INSTRUCTION MANUAL

OTF 5000 All Models

Model shown HS

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BS EN ISO 9001:2008
Certificate No. Q 05456

CONTENTS

SAFETY INFORMATION

CONSUMER PROTECTION

The Consumer Protection Act 1987 Part 1, refers to Product Liability. This legislation was issued as a direct result of an EC Directive to all member states and has been in force with effect from 1st March 1988.
Bright Instrument Co Ltd, ever mindful of the need to ensure that their products are not subject to misuse and/or incorrect handling, have made it their aim to communicate any possible dangers to their customers.
Whilst Bright Instrument Co Ltd markets products manufactured to the highest safety standards, it is in the interest of the purchaser that he is aware of the resultant dangers of misuse and/or incorrect handling of these products.
Your attention is therefore drawn to the following precautions:

ELECTRICAL

a Warnings - A warning notice is fixed to the instrument stating that it should be disconnected from the power supply before removing the panels. This warning should be strictly observed. This cryostat is fitted with an in line mains filter which may affect portable appliance test results.

b Fuses - Fuse ratings are clearly indicated on all fuse panels adjacent to the fuse holder. If and when replacement is necessary, the correct fuse rating must be adhered to.

c Earthing (Grounding) - A protective earth terminal is fitted, and must be used in all two wire installations.

MICROTOMES KNIVES/BLADES

Microtome knives and blades can be hazardous in the laboratory. Personnel should be made aware of the dangers and observe the following warnings:

a **DO NOT** leave the microtome unattended with an exposed knife in position. Remove the knife or cover it with the guards provided.

b **DO NOT** leave knives lying around. Place knives that are not in use in their boxes.

c **DO NOT** carry knives unless secure in the box provided.

d **DO NOT** clean the knife along its length. Wipe from the back edge to the cutting edge.

e **REMEMBER** that even used knives are dangerous - they are still sharp and may have been used to cut potentially infectious specimens.

f **DISPOSE** of used knives with the same care as other sharp objects. On no account should used knives be placed in waste bins.

OPERATION

When placing object holders in the microtome, when orientating, manipulating or in any way placing fingers in a position above the knife edge - ensure that the handwheel is locked and knife guards are in position.

LOW TEMPERATURES

Parts of this instrument may attain temperatures as low as minus 50ºC. It is important to avoid allowing bare skin to touch such cold surfaces - when in doubt, wear gloves. Avoid touching the knife - it is cold as well as sharp! Always use knife guards.

ACCESSORIES

Fluids supplied as accessories with Bright instruments, such as Cryospray 134, Cryo-M-Bed and microtome oil, are strictly for laboratory use only. They should not be taken by mouth and precautions afforded to other laboratory chemicals should be adhered to. Please refer to the material safety data information, towards the back of this instruction manual, for further details.
Care must be taken when using Cryospray 134. The risk of creating an aerosol of potentially infectious tissue particles must be borne in mind.

PRODUCT SAFETY SUGGESTIONS

All Bright Instrument Co Ltd personnel are encouraged to make suggestions regarding product safety. We also welcome such suggestions from our customers. They may be submitted by completing the appropriate (Safety) section of the Quality Survey Record Form supplied with all Bright instruments, or alternatively by letter, telephone, fax or email. All communications should be directed to our Quality Assurance Department and will be acknowledged.

DECONTAMINATION CERTIFICATES

IMPORTANT

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

1 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 that it be decontaminated.

2 A code of practice for decontamination has been prepared by the Health Services Advisory Committee and endorsed by the Health and Safety Commission, see section 4.8. For the avoidance of doubt, we require that all instruments or parts returned to us should be accompanied by a completed decontamination certificate. A copy of this can be found towards the back of this instruction manual and we suggest you use a photocopy of this. Alternatively we would be pleased to either post or fax you another copy should you require.

3 Decontamination certification should be faxed to Bright Instrument Co Ltd prior to the unit being received, or can be attached externally to the carton. Should no decontamination certificate be received, or 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, unrepaired, at the expense of the customer.

4 Customs declarations must indicate that the package contains ‘British Returned Goods’. Failure to do so will involve customs duty payable by us, which will be invoiced to the sender.

WARNING

Before proceeding to Operating Instructions, ensure you are familiar with the contents of the pages marked ‘Safety Information’. This instrument must only be used by competent persons.

WARRANTY

The warranty relating to the instrument is outlined in our Terms and Conditions of Sale, paragraph 6.

Warranty

1. The Seller's manufactures are carefully inspected and submitted to its standard tests.

2. The Seller warrants all its manufactures to be free from defects in workmanship and materials under normal conditions of use and service provided always:

3. that if any of the goods so manufactured is alleged to be defective in workmanship and materials and is returned carriage paid, and protected against damage in transit, to the Seller's works, Huntingdon, within 12 months from the date of despatch and if after examination by the Seller the goods or part of them are found to be so defective then the Seller will repair or replace them free of charge and will return them to the Buyer, carriage paid;

4. where any part of the goods manufactured by the Seller is repaired or replaced under the terms of the foregoing warranty, such warranty shall thereafter be limited to a period of six months from the date when the goods shall have been re-delivered to the Buyer;

5. this warranty does not apply to any defects caused by wear and tear, incorrect installation, abnormal conditions of working, accident, mis-use or neglect;

6. that save as in this clause herein before expressed, the Seller shall not be under any liability for negligence or otherwise in respect of defects in goods delivered or for any injury, damage or loss resulting from such defects, and the Seller's liability under this clause shall be in lieu of any warranty or condition implied by law as to the quality or fitness for any particular purpose of such goods;

7. this warranty is expressly in lieu of all other warranties, guarantees or liabilities expressed or implied by any of the Seller's Representatives or Agents.

For customers in the UK mainland please see our separate Product Warranty sheet.

1.1 RECEIPT AND UNPACKING

This instrument received a final test and inspection prior to despatch from the factory. The following instructions are given for the re-assembly of the instrument, adjustments and its correct use. If the instrument is received before preparations for installation are completed; it should be stored in a clean, dry place and not exposed to dirty or damp conditions. Do not place or store any items on top of the carton.

1.1.1 RECEIPT

Immediately upon receipt of the instrument, make a careful examination for evidence of damage encountered in transit. If any damage is found or suspected, notify both the carrier and Bright Instrument Co Ltd immediately.

1.1.2 UNPACKING

All packing must be carefully removed and parts checked against the enclosed packing list. If any damage or discrepancy is noted, please inform our agent/distributor, or Bright Instrument Co Ltd direct, immediately. To prevent damage in transit, the handwheel and microtome have been removed and packed in separate containers together with the accessories.

1.2 ASSEMBLY AND INSTALLATION

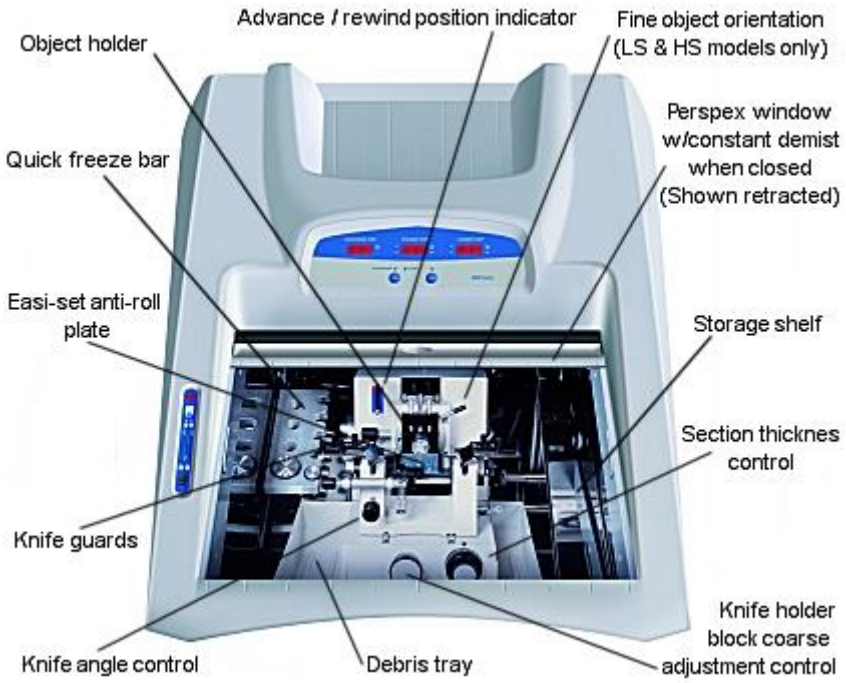
1.2.1 FITTING THE HANDWHEEL

Push the handwheel over the shaft on the right side of the cabinet. Ensure the pin on the shaft engages the slot in the centre of the handwheel. Press firmly home, then fit and tighten the centre screw. Using the special tool provided, 212-053. Older models need a large, flat bladed screwdriver.

1.2.2 DRAIN TUBE AND PLUG

A small drain plug is fitted to the bottom left corner of the chamber, and a drain tube takes defrost water out the left side of the cabinet.
Pour approximately 100ml of water down the drain hole and place the tapered plug into position. The purpose of the water is to act as a vapour lock to prevent the ingress of moist laboratory air. The drain plug should be left in position except when cleaning is carried out.

1.2.3 INSTALLATION OF TRAYS AND SHELVES – FIG 2



A pair of stainless steel trays is packed separately and each marked left and right. Install the right tray first, placing it horizontally on the right hand side of the chamber below the drive shaft projecting from the cabinet wall. Ensure that the rearmost part of the tray firmly locates on the rear wall of the cabinet. After fitting the microtome, (see section 1.2.5), install the left tray in a similar way.
(Alternatively, for cryostats with the /QF option, install the left tray behind the quick freezer, locating on the two studs provided. Fit the small shelf to the front of the /QF).
Next, fit the long narrow shelf to the upper right hand wall of the chamber, locating onto the two studs provided. The trays and shelves are loose fitting and are readily removed for cleaning etc.

1.2.4 FROST ELIMINATION COVER – FIG 3

Frost Elimination Cover
Place on the quick freezer plate

1.2.5 INSTALLATION OF THE MICROTOME (and REMOVAL)

WARNING - The microtome weighs approximately 15kg. Ensure that adequate precautions are taken to prevent injury, i.e. back strain, when lifting and moving. The use of an industrial, personal lifting belt is highly recommended.

Remove the shipping stay as follows:

1 Loosen the specimen clamp and knife clamp screws FIG 4(5).
2 Slide out the shipping stay and the packaging.
3 Retain the stay for possible future use and dispose of the packaging.

Now install the microtome:

1 With your right hand under the front of the microtome and your left hand under the rear left side, carefully lift the microtome into the chamber.

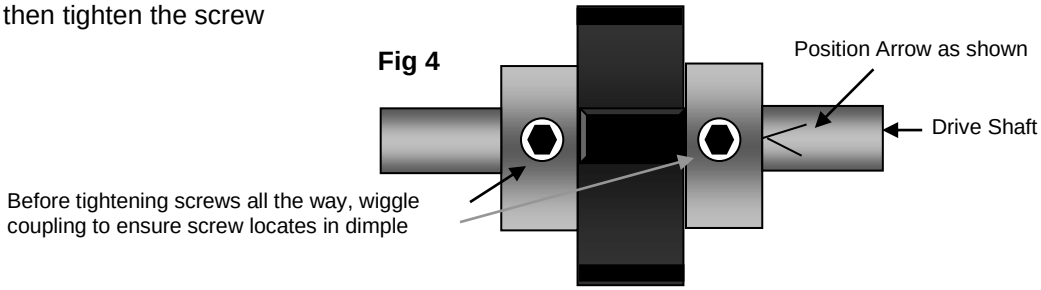
2 Locate it on the four studs in the chamber. Look for the reflection of the holes in the base of the microtome to locate the front two studs - the rear ones will follow.

3 Loosen the two recessed grub screws in the coupling on the Drive shaft projecting from the right chamber wall.

4 Slide the coupling onto the corresponding shaft on the microtome, ensuring that the left screw is exactly over the dimple in the microtome shaft. Tighten the left screw.

5 Now rotate the handwheel until the arrow head (<) points to the right screw as shown below (Fig 4), then tighten the screw

Fig 4



Check that the coupling has been correctly fitted by rotating the handwheel, the specimen arm should rise as the handwheel's knob moves upwards, and should be at the bottom of the stroke when the handwheel knob is at its lowest position.

6 Install the rewind control knob on the top of the microtome. Please note that this knob must be removed prior to lifting the microtome out of the chamber.

