

DO  
1-4

- ①
- ②
- ③
- ④

In service  
 How defrost clock work on its own?  
 queen switch down  
 silver plates = warm when defrosting?  
 plug  
 airflow, traffic flow  
 manual defrost, Then determine # defrost cycles  
 one defrost cycle sometimes better

THEN  
DO  
THIS →

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ACCESSORIES AND LIST OF SPARES FOR MICROTOME AND CRYOSTAT	
BRIGHT 5030 MICROTOME INSTRUCTIONS (where applicable)	

CAB # OTF/AS/MR. 936501083  
 Unit # Hw. 42527481

Knife Sharpening

BRIGHT's provide a sharpening service for knives up to 300mm long.  
 Please state whether for wax or cryostat use when using this  
 service.

RECEIPT AND INSTALLATION OF CRYOSTAT

To prevent damage in transit all external controls and the microtome have been removed and packed in separate containers together with the accessories.

1 - UNPACKING

All packing must be carefully removed and parts checked against enclosed packing list. If any damage or discrepancy is noted, please inform us immediately.

2 - FITTING REMOTE CONTROLS AND MICROTOME

See pages : 2a, 2b (2c)

3 - POSITIONING

Care should be taken to ensure that the ventilators on the back and side of the Cryostat are not restricted. Free air flow is essential.

On Freestanding models adjustable feet are fitted to eliminate rocking on uneven floors.

4 - ELECTRICAL CONNECTION

The Mains lead of the Cryostat can be connected to any ordinary electrical outlet (minimum 13 amps), a 13 amp fuse should be incorporated in the line. Check the voltage stamped on the nameplate located on the back of the Cryostat with your supply.

The connections are:-

- Brown - Positive (Live)
- Blue - Negative (Neutral)
- Yellow/Green - Earth (Ground)

Instructions for Installing :

BRIGHT 5030 ROTARY RETRACTING MICROTOME AND REMOTE CONTROLS

listing part numbers in outside to inside sequence.

NB: When ordering it is most important to quote the REFERENCE NUMBER stamped on the Cryostat number plate.

1. ANTI-ROLL REMOTE CONTROL ASSEMBLY (not fitted on OT or OTE)

B56 - Star wheel	B59 - Flexible cable
B57 - Stainless steel spindle	B60 - Hexagon coupling
B58 - Collar	

Location: Left side of Cryostat, towards the front

Installation:

Loosen allen screw on B56; remove B56 from B57; insert into hole marked 1, from inside of chamber; replace B56; tighten allen screw.

2. THICKNESS SETTING REMOTE CONTROL (not fitted on OT or OTE)

B56 - Star wheel	B95 - Stainless steel shaft with quick release coupling and nylon disc.
------------------	---

Location: Lower left side of Cryostat.

Installation:

Insert B95 into the hole 2, from outside the Cryostat. To connect to the microtome, push male hexagon into female hexagon coupling.

3. FEED RESETTING & COARSE ADVANCE REMOTE CONTROL (not on OT or OTE)

a) FREESTANDING MODELS

B72 - Handwheel	BR4 - Felt washer
BR1 - Stainless washer	BR5 - Stainless steel shaft with spade
BR2 - Spring	
BR1 - Stainless washer	

Location: On top of the Cryostat

Installation:

Remove B72; insert BR5 into bearing from inside the microtome compartment. Assemble parts in this order: BR4; BR1; BR2; BR1; B72.

### 3. FEED RESETTING & COARSE ADVANCE REMOTE CONTROL (continued)

#### b) BENCH MODELS

B72 - Handwheel  
BR5B- Stainless steel shaft

B98 - Flexible cable  
B76 - Clutch

Location: Rear of the left side

#### Installation:

This control is shipped ready assembled except for B72. To fit B72 push it onto BR5B, first making sure that the allen screw is directly above the dimple on BR5B. Tighten allen screw. To connect B76 to the microtome, push on to the top of the lead screw observing first that the spring loaded pin in B76 is in line with the flat section of the feed screw.

NB: B76 is designed to prevent breakage of B98 if turning is continued when the trunnion nut on the lead screw has reached its extreme limit of travel. An adjusting screw is provided so that the tension on B76 can be varied.

### 4. CUTTING HANDWHEEL REMOTE CONTROL (not on OTE)

B5 - Cutting handwheel  
B101-Stainless steel shaft

B102- Flexible coupling

Location: Right side of Cryostat

#### Installation:

Remove B102, noting the position of the allen screw, enter B101 into the hole marked 4. Replace B102 making sure that the allen screw enters its dimple. To connect B101 to the microtome, push coupling on and tighten the other allen screw, after making sure it has entered its dimple. When correctly positioned, the handwheel grip should be uppermost and the microtome should be at the start of the cutting stroke. It is then necessary to tighten the external screw.

### 5. MICROTOME INSTALLATION

Place the microtome on pins on base of the microtome chamber, making sure that it is pushed down firmly and evenly. The remote anti-roll controls can now be connected to the Microtome as follows:

Push hexagon tube onto hexagon spindle on the left of the microtome anti-roll device.

NB: All remote control bearings are of the self-lubricating type, therefore, it is not necessary to oil any of the above remote controls.

## CONTROL PANEL

### Dual Function Digital Temperature Control (DTC)

#### Operating Instructions

- A) Actual chamber temperature is displayed at all times unless SP (Set Point) or QF (Quick Freezer) buttons are depressed.
- B) To set chamber temperature:  
Depress SP button and chamber Set Point will be displayed. To alter temperature keep SP button depressed and turn chamber knob until required temperature is displayed. Control is limited to temperature range specified ie.  $-30^{\circ}$ / $-40^{\circ}$ / $-45^{\circ}$ C. The compressor will stop when chamber temperature coincides with SP temperature. and restart  $3^{\circ}$ C higher. IE stop  $-23^{\circ}$ C, start  $-20^{\circ}$ C; assuming SP set to  $-23^{\circ}$ C.
- C) Quick Freezer temperature will be displayed when QF button is depressed.
- D) A 0.1 amp fuse situated on panel protects the circuits.

PLEASE NOTE: AS DELAY SWITCH HAS BEEN DISCONTINUED, PLEASE IGNORE REFERENCE TO THIS ON LATER PAGES.

#### AUTO. CONT. SWITCH

The auto-continuous switch is fitted to all Cryostats. This switch can be used in conjunction with the delay switch. It can also be used for reducing the temperature of the microtome compartment without adjusting the range of the thermostat. In the case of thermostat failure (open circuit), this switch can be used for hand control until the faulty thermostat is replaced.

#### DEMISTER SWITCH

The demister switch operates the heated microtome compartment window and should be switched off when the night plug is in position. (not fitted to OT models).

#### LIGHT SWITCH

The light switch operates the fluorescent light, which should be switched off when the night plug is in position. OT Cryostats have automatic switching.

## MOTOR DRIVE (if fitted)

After the flexible coupling has been positioned and the allen screws tightened over dimples, to operate the Cryostat on motor drive, it is first necessary to check that the drive pin on the cutting handwheel is engaged.

To disengage for hand operation of the microtome, pull out drive pin.

Switch top switch to "ON".

For single cycle operation, select "SINGLE" and press "START" button. The microtome will operate one cycle and then stop.

For continuous operation, select "CONT" and press "START" button.

On some models a three position switch is fitted, ie SINGLE/OFF/CONT.

To stop press "STOP" button.

The microtome stroke speed can be adjusted by the "SPEED" control, by rotating the knob to the left the speed will be reduced.

## MAINTENANCE

No maintenance is required as all bearings are lubricated for life.

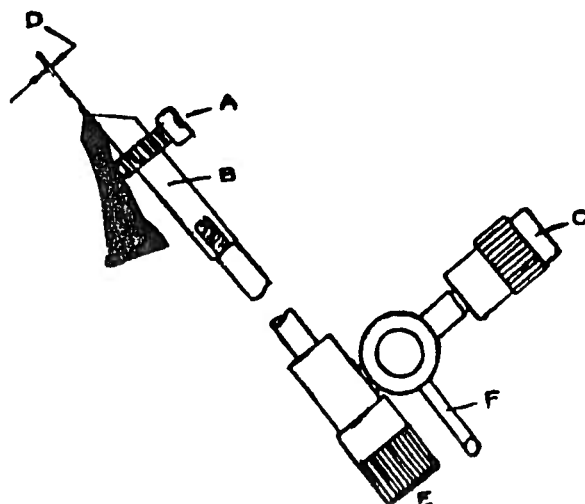
A 2 amp fuse protecting motor is situated on the motor control panel.

## NB: IMPORTANT

NEVER OPEN THE MOTOR DRIVE DOOR WITHOUT FIRST MAKING SURE THE CRYOSTAT IS DISCONNECTED FROM THE MAINS.

## ANTI-ROLL GUIDE PLATE

Fig 1.



- A Nylon spacer screw
- B Anti-roll guide plate
- C Horizontal locking screw
- D 40/50 micron gap
- E Micro-adjusting screw
- F Stop pin

### ANTI-ROLL GUIDE PLATE (see Fig 1)

For all models the glass anti-roll guide plates have now been replaced by a Perspex (Lucite) plate. This plate is fitted with two nylon spacer screws which dispense with the need for sellotape (Scotch tape) spacers. To set the space between the plate and the knife edge, it is only necessary to adjust the two nylon spacer screws. It will be found beneficial to use a piece of airmail paper (usually about 50 microns thick) as a feeler gauge.

Vertical adjustment of the plate may alter the space, therefore, it is advisable to position the plate at the correct height before adjusting the spacer screws.

Too much space between the plate and the knife could cause the sections to curl at the bottom.

After considerable use the leading edge of the guide plate may become worn. This edge can be renewed by lapping the top of the plate on a sheet of fine wet and dry emery paper, using water as a lubricant. The emery paper must rest on a flat surface (plate glass). The guide plate must be held at 90° when lapping.

In setting up the anti-roll guide plate, it will be found helpful to place a small hand mirror behind the knife. The angle which the guide plate makes with the cutting bevel of the knife should be as small as possible, ie the cutting bevel and the anti-roll guide plate should be parallel to each other and the top surface of the guide plate should be just above the knife edge. If it is carried too far above the edge, interference with the section will occur; if it is set too low, the section will begin to roll and will fail to pass between the knife edge and the anti-roll guide plate. Both the surface of the guide plate and the surface of the knife must be clean and free from grease before cutting is attempted.

To adjust the height of the anti-roll guide plate, it is necessary to loosen the horizontal locking screw and adjust the micro-adjusting screw below the anti-roll guide plate holder. When the correct height has been achieved the anti-roll guide plate should be parallel to the knife edge and the face of the knife. The angle at which the anti-roll guide plate lays on the knife bevel is adjustable by loosening the knurled black screw to the right of the assembly and altering the position of the anti-roll guide plate tee.

#### For the production of good sections, the following points should be observed

1. Anti-roll guide plate cooled to cabinet temperature.
2. Top edge of anti-roll guide plate free from damage.
3. Nylon spacer screws correctly adjusted.
4. The face of the anti-roll guide plate must be parallel with the cutting bevel of the knife, not with the knife blade.

## PREPARATION OF TISSUE BLOCKS

Select portions of tissue 3-5mm thick, not larger than the platform of the object holder. Cut a flat surface for mounting onto the latter. Small pieces of tissue (curetings or needle biopsies) are best embedded in a supporting material, for this purpose a piece of rat liver (or other firm tissue) is useful. Sometimes a bed of water soaked filter paper is satisfactory.

It is now necessary to rapidly freeze the tissue by one of the following techniques:

### 1 - QUICK FREEZER DELAY SWITCH

When the cryostat is fitted with a Quick Freezer, the following procedure is carried out:

Place the object holders in the vertical pockets and immediately switch on to "CONT" indicated on the electrical control panel. After approximately 1 hour, or when the temperature of the freezer reaches  $-35^{\circ}/-40^{\circ}\text{C}$ , apply a few drops of water to the object holder required and follow instantly by placing tissue block onto this. The tissue block will adhere almost instantaneously. The object holder is then reversed in the pocket and removed when complete freezing has been obtained, ie 10-60 seconds (depending on the size of the tissue block). A delay switch is fitted so that the continuous operation of the unit can be delayed by up to 27 hours. To operate this switch set the delay hours required and switch to "CONT", the refrigeration unit will then operate automatically until the delay time expires, then it will operate continuously reducing the temperature in the Quick Freezer.

