Box Capacity: As specified on gear box.

#### 6.1.2 GREASING

Use the Maintenance Checklist provided to keep a record of all scheduled maintenance.

1. Use a hand-held grease gun for all greasing.
2. Wipe grease fitting with a clean cloth before greasing, to avoid injecting dirt and grit.
3. Replace and repair broken fittings immediately.
4. If fittings will not take grease, remove and clean thoroughly. Also clean lubricant passageway. Replace fitting if necessary.

### 6.1.3 SERVICING INTERVALS

The period recommended is based on normal operating conditions. Severe or unusual conditions may require more frequent lubrication or oil changes.

8 Hours or Daily

1. Grease PTO driveline (4 locations).

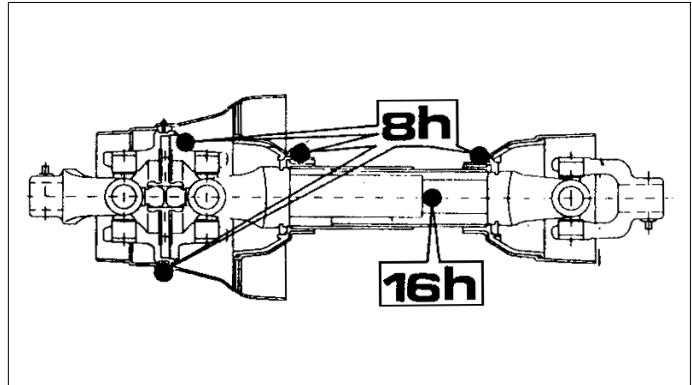


Fig. 52 PTO DRIVELINE

16 Hours

1. Grease PTO driveline (1 location). See previous page.
2. Check hydraulic reservoir oil level. Be sure oil level is in the middle of the sight glass.
3. Check input gear box oil level (PTO drive only).



Fig. 53 SIGHT GLASS

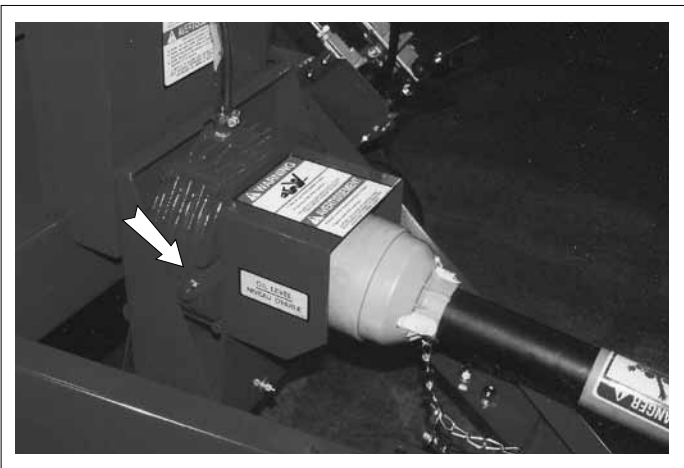
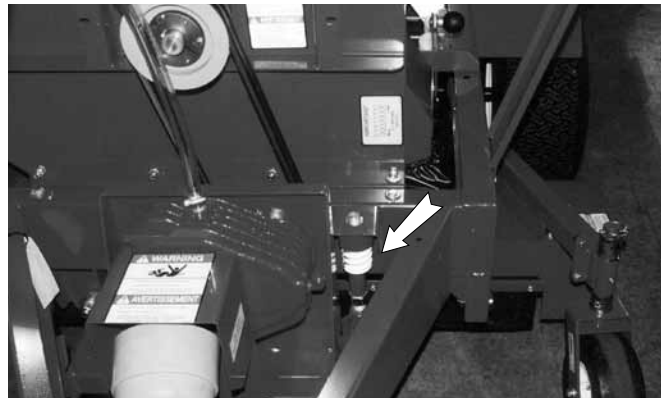


