TWOSE TSF35
SPREADER FEEDER

OPERATOR MANUAL

Publication 571 (Rev.19.09.12) *Part No.41571.71*

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Revisions

Jan. 2009	*First Issue*
07.01.11	*Revised*
14.11.11	*Revised*
19.09.12	*Revised*

IMPORTANT

VERIFICATION OF WARRANTY REGISTRATION

DEALER WARRANTY INFORMATION & REGISTRATION VERIFICATION

It is imperative that the selling dealer registers this machine with Twose of Tiverton Limited before delivery to the end user – failure to do so may affect the validity of the machine warranty.

To register machines go to the Twose web site at **www.twose.com**, log onto '**Dealer Inside**' and select the '**Machine Registration button**' which can be found in the Service Section of the site. Confirm to the customer that the machine has been registered in the section below.

Should you experience any problems registering a machine in this manner please contact the Twose Office on 01884 253691.

Registration Verification

Dealer Name: ……

Dealer Address: ……

Customer Name: ……

Date of Warranty Registration: ……/……/..…… Dealer Signature: ……

NOTE TO CUSTOMER / OWNER

Please ensure that the above section above has been completed and signed by the selling dealer to verify that your machine has been registered with Twose of Tiverton Limited.

IMPORTANT: During the initial 'bedding in' period of a new machine it is the customer's responsibility to regularly inspect all nuts, bolts and hose connections for tightness and re-tighten if required. New hydraulic connections occasionally weep small amounts of oil as the seals and joints settle in – where this occurs it can be cured by re-tightening the connection – *refer to torque settings chart below.* The tasks stated above should be performed on an hourly basis during the first day of work and at least daily thereafter as part of the machines general maintenance procedure.

TORQUE SETTINGS FOR HYDRAULIC FITTINGS

HYDRAULIC HOSE ENDS		
BSP	**Setting**	**Metric**
1/4"	18 Nm	19 mm
3/8"	31 Nm	22 mm
1/2"	49 Nm	27 mm
5/8"	60 Nm	30 mm
3/4"	80 Nm	32 mm
1"	125 Nm	41 mm
1.1/4"	190 Nm	50 mm
1.1/2"	250 Nm	55 mm
2"	420 Nm	70 mm

PORT ADAPTORS WITH BONDED SEALS		
BSP	**Setting**	**Metric**
1/4"	34 Nm	19 mm
3/8"	47 Nm	22 mm
1/2"	102 Nm	27 mm
5/8"	122 Nm	30 mm
3/4"	149 Nm	32 mm
1"	203 Nm	41 mm
1.1/4"	305 Nm	50 mm
1.1/2"	305 Nm	55 mm
2"	400 Nm	70 mm

WARRANTY POLICY

WARRANTY REGISTRATION

All machines must be registered, by the selling dealer with Twose of Tiverton Ltd, before delivery to the end user. On receipt of the goods it is the buyer's responsibility to check that the Verification of Warranty Registration in the Operator's Manual has been completed by the selling dealer.

1. LIMITED WARRANTIES

1.01. All machines supplied by Twose of Tiverton Ltd are warranted to be free from defects in material and workmanship from the date of sale to the original purchaser for a period of 12 months, unless a different period is specified.

1.02. All spare parts supplied by Twose of Tiverton Ltd and purchased by the end user are warranted to be free from defects in material and workmanship from the date of sale to the original purchaser for a period of 6 months. All parts warranty claims must be supported by a copy of the failed part invoice to the end user. We cannot consider claims for which sales invoices are not available.

1.03. The warranty offered by Twose of Tiverton Ltd is limited to the making good by repair or replacement for the purchaser any part or parts found, upon examination at its factory, to be defective under normal use and service due to defects in material or workmanship. Returned parts must be complete and unexamined. Pack the component(s) carefully so that any transit damage is avoided. All ports on hydraulic items should be drained of oil and securely plugged to prevent seepage and foreign body ingress. Certain other components, electrical items for example, may require particular care when packing to avoid damage in transit.

1.04. This warranty does not extend to any product from which Twose of Tiverton Ltd's serial number plate has been removed or altered.

1.05. This warranty does not apply to any part of the goods, which has been subjected to improper or abnormal use, negligence, alteration, modification, fitment of non-genuine parts, accident damage, or damage resulting from contact with overhead power lines, damage caused by foreign objects (e.g. stones, iron, material other than vegetation), failure due to lack of maintenance, use of incorrect oil or lubricants, contamination of the oil, or which has served its normal life. This warranty does not apply to any expendable items such as blades, belts, clutch linings, filter elements, flails, flap kits, skids, soil engaging parts, shields, guards, wear pads, pneumatic tyres or tracks.

1.06. Temporary repairs and consequential loss - i.e. oil, downtime and associated parts are specifically excluded from the warranty.

1.07. Warranty on hoses is limited to 12 months and does not include hoses which have suffered external damage. Only complete hoses may be returned under warranty, any which have been cut or repaired will be rejected.

1.08. Machines must be repaired immediately a problem arises. Continued use of the machine after a problem has occurred can result in further component failures, for which Twose of Tiverton Ltd cannot be held liable, and may have safety implications.

1.09. If in exceptional circumstances a non Twose of Tiverton Ltd part is used to effect a repair, warranty reimbursement will be at no more than Twose of Tiverton Ltd's standard dealer cost for the genuine part.

1.10. Except as provided herein, no employee, agent, dealer or other person is authorised to give any warranties of any nature on behalf of Twose of Tiverton Ltd.

1.11. For machine warranty periods in excess of 12 months the following additional exclusions shall apply:

1.11.1. Hoses, exposed pipes and hydraulic tank breathers.

1.11.2. Filters.

1.11.3. Rubber mountings.

1.11.4. External electric wiring.

1.11.5. Bearings and seals.

1.12. *All service work, particularly filter changes, must be carried out in accordance with the manufacturer's service schedule. Failure to comply will invalidate the warranty. In the event of a claim, proof of the service work being carried out may be required.*
1.13. *Repeat or additional repairs resulting from incorrect diagnosis or poor quality previous repair work are excluded from warranty.*

NB Warranty cover will be invalid if any non-genuine parts have been fitted or used. Use of non-genuine parts may seriously affect the machine's performance and safety. Twose of Tiverton Ltd cannot be held responsible for any failures or safety implications that arise due to the use of non-genuine parts.

2. REMEDIES AND PROCEDURES

2.01. *The warranty is not effective unless the Selling Dealer registers the machine, via the Twose of Tiverton Ltd web site and confirms the registration to the purchaser by completing the confirmation form in the operator's manual.*
2.02. *Any fault must be reported to an authorised Twose of Tiverton Ltd dealer as soon as it occurs. Continued use of a machine, after a fault has occurred, can result in further component failure for which Twose of Tiverton Ltd cannot be held liable.*
2.03. *Repairs should be undertaken within two days of the failure. Claims submitted for repairs undertaken more than 2 weeks after a failure has occurred, or 2 days after the parts were supplied will be rejected, unless the delay has been authorised by Twose of Tiverton Ltd. Please note that failure by the customer to release the machine for repair will not be accepted as a reason for delay in repair or submitting warranty claims.*
2.04. *All claims must be submitted, by an authorised Twose of Tiverton Ltd Service Dealer, within 30 days of the date of repair.*
2.05. *Following examination of the claim and parts, Twose of Tiverton Ltd will pay, at their discretion, for any valid claim the invoiced cost of any parts supplied by Twose of Tiverton Ltd and appropriate labour and mileage allowances if applicable.*
2.06. *The submission of a claim is not a guarantee of payment.*
2.07. *Any decision reached by Twose of Tiverton Ltd is final.*

