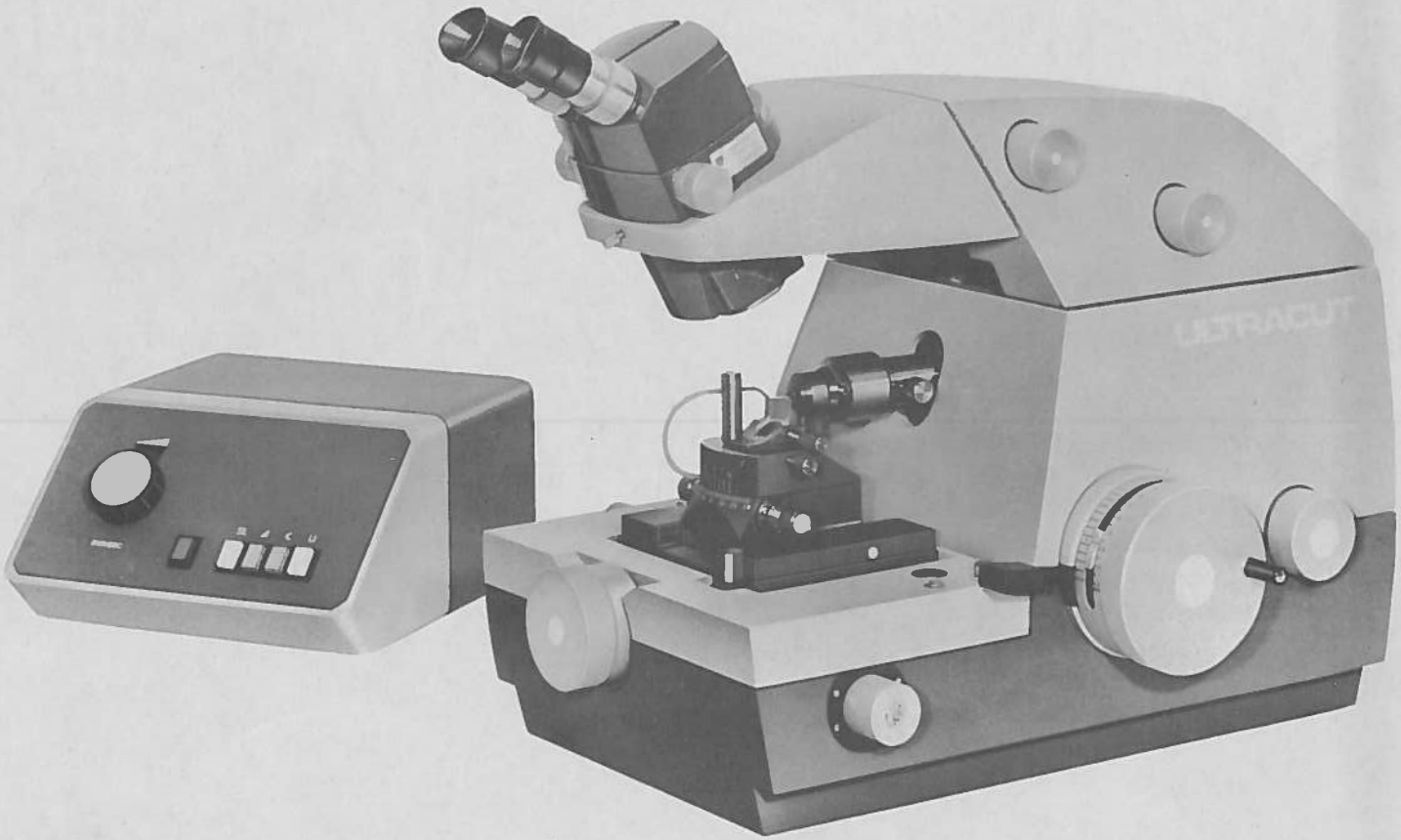
REICHERT-JUNG

ULTRACUT

Manual



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INTRODUCTION

Since 1953 C.REICHERT OPTISCHE WERKE AG has played a leading role in the scientific development of ultramicrotomes and since 1957 it has been one of the few companies that have been manufacturing ultramicrotomes on a continuous serial basis. The merits of Reichert's Om U2 and Om U3 microtomes have been appreciated all over the world and it has been proved that the inertia-free thermal feed combined with precision bearings are not only able to give high precision results but are also suitable for use in routine work.

The reason Reichert's ultramicrotomes are so suitable for routine work is because no effort has been spared to provide instrument designs and accessories which make the day-to-day preparation of sections much easier. In the course of these efforts and after the first practical inertia-free thermal feed and the first variable speed drive control with adjustment of the cutting range had been developed, there followed: Back-lighting to assist with correct knife setting in relation to the cutting surface of the specimen, the REFLEXOMAT for adjusting the level in the boat and the selflocking precision drives for a quick and safe adjustment of the knife/specimen setting. In spite of the high standards of efficiency already achieved with Reichert's Om U3 microtomes, since 1970 each feature of the design of the instrument has been re-examined to see what could be done to improve efficiency and ease of use. As a result we are able to present to you now the ULTRACUT microtome which, while adopting all the well proven features, also offers many completely new and improved features, of which the most important innovations are:

A new mechanical fine feed with extra large adjustment range and very accurate control (Dual Adjustment)

Built-in electronically controlled motor drive with extra large cutting speed control range and high accuracy.

A cantilever specimen arm with vertical specimen movement and extra large specimen retraction on the return stroke.

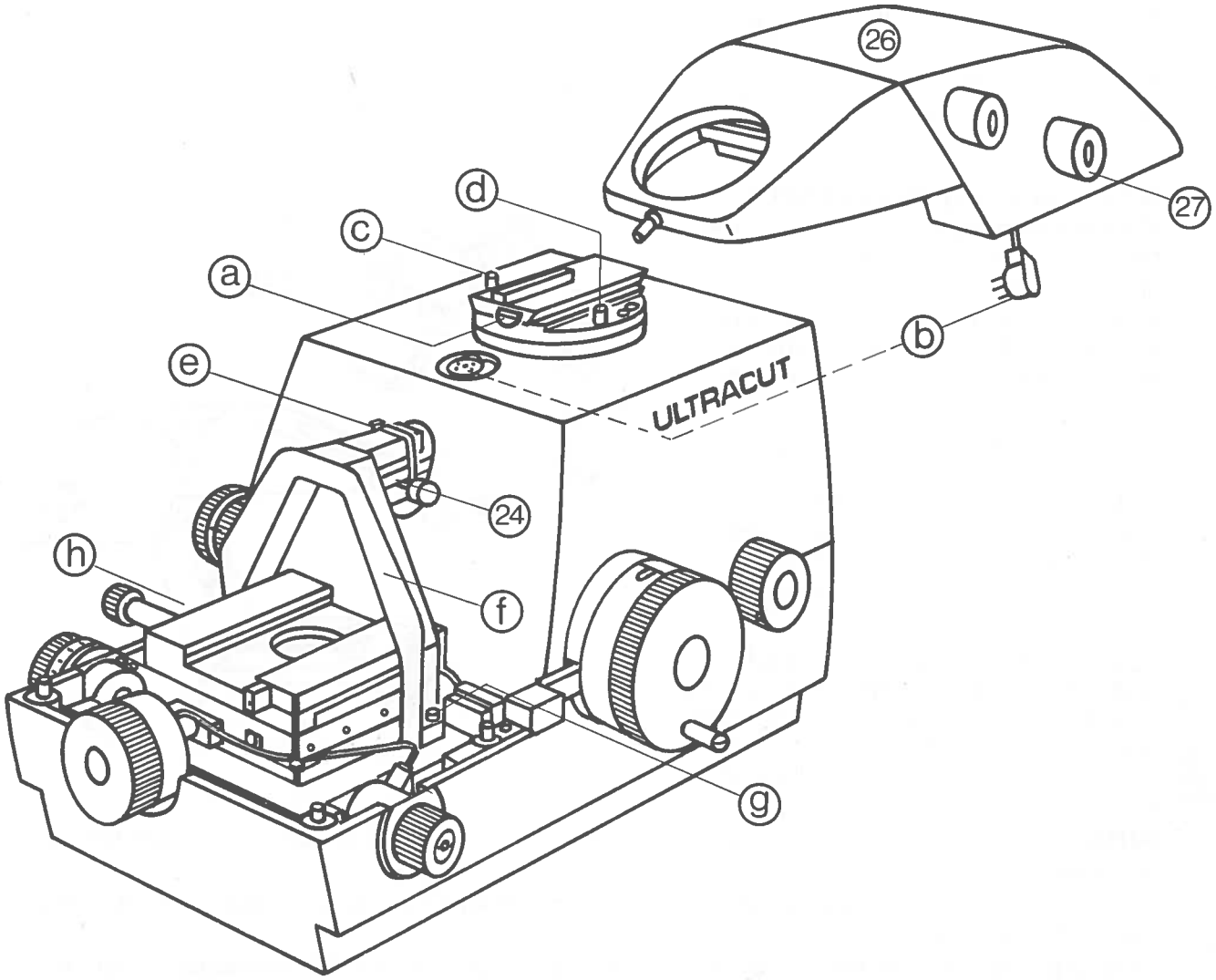
Design of particularly rigid, non-positive bearings with precise retention of their position during all manipulations on the specimen holder thus ensuring safe adjustment of specimen even with an already set microtome knife.

