Standen

Spectrum Mk2

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IMPORTANT

- This operators handbook should be regarded as part of the machine. Suppliers of both new and second-hand machines are advised to retain documentary evidence that this handbook was supplied along with the machine.
- On installation of the machine (i.e. starting off in the field), the New Machine Installation Record Card should be completed by the dealer/distributor and be countersigned by the customer. The document is proof that the correct procedures have been followed.
- The New Machine Installation Record Card should be returned to Standen Engineering Limited within 7 days of installation. Failure to do so may invalidate the machine warranty.

On delivery, check that the machine is as ordered and has not been damaged in transit. Please report any shortfall to your Standen dealer.

The contents of this handbook, although correct at the time of publication, may be subject to alteration by the manufacturers without prior notice.

Standen Engineering Limited operate a policy of continual product development. Therfore, some illustrations and/or text within this publication may differ from your machine.

CONTENTS

1.1 INTRODUCTION

Introduction to the Handbook

This handbook provides the information for the operation, adjustment and maintenance of your **Standen Spectrum Mk2**. To enable you to achieve the best results from the machine, the manufacturer recommends that you read the handbook thoroughly prior to using the machine for the first time.

Record below the details of your machine.

Dealers name.....

Address.....

.....

Telephone number.....

Machine serial number.....

Date purchased.....

Date started work.....

This symbol indicates important safety messages within this handbook. When you see this symbol, be alert to the possibility of injury to yourself or others and/or damage to the machine and carefully read the message that follows.

Throughout this handbook the terms 'front', 'rear', 'left-hand' (LH) and 'right-hand' (RH) are derived from the tractor drivers position facing forward in the normal direction of travel.

Adjustments to the machine may have to be made singly or in combination according soil conditions. Always allow the machine to settle to a new setting before making further adjustments.

Recommended lubrication and maintenance instructions are included in this handbook and if followed will help to keep the machine in a safe working condition.

Warranty

Should the machine suffer any faults or defects within the warranty period, please contact your dealer. The warranty shall be effective only if the dealer is informed of any such defect as soon as practicable upon discovery.

Replacement Parts

Recommended replacement parts are designed for your machine and have the full backing of the warranty. Only when recommended parts are used can responsibility be considered under the terms of the warranty.

Section 2 of this handbook contains a list of spare parts available through your Standen Agents. Each illustration shows a complete unit or assembly in exploded form. Standen's policy of continual product development means that components or even complete assemblies are redesigned from time to time. Where possible the modifications are shown in the remarks column.

The first printing of each page in the spare parts section is identified as issue 1 at the foot of the page. When a complete unit or assembly has been redesigned the appropriate pages are revised and printed as issue 2. The revised pages are filed behind the existing issue so that a complete modification history is gradually built up. When using an illustration and parts list it is essential that both are of the same issue.

Note: Always quote the full serial number of your machine when ordering spare parts.

1.3 SAFETY PRECAUTIONS

SAFETY

The Standen Spectrum Mk2 has been designed to comply with current Safety Regulations. However, as with all farm machinery there will be inherent dangers whilst operating and carrying out maintenance on the machine. The following list of precautions should therefore be brought to the attention of all persons operating and working on the machine. The list is not exhaustive. All farm machinery is potentially dangerous and great care must be exercised by the operators at all times. Standen Engineering Limited will not accept liability for damage or injury caused by their products except when such liability is specifically imposed by English statute.

OPERATION

The machine must never be operated by untrained personnel or children.

Never set machinery in motion before ensuring that everyone in the vicinity is aware of your intentions.

Never allow children in the vicinity where machines are working.

Never stand near the discharge end of the topper while the machine is running.

Before carrying out any work on the machine, lower the machine to the ground, switch off the tractor engine, apply the handbrake, remove the ignition key and disconnect the PTO shaft.

Never operate the machine with the discharge elevator in the folded transport position.

Never operate the machine with the hydraulic reservoir shut-off valves in the closed position.

Never attempt to fit drive chains or drive belts to the machine while the drive sprockets or pulleys are in motion.

Normal safe working procedures should be adopted at all times. Reduce speed when transporting the machine on sloping ground.

Do not work on ground where there is a possibility of overturning or across steep slopes.

The working area should be kept clear and free of obstructions at all times.

Be alert for hidden obstructions. Should the machine hit an obstruction, stop and check for damage before proceeding.

Wear substantial or proper safety footwear. Avoid loose clothing near moving parts. Wear gloves when handling the implement or parts with sharp edges.

The operator must not leave the tractor seat until the machine has been lowered to the ground, the tractor engine switched off, the handbrake applied and the ignition key removed.

Never reverse or turn unless the machine is in the fully raised position.

All guards, covers, warning transfers and safety devices must be correctly fitted and operable at all times.

Inspect the machine on a regular basis and replace damaged or worn parts as necessary.

Inspect the machine for damage after use. Rectify as required.

Never operate the machine in a state of disrepair.

TRANSPORT

When in transport, the discharge elevator must be must be in the folded transport position.

Only transport the machine at a speed suitable to the prevailing conditions. Be aware of the weight and overall length of the machine at all times

MAINTENANCE

When left free standing i.e. not attached to the tractor, the machine must be on level ground.

When working under the machine, or if it is left to stand for any length of time, always lower it onto the lifting wheels.

Never work under the machine when it is raised on the hydraulic lift linkage.

Before working on the machine, all free moving parts should be locked to prevent them moving.

Inspect the hydraulic hoses and fittings for cuts and abrasions. Replace immediately.

The hydraulic system may be under pressure with the machine at rest. Ensure all residual pressure is safely released before disconnecting any pipework.

Regularly lubricate the machine as per the operators handbook and check the tightness of all nuts and bolts.

Always use mechanical or additional help when lifting heavy parts.

Safety is the responsibility of the persons working with this machine. Think "safety" at all times. Read and remember the contents of this handbook.

Standen Spectrum Mk2

The Standen Spectrum Mk2 can be built as either a three row or four row sugarbeet harvester. Both machines are designed to lift, clean and load the sugarbeet into a trailer running alongside. The harvester can be used in a single-stage system by using it in conjunction with a Turbo Topper fitted to the front of the tractor, or it can be used in a two-stage system whereupon a conventional topper is towed behind a second tractor.

Before starting work, check that the machine is in a safe working condition. Check components which could work loose during operation such as wheel nuts, chains, sprockets etc. These checks are especially important during the first week of work.

Pay attention to the maintenance and lubrication instructions within this handbook and pay particular attention to the safety precautions, they are written as a guide to protect you and others.

Tractor Suitability

The minimum recommended tractor power requirement for the Spectrum Mk2 is 100hp with four wheel drive. This power requirement may need to be varied to achieve optimum output under different crop conditions.

The harvester requires a constant hydraulic oil supply from the tractor of a minimum 10 litres/minute (2.2 gallons/minute) with a low back pressure/free return to the tractor. Also required is a 12volt d.c. negative earth power supply rated at 30amp to feed the electrical control box which is mounted inside the tractor cab. The control box allows the hydraulically and electrically powered functions of the harvester to be operated comfortably from the drivers seat while the machine is working.

Tractor Wheel Setting

Both the front and rear wheels of the tractor must be set to straddle the bed. This will ensure the wheels run in the centre-line of the wheelings. The instructions for adjusting the tractor wheels are given in the tractor manufacturer's handbook.

When carrying out wheel adjustments, always place the jack on firm ground under a solid part of the tractor. Before removing a wheel, place a stout support under the tractor frame in case the jack should become dislodged.

Attaching the Turbo Topper to the Tractor

The Turbo Topper mounting frame *(item 1, figure 1)* should be fitted to the front of the tractor supported by special mounting brackets. There are various bracket kits available to suit individual tractors and they should be fitted by bolting them to the existing holes in the tractor chassis with the bolts supplied in the kit.

On initial setup, the topper lift ram (item 2, figure 1) will need to be coupled to the tractor external control lever. After attaching the harvester, the lift ram hose should be coupled to the harvester ram circuit.

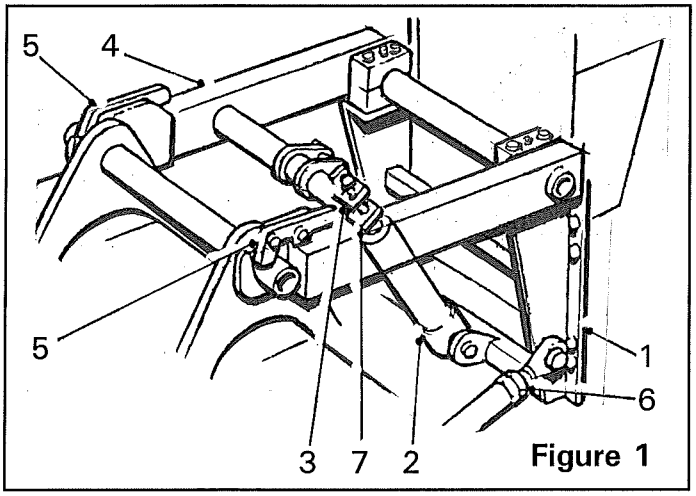


Figure 1

To pick up the topper:

1. Lift the stop plate *(item 3, figure 1)* clear of the ram.
2. Drive the tractor forward and locate the hooks on the lift arms *(item 4, figure 1)* around the topper lift bar. Ensure the lift bar is fully located before any attempt is made to lift the topper.
3. Lift the topper by actuating the hydraulic ram. Ensure the latches *(item 5, figure 1)* have positioned themselves over the lift bar as shown.
4. Fit the stabiliser links *(item 6, figure 1)* between the mounting frame and the topper. When in work, the front of the topper should be set lower than the rear. To achieve this, turn the stabiliser body clockwise or anti-clockwise.
5. Connect the topper hydraulic motor to the diverter valve (see figure 2).

To unhitch the topper:

1. Disconnect the hydraulic motor from the diverter valve.
2. Remove the stabiliser links *(item 6, figure 1).*
3. Reposition the latches *(item 5, figure 1).*
4. Lower the topper to the ground. When in contact with the ground, continue to lower the lift arms *(item 4, figure 1)* and then slowly reverse the tractor.

Attaching the Harvester to the Tractor

The operator should have read and understood the tractor operators manual prior to attaching the machine and putting it into work.

With the harvester standing on firm, level ground, reverse the tractor up to the harvester aligning the drawbar and pick-up hitch.

Once the harvester has been attached to the tractor, switch off the tractor engine before making any other connections. The hydraulic and electrical connections can then be made as detailed below.

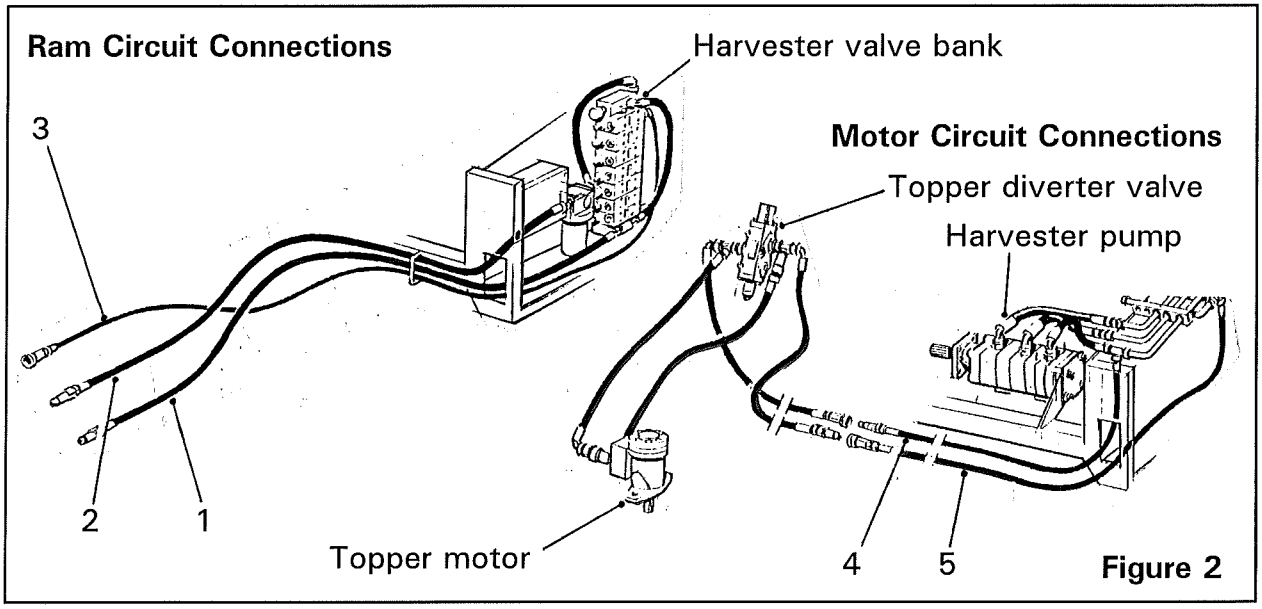


Figure 2

1. Connect the harvester ram circuit return hose *(item 1, figure 2)* to the tractor manufacturers recommended low back-pressure return coupling.
2. Connect the harvester ram circuit pressure hose *(item 2, figure 2)* to the tractor outlet recommended for constant supply. If in doubt, refer to the tractor handbook. If the flow is adjustable, it should be set to supply a minimum 10 litres/minute.
3. Couple the topper ram hose to the supply hose *(item 3, figure 2).*
4. Connect the pressure hose *(item 4, figure 2)* and return hose *(item 5, figure 2)* from the topper diverter valve to the harvester motor circuit as shown.
5. Mount the in-cab control box securely inside the tractor in a position where it is comfortable to operate when seated.
6. Connect the harvester control harness plug to the socket on the control box ensuring the harness is safely routed into the cab.
7. Connect the control box power supply cable to the tractor's highest rated electrical plug if fitted, the black lead to negative (-) and the red lead to positive (+). If the tractor does not have a suitable power socket, then either ask your dealer to fit one, or connect the supply leads directly to the tractor battery.

