



**NXU**

**PROFILE/PLANNERHEAD GRINDER**

**INSTRUCTION MANUAL No. 4009/1**

**HEALTH AND SAFETY**

THE SAFE OPERATION OF WOODWORKING MACHINERY REQUIRES CONSTANT ALERTNESS AND CLOSE ATTENTION TO THE WORK IN HAND.

CAREFULLY READ INSTRUCTION MANUAL BEFORE OPERATING MACHINE.

DO NOT OPERATE WITHOUT ALL GUARDS AND COVERS IN POSITION.

ENSURE MACHINE IS ELECTRICALLY EARTHED - GROUNDED.

REMOVE OR FASTEN LOOSE ARTICLES OF CLOTHING - SUCH AS NECKTIES ETC, CONFINE LONG HAIR.

REMOVE JEWELLERY SUCH AS FINGER RINGS, WATCHES, BRACELETS ETC.

USE SAFETY FACE SHIELD, GOGGLES OR GLASSES TO PROTECT EYES AND OTHER PERSONAL SAFETY EQUIPMENT AS REQUIRED.

STOP MACHINE BEFORE MAKING ADJUSTMENTS OR CLEANING ABRASIVE AND STEEL DUST FROM WORK AREA.

KEEP THE FLOOR AROUND THE MACHINE CLEAN AND FREE FROM SCRAPS, SAWDUST, OIL OR GREASE TO MINIMISE THE DANGER OF SLIPPING.

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1.

**TECHNICAL SPECIFICATION**

Grinding wheel diameter (maximum)	230mm	(9")
Standard Grinding Wheel bore	31.75mm	(1.1/4")
Quick Release Grinding Wheel bore (optional)	62mm	(2.44")
Maximum length of profile accepted	240mm	(9.1/2")
Maximum length of planer head	240mm	(9.1/2")
Maximum cutter diameter	300mm	(12")
Grinding wheel motor	0.75kw	(1 hp)
Speed of grinding motor D.C.	1500-3000 rev/min	
Powered tilt motor	0.12kw	(0.16 hp)
Coolant pump	0.14kw	(0.18 hp)
Coolant tank capacity	50 litres	(11 galls)
Height	1560mm	(62")
Length	1920mm	(76")
Width	1090mm	(43")
Approximate weight	600kg	(1300lbs)

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2.

## **INSTALLATION**

It is recommended that the machine is positioned so there is adequate room for routine maintenance, allowing 350mm passage round the back of the machine and 1 metre passage to the side to allow the removal of the coolant tank. Consideration should also be given to operator comfort. The height of the machine has been designed to suit average operative heights. Some compensation for height variations has been made in the arm rest adjustments. Short operators may need a duck board to prevent excessive reaching, and taller operators may require packing under the machine to prevent excessive bending. The machine should be levelled using levelling screws provided. It is recommended that there is a slight tilt lengthways towards the coolant tank to aid with coolant drainage, and a slight tilt from the back to the front, so that when left unattended there is a tendency for arbor carriage to come away from the grinding wheel. Fixing holes have been provided, but on most normal flooring holding down bolts are unnecessary.

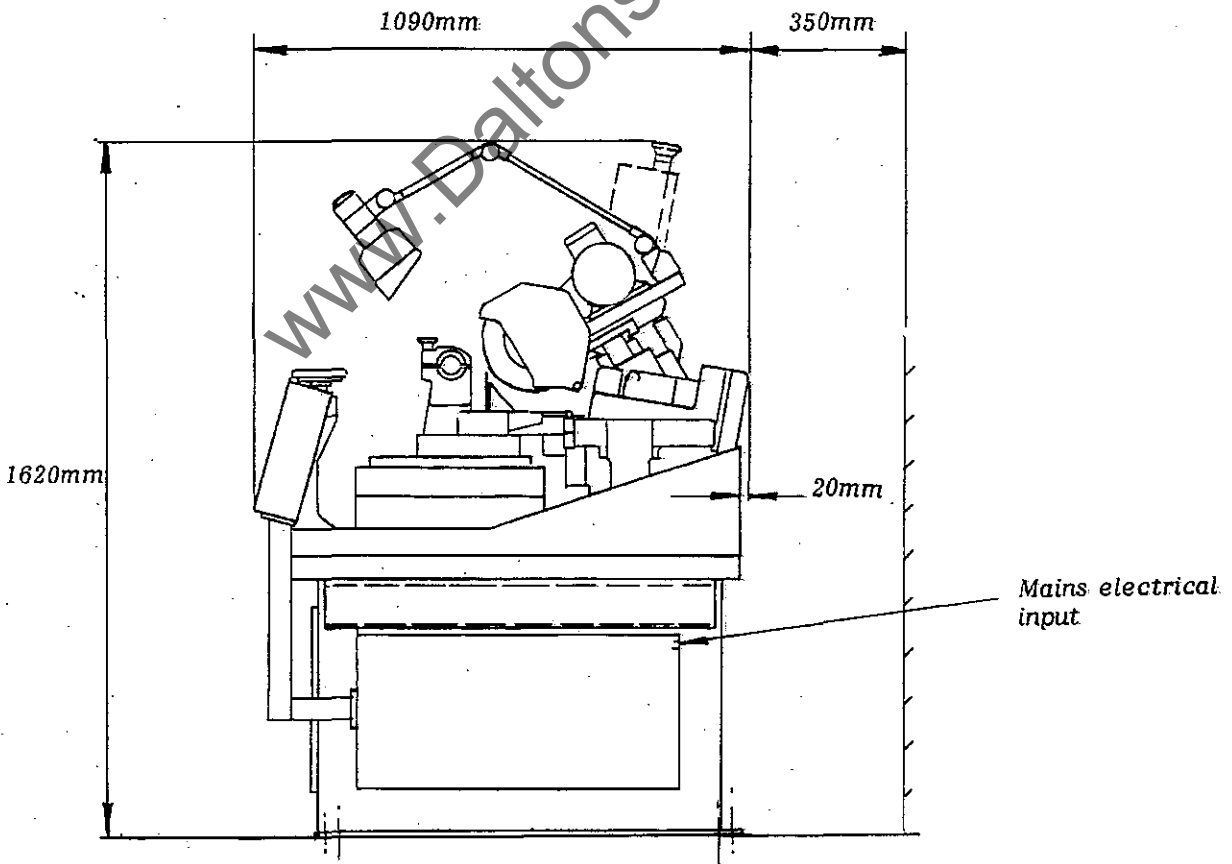
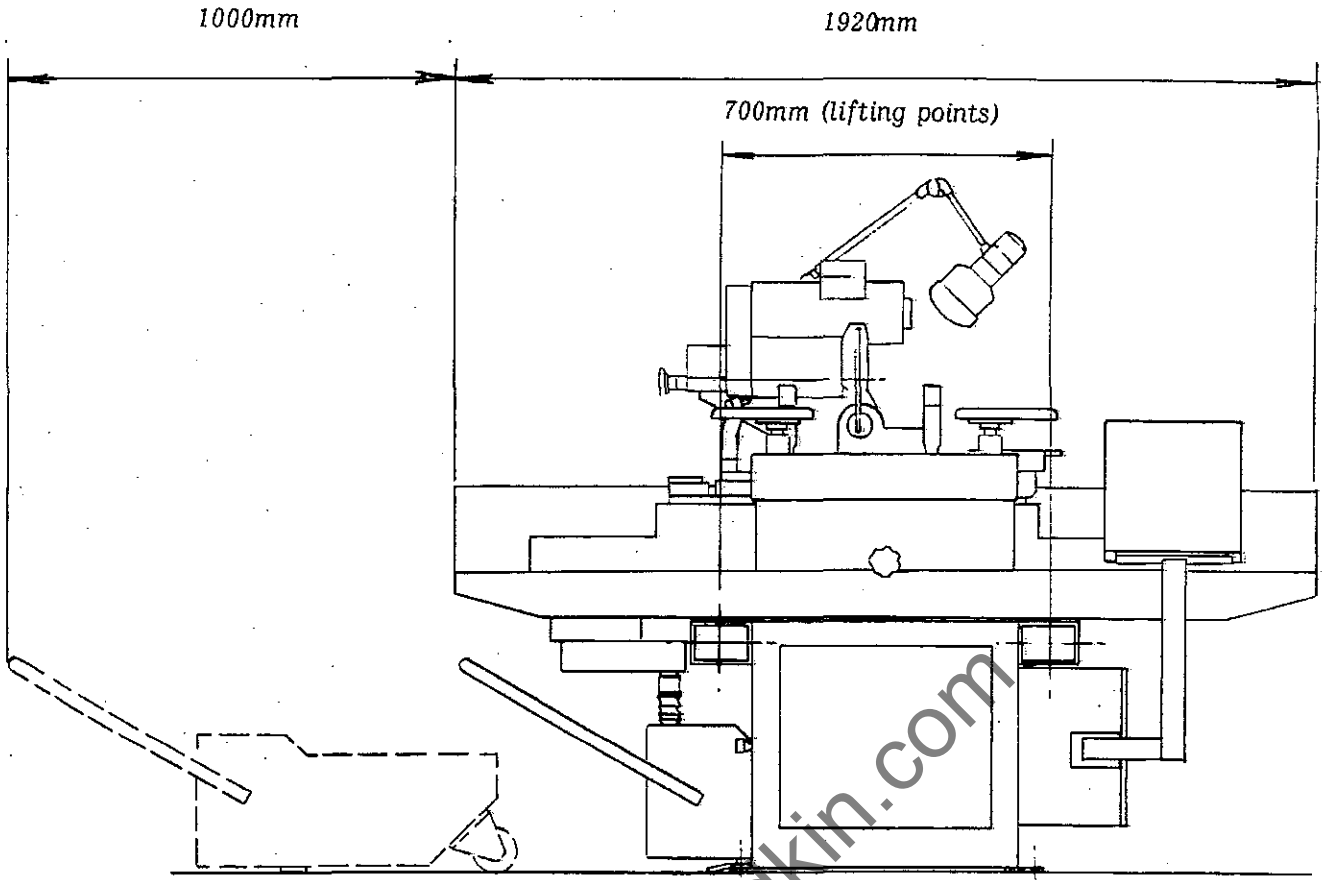
## **ELECTRICAL DETAILS**

The electrical cabling between the motor and the attendant control gear has been carried out by Wadkin prior to despatch. It will only be necessary to connect the three phase power supply to the incoming terminal L1, L2 and L3 in the electrical control cabinet situated at the right hand side looking from the front of the machine. (See 3.5)

## **ENSURE THAT THE MACHINE IS CONNECTED SOLIDLY TO EARTH (GROUND).**

- 1) Check that the electrical supply details on the machine nameplate correspond to the electrical supply available and select the size of the main cable to correspond to the current indicated on the machine nameplate.
- 2) Check that the fuses at the electrical supply distribution board are correct.
- 3) Check that all connections are sound.

2.1 FOUNDATION PLAN

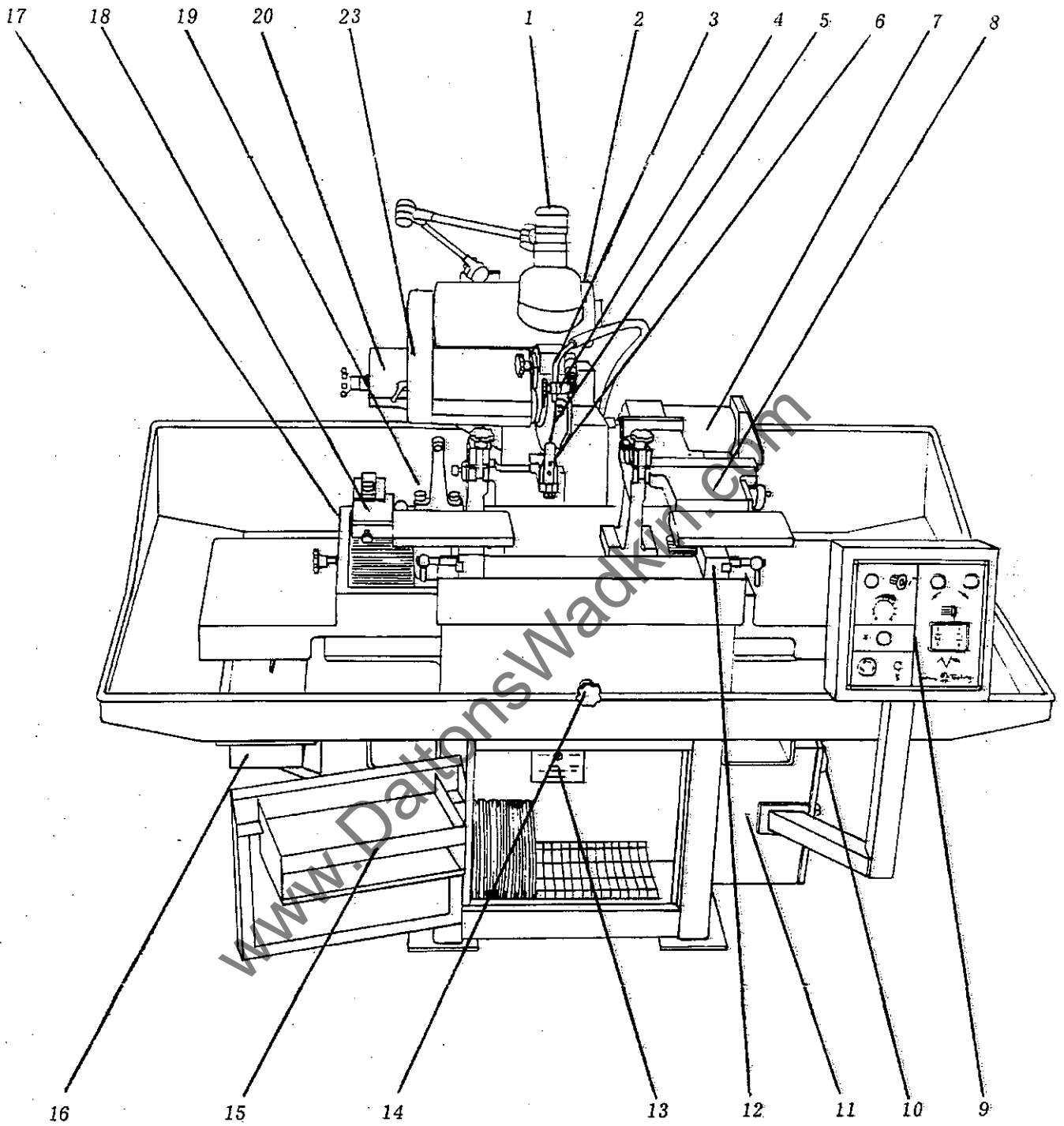


### 3. GENERAL ARRANGEMENT

#### 3.1 OVERALL VIEW

REFERENCE	DESCRIPTION
1 .....	Spotlight
2 .....	Grinding Wheel Motor
3 .....	Wheel Guard
4 .....	Coolant Pipe
5 .....	Grinding Wheel
6 .....	Knife Rest
7 .....	Tilt Drive Assembly
8 .....	Template Carriage
9 .....	Control Panel
10 .....	Isolator Switch
11 .....	Electrical Cabinet
12 .....	Adjustable Arm Rest
13 .....	Machine Number Plate
14 .....	Carriage Lock
15 .....	Storage Tray
16 .....	Filtration Trap
17 .....	Control Valves - coolant (not visible)
18 .....	Dresser Guide Unit
19 .....	Diamond Dresser Unit
20 .....	Horizontal Head Slide (datum)
23 .....	Drive Belt (not visible)

3.1 OVERALL VIEW

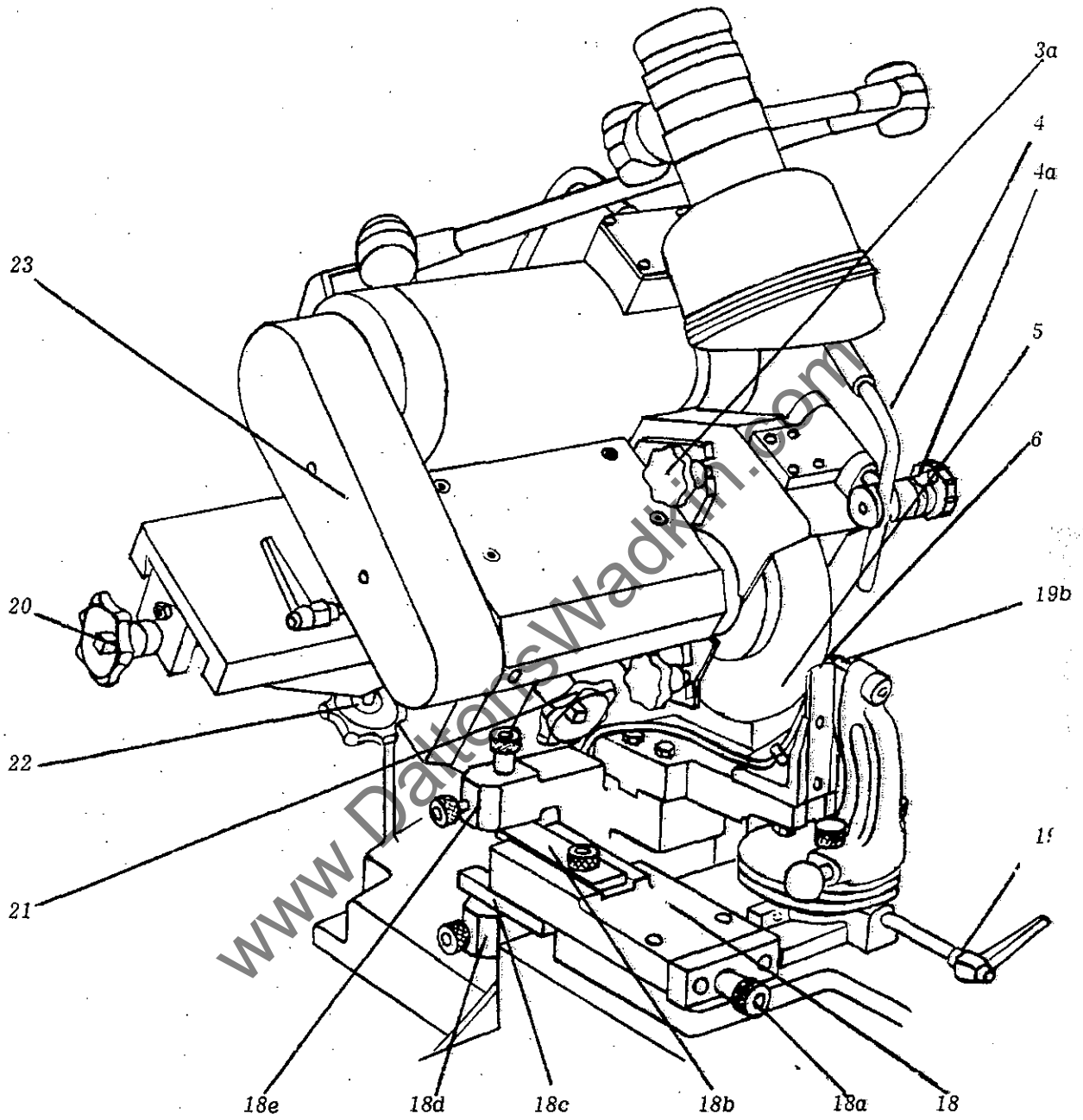




**3.2 DRESSER UNIT**

REFERENCE	DESCRIPTION
3a .....	Wheel Guard - locknut
4 .....	Coolant Pipe
4a .....	Coolant Pipe - clamp
5 .....	Grinding Wheel
6 .....	Knife Rest
18 .....	Dresser Guide Unit
18a .....	Adjusting Screw
18b .....	Top Guide (square or angled)
18c .....	Bottom Guide (fork)
18d .....	Bottom Guide Pin
18e .....	Top Guide Pin
19 .....	Dresser Unit
19a .....	Locking Lever
19b .....	Diamond
20 .....	Horizontal Head Slide (datum)
21 .....	Forward Head Slide (infeed)
22 .....	Vertical Head Slide (clearance angle)
23 .....	Grinding Wheel Belt