reinforcement of all mechanical elements of object and knife holder taking up substantially higher cutting forces and increasing still further the field of application of this instrument.

An extension of the accessory program to which also in future new items will be added such as e.g. a low-temperature cutting chamber.

More convenience in use by a modern functional design.

A new shell construction and the use of a combined hydraulically damped–rubber to metal bonded antivibration system minimizing in particular operation influences (manipulation forces and impulses) and thus greatly facilitate practical work on the instrument.



Turn stop screw anti-clockwise until cut-off surface is on top, then pull out plug (b) on the right side of the stop screw.

Move upper part of cover with control (27) towards rear until rack and pinion disengage; then holding it firmly slide it off completely.

Then two red transport locking screws (c+d) will be visible in the bore holes. Optionally turn them anti-clockwise three times by half a turn and only then unscrew them completely (store them for possible future transportation!).

Carefully slide on upper part of cover (26) from behind until rack and pinion engange and bring it in its foremost position with control (27).

Fasten stop screw (a) clockwise.

Insert plug (b).

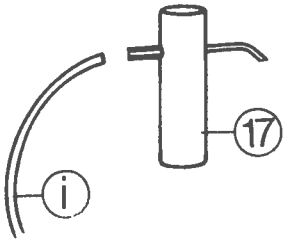
Keep the specimen arm (24) in its upper position and cut plastic strip (c) around.

Then slowly lower specimen arm onto its stop.

Remove the screws (g+h) and remove transport bridge (f) and the screws.

Put on the knife support cover (4) and fasten with screws (44). The silicone tubing (i) of the REFLEXOMAT pump is led best underneath lever (6) to clamp the knife carrier and then upwards.

Shorten the silicone tubing (i) of the REFLEXOMAT pump to required length and fit onto filler syringe (17).



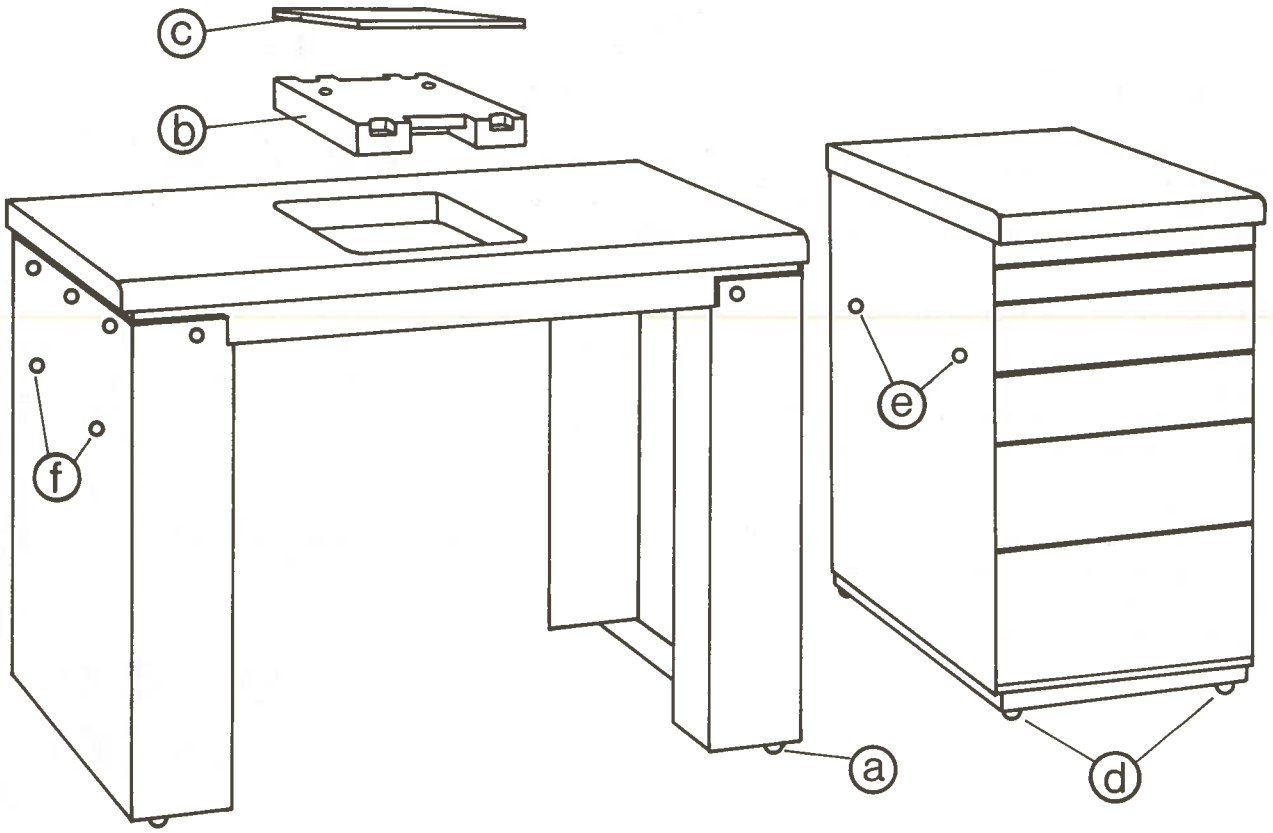
ULTRACUT Special working table

The instrument table is delivered assembled.
IMPORTANT: After placing the table in its exact location the right front leg (a) has to be adjusted to compensate for uneveness of the floor. This adjustment has to be carried out before inserting the anti-vibration base plate and putting the instrument on top of it, as follows:

Put the table exactly in the place provided for it, lift the table in the front in the middle, now lower it slowly and see whether the right and left front leg are touching the floor simultaneously. If not adjust the levelling device in the right leg until repeated lifting and lowering guarantees that both legs contact the floor simultaneously.
Now insert the antivibration base plate (b) which has finger molds in the front and rear into the cut out of the table centrally. Put the rubber mat so on top of it that the locating studs go into the corresponding openings of the antivibration base plate.
Before placing the ultramicrotome on top of the rubber mat, make sure that neither the antivibration base plate nor the rubber mat contacts the table top, then place the ultramicrotome centrally on the rubber mat. Lift, do not slide!