PTO Shaft

It is essential that the PTO shaft is matched to the tractor to give the correct drive line and to ensure that it is safe in work.

The PTO shaft supplied with the machine may require cutting to the correct length to suit individual tractors but should be kept as long as possible in all cases.

1. Separate the male shaft *(item 1, figure 3)* and female shaft *(item 2, figure 3)* and fit them to the tractor and harvester respectively.
2. Support the shafts alongside each other and mark the maximum possible length.
3. Cut the surplus length equally from both male and female drive tubes and guards.

Ensure a minimum of $^{1}/_{3}$rd overlap and check that there is no possibility of the shafts butting up when the tractor linkage is raised.

4. Once the correct length of shaft has been obtained, remove all rough edges and swarf.
5. Grease the shafts to ensure they telescope correctly and then fit the shaft in place
6. Check the PTO shaft does not foul any part of the machine or tractor and inspect the guards to make sure they are fitted correctly and are not damaged.
7. Finally, attach the safety chains *(item 3, figure 3)* to secure anchoring points on the tractor and machine ensuring that the chains will not overtighten when the machine is turning.

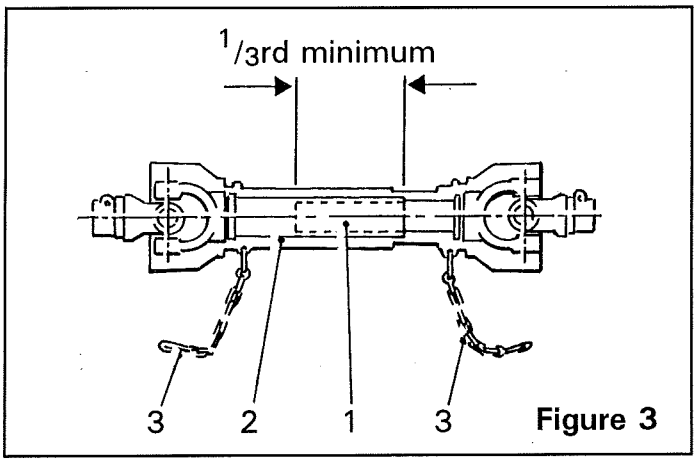


Figure 3

Refer to the manufacturers instructions, these are fitted to all PTO shafts when the machine is delivered.

An incorrectly fitted or badly guarded PTO shaft can be lethal. Do not take chances.

Control Box

Control for the major functions of the Standen Spectrum is provided electronically by the switches on the in-cab control box *(see figure 4).* Seven of these functions are operated by actuating individual hydraulic rams. The rams are actuated by a bank of solenoid valves mounted on the left-hand side of the machine. The remaining function is the engagement of the discharge elevator drive. The switch energises a dump valve which in turn permits a flow of oil to the motor.

Do not leave or store the control box outside in the open and always disconnect the control box from the tractor electrical supply when not in use, so avoiding the possibility of draining the battery.

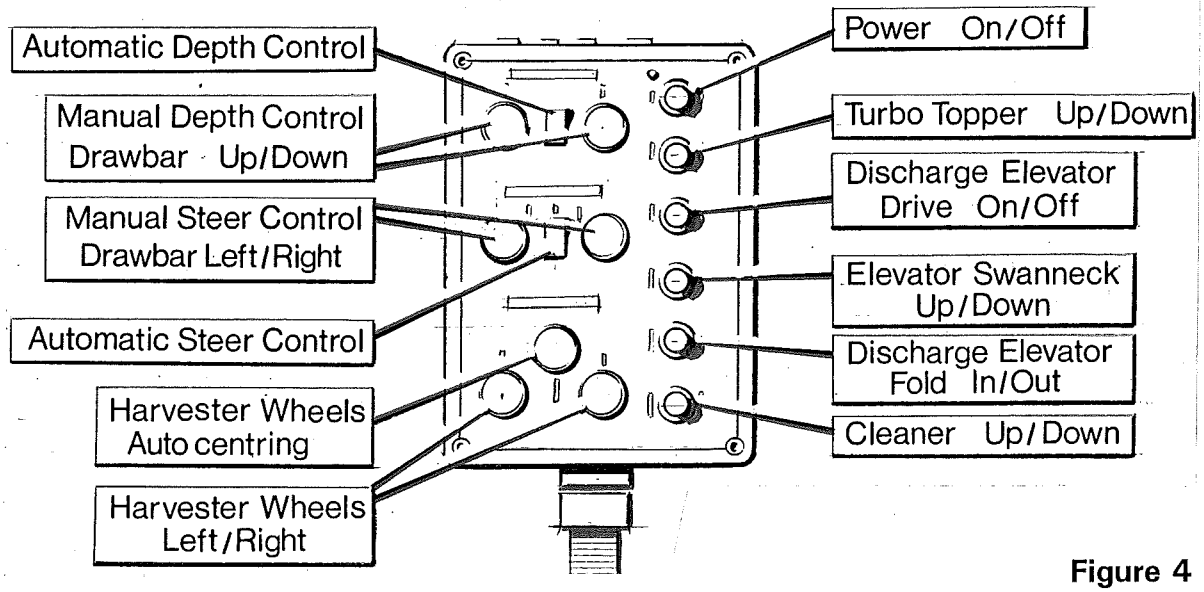


Figure 4

Turbo Topper

The Turbo Topper is designed to remove the leaf from the sugarbeet prior to being topped by the scalpers etc. The topper is fully floating on a pivoting linkage which is raised and lowered electronically from the in-cab control box by a hydraulic ram fed and operated from the harvester valve bank.

Four rotary cutters slice off the leaf which is then thrown from one rotor to the other before finally being ejected out to the side. The suction of the spiral fins fitted around the rotors lifts any loose leaf and trash leaving a clean path for the harvester.

The cutting width of each rotor *(item 1, figure 5)* is 43cm (17"). The overall cutting width of all four rotors is 188cm (74"). Row widths from 41cm (16") to 53cm (21") can be obtained.

The amount of top removed by the rotors is determined by the size of crown that can be removed by the scalpers etc. As a guide to the amount of top to remove prior to scalping, set the depth of cut of the rotor knives to just top the highest beet.

The depth of cut is determined by the depth wheel *(item 2, figure 5).* To adjust the depth wheel, loosen the retaining screws in the stop clamps *(item 3, figure 5)* and lift or lower the wheel according to the amount of topping required.

Never set up the topper so that the rotors touch the soil. Doing so may cause serious damage to the machine.

The stop plate *(item 3, figure 1)* reduces the amount of float should the depth wheel sink into the ground when travelling on undulating ground or soft soil patches. The size of gap between the stop plate and the hydraulic ram determines the amount the topper is allowed to drop. To adjust the stop plate, simply turn the locknuts *(item 7, figure 1).*

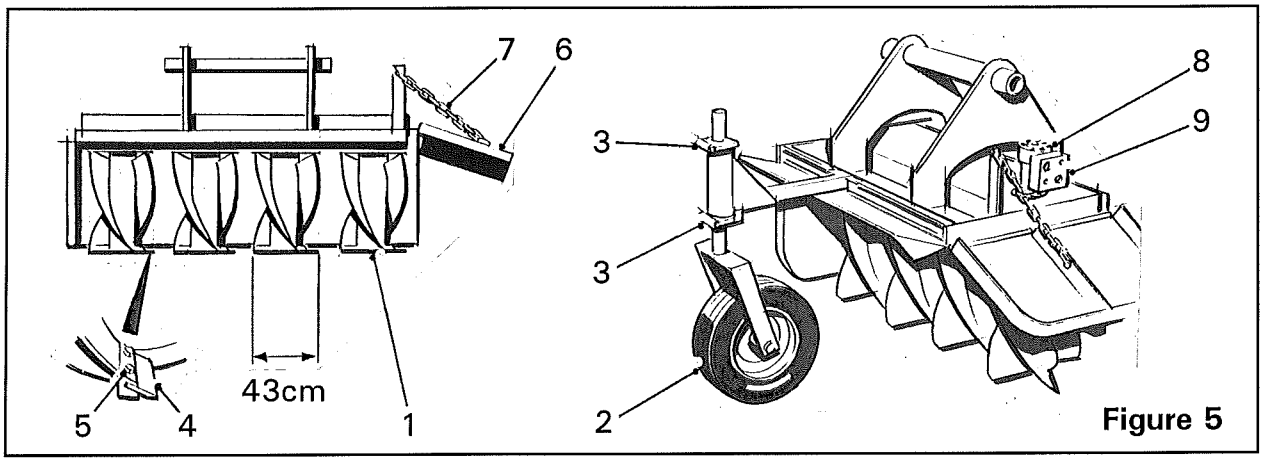


Figure 5

The steel knives *(item 4, figure 5)* fitted to each of the rotors can be removed and replaced by removing the two patch bolts *(item 5, figure 5).*

When fitting or removing the patch bolts (item 5, figure 5), care should be taken not to overheat the nylon locking material fitted to the bolt. Always replace the bolts with new after they have been removed or fitted twice.

The discharge end of the topper is fitted with a hinged deflector flap *(item 6, figure 5)* which can be set to a high position to spread the tops, or low position to form a windrow. Adjustment is made by lengthening or shortening the chain *(item 7, figure 5).*

Never stand near the discharge end of the topper while the machine is running.

The toothed belts *(item 1, figure 6)* transmit the drive from the hydraulic motor *(item 8, figure 5)* to each of the individual rotors. Never allow the belts to run slack as this will result in their premature failure. To adjust the belts, remove the drive guard and turn the belt tension adjuster screws *(item 2, figure 6)* until the correct tension is achieved. The correct adjustment should allow 5-7mm deflection at a point mid-way between the pulleys. After the necessary adjustments have been made, always replace the guard.

Turbo Topper Hydraulics

The rotors are driven by the hydraulic motor *(item 8, figure 5)* fed from the harvester mounted hydraulic pump. The diverter valve *(item 1, figure 7)* mounted above the lift arm is designed to automatically cut off the oil supply to the motor when the topper is in the raised position, so stopping the rotors from turning.

Before attempting any adjustment or maintenance of the drive equipment, switch off the tractor engine, apply the handbrake, remove the ignition key and disconnect the PTO shaft.

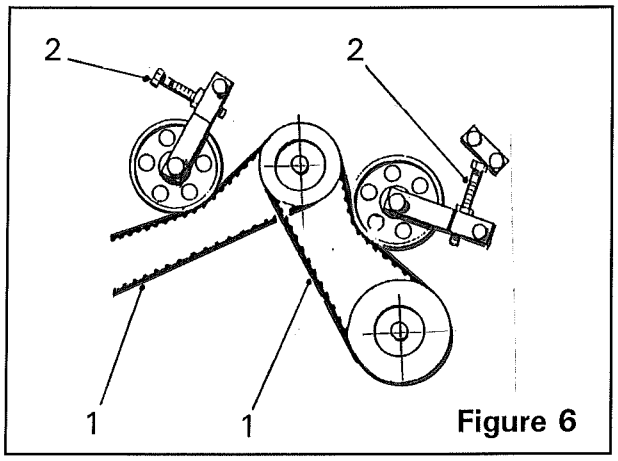


Figure 6

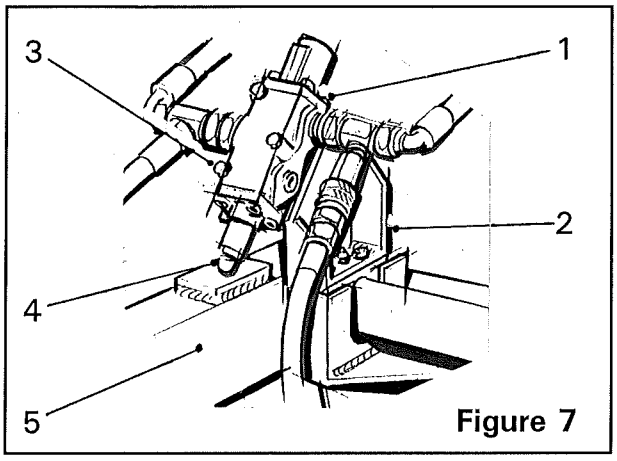


Figure 7

To adjust the diverter valve, the topper lift arms must be in the raised position. Slots in the support bracket *(item 2, figure 7)* allow for adjustment.

