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IMPORTANT

This operator's 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. Therefore, some illustrations and/or text within this publication may differ from your machine.

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CONTENTS

INTRODUCTION	
Introduction to the handbook	1.1
Warranty	1.2
Replacement parts	1.2
SAFETY PRECAUTIONS	
Safety	1.3
Machine noise level	1.3
Operation	1.3
Transport	1.4
Maintenance	1.4
Sate use of potato harvesters Working safely near	1.5
overhead power lines	1.7
INSTALLATION	
TSP 1900	1.9
Tractor suitability	1.9
Tractor wheel setting	1.9
Attaching the harvester	1.10
PTO shaft	1.11
Harvester wheel setting	1.12
OPERATION	
Digger assembly	1.14
Manual depth control	1.14
Automatic depth control	1.15
Depth wheels	1.15
Disc coulters	1.10
Primary web	1.10
Vari-sen	1 17
Secondary web	1 18
Rotary agitators	1.18
Transfer stars	1.19
Omega separator	1.19
Sizer units	1.19

LH boom feed web 1.20 RH boom feed web 1.20 LH & RH booms 1.21 Boom Auto-height Control 1.21 Hvdraulic systems 1.22

	1.66
Electrical control system	1.24
In-cab console	1.24
Boom operator's console	1.25
Speed control / junction box	1.26
Emergency stop / reset button	1.26

HARVESTING

Starting off your harvester Damage prevention	1.27 1.27
during harvesting	1.29
MAINTENANCE	
Maintenance of the	
hydraulic systems	1.32
Residual hydraulic pressure	
dump procedure	1.34
Rear axle self-centring	1.34
Proximity sensor adjustment	1.34
Auto-height ultrasonic sensor	
adjustment	1.35
Split web drive sprockets	1.36
Maintenance of the	
mechanical drives	1.36
Maintenance of the	
electrical system	1.36
New machines	1.36
Machine lubrication	1.37
Daily maintenance	1.37
Weekly maintenance	1.38
Annual maintenance	1.38
Out of season storage	1.38
SPECIFICATIONS	

Machine dimensions 1.40 Machine weight 1.40 Technical data 1.40 Machine nut and bolt tightening torques 1.40

Introduction to the Handbook

This handbook provides the information for the operation, adjustment and maintenance of your Standen TSP 1900. 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 driver's 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.



WELDING WARNING:

Before carrying out any welding on the harvester, <u>always</u> disconnect the harvester from the tractor. Failure to observe the above precautions may cause severe damage to the harvester and tractor electrical systems.

INTRODUCTION

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.

THE OMEGA SEPARATION UNITS IN THIS HARVESTER ARE ONLY APPROVED FOR USE WITH EBONITE AND STEEL ROLLERS. RUBBER ROLLERS MUST NOT BE FITTED INTO THESE MACHINES IN THE PLACE OF THE EBONITE OR STEEL ROLLERS.

Section 3 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.

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

Safety

The Standen TSP 1900 has been designed to comply with current Safety Regulations. However, as with all machinery there will be inherent dangers whilst operating and carrying out maintenance on the machine. The following safety precautions should therefore be brought to the attention of all persons operating and working on the machine. The list is not exhaustive. All machinery is potentially dangerous and the operators must exercise great care 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.

Machine Noise Level

Average continuous noise level at the operator's ear with machine harvesting crop is 80.75dB (maximum peak level 85.6dB). It should be noted that this level could vary dependant upon tractor/machine combinations.

Operation



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

Never allow children or

on the machine.

animals in the vicinity where

machines are working and

never allow anyone to ride



motion before ensuring that everyone in the vicinity is aware of your intentions.

Never set machinery in





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 attempt to fit drive chains or drive belts to the machine while the drive sprockets or pulleys are in motion.



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



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



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



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



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



The hydraulic oil reservoir is integral within the chassis side beams which can become hot during operation. Therefore, take care when touching the chassis and steel pipework.

1.3

SAFETY PRECAUTIONS



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 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



Always switch off the electrical control system before transporting the harvester on the road.



When in transport, the digger assembly must be locked in the raised position.



When in transport, the booms 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 the machine is to be left to stand for any length of time, the digger assembly should be locked in the raised position.



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 released before disconnecting any pipework.



Regularly lubricate the machine as per the operator's 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.

HSE information sheet



Agriculture Sheet No 13



Introduction

This information sheet outlines the key dangers common to most potato harvesters. It also lists essential Do's and Don'ts for the safe operation of these machines.

A study of accidents investigated by HSE showed that 11 people were killed and 121 seriously injured when working with potato harvesters between 1988 and 1996.

Five people died and seven were seriously injured when they were run over by potato harvesters.

Ninety-seven people injured arms or legs when caught in haulm or cleaning rollers. These accidents often caused amputations.

All users of potato harvesters need to identify the hazards caused by their harvesters and make sure all those working with these machines know and follow safe working practices to prevent accidents and serious injuries.

Key dangers

Injuries are caused by:

- getting caught in haulm and cleaning rollers;
- harvesters and tractors running over people;
- falling from access ladders and platforms;
- getting caught in conveyors or elevator chains;
- getting caught by the drive mechanisms;
- getting wrapped around the power take-off (PTO) shaft;
- failing to switch off **all** power sources;
- handling bags of potatoes;
- poor working positions causing back strains etc.

Health & Safety Executive

SAFETY PRECAUTIONS

Do's and Don'ts

Do:

- make sure everyone working on the harvester has understood the safety instructions in the handbook;
- provide the operator with clear instructions on the safe way to clean the harvester of haulm, stones, potatoes etc;
- agree a system for communicating between the platform and the tractor driver, eg sound the horn before starting the engine, reversing or engaging drives;
- check that all haulm, clod and cleaning rollers are properly guarded. Fit additional guards if anyone can reach the rollers with arms or legs from any position. Manufacturers can help with guard kits;
- fit an alarm or stopping device on the platform;
- make sure you and any of your employees, relief drivers and contractors are properly trained in the safe use of the potato harvester and have read this sheet;
- remember that putting the PTO out of gear will not cut the power to some hydraulically driven components;
- take particular care when reversing; make sure you can see what is behind or seek assistance if the view is obscured;
- stop the tractor engine and pocket the ignition key before you carry out any work on the potato harvester;
- make sure all guards are in position and correctly fitted before starting work;
- stop the engine before anyone clears a blockage;
- stop the tractor before anyone gets on or off the harvester.

Don't:

- reach into the potato harvester unless all drives are stopped;
- climb over harvesters;
- jump on or off the harvester when it is moving;

- leave the driving position of a moving or running tractor;
- work under box handling attachments without using the supports provided;
- carry out maintenance with the tractor engine running;
- park or carry out maintenance when under or near overhead power lines;
- run the harvester with the guards raised or removed;
- allow children on or near the harvester.

General guidance

Take care when working in difficult conditions or those with weed or haulm problems - don't overload the machine. Remember that avoiding blockages is easier than clearing them. Use drive reversing mechanisms when fitted and encourage the use of conveyor controls to optimise picking conditions.

Make use of relevant training courses such as those run by ATB Landbase, manufacturers and dealers. They will help to ensure the safe and efficient use of your potato harvester.

Further information

HSE priced and free publications are available by mail order from:

HSE Books, PO Box 1999, Sudbury, Suffolk CO10 6FS Tel: 01787 881165 Fax: 01787 313995.

HSE priced publications are also available from good booksellers.

For other enquiries ring HSE's InfoLine Tel: 0541 545500 or write to HSE's Information Centre, Broad Lane, Sheffield S3 7HQ.

