MODEL 13

TORNADO

SAFETY, OPERATOR'S & PARTS MANUAL

Manufactured By:
Morbark, Inc.

76340-241
1/99

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.

⚠ WARNING

The engine exhaust from this product contains chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

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INTRODUCTION

Congratulations on your purchase of a new Morbark brush chipper. The brush chipper, designed and introduced by the world's leading manufacturer of portable chippers, is produced with the finest components and workmanship available. If you show proper care and maintenance, your brush chipper will prove to be a safe and reliable unit.

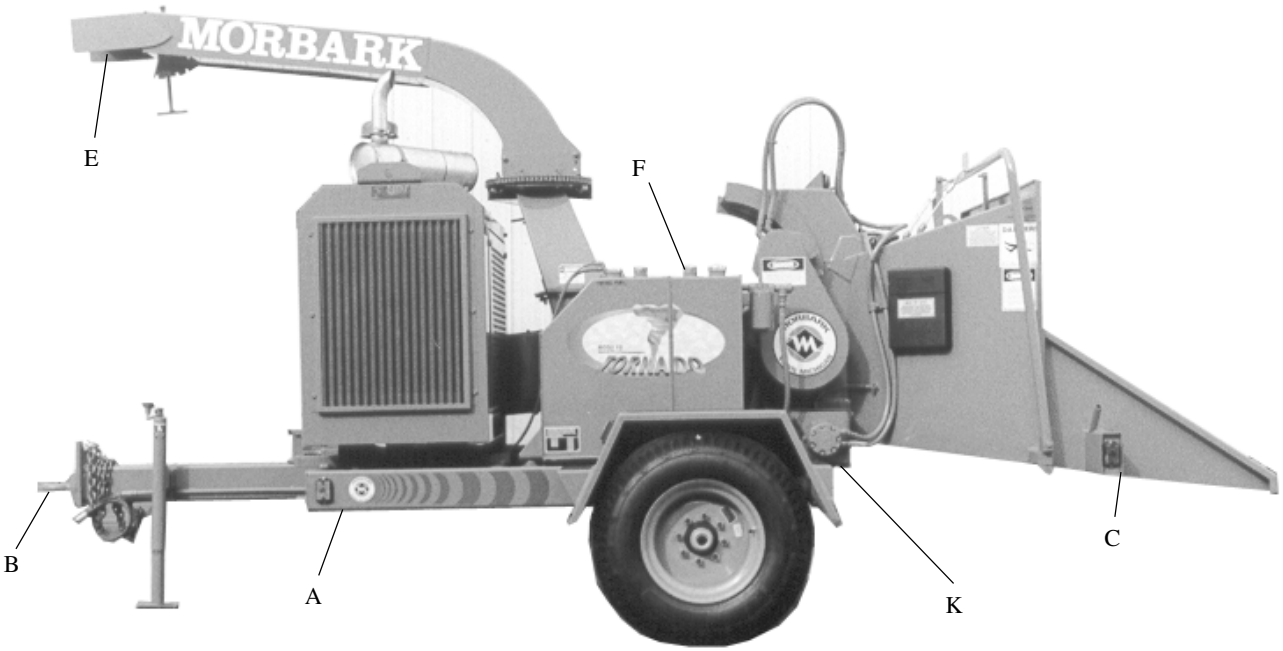
This manual was prepared to make it easy for you to operate and maintain your new brush chipper. In addition to guidelines for safe operation and maintenance, you will find parts listings and detailed assembly illustrations.

The serial number of your brush chipper is located on the side of the tongue. If for any reason you should find it necessary to correspond with us or one of our dealers, please include this number.

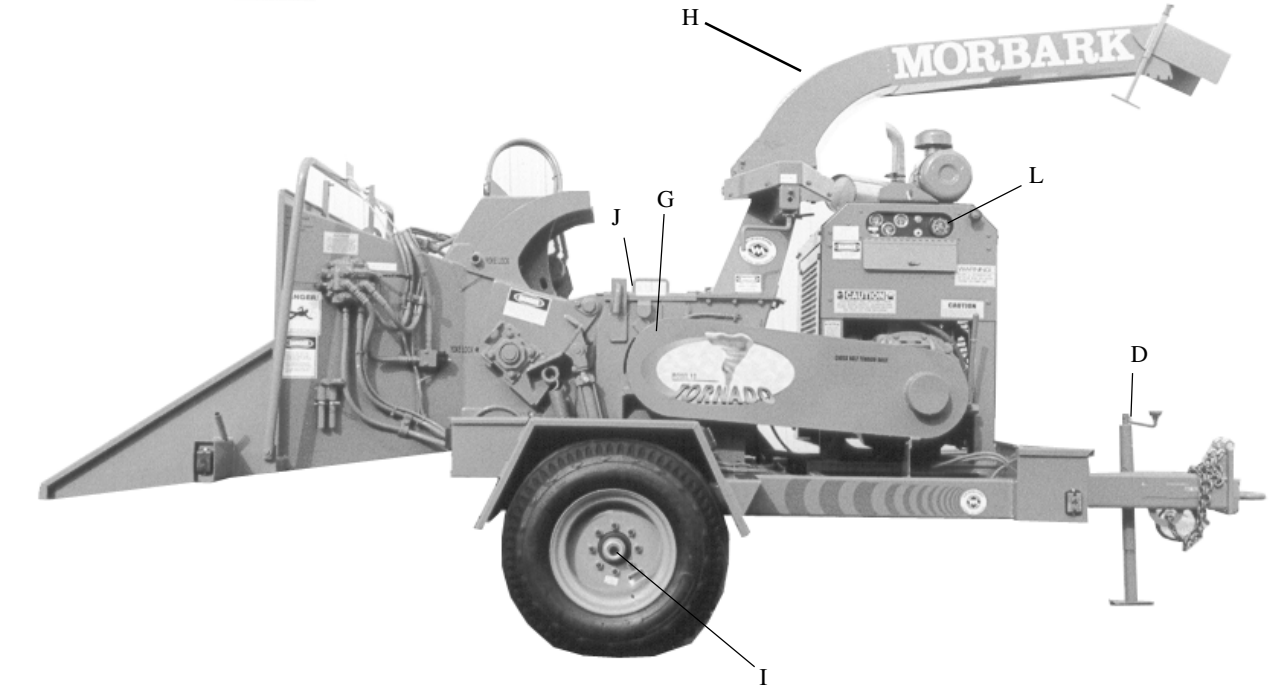
We believe it is the responsibility of the customer to ensure that all personnel, especially operators and maintenance people, view any applicable video tapes and become familiar with this operator's manual prior to working with or around the brush chipper. Safety is everyone's responsibility, but the owner/operator must assume the duty of making sure that these training tools are actually used to help prevent injury.

The information, specifications and illustrations in this manual are based on the information in effect at the time of approval for printing. We reserve the right to discontinue model lines at any time or to change specifications of design without notice and without incurring obligations.

MAIN COMPONENTS



A. Frame	**E. Adjustable Deflector**	**I. Axle**
B. Hitch	**F. Fuel/Hydraulic Tank**	**J. Hood - Hinged**
C. Infeed	**G. Belt Shield**	**K. Anvil**
D Jack Stand	**H. Discharge Spout**	**L. Instrument Panel**



DESCRIPTION OF CHIPPER COMPONENTS

Chipper Drum	This is the component in which the knives are mounted. The chipper drum is dynamically balanced and should not be welded on or modified.
Chipper Bearings	These support the chipper drum.
Chip Pockets	Each drum is designed with chip pockets to allow for accumulation until discharged.
Chipper Base	The chipper base holds the chipper drum assembly and its bearings. The base is a welded construction.
Knife Anvil	The chipper knife cuts against the knife anvil. The knife anvil is adjustable. See "Inspecting and Adjusting Anvil" (pg. 20) for proper adjustment.
Chipper Knife	These are attached to the chipper drum with four bolts.
Feed Wheel	Feeds the material at steady rate to the chipper drum.
Drum Lock Pin	A steel pin used to stabilize the drum when changing knives. It is located on the side of the chipper base.
Chipper Hood	Allows the operator access to the chipper drum.

SAFETY

PROTECT CHILDREN

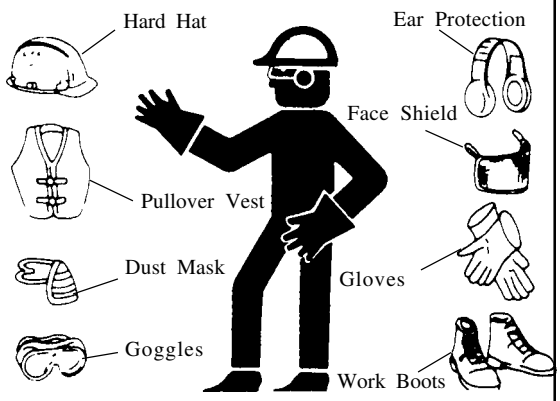
Keep children and other personnel away when operating machine.
Do not let children or untrained personnel operate machine.

WEAR PROTECTIVE CLOTHING

Wear close-fitting clothing and safety equipment appropriate to the job.

Prolonged exposure to loud noise can cause impaired or loss of hearing.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.



HANDLE FUEL SAFELY
AVOID FIRES

Handle fuel with care. It is highly flammable. Do not refuel the machine while smoking or when near open flames or sparks.

Always stop engine before refueling machine. Fill the tank outdoors.

Prevent fires by keeping machine clean of accumulated trash, grease and debris. Always clean up spilled fuel.

PREPARE FOR EMERGENCIES

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

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

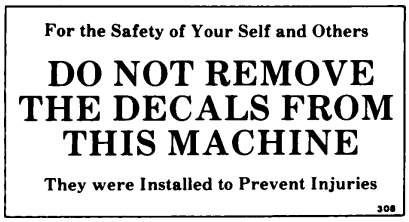
SAFETY

READ SAFETY SIGNS CAREFULLY

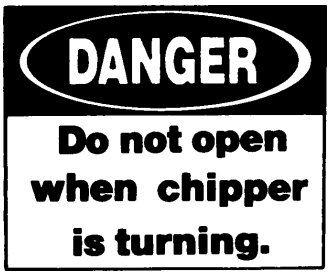
Carefully read and follow all safety signs.

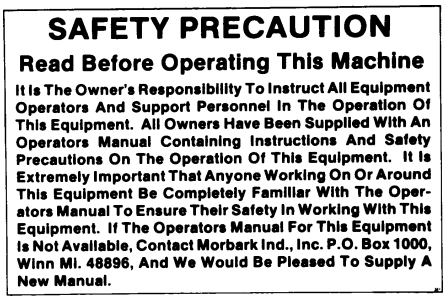
Danger signs identify the most serious hazards.

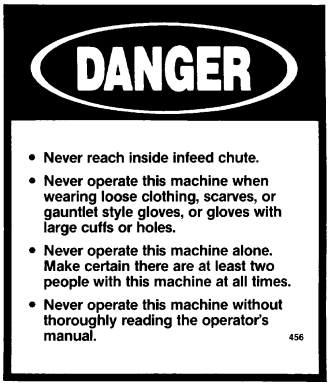
Keep safety signs in good condition. Replace any missing or damaged safety signs. Signs are attached to machine near specific hazard areas. If decals are required, they can be purchased through your local Dealer.



Caution signs call attention to safety messages in this manual.







SAFETY OPERATION

IMPORTANT SAFETY INFORMATION!

For Owners & Operators of Morbark Brush Chippers

This special safety manual and the accompanying video tape have been prepared for all owners and operators of Morbark hand-fed brush and tree chippers.

SAFETY IS NO ACCIDENT.

Like all good things worth having, proper safety training and operating procedures require effort, commitment and concentration every minute of every day.

Accidents don't just happen. They are caused by people who make mistakes.

We strongly encourage you to review this information immediately with all employees working with and around your hand-fed brush chipper.

It is also imperative to review this information with any new employees BEFORE they work with the chipper.

We urge you to review these safety procedures with your employees on a regular basis throughout the year. Safety training is not a one-shot affair. It requires your continuous commitment.

Over the life of the chipper, it is not unusual to have as many as 20 or 30 different operators. Even though we are aware of very few accidents, we are concerned that some operators may not receive all the proper training.

As a manufacturer, we have done everything imaginable to design the safest machine possible and to protect the operator from harm.

Review safety procedures with employees on a regular basis.

Morbark has designed a very safe chipper, **BUT IT CAN STILL BE DANGEROUS!**

SAFETY OPERATION

Before anyone starts up a brush chipper they should know this: **ANY MACHINE THAT CAN PULL IN A WHOLE TREE AND CHIP IT IN LESS THAN A MINUTE IS DANGEROUS IF THE OPERATOR DOES NOT FOLLOW PROPER SAFETY PROCEDURES.**

Following are the step-by-step procedures required to safely operate your brush chipper.

First, every operator should wear the proper clothing or protective gear on the job.

Clothing should be close fitting and should be kept tucked in. Recommended working attire: hard hat, safety goggles, ear protection, gloves without cuffs, trousers without cuffs, hard toe shoes with nonskid soles.

Eye protection, hard hats and ear protection should also be worn at all times.

Gloves are recommended to protect the operator's hands, but gauntlet style gloves should never be worn, again due to the possibility of snagging.

Working boots with good traction should be worn to reduce the possibility of slipping.

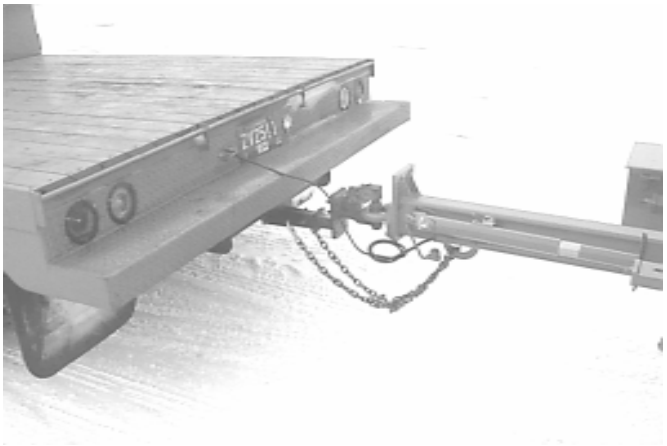
Before operating the chipper, all operators should read and understand all safety information in the operator's manual and all safety decals on the machine. These decals should never be removed. If they are worn or frayed, new decals should be ordered from your local Morbark Brush Chipper Dealer.

Prior to starting the chipper each day, a pre-startup walk-around inspection should be done. Check to make sure all bolts, nuts and belts are tight. Also inspect the infeed chute to make certain there are no tools or wood debris obstructing the infeed.

If the chipper is hitched to a truck or van, make certain the hitch is secure and the safety chains are properly attached.

Always wear proper clothing and protective equipment.

Make sure operators read and understand all safety decals. **NEVER REMOVE DECALS!**



Make certain hitch and safety chains are properly attached.