Loosen the cap screws *(item 3, figure 7)* and slide the valve until the spool *(item 4, figure 7)* touches and compresses centrally on the lift arm *(item 5, figure 7).* At the top of the diverter valve is a return spring to push down on the top of the spool when the topper is lowered. The spring is encased for cleanliness and does not require any adjustment.

A check valve *(item 9, figure 5)* is fitted to the motor which enables the rotors to slow down when the oil supply has been cut off.

The motor must always be connected to the oil supply via the check valve. Failure to do so will cause serious damage to the motor.

A pressure relief valve preset at 190 bar (2800psi), is situated on top of the harvester oil reservoir.

The pressure relief valve is fitted to protect the hydraulic system should any major blockage occur. It is an essential safety feature preset at the factory and should never be tampered with.

Drawbar

The drawbar is adjustable to pivot both vertically and horizontally. Vertical movement is provided by the hydraulic ram *(item 1, figure 8)* which gives the correct digging depth and also lifts the harvester in and out of work. Horizontal movement is provided by either an adjustable stay *(item 2, figure 8)* or a hydraulic ram. The horizontal movement allows the harvester to be aligned with the crop and also assists when harvesting on hillsides. Both hydraulic rams are actuated from the in-cab control box.

To adjust the drawbar fitted with an adjustable stay, loosen the locknut *(item 3, figure 8)* and turn the stay centre section to give the required movement.

The drive shaft carrier *(item 4, figure 8)* is designed to support the PTO shaft after uncoupling from the tractor.

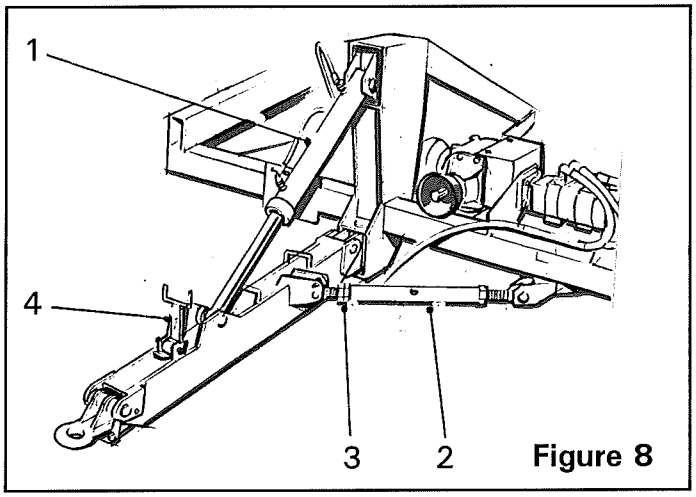


Figure 8

Parallel Linkage Scalpers

The purpose of the scalper unit is to crown the beet cleanly and squarely. The comb *(item1, figure 9)* runs on top of the beet holding it steady while the knife *(item 2, figure 9)* crowns it.

The topping unit frame is adjustable for height. The height of the unit is determined by the depth at which the harvester is lifting beet. As a general rule, the topping unit frame *(item 3, figure 9)* should run parallel to the ground after the depth of lift has been established. To adjust the height of the frame, loosen the locknuts *(item 4, figure 9)* and turn the adjuster nuts *(item 5, figure 9)* until the required height is reached. Ensure both sides are adjusted equally.

The pitch of the scalper units is adjustable by pivoting the tool bar *(item 6, figure 9).* To adjust, loosen the retaining bolts *(item 7, figure 9)* and locknuts *(item 8, figure 9)*, and turn the adjuster nuts *(item 9, figure 9)* to give the required angle.

The scalpers are adjustable for varying row widths. To adjust, loosen the retaining bolt *(item 10, figure 9)* and slide the complete unit along the tool bar. Ensure the knife *(item 2, figure 9)* is crowning the beet as close to the knife arm *(item 11, figure 9)* as possible. All row width settings should be made about the centre-line of the machine *(see figure 22).*

A very important setting of the scalper unit is the tension of the spring *(item 12, figure 9).* The spring is designed to provide a downward pressure on the knife. Sufficient pressure should be exerted to successfully crown a low beet after crowning a high beet. Simultaneously, too much pressure will force the knife to dig into the highest beet causing too much crown to be removed or the beet to be knocked over. To adjust the spring tension, reposition the locking collar *(item 13, figure 9).*

The comb *(item 1, figure 9)* should ride onto the beet before the knife crowns it. The comb should be positioned further forward away from the knife for large beet, and further backward closer to the knife for small beet. To adjust, loosen the two setscrews *(item 14, figure 9)* and slide the comb in the required direction.

The amount of crown removed is determined by the difference in height between the comb and knife. To adjust, loosen the retaining bolt *(item 15, figure 9)* and slide the knife arm *(item 11, figure 9)* to the required position.

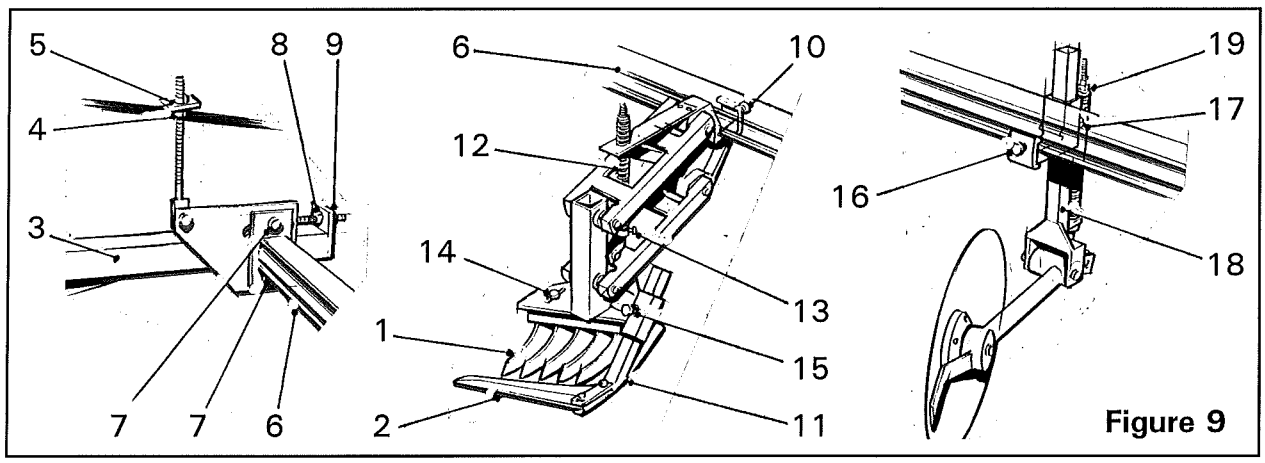


Figure 9

Disc Coulters

The disc coulters, used in conjunction with the scalper unit, are designed to cut through sugarbeet leaves and trash thus preventing them from building up and clogging on the scalper knives, and to create a 38mm ($1\frac{1}{2}$") deep furrow for the knife arms.

As with the scalpers, the disc coulters can be adjusted to suit varying row widths. To adjust, loosen the retaining bolt *(item 16, figure 9)* and slide the disc unit along the tool bar *(item 6, figure 9).* Adjustment is also provided for different depths of cut. To adjust, loosen the securing bolt *(item 17, figure 9)* and slide the disc arm support *(item 18, figure 9)* up or down. After the row width and depth adjustments have been made, attention must be paid to the tension of the disc coulter. The pressure on the disc arm should be sufficient to cut into the soil but also allow the disc coulter to ride over obstructions. To set the spring tension, adjust the locknuts *(item 19, figure 9).*

Skewbar Topper

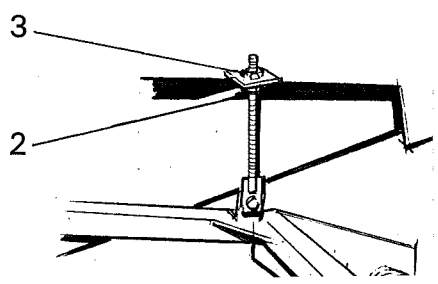
The Skewbar Topper is designed to crown the sugarbeet with the use of a power driven barrel. The barrel rubs off the remaining crown left by the Turbo Topper.

To obtain good, clean topping, the pivot end of the skewbar arm *(item 1, figure 10)* should be set to clear the tops of the pre-topped beet. This setting is dependent on the depth at which the harvester is lifting. To adjust the height of the skewbar unit, loosen the locknuts *(item 2, figure 10)* and turn the adjuster nuts *(item 3, figure 10).* Ensure both sides are adjusted equally.

The height at which the skewbar barrel operates is determined by the height of the skewbar unit frame and the damper assembly *(item 4, figure 10).* The height should be set so that the skewbar barrel is able to top the low beet as well as the high beet with the working angle of the skewbar arm *(item 1, figure 10)* set between 10° and 15° from the horizontal.

To adjust the angle of the skewbar arm, turn the adjuster nut *(item 5, figure 10)* in the required direction.

When in work, the skewbar arm should be supported by the top damper spring *(item 6, figure10).* When topping the lowest beet, a 7-10cm (3-4") gap should exist between the top spring and bottom spring *(item 7, figure 10)* allowing the skewbar barrel to successfully top the high beet. To adjust the gap, reposition the locking collar *(item 8, figure 10).*



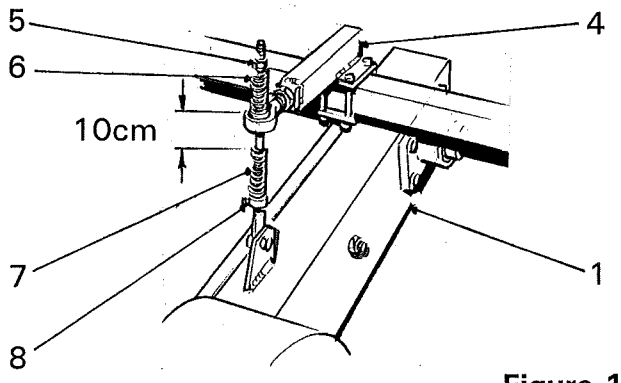


Figure 10

The skewbar arms are adjustable for different row settings. To adjust the position of a skewbar arm it is essential to follow the procedure as written below. All row settings should be made about the centre-line of the machine *(see figure 22).*

To adjust the skewbar arms to a different row setting:

1. Loosen the top pulley locking screws *(item 1, figure 11)* until they are no longer in contact with the pulley *(item 2, figure 11).*
2. Slightly loosen the nut *(item 3, figure 11).*

3. Apply light blows to the nut *(item 3, figure 11)* as indicated by the arrows. This is necessary to release the inner sleeve *(item 4, figure 11).* To release the sleeve even more, turn it out of the pulley (LH thread).
4. Now that the necessary components are loose, the pulley *(item 2, figure 11)* can be slid along the drive shaft.
5. The eccentric locking collars *(item 5, figure 11)* can be released by loosening the grubscrews *(item 6, figure, 11)* and then, by using the blind holes, turn the collars in the opposite direction to the drive shaft rotation.
6. The skewbar arm can now be slid along the drive shaft while simultaneously sliding the damper bracket *(item 4, figure 10)* along the support beam.

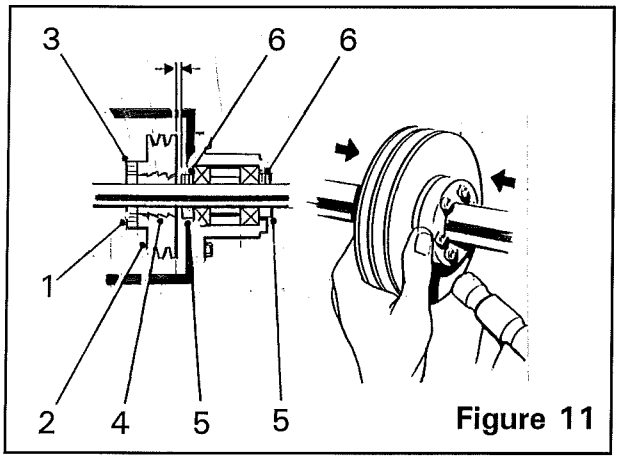


Figure 11

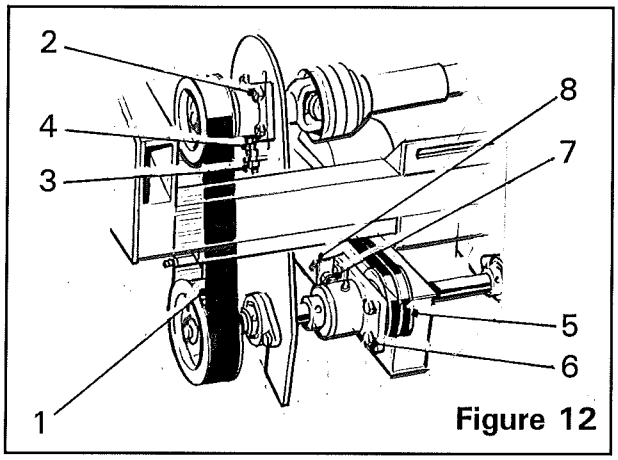


Figure 12

7. When in the correct position, retighten the eccentric locking collars *(item 5, figure 11)* by turning the collars in the direction of the shaft rotation until the eccentric diameters of the collars and inner rings fully engage. Tighten the collars by using the blind holes. Finally, retighten the grubscrews *(item 6, figure 11)* to a torque of 12.4 Nm to prevent the collars loosening during service.
8. To resecure the top pulley, check to see that the locking screws *(item 1, figure 11)* do not protrude from the rear of the nut *(item 3, figure 11).*
9. Tighten the nut *(item 3, figure 11)* onto the inner sleeve *(item 4, figure 11)* as far as it will go.
10. Thread the pulley *(item 2, figure 11)* onto the inner sleeve (LH thread) until it abuts the nut *(item 3, figure 11).*
11. Turn the locking screws *(item 1, figure 11)* until they loosely abut the pulley.
12. Set the pulley in the required position, but leave a slight gap between the pulley and eccentric collar as shown *(see figure 11).* The gap allows the pulley to move slightly while tightening.
13. Lightly tighten the locking screws *(item 1, figure 11)* using an allen key.
14. Tighten the locking screws to a torque of 9 Nm, tightening alternately on the diagonal.