For example: Present time 5.00 pm. Quick Freezer required at  $-35^{\circ}/-40^{\circ}\text{C}$  9.00 am next day. Set the delay switch for 15 hours delay and switch to "CONT", the refrigeration unit will then run thermostatically until 8.00 am and then continuously for the last hour so that the Quick Freezer will be at the required temperature at 9.00 am.

For extra quick pull down of the temperature, it is advisable to position the insulated night plug beneath the window and switch off the demister and light.

It is important to switch back to "AUTO" when the Quick Freezer is no longer required.

### 2 - CRYOSPRAY TECHNIQUES (AEROSOL)

The object holder should be kept inside the cryostat and should be at the temperature of the cryostat when required. A few drops of water should then be placed on the platform of the object holder and the tissue placed in position. CRYOSPRAY can then be sprayed over the top of the object holder platform and tissue. The freezing of the tissue, according to size, can usually be accomplished in 4-5 seconds. CRYOSPRAY is also very useful in quickly reducing the temperature of tissue, knife or anti-roll guide plate when fatty tissues require sectioning and the cryostat is not cold enough.



### 3 - SOLID CO<sub>2</sub> (CARBIDE)

Two pieces of solid CO<sub>2</sub> can be held by the gloved hand against the object holder, the tissue and drops of water having been previously positioned.

### 4 - CRYO-M-BED

CRYO-M-BED can be used instead of water in the previously described techniques. CRYO-M-BED instructions are as follows:

A) Squeeze 10-15 drops CRYO-M-BED on object holder. The object holder must be at ambient temperature. Freeze with polar spray or alternative method. When nearly frozen insert the tissue specimen, then freeze to required temperature.

B) Form puddle of CRYO-M-BED on object holder. Place tissue in puddle at correct orientation. Freeze to optimal cutting temperature.

C) Squeeze 5-10 drops of CRYO-M-BED on puddle to give a convex shape, position tissue and freeze to cutting temperature.

One of the most important stages during the preparation of Cryostat sections is the mounting of the frozen tissue block to the metal chuck. The final quality of the sections depends very much on how this procedure is carried out. Potential hazards include incorrect orientation of the block, thawing-out, and poor adhesion of the tissue to the mounting medium, and of the mounting medium to the chuck. The last two factors are the most likely causes of thick and thin sections.

CRYO-M-BED is a new mounting medium which has been designed to overcome the above problems as far as possible. It has excellent adhesion to both tissues and chucks, and when frozen is virtually impossible to remove except by first thawing out. It is sufficiently viscous to prevent capillary action from making it creep up the sides of the block, a common cause of thawing out, especially with very small blocks. A novel feature is the special indicator, - in the liquid state the material is blue, but it becomes opaque upon freezing. This means that the pool of liquid medium is always clearly visible, so that the tissue block can be inserted at the correct moment. Normally, if the block is inserted too early, there is more chance of it thawing out, and if it is inserted too late, there is insufficient liquid left to hold it securely.

### 5 - OTHER METHODS

For other methods utilising liquified gases, Cardice/alcohol/hexane mixture, Cardice/acetone, the reader is referred to :

'Practical Histo Chemistry' (Chayen, Bitensky, Butcher; published by John Wiley & Sons, London - New York, 1973)

'Histological Laboratory Methods' (Brenda D Disbrey, J.H.Rack; published by E Livingstone, 1970)

'Frozen section in Surgical Diagnosis' (Andrew A Shivas, Suzanne G Fraser; published by Churchill Livingstone, 1971).

## PREPARATION OF MICROTOME FOR SECTIONING

The angle of the knife is critical. For the knife positioning and the angle adjustments see Microtome Manufacturers Instruction Book.

If the Cryostat is fitted with Quick Freezer, the knife handle\* will lay below the Quick freezer and will automatically cool the knife to a lower temperature than the microtome compartment. If, however, the temperature of the knife is required at a still lower temperature, the knife handle can be placed in the CO<sub>2</sub> trough to the right of the microtome, and solid CO<sub>2</sub> or Cardice chips can be placed around the knife handle\*. We suggest that the knife be left, packed around with the Cardice chips for at least one hour before it is used.

\* If the knife has no integral handle a screw-in knife conductor is supplied.

## SECTION CUTTING

- A - For ROTARY MICROTOMES see Manufacturers Instruction Book.
- For CAMBRIDGE ROCKING MICROTOME open the microtome compartment window. Depress the top microtome arm to lift the end nearest to the operator. Slide the object holder onto the raised end of the object holder and rotate the specimen until the long axis (if any) is at right angles to the knife edge. It is important to check that the nylon cord attached to the top arm of the microtome remains in its pulley wheel. If the nylon cord is allowed to position itself in front of, or behind, the pulley, the microtome will be jammed and if forced the nylon cord could break. Bring the object holder forward until the specimen just touches the back of the knife. Turn screw on the microtome arm clockwise to lock the specimen in place. Close microtome compartment window.
- B - Operate the cutting handwheel until the specimen clears the knife edge. Advance specimen by turning the resetting and trimming control  $\frac{1}{4}$  to  $\frac{1}{2}$  revolution in a clockwise direction (anti-clockwise for 'Bright' 5030 rotary retracting microtome). Complete the cutting stroke. Repeat this sequence until the trimming of the specimen appears satisfactory.
- C - With the anti-roll plate clear of the knife, cut several sections at the desired thickness, observing their quality and uniformity. When satisfactory sections have been cut, clean the knife surface with the bristle brush provided, or with a soft rag or tissue, through the open port in the front window.
- D - Operate the external control to allow the anti-roll guide plate to rest on the knife surface. (see Fig 1.)
- E - Operate the cutting handwheel. The tissue section should pass smoothly between the knife and the anti-roll guide plate, generally a slow operating stroke gives best results.

### SECTION CUTTING (continued)

- F - Swing the anti-roll guide plate clear of the knife without undue haste, this minimises disturbance to the flattened section.
- G - Take a glass slide from the ambient temperature of the laboratory and bring it up to and parallel to the section on the knife. There should be no need to press the slide onto the section; it should move onto the slide. If coverslips are used instead of slides, it will be advantageous to use the coverslip vacuum pick-up tool supplied.

#### Note:

1. Fragments of previous sections, ie ice or a film of grease on the knife or anti-roll guide plate, will cause sufficient friction to prevent the section slipping freely down the knife surface. The bristle brush should frequently be cleaned in acetone or chloroform and occasionally well washed in detergent.
2. A coating of ice on the back of the knife will damage the exposed surface of the tissue block. The back of the knife should be wiped clean at frequent intervals.
3. For Cryostats fitted with rotary microtomes, see manufacturers instruction book.

### STAINING

For a detailed description of histochemical techniques and a selection of histological techniques, the reader is referred to 'Practical Histo Chemistry' (Chayen, Bitensky & Butcher; published by John Wiley & Sons, London - New York, 1973). All the reactions described in this book were tested using sections from a 'Bright' FS/CS model.

For general histological staining, the following haematoxylin and eosin technique is recommended:

#### H & E (Roberts 1966)

1. Fix for 3 minutes in picro acetic fixative
2. Rinse in 70% alcohol
3. Place in celestine blue solution, 3 minutes
4. Rinse in tap water
5. Place in Mayers haemalum, 3 minutes
6. Rinse in tap water
7. Differentiate in 1% acid alcohol
8. 'Blue' in tap water containing a few drops of lithium carbonate
9. Counter stain with 0.5% aqueous eosin, 10 seconds
10. Rinse in tap water
11. Dehydrate and mount.

## STAINING (continued)

### Solution Required (H & E Roberts 1966)

<u>Celestine Blue</u>	2.5 gm	Iron Alum
	0.25 gm	Celestine Blue
	50 ml	Distilled H <sub>2</sub> O
	Boil 3 minutes, filter and cool	
<u>Myers Haemalum</u>	1 gm	Haematoxylin (B.D.H.)
	1000 ml	Distilled H <sub>2</sub> O
	50 gm	Ammonium alum
	0.2 gm	Sodium iodate
	1 gm	Citric acid
	50 gm	Chloral hydrate
<u>Picro Acetic Fixative</u>	10 ml	Formaldehyde
	0.18 gm	Sodium Chloride
	0.15 gm	Picric Acid
	56 ml	Absolute Alcohol
	5 ml	Glacial acetic acid
	Make up to 100 ml with distilled water.	

An even quicker H & E can be obtained by :

1. Rinsing in 70% alcohol
2. Dipping in alcoholic erhlichs haematoxylin
3. Igniting this solution on the section and allowing it to burn for 10 seconds
4. Extinguish flame and dip in 70% alcohol
5. Immerse in alcoholic eosin for 10 seconds
6. Rinse in absolute alcohol and mount in Euparal.

This stain takes about 30 seconds and therefore definition is very poor and although this gives a very speedy result it should not be used for permanent preparations.

Dipping for a few seconds, in 1% methyl violet (aqueous) or 0.1% toluidine blue (in 0.1 M acetate buffer pH 6.5) is a convenient way of staining sections to see whether they are flat and unscored.

### Reference

ROBERT D.R. 1966

A rapid staining method - giving sharp nuclear definition in frozen sections.  
J. Med. Lab Tech. 23. 119 to 120

## GENERAL MAINTENANCE

### DAILY MAINTENANCE

The insulated night plug needs to be in position only when the Cryostat is out of use for a long period, as for instance, during the night. If ice forms round the seating of the Perspex (Lucite) window, it should be removed and the surface wiped with a cloth soaked in alcohol. Excessive icing of the freezing chamber will only occur if the Perspex (Lucite) window is kept in a raised position for a long period. It is suggested that a brief daily attention to the microtome will prolong the intervals between defrosting.

\* BUT FIRST - REMOVE KNIFE!

- ② LOOK FOR 2 ALAN SET SCREWS ON SHAFT BETWEEN M/TOME HANDLE & M/TOME
- ③ REMOVE SET SCREWS VERY CAREFULLY, THEY ARE SHORT.
- ④ MOVE CONNECTOR SECTION TO RIGHT (AWAY FROM M/TOME).
- ⑤ LIFT GREY HANDLE ON THREADED SHAFT OFF OF SHAFT THROUGH CUT OUT ON TOP OF M/TOME.
- ⑥ LOCK SILVER KNIFE-HOLDER LEVER AT RIGHT FRONT
- ⑦ JOG M/TOME RT & LFT TO LIFT IT OFF OF 4 STATIONARY RAISED PINS. (ONE HAND UNDER FRONT, OTHER AT BACK OF M/TOME)

GENERAL MAINTENANCE (continued)

DAILY MAINTENANCE (continued)

The following should receive attention:

- A - Remove ice from window seating
- B - Brush tissue debris from section chute or in area below knife.
- C - Wipe over the microtome with a cloth moistened with alcohol. Operate feed mechanism to its full extent to dislodge any ice which may have formed in the screw threads. It is important that all traces of alcohol are removed.
- D - Clean the base of the microtome compartment.
- E - Examine the knife and move to a new cutting position if necessary.

- ⑧ SET M/TOME DOWN IN CRYOSTAT & PULL FORWARD BY HOLDING ON TO BOTTOM OF FRONT OF M/TOME.
- ⑨ PUT OTHER HAND AT BACK & LIFT M/TOME OUT OF CRYOSTAT. PART
- ⑩ QUESTIONS? HEAVIEST, PHONE JOE AT HACKER SERVICE DEPT. (201) 226-5450

DE-FROSTING (MANUAL)

It is impossible to state the exact interval at which this process is required, since it depends on the average humidity of the air; on the amount of use of the instrument and particularly, on the regularity with which daily maintenance is carried out. An average period between defrosting might be 6/8 weeks.

The following procedure should be carried out as part of the defrosting process.

- 1 - Switch off mains/isolator switch on control panel
- 2 - Place a suitable container under the drain outlet on low right side of Cryostat
- 3 - Raise the microtome compartment window and leave open - REMOVE KNIFE
- 4 - Remove microtome \*
- 5 - When all water has drained from the microtome compartment, dry the interior thoroughly with a cloth or by means of hot air from a hair dryer
- 6 - Clean, dry and oil the microtome. The Bright 5030 microtome is self-lubricating.
- 7 - Replace microtome, attach controls, switch on mains/isolator switch.

Note: Allow microtome to thaw at room temperature. On no account use any form of heat on microtome. On models fitted with a fin coil on the roof of the microtome compartment, defrosting can be quickly carried out by brushing fins front to back or vice versa with a soft brush, never brush across fins.