This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

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SAFETY PRECAUTIONS

HSE information sheet



Working safely near overhead power lines

Agriculture Information Sheet No 8 (rev)



Be aware of line heights

Introduction

About five people are killed every year in accidents involving overhead power lines during agricultural work. Machinery (eg combines, tipping trailers and loaders); equipment (eg irrigation pipes and ladders); and activities (eg stacking) are often involved. Contact with the lines does not need to be made. Electricity can flash over when machinery or equipment gets close to overhead lines.

Most incidents involve high-voltage lines supported on wooden poles, but the dangers of other power lines cannot be ignored.

This information sheet outlines the steps you can take to reduce the risks when working near overhead power lines. Remember the Electricity at Work Regulations 1989 apply to work activities carried out near power lines.

Planning precautions

Consult your local electricity company. They will provide free information and advice about precautions and safe working procedures which can be followed near power lines.

Find out the maximum height and maximum vertical reach of your machines and those used by contractors.

Find out the routes of **all** overhead lines on your land or near your boundaries. Mark them on the farm map. The electricity company will give you this information. **Make sure** you have information about all the lines on your land - if not, contact the owners of those lines.

The farm map can be used as a reference when planning cropping or other work, instructing machine operators and contractors, or buying new equipment.

In cases where there is a significant risk area, it is sensible to discuss the following measures with the electricity company:

- **access**: creating alternative access points and routes this is often the cheapest option;
- divert lines: benefits can arise from burying lines or changing routes - an option particularly suited to farmyards;
- barriers and goal posts: by erecting goal posts and barriers, machines which have to pass beneath lines can be limited to a safe height - an option especially suited to gateways and tracks.

Working safely

Key elements of safe systems of work are:

Training

Everybody who works near overhead power lines with a machine or equipment needs to know what the dangers of overhead lines are and the precautions to follow.

Contractors are at risk when they work on farms where overhead lines are present. Make sure they know where the lines are and tell them the precautions they need to take. Routes can be marked with safety signs to warn all visitors of the dangers.

Use of machinery

Accidents can be avoided if the following operations are **not** carried out within a horizontal distance of at least 9 m from power lines on wooden poles or at least 15 m of lines on metal towers:

- stacking bales or potato boxes;
- folding sprayer booms;
- tipping trailers or lorries;
- operating materials handlers;
- working on top of combines or other high machinery.

Risks can be reduced by:

- using sprayers with horizontally folding booms;
- taking care not to damage poles and stays;
- making sure machinery can operate safely near any overhead lines;
- fitting shorter radio aerials to high machines so they cannot cause danger;
- carrying irrigation pipes horizontally using two people and not storing pipes near power lines.

EMERGENCY ACTION IN THE EVENT OF AN ACCIDENT

- Never touch an overhead line even if it has been brought down by machinery, or has fallen. Never assume lines are dead.
- When a machine is in contact with an overhead line, electrocution is possible if anyone touches both the machine and the ground.
- If you need to get out to summon help or because of fire, jump out without touching any wires or the machine. Keep away.
- Get the electricity company to disconnect the supply. Even if the line appears dead, do not touch it - automatic switching may reconnect the power.

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Further advice

For further advice and information contact your local electricity supply company. You can also get advice from the Farm Energy Centre, National Agricultural Centre, Stoneleigh Park, Warwickshire CV8 2LS (Tel: 01203 696512). To obtain the latest edition of their handbook *Safe use of electricity in farming and horticulture* (FEC 2100: 3rd edition 1992), send them a cheque for £2.50 made payable to Farm Energy Centre.

Further reading

Avoidance of danger from overhead electrical lines GS 6 (rev) HSE Books 1991 ISBN 0 11 885668 5

Farm Electric *The safe use of irrigators and slurry guns near overhead electric power lines* Electricity Association Technology Ltd. Available free from the Farm Energy Centre, National Agricultural Centre, Stoneleigh Park, Warwickshire CV8 2LS

Memorandum of guidance on the Electricity at Work Regulations 1989 HSE Books 1989 ISBN 0 11 883963 2

Management of health and safety at work. Management of Health and Safety at Work Regulations 1992. Approved Code of Practice HSE Books 1992 ISBN 0 7176 0412 8

An HSE video called *Shock horror* is available for purchase or hire from CFL Vision, PO Box 35, Wetherby LS23 7EX (Tel: 01937 541010).

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HSE home page on the World Wide Web: http://www.open.gov.uk/hse/hsehome.htm

This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

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TSP 1900

The Standen TSP 1900 is a tractor-drawn sweet potato harvester designed to harvest two rows of sweet potatoes, clean, grade and load them into trailers running alongside.



Before starting work, check that the machine is in a safe working condition. Check components that could work loose during operation such as wheel nuts, chains, sprockets and share arms 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 recommended tractor for the TSP 1900 is four-wheel drive with 134 kW (180 bhp). This power may need to be varied to achieve optimum output under different crop conditions and depending on the specification of the harvester.

The harvester requires a constant hydraulic oil supply from the tractor of a minimum 50 litres/minute (80 litres/minute maximum) with a low back pressure/free return to the tractor. A load-sensed oil supply above this figure is recommended. Also required is a 12volt D.C. negative earth power supply rated at 50 amps to feed the electrical control system.

Three control consoles operate the electrical and hydraulic functions of the harvester. The in-cab console fitted inside the tractor, the boom operator's console fitted on the harvester rear platform, and the speed control junction box fitted on the RH side of the harvester.

The TSP1900 can be towed from either the tractor pick-up hitch hook or from the tractor clevis hitch. If towed from the clevis hitch, the optional ring spacer (item 1, fig 1)) must be used to eliminate chop on the clevis pin.

Tractor Wheel Setting

Both the front and rear wheels of the tractor must be set to straddle the bed to be lifted. 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 Harvester



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

The harvester chassis should be nominally level. If the chassis is in a nose up attitude or extremely nose down, the drawbar eye (item 2, fig 1) should be adjusted accordingly to compensate. To adjust the eye position, remove the bolts (item 3, fig 1) and move the eye to the required position. The eye can be turned over to achieve a second range of adjustments.

A drawbar jack (item 4, fig 1) is provided when mounting the harvester to the tractor clevis hitch. Once the harvester is securely attached to the tractor, the jack should be removed and put in the stowage position (see fig 2).







Switch off the tractor engine before making any other connections. The hydraulic and electrical connections can then be made. Connect the hydraulic return hose marked 'RETURN' to the tractor manufacturers recommended low back-pressure return coupling. Connect the pressure hose marked 'FLOW' to the tractor outlet recommended for constant supply. If in doubt, refer to the tractor handbook. Connect the load sense hose to the tractor L/S outlet. Mount the in-cab control console securely inside the tractor in a position where it is comfortable to operate when seated. Connect the console power supply cable directly to the tractor battery. The black lead to negative (-) and the red leads to positive (+). Route the control console harness through the rear of the tractor and connect it the socket on the front of the harvester. Connect the lighting plug to the tractor lighting socket.

PTO Shaft

 \triangle

It is essential that the PTO shaft be matched to the tractor to give the correct drive-line and to ensure that it is safe in work. An incorrectly fitted or badly guarded PTO shaft can be lethal. Do not take chances.

The standard specification machine is geared to operate at 1000 rpm PTO speed.

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, fig 3) and female shaft (item 2, fig 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 1/3rd 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, fig 3) to secure anchoring points on the tractor and machine ensuring that the chains will not over-tighten when the machine is turning.