15. Tighten the locking screws to a torque of 18 Nm, again tightening alternately on the diagonal.

16. Tighten the locking screws to a torque of 18 Nm by going circumferenially around the screws four times.

    Note: It is essential that this tightening procedure is followed to allow the bush assembly to transmit the required torque

The drive for the skewbar unit is taken from the centrally mounted gearbox via a universal coupling. The drive is transmitted to the skewbar arms by a toothed belt *(item 1, figure 12).* The tension of the belt can be adjusted by loosening the four bearing housing securing bolts *(item 2, figure 12)* and the locknuts *(item 3, figure 12)*, and turning the adjuster screw *(item 4, figure 12).* The correct adjustment should allow 10-13mm deflection at a point mid-way between the pulleys.

Each skewbar barrel is driven by two 'V'belts *(item 5, figure 12).* The tension of these belts is adjusted by loosening the four securing bolts *(item 6, figure 12)* and the locknuts *(item 7, figure 12)*, and turning the adjuster screw *(item 8, figure 12).* Again, allow 10-13mm deflection at a point mid-way between the pulleys.

Overload protection for the skewbar barrels is provided by the 'V'belts. Do not overtighten the belts. The belts should be tensioned to drive normally without slipping, but not so great that the belts cannot slip when the drive is obstructed.

Lifting Wheels

The lifting wheels are designed to lift the sugarbeet from the ground and transfer them onto the lift web. The working depth of the lifting wheels is determined by the depth required to lift the beet cleanly without breaking off the root or lifting too much soil (approximately 5cm (2"). The depth is increased or decreased by actuating the drawbar depth ram. Further depth control can be effected by changing the angle of the lifting wheel mountings *(item 1, figure 13).*

To lower the lifting wheels relative to the harvester, loosen the locking bolts *(item 2, figure 13)* and the locknuts *(item 3, figure 13)*, and turn the adjuster nuts *(item 4, figure 13)* in the required direction. This adjustment will also alter the point of lifting in relation to the width of the lifting wheels.

The lifting wheel units can be adjusted to follow 46cm (18") to 56cm (22") rows on a three row machine, and 41cm (16") to 51cm (20") rows on a four row machine. For 41cm (16") work a different lifting wheel mounting is required. To obtain these settings, loosen the securing bolts *(item 5, figure 13)* and move the lifting wheel unit along the mounting bar. All row width settings should be made about the centre-line of the machine *(see figure 22)*

The width between the lifting wheels at the narrowest point is 3.8cm ($1\,^{1}/_{2}$") to 4.5cm ($1\,^{3}/_{4}$"). The gap can be adjusted by removing or adding spacers *(item 1, figure 14)* between the lifting wheels *(item 2, figure 14)* and hubs *(item 3, figure 14).*

The lifting wheel spindles are fitted with tapered roller bearings which are adjusted by a castellated nut beneath the hub cap *(item 4, figure 14)*. Care should be taken not to overtighten the bearings. Adjust the bearings by removing the split pin and then tighten the castellated nut as much as possible while at the same time slowly rotating the lifting wheel, then slacken off one or two castellations and resecure with a new split pin.

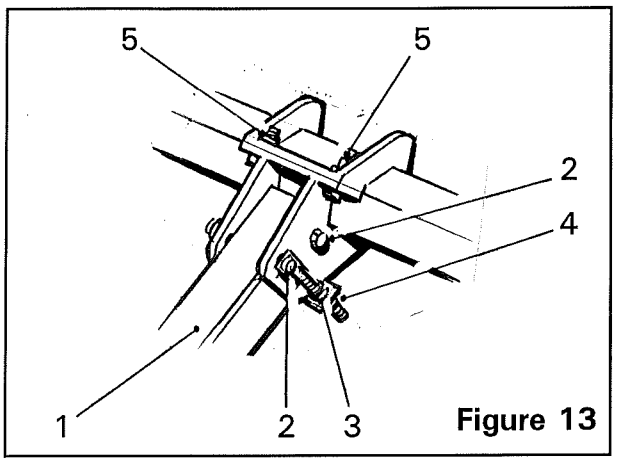


Figure 13

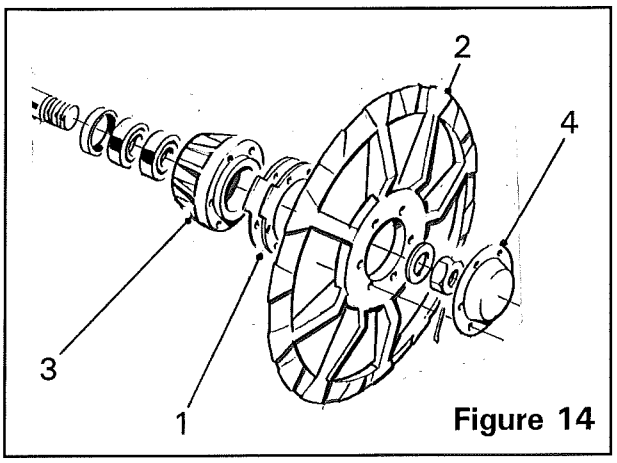


Figure 14

Flipper Unit

Rotating rubber flippers *(item 1, figure 15)* are fitted between the lifting wheels to transfer the sugarbeet onto the lift web. Provision is made to raise and lower the flippers which generally should be set higher when the beet are large, and lower when the beet are small. The speed of the flippers can be increased or decreased by turning the control knob *(item 10, figure 26)*.

To adjust the height of the flippers, loosen the locknuts *(item 2, figure 15)* and turn the adjuster nuts *(item 3, figure 15)* until the flippers are in the required position. Ensure both sides are adjusted equally by checking that the drive shaft *(item 4, figure 15)* remains horizontal across the machine.

When changing row settings, it is also necessary to move the flippers and their safety guards to correspond with the final position of the lifting wheels. To adjust, loosen the bolts *(item 5, figure 15)* and slide the flippers along the drive shaft. Ensure the flippers are positioned centrally between the lifting wheels.

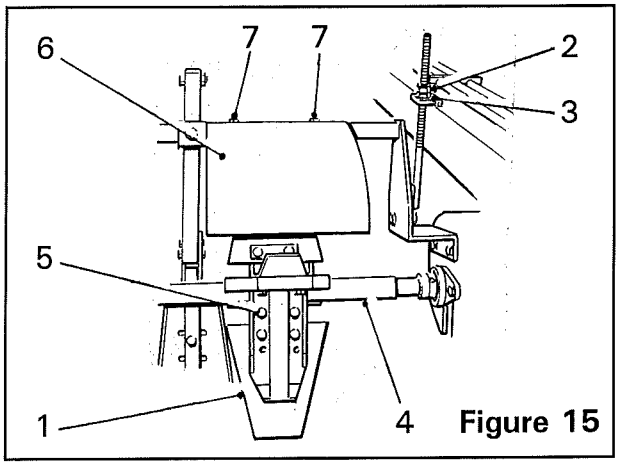


Figure 15

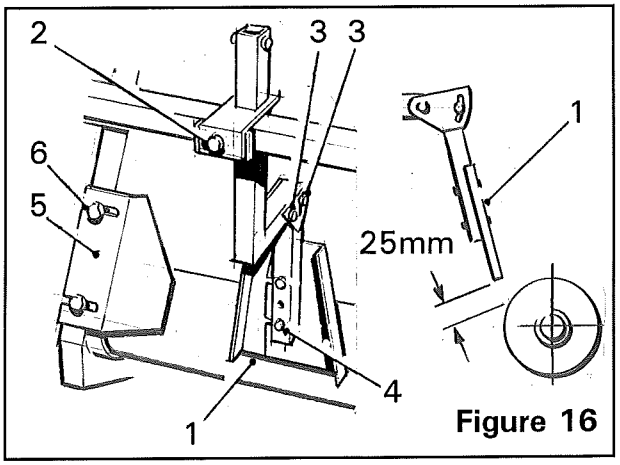


Figure 16

Position the safety guards *(item 6, figure 15)* directly above the flippers by loosening the mounting bolts *(item 7, figure 15).*

The safety guards must be positioned correctly to eliminate the danger from dirt and stones being thrown up by the flippers.

The flipper unit drive chain is fitted with a spring loaded tensioner. The tensioner is designed to take up the slack that occurs when raising and lowering the flipper unit. If necessary, the pressure exerted by the tensioner can be adjusted by rotating the spring tab.

Beet Deflectors

Beet deflectors are fitted between the lifting wheel units and on the outside of the two outer lifting wheels. The deflectors are designed to eliminate loss of beet from the lift web.

The deflectors *(item 1, figure 16)* should be positioned centrally between the lifting wheel units. To achieve this, loosen the securing bolt *(item 2, figure 16)* and slide the complete deflector to the required position. Before securing, set the height of the deflector to leave a vertical gap of approximately 25mm (1") between the bottom of the deflector and the lift web trip roller *(see figure 16)*. To achieve the optimum setting, the deflectors may need to be tilted by loosening the bolts *(item 3, figure 16)* and lining up the bottom face of the deflector with the front face of the trip roller.

To ensure the gap between the lifting wheel units is completely filled, the deflectors are also adjustable for width. To adjust, loosen the retaining bolts *(item 4, figure 16)* and slide the deflector plates to the required position.

The outer beet delectors *(item 5, figure 16)* are also adjustable to fill in the remaining gap between the outer lifting wheels and the web sides. To adjust, loosen the retaining bolts *(item 6, figure 16).*

Lift Web

The lift web transfers the sugarbeet from the lifting wheels to the trash extractor. The sugarbeet pass over the trip roller *(item 1, figure 17)* and onto the cage feed roller *(item 2, figure 17)* where material such as stones, clod and trash pass through onto the ground. The beet are then elevated by means of two webs running in the same direction. The speed of the lift web can be increased or decreased by turning the control knob *(item 11, figure 26).*

The sugarbeet are trapped between the webs and, while travelling up the elevator, are cleaned by being able to rotate and move around. If more cleaning is required, the gap between the two webs can be increased to allow the crop to roll around even more thus removing more soil. To increase the gap, reposition the web carrying rollers *(item 3, figure 17).*

The top track frame *(item 4, figure 17)* is adjustable for varying crop conditions. As a general rule, the smaller the beet, the lower the top track frame should be set. This allows the front web *(item 5, figure 17)* to grip the beet rather than allowing them to fall and possibly block the lift web. Conversely, if the top track frame is set too low and the beet are large, the front web may have a tendency to force the beet back into the lifting wheels.

To adjust the top track frame, loosen the pivot screws *(item 6, figure 17)* and reposition the adjusters *(item 7, figure 17).* Two adjustable stops *(item 8 & 9, figure 17)* are provided to restrict the amount the frame can move. Too much forward movement may result in the web becoming entangled with the flippers, too little forward movement will restrict the beet from going between the two webs. The lower stop *(item 8, figure 17)* allows the operator to achieve the correct "throat" between the two webs. The larger the beet, the larger the "throat" should be. To adjust the stops, loosen the retaining bolts *(item 10, figure 17)* and slide the stops to the required position.

Note: The front web will require tensioning after carrying out adjustment. Always loosen the web to lower the top track frame, and always tighten the web after the top track frame has been raised.

