Wadkin ULTRACARE
At the Cutting Edge of Industry

LAM180

THROUGH FEED FOUR SIDE PLANING MACHINE

INSTRUCTION MANUAL No.2042/1

LAM180

THROUGH FEED FOUR SIDE PLANING MACHINE

MACHINE No.	
TEST No.	
YEAR OF MANUFACTURE	

MANUFACTURERS E.C. DECLARATION OF CONFORMITY

The following machine has undergone "Conformity Assessment" and has undergone Self Assessment in accordance with:-

Schedule IV of the Supply of Machinery (Safety) Regulations 1992
and Amendment No. 2063

COMPANY

Wadkin Ultracare Limited
Franks Road
Hilltop Industrial Park
Bardon
Leicestershire
LE67 1TT

RESPONSIBLE PERSON

Mr J P Smith (Director)

MACHINE DESCRIPTION

TYPE Four Sided Planer

MODEL LAM180

DIRECTIVES COMPLIED WITH

Supply of Machinery (Safety) Regulations 1992
Amendment No. 2063 1994
Draught Proposal CEN/TC 142
ISO 9001 Part 1

SIGNED ON BEHALF OF WADKIN
ULTRACARE LTD.

.....

BE CAREFUL
THIS MACHINE CAN BE DANGEROUS
IF IMPROPERLY USED

Always use guards.
Keep clear until rotation has ceased.
Always operate as instructed
and in accordance with good practice.
Read instruction manual before installing,
operating or maintaining machine.

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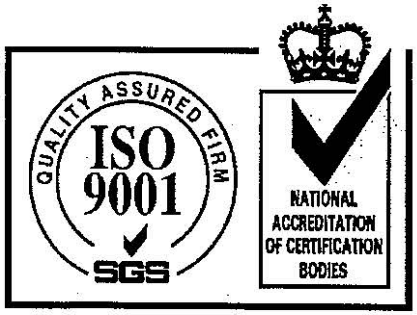

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EXTENT OF MANUAL

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This Operation and Maintenance Manual is intended to provide users with all relevant information concerning the operation and maintenance of a Through Feed Planing and Moulding Machine, Model LAM 180.

The document is produced in seven sections.

Section One gives advice general safety aspects of the machine usage including references to the various current statutory and safety regulations in force, advice on record keeping of machine operation and maintenance, and also instructions on recommended procedures when accepting and receiving the machine from the manufacturer.

Sections Two to Eight provide the information necessary to install, operate and maintain the machine including procedures for fault finding.

At the end of the manual is a Glossary of terms used throughout the body of the manual.

1 HEALTH AND SAFETY

This Section covers all aspects of safe operation and safe use of woodworking machinery. It refers to various statutory Health and Safety regulations, and also includes information and advice derived from many years' experience in the in the building, operation and maintenance of woodworking machinery.

It is of the utmost importance that the user or employer reads this Section of the document and understands clearly all of the stated requirements concerning safe operation of the equipment.

1.1 Health and Safety

There are a number of statutory regulations which apply to the safe operation of woodworking machinery in the UK. These regulations are listed below, and the user is advised to refer to the relevant parts of these regulations and ensure that the requirements are complied with.

Where the machinery is used outside the UK, then the regulations of that country will apply, and should be complied with.

Note:
The list below relates to the most recent published editions of the regulations including all amendments and supplements.

Factories Act.

Health and Safety at Work Act.

Electricity Regulations.

Provision and use of Work Equipment Regulations.

Safe Use of Woodworking Machinery.

1.1.1 Factories Act

This Act requires that rotating machinery shall be of good mechanical construction and that it shall be **properly maintained and serviced by competent and experienced persons.**

1.1.2 Health and Safety at Work Act

This Act imposes obligations to apply similar standards to those of the Factories Act as a minimum requirement, **especially where a machine is installed in a place of work where no suitable legislation applies.**

1.1.3 Electricity Regulations

These regulations place general requirements on the installation and maintenance of electrical equipment. Users should be aware of the requirements concerning the availability of lighting and free working space for maintenance personnel, and the importance of personnel being fully competent and trained when working on electrical equipment.

1.1.4 Provision and use of Work Equipment Regulations

Compliance with these regulations is necessary for equipment to be considered to be conforming with the EC declaration of conformity.

The regulations also place obligations on the user (see Section 1.2).

1.1.5 Safe Use of Woodworking Machinery

These regulations place absolute legal requirements on employers and users to ensure **that all fitted guards and safety devices are always used, securely fitted, correctly adjusted and properly maintained.**

The regulations also require that **maintenance be undertaken only by suitably qualified and competent personnel, and that all power supplies are isolated from the machine before any maintenance is undertaken.**

It is also required that **operators (users) receive suitable training and instruction into the possible dangers arising from machine usage and that local working practices are followed.**

1.1.6 Other Documents for Reference

Other documents which refer to woodworking machinery operation and maintenance in the UK include:

Noise at Work Regulations.

Control of Substances Hazardous to Health Regulations.

Code of Practice BS5304 - Safeguard of Machinery.

Code of Practice BS6854 - Safeguard of Woodworking Machines.

Health and Safety Executive note IND(G) 1(L).

1.2 Supply of Machinery (Safety) Regulations 1992

A machine manufactured in accordance with the Essential Health and Safety Requirements of the Supply of Machinery (Safety) Regulations 1992, complies with the EC conformity requirements and can thus have the CE mark appended (Harmonised Standard PREN 12750: 1997) .

These regulations also impose legal requirements on both the employer and the user of the machine with regard to proper usage, user working conditions, risks of injury and many more. These requirements are wide ranging, and in some cases specific to only certain types of machine or process. Some of the more general requirements which apply to woodworking machinery are briefly detailed below.

1 An employer shall ensure that the equipment is constructed/adapted as to be suitable for the purpose that it is used.

2 In selecting the equipment, the employer shall have due regard to the working conditions and the risks to health and safety of persons which exist in the premises in which the equipment is to be used.

3 The employer shall ensure that the equipment is used for the operations for which, and under the conditions for which it is suitable.

Other requirements include provision of suitable training of users, provision of suitable documentation (information and instructions), and declarations of any specific risks.

1.3 Specific Information

Section 4 of this manual - Machine Usage and Controls identifies and details general safe working practices and specific local practices which should be adopted when using the machine. In addition to this information two hazards, specific to woodworking machinery should be considered in more detail.

1.3.1 Noise

Noise levels can vary widely depending upon the machine and the conditions of use.

Planing and moulding machines produce high noise levels, typically in the region of 95dB to 115dB when cutting.

The Noise at Work Regulations require that an operator is not subjected to continuous noise levels above 90dB over an 8 hour period. Thus, some form of noise protection is necessary.

A machine manufacturer may supply (or provide information) a suitable sound enclosure. It is possible that, given the types of materials available in the works (ie sawmill), a suitable enclosure may be produced on site.

It should be noted however, that even with an enclosure, noise levels might still exceed the 90dB limit (especially at the machine infeed end).

As a precaution suitable ear protection should be worn by all machine operatives.

Refer to use of ear defenders in Section 4.1.2 of this manual.

1.3.2 Dust

Wood dust can be harmful to health through inhalation and also skin contact.

The Control of Substances Hazardous to Health Regulations place legal requirements on **employers** to prevent exposure of the user to substances hazardous to health or, where prevention is not practicable, to adequately control the exposure. Adequate control should be achieved by measures other than provision of personal protective equipment.

The Regulations require that airborne dust levels should not exceed $5mg/m^3$.

2 MACHINE SPECIFICATION

Machine Details

Model	LAM 180
Dimensions	Refer to machine Foundation Plan
Services	Refer to the machine Specification Plate located on the machine frame

Capacities and Adjustments

Maximum timber size admitted	180mm x 130mm
Maximum finished work size	170mm x 120mm
Minimum finished work size	80mm x 40mm
Feed speeds	Up to 80m/min
Spindle speeds	4500 and 6000 rev/min
Spindle motors	56.25 and 15kW
Pneumatic air requirement	0.25 m^3/min
Head sequence	Sawing head First bottom head First top head Second bottom head Second top head
Feed motor	30kW (driving hydraulic power pack)

3 INSTALLATION

3.1 Receipt of the Machine

Before accepting the machine at its destination check the packages/items against the bill of loading. Confirm that all listed fittings/accessories have been received and carry out a visual inspection of the packages/items for obvious signs of damage.

Report any omissions or damage; note these for any future reference.

3.2 Preparation for Installation

Ensure that all the necessary external services are available ie electricity, pneumatic air, etc., as identified in Section 2 Machine Specification.

Check also that adequate space is available on the installation site for lifting and manoeuvring access.

Ensure that any covers or guards are removed and stored away from the machine.

Check that the following lifting equipment is available and of is of adequate capacity:

crane or approved lifting equipment
45mm diameter steel rods, 1.2m long (certified as suitable for lifting purposes)
lifting slings (capacity according to machine Foundation Plan)
wooden chocks.

Refer to the Foundation Plan for details of the floor area required and for any special foundations necessary

Ensure that the final location of the machine has been levelled.

3.3 Lifting and Locating the Machine

Place the steel rods through the holes in the machine base.

Position the lifting slings on the crane/lifting equipment hook.

Locate the slings securely on the steel rods. Insert the wooden chocks between the slings and the machine base to prevent damage to the base.

Position a steel levelling plate at each machine jacking screw point (refer to the machine Foundation Plan).

Lift and position the machine on the prepared location, and remove any transit clamps that may have been fitted.

Level the machine (as detailed below) using an engineer's level by adjusting the jacking screws located at each machine foot position.

Levelling longitudinally
With the engineer's level lengthways on the table of the machine, adjust the machine longitudinally by adjusting the jacking screws. Check level at approximately every 300mm along the machine length. Deviation should not exceed 0.1mm/m.

Levelling transversely
Position the engineer's level across the table (at right angle to the fence), and adjust the machine transversely by adjusting the jacking screws. Repeat this action at points similar to the longitudinal checks. Deviation should not exceed 0.1mm/m.

WARNING:
The machine must be firmly bolted down before connecting any services.

3.4 Connecting the Services

3.4.1 Electrical Supply

The customer is responsible for an electrical supply suitable to meet the power requirements of the machine. These requirements are shown on the machine Specification Plate on the machine frame, and are also shown on the electrical schematic/connection diagram accompanying the machine.

Electrical connections should be made to the isolating switch on the electrical control cubicle.

WARNING:
Connection of the supply must be made by a competent and experienced electrician.

The connection procedure should include, but not be limited to:

Confirm that the supply is of the correct voltage, phase and frequency to that identified on the machine Specification Plate.

Check that the incoming fuse ratings can accommodate the full load current shown machine Specification Plate.

Connect the incoming supply to the relevant terminals on the electrical control cubicle (L1, L2 and L3).

Make a good earth connection to the machine.

WARNING:
Before continuing further, refer to Section 4 for advice on safe operation of the machine. Also, ensure that when undertaking any of the following operations all relevant safety requirements and procedures detailed in Section 1 are complied with.

Close the isolator on the electrical control cubicle, and run each spindle in turn to ensure direction of rotation is correct:

Bottom horizontal spindles - clockwise when viewed from front.

Top horizontal spindles - counterclockwise when viewed from front.

Note:
Incorrect rotation of the spindles can be corrected by reversing any two of the incoming supply connections to the terminals of the electrical control cubicle.

WARNING:
Phase changes must be made by a competent and experienced electrician.

3.4.2 Pneumatic Air Supply

The customer is responsible for a pneumatic air supply suitable to meet the requirements of the machine as shown on the machine Foundation Plan (0.25m^3/min).

