

# FERRI



## *Owner's Manual* *ZMT Offset / In-line* *Verge Mowers* **Maintenance & Use**



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## 1 GENERAL INFORMATION

1.1 This operation and maintenance manual is intended for the professional user. It is mandatory to follow these instructions in order to prevent situations that could endanger the operator's and other people's safety, and to ensure the correct functioning of the shredder. If you have questions, call "FERRI" after-sales service or a specialized "FERRI" dealer.

### 1.2 Identifying the Machine

Each shredder has an identification plate attached; the data necessary to identify the model and the serial number to order spare parts or after-sales service are both stamped on the plate (see Figure 1)

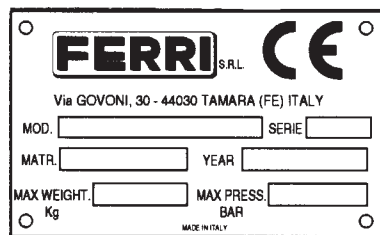
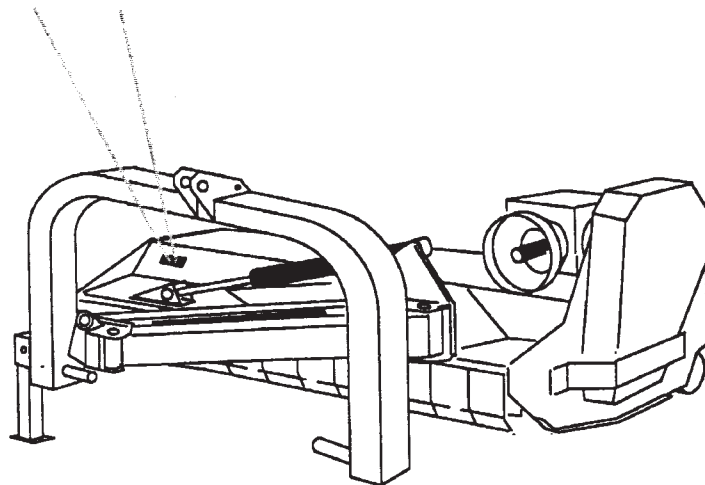


Figure 1



1.3 It is strongly recommended to use genuine "FERRI" spare parts to avoid altering the technical features of the shredder. "FERRI" is not responsible for any damage or injuries to people due to unauthorized modifications or to the use of non-genuine spare parts.

## 2 TECHNICAL FEATURES

2.1 FERRI shredders have been designed to shred materials growing or laying on the ground, e.g. grass, bushes, sticks and shrubs up to .8" diameter (proper use). Any other use is considered improper and the manufacturer disclaims all responsibility for any consequential injuries to people or for damage to the machine. "Proper use" also refers to the safety and maintenance rules provided by the manufacturer.

### Technical Names (Figure 2)

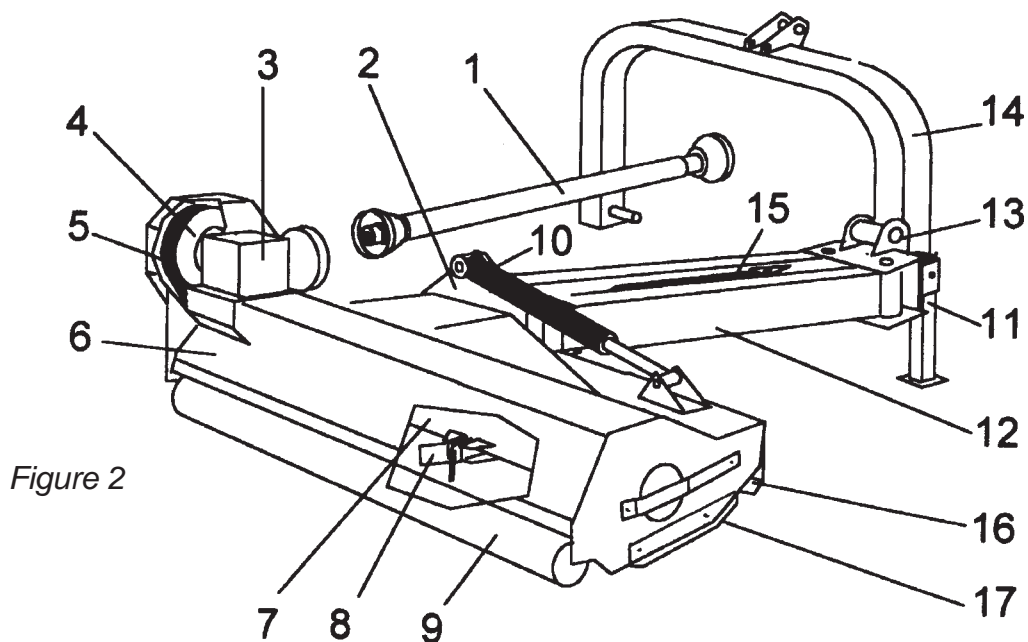


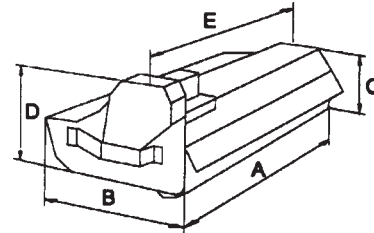
Figure 2

- |                                 |                               |
|---------------------------------|-------------------------------|
| 1 - PTO Shaft                   | 10 - Ram To Adjust Flail Head |
| 2 - Levers To Adjust Flail Head | 11 - Stand                    |
| 3 - Gearbox                     | 12 - Arms For Side Movement   |
| 4 - Pulleys                     | 13 - Joint Pin                |
| 5 - Belts                       | 14 - 3-Point Linkage          |
| 6 - Frame                       | 15 - Ram For Side Movement    |
| 7 - Rotor                       | 16 - Front Guard              |
| 8 - Flails                      | 17 - Side Guard               |
| 9 - Roller                      |                               |

This machine is in conformity with the following provisions of law:

- Directive Machine 89/392/CEE and following additions: 91/368/CEE, 93/44/CEE and 93/68/CEE;
- Regulations UNI EN 292/1 and 292/2 (machinery safety);
- DPR 27th April'1955, N. 547 (Rules for the prevention of industrial accidents).

