

Durst LABORATOR 138 S + COLOR LABORATOR 138

Operating manual

Durst[®]
PHOTOTECHNIK



With the Durst LABORATOR 138 S you now own a quality product made by Durst Phototechnik GmbH of Bolzano, Italy, incorporating the highest standards of precision and workmanship in manufacture and quality control. With its convenience of handling and reliable operation, this high-quality unit will serve you well for all colour and black-and-white enlarging.

Successful operation however also depends on correctly following the operating instructions. This manual systematically explains both the assembly and operation of your enlarger.

Please take the trouble to read this manual thoroughly. Complete familiarity with all the operations and controls will allow you to avoid annoying failures or even damage.

Durst Phototechnik GmbH, Bolzano

Contents	Page	Page
A) General note	4	
Shipping and check for completeness		
The LABORATOR 138 S BW outfit		
The LABORATOR 138 S COLOR outfit		
Components and controls		
B) Assembly	6	
The base and lower column		
The upper section		
The baseboard		
The condenser lamphouse		
Fitting the opal lamp		
Condenser combinations with the opal lamp		
Condenser combinations with the point source lamp		
Wall fixing of the LABORATOR 138 S COLOR		
The CLS 1000 colour head		
Fitting the reflector and tungsten-halogen lamp		
Connecting the CLS 1000 colour head		
C) Operation	9	
Lenses		
Mixing boxes		
Fitting the diffusers		
The negative carrier		
Adjusting the magnification		
Focusing		
Centering the lamp in the condenser lamphouse		
The filter drawer		
Correcting converging verticals		
Horizontal projection		
		Reductions
		Copying
		D) Colour enlargements
		15
		Filter settings
		The variable density control
		Supplementary filters
		The white-light setting
		Black-and-white enlargements with the CLS 1000 colour head
		Black-and-white enlargements on variable contrast papers
		E) Maintenance
		16
		The basic L 138 S enlarger
		The CLS 1000 colour head
		Changing the lamp
		Fuses
		The colour filter unit
		F) Conversion instructions
		17
		Mounting the CLS 1000 colour head on the L 138 S (with NEGA 138 negative carrier)
		Mounting the CLS 1000 colour head on the L 138 S BW (with TRINEG negative carrier)
		Fitting the new TRINEG negative carrier in the L 138 S (with NEGA 138 carrier)
		G) Technical data
		20
		Dimensions and weights
		Condenser combinations
		Wiring schematics
		(see enclosures)

A) General note

The Durst LABORATOR 138 S is a universal enlarger for all film sizes up to 13×18 cm or 5×7 inches. The LABORATOR 138 S is supplied from the factory either in a black-and-white version or as a colour enlarger. The colour version of the Durst LABORATOR 138 S with the CLS 1000 colour head is a high-power enlarger which gives the shortest possible exposure times and outstanding evenness of colour mixing and illumination.

Shipping and check for completeness

The Durst LABORATOR 138 S BW and the LABORATOR 138 S COLOR are shipped in two protective cases. Before assembling the unit please check that all components of the outfit specified are included and undamaged. Also carefully clean all parts.