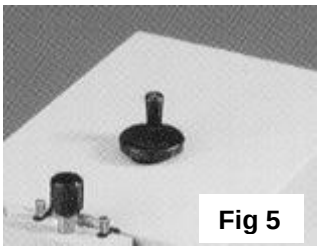


Fig 5

7 For /MAR - Motorised Advance Rewind (where applicable): When fitting the microtome, the electrical socket and plug must be connected and screwed together. Before removing the microtome from the cryostat, the electrical socket and plug must be unscrewed and disconnected. Ensure that the power supply is disconnected before installing or removing the microtome.

8 For /D - Cryomatic Specimen Temperature Control (where applicable): Install the temperature heater/vee block in the microtome head first and then route the cable around the microtome using the cable clips already fitted. Ensure that the power supply is disconnected before installing or removing the microtome.

9 Position the left tray.

10 Finally, place the plastic brush and debris tray in position at the front of the microtome, ensuring it is in contact with the base of the microtome.

To Remove the Microtome (Refer to Fig 4):

1 Remove Debris Tray in front of microtome.

2 Remove Advance/Rewind Knob (on top of microtome) by pulling upward.

3 Remove LH tray by sliding forward and up.

4 If a heated v-block is fitted then lift it & move it out of the way

5 Remove Coupling by loosening grub screws and slide onto Drive shaft (see Fig 4)

6 Use 2.5mm Allen Key (supplied)

7 If MAR then unplug socket at bottom Left of Tank.

8 With your right hand under the front of the microtome and your left hand under the rear left side, carefully lift the microtome from the pins in the chamber.

1.2.6 INSULATED NIGHT PLUG

Unpack and store ready for use when required

1.2.7 /X - THIN SECTION CONVERSION KIT (where applicable)

Refer to section 2.2.3

1.2.8 /U - ULTRA VIOLET LIGHT DECONTAMINATION UNIT (where applicable)

Unpack and store ready for use when required

1.2.9 /Y - GLOVE PORT (where applicable)

For access to the cryostat chamber, press the glove port unit into the lower half of the window recess and then close the window until it seals against the glove port unit.

1.2.10 /V - FOOT SWITCH (where applicable)

Plug the foot switch lead into the socket on the lower front surface of cabinet, right hand side. Place the foot switch on the floor in a convenient position.

1.2.11 POSITIONING

Fit the two spacer brackets to the rear of the cabinet and ensure that nothing will block the vents on this rear panel. The instrument should be positioned on a level floor so that an unrestricted air flow through the cooling vents is obtained. This is necessary in order to ensure adequate ventilation, and can be achieved by leaving a gap of 100mm minimum at the rear of the cabinet. Ensure that the instrument has been positioned away from direct, hot sunlight and is in a location completely free from draughts, e.g. fans, air conditioning units, air inlets and air outlets etc. The instrument is mounted on castors, two of which are lockable, to give easy movement.

1.3 ELECTRICAL

1.3.1 SETTLING

During transit the oil in the compressor will have been subject to movement, so it is important to let the cryostat settle before switching on. We recommend the instrument is left standing for at least eight hours, and preferably overnight, before switching on.
Moving the instrument around on its castors, e.g. from one laboratory to another, will not affect the compressor oil.

1.3.2 ELECTRICAL REQUIREMENTS

The supply cord of the instrument should be connected to any ordinary electrical outlet (minimum 13 amps for 220/240V), a 13 amp fuse should be incorporated in the line. (minimum 20 amps for 110/115V) Check the voltage stamped on the nameplate, located on the back of the cabinet, with your supply.
The connections are:

Brown	-	Positive (live)
Blue	-	Negative (neutral)
Yellow/Green	-	Earth (ground)

1.3.3 ELECTRICAL SAFETY

Where earth cables may have to be removed from panels for servicing or repair purposes, care should be taken to replace them when replacing the panel. Earth points are identified by a yellow and green striped circular sticker.
Where earth connections are taken through connectors, then the connector must be rated to take the maximum fault current. The machine should be disconnected before such connectors are separated for servicing purposes.
This cryostat is fitted with an in line mains filter which may affect portable appliance test results.

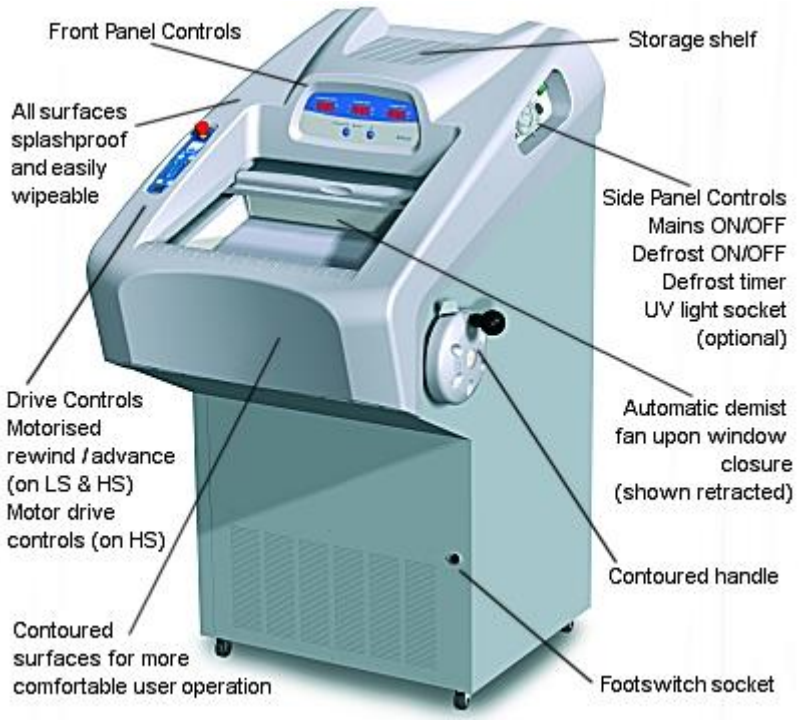
2 OPERATING INSTRUCTIONS

INTRODUCTION

Based on the long-established and reliable OTF/AS cryostat, the new OTF5000 brings Bright cryostats completely up to date. New styling with improved user ergonomics, the latest blade systems in the ever-reliable and powerful 5040 microtome, a huge choice of options plus money-saving package deals make these cryostats absolutely unique.

They are suitable for an endless range of applications and in the correct configuration are capable of cutting a wide diversity of specimens from undecalcified bone to brain, resins, plastics and plant tissue as well as more usual soft tissue. Allowing full anti-roll plate adjustment for perfect results coupled with long lasting temperature stability, the OTF5000 can truly be described as complete.

FIG 1



SWITCHING ON

On receipt of your new Bright instrument, please refer to the Receipt and Unpacking section and the Assembly and Installation section of this Handbook
As part of its policy of continual improvement, Bright Instrument Company Limited reserves the right to incorporate changes, or make additions to, without prior notice. There may, therefore, be minor detail differences between the information in this manual and your instrument. These differences will not affect the safety and use of the instrument.
After settling, switch on the power (see section 2.1.1). Initially the LED displays will flash for a few seconds. Once the displays are constant, the required chamber temperature can be set (see section 2.1.8). After the cryostat has reached the set chamber temperature, leave for a further two hours before attempting to cut sections.

2.1 CABINET CONTROLS

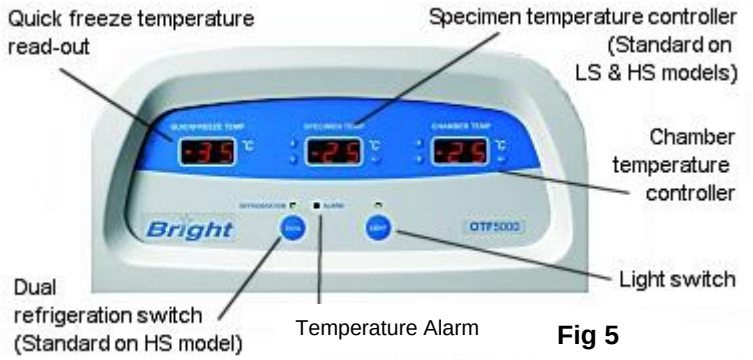


Fig 5

FIG 6

2.1.1 MAINS SWITCH (Located on side panel)

This switch is used to connect the power supply to the cryostat. Operate this switch to switch the instrument on and off.

2.1.2 LIGHT SWITCH BUTTON

This switch operates the fluorescent lamp, which should be switched off whenever the night plug is in position.

2.1.3 DEFROST SWITCH (Located on the side panel)

This switch will only activate in conjunction with the defrost clock settings. When on, a heater is activated which is in contact with the evaporator cooling fins during the defrost cycle and the switch will illuminate.

2.1.4 DEFROST CLOCK (Located on side panel)

This clock sets the time required for the routine defrosting of the evaporator cooling fins. During the defrost cycle the clock switches off the refrigeration unit and activates a low power heater, which clears frost from the evaporator cooling fins. The defrost clock should be set so that it initiates the defrost at night, and the defrost duration is sufficient to clear the evaporator cooling fins without the rest of the chamber rising above 0ºC.
Set the 12 hour analogue clock to the current time by turning the clear plastic disc with your finger. Note that because the defrost needs to run on a 24 hour cycle, make sure that the small black arrow is aligned with the correct number of the outer ring e.g. if the time is 4.00pm, then the corresponding number is 16.
The defrost time is set in the factory to start at midnight for 30 minutes, but may be altered by moving the pins which are around the edge of the clock face. If the time already set provides inadequate defrosting, it is recommended that a second 30 minute cycle is programmed to operate several hours later (e.g. at 12 midnight and 6am).
Important: do not increase the defrost time above 30 minutes, as the microtome and chamber may warm up above 0ºC, causing pools of water to form and subsequently freeze to form ice.
In conditions of high humidity some experimentation may be required to obtain optimal defrosting (see section 4.5).

Please note that the defrost switch is normally left in the ON position.

There is an override switch on the defrost clock: turning the small black button switches the defrost cycle on or off.

2.1.5 CHAMBER TEMPERATURE

FIG 7

To set the chamber temperature, press and release the Set button and then press the Up or Down buttons until the desired temperature is set. After 5 seconds the actual chamber temperature will show.
To view the Set temperature, press and release the Set button.

WARNING: Do not hold the Set button down for more than six seconds as the control will go into a diagnostic/calibration mode. If the diagnostic/calibration mode is selected in error take the following steps:

a If Up or Down have not been pressed (i.e. no new parameters have been entered), simply leave for 20 seconds. Display will revert to normal.
b If new parameters have been selected contact Bright Instrument Co Ltd or your local representative for advice.

Temperature Alarm

The chamber temperature controller also features an alarm setting which is audible and connected to an Alarm LED (shown in Fig 5). The Alarm setting is pre-set at the factory.

The alarm function warns the operator if there is a significant deviation from the set chamber temperature, so that corrective action can be taken – See Trouble Shooting below.

The controller is factory set with a 2ºC control differential, an 8ºC High Alarm setting and a 20ºC Low Alarm setting. This means it operates in the following way:

The alarm (light and audible) will activate if the working chambers warms up 8ºC more than the set chamber temperature or if the chamber temperature goes 20ºC colder than the set temperature. The Alarm can be manually reset by pressing any one of the 3 Controller buttons on the Chamber Temperature Controller shown in Fig 7.

On start up, the Alarm is deactivated for 3 hours to allow the cryostat reach its set chamber temperature. It will then automatically become activated.

During ‘Defrost’ the power to the Controllers is switched off. When defrost is complete the power will be switched back on to the controllers. Please note that the Alarm will revert back to start up status and will not become active for 3 hours.

Trouble Shooting

The Alarm may sound in the following conditions:

- If continual work is carried out for long periods with the window open & hands in the chamber (particularly at low temperature setting), the chamber may warm enough to set the alarm off

- If the temperature has been reset by more than 8ºC (High Alarm setting) or less than 20ºC (Low Alarm setting), the alarm will sound until the temperature is within the range.

- Placing a warm microtome in a cold chamber could also cause the alarm to activate.

The correct action to follow is:

- Reset the Alarm as detailed above
- Close the window and see if the chamber temperature cools down
- If it does then continue working

If the chamber continues to warm there is a strong possibility of a fault, call your service engineer
If the unit returns to its correct operating temperature it could be that the Alarm parameters need to be adjusted to suit your working conditions. If required contact your service engineer for instructions.