SAFETY OPERATION

If the chipper is not hitched to a vehicle, the tongue should be blocked and wheel chocks should be placed under both wheels to keep the chipper from moving.

The safety control bar simply controls the flow of hydraulic oil to the motor that drives the chipper's feed wheel.

We believe our design of the safety control bar is the best possible safety feature. Accessible along the entire top of the infeed and down both sides, this control bar instantly stops and reverses the hydraulic feed wheel, giving the operator complete control.

The control bar has three positions. It is pulled to turn the feed wheel forward and pushed to reverse the feed wheel. In between forward and reverse is the neutral position. It is vital that operators know and understand its function. During the course of a working day, the chipper operator will use this control bar hundreds of times to control the feed of wood and brush. It becomes second nature for an experienced operator to use the bar and it is very important to train any new operators in its use.

Before starting the engine, the safety control bar should be placed in the neutral position.

While chipping wood, the single most important safety rule is this: **NEVER, UNDER ANY CIRCUMSTANCES, PLACE YOUR HANDS OR FEET INSIDE THE INFEED CHUTE WHILE THE MACHINE IS RUNNING!**

It should be remembered that the only reason for the infeed chute or shroud is to protect the operator from becoming entangled in the feed wheel. It has absolutely no bearing on the utility or operation of the machine.

Use wheel chocks and block the tongue when the chipper is not hitched to a vehicle

NEVER REACH INSIDE THE INFEED WHEN THE CHIPPER IS RUNNING!

The safety control bar is an important safety feature.

SAFETY OPERATION

Again, the single most important chipper safety rule is: **NEVER BREAK THE PLANE OF THE INFEED CHUTE WITH YOUR HANDS, AND NEVER, FOR ANY REASON, ATTEMPT TO KICK BRUSH IN WITH YOUR FEET!**

NEVER BREAK THE PLANE OF THE INFEED WITH HANDS OR FEET!

To safely feed short material, place the feed system in the neutral position. Lay the short material on top of longer material and engage the feed system.

You should never attempt to feed handfuls of twigs, leaves and other material that has been raked up. There is no way to get it into the chipper without violating safety rules. This material should be placed in the chip van or chip pile directly. Not only is it dangerous to feed the material, but it can contain rocks, metal and other material that can damage the chipper.

To safely feed short material, place it on top of longer material.

DON'T try to feed twigs, leaves and rakings!

SAFETY OPERATION

Brush and limbs should always be fed butt end first.

At least two people should be on the job site at all times. No one should ever operate the chipper alone.

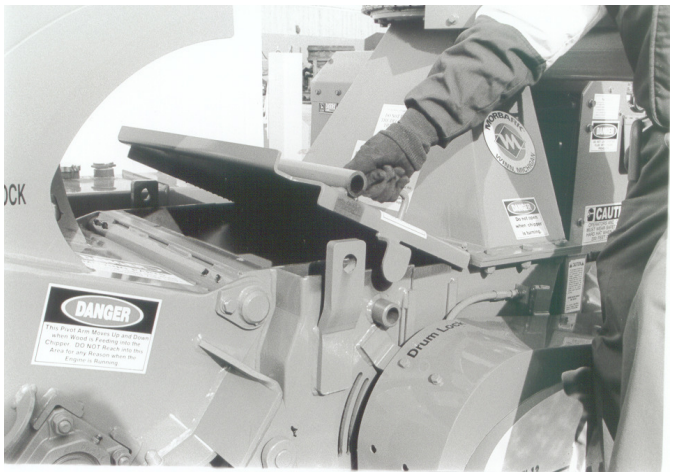
It is the operator's responsibility to ensure that other workers or bystanders are kept away from the path of discharged chips.

Turn engine off, remove ignition key and WAIT for drum to come to a complete stop before attempting maintenance.

Be prepared in case of an accident. Always have a first aid kit and fire extinguisher handy at the job site.

Never attempt to unclog the chipper or perform any other type of maintenance when the chipper is running.

Before performing any maintenance on the chipper, always turn off the engine and remove the ignition key.

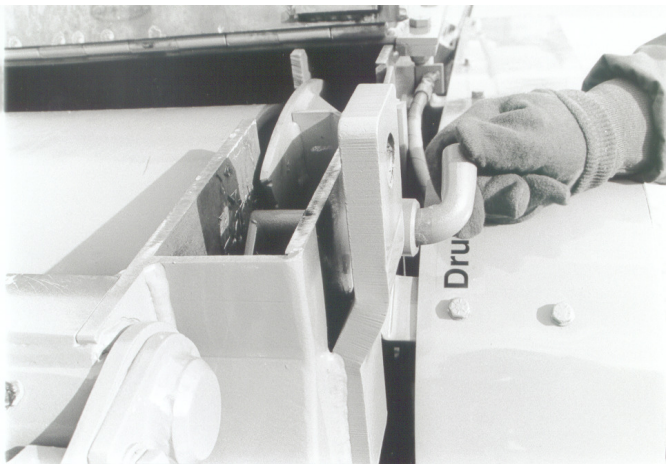


Never open chipper hood until drum comes to a complete stop.

Also, keep in mind that the chipper drum will coast for several minutes after the machine is shut off. **ALWAYS MAKE CERTAIN THE DRUM HAS COME TO A COMPLETE STOP BEFORE ATTEMPTING ANY MAINTENANCE.**

Never open the chipper hood until you are certain the drum has come to a complete stop. **NEVER, UNDER ANY CIRCUMSTANCES, RUN THE CHIPPER WHEN THE HOOD IS OPEN.**

Always insert the drum lock pin through the access hole in the drum fan. This pin will hold the drum in place while performing any knife maintenance.



Use drum lock pin to hold drum in place.

SAFETY OPERATION

When refueling the chipper, always be certain there is no open flame or source of a spark in the vicinity of the machine.

Always remove the ignition key when the machine is left unattended for any reason.

No one should ever operate the chipper when under the influence of drugs, alcohol or prescription medications which could in any way affect the operator's performance and concentration.

When the chipper is hitched to a vehicle, never attempt to feed material until the vehicle has come to a complete stop, the parking brake is applied and the driver has exited the vehicle.

When the chipper is hitched to an aerial lift truck, always be aware of any power lines in the vicinity. If the bucket should come in contact with power lines for any reason, the current could travel through the truck to the chipper. Never operate or touch the chipper until all aerial operations in the vicinity of power lines are completed.

Whenever possible, the chipper should be set up on level ground.

Never stand in front of the chipper discharge chute. Never direct the flow of chips towards anyone. Flying wood chips are very dangerous.

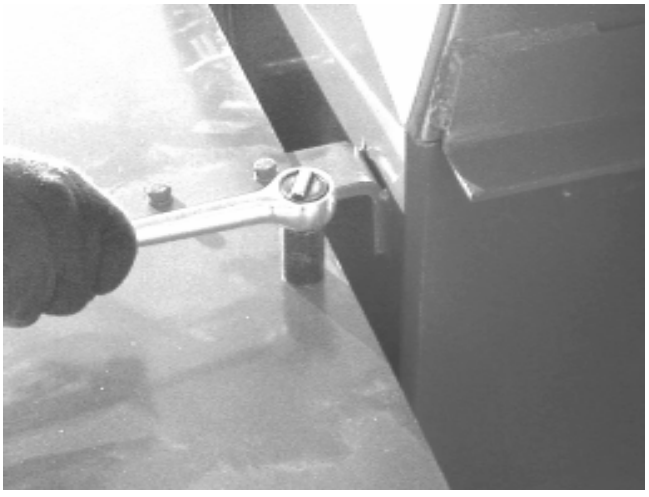
Never just turn the engine off and leave the key in the ignition. If the key is accidentally left in the "on" position, the engine can start while the chipper drum is being turned by hand.

Whenever the chipper belt drive guard is removed for service, replace it after you have finished. Guards are built for your protection. **USE THEM.**

Never attempt to do any type of maintenance on the machine while the engine is running. ALWAYS REMOVE THE IGNITION KEY.

Don't feed material when chipper is being towed.

Never stand in front of the discharge chute when the chipper is running.



Replace all guards.

SAFETY OPERATION

As an owner or operator of a Morbark chipper, you know what a useful tool it is. With anti-burning and anti-burying regulations spreading across the country, it is absolutely necessary that we have brush chippers to dispose of and recycle brush and wood waste.

It is equally necessary that we operate these machines in the safest manner possible.

We have done all we can do to manufacture the safest chipper possible that will still do the job it is intended for. But no matter how we build it, **IT CAN BE DANGEROUS IF IT ISN'T USED PROPERLY.**

It is the responsibility of the owner to ensure that operators are properly trained and that they practice safe operating procedures on the job.

These chippers are designed to give years of service. Over the course of the life of the chipper, it may have several owners and dozens of different operators. It is vital that each new operator be trained in safety and that even experienced operators are given safety reviews from time to time.

Safety is just too important to be taken lightly. With proper information and commitment to safety every day, your Morbark hand-fed chipper will give you years of reliable, safe service.

With proper safety information and training, your Morbark chipper will give you years of service.

SAFETY HINTS

1. Under no circumstances should any modifications be made without factory authorization. This machine was designed to do a specific job and alterations could result in injury to the operator or machine.
2. Never leave one person to work at the job site alone. If an accident occurred, someone could suffer or even die before help arrived.
3. Keep bystanders away from the machine during operation. Only the operator should be at the machine.
4. Be constantly aware of people and obstacles in your job area while operating the machine.
5. Never change or work on the chipper knives unless you wear gloves. The knives are very sharp and can seriously cut you.
6. Always check the tail lights and turn signals before transporting machine.
7. Never haul the machine without safety chains securely attached.
8. Never smoke, weld or use any type of flame around the fuel tank.
9. Remember, do not attempt any maintenance without first removing the ignition key and installing the drum lock pin.

SAFETY OPERATION

For a safe and productive operation, follow the procedures discussed in this section. **Safety guidelines are written in bold print.** All personnel must observe these guidelines when working with the equipment.

NEW ENGINE BREAK-IN

Proper break-in will lead to trouble free operation and increased engine life. The factory test given to a new engine is not sufficient to establish the polished bearing surfaces which are so necessary for good performance and long life. There is no quick way to force the establishment of good bearing surfaces. These can only be obtained by running a new engine carefully and under reduced loads for a short period of time.

Consult the Engine Operator's Manual located at the rear of this handbook for operation and safety guidelines.

CLOTHING

Avoid wearing loose clothing, particularly cuffs and scarves, which could catch on a branch and pull you into the chipper. Wear appropriate safety equipment at all times.

PRIOR TO STARTING YOUR MACHINE

If not attached to the towing vehicle block the tongue of the machine. Never use the adjustable jack as the sole support when operating the machine.

Block the wheels.

Check for foreign objects in the chipper housing, infeed area.

Check all parts. They should be in good working condition and be fastened in place.

Make sure all shields and covers are in place and secure.

Make sure no one is in the path of flying wood chips.

It is your responsibility as an operator to make sure that all bystanders are at a safe distance from the equipment.

All machines are shipped without fuel.

SAFETY OPERATION

INSPECTING CHIPPER KNIVES

CAUTION
BEFORE INSPECTING KNIVES
Always remove ignition key and install drum lock wedge.

1. Remove bolts from hood and open hood.
2. Turn drum by hand until knife is accessible.

NOTE: Whenever working on the chipper drum, always insert the drum lock pin through the access hole in the drum fan. This pin will hold the drum in place while performing any knife maintenance. This does not mean the ignition key can be left in the "on" position. The drum lock pin is only a secondary safety system.

3. Install drum lock pin.
4. Inspect knives. If knives need to be replaced, refer to "Changing Chipper Knives" section.
5. If knives are in good condition, check 3/4"-16 knife bolts for tightness. (Refer to torque chart on pg. 22)
6. When checking knives, always check the chipper bearings and grease them. Also check knife holder bolts.
7. After inspecting all knives and bolts, remove the drum lock pin.
8. Close chipper hood, and bolt down tight.

MAKE ONE LAST VISUAL INSPECTION

1. Check tightness of all bolts.
2. Clear infeed of all debris.
3. You are now ready to begin chipping.

NOTE:
Do not leave the machine unattended with the engine running.

It is recommended that at least two people remain at the job site during machine operations.

Always have an operable fire extinguisher and first aid kit handy at all times.

Remove the ignition key before attempting any maintenance.

Drum Lock pin properly installed.

Check all knife bolts for proper torque.

SAFETY OPERATION

MACHINE WARM-UP

NOTE: Most engines include a safety shutdown system. This system will shut down if coolant temperature is too high or oil pressure is too low. If service is required, please refer to your nearest authorized dealer.

1. Check all engine fluids.

NOTE: On machines equipped with a permissive start button, hold the button in, start the engine and hold the permissive start button until oil pressure reaches operating pressure (approx. 5 seconds).

2. Start the engine according to your Engine Operator's Handbook which is located in the rear of this manual.

3. Let the engine idle at 750-800 RPM for no longer than 2-3 minutes on a "cold start" or until the engine stabilizes.

CAUTION: Do not allow the engine to idle with the clutch disengaged for no longer than 2-3 minutes or failure to the pilot bearing will occour.

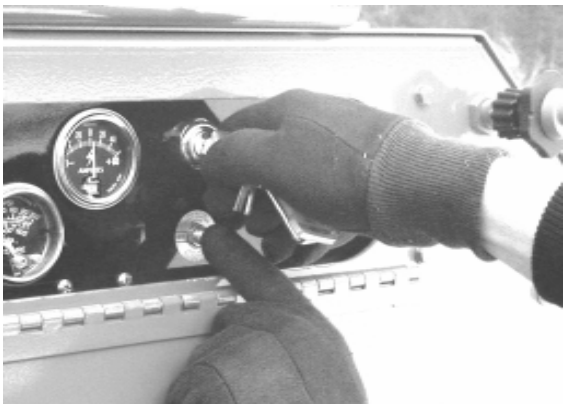
4. Engage clutch at 750-800 RPM by slipping (bump ing) the clutch for a 2-3 second count. Disengage the clutch handle, and allow the engine to regain RPM, then fully engage the clutch handle.

CHIPPING WOOD

1. Always position the throttle at full RPM while chipping.
2. Feed material into infeed spout. Never allow your hands to enter the infeed spout. Feed short material by placing it on top of longer material that is feeding into the chipper.

NOTE: For proper break-in, it is recommended that you begin by feeding 2" to 3" diameter material into the chipper and gradually work up to larger diameter material during the first 4 to 8 hours of operation.

3. Observe gauges throughout operation.
4. Throttle engine down to 600-800 RPM before disengaging clutch.
5. After the power is shut-off, the chipper drum will coast for several minutes. **Never loosen or remove the chipper hood or attempt any other maintenance until the drum and power unit are completely stopped.**



Start the engine according to your Engine Operators Manual.

Engage the clutch at 750-800 RPM.

Position the throttle at full RPM when chipping.

Never allow your hands to enter the infeed spout.