3. LIMITATION OF LIABILITY

3.01. T*wose of Tiverton Ltd disclaims any express (except as set forth herein) and implied warranties with respect to the goods including, but not limited to, merchantability and fitness for a particular purpose.*
3.02. *Twose of Tiverton Ltd makes no warranty as to the design, capability, capacity or suitability for use of the goods.*
3.03. *Except as provided herein, Twose of Tiverton Ltd shall have no liability or responsibility to the purchaser or any other person or entity with respect to any liability, loss, or damage caused or alleged to be caused directly or indirectly by the goods including, but not limited to, any indirect, special, consequential, or incidental damages resulting from the use or operation of the goods or any breach of this warranty. Notwithstanding the above limitations and warranties, the manufacturer's liability hereunder for damages incurred by the purchaser or others shall not exceed the price of the goods.*
3.04. *No action arising out of any claimed breach of this warranty or transactions under this warranty may be brought more than one (1) year after the cause of the action has occurred.*

4. MISCELLANEOUS

4.01. *Twose of Tiverton Ltd may waive compliance with any of the terms of this limited warranty, but no waiver of any terms shall be deemed to be a waiver of any other term.*
4.02. *If any provision of this limited warranty shall violate any applicable law and is held to be unenforceable, then the invalidity of such provision shall not invalidate any other provisions herein.*
4.03. *Applicable law may provide rights and benefits to the purchaser in addition to those provided herein.*

DECLARATION OF CONFORMITY

Conforming to EU Machinery Directive 2006/42/EC

We,

TWOSE of TIVERTON LIMITED,
6 Chinon Court, Lower Moor Way,
Tiverton Business Park, Tiverton, Devon, EX16 6SS, UK

Hereby declare that:

The Product; *Tractor Trailed Spreader Feeder*

Product Code; *TWSP*

Serial No. & Date …… Type ……

Manufactured in; *United Kingdom*

Complies with the required provisions of the Machinery Directive 2006/42/EC
The machinery directive is supported by the following harmonized standards;

- BS EN ISO 12100 (2010) Safety of machinery – General principles for design – Risk assessment and risk reduction.
- BS EN 349 (1993) + A1 (2008) Safety of machinery - Minimum distances to avoid the entrapment with human body parts.
- BS EN 953 (1997) + A1 (2009) Safety of machinery - Guards general requirements for the design and construction of fixed and movable guards.
- BS EN 4413 (2010) Hydraulic fluid power. Safety requirements for systems and their components.

Signed …….. *Responsible Person*
CHRISTIAN DAVIES on behalf of TWOSE OF TIVERTON LIMITED

Status: *General Manager* Date: *September 2015*

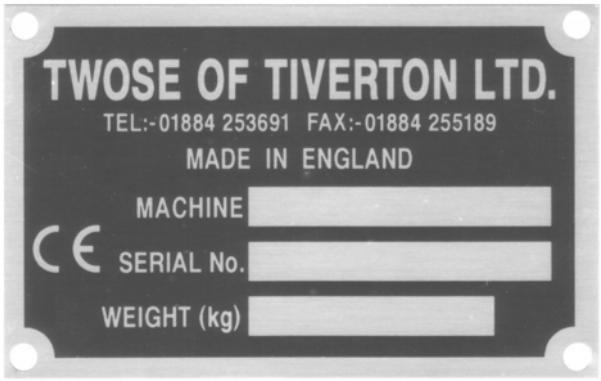
LIST OF CONTENTS

TECHNICAL DATA

SPECIFICATIONS	TSF35
Number of Rotors	*1*
Chamber Width	*1.55m*
Side Discharge Height - Barrier	*2.38m*
Chute Height (Max)	*3.66m*
Chute Rotation	*300°*
Overall Width (Chute Closed)	*2.09m*
Overall Width (Chute Raised)	*n/a*
Overall Height (Max)	*3.7m*
Overall Height (Min)	*2.9m*
Overall Length (Tailgate Up)	*4.09m*
Overall Length (Tailgate Down)	*5.46m*
Maximum Round Bale Diameter	*1.83m*
Maximum Rectangular Bale Size	*1.3m x 1.2m x 2.5m*
Tyre Size (Standard Tyres)	*10.75 15.3 Six Stud*
Wheel Track (Standard Tyres)	*1.8m*
Weight	*2400kg*
Volume of Clamp Silage	*2.5m³*
Hydraulic Oil Pressure (Max)	*220bar*
Hydraulic Oil Flow (Max)	*60 litres/minute*
Hydraulic Oil Flow (Min)	*30 litres/minute*
Maximum Drawbar Load	*650Kg*
Minimum Tractor Size	*45kw (60HP)*
Noise Level	*95dbA*

MACHINE SERIAL NUMBER PLATE

All machines will have a serial number plate fitted to them stating; the machine model, serial number of the machine, and the machine's weight. When ordering replacement parts or requesting service information always quote the machine model and serial number as stated on its serial number plate.

