

**Hammermill
Model 450**

2nd Edition

AMADAS

**MAN071
November 2005
©2005**

*Hammermills are manufactured
by AMADAS Industries.*

You can find us on the Web at:

www.amadas.com

or e-mail us at:

amadas@amadas.com

You can also contact us at:

P.O. Box 1833 / Suffolk, VA 23439
(mailing)
1100 Holland Road / Suffolk, VA 23434
(shipping)
(757) 539-0231 (phone)
(757) 934-3264 (FAX)

P.O. Box 3687 / Albany, GA 31701
(mailing)
1701 South Slappey Blvd. / Albany, GA 31706
(shipping)
(229) 439-2217 (phone)
(229) 439-9343 (FAX)

Table of Contents

Welcome	iii
1. Safety	1
Overview	2
Safety Symbols	3
Safety Guidelines	5
Safety Decals	6
2. Installation	7
Before Installing	8
Installation Instructions.....	9
3. Operation	11
How the Hammermill Works.....	12
Pre-Operation Checklist	13
How to Use the Hammermill	14
How to Stop the Hammermill	14
4. Maintenance	15
Regular Maintenance	16
Powering Down the Machine	16
After Servicing the Machine	16
Maintenance Schedule.....	17
Hammers.....	18
How to Rotate or Replace Hammers	19
How to Balance Hammers.....	20
Bolts	21
Wear Plates.....	21
Infeed Chute.....	21
Product Screen	21
Shear Blade	22
How to Inspect and Replace the Shear Blade.....	22
How to Lower the Shear Blade.....	22
Rotor Drive	22
Electric Motor.....	22
Rotor Shaft Bearings.....	23

How to Lubricate the Bearings	23
How to Remove the Bearings.....	23
How to Install the Bearings.....	23
Hydraulic Access Door.....	25
Rotor	25
How to Fix a Stalled Rotor.....	25
How to Balance the Rotor	26
Troubleshooting	27
Appendix	A - 1
Concrete Support Pad	A - 2
Maintenance Log	A - 2
Rotor Balancing	A - 3
Hammermill Maintenance Log	A - 4
Grease Lubrication.....	A - 5
Warranty Statement	

AMADAS

Welcome to Amadas Industries

With origins dating back to 1963, Amadas Industries and its predecessors have a long history of providing high quality, reliable, innovative equipment for the farming industry. Amadas equipment is currently at work throughout the United States and in many other countries. This equipment includes machinery such as the Magnum Fource Peanut Combine, Reel Rain Traveler Irrigation System, Tree Bark Processing and Packaging Machinery, the Soils and Bark Bagger, and various sizes of Hammermills.

Low Profile Hammermill

Congratulations on your purchase of a Model 450 Hammermill. Our Hammermills are designed to reduce material consistently and efficiently, as well as to provide a long service life with a minimum of maintenance.

Description

All of the Hammermill models are built of heavy duty steel and designed for the most demanding conditions. Our Hammermills feature:

- Blades made from C-1080 high carbon steel.
- An easy access door for blade inspection and screen changes.
- A metal trap.
- Replaceable wear blades.
- A variety of different screen sizes to fit your specific product requirements.

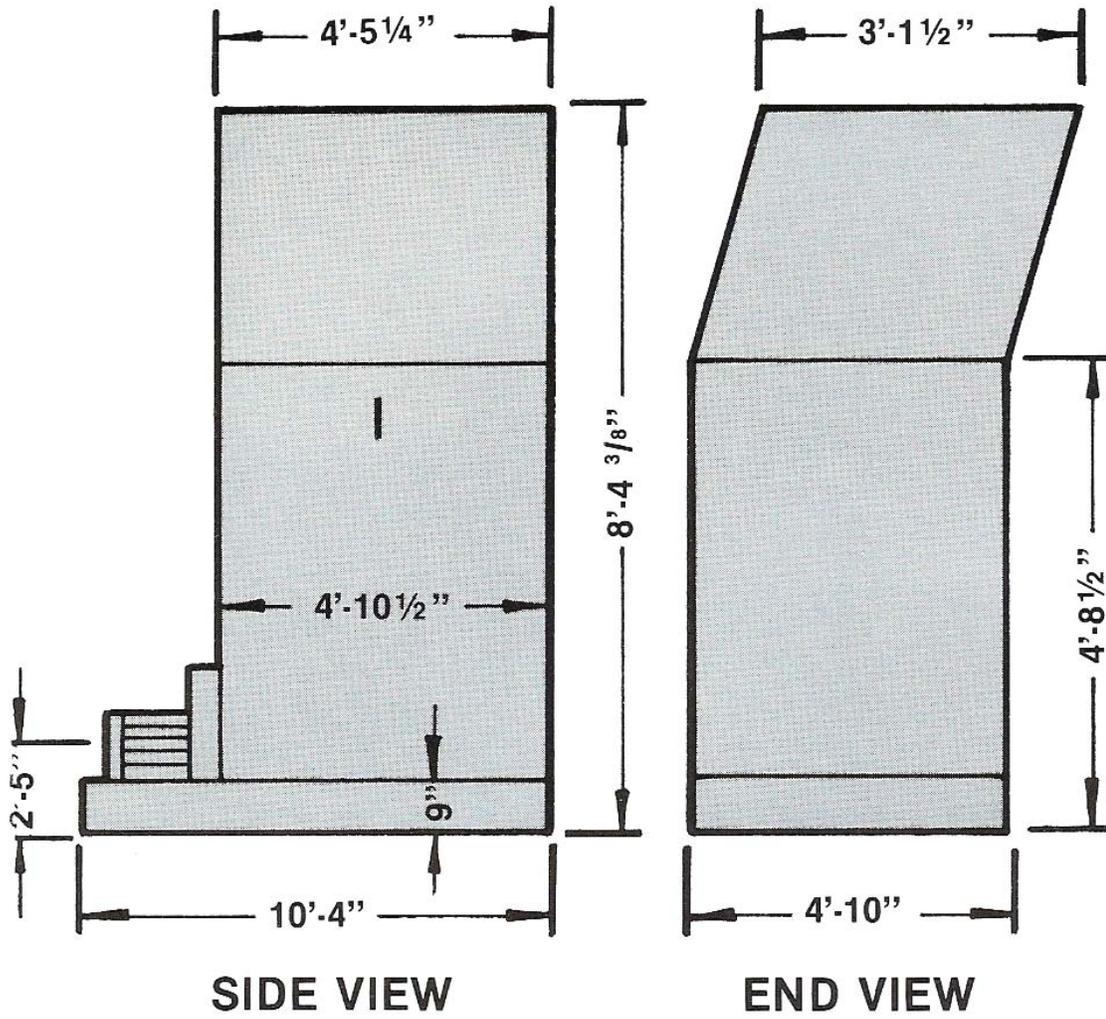
Standard Features

All of our Hammermills have the following standard features:

- Replaceable 1" steel wear plates.
- 64 replaceable AR 360 strap hammers.
- Replaceable shear blade and product screens.
- Hydraulically operated access door.
- Infeed chute.
- 8-foot Hammermill stand.