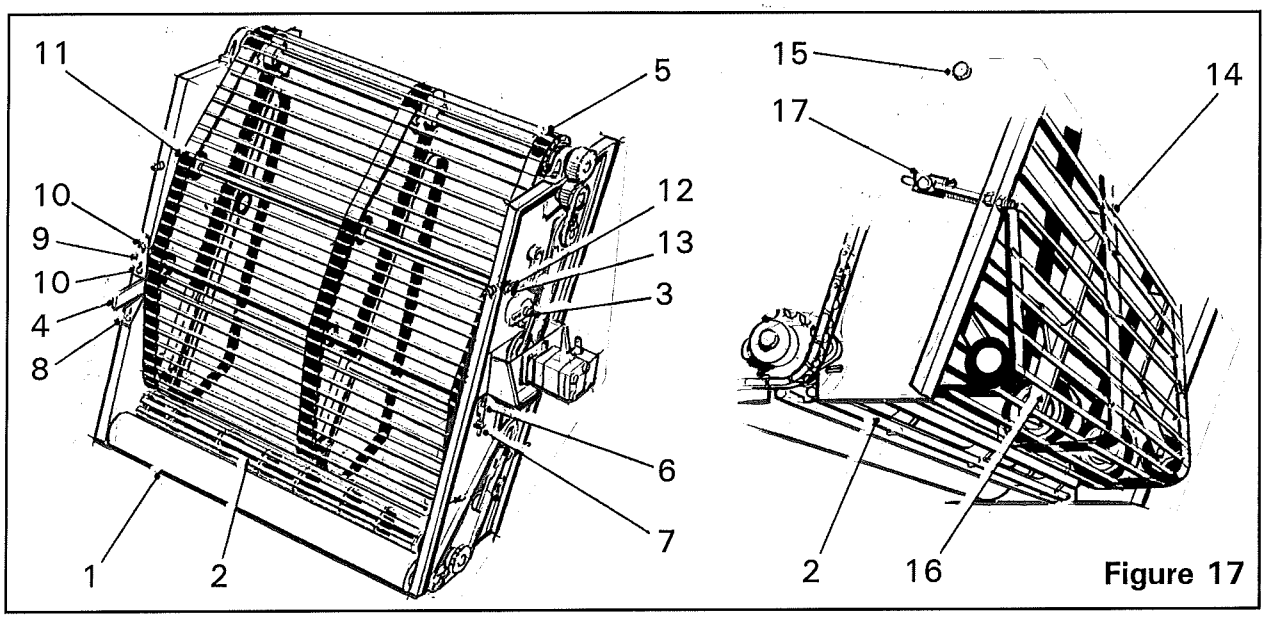


Figure 17

The front web *(item 5, figure 17)* is tensioned by three rollers *(item 11, figure 17).* The web should never be allowed to run slack. To tension the web, loosen the setscrews *(item 12, figure 17)* and reset the adjusters *(item 13, figure 17).*

The rear web *(item 14, figure 17)* is adjustable at the lower end to allow for repositioning of the web in relation to the cage feed roller *(item 2, figure 17).* The larger the gap between the two, the more clod and trash etc. can be removed. However, if the gap is too large it may result in beet loss. To adjust, loosen the setscrews *(item 15, figure 17)* and reposition the rear web roller frame *(item 16, figure 17)* by resetting the adjusters *(item 17, figure 17).*

The trip roller, cage feed roller, front web and rear web are driven hydraulically. A pressure relief valve set at 190 bar (2800psi) is fitted to protect the hydraulic system should any major blockage occur. It is an essential safety feature preset at the factory and should never be tampered with.

Trash Extractor

Once the sugarbeet reach the top of the lift web, they are transferred onto the trash extractor unit. The beet fall past the trash roller *(item 1, figure 18)* while leaves etc. are carried forward under the roller to be thrown out of the harvester. The beet fall onto the reverse running trash extractor web *(item 2, figure 18)* where further cleaning takes place and then roll down onto the discharge elevator feed web. The speed of the trash extractor web can be increased or descreased by turning the control knob *(item 12, figure 26).*

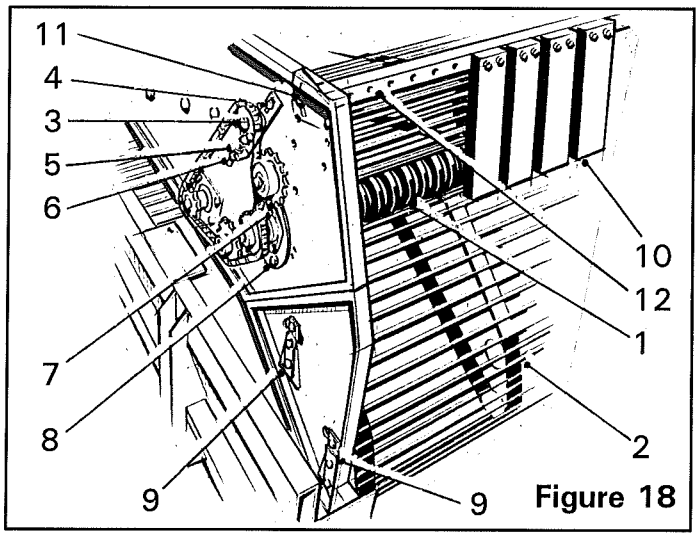


Figure 18

The rubber trash roller *(item 1, figure 18)* can be adjusted to suit varying soil conditions. To adjust the trash roller:

1. Loosen the chain tensioner *(item 3, figure 18)* by slackening the securing bolts *(item 4, figure 18)* and the locknut *(item 5, figure 18).*
2. Turn the adjuster nut *(item 6, figure 18)* to loosen the chain.
3. Loosen the locknuts *(item 7, figure 18)* and remove the bolts *(item 8, figure 18).*
4. Pivot the trash roller to the required position and refit the bolts *(item 8, figure 18)* into a different hole. Ensure both sides of the roller are set equally.
5. Finally, retension the chain by turning the adjuster nut *(item 6, figure 18)* and retighten all nuts and bolts.

The angle at which the trash extractor web *(item 2, figure 18)* operates, is adjustable. When the trash is dense, the web should be operated at a shallow angle. When only a small amount of trash is evident, the web should be operated at a steeper angle.

The adjustment is made by repositioning the four web carrying rollers by removing the setscrews *(item 9, figure 18)* and swinging the rollers into the new position.

Rubber deflector blocks *(item 10, figure 18)* are fitted to deflect the sugarbeet down onto the trash extractor web. The deflectors are adjustable for height and angle depending on crop conditions. To adjust the angle of the deflectors, loosen the securing bolts *(item 11, figure 18)* and pivot the deflector frame *(item 12, figure 18)* to the required angle. To adjust the height of the deflectors, remove the securing bolts *(item 11, figure 18)* and reposition the deflector frame over a different pair of holes.

Discharge Elevator

The discharge elevator is designed to provide ease of folding from the working position to the transport position and vice-versa. The elevator top section is hydraulically adjustable to allow even filling of the trailer and also to keep the drop to a minimum. All hydraulic functions of the discharge elevator are controlled electronically from the in-cab control box.

Never operate the machine with the discharge elevator in the folded transport position.

The elevator feed web conveys the beet across the rear of the machine to the foot of the discharge elevator. The beet are then elevated between two webs running in the same direction to the top of the elevator where they are discharged into the trailer. The sugarbeet are trapped between the webs and, while travelling up the elevator, are cleaned by being able to rotate and move around. If more cleaning is required, the gap between the two webs can be increased by repositioning six adjustable rollers.

To increase the gap between the webs, remove the adjustable roller setscrews *(item 1, figure 19)* and rotate the roller arms *(item 2, figure 19)* to the required position and resecure.

The top track frame *(item 3, figure 19)* is adjustable for varying crop conditions. As a general rule, the smaller the beet, the lower the top track frame should be set. This allows the top track web to grip the beet rather than allowing them to fall and possibly block the elevator.

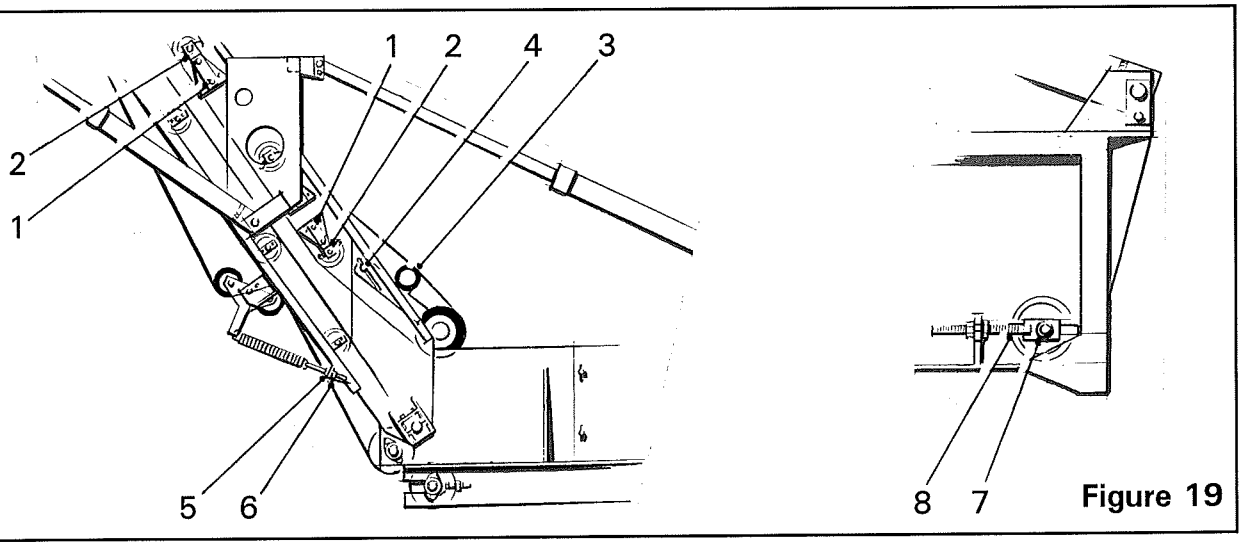


Figure 19

To adjust the top track frame *(item 3, figure 19)*, slacken the setscrews *(item 4, figure 19)* and remove the spring tensioner tab locking bolt. Slide the frame up or down the slot and resecure. Finally, refit the spring tensioner tab locking bolt.

The discharge elevator web tension is provided by a spring loaded mechanism fitted to the lower section of the elevator. To increase the tension, loosen the spring adjuster locknut *(item 5, figure 19)* and turn the adjuster nut *(item 6, figure 19)*.

Adjustment in tracking of the discharge web is made by loosening the end roller locknuts *(item 7, figure 19)* and repositioning the adjusters *(item 8, figure 19)*. Further adjustment can be achieved by repositioning the top drive shaft bearings *(item 1, figure 20)* by adjusting the tensioners *(item 2, figure 20)*.

The drive for the discharge elevator webs is provided by a hydraulic motor. The drive is transmitted by three chains and two gears which should be checked regularly and adjusted when required. Two of the chains are tensioned by the adjuster blocks *(item 3, figure 20)*. The remaining chain is fitted with a spring adjusted tensioner *(item 4, figure 20)*. The idler gear *(item 5, figure 20)* can be adjusted in relation to the motor gear when required. To adjust, loosen the three retaining bolts *(item 6, figure 20)* and rotate the gear and spigot in the slots.

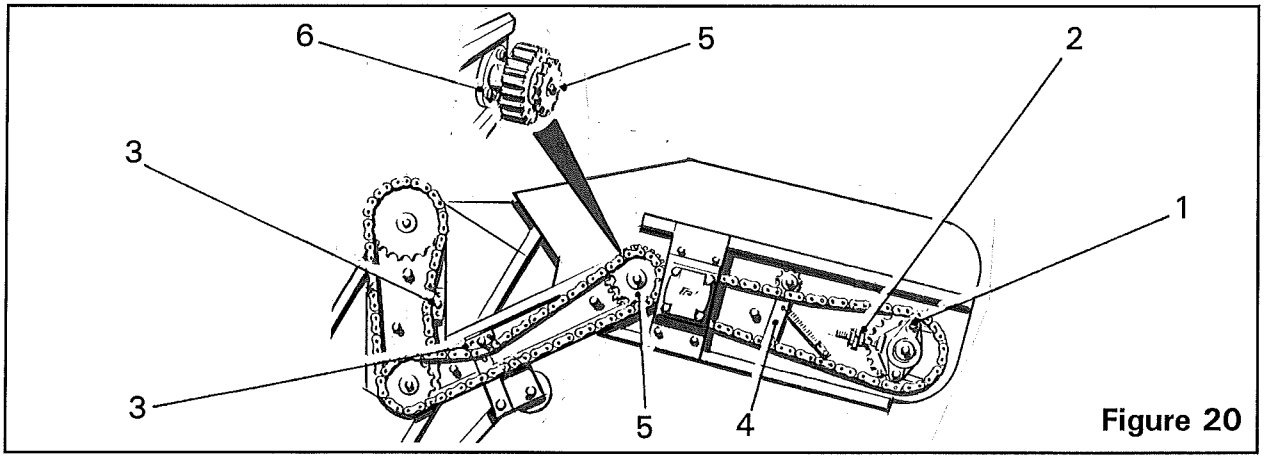


Figure 20

Rear Wheels

On some machines the rear wheels are steerable to assist with hillside work and also enable easier headland turning. The steering is controlled electronically from the in-cab control box. The steering buttons marked 'Left' and 'Right' steer the rear of the machine in the indicated direction. The 'Auto Centre' button when pressed and held, operates the self centring circuit which automatically sets the wheels to the straight ahead position.