## 2.2 Technical Specifications (Table 1)



**Table 1**

Model		ZMT 160	ZMT 180	ZM T200
Width of cut	ft.	63"	71"	79"
Min. Tractor required power	HP	50 - 60	60 - 70	70 - 80
Min. Tractor Weight		4818	5256	5694
PTO speed	rpm	540	540	540
Max. Absorbed Power*	HP	32	52	52
Weight Machine / Weight PTO Shaft	lbs.	984 / 53	1178 / 53	1237 / 53
3-point linkage	cat.	II - III	II - III	II - III
Rotor Speed	rpm	2430	2510	2510
Multi-Use Flails	num.	40	48	48
Hammer Flails	num.	20	24	24
Max. Pressure	psi	2750	2750	2750
Dimensions				
A - Width	in.	63"	71"	79"
B - Length	in.	35"	37"	37"
C - Height	in.	17"	19"	19"
D - Total Height	in.	26"	28"	28"
E - Total Width	in.	70"	77"	85"

\* When the absorbed power exceeds the maximum power indicated in Table 1 it is recommended to use a PTO clutch (torque limiter).

## 2.3 Noise

The sound level of this machine, as measured at the operator's position, ranges from 75 dB to 77.2 dB when the cab is closed, and from 81.9 to 83.4 dB when the rear window is open. The acoustic power level is LWA 102.5.

When the sound level perceivable at the operator's position ranges from 85 dB and 90 dB, the use of ear protectors is recommended.

**2.4 Width of Cut** Figure 3 shows the width of cut of the shredder. Dimensions are shown in Table 2.

Figure 3

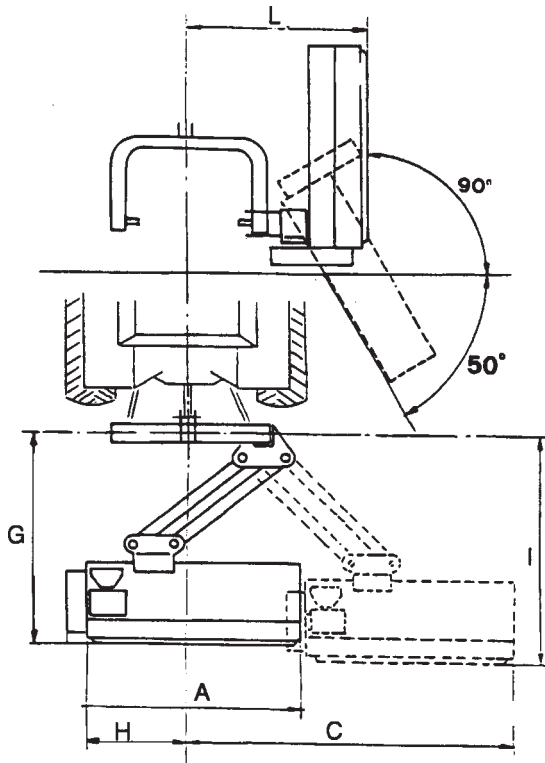


Table 2

Model	ZMT 160	ZMT 180	ZMT 200
A	63"	71"	79"
C	88"	96"	104"
G	73"	76"	76"
H	25"	25"	25"
I	69"	72"	72"
L	63"	63"	63"

## 2.5 Optional Equipment

### 2.5.1 Flails

Depending on the different crops to be cut, suitable flails can be fitted and used:

- Articulated flails for grass, shrubs, sticks and bushes of up to 1.2" in diameter.
- Forged hammer blades for grass, twigs, shrubs, bushes up to 1.2" in diameter.



**3 GENERAL SAFETY RULES****3.1 General Safety Rules:**

- It is mandatory to read and follow the instructions from the use and maintenance manual before carrying out any operation or moving the shredder. Improper use or moving it improperly may seriously damage property and harm people.
- Both the operator and maintenance fitter must know the shredder well, especially regarding dangers resulting from improper use or incorrect repairs.
- Before starting, check the tractor and shredder in regards to functionality, road safety and accident prevention rules.
- Even when using the shredder correctly, stones or other objects may be thrown a long distance. Therefore, nobody should be standing within the danger area. Special attention must be paid when working near roads or buildings.
- Use tractor with cabs.
- The condition of flails and of all guards must be checked before beginning the daily work. They must be replaced if damaged or missing.
- During checks or repairs, make sure nobody can start the shredder by mistake.
- Never wear loose or fluttering clothes.
- Never carry passengers on the tractor.
- Never carry passengers on the shredder.
- Never engage the PTO with the engine stopped.
- Never approach the shredder until the rotor has completely stopped.
- Do not enter the working zone of the PTO shaft while it is in motion. It is dangerous to approach the rotating parts of the machine.
- Keep the PTO shaft guard in good working order.
- Before starting, check the surrounding area for the eventual presence of children and or animals.
- **DO NOT** stand in the range of operation of the machine.
- The PTO shaft must be assembled and disassembled only with the engine is stopped and the ignition key removed.
- Before connecting the power take-off, check that the speed and rotation direction corresponds to those of the shredder.
- Before leaving the tractor with the shredder attached, proceed as follows:
  1. Disconnect the power takeoff.
  2. Put the machine firmly on the ground (with the hydraulic lift).
  3. Apply the hand brake and if the ground is sloping steeply, wedge the tractor wheels.
  4. Take the ignition key out.
- Immediately replace any safety sign or missing, damaged decal.



## 3.2 Safety Rules Concerning the Hydraulic System

- This shredder uses the hydraulic circuit of the tractor to carry out side movements and to adjust the flail head; the pressure of such system must not exceed 190 BAR.
- Mark the different pipes to avoid reversal of operation.

**IMPORTANT:** Do not look for oil leaks with bare hands, but always while wearing gloves or with a cloth. Oil under strong pressure may seep into the skin causing serious infections. In this case contact a doctor immediately.

- Periodically check the flexible hoses; if they are worn or damaged they must be replaced with others of the same specification.
- Before working on the hydraulic system, lower the machine, take pressure out and stop the tractor.
- Used oils and greases must be stored and disposed of according to antipollution rules.