DE-FROSTING (AUTOMATIC) on OT and some special models

While the working area of the microtome compartment remains frost-free the fin type cooling coil above or behind the microtome collects some frost during the normal use of the Cryostat. To automatically defrost the coil every 24 hours the following procedure must be carried out :

- 1 - Switch on DEFROST switch
- 2 - Set defrost clock to time of day or night - see enclosed clock manufacturers Setting-Up Instructions. The defrosting/switching cycles has been factory set to 15/20 minutes and requires no further adjustment. It is advantageous that defrosting takes place when the Cryostat is normally not in use, ie. between 1.00 and 2.00 hrs.

## GENERAL MAINTENANCE (continued)

### DE-FROSTING (AUTOMATIC) (continued)

- 3 - In the event of a power failure, or if the Cryostat has been disconnected from the main electricity supply, be sure to repeat (2)
- 4 - Should Automatic Defrosting not be required switch off DEFROST switch. This will not stop the clock.
- 5 - Moisture formed by defrosting will drain into a trough in the compressor compartment and will evaporate by the warmth of the motor and the ventilating action of the condenser cooling fan.

### LUBRICATION

Shell Clavus 17 oil should always be used to lubricate the working parts of the microtome. ~~The Bright 5000 microtome is self-lubricating for life.~~

### NIGHT PLUG PRECAUTION

Care must be taken to keep the night plug in the compartment provided when not in use and not to place the plug near any source of heat.

### FLUORESCENT LIGHT

To remove lamp, lever the left hand side of the lamp carefully, then withdraw lamp from Perspex (Lucite) casing. Care must be taken when replacing, that the cable is not pinched or caught in any way. The starter is situated behind the control panel along with the ballast in Freestanding models. In Bench models they are situated in the unit compartment. In Open-Top models it is necessary to remove the control panel facia to gain access to the lamp and starter.

### REFRIGERATION MAINTENANCE

The sealed condensing unit requires very little attention, except to the condenser. The condenser should be freed from dust about every 6 months. It is advisable to have this done by a refrigeration service engineer.

### HEATED WINDOW

No maintenance required.

### MAINTENANCE TO MICROTOME KNIVES

Because the anti-roll guide plate has to be adjusted against the knife edge, difficulties may arise in sharpening the knife correctly. If the knife is frequently honed by hand, the facet may become broad and irregular, it will then be impossible to adjust the anti-roll guide plate correctly. The use of a knife back, or automatic knife sharpener, will delay this condition. It is, therefore, recommended that the knives be reground. We provide a regrinding and sharpening service, and a similar service is available in most countries.

## BRIGHT – OTF SERIES

### Microtome Cryostat and Ambient Humidity

Temperature control for cryostats operating above  $-45^{\circ}\text{C}$  is straightforward and the operator can rely on the functions provided. Or, if not, then a service condition exists and appropriate adjustments and/or replacements must be made.

Control of ice or excessive frost build-up is not, however, entirely within the province of the cryostat manufacturer. Two extraneous factors are apparent, viz: environment and work techniques.

Cryostats are usually installed in air conditioned laboratories and operate year-round under more-or-less standardized ambience. Under these conditions the auto-defrost provision will be entirely adequate provided simple rules are followed, viz:

1. Your Bright cryostat may be rated for  $-30^{\circ}$ ,  $-40^{\circ}$  or  $-45^{\circ}\text{C}$  operation. However, most routine sectioning is carried out at  $-20^{\circ}\text{C}$  and there is no need to use the lowest temperatures continuously. Frosting is slower at the higher temperature.
2. Keep the sliding door closed whenever possible. The full aperture is required only for access and sectioning can be carried out with the door half-way open.
3. "Auto-defrost" is provided to remove frost and ice from the cooling coil within the cabinet. Use minimum defrost time. Until operating experience is gained, use short defrost periods, i.e., set the red and green timer pins as close as possible. Chamber temperature should not exceed  $-5^{\circ}\text{C}$  during defrost unless breakdown for general cleaning is contemplated.
4. "Auto-defrost" does not remove directly accumulations of frost from microtome and quick freezer; but under normal conditions, once the coils are free of ice and refrigeration recommences, there is migration of moisture to the coils. Thus, moisture is eventually cycled out of the chamber. If the quick-freezer is used continuously or for long periods at lowest temperatures, a frost coating may be more-or-less permanent. This is normal.
5. Do not position the cryostat so ventilation or any other draft blows on or close to the chamber door.
6. Generally, leave the demister switched on and thereby avoid moisture concentration on the window.

#### Operation under extreme conditions

A clinical laboratory is expected to function even under extremely difficult conditions. Absence of air conditioning in a hot climate with low humidity is not especially deleterious; but if relative humidity is high then auto-defrost settings must be made with care.

In extreme conditions, 24 hour use of a single cryostat is not feasible and two cryostats should be alternated. If a "working day" is established for cryotomy, say 6 a.m. – 4 p.m., a suitable auto-defrost program could be set as follows:

4 p.m.	(1600 hrs.)
8 p.m.	(1200 hrs.)
12 midnight	(2400 hrs.)
4 a.m.	(0400 hrs.)

Use the red and green pins adjacent to each other for shortest possible defrost time (30 minutes approx.). The green pin must lead in direction of rotation. Moisture accumulated during the working day will cycle towards the cooling coil during successive defrost periods and be eliminated via the water collection apparatus below the coils.

It will also be helpful to set the quick-freezer delay device to switch on about 1 hour before work commences. This will help collect free moisture and provide quick freeze facility.

There is no objection to using four short defrost periods even when ambient conditions are favorable.

GENERAL MAINTENANCE (continued)MAINTENANCE TO MICROTOME KNIVES (continued)

Unless very thin sections are required, it is not advisable to treat the knife in any way after regrinding. Stropping is not recommended as the very fine edge produced is soon removed by sectioning hard frozen specimens.

CRYOTOMY - FAULT DIAGNOSIS1 - TISSUE BLOCK BECOMES DETACHED FROM OBJECT HOLDER

- A - Tissue not frozen enough when mounted
- B - Not enough water used for mounting
- C - Object holder used with dirt or grease on platform
- D - Bottom surface of tissue not flat enough
- E - Trimming too thick slices
- F - Tissue below knife when advancing feed
- G - Knife clearance angle insufficient.

2 - THICKNESS OF SUCCESSIVE SECTIONS VARIABLE - INTERMITTENT FAILURE TO CUT

- A - Irregular advance of microtome feed due to ice on feed screw or ratchet wheel
- B - Microtome actuating arm not coming to stop post (Cambridge Rocker)
- C - Object holder or knife not clamped securely
- D - Excessive icing of microtome rocker knife edges
- E - Clearance angle of knife insufficient, tissue block fouling shoulder of cutting bevel
- F - Tissue being compressed due to tilt angle of knife being too great
- G - Blunt knife edge
- H - Tissue expands due to warming up of block
- I - Block being sectioned when it is colder than the microtome chamber, by cutting immediately after freezing
- J - Microtome compartment colder than tissue
- K - Too long interval between section cutting, allowing small temperature change to reduce dimensions of block
- L - Tissue insecurely attached to object holder

3 - SECTIONS CRUMBLE OR DO NOT FORM

- A - Blunt knife
- B - Clearance angle of knife not sufficient
- C - Angle of knife tilt too great
- D - Tissue, knife chamber or anti-roll plate too warm
- E - Tissue dehydrated

4 - SECTIONS COMPRESS

- A - Guide plate nylon spacer screws require adjusting
- B - Guide plate covered with ice or frozen pieces of tissue
- C - Insufficient angle of guide plate to knife



CRYOTOMY - FAULT DIAGNOSIS (continued)

4 - SECTIONS COMPRESS (continued)

- D - Angle of knife to tilt too great
- E - Blunt knife
- F - Knife covered with ice or frozen pieces of tissue

5 - HORIZONTAL CRACKS IN SECTION

- A - Tissue block too cold
- B - Tissue block frozen too slowly

6 - VERTICAL SCORES OR LINES IN SECTIONS

- A - Ice or frozen tissue on edge or face of guide plate
- B - Top edge of guide plate damaged
- C - Nicks or damage on knife edge
- D - Knife edge or face covered with pieces of ice or frozen tissue

7 - LINES OF VARYING THICKNESS IN SECTIONS

- A - Knife too blunt to cut tough structure in object
- B - Knife edge too thin, causing vibration
- C - Knife or object holder not firmly clamped
- D - Jerky rotation of remote control cutting wheel
- E - Tissue not properly attached to object holder

8 - SECTIONS CURL UP ABOVE GUIDE PLATE

- A - Top of guide plate too low

9 - TISSUE BLOCK FOULS GUIDE PLATE

- A - Top of guide plate too high

10 - TISSUE SHATTERS

- A - Tissue block too cold
- B - Tissue block dehydrated

11 - SECTION STICKS TO GUIDE PLATE

- A - Guide plate not cold enough
- B - Guide plate dirty or greasy
- C - Incorrect guide plate angle to knife

12 - FLATTENED SECTION CURLS UP UPON REMOVAL OF GUIDE PLATE

- A - Angle of guide plate to knife too great
- B - Guide plate removal from knife too rapid causing air current to disturb section

13 - SECTIONS NOT FLATTENING, REMAINING COMPRESSED ON TOP OF KNIFE EDGE

- A - Guide plate not cold enough
- B - Guide plate dirty
- C - Guide plate not positioned correctly
- D - Guide plate alignment to knife incorrect
- E - Knife too warm

CRYOTOMY - FAULT DIAGNOSIS (continued)14 OBJECT NOT ADVANCING TO KNIFE

- A - Remote thickness control set to zero
- B - Microtome ratchet pawl iced up
- C - Microtome feed screw trunnion nut at end of travel, or iced up.

15 - TIGHTNESS IN FEED RESETTING CONTROL

- A - Microtome feed screw iced up
- B - Microtome feed screw trunnion nut jammed at top or bottom of travel
- C - Remote control spindle iced up in bush

16 - TIGHTNESS IN ANTI-ROLL GUIDE PLATE CONTROL

- A - Bottom of guide plate holder touching shute
- B - Remote control spindle is iced up in bush

17 - TIGHTNESS IN TURNING REMOTE CUTTING WHEEL AND MICROTOME ARM CANNOT BE RAISED OR LOWERED

- A - Nylon cord on microtome jammed outside its pulley groove (Cambridge rocker)
- B - Remote control spindle is iced up to bush
- C - Drive link requires adjusting - see page
- D - On rotary models the microtome slides and actuating mechanism iced up.

CRYOSTAT ZONE/MOTOR CONTROL (MR)

(Located on right side of Cryostat)

PURPOSE: To control the speed of the specimen in its path through the knife (zone) and then to accelerate automatically to maximum speed for the remainder of the microtome operating cycle.

SETTING:

1. Switch to ON
2. Set Upper Limit above knife slider (U/L) to top
3. Set Lower Limit below knife slider (L/L) to bottom (BTM)
4. Switch to TRIM Mode for continuous operation
5. Select cutting stroke speed required by slider on speed control
6. The zone is now set at maximum. To reduce zone to correspond with specimen size adjust appropriate sliders. (see 2 and 3)

1

ACCESSORIES AND LIST OF SPARES FOR MICROTOME AND CRYOSTAT

A - denotes Bright 5030 Rotary Retracting Microtome  
S - " Cambridge Small Rocking Microtome  
R - " Cambridge Rotary Rocking Microtome  
J - " Jung 1130/CR Microtome  
M - " International Minot Rotary Microtome  
B - " A.O. 840C Microtome

---

MICROTOME KNIVES and KNIFE ACCESSORIES

	<u>Part No</u>
Bright 203 x 20 x 6mm knife, with integral handle drilled and tapped for use with the small screw type holder of the Elliott Knife Sharpener, packed in a wooden box	B1004DR(S)
Knife sharpening bevel for above	J1001
Bright 22° angle knife 189 x 27 x 10mm, drilled and tapped to accept holder for Elliott Knife Sharpener supplied in a wooden box	B1009DR(RA)
Knife sharpening bevel for above	B1008 (RA)
Knife handle for above	B1007A (RA)
A.O. 120mm knife in box	A0942 (B)
Knife sharpening bevel (back) for above	A0961 (B)
Knife handle for above	A0955 (B)
Jung 160 x 34 x 9mm in box	J1011 (JM)
Knife sharpening bevel for above	J1012 (JM)
Knife handle for above	J1101A(JM)
ARP Tungsten tipped knife complete with wooden box (for sledge)	A0001 (OT)
Jung tool edge 'D' profile 240 x 32 x 13mm, in wooden box (for sledge)	J2400 (OT)
Knife bevel for above	J2401 (OT)
Knife handle for above	J2402 (OT)
250 x 44 x 11mm 'D' profile knife in box	A0081