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

The PTO rest (item 5, fig 1) is provided to support the PTO shaft when it is not fitted to the tractor.

INSTALLATION

Harvester Wheel Setting

The harvester wheels are adjustable to suit wheelings of 68" to 96".



Before commencing wheel adjustment, ensure adequate jacks and axle stands are available along with suitable wheel chocks.



It is important that the harvester is correctly fitted to the tractor and the handbrake is fully applied while wheel adjustments are made.



Fig 4

- 1. Place chocks at the front and rear of the opposite wheel to the one being adjusted.
- 2. Jack up the harvester and place stands under the side beam.
- 3. Slacken the clamp bolt (item 1, fig 4) and remove the axle pin (item 2, fig 4).
- 4. Remove the top securing bolts x^2 (item 3, fig 4).
- 5. Remove the track rod bolts x2 (item 4, fig 4).
- 6. Slide the wheel to the required setting (see fig 5).
- 7. Refit the axle pin (item 2, fig 4) and top securing bolts x2 (item 3, fig 4).
- 8. Retighten the clamp bolt (item 1, fig 4).
- 9. Finally, refit the track rod bolts x2 (item 4, fig 4).
- 10. Repeat for the opposite wheel.



Wheeling	Erom C	F	loles
wheeling		Tube	Top Beam
68"	34"	S	A1 + C4
72"	36"	Т	B3 + D6
76"	38"	U	A2 + C5
80"	40"	V	B4 + D7
84"	42"	W	A3 + C6
88"	44"	Х	B5 + D8
92"	46"	Y	A4 + C7
96"	48"	Z	B6 + D9

Digger Assembly

The digger assembly, which includes the depth wheels, disc coulters, shares, primary web, secondary web and agitators, is controlled by two hydraulic rams which raise and lower the digger assembly in and out of work. Before attempting to operate the digger assembly, the transport chains (item 1, fig 6) need to be unhooked from the chassis and hung on the stowage hook (item 2, fig 6).



Always support the digger assembly on the chains (item 1, fig 6) before transporting the harvester or when working under the machine.





Fig 6

Fig 7

The digger assembly is controlled electronically from the in-cab console. The 'DIGGER SHARE' switch manually raises and lowers the digger assembly. When the switch is set to 'lower' the digger assembly is in the 'float' position, and it will continue to lower until the manual depth/suspension setting is reached or the 'AUTO DEPTH' takes over.

Manual Depth Control

The manual depth control sets the depth at which the digger shares will dig. Set the depth control as follows:

- 1. Operate the 'DIGGER SHARE' switch to lower the digger assembly. The digger will lower until the suspension depth arm (item 1, fig 7) touches the stop block (item 2, fig 7). The digger will continue to lower until the weight of the digger assembly is taken up by the torsion bush (item 3, fig 7).
- 2. Note the depth at which the machine is digging.
- 3. Raise the digger assembly.
- 4. Loosen the stop block retaining bolts x2 (item 4, fig 7).
- 5. Adjust the stop block using the stop block adjuster (item 5, fig 7). Adjust both sides evenly.
- 6. Lower the digger assembly and check the depth.
- 7. Readjust if necessary.

Automatic Depth Control

Setting the in-cab console 'AUTO DEPTH ON' switch to its down position brings the automatic depth control into circuit. The 'DIGGER SHARE' switch operates the system. Selecting 'DIGGER SHARE RAISE' will manually raise the digger assembly, while selecting 'DIGGER SHARE LOWER' will turn ON the 'AUTO DEPTH' control allowing the depth wheels (item 1, fig 8) to control the LH and RH digger depth rams independently.



Fig 8

Fig 9

The share depth is controlled by the proximity sensors (item 2, fig 8). To make fine adjustments, turn the depth wheel handles (item 3, fig 8) clockwise to decrease depth or anti-clockwise to increase depth. Larger adjustments can be made by repositioning the trigger plate (item 4, fig 8). To adjust, remove the retaining screw (item 5, fig 8) and rotate the trigger plate forwards to increase depth or backwards to decrease depth. The proximity sensors (item 2, fig 8) are factory set and in normal circumstances should not require any adjustment.

Raise and lower time delay for each side of the digger can be set by adjusting the timer relays within the junction box. LH raise timer (item 1, fig 9). LH lower timer (item 2, fig 9). RH raise timer (item 3, fig 9). RH lower timer (item 4, fig 9).

Depth Wheels

The depth wheels (item 1, figure 8) running on each ridge control the share depth. Rubber torsion springs (item 6, fig 8) in the pivot provide downward pressure. To increase or decrease the amount of pressure exerted by the torsion spring, remove the mounting bolts (item 7, figure 8) in the spring tension bracket and reposition the bracket in either a forward or rearward position. Turning the handle (item 3, fig 8) changes the relationship between the wheel and the trigger plate (item 4, fig 8) thus adjusting the working depth.

Row width setting is adjusted by loosening the clamp bolts (item 8, figure 8) and sliding the wheel assembly until positioned centrally over the ridge. Both depth wheels must be equally spaced about the centre line of the machine.

Disc Coulters

For two row work the harvester is fitted with four disc coulters (item 1, fig 10), and for full width bed work, with two. The disc coulters run on either side of the ridge, cutting and parting the haulm and trash in front of the shares whilst at the same time containing the ridge and feeding it over the shares onto the digger web. The centre discs (if fitted) may need to be set differently to the outer pair which operate where the soil has been compressed by the tractor wheels. The disc coulters are adjustable for depth of work and for different row widths.

To adjust the disc width setting, loosen the clamp bolts (item 2, fig 10) and slide the disc unit to the required position. When correctly set, the discs should be approximately 20mm clear of the edge of the share blades.

Depth adjustment is controlled by the set screw (item 3, fig 10) mounted under each disc arm. Turning the screw clockwise reduces depth and turning anti-clockwise increases depth. Each disc unit is fitted with a torsion block (item 4, fig 10) which applies downward pressure to the disc to ensure a clean cut, but allows some movement if the disc should contact an obstacle. Tension adjustment is carried out by turning the handle (item 5, fig 10) clockwise to increase tension and anti-clockwise to decrease tension. The tension should not be set such that the discs act as wheels partially supporting the digger assembly.





Fig 10

Fig 11

Shares

Share pitch adjusters (item 1, fig 11) are fitted to either side of the machine. The points of the share should be kept as high as practical whilst still maintaining adequate digging depth. Lowering the points will assist penetration but may increase risk of crop damage. If the soil has been adequately cultivated this should not be necessary. If the pitch is too steep (points lowered) it can greatly increase the loading or bulldozing effect on the share frame, especially when in hard or tough conditions. Regularly check for soil build-up on the share frame (especially in wet conditions) as a pad of soil at this point will create a considerable braking effect on the digger web. Ensure that the share frame is not in contact with the web bars at this point.

The standard share has one blade per row. Each blade has eight mounting holes, of which only four are used at any one time. Row width adjustments are made by using the alternative attachment holes to achieve the required row width.

Primary Web

The standard specification machine is fitted with a 1830mm wide primary web. Various web pitches can be fitted to suit particular crop and soil conditions. The primary web is driven by the motor gearbox unit (Item 1, fig 12). The switch marked 'PRIMARY WEB' on the in-cab console (item 1, fig 14) starts/stops the web and the dial controls the web speed.

The spring-loaded tension rollers (item 2, fig 12) maintain the drive on the return side of the web. To tension the web, loosen the locknuts (item 3, fig 12) and reposition the spring adjuster (item 4, fig 12). Ensure both sides are adjusted equally.