Dimensions

Length:	124"
Width:	58"
Height:	60"
Height with Infield Shoot:	101"
Height of Stand:	96"
Throat Dimensions At Top:	31" x 50"
Internal Diameter:	35 ¼ "
Hole Sizes for Screen Rating:	3", 4", 4 ½ " x 9 diameters
Weight:	Approx. 10,100 lbs.
Rotor Weight:	2200 lbs.
Hammer Weight:	6 ¾ lbs.
Number of Hammers:	64
Product Range:	Hardwood mulch to soft pine
Electrical:	3 phase 420 amps 460 volts 60 Hz 350 hp 1780 rpm



Shown With Optional Infeed Chute

NOTES

1. Safety

Overview	2
Safety Symbols	3
Safety Guidelines	5
Safety Decals	6

Overview

Safety is **everyone's** responsibility! Although safety features are incorporated into the machine and dangerous areas are marked, ultimately, careful operation is the best way to prevent accidents. To reduce the risk of accidents, please read thoroughly and follow the safety instructions and messages included in this manual and on the machine.

Safety Symbols Used

Three safety symbols are used on the machine and in this manual.

 **DANGER**

 **WARNING**

 **CAUTION**

Please familiarize yourself with each symbol and its meaning. It is crucial to your safety, and the safety of others, that you follow the safety precautions indicated by these symbols. The section beginning on the next page explains each of these symbols in detail.

Protective Devices

Protective guards and shields have been installed to protect you from hazards.

 **CAUTION**

NEVER remove, tamper with, or modify guards or shields!

NEVER open or take off the shields while the machine is operating!

NEVER run the machine if the shields are missing or removed!

Safety Symbols

Danger

This symbol indicates an imminently hazardous situation, which if not avoided, will result in death or serious injury. The use of the word DANGER is limited to the most extreme situations. Extreme care should be taken when you near these areas. DANGER decals are located at or as near as possible to these areas.



Warning

This symbol identifies areas or practices, which if not avoided, could result in serious personal injury. These injuries could range from minor cuts to dismemberment. Warning decals are located at or as near as possible to these areas.

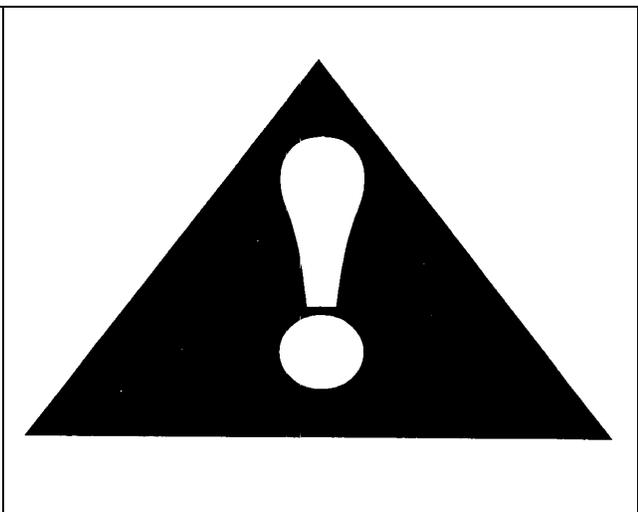


Caution

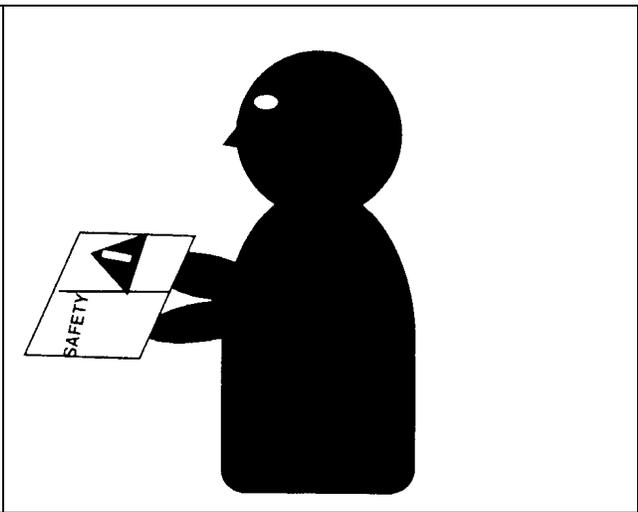
This symbol identifies a potentially hazardous situation, which if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices that could cause damage to the machine. Caution decals are located at or as near as possible to these areas.



Safety Alert Symbol
This symbol alerts you to possible hazards. Follow the recommended precautions and safe operating procedures. If you have any questions, please contact your dealer or the manufacturer.



Safety Instructions
Safety features have been designed into the machine with hazardous areas marked. Please read and follow the instructions in this manual prior to operating, maintaining, or servicing this machine.



Notes
Throughout the manual, information that needs to be emphasized is set apart with either a "NOTE!" or "IMPORTANT!" heading. Please be sure to read carefully this information, as it usually indicates a situation that could cause machine damage.

NOTE! It is recommended that a lockout power disconnect switch be installed at the Hammermill for the protection of the maintenance personnel.

Safety Guidelines



Many accidents can be prevented by your knowledge of safety. Prevent injuries by reading and following the safety warnings in this manual and on the machinery. Alert others to potential hazards.

Remember all machinery can be dangerous if used incorrectly. Please operate carefully. Safety is only a word until it is put into practice!

When operating the machine:

- Keep hands, feet, and clothing away from moving parts.
- Keep all safety shields in place
- Do NOT operate Hammermill with broken or missing rotor parts.
- Properly ground all electrical equipment.
- Do NOT operate the Hammermill without the access door bolted closed.

- Do NOT allow anyone to stand on or inside the machine during operation.

When servicing the machine:

! DANGER

Always lock out and tag the Hammermill power disconnect switch before performing any kind of maintenance. Failure to turn the power off can lead to death or serious personal injury.

- Disconnect and lock out power before servicing.
- Keep people away from Hammermill while maintenance people are servicing the machine.
- Use stable work platforms to reach any point not easily reached from floor level.