<u>Description</u>	<u>Part No</u>
Object holder - 22mm simple pattern tubular (S)(A)	B1013
Object holder - 22mm orientating pattern tubular (S)(A)	C1014
Object holder - 22mm solid (R)(A)	B1015
Object holder - 37mm solid (R)(A)	B1016
Object holder - 42mm x 50mm solid (R)(A)	B1002
Object holder - orientating pattern solid (R)(A)	C1017
Object holder - 22mm (J)	J1018
Object holder - 37mm (J)	J1019
Object holder - 22mm (M)	M1026
Coverslip vacuum pick-up holder, complete with suction cup and teat	B1020
*Suction cups for B1020	B1021 (dozen)
Rubber teats for B1020	B1022 (dozen)
Knife cleaning brush	B1023
Dial thermometer -30°C to +60°C	B1024
Glove box for Cryostat	
CO <sub>2</sub> container (all models)	
Coverslip staining tray	
Micron setting rod for FS/FCS	
Knife sharpening outfit	52423
Perspex anti-roll guide plate (A)	5030/15
Stem for above	5030/16
Perspex anti-roll guide plate (S)(M)	SR.20
Stem for above	SR.208
Micro adjusting tee piece (S)	SR.21
Micro adjusting tee piece (R)	SR.21R
Perspex anti-roll guide plate (R)(A)	RR.8
Stem for above	RR.8S
Anti-roll guide plates with sellotape strips (S)	B1025 (six)
Anti-roll guide plates with sellotape strips (R)	B1026 (six)
Aeroshell grease	B1055
Bottle low temperature oil	B1027
Bottle low temperature oil (red)	B1027R
Allen Key	B1028
Bright Cryospray	B1029 (dozen)
Tryco-M-Bed	B1056 (ten)
Allen screws	B1028a (each)
1 gallon low temperature oil	

<u>Description</u>	<u>Part No</u>
Complete microtome assembly for Cryostat (S)	C1030
Complete microtome assembly for Cryostat (R)	C1031
Feed spindle with integral ratchet wheel and trunnion nut (S)	C1032
Feed spindle with integral ratchet wheel and trunnion nut (R)	C1033
Pawl (S)	C1034
Pawl spring (S)	C1034A
Pawl (R)	C1035
Pawl spring (R)	C1035A
Microtome spares kit	C52491
Nylon cord (38 cms)	C1036
Nylon cord (1.53 metres)	C1037
Pawl (A)	5030/17

FLUORESCENT LIGHT UNIT (all models)

Complete Unit	B1038
Fluorescent tube	B1039
Tube holder	B1040
Choke	B1041
Starter	B1042
Perspex cover tube	B1043
Knife cooling conductor rod	
Micro switches	

CRYOSTAT CABINET & MICROTOME CHAMBER

Drive chain pulley	B1044
Perspex heated window in metal frame with spring loaded port plug	B1045
Heated window transformer	B1046
Rubber gasket for window	
Switch for window	
Red indicator lights - rectangular	B1047
Red indicator lights - round	B1048

<u>Description</u>	<u>Part No</u>
Delay switch	B1049
Panel thermometer $-40^{\circ}\text{C}$ to $+15^{\circ}\text{C}$	B1050
QJ Replacement thermostat	B1053
Night plug complete	B1051
Thermostat $-5^{\circ}\text{C}$ to $-30^{\circ}\text{C}$ QR	B1052
Cryostat coverslip staining tray	
Indicating thermostat $-50^{\circ}\text{C}$ to $+50^{\circ}\text{C}$ (new type)	B1054
New type thermometer $-50^{\circ}\text{C}$ to $+50^{\circ}\text{C}$	B1055
Frigidaire Fan Motor	
Fan blades (Frigidaire)	(pair)

OPERATING, MAINTENANCE AND SPARES MANUAL  
FOR THE  
5030 SERIES MICROTOME

Bright Instrument Co. Ltd.,  
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Cambridgeshire,  
England PE18 7EU.

Telephone: (0480) 54528  
Telex: 22022



## **WARRANTY**

The warranty relating to the instrument is outlined in our Terms and Conditions of Sale, paragraph 6. The warranty registration card must be completed and returned to Bright Instrument Company Limited.

## **SERVICE INFORMATION**

If service or replacement are required under warranty, contact the Bright dealer from whom the instrument was purchased or Bright Instrument Co. Ltd., Service Department. Be sure to state model type, serial number, date of delivery and name of dealer. Bright Instrument Co. Ltd., cannot accept goods returned without official authorisation.

If the instrument or any part of it is to be returned to Bright Instrument Co. Ltd., please note the following:

- (a) If the instrument or any part of it has been exposed to or been in contact with potential pathogenic or radioactive material, it is essential to decontaminate the instrument or part.
- (b) Ensure that there is no radioactivity or dangerous bacteria present, and advise Bright Instrument Co. Ltd., of any decontamination procedure that has been carried out.

Should the instrument or any part of it be received in a condition that Bright Instrument Co. Ltd., consider to be a potential biological hazard, the instrument or part will be returned unrepaid at the expense of the customer.

When requesting a service call, provide the following:

- (a) Model type and serial number of the instrument.
- (b) Location of the instrument and the person to contact.
- (c) The reason for the service call.

## **PRODUCT CHANGES**

BRIGHT INSTRUMENT CO. LTD reserves the right to change designs or to make additions to or improvements in its products without imposing any obligation on itself to add such to products previously manufactured.

The equipment supplied may not agree in all details with our description or illustrations because instruments are subject to modification and improvement. Details of any changes can be found on coloured sheets at the back of this manual.

**ALL INFORMATION IS GIVEN IN GOOD FAITH,  
BUT WITHOUT WARRANTY**

**FREEDOM FROM PATENT RIGHTS  
MUST NOT BE ASSUMED**

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## 1. INTRODUCTION

This manual contains instructions for the installation, operation and servicing of the 5030 series microtome. The microtome is intended for use as a sectioning device of hard and soft specimens in clinical, scientific and pathological applications.

## 2. TECHNICAL DATA

Overall dimensions:	470mm long x 190mm wide x 310mm high
Weight:	20 kg
Knife angle:	0° to 25°
Maximum specimen size:	50mm x 70mm x over 25mm thick
Thickness of cut specimen:	0.5 to 30 micron in 0.5 micron increments (standard) 0.2 to 12 micron in 0.2 micron increments (optional extra) 1.0 to 60 micron in 1.0 micron increments (optional extra) 2 to 120 micron in 2.0 micron increments (optional extra) 3 to 180 micron in 3.0 micron increments (Optional extra)
Specimen retraction on return stroke:	30 micron

## 3. DESCRIPTION

The 5050 series microtome comprises four basic models, all of which can be supplied with various optional extras.

The standard microtome uses a vice arrangement to hold various types of specimen mounts. Specimens can be mounted on wooden blocks, several sizes of circular object holder or a freezing object holder cooled by CO<sub>2</sub>. An orientating universal holder, for use with several sizes of orientating object holder, can also be fitted to the standard vice. An orientating object holder, fitted with a lever operated clamp, can be supplied in place of the standard vice arrangement.

Various types of knife can be fitted to the knife holder. These include a 22° angle steel type and two glass types, one of which is fully orientating.

The knife holder is adjustable to permit alterations to the cutting angle of the knife. The position of the knife relative to the specimen is also adjustable, permitting specimens over 25mm thick to be sectioned.

The microtome supplied as standard can provide specimen sections 0.5 to 30 micron thick in 0.5 micron increments. The range of the section thickness can be extended by changing a feed screw assembly. Various sizes of feed screw assembly are available.

The specimen is automatically retracted on the non-cutting or upward stroke to prevent the cut section being pulled from the knife. This retraction ensures the consistent production of perfect sections irrespective of the selected thickness.

A 5030/WD/M model fitted with a knife carriage control and a knife angle control is shown in fig. 1.

### 3.1 5030/W

The 5030/W model is the basic microtome, and is supplied with object holders of 22mm and 37mm in diameter.

### 3.2 5030/WD

The 5030/WD model is identical to the 5030/W model, but is fitted with a steel cover.

### 3.3 5030/WD/M

The 5030/WD/M is similar to the 5030/WD model and is fitted with a 110V or 220V motor drive unit. This variable speed machine can be operated in single or continuous mode to provide one or more specimen sections.

#### 3.3.1 Zone control unit

The zone control unit (Part no. A-227-B) is used to enable operating times to be considerably reduced.

The unit governs the speed of the motor drive, increasing the speed during non-cutting movements of the microtome.

### 3.4 5030 Cryostat version

The 5030 Cryostat version is intended for use in a cryostat. The cryostat version is similar to the 5030/W model, but is fitted with a remotely operated cutting handwheel. A knife carriage control and a knife angle control are fitted as standard on the OTF Cryostat and optional on the remainder. A facility for retaining tubular object holders, and an anti-roll guide plate are also standard. The anti-roll guide plate is a perspex plate assembly located above the knife. The guide plate prevents curling or rolling of the cold specimen section during the cutting operation.

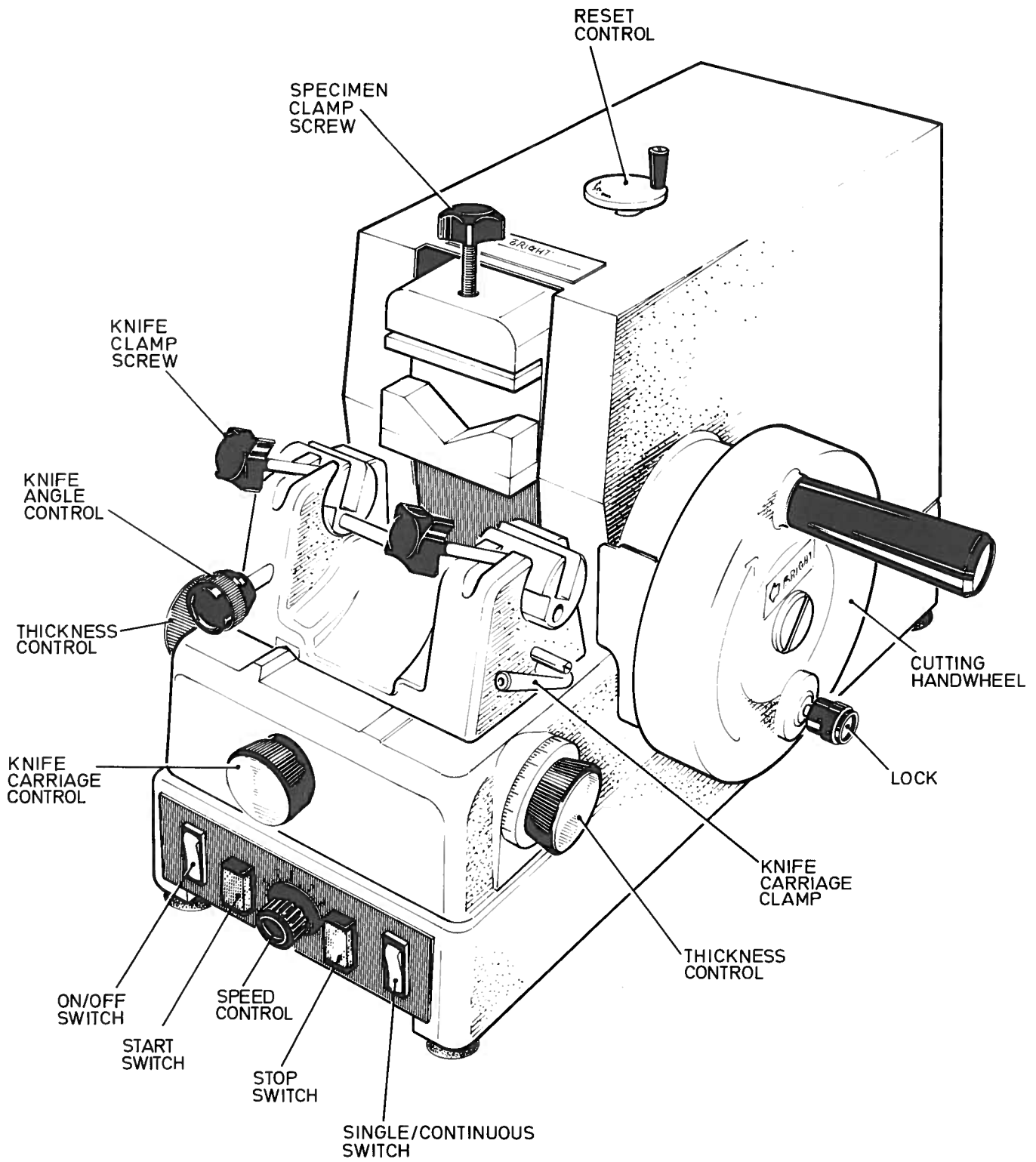


Fig. 1 5030/WD/M model - general view

### 3.4.1 C02 operated freezing object holder

The C02 operated freezing object holder (Part no. A-930-B) is supplied for additional rigidity of certain specimen types. The object holder is fitted with a control valve and is supplied with C02 from a cylinder.