If the special table is supplied with 1 or 2 drawer units or the drawers are supplied subsequently the following has to be observed: by adjusting the 4 legs (d) of the drawer units (either by screwing the legs in or out) their height has to be adapted to that of the instrument table. Moreover the side of the drawer unit and of the table should be parallel and the legs should touch the floor.

All drawer units have to be mounted to the sides of the table by means of rubber-to-metal bounded shock absorbers which are to be found in one of the drawers together with screws and washers. These shock absorbers act as spacers between table and drawer unit. For mounting the drawer units to the instrument table, the table sides are provided with holes (e) and the sides of the drawer units with thread holes (f).
At first the rubber shock absorbers are fixed on the side of the drawer unit and then fastened to the sidewall of the foot elements of the table with screws and washers.



FIRST STEPS – OPERATING ELEMENTS

The following short instructions for use as well as the fold-out illustration (page 14) of the instrument and a numbered listing of all instrument parts will mediate all information for the proper use and maintenance of the ULTRACUT ultramicrotome which unpacked and set-up after removal of all transport locks is now ready for use. May we suggest to familiarize yourself with the operating elements and to run through the following manipulations several times before starting to prepare your sections?

Specimen/knife area

Pivot the microscope carrier (29) leftwards to the stop. Place REFLEXOMAT filler syringe (17) with the adhesive magnet on one of the stainless steel plates (43). Put the lever (6) to the left. Set the main control lever (12) on the hand wheel to its top stop and turn handwheel **slowly** clockwise until it clicks home. This fixes the inner ring (14). The outer ring (15) and the specimen arm (24) maintain their position. The specimen is fixed in the **specimen holder** (37) by means of a special key (42). The same special key fastens the specimen holder in the **specimen head** (35) or **segment arc.** Store special key in one of the recesses on the right or left of the support cover (4). Fix specimen head (35) in specimen arm (24) by means of knurled screw (23). For **inspection and trimming** of the specimen the specimen head with the specimen holder and specimen is placed into the **trimming block.** Insert trimming block into guide track (7) of knife support (8) and fix with lever (6) (position "fix").

The **knife carrier assembly** consists of the knife carrier (9/10) and knife holder (20). The knife carrier assembly is mounted in the guide track (7) analogously to the trimming block.
Swivelling the upper portion of the knife carrier over a larger amount (several degrees) is carried out by turning the upper portion (10) by hand – fine adjustment can then be accomplished with one of the drives (45).
Fit knife into knife holder (20) with clamping screw (19). Select the clearance angle via knurled knob (41), then clamp knife holder (20) via knurled screw (11).

Control Unit and Drive System

After depressing the main switch (53) of the control unit the ULTRACUT System is ready for use. Simultaneously the **illumination** is switched on. Switch-over from incident dark ground illumination or vice versa with push-button (49). The "Starlight" 6V illuminator is switched on with push-button (52). It is not included in standard equipment.

Pilot lamps (50/51) indicate final positions of specimen and knife feed (by a threefold intermittent acoustic signal and a continuous light signal). For **motor drive** operation press main control lever (12) down to its stop–motor runs. Cutting speed is adjusted with rotating knob (54). Detent at red dot setting (2 mm/sec.) allows adjustment of this position without interrupting observation through stereomicroscope. Presetting of the cutting zone length (2 to 22 mm) for two-speed operation with sliding control (13) after arresting the inner ring (14) of the handwheel: for that purpose raise main control lever (12) back into highest position and then turn handwhed **slowly** to its click stop. After adjustment of cutting zone length set switch-over point (slow cutting speed to rapid return speed) by rotating the outer knurled ring (15) of the handwheel with the inner ring (14) still arrested. After switching on the motor drive by pressing down main control lever (12) cutting speed changes automatically into return stroke speed at preselected switch over. For **manual operation** set main control lever (12) into horizontal position. The handwheel can then be freely moved clockwise (cutting movement) as well as counter-clockwise. When rotating the handwheel clockwise the downward movement of the specimen corresponds to the cutting stroke, the upward movement to the return stroke. During the return stroke the specimen is always retracted 0,2 mm(single pass).

HOW TO PREPARE YOUR SECTIONS

After having familiarized yourself with the individual operating elements of the ULTRACUT system by studying the numbered illustrations, the list of elements and the section "FIRST STEPS – OPERATING ELEMENTS" you may proceed as follows:

- press main switch (53) on control unit (red signal)
- in case fluorescent tubes do not light up: press white push-button L↑on the right of the control unit: white signal and background illumination go out – fluorescent tubes for incident illumination light up.
- swing stereo microscope with carrier to the left
- pivot lever (6) on knife support to the left and take out knife carrier assembly (9/10) from its guide track (7) in an upward movement.
- raise main control lever (12) on handwheel to its upper stop and rotate handwheel (15) slowly to its detent (arresting of inner ring)
- preset cutting zone length with sliding control(13). Normally: red dot position corresponding to 4,5 mm
- fasten specimen in specimen holder (37) – insert specimen holder with specimen into specimen head (35) (alternative: segment arc) and secure.
- insert specimen head with specimen holder and specimen into the trimming block and insert trimming block with these elements in the guide (7) of knife support
- swing stereo microscope over trimming block, adjust zoom to minimum magnification and shift trimming block longitudinally in the support guide (7) until the specimen appears in the center of the field of view. Then move clamping lever (6) into position "fix"
- adjust zoom control (32) to red dot setting: distance between grid lines in the eyepiece graticule 1 mm
- cut and trim specimen block with a razor blade (cutting face normally $0{,}5 \times 1\,mm^2$ to $1 \times 2\,mm^2$)
- remove complete specimen head assembly (35) from trimming block and mount into specimen arm
- loosen lever (6) on support, take off trimming block and replace it by knife carrier assembly (9/10).
- set specimen opposite knife edge
- approach knife with carrier (9/10) in its guide manually as near as possible to the specimen controlling this adjustment through the microscope at low magnification. Then set clamping lever (6) into position "fix"
- coarse knife-specimen alignment is made with the controls on the knife support (3,47), the knife carrier assembly (45) and the specimen head (36)
- fill REFLEXOMAT (5) with fresh bidistilled H_2O
- fill knife boat with frest bidistilled H_2O with pipette or syringe. Then attach REFLEXOMAT filler syringe (17) and adjust water level to optimum reflection by means of knurled knob (5)

INTRODUCTION

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Built-in electronically controlled motor drive with extra large cutting speed control range and high accuracy.

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Design of particularly rigid, non-positive bearings with precise retention of their position during all manipulations on the specimen holder thus ensuring safe adjustment of specimen even with an already set microtome knife.

reinforcement of all mechanical elements of object and knife holder taking up substantially higher cutting forces and increasing still further the field of application of this instrument.

An extension of the accessory program to which also in future new items will be added such as e.g. a low-temperature cutting chamber.

More convenience in use by a modern functional design.

A new shell construction and the use of a combined hydraulically damped–rubber to metal bonded antivibration system minimizing in particular operation influences (manipulation forces and impulses) and thus greatly facilitate practical work on the instrument.