Vari-Sep

The step height from the primary web to the secondary web can be adjusted to aid separation. The height is set by releasing the locking tabs (item 5, fig 12) and turning the adjuster tubes (item 6, fig 12). Ensure both sides are adjusted equally.

The gap between the primary and secondary webs can also be adjusted to suit crop size and required separation. To adjust, release the locknuts (item 7, fig 12) and move the adjusters (item 8, fig 12) to achieve the required gap. Ensure both sides are adjusted equally.

Secondary Web

The 1830mm wide secondary web is available in various web pitches to suit particular crop and soil conditions. The secondary web is driven by the motor gearbox unit (Item 1, fig 13). The switch marked 'SECONDARY WEB' on the in-cab console (item 1, fig 14) starts/stops the web and the dial controls the web speed.

Rotary Agitators

Two rotary agitator shafts are fitted inside the secondary web. These are designed to separate the soil from the crop as it is elevated up the web. Drive for each agitator shaft is by a directly coupled hydraulic motor. The two switches on the in-cab console (item 1, fig 14) marked 'SECONDARY WEB AGITATION' start/stop the 1st and 2nd agitator shafts. Speed control for each shaft is controlled by the dials marked 'FIRST AGITATOR' and 'SECOND AGITATOR' on the side of the junction box (item 1, fig 15).

OPERATION

Adjusting the speed will vary the frequency of agitation. The faster the speed the more separation takes place, but also more bruising damage may occur. The amount of agitation necessary will depend on the crop and soil conditions encountered.

Transfer Stars

A pair of transfer stars are fitted immediately behind the secondary web. The soft, pliable stars cushion the drop from the secondary web and remove loose soil from the crop.

Speed control of the stars can be altered by adjusting the flow divider (item 2, fig 13). The hydraulic drive is directly linked to the secondary web drive. Therefore, secondary web stop/start and speed changes also affect the transfer stars.





Fig 14

Fig 15

Omega Separator

The Omega separator consists of four scroll shafts and four clod rollers. The height of the scroll tips can be specified as 10mm (standard) or 6mm for less aggressive action.

The in-cab console switch marked 'OMEGA CLEANER SCROLLS' starts/stops the unit. The switch marked 'CLOD ROLLER REVERSE' reverses all four clod rollers to remove blockages.

The clod rollers can be either ebonite, mild steel, or stainless steel and are available in different diameters. Stainless steel is the least aggressive due to the smooth, shiny surface, while ebonite will give more aggressive, general-purpose results. Also, fitting a smaller diameter clod roller allows larger more aggressive gaps to be set through the separator.

To encourage a steady flow, the unit is set at an angle of 5°. The scroll speed can be varied by turning the dial marked 'OMEGA SCROLLS' on the side of the junction box (item 1, fig 15). The faster the scroll speed, the quicker the crop will flow over the Omega giving less separation. The speed of the clod rollers can be varied by turning the dial marked 'OMEGA CLOD ROLLERS' on the side of the junction box (item 1, fig 15). All clod rollers can be fitted with a manual reversing valve (item 1, fig 16) (standard on 4^{th} clod roller). To reverse the clod roller, rotate the handle (item 2, fig 16).

When running the clod rollers in reverse to the crop flow, the higher the speed, the more aggressive the separation will be. Reducing the speed lessens the pinching effect of the clod rollers. Running the clod roller with the crop flow at a slow speed will give some separation, while increasing the speed will transfer all the crop and soil.

The relative height of the clod rollers is set by adjusting the turnbuckle (item 1, fig 17). Raising the height of the clod roller introduces a larger ripple into the crop flow creating more separation by allowing the crop to ride over the soil and top.

The clod rollers will normally be adjusted to run approximately 1 to 2mm away from the tip of the scrolls for effective haulm removal. The clod roller gap is set by adjusting the stop bolts (item 2, fig 17) against the spring tension on the clod roller mounting plates. Spring tension is adjusted on the spring tie bolts (item 3, fig 17).

Each clod roller is fitted with a scraper (item 4, fig 17) which needs to be closely adjusted to remove loose soil from the rollers.

Note: All adjustments must be made evenly on both sides of the units.



The TSP 1900 can be fitted with either a single sizer unit or a twin sizer unit. The singlesizer unit is made up of a 7 roller sizer only. The twin-sizer unit is made up of a 4 roller sizer feeding onto a 7 roller sizer.

Fig 16

On a single-sizer machine, the small graded crop falls through the sizer onto the LH boom feed web and the larger crop passes over the sizer onto the RH boom feed web.

On a twin-sizer machine, the small graded crop falls through the 4 roller sizer and is funnelled into a windrow under the machine. The remaining crop continues onto the 7 roller sizer where the medium-graded crop falls through the sizer onto the LH boom feed web, and the larger crop passes over the sizer onto the RH boom feed web.

Grading of the crop is done by setting the gap between the rollers. The gap is set on the turnbuckles (item 3, fig 16) on each side of the unit. Ensure both sides are adjusted equally.

gainst the spring tension on the n the spring tie bolts (item 3, fig 1 vith a scraper (item 4, fig 17) v il from the rollers.



OPERATION

On a single-sizer unit, the roller speed is varied by turning the dial marked 'FIRST SIZER' on the side of the junction box (item 1, fig 15). On a twin-sizer unit, the roller speed is varied by turning the dials marked 'FIRST SIZER' (4 roller sizer) and 'SECOND SIZER' (7 roller sizer).

To adjust the drive chain tension, loosen the idler sprocket spigot bolt (item 4, fig 16) and turn the adjuster screw (item 5, fig 16). Retighten the spigot and adjuster screw after tensioning.

LH Boom Feed Web

The LH boom feed web under the 7 roller sizer transfers the small graded crop into the LH boom. The speed of the web is varied by turning the dial on the flow divider (item 1, fig 18).

The drive chain is tensioned by loosening the motor mounting bolts x^2 (item 2, fig 18) and turning the adjuster screw (item 3, fig 18).

The web is tensioned by loosening the retaining bolts (item 4, fig 18) and turning the adjuster screw (item 5, fig 18). Always adjust both sides of the web evenly. Over-tightening will result in premature wear.





Fig 18

RH Boom Feed Web

The RH boom feed web transfers the crop from the end of the 7 roller sizer into the RH boom.

Drive is taken from the last sizer roller. The drive chain is tensioned by loosening the bolt (item 1, fig 19) and turning the tension roller (item 2, fig 19).

The web is tensioned by adjusting the turnbuckles (item 3, fig 19) on both sides of the unit. Ensure both sides are adjusted evenly. Over-tightening will result in premature wear.



LH & RH Booms

The booms are designed to fold in for transport and open out for work when loading into trailers running alongside.

The speed of the boom webs is controlled by the dials on the boom operator's console (item 1, fig 20) marked 'LEFT HAND BOOM' and RIGHT HAND BOOM'. Folding and unfolding of the centre section and top section of each boom is controlled by the joysticks.



Fig 20

Fold 'IN' and fold 'OUT' of the centre section is primarily used to set the working height and reach. 'RAISE' and 'LOWER' of the top section adjusts the discharge height of the crop into the trailer and allows for even loading.

Note: Because the tractor oil supply is used to power the RH boom, the maximum speed of the web will depend on the hydraulic flow from the tractor and may be subject to slight fluctuation when ram services are operated. If ram services are taken to relief (dead headed) the elevator will stop while the tractor relief value is blowing.