## 3.3 Safety Rules Concerning Road Traffic

- In transport, reduce speed, especially on bumpy roads. The weight of the shredder may render driving difficult and damage the shredder itself.
- Check that the levers which operate the hydraulic lift are locked to avoid the lowering of the machine during transport.
- When driving on public roads, respect all road rules in force. Never transport the shredder with the rotor moving, even for short distances.
- Lock the shredder with the appropriate chain.

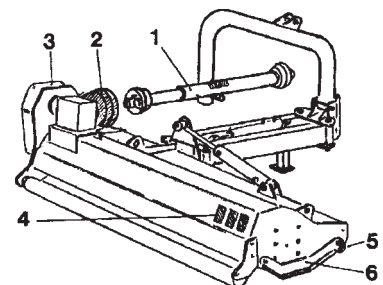
## 3.4 Safety Rules During Use

- Pay special attention, when working with the machine, not to touch fixed objects such as road drains, wells, shafts, curbs, guard rails, tracks, etc. This could cause the breakage of the flails, which can be thrown at very high speed.
- If wires, ropes or chains should get entangled in the rotor, stop immediately to prevent damage or a dangerous situation; stop the rotor and the tractor, take out the ignition key.  
Put working gloves on, clear the rotor with the aid of pliers or shears. Do not try to disentangle by inverting the rotational direction of the rotor.
- Do not use the machine when there is vibration in the flail head, as this could cause breakage and serious damage. Find the cause of the vibration and repair it.
- **Do not operate with the arm extended if the tractor is on a sloping ground.**

## 3.5 List of Guards Attached to The Shredder (Figure 4)

- 1 - PTO Shaft
- 2 - PTO Shaft Guard
- 3 - Belt Guard
- 4 - Danger and Warning Decals
- 5 - Front Guard
- 6 - Side Guard

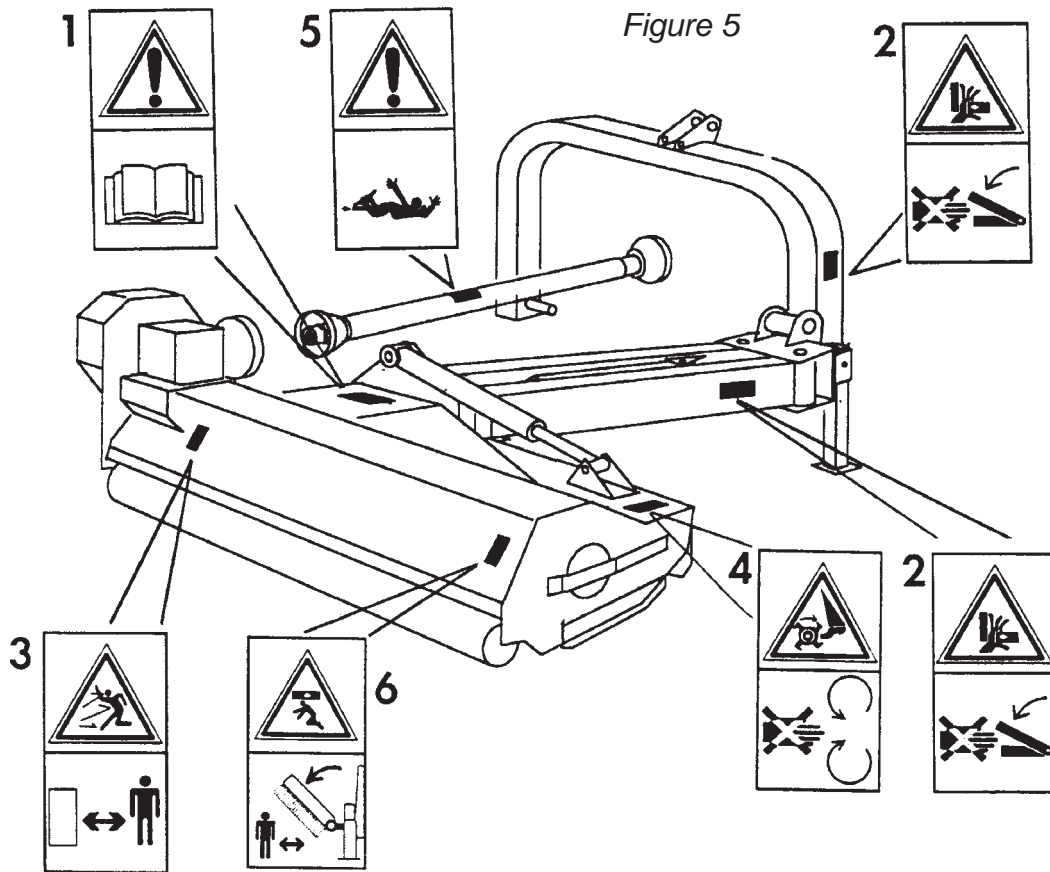
Figure 4





## 3.6 Description and Location of Safety Decals (Figure 5)

Carefully follow the instructions detailed on the decals.



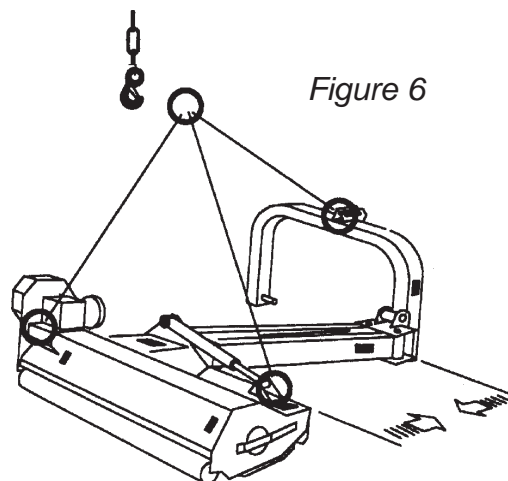
### Description of the Decals

1. Warning of danger through lack of knowledge of all the functions of the machine and the resulting risks: read the use and maintenance manual before operating the shredder.
2. Danger sign of crushing or shearing: do not put limbs in the moving parts of the machine where this decal is located.
3. Danger sign: it shows the risk of flying stones or other objects and it is mandatory to keep out of the danger zone.
4. Danger sign of rotating flails: do not enter the area of operation with hands or feet.
5. Danger of getting entangled: do not approach the rotating PTO shaft. Pay special attention to clothes which must not be loose or fluttering.
6. Danger of crushing: keep out of the danger zone. Before you make any adjustments or perform maintenance it is necessary to lock the hydraulic cylinders.