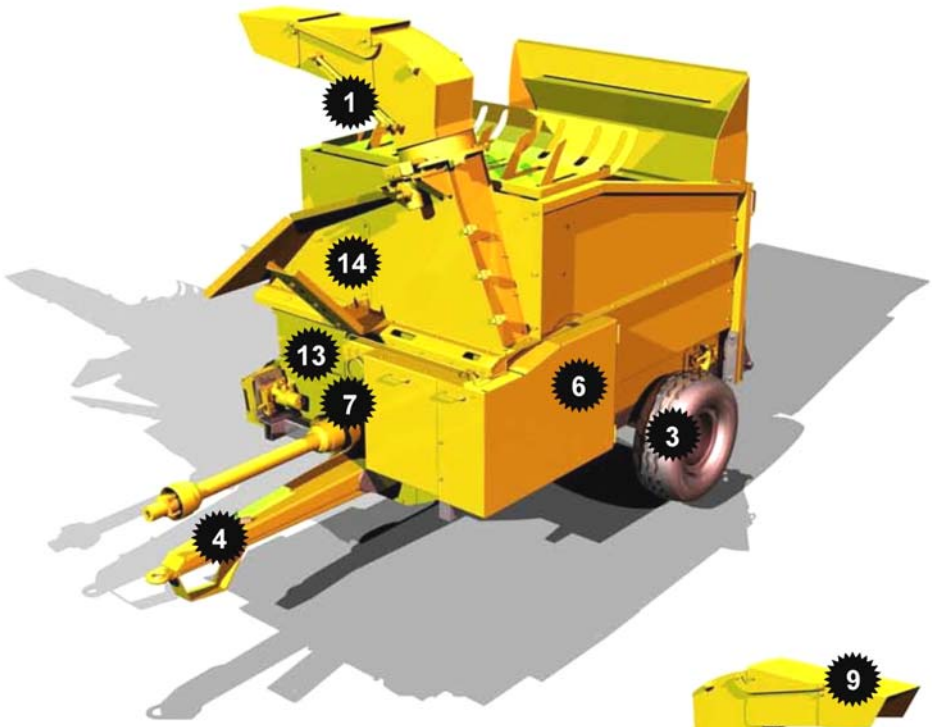


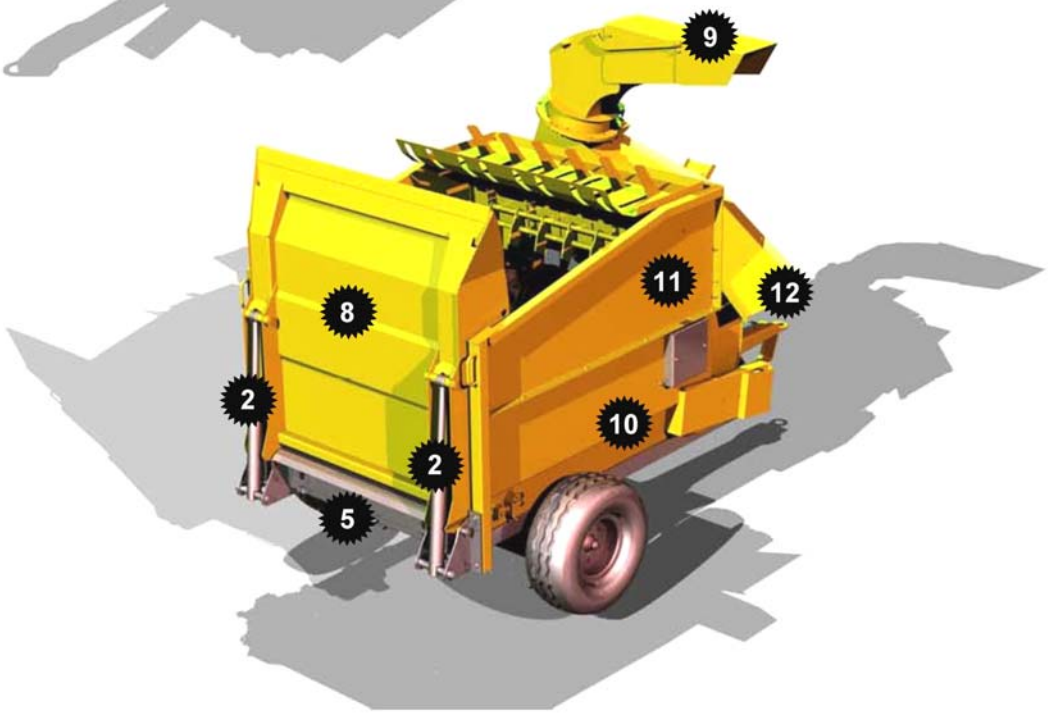
DESCRIPTION

The Twose TSF35 is a tractor trailed machine designed for quick and efficient distribution of bedding materials and feed. The machine is equally capable of distributing both round and rectangular bales. The machine must never be used for any purpose other than the tasks it was designed for.
This manual should be read in conjunction with the tractor's operation manual. It is essential that the manuals are read and fully understood before attempting to operate the machine.

GENERAL ARRANGEMENT

The diagrams below show the location of the machines main components.





1. **Chute Ram**
2. **Tailgate Ram**
3. **Axle & Wheels**
4. **Drawbar**
5. **Chassis**
6. **Rotor**
7. **Gearbox**
8. **Tailgate**
9. **Chute**
10. **Lower Body**
11. **Upper Body**
12. **Feed Chute**
13. **Lower Turbine Housing**
14. **Upper Turbine Housing**

SAFETY INFORMATION

In the interest of safety it is important that great care is adopted at all times during the attachment, transportation, operation and maintenance of this machine. Both the owner and the operator of the machine should read and understand the following section to ensure the safety of themselves and all other persons who enter into the close proximity of the machine.

Read, Understand and Follow the Safety Messages. Serious injury or death may occur unless care is taken to follow the warnings and instructions given in the safety messages,

CAUTION! The lowest level of Safety Message; warns of possible injury.

WARNING! Serious injury or possible death.

DANGER! Imminent death/critical injury.

Never operate the tractor or machine until you have read and completely understood this manual and the tractor's operation manual – ensure you are aware of all safety messages found in the manuals and those displayed on the tractor and machine.

DANGER! DO NOT attempt any maintenance of or adjustment to the machine while it is running. Before carrying out any work on the machine follow the two safety instructions below:

a) Put the PTO out of gear

b) Stop the tractor engine

WARNING! Ensure only one person operates the machine at any one time.

WARNING! Ensure that the correct guards are properly fitted to the machine and tractor at all times and that they are in good condition.

WARNING! **KEEP HANDS OUT** of the sloping delivery chute. In the event of a blockage remove guard and clear it. First, stop the engine, remove the key, disengage the PTO and wait for the turbine to come to rest.

WARNING! **KEEP OUT** of the bale chamber unless the engine has been stopped the key removed, the PTO disengaged and the turbine come to rest.

WARNING! While the tractor is running all personnel should keep well clear of the area around the machine as there are numerous crushing, shearing, impact dangers caused by the machine operation.

WARNING! **DO NOT** insert anything inside the chute or bale chamber while the machine is running.

CAUTION! The slippery tailgate surface may prove hazardous when entering/leaving the bale chamber.

DANGER! **CHECK** for any overhead power lines when operating the machine, especially when operating with the chute fully open, contact with power lines could prove to be fatal for the operator.

DANGER! **DO NOT** climb onto the top edges of the bale chamber whilst the machine is use.

DANGER! **DO NOT** allow anyone to ride on the machine, the tractor linkage, or the drawbar.

DANGER! **DO NOT** allow people/animals to stand in front of the outlet chute whilst the machine is running.

WARNING! **DO NOT** operate the tailgate if any person or animal is standing in the loading area behind the machine and always ensure good rearward visibility when lowering the tailgate.

WARNING! Transport the machine only at safe speeds. Serious accidents and injuries can result from operating this equipment at unsafe speeds**.**

DANGER! **NEVER** put your hand over a hydraulic leak. Oil under pressure may enter the blood stream.

WARNING! **BEWARE:** Dusty or mouldy material when shredded can create thick layers of dust which may have adverse health effects. Operator exposure to such conditions should always be avoided wherever possible. Ensure area is as well aired as possible - when circumstances prevent this, either use a tractor with a suitable forced air cab filtration system or an adequate respirator. Respirators must comply with the relevant Standard and be approved by the Safety Inspectorate. Disposable filtering face piece respirators to EN149 or half mask respirators to EN 140 fitted with filters to EN 143 are likely to be adequate.

CAUTION! **ALWAYS** ensure the tailgate is fully lowered onto the ground for safety reasons and to avoid residual pressure in the hoses before disconnecting the hydraulic hoses.

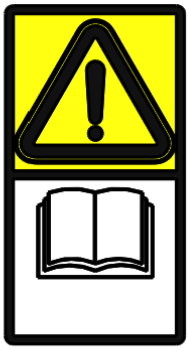
WARNING! **NEVER** fit any tyres other than the ones specified in this instruction manual to the rims of the wheels.

Care must always be taken when handling large bales, since they have sufficient weight and density to cause serious injury. Large bales should be handled with appropriate machinery either directly into the machine or into a position where they can be self loaded. Do not manually load bales from a stack above the machine – this may cause risk of falling into the machine or collapse of the bales stack.

NOTE: Terms relating to Right and Left Hand apply to the machine when viewed from behind looking forwards towards the tractor.

Although the information given here covers a wide range of safety subjects it is impossible to predict every eventuality that can occur under differing circumstances whilst operating this machine. No advice given here can replace 'good common sense' and 'total awareness' at all times but will go a long way towards the safe use of your Twose machine.