The air supply connection in the machine base is ¼BSP female.

Check the condition of the air connectors, confirm their cleanliness, and make the air connection.

3.4.3 Dust Extraction

The customer is responsible for the supply and fitting of suitable dust extraction equipment.

The number and length of the flexible connections from the exhaust hood to the machine should be as shown on the machine Foundation Plan.

See the machine Foundation Plan for:

Airflow requirements in m^3/hour.

Cross-sectional dimensions of machine extraction connections.

Duct air velocities in m/second.

Average pressure drop at machine extraction connections are shown below.

Duct Diameter (mm)	Required Air Volume (m^3/hour at 30m/sec)	Pressure Drop (Pa)
120	1222	1000
150	1909	850

4 MACHINE USAGE AND CONTROLS

Note:
Refer also to Section 1 for information on general statutory requirements when operating woodworking machinery.

4.1 Safe Practices

Safe and proper working practices must be followed when setting-up and operating the machine. Adequate advice and information are readily available in the form of local working practices, notices, warnings and the information contained in this manual.

IT IS THE OPERATOR'S RESPONSIBILITY TO USE THE MACHINE FOLLOWING THE PROCEDURES LAID DOWN AND ONLY FOR THE PURPOSES FOR WHICH IT WAS DESIGNED.

4.1.1 Pre-operation Checks

All guards and fences are fitted securely and properly adjusted to suit their purpose.

Dust extraction equipment is working correctly.

Machine controls are functioning correctly (see Section 4.2).

Adequate working space is provided and lighting is available.

4.1.2 Checks During Operation

Proper protective equipment is available and employed (goggles, ear defenders, face mask, etc).

Area around the machine is kept clean and free of wood refuse.

Any machine malfunction is recorded and reported to person in authority.

Machine is made stationary and electrically isolated before any cleaning of work area or ANY adjustments are made to the machine or ancillary equipment.

4.1.3 Safety Devices

In order to avoid injury or accidental damage to personnel or equipment, a number of interlocking features have been incorporated into the machine operation. These are:

1 A splinter catching device (optional) which protects against splinters at the machine infeed.

2 If the enclosure door is opened during normal operation all spindles and feed rollers stop.

3 With the enclosure open, the machine may be used for setting-up and test purposes only.

4 The machine feed does not operate unless the spindles are running and the enclosure is closed.

5 Brakes are fitted to all spindles.

6 Infeed trip device (1) which will trip the operation of the machine feed. The spindles will continue to run. This trip level is set through the height of the beam setting. (See Figure 4.1.3).

Electrically isolate the machine before trying restart after operation of the trip device. The feed must be restarted at the control panel after removal of the cause of the trip.

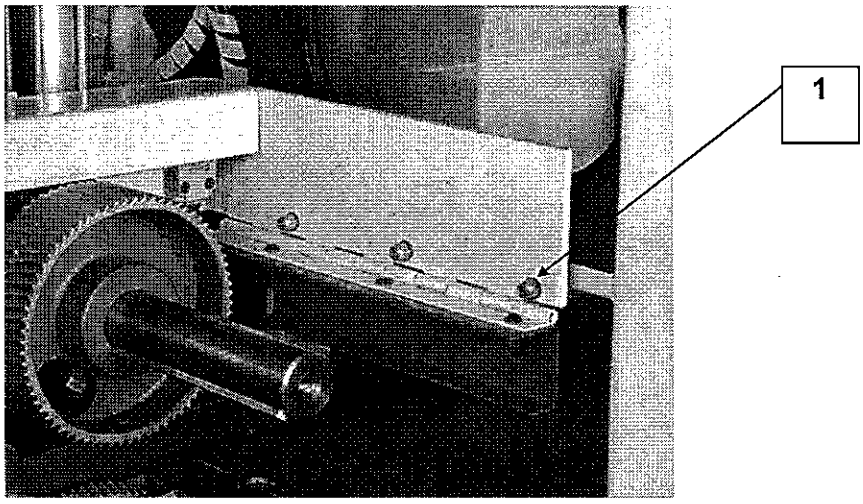

Figure 4.1.3

4.2 Machine Controls

4.2.1 Machine Control Panel

Before using the machine, operators should familiarise themselves with the machine control panel and other controls.

The machine control panel is mounted at the infeed end of the machine and consists of a number of buttons, switches and indicators (see Figure 4.2.1). Depending upon the model of the machine and special features fitted, the illustration of the control panel may differ slightly from the panel on the machine being installed.

Feed Stop/Start (1)

Start/stop buttons with indicator lamp which controls the operation of the feed rollers.

Inch Forward/Reverse (2)

Two buttons enable the feed to be inched forward or backwards - for setting-up or other maintenance purposes.

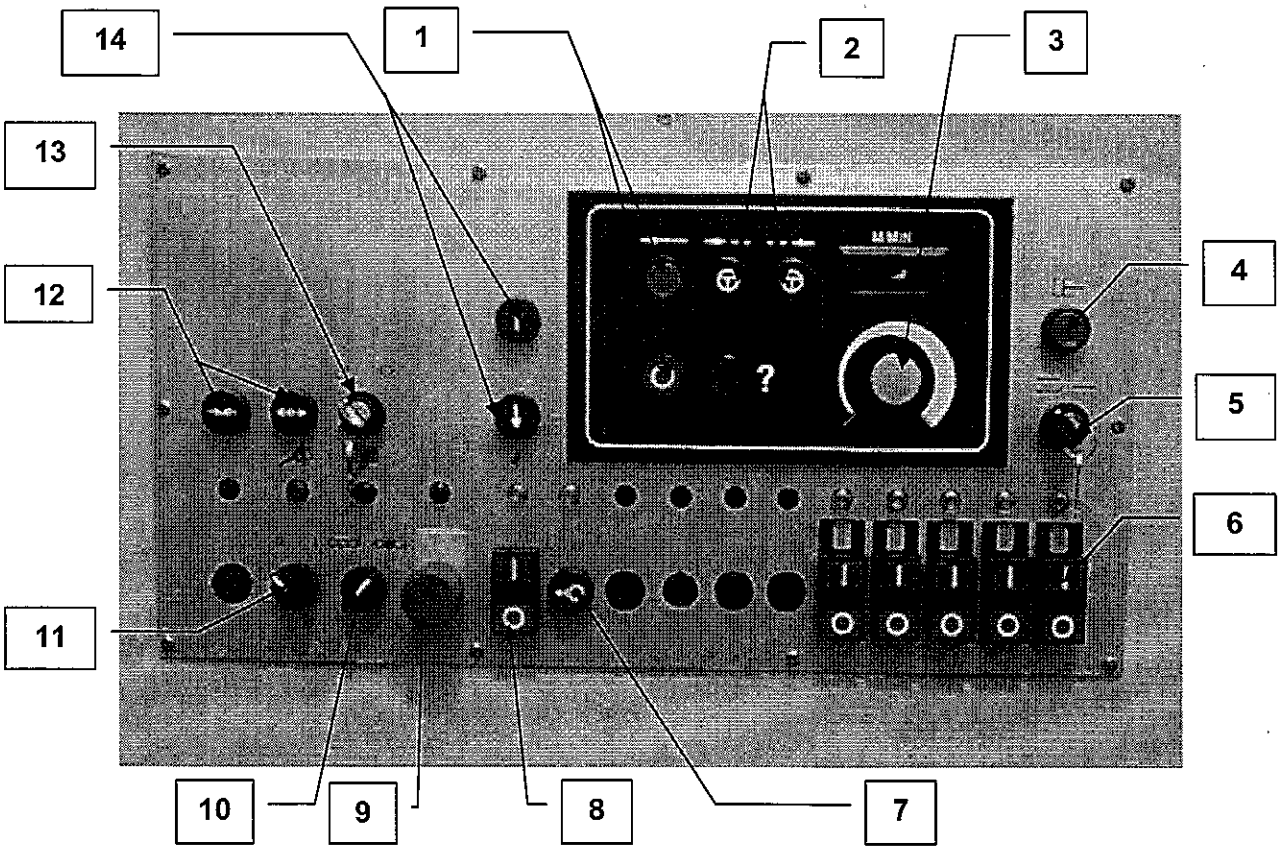

Figure 4.2.1

Feed Speed Controller (3)

Controls the speed of the feed through the machine; adjusted only when the feed is operating.

Hydraulic Feed Pump Motor Start/Stop (4)

Illuminated button enables hydraulic motor to be started/stopped.

Feed Reverse (5)

Two-position keyswitch permitting feed direction to be reversed.

Spindle Start/Stop (6)

Each spindle has a toggle start/stop button with lamp indicator. These enable spindles to be started and stopped independently.

Spindle Head Brake Release (7)

Releases the spindle brakes to enable free rotation of the spindles for changing cutter blocks, belts, etc; lamp indication when enabled.

Power On/Off (8)

Toggle power on/off button with lamp indicator. Controls power through the control panel.

Emergency Stop (9)

Emergency stop button shuts down machine operation when depressed. Must be unlocked to reset.

Emergency stop buttons are also located at other points on the machine and on the pendant controller in compliance with the Machinery Directive requirements.

In-Line/Indepenent Transfer (10)

Switch for setting the machine in-line or for independent use.

Automatic Lubrication (11)

Two-position on/off switch to provide automatic lubrication to machine bed.

Clamp On/Off (12)

Two buttons enable the vertical movement of the top head to be hydraulically clamped/unclamped.

Enclosure Override (13)

Two-position keyswitch which enables the machine drives to operate when the enclosure is raised - for setting-up and other maintenance purposes.

Beam Raise/Lower (14)

Two buttons enable the beam to raised or lowered within predetermined limits.

4.2.2 Pendant Controller

A pendant controller on a wander lead is supplied and provides the following controls.

Emergency Stop

Emergency stop button shuts down machine operation when depressed. Must be unlocked to reset.

Inch Forward

A button enables the feed to be inched forward - for setting-up purposes.

Beam Raise/Lower

Two buttons enable the beam to be raised or lowered within predetermined limits.

Clamp/Unclamp

Two buttons enable the vertical movement of the top heads to be hydraulically clamped/unclamped.

4.2.3 Air Pressure Regulators and Gauges

Other controls located on the machine comprise the regulators and gauges used to set the feed roller, side roller and pad pressure segments.

5 SETTING-UP THE MACHINE

5.1 General

This Section describes the procedures to set-up a five-spindle Model LAM 180 machine, comprising a sawing head, first and second bottom heads and first and second top heads.

Setting-up comprises setting tool spindles to basic positions relative to the table and the and setting feed and side roller positions and jointers.

To achieve a good product, the tool must be adjusted very accurately to the table.

The basic procedure for setting-up all cutting tools is as follows:

1 Place the straight edge on the table and hold in position.

2 Rotate the tool by hand in the opposite direction of the cut.

3 Adjust the position of the tool using the crank handle until **a cutting edge** of the tool touches the straight edge.

To eliminate spindle backlash, always move the bottom head spindles in the direction of the workpiece to their final positions, but move the top head spindles and feed rollers in an upward direction.

4 Secure the tool in position, and note the digital indicator display reading.

5.1.1 Preparation

Before beginning the setting-up procedure carry out the following checks:

1 Cutter blocks are securely fitted (see Section 5.1.2).

2 Adequate working space is provided and lighting is available.

3 Proper protective equipment (goggles, ear defenders, face mask, etc) is available and employed if required.

4 Area around the machine is clean and free of wood refuse.

5 Machine spindles and feed rollers are stationary and the machine is electrically isolated.

Equipment required:

1 Straight edge.

2 Standard tool kit.

3 Hydraulic fluid applicator.

5.1.2 Remove/Refit Cutter Block in Spindle (Typical) (Figure 5.1.2)

WARNING:
ENSURE THAT THE MACHINE IS ELECTRICALLY ISOLATED (EMERGENCY STOP ACTIVATED) BEFORE PROCEEDING.