Fig. 54 LEVEL PLUG

Monthly

1. Check blower drive belt tension. Be sure spring length is 3 1/2 inches (89 mm).



PTO



Gas

Fig. 55 BLOWER BELT TENSION

2. Check rotor drive belt tension.



Fig. 56 ROTOR BELT TENSION



3. Grease discharge door pivot.

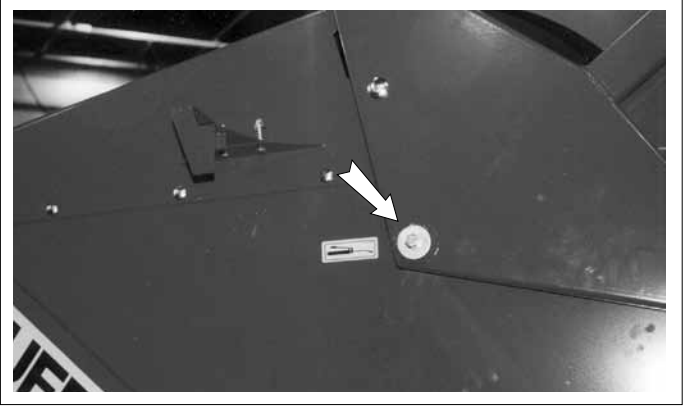


Fig. 57 DISCHARGE DOOR

Annually

1. Change hydraulic system oil filter.

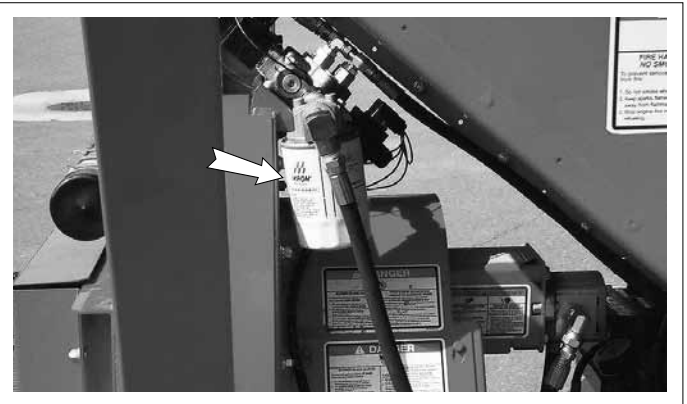


Fig. 58 OIL FILTER

2. Clean screen.

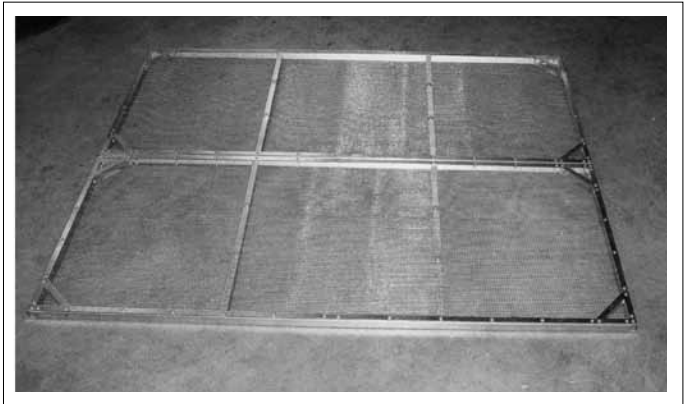


Fig. 59 SCREEN

3. Oil hydraulic pump input coupler roller chain.



Fig. 60 COUPLER

4. Clean machine.

#### 6.1.4 SERVICE RECORD

See Lubrication and Maintenance sections for details of service. Copy this page to continue record.

ACTION CODE:	CK	CHECK	CL	CLEAN
	G	GREASE	CH	CHANGE

[illegible]

## 6.2 MAINTENANCE

### 6.2.1 BLOWER DRIVE BELT TENSION AND ALIGNMENT

A set of V belts transmits rotational power to the blower. They must be kept properly tensioned and the pulleys aligned to obtain the expected performance and life.