Operation of the control valve releases C02, which escapes immediately under the object holder. The C02 expands in a small chamber, which is rapidly cooled. The wall of this chamber is constructed of a heat insulating material through which the C02 gas flows. The gas passes into an outer chamber that causes the gas to flow around the specimen block.

The coupling nut fitted to the assembly is suitable for use only with C02 cylinders of the type supplied by the British Oxygen Co. (BOC).

### 3.4.2 Solid C02 knife and object holder freezer

The solid C02 knife and object holder freezer (Part no. A-931-B) is supplied where extreme rigidity of certain specimen types is required. The assembly comprises a number of troughs, which are filled with solid C02.

### 3.5 Knife

The knife normally supplied with the microtome is Part no. B1009DR. This is a wedge knife, drilled and tapped for use with an Elliot knife sharpener. The knife dimensions are 189mm x 27mm x 10mm with a 40mm x 7mm safety cut-out at each end.

However, the knife holder of the 5030 is designed to accept a variety of alternative knives including Tungsten Carbide Tipped (TC) knives which are listed under accessories, section 10. Brights would be pleased to sharpen your steel and TC knives.

## 4. INSTALLATION

### 4.1 Unpacking

#### CAUTION:

To prevent damage to the hinges the microtome must be carried from the base. On no account must the top arm be strained in any direction.

All packing must be carefully removed and the contents checked against the packing list. If any damage or discrepancy is noted, immediately contact your Bright dealer or Bright Instrument Co. Ltd.

## 4.2 Mains Connection

The 5030/WD/M model can be supplied for use with a 220/230V 50Hz single phase supply or a 110/115V 60Hz single phase supply. Check that the instrument voltage, which is engraved on the nameplate, is correct for the mains supply. A 2A fuse must be provided in the supply to the instrument. Cable connections are as follows:

- (a) Brown wire - live
- (b) Blue wire - neutral
- (c) Yellow/blue wire - earth

## 4.3 Positioning

### 4.3.1 5030/W, 5030/WD and 5030/WD/M

Locate the microtome on a suitable flat bench. Ensure that access to the controls is unobstructed.

### 4.3.2 5030 Cryostat version

Refer to the Cryostat manual for positioning details regarding the 5030 Cryostat version.

## 5. CONTROLS

### 5.1 Cutting Handwheel

The cutting handwheel is used to operate the top arm. One clockwise revolution of the handwheel causes the following to occur:

- (a) The top arm is advanced by the distance selected at the thickness control.
- (b) The top arm descends to enable the knife to remove a section of specimen.
- (c) The top arm is retracted and returned to the raised position.

Turning the handwheel counter-clockwise will not damage the specimen face.

### 5.2 Cutting Handwheel Lock

#### 5.2.1 5030/W and 5030/WD

The lock is fitted in the handwheel and is used to retain the top arm in the raised position. To lock the top arm, proceed as follows:

- (a) Place the top arm in the raised position using the handwheel.

- (b) Pull out the handwheel lock and rotate it a ¼ turn. Release the lock and ensure it is correctly located.

### 5.2.2 5030/WD/M

The lock is fitted in the handwheel and functions as a drive pin between the motor and the handwheel. To disengage the motor, pull out the handwheel lock and rotate it a ¼ turn.

The motor drive unit normally retains the top arm in the raised position.

### 5.2.3 5030 Cryostat version

The lock comprises a spring-loaded thumb lever that, when depressed, engages with a multi-slot locking plate.

### 5.3 Thickness Control

The thickness control is used to set the thickness of the sectioned specimen, and is provided with a spring loaded stop to provide a positive engagement. The control adjusts the forward travel of the top arm, through the setting on a feed screw, to effect changes in section thickness.

The microtome is supplied as standard with a 0.5 to 30 micron feed screw, which is indicated on the scale at the right hand control knob. If the microtome is fitted with a 1.0 to 60 micron feed screw, the readings on this scale must be doubled. If a 0.2 to 12 micron feed screw is fitted the scale at the left hand control knob is used.

### 5.4 Reset Control

The reset control is used to return the top arm to the beginning of its travel. Resetting the top arm ensures that the maximum number of sections are cut. The travel mechanism is disengaged when the top arm reaches a fully advanced position.

Before operating the reset control, ensure that the thickness control is set to zero or the top arm is in the lowered position.

### 5.5 Knife Carriage Clamp

The clamp is used to lock the knife carriage to the base. The clamp comprises an eccentric rod that passes through a clamp bolt assembly.

### 5.6 Knife Clamp Screws

The screws are used to secure the knife to the knife carriage and to clamp the knife at the required cutting angle.

### 5.7 Specimen Clamp Screw

This screw is used to secure specimen holders or blocks to the vice arrangement in the top arm.

On 5030 Cryostat models there is an additional clamp screw fitted to the top arm. This screw and a mandrel located in the top arm are used to retain tubular specimen holders.

### 5.8 Knife Carriage Control

The control is used to move the knife carriage to or from the top arm, when setting up the microtome. The control is standard on the OTF Cryostat version, but may be fitted to other models as an option.

### 5.9 Knife Angle Control

The control is used to carry out fine adjustments to the knife angle. The control is standard on the OTF Cryostat version, but may be fitted to other models as an option.

### 5.10 Motor Drive

#### 5.10.1 ON/OFF switch

The switch is used to connect the mains supply to the motor drive unit.

#### 5.10.2 SINGLE/CONT. switch

The switch is used to select the number of sections to be cut. Set to SINGLE, the microtome will cut a single section. Set to CONT, the microtome will cut continuously until the top arm is fully advanced.

#### 5.10.3 SPEED control

The control is used to vary the cutting speed between 0.6 and 3.4 mm/S. The return stroke is set at maximum speed.

#### 5.10.4 START switch

The switch is used to initiate the cutting cycle.

### 5.10.5 STOP switch

Operation of the switch stops the cutting cycle.

### 5.11 Zone Control Unit

The unit (Part no. A-227-B) is used to control the speed of the microtome over the upward and downward stroke of the top arm. The unit functions by allowing the SPEED control to be effective only while the specimen is passing across the knife.

## 6. OPERATION

### 6.1 General

#### 6.1.1 Knife

##### WARNINGS:

1. DO NOT LEAVE THE MICROTOME UNATTENDED WITH AN EXPOSED KNIFE. REMOVE THE KNIFE OR COVER THE KNIFE WITH THE GUARD PROVIDED.
2. DO NOT LEAVE UNBOXED KNIVES LYING AROUND. PLACE KNIVES THAT ARE NOT IN USE IN THEIR BOXES.
3. DO NOT CARRY A KNIFE EXCEPT IN THE BOX PROVIDED.
4. DO NOT WIPE A KNIFE ALONG ITS LENGTH. WIPE THE KNIFE FROM THE BACK EDGE TO THE CUTTING EDGE.

The knife can be a hazard in the laboratory. Personnel must be made aware of the dangers and observe the warnings given above.

To obtain the best results, the knife must be sharpened to the correct angle for the type of tissue to be sectioned. A knife, even when new, should be sharpened just before use. Generally, the knife (Part no. B1009DR) supplied with the microtome is suitable for most types of tissue.

To fit the knife to the knife holder, proceed as follows:

**NOTE:** On 5030 Cryostat version fitted with a solid CO<sub>2</sub> knife and object holder freezer, refer to section 6.1.6.

- (a) Ensure that the knife is sharp. If necessary, carry out the knife sharpening, section 8.2.
- (b) Loosely assemble the knife to the knife holder using the clamp screws.
- (c) Set the knife to the required angle using if fitted, the knife angle control. Tighten the knife clamp screws. If necessary, refer to knife angle setting section 6.1.2.

#### 6.1.2 Knife angle setting

The correct knife angle setting depends on the knife shape and the facet angle. When correctly set, only the cutting edge of the knife should contact the specimen block. Any contact between the side of the knife and the specimen block will produce irregularities in the thickness of the resultant sections. These irregularities are due to compression and distortion of the specimen. An initial setting can be 15°.

Trial sections should be cut and then examined to confirm the correct setting of the knife angle. Re-adjustment to the setting will be necessary if the following is observed:

- (a) Irregular thickness of sections or missed sections — select a larger angle to increase the clearance.
- (b) Compression and lines of different thickness in the sections — select a smaller angle to reduce the clearance.
- (c) Torn and ragged sections that will not flatten, and a scraping effect — select a smaller angle to reduce the clearance.

#### 6.1.3 Reset control

Prior to cutting a new specimen block, the reset control should be used to set the feed screw to the beginning of its travel. With the full travel of the feed screw available, the maximum number of sections can be obtained.

If the feed screw reaches the fully advanced position during the cutting operation, the cutting is automatically stopped. The feed screw must then be reset.

#### 6.1.4 Alterations of thickness control range

The range of the thickness control is varied by fitting an alternative type feed screw assembly.

To change the feed screw assembly, proceed as follows:



**NOTE:** Numbers in parenthesis refer to fig. 3, unless otherwise stated.

- (a) Set the top arm to the raised position using the cutting handwheel. On hand-driven models, pull out the handwheel lock and turn it a ¼ revolution. Release the lock.
- (b) Remove the reset control (3) and the steel cover (fig. 4-1).
- (c) Raise the pivot arm (27) using the knock off arm (37). Pull the feed screw assembly (39) forward to release the trunnion nut (40) from the spring (32).
- (d) Remove the feed screw assembly (39).
- (e) Locate the appropriate feed screw (39) in the bearing post (43), and engage the trunnion nut in the spring (32). Ensure that the projections on the trunnion nut are correctly located in the grooves of the pivot arm (27).
- (f) Refit the steel cover (fig. 4-1) and the reset control (3).

#### 6.1.5 C02 operated freezing object holder

To obtain the best results the liquid C02 must reach the outlet under the specimen holder.

Certain types of C02 cylinder are fitted with syphon tubes to maintain the supply of liquid C02 until the cylinder is empty. This type of cylinder is normally marked to indicate it is of the syphon tube type.

Other types of cylinder must be carefully mounted upside-down on a suitable support.

The time taken to freeze the specimen depends upon the size of the block. Several trial sections should be cut to ascertain that the flow of C02 is correct. The flow rate should not be such that the section is blown about and the ribbon spoilt.

To freeze the specimen, proceed as follows:

- (a) Connect the coupling nut to the C02 cylinder.
- (b) Close the control valve on the object holder.
- (c) Slowly open the cylinder valve.
- (d) Slowly open the control valve and allow the specimen to cool.

- (e) When the cutting operation is complete, turn off the cylinder valve and then the control valve.

#### 6.1.6 Solid C02 knife and object holder freezer

To fit the object holder and the knife troughs, proceed as follows:

- (a) Fit the combined object holder and trough to the vice arrangement in the top arm, and secure using the specimen clamp screw.
- (b) Fit the longitudinal trough to the knife holder. Ensure that the trough is towards the front of the microtome.
- (c) Fit the knife cooling conductors to each end of the knife.
- (d) Loosely assemble the knife to the knife holder using the clamp screws.
- (e) Set the knife to the required angle using the knife angle control. Tighten the knife clamp screws.
- (f) Fit the knife cooling trough to each end of the knife.

To freeze the specimen and the knife, fill the four troughs with solid C02. The required temperature can be obtained by adjusting the quantity of solid C02.

### 6.2 Motor Driven Models

#### 6.2.1 Setting up procedure

To set up the microtome, proceed as follows:

- (a) Set the thickness control to 0.
- (b) Set the SPEED control to the maximum setting.
- (c) Set the SINGLE/CONT switch to CONT.
- (d) Connect the mains supply and ensure the ON/OFF switch is set to OFF.
- (e) Ensure that the top arm is in the raised position. If necessary, set the ON/OFF switch to ON and depress the START switch. Depress the STOP switch.
- (f) Rotate the reset control clockwise until the stop is reached.