2.1.6 /D - CRYOMATIC SPECIMEN TEMPERATURE CONTROL (where applicable)

FIG 8

To set the specimen temperature, press and release the Set button and then press the Up or Down buttons until the desired temperature is set. After 5 seconds the actual temperature will show. To review the Set temperature at any time press and release the Set button.
NB: This system can only set temperatures above the selected chamber temperature, not colder.

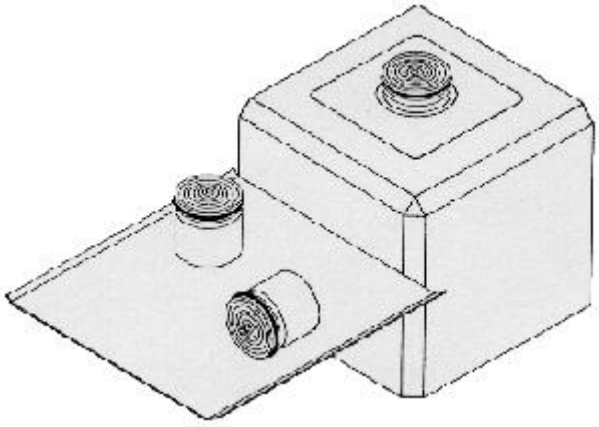
2.1.7 QUICK FREEZER PLATE

FIG 9

Remove the frost elimination cover before using the quick freezer plate. This plate runs at or below the set chamber temperature (typically 10ºC below chamber temperature) and is useful for storage or pre-cooling of knives etc. Although it is possible to freeze fresh tissue on the quick freezer plate, it is generally preferable to use a much colder medium.
The temperature of the quick freezer plate is displayed constantly on the main control panel. Do not forget to replace the frost elimination cover after using the quick freezer plate, this helps prevent a build up of frost.

2.1.8 /QF - SPECIMEN QUICK FREEZER (where applicable)

FIG 10



The specimen quick freezer (/QF) is designed for rapid freezing of specimens mounted on specimen holders. Cooled by a separate compressor, the /QF can either run continuously or be switched on 30 minutes before use. Please note that the operation of the freezer is dependant on the operation of the chamber compressor. The /QF will not function when a chamber temperature warmer than -15ºC is selected. Optimum performance is achieved with chamber temperatures of -20ºC or colder.

SAFETY: The quick freezer operates at extremely low temperatures and may cause freeze burns. Suitable protective gloves should be worn when handling frozen specimen holders.

Switching On

1 Ensure that the /QF is clean and dry before switching the cryostat on, as the cold chamber temperature will freeze the quick freezer even when it is switched off.

2 Ensure that the appropriate sleeve is fitted into the freezer block to accept the object holder to be used, (a sleeve for the standard 22mm object holder is fitted and a sleeve for the 37mm object holder is supplied in addition).

3 Place the /QF cover over the /QF, this will reduce the rate that frost forms.

4 Switch the /QF on at least 30 minutes before it is required for use. Please note that in certain conditions the /QF compressor will not operate immediately. This is because the operation of the /QF compressor is dependant on the temperature of a heat exchanger, which is cooled by the chamber cooling system. Once the chamber compressor has been running for a few minutes the /QF compressor will operate and the /QF will start to cool.

Using the /QF

1 Wait until the /QF has reached a temperature of at least minus 70ºC before freezing specimens. Although specimens will freeze at warmer temperatures the advantages of the rapid freezing will be lost.

2 Apply a layer of embedding compound to the object holder (which must be above a temperature of 0ºC), place the specimen on top of the object holder and then insert the object holder into the sleeve of the /QF. While this is freezing through, but before the top surface of the embedding compound goes solid, apply subsequent layers of embedding compound if required. Once the specimen is frozen all the way through, remove the object holder, complete with the specimen and place it in the vice jaws ready for sectioning.

Note - the /QF is obviously very cold and if the object holder is left in it for some length of time the specimen will achieve a temperature of -80ºC. If the specimen is then placed in the vice jaws it will be far too cold to cut and if attempted, damage may occur to knives. It is imperative that a little time is allowed for the specimen temperature to equalise before cutting commences.

Defrosting

Defrosting of the /QF is controlled by the cryostats defrost clock. It is recommended to select 30 minutes defrost each night.

Always switch off the /QF and remove its cover at the end of the day when defrosting is required. Failure to do this will result in rapid frosting of the /QF once it starts working. This is due to the increased humidity in the chamber and /QF resulting from the defrosting. Once the chamber has cooled to its normal working temperature, this humidity will have reduced.

At the start of the day, switch on the /QF and replace its cover.

Temperature Calibration

The temperature display has been calibrated to read accurately between -70ºC and -80ºC. It may read inaccurately at temperatures significantly out of this range (e.g. at room temperature).

2.1.9 /EC or /LT or /LOWEC - DUAL REFRIGERATION SYSTEM (where applicable)

Press the DUAL button on the front panel to initiate use of both compressors.

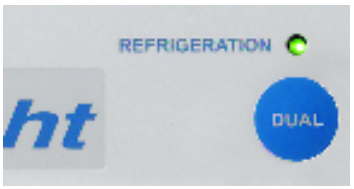


FIG 11

NOTE: When running without the DUAL light illuminated, the cryostat will automatically switch between one compressor and the other in order to reduce wear on the ocmpressors.
Please note that there will be a pause of 40 to 70 seconds between the compressors starting in order to reduce current surges.

In the DUAL mode, full advantage can be taken of the extra refrigeration power available, and an extra 5ºC can be achieved in the cryostats freezing performance.

2.1.10 MOTORISED ADVANCE/REWIND (where applicable)

FIG 12

Warning:
Do not operate the rewind motor when the cutting arm is in motion. Only operate the rewind motor with the cutting arm at the rest position. The advance motor may be operated when the cutting arm is in motion. Operating outside these parameters can cause damage to the mechanical components of the instrument.

Motorised Specimen Advance

1 With the specimen in place set the specimen thickness control to 0µm

2 Fully rewind the specimen.

3 Adjust the position of the knife carriage with knife to specimen clearance set to a minimum (refer to section 2.2.2 to install a knife and for recommended knife angle).

4 Lock the knife carriage.

5 Begin advance, with cutting arm fully up, by 'toggling' the Advance switch whilst rotating the handwheel. The longer the switch is pressed the thicker the section. If the Advance switch is pressed for more than 1.5 seconds, a faster advance of the specimen is achieved.

Motorised Specimen Rewind

1 To fully rewind specimen, 'toggle' the Rewind switch for a minimum of 1.5 seconds and release. The feedscrew will automatically stop when fully rewound.

2 To stop the specimen rewinding during the period, 'toggle' the Advance switch and release immediately.

For small rewind increments, quickly 'toggle' the Rewind switch.

2.1.11 HANDWHEEL

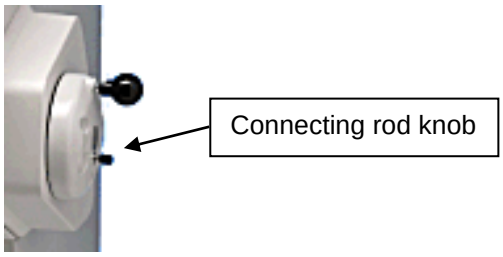


FIG 14 /HS and models with /MR and /MR(S)

On instruments without /MR or /MR(S) the handwheel is fitted with a locking lever which locks the wheel (and therefore the specimen arm) in a variety of positions.

Where /MR or /MR(S) is fitted, leave the specimen arm in the top position before switching off motor. The arm and handwheel can now be locked in position by pushing in the connecting rod knob.

For safety, the handwheel MUST BE LOCKED whenever a specimen is being fitted, manipulated or removed.

2.1.12 /MR or /MR(S) - MOTOR DRIVE (where applicable)

To operate the motor drive:

FIG 15

1 Rotate the handwheel while pushing the small connecting rod knob. The rod will engage through to the motor drive, and the handwheel is now locked into the motor drive.

2 Switch on Drive. The green Power light will illuminate.

3 Select Trim mode (for continuous running of motor drive).

4 After ensuring the specimen will not collide with the knife, press Start the Drive.

5 Use the Speed Control to adjust cutting speed

6 Adjust the Zone control. The space between the Upper and Lower positions indicates that part of the specimen travel which is determined by the speed control.

7 By switching to Single the arm will be made to stop at the bottom of each stroke, allowing section collection.

8 To stop the drive, press Stop. Start and Stop functions can be used at any time.

Pull out the connecting rod knob to operate the microtome manually.

The Emergency Stop button stays in when pressed. Twist button in direction of arrows to release. Then press Start to continue.

2.1.13 /C - ELECTRONIC SECTION COUNTER (where applicable)

When the cryostat's power is on, the preset digital counter will remain illuminated at all times.

1 Use the + and - buttons to set the desired preset count, up to 9999 is possible. Remember that without a programmed setting the motor will not run.

2 Press the Reset button and then start as stated in /MR instructions (section 2.1.13 above). The counter will then count up to the preset count and then stop.

3 Repeat step 2 to continue using the counter or go back to step 1 if a new preset count needs to be entered.

2.1.14 /V - FOOT SWITCH (where fitted)

When the motor drive is in use the left and right foot switches will duplicate the action of the Stop and Start buttons respectively. A combination of both hand (using the Stop and Start buttons) and foot (using the foot switch) operations may be used.

2.1.15 /U - ULTRA VIOLET LIGHT DECONTAMINATION UNIT (where applicable)

Following is the recommended use of the /U optional feature. The information given is, to the best of the Company's knowledge and belief, accurate and reliable. However, no warranty, guarantee or representation is made to its accuracy, reliability or completeness. Much will depend upon the specimens and substances being worked on and other decontamination procedures being used.

CAUTION: UV-C radiation is dangerous and excess exposure can cause skin and eye damage.

The germicidal lamp has a peak short wave radiation of 254nm, and combined with some reflection from the stainless steel chamber will irradiate bacteria and viruses within the chamber, however, any bacteria trapped in shadows or hidden pockets will not be irradiated and will remain active.

To prevent airborne contamination in the chamber due to convection air currents caused by the refrigeration system it is recommended that the UV system is switched on at all times the cryostat is not being used.

The life of the 6W TUV lamp is 5000 hours, after which it should be replaced.

Open the window and press the ultra violet light decontamination unit into the window recess to help with decontamination when the instrument is not in use. Plug the lead into the UV socket on the control panel and switch on.

2.1.16 /Y - GLOVE PORT (where applicable)

For access to the cryostat chamber, press the glove port unit into the lower half of the window recess and then close the window until it seals against the glove port unit.

Allows hands to access the cryostat chamber without opening the window and may be used in conjunction with the foot switch (see above). Once glove port has been fitted, simply remove the porthole plugs to allow access. When finished, replace porthole plugs or remove the complete unit by reversing the procedures above.

2.2 MICROTOME CONTROLS - STANDARD KNIFE BLOCK

Refer FIG 16

1	Section thickness control	11	Knife guard height adjustment screw
2	Knife holder block	12	Knife guard release knob
3	Knife block clamp locking lever	13	Knife guard slider knobs
4	Knife carriage feed control	14	Anti-roll plate clamp knob
5	Knife clamp screws	15	Easi-Set anti-roll plate
6	Microtome knife	16	Anti-roll T piece clamp screw
7	Knife angle scale	17	Anti-roll micro adjusting knob
8	Knife angle adjustment knob	18	Anti-roll height clamp screw
9	Knife guard	19	Anti-roll extension knob
10	Knife guard release knob		

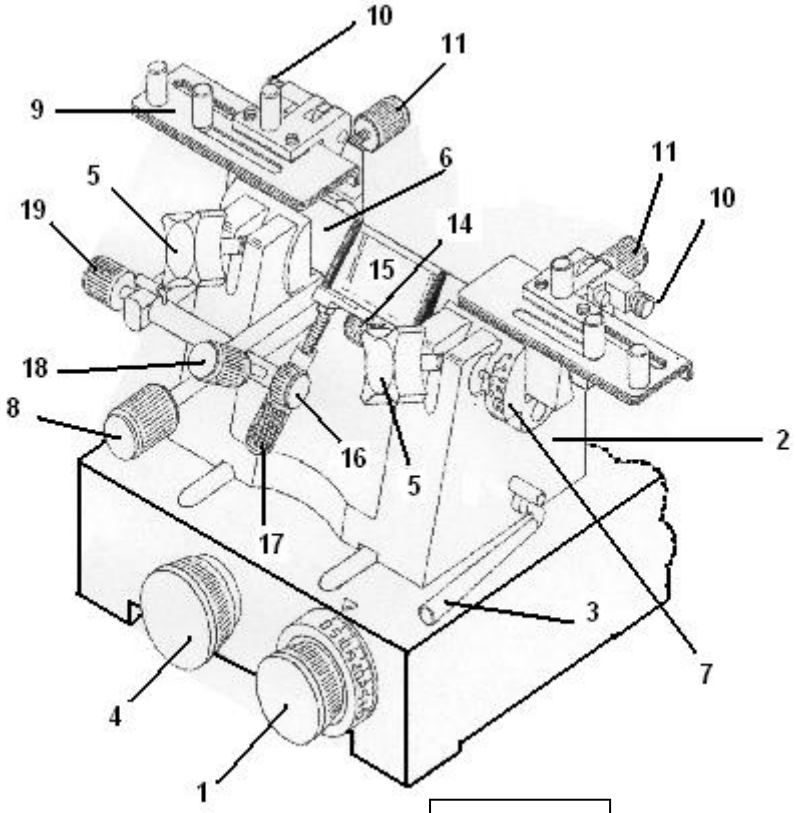


Fig 16

2.2.1 KNIFE GUARDS

A pair of knife guards (9) are fitted and it is strongly recommended that they remain fitted at all times.
When access to the knife is required, the knife guards can be opened. Pull the knife guard raise knobs (10) to release and then push the guards up.
During sectioning, the guards are slid to the outer position. At all other times when a knife is fitted, the guards should be slid to the central position for operator safety. To adjust the knife guards loosen the knife guard release knob (12) and using the knife guard slider knobs (13) move from side to side.
To remove the knife guards completely, loosen the knife guard removal screw (11) at the rear to lift the complete guard off.