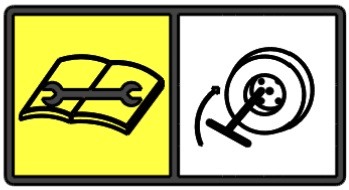
SAFETY DECALS



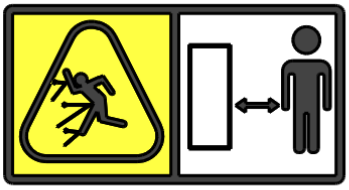
Please read instruction book before using the machine

Allow turbine to stop before removing blockage

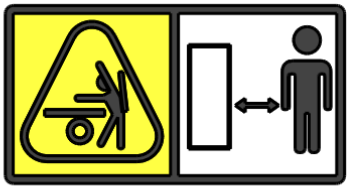
Do not allow anyone to ride on the machine



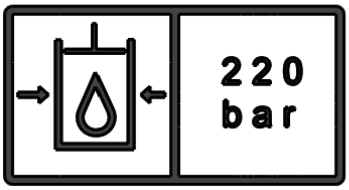
Tighten wheel nuts to setting in operators handbook



Beware of flying debris



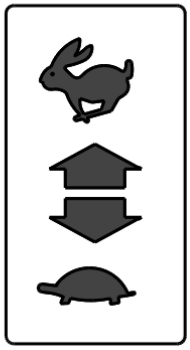
Beware crushing hazard, Keep clear



Maximum hydraulic circuit pressure

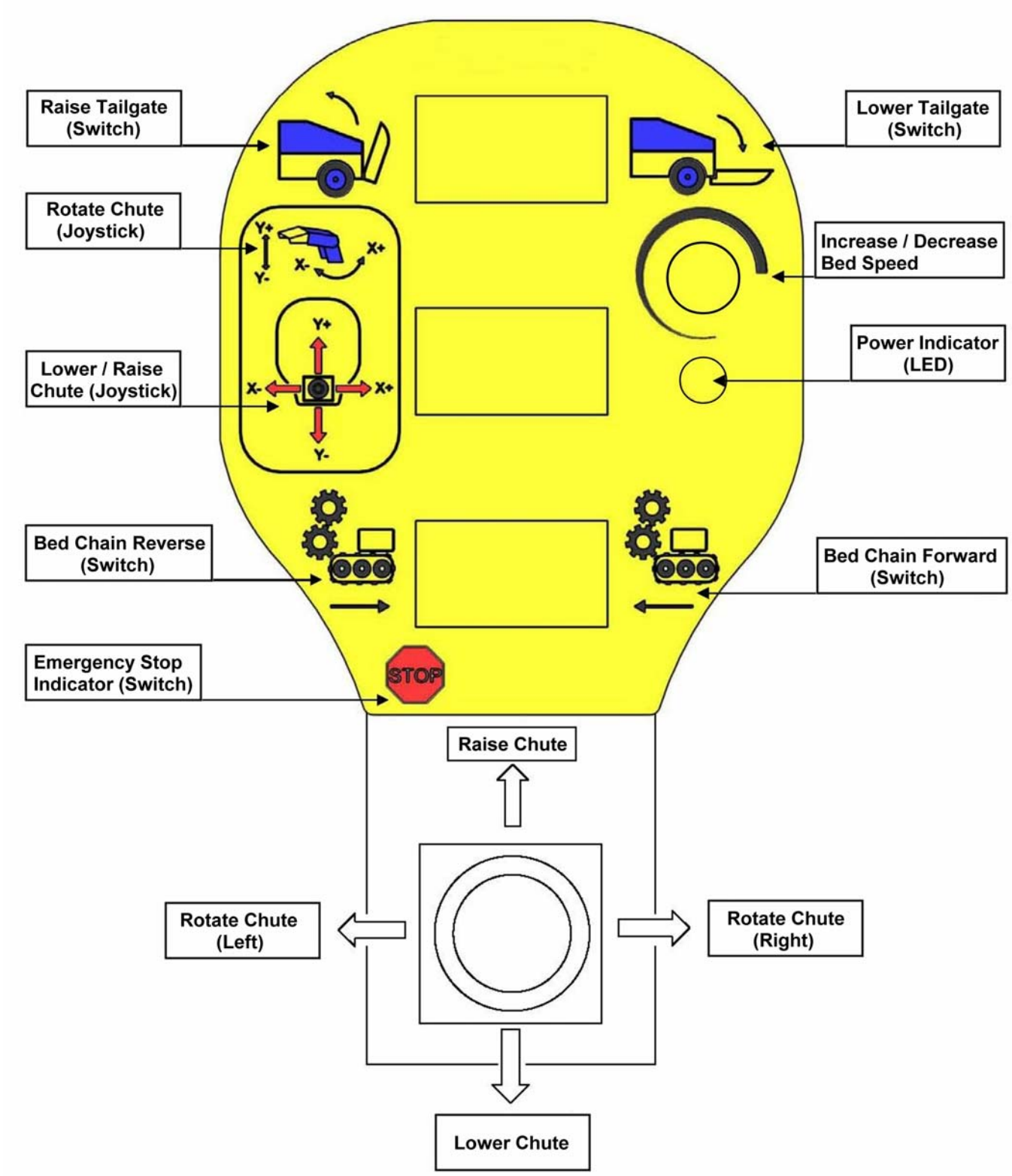
Frequency and direction of rotation of PTO input shaft

High Turbine Speed



Low Turbine Speed

MACHINE CONTROLS



FUNCTIONALITY OF THE MACHINE

The TSF35 can distribute both round and rectangular bales of hay, straw or silage. It can also be used to dispense clamp silage. Use for shredding other materials is not recommended.

Ensure that all chute components are fully installed when operating the machine. Unapproved chute modifications should not be carried out otherwise Safety Regulations may be infringed.

USING THE MACHINE ON PUBLIC ROADS

For the safety of others, if the machine is to be transported behind a vehicle on roads that the public have access to, a road lighting kit will be required in order to comply with local road traffic legislation, as the machine is likely to obscure the rear lighting units of the towing vehicle. Suitable lighting kits are available from your local supplier or may be obtained by contacting Twose direct.

The TSF35 is classed as a ‘Trailed Implement’ and as such does not require brakes when used in the United Kingdom providing a maximum speed limit of **20 mph** is observed at all times.

WARNING: Failure to comply with road traffic legislation may lead to prosecution by local law enforcement agencies and could also result in a road traffic accident.

TRACTOR PREPARATION

Ensure the tractor is fitted with mirrors to ensure the operator has maximum visibility around the machine at all times whilst operating the machine and especially for all reversing manoeuvres.

The PTO power required to drive the machine is typically about 45KW (60HP), however, the suitability of any particular tractor will depend upon the following criteria;

a) *The distance over which the straw is to be spread.*

b) *The type of bale to be spread.*

The machine is designed to use a standard 540 rpm PTO shaft. In specific circumstances 1000 rpm may be used - *see 'Operation Section' for precise details*

The valve block includes a flow control valve to vary the rotational speed of the bed chain. A rotational speed of the bed chain speed indicator of approximately 15 rpm is required for the shredding of rectangular bales and dispensing clamp silage. For round bales front indicator speeds of up to 30 rpm may be used to improve the feed rate.
The hydraulic valve block requires a double acting spool valve or a single acting valve with an unrestricted return. Whichever is used, the hydraulic supply must be independent of the 3-point linkage.

Where the machine is to be operated on a tractor with closed centre hydraulics, a large volume of oil will be passing through the valve and motor when the bed chain is in use. This may require the tractor to be fitted with a high flow "3rd line return kit' to protect the pump from being damaged.

For details of the 3rd line return kit and technical guidance contact your local tractor dealer.

The control lever mounting bracket should be fitted inside the cab so that the controls are conveniently situated for the operator. It should be remembered that structural members of the cab must not be drilled or welded.

MACHINE INSTALLATION

Ensure lower links are positioned at a height that they do not interfere with the PTO shaft when the tractor is turning. For ease of use it is recommended that the lower links be removed from the tractor if they are not used on a regular basis.

Fit the slip clutch unit end of the PTO shaft to the gearbox.

Fit the over-run clutch end of the PTO shaft to the tractor. Gradually turn the tractor until maximum turning lock is achieved checking that the PTO shaft does not come to within 100 mm *(4")* of bottoming. With the shaft in its most extended position, there should not be less than half of the original overlap between the sliding members. If necessary, cut the PTO shaft to the correct length.

Connect the hydraulic hoses to their positions on the spool valve, making sure that the supply hose to the valve is connected to the pressure port of the tractor. This hose is marked with an identifying tag. Mount the control box in the cab and attach it to the bracket provided.