UNPACKING AND INSTALLATION

Selection of location

The Reichert ULTRACUT System with its exceptionally robust mechanical design, its shell construction and its special hydraulically damped antivibration system keeps external or manipulation disturbances at a minimum. However, optimum performance will only be achieved by carefully selecting an appropriate location and properly installing the instrument. It is therefore imperative to observe the following:

Prevention of building and walking vibrations

a quiet place away from larger machines, transformers, air conditioners, elevators, heavily frequented corridors or staircases and streets with heavy traffic
solid floor (if not possible, installation on a stable wall console)
installation near a supporting wall, if possible in a corner; never in the center of a room (vibration maximum)
without contacting adjoining laboratory furniture to avoid vibration transfer

Prevention of draught and thermal convection

not within close proximity of fans or air conditioner outlets with intense convection
as far away as possible from doors, windows and ventilation openings (if unavoidable, provide a screen against draught), never between door and window
room size if possible smaller than 15 sq.m. (150 sq.ft). If necessary, set up partition walls

Prevention of thermal influences due to radiation

avoid direct sunshine (if room is facing south side, Venetian or roller blinds are indispensable)
avoid close proximity of heaters or air conditioners
keep room temperature as constant as possible within 18 and 25°C
do not install near window

Unpacking the ULTRACUT

When the instrument is supplied with working table the ultramicrotome ULTRACUT is packed in a special carton with wooden bottom. The special carton is attached to the underside of the working table. When the ULTRACUT is supplied without working table the special carton is housed in a second carton. Cut open the carton on its top and withdraw the spanner for the hexagon nut and the carton pad.

Put the carton pad on the table top and place the carton with the instrument on it in such a way that one third of either front or back of the instrument protrude over the table edge. In this position two each of the four transport locking screws may be unscrewed from below.

After removing the 4 transport locking screws take the carton with the ULTRACUT cautiously from the table and place it on the floor. The carton pad is left on the table.

Pull off the upper part of the carton and unfold the 4 lateral walls of its lower part.

IMPORTANT: Do not operate the knobs and levers which are now accessible until all transport locks have been removed.

The upper part of the cover must not be pivoted (turned) at all.

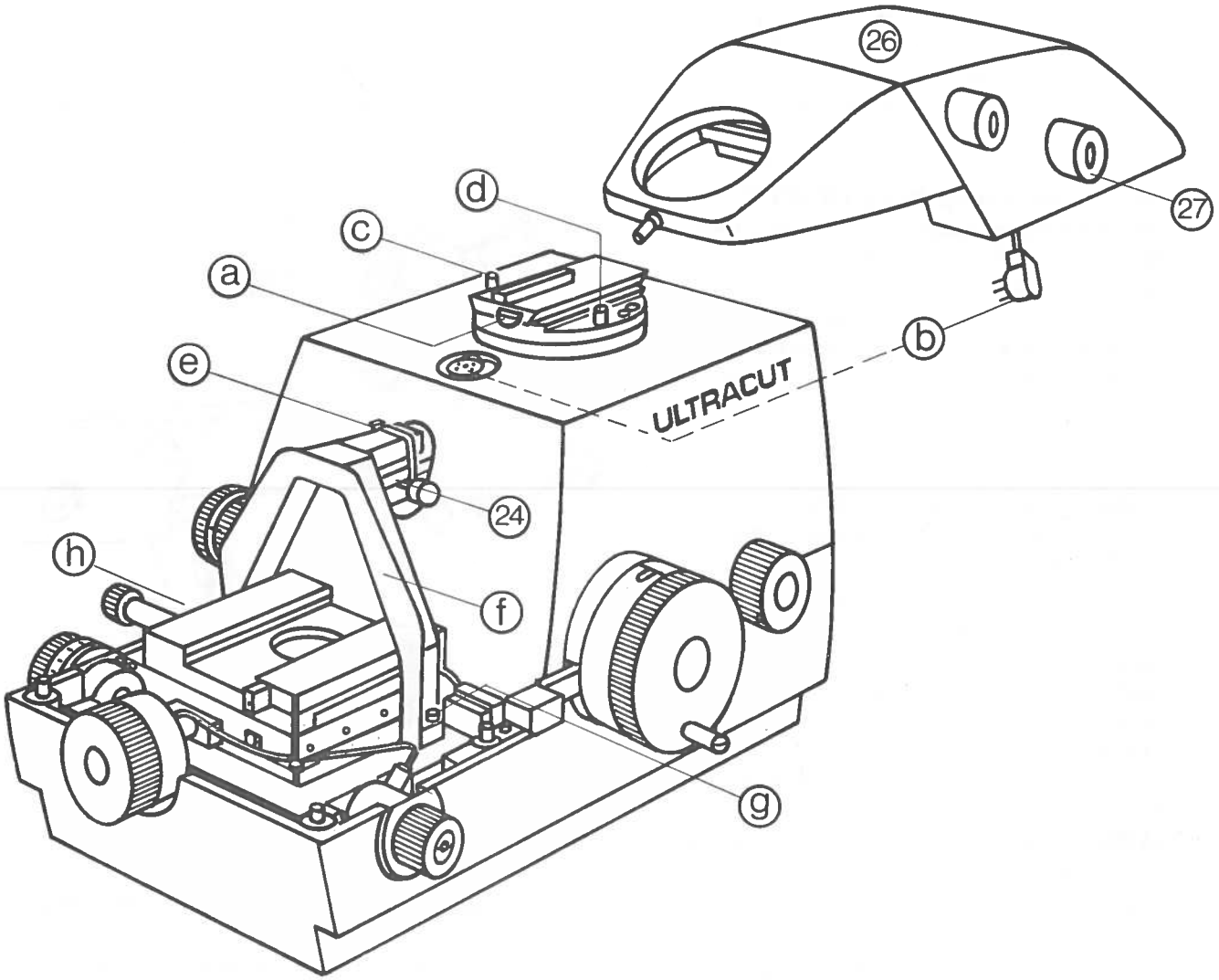
The ULTRACUT should be lifted only by means of the lateral carrying ledges (2) of the microtome base (1). These carrying ledges have four finger holds (see sketch on the fold-out picture) to enable transport by two persons.

Removal of transport locks

The ULTRACUT is despatched in such a way that neither for removing the transport locks nor during its operation the factory-sealed cover must be opened. Breaking the seals voids factory warranty.

The following sequence must be followed implicitely to avoid damage:
Put the ULTRACUT, underneath the paperboard, on the working table and remove the transport locks underneath the upper part of the cover (26) as follows:

Align upper part (26) exactly to the lower part of the cover.



Turn stop screw anti-clockwise until cut-off surface is on top, then pull out plug (b) on the right side of the stop screw.

Move upper part of cover with control (27) towards rear until rack and pinion disengage; then holding it firmly slide it off completely.

Then two red transport locking screws (c+d) will be visible in the bore holes. Optionally turn them anti-clockwise three times by half a turn and only then unscrew them completely (store them for possible future transportation!).

Carefully slide on upper part of cover (26) from behind until rack and pinion engange and bring it in its foremost position with control (27).

Fasten stop screw (a) clockwise.

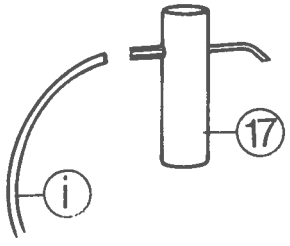
Insert plug (b).

Keep the specimen arm (24) in its upper position and cut plastic strip (c) around.

Then slowly lower specimen arm onto its stop.

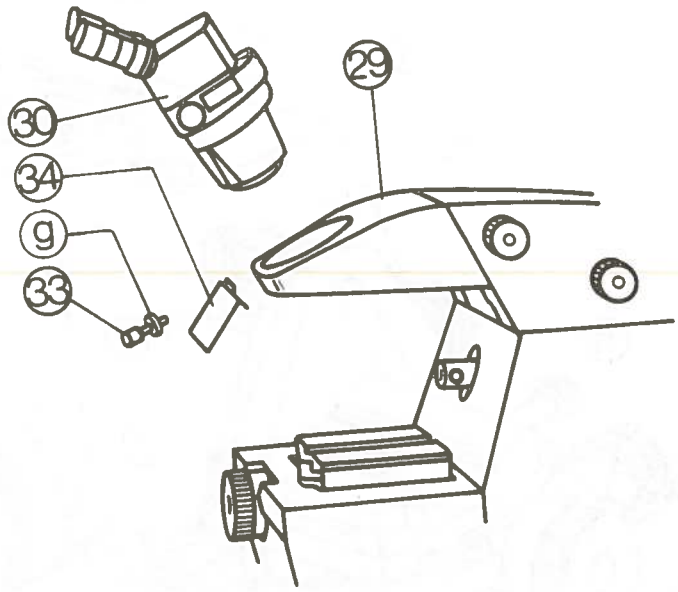
Remove the screws (g+h) and remove transport bridge (f) and the screws.