Boom Auto-height Control

The RH boom auto-height sensor (if fitted) is activated by pressing the green button on the boom operator's console. The ultrasonic sensor senses the height of the boom above the discharged crop in the trailer and maintains that distance. The sensor circuit is turned off automatically if the boom top section is operated. To set the sensing distance see section 'Auto-height Ultrasonic Sensor Adjustment'.

Circuit 1 – Auxiliary Hydraulics

Circuit 1 is powered from the tractor hydraulics and delivers oil to the hydraulic rams and RH boom motor. A minimum supply of 50 litres/minute (80 litres/minute maximum) is fed through the pressure filter (item 1, fig 29) into the inlet section of the auxiliary valve bank (see fig 21).

The RH boom motor valve section (item 9, fig 21) has priority over the ram services. The return oil from the valves and motor recombines and is returned to the tractor, ideally through a low back-pressure or free-flow return coupling. No separate relief valve is fitted to the auxiliary circuit, the system relies totally on the tractor relief valve.

The auxiliary valve bank is capable of operation with open centre, closed centre, or load sensed tractor systems. For closed centre configuration tractors, turn the screw (item 10, fig 21) clockwise until fully closed. For open centre, turn the screw anticlockwise until fully out.





Item 1 = RH digger lift Item 2 = LH digger lift Item 3 = Axle steer Item 4 = LH boom centre Item 5 = LH boom top Item 6 = RH boom centre Item 7 = RH boom top Item 8 = Valve inlet section Item 9 = RH boom motor

The flow rate from all the valve sections are proportionally controlled and are manually adjustable. To adjust, loosen the solenoid retaining screws x4 (item 11, fig 21) and turn the ring (item 12, fig 21) clockwise to decrease the flow and anti-clockwise to increase the flow. Retighten the solenoid screws before operating the valve.

1.23

Circuit 2

Circuit 2 is powered by the RH pump (item 1, fig 22). The pump is fed from the RH suction filter (item 2, fig 22) submerged in the chassis front beam. The oil is fed through the pressure filter (item 1, fig 30) to the front 3-section valve (see fig 23). The return oil from the motors passes through the oil cooler (item 1, fig 24) before returning to tank. The oil cooler fan is thermostatically switched to operate when the oil reaches 60°C.



Fig 22



Fig 23

Item 1 = Primary web Item 2 = Secondary web / Transfer stars Item 3 = 2^{nd} rotary agitator Item 4 = 1^{st} rotary agitator Item 5 = 4 roller sizer

Circuit 3

Circuit 3 is powered by the LH pump (item 3, fig 22). The pump is fed from the LH suction filter (item 4, fig 22) submerged in the chassis front beam. The oil is fed through the pressure filter (item 2, fig 30) to the rear 3-section valve (see fig 25).



Fig 24



Fig 25

Item 1 = Omega scrolls

Item 2 = 7 roller sizer

Item 3 = Omega clod rollers

Item 4 = Omega clod rollers

Item 5 = LH boom motor/LH boom feed web

OPERATION

Electrical Control System



WARNING: Always switch off the electrical control system before transporting the harvester on the road.



Ensure that all plug and socket connections are clean and coupling pins undamaged before connection, and that they are securely locked together before the power is switched on.



Do not leave or store the control consoles 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.

In-cab Console

Green ON button Switches on the electrical system. LED illuminates when the system is on.

EMERGENCY STOP / RESET button

When activated, the button shuts down all hydraulic drives and electrical controls. The button must be reset before turning the system on again.

DIGGER SHARE RAISE / LOWER

Manually raises/lowers the digger assembly increasing/decreasing the depth of the shares below the soil. Releasing the switch to the central position leaves the share depth at the present setting. Setting the switch to the locked lower position enables the depth rams to free float.

AUTO-DEPTH ON

Brings the automatic depth control into circuit. LED illuminates when the system is active.

SECONDARY WEB AGITATION

Switches start/stop the 1st and 2nd agitator shafts. LEDs illuminate when agitators are running.

OMEGA CLEANER

Switch marked 'SCROLLS' starts/stops the scroll shafts and clod rollers. LED illuminates when the unit is running.

Switch marked 'CLOD ROLLERS REVERSE' reverses all four clod rollers to remove blockages.

SIZER

Switches start/stop the 1st sizer and 2nd sizer (if fitted). LEDs illuminate when sizers are running.

1.25

ALL RUN

Starts/stops primary web, secondary web, agitators, Omega separator and sizers if already activated. LED illuminates when running.

BUZZER

Press yellow button to warn personnel on rear platforms.

PRIMARY WEB

Switch starts/stops the web and the dial controls the web speed. LED illuminates when running.

SECONDARY WEB

Switch starts/stops the web and the dial controls the web speed. LED illuminates when running.

STEER LEFT / STEER RIGHT Joystick steers the harvester wheels to the left/right.

AUTO-CENTRE

Automatically centralises the harvester wheels after turning.

Boom Operator's Console

EMERGENCY STOP / RESET button

When activated, the button shuts down all hydraulic drives and electrical controls. The button must be reset before turning the system on again.

SYSTEM POWER

LED illuminates when system is ON.

BUZZER

Press yellow button to warn tractor driver.

LEFT HAND BOOM

Switch starts/stops the LH boom web and the dial controls web speed. LED illuminates when running. Joystick folds in/out LH boom centre section and raises/lowers LH boom top section.

RIGHT HAND BOOM

Switch starts/stops the RH boom web and the dial controls web speed. LED illuminates when running. Joystick folds in/out RH boom centre section and raises/lowers RH boom top section.

Green ON button Switches ON RH boom auto-height sensor (if fitted).

Speed Control / Junction Box

FIRST AGITATOR Dial controls speed of 1st agitator.

SECOND AGITATOR Dial controls speed of 2nd agitator.

OMEGA SCROLLS Dial controls speed of Omega scrolls.

OMEGA CLOD ROLLERS Dial controls speed of Omega clod rollers.

FIRST SIZER Dial controls speed of 1st sizer.

SECOND SIZER Dial controls speed of 2nd sizer (if fitted).



Fig 26

Emergency Stop / Reset Button

The emergency stop button (item 1, fig 26) adjacent to the LH sorting station shuts down all hydraulic drives and electrical controls. The button must be reset before turning the system on again.

Starting Off Your Harvester

Before commencing work whether starting off a new machine or starting work in a new field, it is advisable to carry out the following checks.

Ensure the harvester is level when hitched to the tractor.

Ensure the hydraulic and electrical connections from the tractor are correctly made and are secure.

Ensure the tractor and harvester wheel settings match the rows to be harvested.

Ensure the shares are set to the correct row widths and are set centrally to the rows.

Release the digger transport chains from their transport position.

Set the shares so that they are evenly spaced and the tip plates are in line with the top of the digger web.

Ensure the depth rollers are mounted centrally over the rows.

Set the disc coulters to the correct width to suit the ridges being lifted, typically 20mm from the outer edge of the share blade.

Ensure the disc coulters are sharp, especially in soft ground or trash.

Ensure the ant-roll flaps are set to the correct width.

Check that the web pitch is suitable for the size of crop to be lifted.

Damage Prevention

A machine that is incorrectly adjusted or operated can cause a significant amount of damage to the crop. The type of damage found in the sample will usually give an indication as to how the damage was caused and where it is occurring. Examine samples at various points. Start in the row in front of the machine and follow the path of the crop through to the trailer. Somewhere between the last undamaged sample and the first signs of damage will be the area causing the problem. The shape and nature of the damage will give clues as to the cause.