Safety Decals

Safety decals identify specific hazards and general safety. Please note the following about the decals:

- Keep them clean and legible.
- Never remove a safety decal from the machine.
- When you replace a part with a safety decal, also replace that decal.
- For replacement decals, call your AMADAS parts representative.
- Replacement safety decals are available free of charge.

Decals

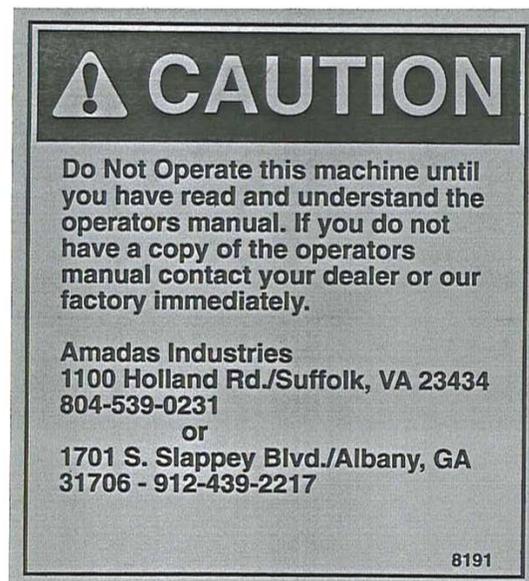
The following decals are included on the Hammermill:



8188



8190



8191

2. Installation

Before Installing8
Installation Instructions9

Before Installing

Before you install the Hammermill, please read the following:

- Carefully read over the installation instructions and familiarize yourself with the installation procedure.
- Be aware that the Hammermill is heavy. You will need a hoist with a minimum lifting capacity of 5 tons.
- Determine where the Hammermill will be located. It is necessary to have a concrete pad at that location.
- Make sure the stand meets all relevant codes and standards.
- Perform the pre-installation inspection indicated on the checklist below.

Inspection Checklist

- √ Remove all packing materials.
- √ Carefully inspect the Hammermill and all associated parts and equipment.
- √ If there is any evidence of damage from shipment or handling, report it immediately to your Amadas representative.

Installation Instructions

CAUTION

1. Do NOT attempt to lift the Hammermill without a hoist. The hoist must have a minimum capacity of 5 tons.
 2. Do NOT lift the 421 and 431 Hammermills using the lifting eye on the electric motor. The lifting eye is designed to carry the weight of the motor.
1. If you haven't already done so, determine where the Hammermill is to be located. Pour a concrete pad, if needed. (Refer to the *Appendix* at the end of this manual for details on pouring a concrete pad.)
 2. Place the Hammermill stand on the concrete support pad.
 3. Lift the Hammermill and bolt it to the stand.

NOTE! Position the Hammermill so that material will be fed into the Hammermill in the direction of rotor movement. By feeding material into the Hammermill in the same direction as the rotor is spinning, less material fly-out will occur. If the material is fed into the Hammermill perpendicular to the rotor movement, a uniform distribution of material cannot be attained and the rotor will wear out faster.

4. Using shims, adjust the Hammermill stand until the rotor shaft is horizontal. This will reduce the side thrust load on the bearings and prevent premature bearing failure.
5. Bolt the Hammermill stand to the concrete support pad.

6. Bolt the Hammermill to the concrete support pad.
7. Bolt the infeed chute to the Hammermill.
8. Install the discharge spout and weld in place. (Refer to the *Appendix* at the end of this manual for details on designing a suitable spout.)
9. Remove the electrical junction box cover on the motor and connect a ground wire from the motor to a good earth ground.

CAUTION

The electrical circuit to the Hammermill should be installed by a qualified, certified electrician familiar with machinery installation.

10. Properly size and install the electrical circuit to the Hammermill in accordance with the electric motor nameplate, the National Electrical Code, and all relevant local codes.
11. Install a power disconnect switch that can be locked in the open (OFF) position at the Hammermill in accordance with the National Electrical Code.

Installation Instructions (cont'd)

NOTE! It is recommended that a lockout power disconnect switch be installed at the Hammermill for the protection of the maintenance personnel. The power disconnect switch also allows the machine to be shut off in the event of an emergency.

12. Install the electrical junction box cover and bolt into place.

3. Operation

How the Hammermill Works	12
Pre-Operation Checklist.....	13
How to Use the Hammermill	14
How to Stop the Hammermill	14

How the Hammermill Works

The Hammermill 450 is designed to break large material into small material. The hammermill consists of an electric motor driven rotor assembly containing a series of swing hammers, a shear blade, and a screen for sizing the material. The Hammermill functions as follows:

1. The wing hammers initially reduce the material through breakage as the hammers impact the material.
2. The material is further reduced as the rotor assembly forces it past the shear blade.
3. Finally, the material is reduced again as the rotor assembly either forces it through the product screen or circulates it past the shear blade again.
4. Material is fed into the Hammermill above the machine.
5. The Hammermill discharges material from underneath the machine.

NOTE! Both the input machinery and the machinery removing the product should be designed to provide a steady, uniform flow of material across the full width of the Hammermill. This will minimize wear on the Hammermill components and maximize the output.

Pre-Operation Checklist

Before using the Hammermill, perform the checklist to make sure that the machine is ready to be used.

DANGER

Always lock out and tag the Hammermill power disconnect switch before opening the access door. Failure to turn the power off can lead to death or serious personal injury.

Pre-Operation Checklist

- √ Lockout and tag the Hammermill power disconnect switch. Verify that the power is OFF.
- √ Turn on power to the hydraulic motor. Keep the power to the Hammermill turned OFF.
- √ Remove the 21 bolts holding the access door closed and open the door by moving the lever next to the hydraulic motor.
- √ Verify that the Hammermill is empty and there are no obstructions which could interfere with the movement of the rotor.
- √ Check that the swing hammers rotate freely and are not damaged. Do NOT operate if part is broken or missing.
- √ Close the access door and tighten the 21 locking bolts to 70 ft-lbs torque.
- √ Verify that all equipment associated with the Hammermill is ready to operate.
- √ Check all shields. **DO NOT OPERATE UNLESS ALL SHIELDS ARE IN PLACE!**
- √ Make sure that everyone is clear of the Hammermill.
- √ Turn the power disconnect switch ON.

How to Use the Hammermill

Follow the steps below to use the Hammermill:

1. Verify the Hammermill is ready for use by completing the Pre-Operation Checklist on the previous page.
2. Turn on the power to the Hammermill. Keep the power to all associated equipment turned off.

IMPORTANT! In case of an emergency, turn the power disconnect switch off to stop the Hammermill.

3. Wait several minutes for the Hammermill to reach its full operating speed.

CAUTION

If the Hammermill is vibrating excessively or making abnormal noises, stop the machine immediately and investigate. Do NOT operate the Hammermill if it is not working properly or needs immediate maintenance.