### 3.2 DRESSER UNIT

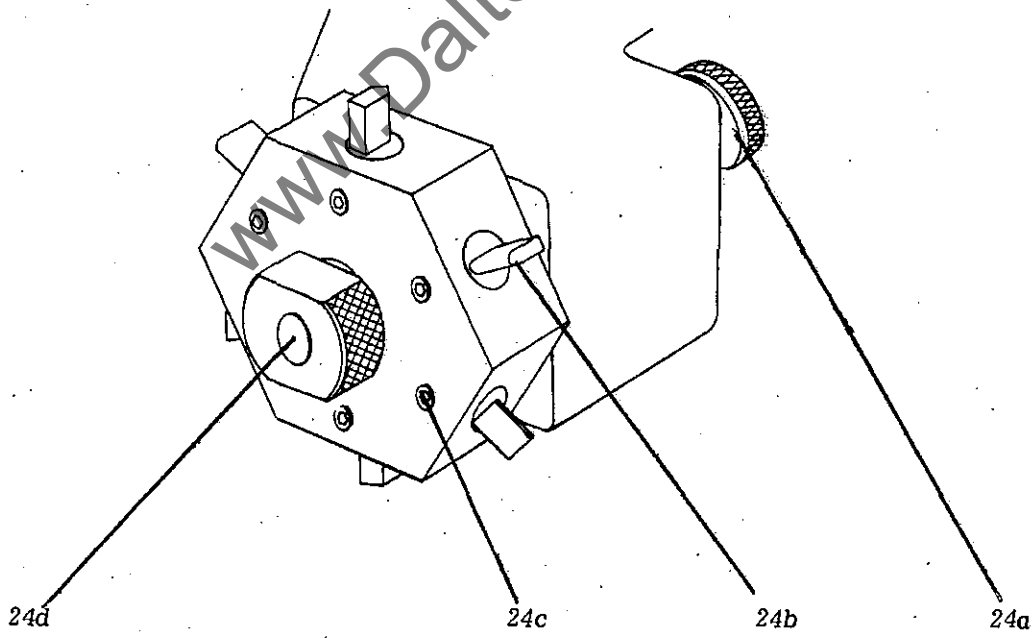
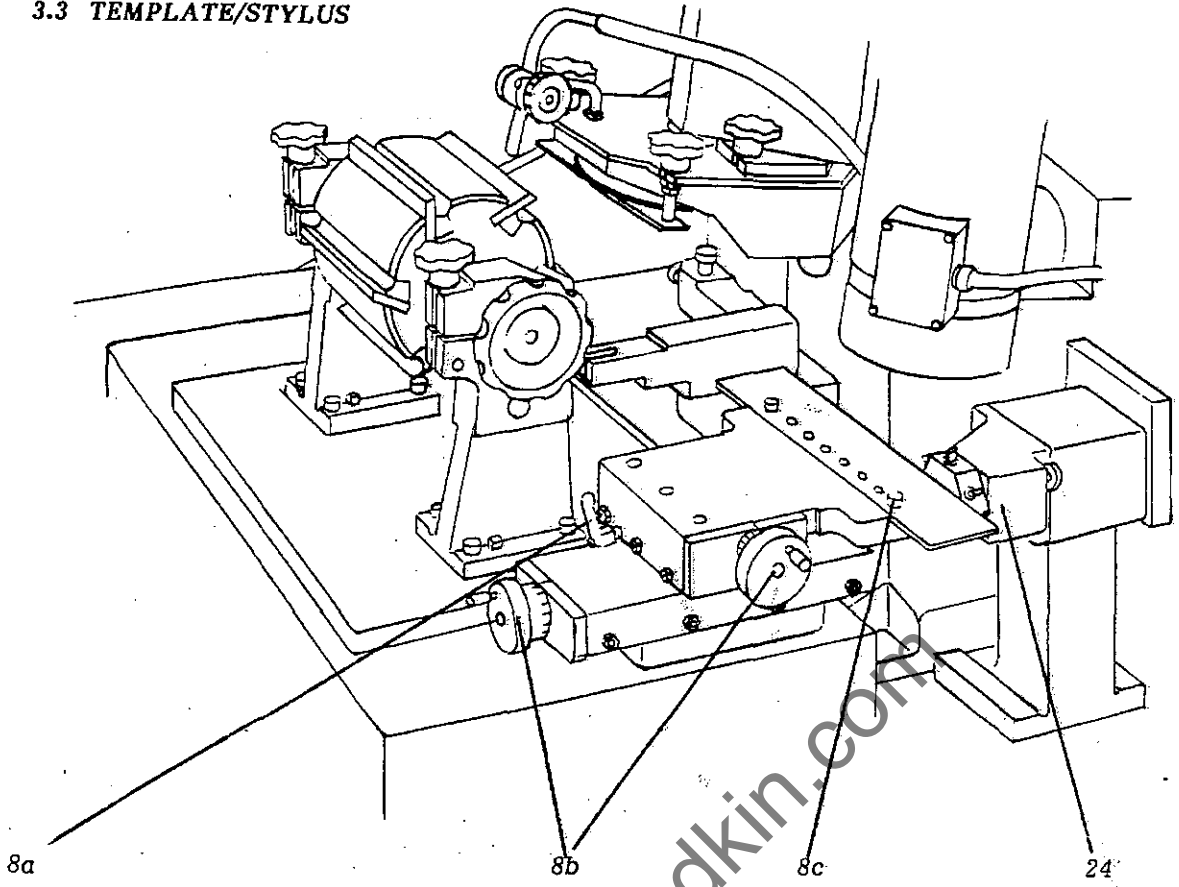


### 3.3 TEMPLATE/STYLUS

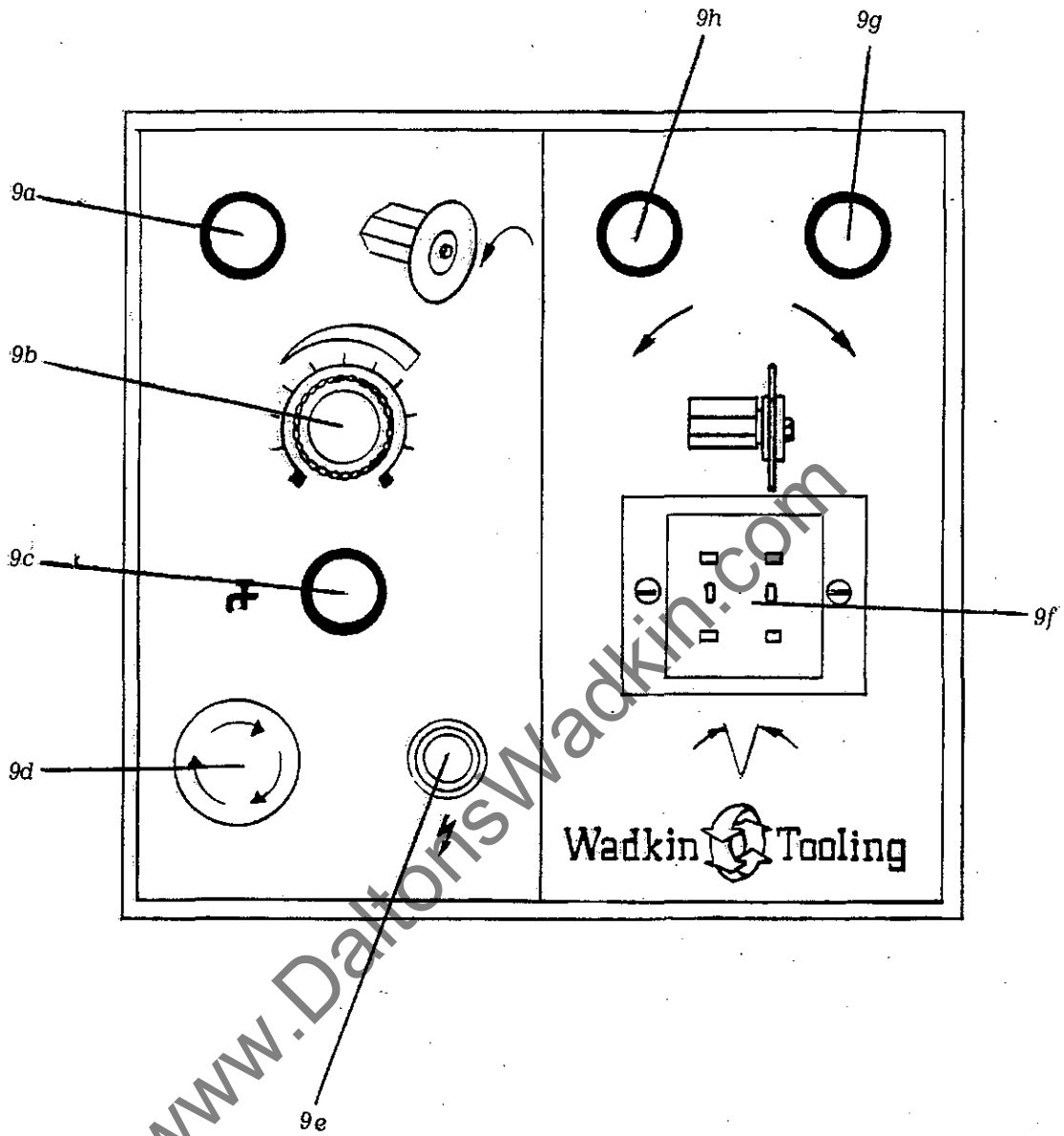
REFERENCE	DESCRIPTION
8a .....	Template Carriage Slide Lock
8b .....	Graduated Handwheels
8c .....	M8 x 20 Socket Capscrew
24 .....	Multi Stylus Turret
24a .....	Plunger Knob
24b .....	Stylus
24c .....	M6 x 20 Socket Screw
24d .....	Locking Nut

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### 3.3 TEMPLATE/STYLUS



### 3.4 CONTROL PANEL



### 3.4

#### CONTROL PANEL

- 9a) Grinding motor - on
- 9b) Variable speed control knob for setting grinding wheel speed between 1500-3000mm
- 9c) Coolant pump - on
- 9d) Emergency stop button requires twisting in the direction of the arrows to be released, as buttons are inoperable when the stop is depressed.
- 9e) Power indicator light - **No maintenance work should be carried out unless the machine is electrically isolated**
- 9f) Counter
- 9g) Head tilt - clockwise (right)
- 9h) Head tilt - counter clockwise (left)

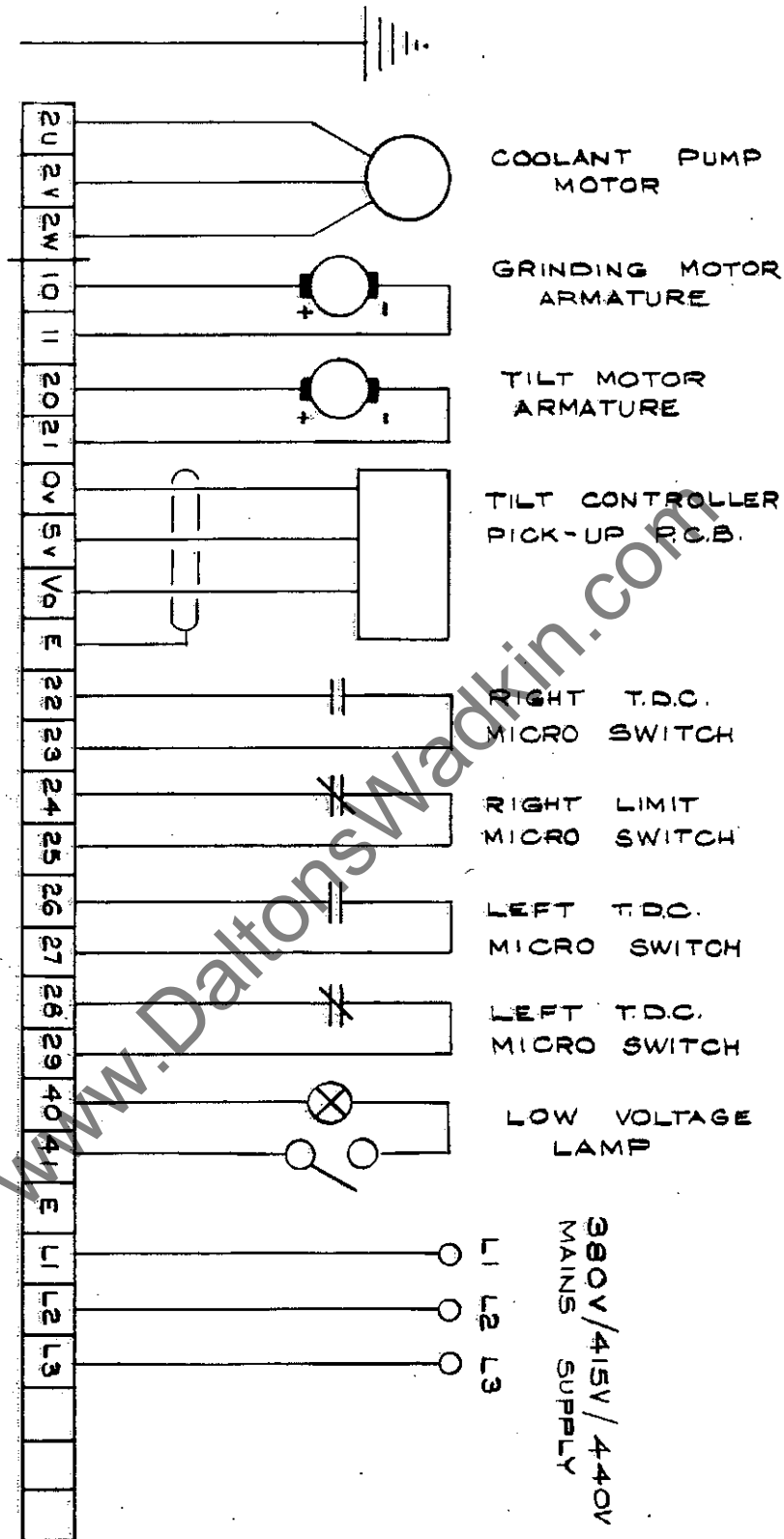
#### OPERATION OF POWERED HEAD TILT

To tilt the head over, the angle must be set on the counter (9f). By pressing a bottom button the digit above is advanced by one. By pressing a top button the digit below is retarded by one. The number indicated by the digits is the number of degrees that the head will move when a head tilt button is engaged. For example by entering 05 and pressing the tilt right button the head will move 5°. If it is pressed again it will move an additional 5°. There is no memory, so there is no record that the head is 10° to right. However there is a datum position at the point where the grinding wheel is at right angles to the arbor. This is found by entering 00 and pressing the tilt button in the appropriate direction. The head will automatically stop when datum position has been reached. The range of positions is 15° to the left of datum and 90° to the right. \* There are two limit switches positioned to these extremes to prevent over travel. **Note:-** It is extremely important that the head is watched over as it is tilting, to prevent potentially damaging situations created by loose guards and snared cables.

**\* IMPORTANT** - When tilting head 90° to the right, ensure that the head is wound away the pivot by 60mm. Otherwise significant damage may occur.

3.5 ELECTRICS

NXU GRINDING MACHINE EXTERNAL ELECTRICAL CONNECTION DIAGRAM



3.5

**ELECTRICS**

The electrical system comprises of the following elements.

- (a) D C grinding head motor
- (b) D C tilt motor and gearbox
- (c) Coolant motor
- (d) Low voltage light
- (e) Push buttons and switches
- (f) Control gear

The grinding motor is infinitely variable in speed between 1500 and 3000 RPM. The motor controller card is mounted inside the main electrical cabinet attached to the right hand side of the machine. Periodically the carbon brushes on the motor may need cleaning and eventually replacing but otherwise no maintenance should be required.

The tilt motor is mounted on a gearbox that has been greased for life. The front shaft of the motor drives the gearbox, whilst the rear shaft is used for encoding. Again the carbon brushes for motor may need attention for cleaning or replacement, but no other maintenance should be necessary. At the rear of the main pivot casting 4 micro switches are mounted. Two of the micro switches are used to limit the travel to the left and to the right. The other two switches are used to position the pivot so that the grinding wheel is at top dead centre. One switch is used when travelling from the left and the other is used when travelling from the right. These switches have been set up precisely and checked for positional accuracy. If these switches are moved accuracy will be lost unless they are properly reset. Two cards are used in conjunction with tilting. One is the motor reversing control card and the other is tilt angle control card. Both cards are mounted in the push button box.