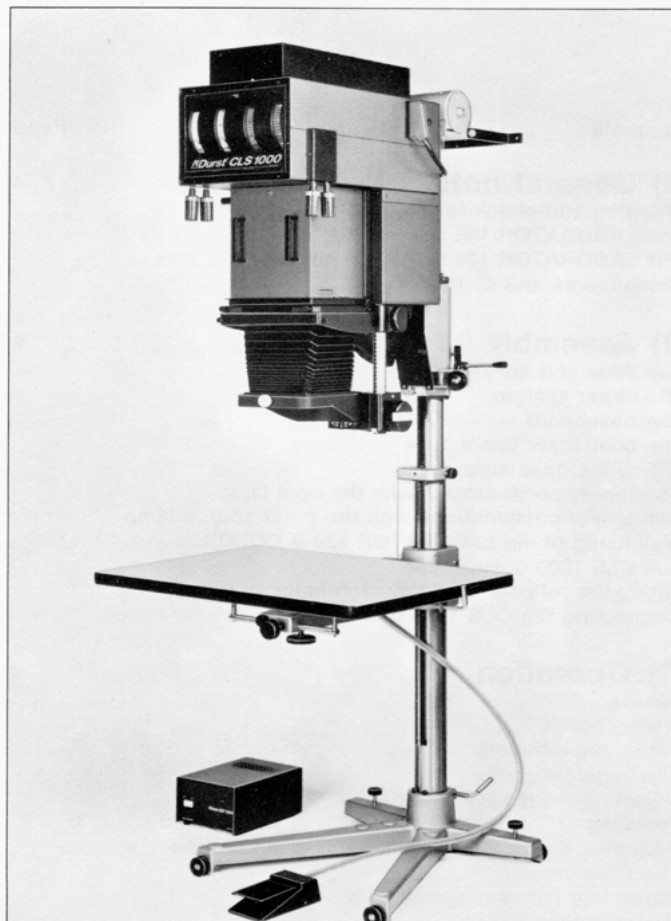
The LABORATOR 138 S BW outfit

- Basic enlarger consisting of the base, lower column with baseboard arm and upper column with negative carrier stage
- 60×80 cm (23.6×31.5 inch) baseboard
- Condenser lamphouse with 45° mirror, filter drawer and electrical fittings
- TRINEG negative carrier with REGLAS 139 glass inserts
- 300 watt opal lamp (OPAL 300).



The LABORATOR 138 S COLOR outfit

- Basic enlarger consisting of the base, lower column with baseboard arm and upper column with negative carrier stage and upgraded counterweight spring
- 60×80 cm (23.6×31.5 inch) baseboard
- CLS 1000 colour head
- EST 1000 voltage stabiliser
- 1000 watt 120 volt tungsten-halogen lamp (COLAMP 1840)
- 13×18 cm (5×7 inch) mixing boxes (TRINOBOX 138)
- TRINEG negative carrier with REGLAS 139 glass plates
- Wall fixing bracket.