4. Turn on the power to all associated equipment.
5. Verify that the Hammermill and all associated equipment is operating properly. Make any adjustments necessary to keep the operation running smoothly.

CAUTION

Shut off power before making any adjustments. If power is required to make an adjustment, use extreme caution to avoid contact with moving parts.

How to Stop the Hammermill

1. Turn off the power to the Hammermill and all associated equipment.
2. Verify that the Hammermill stops.
3. If the machinery is to be left unattended for any length of time, lock out and tag the power disconnect switch and all circuit breakers.

CAUTION

Do NOT leave the Hammermill unattended without locking out and tagging the power disconnect switch and all circuit breakers. Failure to disconnect the power could result in serious personal injury.

4.

Maintenance

Regular Maintenance.....	16
Powering Down the Machine	16
After Servicing the Machine	16
Maintenance Schedule	17
Hammers	18
How to Rotate or Replace Hammers.....	19
How to Balance Hammers.....	20
Bolts	21
Wear Plates	21
Infeed Chute	21
Product Screen	21
Shear Blade	22
How to Inspect and Replace the Shear Blade	22
How to Lower the Shear Blade.....	22
Rotor Drive	22
Electric Motor	22
Rotor Shaft Bearings.....	23
How to Lubricate the Bearings	23
How to Remove the Bearings.....	23
How to Install the Bearings.....	23
Hydraulic Access Door.....	25
Rotor	25
How to Fix a Stalled Rotor.....	25
How to Balance the Rotor	26
Troubleshooting	27

Regular Maintenance

We strongly recommend that you perform regular maintenance on your Hammermill to help ensure efficient and safe operation. This section describes the maintenance that needs to be performed according to the Maintenance Chart on the following page.

A Maintenance Log is included in the Appendix. Please copy this log and use it to maintain records of maintenance performed on the Hammermill.

Powering Down the Machine

IMPORTANT! Before any kind of maintenance is performed on the Hammermill, it must be powered down. Follow the steps below to make sure the Hammermill is shut down completely.

1. Turn off power to the Hammermill and all associated equipment.
2. Lock out and tag the Hammermill power disconnect switch.
3. Verify that power is off by performing the following checks.
 - a. Turn on power to the Hammermill, leaving the power disconnect switch locked out. Verify that the Hammermill does not operate.
 - b. Turn off power to the Hammermill and lock out and tag all circuit breakers.
 - c. Using a volt meter, verify that incoming power is disconnected from the Hammermill.

DANGER

Always lock out and tag the Hammermill power disconnect switch before performing any maintenance. Failure to turn the power off can lead to death or serious personal injury.

After Servicing the Machine

Once maintenance has been complete and all safety checks performed, restart the Hammermill for operation as follows:

1. Check all shields. **DO NOT OPERATE UNLESS ALL SHIELDS ARE IN PLACE!**
2. Make sure that everyone is clear of the Hammermill.
3. Turn the power disconnect switch ON.
4. Turn on the power to the Hammermill. Keep the power to all associated equipment turned off.

IMPORTANT! In case of an emergency, turn the power disconnect switch off to stop the Hammermill.

5. Wait several minutes for the Hammermill to reach its full operating speed.

CAUTION

If the Hammermill is vibrating excessively or making abnormal noises, stop the machine immediately and investigate. Do NOT operate the Hammermill if it is not working properly or needs immediate maintenance.

6. Turn on the power to all associated equipment.

Maintenance Schedule

Item	Action	Interval		
		Daily	Weekly	Every 3 Months
Hammers	Rotate	As required		
Hammers	Inspect	X		
Electric motor	Clean		X	
Shear Bar	Inspect		X	
Bolts	Inspect		X	
Coupling	Inspect		X	
Wear plates	Inspect		X	
Infeed chute	Inspect		X	
Screen	Inspect		X	
Bearings	Lubricate			X

Hammers

Because of the varied nature of the material processed, it is difficult to give maintenance intervals for rotating the hammers in the Hammermill. Instead, we can only give the following guidelines.

Keep in mind that you can make up your own maintenance schedule after several months of operation by keeping track of the type of material processed and the intervals at which you have to rotate the blades.

The following will also help you set your schedule for rotating and replacing blades.

- Hammers usually last 50 to 300 hours before requiring rotation. Hammer life depends on the abrasiveness of the product, volume of the material being processed, and the amount of foreign material in the product (e.g., sand, stones, etc.).
- Hammer life can be judged by measuring the output of the mill. A mill with new blades will produce 100% of the possible output under the given conditions. As the hammers wear, output will decrease in an exponential fashion. When the hammers are severely worn, the mill will not accept the material or will only accept material at a greatly reduced volume. This will often lead to plugging (or stalling) of the mill. We generally recommend that you rotate hammers when they wear to the point that you are producing less than 70% of full capacity.
- Hammers have four wear surfaces. When you change or rotate blades, be sure to measure the diameter of the mounting shafts. Depending on the age of the mill and the amount of wear it has received, the mounting shaft will wear in one of two ways.
 - Most commonly: The shaft becomes out of round due to wear between the hammer and the shaft.
 - Other wear: The shaft wears out concentrically. This is caused by the shaft rotating slightly as the hammer swings. This usually occurs after a number of hammer rows have been replaced and the holes in the rotor discs begin to wear.
- Two additional items to check when you change or rotate hammers are the shaft ends and the wear on the rotor and plates. Normally, it will take several years of operation to wear to this point.
- Hammers wear out quickly. This is both expected and unavoidable in a swinging hammer type mill. We recommend that you keep hammers on hand to minimize down time.
- Hammers should be inspected every day. Any hammer that is cracked, bent, or does not rotate freely on its shaft should be replaced.

How to Rotate or Replace Hammers

NOTE! Before removing the hammers, obtain a 1" micrometer to measure the hammer mounting shafts.

1. Turn off power to the Hammermill. Lock out and tag the power disconnect switch. Follow the instructions for "Powering Down the Machine" on page 16 to verify the power is off.

DANGER

Always lock out and tag the Hammermill power disconnect switch before performing any maintenance. Failure to turn the power off can lead to death or serious personal injury.

2. Turn on the power to the hydraulic motor. Do NOT turn the power back on to the Hammermill.
3. Remove the 21 bolts holding the access door shut and open the access door by moving the lever next to the hydraulic motor.
4. Turn off power to the hydraulic motor. Lock and tag out the power disconnect switch.
5. Rotate the rotor by hand until the hammer mounting shaft is accessible. Block the rotor with wooden blocks to keep it from moving.
6. Remove the roll pins from both ends of the mounting shaft. If the pins are damaged, they can be drilled out with a 5/16" drill bit.
7. Using paint or tape, mark the rotor discs that each hammer is mounted between.