Put on the knife support cover (4) and fasten with screws (44). The silicone tubing (i) of the REFLEXOMAT pump is led best underneath lever (6) to clamp the knife carrier and then upwards.



Shorten the silicone tubing (i) of the REFLEXOMAT pump to required length and fit onto filler syringe (17).

Then the stereomicroscope (30) is placed in the corresponding opening of the microscope carrier (29) and the breath guard (34) is brought into position.
Stereo microscope (30) and breath guard (34) are fastened with special screw (33) by first securing the screw which fixes the microscope and then fastening the knurled nut (g) which holds the breath guard in its position.



Before transporting the ULTRACUT ultramicrotome again the transport locks have to be replaced as follows:
Move knife support (8) with coarse (N-S) feed (3) into medium position (indication 46) and with E-W drive (47) control in a position enabling the fastening of transport lock (f),
remove coin-slotted screw (44) and detach knife support cover (4),
withdraw filler syringe (17) from silicone hose push lever (12) upwards and turn the handwheel (15) until it locks in,
turn handle (16) into horizontal position, to 3 hrs. approx.,
set up transport bridge (f) and attach with screws (g+h), raise specimen arm (24) press it against the lower side of the transport lock and fix it by winding adhesive tape several times around arm and bridge (f).
IMPORTANT: After attaching the specimen arm (24) to the transport bridge (f) the handwheel must not be operated anymore.
Turn stop screw (a) anti-clockwise until surface is horizontal, pull out upwards plug (b) on the right side of the stop screw,
move upper part of cover with control (27) towards rear until rack and pinion disengage, then cautiously slide it off completely,
fasten the two locking screws (c+d) until a slight resistance will be felt (dovetail eventually in N-S position so that bores in upper and lower part coincide),
then turn screw (c) 1/2 turn, screw (d) one complete turn and screw (c) one complete turn and finally screw (d) 1/2 turn,
carefully slide on upper part of cover (26) from behind (dovetail must remain in its N-S position and should not be turned),
keep the plug (b) at the right side and rack the cover into its formost position with control (27),
fasten stop screw (a) clockwise and insert plug (b).
IMPORTANT: From now onwards the upper part of the cover must not be pivoted (turned).

Shipment without transport lock as well as without special carton causes damages. The special carton with complete set of transport locks and packing instructions can be obtained from the local Reichert Agency as well as directly from C. REICHERT OPTISCHE WERKE AG, A–1170 Vienna (Austria).

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Pivot the microscope carrier (29) leftwards to the stop. Place REFLEXOMAT filler syringe (17) with the adhesive magnet on one of the stainless steel plates (43). Put the lever (6) to the left. Set the main control lever (12) on the hand wheel to its top stop and turn handwheel **slowly** clockwise until it clicks home. This fixes the inner ring (14). The outer ring (15) and the specimen arm (24) maintain their position. The specimen is fixed in the **specimen holder** (37) by means of a special key (42). The same special key fastens the specimen holder in the **specimen head** (35) or **segment arc.** Store special key in one of the recesses on the right or left of the support cover (4). Fix specimen head (35) in specimen arm (24) by means of knurled screw (23). For **inspection and trimming** of the specimen the specimen head with the specimen holder and specimen is placed into the **trimming block.** Insert trimming block into guide track (7) of knife support (8) and fix with lever (6) (position "fix").

The **knife carrier assembly** consists of the knife carrier (9/10) and knife holder (20). The knife carrier assembly is mounted in the guide track (7) analogously to the trimming block.
Swivelling the upper portion of the knife carrier over a larger amount (several degrees) is carried out by turning the upper portion (10) by hand – fine adjustment can then be accomplished with one of the drives (45).
Fit knife into knife holder (20) with clamping screw (19). Select the clearance angle via knurled knob (41), then clamp knife holder (20) via knurled screw (11).

Control Unit and Drive System

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Pilot lamps (50/51) indicate final positions of specimen and knife feed (by a threefold intermittent acoustic signal and a continuous light signal). For **motor drive** operation press main control lever (12) down to its stop–motor runs. Cutting speed is adjusted with rotating knob (54). Detent at red dot setting (2 mm/sec.) allows adjustment of this position without interrupting observation through stereomicroscope. Presetting of the cutting zone length (2 to 22 mm) for two-speed operation with sliding control (13) after arresting the inner ring (14) of the handwheel: for that purpose raise main control lever (12) back into highest position and then turn handwhed **slowly** to its click stop. After adjustment of cutting zone length set switch-over point (slow cutting speed to rapid return speed) by rotating the outer knurled ring (15) of the handwheel with the inner ring (14) still arrested. After switching on the motor drive by pressing down main control lever (12) cutting speed changes automatically into return stroke speed at preselected switch over. For **manual operation** set main control lever (12) into horizontal position. The handwheel can then be freely moved clockwise (cutting movement) as well as counter-clockwise. When rotating the handwheel clockwise the downward movement of the specimen corresponds to the cutting stroke, the upward movement to the return stroke. During the return stroke the specimen is always retracted 0,2 mm(single pass).

Advance systems and feed setting

Coarse setting of the knife support in N-S and E-W position with coarse feed (3) and E-W drive (47). **Fine advance of the knife** with calibrated manual fine feed knob (40). Click stop for knife andvance of 0,5 – 1,0 – 1,5 – 2,0 µm and no click stop can be set with ring (39). Note position of support on indicator (46)! End of support movement towards specimen is indicated by intermittent acoustic and light signals (indicator (51) on control unit). **Setting of the automatic micro feed of the specimen advance** (0 to 0,5 µm) with the calibrated knurled knob (38). Ultra feed setting with the knurled knob (48) with arbitrary scale "0 to 10": position of the knurled control knob (48) determines the end position and acts as a positive stop for the micro feed control (38). **Advance rate of the specimen feed** can be read off on the scale of the micro feed knob (38). After the acoustic signal has been repeated three times it is switched off whereas the light signal is stopped only after resetting the advance. After the signal has started there is an advance reserve of abt. 50 µm to complete section series. Then reset!

IMPORTANT:

Resetting: rotate the knurled knob (18) clockwise to its stop. Then it has to be rotated by 1/4 turn anti-clockwise to ensure immediate specimen advance and to avoid long delays before nex section.

Observation and adjustment of reflection

Pivot stereoscopic microscope (30) over specimen-knife area, shift it in N-S direction with controls (27/28) and focus it. Adjust Zoom optics with calibrated control (43) in the 0,7 to 4,2 magnification range: at red dot setting distance between two lines of the eyepiece graticule (31) equals 1 mm on the specimen (measuring size of block face, relocation of nicks on diamond knives etc.) Adjust the fluid level in the knife boat with REFLEXOMAT knurled knob (5) and filler syringe (17). Before using the REFLEXOMAT has to be rinsed several times with fresh bi-distilled H_2O and filled bubblefree (autoclaving not necessary). For this purpose turn out knurled knob (5) anti-clockwise to its stop. Tip filler syringe (17) into fresh bidistilled H_2O, press down knurled knob (5) several times and after springing back wait until red fluid level indicator in the middle of the knurled knob (5) has reached its start position. Repeat this process until no air bubbles will come out of the filler syringe when pressing the knob (5).