When satisfied that the tractor and harvester are set up correctly then commence work. Work the machine for approximately 30 metres and stop. Do not run the machine out, leave the crop and soil on all of the sections of the machine. By a series of visual checks you can assess how the harvester settings are performing, and carry out the following checks.

Damage can take various forms. The following comments will help find and cure some of the more common problems. Remember, the harvester is not always the culprit.

HARVESTING

The speed and efficiency of mechanical harvesting can be greatly improved by good planting techniques and adequate cultivation methods. Visually check behind the harvester. If cut or sliced potatoes are evident, the digging depth or disc settings may be incorrect. Potatoes with an uneven cut are normally caused by the shares while a clean straight cut can be caused by the discs.

Check for correct depth of lifting by digging into the lifted rows. Potatoes in the ground indicate depth too shallow. If depth is too deep, then excessive soil will be lifted making the separating areas of the harvester work harder. Avoid lifting the unworked soil below the ridge. A small amount of extra depth will equate to many tonnes of extra soil being lifted.

If undamaged potatoes lie on the surface behind the machine, check their position. If they are to the side of the lifted rows, they may have spilled out of the front of the primary web. Check disc position and anti-roll flaps. If potatoes lie on top of the lifted rows, check webs are correct pitch for crop being lifted and gap between star shafts is not too large.

If damaged potatoes lie on top of the lifted rows, these may be being lost through the separating areas of the machine. Check the following.

Crushed potatoes may be caused by the Omega clod roller setting. Nipped potatoes may be caused by the roller size or speed.

Looking on top of the soil under the harvester may give an indication as to where these damaged potatoes are being produced.

Inspect the crop on the primary web. If cut potatoes are evident, check digging depth and disc settings. If clods or stones are present at the sides of the web, then the discs an shares may be set too wide and are picking up material from the wheelings. Excessive soil on the primary web indicates depth too deep.

Check these points with the appropriate section of this handbook. When making adjustments do so one at a time and try harvesting to see the result. More than one adjustment at a time may cause confusion.

In dry conditions:

Keep adequate soil around the crop to prevent risk of damage. Keep soil in the machine as long as possible to cushion the crop. A combination of digging depth and forward speed will help to achieve this. Keep agitation and crop movement down to a minimum. Set depth wheels to exert lightest amount of downward pressure so as not to disturb the ridge or bruise the crop. Use a water misting kit to minimise nipping.

In wet conditions:

Set primary web slightly faster than ground speed.

In clod conditions:

Open gap between shafts in separator units. Fit smaller rollers.

In stony conditions:

In stony ground a stone can become wedged between the share blades preventing penetration. Make sure discs are kept sharp so that they cut the haulm and prevent wrapping and blockages around the roller mountings.

Damage prevention:

Do not hold the crop on the Omega unit longer than necessary. Run the booms at a suitable speed to take the crop away smoothly without overloading the web flights or throwing the crop into the trailer.

Getting The Best Results During Harvesting

Tractor / Harvester

Ensure tractor wheel widths are at the correct settings for your row widths and system and that the tyre widths are no too wide as to crush the side of the ridges. Ensure tractor drawbar pin is not too long or the harvester drawbar set too low that it can drag and bunch up haulm which in turn will go into the harvester in large bunches and damage crop at the haulm extraction point. Ensure correct tractor forward speed to match the conditions and harvester capabilities. While standing on level ground and with the harvester connected to the tractor, ensure the drawbar eye is adjusted so that the booms are parallel to the ground. This will ensure that the machine is at the correct angle for the separators to work at maximum efficiency.

Shares

Ensure the shares are set at the correct width settings for your row widths and system. Make sure the outside corners are cut off the outside share blades, this will help to stop the haulm that the discs have pressed into the ground wrapping around the front corners of the blades. Make sure chamfer on front edge of blades is not too acute as to cause a restriction or bulldozing effect. Ensure the shares are clean and shiny before commencing work. This will reduce drag and help flow into the machine. In wet, heavy conditions, make sure the share area is kept clean. A build up of soil under the flaps may cause them to stand up, causing flow and damage problems to the crop. Also, keep the share frame area clean as this will prolong the life of the web, reduce drive roller wear, and reduce the load on the drive system. If using a centre share blade, ensure the blade is parallel with the other blades. This will maintain an even depth across the bed. Ensure the correct depth settings when moving to different fields and/or varieties. Use the correct share frame and blade configuration for your conditions. As soon as the harvester has finished work, apply a film of grease over the bright working surfaces. This will reduce corrosion and assist flow when the machine starts work next season.

Disc Coulters

Ensure the discs are set to the correct depth. Too much depth will cause soil to slab and encourage the soil to stick to the discs preventing them from turning. Make sure the discs are kept sharp to cut the haulm and that the disc does not have to be set deeper to compensate for not cutting the haulm. In wet conditions set a wider gap between the discs and the share blades (25mm). If crop is rolling back down the web and hitting the discs causing damage, reduce the web speed slightly so there is more soil to carry the crop away. Make sure the discs are being scraped clean. This will help flow into the machine.

HARVESTING

Depth Wheels

Ensure the depth wheels are set to the correct width settings for your particular system. Double check as sometimes with ridging up during the growing season the ridge positions can vary. Do not apply too much pressure on the depth wheels. As a result of too much pressure, clods could be produced and soil made to stick to the crop. If this happens, more agitation will be necessary meaning the possibility of more crop damage. Enough pressure to keep the wheels turning is sufficient in most conditions.

Primary Web

The primary web speed in conjunction with ground speed is essential for the harvester to work efficiently. Incorrect web speed can result in crop damage and poor harvester performance. If web speed is too fast this will result in roll back and poor take off after the share. Either decrease web speed or increase forward speed. If the web speed is too slow this will result in the machine being overloaded which will cause poor performance of the separating areas, putting undue stress on the mechanical components, reducing the life of the machine, and putting excessive amounts of soil and haulm into the discharge elevator. Either increase web speed or decrease forward speed.

Vari-Sep

The variable step between the primary web and secondary web is used to break up the ridge and to start to separate the crop from the soil. In the fully raised position the crop will pass across with minimum disturbance, while fully dropped the ridge will be broken up allowing the soil to drop through the web.

Secondary Web

Separation on the secondary web is mainly controlled by changing the pitch of the web. The speed of the web relative to the primary web will give more or less spread to the crop on the web, and determine the amount of soil carried over onto the separators.

Agitators

Over use of the agitators is one of the main causes of damage and will result in roll back and bounce of the crop causing bruising etc. Always use the minimum amount of agitation. When starting to harvest it is best to begin with minimal agitation. Add more agitation as conditions dictate

Omega Separator Units

The height of the polyurethane scroll can be specified as 10mm (standard), or 6mm for less aggressive action. The clod rollers can be ebonite, plain steel, or stainless steel. Stainless steel is the least aggressive due to the smooth, shiny surface, while ebonite will give more aggressive, general-purpose results. Also, fitting a smaller diameter clod roller allows larger more aggressive gaps to be set through the separator. By raising the height of the clod roller relative to the scroll, a larger ripple is introduced into the crop flow creating more separation by allowing the crop to ride over the soil and top. To work in conjunction with this, the relative speed and rotation direction of the clod rollers can be set. When running the clod roller in reverse to the crop flow, the higher the speed, the more aggressive the separation will be. Reducing the speed lessens the pinching effect of the clod rollers. Running the clod roller with the crop flow at a slow speed will give some separation, while increasing the speed will transfer all the crop and soil.