This will make installing the hammers much easier.

8. Pull the hammer mounting shaft out slowly. Remove the row of hammers as the shaft is removed.
9. Inspect the hammers and make the following corrections when you install them:
 - If the mounting hole in any hammer is slotted or out of round, re-install that hammer by the opposite mounting hole. Replace the hammer if both mounting holes are slotted or out of round.
 - If the impacting corner of any hammer is rounded excessively, rotate that hammer so that a sharp corner will do the impacting. Replace the hammer if all four corners are rounded.
 - If any hammer is bent, cracked, or broken, replace that hammer.
8. If any hammer is repaired, balance the row of hammer before re-installing (see "How to Balance Hammers" on page 20).

NOTE! Hammers must be balanced. If the shredder blades are not balanced, the rotor will become unbalanced, causing excessive vibration and unnecessary wear.

9. Check each rotor disc for slotted or out of round hammer mounting rod holes. Check that the end plates are at least 1/4" thick. If the rotor discs are damaged or worn excessively, replace the rotor disc. Refer to the *Appendix*, "Rotor Balancing supplement", before you replace the rotor disc.
10. Clean the hammer mounting shaft and check the straightness of the shaft by

rolling it on a flat surface. Replace the shaft if it is bent.

11. Measure the hammer mounting shaft. The shaft should be between 1.0" and .95" in diameter. The center of the roll pin to the end of the shaft should be greater than .4". Replace the hammer mounting shaft if it is worn excessively, cracked, or damaged.
12. Insert the hammer mounting shaft into the holes in the rotor discs. Replace each hammer in the proper location on the rotor assembly.
13. Insert new roll pins into both ends of the hammer mounting shaft.
14. Remove the wooden blocks that are blocking the rotor.
15. Turn on power to the hydraulic motor. Do NOT turn power back on to the Hammermill.
16. Close the access hood and tighten the hood's 21 locking bolts to 70 ft-lbs torque.
17. Turn off power to the hydraulic motor. Lock out and tag the circuit breaker.

1. Make sure power to the Hammermill and hydraulic motor remains off and the circuit breakers locked out and tagged.
2. Rotate the rotor and remove the row of hammers on the direct opposite side of the rotor.

NOTE! Inspect the hammers for wear or damage and make all necessary corrections when re-installing.

3. Divide the removed hammers into two stacks of eight hammers each. The difference in weight of the two stacks should be no more than one pound.

NOTE! Ideally, both rows of hammers should weigh the same. Weight can be added to the hammers by welding a filler material to the hammers and hard-surfacing by welding an abrasion resistant cover over the filler.

4. Reinstall the hammers according the instructions in "How to Rotate or Replace Hammers" on the previous page.

How to Balance Hammers

Whenever one of the hammers in a row of hammers is replaced, compare this row of hammers to the row of hammers on the opposite sides of the rotor. Rows of hammers opposite each other should be balanced in terms of weight to minimize wear on the bearings.

Use a package or postal scale to determine the hammer weight. If one is not available, you can use or make a balance to make sure hammer stacks are roughly the same weights.

To balance the hammers:

Bolts

Check the tightness of the nuts and bolts at least once a week. Due to the machine's vibration, nuts and bolts can work loose over a period of time. Loose bolts falling into the rotor during operation can cause serious damage to the machine.

1. Power down the machine according to the instructions on page 16.
2. Tighten all loose nuts and bolts.
3. Replace any missing pieces.

Wear Plates

Inspect the wear plates every week. Regular inspection will help prevent damage to the frame and increase the life of the Hammermill.

1. Power down the machine according to the instructions on page 16.
2. Open the access door and inspect the condition of the wear plates.
3. Replace wear plates if damaged or worn through to the frame.
4. Close the access door and bolt it shut.

Infeed Chute

Inspect the infeed chute every week. This infeed chute guides the material uniformly into the Hammermill and helps prevent uneven wear on the rotor assembly.

1. Power down the machine according to the instructions on page 16.
2. Inspect the chute for dents or holes which can cause the material to flow unevenly into the Hammermill.
3. Weld any small holes shut and straighten any small dents.

4. If any severe damage exists, replace the infeed chute.

Product Screen

Inspect the screens every week. The product screens must be in good condition for the Hammermill to operate properly. When screens are damaged or torn, replace as follows:

1. Power down the machine according to the instructions on page 16.
2. Turn on power to the hydraulic motor. Do NOT turn the power back on to the Hammermill.
3. Remove the 21 bolts holding the access door shut and open the door by moving the lever next to the hydraulic motor.
4. Turn off the power to the hydraulic motor. Lock out and tag the circuit breaker.
5. Support the weight of each screen by chaining each one to the rotor assembly.
6. Unbolt the screen and remove it from underneath the Hammermill.
7. Install the new screen and bolt it in place.
8. Turn power back on to the hydraulic motor. Do NOT turn power back on to the Hammermill.
9. Close the access door and tighten the 21 bolts to 70 ft-lbs torque.
10. Turn off power to the hydraulic motor. Lock out and tag the circuit breaker.

Shear Blade

Inspect the shear blade every week. The shear blade must be in good condition for the Hammermill to operate properly.

As both the hammers and shear blade wear, the product size starts to vary. To help maintain product size, the shear blade can be lowered closer to the hammers.

If you cannot maintain product size, and the shear blade has been lowered as far as possible, the shear blade needs to be replaced.

How to Inspect and Replace the Shear Blade

1. Power down the machine according to the instructions on page 16.
2. Turn on power to the hydraulic motor. Do NOT turn the power back on to the Hammermill.
3. Remove the 21 bolts holding the access door shut and open the door by moving the lever next to the hydraulic motor.
4. Turn off the power to the hydraulic motor. Lock out and tag the circuit breaker.
5. Inspect the shear blade. If the blade is cracked or damaged, continue with Step 6 to replace the plate.
6. Unbolt the mounting bolts and remove the old shear blade.
7. Install new blade. Torque the mounting bolts to 70 ft-lbs.

NOTE! Position the new shear blade as high as the slotted bolt holes allow.

How to Lower the Shear Blade

1. Power down the machine according to the instructions on page 16.
2. Turn on power to the hydraulic motor. Do NOT turn the power back on to the Hammermill.
3. Remove the 21 bolts holding the access door shut and open the door by moving the lever next to the hydraulic motor.
4. Turn off the power to the hydraulic motor. Lock out and tag the circuit breaker.
5. Loosen the mounting bolts.
6. Slide the shear blade down and torque the mounting bolts to 70 ft-lbs.