For adjustment of reflection the filler syringe (17) with its magnet holder (20) is fitted to the knife holder (20) in such a way that the adjustable stainless steel tubing enters the knife boat. Now overfill the knife boat by means of a pipette or syringe with fresh bidistilled H_2O. Then use REFLEXOMAT only for reflection adjustment. For that purpose rotate the knurled knob (5).

HOW TO PREPARE YOUR SECTIONS

After having familiarized yourself with the individual operating elements of the ULTRACUT system by studying the numbered illustrations, the list of elements and the section "FIRST STEPS – OPERATING ELEMENTS" you may proceed as follows:

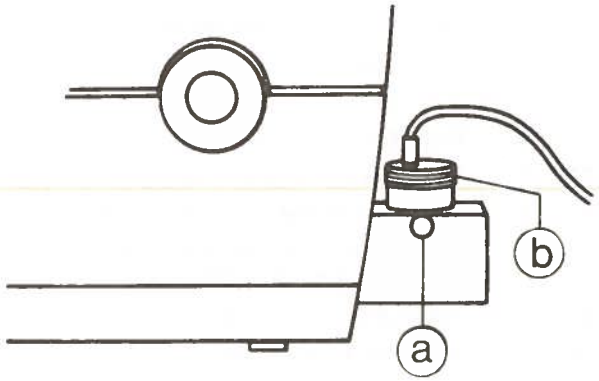
- press main switch (53) on control unit (red signal)
- in case fluorescent tubes do not light up: press white push-button L on the right of the control unit: white signal and background illumination go out – fluorescent tubes for incident illumination light up.
- swing stereo microscope with carrier to the left
- pivot lever (6) on knife support to the left and take out knife carrier assembly (9/10) from its guide track (7) in an upward movement.
- raise main control lever (12) on handwheel to its upper stop and rotate handwheel (15) slowly to its detent (arresting of inner ring)
- preset cutting zone length with sliding control(13). Normally: red dot position corresponding to 4,5 mm
- fasten specimen in specimen holder (37)–insert specimen holder with specimen into specimen head (35) (alternative: segment arc) and secure.
- insert specimen head with specimen holder and specimen into the trimming block and insert trimming block with these elements in the guide (7) of knife support
- swing stereo microscope over trimming block, adjust zoom to minimum magnification and shift trimming block longitudinally in the support guide (7) until the specimen appears in the center of the field of view. Then move clamping lever (6) into position "fix"
- adjust zoom control (32) to red dot setting: distance between grid lines in the eyepiece graticule 1 mm
- cut and trim specimen block with a razor blade (cutting face normally $0{,}5 \times 1\,mm^2$ to $1 \times 2\,mm^2$)
- remove complete specimen head assembly (35) from trimming block and mount into specimen arm
- loosen lever (6) on support, take off trimming block and replace it by knife carrier assembly (9/10).
- set specimen opposite knife edge
- approach knife with carrier (9/10) in its guide manually as near as possible to the specimen controlling this adjustment through the microscope at low magnification. Then set clamping lever (6) into position "fix"
- coarse knife-specimen alignment is made with the controls on the knife support (3,47), the knife carrier assembly (45) and the specimen head (36)
- fill REFLEXOMAT (5) with fresh bidistilled H_2O
- fill knife boat with frest bidistilled H_2O with pipette or syringe. Then attach REFLEXOMAT filler syringe (17) and adjust water level to optimum reflection by means of knurled knob (5)

- fine adjustment of knife is made using the reflection in the block face. Incident light is recommended for glass knives, dark ground illumination for diamond knives. (Switch over the light by push-button on the control unit)
- for setting the switch over point from slow cutting to fast return speed adjust the upper edge of the cutting face just underneath the knife edge
- preset automatic specimen feed: ultra feed (48) at red dot (approx. 0,07 µm = 70 nm) and micro feed (38) to green dot (0,35 µm)
- set cutting speed control knob (54) on control unit at green dot (90 mm/sec.)
- For automatic start of sectioning with triangular glass knife press down control lever (12) on handwheel up to the stop. Observe the whole start of sectioning through the stereoscopic microscope. The left hand remains on control knob (54) for adjusting cutting speed.
- After taking off the first section fragments reduce cutting speed without interrupting observation through the microscope. When the first full face section appears rotate the control knob (54) on the control unit anti-clockwise till it clicks in (red point–2 mm/sec.). Immediately after taking off the next section turn the micro feed knob (38) anti-clockwise to its stop. Section thickness then corresponds to red dot setting on the scale of ultra-feed control knob (48) (0,07 µm=70 nm).
- you can now expect a series of uniform ultra-thin sections (generally after 3 to 5 sections). The sections obtained are in the gold to mat silver interference colour range.
- any further adjustment of the ultra-feed control (48) can be made immediately after a section has come off. Limit changes in setting to 1 or 2 scale divisions.
- For preparing a section ribbon switch off the motor drive with lever (12) immediately after taking off a section only. Lever should be in horizontal position.
- combination of serial sectioning after fishing off of a ribbon: put main control lever (12) in its lowest position, all other controls remain unchanged.

We urge you to take advantage of the fact that all manipulations described above concerning aligning and sectioning can be carried out without interrupting control through the stereomicroscope.
This has been made possible by the well planned arrangement of the controls and the design of the ULTRACUT.

1. Periodically remove knife support cover (4) by opening retaining screws (44) and clean area under cover by means of vacuum cleaner or brush

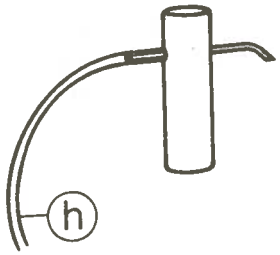
2. **Exchange and adjustment of the halogen bulb for the back light**
   Loosen clamping screw (a) and withdraw lamp holder (b). Exchange bulb. It is absolutely necessary to check the position of the filament after the lamp holder has been replaced. For this purpose place a piece of thin paper on the light exit opening of the back light in the support. When the control unit is switched on by pressing switch (53) and if necessary switch (49) the contures of two filament images can be seen. By rotation and raising or lowering the lamp holder (b) the two images of the lamp filament should be made to coincide. Then tighten clamping screw (a).

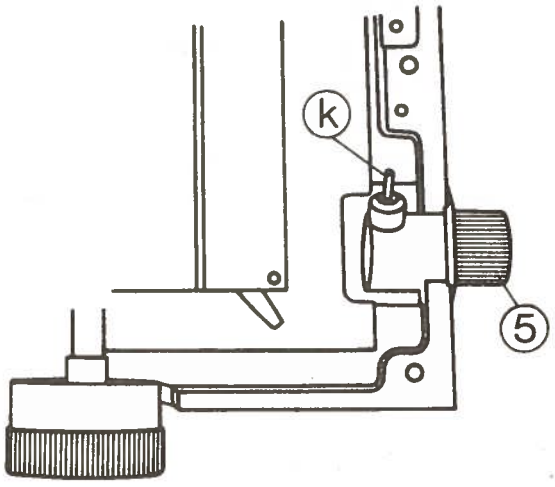


3. **Exchange of the fluorescent tube in the microscope illuminator**
   The fluorescent tube can be removed from its holder after turning through 90°. In case of failure of one tube it is advisable to replace both fluorescent tubes with new ones.
   PLEASE NOTE:
   The two tubes are switched in series, i.e. if one tube is faulty both do not operate.
   The corresponding starters are mounted in the control unit (see enclosed wiring diagram) and they are visible after removing the control unit cover by four screws.

4. **Replacing REFLEXOMAT silicone tubing:**
   Remove support cover (4) and connect new silicone tubing (h) to REFLEXOMAT pump (k).