Notes:
All spindles have right-hand threads.

Do not strike any component; do not use a box or extension spanner.

1 Open the enclosure door to access the outboard bearing.

2 Depressurise the outboard bearing by turning the pressure release screw counterclockwise ¼ turn using a 3mm hexagon key.

3 Slacken the two 12mm collar nuts (1) securing the outboard, and swing the two captive 'C' washers clear of the housing and remove the housing.

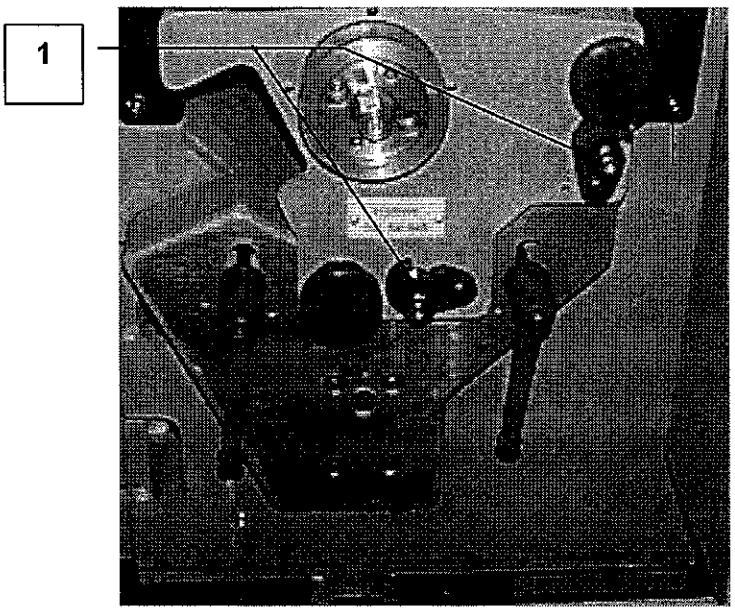

Figure 5.1.2

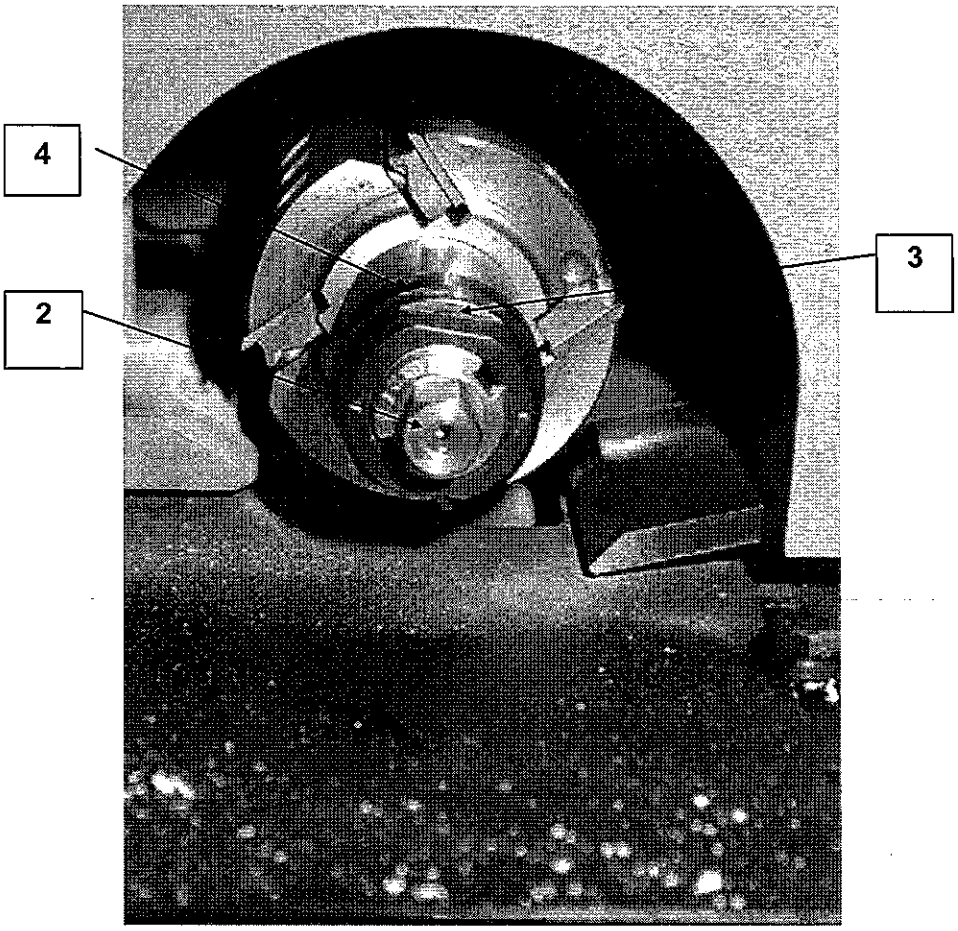

Figure 5.1.2

4 Using a combination spanner, unscrew the spindle nut from the spindle by locating the spanner on the hexagon (2) of the spindle and the two flat faces of the cutter block locknut (3), (unscrew counterclockwise).

5 Remove the locking collar (4).

6 Before refitting the cutter block, carefully clean the spindle and the cutter block.

7 Locate the cutter block on the spindle and the locking collar, and tighten the hexagon (clockwise) using a combination spanner.

8 Refit the outboard bearing housing and retighten the captive washers and collar nuts (1).

9 Tighten the pressure release screw and pressurise the bearing to 300bar by applying hydraulic fluid to the pressure nipple located in the recess on the front of the bearing.

10 Close the enclosure door.

5.2 Setting the Sawing Unit (Figure 5.2)

The heavy duty sawing unit is fitted with a 56.25kW motor.

The unit consists of a bedplate (through which saw cuts are made), an assembly carrying eight riving knives, and pneumatically-loaded top rollers.

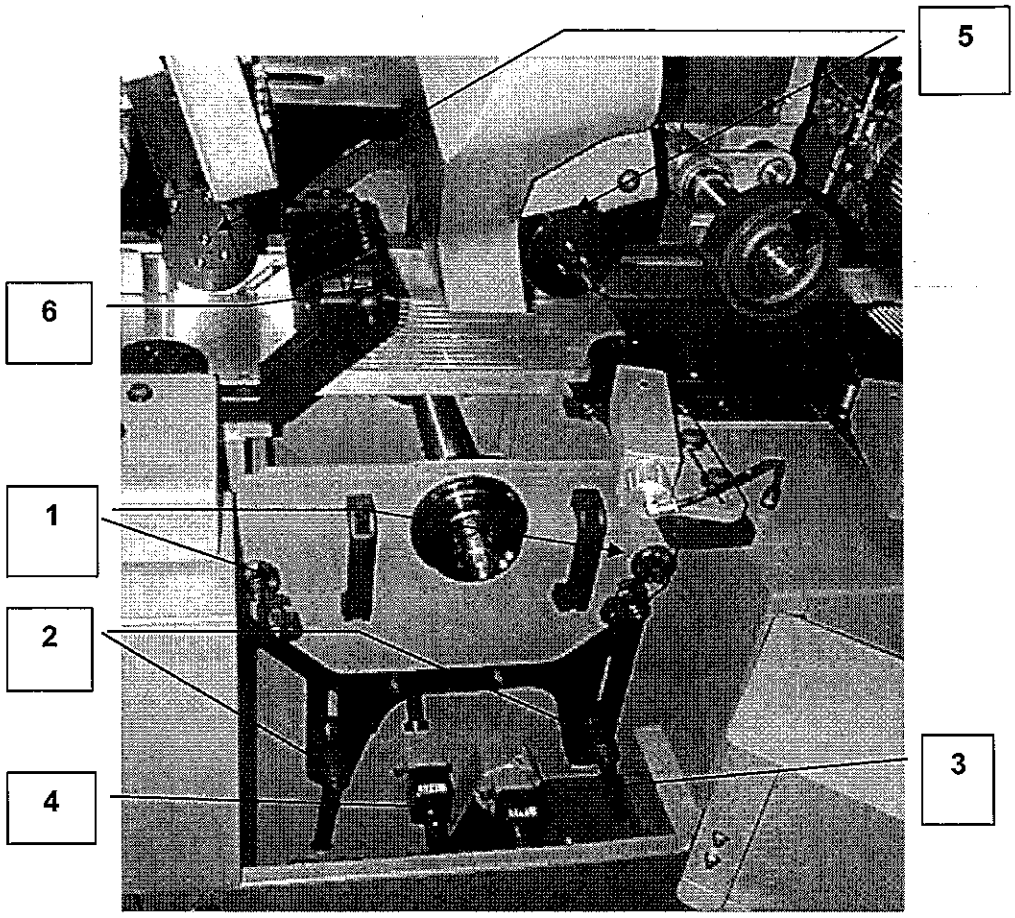

Figure 5.2

The riving knives are set in-line with the saw blades so relieving stress during cutting by preventing the timber from 'gripping' the saw blades.

WARNING:
ENSURE THAT THE MACHINE IS ELECTRICALLY ISOLATED (EMERGENCY STOP ACTIVATED) BEFORE PROCEEDING.

1 On the outboard bearing faceplate loosen nuts (1) and release the C washers.

2 Grip the faceplate at the left and right hand positions and remove the outboard bearing.

3 Release locking handles (2) and using a crank handle adjust shaft (3) to set the spindle to its lowest position (counterclockwise rotation).

4 With the required number of saws/spacers on the saw sleeve, fit the sleeve on to the spindle (see Section 5.1.2). Ensure that the spindle rotates freely.

5 Refit the outboard bearing and secure with the C washers and nuts (1).

6 Lock handles (2).

7 Using the crank handle adjust shaft (4) to position the spindle to the fence to suit the size of the timber.

Clockwise rotation of the crank handle moves the spindle away from the fence (giving a positive count on the digital indicator), counterclockwise rotation moves it towards the fence.

8 Adjust the height of top rollers (5) to position them slightly above that of the finished timber thickness (final setting the rollers is carried out when passing a 'test piece' of timber through the machine).

10 Release in turn each riving knife locking screw (6) and align each knife to suit the spacing of the saws on the saw sleeve. Ensure that all screws are retightened after adjustment of the knives.

Caution:
When undertaking any of the following procedures involving rotating spindles and passing a 'test piece' through the machine, ensure that the conditions stated in Section 7.1.2 are closely followed.

WARNING:
ALWAYS ELECTRICALLY ISOLATE THE MACHINE BEFORE EACH AND EVERY ADJUSTMENT DURING A 'TEST PIECE' PROCEDURE.

11 Release locking handles (2) and using the crank handle slowly adjust shaft (3) to wind the saw blades through the bedplate until the blades project above the bedplate the thickness of the finished timber.

12 Start the saw spindle and pass a 'test piece' through the machine stopping when the 'test piece' reaches the first top roller (5).

13 Lower the roller until it touches the timber.

14 Continue passing the 'test piece' through the machine stopping when it is just in front of the riving knives.

15 Check the alignment of the riving knives with the saw cuts.

16 Continue passing the 'test piece' stopping when it is fully past the riving knives.

17 Recheck that the knives are properly aligned and parallel to each other; ensure that all locking screws (6) are tight.