2.2.2 KNIFE HOLDER

To ensure optimum sectioning performance the knife must be kept clean from grease and dirt. To clean the knife, carefully apply a small amount of methylated spirits or ethanol to the surface of the knife using a clean, dry, soft paper towel. Always move the towel away from the edge of the knife - never towards it.

To install a knife, loosen the knife clamp screws (5), slide the knife guards to the centre and slide the knife in from the left.

Before re-tightening the knife clamp screws, set the knife tilt angle scale (7) by adjusting the knife angle adjustment knob (8). The correct setting of the knife angle is essential for obtaining good results.

See the table below for a list of recommended knife angles.

Recommended Knife Angles	Angle	+/-
50230 - Standard knife	15º	2.5º
50232-1 - Hardened Steel knife	12º	2.5º
50207 - Steel knife	15º	2.5º
50234 - Tungsten Carbide Tipped knife	25º	2.5º
Lever release Feather blade holder	7.5º	2.5º

To remove a knife, loosen the knife clamp screws (5), slide the knife guards to the centre and slide the knife out through to the left.

2.2.3 /X - THIN SECTION CONVERSION KIT (where applicable)

This kit consists of a 0.2 - 12µm feed screw (part number 50256), an orientating glass knife holder (part number 50681) and a 0.2 - 12µm section thickness scale (part number 52364). The thin section conversion kit should only be fitted with the cryostat fully defrosted, decontaminated, clean, dry and switched off. For details of a total defrost refer to section 4.3.

Step 1 - Fit the 0.2 - 12µm Feed Screw (refer to section **Error! Reference source not found.**).

Step 2 - Fitting the Orientating Glass Knife Holder

Refer to Figure 16

1 Loosen the knife clamp screws (5) and lift the knife guards up.

2 Place the orientating glass knife holder in from the top.

3 Set the knife tilt angle scale (7) to the desired angle. Usually between 1º and 3º maximum for glass knives.

4 Lower the knife guards and retighten the knife clamp screws (5).

5 Place the glass knife into the orientating glass knife holder. The orientating glass knife holder accepts 25mm high Latta-Hartman knives with edges up to 15mm.

Step 3 - Fitting the 0.2 - 12µm Section Thickness Scale

Refer to Figure 16

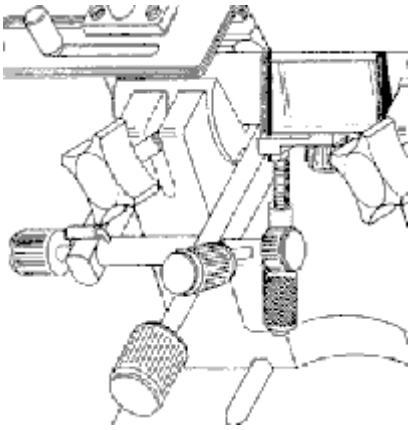
1 With the thickness set to zero, pull off the standard section thickness scale (19).

2 Snap on the 0.2 - 12µm section thickness scale and the kit is ready to use.

Proceed with the sectioning of your specimens, see section 3 (Cutting and Collecting Specimens). To remove the thin section conversion kit, just follow the instructions above replacing items from the thin section conversion kit with the items that were removed.

2.2.4 ANTI-ROLL ASSEMBLY

Refer to Figure 16



The Easi-Set anti-roll plate (ARP) is a device for ensuring that tissue sections pass down the knife face without curling, so that they can be collected flat on to microscope slides.

The design and setting up of the ARP is second only in importance to the quality of the knife edge in obtaining ribbons of high quality sections.

Step 1 – Preparation

1 Install a sharp Bright microtome knife (6), setting the appropriate clearance angle for that particular knife.

2 Clamp a frozen specimen (or embedding compound alone) into the microtome (refer to section 3.2)

3 Release the knife block clamp locking lever (3) and turn the knife carriage feed control (4) clockwise to bring the knife towards the specimen.

4 Trim the specimen or embedding medium until a suitable block face is made (refer to section 3.3).

5 Lock the knife carriage clamp firmly and proceed to cut sections at the chosen thickness. Once it can be seen that regular, good quality sections are cut (albeit curled up) go on to step 2.

Step 2 - Setting the Anti-Roll Plate

Refer to FIG 16

To ensure optimum sectioning performance the anti-roll plate must be kept clean from grease and dirt. To clean the anti-roll plate carefully apply a small amount of methylated spirits or ethanol to both the upper and lower surfaces using a clean, dry, soft paper towel. Take care not to break the side panels which are quite delicate.

It is important that the anti-roll plate is adjusted so that:

a) the leading edge of the anti-roll plate is parallel to the edge of the knife

b) the leading edge of the anti-roll plate is parallel in line with the knife

c) the under side of the anti-roll plate is at an angle slightly greater than parallel with the facet of the edge of the knife

1 Slacken the anti-roll T piece clamp screw (16) and slide the angle adjustment shaft backwards and forwards until approximately 2/3 of the anti-roll plate stem is below the anti-roll T piece clamp screw. Then tighten the anti-roll piece clamp screw.

2 Next slacken the anti-roll height clamp screw (18) and turn the anti-roll micro adjusting knob until the edge of the anti-roll plate is very slightly below the edge of the knife but exactly parallel to it.

3 Tighten the screw (14) and have screw (12) lightly screwed down so that screw (13) can still be turned.

4 Place the roll plate against the knife and start to cut sections again. They will curl up over the roll plate.

5 Slowly turn the anti-roll micro-adjusting knob (17) clockwise while cutting sections. When the plate (15) reaches the correct height, the sections will start to go under the plate.

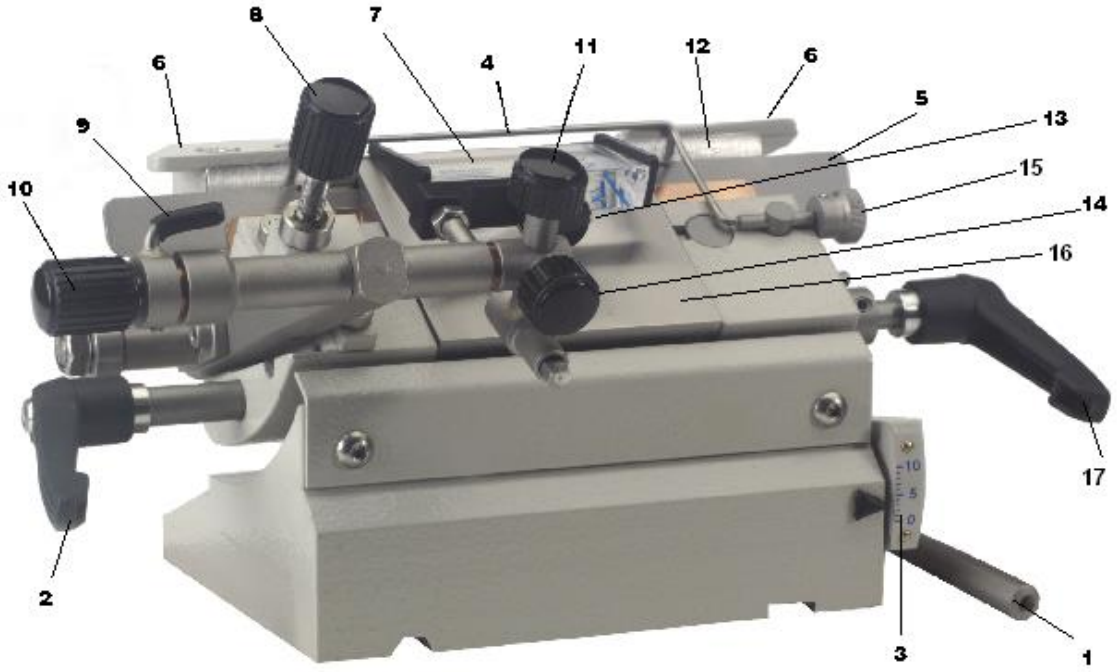
6 Tighten all the screws then flip the plate away from the knife by operating the anti-roll plate adjuster (19). Now flip the plate back into position. When cutting is resumed, sections should go under the plate as before, i.e. the plate has aligned itself. If not, repeat the setting up process.

Do not drag the anti-roll plate downwards across the edge of the knife as this will result in possible damage to both the anti-roll plate and the knife.

Your anti-roll plate may vary from the design shown, but the set-up procedure remains the same. Please refer to section 3.6, A Problem Solving Guide, for further assistance.

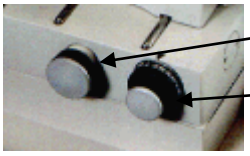
2.3 MICROTOME CONTROLS - Quick Release Feather Blade Holder

FIG 17



1	Knife Block Clamp Lever	9	Stop Pin
2	Blade Angle Locking Lever	10	Anti-Roll Plate Adjuster
3	Blade Angle Indicator	11	Stem Clamp Knob
4	Wire Knife Guard	12	Blade
5	Blade Loading Plate	13	Anti-Roll Plate Clamp Knob
6	Fixed Blade Guard	14	T-Piece Clamp Knob
7	Easi Set Anti-Roll Plate	15	Wire Blade Guard Knob
8	Anti-Roll Height Adjustment Knob	16	Blade Clamping Plate
		17	Blade Clamp Lever

FIG 17A



2.3.1 BLADE GUARDS

Refer to Figure 17

A pair of fixed blade guards (6) is fitted. These must never be removed under any circumstances.

A wire blade guard (4) is also fitted.

When access to the blade is required, the wire blade guard can be opened. Turn the wire blade guard knob (15) anticlockwise to open and turn the wire blade guard knob clockwise to close.

During sectioning, the wire blade guard is in the open position. At all other times when a blade is fitted, the guard should be in the closed position for operator safety.

2.3.2 BLADE HOLDER

Refer to Figure 17

Release the blade angle locking lever (2). Taking the body of the blade holder in both hands move it against the lower part of the assembly until the correct angle is shown on the blade angle indicator (3), then re-lock the blade holder body with the blade angle locking lever. Normally this angle should be set at 3º.

To ensure optimum sectioning performance the blade and blade clamping plate must be kept clean from grease and dirt. To clean the blade and blade clamping plate, carefully apply a small amount of methylated spirits or ethanol to the surface of the blade and blade clamping plate using a clean, dry, soft paper towel. Always move the towel away from the edge of the blade - never towards it.

To install a blade:

Feather blades are covered with a fine film of protecting varnish. It is necessary to remove this varnish using solvents, i.e. xylene or acetone, before using a blade for sectioning. Please ensure that this process is carried out with the utmost of care. Feather blades are sharp and could cause serious injuries. Alternatively the film can be removed by cutting several sections of embedding compound.

Open the wire blade guard.

Unlock the blade clamping plate (16) by using the blade clamp lever (17).

Push the blade loading plate (5) to one side and carefully place a new blade in position.

Slide the blade loading plate back to the centre and use the blade clamp lever to lock it into position.