SAFETY MAINTENANCE SCHEDULE

GENERAL	DAILY	WEEKLY
Check engine oil level	X	
Check radiator fluid level (if applicable)	X	
Check battery water level (fill with distilled water)	X	
Check hydraulic fluid	X	
Check clutch engagement torque	X	
Check tightness of engine bolts*	X	
Check tire pressure	before moving machine	
Replace engine air, fuel and oil filters	refer to engine manual	

CHIPPER		
Check sharpness of knives	X	
Check tightness of chipper bearing bolts*		X
Check tightness of chipper knife bolts*		X
Check for proper anvil clearance	every time you check chipper knives	
Check for worn anvil edge	X	
Check for proper drive belt tension*	X	
Check tightness of chipper sheave bushing*		X
Torque chipper drive sheave*		X

*** Refer to torque specs. (pg.22)**

NOTE: During the first hours of operation, check belt tightness frequently. After the first week, check tightness of belts and bolts weekly. Please refer to torque schedule.

SAFETY MAINTENANCE

Safety and daily maintenance are the two most important things to remember when operating machinery. A small amount of daily maintenance will make the weekly or monthly maintenance much easier and less expensive. While maintaining your brush chipper, please follow the safety guidelines which are written in **bold** print.

Always REMOVE THE IGNITION KEY and COIL WIRE (on gasoline power units), DISENGAGE THE CLUTCH (if applicable), and INSTALL THE DRUM LOCK PIN before attempting any maintenance.

Do not, under any circumstances, open the chipper housing without first making sure the chipper drum has come to a complete stop and power unit is off.

Because of the high temperature of the coolant, use caution when removing radiator cap.

Always shut off the machine before refueling.

Do not smoke, weld, or use any type of flame near the machine when refueling.

Always wear appropriate clothing and safety equipment while maintaining your machine.

Always wear leather gloves when changing or servicing chipper knives.

Always replace all safety guards after servicing

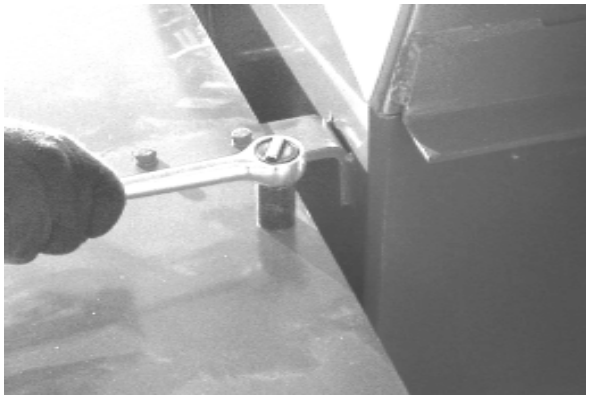
Always make sure all filler plugs and caps are in place after servicing.

When starting power unit indoors, make sure the area is properly ventilated.

Do not attempt to unplug the chipper infeed spout with the chipper running. Always shut the engine off. REMOVE THE IGNITION KEY and wait for the chipper drum to come to a complete stop.

Remove the ignition key before attempting any maintenance.

Always wear appropriate clothing and safety equipment when servicing your machine.



Replace all safety guards after servicing your machine.

SAFETY MAINTENANCE

CHANGING CHIPPER KNIVES

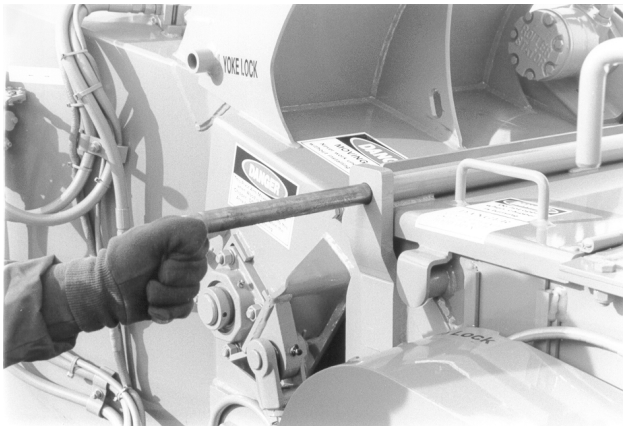
CAUTION:
BEFORE CHANGING KNIVES

1. Always remove ignition key and coil wire (on gasoline power units) and disengage clutch, if applicable.
2. Make sure the chipper drum has come to a complete stop.
3. Open the chipper hood.
4. Rotate drum so knife is accessible.
5. Install drum lock pin.
6. Remove the (4) knife bolts.
7. Remove all dirt and chip particles from the knife and knife pocket.
8. Reverse or replace the knife.
9. Place the knife onto the knife holder and insert bolts. Before tightening slide the knife forward and then proceed to torque bolts down.

NOTE: Refer to torque chart on pg. 22

10. Remove drum lock pin.
11. Repeat this process for each knife.
12. After changing knives, fasten chipper hood back in place.

IMPORTANT! Always adjust anvil after each time you replace or sharpen knives. (Refer to "Adjusting Anvil Clearance)(pg. 20)



Close the chipper hood, install the hood pin and clip.

Remove the ignition key before attempting any maintenance.

Install the drum lock pin.

Replace the knives and tighten all the knife bolts.

SAFETY MAINTENANCE

INSPECTING AND ADJUSTING THE KNIFE ANVIL CLEARANCE

The anvil should be adjusted to a minimum of .025" and a maximum of .040" from the cutting edge of the highest chipper knife.

To inspect and adjust the knife anvil clearance, follow these steps:

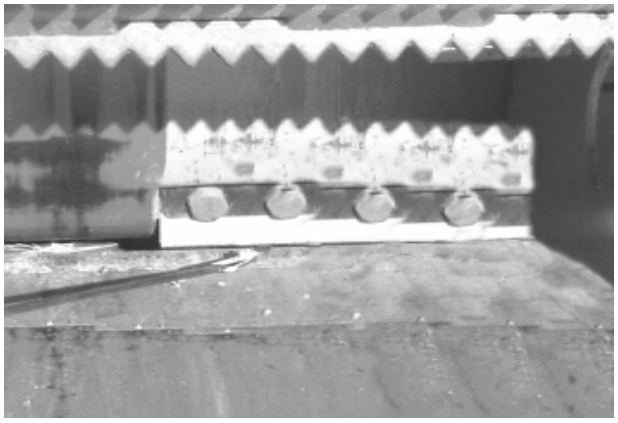
1. Disengage clutch and run engine at idle speed.
2. Be certain feed wheel control bar is in neutral position.
3. Activate the hydraulic valve to raise the yoke.
4. **Install yoke lock pins.**

Note: the yoke lock pins are located on the side of the infeed. It is absolutely essential to install these pins prior to working beneath the feed wheel. Make sure these pins are completely inserted. These pins prevent the feed wheel from lowering accidently.

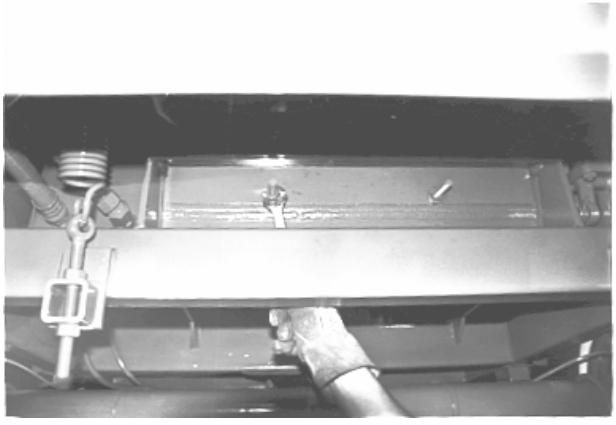
5. Turn the engine off and remove the ignition key and coil wire (on gasoline power units.) Disengage the clutch. Wait until the drum comes to a complete stop.
6. The anvil clearance can be checked by reaching into the infeed spout.
7. Use a feeler gauge to check the clearance between the knife anvil and the cutting edge of each knife. Set anvil to the knife that is located closest to the anvil.
8. Loosen the six anvil bolts by using a 15/16" socket.
9. Slide the anvil to the desired position using the two eye bolts located behind the anvil bolts.
10. Retighten the 5/8"-18 anvil bolts. (Refer to torque chart pg. 22)
11. Turn the drum backwards to check for proper clearance on the other knives, ensuring that the closest knife is no closer than .025".

Activate the valve to raise the infeed yoke.

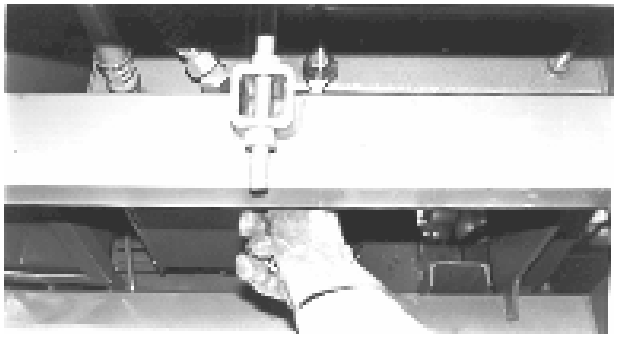
Install <u>both</u> yoke lock pins.



Use a feeler gauge to check clearance.



Tighten the anvil bolts.



Adjust the anvil to desired position.

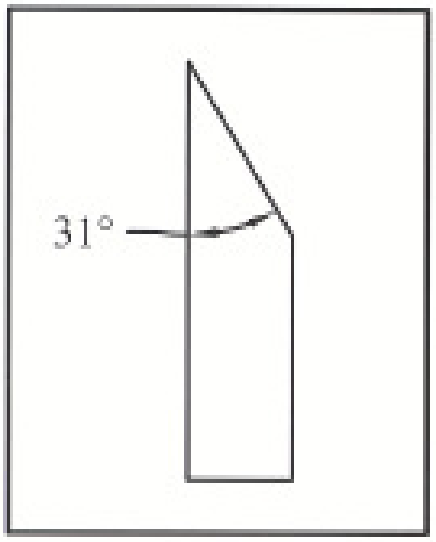
SAFETY MAINTENANCE

Sharp knives cause less wear on the machine and increase fuel economy. Morbark Brush Chippers are equipped with double edged chipper knives. When one cutting surface of the knife becomes dull, simply rotate the knives.

The time between knife sharpening will depend on many factors, such as:

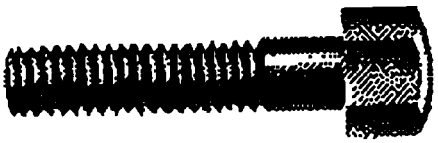
a. Species of wood.
b. Weather conditions: rain causes the trees to pick up soil while being dragged to the chipping site Soil is extremely hard on knives.
c. Amount of chipper production.
d. The quality of the knife. Knives should be sharpened professionally with a coolant type surface grinder (Sharp Edge, Inc. knives are recommended.)

Knives should be ground at 31 degrees.



Tightening Torque Guide

Hex Head Cap Screws



GRADE 5

Coarse Thread

Size	Clamp Load	Plain	Plated
1/4-20 (.250)	2,025	8 ft. lbs.	76 in. lbs.
5/16-18 (.3125)	3,338	17 ft. lbs.	13 ft. lbs.
3/8-16 (.375)	4,950	31 ft. lbs.	23 ft. lbs.
7/16-14 (.4375)	6,788	50 ft. lbs.	37 ft. lbs.
1/2-13 (.500)	9,075	76 ft. lbs.	57 ft. lbs.
9/16-12 (.5625)	11,625	109 ft. lbs.	82 ft. lbs.
5/8-11 (.625)	14,400	150 ft. lbs.	112 ft. lbs.
3/4-10 (.750)	21,300	266 ft. lbs.	200 ft. lbs.
7/8-9 (.875)	29,475	430 ft. lbs.	322 ft. lbs.
1-8 (1.000)	38,625	644 ft. lbs.	483 ft. lbs.
1 1/8-7 (1.125)	42,375	794 ft. lbs.	596 ft. lbs.
1 1/4-7 (1.250)	53,775	1120 ft. lbs.	840 ft. lbs.
1 3/8-6 (1.375)	64,125	1470 ft. lbs.	1102 ft. lbs.
1 1/2-6 (1.500)	78,000	1950 ft. lbs.	1462 ft. lbs.
Fine Thread			
1/4-28 (.250)	2,325	10 ft. lbs.	87 in. lbs.
5/16-24 (.3125)	3,675	19 ft. lbs.	14 ft. lbs.
3/8-24 (.375)	5,588	35 ft. lbs.	26 ft. lbs.
7/16-20 (.4375)	7,575	55 ft. lbs.	41 ft. lbs.
1/2-20 (.500)	10,200	85 ft. lbs.	64 ft. lbs.
9/16-18 (.5625)	12,975	122 ft. lbs.	91 ft. lbs.
5/8-18 (.625)	16,350	170 ft. lbs.	128 ft. lbs.
3/4-16 (.750)	23,775	297 ft. lbs.	223 ft. lbs.
7/8-14 (.875)	32,475	474 ft. lbs.	355 ft. lbs.
1-12 (1.000)	42,300	705 ft. lbs.	529 ft. lbs.
1-14 (1.000)	32,275	721 ft. lbs.	541 ft. lbs.
1 1/8-12 (1.125)	47,475	890 ft. lbs.	668 ft. lbs.
1 1/4-12 (1.250)	59,550	1241 ft. lbs.	930 ft. lbs.
1 3/8-12 (1.375)	72,975	1672 ft. lbs.	1254 ft. lbs.
1 1/2-12 (1.500)	87,750	2194 ft. lbs.	1645 ft. lbs.

GRADE 8

Coarse Thread

Size	Clamp Load	Plain	Plated
1/4-20 (.250)	2,850	12 ft. lbs.	9 ft. lbs.
5/16-18 (.3125)	4,725	25 ft. lbs.	18 ft. lbs.
3/8-16 (.375)	6,975	44 ft. lbs.	33 ft. lbs.
7/16-14 (.4375)	9,600	70 ft. lbs.	52 ft. lbs.
1/2-13 (.500)	12,750	106 ft. lbs.	80 ft. lbs.
9/16-12 (.5625)	16,350	153 ft. lbs.	115 ft. lbs.
5/8-11 (.625)	20,325	212 ft. lbs.	159 ft. lbs.
3/4-10 (.750)	30,075	376 ft. lbs.	282 ft. lbs.
7/8-9 (.875)	41,550	606 ft. lbs.	454 ft. lbs.
1-8 (1.000)	54,525	909 ft. lbs.	682 ft. lbs.
1 1/8-7 (1.125)	68,700	1288 ft. lbs.	966 ft. lbs.
1 1/4-7 (1.250)	87,225	1817 ft. lbs.	1363 ft. lbs.
1 3/8-6 (1.375)	103,950	2382 ft. lbs.	1787 ft. lbs.
1 1/2-6 (1.500)	126,450	3161 ft. lbs.	2371 ft. lbs.
Fine Thread			
1/4-28 (.250)	3,263	14 ft. lbs.	10 ft. lbs.
5/16-24 (.3125)	5,113	27 ft. lbs.	20 ft. lbs.
3/8-24 (.375)	7,875	49 ft. lbs.	37 ft. lbs.
7/16-20 (.4375)	10,650	78 ft. lbs.	58 ft. lbs.
1/2-20 (.500)	14,400	120 ft. lbs.	90 ft. lbs.
9/16-18 (.5625)	18,300	172 ft. lbs.	129 ft. lbs.
5/8-18 (.625)	23,025	240 ft. lbs.	180 ft. lbs.
3/4-16 (.750)	33,600	420 ft. lbs.	315 ft. lbs.
7/8-9 (.875)	45,825	668 ft. lbs.	501 ft. lbs.
1-12 (1.000)	59,700	995 ft. lbs.	746 ft. lbs.
1-14 (1.000)	61,125	1019 ft. lbs.	764 ft. lbs.
1 1/8-12 (1.125)	77,025	1444 ft. lbs.	1083 ft. lbs.
1 1/4-12 (1.250)	96,600	2012 ft. lbs.	1509 ft. lbs.
1 3/8-12 (1.375)	118,350	2712 ft. lbs.	2034 ft. lbs.
1 1/2-17 (1.500)	142,275	3557 ft. lbs.	2668 ft. lbs.