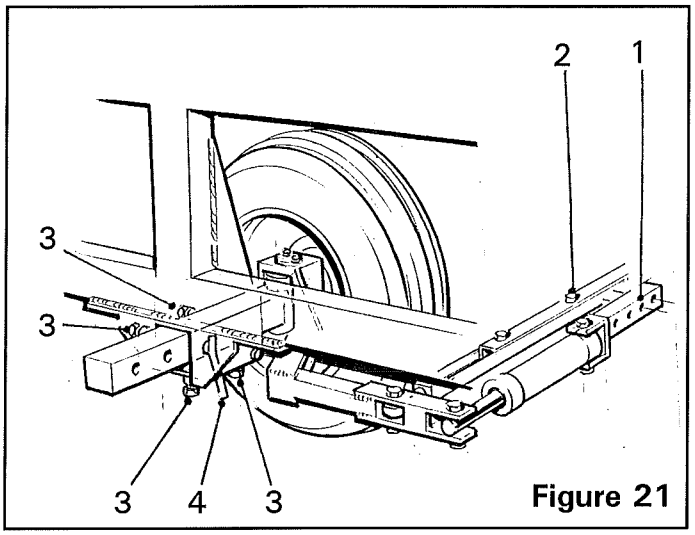


Figure 21

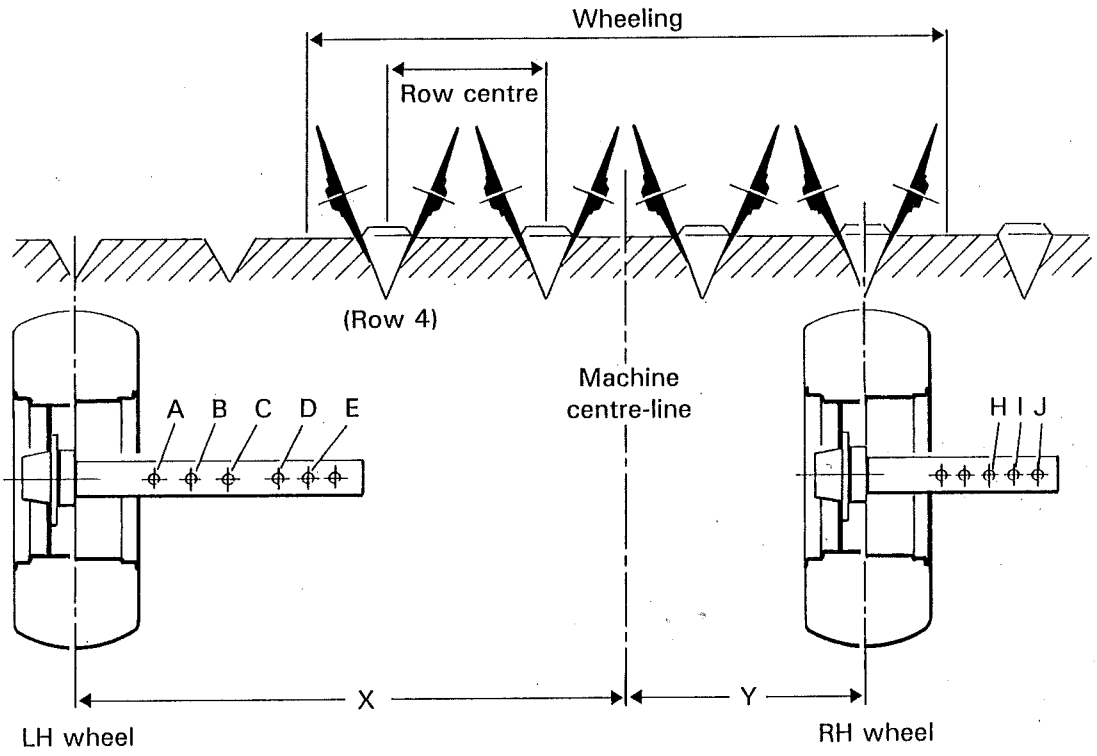
Both LH and RH wheels are adjustable to suit different row settings. To adjust the rear wheels:

1. Jack up the harvester.

When carrying out wheel adjustments, always place the jack on firm ground under a solid part of the harvester. Before removing a wheel, place a stout support under the harvester frame in case the jack should become dislodged.

2. If steerable rear wheels are fitted, remove the ram support bolts *(item 1, figure 21)* and the track rod retaining bolts *(item 2, figure 21)*.
3. Loosen the stub axle clamp bolts *(item 3, figure 21)* and withdraw the locking pin *(item 4, figure 21)*.
4. Slide the stub axle to the required position *(see figure 22)*.
5. Refit the locking pin *(item 4, figure 21)* into the correct hole *(see figure 22)* and retighten the axle clamp bolts *(item 3, figure 21)*.
6. If steerable rear wheels are fitted, replace the ram support bolts *(item 1, figure 21)* and the track rod retaining bolts *(item 2, figure 21)*.

Rear Wheels Setting Chart



			LH Wheel Position		*RH Wheel Position*
No. of Rows	***Row centres***	***Wheelings***	***Opening Up Position***	***Working Position***	***Working Position***
4 Row	41cm (16")	183cm (72")	A	C	J
3 Row	46cm (18")	152cm (60")	B	D	I
4 Row	46cm (18")	198cm (78")	B	D	I
3 & 4 Row	46cm (18")	-	A	C	I
4 Row	51cm (20")	213cm (84")	B	E	H
3 & 4 Row	51cm (20")	-	B	D	H

Hole Position	*X' Dimension*		*Hole Position*	*Y' Dimension*
A	143cm (56")		H	76cm (30")
B	152cm (60")		I	69cm (27")
C	163cm (64")		J	61cm (24")
D	178cm (70")			
E	185cm (73")			

Figure 22

Automatic Depth Control

The purpose of the automatic depth control unit is to ensure the lifting wheels are always lifting at the same depth. The depth foot *(item 1, figure 23)* runs along the ground between two rows of beet following the contours of the land. The depth foot actuates proximity switches which in turn operate the drawbar depth ram which then corrects the harvester.

To engage the automatic depth control, press the control box switch *(item 2, figure 23)*. Manual control can be obtained by disengaging the automatic depth control and pressing the up and down buttons *(item 3, figure 23)*.

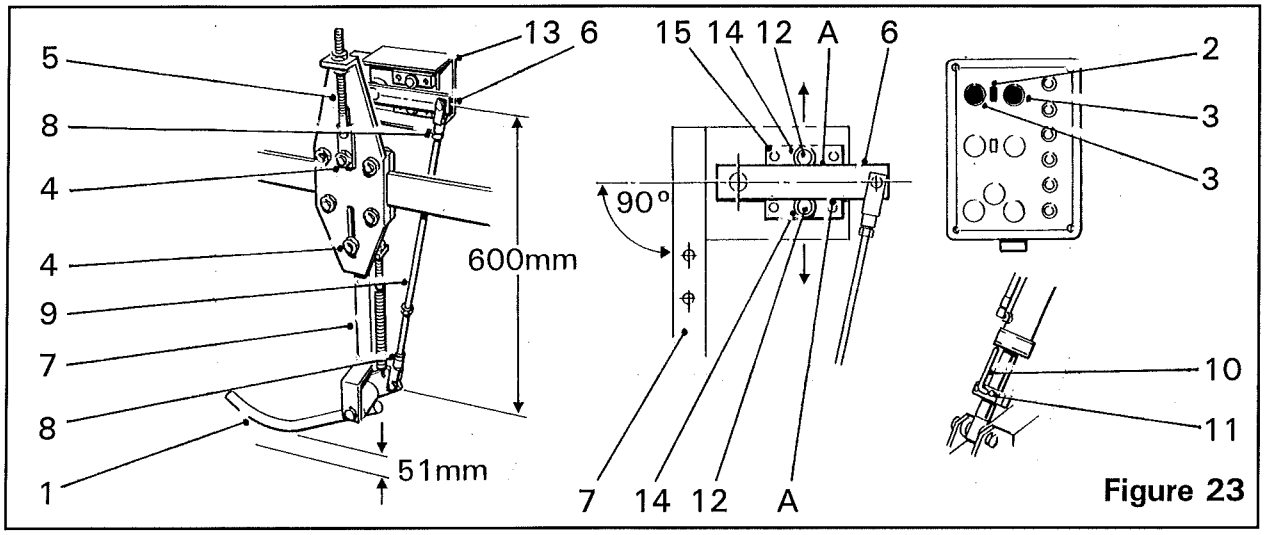


Figure 23

Note: When setting the depth control it is advisable to stand the harvester on a level concrete surface with the lifting wheels in contact with the ground.

To adjust the automatic depth control, place a 51mm (2") block of wood, or something to represent the depth at which you wish to lift, beneath the depth foot *(item 1, figure 23)*. Ensure the connecting rod dimension is 600mm. Loosen the retaining bolts *(item 4, figure 23)* and, using the adjuster *(item 5, figure 23)*, raise or lower the complete unit until the sensor arm *(item 6, figure 23)* is at 90° to the depth stalk *(item 7, figure 23)*. Retighten all nuts and bolts. The machine is now set to lift at the required depth.

If finer adjustment is required, loosen the clevis locknuts *(item 8, figure 23)* and turn the connecting rod *(item 9, figure 23)*. Be sure not to turn the connecting rod more than a couple of turns. Finally, retighten the locknuts *(item 8, figure 23)*.

The drawbar ram depth marker *(item 10, figure 23)* should be set after the harvester lifting depth has been established. Loosen the retaining bolts *(item 11, figure 23)* and slide the marker until the top edge is aligned with the bottom edge of the ram. Finally, retighten the retaining bolts.

The proximity switches *(item 12, figure 23)* are located inside the depth control box *(item 13, figure 23)*. Under normal circumstances, these are factory set.

The retaining nut *(item 14, figure 23)* holds the proximity switch in place. If the nut is loosened the switch can be positioned closer or further from the sensor arm *(item 6, figure 23)*.

The remaining adjustment is for altering the time that elapses between one switch deactuating and the other switch actuating (dead band). To adjust the dead band, the switches are moved fractionally closer/further from the sensor arm edges "A". Moving the proximity switches fractionally away from the arm as shown by the arrows will increase the dead band. Moving the proximity switches fractionally closer to the arm will decrease the dead band. The proximity switches are held in place by the setscrews *(item 15, figure 23)*. Ensure both switches are adjusted equally in order to maintain the sensor arm neutral position at 90° to the depth stalk *(item 7, figure 23)*.

Note: At no time should both proximity sensors light up. A neutral band must always be present where both switches are off.

Automatic Self Steering

The purpose of the automatic self steering unit is to allow the harvester to follow the rows of beet irrespective of the contours of the land. The steering feet *(item 1, figure 24)* travel on either side of the beet and in doing so, are steered by them. The feet actuate and deactuate proximity switches which in turn operate the drawbar steering ram which then corrects the harvester.

To engage the automatic self steering, press the control box switch *(item 2, figure 24)*. If during work steerage of the harvester needs to be made manually, the automatic self steering can be overriden by pressing the left and right buttons *(item 3, figure 24)*.

Note: Before adjusting the automatic self steering, the harvester working depth must be set.

To adjust the steering feet to suit different row centres, remove the tie tube *(item 4, figure 24)* and detach the two springs *(item 5, figure 24)*. Loosen the securing bolts *(item 6, figure 24)* and slide the steering unit to the required position. All row width settings should be made about the centre-line of the machine *(see figure 22)*. Adjust the tie tube to suit the desired row setting by turning the adjustable ends *(item 7, figure 24)*. Finally, refit the tie tube *(item 4, figure 24)* and springs *(item 5, figure 24)*.

The steering feet should be adjusted to pass on either side of the largest beet. To adjust, loosen the retaining bolt *(item 8, figure 24)* and slide the clamp bracket *(item 9, figure 24)* to the required position and retighten.

The bottom of the steering feet should be adjusted to run parallel with the ground. To adjust, loosen the retaining bolt *(item 10, figure 24)* and slide the support leg *(item 11, figure 24)* until the steering feet are at the correct attitude.

The proximity switches *(item 12, figure 24)* are located inside the depth control box *(item 13, figure 24)*. Under normal circumstances, these are factory set.

The retaining nut *(item 14, figure 24)* holds the proximity switch in place. If the nut is loosened the switch can be positioned closer or further from the sensor arm (item 15, figure 24).

The remaining adjustment is for altering the time that elapses between one switch deactuating and the other switch actuating (dead band). To adjust the dead band, the switches are moved fractionally closer/further from the sensor arm edges "A". Moving the proximity switches fractionally away from the arm as shown by the arrows will increase the dead band. Moving the proximity switches fractionally closer to the arm will decrease the dead band. The proximity switches are held in place by the setscrews *(item 16, figure 24)*. Ensure both switches are adjusted equally in order to maintain the sensor arm neutral position.

Note: At no time should both proximity sensors light up. A neutral band must always be present where both switches are off.