PTO shaft life is dependant on getting the relationship between the tractor PTO shaft and the gearbox input shaft correct. The ideal relationship is when the machine is horizontal

If the machine is shredding whilst turning on a regular basis it is recommended that a PTO shaft with a wide angle constant velocity joint be fitted.

OPERATION

These notes are produced for guidance and are intended to help you obtain the best results from your machine, with the minimum of trouble and downtime. Read the following pages carefully and familiarise yourself with their contents.

INITIAL CHECKS

Check the tractor is equipped to deliver 540 rev/min at the PTO shaft; the machine is designed to run at this speed. **Under no circumstances must the PTO exceed 600 rpm/min.**

MACHINE PRE-START CHECK

With the tractor engine stopped and the ignition key removed:-

1. *Check that the rotor is free from all obstructions, especially pieces of wire.*
2. *Check that all knives are in good condition and securely attached to the rotor.*
3. *Check that all guards are in their correct place and also that they are in good condition.*

STARTING UP PROCEDURE

COLD START UP

When starting the machine for the first time prior to commencing work, it is essential not to run the tractor hydraulics and turbine at too high a speed. Therefore the tractor PTO speed should not exceed 360 rev/min, and should be allowed to reach this speed gradually. The cold start up instructions given below should be strictly adhered to:

- *Ensure that the tractor PTO drive is in neutral.*
- *Start tractor engine, run at idle speed and engage PTO drive.*
- *Gradually increase engine speed.*
- *Continue increasing engine speed until turbine is running smoothly and PTO speed is approximately 350 rev/min.*
- *Run rotor at this speed for minimum of 5 minutes to allow oil in system to warm up.*

The machine is now ready for work.

NORMAL START UP

- *Never attempt to start the turbine while it is under load - always free the turbine from any obstructions first.*
- *Never increase or decrease PTO speed rapidly as this can lead to pump, motor and gearbox damage.*

The machine is fitted with a two speed gearbox. For minimum blockage it is important that the correct gearbox speed is selected for the particular material being shredded and the chute angle through which it is being discharged is correct.

The gearbox has a neutral position; ensure the required gear has been properly selected by moving the lever attached to the gearbox. If operated in neutral, material will enter the turbine housing. Make sure all material is removed before restarting the turbine - removal of lower and side guards may be required.

Either of the two turbine speeds can be selected when spreading straw or any other dry materials, distance will vary depending on which gear is selected; the gear marked with the tortoise symbol indicates a slower speed and the gear marked with the hare symbol indicates a faster speed.

For shredding silage and other wet materials it is recommended that the slow speed be used as long throw distances are not usually required and wastage is reduced. The machine may be used at reduced PTO speeds and still deliver material to the desired position.

Where a 1000 rpm PTO shaft is to be used, set the slow turbine speed with the gearbox handle in the position marked by the tortoise symbol. To achieve maximum throw distance, operate the tractor engine at PTO speed. For reduced throw distances operate the tractor at reduced engine speeds. Very slow turbine speeds may cause blockages.

GEARBOX & PTO SETTINGS

Material	Distance Spread	Gearbox Speed	PTO Speed
Straw	**Maximum**	**High**	**540**
Straw	**Close**	**High**	**300**
Baled Silage	**Close**	**Low**	**540**
Clamp Silage	**Close**	**Low**	**300**

SLOPING SWIVEL CHUTE

The swivel chute rotates through 300 degrees and can offer fully directional distribution.

To deliver silage close to the machine, position the chute so that material is delivered onto the feed chute. The position of the material can be controlled by the chute, it may be necessary to rotate the chute fully for delivery of material alongside the drawbar.

In transport, rotate the chute to the right hand side of the machine. Fully lower the deflector to keep the width and height of the machine to a minimum.

ROTOR OPERATING INSTRUCTIONS

The bale restraint above the rotor should not need adjusting for different bale types, it will automatically adjust to accommodate for differing shapes and sizes of bales entering the chamber. When loading, the top cover can be folded towards the front of the machine.

OPERATING INSTRUCTIONS

When in use the rotating bed slats continuously feed the bale into the rotor. The speed of the bed can be adjusted in order to control the flow of material entering the turbine chamber.

It is recommended that any string or netting that is attached to the bale is removed before the bale enters the bale chamber. The machine will shred some string but some will tend to wrap around the rotor, affecting performance. Putting twine or netwrap through the machine is not recommended as it will be eventually spread on the land and polluting the next crop of silage or hay.

The TSF35 is a self loading machine using the tailgate to scoop up bales. If this method is not preferred by the user a loader can be used to simply load the bale onto the tailgate or place it directly into the bale chamber, in the case of the latter option, care must be adopted to avoid ramming the bale against the rotor.

When loading the machine, avoid running the bed chain without the turbine turning if there are large amounts of material still in the bale chamber as materials will be placed into the turbine chamber causing the turbine to jam at start up.

DANGER: Never stand above the machine on a stack of bales or in a barn to load the machine manually.

WARNING: When removing string or netwrap from bales never climb into the bale chamber or onto the tailgate behind a bale unless the PTO has been disengaged, the engine has been stopped, the key removed and the machine come to rest.

The tailgate is designed to load bales into the chamber of the machine. For large rectangular bales place the bale on the ground with one end against a solid object. For easy removal of the strings place the bale on its side so that the strings are not in contact with the ground. Reverse the machine with the tailgate lowered until the bale slides up the tailgate into the bale chamber. Raise the tailgate until it is horizontal and engage the bed chain to move the bale fully onto the tailgate.

Make sure the drawbar is securely attached to the tractor as when loading bales or silage the weight of the material on the tail gate may cause the drawbar to lift.

Take care not to force the bale against the rotor as this may affect performance and cause problems when starting the machine.

Note: To avoid blockages it is advisable after each use of the machine to run the bed chain for a couple of minutes to clear any excess silage.

To load round bales, reverse the machine under the bale so that the bale rests against the tailgate *(Fig.1)*. Lift the tailgate slightly and drive forward a short distance away from the solid object before raising the tailgate further, either roll the bale onto the tailgate or cut the strings or netwrap on the machine side of the bale as low as possible. Raise the bale into the chamber and then remove the strings. A second bale can be loaded and carried on the tailgate *(Fig.2)*.

Fig.1

Fig.2

When loading clamp silage, lower the tailgate to give a larger body capacity. The hydraulic oil pressure required to rotate the bed chain will be determined by the quantity of silage loaded. The machine requires operating pressures of 120 bar *(1750 psi.)* when the body is filled with clamp silage.

Adjust the deflector on the chute to give the desired spread width.

Engage the PTO with the tractor engine on low idle and increase the speed rapidly when the clutch has engaged fully. Once the turbine is rotating at the working speed, operate the spool valve so that the bed chain starts rotating and shredding begins.

With 2 round bales in the machine, the tailgate must be lowered so that the second bale is not in contact with the first allowing it to rotate freely *(Fig.3).* Do not force bales against the rotor using the tailgate as it may cause damage to the machine.