NOTES:

1. Always use the torque values above when specific torque values are not available.
2. Do not use above values in place of those specified in other sections of this manual; special attention should be observed when using SAE Grade 6, 7 and 8 capscrews.
3. The above is based on use of clean, dry threads.
4. Reduce torque by 10% when engine oil is used as a lubricant.
5. Reduce torque by 20% if new plated capscrews are used.
6. Capscrews threaded into aluminum may require reductions in torque of 30% or more of Grade 5 capscrews torque and must attain two capscrew diameters of thread engagement.

Caution: If replacement capscrews are of a higher grade than originally supplied, adhere to torque specifications for that placement.

**Based on IFI 5th Edition Technical Data N-12/N-16, using Equation (1) and a torque coefficient, K=0.20 for nonplated steel fasteners and K=0.15 for plated fasteners.

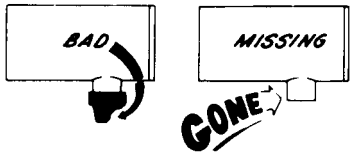
These Figures represent an estimate of torque (torque being the measurement of friction, not tension) required to induce given preload (clampload) in a bolt for noncritical applications only. For critical or special applications where greater control is desired this should be experimentally determined. This applies to washer faced or double chamfered hex nuts (or bolts, if bolt is torqued) having a width across flats of approximately 1.5 times the nominal diameter and having threads free of interference.

Because of the many interrelated variables that directly or indirectly affect friction, such as surface texture, type of coating or finish, lubrication, speed of tightening , human error, etc., it is possible to experience as much as ±25% deviation in preload (clampload) with the use of a torque wrench.

SAFETY MAINTENANCE

AIR FILTER MAINTENANCE

NOTE: It's the customer's responsibilty to follow all steps of air filter maintenance as required, depending on the operating conditions.



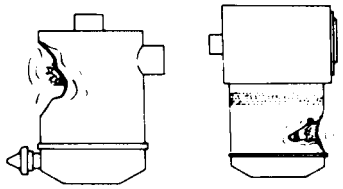
Low pre-cleaner efficiency will cause short element life. Low pre-cleaning efficiency can be caused by:

1. Leaking dust cup to air cleaner body joint; cup must seal 360° around the air cleaner.

2. A damaged or missing dust evacuator valve.

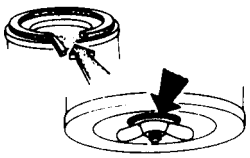
3. Plugging or buildup in the vanes of the pre-cleaner.

4. Damage to the pre-cleaning section of the air cleaner.



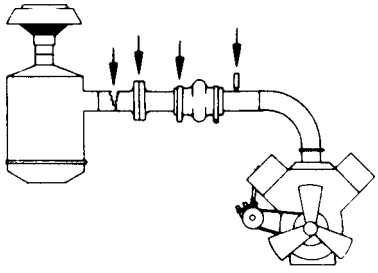
THE PROBLEM OF AIRBORNE CONTAMINANTS ENTERING THE ENGINE

1. Check to make sure the element has not been damaged in handling. Examine for dents and holes.



2. Check to make sure all gaskets are sealing. Examine for dust trails which indicate leaks. Check to be certain wing nut is tight.

3. Examine the clean air transfer tubing for cracks, loose clamps, or loose flange joints.



4. Check ether fittings (if used) to be certain no contaminants are entering the engine through these connections.

5. Check the service indicator for damage, working lock-up function, and correct calibration per engine manufacturers recommendation.

SAFETY MAINTENANCE

BASIC ELEMENT SERVICE PRECAUTIONS

7 Important Steps to Follow

every time an air cleaner element is replaced

NOTE: Be sure to empty pre-cleaner bowl or cup as required.

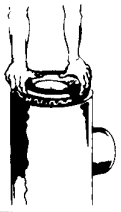
Always clean the inside of the housing carefully without allowing dust to enter the intake ducting

Press your fresh gasket to see if it springs back

Remove the old element as gently as possible

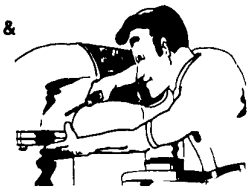
Always clean the gasket sealing surfaces of the housing

Make sure the gasket is seating evenly



Check for uneven dirt patterns on your old element for indications of gasket leakage

Check connections & ducts for leak-tight fit

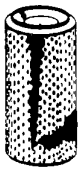


The Important "Don'ts"

to always remember about air cleaner servicing

Never judge your element's life by looking at it

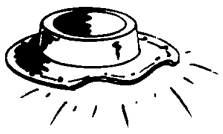
Don't use a dented or bunched filter element



Don't remove element for inspection

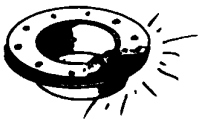
Never leave an air cleaner open longer than necessary

Never use a warped cover on a housing

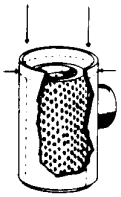


Never rap an element to clean it-only to destroy it

Don't overlook a worn or damaged gasket in the housing

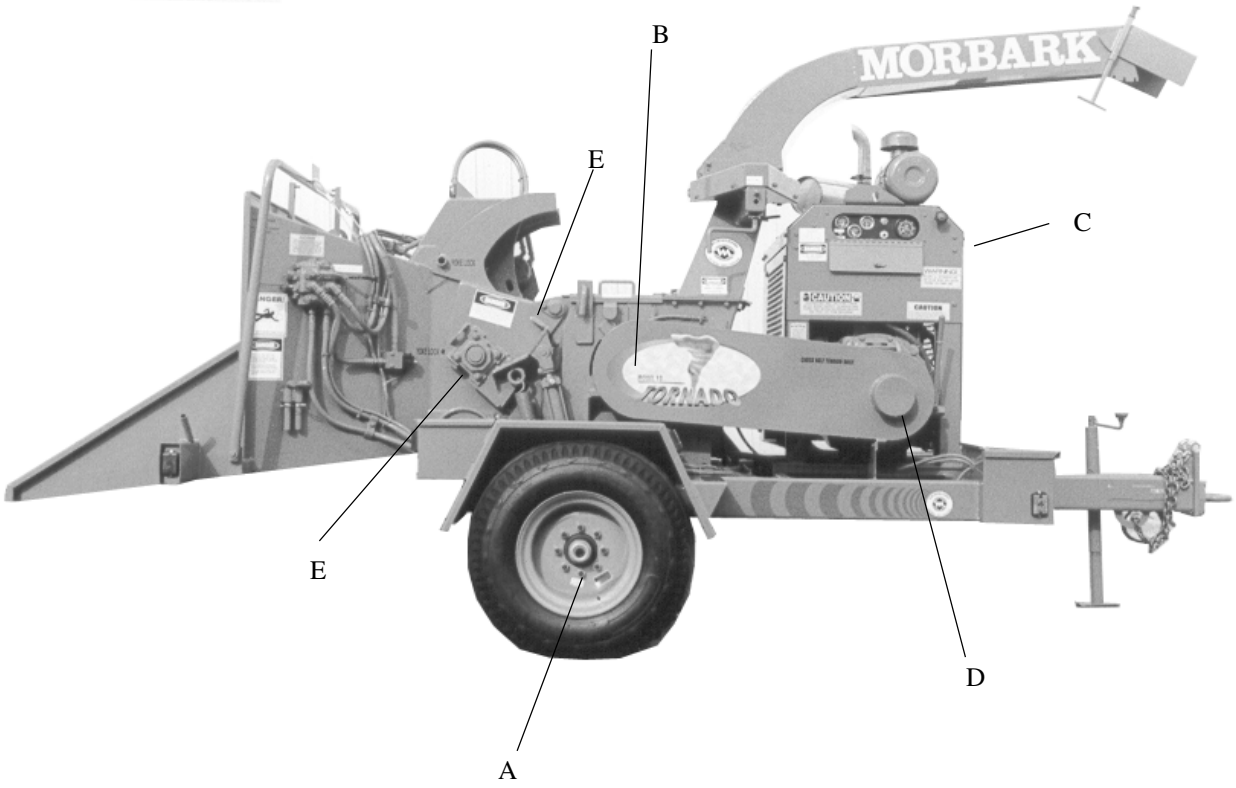


Never substitute an incorrect element model number



SAFETY MAINTENANCE

LUBRICATION SCHEDULE



A. Lubricate wheel bearings with a good grade EP1 Lithium base grease. - every 6 months.
B. Chipper bearings - Lubricate every 50 hrs. until excess grease is present.
C. Follow engine manufacturer's guidelines for lubrication of engine.
D. Grease clutch - monthly. - According to specs.
E. Grease remaining pivot points every 8 hrs. with a good grade EP1 Lithium base grease.

SAFETY MAINTENANCE

ADJUSTING THE BELT TENSION

CAUTION:
BEFORE ADJUSTING BELTS

Remove ignition key and coil wire (on gasoline powered units.) Disengage clutch (if applicable.)

To check for proper tension of belts, use a belt tension gauge or a spring scale to deflect one belt at the center of the span 1/64" per inch of span length. The scale should read a minimum of 20 lbs. of deflection force.

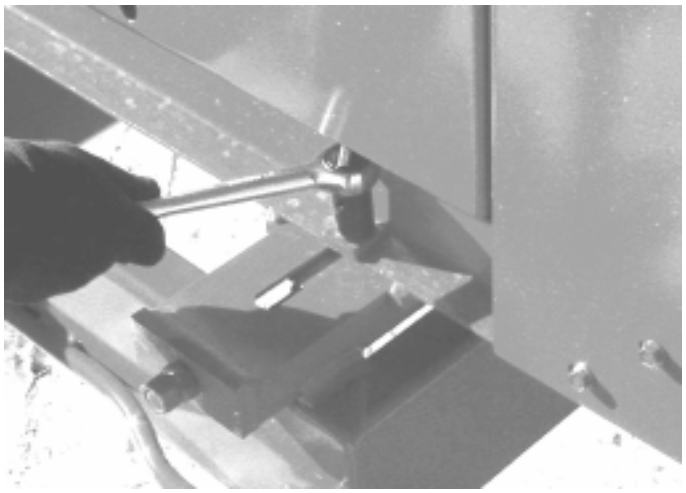
To adjust the chipper belt tension, follow these steps:

1. Remove ignition key & coil wire (on gasoline power units).
2. Remove the belt shield.
3. Loosen the engine bolts.
4. Adjust chipper belt with the belt tightening bolts to get proper belt tension.
5. Tighten 5/8"-11 engine bolts with proper torque. (pg. 22)

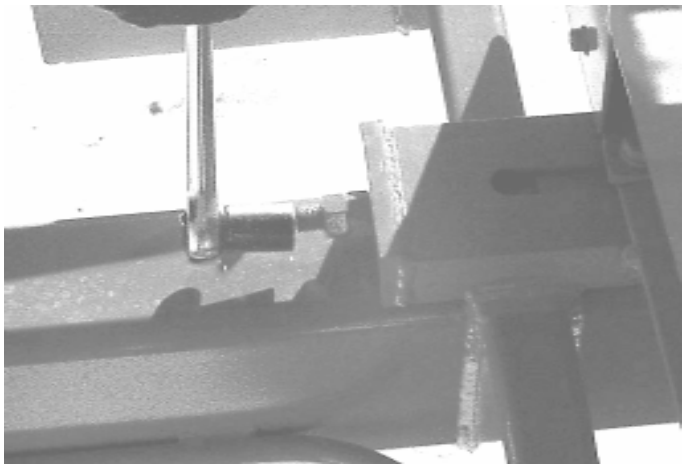
NOTE: Adjust both sides evenly to ensure proper sheave alignment.

6. Whenever the belt shield is removed for service, replace it after you have finished. Shields are built for your protection. **Use them.**

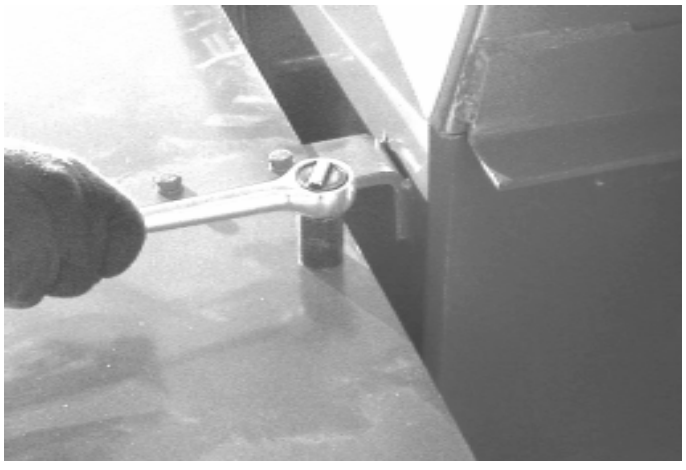
Inspect chipper drive belts hourly during the first week of operation and weekly thereafter.



Loosen the engine mounting bolts.



Adjust chipper belt tension.



Replace all guards after servicing the machine.

SAFETY MAINTENANCE

TRANSPORTING THE BRUSH CHIPPER

1. The standard towing hitch on the brush chipper is either a 2 1/2" Lunet ring or a 2" ball. Be sure the towing vehicle hitch is properly equipped for the hitch on your brush chipper. The towing vehicle should be capable of handling a minimum of 1000# tongue weight.