18 Continue passing the 'test piece' through the machine to the outfeed bed.

19 Check the 'test piece' for quality and sawn sizes.

5.3 Setting First Bottom Head (Figure 5.3)

The first bottom head is driven by a 15kW motor. Setting the head involves a single radial (vertical) adjustment setting the cutter block level with the outfeed side bed of the head.

WARNING:
ENSURE THAT THE MACHINE IS ELECTRICALLY ISOLATED (EMERGENCY STOP ACTIVATED) BEFORE PROCEEDING.

1 Open the front enclosure doors and remove any guards to permit easy access; ensure that the bottom head outfeed side bed is clear.

2 Place a straight edge on the outfeed side bed extending over the bottom head cutter block.

3 Release the spindle brake.

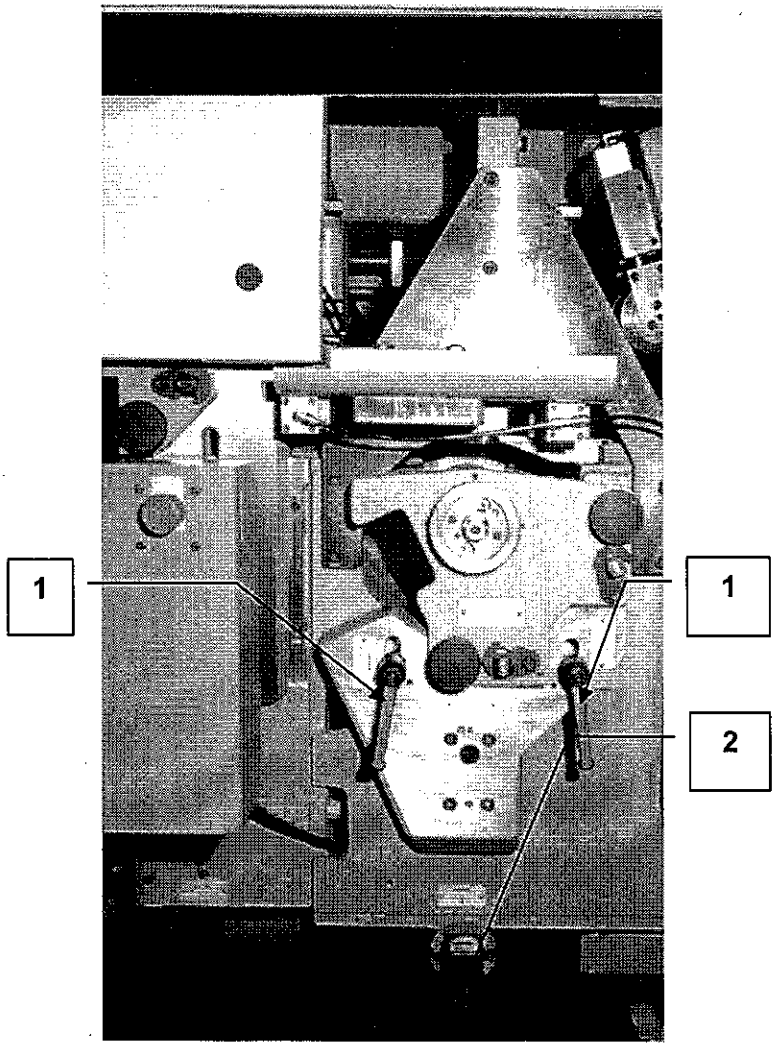

Figure 5.3

4 Release locking handles (1).

5 Turn the cutter block by hand counterclockwise and using the crank handle, adjust shaft (2) until a cutting edge of the cutter block **just touches** the straight edge. The final movement of the spindle should be **towards** the workpiece.

7 Lock handles (1).

8 Check that adjustment is correct **across whole width** of the cutter block.

9 Replace any guards and close the front enclosure doors.

5.4 Setting First Bottom Head Segmental Pneumatic Pad Pressure (Figure 5.4)

The procedure sets the pad pressure to the base cutting circle of the first bottom head cutter block.

WARNING:
ENSURE THAT THE MACHINE IS ELECTRICALLY ISOLATED (EMERGENCY STOP ACTIVATED) BEFORE PROCEEDING.

1 Place a piece of timber from the batch to be processed on the bed above the bottom head.

2 Slacken the four locknuts (1) and adjust the height of the pad pressure by turning adjuster (2) until the segments of the pad pressure **are just touching** the timber. Lower the pad pressure ½ turn of adjuster (2) (to apply slight pressure).

3 Tighten locknuts (1).

4 The pad pressure segments (3) are pneumatically loaded, via a regulator located above the bottom head, to ensure a constant pressure on the timber).

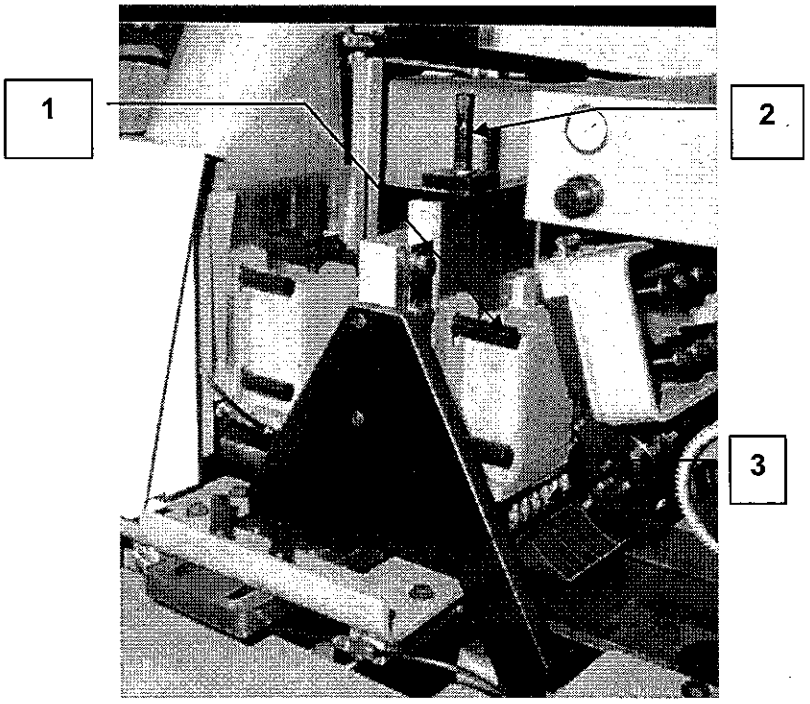

Figure 5.4

5.5 Setting First Top Head (Figure 5.5)

The first top head is driven by a 15kW motor. Setting the first top head involves a radial (vertical) adjustment which is accomplished by powered and manual adjustment of rise and fall of the beam.

WARNING:
ENSURE THAT THE MACHINE IS ELECTRICALLY ISOLATED (EMERGENCY STOP ACTIVATED) BEFORE PROCEEDING.

1 Open the front enclosure doors and remove any guards to permit easy access; ensure that the top head outfeed side bed is clear.

2 Place a piece of timber from the batch to be processed on the bed beneath the top head.

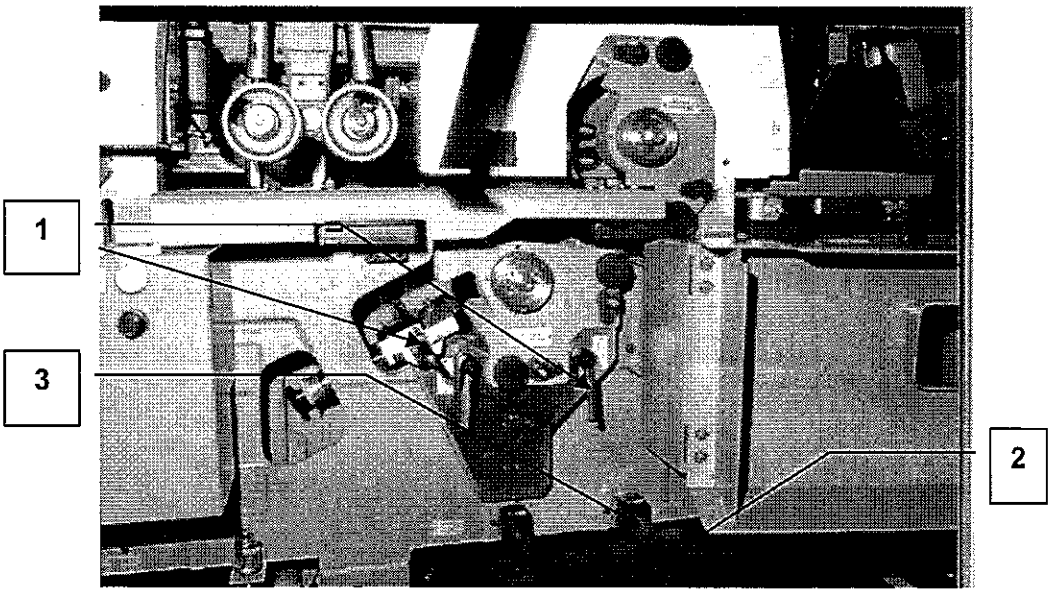

Figure 5.5

3 Reset the emergency stop.

4 Release the spindle brake.

5 Release locking handle (1).

6 Lower lever (2) and hold until automatic adjustment engages. (If engagement does not occur, adjust shaft (3) to right or left until engagement is achieved).

7 Press the raise/lower buttons on the remote pendant to position the cutter block close to the timber.

8 Raise lever (2) to disengage the automatic adjustment.

Note:
The proximity of the spindle to the timber is dependent on the beam setting. Carry out Steps 10 to 12 achieve accurate setting.

9 Operate the emergency stop.

10 Turn the cutter block by hand counterclockwise and using the crank handle adjust shaft (3) until a cutting edge of the cutter block **just touches** the timber. The final movement of the spindle should be **away from** the workpiece.

Clockwise rotation of the crank handle lowers the cutter block towards the timber (giving a negative count on the digital indicator), counterclockwise rotation raises it.

11 Lock handle (1) and reset the emergency stop.

5.6 Setting Top Head Segmental Pneumatic Pad Pressures (Figure 5.6)

The procedure sets the two pad pressures to the base cutting circle of the top head cutter blocks.

WARNING:
ENSURE THAT THE MACHINE IS ELECTRICALLY ISOLATED (EMERGENCY STOP ACTIVATED) BEFORE PROCEEDING.

Note:
The following procedure covers the setting of both leading and trailing pad pressures on the first and second top heads.