Most of the fuses are in the main electrical cabinet, although some are located on individual printed circuit boards. Due to the complexity of the printed circuit boards, qualified electronic engineers along with sophisticated test equipment are required for fault finding. Therefore no repairs should be undertaken other than replacing fuses and ensuring that external connections are properly made. Board failures during the first twelve months of normal use will be replaced under warranty unless unauthorised repairs have been attempted. Fault finding on individual electronic components like the coolant motor, grinding motors etc can be checked by competent electricians using normal procedures. When entering electrical cabinet care should be taken to prevent metallic dust or debris coming into contact with the printed circuit boards, which could be extensively damaged as a result.

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### 3.6

#### THE COOLANT SYSTEM

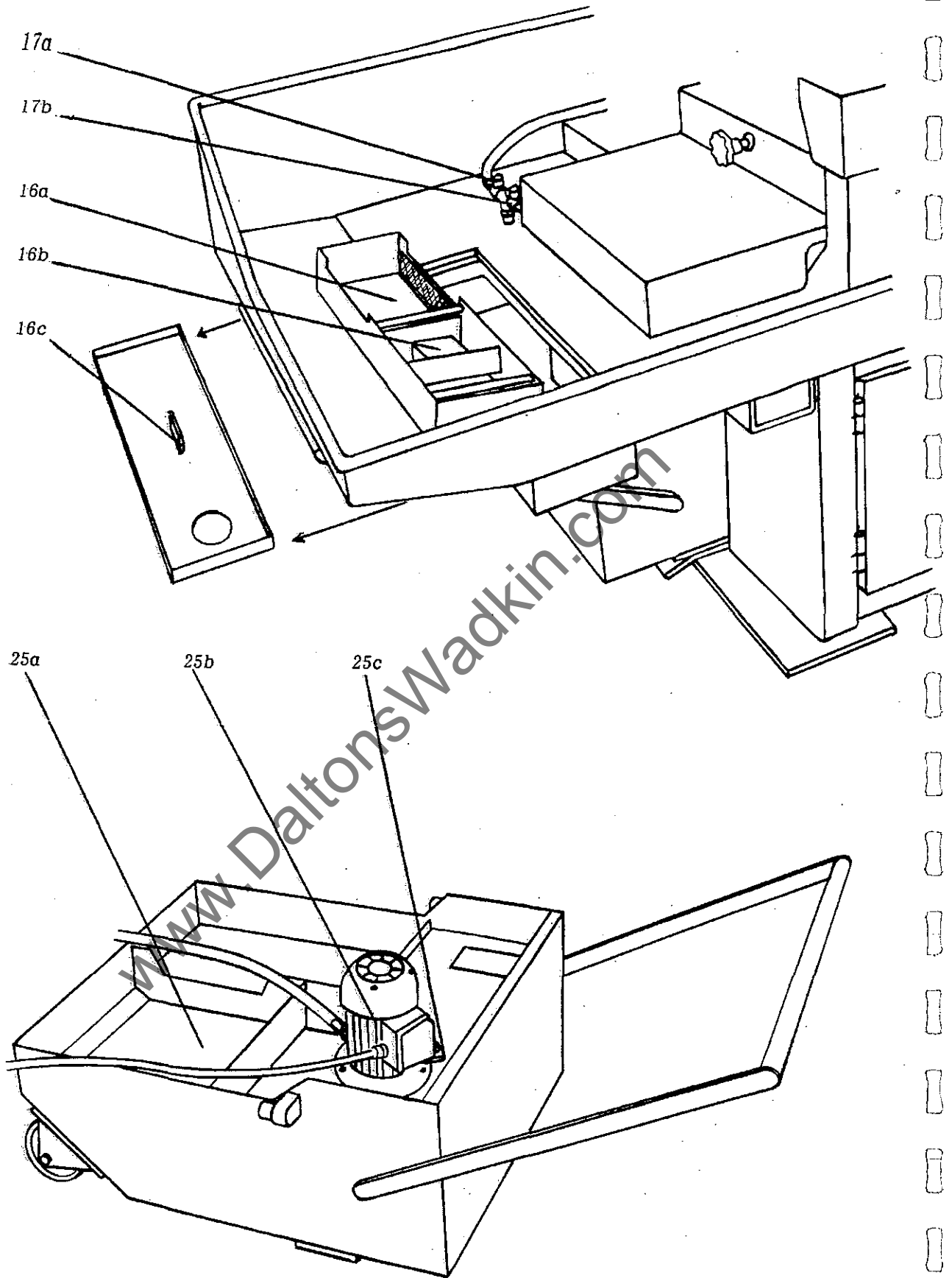
The coolant system utilises the weir principle, so that swarf and grinding grit collects in stages to prevent the re-cycling of waste products. The capacity of the tank is 50 litres (11 gallons).

When changing the coolant it is suggested that the coolant hose is disconnected from the guard, so that waste coolant can be directed into buckets for disposal. When the level has descended to the base of the pump stem, the pump should be switched off and the machine isolated electrically. The pump retaining catch should then be released and the pump lifted clear of the tank. The tank can then be withdrawn to a convenient place for cleaning. After cleaning the tank and the pump, replace in their normal positions. If mixing in the machine a mixture of 5:1 should be first poured gently into the machine tray and then diluted to the recommended strength.

The coolant concentrate supplied with the machine is a semi-synthetic cutting fluid. In operation it lubricates the grinding action, keeps the cutter cool, inhibits the formation of rust and has a good tank life. **CARE MUST BE USED IN HANDLING THE COOLANT PARTICULARLY THE CONCENTRATE. IN CASE OF CONTACT WITH THE EYES, FLUSH WITH CLEAN WATER FOR 15 MINUTES. EXCESSIVE CONTACT WITH THE SKIN SHOULD BE AVOIDED, AND BARRIER AND CLEANING CREAMS SHOULD BE USED BY OPERATORS AS PART OF NORMAL PROCEDURE.**

The coolant concentrate should be mixed with water in the ratio indicated on the container label. After mixing, the ratio can be checked with a refractometer, which is an instrument for measuring density. Periodically the density should be checked, as evaporation tends to increase the concentration of the mix. Topping up with a weaker mix can normally restore the correct density. As a general guide the coolant should be replaced every 4 to 6 months, and the whole system cleaned with an anti-bacterial solution. This is particularly important when changing types of cutting fluid, as different types of coolant concentrate should not be mixed. If using an alternative supplier, the mixing recommendation of the manufacturer should be followed.

3.6 COOLANT SYSTEM



### 3.6 COOLANT SYSTEM

REFERENCE	DESCRIPTION
16a .....	Filtration Tray
16b .....	Magnetic Trap
16c .....	Lid
17a .....	Control Valve - top coolant
17b .....	Control Valve - bottom coolant
25a .....	Coolant Tank
25b .....	Coolant Pump
25c .....	Clamp

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4.

#### **LUBRICATION AND MAINTENANCE**

To maintain the machine in good condition it is essential to clean it regularly. Compressed air should not be used to assist cleaning, as often the effect has pushed debris into slides screws and bearing surfaces. Similarly washing down with coolant hose the same consequences with added dangers that electrical motors are splashproof, but not designed to withstand constant jets of water. After the coolant has been allowed to drain away, the filter tank cover should be removed and the magnet withdrawn and cleaned. The filter box should be washed out paying particular attention to unclogging the gauze. Loose swarf and debris can be swept towards the filter box well, which provides a convenient scoop point.

The grinding head spindle and carriage bearings are greased for life. As these bearings do the bulk of the work, however it is recommended that both assemblies are stripped down on a yearly basis and the bearings inspected. Bearings should be regreased or replaced as necessary.

Slides and screws should be examined periodically, cleaned, oiled, or re-greased. Where necessary, careful attention should be paid to moving parts that suddenly become stiff. If cleaning and lubrication do not resolve the problem, stripping the assembly should be considered. Carefully examine the particular assembly in the spares section, and always consider what dangers to alignment could be caused by poor re-assembly. If in doubt call on the services of a competent Engineer.

## BEARING INSPECTION / REPLACEMENT

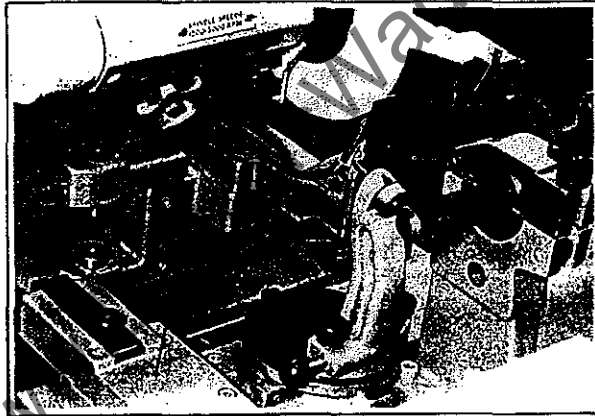
The main load carrying carriage bearings of the NXU machine are greased for life type and generally require little maintenance over a number of years.

Due to the nature of the bearings, over lubrication may cause slipping of the bearings and hence inaccurate carriage movement. Therefore no lubrication points are provided on the machine for weekly/monthly lubrication.

However, as these bearings carry the main loading of the machine it does over a period of time become necessary to re grease the bearings and/or replace any worn parts. This procedure requires the removal of the carriage top cover, and a visual examination of the bearings and associated parts carried out to ascertain their position.

If all parts are in a reasonable condition then re greasing of the bearings should be carried out and the rails cleaned. Roller bearing grease should meet the requirements of type 'K' grease with a consistency of NGLI 1.2 or 3.

1. Remove dresser unit (1)

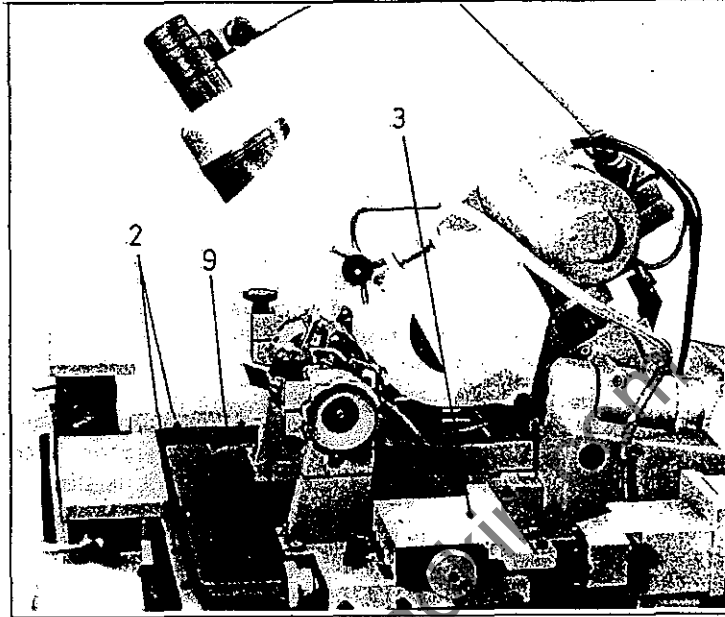


2. Turn the tables, side locking handle anti clockwise until the black plastic handle and shaft can be removed.

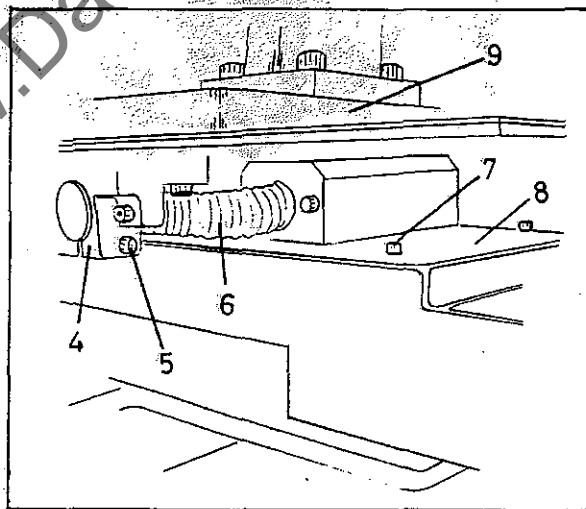
3. Unscrew and remove all the screws (2) securing the tin cover.

**Note:** although not essential it may be found easier if the template/stylus unit (3) is also removed.

4. Remove screws holding gaitors (6) to rail support block (4).



5. Slacken off pinch screws (5) in support blocks and slide out rails (support top plate whilst removing rails). With the bar removed lift clear the top plate assembly (9) and also remove the gaitors.
6. Remove capscrews (7) and second tin cover (8). This exposes the bottom rails.



7. Remove plastic blanking caps.

8. Slacken off pinch screws in the bottom rail nearest the head and slide out the rail through the hole where the plastic cap was.
9. Remove bearings for this rail only and check these and the rail for wear, pitting, dust build up, etc.

Replace as necessary

**Note:** as long as the support blocks are not disturbed they should provide an accurate guide when refitting bearings and rails.

10. Check and if necessary adjust rail so it is square to the side face of the wheel or flange.  
When correct proceed to the next bottom rail.
11. This second bottom rail should be removed and inspected in the same manor as before.  
When refitting set this rail parallel to the first within a tolerance of +/- 0.009mm.
12. Refit top plate (9) and insert one of the top rails.  
Do not fit gaitors (6) or second tin cover (8) at this stage.
13. Support the top plate with blocks to keep level.
14. Remove bearing.  
Check and inspect rail and bearings as for the bottom rails. When refitting the support blocks should provide an accurate location.  
  
Check and if necessary adjust this rail so it is square to the first bottom rail checked ie. the rail nearest the head, using a square and dial indicator to ensure it is within a tolerance of +/- 0.009mm.
15. Support top plate (9) on the other side.  
Remove and check, bearings and rail as previously
16. This second top rail should be checked and adjusted if required so it is parallel to the other top rail to within a tolerance of +/- 0.009mm.
17. Check front/back movement has a nominal travel of 118mm +/- 1mm.
18. Check left/right movement has a nominal travel of 404mm +/- 1mm.
19. Remove both top rails when set and refit gaitors and second tin cover (8) and then refit and secure top plate.
20. Refit all other items in the reverse order to which they were removed ensuring all mating surfaces are clean.



5.

**GENERAL MACHINE OPERATION**

*Before operating the machine the operator should be conversant with the electrical control buttons, lock taps, grinding and safety procedures. Ensuring that the floor around the machine is free from scrap, sawdust and oil or anything else likely to cause tripping or slipping. Safety footwear should be worn. In addition loose clothing and long hair should be fastened back and jewellery removed when it is likely to cause a hazard. No grinding should ever be undertaken without protective eyewear, or without the appropriate guards in position.*

*Adjustments should be made to the armrests, so the operator can assume a comfortable working posture. Finally ensure the proper hand tools and work pieces are conveniently placed to prevent loss of concentration or hurried actions.*

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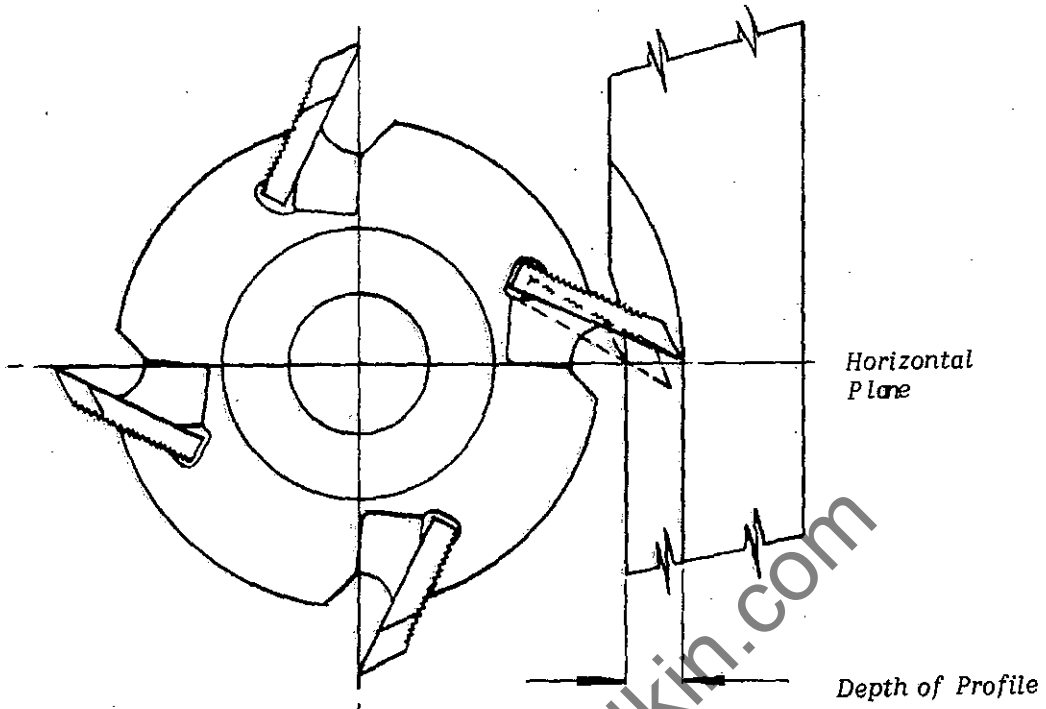
## 5.1

**PROFILE GRINDING THEORY**

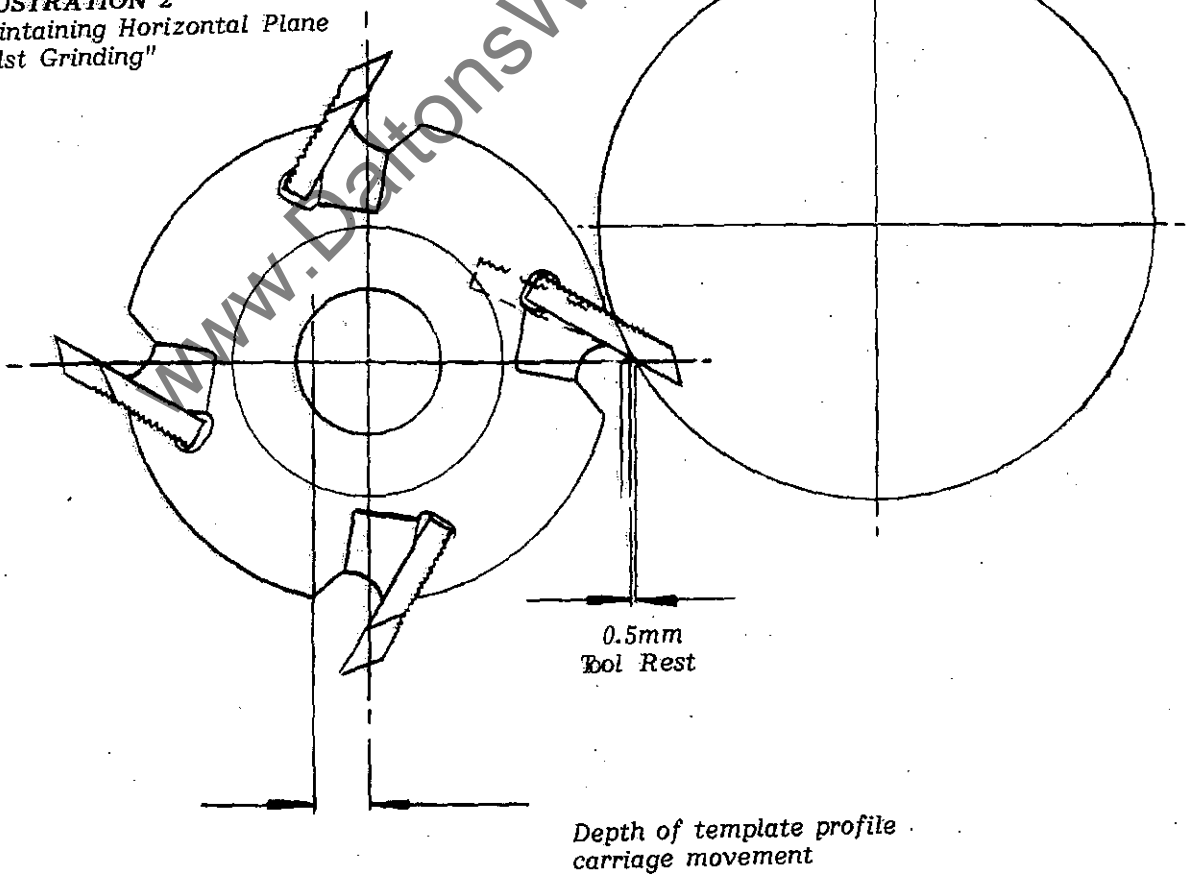
The basic objective of profile grinding is the accurate reproduction of cutter knives. The method used on the NXU is that of template and stylus, similar to that commonly employed in key cutting. The template matches the generated form of cutter and the stylus matches the form of the wheel. Wheel and cutters are connected in parallel with the template and stylus, therefore the action of one is copied by the action of the other. Good reproduction is therefore dependant upon an accurate template and an accurate matching of grinding wheel form to the stylus.