MICROTOME ZONE/MOTOR CONTROL (MR)

PURPOSE: To control the speed of the specimen in its path through the knife (zone) and then to accelerate automatically to maximum speed for the remainder of the microtome operating cycle.

CONNECTING:

To connect control to microtome, plug multi-pin cable from microtome into rear of control box. Then engage microtome drive pin in handwheel.

SETTING:

1. Switch to ON
2. Set Upper Limit (above knife) slider (U/L) to top.
3. Set Lower Limit (below knife) slider (L/L) to bottom (BTM)
4. Switch to TRIM Mode for continuous operation.
5. Select cutting stroke speed required by slider on speed control
6. The zone is now set at maximum. To reduce zone to correspond with specimen size adjust appropriate sliders. (see 2 and 3)

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- (g) Fit the object holder complete with a mounted specimen to the top arm. Secure the holder using the specimen clamp screw.

### 6.2.2 Trimming specimen face

The specimen face can be trimmed by moving the knife to the specimen or the specimen to the knife. Moving the specimen to the knife, however, will use part of the forward travel of the top arm. Therefore if a number of sections are to be cut, move the knife to the specimen.

To trim the specimen face by moving the knife to the specimen, proceed as follows:

- (a) Set the thickness control to a suitable setting.
- (b) Release the knife carriage clamp.
- (c) Move the knife carriage towards the specimen using careful hand movements or, if fitted, the knife carriage control.
- (d) Depress the START switch, and continue to move the knife carriage until the specimen is trimmed by the knife.
- (e) Depress the STOP switch and apply the knife carriage clamp.

To trim the specimen face by moving the specimen to the knife, proceed as follows:

- (a) Release the knife carriage clamp.
- (b) Move the knife carriage using hand movements or, if fitted, the knife carriage control until the knife reaches the specimen.
- (c) Apply the knife carriage clamp.
- (d) Rotate the reset control counter-clockwise until the knife just touches the specimen.

**NOTE:** 1 revolution of the reset control moves the top arm approximately 150 micron.

- (e) Set the thickness control to a suitable setting.
- (f) Depress the START switch.
- (g) When the specimen is trimmed by the knife, depress the STOP switch.

### 6.2.3 Cutting sections

Ensure that the trimming of the specimen face has been carried out. Set the thickness control, SPEED control and SINGLE/CONT switch to the required positions. Depress the START switch to obtain sections.

### 6.2.4 Zone control unit

Plug multi-pin cable from microtome into rear of zone control box. To adjust zone control, proceed as follows:

- (a) Set SINGLE/CONT switch to CONT.
- (b) Set U/L, upper limit, to 0.
- (c) Set L/L, lower limit, to 10.
- (d) Set SPEED control to required setting.

**NOTE:** If the SPEED control is subsequently disturbed, the zone control must be re-adjusted.

- (e) Depress START switch.
- (f) Adjust U/L until microtome engages slow speed mode just before specimen touches knife.
- (g) Adjust L/L until microtome engages fast speed mode just after section is cut.

## 6.3 Hand Driven Models

### 6.3.1 Setting up procedure

To set up the microtome, proceed as follows:

- (a) Set the thickness control to 0.
- (b) Set the top arm to the raised position using the cutting handwheel. Pull out the handwheel lock and turn it a ¼ revolution. Release the lock.
- (c) Rotate the reset control until the stop is reached.
- (d) Fit the object holder complete with a mounted specimen to the top arm. Secure the holder using the specimen clamp screw.

### 6.3.2 Trimming specimen face

The specimen face can be trimmed by moving the knife to the specimen or the specimen to the knife. Moving the specimen to the knife, however, will use part of the forward travel of the top arm. Therefore if a number of sections are to be cut, move the knife to the specimen.

To trim the specimen face by moving the knife to the specimen, proceed as follows:

- (a) Pull out the handwheel lock and turn it a  $\frac{1}{4}$  revolution to release the top arm.
- (b) Set the thickness control to a suitable setting.
- (c) Release the knife carriage clamp.
- (d) Move the knife carriage towards the top arm using careful hand movements or, if fitted, the knife carriage control.
- (e) Rotate the cutting handwheel and continue to move the knife carriage until the specimen is trimmed by the knife. Apply the knife carriage clamp.

To trim the specimen face by moving the specimen to the knife, proceed as follows:

- (a) Pull out the handwheel lock and turn it a  $\frac{1}{4}$  revolution to release the top arm.
- (b) Release the knife carriage clamp.
- (c) Move the knife carriage using hand movements or, if fitted, the knife carriage control until the knife reaches the specimen.
- (d) Apply the knife carriage clamp.
- (e) Rotate the reset control counter-clockwise until the specimen touches the knife.

**NOTE:** 1 revolution of the reset control moves the top arm approximately 150 micron.

- (f) Set the thickness control to a suitable setting.
- (g) Rotate the cutting handwheel until the knife trims the specimen.

### 6.3.3 Cutting sections

Ensure that the trimming of the specimen face has been carried out. Set the thickness control to the

required setting, and rotate the cutting handwheel to obtain sections.

## 7. CALIBRATION AND ADJUSTMENT

**NOTE:** The numbers in parenthesis refer to fig. 3, unless otherwise stated.

### 7.1 Thickness Control

#### 7.1.1 Function check

To check that the thickness control is functioning correctly, proceed as follows:

- (a) Remove the reset control and the steel cover (fig. 4-1).
- (b) Set the thickness control to 0.
- (c) Mark the ratchet wheel of the feed screw assembly (39) at a point opposite a stationary object.
- (d) Rotate the cutting handwheel several times, and check that the ratchet wheel does not move.
- (e) Set the thickness control to 1 micron.
- (f) Rotate the cutting handwheel five times, and check that the ratchet wheel is advanced by 10 teeth.
- (g) If the advance of the ratchet wheel is incorrect, recalibrate the thickness control as detailed in calibration, section 7.1.2.
- (h) Refit the steel cover (fig. 4-1) and the reset control.

#### 7.1.2 Calibration

To calibrate the thickness control, proceed as follows:

- (a) Remove the reset control and the steel cover (fig. 4-1).
- (b) Set the thickness control to 5 micron.
- (c) Check that the ball of the click block assembly (51) is engaged with the 5th notch in the cam plate (50).
- (d) Slowly rotate the cutting handwheel. Check that the ratchet wheel of the feed screw assembly (39) is advanced by the pawl (46). Check that the pawl

returns over 10 teeth, and is fully located in the root of the last tooth.

**NOTE:** The 10 teeth advance of the ratchet wheel results in a 5 micron advance of the specimen. 2 teeth represents 1 micron.

- (e) If 10 teeth are not spanned, adjust the thickness control as follows:
- (i) Remove the grub screw (19) and slacken the grub screw (18).
  - (ii) Adjust the angular position of the connecting crank (17) on the crank pin (21) until the correct advance is obtained, as detailed in sub-para (d).
  - (iii) Refit the grub screw (19) and tighten both grub screws to 20 lb in.

## 7.2 Top Arm Retraction

To adjust the retraction of the top arm, proceed as follows:

- (a) Set the top arm (2) to the raised position using the cutting handwheel.
- (b) Check that the trunnion nut (40) is positioned at the top of the feed screw assembly (39). If necessary reposition the trunnion nut using the reset control.
- (c) Using a feeler gauge, check that there is a 1mm gap between the stop pin (35) and the pivot arm stop screw (36).
- (d) If the gap is incorrect, adjust the length of the retraction link rod (25) by turning one of the anti-rattle joint assemblies (26).

**NOTE:** Lengthening the link rod increases the gap.

## 7.3 Knife Carriage

The knife carriage (68) must not move when the clamp lever is in the lock position. If the knife carriage moves, adjust the nut (fig. 4-11).

## 7.4 Advance Knock Off

The advance knock off (37) stops the top arm (2) advancing when the trunnion nut (40) reaches the

end of its travel. To adjust the knock off ring, slacken the securing screws (38) and move the ring to the left as viewed from below.

## 8. MAINTENANCE

No lubrication is necessary, since all bearings are of the self lubricating type.

**NOTE:** Numbers in parenthesis refer to fig. 3.

### 8.1 Cleaning

The microtome should be cleaned at intervals dictated by local conditions. Ensure that the vee pads (75) and bearing pads (76) are kept free of wax, ice and debris. Ensure that the ratchet wheel of the feed screw assembly (39) and the pawl (46) are kept clean and move freely.

### 8.2 Knife Sharpening

The knife sharpening kit (Part no. A-52423-C) is recommended for use in sharpening the knife. The kit comprises a hone, strop, oil and abrasives. Similar knife sharpening kits are available and can be used if suitable.

A badly damaged knife, i.e. with visible gaps in the cutting edge, may first need honing on a Belgian or similar type stone using soapy water as a lubricant. When the gaps are removed, carry out the honing procedure.

The facet angle of the knife must be 5°. Although careful honing and stropping to a different angle can produce the sharpest edge, this edge may not be the most durable.

#### 8.2.1 Honing

Mix a small quantity of abrasive and oil to a thin paste. Spread the paste evenly over the surface of the glass. Hold the knife by the ends, and avoid any bending stresses. Pressure must be applied evenly across the knife, and the knife held at the correct angle. Do not attempt to position the full length of the knife across the surface of the glass. As the blade is moved up the glass, also move it sideways to ensure that the full length of the cutting edge has contacted the glass. When honing, the cutting edge must always move forward and must not run off the edge of the glass. Reverse the knife after each stroke to alternately sharpen the sides of the cutting edge. When correctly sharpened, the cutting edge should appear under a microscope as a straight line with no gaps.

### 8.2.2 Stropping

Ensure that the surface of the glass is clean, and locate the strop on the glass. If necessary rub a small quantity of rouge into the strop. Use the same action as for honing the knife, but move the cutting edge backwards. Excessive stropping will produce a blunt cutting edge.

gain access to the fuse, remove the screws securing the baseplate and remove the baseplate.

#### WARNING:

**ENSURE THE MAINS SUPPLY IS DISCONNECTED BEFORE REMOVING THE BASEPLATE.**

### 8.3 Motor Drive

#### 8.3.1 Fuse

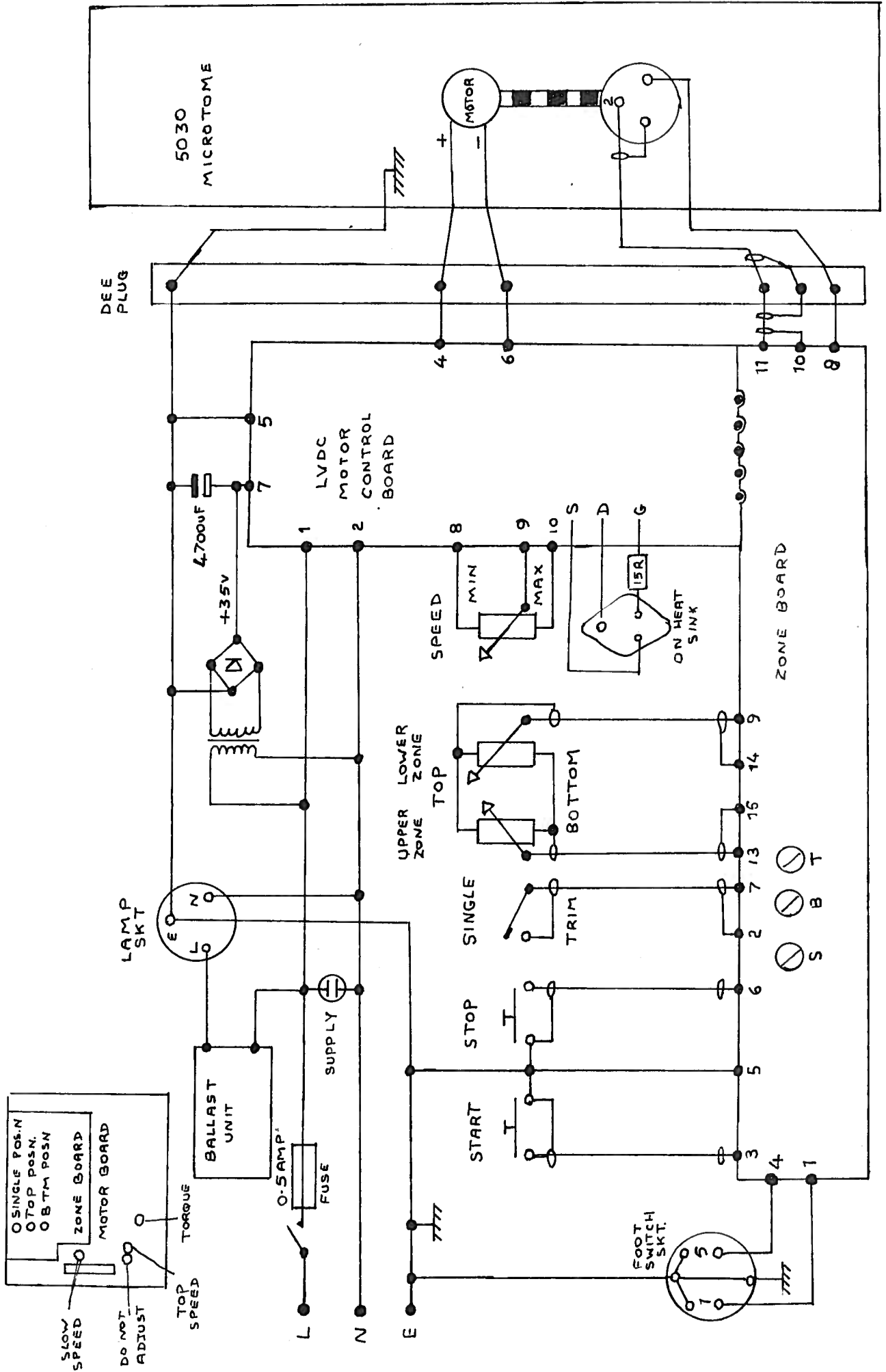
The motor drive is fitted with a 2A fuse which is located in the interior of the motor drive unit. To