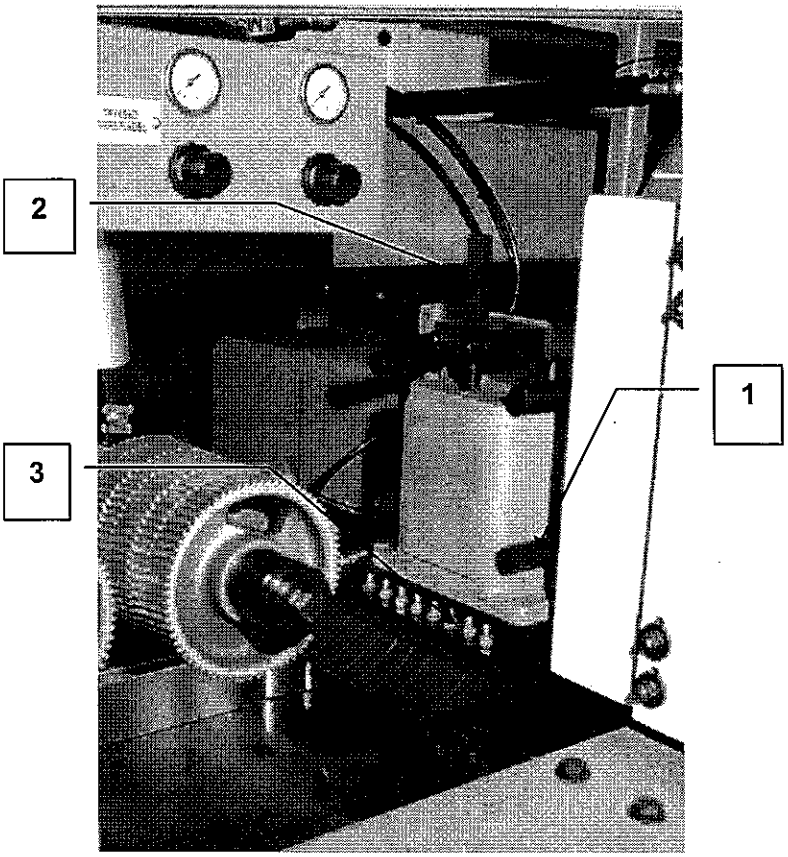

Figure 5.6

1 Place a piece of timber from the batch to be processed on the bed below the top head.

2 Slacken the four locknuts (1) and adjust the height of the pad pressure by turning adjuster (2) until the segments of the pad pressure **are just touching** the timber. Lower the pad pressure ½ turn of adjuster (2) (to apply slight pressure).

3 Tighten locknuts (1).

4 The pad pressure segments (3) are pneumatically loaded, via a regulator located above the top heads, to ensure a constant pressure on the timber).

5.7 Setting Second Bottom Head (Figure 5.7)

The second bottom head is driven by a 15kW motor. Setting the head involves a single radial (vertical) adjustment setting the cutter block to give a nominal 0.5mm cut on the timber.

Note:
The setting of the straight knife jointer is described in Section 6.2.1.

1 Open the front enclosure doors and remove any guards to permit easy access; ensure that the bottom head outfeed side bed is clear.

2 Place a straight edge on the bed beneath the bottom head.

3 Release the spindle brake.

4 Release locking handle (1).

5 Turn the cutter block by hand counterclockwise and using the crank handle, adjust shaft (2) until a cutting edge of the cutter block **just touches** the straight edge. The final movement of the spindle should be **towards** the workpiece.

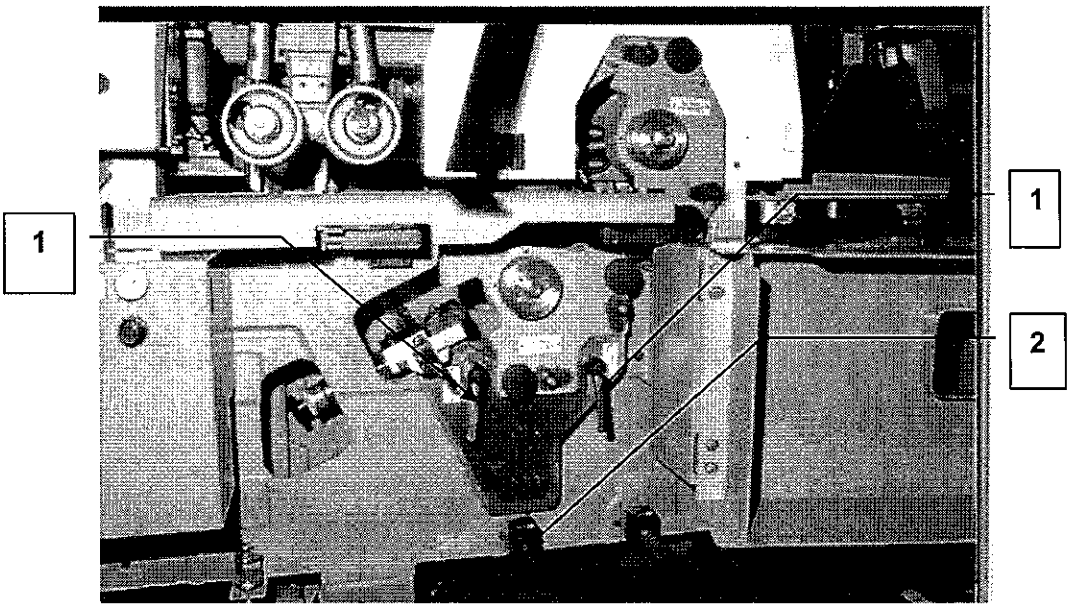

Figure 5.7

6 Lock handle (1).

7 Check that adjustment is correct **across whole width** of the cutter block.

8 Replace any guards and close the front enclosure doors.

5.8 Setting Second Top Head

The second top head is driven by a 15kW motor. Setting the second top head involves a radial (vertical) adjustment which is accomplished by powered and manual adjustment of rise and fall of the beam to give a nominal 0.5mm cut on the timber.

Note:
The setting of the straight knife jointer is described in Section 6.

The procedure for setting the second top head is identical to for the first top head described in Section 5.5.

5.9 Push Feed System (Figure 5.9)

This equipment, which comprises pneumatically controlled top and bottom feed rollers, provides a positive feed of the timber to the sawing head.

It has pneumatically controlled top and bottom feed rollers (1 and 2) and the equipment can be active or inactive depending upon requirements. Selection is via a two-position switch located at the infeed end of the machine, and the pneumatic setting is via a regulator located above the feed rollers; this regulator is also used to provide pneumatic loading of the side rollers detailed below.

Side pressure rollers are fitted to prevent any lateral movement of the timber as it is fed into the machine. The first roller is set to contact the timber, while subsequent rollers apply progressively greater pressure to the timber.

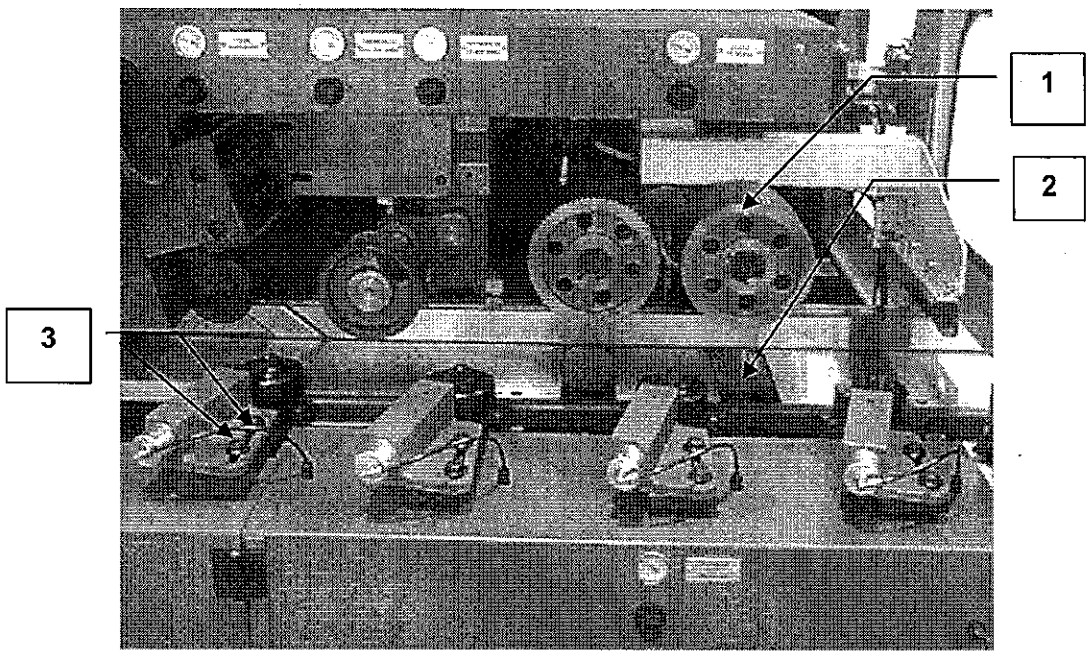

Figure 5.9

Manual setting of the side rollers is achieved as follows.

1 Slacken screws (3).

2 Position the side rollers to the timber width.

3 Tighten screws (3).

5.10 Driven and Idling Feed Rollers

Pneumatically-loaded top feed rollers and pressure rollers are fitted throughout the machine in addition to pressure rollers on the machine near side and unloaded rollers on the fence side.

The top feed rollers are of the shaft-mounted type mounted on the beam; pressure is exerted via pneumatic cylinders. The top pressure rollers are also mounted on the beam.

Initial setting of the top feed rollers and the top pressure rollers is made through the beam control setting (beam raise/lower buttons on the remote pendant or the machine control panel). This setting should be generally, the thickness of the finished timber.

Maximum traction over the full width of the timber is achieved by the positioning of the feed rollers at points along each shaft.

Feed rollers shall be fitted not less than 4mm from a fence.

The pressure side rollers are set manually, generally to the width of the finished timber. There is no setting necessary for the idling rollers fitted in the fence.

WARNING:
ENSURE THAT THE MACHINE IS ELECTRICALLY ISOLATED (EMERGENCY STOP ACTIVATED) BEFORE PROCEEDING.

Positioning Shaft-Mounted Feed Rollers (Figure 5.10.1)

1 Ensure that shaft is clean.

2 Slacken set screw (1).

3 Position feed roll(s) to suit product width.

4 Tighten set screw (1).

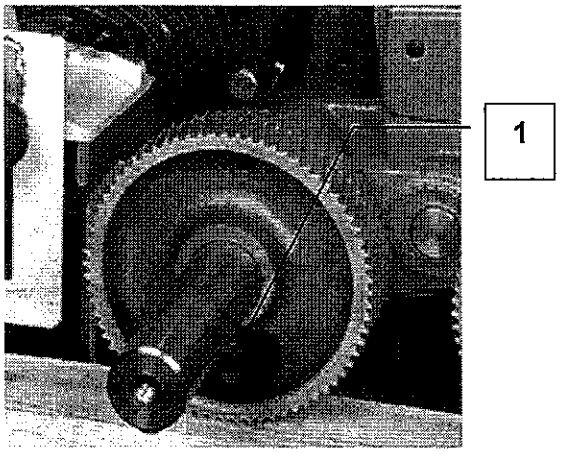

Figure 5.10.1

Positioning Pressure Side Rollers (Figure 5.10.2)

1 Slacken screws (1).

2 Position the side rollers to the timber width.

3 Tighten screws (1).

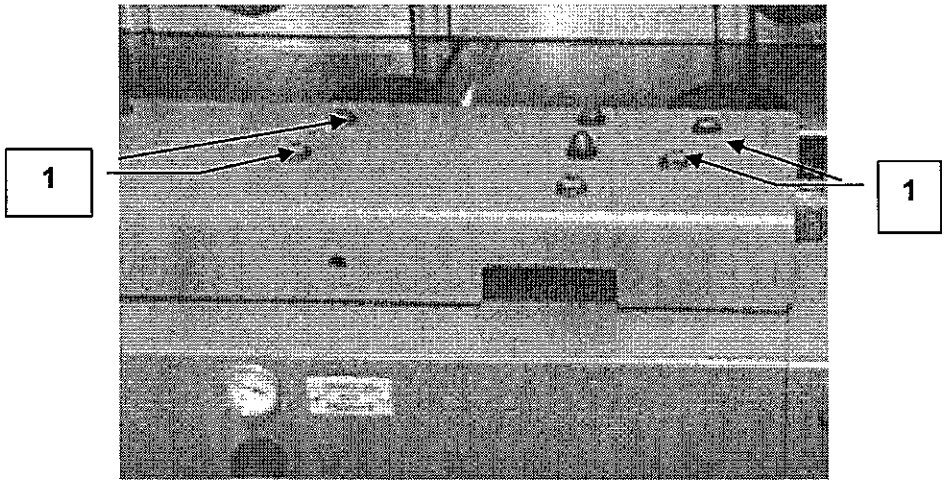

Figure 5.10.2

6 JOINTING

6.1 General

Jointing is a dressing technique which is applied to a rotating cutter block in order to true all cutter blades to a common cutting circle. By applying this technique, the feed speed of the machine by a factor equal to the number of blades on the cutter block.