A third factor is brought into play by the cutting angle. If the cutting angle was  $0^\circ$ , the cutter could be ground in the horizontal plane and the finished profile would match the template. However most cutterblocks have a cutting angle of between  $15^\circ$ - $45^\circ$ . This necessitates the use of a tool rest, to allow rotation of the cutterblock whilst grinding. If the cutting action of a shaped cutter is examined (illustration 1), it will be observed that outer cutter edge reaches the maximum depth of cut before the inner and that the maximum depth of cut for both edges occurs when the edge passes a line drawn through the horizontal plane of cutterblock. Similarly the cutter rest ensures that each successful edge ground is in the same plane as the template. Theoretically this means that the ground edge and the finger support should be at the same point and horizontally level with the centreline of the cutterblock. However for practical considerations there should be a gap of 0.5m between the dressed wheel and the support (illustration 2), but the bigger the gap, the greater the inaccuracy. Similarly deviation in the height of the support creates inaccuracies of depth. It is therefore important to keep the cutter rest in good condition and to replace it once worn.

**ILLUSTRATION 1**  
"Cutting Action of Shaped Cutter"



**ILLUSTRATION 2**  
"Maintaining Horizontal Plane  
Whilst Grinding"



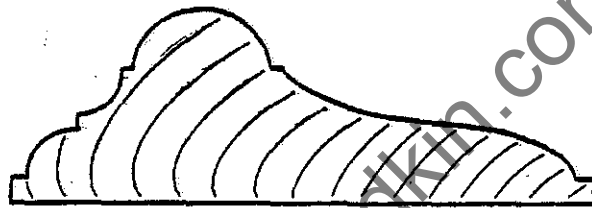
5.2

**PRODUCING THE GRINDING BLANK TEMPLATE**

The template should be made from a blank (part no NXT 6) supplied by "WADKIN" Ptc., It should always be made at least 20mm wider than the profiling knife and it should always be produced with at least two fixing holes 9.5mm diameter at 30mm centres.

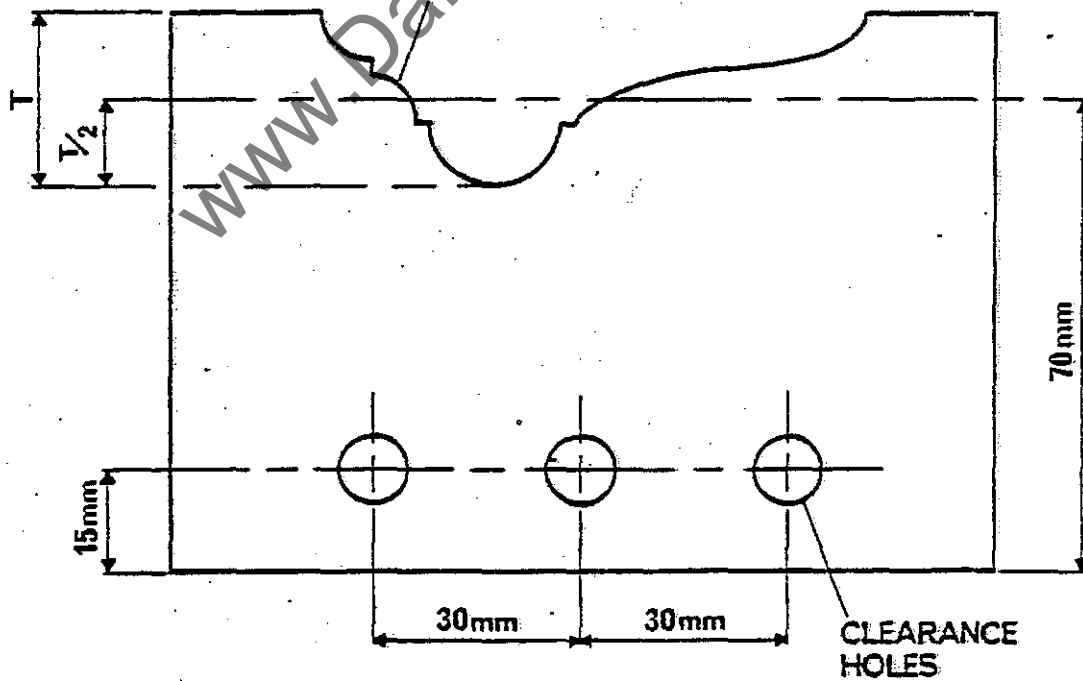
The template should fit precisely the wooden mould to be produced.

**NOTE:-** Detailed instructions are provided as part of the Wadkin in-house training course on profile grinding. In addition, an instruction manual is included in the Wadkin template making toolkit (Part No TBO 650).



**WOODEN MOULDING**

**CONTRA PROFILE**

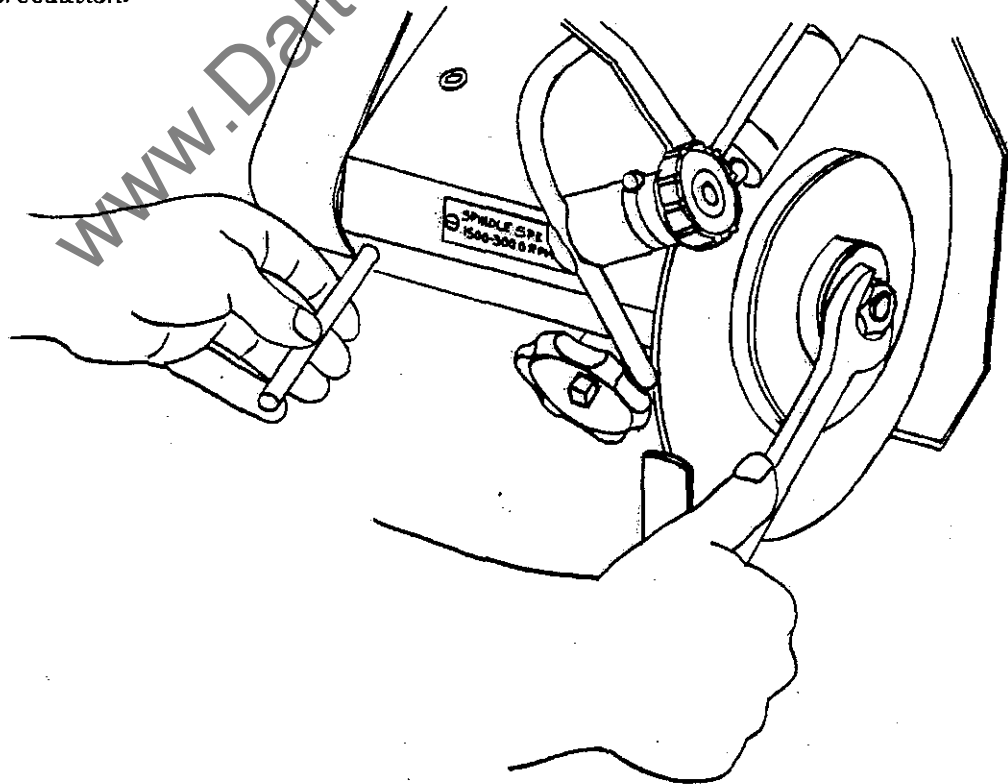


## 5.3

**GRINDING WHEEL MOUNTING**

Part of an operator's training should be the mounting of wheels. Breakage of wheels constitutes the biggest source of danger to the operator. Store wheels properly and ensure that the wheel rings true before mounting. All aluminium oxide wheels require soft card washers, so that the tightening stresses are uniformly distributed around inner and outer flanges. Metal wheels are machined flat and should therefore seat properly without the aid of washers.

After selecting the required wheel, ensure that the bore seats firmly on the shaft and that the maximum recommended speed of the wheel equals or exceeds the range of the machine. Wipe spindle clean and push on rear flange so that it mates with the spindle drive peg. Fit on grinding wheel and washers (if required), add the outer flange and finally the locknut. When the assembly is seated firmly, place tommy bar in hole in the spindle casting. Rotate the spindle until the tommy bar registers and tighten the locknut. When switching on a newly mounted wheel, stand clear for a minute, as an additional safety precaution.

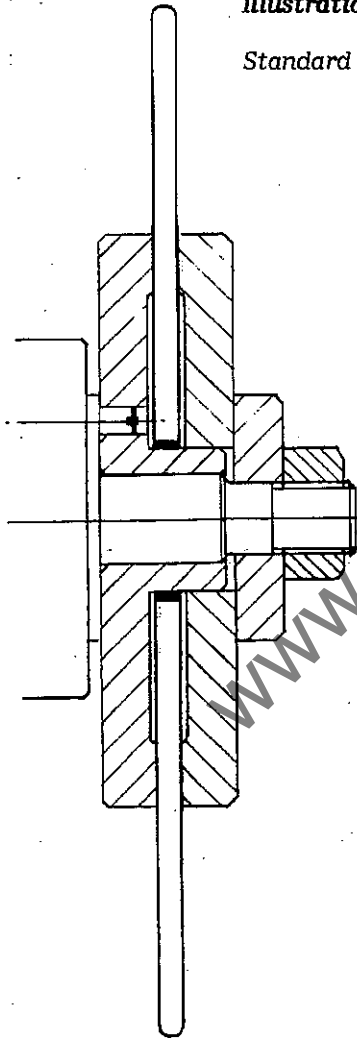


**THE QUICK RELEASE SPINDLE - (OPTIONAL)**

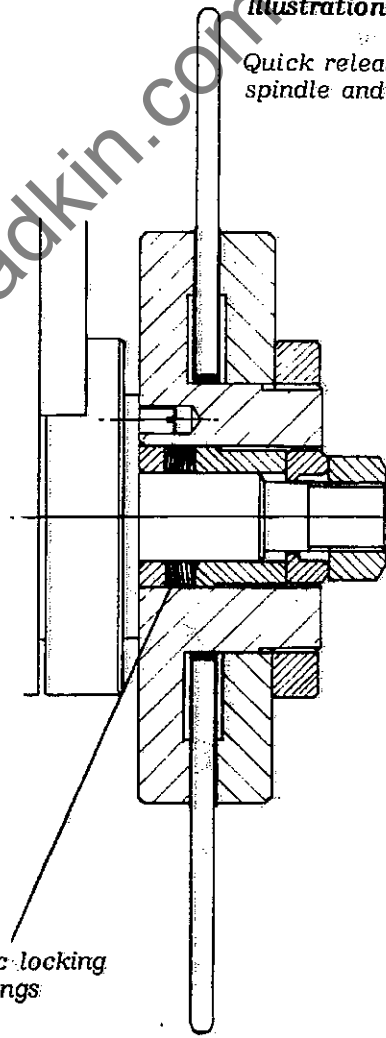
The quick release spindle was designed to speed up wheel changes and to ensure a more accurate seating. The grinding wheels are mounted on special flanges in a similar way to direct mounted wheels, but once assembled, they are locked by a friction drive assembly. The wheel is then located on the spindle, so that the drive peg fits into the rear flange. Ensure that the flange is firmly against the spindle shoulder and with the aid of a tommy bar tighten the locknut. The locking is as shown with the disc locking springs pushing the bore of the flange towards the spindle shoulder and upwards to grip the bore itself. It is important that if this assembly is removed it should be replaced in the same order and direction as when it was taken off.

**Illustration 1**

Standard spindle and flange

**Illustration 2**

Quick release spindle and flange

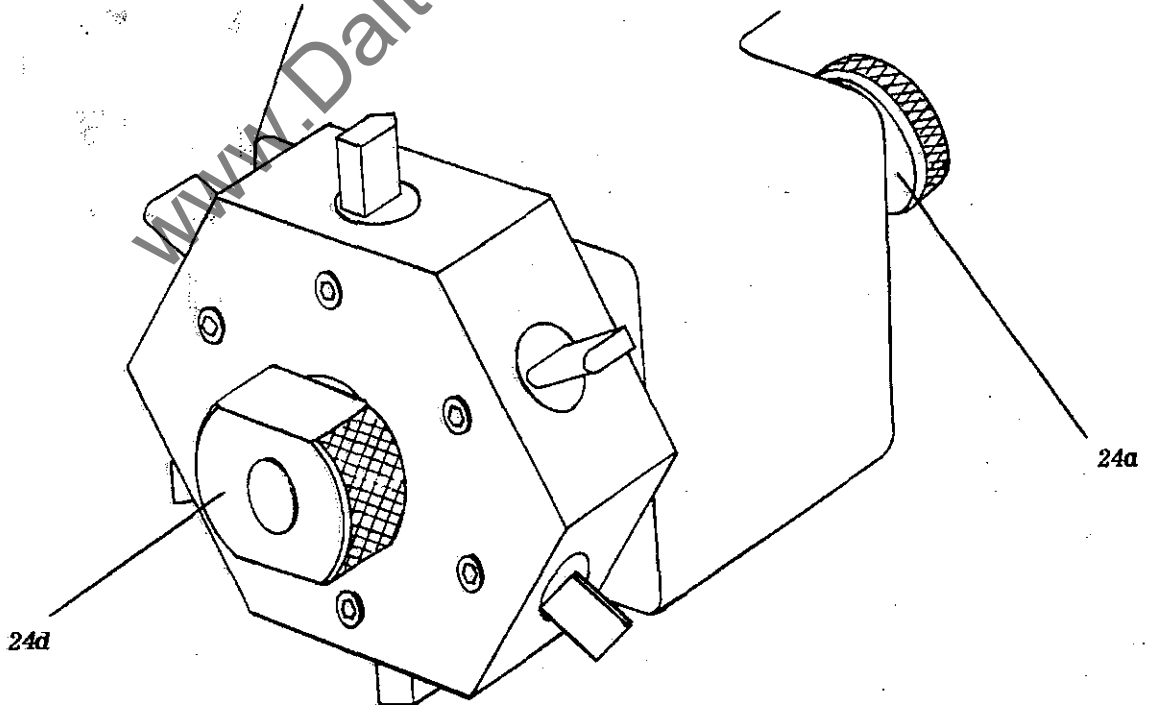


Disc locking springs

6.

### SETTING UP FOR GRINDING

Blank or reground cutters should be set in the blocks ensuring that they are tightened to the correct torque and leaving enough projection for the profile to be ground without interference with the cutterblock body. This will ensure that there is the minimum amount of distortion between grinding and finish wood machining. The block can then be mounted on the arbor and locked in position on the machine. The template should then be screwed onto the carrier (8) with the rear edge of the template firmly against the shoulder. Existing profiles should then be aligned with the template by adjusting the template carriage as necessary. With the head switched off, the wheel should be clear of the cutter. Selection of the stylus is aided by a multi stylus holder. By pulling back the spring loaded plunger (24a) and releasing the locknut (24d) the hexagonal holder can be rotated to the selected stylus. It is important that the styli are mounted at right angle to the template. This can be checked by placing a square on the template location shoulder, and on the side of the stylus.



## 6.1

### DRESSING THE WHEEL

The purpose of dressing the wheel is threefold: Firstly ... to produce a wheel profile identical to the stylus, secondly; ... to compensate for wheel wear and thirdly; ... to open up the wheel for free cutting.

The dresser unit (19) is situated on the carriage to the left of the arbor post. The method of dressing is similar to that of profile grinding, with the wheel form being produced by guides and stylus pins. There are two pins mounted (18d & e), one directly above the other on the main head assembly. On the carriage there is a dresser slide (18), that carries a guide fork (18c) on the underside and interchangeable guides (18b) on top.