## 4. INSTRUCTIONS FOR INSTALLATION AND HANDLING

### 4.1 Lifting and Unloading

To handle the shredder use a hoist or a crane with lifting capability suitable to the weight of the machine (see Table 1) and with proper chains and type approved hooks attach them to the marked points, as shown in Figure 6.



### 4.2 Packing

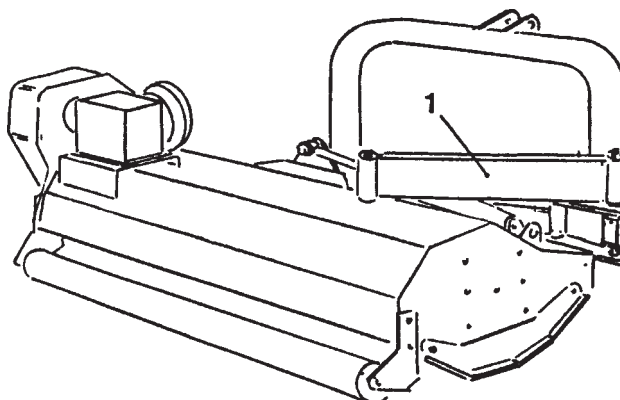
To make transport easier, the shredder can be supplied in a special pack (disassembled and on pallets).

In this case, a card showing the reassembling procedure will be attached to the Use and Maintenance Manual.

#### 4.2.1 Instructions For Assembly

Instructions for the assembly of the mower when it is shipped partially dismantled (Figure A).

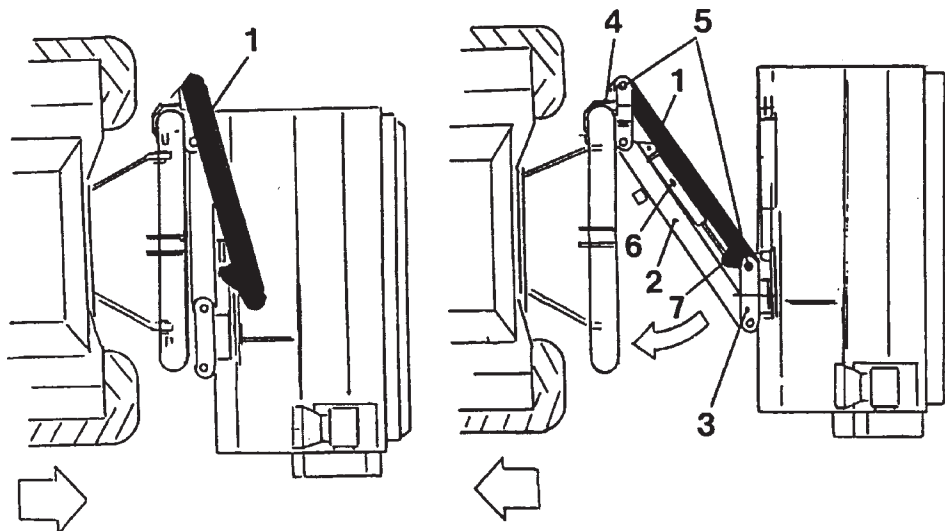
Figure A



In order to have the mower stable during the operations, hook the mower up to the shift of the tractor.

- Switch off the tractor.
- Cut the fixing strings used for transport reasons.
- Bring the arm (1) and put it on the ground.
- Turn the arm (2) around as shown on Figure B.
- Put the arm (1) on the proper support (3) & (4) and lock with threaded pins (5).
- Fix the cylinder (6) (rod side) with threaded pin (7).

Figure B



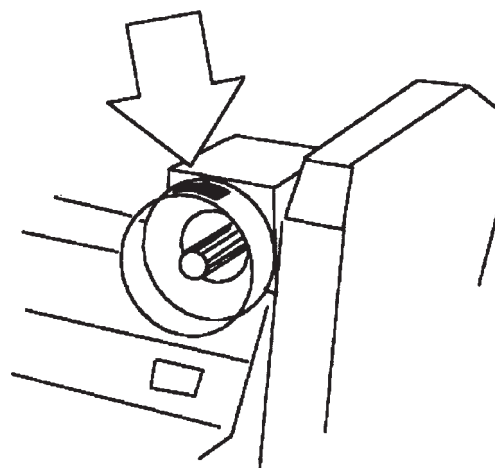
**WARNING: All Operations Must Be Done Without The PTO Shaft Mounted.**

### 4.3 Attachment to and Detachment from the Tractor

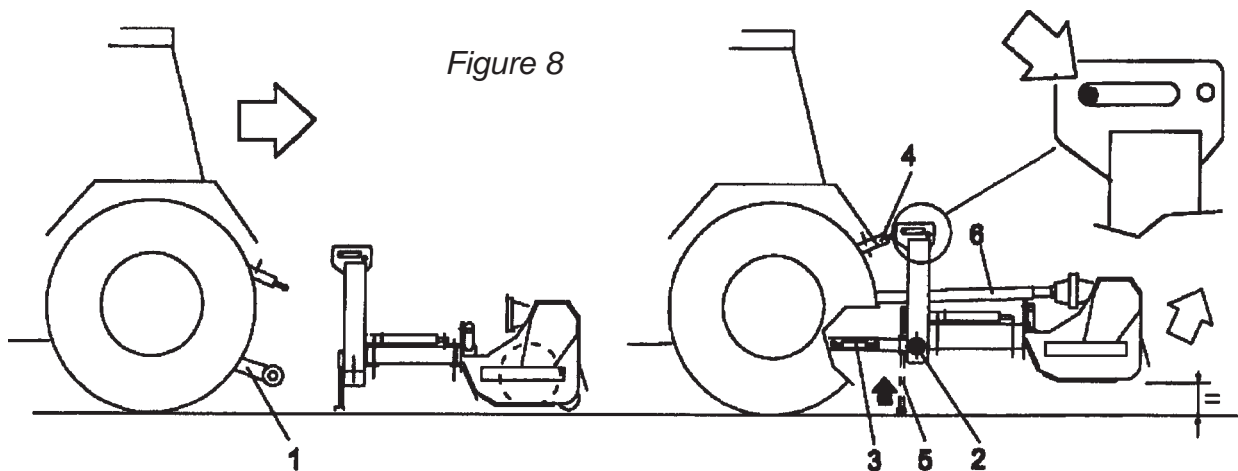
Before carrying out this operation and whenever the shredder is used, it is important to:

- Visually check the machine in general.
- Check that all guards are fitted and in good condition.
- Confirm that all flails are fitted and in good condition.
- Grease the bearings and any other part as indicated by a decal (Figure 21).
- Check that all hydraulic pipes are in good condition, look for signs of leakage beneath the machine.
- Check that the number of revolutions and the rotational direction of the power take off correspond to those required by the shredder (Figure 7).

Figure 7



- To attach the machine to the tractor (Figure 8), bring the tractor lower lines (1) near the shredder, to the points corresponding to the pins.
- Insert the pins (2) and secure them with the spring clips (3).
- Fit the top link (4) and adjust it at the limit of the slot side tractor (see Figure 8) in order to follow any small depression on the ground. Raise the shredder to a perpendicular position with the ground. Adjust the two tractor lower linkage stabilizers (3) thus fixing the machine to the tractor in a central position.
- Lift the stand (5).
- Connect the pipes for ram control to the tractor and mark them to avoid reversing them during assembly (see Figure 15).

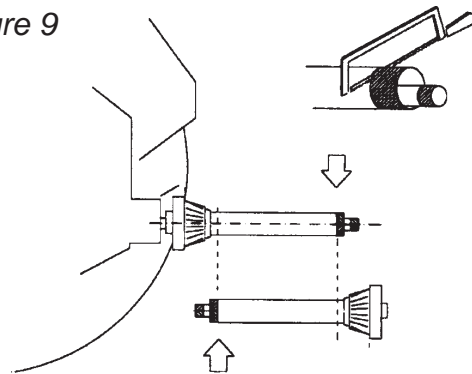


- Proceed in reverse order to detach the shredder from the tractor.

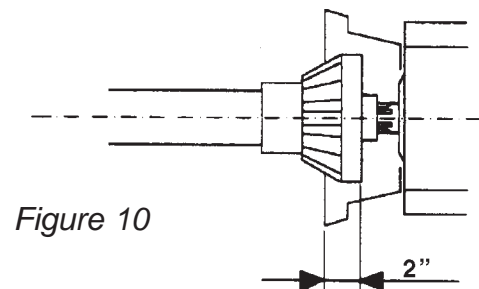
## 4.4 Fitting The PTO Shaft

**4.4.1** Following the instructions in 4.3, assemble the PTO shaft (6) and check that the overlap is not less than  $\frac{2}{3}$  of L. Be sure to keep a 1.6" backlash (Figure 8). If it needs shortening, proceed as in (Figure 9).

Figure 9

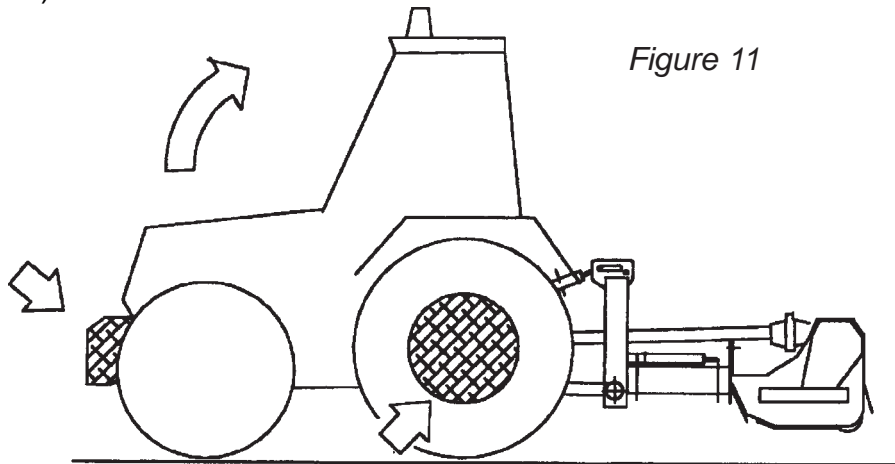


**4.4.2** The guards of the PTO shaft must be fixed to the shredder and to the tractor with chains to prevent rotation. The minimum overlap of the guard and the PTO shaft must not be less than 2" (Figure 10).



#### 4.5 Tractor Stability

Due to the design of the shredders and the work they do, it is essential to ensure tractor stability in order to eliminate any risk of an imbalance or overturning. Lift the shredder and check that the tractor's front tires do not lift up. In case they do, ballast the rear wheel of the tractor opposite to the extended arms and in front. (Figure 11).



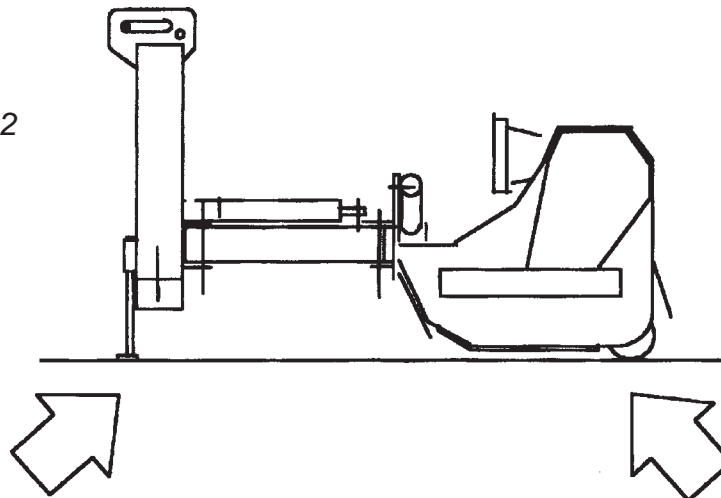
**IMPORTANT:**

- Never work with the extended arms when the tractor is on sloping grounds.
- During transport, the machine must be in the central position.