Please note that as the blade wears it is possible to slide into a new position and by doing this it is possible to utilise the whole length of the blade.

To remove a blade:

Open the wire blade guard.

Unlock the blade clamping plate (7) by using the blade clamp lever (8).

Push the blade loading plate (9) to one side and carefully remove the blade.

2.3.3 ANTI-ROLL ASSEMBLY

Refer to FIG 17

The Easi-Set anti-roll plate (ARP) is a device for ensuring that tissue sections pass down the blade face without curling, so that they can be collected flat on to microscope slides.

The design and setting up of the ARP is second only in importance to the quality of the blade edge in obtaining ribbons of high quality sections.

Step 1 - Preparation

Install a sharp Feather blade. (See section 2.3.2)

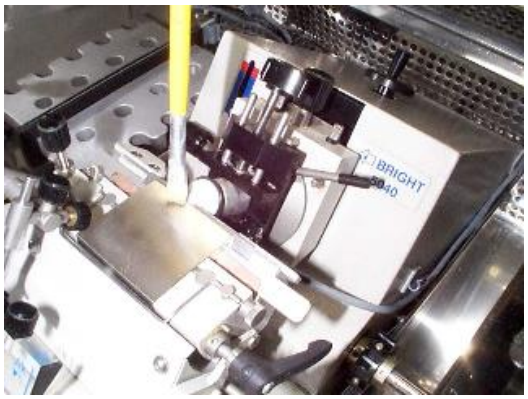
Clamp a frozen specimen (or embedding compound alone) into the microtome (refer to section 3.2).

Release the knife block clamp lever (1) and turn the coarse advance control (18) clockwise to bring the blade towards the specimen.

Trim the specimen or embedding medium until a suitable block face is made (refer to section 3.3).

Lock the knife block clamp lever firmly and proceed to cut sections at the chosen thickness. Once it can be seen that regular, good quality sections are cut (albeit curled up) go on to step 2. To check that the sections are good, it is possible to tease them off using the bristles of an artist's paintbrush, as shown in FIG18 below**.**

FIG 18



Step 2 - Setting the Anti-Roll Plate

To ensure optimum sectioning performance the anti-roll plate must be kept clean from grease and dirt. To clean the anti-roll plate, carefully apply a small amount of methylated spirits or ethanol to both the upper and lower surfaces using a clean, dry, soft paper towel. Take care not to break the side panels which are quite delicate.

It is important that the anti-roll plate is adjusted so that:

a) the leading edge of the anti-roll plate is parallel to the edge of the blade

b) the leading edge of the anti-roll plate is parallel in line with the blade

c) the under side of the anti-roll plate is at an angle slightly greater than parallel with the facet of the blade

Swing the anti-roll plate away from the blade, rotate the anti-roll plate adjuster (10).

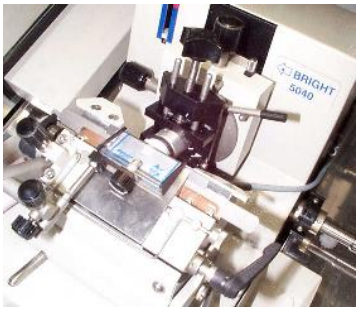
Turn the anti-roll plate height adjustment knob (8) fully clockwise and then fully anti-clockwise to determine the limits of movement of the mounting arm.

Adjust the anti-roll plate height adjustment knob until the mounting arm is set approximately half way.

Rotate the anti-roll plate adjuster to bring the anti-roll plate back on to the blade clamping plate (16).

Loosen the T-piece clamp knob (14) and set the stem of the T-piece at the half way position. Ensure that the front edge of the anti-roll plate is parallel with the edge of the blade. Tighten the T-piece clamp knob.

Loosen the stem clamp knob (11) and adjust the height of the anti-roll plate until it is about 1mm below the edge of the blade. Lock the stem clamp knob.



Use the anti-roll plate height adjustment knob by turning it anti-clockwise to bring the anti-roll plate in line with the edge of the blade.

Experiment to make sure that sections now slide under the anti-roll plate. The microtome is now ready for sectioning.

Do not drag the anti-roll plate downwards across the edge of the blade as this will result in possible damage to both the anti-roll plate and the blade.

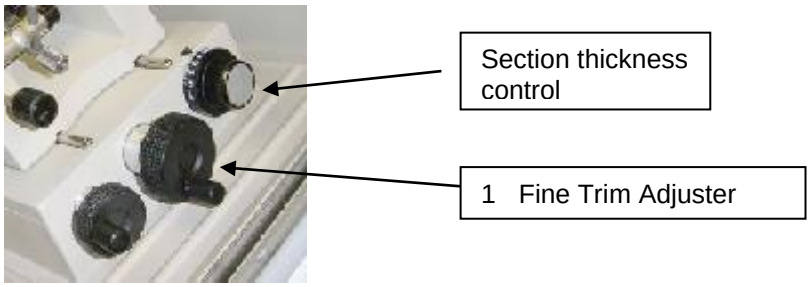
Your anti-roll plate may vary from the design shown, but the set-up procedure remains the same. Please refer to section 3.6, A Problem Solving Guide, for further assistance.

2.4 Common MICROTOME CONTROLS

2.4.1 COARSE ADVANCE CONTROL

For large movements of the knife holder or rapid advance (e.g. specimen trimming) first raise the knife block clamp locking lever on the right hand side of the knife holder then turn the knife carriage feed control on the front of the microtome base. To turn clockwise will move the knife towards the specimen and to turn anticlockwise will move the knife away from the specimen.
When set in the desired position lower the knife block clamp lever to lock in position.

2.4.1.1 FINE TRIM ADJUSTER / FTA (where applicable)

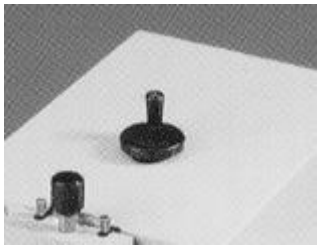


Works exactly the same as the knife carriage feed control

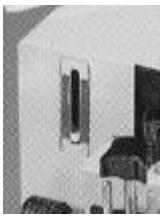
2.4.2 SECTION THICKNESS CONTROL

See above: To select section thickness, set the thickness control (1) at zero and rotate anticlockwise until desired thickness is level with the indicator. To reset the section thickness at any time, ensure that the thickness control is always reset back to zero before selecting the new section thickness.
NB: If feed screws other than the standard 0.5 - 30µm are fitted, a conversion factor is needed (see section 2.5).

2.4.3 ADVANCE / REWIND CONTROL



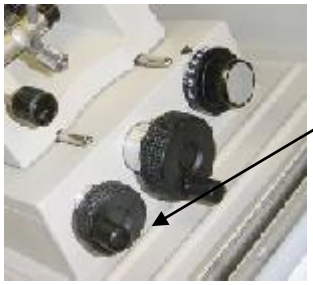
The knob located on the top of the microtome should be used to reset the feed mechanism before starting a new specimen or whenever appropriate. The advance / rewind control can also be used for fine advance of the specimen



The feed used indicator on the front cover of the microtome shows how much forward travel is available. When the white pointer has moved into the red section, the feed mechanism has reached its limit and should be rewound.

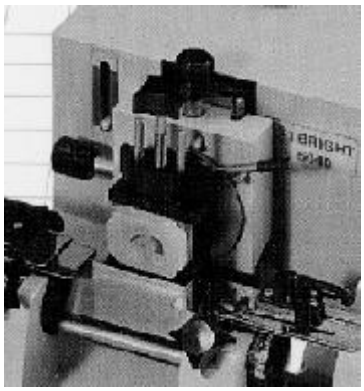
Warning: The mechanism must not be rewound with the microtome arm at the top of its stroke. Either rotate the cutting handle to move the arm down or set the section thickness to 0µm to disengage the ratchet mechanism.

2.4.3.1 /LHS - LEFT HAND SIDE ADVANCE/REWIND CONTROL (where applicable)



The operation is exactly the same as for the Advance/Rewind control on the top of the microtome. Please note that this option is not available with Motorised Advance/Rewind

2.4.4 SPECIMEN HOLDER



The standard vice, consisting of a V-block and upper moveable jaw, accepts a variety of circular and square specimen holders. Where specimen orientation (50539 or 50627) is fitted, orientation is achieved by first releasing the locking lever then moving the specimen (using the screw mechanisms if fitted). Re-lock the lever before section cutting.

2.5 ALTERNATIVE FEED SCREWS

The 5040 microtome is usually fitted with a feed screw which gives a thickness range of 0.5µm to 30µm. A range of other feed screws are available and are easily interchangeable by the user.

50256 manual 50256-1 MAR	**50255 manual 50255-1 MAR**	**50257 manual 50257-1 MAR**	**50258 manual 50258-1 MAR**	**50259 manual 50259-1 MAR**	**50260 manual**
Thin Section	Standard in cryostat	Standard in wax microtome			
0.2 to 12µm	0.5 to 30µm	1 to 60 µm	2 to 120µm	3 to 180µm	5 to 300µm
0.2µm incrs.	0.5µm incrs.	1 µm incrs.	2µm incrs.	3µm incrs	5µm incrs.
With scale	With scale	With scale	Without scale	Without scale	Without scale

As the scale fitted to the microtome is only relevant to the originaly fitted feed screw, a table is supplied with the new feed screw to give an appropriate conversion to the feed screw fitted.

Note: MAR = Motorised Advance/Rewind

To change a feed screw:

1 Remove the microtome knife (refer to section 2.2.2).

2 Rewind microtome until the pointer is in mid range on the feed indicator on cover.

3 Remove the microtome from the chamber, the reverse of the installation procedure (see section 1.2.5).

4 Remove the microtome cover by removing the two screws at the side. Loosen the two top blind clamp screws until the top blind comes free, then remove cover.

5 With the front of the microtome nearest to you, use your right hand to hold the top arm and the hinge segment (just below the top arm).

6 Use your left hand to press down on the top of the feed screw (where the rewind knob fits on) and pull towards you. Use upwards counter pressure on the hinge segment with your right hand at the same time.

7 The trunnion nut will come out of the clips in the hinge section, and the entire feed screw assembly can now be lifted out from the left.

8 Ensure the trunnion nut is midway on the feed screw.

9 Position your right hand as in '5' above and insert the alternative feed screw assembly in from the left, directing the top of the screw through the hole in the top arm.

10 Locate the ball at the bottom of the assembly into the corresponding recess in the pawl arm assembly.

11 With the lugs on the trunnion nut positioned towards the sides, locate them under the clips beneath the hinge segment (this can only be done by feel).

12 Check that both lugs are held by the clips and that the trunnion nut ball is still properly located.

13 Before refitting the cover, rewind the feed screw to the top, (i.e. furthest from the large toothed wheel), by using the rewind knob. Remember to remove rewind knob to enable the microtome cover to be refitted.

14 Replace the microtome cover and then place the microtome back in to the cryostat chamber, remembering to refit the rewind knob.

3 CUTTING & COLLECTING SECTIONS

3.1 BASIC FREEZING TECHNIQUES

As a general rule, the quicker tissues are frozen the better the results will be. The aim is to minimise the damage caused by ice crystal artefact, and the more rapid the transition from liquid phase to solid phase, the smaller the ice crystals will be. The susceptibility to damage varies between tissue types, with certain tissues (e.g. muscle) being very easily damaged. Furthermore, the nature of the work may dictate the level of tissue disruption which is acceptable. In all cases it is important to keep the specimen size minimal, i.e. at least one dimension should be no more than a few millimetres.

3.1.1 LIQUID NITROGEN

With a boiling point of -196ºC, LN_2 is an ideal freezing agent. Tissues may be immersed directly, or more frequently a solvent, such as hexane, is pre-cooled in LN_2 then specimens are immersed in the solvent.

3.1.2 CARBON DIOXIDE - GAS

The traditional method of freezing. A blast of gas from a CO_2 cylinder will achieve temperatures around -60ºC. Care must be taken with pressurised gas, and the risk of creating an aerosol of potentially infectious tissue particles must be borne in mind.

3.1.3 CARBON DIOXIDE - SOLID

This can be used in a bath of solvent, such as hexane, to achieve temperatures around -60ºC. Safer than CO_2 gas, solid CO_2 (cardice) remains one of the most popular methods of freezing.

3.1.4 FREEZER PLATES

Some cryostats incorporate special cold plates for rapid freezing, covering the temperature range -45ºC to -60ºC. The OTF cryostat has a standard quick freezer plate that operates at approximately 10ºC below chamber temperature. The /QF optional feature, available on the

OTF, enables tissue samples to be rapidly frozen inside the cryostat chamber to -80ºC. In most cases this will avoid the need for external freezing media.