5. Since glass fragments and dirt may cause instability of the knife carrier (9/10) and the knife holder it is essential that the knife holder (20) and guide track (7) for knife carrier are periodically cleaned with a solvant.





No.		Designation	No.		Designation
1	S	Base plate	32	S	Zoom magnification control (both sides)
2	S	Carrying ledge with finger holds (both sides)	33	S	Knurled screw with nut to secure stereomicroscope and breath guard
3	C	Manual coarse N-S feed (knife)	34	S	Breath guard
4	S	Knife-support cover	35	C	Rotatable specimen head interchangeable against segment arc
5	S	REFLEXOMAT control knob	36	C	Specimen holder rotation control
6	C	Lever for clamping knife carrier	37	C	Universal specimen holder (alternative: flat specimen holder)
7	C	Guide track for knife carrier	38	S	Micro feed setting for automatic specimen advance 0,0 to 0,5 µm
8	C	Knife support	39	S	Click stop setting control for 0,0–0,5–1,0–1,5–2,0 µm
9	C	Knife carrier–lower portion	40	S	Manual fine feed of knife
10	C	Knife carrier–upper portion	41	C	Clearance angle adjustment control
11	C	Clamping screw for knife holder	42	S	Special key in storage receptacle (both sides)
12	S	Main control lever for motor drive	43	S	Stainless steel plate for 'parking' of REFLEXOMAT filler syringe (both sides)
13	S	Sliding control for selecting length of cutting zone (0,5–22 mm)	44	S	Support cover retaining screws (both sides)
14	S	Handwheel–inner ring	45	C	Controls for precise knife pivoting (both sides)
15	S	Handwheel–outer ring	46	C	N-S support position indicator
16	S	Handle	47	C	Knife support E-W drive control
17	S	REFLEXOMAT filler syringe with magnetic carrier	48	S	Ultra feed setting for automatic specimen advance from 0 to 0,14 µm (140 nm)
18	S	Reset control for specimen advance	49	E	Push-button L↕ incident light/ back lighting
19	C	Knife clamping screw	50	E	Reset indicator for specimen advance
20	C	Knife holder	51	E	Reset indicator for knife advance
21	C	Wedge for standard knife	52	E	Push-button SL for supplement illumination "Starlight"
22	C	Swing-out knife gauge for height adjustment	53	E	Main switch
23	C	Clamping screw for specimen head or segment arc	54	E	Control knob for cutting speed (0,1–90 mm/sec.)
24	C	Specimen arm			
25	S	Fibre glass epoxy cover			
26	S	Upper part cover, swing-out			
27	S	Control for N-S microscope movement (both sides)			
28	S	Microscope focus control (both sides)			
29	S	Microscope carrier			
30	S	Stereostar Zoom microscope			
31	S	Wide-field eyepiece with net graticule			

C Core element
S Shell element
E Control unit

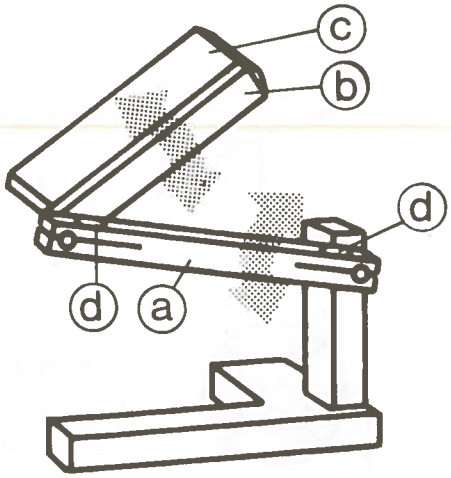
REICHERT-JUNG

MESACUT 2

This instruction manual is thought in combination with the ULTRACUT. All numbers mentioned refer to the folder in the ULTRACUT manual.
When using the MESACUT 2 with an Om U2 or Om U3 different manipulations have to be carried out according to the corresponding model.

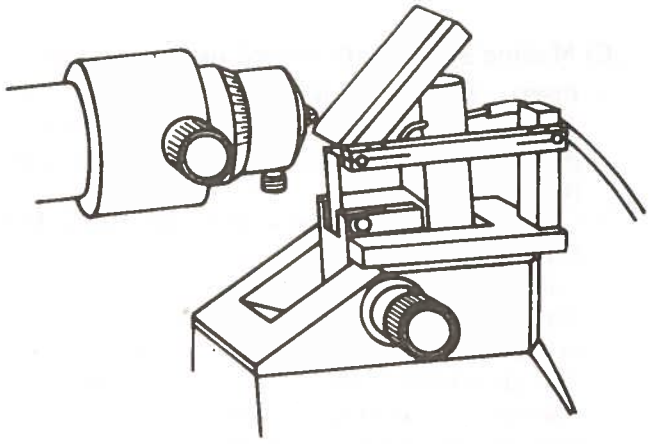
The Illumination

1. The incident-light illumination with the fluorescent illuminator and the backlighting will be satisfactory in most cases.
2. An essential improvement, however, offers the additional use of the "Starlite" low-voltage illuminator (Ref. 80 05 19). It is mounted in the bore-hole of the STEREOSTAR stereoscopic microscope.



Fitting the MESACUT 2

1. Before fitting the MESACUT 2 the mirror should be slightly lifted by its arms (a, b) (see drawing on the right). When putting on the MESACUT 2 please don't touch an eventually mounted knife boat or filler syringe!
2. The MESACUT 2 is fitted to the upper portion of the knife carrier (10) in such a way that the angular base plate fits exactly the left and rear side of the knife holder. The base plate is held by magnets in its position.
3. The MESACUT 2 may be used with glass knives as well as with diamond knives of all makes.



After fitting the MESACUT 2 the stereo microscope should be adjusted to its lowest magnification. This facilitates the finding of the object block respectively the reflex image.

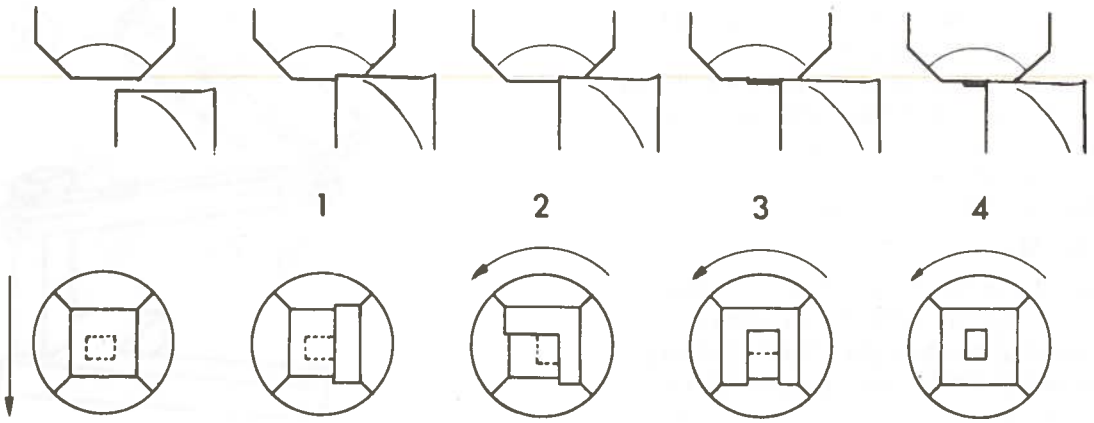
Application

A) Observation and examination of the cutting face

1. Fit MESACUT 2 as described above.
2. Lower mirror by arm (c) until slightly above the knife boat (distance about 2 mm).
3. Place specimen arm with specimen manually about 5 mm over knife edge. This is done by means of the handwheel (15) after bringing the main control lever (12) in its upper position.
4. Tilt mirror by arm (b) until the usual image of the object block with the knife edge in steep oblique view as well as that of the cutting face in vertical view projected by the MESACUT adapter will become visible. Here in "reflex position" existing compression cracks and excavations, in "half-shade position" free embedding media in the border zones of the specimen or the position of the specimen may be clearly recognized. In "reflex position" the measuring graticule of the stereo microscope may be used for measurements on the cutting face.