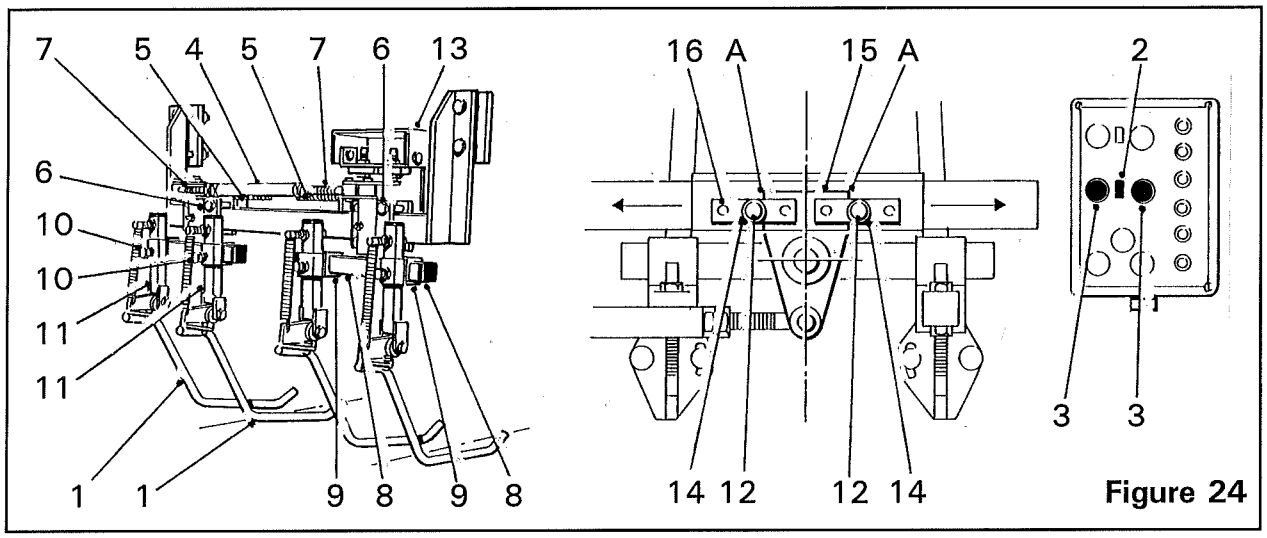


Figure 24

Hydraulic Systems

Two separate hydraulic systems are fitted to the harvester and have no interaction apart from the electrical control system.

Circuit 1. Auxiliary Hydraulics

The hydraulic ram services are supplied with oil from the tractor. The oil is fed through the pressure filter *(item 1, figure 25)* to the inlet section of the solenoid valve bank *(item 2, figure 25)*. The in-cab control box energises the individual solenoid valves which in turn actuate the hydraulic rams.

On tractors equipped with an open circuit, the screw located at the rear of the return section of the valve block (location "A", figure 25) should be screwed out anticlockwise as far as possible. On tractors equipped with a closed circuit (eg. John Deere), the screw should be screwed in clockwise as far as possible.

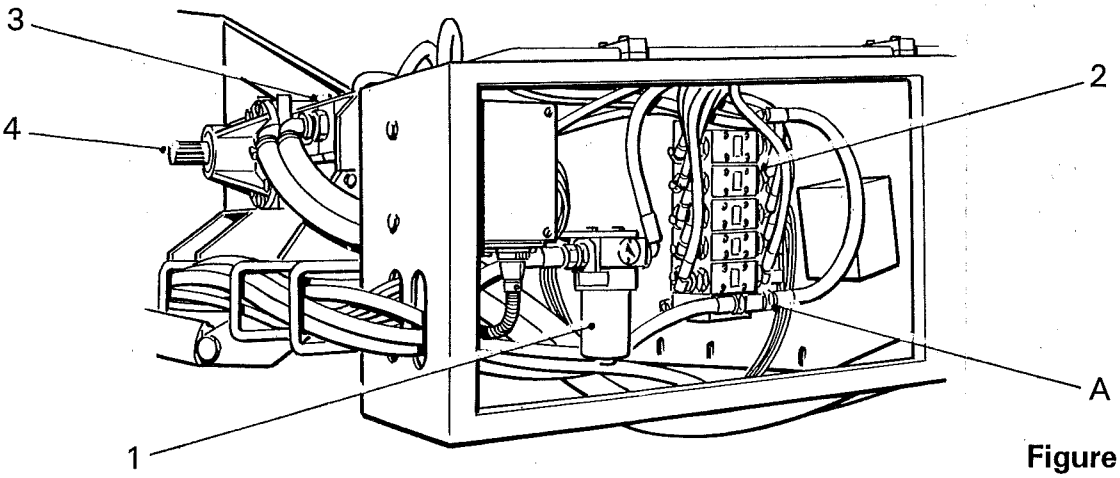


Figure 25

Circuit 2. Hydraulic Drives

The triple pump *(item 3, figure 25)* driven from the 1:2.4 ratio gearbox *(item 4, figure 25)* provides the necessary oil flow to drive the hydraulic motors that perform the working functions of the machine. The oil reservoir is integral within the harvester chassis and has a capacity of approximately 225 litres (50 gallons). The reservoir has a removable lid for ease of maintainance of the two suction strainers *(item 1, figure 26)* inside. The 10 micron filter *(item 2, figure 26)* mounted on the reservoir return port removes any foreign bodies within the hydraulic fluid. Two shut-off valves *(item 3, figure 26)* are fitted to the oil reservoir to allow maintenance of the hydraulic system without having to drain the reservoir.

Never operate the machine with the shut-off valves (item 3, figure 26) in the closed position.

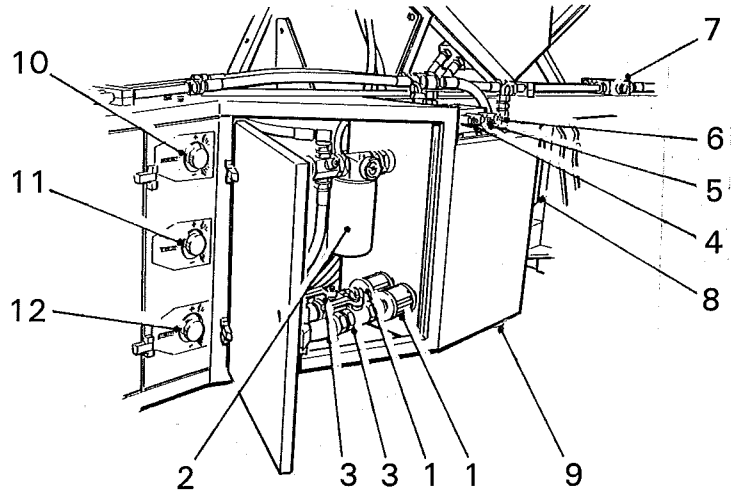
The triple pump *(item 3, figure 25)* is a double gear type. Each section of the pump delivers 54 litres/minute (12 gallons/minute) at a tractor PTO speed of 540rpm.

When the turbo topper is not in use, the male and female hose couplings should be connected together to complete the circuit. Failure to do so may result in damage to the machine.

A valve block containing three pressure relief valves is located on top of the hydraulic reservoir. The relief valves protect the hydraulic system should any major blockage occur. The relief valve *(item 4, figure 26)* located nearest the front protects the turbo topper and flipper circuit. The centre relief valve *(item 5, figure 26)* protects the lift web and trash extractor circuit. The rear relief valve *(item 6, figure 26)* protects the discharge elevator circuit. The working pressure of each circuit can be rated by removing the blanking plug on the appropriate relief valve and inserting a pressure gauge.

The pressure relief valves are an essential safety feature of the hydraulic system. They are preset at 190 bar (2800psi) and should never be tampered with.

The hydraulic dump valve *(item 7, figure 26),* located on the chassis frame behind the LH wheel, engages and disengages the discharge elevator drive. The valve is electronically operated from the in-cab control box.



Never operate the machine with the shut-off valves (item 3) in the closed position

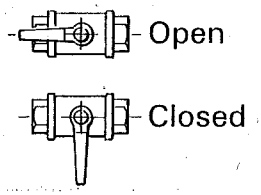


Figure 26

Maintenance of the Mechanical Drives

Drive chains and belts must be maintained at the correct tension. The various adjustments are detailed within this manual. Maintaining correct tension, alignment and lubrication will ensure the efficient running of the harvester and prolong the life of the drive components.

The input drive shaft from the tractor PTO should be checked for damage regularly and the inner and outer tubes checked to ensure a free sliding movement. Binding between the input drive shaft components will cause severe end loading on the gearbox input shaft leading to premature failure of the gearbox.

Maintenance of the Hydraulic Systems

The components utilised in the design of the hydraulic systems have been chosen for their maintenance-free characteristics. Should it be necessary to remove any of the hydraulic components, cleanliness is of the utmost importance. Before breaking any connection in the system, ensure that the surrounding area is clean. Pressure wash the machine if possible. Prevent contamination entering the system by plugging any open pipe work and ports with plastic plugs or clean paper wipes. Do not use cloth or rags. Preventing contamination entering the system will prolong the life of the various hydraulic components and will help prevent component failure.

Hydraulic oil under pressure is dangerous. Ensure that any residual pressure is released safely before working on the system. Do not release ram hoses without first supporting the part of the machine the ram controls.

Remember that the tractor hydraulic oil supply serves the machine. Ensure the tractor hydraulic system is serviced in accordance with the manufacturers recommendations to prevent cross contamination of the harvester auxilliary system.

To extend the life of the hydraulic drive system, the hydraulic oil should be carefully monitored. The oil level should be checked regularly using the fluid level gauge *(item 8, figure 26)*. Maintain the level by topping up or refilling with BP UK46 Hydraulic Oil. The reservoir holds approximately 225 litres (50 gallons).

The hydraulic reservoir should only be filled with clean BP UK46 Hydraulic Oil or manufacturers recommended equivalent. Failure to adhere to this specification may result in damage to the equipment.

If a high water content becomes apparent or a cloudiness in the oil, the hydraulic oil should be changed. A drain plug *(item 9, figure 26)* is located under the reservoir.

Regularly check all hoses for chafing or accidental damage and replace immediately.

The pressure filter *(item 1, figure 25)* and return filter *(item 2, figure 26)* elements should be replaced after the first 50 hours running time and then every 500 hours or annually thereafter. Subsequently the filter elements should be replaced if the indicators show that the elements are becoming blocked.

To replace a filter element:

1. Switch off the tractor engine and apply the handbrake.
2. In the case of the auxilliary circuit pressure filter, operate the spool valve feeding the harvester to release any residual pressure and then disconnect the feed hose from the tractor.
3. Unscrew the bottom casing of the filter housing.
4. Remove the filter element and rinse out the casing.
5. Fit the new element and refit the casing ensuring that it is tight.
6. Run the system and check for leaks.

The two suction strainers *(item 1, figure 26)* located within the oil reservoir should be cleaned every 500 hours or annually. Subsequently the strainers should be cleaned or replaced if the elements are becoming blocked.

Maintenance of the Electrical Control System

Trouble shooting of the electrical control system must be carried out by a competent engineer familiar with electrical servicing. The basic test to confirm an electrical fault if a service does not operate, is to try to operate the service using the manual override knobs fitted to the hydraulic valve block. If the service operates manually, then checks should be made to see if power is reaching the relevant solenoid on the valve. If the service does not operate manually, then it is possible the fault lies within the hydraulic system.

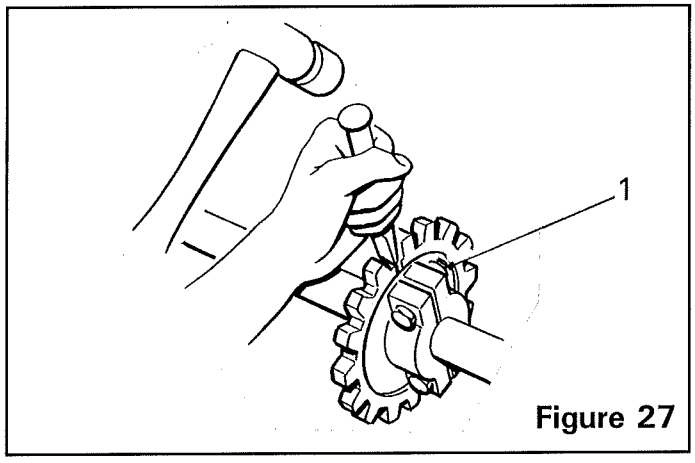


Figure 27

Split Web Drive Sprockets

Split web drive sprockets are fitted as standard on all of the web drive shafts. The sprockets allow for worn sprockets to be replaced or alternative pitch sprockets to be fitted without dismantling the drive shafts.

Most drive sprockets will have been split on initial installation, but if not, they should be split with a hammer and sharp chisel. Before splitting a sprocket, on or off the machine, remove the fixing bolts *(item 1, figure 27)*. Keep the split halves of the sprockets in the correct pairs to prevent mis-match when fitting.

Lubrication

Regular lubrication will ensure that the Standen Spectrum provides a long and efficient service life. Depending on soil and weather conditions, the service schedule can vary. It is recommended that the harvester is given a thorough inspection at least weekly during the working season and at this time the the machine should be greased and the gearbox oil levels checked.

Shafts and bearings fitted with grease nipples should be lubricated using a good quality general purpose grease. Bearings must not be allowed to run dry. When greasing it is better to give a little frequently than a lot a long intervals.

Note: With reference to the lubrication chart, some of the bearings are sealed and pre-lubricated. Care should be taken not to flood these bearings with grease or the seals may burst allowing grease to escape and dirt to get in. Should this happen, more frequent greasing will be required in order to keep the dirt at bay. When lubricating sealed bearings, only two strokes of the grease gun every twenty acres of work is necessary.

The non-sealed bearings should be greased at least once a day or every ten acres.

When checking the chain and gear drives, BP FG00-EP Energrease should be applied to prolong their life.

The gearboxes should be checked occasionally and topped up with EP 90 Gear Oil.

The universal couplings (such as the PTO shaft) should be dismantled periodically and their shafts smeared with grease.