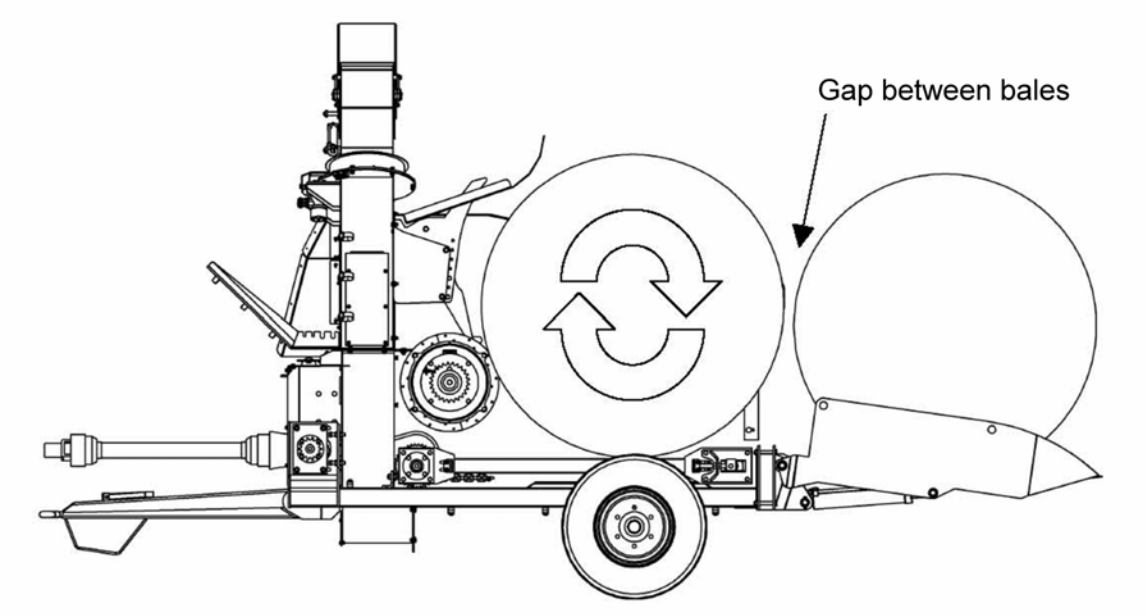


Fig.3 Round bale shredding

When shredding rectangular bales keep the tailgate in a position such that the rear of the bale is falling away from the front so that no pressure is being applied to the front half of the bale *(see Fig.4 below).*

The bed chain should be operated at 15 rpm to force the front half of the bale to rotate in the bale chamber in the same way that a round bale would rotate.

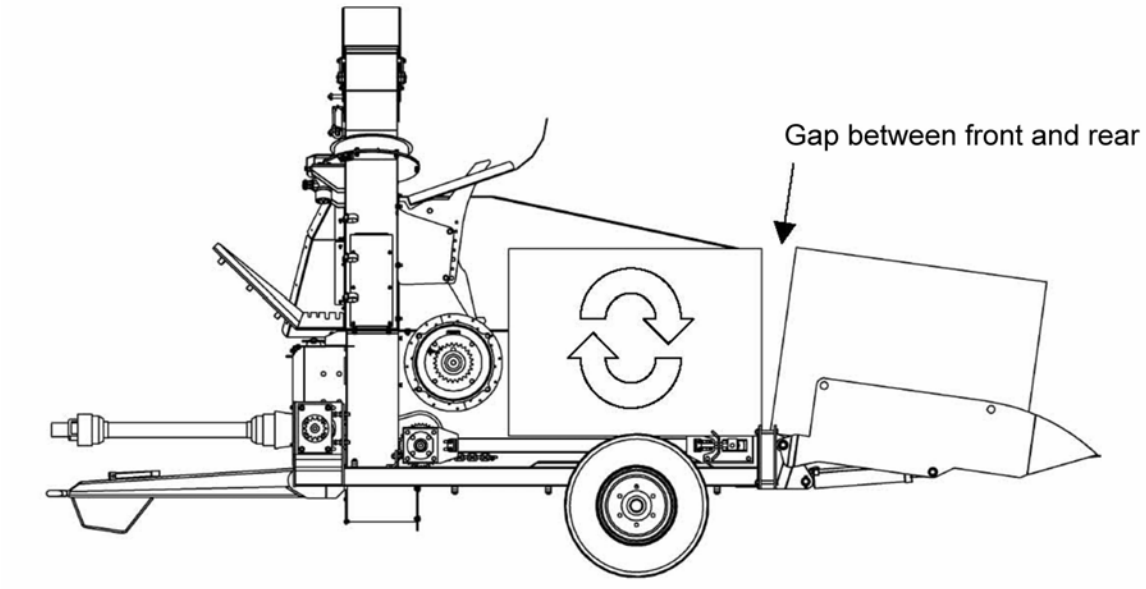


Fig.4 Rectangular bale shredding

Allow the front half of the bale to be almost fully discharged before raising the tailgate to shred the rear half of the bale. Once the rear half of the bale is moving on the bed chain, lower the tail gate slightly to allow room for the bale to rotate within the bale chamber.
When it is necessary to stop shredding part way through a bale, always stop the bed chain rotation and put it in reverse for a few seconds before stopping the turbine and rotor. This allows the material in the area around the rotor and to be blown clear of the machine. Failure to do this may result in a blockage occurring when the machine is re-started.

The length of chop will vary with the condition of the bale. Fresh clean straw will tend to result in a longer chop length than that which is old, slightly damp, weathered or caked together in the bales. The power consumption will also vary with the material being shredded. In general, baled silage and damp or caked straw materials will require a relatively high power input.

Should the rotor or turbine become blocked and material become jammed it may be necessary to turn the turbine backwards. This may be achieved by pushing the paddles with a post through the outlet chute. Further access may be gained by removing the blockage panels from the front of the upper and lower housing.

DANGER: care must be taken when removing blocked material, because cross beater blades are extremely sharp. Leather gloves will give some protection against minor cuts.

IMPORTANT: The machine is fitted with a shear bolt on the rotor shaft drive line. After a blockage, the bolt may need replacing. If the bolt has failed grease must be applied to the slipping surfaces via the grease nipple before the shear bolt is replaced.

IMPORTANT: The machine is fitted with a slip clutch on the shaft. If this slips repeatedly, it should not be tightened until the machine has been examined to check that there is no fault or blockage - *refer to Maintenance Section for the correct clutch setting.*

DANGER the slip clutch may be hot. Care should be taken when removing it from either the machine or tractor.

MAINTENANCE SECTION

BLADES

When carrying out maintenance work on the blades enter the bale chamber by using the tailgate and the handles mounted on the rear body pillars. Wedge the turbine and rotor to prevent them from turning and pinching hands and fingers between the bale restraint fingers and the knives.

When replacing knives use spanners with long handles which will allow the bolts to be removed whilst avoiding contact with the sharp edges of the knives.

Always keep your hands away from the edges of blades, particularly new ones, as they are extremely sharp. The blades have a sharp trailing edge, which remains sharp even when the leading edge is blunt. Leather gloves will provide some protection against minor cuts.

BED CHAIN

To tension the bed chain, release the front lock nut and jack the mounting bush using the other nut. The bed chain should be tensioned such that the chain can be lifted 50mm above the bed midway between the drive sprockets. Retighten the lock nuts.
The position of the rear sprocket scrapers must now be altered. To adjust them, slacken the nut on the outside of the body, slide it towards the sprocket and retighten the nut.

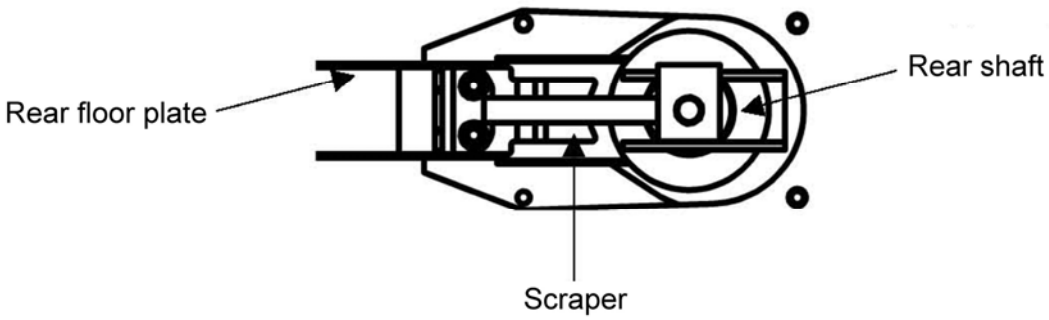


Fig. 5 Sprocket scraper position

If the bed chain becomes tight in use, check that the grooves in the sprockets have not packed tight with straw or silage. Adjust the sprocket scrapers so that they run tightly against the bottoms of the grooves in the centre of the sprockets.