The clod rollers will normally be adjusted to run approximately 1 to 2 mm away from the tip of the scrolls for effective haulm removal.

Booms

Correct boom speed is essential. The objective is to have the speed as slow as possible, filling every compartment with crop. As far as crop damage is concerned, the more crop in each compartment the better. It should also be fast enough not to cause the crop to spill out over the top of the web flights and roll back causing a restriction at the bottom of the elevator. Too much crop at this position can cause nipping as the web goes around the corner.

MAINTENANCE

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 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 (see heading 'Residual Hydraulic Pressure Dump Procedure').



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 system.

The hydraulic oil should be carefully monitored. The cold oil level should be kept to the lower mark on the dipstick (item 1, fig 27) with the dipstick screwed fully in. Maintain the level by topping up or refilling with Esso Nuto 46 Hydraulic Oil. The reservoir holds approximately 410 litres. Should a high water content become apparent, or a cloudiness in the oil, the hydraulic oil should be changed.





Fig 27

Fig 28

The oil reservoir magnetic plug (item 1, fig 28), located underneath the centre of the front beam, should be removed and cleaned annually. This plug is also used to drain the reservoir, so if the oil is not being changed a temporary 3/4" BSP plug should be used to seal the tank and minimise oil loss.



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

The shut-off valves (item 2 & 3, fig 28) connected to the pump case drain lines allow maintenance to be carried out without draining the oil tank.

The two suction filter elements should be replaced after the first 50 hours running time and then every 500 hours or annually thereafter. The suction filter elements are serviced as follows:

- 1. Wind the suction filter screw (item 5, fig 28) fully out anti-clockwise to close the cut-off valve within the filter housing.
- Release the six screws (item 4, fig 28) holding the filter lid. A small amount of oil 2. will be lost from the filter body.
- 3. Remove the top of the filter and withdraw the element.
- Clean or replace the element and reassemble. 4.
- Wind the suction filter screw (item 5, fig 28) fully in clockwise to open the cut-off 5. valve. 6. Run the system and check for leaks.





Fig 29



The pressure filter elements (item 1, fig 29) and (item 1 & 2, fig 30) should be replaced after the first 50 hours running time and then every 500 hours or annually thereafter.

To replace a pressure filter element:

- 1. Switch off the tractor engine and apply the hand brake.
- 2. In the case of the auxiliary circuit pressure filter (item 1, fig 29), 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.
- Remove the filter element and rinse out the casing. 4.
- Fit the new element and refit the casing ensuring that it is tight. 5.
- 6. Run the system and check for leaks.

Residual Hydraulic Pressure Dump Procedure

The following procedure outlines the method of relieving the residual pressure within the hydraulic system. It is essential that this procedure is carried out before any maintenance or repairs are attempted on the hydraulic system.

- 1. Set the booms into the fully folded position.
- 2. Place chocks to the front and rear of both wheels to prevent the machine from moving.
- 3. Lower the digger assembly to the ground.
- 4. Lower the harvester onto the drawbar stand or jack and disconnect it from the tractor leaving the hydraulic and electrical connections in place.
- 5. Switch off the tractor engine.
- 6. Operate all switches on the control consoles, in turn, to remove any remaining pressure within the hydraulic system.
- 7. Disconnect the hydraulic and electrical connections from the tractor.

Rear Axle Self-centring

The rear axle self-centring mechanism is combined with the wheel position indicator (item 1, fig 31) and is used to bring the harvester wheels back to the straight ahead position after manoeuvring. The proximity switches (item 2, fig 31) sense the position of the indicator. The centre position is factory-set but may need to be adjusted after a period of service. Should the cable (item 3, fig 31) be in need of adjustment, the wheels will tend to centre to a RH bias. To correct the centre position, the cable can be reset by means of the cable adjuster. The setting of the proximity switches (item 2, fig 31) in the axle position indicator will only need adjustment if the unit has been dismantled for any reason and should be carried out by a competent service engineer.





Fig 32

Proximity Switch Adjustment

The proximity switches fitted to both the axle self-centring mechanism and the automatic depth control are factory set and in normal circumstances should not require adjustment. Should it be necessary to readjust the proximity switches then the settings shown (see figure 32) should be obtained.

Auto-height Ultrasonic Sensor Adjustment

Adjustments are made via the display on the side of the sensor body as follows:

SET RAISE DISTANCE (This must be a lower figure than the Lower Distance)



SET LOWER DISTANCE (This must be higher than the Raise Distance)



MAINTENANCE

Split Web Drive Sprockets

Split web drive sprockets (item 1, fig 33) on some 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 2, fig 33). Keep the split halves of the sprockets in the correct pairs to prevent mis-match when fitting.



Fig 33

Maintenance of the Mechanical Drives

Drive chains must be maintained at the correct tension. Maintaining correct tension, alignment and lubrication will ensure the efficient running of the harvester and prolong the life of the drive components. Adjust the chains to give positive drive without undue stretching. Where plastic chain tensioner or guides are fitted, these will show fairly rapid wear initially but will settle down when the chain rollers rather than the chain side plates come into contact with the plastic.

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 Electrical System

Trouble shooting of the control system must be carried out by a competent engineer familiar with electrical servicing. Items such as the proportional valve control cards and the control circuit boards may be damaged if incorrectly connected.

New Machines

It is important during the first few weeks with a new machine to keep a regular check for any bolts, screws, connections etc. which may work loose during this initial working period.

Machine Lubrication

Regular lubrication will ensure that the Standen TSP 1900 provides a long and efficient service life. Depending on soil and weather conditions, the service schedule can vary. It is recommended that the harvester be given a thorough inspection at least weekly during the working season and at this time the machine should be greased and the gearbox oil levels checked. Optional automatic greasing kits can be fitted to the machine and are recommended for machines covering large acreages to reduce maintenance time.

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.

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.

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

When checking the chain and gear drives, proprietary chain lubricant or a smear of grease should be applied to prolong their life.

Gearbox oil levels should be checked occasionally and topped up with EP90 gear oil.

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

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

Daily Maintenance

During the working season the following daily maintenance should be carried out. Check all covers and guards are in position, free from damage, and all retaining latches and hinges are in place and operative. Repair or replace any found to be defective before operating the machine.

Carry out the following checklist:

- 1. Check tension of all drive chains, adjust if necessary and lubricate with clean oil.
- 2. Check tyre pressures and adjust if necessary.
- 3. Check for any damaged or broken rollers, web bars, stars and scrolls etc. Repair or replace as necessary.
- 4. Check wheel nuts for tightness.

MAINTENANCE

- 5. Check all scraper clearances and adjust as necessary. Scrapers should be adjusted as close as possible without actually touching.
- 6. Check all hydraulic cylinders, valves and pipe work for signs of leaks or damage, repair or replace as necessary.
- 7. Carry out lubrication
- 8. Grease axle king pins

Weekly Maintenance

During the working season the following weekly maintenance should be carried out.

- 1. Carry out all the procedures listed in daily maintenance.
- 2. Check all shafts, bearings and rollers for undue wear, and replace as necessary.
- 3. Check all bearings for lubrication, grease as necessary.
- 4. Check discs and shares blades for excessive wear, replace if necessary.
- 5. Check hydraulic and gearbox oil levels.

Annual Maintenance

Prior to the start of the working season the following maintenance should be carried out.