6.1.1 Practice

The technique of jointing is achieved by grinding all cutting edges of the blades to within 0.01mm of the cutting circle.

When mounted in the machine, an abrasive stone is traversed across the width of the cutter block (straight jointing) while it rotates at its operating speed (normally 4500 rev/min or 6000rev/min).

This action effectively puts a flat on the edges of the blades. The width of the flat (joint) produced increases for every successive jointing, but should exceed 0.5mm.

'Straight' jointing (across the blade) is used for planing applications and is described below.

Straight Jointing

1 Set the jointing stone to just touch a blade, then traverse the stone across the stationary cutter block and ensure that the stone touches all of the blades in turn. Park the stone 5-10mm away from the cutter block.

2 Set the spindle in operation; traverse the cutter block once. Set a further incremental cut (using the relevant index wheel) and traverse again.

3 Switch off the spindle, bringing it to rest as smoothly as possible, using braking if available.

4 Check the jointing using a light, if necessary, to aid inspection. Ensure that even jointing has been applied to all blades.

5 Repeat Steps 2 to 4 if necessary to achieve an even joint. Park the stone away from the cutter block.

6.2 Jointing Procedures

6.2.1 Second Bottom Head (Figure 6.2.1)

This is a built-in straight knife jointer with index wheel and traverse screw. similar to the top head jointer. The axial traverse is effected by a removable handle connected to the traverse screw.

The outfeed bedplate can be retracted, if required, to give increased access to the jointer by slackening two screws on the bedplate.

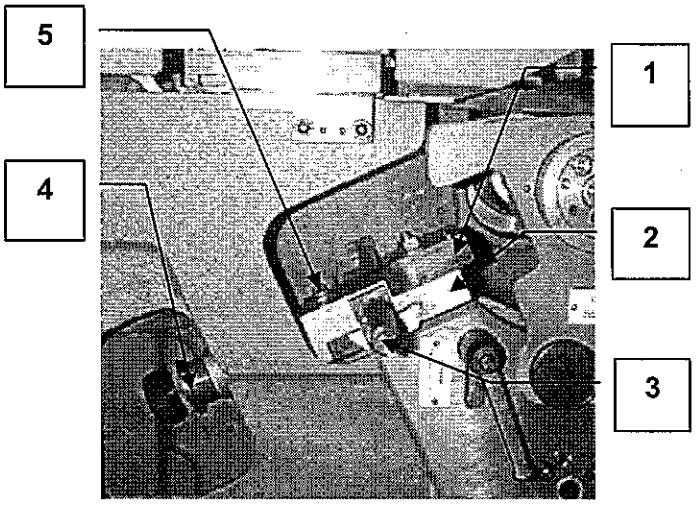

Figure 6.2.1

1 Fit the pre-set profile or straight jointer stone cartridge (1) to the head clamp block (2) and secure.

2 Move the jointer into position relative to the cutter block with the traverse (3) using a handle and/or the index wheel (4).

3 Proceed as described in Section 6.1.1.

4 On completion, retract the jointing stone and park away from the cutter block - at the fence side or near side position.

6.2.2 Second Top Head (Figure 6.2.2)

This is a built-in straight knife jointer forming part of the assembly which carries the top head pad pressure.

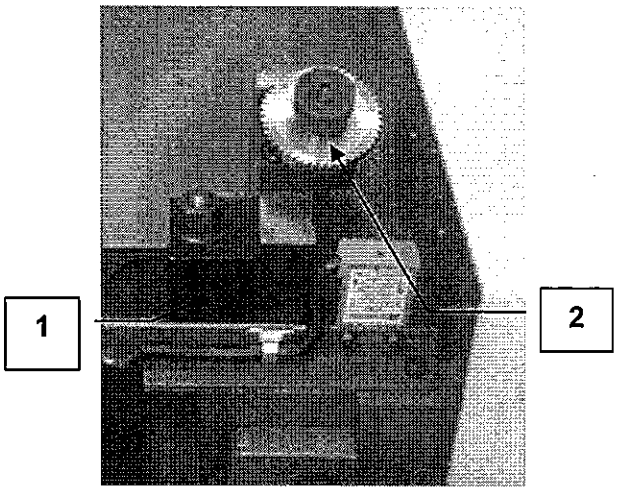

Figure 6.2.2

The method of traverse and feed are similar to the second bottom head (see Section 6.2.1).

1 Fit the pre-set straight jointer stone cartridge to the head clamp block (1) and secure.

2 Move the jointer into position relative to the cutter block using the the index wheel (2).

3 Proceed as described in Section 6.1.1.

4 On completion, retract the jointing stone and park away from the cutter block - at the fence side or near side position.

7 OPERATION

7.1 General

This Section gives a typical operating sequence for a Model LAM 180 machine using the controls described in Section 4 and the basic set-up procedures described in Section 5.

It should be noted that the sequence is typical only - the use of machine controls in conjunction with the setting-up procedures vary depending upon the features of the machine and also the process it is to undertake.

Users are expected to establish operating procedures which comply with local requirements and practices.

7.1.1 Pre-operation Checks

Undertake all the pre-operation checks detailed in Section 4.1.1.

7.1.2 Setting Controls and Adjustments

1 Close the electrical supply isolator and connect the pneumatic air supply at the electrical control cubicle.

2 Power-up the machine at the machine control panel.

3 Using the raise/lower buttons on the pendant controller or the machine control panel move the beam to set the top feed rollers and the top pressure rollers to be generally to the thickness of the finished timber.

4 Set the first bottom head to give the required cut (see Section 5.4).

5 Set the first top head to the required height (see Section 5.5).

6 Set the second bottom head to give the required cut (see Section 5.7).

7 Set the second top head to the thickness of the finished timber (see Section 5.8).

8 Make the necessary settings to the push feed top and side rollers (see Section 5.9), the side rollers along the machine length (see Section 5.10), and the bottom and top head pad pressures (see Sections 5.4 and 5.6).

Before continuing, check all guards and check that the dust extraction system is switched on and working properly.

9 With the spindle brakes released, carefully rotate all cutter blocks by hand to ensure free rotation.

10 With the enclosure door open, turn the 'enclosure override' keyswitch to door open.

11 Start all spindles.

During the set-up procedure the main feed is inoperative; only the inch control forward is enabled allowing the workpiece to move forward a short distance at a time, each movement requiring a pressure on the button.

12 Using the 'inch forward' control pass a 'test piece' timber through the machine and check the dimensions for specification and the quality of finish.

Inspection of the timber should be carried out at each position and at this point, if necessary, adjustments of cut, pressure, etc. should be undertaken.

WARNING:
ALWAYS ELECTRICALLY ISOLATE THE MACHINE BEFORE EACH AND EVERY ADJUSTMENT DURING A 'TEST PIECE' PROCEDURE.

13 Repeat Step 12 until the 'test piece' timber meets all dimensional and quality requirements.

14 Set the machine to operate in production mode by setting the 'enclosure override' keyswitch to door closed, starting main feed and setting feed speed to between 20 and 30mm/min

The machine is now ready for production operation.

8 MAINTENANCE

8.1 General

This Section covers scheduled and unscheduled maintenance of the machine, and also covers some basic fault-finding procedures.

Scheduled maintenance comprises the maintenance necessary, at regular intervals, to maintain the machine in good working order.

Unscheduled maintenance is that work necessary to replace or repair worn, unserviceable or damaged components.

Scheduled maintenance can normally be undertaken by a competent, but not necessarily specialised person (operator); unscheduled maintenance must be undertaken by an engineer experienced on this type of equipment and equipped with special tools.

8.2 Scheduled Maintenance

The LAM 180 machine has been designed to require only a minimum of lubrication.

'Sealed for life bearings' have been used wherever possible, and cutter blocks have permanently lubricated bearings which require lubrication only when a bearing is replaced.

The following schedule, when undertaken, should be recorded in a maintenance log.

Equipment required:

1 Compressed air gun.

2 Standard tool kit.

3 Lubricants as detailed.

4 Grease gun.

5 Hand oil pump.

6 Replacement parts as necessary.

8.2.1 Daily

WARNING:
ENSURE THAT THE MACHINE IS ELECTRICALLY AND PNEUMATICALLY ISOLATED BEFORE UNDERTAKING ANY OF THE FOLLOWING TASKS.

1 Clean the machine using a compressed air gun taking care not to direct the air jet directly on to spindles, shafts, bearing housings, etc.

Clean the spindles and cutter block collars and lightly lubricate with hydraulic oil (see the lubrication chart at the end of this Section for oil types).

Clean the top and side rollers, and scrapers, and lightly lubricate with hydraulic oil (see the lubrication chart at the end of this Section for oil types).

2 Carry out a visual check of the machine and the surrounding area to check for any obvious signs of damage, wear, etc., and to ensure safe working conditions exist.

8.2.2 Monthly

1 Apply hydraulic oil using a hand pump via the centralised lubrication points on the front of the machine (see the lubrication chart at the end of this Section for oil types).

Note:
The amount of lubrication and the frequency of application depends upon the type of wood being processed and speed of throughput. This requirement is based on experience and could well be necessary more frequently than recommended here.

Grease the handscrew mechanisms with lithium grease using a grease gun via the grease nipples on the machine (see the lubrication chart at the end of this Section for grease types).

2 Grease the feed roller drive shafts via the associated grease nipples using lithium grease.

3 Check the hydraulic fluid level in the hydraulic feed pump pack and replenish if necessary (see Section 8.2.4).

Feedworks Maintenance

The gearboxes used on Wadkin through-feed moulders are designed for the minimum of maintenance through the use of long life synthetic oils and high specification seals.

As such machinery can operate for prolonged periods within a hostile working environment we recommend that a visual inspection is made of the feed system (universal joints, gearboxes etc) every month. It is recommended that a record is kept of all such inspections to ensure continued trouble-free operation.

Whilst "wetting" of seal faces is normal with the use of high speed gearboxes, excessive seepage may lead to premature failure of the unit.

An oil change is recommended after 5000 hrs (2.1/2 years single shift) of operation. It is advisable to combine the lubricant change with thorough cleaning of the gear unit and replacement of any worn/damaged seals.

Size 63 gearbox	=	0.40 Litre
Size 80 gearbox	=	0.56 Litre

Oil Equivalents (type 320 grade, Polygloycol)

Agip	Telium VSF320
BP	Energol SG-XP320
Castrol	Alphasyn PG320
Esso	S220
Mobil	Glygoyle 30
Shell	Tivela oil SC320

8.2.3 Three-Monthly

1 Remove covers from all spindle drive belts (top and bottom heads and sawing head) and check the belt tension. If re-tensioning is necessary, refer to Sections 8.3.1 and 8.3.2.

2 Remove the cowls from the electric drive motors and clean the motor fans; check for signs of overheating or excessive end-float of the motors.