#### 4.6 Parking

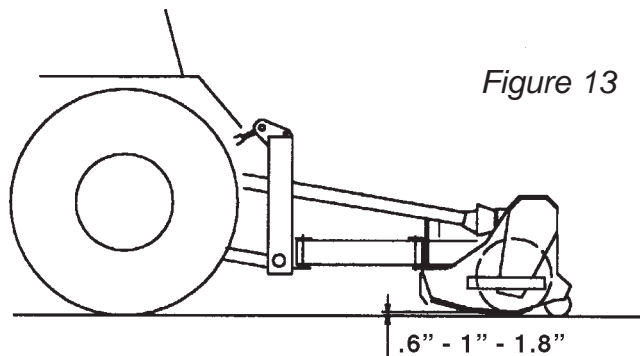
- Park the machine in a safe place, on flat and firm ground, in order to prevent the risk of rolling over.
- Lower the shredder to the ground with the aid of the hydraulic lift of the tractor. After lowering and blocking the stand, close the arms and lower the flail head to the ground (Figure 12).

Figure 12



## 5 ADJUSTMENT AND SETTING UP

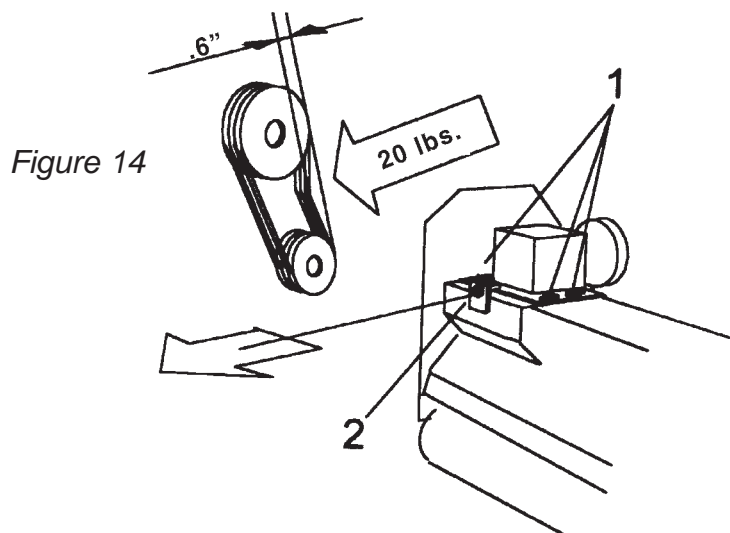
- 5.1 Adjustment of the height of cut is obtained by shifting the flail head roller in order to suit the material to be cut and the required degree of chopping (Figure 13).



**IMPORTANT:** Flails must never touch the ground.

## 5.2 **Adjusting belt tension**

This operation must be carried out with the shredder standing on the ground, the power takeoff disconnected and the ignition key removed. Remove the belts guard, loosen the 4 screws (1) fixing the gearbox, adjust the link (2) to obtain a belt deflection of no more than .6" with 10 lbs. of pressure applied (see Figure 14).



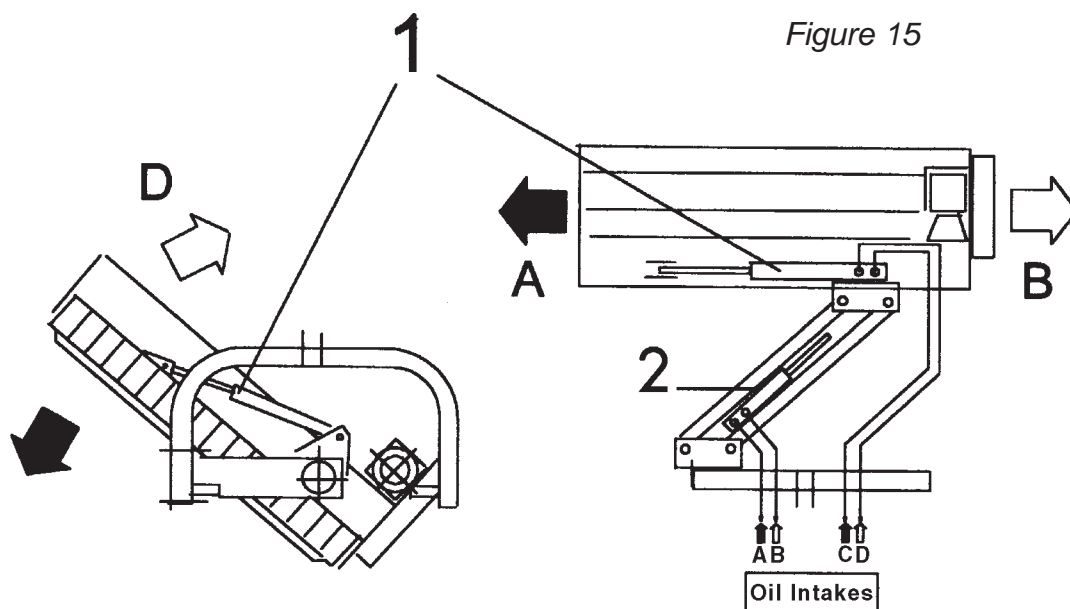
At the end of the operation, tighten the 4 screws (1) holding the gearbox and reassemble the belts guard.

## 6 USE AND OPERATING RULES

### 6.1 Ram control

6.1.1 The ram control levers of the shredder are placed inside the cab and are part of the shredder. This delivers the hydraulic power necessary to run the shredder.

- Ram (1) (Figure 15) controls the adjustment of the flail head.
- Ram (2) controls side movement of the flail head.



### 6.1.2 Controls with distributor (OPTIONAL)

For tractors equipped with just one pressure tube or when requested by the user, a distributor for ram control can be fitted to the shredder. This is also equipped with a floating position to control the ram (1) (Figure 15).