- 1. Carry out all the procedures listed in daily and weekly maintenance.
- 2. Check all webs for damage or wear and repair or replace as necessary.
- 3. Check stars and scrolls and replace any worn parts.
- 4. Check metalwork (e.g. side plates) for any damage or wear and repair or replace as necessary.
- 5. Replace the pressure and suction filter elements Use only genuine Standen replacement parts.

Out of Season Storage

The machine can frequently operate in soils which contain residual chemical fertilisers etc. When the working season is completed wash and clean the machine thoroughly prior to carrying out the following checks and operations.

- 1. Apply oil, grease or an anti rust agent on any exposed bright metal surfaces which have been polished by the soil flow.
- 2. Clean all drive chains and lubricate with oil.

1.39

- 3. After carrying out the hydraulic residual pressure dump procedure, any parts of hydraulic cylinders rods that are still exposed should be greased or oiled to prevent corrosion.
- 4. Ensure that the tyres are inflated to the correct pressure.
- 5. Ensure that the hydraulic hose quick release couplings and the electrical connectors on the machine are kept clean and dry.
- 6. Check the whole machine carefully and note any repairs that may need to be carried out. It is always better to carry out any repairs well before the commencement of the following season.
- 7. Carry out all the lubrication checks outlined in routine maintenance.
- 8. Ensure the control consoles are kept in a safe, dry place and available for use at the commencement of work or for any maintenance to be carried out.
- 9. Ensure that this handbook is kept in a safe place and available for use at the commencement of work or for any maintenance to be carried out.

Machine Dimensions

	Single Sizer	Twin Sizer
Length:	11.75 m (38' 6")	12.2 m (40')
Width (in transport):	5.1 m (16' 8")	5.1 m (16' 8")
Height (in transport):	4.0 m (13' 2")	4.0 m (13' 2")

Machine Weight

Weight

Technical Data

Tractor power requirement: 134 kW (180 bhp) minimum Tractor hydraulic flow rate: 50 litres/minute minimum Harvester oil reservoir capacity: 410 litres Electrical requirements: 12V DC negative earth

Tyre size: Tyre pressure: 560/60 R22.5 @ 3 bar (45 psi)

8700 kg (8.7 ton)

Machine Nut and Bolt Tightening Torgues

Wheel nuts	266 lb/ft (360 Nm)
M6 nyloc zinc plated nut	10 lb/ft
M8 nyloc zinc plated nut	23 lb/ft
M10 nyloc zinc plated nut	44 lb/ft
M12 nyloc zinc plated nut	87 lb/ft
M16 nyloc zinc plated nut	208 lb/ft
M20 nyloc zinc plated nut	380 lb/ft
M24 nyloc zinc plated nut	690 lb/ft
M6 bolt/steel nut	7 lb/ft
M8 bolt/steel nut	19 lb/ft
M10 bolt/steel nut	38 lb/ft
M12 bolt/steel nut	70 lb/ft
M16 bolt/steel nut	170 lb/ft
M20 bolt/steel nut	325 lb/ft
M24 bolt/steel nut	565 lb/ft

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

DIAGRAMS

Hydraulics

Circuit 1-	Auxiliary hydraulics	2.1		
Circuit 2 -	Primary web/secondary web/transfer stars/ agitators/4 roller sizer	2.2		
Circuit 3 -	Omega scrolls & clod rollers/7 roller sizer/ LH boom motor & feed web	2.3		
Electrics				
Electrical circuit schematic 2.				
Valve plug connection to circuit board				
Valve plug wiring identification 2.6				
Control cable wiring identification 2.7				

DIAGRAMS

Circuit 1 - Auxiliary Hydraulics





Circuit 2 - Primary web/secondary web/transfer stars/agitators/4 roller sizer



Circuit 3 - Omega scrolls & clod rollers/7 roller sizer/LH boom motor & feed web

Electrical Circuit Schematic





Valve Plug Connection to Circuit Board

DIAGRAMS

Valve Plug Wiring Identification

TSP 1900

			\triangle 34 CORE
VALVE NO	OPERATION	FUNCTION	YY WIRE NO
1	LEFT ELEVATOR	OUT	+V=1 0V=2
2	LEFT ELEVATOR	IN	+V=30V=4
3	LEFT SWAN NECK	LOWER	+V=50V=6
4	LEFT SWAN NECK	RAISE	+V=70V+8
5	RIGHT ELEVATOR	OUT	+V=90V=10
6	RIGHT ELEVATOR	IN	+V=110V=12
7	RIGHT SWAN NECK	LOWER	+V=130V=14
8	RIGHT SWAN NECK	RAISE	+V=150V=16
9	RIGHT ELEVATOR	RUN	1718
10	RIGHT DIGGER	LOWER	+V=190V=20
11	RIGHT DIGGER	RAISE	+V=210V=22
12	LEFT DIGGER	LOWER	+V=230V=24
13	LEFT DIGGER	RAISE	+V=250V=26
14	AXLE STEER	RIGHT	+V=270V=28
15	AXLE STEER	LEFT	+V=290V=30
28	SPARE		+V=300V=31
29	SPARE		+V=320V=33
			\bigcirc 25 CORE
16	1ST AGITATOR	RUN	12
17	2ND AGITATOR	RUN	34
18	OMEGA SCROLLS	RUN	56
19	CLOD ROLLERS REV	RUN rev	78
20	CLOD ROLLERS FWD	RUN fwd	910
21	1ST SIZER	RUN	1112
22	2ND SIZER	RUN	1314
23	LEFT ELEVATOR	RUN	1516
24	2ND WEB	RUN	1718
25	1ST WEB	RUN	1920
26	SPARE		2122
27	SPARE		2324

Control Cable Wiring Identification

CAB CONTROL CABLE	
CABLE No	FUNCTION
F1	BUZZER LINK
F2	CLOD ROLLER REVERSE
F3	OMEGA CLEANER ON/OFF
F4	FIRST SIZER ON/OFF
F5	SECOND SIZER ON/OFF
F6	SECONDARY WEB COIL
F7	SECONDARY WEB COIL
F8	PRIMARY WEB COIL
F9	PRIMARY WEB COIL
F10	SECOND AGITATION ON/OFF
F11	FIRST AGITATION ON/OFF
F12	DIGGER LOWER
F13	DIGGER RAISE
F14	DIGGER AUTO POWER
F15	FUSED POWER
F16	FUSED POWER
F17	FUSED POWER
F18	STEER RIGHT
F19	STEER LEFT
F20	STEER AUTO CENTRE
F21	SWITCH POWER
F22	LIVE FEED (FUSED)
F23	E ' STOP RETURN
F24	EARTH
F25 / EARTH	EARTH

REAR CONTROL CABLE		
CABLE No	FUNCTION	
R1	SPARE	
R2	SPARE	
R3	SPARE	
R4	SPARE	
R5	SPARE	
R6	LIVE POWER	
R7	LIVE POWER	
R8	LIVE POWER	
R9	LEFT BOOM FOLD OUT	
R10	LEFT BOOM FOLD IN	
R11	LEFT BOOM LOWER	
R12	LEFT BOOM RAISE	
R13	LEFT BOOM RUN COIL	
R14	LEFT BOOM RUN COIL	
R15	RIGHT BOOM FOLD OUT	
R16	RIGHT BOOM FOLD IN	
R17	RIGHT BOOM LOWER	
R18	RIGHT BOOM RAISE	
R19	RIGHT BOOM RUN COIL	
R20	RIGHT BOOM RUN COIL	
R21	SPARE	
R22	BUZZER LINK	
R23	E'STOP	
R24	E'STOP	
R25 / EARTH	EARTH	
	TSB IN041	