If the area beneath the bed chain becomes blocked or requires attention, remove the bolts retaining the double skin debris tray underneath the machine and remove the blockage. This can be avoided by running the bed chain for a couple of minutes after use in order to clear any excess silage.

ROTOR REMOVAL

DANGER: the knives fitted to the rotor are extremely sharp and should be handled with care. Before attempting to remove the rotor either remove the blades or wrap the rotor in old carpet or hessian sacking.

It is not necessary to remove the rotor to replace the bearings.

Before the rotor can be removed, remove the large top cover and the left hand hinged drive chain guard. Release the chain tension on the side drive chains and remove them. The sprocket and bearing can now be removed from the input shaft of the rotor to be removed.

To replace the rotor, it will be necessary to remove the bale restraint assembly. To do this, release the bolts at each end of the bale restraint beam. Suspend the assembly with a suitable lifting device and remove. Remove side panels and remove bolts holding bearing housing to the floor assembly. The rotor can then be withdrawn by lifting upwards.

Refitting is a reverse of the above.

TURBINE REMOVAL

First, remove the front drive guard, valve guard, housing top and hose support. Release the hoses to the chute operating ram. Wedge the turbine to prevent rotation and unscrew the bolt in the centre of the turbine. Support the bottom of the gearbox and secure it with a rope so that when it is released it does not fall. Remove the bolts retaining the turbine gearbox.

Suspend the turbine from a lifting device so that it can be removed safely. The turbine is located on a taper and will usually require a special tool to remove the turbine from the gearbox. This tool is available from the manufacturer.

Lift the turbine clear of the housing. Refitting is a reverse of the above.

ROTOR SHEAR BOLTS

To replace the shear bolt, open the hinged left hand drive guard to gain access to the shear sprocket. Grease the sprocket hub before replacing the shear bolt. One Grade 10.9 M8 x 50 bolt should be fitted.

GEARBOX

After 50 hours of use the gearbox oil should be drained and replaced with new oil. To drain the oil, remove the valve guard, remove the drain and filler plugs and allow it to empty. Waste oil should be collected and disposed of at an oil recycling facility.

Refill the gearbox with SAE90 EP gearbox oil.
The oil capacity of the gearbox is 4.7ltrs *(1.25 Gallon)*.

DRIVE CHAINS

Apply chain lubricant or oil on a weekly basis to these chains.

To tension the bed chain drive, remove the guard covering the chain, release the clamp bolts on the motor mounting plate. Using the tensioning bolt provided jack the motor mounting plate until the chain has 12mm movement midway between the sprockets *(see Fig. 6).*

To tension the rotor chain drive, remove the shear sprocket cover from the left hand chain guard. Release the clamp bolt and reposition the relevant tensioner so that there is the correct movement midway between the sprockets on the opposite side to the tensioner *(see Fig. 6 and chain deflection table below).*

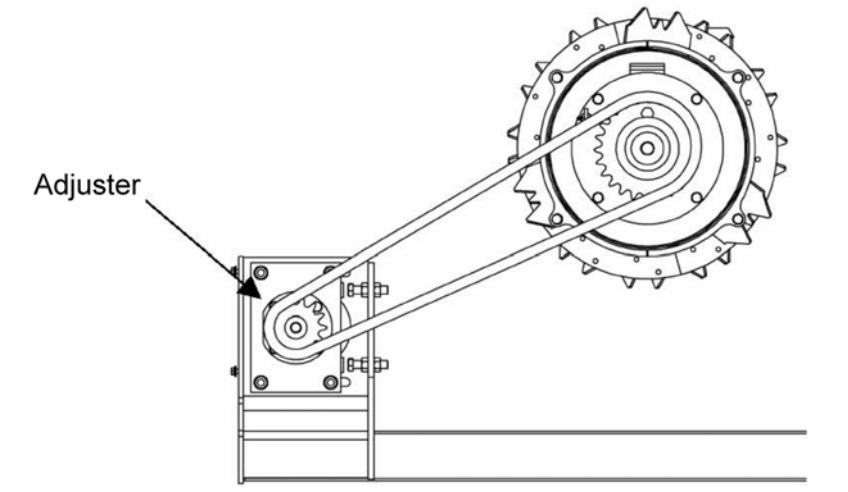


Fig. 6 Chain tension

Chain Deflection Table

Drive Chain	Rotor Deflection *(mm)*
Outer Drive	**15**
Rotor	**- - -**

SWIVEL CHUTE

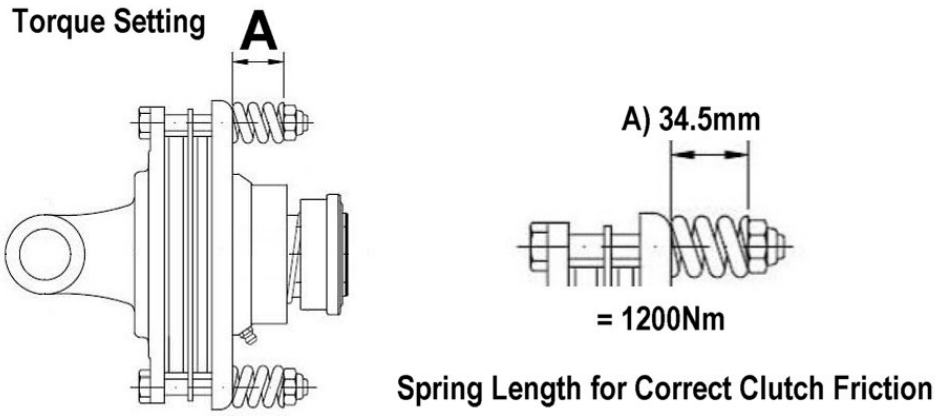
The chute is rotated by means of a gear and ring gear. It is important that this is kept well greased. To apply grease to the ring gears there are nipples located on the clamp plates. The deflector ram has 2 grease nipples, one on each pivot.

SLIP CLUTCH

If the clutch slips repeatedly for no apparent reason there are a number of things to be checked:
Firstly check that the clutch linings do not show signs of damage or excessive wear. If so, they should be replaced. When new the linings are 3mm *(1/8")* thick.
Also make sure that the compressed spring length is set to give the correct torque setting - *see PTO shaft parts list.*

If the clutch continues to slip it should be adjusted as follows;

1. Remove the guard fitted to the gearbox.
2. Fit the PTO shaft with the slip clutch at the machine end.
3. Insert a piece of wood through the discharge chute and position it such that it prevents it from turning.
4. Insert a steel bar through the rear PTO yoke and use a spring balance to obtain the correct torque setting. The clutch should 'just' slip at a torque of 1200 Nm. *(900 lb.ft.)* - equal to a force of 1000N. at 1.2 metre *(225 lb. at 4 feet)* from the centre of the yoke. Adjust the clutch as necessary using the eight spring loaded clamp bolts.



WHEEL REPLACEMENT

If it is necessary to remove a wheel, place a jack underneath the axle beam, loosen the wheel nuts and raise the machine until the wheel can be removed. Place an axle stand underneath the machine before removing the wheel. Refit the wheel and tighten the wheel nuts. This should, as with all maintenance and service work, be performed on a firm level site wherever possible.