3.1.5 BRIGHT CLINI-RF

The Bright Clini-RF is a small, free standing, top opening, ultra low temperature freezer. Its function is to rapidly freeze tissue specimens ready for cryotomy or for storage. Inside the Clini-RF are two cylindrical chambers, the upper chamber is held at minus 40ºC and the lower at minus 80ºC. It is an ideal replacement for CO_2 freezing techniques.

3.2 FITTING THE SPECIMEN

For setting up tissue, proceed as follows:

1 Remove the frost elimination cover from the quick freezer plate.

2 Make sure that the object holder is above 0ºC, if it is at room temperature that is fine and it just takes a little longer. It is important to note that embedding compound does not stick to a surface that is below 0ºC.

3 Place a small amount of embedding compound on the top surface of the object holder and make sure that it covers all of it in order to get the maximum area for adhesion. Try to avoid spilling embedding compound over the side.

4 Place the object holder in one of the semicircular recesses of the quick freezer plate so that the machined slot fits with the top of the object holder a few mm above the level of the plate. Alternatively if the quick freezer plate has frosted over too much then object holders may be stood on the top of it.

5 Before the embedding compound starts to freeze place the tissue in the correct orientation, holding it with a pair of forceps. Take care that the forceps do not freeze to your tissue. If your tissue is fresh you will see the freezing isotherm gradually rise through the tissue, as a white line.

6 Remove the object holder from the quick freezer and place it in the V block or cryomatic block and tighten the screw firmly to hold it in position. Wait a few minutes for temperatures to equalise before trimming.

It is often best to set up a new blade, knife or anti-roll plate using some embedding compound first. Proceed as follows:

1 Follow steps 1 to 4 above.

2 Watch the embedding compound and suddenly it will be seen to freeze as it turns from transparent to a dense white colour. Watch the freezing isotherm until just before it reaches the top surface of the embedding compound and while it is still liquid, carefully apply some more embedding compound until it forms a mound on the top. Then let it continue to freeze until it is completely solid.

3 Remove the object holder from the quick freezer and place it in the microtome.

Note 1: If you are unlucky enough to have your object holder freeze solidly into ice on the quick freezer plate, a little 90% ethanol solution around the base or neck of the chuck will act as an antifreeze to release it. Be careful if you do this because the ethanol will also lower the melting point of your specimen.

Note 2: If you are using pre-frozen tissue then it will be much colder than its optimum cutting temperature and therefore plenty of time must be allowed for temperature to equalise in the specimen before cutting.

Note 3: It is important that after use the frost elimination cover should be replaced on the quick freezer plate.

3.3 TRIMMING THE SPECIMEN

1. Fit a sharp knife in position. Allow the knife to equilibrate to chamber temperature.

2. Lock the handwheel with the specimen holder in the top position.

FIG 24

3. Fit the specimen into the microtome.

4. Release the knife block clamp locking lever and turn the coarse advance control to bring the knife towards the specimen.

5. Either rotate or rock the handwheel while using the knife carriage feed control or use the section thickness mechanism (at 10-20µm) and rotate the handwheel to trim the tissue.

NB: If rocking the handwheel, ensure trimming is done on the downstroke (handwheel knob in 1 o'clock round to 5 o'clock position). Trimming on the upward (retraction) stroke will result in a subsequent very thick section and may damage the specimen.

3.4 SECTION CUTTING AND COLLECTION

1 After trimming, lock the knife block clamp locking lever FIG 16(3) firmly downwards. Set the section thickness control to the desired position.

2 It may be necessary to cut a few sections off first to clear trimming marks.

3 Once sections are seen to be cut, place the anti-roll FIG 16(15) plate against the knife and proceed to cut sections. if adjustments to the anti-roll plate are required, see section 2.2.8.

4 To collect sections, have a clean microscope slide ready at ambient temperature. Bring the slide towards the knife, swing the anti-roll plate out of the way, and move the slide very close to the section(s). The section(s) should jump across the gap and stick to the slide.

NB: Keep the knife clear of debris and frost by brushing upwards with the knife cleaning brush. Never brush along or down the knife, always brush upwards.

- Beware of debris build-up on the back of the knife.
- Cut with a slow, steady movement.
- Sometimes, especially with soft tissue such as brain, the best results can be obtained with a very slow approach to the knife and then accelerating through the cut.

3.5 HINTS ON SECTIONING

1 Always start by turning the hand wheel slowly to cut the first sections. Later it may be found that the best sections are obtained by varying the speed of cut.

2 Don't trim too thickly - you might damage the tissue internally.

3 If the anti-roll plate seems to be giving problems, first make sure that you can cut good sections of embedding compound without the anti-roll plate by teasing off sections using a fine brush.

4 Make sure that the knife and the anti-roll plate are suitably cold. It can often help to use a short blast of Cryospray 134 if this is in doubt. If Cryospray 134 is used, make sure that

there is not an accumulation of rime present on the underside and leading edge of the anti-roll plate. Care must be taken when using Cryospray 134. The risk of creating an aerosol of potentially infectious tissue particles must be borne in mind.

5 If the section is skewing, this is a sign that the anti-roll plate is not parallel to the edge of the knife. Remember also that the angle of the underside of the anti-roll plate must be parallel to the facet of the knife (but just a little larger for the best results). If the angle is too large then the section will curl. If the angle is too small then the section will crumple.

6 If there is any doubt that the temperature of the microtome or cryostat chamber is not at the right temperature, be patient and wait for a while until the temperatures equalise.

7 For other problems follow the advice in section 3.6 below.

3.6 FROZEN SECTIONING - A PROBLEM SOLVING GUIDE

Cutting good frozen sections requires skill and practice, and some tissues are particularly difficult. In all cases the quality of the result depends on a number of factors.
The notes which follow deal with the more commonly encountered difficulties, and suggest a systematic approach to problem solving.

3.6.1 SOLUTIONS - CHECK LIST

First check all the basic factors:

Specimen

- was it frozen badly?
- has it equilibrated to chamber temperature?
- has it become loose on the specimen holder?
- is the specimen holder tightly clamped?
- is the orientation lever locked?
- has the specimen dehydrated?

Knife

- has it become dull?
- is it nicked or chipped?
- is the knife tilt angle incorrect?
- is the knife loose?
- is there a build-up of frost or debris on the knife?

Anti-Roll Plate

- is it set too high/low?
- is the angle to the knife too wide/narrow?
- is it parallel to the knife?
- is it frosted/too warm?
- is it damaged? (See section 2.2.8).

General Factors

- is the chamber temperature appropriate to the specimen (or specimen temperature control, where fitted)?
- is the cutting motion too fast/slow/uneven?
- has the microtome reached the end of its travel?
- is the section thickness setting appropriate?

3.6.2 SPECIFIC PROBLEMS

Thick/thin sections, intermittent failure to cut:

- knife not sharp enough
- knife tilt angle too high/low
- clamping screws too loose
- specimen loose on holder
- cutting temperatures too warm/cold
- anti-roll plate adjusted too high
- tissue expansion due to block warming up

Sections crumbling or not forming:

- freezing technique too slow
- cutting temperatures too warm/cold
- specimen not equilibrated to chamber temperature
- specimen dehydrated
- knife not sharp enough
- cutting motion too fast or uneven
- knife tilt angle too high/low

Excessive compression of sections:

- knife not sharp enough
- knife tilt angle too high
- knife surfaces frosted or debris built up
- anti-roll plate frosted, too warm or incorrectly adjusted
- freezing technique too slow
- cutting temperature too warm

Uneven thickness across section:

- clamping screws too loose
- specimen loose in holder
- specimen was not trimmed correctly
- knife not sharp enough
- knife edge too thin
- cutting motion uneven

Vertical score marks on sections:

- knife edge nicked or chipped
- knife faces have built up debris or frost
- anti-roll plate edge damaged
- anti-roll plate surface has debris or frost built up
- tissue contains hard, fine particles (e.g. bone fragments)

NB: When removing frost and debris always brush up the knife, never down or along.

Sections curl over anti-roll plate:

- anti-roll plate too low

Section curl under anti-roll plate:

- anti-roll plate at too large an angle to knife

Sections curl under and stick to anti-roll plate:

- anti-roll plate too warm, greasy

Sections curl after lifting anti-roll plate:

- anti-roll plate at too large an angle to knife, movement too quick, delay in collecting sections, static electricity present

Sections fail to flatten and pass down knife:

- anti-roll plate too warm, greasy or misaligned
- knife surface has built up frost or debris or is too warm

NB: To remove static electricity use an anti-static brush or gun. The main area of static electricity build-up is on the anti-roll plate.

3.7 CUTTING TEMPERATURES

Standard textbooks on histological technique give tables of recommended cutting temperatures for different tissues. However, in most cases, the following guidelines will prove adequate.

3.7.1 FRESH, UNFIXED TISSUE

Most soft tissues will cut at -18ºC to -20ºC. Fatty tissue, such as breast lumps, will need lower temperatures, -25ºC or colder. Brain and spinal cord cut best at warmer temperatures, e.g. minus 12ºC.

3.7.2 FIXED TISSUE

Differences between tissues are much reduced after fixation. Cutting temperatures around -10ºC to -15ºC are recommended, but some experimenting may be required. Ensure fixative is rinsed off tissue before freezing.

4.1 DAILY CARE

Routine daily care consists of removing sectioning debris from the working area and brushing debris & frost from the knife.

4.2 AUTOMATIC DEFROST CYCLE

Refer to section 2.1.6. The function of the automatic defrost cycle is to clear the evaporator cooling fins of frost but without allowing the chamber or microtome temperature to rise above 0ºC. This ensures efficient refrigeration.

4.3 TOTAL DEFROSTING

It will be necessary to periodically defrost the entire cryostat to carry out cleaning and/or other procedures. The frequency of this total defrosting will depend on how heavily the cryostat is used; it may be as often as daily but is commonly once a month.
To initiate a total defrost:

1 Place a suitable container under the drain tube.

2 Turn off the cryostat.

IMPORTANT: If decontamination of the cryostat is required carry out the standard procedures as practised in your laboratory at this point. Refer to section 4.8 for further details.

3 Remove the microtome knife (refer to section 2.2.2) and clean it (see section 4.4).

4 Remove the microtome from the chamber, the reverse of the installation procedure (see section 1.2.5). Remove drain plug from base of chamber.

5 Place the microtome on the laboratory bench and clean it. Refit the rewind knob and rewind the feed mechanism until the pointer is at the bottom on the indicator. Undo the two knurled screws on the specimen arm and lift off the upper debris screen. Now remove the two small screws which hold the microtome cover, using the Allen key provided. The cover can now be lifted off. Allow the microtome to warm up completely and dry it off carefully.

6 The chamber interior can now be cleaned once it has thawed. Replace the drain plug.

7 Once the chamber and microtome have been cleaned and dried off, apply a little low temperature oil to the threads of the knife clamp screws and feed screw, replace the cover and re-install in the chamber (see section 1.2.5).

Make sure that the inside of the cryostat is perfectly dry before switching the refrigeration on. Use a hair dryer if necessary. Note that the microtome requires no other routine maintenance.

4.4 MICROTOME KNIVES

GREAT CARE MUST BE EXERCISED WHEN HANDLING KNIVES

- knives must be stored in their boxes when not in use
- knives fitted to the microtome must be properly guarded
- particular care must be taken during cleaning and knife sharpening

Conventional microtome knives are usually made from carbon steel and will corrode in moist conditions.

Whenever the cryostat chamber is allowed to warm up above freezing point (e.g. during a full defrost) the knife should be removed, warmed up, cleaned and/or decontaminated, oiled and then stored in its box in a dry place.

The Bright 50230 cryostat knife normally supplied with the cryostat can be sharpened on a conventional knife sharpening machine. Alternatively, Bright Instrument Co Ltd offer a knife sharpening service.

4.5 OPERATING IN EXTREME CONDITIONS

The refrigeration system used in Bright cryostats is highly efficient and will cope well with high ambient temperatures. However, where conditions of high humidity exist, it may be necessary to adjust the automatic defrost cycle in order to ensure that the evaporator cooling fins remain frost free.
It is recommended that additional defrost cycles are initiated at convenient times (e.g. 1800hrs, 0600hrs). This is done by pressing in the appropriate pins on the clock to give two further thirty minute defrosts (refer to section 2.1.6).
Do not exceed the defrost cycle time beyond thirty minutes as this could cause the entire chamber to warm up above 0ºC.