To check the tension and alignment, follow this procedure:

1. Clear the area of bystanders, especially small children.
2. Place all controls in neutral, stop engine, set park brake, remove ignition key and wait for all moving parts to stop before dismounting.
3. Measure the length of the motor or gear box tension spring. It should be 6 3/4 inches (171.5 mm) for the belt to be properly tensioned.
4. Remove guard over belt, release tensioner and replace belt when required.
5. Lay a straight edge across the pulley faces to check the alignment. Adjust alignment if pulley faces vary more than 1/32 inch (.7 mm).



Fig. 61 TENSION SPRING (TYPICAL)

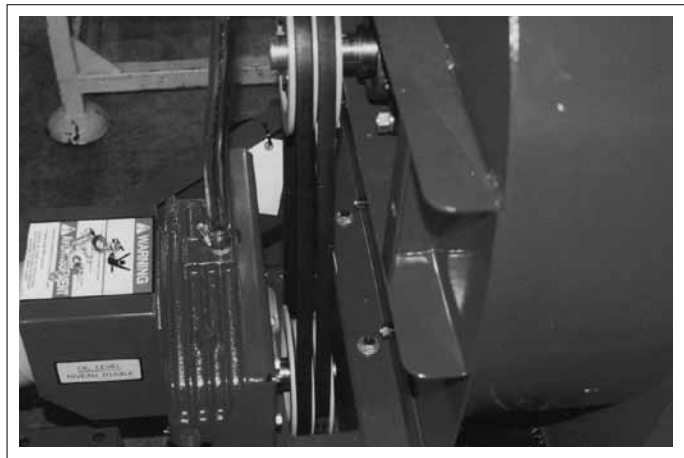


Fig. 62 PULLEY ALIGNMENT



#### WARNING

Machine is shown with guard removed for illustrative purposes only. Do not operate machine with guard removed.

## 6.2.2 PICK-UP DRIVE BELT TENSION AND ALIGNMENT

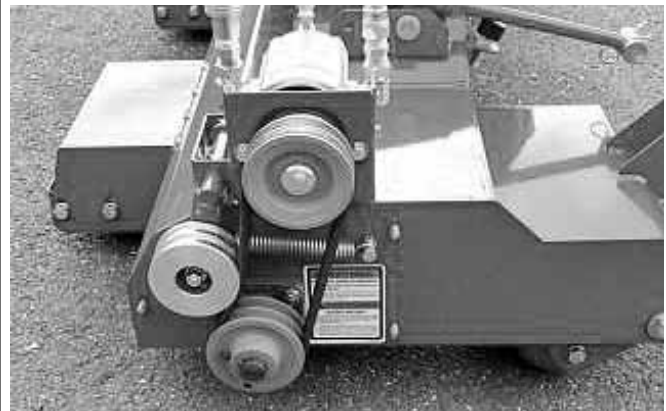
A set of V belts transmits rotational power from the hydraulic motor to the rotor. They must be kept properly tensioned and the pulleys aligned to obtain the expected performance and life.

To check the tension and alignment, follow this procedure:

1. Clear the area of bystanders, especially small children.
2. Place all controls in neutral, stop engine, set park brake, remove ignition key and wait for all moving parts to stop before dismounting.
3. Remove the guard from the drive system.
4. Check the spacing between the spring coils. It should be the thickness of a nickel for the proper tension.
5. Release the spring, remove old belt and replace with new set of belts.



Guard



Spring

Fig. 63 DRIVE ASSEMBLY

6. Lay a straight edge across the pulley faces to check the alignment. Adjust alignment if pulley faces vary more than 1/32 inch (.7 mm).



### WARNING

Machine is shown with guard removed for illustrative purposes only. Do not operate machine with guard removed.



Fig. 64 ALIGNMENT

### 6.2.3 UPPER DOOR SEAL

The compartment is designed with very small gap to retain most debris. Check the upper gap if debris escapes.

To check fit of door, follow this procedure:

1. Clear the area of bystanders, especially small children.
2. Place all controls in neutral, stop engine, set park brake, remove ignition key and wait for all moving parts to stop before dismounting.
3. Check the gap at the top of the door. It should be minimal.
4. Loosen bolts on door support frame to reduce gap. Tighten fasteners to their specified torque.