Rotor Drive

Inspect the motor/rotor shaft coupling every week. Regular inspection can prevent possible rotor or motor shaft damage.

1. Power down the machine according to the instructions on page 16.
2. Inspect the coupling, making sure that each bolt is torqued to 75 ft-lbs.
3. Replace the coupling if damaged.

Electric Motor

Clean the motor every week, or as necessary to keep the motor clean. A clean motor will run cooler and last longer.

1. Power down the machine according to the instructions on page 16.
2. Blow dust and dirt off of the motor using compressed air.
3. Wipe any grease or oil off of the motor with a rag.

Rotor Shaft Bearings

Bearings should be greased every three months. When the bearings wear out, they must be replaced. Operating the Hammermill with worn out bearings will damage the rotor shaft. An increase in vibration and noise during operation are signs that the bearings are worn out.

How to Lubricate the Bearings

1. Power down the machine according to the instructions on page 16.
2. Using a hand-operated grease gun, add a single pump of NLGI no. 2 multi-purpose ball bearing grease to each bearing.

NOTE! Keep grease fittings clean by wiping clean with a rag prior to greasing the bearings. Cleaning the fittings helps prevent dirt from entering and damaging the bearings.

How to Remove the Bearings

1. Power down the machine according to the instructions on page 16.
2. Turn on power to the hydraulic motor. Do NOT turn the power back on to the Hammermill.
3. Remove the 21 bolts holding the access door shut and open the door by moving the lever next to the hydraulic motor.
4. Turn off the power to the hydraulic motor. Lock out and tag the circuit breaker.
5. Remove the safety shield and unbolt the motor/rotor shaft coupling.
6. Mark each bearing cap so it can be replaced on the same end of the shaft from which it was removed.

NOTE! The bearing caps and housing bases are machined as a matched unit. Mark each cap so that it can be re-installed with its matching base.

7. Unbolt and remove the bearing caps from the Hammermill frame.
8. Lift the rotor assembly by the rotor shaft. It is important to position the lifting sling as close to the center as possible without the sling contacting the rotor discs.
9. Remove the rotor assembly and place it on a support stand.
10. Remove the C-spacer from the bearing house base closest to the electric motor.
11. Remove each bearing from the rotor shaft as follows:
 - a. Slide the outer steel seal ring off of the rotor shaft.
 - b. Bend the lock-washer tang up and remove the lock-nut with a spanner wrench.
 - c. Remove the bearing and adapter sleeve. Be careful not to misalign the bearing outer rings.
 - d. Remove the inner steel seal ring.

How to Install the Bearings

1. Check that the rotor shaft is clean. If necessary, wipe clean with a rag.
2. Install each bearing on the rotor shaft using the following procedure:
 - a. Slide one steel seal ring and the adapter sleeve on the rotor shaft.
 - b. Slide the bearing on the adapter sleeve.
 - c. Install the lock-washer and the lock-nut and finger-tighten.

- d. Place the second steel seal ring on the rotor shaft.

3. Position the bearings and adapter sleeves on the shaft so they will engage the housing bases properly.

NOTE! The rotor shaft bearing on the drive end of the rotor shaft should be positioned so that it will be up against the shoulder of the base with the lock nut on the opposite side of the shoulder. The bearing on the other end of the rotor shaft should be positioned so that it will be centered between the shoulders of the housing base.

Remember that the bearings will be moved up the tapered adapter sleeve when they are tightened.

4. Lift the rotor assembly and position it in the Hammermill while aligning the bearings and seals with the housing bases.

NOTE! If the bearings' outer rings become misaligned, do not force them back into place. Reposition the rings by carefully turning and sliding them.

5. Adjust the rotor shaft until it lines up with the electric motor shaft and install the motor/rotor shaft coupling. Torque the bolts to 70 ft-lbs.
6. Measure and record the clearance at each bearing between the top rollers and the outer ring raceway with a feeler gauge.

NOTE! When the bearings are properly tightened, the clearance will be .0015" to .0025" less than the clearance just measured.

7. Using a spanner wrench, tighten the lock-nuts until they are snug.

8. With a soft steel bar and a hammer, strike the face of the lock-nut to relieve the thread pressure.

9. Measure the clearance between the top rollers and the outer ring raceway in both bearings. Check to see if the measured clearance is .0015" to .0025" less than the clearance recorded in Step 6. If the measured clearance has not been reduced enough, continue tightening the lock-nut, striking the lock-nut and measuring the clearance until it is within the proper range.

10. Bend down a tang of the lock-washer into one of the lock-nut slots. This will secure the lock-nut from loosening.

11. At the drive end of the rotor shaft, insert the C-spacer next to the lock-nut in the bearing housing.

12. Fill the housing bases with grease on both sides of the bearing. Pack both bearings full of grease.

13. Apply a non-hardening gasket compound to the cap surfaces that will contact the base.

14. Place the caps on the bases and tighten the bolts to 350 ft-lbs.

15. Verify that the rotor assembly rotates freely by hand. If the rotor assembly is binding or does not rotate smoothly, disassemble and re-align the bearings.

16. Install the safety shield over the motor/rotor shaft coupling and bolt it in place.

17. Turn on power to the hydraulic motor. Do NOT turn power back on to the Hammermill.

18. Close the access door and tighten the 21 bolts to 70 ft-lbs torque.

19. Turn off power to the hydraulic motor. Lock out and tag the circuit breaker.

5. Check the oil level in the reservoir. Fill with 10W oil if necessary.

Hydraulic Access Door

Inspect the hydraulic system every month. Regular inspection and repair will keep the system in good working order.

CAUTION!

Escaping fluid under pressure can penetrate the skin, causing serious injury.

Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.

1. Power down the machine according to the instructions on page 16.
2. Inspect the hydraulic lines and cylinders for leakage. Replace as required.
3. Check the entire hydraulic system for damaged or missing parts. Replace as required.
4. Using compressed air, blow dust and dirt off the motor. Wipe grease or oil off with a rag. Regular cleaning will help the motor last longer.

Rotor

It is important that the rotor run correctly. Generally, if the rotor stalls, it can be restarted using the instructions given.

Additionally, a balanced rotor is essential to ensure the safe and efficient operation of the Hammermill. The following signs indicate the rotor has become unbalanced:

- Increase in the noise level
- Increased vibration
- Premature bearing failure.

If the rotor assembly is damaged, cannot be restarted or balanced, it will need to be replaced.