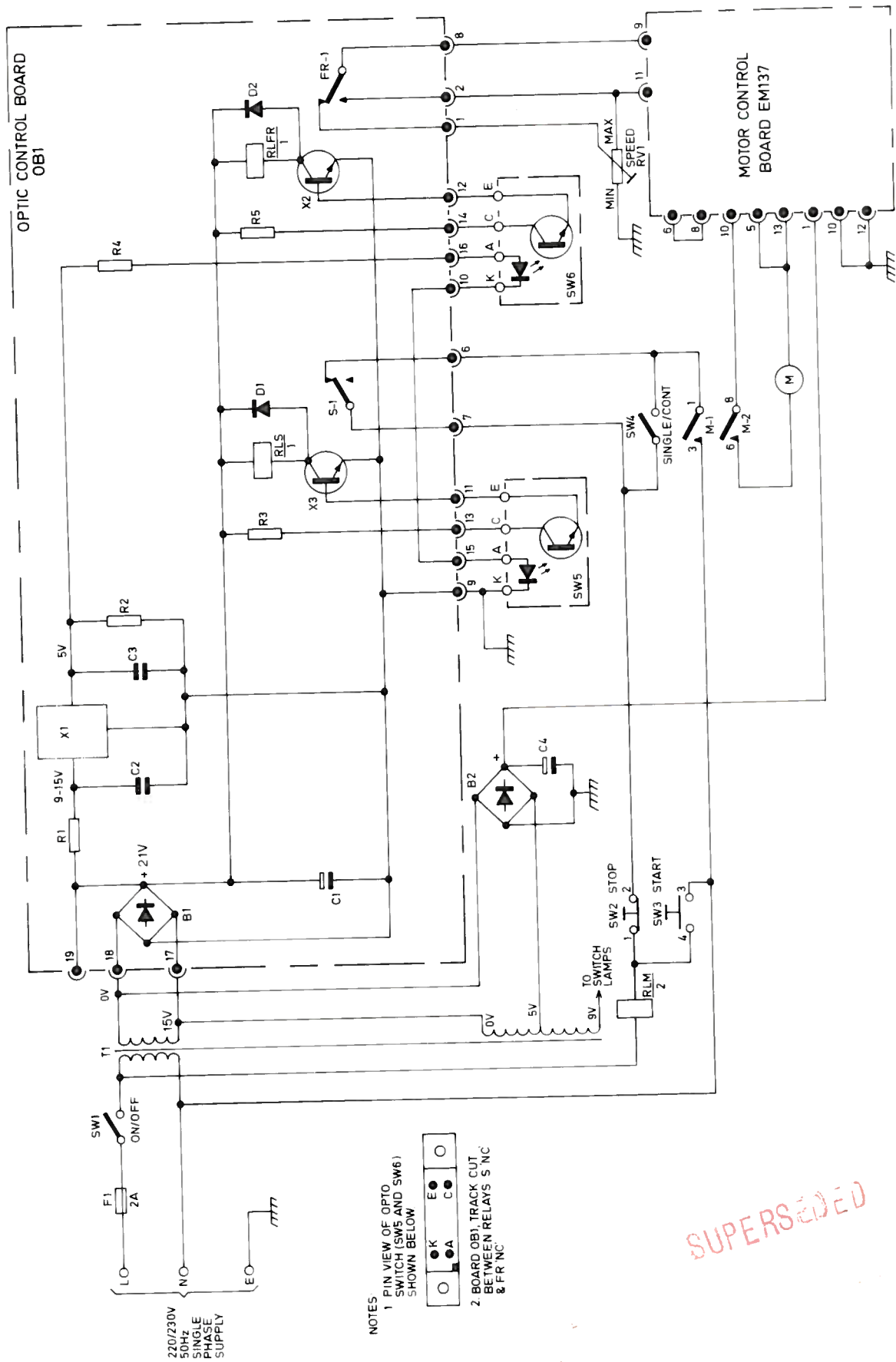
#### 8.3.2 Fault finding

A circuit diagram of the motor drive is shown in fig.2. Fault finding information is provided in Table 1.

**Table 1 Fault finding – motor drive**

Symptom	Possible Cause	Remedy
Motor will not run	<ol style="list-style-type: none"> <li>1) check fuse if switches not lit</li> <li>2) Motor control board faulty</li> <li>3) Motor faulty or jammed</li> <li>4) Transformer T2 circuit faulty</li> </ol>	<ol style="list-style-type: none"> <li>1) Renew 2A fuse</li> <li>2) Renew motor control board EM137</li> <li>3) If microtome free, replace motor</li> <li>4) Check transformer T2, bridge capacitor B2 for defective component</li> </ol>
Motor SPEED control inoperative	Motor control board faulty	Replace motor control board EM137
No automatic speed	<ol style="list-style-type: none"> <li>1) Optic switch SW6 dirty</li> <li>2) Cam slipping</li> <li>3) Optic control board faulty (transistor X2 or relay FR)</li> <li>4) Transformer T1 fault</li> </ol>	<ol style="list-style-type: none"> <li>1) Clean optic switch in slot</li> <li>2) Check cam not touching optic switch, adjust as necessary</li> <li>3) Repair or renew optic control board OB1</li> <li>4) Check voltages</li> </ol>
No single shot	<ol style="list-style-type: none"> <li>1) Optic switch SW5 dirty</li> <li>2) Cam slipping</li> <li>3) Optic control board faulty (transistor X3 or relay S)</li> <li>4) Transformer T1 fault</li> </ol>	<ol style="list-style-type: none"> <li>1) Clean optic switch in slot</li> <li>2) Check cam not touching optic switch, adjust as necessary</li> <li>3) Replace optic control board OB1</li> <li>4) Check voltages</li> </ol>





NOTES  
 1 PIN VIEW OF OPTO SWITCH (SW5 AND SW6) SHOWN BELOW

○	●	●	○
K	A	C	E

2 BOARD OB1 TRACK CUT BETWEEN RELAYS S'NC & FR'NC

SUPERSEDED

Fig. 2 Circuit diagram



## 9. PARTS LIST

Parts can be obtained through the local Bright dealer, or from Bright Instrument Co. Ltd.

When ordering parts, provide the following details:

- (a) Model type and serial number of microtome.
- (b) Full description, part number and quantity of part(s) required.
- (c) Address to which parts are to be delivered.
- (d) Address to which invoice is to be delivered.

### 9.1 5030 Series - Top View

Item numbers refer to those shown on fig. 3.

Item No.	Part No.	Description	Qty
1	5030-099	Base, CBM 037	1
2	5030-098	Top arm, CBM 036	1
3	5030-008	Reset control handle	1
4	5030-008A	Remote control reset assembly - FS Cryostat	1
5	5030-090	Main hinge	1
6	5030-078	Top retaining plate	1
7	5030-079	Centre retaining plate	1
8	5030-080	Lower retaining plate	1
9	5030-077	Socket head screw M4 x 10	12
10	5030-087	Small hinge	4
11	5030-088	Retaining plate, small	8
12	5030-089	Socket head screw M4 x 10	16
13	5030-100	Plug	2
14	5030-006	Link shaft	1
15	5030-051	Pawl drive rod	1
16	5030-052	Anti-rattle joint assembly	2
17	5030-049	Connecting crank	1
18	5030-101	Grub screw, plain	1
19	5030-102	Grub screw, pointed	1
20	5030-007	Connecting link assembly	1
21	5030-050	Crank pin	1
22	5030-047	Crank plate	1
23	5030-103	Grub screw	2
24	5030-013	Spring	2
25	5030-018	Retraction link rod	1
26	5030-016	Anti-rattle joint assembly	1
27	5030-095	Pivot arm, BBM 031	1
28	5030-096	Hinge segment, BBM 032	1
29	5030-011	Clamp screw assembly	1
30	5030-104	Pivot ball	2
31	5030-012	Spring anchor pin	2
32	5030-105	Spring plate	1
33	5030-106	Retaining plate	1
34	5030-107	Socket head screw	2
35	5030-015	Stop pin	1
36	5030-014	Pivot arm stop screw	1
37	5030-108	Knock-off arm	1
38	5030-109	Socket head screw	2
39	5030-010	Feed screw assembly - state thickness range	1
40	5030-009	Trunnion nut	1
41	5030-059	Thickness link rod	1
42	5030-058	Anti-rattle joint assembly	2

Item No.	Part No.	Description	Qty
43	5030-043	Bearing post	1
44	5030-044	Bearing assembly	2
45	5030-093	Pawl arm, ABM 038	1
46	5030-055	Pawl	1
47	5030-054	Pawl tension spring	1
48	5030-053	Socket head screw M4 x 16	1
49	5030-110	Washer	1
50	5030-056	Thickness cam plate	1
51	5030-057	Thickness click block assembly	1
52	5030-111	Cam, optical switch - 5030/WD/M model	1
53	5030-112	Grub screw	1
54	5030-076	Bush	2
55	5030-113	Circlip	1
56	5030-075	Main drive shaft	1
57	5030-073	Drive coupling - Cryostat model	1
58	5030-072	Screw	1
59	5030-097	Handwheel, BBM 069 - except Cryostat model	1
60	5030-074	Drive handle assembly	1
61	5030-114	Locking pin assembly	1
62	5030-115	Socket head screw	2
63	5030-116	Thrust ring - 5030/WD/M model	1
64	5030-117	Grub screw	2
65	5030-118	Gear wheel - 5030/WD/M model	1
66	5030-119	Guard - 5030/WD/M model	1
67	5030-120	Screw	2
68	5030-094	Knife carriage, BBM 017	1
69	5030-001	Knife clamping screw	2
70	5030-046	Knife holder	2
71	5030-084	Tie bar	1
72	5030-067	Socket head screw 4BA x 3/8 in	2
73	5030-064	Scale, knife angle	1
74	5030-071	Adjusting screw, knife angle	1
75	5030-082	Vee pads	2
76	5030-086	Bearing pad	1
77	5030-121	Stop	1
78	5030-032	Clamp bolt	1
79	5030-069	Clamp lever, eccentric	1
80	5030-062	Anti-roll guide plate, perspex-Cryostat model	1
81	5030-81	Screw, adjusting, nylon, 4BA x 5/8 in	2
82	5030-061	Stem	1
83	5030-022	Lock screw assembly, stem	1
84	5030-023	Tee piece assembly	1
85	5030-063	Lock screw assembly, tee piece	1
86	5030-060	Control knob assembly	1
87	5030-024	Bearing posts, anti-roll assembly	2
88	5030-092	Vee block	1
89	5030-003	Clamp screw	1
90	5030-122	Washer	1
91	5030-091	Clamp plate	1
92	5030-123	Socket head screw	1
93	5030-004	Tubular object holder adaptor - Cryostat model	1
94	5030-002	Locking bar	1
95	5030-1220	Locking bar clamp pin	1
96	5030-124	Clamp screw, tubular object holder	1
97	5030-125	Grub screw	1
98	5030-068	Knob, RH, thickness control	1
99	5030-126	Grub screw	1
100	5030-066	Scale, thickness	1

Item No.	Part No.	Description	Qty
101	5030-127	Grub screw	1
102	5030-065	Indicator	1
103	5030-045	Knob, LH, thickness control	1
104*	5030-128	Grub screw	1
105	5030-129	Scale, thickness	1
106*	5030-130	Grub screw	1
107*	5030-131	Indicator	1
108	5030-025	Knob, knife feed screw control	1
109	5030-132	Grub screw	1
110	5030-133	Holder, universal	1
111	5030-134	Block	1
112	5030-135	Vee block	1
113	5030-003	Clamp screw	1
114	5030-136	Washer	1
115	5030-137	Clamp plate	1
116	5030-138	Socket head screw	1
117	5030-139	Pressure plate	1
118	5030-140	Screw	2
119	5030-141	Lever assembly, locking	1
120	5030-142	Spring	1
121	5030-143	Stop	2
122	5030-144	Ball	1
123	5030-145	Seat	1
124	5030-146	Grub screw	1
125	5030-147	Drive motor - 5030/WD/M model	1
126	5030-148	Screw	2
127	5030-149	On/off switch SW1 (Russenberger) - 5030/WD/M model	1
128	5030-150	Start switch SW3 (RAFI) - 5030/WD/M model	1
129	173-237	Speed control RV1 (RS) - 5030/WD/M model	1
130	5030-151	Stop switch SW2 (RAFI) - 5030/WD/M model	1
131	5030-152	Single/cont switch SW4 (Russenberger) - 5030/WD/M model	1
132	5030-153	Mains lead	1
133	5030-154	Plug, zone control unit	1
134*	5030-155	Locking screw, retraction arm pivot stud	1

\* Not illustrated

## 9.2 5030 Series - Bottom View

Item numbers refer to those shown on fig. 4.