Fig. 65 GAP

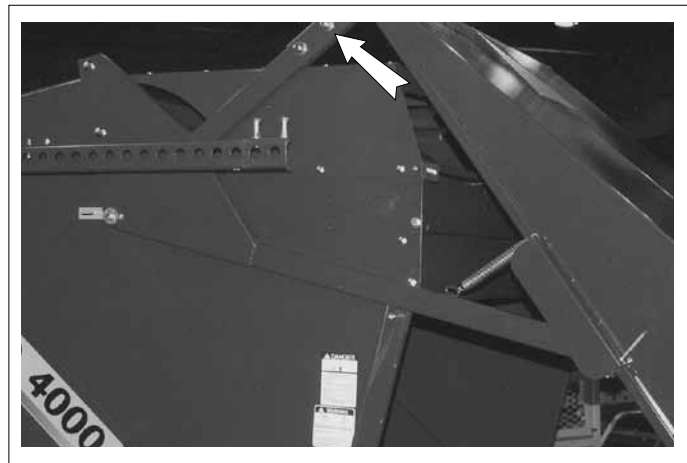


Fig. 66 FRAME BOLTS

## 6.2.4 DOOR LATCH

The door is secured by latches on the lower corner of the door. Each latch must fully engage to hold the door closed.

To adjust latch, follow this procedure:

1. Clear the area of bystanders, especially small children.
2. Place all controls in neutral, stop engine, set park brake, remove ignition key and wait for all moving parts to stop before dismounting.
3. Check the engagement of the latch.
4. Adjust the latch striker plate to change the engagement.



Fig. 67 ENGAGEMENT

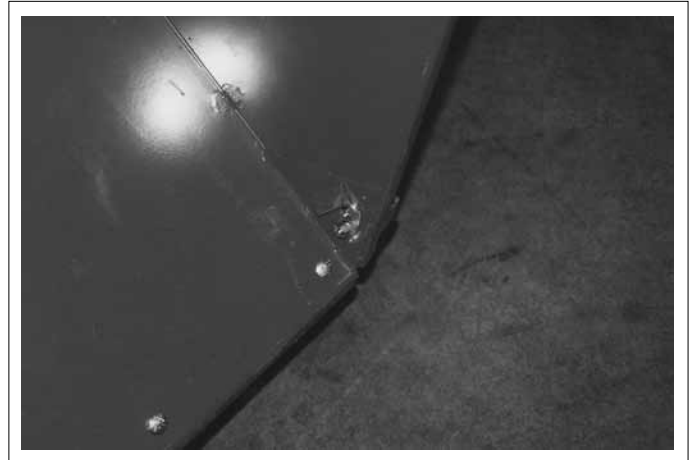


Fig. 68 STRIKER PLATE

## 6.2.5 REPLACEABLE WEAR LINER

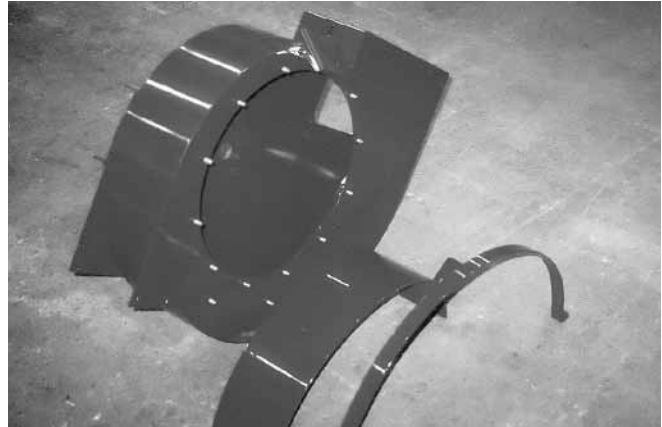
The blower housing is designed with a replaceable wear liner to go around the blower housing. Replace the liner when dust starts to come out around the edges of the liner.