WHEEL NUTS

Before using a new machine and on a daily basis during use, check the wheel nuts are tight. The recommended torque for standard 6 stud wheels is 400Nm *(295 lb.ft).*
If wheel nuts are allowed to work loose, it may be found impossible to keep them tight and new nuts and studs will be required to overcome the problem. In extreme cases damage to the wheel rims and hubs may result.

TYRE PRESSURES

Check tyre pressures on a regular basis and re-inflate as and when necessary – the correct pressure for standard tyres 10.0/75-15.3 is 2.0bar *(29 psi).* Over inflation can be dangerous.

LUBRICATION

Good quality semi-solid grease should be applied to the grease points listed below at the frequency periods stated:

Twice weekly:

- Bed chain bearings
- Rotor bearings
- Shearbolt sprocket bearing
- Bale restraint pivot bearings
- Pivoting drawbar pivots
- Chute ram pivots
- Ring hitch
- Oil Rotor & Bed chain roller chains

Every 2 weeks:

- Swivel chute ring gear
- PTO shaft joints
- PTO guard bearings *(where fitted)*
- PTO shaft sliding members

Every 4 weeks:

- Oil PTO shaft spring plungers

NOTE: The frequencies stated above are based on typical daily use for bedding & feeding purposes. Continuous use for special applications may necessitate the machine being lubricated more frequently.

CONTROL BOX

Supplied with the machine is a mounting plate for the controls box, which should be fitted in the cab in a suitable position ensuring no damage to the cab structure.
The control box is fitted to a mounting bracket which can be used on either side of the cab. To reverse the bracket, remove the mounting bolts beneath the control box lid and re-position the control box. Make sure the seal is in its correct position when reassembling.

A 30 amp blade type fuse is fitted in the supply lead of the control box. If the connector provided on the supply lead is not to be used, it is essential that the 30 amp fuse is retained to prevent damage by current overload or incorrect connection to the tractor battery.

MACHINE CABLE

Once the control box has been positioned, route the machine cable into the cab making sure it is kept away from the rear wheel and any pinch points between the PTO shaft and link arms. Where possible, route into the cab through cable entry points on the tractor, allowing the rear window to be kept closed during use. Plug the cable connector into the socket on the box and secure by rotating the locking collar.

BED CHAIN OPERATION (Push Button Controls)

The bed chain is operated by pressing forward button to move forwards, pressing forward button to stop, and pressing and holding reverse button to reverse. It is not necessary to stop the bed chain before pressing the reverse button as this will automatically cancel the forward direction before engaging reverse.

STORAGE

When the machine is not being used it is recommended that the control box be stored safely away from the machine in a clean dry location – do not wrap controls in plastic bags as these will harbour condensation that can lead to rapid corrosion of components.
The plug on the end of the machine cable should be kept stored in the bracket provided to keep it clean and stored safe from risk of damage.

ELECTRICAL MAINTENANCE

Before attempting to service or maintain any part of the electronic controls and wires, disconnect the 12v supply. Failure to do so may result in damage to the electronic circuit controlling the bed chain speed.
It is recommended that the controls are repaired by a competent person. Copies of the circuit diagram are available from the manufacturer on request.

HOSES

DANGER! Do not operate this Equipment with hydraulic oil leaking. Do not check for leaks with your hand - use a piece of heavy paper or cardboard. High-pressure oil streams from breaks in the line could penetrate the skin and cause tissue damage including gangrene. If oil does penetrate the skin, have the injury treated immediately by a physician knowledgeable and skilled in this procedure.

It is important that hoses are fitted correctly ensuring that there are no kinks or sharp bends in their 'runs' and that the hoses do not chafe against any sharp edges - the following instructions and diagrams should be used as a guide.

TWISTS

Hoses should never be twisted or kinked. On most hoses there is a line which runs the full length of the hose acting as a useful guide. If there is no guideline running along the hose, follow the fitting instructions below – *refer to Fig. 7.*

a. Loosen any clamps.
b. Attach one end of hose to its coupling, but do not tighten.
c. Place the hose in its required position.
d. Connect other end loosely to its union.
e. Tighten angled end of hose in required position.
f. Tighten straight end. It may be found that as the nut is tightened the hose may twist slightly. If this happens follow instruction (g), if it does not follow instruction (h).
g. Slacken off nut and turn hose in opposite direction to that of twist.
h. Re-tighten nut and bring hose back centrally.
i. Tighten any clamps.
j. Finally, re-bleed the rams and operate the arms in all positions whilst carefully checking for twists and obstructions.

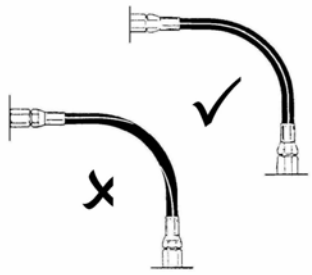


Fig. 7

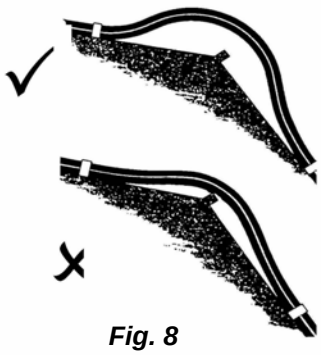


Fig. 8

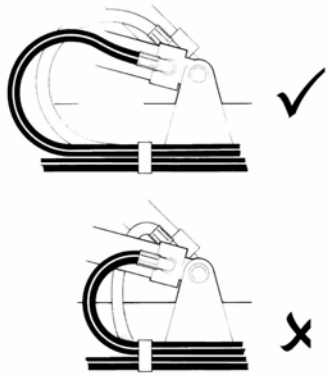


Fig. 9

SHARP BENDS

Avoid sharp bends in the hose run - allow enough radius for free movement *(Fig. 8).*

CHAFING HOSES

Avoid hose chafing - allow plenty of clearance around sharp edges *(Fig 9).*

HOSE INSPECTION & MAINTENANCE

It is false economy to try and make a damaged hose last a bit longer, failure can cause spillage of a lot of oil on the road both endangering traffic and costing money. To reduce the risk of this happening, and ensure long life from hoses, follow the instructions given below:

- Check weekly that all hoses and their connections are in good condition and that there are no leaks or damage.
- Replace immediately any hose that is leaking or damaged.
- Ensure hoses are not chafing against sharp edges - if they are, inspect for damage and replace if required.
- Re-route any hoses that have been chafing.
- Ensure hoses are fitted without kinks or sharp bends.
- If in doubt exists about the condition of a hose – replace it.

Recommended Torque Settings for Hose Nuts

1/4" BSP	**=**	**24 Nm**	***(18 lbf ft)***
3/8" BSP	**=**	**33 Nm**	***(24 lbf ft)***
1/2" BSP	**=**	**44 Nm**	***(35 lbf ft)***
5/8" BSP	**=**	**58 Nm**	***(43 lbf ft)***
3/4" BSP	**=**	**84 Nm**	***(62 lbf ft)***
1" BSP	**=**	**115 Nm**	***(85 lbf ft)***

POWER TAKE-OFF SHAFT

The PTO shaft used is of the normal agricultural type. Spares kits comprising the spider, needle bearings, circlips etc., are available from your local dealer. For correct part numbers, which must be quoted when ordering spares, refer to the parts manual for the machine.

Some routine maintenance is needed to ensure a trouble free life for the PTO shaft, as follows:

- Grease both ends of PTO shaft daily.
- Grease the PTO shaft tubes regularly.
- Ensure guard check chains are securely attached and in good condition.
- Check that PTO guard is in good condition and replace if cracked or damaged.
- Check universal joint bearing journals for roughness or slackness. Replace if necessary.

DISPOSAL

At the end of the machine's working life the method of disposal must be within the legislation laid down by the local authority or the National Environment Agency.

The machine is composed of ferrous materials, synthetic paints and rubber compounds.