Apply grease to all pivot points, slideways and exposed threads etc to ensure they operate easily and remain free of corrosion.

Particular care must be taken to ensure grease or oil does not come into contact with the 'V'belts or slip clutches.

Lubrication Chart

Lubrication Point Description	*Sealed Bearing*	*Non-sealed Bearing*	*EP 90 Gear Oil*	*BP FG00-EP Energrease*
Main PTO coupling		●		
Gearboxes			●	
Lifting wheel hubs		●		
Flipper wheel drive shaft	●			
Flipper drive chain idler spigot	●			
Lift web front drive shaft	●			
Lift web rear drive shaft	●			
Lift web trip roller	●			
Lift web cage feed roller	●			
Trash extractor web drive shaft	●			
Trash roller drive shaft	●			
Trash extractor drive chain tensioner	●			
Cleaner unit pivots		●		
Cleaner unit drive gears				●
Cleaner unit front drive bearings	●			
Cleaner unit rear bearings	●			
Discharge elevator bottom pivot		●		
Discharge elevator top track web drive shaft	●			
Discharge elevator web top drive shaft	●			
Discharge elevator idler sprocket spigot	●			
Discharge elevator idler gear/sprocket spigot	●			
Discharge elevator drive gears				●
Rear axle king pins		●		
Rear axle wheel hubs	●			
Turbo topper spindle housing (access hole in rotor side)		●		
Turbo topper lift arm pivot		●		
Skewbar PTO coupling		●		
Skewbar drive input housing	●			
Skewbar drive shaft support bearings	●			
Skewbar arm top bearing housings	●			
Skewbar arm bottom bearing housings	●			
Disc coulter pivots		●		

Service Schedule

On delivery and after the first 2 hours	
Nuts, bolts and keyways	Check tightness
Machine	Lubricate

Every day (or every 10 acres)	
Hydraulic oil	Check level
Nuts, bolts and keyways	Check tightness
Non-sealed bearings	Lubricate
Hydraulic hoses and fittings	Check condition
Machine components	Check condition

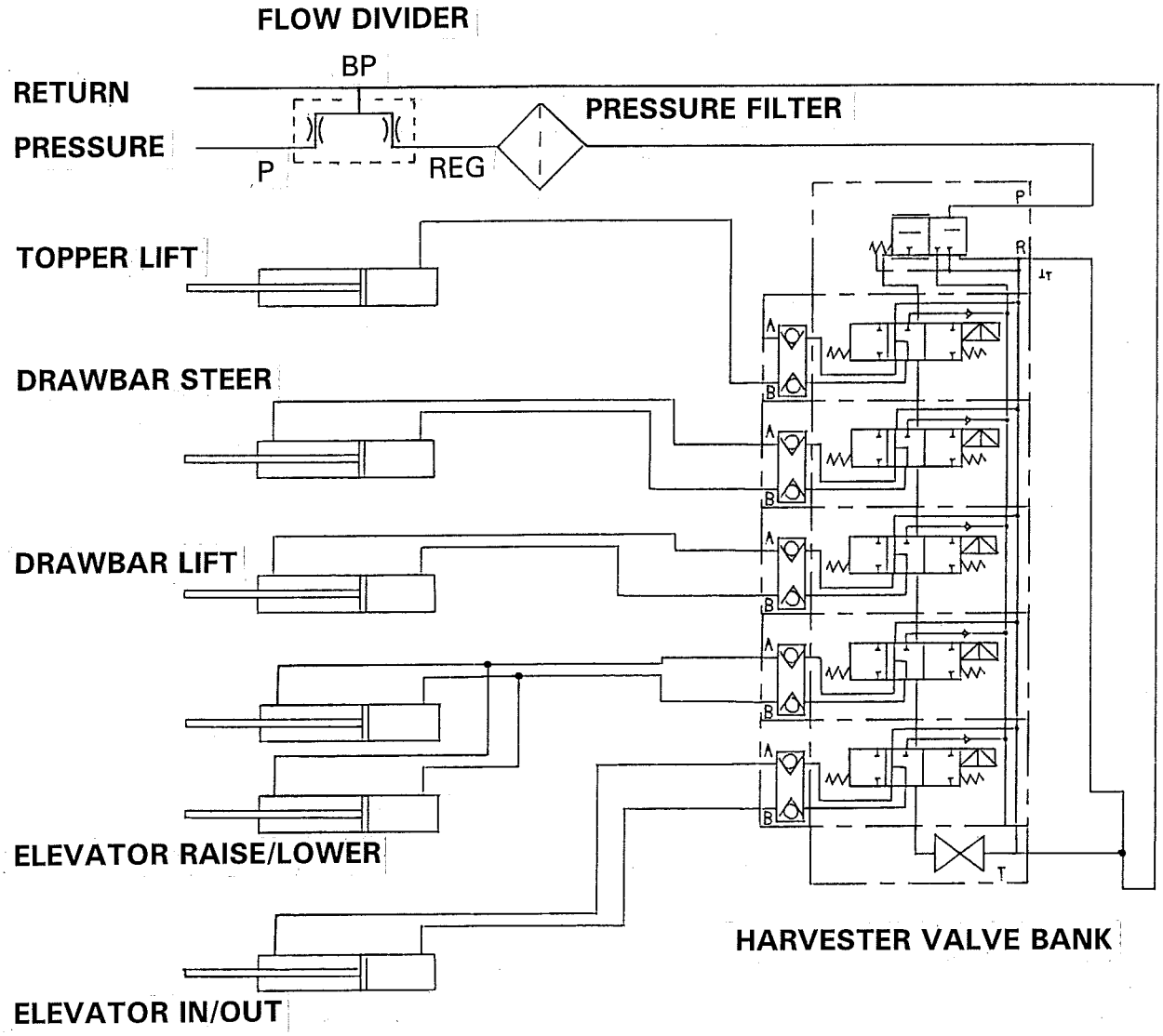
Every two days (or every 20 acres)	
Sealed bearings	Lubricate
Chain drives	Check tension and lubricate
Gear drives	Lubricate

After the first 50 hours	
Pressure filter and return filter	Replace filter element
Suction strainer	Clean

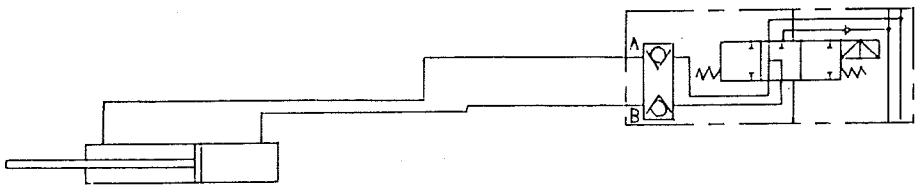
Every 500 hours (or annually)	
Pressure filter and return filter	Replace filter element
Suction strainer	Clean or replace
Hydraulic oil	Change

End of the season	
Machine	Clean down thoroughly
Machine components	Check condition
Machine	Lubricate
Bright surfaces	Treat with rust preventative
Paintwork	Touch up
Machine	Store in a dry place
Control box	Remove and store in a dry place

Auxiliary Hydraulic Circuit

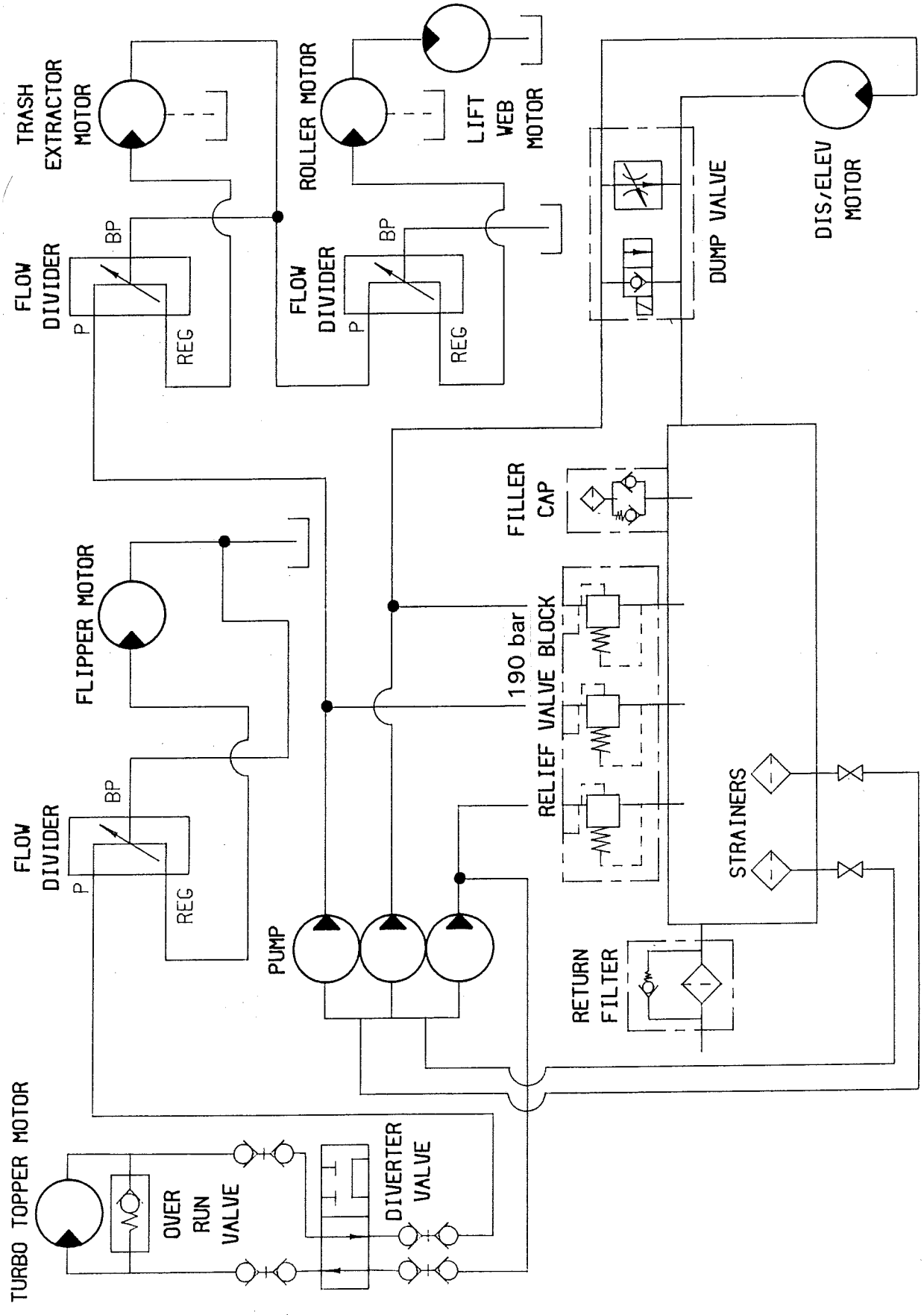


BASIC BUILD



REAR WHEEL STEER OPTION

Hydraulic Drives Circuit



Nut/Bolt Tightening Torque

Description	*Torque*		*Description*	*Torque*
M6 nyloc zinc plated nut	10lb/ft		M6 bolt/steel nut	7lb/ft
M8 nyloc zinc plated nut	23lb/ft		M8 bolt/steel nut	19lb/ft
M10 nyloc zinc plated nut	44lb/ft		M10 bolt/steel nut	38lb/ft
M12 nyloc zinc plated nut	87lb/ft		M12 bolt/steel nut	70lb/ft
M16 nyloc zinc plated nut	208lb/ft		M16 bolt/steel nut	170lb/ft
M20 nyloc zinc plated nut	380lb/ft		M20 bolt/steel nut	325lb/ft
M24 nyloc zinc plated nut	690lb/ft		M24 bolt/steel nut	565lb/ft

Dimensions	**3 Row Machine**	**4 Row Machine**
Length	7.1m	7.1m
Width (in work))	5.2m	5.2m
Width (in transport)	3.0m	3.0m
Height (in work))	4.0m	4.0m
Height (in transport)	3.3m	3.3m
Under elevator clearance (maximum)	3.5m	3.5m
Under elevator clearance (minimum)	2.5m	2.5m
Row widths	46cm (18") to 56cm (22")	41cm (16") to 51cm (20")
Wheel size	12.5x18 or 16x20	12.5x18 or 16x20
Shipping dimensions	(L)5.6m,(W)2.9m,(H)3.0m	(L)5.6m,(W)2.9m,(H)3.0m

Technical Data

Weight	4.4 tonnes	5.1 tonnes
Tractor hp requirement (scalper)	100hp min.	105hp min.
Tractor hp requirement (skewbar)	110hp min.	115hp min.
Tractor hydraulic flow rate	10 litres/minute min.	10 litres/minute min.
Oil reservoir capacity (BP UK46 Hydraulic Oil)	225 litres (50 gallons)	225 litres (50 gallons)
Relief valve setting	190 bar (2800psi)	190 bar (2800psi)
Tyre pressure	2.7 bar (40psi)	2.7 bar (40psi)
Wheel nut torque	185lb/ft	185lb/ft

Standen Engineering's policy of continual product development means that specifications may be altered without prior notice. All dimensions are approximate.