2. Check to make sure that hitch has been properly attached and safety pins installed.

4. Check tire pressure to ensure proper inflation: which is found on the side of the tire.

5. Hook up electrical connections and be sure tail lights and turn signals function properly.

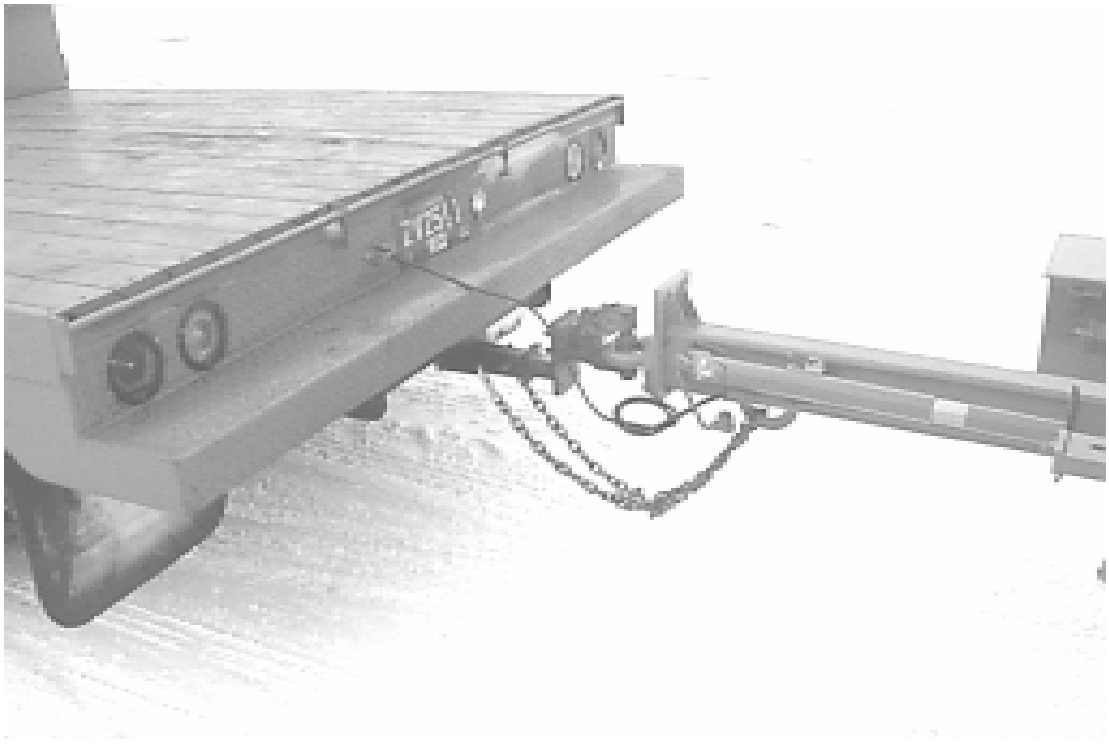
6. Cradle safety chains under towing hitch and securely attach them to the towing vehicle. Raise tongue jack and swivel to horizontal position.

7. Clean infeed of all debris.

8. Securely attach safety chains and raise tongue jack.

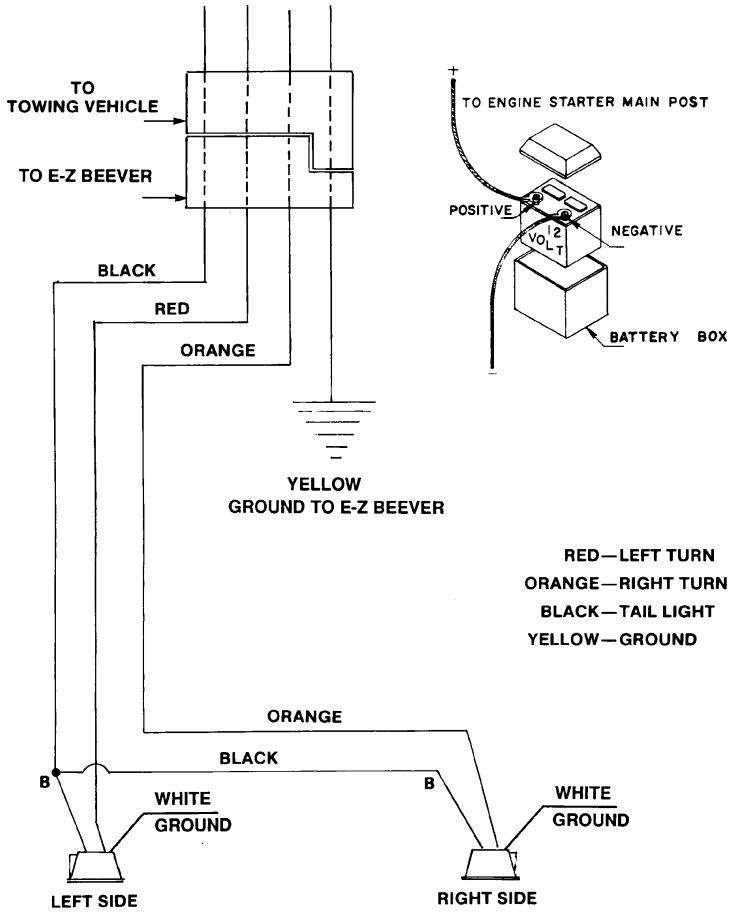
9. Remove wheel blocks and check around machine for any tools or loose items that might be lost during transport.

10. Before moving your brush chipper be sure to check wheel rims for fatigue or loose bolts.



Always use this equipment in accordance with your local OSHA guidelines.

ELECTRICAL DIAGRAM



ADJUSTING THE AUTO-FEED

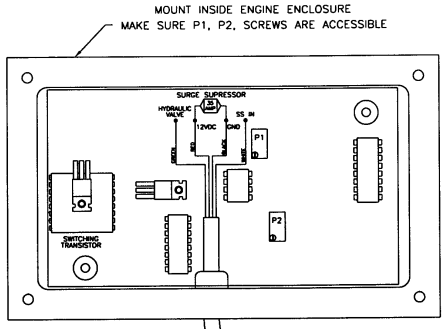
1.) START POWER UNIT, PUT FEEDWHEEL CONTROL HANDLE IN FORWARD POSITION AND RUN ENGINE TO FULL THROTTLE. IF FEEDWHEEL IS RUNNING, TURN P1 CLOCKWISE UNTIL FEEDWHEEL JUST STOPS, THEN TURN BACK UNTIL FEEDWHEEL JUST STARTS. IF FEEDWHEEL IS STOPPED TURN P1 COUNTER CLOCKWISE UNTIL FEEDWHEEL JUST STARTS TURNING.

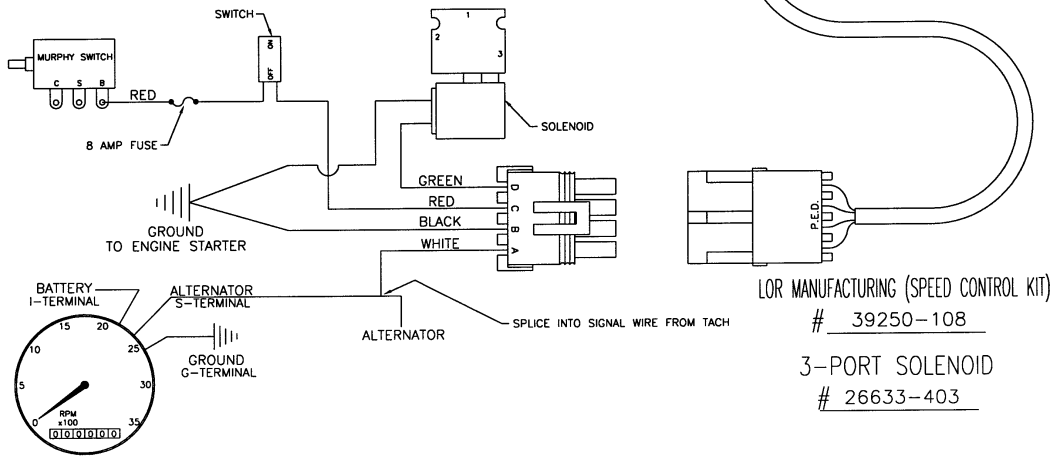
2.) NEXT DROP RPMS 200 BELOW FULL THROTTLE IF FEEDWHEEL DOESN'T STOP, TURN P2 CLOCKWISE 2 TO 3 TURNS, YOUR FEEDWHEEL WILL NOT STOP. IF FEEDWHEEL STOPS BEFORE YOU REACH 400 BELOW FULL THROTTLE, TURN P2 COUNTER CLOCKWISE 2 TO 3 TURNS, YOUR FEEDWHEEL WILL NOT START.
"BY TURNING P2 YOU ARE ADJUSTING THE SPREAD BETWEEN HIGH AND LOW RPMS, P2 WILL NOT START AND STOP FEEDWHEEL."

3.) RUN ENGINE BACK UP TO FULL THROTTLE.

4.) DROP RPMS 250 BELOW FULL THROTTLE IF FEEDWHEEL DOESN'T STOP, RUN ENGINE TO FULL THROTTLE AND REPEAT STEPS 2 AND 3.

5.) AFTER AUTOFEED IS SET TO DESIRED SETTINGS PUT A DROP OF SILICONE ON P1 AND P2.





LOR MANUFACTURING (SPEED CONTROL KIT)
39250-108

3-PORT SOLENOID
26633-403

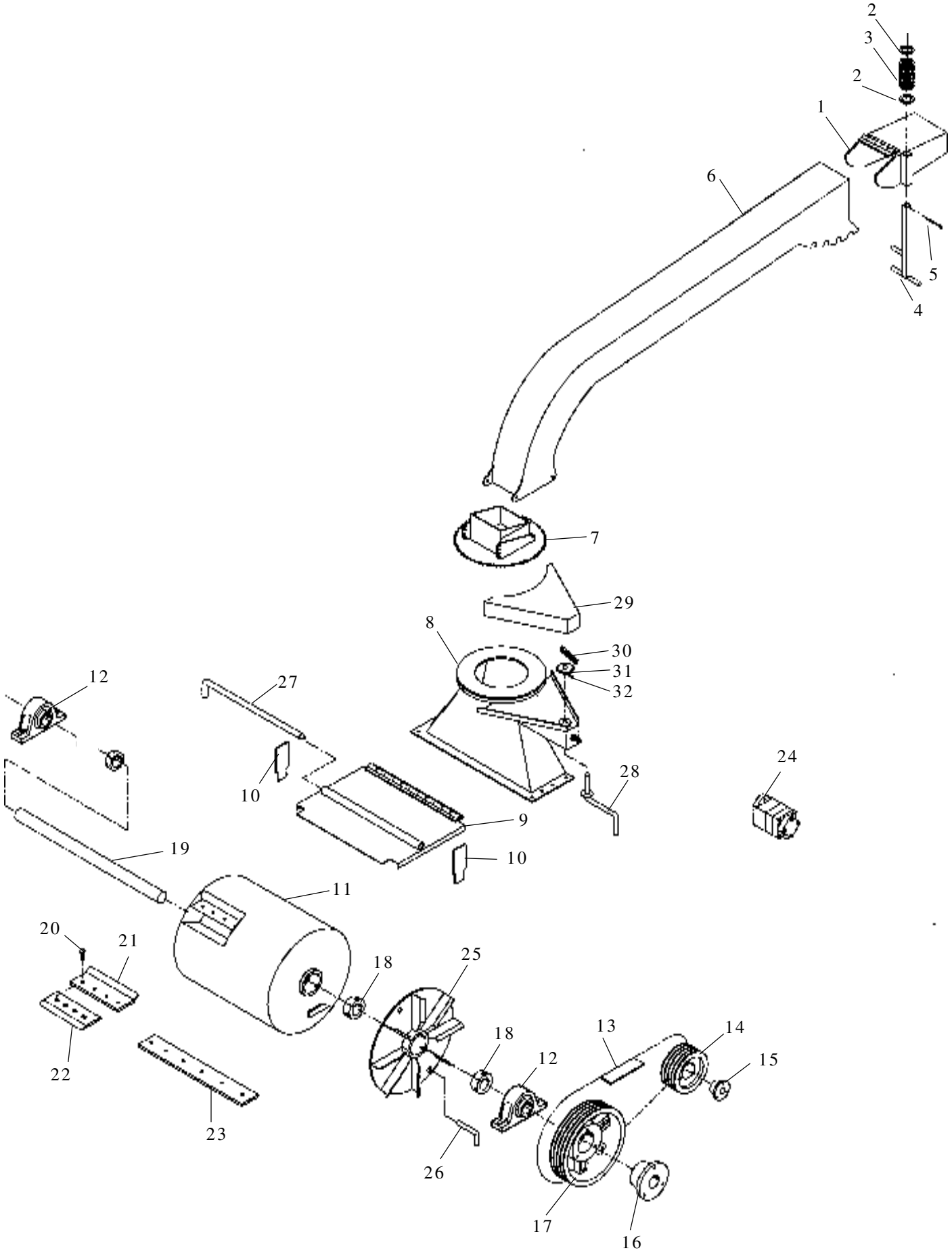
TROUBLE SHOOTING THE CHIPPER

PROBLEM	PROBABLE CAUSES AND SOLUTIONS
Chipper will not feed properly.	1. Dull knives. Sharpen or replace knives. 2. Loose belts. Check for proper belt tension. 3. Knives ground at incorrect angle. Grind knives at 31 degrees (Refer to Maintenance Section.) 4. Obstruction in infeed spout. If material lodges in the chipper, raise top yoke, install yoke lock pins. REMOVE THE IGNITION KEY AND COIL WIRE (on gasoline units), DISENGAGE THE CLUTCH (if applicable). Carefully pull the material from the infeed. Resume Operation.
Chipper bearing running too hot. (210° F Maximum)	1. Lubricate or replace bearings. 2. Drum RPM too high. Do not exceed 2300 RPM. 3. Bearing retainer cap loose. Torque to 100 ft. lbs.
Discharge spout plugged.	1. Obstruction in discharge spout. Remove obstruction. Patches welded on spout may cause obstruction. If so, replace spout. 2. Chipper drum RPM too low. Do not run chipper drum below 1700 RPM.
Chipper drum wobbles.	1. Chipper bearings worn. Replace. 2. Knife pocket is plugged with material. Unplug pocket.
Chipper drum will not turn.	1. Check for obstruction in chipper housing. 2. Check for seized chipper bearings. Lubricate or replace.

Always be sure engine is shut off and chipper drum is completely stopped and all lockout procedures are followed before attempting to do any maintenance on chipper.