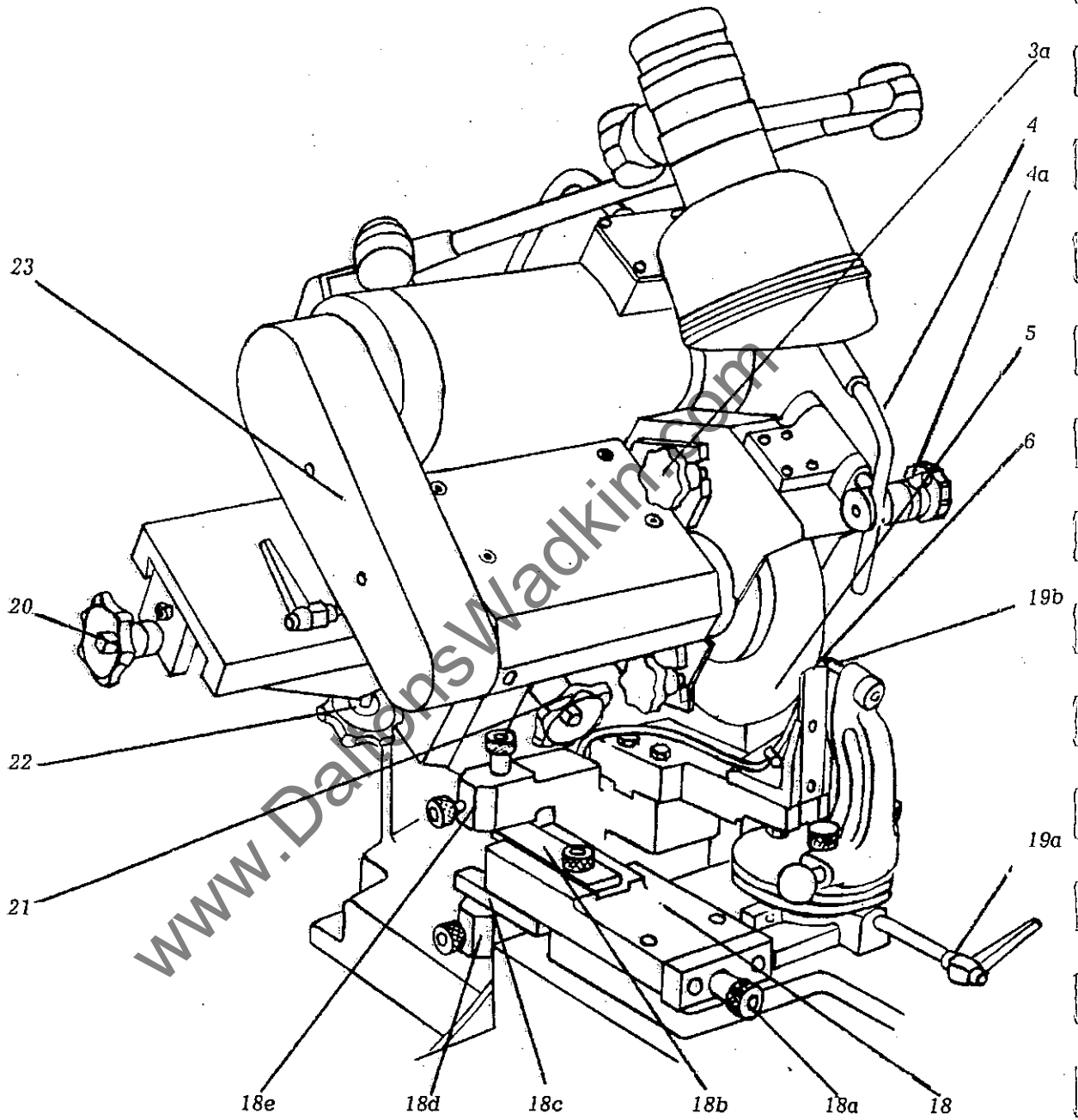
#### "SIZING"

All aluminium oxide wheels are generally supplied at 5.0mm wide, and so the wheel must be sized to the selected stylus width (generally 4.7mm or 3mm wide). For this purpose, the bottom pin should be locked in the "raised" position and the top pin locked in a "clear" position. The dresser unit should be rotated and set at 90° to the left or right. The carriage is then moved to a position where the lower pin is engaged with the fork. The carriage should then be able to move only backwards and forwards.

The diamond dresser (19b) should then be wound in until this slightly touches the side of the wheel. Withdraw and turn through 180°, push forwards again. If the diamond is well clear or well in from the side of the wheel, check that the horizontal head slide (20) is properly against the stop. If not, gently hand wind until firm and lock slide. Repeat as before. Switch on motor and coolant pump and dress down the side of the wheel, turn through 180° and repeat until a small amount has been taken off each side of the wheel. Measure the wheel width with a pair of calipers, and then the stylus. Half the difference between the two is the amount the diamond wheel will need to move in order to size the wheel. As a maximum cut of 0.1mm is recommended, successive dressings may be required to size the wheel (NOTE: Each graduation represents 0.05mm).



**DRESSER UNIT**



### 6.1a

#### **PRODUCING A RADIUS**

If the required profile is round, the bottom pin (18d) is left in play and the top pin (18e) brought down into play. The top pin has three positions: Disengaged, 4.7mm stylus (smaller diameter), and 3mm stylus (larger diameter). With the wheel at rest, locate the carriage in the dressing position. With the dresser unit set at 0°, wind the grinding wheel slide (22) so that the grinding wheel is set 0.5mm away from the cutter rest. The dresser slide and locking screw (18a) should be released and positioned such that the diamond slightly touches the grinding wheel when the square guide touches either the 4.7mm or 3mm pin. The difference in pin diameter is to compensate for difference in wheel radius without having to reset the dresser slide.

If the wheel has just been sized to 4.7 the radius has been automatically set up at 2.35, so to dress a radius both pins are engaged and the dresser is swept through an arc of 180°.

However when producing a radius from a square form, there should be several successive small cuts made to avoid unnecessary damage to the diamond dresser. This can be achieved by winding the head back and incrementing forward small amounts.

### 6.1b

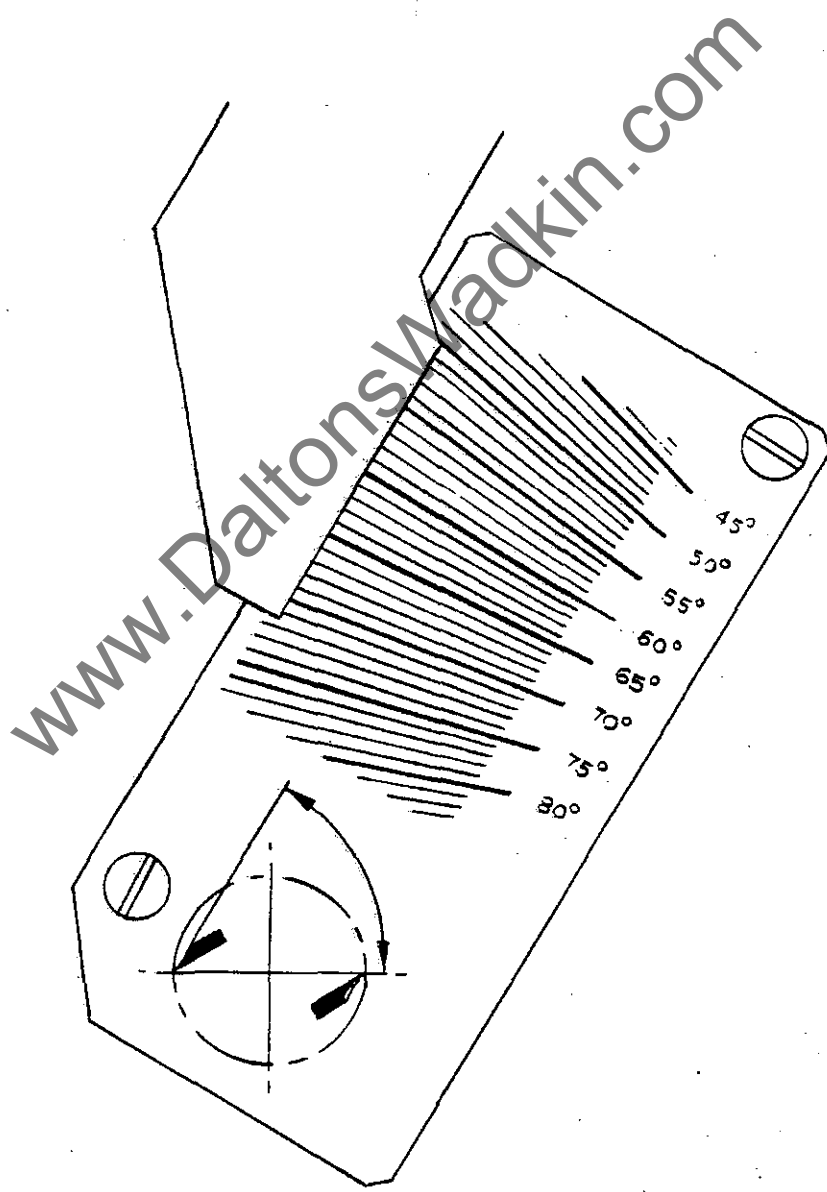
#### **DRESSING SQUARE**

To dress the wheel square it is necessary to take the bottom pin out of play and to use the top pin (18e) and the square template (18b). By moving the template up to the selected pin and moving the carriage from side-to-side, successive dressing can be made moving the head forwards in small increments. For angled dressing the templates should be changed to that of the required angle and set diamond 90° to angle. Dress using a similar method to that for squaring the wheel.

6.2

**SETTING CUTTER CLEARANCE ANGLE**

The clearance angle should be set by raising or lowering the head. On preground cutters, a quick practical method is to position the grinding wheel so that it touches halfway on the edge of the cutter. The set angle can be read from the pointer. The angle can be taken from 90° to give an approximate clearance angle. Whilst the scale copes with wheels of various diameters, it cannot cater for different thicknesses of cutter or the variations of the hollow ground radius, as shown in the exaggerated scaled drawing. Whilst the clearance is constant on all cutting edges, the sharpness angle varies because the cutting angle changes from the outside to the inside of the profile.



To produce a pointed wheel, one angled guide is used and the wheel is dressed until half of the wheel has been shaped. Reverse the template and dress until a point has been formed. A final dressing should be taken on each side at the same head setting. The head should be wound to 0.5mm from the cutter rest and the dresser slide reset, so that subsequent dressing can re-create the same gap.

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## 6.3

**GRINDING WHEEL SPEED**

The speed control on the grinding wheel is infinitely variable between 1500 and 3000 RPM. Although all wheels supplied are 230mm diameter, the aluminium oxide wheels will however gradually reduce in diameter with wear. Most of the wheels have optimum peripheral speeds of between 20 to 30 metres per seconds (m/s).

The table below shows RPM at various diameters to achieve 20m/s, 25m/s and 30m/s peripheral speeds.

To nearest 25RPM	20m/s	25m/s	30m/s
Wheel Diameter			
170mm	2250	2800	3375
180mm	2125	2650	3200
190mm	2000	2500	3025
200mm	1900	2375	2875
210mm	1825	2275	2725
220mm	1725	2175	2600
230mm	1650	2075	2500

When using aluminium oxide wheels, rough grinding is normally achieved between 20m/s-25m/s. Finish grinding is between 25m/s-30m/s. Straight knife borazon is between 20m/s-25m/s. Straight knife diamond is between 25m/s-30m/s.

7.

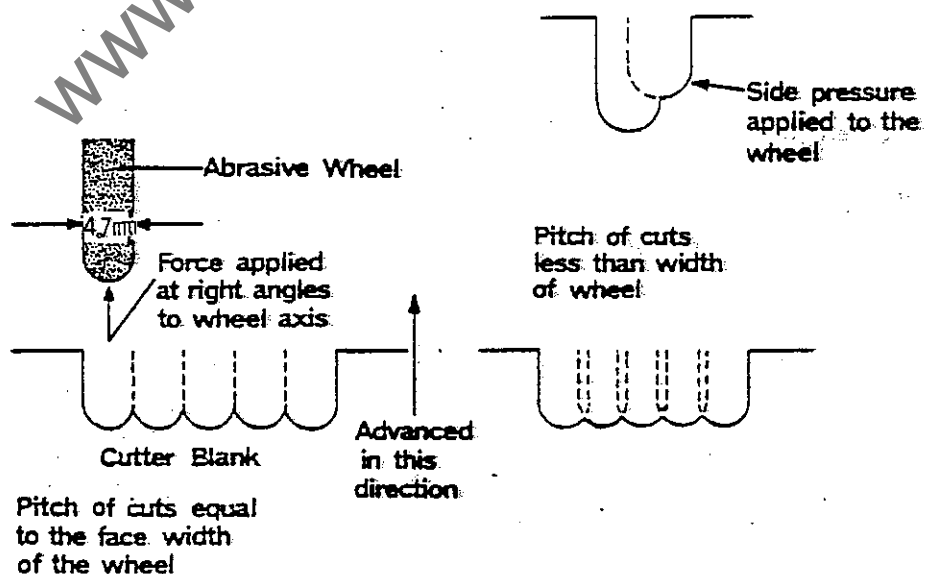
**PROFILE GRINDING**

7.1

**ROUGH GRINDING**

Before switching on the head, ensure that the wheel guard is securely clamped in position and the grinding wheel is firmly fixed on the spindle. Position the head vertical upright and check the horizontal slide is wound up against the stop. Dress the wheel to selected stylus form, after setting the head for the required clearance angle.

Select an appropriate grinding speed and commence grinding. When roughing out, a nibbling action is adopted. Short bites in a backwards/forwards motion, so that most of the work is carried out by the front edge of the wheel. Avoid unnecessary sideways movement, as excessive side pressure can cause wheel breakage. In addition it can cause wear to the side of the wheel therefore causing the wheel to become thinner than the stylus and as a result, insufficient material would be ground off the cutters. The wheel should have a restricted plunge depth of 5mm. If a wheel is buried too far the grinding motor can be stalled or overloaded. When the form has been ground to within 2-3mms of the finished form, the wheel should be redressed to ensure equal amounts have been rough ground out of each cutter.



## 7.2

### **FINISH GRINDING**

*On simple forms, soft roughing wheels are often used for finish grinding. Frequent dressing and small cuts are employed to compensate for the effects of wheel wear. Finish cuts are generally between 0.1-0.025, all the cutters being ground at the same template setting. Finishing wheels are harder and less free cutting than roughing wheels. However as they are less subject to wear they retain their shape much longer. This feature is particularly useful for squared or pointed wheels. When blending from one form to another, it is useful to switch off the grinding head and check to blend points to see whether the grinding wheel is touching the cutter at the same time as the stylus is touching the template.*

*Diamond dresser manufacturers recommend the use of coolant when dressing to save diamond wear and to prevent dust formation.*

## 7.3

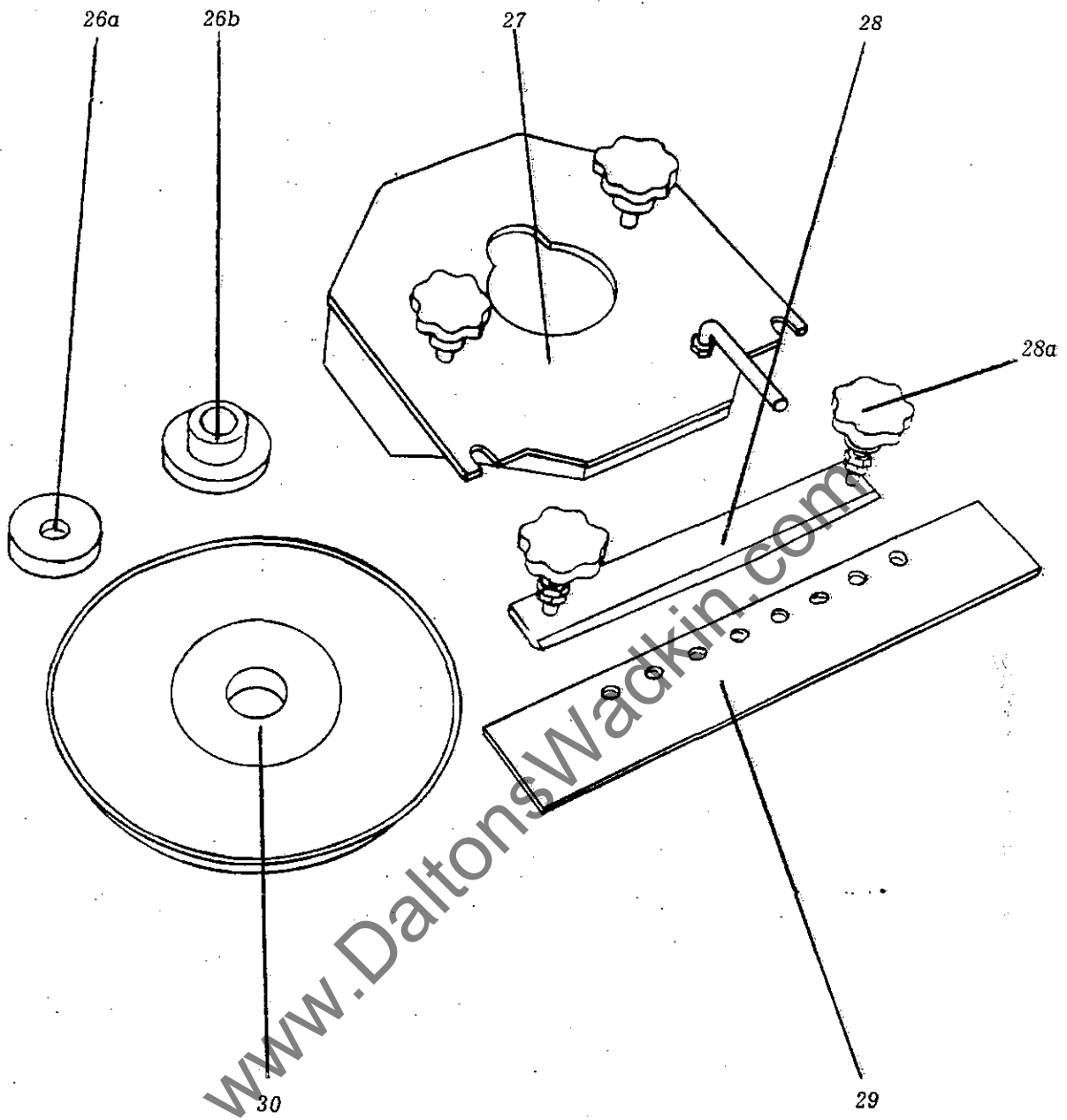
### **SIDE RELIEF**

*When grinding a form with steep edges or square rebates there is a need for side relief.*

*The required angle is selected on the counter switch and the head is positioned either right or left by the directional control buttons. On a radiused wheel no further adjustments are normally required. The wheel should only be dressed in a round form when the head is in a vertical position. On the other hand square dressed wheels can be dressed after tilting, or the head may be wound back until the dresser is touching just on one corner.*

*After grinding there should be a slight land on edge being ground. This land can be reduced by moving the template sideways a small amount.*

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8. STRAIGHT KNIFE GRINDING ATTACHMENT





**8. STRAIGHT KNIFE GRINDING ATTACHMENT**

<i>REFERENCE</i>	<i>DESCRIPTION</i>
26a .....	<i>Direct Mounting Flange</i>
26b .....	<i>Direct Mounting Flange</i>
27 .....	<i>Guard</i>
28 .....	<i>Knife Guide</i>
28a .....	<i>Knife Guide Locking Handle</i>
29 .....	<i>Straight Knife Template</i>
30 .....	<i>Borozone Grinding Wheel</i>

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## 8.1

### SETTING UP

#### 8.1a

#### TILTING THE HEAD

The head should be reset from the normal profile grinding mode as follows.