4.6 SERVICING AND REPAIRS

In the event of a breakdown a qualified person should be called.

If a service visit is required, the cryostat should be defrosted, decontaminated (refer to section 4.8), cleaned thoroughly and left switched off in preparation for that visit, unless otherwise advised by the engineer. Please remember that the cleaning procedure should also include removing the microtome and cleaning underneath where it sits in the chamber - the microtome should be left out of the chamber until the arrival of the engineer. Failure to carry out this action will result in the service visit being cancelled and could incur further call-out charges. A completed decontamination certificate must be left with the cryostat and work will not commence until the engineer has seen sight of that certificate (refer to details regarding decontamination certificates on the page marked Safety Information towards the front of this instruction manual).

If the cryostat or any part of it is returned to the distributor or manufacturer, it must be decontaminated (refer to section 4.8) and cleaned thoroughly. Please remember that the cleaning procedure should also include removing the microtome and cleaning underneath where it sits in the chamber. A completed decontamination certificate must be either sent in advance or attached to the outside of the packaging of the returned goods. Work on the returned goods will not proceed until the decontamination certificate has been received (refer to details regarding decontamination certificates on the page marked Safety Information towards the front of this instruction manual). Should no decontamination certificate be received, or the cryostat or any part of it be received in a condition that Bright Instrument Co Ltd consider to be a potential biological hazard, the cryostat or part will be retuned, unrepaired, at the expense of the customer.

4.6.1 UK

For customers in the UK, Bright Instrument Co Ltd offer a comprehensive range of after sales services that include extended warranties and a full range of service contracts. For further information or for any refrigeration, electrical or mechanical problems contact Bright Instrument Co Ltd direct providing the following information:

Model (see ID plate on rear panel)
Serial Number (see ID plate on rear panel)
Date of installation
Nature of fault

4.6.2 REST OF WORLD

Refrigeration problems are likely to be rare and will normally be dealt with by a local refrigeration specialist. For electrical and mechanical problems contact your local distributor of Bright products providing the following information:

Model (see ID plate on rear panel)
Serial Number (see ID plate on rear panel)
Date of installation
Nature of fault

To assist in refrigeration and electrical repairs ensure that the engineer refers to the mini-manual which is located in the refrigeration unit compartment.

4.7 SIMPLE SERVICING/REPAIR PROCEDURES

User servicing is restricted to changing of fuses and fluorescent light tubes. All other servicing must be carried out by a qualified engineer. Any replacement parts must be ordered from Bright Instrument Co Ltd - no liability can be accepted if non-Bright supplied parts are installed.

4.7.1 CHANGING FUSES

On the rear panel of the cabinet are a number of fuse holders. Determine which fuse is blown and replace it with one of exactly the same type and rating.

1. Determine which function is not working.
2. Disconnect power supply.
3. Locate appropriate fuse (function is specified under the fuse holder).
4. Remove fuse and check to see if it has blown.
5. Replace with correct rating fuse (ratings are specified under each fuse holder).
6. Reconnect the power supply and ensure instrument is working correctly.

If there are any further problems contact your local distributor or Bright Instrument Co Ltd direct.

4.7.2 CHANGING FLUORESCENT TUBE

1. Disconnect power supply.
2. Remove plastic trim from over light area, it is held by five Pozidrive screws. This will also release the light support bracket.
3. Lower light unit from right hand side.
4. Ease the Perspex light cover from the left hand rubber housing to allow access to light tube.
5. Replace light tube and reverse stages 4 to 1.

Please note that the wires must be pushed back with care!

4.8 DECONTAMINATION

If decontamination is required carry out the standard procedures as practised in your laboratory. It is the responsibility of the customer to use a decontamination procedure appropriate to his/her work. The following decontamination method is as recommended in the ‘Code of Practise for the Prevention of Infection in Clinical Laboratories and Post-mortem Rooms’, ISBN 0 11 320464 7.

1 Bring the cryostat to room temperature.

2 Place 50-100ml of formalin BP in a flat dish inside the chamber. Close the window.

3 Leave for at least 24 hours, preferably 48 hours.

4 Open the window and place a beaker containing 10ml of ammonia SG.880 in the chamber. Close the window.

5 Leave for one hour. The cryostat is now decontaminated.

For further information regarding alternative decontamination procedures please refer to ‘Safe Working and the Prevention of Infection in Clinical Laboratories’, ISBN 0 11 885446 1.

5 ACCESSORIES

5.1 OBJECT HOLDERS

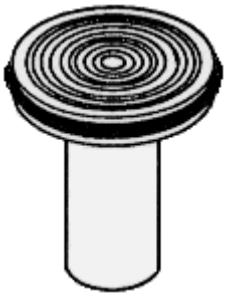
A wide range of object holders is available as shown below:
Standard types

50727

50734-1

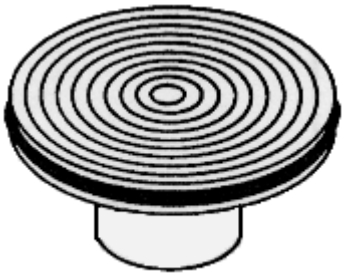
50734-2

50735-1

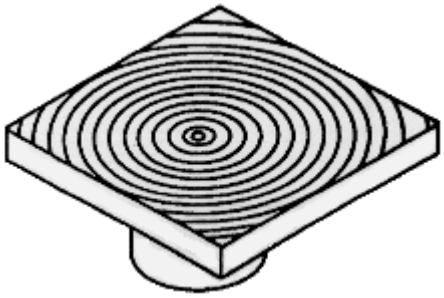


50735-2

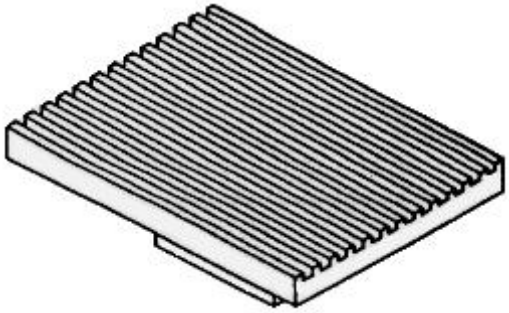
50744



50721



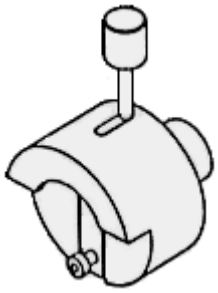
50741



50743

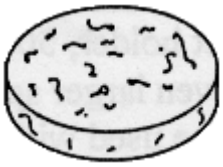
50727	Standard tubular holder, 22mm dia. Fits Bright 5030 microtome only.
50734-1	Solid object holder, 22mm dia. Suitable for most applications
50734-2	Solid object holder 22mm long type, gives greater clearance between specimen clamp and knife holder. Ideal for when multi-position glass slides are used.
50735-1	Object holder with stem, 37mm dia. Suitable for larger specimens.
50735-2	Object holder with long stem, 37mm dia. Suitable for larger specimens and gives extra clearance.
50744	Object holder, 5mm dia. Suitable for small specimens, particularly where orientation is required.
50721	Object holder with stem, 50mm dia. Suitable for very large specimens
50741	Object holder with stem, 50mm x 50mm square, suitable for very large specimens

Quick-release type



50203

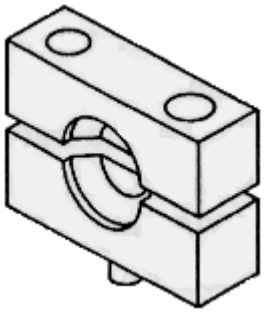
50690



50204

50203	Quick release object holder. Fits into a standard vice clamp and takes 50690 metal discs
50222-1	Quick release object holder. Complete with 50 off 50690 metal discs
50690	Metal object holder discs, 22mm dia. Fits 50203 quick release object holder, Pack of 50
50204	Cork object holder discs, 22mm dia, pack of 100
50204-1	Cork object holder discs, 50mm dia, pack of 100

Orientating specimen holders



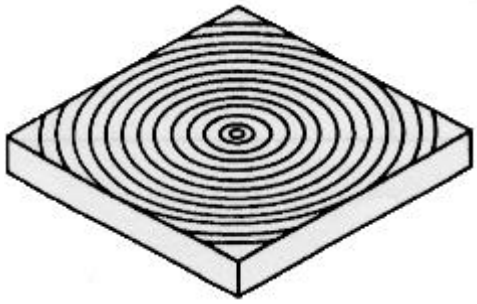
51695	Universal holder. This simple inexpensive device will fit 5030 or 5040 microtomes that have fixed heads. Any of the object holders shown below can be fitted to give coarse orientation

50745

50720

50719

50718

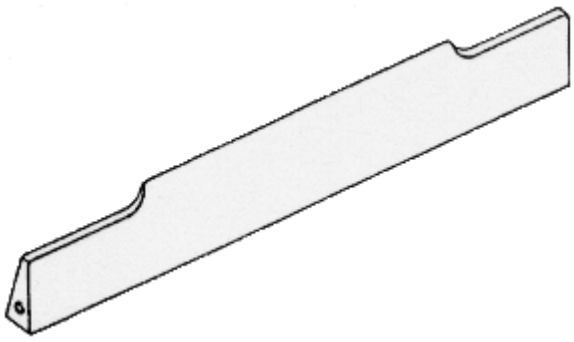


50712

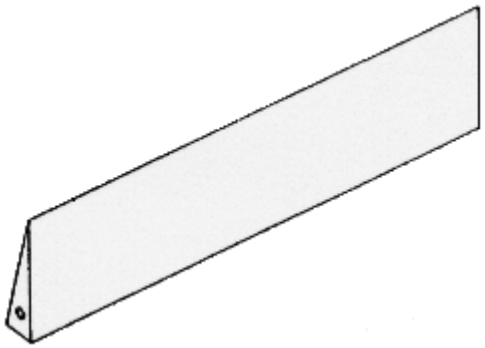
50745	Orientating object holder 5mm dia., for small specimens
50720	Orientating object holder 22mm dia., for medium size specimens
50719	Orientating object holder 37mm dia., for larger specimens
50718	Orientating object holder 50mm dia., for very large specimens
50712	Orientating object holder 50mm x 50mm, for very large specimens

5.2 KNIVES

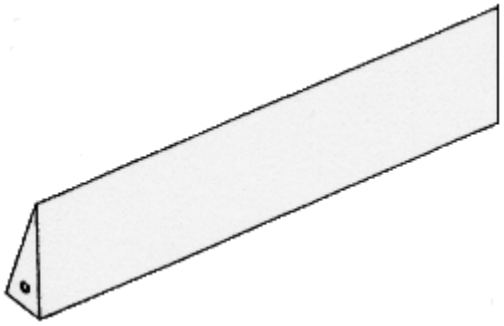
The following knives are available to fit the 5030 and 5040 microtomes:



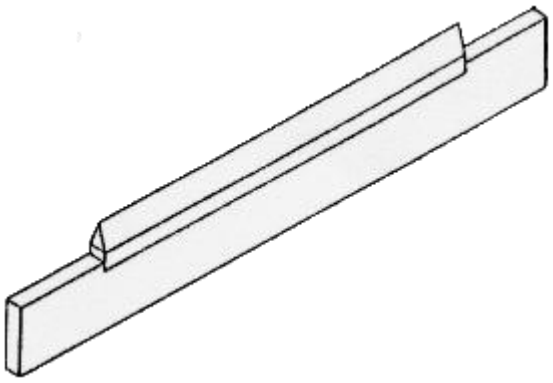
50230	Standard knife supplied in box, C profile, 189 x 27 x 10mm, 22º angle, tapped to accept holder for Shandon knife sharpener, safety cut outs at each end.



50232-1	Hardened steel knife supplied in box, C profile, 160 x 35 x 9mm, 15º angle suitable for large area sections.



50207	Similar to 50232-1 but slightly heavier for tougher specimens. C profile, 160 x 32 x 13mm, 23º angle



50234	Tungsten Carbide tipped knife for cutting bone and other hard specimens. C profile, 228 x 38 x 6mm, 24º angle. Length of knife edge, 155mm

5.3 LEVER RELEASE FEATHER BLADE HOLDER

5.3.1.1 Cat. No. 57903

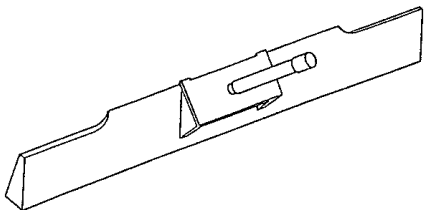
Description

The Lever Release Feather™ Blade Holder has been designed to fit standard knife holders on most microtomes. It accepts low profile S35 blades or similar. It's shape is similar to a solid knife and has stainless steel pressure pads (not shown) that act as cushions to spread the pressure of the fixing screws as well as blade guides to make it easier to change and insert a new blade.