How to Fix a Stalled Rotor

1. Power down the machine according to the instructions on page 16.
2. Turn on power to the hydraulic motor. Do NOT turn the power back on to the Hammermill.
3. Remove the 21 bolts holding the access door shut and open the door by moving the lever next to the hydraulic motor.
4. Turn off the power to the hydraulic motor. Lock out and tag the circuit breaker.
5. Inspect the inside of the Hammermill and determine why the rotor stalled. Generally, a rotor will stall for one of the following reasons:
 - The wrong type of material has been fed into the Hammermill and jammed the rotor.
 - The Hammermill has worn or damaged parts and cannot process the material fed into it.

- The material has been fed into the Hammermill too fast and has overloaded the Hammermill.
 - The material has not been removed fast enough from the Hammermill and has built up, plugging the product screen.
6. Make the necessary corrections to prevent the rotor from stalling again.
 7. Remove all material from the Hammermill. Verify that the rotor assembly rotates freely by hand.
 8. Close the access door and torque the bolts to 70 ft-lbs.
 9. Turn off power to the hydraulic motor. Lock out and tag the circuit breaker.

How to Balance the Rotor

The rotor assembly is balanced before it leaves the factory. However, it may become unbalanced due to wear.

If the rotor becomes unbalanced, follow the instructions on page 20 for removing and balancing the hammers. If the rotor assembly is still unbalanced after the hammers have been balanced, the rotor assembly will have to be balanced.

The process of balancing the rotor is a complex operation requiring disassembling the entire rotor assembly and the use of special equipment such as a balancing stand. A copy of the AMADAS Hammermill 450 Rotor Balancing Supplement is included in the **Appendix**.

Troubleshooting

Problem	Cause	Remedy	See Page
Hammermill does not operate	Power is off.	Make sure power has been fully restored to machine.	16
	Machine is stalled.	Power down the machine according to page 16 and clear the blockage.	.16
Size or rate of output is not correct	Worn rotor hammers.	Inspect the hammers. Repair or replace as necessary.	19
	Worn, damaged, or wrong size screen.	Inspect the screen. Repair or replace as necessary.	21
	Damaged or missing shear blade.	Inspect the plate and replace as necessary.	22
	Wrong type of material fed into machine.	Check to make sure machine and type of material are a match. Make adjustments as necessary.	
	Inconsistent rate of feed into Hammermill.	Check rate of feed and adjust it as necessary.	
Excessive noise or vibration during operation	Wrong type of material fed into machine.	Check to make sure machine and type of material are a match. Make adjustments as necessary.	
	Damaged or missing parts on rotor assembly.	Inspect rotor assembly. Replace and damaged or missing parts.	25
	Rotor assembly out of balance.	Balance the hammers and/or rotor assembly.	
	Bearings are worn or need lubrication.	Inspect bearings. Lubricate or replace as necessary.	23

NOTES

Appendix

Concrete Support Pad	A - 2
Maintenance Log	A - 2
Rotor Balancing	A - 3
Hammermill Maintenance Log	A - 4
Grease Lubrication.....	A - 5

Concrete Support Pad

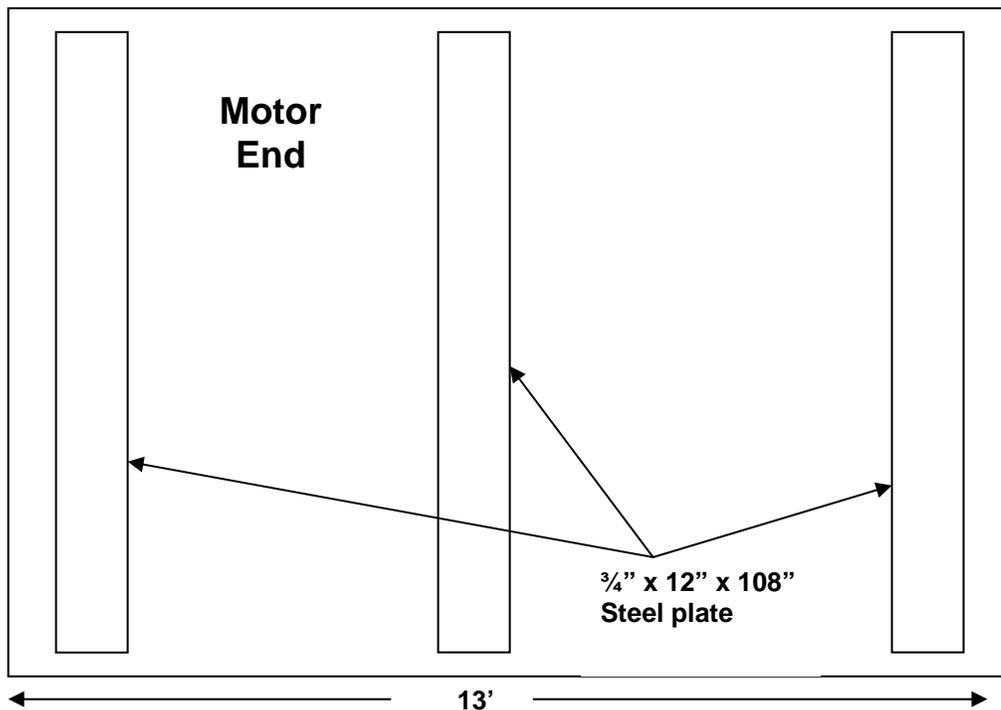
The concrete support pad provides a safe, stable platform for the Hammermill. The pad may be part of a larger structure, such as a plant floor, but it must meet the following requirements:

- The concrete support pad must be flat and level within 1 degree of horizontal (1" rise for 5' run).
- The concrete support pad must be made from at least 4000 PSI concrete.
- The concrete support pad must be at least the following dimensions:
 - 10 feet long
 - 13 feet wide
 - 3 feet thick.
- The concrete support pad must have three $\frac{3}{4}$ " x 12" x 108" steel plates anchored to the pad at the grade.

Maintenance Log

A Maintenance Log for the Hammermills should be filled out and kept up to date. By recording all maintenance performed on the machine, it can be verified that the routine maintenance has been performed as scheduled. An accurate maintenance log will also help identify any abnormal or untimely repairs made to the machine.

A log has been included in this *Appendix*. We recommend you photocopy this log and use it to record maintenance.



Rotor Balancing Supplement

This section describes the proper procedure for performing the following maintenance:

- Removal, inspection, and replacement of the rotor discs.
- Removal, inspection, and replacement of the rotor shaft.
- Balancing of the rotor assembly.

Special tools and equipment are required to perform the maintenance. The following items are required:

- A balancing stand.
- A support stand.
- Welding equipment.
- A micrometer large enough to measure a 4" shaft.
- A hoist with a lifting capacity of at least 3000 lbs.
- A spreader to separate the hoist slings 4' 10" in order to lift the rotor assembly correctly.