The profile grinding wheel is removed along with the top coolant pipe with clamp (4) from the guard. The profile grinding wheel guard is also removed by releasing the two plastic knobs (3a).

The tool rest (6) is then removed by releasing the hexagon nut and sliding forward and the coolant supply to the tool rest turned off using the correct tap (17b). To avoid disconnecting the coolant pipe, the tool rest can be laid in the tray towards the rear of the machine.

The straight knife grinding wheel guard (28 - See Section "8") is then fitted to the head and securely locked using the two plastic knobs. Ensure that the mating faces are clean.

With the knife guide removed, the straight knife grinding wheel (30 - See Section "8") is fitted using the correct mounting flanges.

Before tilting the head the area should be checked for any potential obstructions. The carriage should be moved forward to be well clear of the head. **It is essential that the head is adjusted at least 60mm to the left of the profile grinding position before tilting to avoid any possibility of the head motor fouling templates etc.**

The head is tilted by first entering "00" and pressing the appropriate tilt button on the control panel, to ensure that the tilting movement begins from a "zero" vertical position.

The counter is then set to "99" and the right tilt button (9g - See Section 3.4) pressed. The movement should be watched to ensure that there are no fouling conditions or that items such as coolant pipes do not become trapped.

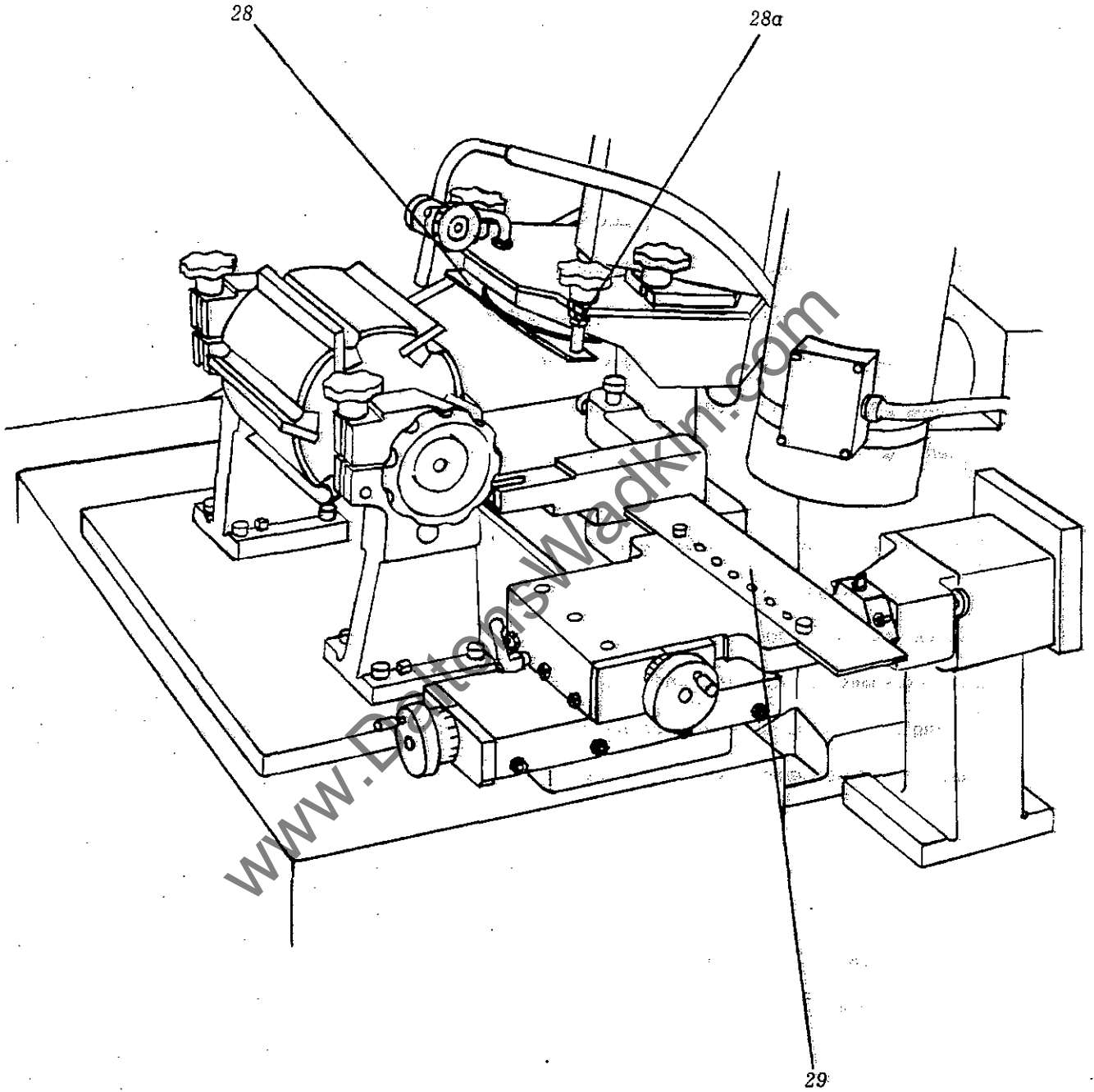
**NOTE:** The machine is programmed such that when this "99" movement is carried out the head will position itself at slightly less than 90° to ensure that the grinding wheel will always cut on its leading edge.

The coolant pipe clamp should be mounted on the post provided on the straight knife guard.

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8.1b

ADJUSTING KNIFE GUIDE



**8.1b**

**KNIFE GUIDE**

The knife guide (28) is fitted to the two slots at the front of the wheel guard and locked into position using the two plastic knobs.

When the guide is first fitted, or when a new grinding wheel is used, the height of the guide should be adjusted by releasing the locknuts (28a) on the mounting studs and re-setting such that the knife guide is about 2mm parallel from the face of the wheel. This should be checked by resting the cutter knife on the knife guide and ensuring that contact is only made at the peak of the guide with clearance afterwards. Adjust locknuts at one end if required. The height setting would not normally require adjustment but, after a long period of use, wear on the face of the grinding wheel will take place, and adjustment can be carried out to reduce the gap back to 2mm if desired.

A 2mm gap is ideal for most 4mm thick straight knives. If however the knife projection is small, the gap can be reduced to 1mm to prevent the knife guide fouling on the cutter-block body or wedges. If 6 or 8mm thick knives are to be ground, the gap may need to be increased to allow the wheel to cover the full width of the knife heel. **NOTE:** The standard knife guide is not suitable for straight grinding thick (eg. square block) cutters - and a modified guide (NXU JO2) must be fitted.

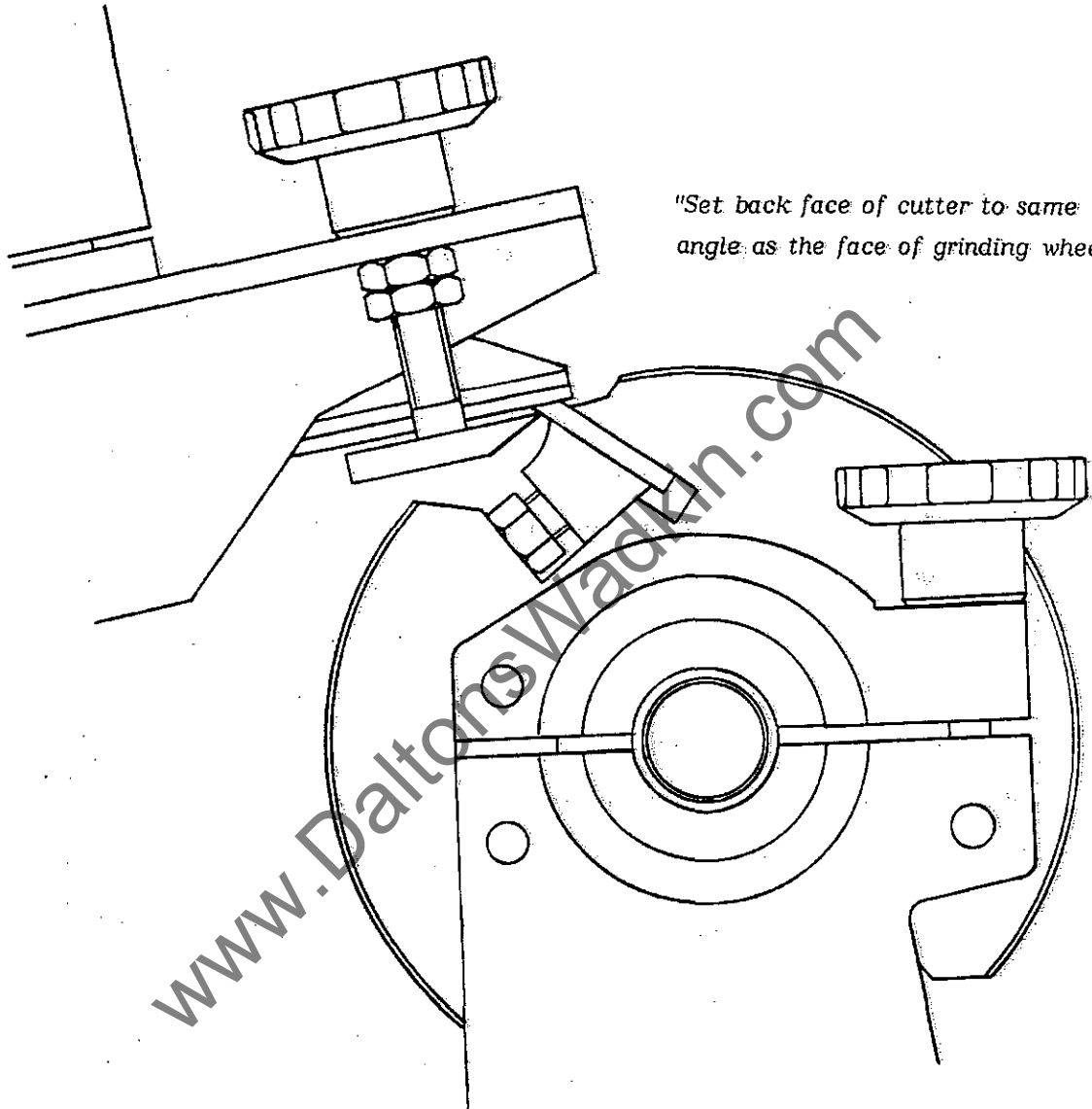
**8.1c**

**ARBOR AND TEMPLATE**

The cutterblock is mounted on the standard arbor using the same methods as for normal profile grinding. The arbor is then mounted on the machine in the conventional manner.

A straight knife template (29) is mounted on the template carrier in such a position that the carriage and cutterblock can be moved past the grinding wheel without the template coming off the end of the stylus.

**8.1d HEAD AND TEMPLATE ADJUSTMENT**



*"Set back face of cutter to same angle as the face of grinding wheel".*

**8.1d**

**HEAD AND TEMPLATE ADJUSTMENT**

The straight knife grinding template (29) should be brought into contact with the stylus (24b) and the face of the cutter brought to rest on the knife guide (28). By sideways movement of the carriage, the cutter should be positioned over the peak of the knife guide. Care should be taken to avoid damaging the wheel.

Using a combination of template carrier adjustment (8b), vertical headslide adjustment (22), and if necessary, forward head adjustment (21), the relative positions should be adjusted so that the back face of the cutter is set to the same angle as the face of the wheel (See illustration).

Clearances should be checked to ensure that the wheel covers the back face of the cutter but does not foul the body of the cutterblock, and that the knife guide does not foul the cutterblock or wedge. If these clearances are not correct, adjustment should be made to the height of the knife guide and the head and template positions re-set.

Once set, the head position should not be moved unless an alteration of the sharpness angle of the knives is required. Moving the head down will cause more material to be ground off the heel of the knife, decreasing the sharpness angle. Moving the head up will cause more material to be ground off the tip of the knife, increasing the sharpness angle.

## 8.2

### GRINDING

Starting with the highest knife resting on the knife guide (to the left of the wheel) and the template in contact with the stylus, the carriage is moved to the right passing the knife under the wheel. It is important that the knife remains in contact with the knife guide and that the template remains in contact with the stylus whilst grinding.

The template carrier should be adjusted back one graduation (0.05mm) to apply a suitable depth of cut.

Each knife should then be ground once. This method of straight knife grinding will bring all the knives to a true cutting circle which should allow longer periods between regrinds.

During the initial grinding therefore, more material will be removed from some knives than others.

When each knife has been passed under the wheel once, the template carrier should be adjusted back one more graduation (0.05mm) and the process repeated until all knives are ground.

A final finishing cut can be taken off half a graduation (0.025mm).

Before grinding a cutterblock it may be found useful to mark the first knife with a felt marker so that the starting point can be seen during the grinding operation.

If the operator is unfamiliar with straight knife grinding on the machine, it may be found helpful to lock the carriage front to back axis with the template in contact with the stylus during grinding. This will soon be found to be unnecessary however, as experience is gained.



**9. SPARES****9.1****TOOLS AND ACCESSORIES - SUPPLIED WITH MACHINE**

<b>PART NUMBER</b>	<b>DESCRIPTION</b>	<b>QUANTITY</b>
K0521626	Crank handle 1/2"	1
K3041140	Allen key 2.5mm A/F	1
K3041141	Allen key 3mm A/F	1
K3041142	Allen key 4mm A/F	1
K3041143	Allen key 5mm A/F	1
K3041144	Allen key 6mm A/F	1
K3041145	Allen key 8mm A/F	1
K3041146	Allen key 10mm A/F	1
K3073738	Spanner 17 x 19mm A/F	1
K3073782	Spanner 11 x 13mm A/F	1
K3073785	Spanner 24 x 27mm A/F	1
NXT 6	Template Steel	3
NXT 51	Coolant Oil 1 pint	2
NXU 402	Tommy Bar	1
T3033201	Instruction Manual	1
<b>Supplied with machines fitted with direct mounting flanges</b>		
GW 202	Profiling finishing wheels (1.1/4" bore)	5
GW 203	Profiling roughing wheels (1.1/4" bore)	5
<b>Supplied with machines fitted with quick release flange</b>		
GW 282	Profiling finishing wheels (62mm bore)	5
GW 281	Profiling roughing wheels (62mm bore)	5
QT 168	Spanner 70mm A/F (Assembly of flange nut)	1

9.2

**Grinding Wheels for use with direct mounting flanges (Models NXU 230 & NXU 230S)**

- GW 203 Spare profiling roughing wheels for HSS and HSS on Iron -  
for direct spindle mounting 1.1/4" bore
- GW 202 Spare profiling finishing wheels for HSS and HSS on Iron -  
for direct spindle mounting 1.1/4" bore

**Diamond Wheels for Profiling**

- GW 210 230mm dia x 4.7mm thick round edge abrasive wheel  
for grinding TCT cutters
- GW 211 230mm dia x 3.0mm thick round edge abrasive wheel  
for grinding TCT cutters
- GW 212 230mm dia x 3.0mm thick square edge abrasive wheel  
for grinding TCT cutters
- GW 213 230mm dia x 3.0mm thick 60 deg bevel abrasive wheel  
for grinding TCT cutters
- GW 214 230mm dia x 3.0mm thick 45 deg bevel abrasive wheel  
for grinding TCT cutters
- GW 215 230mm dia x 3.0mm thick radius edge abrasive wheel  
for grinding TCT cutters
- GW 216 230mm dia x 4.7mm thick double 45 deg bevel abrasive  
wheel for grinding TCT cutters

**Grinding Wheels for straight knife grinding**

- GW 279 Borozon Cup Wheel for straight knife grinding of HSS -  
direct mounting
- GW 269 Diamond Cup Wheel for straight knife grinding of tungsten  
carbide - direct mounting

**Spares for direct mounting flanges**

- NXU DO3 Direct mounting flange for profiling
- NXU DO4 Direct mounting flange for straight knife
- NXU DO2 Locking washer for direct mounting flanges

9.3

**Grinding Wheels for use with Quick Release Flanges (Models NXU 230R and NXU 230SR)**

- GW 281 Spare profiling roughing wheels for HSS and HSS on Iron - for quick release flange mounting 62mm bore
- GW 282 Spare profiling finishing wheels for HSS and HSS on Iron - for quick release flange mounting 62mm bore

**Diamond Wheels for Profiling - For Quick Release Flange Mounting 62mm Bore**

- GW 260 230mm dia x 4.7mm thick round edge abrasive wheel for grinding TCT cutters
- GW 261 230mm dia x 3.0mm thick round edge abrasive wheel for grinding TCT cutters
- GW 262 230mm dia x 3.0mm thick square edge abrasive wheel for grinding TCT cutters
- GW 263 230mm dia x 3.0mm thick 60 deg bevel abrasive wheel for grinding TCT cutters
- GW 264 230mm dia x 3.0mm thick 45 deg bevel abrasive wheel for grinding TCT cutters
- GW 265 230mm dia x 3.0mm thick radius edge abrasive wheel for grinding TCT cutters
- GW 266 230mm dia x 4.7mm thick double 45 deg bevel abrasive wheel for grinding TCT cutters

**Grinding Wheels for Straight Knife Grinding**

- GW 278 Borozon Cup Wheel for straight knife grinding of HSS - for quick release flange mounting
- GW 268 Diamond Cup Wheel for straight knife grinding of tungsten carbide - for quick release flange

**Spares for Quick Release Flanges**

- NXU DO6 Quick change grinding wheel flanges for profiling
- NXU DO7 Quick change grinding wheel flanges for straight knife grinding
- NXU DO5 Quick release facility on spindle