TABLE OF CONTENTS
PARTS LISTINGS

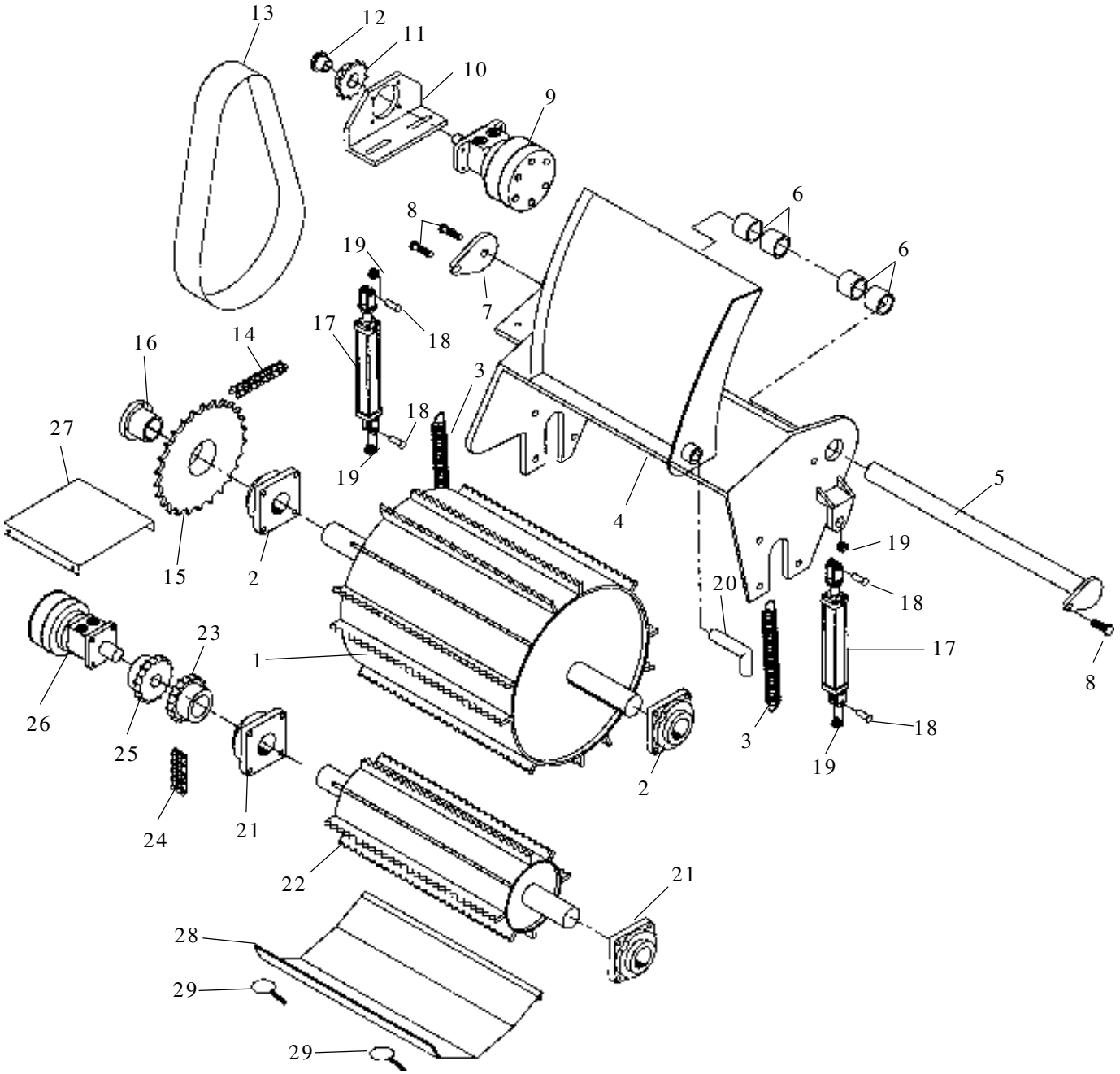
CHIPPER COMPONENTS



CHIPPER COMPONENTS

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	40444-462	Deflect
2	2	21161-048	Washer
3	1	24741-012	Spring
4	1	40115-061	Deflect Adjustment Handle
5	1	21126-041	Cotter Pin
6	1	40443-462	Discharge
7	1	40497-462	Swivel
7 a	1	40711-460	Swivel Lock Pin
8	1	40178-452	Transition
9	1	40103-452	Chipper Hood
10	2	30024-452	Chipper Base Filler
11	1	40098-452	Chipper Drum Complete
12	2	30936-901	Bearing
13	1	24181-660	Belt (over 60hp)
14	1	24217-668	Sheave (over 60hp)
15	1	24133-223	Bushing
16	1	24133-591	Bushing
17	1	24217-128	Sheave (over 60hp)
18	3	24131-318	Bushing
19	1	30449-452	Shaft
20	8	22424-404	Bolt
21	2	30130-101	Cover Plate
22	2	39233-692	Knife
23	1	30412-462	Anvil
24	1	*	Pump
25	1	40219-452	Discharge Fan
26	1	31030-462	Drum Lock Pin
27	1	30438-452	Hood Pin
28	1	40502-462	Handle Assembly (includes #31,32)
29	1	31245-462	Manual Turn Discharge Cover
30	1	24251-026	Roller Chain
31	1	24264-103	Sprocket
32	1	21133-130	Roll Pin
-	1	40503-462	Swivel Lock Assembly

INFEED COMPONENTS



ITEM	QTY.	PART NO.	DESCRIPTION	ITEM	QTY.	PART NO.	DESCRIPTION
1	1	40188-452	Feed Wheel	15	1	24264-837	Sprocket
1a		30278-452	Feed Wheel Teeth	16	1	24132-212	Bushing
2	2	23918-622	Bearing	17	2	26816-119	Cylinder
3	2	24741-621	Spring	18	4	26816-538	Pin
4	1	40201-452	Yoke Assembly	19	4	30784-901	Bushing
5	1	40186-462	Pivot Shaft	20	2	31030-462	Yoke Lock Pin
6	4	23131-113	Bushing	21	2	23918-629	Bearing
7	1	31029-462	Washer	22	1	40215-452	Bottom Feedwheel
8	3	21624-353	Bolt	23	1	24333-245	Chain Coupler Half
9	1	26737-207	Hydraulic Motor	24	1	24333-002	Roller Chain
10	1	30480-701	Motor Mount	25	1	24333-247	Chain Coupler Half
11	1	24264-753	Sprocket	26	1	26737-204	Hydraulic Motor
12	1	24132-103	Bushing	27	1	31387-462	Chain Coupler Cover
13	1	40182-452	Chain Guard	28	1	40216-452	Cleanout Door
14		24251-026	Roller Chain	29	2	21129-054	Door Clips

*REFER TO CHECK SHEET FIRST

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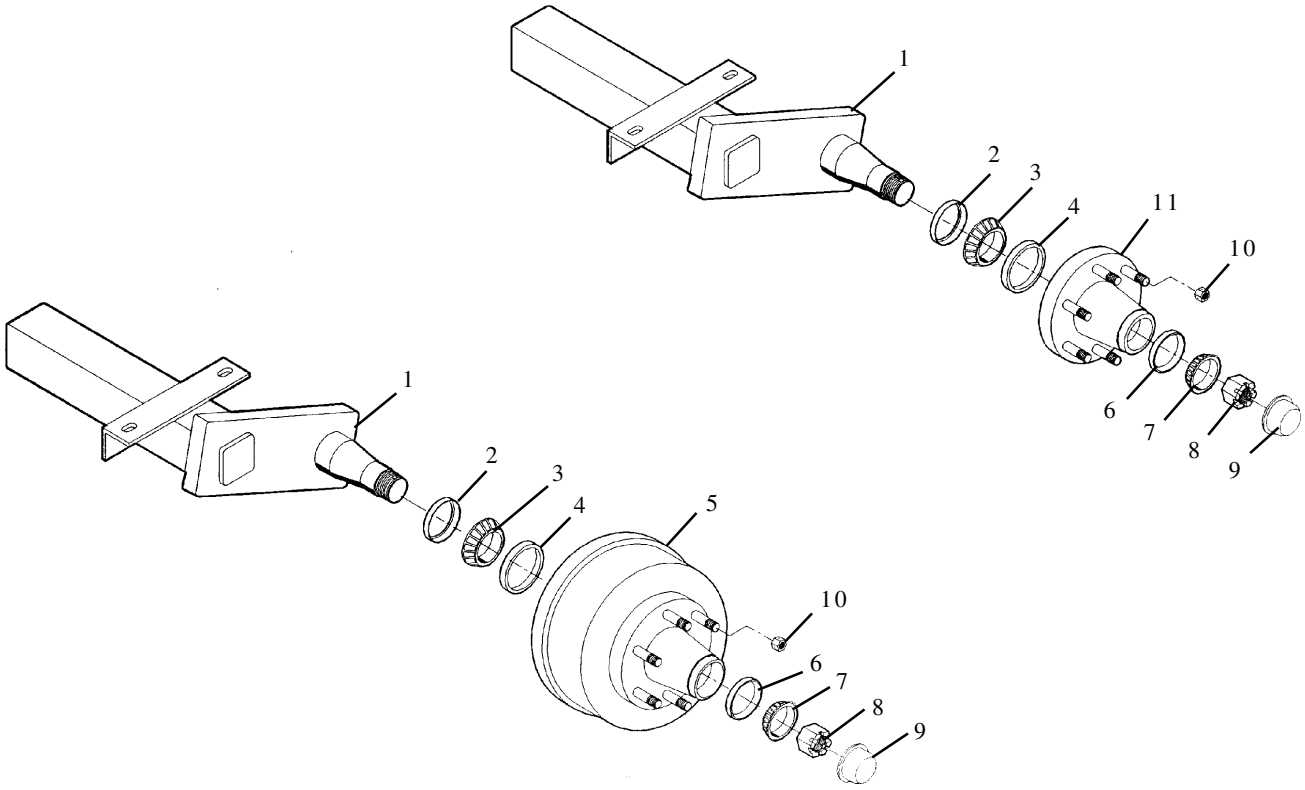
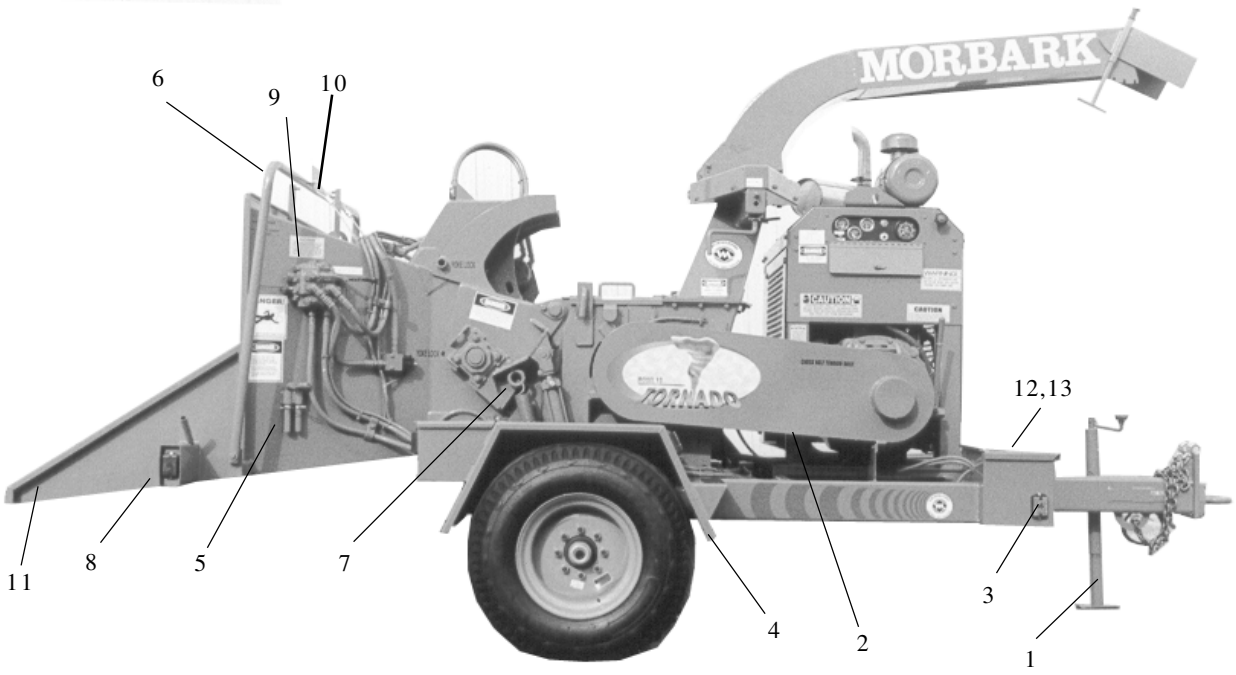
AXLE COMPONENTS



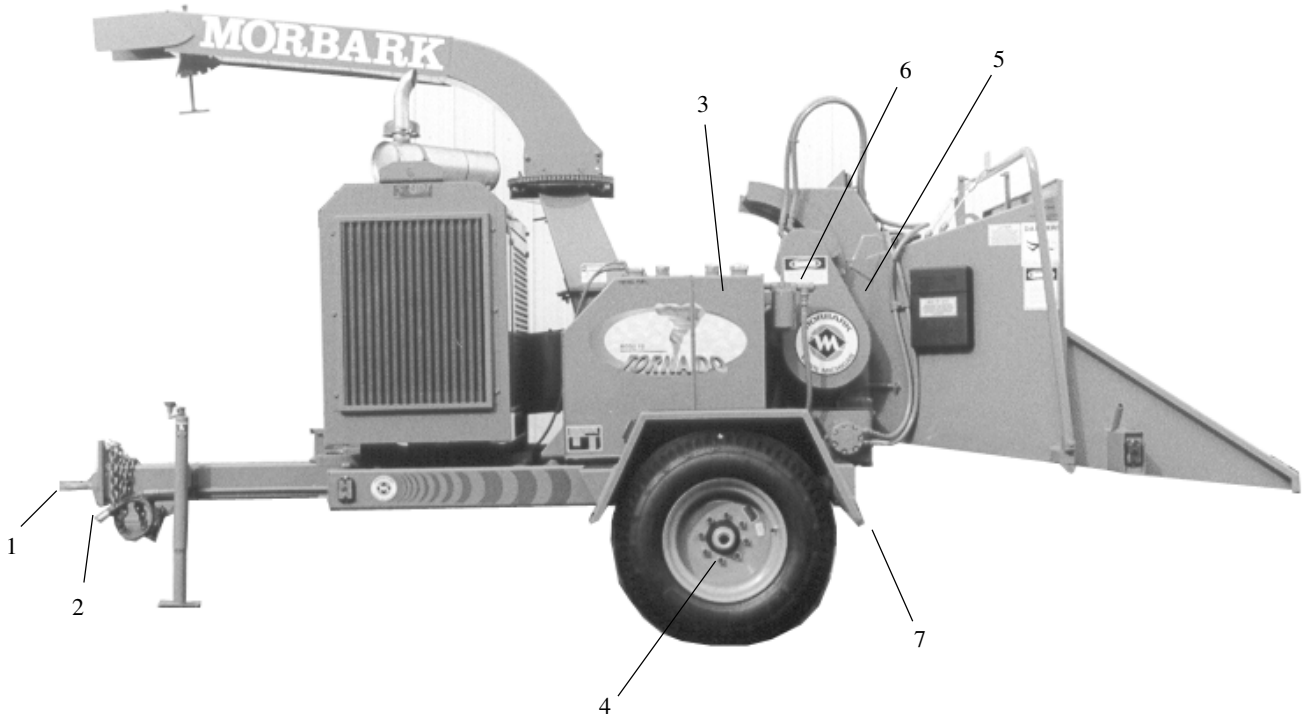
ITEM	QTY.	PART NO.	DESCRIPTION
1	1	29310-358	Axle Complete - Plain Hub
	1	29310-359	Axle Complete - Electric Brakes
	1	29310-360	Axle Complete Hydraulic Brakes
2	2	29311-866	Grease Seal
3	2	29311-865	Bearing Cone
4	2	29311-890	Bearing Cup
5	2	29310-431	Brake Drum (Includes Brg. Cups)
6	2	29311-889	Bearing Cup
7	2	29311-864	Bearing Cone
8	2	29310-120	Spindle Nut
9	2	29310-432	Dust Cap
10	12	29310-433	Wheel Nut
11	1	29310-374	Plain Hub (Includes Brg. Cups)