How to Assemble and Balance the Rotor Assembly

1. Place the rotor shaft (part # 10338) on the balancing stand.
2. Attach a dial indicator to the stand and measure the shaft runout five places along the length of the shaft. If the runout exceeds .020" at any point, contact your AMADAS representative before proceeding.
3. Assemble the drive rotor assembly loosely and center the rotor assembly on the main body of the shaft.

4. Insert rods "E" and move the entire rotor assembly 1/8" towards the left end of the rotor.
5. Tighten three bolts in hub "H" on the right end of the rotor to 140 ft-lb torque.
6. Insert three bolts in hub "H" (opposite end) and finger tighten.
7. Install nut "F" on rod "E" and finger tighten. Repeat the procedure for the remaining three rods.

NOTE! Threads should be greased lightly with a petroleum lubricant prior to installing nuts or pulling torque.

8. Pull the nuts up in steps on the four rods with the impact wrench using the diagonal torque pattern shown on the drawing.
9. Place shaft in balancing stand and torque the four rod nuts to 300 ft-lbs. Bring the torque up in 50 ft-lb increments using the diagonal torque pattern.
10. After all nuts have been torqued to 300 ft-lbs, mount a dial indicator on the test stand to balance the rotor.
11. Check the shaft for runout at the bearing journal surfaces. The maximum allowable run-out is .005".
12. If the runout exceeds .005", increase the torque on the rod or rods opposing the low side of the shaft and re-measure.
13. Continue torquing the rotor bolts in 50 ft-lb intervals until the nuts are torqued to at least 450 but not more than 550 ft-lbs.
14. Tighten the three bolts in hub "H" to 140 ft-lb.

15. Recheck the runout and if the shaft is within tolerance, install jam nut "G" and torque to 150 ft-lbs.
16. After torquing jam nut "G", tack weld it to shaft "E".

Grease Lubrication

Ambient Conditions		Operating Conditions		Bearing Operating Temperature		Suggested Greasing Interval	Use These Greases or Equivalents	
Dirt	Moisture	Load	Speed	Low	High			
Clean	Dry	Light to medium	Slow to medium	0	120	2 to 6 months	High quality NLGI # 1 or 2 multi purpose bearing greases are generally satisfactory. Consult with a reputable lubricant supplier.	
				120	200	1 to 2 months		
Moderate to dirty	Dry	Light to medium	Slow to medium	0	120	1 to 4 weeks		
				120	200	1 to 7 days		
Extreme dirt	Dry	Light to medium	Slow to medium	0	200	Daily - flushing out dirt		
	High humidity/direct water splash	Light to Heavy	Slow to Medium	32	200	1 to 4 weeks/ grease at shutdowns		Mobil Oil Corp. Mobilith AW-2 Texaco Inc., Premium RB2 Shell Oil Co., Alvania EP2
		Heavy to very heavy	Slow	0	200	1 to 8 weeks		Shell Oil Co., Alvania EP2
				-20	120	1 to 8 weeks		Shell Oil Co., Alvania EP2
		Light	High speed	100	200	1 to 8 weeks	Amoco, Rykon No. 2 Mobil Oil Corp., Mobilgrease 532	
	Possible frost	Light to heavy	Slow to medium	-65	+250	1 to 4 weeks grease at shutdown	Mobil Oil Corp., Mobiltemp SHC32 Texaco In., 2345 EP Low temp Shell Oil Co., Aeroshell 7A	
Clean to moderate	Dry	Light to medium	Slow to medium	80	240	1 to 8 weeks	Union Oil Corp., Unoba EP2 Mobil Oil Corp., Mobiltemp 78	
Clean to dirty	Dry	Light	Slow	80	300	1 to 4 weeks	Keystone Lubricants Co., No 89 Dow Chemical Co., DC44	

WARRANTY

For AMADAS INDUSTRIES Industrial Machinery

A. General Provisions

AMADAS INDUSTRIES ("Company") warrants that each machine manufactured by it and sold under its trademark shall be free from defects in material and workmanship. The company's sole obligation under this warranty shall be limited to making good, F.O.B. Company factory, any part of its product which under normal and proper use and maintenance proves defective in material and workmanship within six months after delivery to the Buyer provided that notice of such defect and satisfactory proof thereof is promptly given by the Buyer to the Company, with transportation charges prepaid, and Company's examination proves such part to have been defective.

This warranty does not apply in respect to damage to any product or accessory or attachment thereof caused by overloading or other misuse, neglect or accident nor does this warranty apply to any product, or accessory or attachment thereof which shall have been repaired or altered by other than the Company which, in the sole judgement of the Company affects the performance, stability or purpose for which it was manufactured.

With respect to tires, engines, or other trade accessories, the Company makes no warranty whatsoever and the buyer shall rely solely upon the existing warranties, if any, of the respective manufacturers thereof.

B. Unapproved Service or Modification

All obligations of AMADAS INDUSTRIES under this warranty are terminated if the machinery is modified or altered in ways not approved by AMADAS INDUSTRIES

C. Owner's Responsibilities

- a. Read the operator's manual before operating the machinery.
- b. Perform all necessary maintenance as described in the operators's manual.
- c. Contact AMADAS INDUSTRIES promptly on any warranty claim.
- d. Sign the AMADAS INDUSTRIES machine delivery form and return promptly as this validates the warranty.

D. Disclaimer

There are no warranties that extend beyond the description here. **ANY WARRANTIES OF MERCHANTABILITY AND FITNESS FOR ANY PARTICULAR PURPOSE ARE SPECIFICALLY DISCLAIMED AS ARE ALL OTHER REPRESENTATIONS TO THE PURCHASER.** AMADAS INDUSTRIES specifically excludes any liability on behalf of the Company for any incidental or consequential damages including, but not limited to loss of profits, rental of substitute equipment, or other commercial losses. AMADAS INDUSTRIES shall not be responsible for expenses or inconvenience that you might incur or experience with respect to any AMADAS INDUSTRIES Industrial Machinery, nor shall AMADAS INDUSTRIES be liable for defects, damage, or failure caused by improper storage, unreasonable use, or abuse, or accident, including the failure to provide reasonable and specified maintenance. This warranty applies only to the original purchaser of the machinery. Because some states do not allow the exclusion of limitation of incidental or consequential damages, the above limitation may not apply to you. This warranty gives you specific legal rights. You may also have other rights, which vary from state to state. Where there is a conflict between a provision of this warranty and the provision of any state, the state legislation prevails.

AMADAS