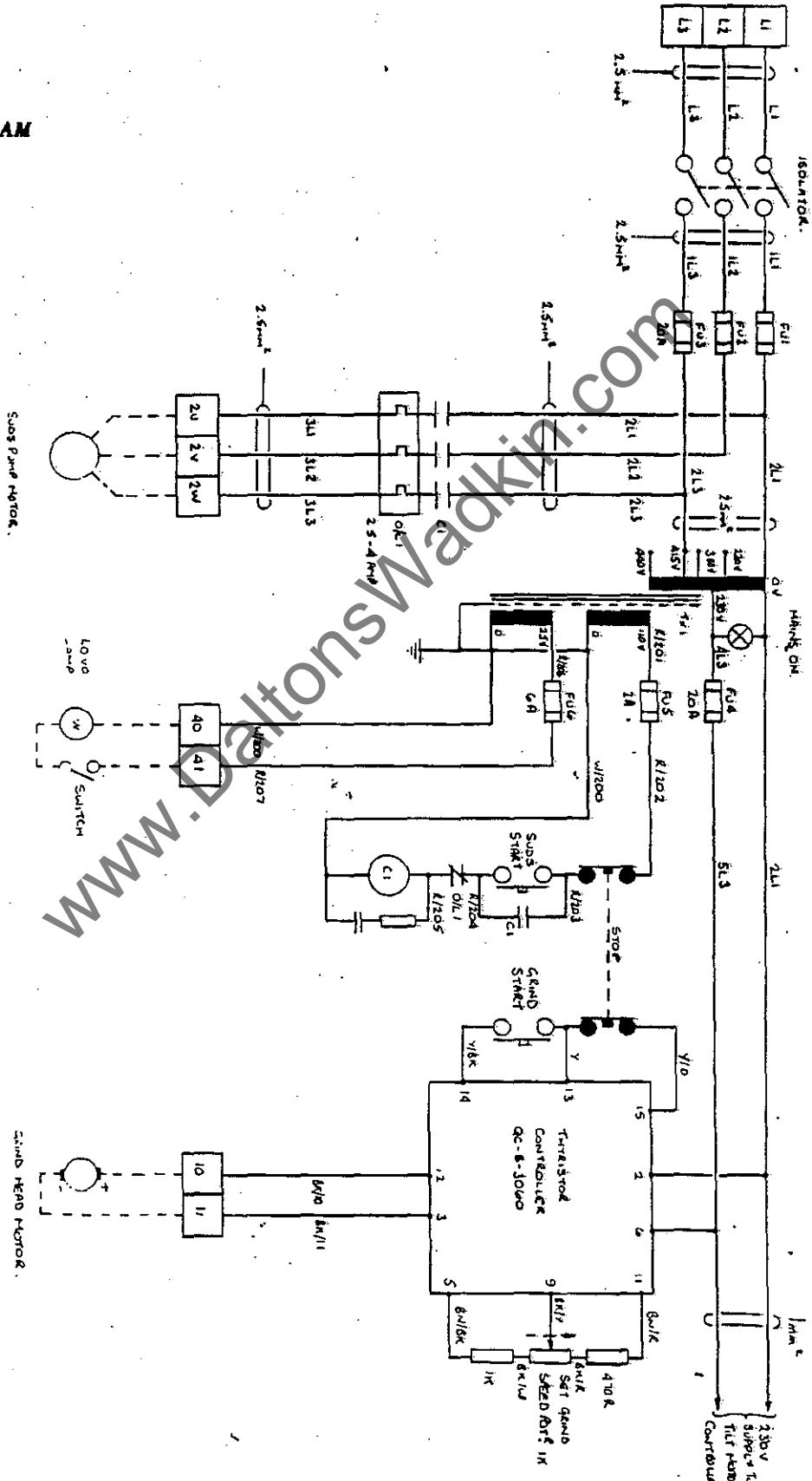
## 9.4

**SPARES AND ACCESSORIES (OPTIONAL)**

NXU 320	Spare Drive Belts for Motor
T30 17 103	Spare brushes (pr) - head tilt motor
T30 17 102	Spare brushes (pr) - spindle motor
NXU S0105	Spare Bulb for Spotlight
NXU 522	Spare Diamond for Grinding Wheel Dresser
NX 40	4.7mm wide radius and square stylus
NX 110	90 deg point x 4.7mm wide stylus
NX 111	30 deg chamfer RH stylus
NX 112	30 deg chamfer LH stylus
NX 131	45 deg chamfer RH and LH stylus
NX 133	3mm wide radius and square stylus
NXU 508	Dresser Guide Pin (top)
NXU 509	Dresser Guide Pin (bottom)
NXU 531	Dresser Guide - fork (LH)
NXU 532	Straight follower for dresser unit
NXU 537	30°/45° angle combined spare follower for dresser unit
NXU 545	25mm Cutter Rest
NXU 530	Dresser Guide - fork (RH)
NXT 6	Extra 305mm (12") length of template steel
NXT 124	Special template for straight knife grinding
NXT 51	Tin of soluble oil (1 pint (1/2 litre))
K30 50 10/EM	Graduite seal - coolant pump
TBO 650	Template making tool kit
SDT A01	230mm capacity setting stand for use with machine arbors
T30 49102	Hand held refractometer for measuring concentration of grinding fluid

10.

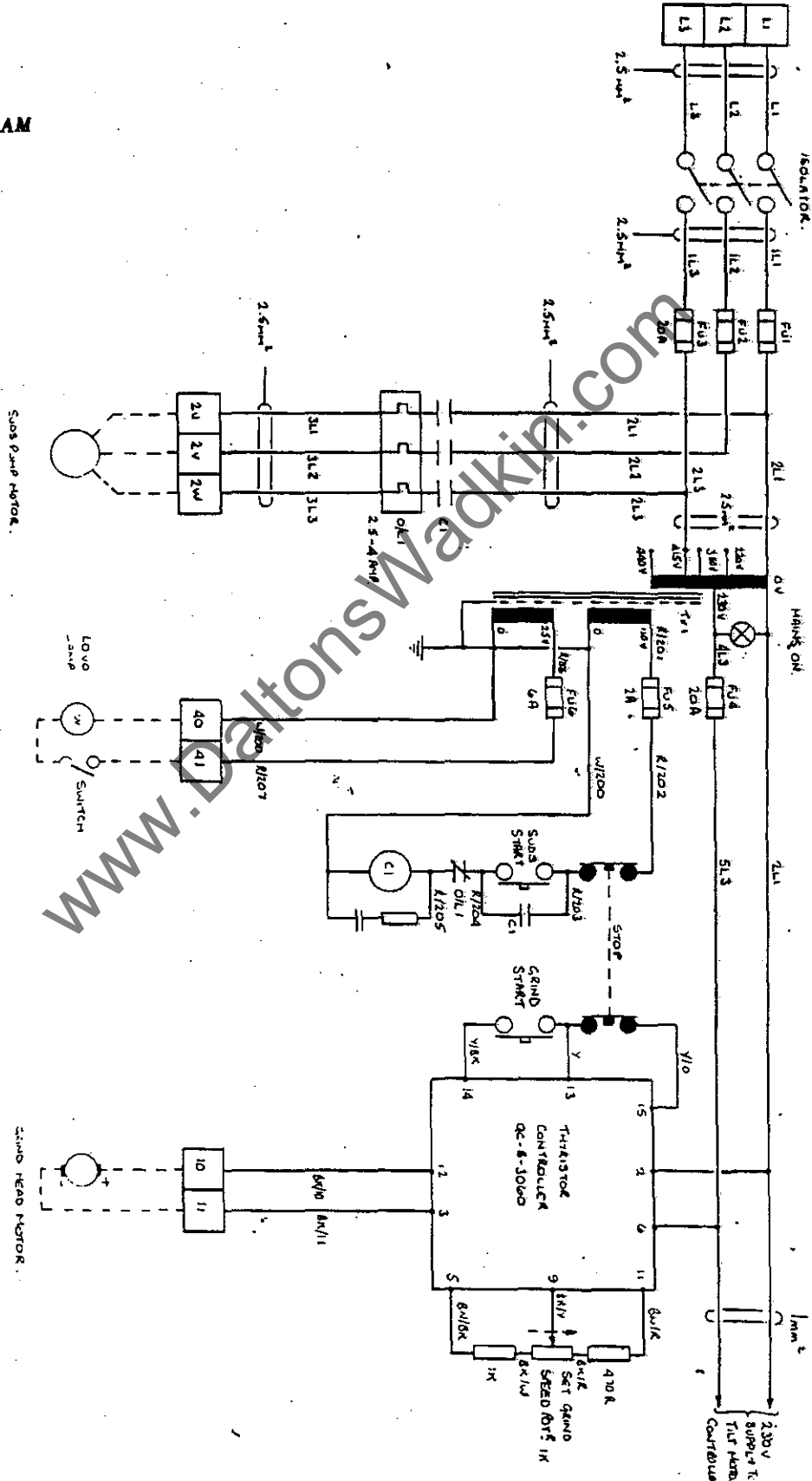
WIRING DIAGRAM



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DRAWN	TJR	

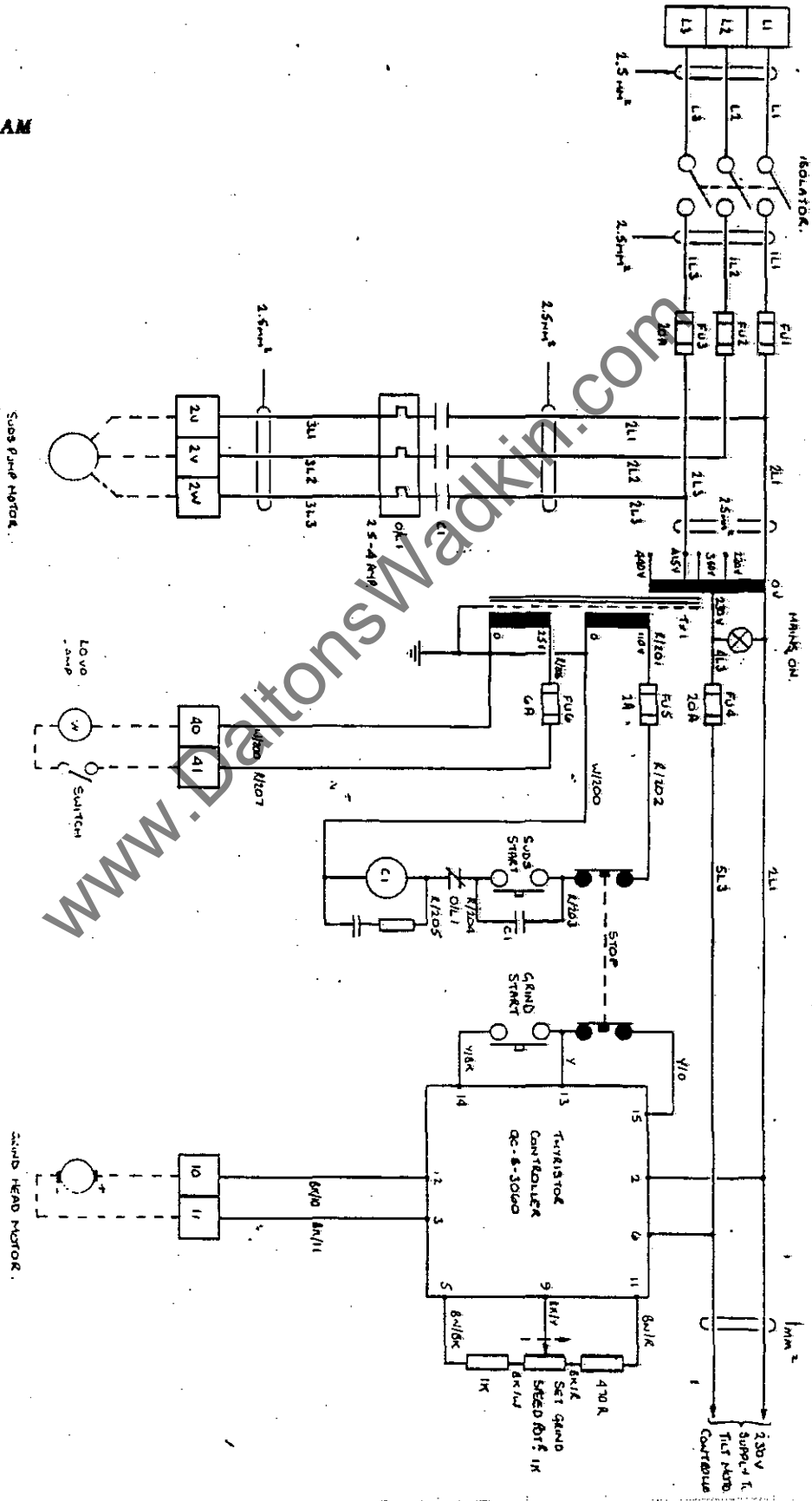
NC-A-2-2070

10.  
WIRING DIAGRAM



APP	2132	Nixu GRANDHUK MITC
COUNTER	OK 2336	A.C. CIRCUITS
DRAWN	TJR	07-A2-2070

10.  
WIRING DIAGRAM

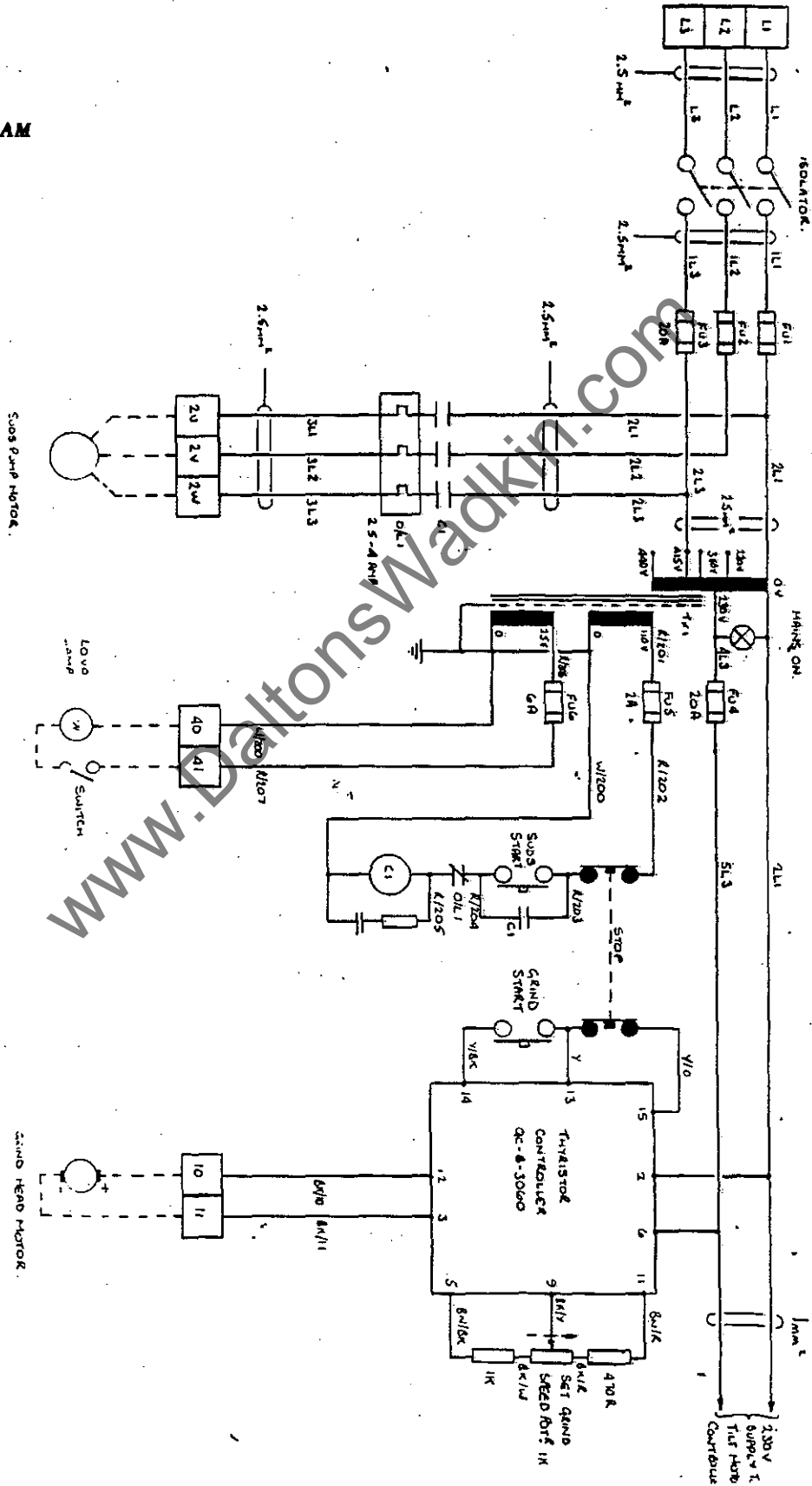


NO	2132	NXX GRINDING M/C A.C. CIRCUITS
CONTRACT	OK 1356	
DRAWN	TJR	

NF-A 2-2070

10.