8.2.4 Hydraulic Feed Motor (Figure 8.2.4)

General

Maintenance of the hydraulic feed motor system consists primarily of changing the filter unit, checking/replenishing the hydraulic fluid in the system and changing the fluid in the motor, pump, cooler and vent tank.

If the system becomes contaminated due to the ingress of foreign matter, then it must be thoroughly cleaned, flushed out and refilled.

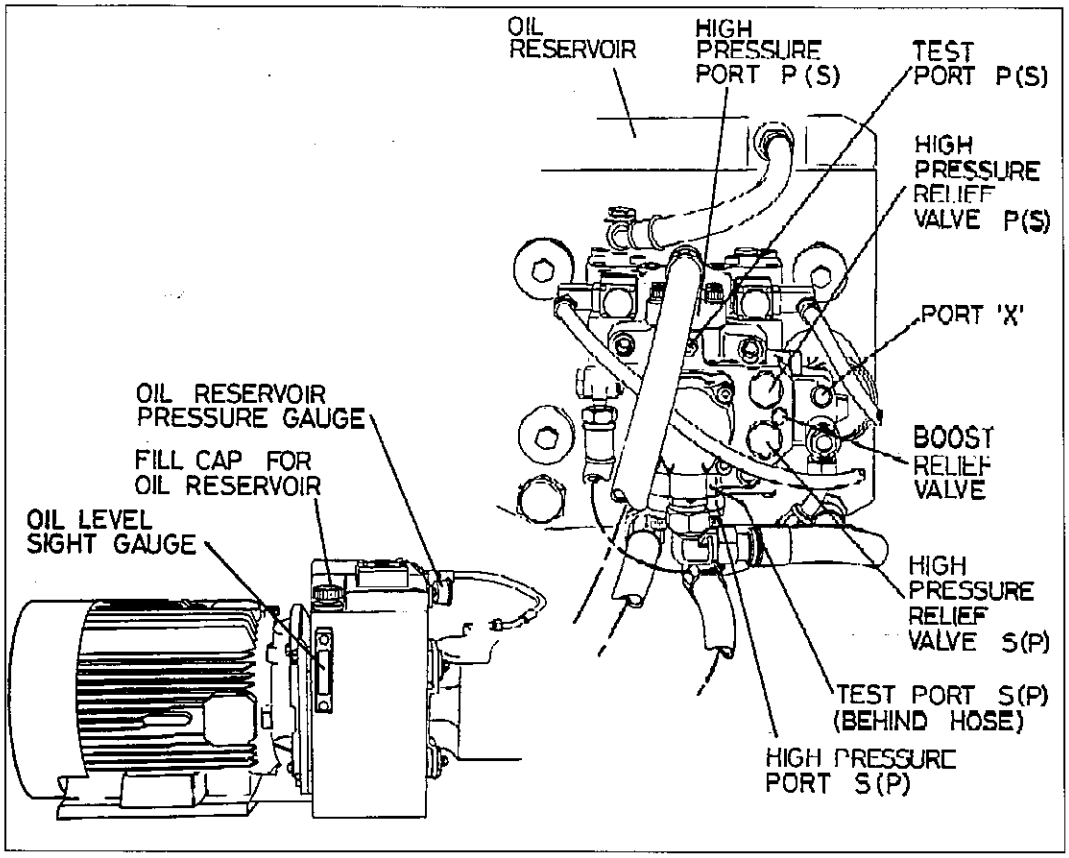

Figure 8.2.4

The system operating pressure is measured by connecting a pressure gauge into each side of the closed circuit at the test tappings P(S) and S(P) on the pump.

The reading obtained at both points are limited by the settings of the associated high pressure relief valves.

Boost pressure is measured by connecting a pressure gauge into port 'X'. Boost pressure is normally 16 bar and is regulated by the 16 bar relief valve.

Check/Replenish Fluid Level

1 View the level of the fluid on the oil level sight gauge.

2 If necessary, replenish via the fill cap for the oil reservoir using approved fluid (see the lubrication chart at the end of this Section for fluid types).

Filling the System

Filling of the system must be carried out systematically so that al air is expelled from the circuit. An integral purge valve is fitted to assist in the venting of the system to facilitate air escape to the vent tank.

1 Ensure that the hydraulic motor is free to operate under 'no load'.

2 Slacken the vent plug in port 'X'.

3 Fill the oil reservoir (with approved fluid) until the level sight gauge indicates full, and fill the body housing via the vent port on the body.

4 Ensure that the electrical supply is switched to the machine control panel and start the hydraulic feed motor (from the machine control panel).

5 Permit the unit to run for approximately 10 seconds, then stop the motor by operation of the master stop (on the machine control panel). Air vents from the pump housing via the vent hose.

6 After 2 to 3 minutes repeat Steps 4 and 5; repeat these steps three or four times ensuring that the oil reservoir remains full in order to prevent the ingress of air into the system while the pump is operating.

7 Observe the vent plug in port 'X'; when oil issues close the plug.

8 Increase the feed motor speed to maximum and using the inch feed forward control (on the machine control panel) run for 20 seconds. **(There must be no timber on the feed during this operation).**

9 Reverse the feed for 20 seconds using the inch feed reverse control.

10 Repeat Steps 8 and 9 three times.

11 Decrease the feed motor speed and continue running the motor for several minutes to bring the fluid up to working temperature.

12 Increase the feed motor speed to maximum to cause any residual air in the system is finally expelled to the vent tank.

Changing the fluid in the Vent Tank, Cooler and Pump and Motor Housings

The fluid should be changed at an interval between 1000 and 2000 operating hours.

High working temperatures and frequent cooling periods at low temperatures resulting in high levels of condensation shorten the life of the fluid.

Drain the fluid from the vent tank, cooler pump and motor housings and replenish as detailed under Check/Replenish Fluid Level.

Changing the Filter

The filter should be changed after no more than 50 operating hours from initial start-up, and thence every 500 operating hours.

8.3 Unscheduled Maintenance

Unscheduled maintenance is that work necessary to replace or repair worn, unserviceable or damaged components.

Generally, following any procedure covered in this Section, a set-up procedure will need to be undertaken (see Section 5) before the machine is put into service.

This Section covers checks and replacement procedures in isolation. There will be times, depending upon the work to be undertaken, where many of these procedures will be carried out sequentially.

Equipment required:

1 Standard tool kit.

2 Replacement parts as necessary. (Refer to Wadkin Service Department at the address given in this manual for information on supply of drive belts).

WARNING:
ENSURE THAT THE MACHINE IS ELECTRICALLY AND PNEUMATICALLY ISOLATED BEFORE UNDERTAKING ANY OF THE FOLLOWING TASKS.

ENSURE THAT PROPER PROTECTIVE CLOTHING IS USED THROUGHOUT THESE TASKS.

8.3.1 Re-tension Top/Bottom Head Drive Belts (Figure 8.3.1)

1 Slacken the motor mounting plate clamp bolts (1).

2 Slacken top lock nut (2), and tension the belt by turning lock nut (3) clockwise approximately 10mm.

3 Lock nuts (2) and (3).

4 Lock clamp bolts (1).

Note:
The 10mm adjustment may need to be varied depending upon belt condition.

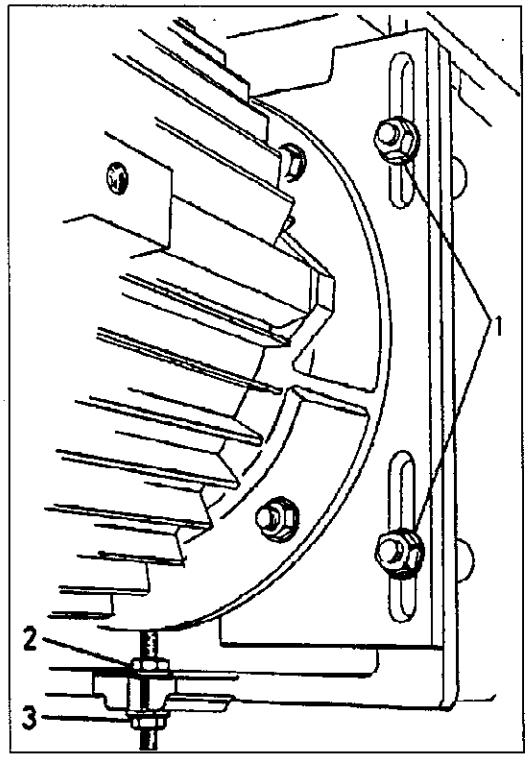

Figure 8.3.1

8.3.2 Re-tension Sawing Head Drive Belt (Figure 8.3.2)

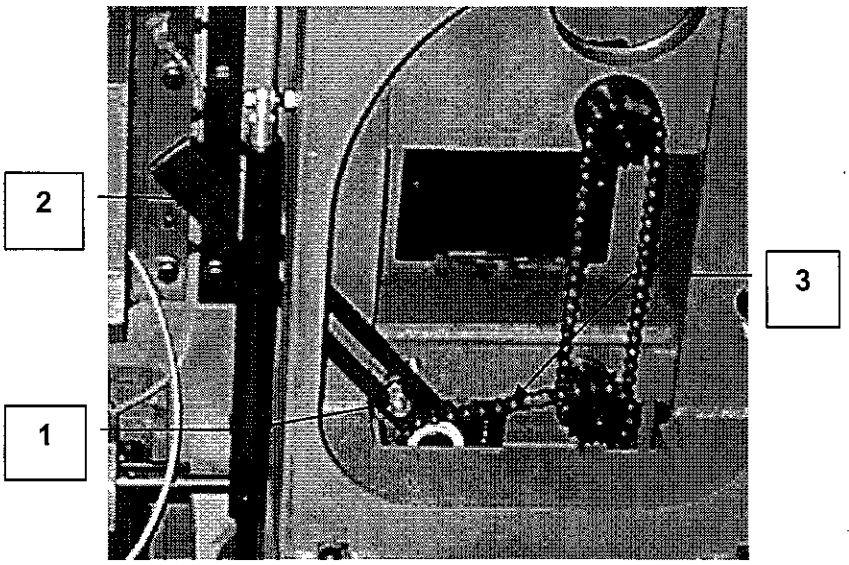

Figure 8.3.2

1 Remove cover over the sawing head from the rear of the machine.

2 Release lock nut (1).

3 Adjust the belt tension using lever (2) until the belt (3) is tight.

4 Lock nut (1) and replace the sawing head cover.

8.3.3 Replace Top/Bottom Head Drive Belts (Figure 8.3.1)

1 Slacken the motor mounting plate clamp bolts (1).

2 Slacken top lock nut (2), and screw out the bolt by turning lock nut (3) counterclockwise until it is clear of the motor rim.