MISC. COMPONENTS



ITEM	QTY.	PART NO.	DESCRIPTION
1	1	29341-838	Jack
2	1	40253-452	Belt Shield
3	2	29316-053	Marker Light
4	1	40506-462	Fender
5	1	31030-462	Yoke Lock Pin
6	1	30403-452	Forward/Reverse Handle
7	2	24741-621	Yoke Spring
8	1	40479-462	Tail Light Kit
9	1	40587-926	Valve Bank
10	1	31170-462	Valve Bank Linkage (from valve)
10a	1	31167-462	Valve Bank Linkage (to forward/reverse handle)
11	1	40199-452	Infeed
12	1	29315-007	Battery Box (Plastic)
12a	1	40546-460	Lockable Battery Box
13	1	29315-021	Battery

MISC. COMPONENTS

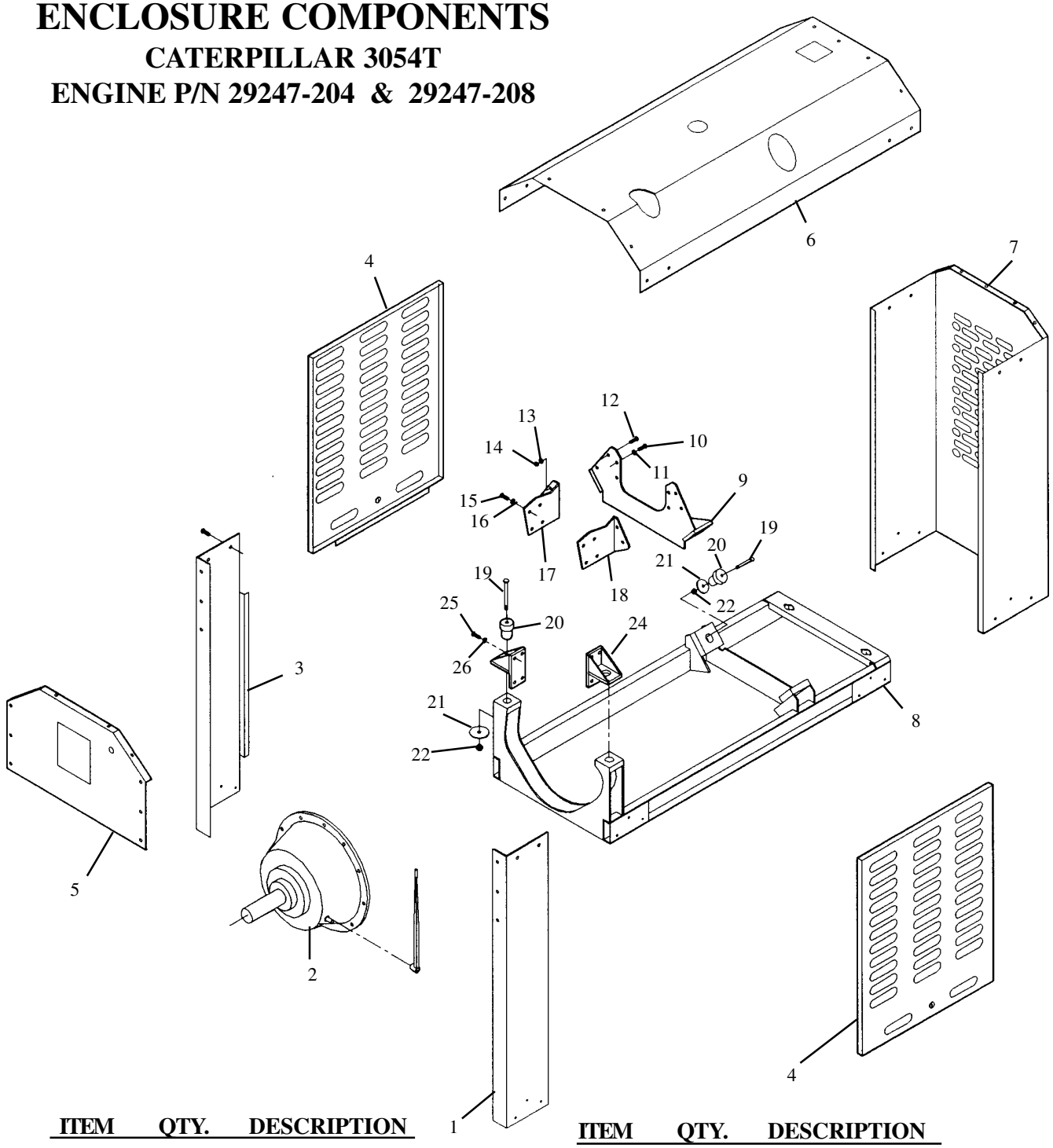


ITEM	QTY.	PART NO.	DESCRIPTION
1	1	29311-608	Lunet Ring
1 a	1	40208-460	2" Ball Hitch
2	1	40168-462	Safety Chain
3	1	40223-452	Hydraulic Tank/ Fuel Tank
4	2	29312-418	Tire & Rim (9.50 x 16.5)
5	1	40182-452	Chain Guard
6	1	26838-071	Hydraulic Filter
7	1	40506-462	Fender

ENCLOSURE COMPONENTS

CATERPILLAR 3054T

ENGINE P/N 29247-204 & 29247-208



ITEM	QTY.	DESCRIPTION
1	1	Right Rear Panel
2	1	Power Take-Off
3	1	Left Rear Panel
4	2	Side Panel
5	1	Rear Panel
6	1	Hood
7	1	Front Wrap
8	1	Base
9	1	Front Engine Mount Plate
10	4	Bolt
11	4	Lockwasher
12	4	Bolt
13	4	Bolt

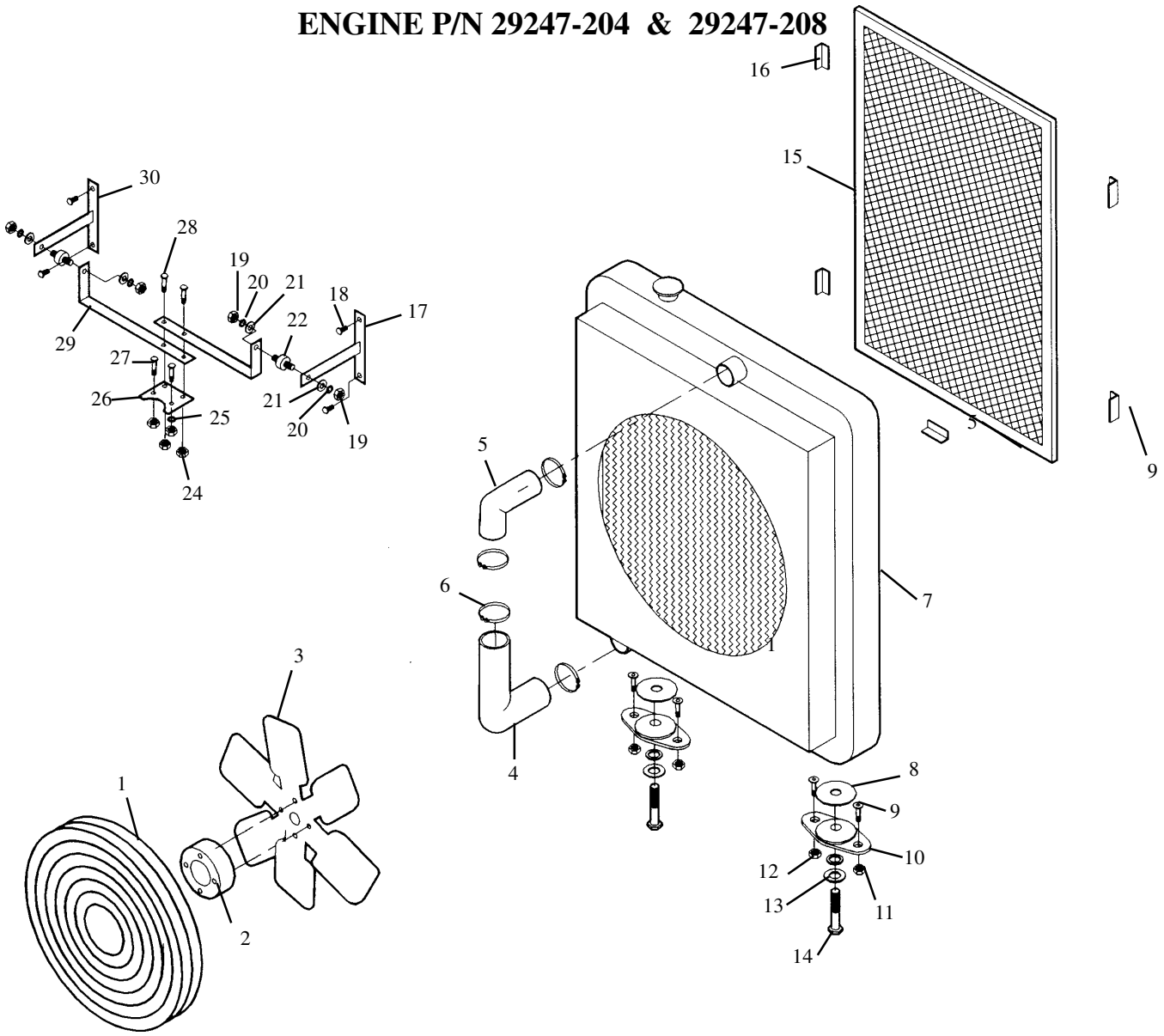
ITEM	QTY.	DESCRIPTION
14	4	Nut
15	8	Bolt
16	8	Lockwasher
17	1	L.H. Bracket
18	1	R.H. Bracket
19	4	Shock Mount Bolt
20	4	Shock Mount
21	4	Shock Mount Washer
22	4	Shock Mount Nut
23	4	Shock Mount Lockwasher
24	2	Rear Mount
25	8	Rear Mount Bolt
26	8	Rear Mount Lockwasher

*Note: Order by Engine s/n, & Item number/description requesting.

COOLING SYSTEM COMPONENTS

CATERPILLAR 3054T

ENGINE P/N 29247-204 & 29247-208

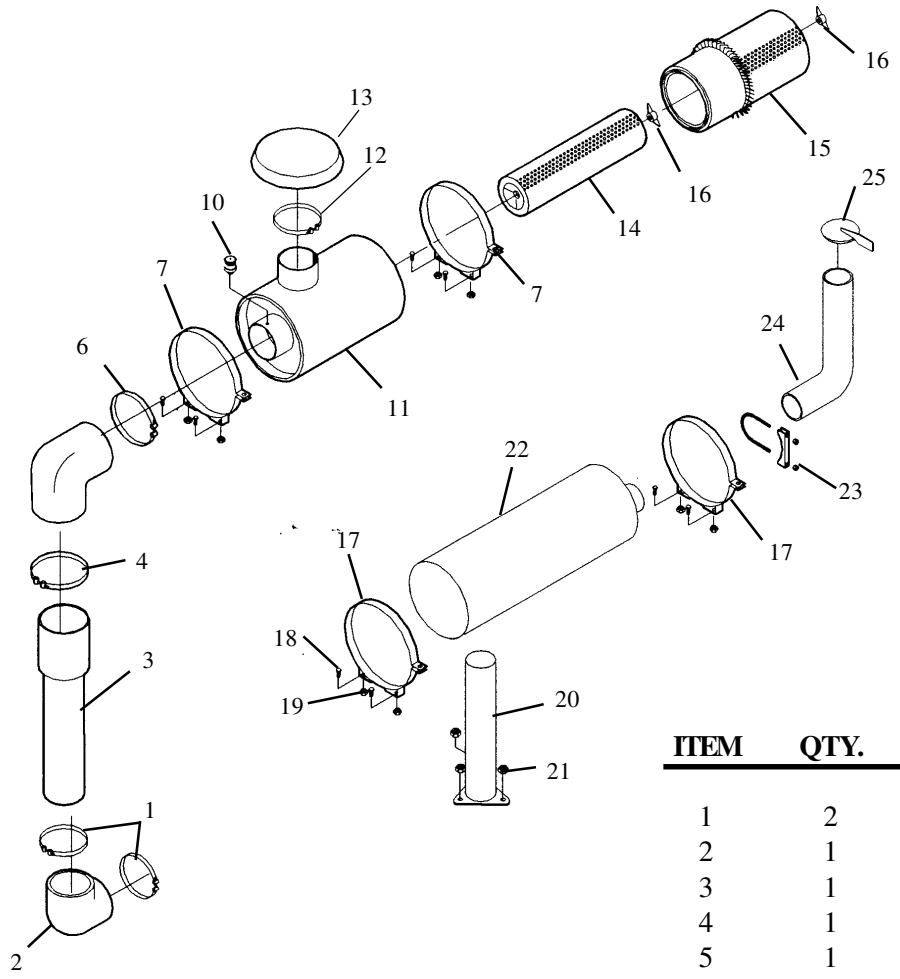


ITEM	QTY.	DESCRIPTION
1	1	Fan Guard
2	1	Fan Spacer
3	1	Sucker Fan
4	1	Lower Radiator Hose
5	1	Upper Radiator Hose
6	4	Hose Clamp
7	1	Radiator
8	2	Washer
9	4	Flat Head SSS
10	2	Shock Mount
11	4	Nut
12	2	Spacer
13	2	Washer
14	1	Bolt
15	1	Screen

ITEM	QTY.	DESCRIPTION
16	5	Screen Mount
17	1	R.H. "L" Bracket
18	4	Bolt
19	4	Nut
20	4	Lockwasher
21	4	Flat Washer
22	2	Radiator Isolators (Top)
23	1	R.H. Tee Bracket
24	2	Nut
25	1	Spacer
26	1	Mounting Bracket
27	2	Bolt
28	2	Bolt
29	1	L.H. Tee Bracket
30	1	L.H. "L" Bracket