5.4 MAGNAPLATE, ANTI-ROLL PLATE

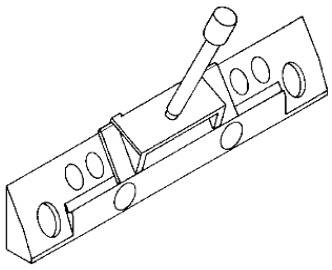
Cat. No. 50300-1

The Magnaplate is a non-adjustable anti-roll plate that will Fit most knives and blades. It is shown sitting on a 50230 standard knife. The Magnaplate is supplied in a pack of 3 with a single removable handle.



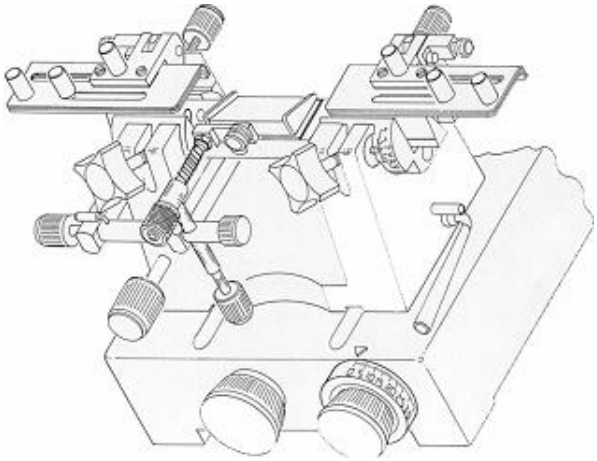
5.5 MAGNACUT, MAGNETIC DISPOSABLE BLADE SYSTEM

50133 shown with Magnacut holder, disposable blade and Magnaplate non-adjustable anti-roll plate.

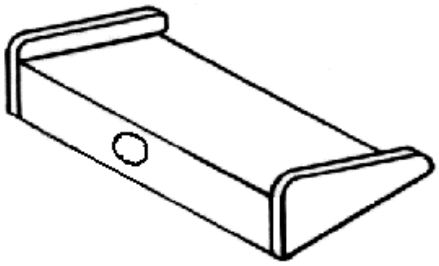


50133	Magnacut, magnetic disposable blade system. For use without a fixed anti-roll plate (Will fit most other manufacturers cryostats). Consists of magnetic blade holder, Magnaplate anti-roll plate, 10 blades, blade removal tool, box and instructions.
50140	Magnacut, magnetic disposable blade system. For direct replacement of a solid knife system in a 5030 or 5040 microtome. Consists of magnetic blade holder, 50mm anti-roll plate, 10 blades, blade removal tool, micro-adjusting T-piece and stem, box and instructions.

50140 shown in-situ on a 5040 microtome.



5.6 Easi-Set, ANTI-ROLL PLATES



These anti-roll plates are of unique design having “side wings” that facilitate extremely easy adjustment and give a wide leeway when positioning against the edge of the blade or knife.

50424	Easi-Set anti-roll plate 37mm
50425	Easi-Set anti-roll plate 50mm
50426	Easi-Set anti-roll plate 75mm

5.7 FEED SCREWS

5030 and 5040 microtomes are fitted with a feed screw that controls the section thickness range. These feed screws may be freely changed so that a new section thickness range can be given to the microtome in a matter of minutes (when warm).

Feed Screws for non /MAR	
50260	5 – 300µm Feed Screw
50259	3 – 180µm Feed Screw
50258	2 – 120µm Feed Screw
50257	1 – 60µm Feed Screw
50255*	0.5 – 30µm Feed Screw
50256	0.2 – 12µm Feed Screw
Feed Screws for /MAR	
50259-1	3 – 180µm Feed Screw
50258-1	2 – 120µm Feed Screw
50257-1	1 – 60µm Feed Screw
50255-1*	0.5 – 30µm Feed Screw
50256-1	0.2 - 12µm Feed Screw

* Fitted as standard on cryostats

5.8 CRYOSPRAY

57713-1	Bright Cryospray 134 300ml aerosol can.
57713	Bright Cryospray 134 300ml aerosol can, carton of 12 cans

Cryospray 134 is an aerosol-freezing agent and is 80 – 100% Tetrafluoroethane.

It is capable of delivering an aerosol jet at –52ºC for rapid freezing of tissue. The container has a comfortable and effective trigger grip and is complete with a 155mm nozzle to direct a fine spray to its target.

WARNING: This product can cause frostbite if unintentionally misused.

Please note that this product is not normally supplied with cryostats for export outside the UK since, being a pressurised container it is classed as hazardous goods for shipments by air.

5.9 CRYO-M-BED

53581-1	Bright Cryo-M-Bed 113ml bottle
53581	Bright Cryo-M-Bed 113ml bottle, carton of 6 bottles.

Bright Cryo-M-Bed is a blend of polyviol alcohol 217, thymol and water.

It is an inert colourless viscous fluid which is totally transparent at room temperature. It becomes opaque when frozen and turns white in colour. It shrinks slightly when frozen and is ideal for putting in embedding moulds. Its optimum cutting temperature is –18ºC to –20ºC but it will also cut well over a much wider range of temperatures and so is ideal for embedding many different types of tissue.

6 SPARE PARTS

Parts can be obtained through your local Bright representative, or from Bright Instrument Co Ltd. When ordering parts, please provide the following details:

a Model type and serial number of your instrument
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 sent

6.1 5040 Parts **please see Appendix Drawing and Part List**

6.2 5040 ELECTRONICS SPARE PARTS

Spares for /V

Part No	Description
137024	Plug free DIN
138026	Twin footswitch

6.3 ACCESSORIES AND CONSUMABLES

Part Number	Description
/R	Conveyor for section ribbon.
50539	Orientating object holder, with fine adjustment screws, factory fitted.
50657	Orientating object holder, without fine adjustment screws, factory fitted.
50209	Triangular glass knife holder, fixed.
50681	Triangular glass knife holder, orientating. These accept 25mm high Latta-Hartmann knives with edges up to 15mm.
52985	CO_2 (gas) object holder and knife freezer.
50208	Sloped (20º) knife holder.
50213	Ralph knife holder.
50214	Ralph knife holder with section float-out trough. For long edged glass knives with edges up to 38mm.
50230	Standard knife with box, C-profile, 189 x 27 x 10mm. 22º angle, tapped to accept holder for Shandon knife sharpener, safety cut-outs at each end.
50724	Knife sharpening back for 50230.
50232-1	Hardened steel knife with box, C-profile, 160 x 35 x 9mm. 15º angle, suitable for large area sections.
50210	Knife sharpening back for 50232-1.
50207	Steel knife with box, C-profile, 160 x 32 x 13mm. 23º.
50211	Knife sharpening back for 50207.
51675	Handle for 50230, 50232-1 and 50207.
50234	Tungsten carbide tipped knife with box, 228 x 38 x 6mm. Suitable for cutting bone and hard plastics. NB: needs to be resharpened at our factory.
52647	Stem for 50232-1 and 50234 knives.
52671	Knife sharpening kit. Includes hone, strop, oil, three grades of abrasive and instructions.
57612	Coarse abrasive, 6g net.
57611	Fine abrasive, 6g net.
57610	Honing compound, 6g net.
50239	Clock oil, 6g net.
50140	'Magnacut' disposable blade system. Consists of magnetic blade holder, 50mm anti-roll plate, 10 blades, blade removal tool, micro-adjusting T-piece and stem, box and instructions.
50133	'Magnacut' disposable blade system. Consists of magnetic blade holder, Magnaplate anti-roll plate, 10 blades, blade removal tool, box and instructions.
50540	'Magnacut' disposable blade holder only.
52727	Long-life disposable blades for Magnacut, C-profile, pack of 50.
51564	'Magnacut' blade removing tool.
50240	Feather blade holder with box.
50241	Feather disposable blades, pack of 50.
50162	Adaptor, to accept Ames cryostat, saddle type object holders.
52658	Vertical vice clamp.
57713-1	Bright Cryospray 134, 300ml aerosol can.
57713	Bright Cryospray 134, 300ml aerosol can, carton of 12 cans.
54791	Low temperature oil, 200ml bottle.
54791-1	Low temperature oil, 4.54 litre drum.
57344	Knife cleaning brush.
57808	Anti static brush, 12mm.
52531	Wax brush and debris tray.

6.4 A KNIFE SHARPENING SERVICE IS AVAILABLE

DETAILS ON REQUEST

7 PRODUCT INFORMATION

Introduction

Based on the long-established and reliable OTF/AS cryostat, the new OTF5000 brings Bright cryostats completely up to date. New styling with improved user ergonomics, the latest blade systems in the ever-reliable and powerful 5040 microtome, a huge choice of options plus money-saving package deals make these cryostats absolutely unique.

They are suitable for an endless range of applications and in the correct configuration are capable of cutting a wide diversity of specimens from undecalcified bone to brain, resins, plastics and plant tissue as well as more usual soft tissue. Allowing full anti-roll plate adjustment for perfect results coupled with long lasting temperature stability, the OTF5000 can truly be described as complete.

SPECIAL FEATURES:

- New contoured top for added operator comfort and usability
- Suitable for research and clinical operation
- 2 money-saving special packages available
- Uses solid knives or disposable blades including new lever release Feather™ blade holder
- Available in 2 different working heights
- Automatic evaporator defrost supplied as standard
- Non-urgent functions on side panel
- Long list of options and accessories
- Contains tried and tested 5040 rotary microtome

Configurations

The OTF5000 cryostats are available in 3 configurations:

Basic Instrument which includes; Quick Freezer, Internal shelves, Evaporator defrost, Manual cutting system, 5040 microtome with fixed head, Heated window surround, Window demist system, Analogue defrost clock, Side mounted non urgent controls and a full set of accessories.

LS specification, which includes all of the features of the basic instrument and additionally; 2 speed motorised advance/rewind, Fine object orientation and Cryomatic specimen temperature control.

HS specification, which includes all the features of the LS specification and additionally; 6 digit section counter, Dual refrigeration and Motor drive.

Basic Specification

Cryochamber	Polished stainless steel construction
Quick freezer	9 position, running at 10º C below chamber temperature, ultra low temperature –80ºC version can be factory fitted at extra cost
Minimum chamber temperature	Single compressor –35ºC
Shelves	3 internal, 1 external
Chamber temperature control	Microprocessor with LED display
Evaporator defrost	Automatic with analogue clock
Cutting system	Manual with balanced handwheel
Microtome	5040 rotary microtome with beryllium hinges

Retraction on return stroke	Approx. 50µm
Section range	0.5 to 30µm in 0.5µm increments
Maximum head advance	5.6mm
Maximum knife block adjustment	44mm (Coarse control)
Knife angle adjustment	25º
Window surround	Heated
Window demist system	Fan driven, automatic
Surface finishes	Easy clean, scratch and solvent resistant, flame retardant
Defrost clock	Analogue with battery back-up
Non urgent controls	Side mounted
Normal working height all models	990mm
Low working height all models	890mm
Overall height all normal height models	1300mm
Overall height low height models	1200mm
Width Basic/LS models	755mm with handle
Width HS model	840mm with handle
Depth all models	935mm
Nett Weight - Basic and LS	120Kg
Nett Weight – HS	140Kg

Note: If the handle is removed to negotiate doorways a further 65mm can be gained

LS Specification

As the basic specification but with the addition of the following items:

Object orientation	Fine, with +/-8º in horizontal and vertical axes, 360º rotation
Motorised Advance/Rewind	2 speed, 116µm/s and 164µm/s with auto- reset
Specimen temperature control	Fast reacting from -5ºC to minimum chamber temperature microprocessor controlled with LED display

HS Specification

As the LS specification but with the addition of the following items :

Section counter	6 digit LCD display
Dual refrigeration	Twin compressors automatically switched with fail-safe feature, -40ºC chamber temperature. LT system available to go to –45ºC Note: ultra low temperature –80ºC quick freezer cannot be fitted to the HS model
Motor drive	Features cutting window to accommodate differences in specimen size, Infinitely variable speed control in cutting window, Maximum cutting speed = 35mm/s. Slow speed version available for cutting hard materials, footswitch operation available