3 Remove the belt and replace with a suitable belt.

4 Tension the belt as described in Section 8.3.1.

8.3.4 Replace Sawing Head Drive Belt (Figure 8.3.2)

1 Remove cover over the splitting head cover from the rear of the machine.

2 Release lock nut (1).

3 Slacken the belt tension using lever (2) until the belt can be removed.

4 Remove the belt and replace with a suitable belt.

5 Tension the belt as described in Section 8.3.2.

8.3.5 Replace Shaft-Mounted Feed Rollers (Figure 8.3.5)

1 Slacken set screw (1).

2 Ensure that the shaft is clean and withdraw the feed roller.

3 Replace the feed roller ensuring that the shaft key is correctly located.

4 Position the feed roller to suit the timber width and tighten set screw (1).

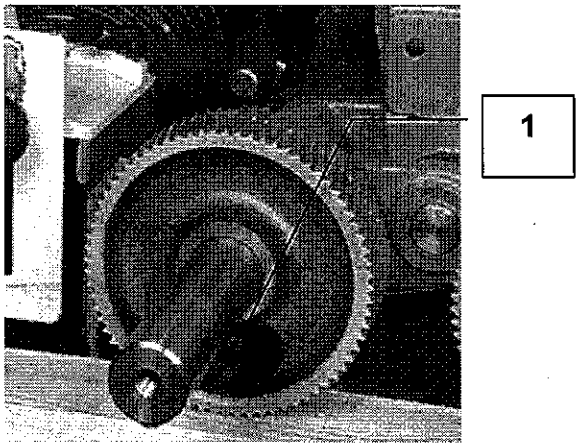

Figure 8.3.5

8.3.6 Changing Cutter Block Spindle Bearings

It is not recommended that users attempt to change a spindle bearing owing to the complexity of the procedure and the exacting nature of the work.

Note:
For supply and information on spindles, contact Wadkin Service Department at the address given in this manual.

8.4 Fault Finding

8.4.1 General

Many of the faults occurring on woodworking machinery, apart from those caused by electrical or major mechanical failure, can be attributed to incorrect setting-up of the machine. Badly-tensioned drive belts, incorrectly set cutter blocks and loose components are frequent causes of irritating, often minor, faults.

When a fault occurs, unless the cause is because of a major mechanical or electrical failure or an operator error, it is recommended that the machine set-up is reviewed before any other investigative work is undertaken.

8.4.2 Workpiece Faults

Listed below are problems identified on the product after processing, with an indication of the diagnosis and remedy.

FAULT - Blips at leading end of underside of product

Diagnosis/Remedy
Cutter block set too low in relation to bedplate - Adjust cutter block.

FAULT - Blips on trailing end of underside of product

Diagnosis/Remedy
Cutter block set too high in relation to bedplate - Adjust cutter block.

FAULT - Trailing end of product top face shows blips

Diagnosis/Remedy
Pad and roller pressures are set incorrectly - Adjust pressures.

FAULT - Out of square product

Diagnosis/Remedy
Cutter block cutters not set parallel to bedplate or badly ground - Inspect/adjust cutter block.

FAULT - Burn marks on product

Diagnosis/Remedy
Cutter block cutters blunt - Inspect/regrind.
Timber stationary in machine - Remove timber.

8.4.3 Machine Faults

Detailed below is a number of fault conditions with associated diagnoses and the recommended remedial action. The diagnoses should be considered only advisory; a proper determination of any fault is more likely to be ascertained by the competent engineer called to rectify the problem.

Note that obvious operator errors (switches not closed, enclosure open, etc.) are not listed in the diagnoses below.

FAULT- None of the spindle drives nor the feed drive operates when the Start buttons are pressed

Diagnosis/Remedy
Circuit breaker out - Reset circuit breaker.
Main fuse or control fuse blown - Check fuses and replace.

If either fault re-occurs, investigate for cause on the machine.

FAULT - A spindle motor or feed motor does not start

Diagnosis/Remedy
Circuit breaker out - Reset circuit breaker.
Motor fuse blown - Check fuse and replace.
Motor contactor failed - Check contactor for pitted contacts or mechanical failure.
Open circuit in motor line leads - Check circuit and correct.

If fuse or circuit breaker fault re-occurs, investigate for cause on the motor.

FAULT - Motor contactor makes noise on closing

Diagnosis/Remedy
Supply voltage too low - Check supply voltage with meter.
Contactor contacts pitted or dirty - Clean or replace contacts.

FAULT - After a motor has started, circuit breaker trips or a motor fuse blows

Diagnosis/Remedy
Motor/spindle seized on bearings - Check and replace.
Failure in circuit to motor (line lead earthed or short circuit) - check with resistance and continuity meter.

FAULT - Motor overheats while running unloaded

Diagnosis/Remedy
Supply voltage too high - Check supply voltage with meter.
Motor windings incorrectly connected - Check for correct starting/running connections.
Motor air ducts blocked impeding flow of cooling air - Clear ducts.

FAULT - Motor overheats while running loaded

Diagnosis/Remedy
Establish if mechanical problem - Check spindle for seizure/incorrect setting.
Single phase operation in motor line leads - Check circuit and correct.

FAULT - Motor noisy when running

Diagnosis/Remedy
Establish if mechanical or electrical problem - If mechanical, noise will change in intensity/frequency with change in motor speed; if electrical, noise will continue after motor has stopped. Carry out appropriate investigation.

FAULT - Spindle stops while motor is still running

Diagnosis/Remedy
Slipping or broken belt - Check and retighten or replace.

FAULT - Motor contactor remains closed after operation of Stop button

Diagnosis/Remedy
Contactor contacts have 'welded' together - Replace contacts.

8.4.4 Hydraulic Feed Motor Faults

Detailed below is the fault finding procedure to enable the user to identify the cause of problems in the operation of the hydraulic feed motor, and to provide information and remedial actions.

SYMPTOM	CAUSE	REMEDY/CHECK
System does not operate in either direction	A Low oil level in system	1 Check oil level in reservoir, replenish as necessary 2 Locate and repair leaks causing oil loss 3 Fill then vent pump and motor casings and coolant circuit
	B Damaged/disconnected coupling or clutch	1 Check couplings between electric motor and pump shaft and hydraulic motor to gearbox, rectify as necessary
	C Low boost pressure	1 Connect pressure gauge into port X on pump filter block and run pump in neutral at 1000 rev/min. Observe boost pressure is approx. 16 bar; then run under load and check pressure Check Boost relief valve is seating correctly Cold start relief valve is seating correctly Oil level satisfactory (see A) Restricted inlet to gear pump Gear pump coupling sheared Worn or damaged pump causing excessive internal leakage
	D Low and fluctuating boost pressure	1 Check for air in system (air in system also causes system to be noisy), vent as necessary 2 Check oil level (see A) 3 Check all pipe connections with especial reference to the inlet circuit

SYMPTOM	CAUSE	REMEDY/CHECK
System operates in one direction only	E Faulty high pressure relief valve/non return valve	1 Switch the two high pressure valves from one circuit to the other to establish if a valve fault occurs; remove and rectify/replace as necessary
	F Damaged shuttle valve	1 Remove shuttle valve components and check for damage, rectify and replace as necessary
	G Damaged pump control pistons or piston seals	1 Examine pump/seals and rectify or replace as necessary
System overheats	H Operation at maximum pressure for prolonged period	1 Limit period of maximum pressure operation to manufacturer's recommendations
	I Incorrect oil viscosity	1 Use a recommended oil type
	J Low oil level in system	1 Check oil level (see A)
	K Cooler inoperative or working at reduced efficiency	1 Check for adequate water supply to cooler
		2 Clean cooler matrix
		3 Check cooler operation, rectify/replace as necessary
	L Oil lines to/from cooler restricted	1 Clear lines
	M Cold start valve not seating correctly	1 Dismantle valve and clean, replace if damaged
	N Relief valve not seating	1 Check valve settings with pressure gauges, if low, dismantle valve and clean
	O Purge valve in motor not opening	1 Dismantle valve and clean, ensure ball is free to move and that ports have no restrictions
	P Shuttle valve in motor not opening	1 Dismantle valve and clean, check for damaged components
	Q Worn components causing excessive internal leakage	1 Check boost pressure, if low, replace worn components or complete unit (after undertaking checks in D)
Excessive noise	R Air leak in system (sometimes indicated by foaming of oil in reservoir)	1 Replenish oil in system and purge of air
		2 Check if suction line to boost pump is leaking, rectify if necessary
	S Cavitation (hammering effect caused by low boost pressure)	1 Carry out checks in D
	T Prolonged high pressure operation	1 Limit period of maximum pressure operation to manufacturer's recommendations
	U Drive misalignment or worn coupling	1 Check alignment and coupling wear, rectify as necessary
	V Mechanical damage (bearings, pistons, etc)	1 Replace faulty/worn components after examination

SYMPTOM	CAUSE	REMEDY/CHECK
Loss of power	W Loose or fractured pipe	1 Check pipes and hoses. Check that no contact is being made with other components so causing vibration
	X Relief valve not seating	1 Check valve settings with pressure gauges, if low, dismantle valve and clean
	Y Low boost pressure	1 Check for air in system (air in system also causes system to be noisy), vent as necessary 2 Check oil level (see A) 3 Check all pipe connections with especial reference to the inlet circuit
	Z Prime mover slow speed	1 Check speed of primer mover, rectify as necessary
Hydraulic motor stationary or rotates at slow speed	AA Prime mover stationary or rotating at slow speed	1 Check primer mover, rectify as necessary
	AB Relief valve not seating	1 Carry out checks in N
	AC Low boost pressure	1 Carry out checks in C
	AD Damaged shuttle valve	1 Carry out checks in D

8.5 Lubrication Chart

8.5.1 Lubricants specified

Hydraulic oil with anti-corrosion, anti-oxidation and anti-foam qualities.

Grease - Lithium bearing grease with NLG1 No.3 consistency.

8.5.2 Approved Lubricants

Hydraulic Oil	Grease
Castrol Hyspin AWS32	Castrol Spheerol AP3
BP Energol HLP32	Energrease LS3
Shell Tellus 32	Shell Alvania grease R3
Mobil DTE light 24	Mobilplex 48
Esso Nuto 44/ESSTIC H44	Esso Beacon 3
Gulf Harmony 32AW	Gulf Crown No.3
Elf Elfona 32	Elf Multi 3 grease

8.6 Tool and Toolholder Care

When selecting tools, care must be taken to ensure that they are suitable for 4500 and 6000 rev/min operation (dynamically balanced and tested for cracks).

The life of the tool depends upon the quality of the steel used in its manufacture and the type of wood being machined.

When resharpening, care should be taken to ensure that the blade is not unduly heated by using the correct type of grinding wheel, coolant, chip removal process, etc.

With multi-toothed tools, the correct tooth pitch is important to ensure effective cutting.

Whether a tool is effective depends much on how it is used. Careful handling will ensure longer service life and improved product quality.

Tooling should comply with the Tooling Standard PREN 847-1: 1997.

GLOSSARY

Below is a Glossary of terms used in this manual specific to the equipment being described. Other documents which should be referred to are listed in Section 1.1.6.

Bed	Machine level on which timber travels during machining.
Blips	Marks on planed timber indicating fault in processing.
Chipbreaker	Tool which provides pressure to hold the timber on to the machine bed; it also prevents the breaking of wood chips.
Cutter block	Cutting tool(s) mounted on a spindle of the machine.
Datum block	Block of timber of known height/width used as tool to datum machine settings.
dB	Decibel of noise (measurement of noise level).
Drive belt	Flat, 'V' or toothed belt which drives the spindles from the drive shaft.
Feed rolls	Rotating rolls which move the timber through the machine while exerting necessary pressure to enable proper processing.
Feed speed	Speed at which timber is passed through the machine.
Fence side head	Planing process on the right-hand side of the timber (when viewed from the infeed end of the machine).
First bottom head	First process on the machine; planes the bottom face of the timber.
First top head	Planing process on the top of the timber.
Infeed	End of machine where timber is introduced.

Near side head	Planing process on the left-hand side of the timber (when viewed from the infeed end of the machine).
Outfeed	End of machine where finished product is produced.
Spindle	Rotating shaft carrying the cutter block.
Spindle backlash	Natural movement of rotating cutter block towards/away from workpiece depending upon direction of rotation.
Test piece	Timber on which setting-up processes are conducted.