B) Retrimming the object block with a glass knife

1. To retrim an object block a glass knife without knife boat is used.
2. Fit MESACUT 2 as described above. Now, however, arm (a) is lowered 2 mm below the knife edge.
3. Adjust mirror as described under A) 4.
4. Pivot upper portion of the knife carrier (10) to the left and align glass knife to object block. Retrimming may now be done manually by the handwheel (15) or motorically. Advance movement takes place either automatically or manually.
5. Subsequently draw back glass knife with knife support (8) and shift it to the left. Pivot upper portion (10) to the right, align glass knife again and trim right specimen side in the same way. Following this way both edges of the block will be parallel to each other. Subsequently rotate specimen holder by 90° and trim remaining two block edges in the same way.



C) Making a Mesa with leveled basis by the aid of the adjusting block

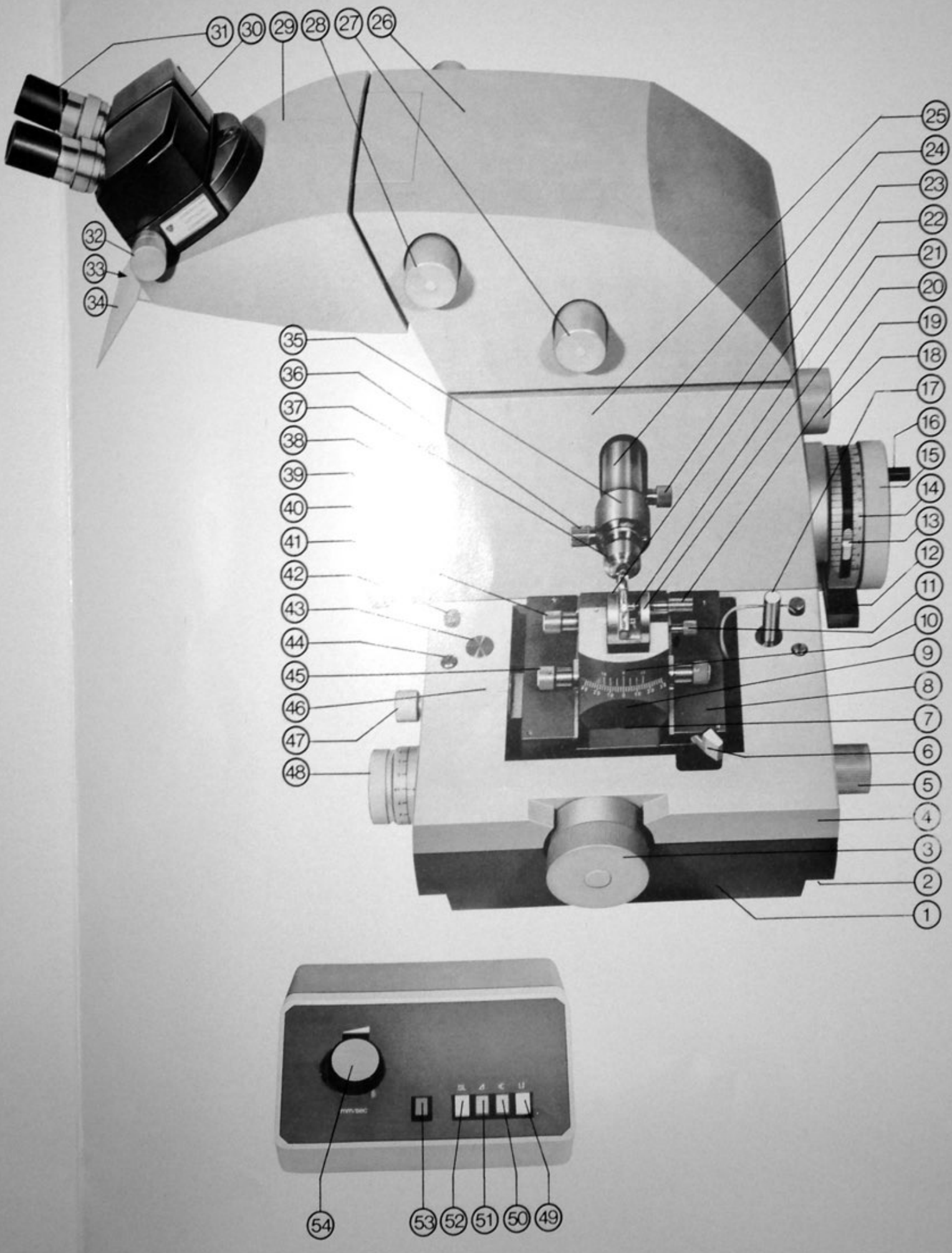
1. Insert a specimen holder with fitted adjusting block into the rotary head or segment arc.
2. Adjust cutting edge of the glass knife parallely to the reflecting front face of the adjusting block by pivoting the upper portion of the knife carrier (10). With backlighting this light split may be easily recognized.
3. Clamp specimen holder with object block. Make semi-thin sections to localize the position suitable for a Mesa.
4. Take off knife boat from glass knife.
5. Fit MESACUT 2 as described above. Adjust mirror as described under A) 4. Focussing of the image is made by the focus control (28) of the stereo microscope.
6. The glass knife is shifted laterally so that with its left edge material on the right of the cutting face may be cleared away. Advance movement takes place either automatically or manually. Sectioning may also be carried out either motorically or manually—by slightly turning the handwheel (15) forward or backward.
7. When the required depth is reached on one side the glass knife with knife support (8) is retracted and the specimen block is rotated 90° anti-clockwise. When cutting the second and following sides the split image (see para C) 2.) shows how much there is still to trim away when the knife comes over the plane already trimmed off, respectively whether the required level has already been reached. By this it is very easy to obtain an absolutely leveled Mesa basis free of clippings.

Maintenance

The surface mirror (c) may be cleaned carefully with lens tissue paper and thrown out of the arm (b) in case of an exchange. By means of the adjusting screws (d) the tread of the arms (a, b) may be adjusted. It should be taken into account, however, that it is easier to pivot the mirror than to lower the arm (a).

ACCESSORIES AND SPARES

	Reference No.
Universal specimen holder	70 01 38
Flat specimen holder	70 04 01
Special key for specimen holder	70 04 21
Trimming block (up to ser.no. 365 848)	70 17 32
(from ser.no. 365 849)	70 17 56
Goniometer specimen head V, adjustability ±15°	70 17 21
Goniometer specimen head H,adjustability:	
±45° horizontal, ±2,5° vertical	70 17 22
Spotlight "Starlight" (to be connected to control unit)	80 05 19
Low-Voltage halogen bulb for back light	86 00 19
Fluorescent tube	87 00 27
Starter for fluorescent tube	87 00 28
Fuse T 0,25 B (220 V), 10 off	86 01 56
Fuse T 0,5 B (110 V), 10 off	86 01 59
Silicone tubing for REFLEXOMAT	70 02 25
Plastic cover for main unit	89 50 05
Plastic cover for control unit	89 50 16
Breath guard	70 17 50
MESACUT 2 structure viewer	70 17 14
Mirror for MESACUT 2	70 17 – 41 576
Special glass strips 400 x 25 x 6 mm, 30 pieces	97 00 63
Special glass 200 x 50 x 6 mm, 50 pieces	87 00 59
Special glass 200 x 50 x 10 mm, 25 pieces	87 00 60
Special glass 200 x 50 x 12 mm, 25 pieces	87 00 61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