INTAKE/EXHAUST COMPONENTS

CATERPILLAR 3054T
ENGINE P/N 29247-204

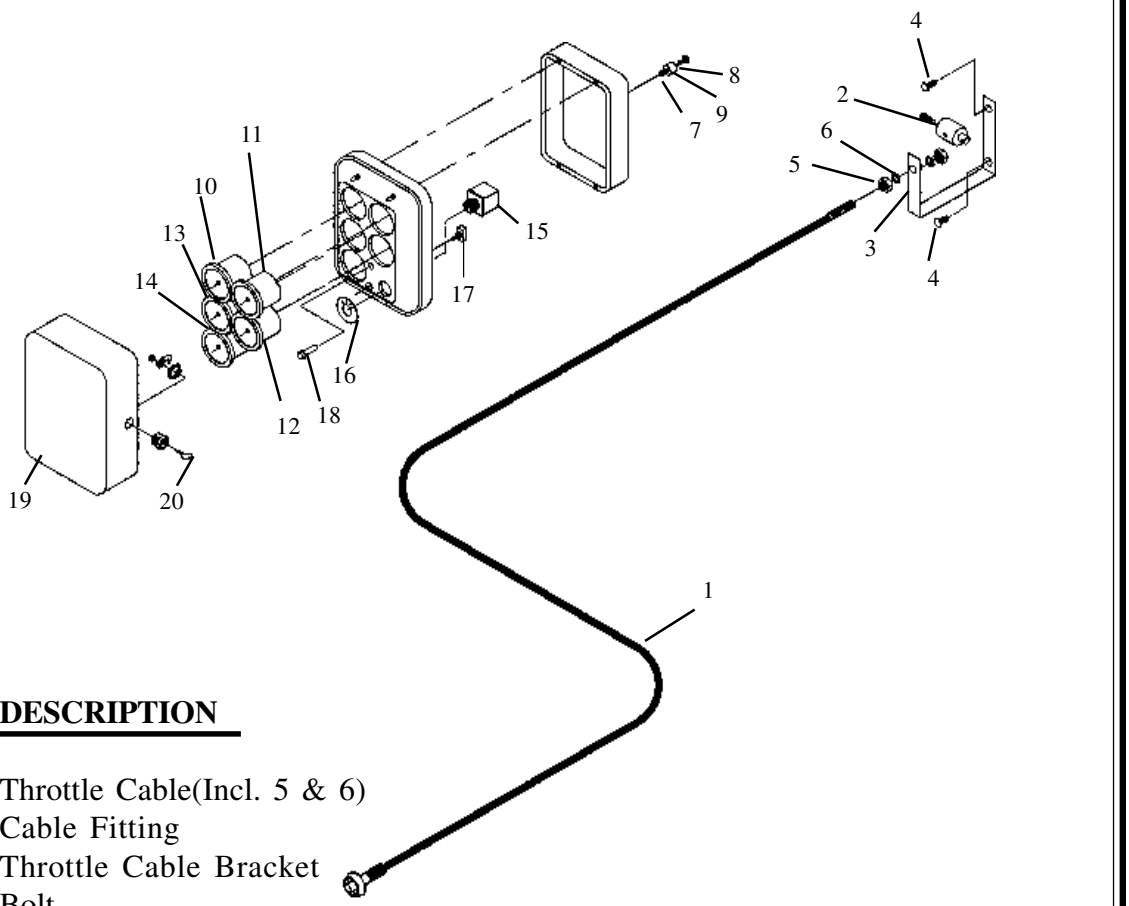


ITEM	QTY.	DESCRIPTION
1	2	T-Bolt Clamp
2	1	Elbow, 90°
3	1	Air Inlet Pipe
4	1	T-Bolt Clamp
5	1	Elbow, 90° Reducer
6	1	T-Bolt Clamp
7	2	Mounting Bands
8	4	Bolt
9	4	Lock Nut
10	1	Service Indicator
11	1	Air Cleaner Ass'y.
12	1	Worm Gear Clamp
13	1	Air Inlet Hood
14	1	Safety Element
15	1	Primary Element
16	2	Nut Assembly
17	2	Mounting Bands
18	4	Bolt
19	4	Bolt
20	1	Exhaust Pipe
21	3	Nut
22	1	Muffler
23	1	Clamp
24	1	90° Elbow
25	1	Rain Cap

GAUGE PANEL COMPONENTS

CATERPILLAR 3054T

ENGINE P/N 29247-208 & 29247-204



ITEM	QTY.	DESCRIPTION
1	1	Throttle Cable(Incl. 5 & 6)
2	1	Cable Fitting
3	1	Throttle Cable Bracket
4	2	Bolt
5	2	Nut
6	2	Lockwasher
7	4	Shock Mount
8	8	Nut
9	8	Lockwasher
10	1	Water Temperature Gauge
10a	1	Water Temperature Sender
11	1	Oil Pressure Gauge
11a	1	Oil Pressure Sender
12	1	Tachometer
13	1	Volt Meter
14	1	Hour Meter
15	1	Key Switch
15a	1	Key
16	1	Legend Plate
17	1	Permissive Overide Switch
18	1	15 Amp Fuse
18a	1	15 Amp Fuse Holder
19	1	Vandalism Door
20	1	Door Key Assembly

ENGINE COMPONENTS

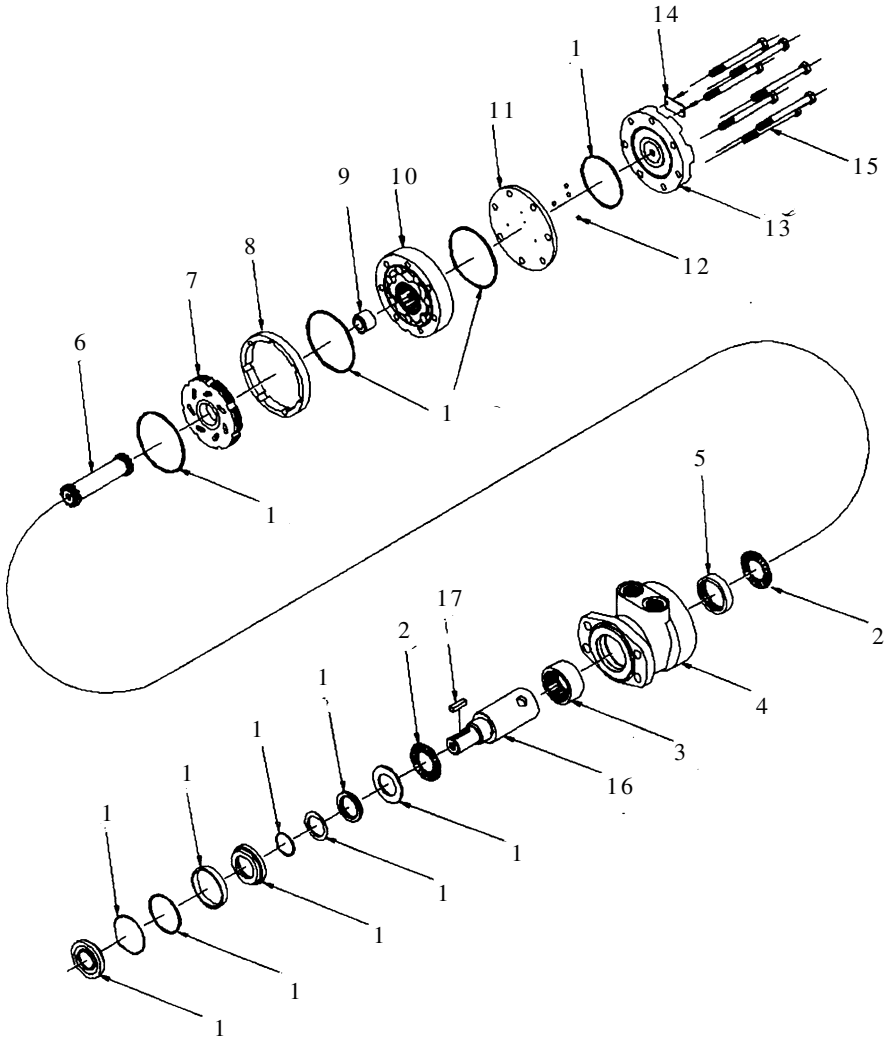
CUMMINS (4B)

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	29215-327	Fuel Filter
2	1	29215-326	Oil Filter
3	1	29321-295	Air Filter
4	1	29215-398	Oil Pressure Gauge
5	1	29215-382	Tachometer
6	1	29215-401	Voltmeter
7	1	29215-399	Water Temperature Gauge
8	1	29215-458	Throttle Cable
9	1	29215-404	Ignition Switch
10	1	29215-405	Ignition Key
11	1	29323-063	Muffler (4B)
11a	1	29323-064	Muffler (4BT, 4BTA)
12	1	29323-917	Tail Pipe (4B)
12a	1	29323-711	Rain Cap (4BT, 4BTA)
13	1	29215-328	Water Separator Filter
13a	1	29316-226	Override Switch
14	1	29215-393	Water Temperature Sending Unit
15	1	29215-400	Hour Meter
16	1	29215-454	Oil Pressure Shut Down
17	1	29215-483	Tach Probe

JOHN DEERE (4045D) (4045T)

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	29229-572	Fuel Filter
2	1	29229-571	Oil Filter
3	1	29321-288	Air Filter
4	1	29229-330	Oil Pressure Gauge
5	1	29230-051	Tachometer/Hour Meter
6	1	29229-389	Amp Gauge
7	1	29215-399	Water Temp. Gauge
8	1	29229-581	Throttle Cable
9	1	29229-334	Ignition Switch
10	1	29229-335	Ignition Key
11	1	29229-460	Muffler
12	1	29323-710	Rain Cap
13	1	29316-226	Override Switch

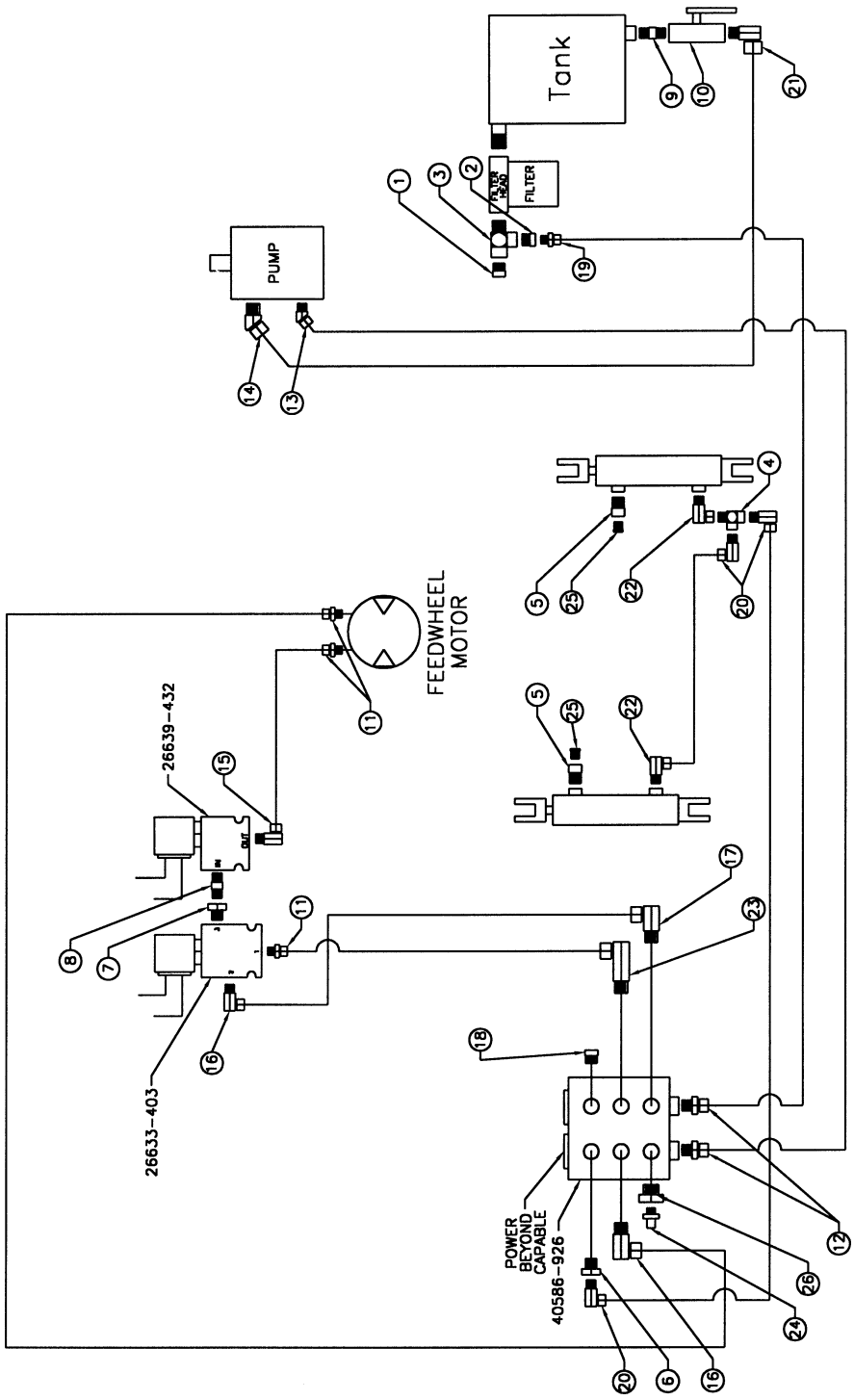
HYDRAULIC MOTOR COMPONENTS



ITEM	QTY.	PART NO.	DESCRIPTION
1	1	26737-210	Dust Seal
2	1	26737-712	Thrust Bearing
3	1	26737-713	Front Housing Bearing
4	1	26737-212	Housing
5	1	26737-715	Rear Housing Bearing
6	1	26737-213	Drive Link
7	1	26737-214	Reverse Manifold
8	1	26737-215	Manifold Boot
9	1		Drive Link Spacer
10	1	26737-216	Standard Rotor
11	1	26737-217	Balance Plate
12	1	26737-218	Steel Ball
13	1	26737-219	Endcover
14	1		Tag
15	1	26737-220	Bolt Set
16	1	26737-221	Shaft
17	1	26737-725	Key

HYDRAULIC SCHEMATIC

1.)	25311-005
2.)	25312-010
3.)	25316-105
4.)	25436-202
5.)	25845-626
6.)	25845-629
7.)	25845-631
8.)	25892-311
9.)	25892-312
10.)	25975-153
11.)	26511-010
12.)	26511-012
13.)	26511-031
14.)	26511-036
15.)	26511-045
16.)	26511-049
17.)	26511-053
18.)	26511-074
19.)	26511-210
20.)	26511-243
21.)	26511-254
22.)	26511-269
23.)	26511-776
24.)	26538-418
25.)	26849-072
26.)	31028-901



REPLACEMENT PARTS ORDER RECORD

PART NAME	PART NO.	QUANTITY ORDERED	EXPECTED DELIVERY DATE	

*REFER TO CHECK SHEET FIRST

WARRANTY