### 6.2 Starting

- Before using the shredder check the tightness of all bolts and the integrity of all guards. Check that the number of revolutions and the rotational direction of the power takeoff of the tractor correspond to those required by the shredder, see decal on the gearbox (Figure 7).
- Engage the power takeoff at low engine RPM (without jerking) to avoid damaging the transmission (gearbox and belts).



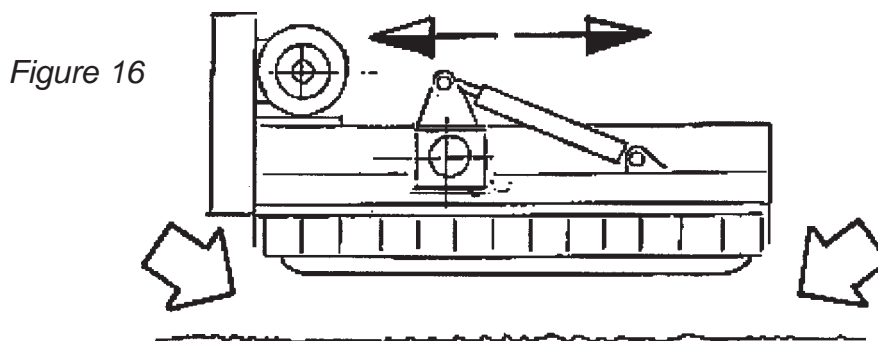
## 6.3 Working Mode

- 6.3.1 Adjust the machine to suit the type of work to be done and the material to be cut:
- Adjust the height of cut, as shown in Figure 13.

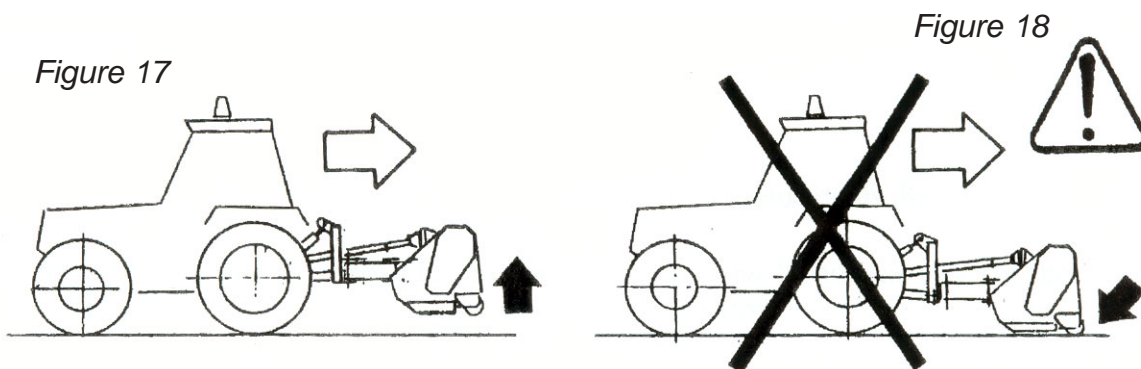
Working speed is chosen to suite the material to be cut and the degree of chopping required.

The optimum speed ranges from 2 to 5 miles per hour.

**IMPORTANT:** When extending and closing the arms, lightly lift the flail head off the ground, to avoid damage to the frame (Figure 16)



**IMPORTANT:** During reverse movement, lift the shredder off the ground to avoid damaging the machine (Figure 17 & 18)



## 6.4 Stopping

Before stopping the tractor:

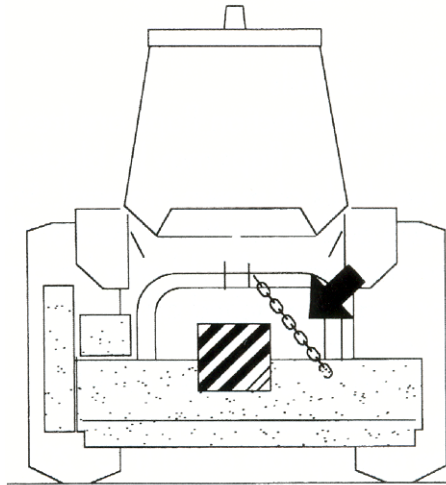
- Close the arms and lower the flail head to the ground.
- Disconnect the power takeoff.
- Stop the tractor, take out the ignition key and apply the hand brake.
- If the ground is sloping, block the tractor wheels.

**6.5 Transport Position**

For transport it is mandatory to:

- Observe all road transport requirements and fit the necessary warning signs (Figure 19).
- Secure the arm and the flail head with the appropriate chain, to prevent movement.

*Figure 19*



**IMPORTANT:** During transport reduce speed especially on bumpy roads. The weight of the shredder may render driving difficult and damage the machine itself. The power takeoff must be disconnected during transport.

## 7 MACHINE MAINTENANCE

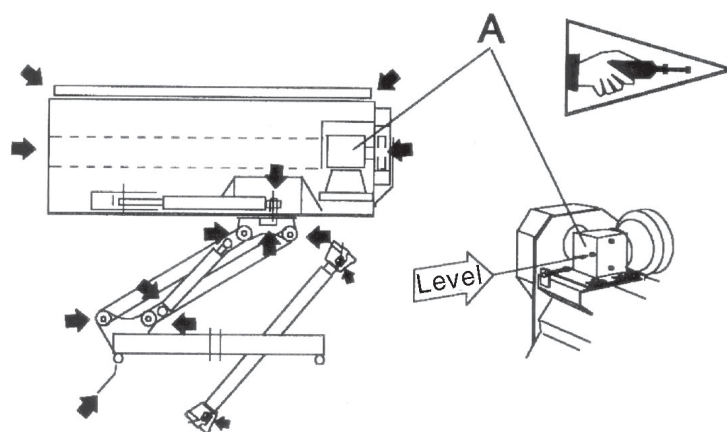
All maintenance, cleaning and repair operations must be carried out with the shredder firmly lowered to the ground and detached from the tractor, or with disconnected PTO, engine off and ignition key out.

After the first 2 hours of operation from new (or after fitting new belts), check belt tension.