### NOTE

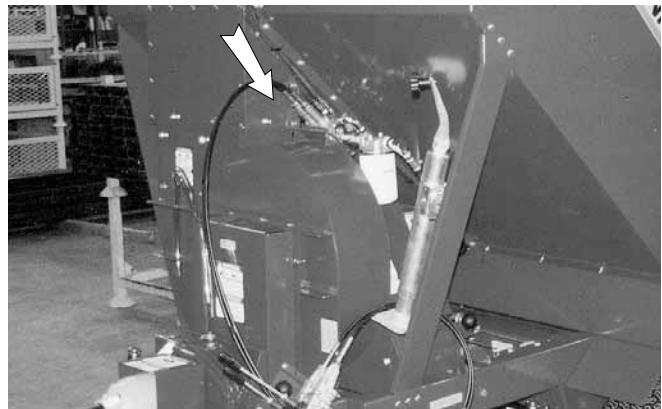
It is recommended that the blower housing be replaced when the liner is being replaced for the 3rd time.

### IMPORTANT

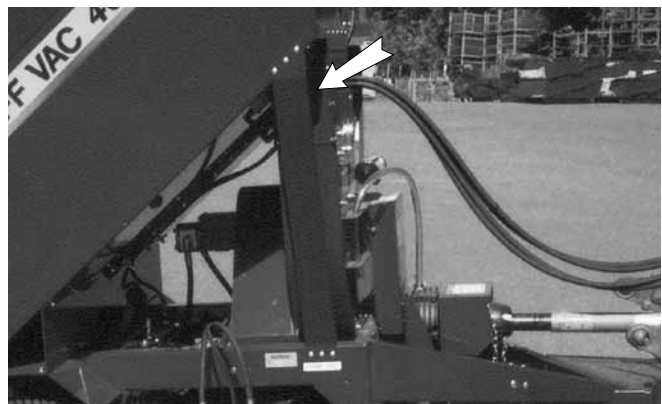
It is not recommended that the machine be used to pick up cores. Cores contain large amounts of soil and sand that is very abrasive and dramatically increases wear. When used to pick up cores, it will void the warranty.



Liner Kit



Left Side



Right Side

Fig. 69 REPLACEABLE WEAR LINER

## 7 TROUBLE SHOOTING

The AgriMetal Tuff Vac Debris Vacuum is a large portable compartment with a rotor for picking up trash and debris. It is a simple system that requires minimal maintenance.

In the following Trouble Shooting section, we have listed many of the problems, causes and solutions that can help you to solve the problems that you might encounter.

If you encounter a problem that is difficult to solve, even after having read through this trouble shooting section, please call your local distributor or dealer. Before you call, please have this Operator's Manual and the serial number of your machine at hand.

PROBLEM	CAUSE	SOLUTION
No trash is being picked up.	No suction.	Use baffle to direct air flow to pick-up or hose as directed.
	Compartment full.	Empty machine.
	No suction to hose.	Move baffle to hose intake duct.
	Screen plugged.	Clean screen.
<hr/>		
Machine vibrates.	Blower out of balance.	Stop machine. Inspect impeller. Repair or replace as required.
	Blower worn out.	Replace the impeller.
	Debris tangled in brush.	Remove material from brush.
	Belts loose.	Adjust belt tension.
<hr/>		
Discharge door comes open.	Door is not latched.	Hold hydraulic lever to close door for 5 seconds after door is closed to engage latches.
	Door still won't latch.	Adjust pressure on hydraulic valve.
<hr/>		



## 8 SPECIFICATIONS

### 8.1 MECHANICAL

TUFF VAC	PTO
VACUUM NOZZLE WIDTH	60" (152 cm)
MACHINE LENGTH	121" (307 cm)
MACHINE WIDTH	66" (167 cm)
MACHINE HEIGHT	85 1/2" (217 cm)
MACHINE WEIGHT	1924 lbs. (875 kg)
IMPELLER SIZE	18.5" x 5" (47 x 12.7 cm)
NO. OF BLADES	6
HYDRAULIC BRUSH HEAD	Standard
DETHATCHING ROTOR	Optional
HYDRAULIC LIFT PICKUP HEAD	Standard
FLOATING PICKUP HEAD	Standard
HYDRAULIC UNLOADING	Standard
CONTAINER	4 cu. yard
OPTIONAL HAND PICKUP HOSE	8" x 16' (20 mc x 4.8 m)
HITCH	Adjustable draw bar
TIRES	(2) turf saver 23 x 10.5 - 12
RECOMMENDED HP	30 HP - At PTO