WIRING DIAGRAM



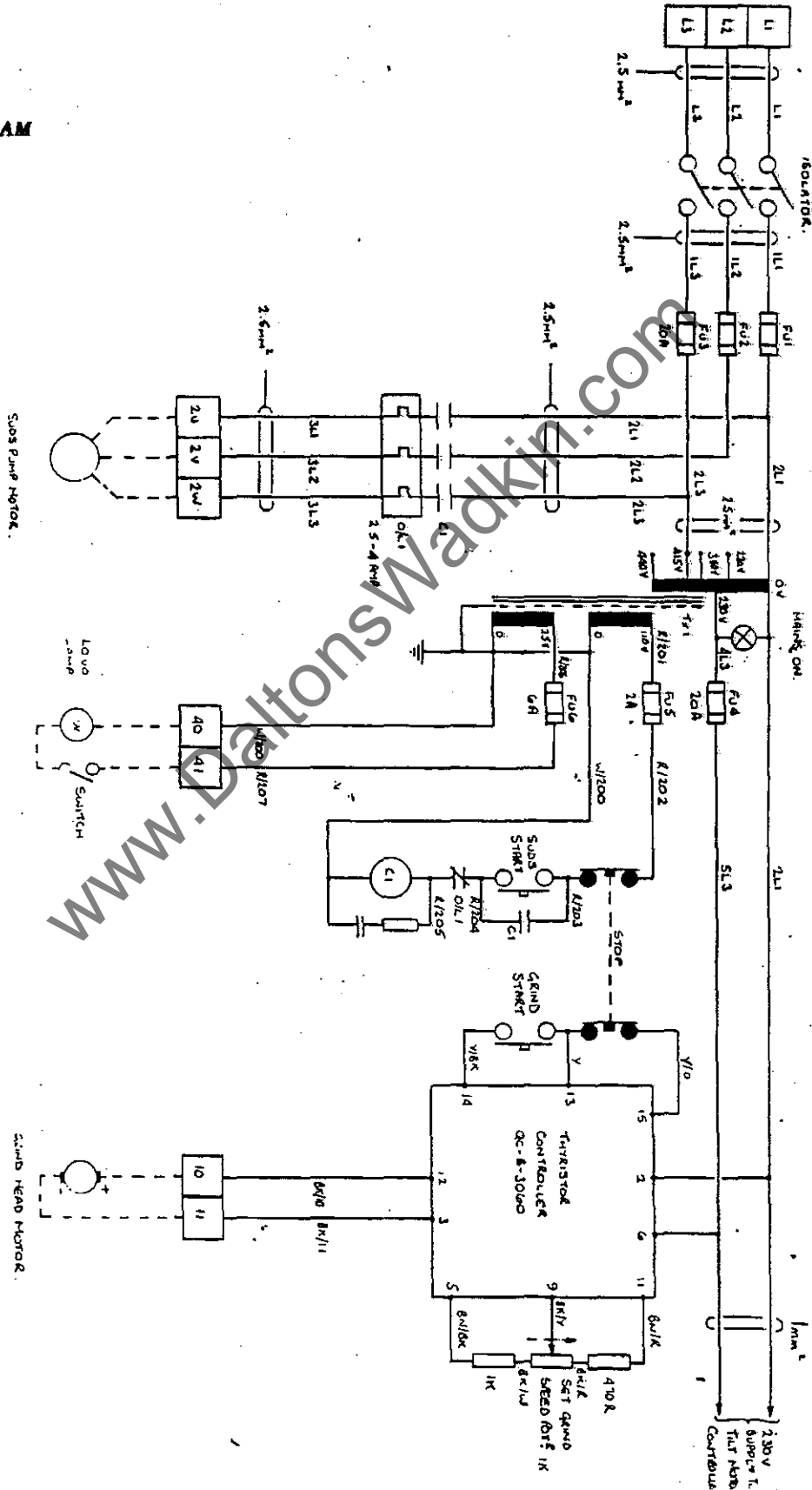
APP	2132	NFU GRINDING M/C
CONTRACT	OC 2356	AC CIRCUITS
DRAWN	TJR	

NF-A2-2070



10.

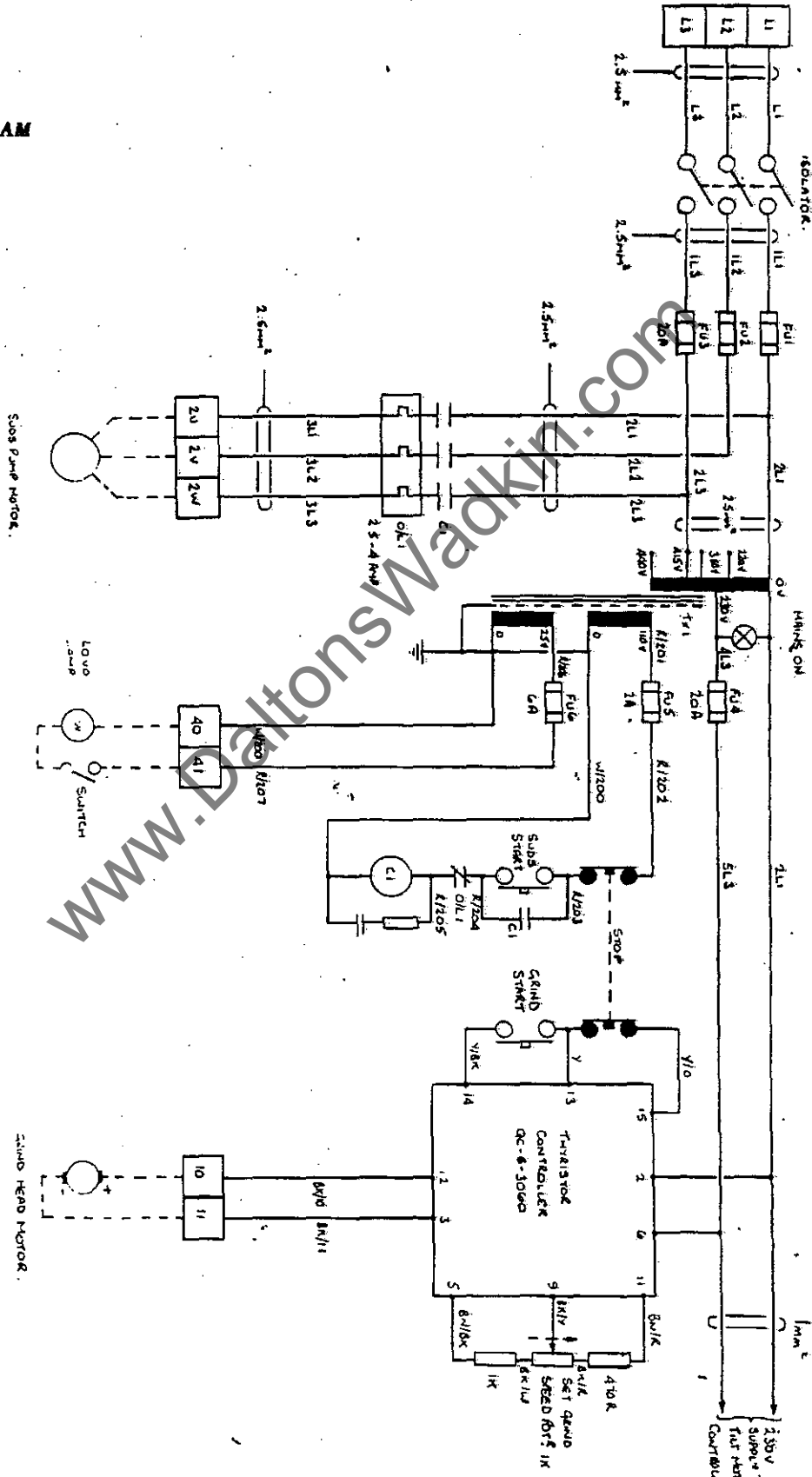
WIRING DIAGRAM



APP	2132	NEW GRINDING M/C
CONTRACT	OK 2336	A.C. CIRCUITS
DRAWN	TSR	

NG-A 2-2070

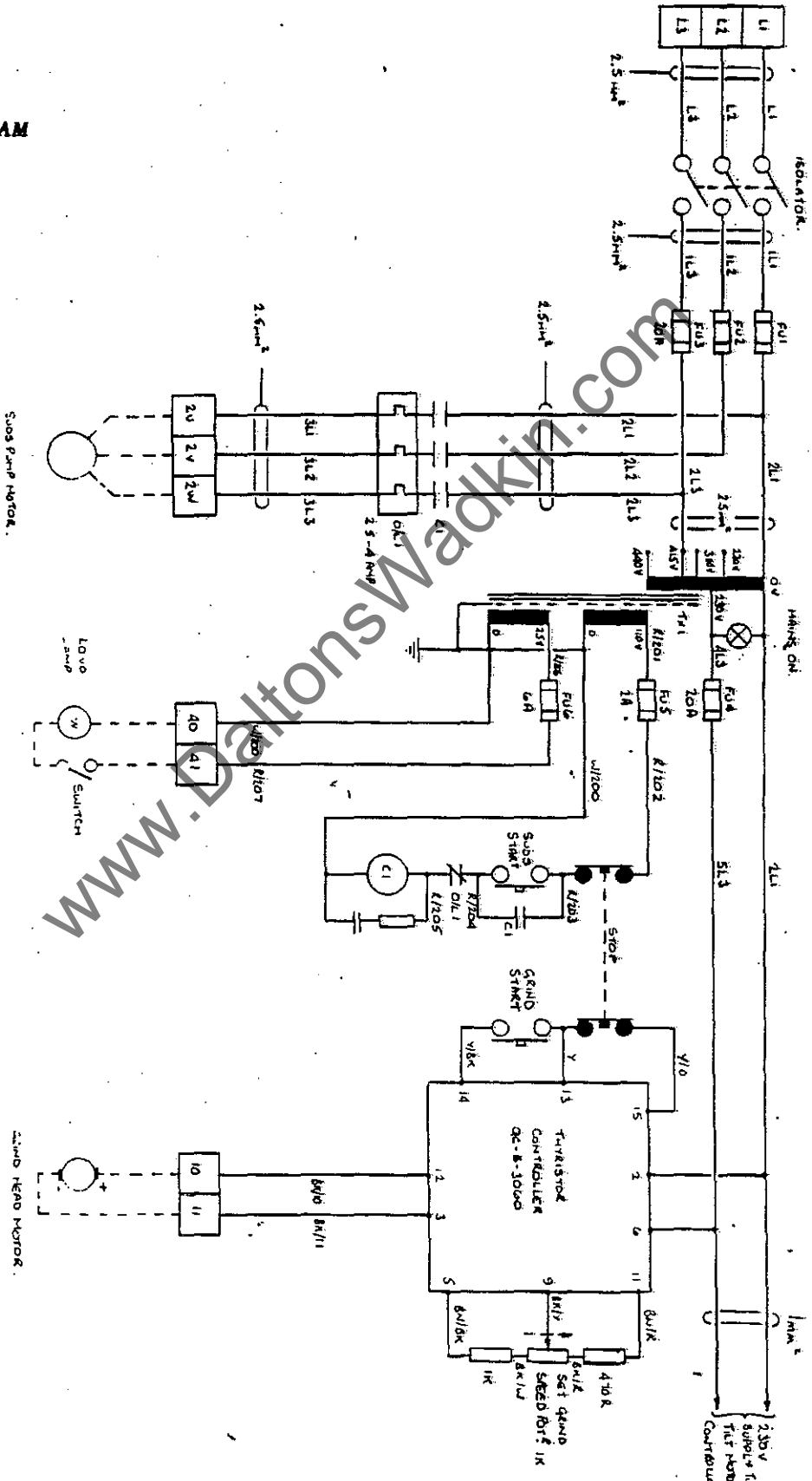
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WIRING DIAGRAM



LOP	2132	NEW GRINDING M/C
CONTRACT	061556	A.C. CIRCUITS
DRAWN	TJR	

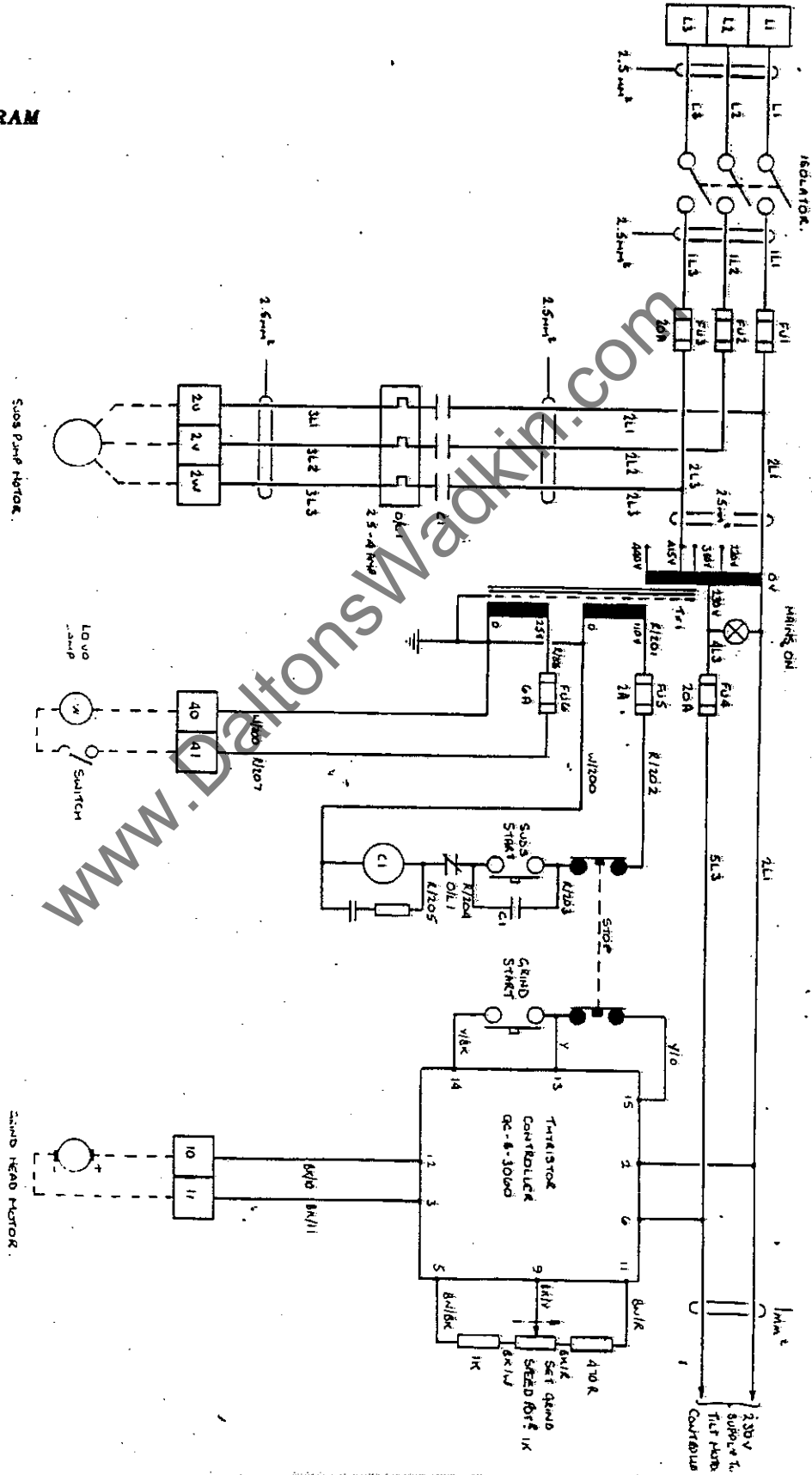
NC-A2-2070

10.  
WIRING DIAGRAM

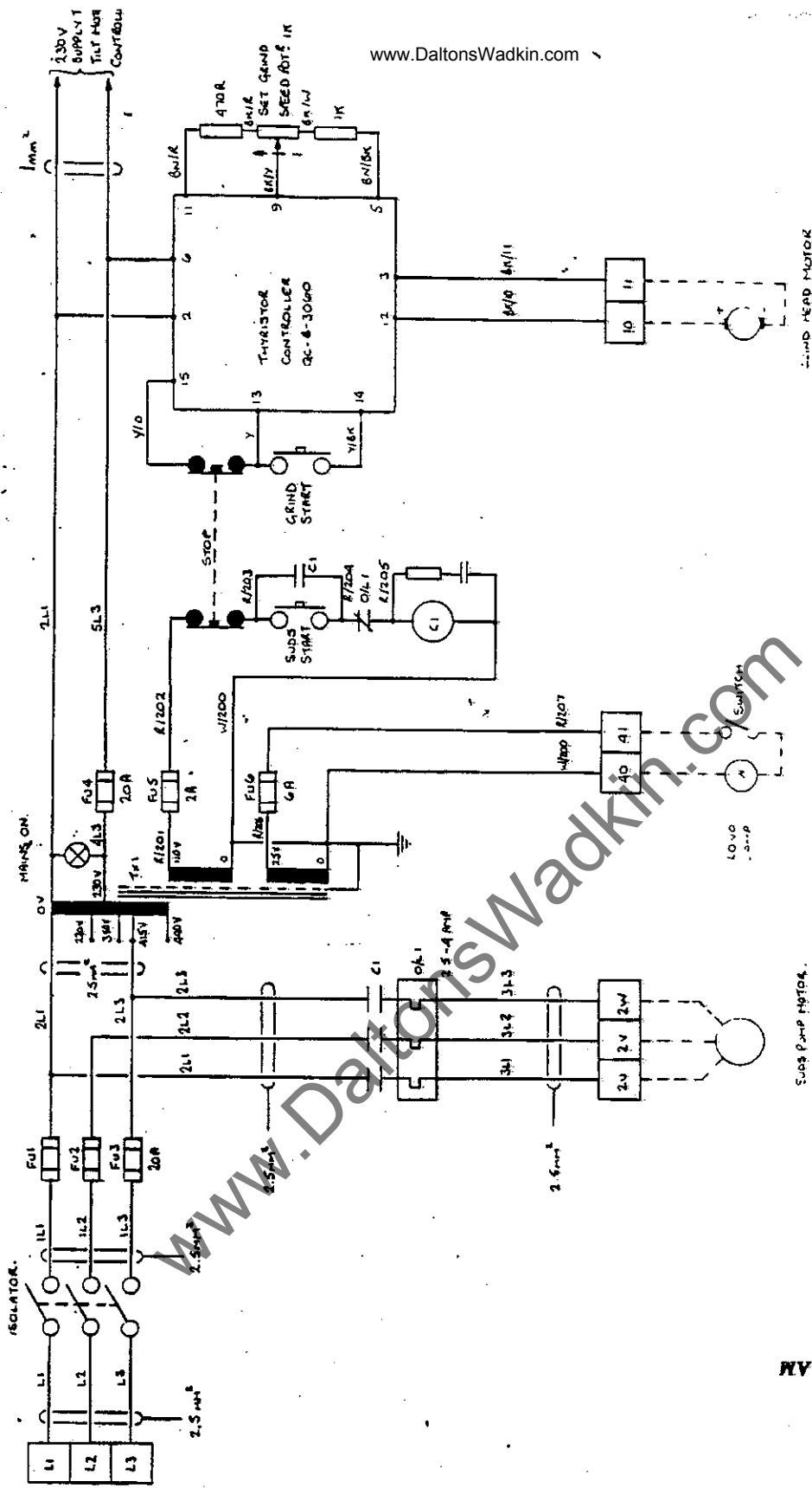


NO	2132	NKV GRINDING MIC
CONTRACT	081336	AC CIRCUITS
DRAWN	TJR	
		NF-A-2-2070

10.  
WIRING DIAGRAM



TOP	2132	NEW GRINDING M/C
CONTRACT	OK 2336	A.C. CIRCUITS
DRAWN	TJR	NY 2-2070



WIRING DIAGRAM

NO	2132	NEW GRINDING M/C
CONTRACT	DC 1336	AC 116115
DRAWN	TJR	

UC-A-2-2070