Check regularly after every 8 hours' operation:

- Tighten bolts and nuts.
- Check wear and condition of flails.
- Check that the protection flaps may be blocked or damaged by the presence of mud and stones or residuals of mown material. Should this be the case stop the tractor immediately, clean and repair the protection flaps as necessary. Adjustments or maintenance work should only be carried out when the machine is stopped and the tractor engine is switched off.
- Check belt stretch and condition.
- Visually check the frame and arms to detect possible damage caused by earlier work.
- Check gearbox and extension lubricating levels.
- Grease the parts as shown on the appropriate decal (Figure 20).

Figure 20



This operation must always be carried out at the end of each working day. This facilitates the removal of mud or other material from the rotating parts (bearing, pins, etc.) in order to avoid rust and possible seizure.

- Every 100 hours' operation, grease the moving parts of the PTO shaft, extracting the two parts of the shaft.
- After long inactivity, repeat the operation before re-using the machine.
- Use grease such as AGIP GR MU EP/2 (classification DIN 51825 (KP 2 K)).

To fill oil to level, use:

- For gearbox use oil AGIP BLASIA 220 or compatible oils (classification ISO VG 220).
- Amount of oil (at level) ,5 quarts.

## 8. TROUBLE SHOOTING CHART

PROBLEM	CAUSE	FIX
<b>Irregular cut</b>	<ul style="list-style-type: none"> <li>• Worn, bent or broken flails</li> <li>• Machine is not level with the ground</li> <li>• Clogged material due to excessive working speed</li> </ul>	<ul style="list-style-type: none"> <li>• Replace</li> <li>• Level it by adjusting the flail head hydraulic ram</li> <li>• Reduce working speed</li> </ul>
<b>Machine noise</b>	<ul style="list-style-type: none"> <li>• Loose bolts</li> <li>• Cracks or initiation of flail head</li> </ul>	<ul style="list-style-type: none"> <li>• Tighten bolts</li> <li>• Have it repaired in specialized workshop</li> </ul>
<b>Gearbox noise</b>	<ul style="list-style-type: none"> <li>• Lack of oil</li> <li>• Worn gears</li> <li>• Worn bearings</li> </ul>	<ul style="list-style-type: none"> <li>• Fill to level</li> <li>• Replace</li> <li>• Replace</li> </ul>
<b>Vibration</b>	<ul style="list-style-type: none"> <li>• Broken or worn flails</li> <li>• Unbalanced rotor</li> <li>• Worn rotor bearings</li> </ul>	<ul style="list-style-type: none"> <li>• Replace</li> <li>• Have it replaced in authorized workshop</li> <li>• Have them replaced in authorized workshop</li> </ul>
<b>Premature flail wear</b>	<ul style="list-style-type: none"> <li>• Flails touching the ground</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust height of cut</li> </ul>
<b>Excessive backlash in the arms &amp; joints</b>	<ul style="list-style-type: none"> <li>• Worn pins</li> <li>• Worn arm sliding blocks</li> </ul>	<ul style="list-style-type: none"> <li>• Replace</li> <li>• Adjust</li> </ul>
<b>Flail head lowers involuntarily</b>	<ul style="list-style-type: none"> <li>• Worn glands in the rams</li> </ul>	<ul style="list-style-type: none"> <li>• Replace glands in authorized shop</li> </ul>
<b>Breakage of roller bearings</b>	<ul style="list-style-type: none"> <li>• Violent impact on the ground when the arm is lowered</li> <li>• Dirty or little greased bearings</li> </ul>	<ul style="list-style-type: none"> <li>• Lower it gently</li> <li>• Clean and grease</li> </ul>
<b>Belts overheating</b>	<ul style="list-style-type: none"> <li>• Flails touching the ground</li> <li>• Working speed unsuitable for amount of the material to cut</li> <li>• Belts slip on the pulleys</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust cut height</li> <li>• Reduce speed</li> <li>• Adjust belt tension</li> </ul>

## 9 REPLACING PARTS

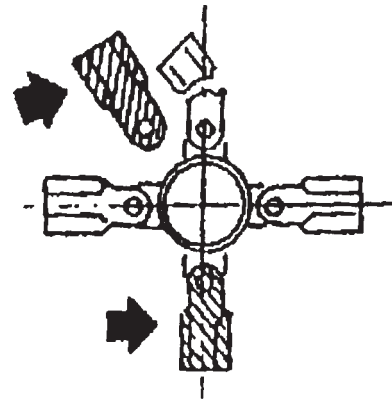
Before carrying out any work, it is mandatory to:

- Lower the shredder to the ground.
- Disconnect the power takeoff, stop the tractor and take out the ignition key.
- Wear working gloves.

Figure 21

### 9.1 Flail Replacement

When the flails are worn, they must all be replaced. In case of a partially broken flail it is advisable to replace the broken one and the one diametrically opposite, in order to maintain the balance (Figure 21).



### 9.2 Pipe Replacement

- Before working on the hydraulic system, bleed all pressure, working with the engine stopped and using all control levers.
- Pay particular attention to cleanliness as dirt and dust can cause considerable damage to the hydraulic system
- Replace any damaged pipes with genuine spare parts or with others of the same specification; ensure that they are not kinked or twisted, remembering to check this throughout the entire cycle of arm movement.

### 9.3 Pin Replacement

- Carry out this operation with the aid of a lift or hoist, to prevent detached component from falling, and also to avoid upsetting the balance of the machine.
- When replacing parts, clean and grease their housings.

### 9.4 Belt Replacement

This operation must be carried out with the flail head touching the ground, the power takeoff disconnected and the ignition key out.

- Remove the beltguard, loosen the screws (1) (Figure 14), unscrew the tightener (2), remove the belts and replace them with similar ones for dimensions and type. See 5.2 for registration.

**IMPORTANT** - More complex operations must be done in authorized workshops.

**10 DEMOLITION, DIFFERENTIATED DIVISION OF THE MATERIALS AND DISPOSAL**

If the machine is in need of disposal, all its parts that might be dangerous to the environment have to be made safe. The materials on the machine that have to undergo a differentiated division are:

- steel
- mineral oil
- rubber
- plastic
- electric system conductors

All the above modification operations and the final disposal have to be carried out in total respect of the present provisions of law on the subject.