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

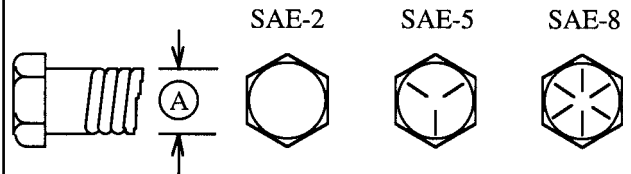
## 8.2 BOLT TORQUE

### CHECKING BOLT TORQUE

The tables shown below give correct torque values for various bolts and capscrews. Tighten all bolts to the torques specified in chart unless otherwise noted. Check tightness of bolts periodically, using bolt torque chart as a guide. Replace hardware with the same strength bolt.

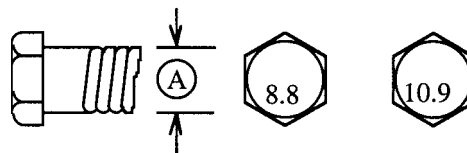
### ENGLISH TORQUE SPECIFICATIONS

Bolt Diameter "A"	Bolt Torque *					
	SAE 2		SAE 5		SAE 8	
	N.m	(lb-ft)	N.m	(lb-ft)	N.m	(lb-ft)
1/4"	8	(6)	12	(9)	17	(12)
5/16"	13	(10)	25	(19)	36	(27)
3/8"	27	(20)	45	(33)	63	(45)
7/16"	41	(30)	72	(53)	100	(75)
1/2"	61	(45)	110	(80)	155	(115)
9/16"	95	(70)	155	(115)	220	(165)
5/8"	128	(95)	215	(160)	305	(220)
3/4"	225	(165)	390	(290)	540	(400)
7/8"	230	(170)	570	(420)	880	(650)
1"	345	(225)	850	(630)	1320	(970)



### METRIC TORQUE SPECIFICATIONS

Bolt Diameter "A"	Bolt Torque*			
	8.8		10.9	
	(N.m)	(lb-ft)	(N.m)	(lb-ft)
M3	.5	.4	1.8	1.3
M4	3	2.2	4.5	3.3
M5	6	4	9	7
M6	10	7	15	11
M8	25	18	35	26
M10	50	37	70	52
M12	90	66	125	92
M14	140	103	200	148
M16	225	166	310	229
M20	435	321	610	450
M24	750	553	1050	774
M30	1495	1103	2100	1550
M36	2600	1917	3675	2710



Torque figures indicated above are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or capscrews unless otherwise specified in this manual. When using locking elements, increase torque values by 5%.

\* Torque value for bolts and capscrews are identified by their head markings.

## 8.3 HYDRAULIC FITTING TORQUE

### TIGHTENING FLARE TYPE TUBE FITTINGS \*

1. Check flare and flare seat for defects that might cause leakage.
2. Align tube with fitting before tightening.
3. Lubricate connection and hand tighten swivel nut until snug.
4. To prevent twisting the tube(s), use two wrenches. Place one wrench on the connector body and with the second tighten the swivel nut to the torque shown.

Tube Size OD	Nut Size Across Flats	Torque Value*		Recommended Turns To Tighten (After Finger Tightening)	
(in.)	(in.)	(N.m)	(lb-ft)	(Flats)	(Turn)
3/16	7/16	8	6	1	1/6
1/4	9/16	12	9	1	1/6
5/16	5/8	16	12	1	1/6
3/8	11/16	24	18	1	1/6
1/2	7/8	46	34	1	1/6
5/8	1	62	46	1	1/6
3/4	1-1/4	102	75	3/4	1/8
7/8	1-3/8	122	90	3/4	1/8

- \* The torque values shown are based on lubricated connections as in reassembly.

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