Item No.	Part No.	Description	Qty
1	5030-156	Cover - 5030/WD and 5030/WD/M models	1
2	5030-157	Screw	3
3	5030-158	Washer, nylon	3
4	5030-027	Front bearing, feed screw	1
5	5030-159	Socket cap head screw, 4BA x 3/8 in	2
6	5030-160	Circlip	1
7	5030-030	Knife feed screw	1
8	5030-031	Drive adaptor, knife feed	1
9	5030-161	Washer	1
10	5030-162	Spring	1
11	5030-033	Nut 3/8 in BSF	1
12	5030-085	Crank arm, thickness	1
13	5030-083	Drive rod, thickness	1
14	5030-020	Anti-rattle joint assembly	1
15	5030-041	Retraction plate	1
16	5030-019	Spring anchor pin	2
17	5030-038	Retraction roller and pin	1
18	5030-039	Retaining plate	1
19	5030-040	Countersunk socket cap head screw, 2BA x 1/2 in	1
20	5030-017	Pivot stud	1
21	5030-021	Lock nut assembly	1
22	5030-163	Bearing post	Ref. only
23	5030-164	Washer	1
24	5030-042	Nut, 3/8 in BSF	1
25	5030-165	Socket cap head screw, retaining, thickness click block assembly	1
26	5030-166	Washer	1
27	5030-029	Feet, plastic	4
28	5030-167	Screw	4
29	5030-168	Housing, motor drive unit - 5030/WD/M model	1
30	5030-169	Screw	1
31	5030-170	Motor control board EM137	1
32	5030-171	Optic control board OB1, comprises following items:	1
RLS	5030-172	Relay (PYE) 26-730/232-740	1
RLFR	5030-173	Relay (PYE) 26-730/232-740	1
B1	5030-174	Bridge rectifier (RS) 261-328	1
D1,D2	5030-175	Diode, 1N4148	2
X2,X3	5030-176	Transistor, 2N3053	2
C1	5030-177	Capacitor, electrolytic, 470 uF, 35V	1
C2	5030-178	Capacitor, 0.22 uF, 250V	1
C3	5030-179	Capacitor, 0.47 uF, 250V	1
X1	5030-180	Regulator, 5V 0.1A 78L05	1
R4	5030-181	Resistor, carbon film, 82R, 0.5W	1
R1	5030-182	Resistor, carbon film, 330R, 1W	1
R2	5030-183	Resistor, carbon film, 4k7, 0.5W	1
R3,R5	5030-184	Resistor, carbon film, 10k, 0.5W	2
33	5030-185	Edge connector (PYE) 466-523	1
34	5030-186	Printed circuit board PCB (OB1)	1
35	5030-187	Transformer T1, 240V to 20V, 1A (Douglas) MT79CT	1
36	5030-188	Optic switch SW5, slotted (GI) MC78	1
37	5030-189	Optic switch SW6, slotted (GI) MC78	1
38	5030-190	Fuse holder F1 (Bulgin) F315	1
39*	5030-191	Fuse, quick blow 2A, 1 1/4 in glass	1
40*	5030-192	Bridge rectifier B2 (RS) 261-328	1
41	5030-193	Capacitor C4, electrolytic, 4700 uF, 63V (RS) 103-064	1
42	5030-194	Relay M2, 240V a.c. (PYE) 12-350/232-380	1
43	5030-195	Relay base, octal (RS) 401-267	1

## 10. ACCESSORIES

Accessories can be obtained through the local Bright dealer or from Bright Instrument Co. Ltd.

When ordering accessories, provide the following details:

- (a) Model type and serial number of the microtome.
- (b) Full description and part number of the accessories required.
- (c) Address to which parts are to be delivered.
- (d) Address to which invoice is to be delivered.

Part No.	Description
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Note: \* denotes optional extras that require factory fitting.

A-225-B*	Motor drive, 220-230V, 50Hz
A-226-B*	Motor drive, 110-115V, 60Hz
A-227-B*	Electronically variable sectioning zone control system - motor driven models only
A-1020-B*	Orientating object holder clamp type (vice) - only available if ordered with microtome
A-215-B*	Knife carriage feed screw mechanism - not available with 5030 Cryostat model
A-217-B*	Micro-adjustable knife angle mechanism
B1013	Simple pattern tubular object holder 22mm diam. - Cryostat model
A-5150-B	Object holder 5mm diam.
A-1015-B	Object holder 22mm diam.
A-1016-B	Object holder 37mm diam.
A-999-B	Object holder 50mm diam.
A5050-B	Object holder 50mm x 50mm
A5070-B	Object holder 50mm x 70mm
A-995-B	Orientating universal holder (not necessary for microtomes fitted with optional extra A-1020-B) for use with ball type orientating object holders.

Ball type orientating object holders (for use with A-955-B):

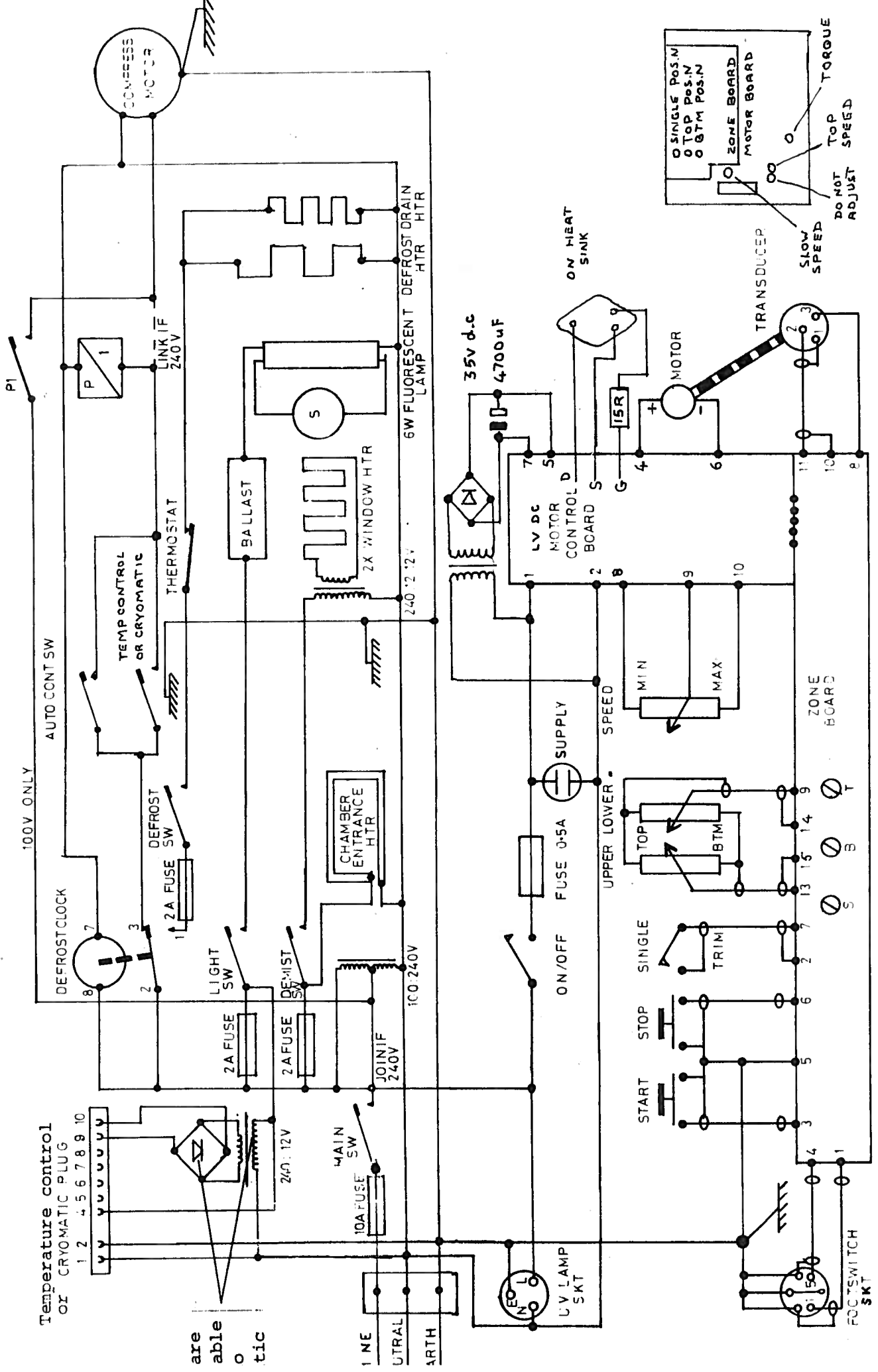
A-5151-B	5mm diam.
A-998-B	22mm diam.
A-997-B	37mm diam.
A-996-B	50mm diam.

Feed screw assemblies for sections:

A-212-S	0.5 to 30 micron in 0.5 micron increments
A-212-B	0.2 to 12 micron in 0.2 micron increments
A-214-B	1.0 to 60 micron in 1.0 micron increments
A2120-B	2 to 120 micron in 2.0 micron increments
A3180-B	3 to 180 micron in 3.0 micron increments

A-213-B	Glass knife holder for thin sections
A-216-B	Glass knife holder fully orientating
A-930-B	C02 operated freezing object holder (with drip feed to cool knife)
A-931-B	Solid C02 knife and object holder freezer
SR.20	Perspex anti-roll guide plate, 38mm - 5030 Cryostat model
5030-15	Perspex anti-roll guide plate, 76mm - 5030 Cryostat model
A-2320-W	Fluorescent lamp complete with magnifier
5030-192	Fluorescent tube

Part No.	Description
A-0002-B	20° knife holder and anti-roll device - Cryostat model
A-0002-C	20° knife holder for hard sections
	Knives:
B1009DR	Knife, 22° angle, 189mm x 27mm x 10mm with 40mm x 7mm safety cut-outs at both ends. Drilled and tapped to accept Shandon-Elliott knife sharpener. Supplied in wooden box.
B1008	Knife sharpening bevel (back)
B1007	Knife handle
B160359CDR	Knife 160 x 35 x 9mm "C" profile with box
B163213DR	Knife 160 x 32 x 13mm "C" profile with box
B228386TCDR	Knife 228 x 38mm/150mm Tungsten Carbide "C" profile with box
B1638TCDR	Knife 160 x 38mm Tungsten Carbide "C" profile with box
B164038TCDR	Knife 160 x 38/40mm Tungsten Carbide "C" profile with box
5030-192	Angle converter for adapting Tungsten Carbide knives for Auto-cut Microtome
B1023	Knife cleaning brush
A-52423-C	Knife sharpening kit, comprises hone, strop, oil and abrasives
B1029	Bright Cryospray Aerosols, carton of 12
B1056	Bright Cryo-M-Bed, carton of 6



# O.T. CRYOSTAT CIRCUIT DIAGRAM