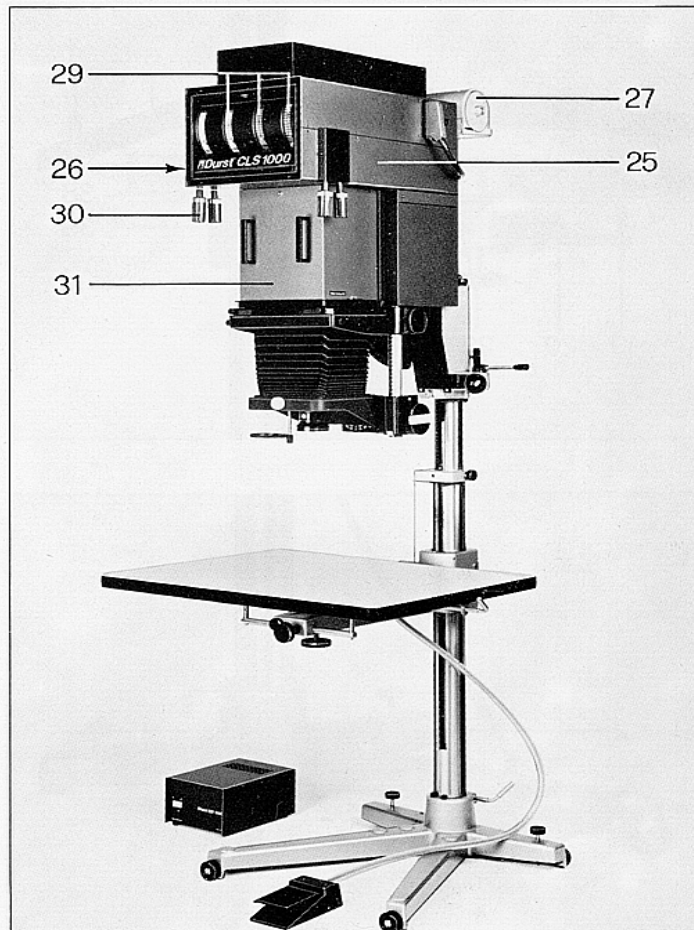
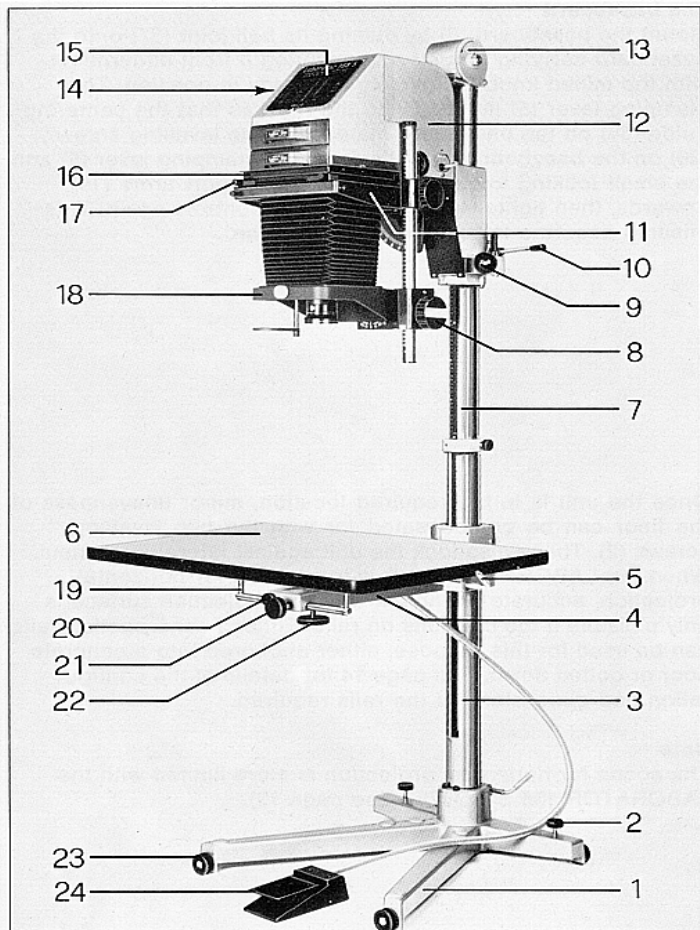


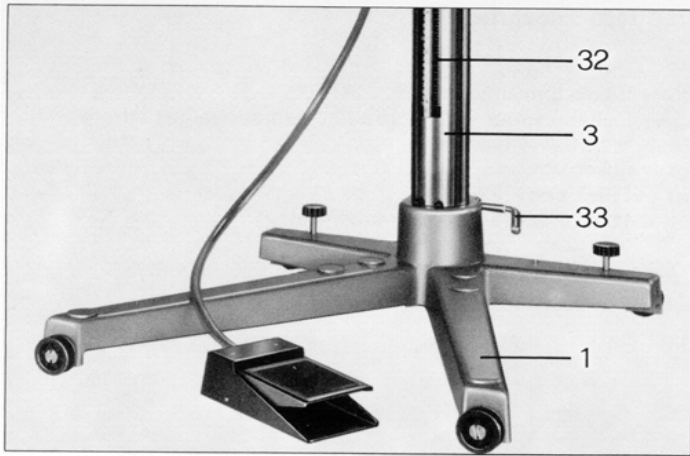
Components and controls

- 1 - Base with four feet and -
- 2 - Levelling screws
- 3 - Lower column with -
- 4 - Baseboard arm
- 5 - Clamping lever
- 6 - Baseboard
- 7 - Upper column
- 8 - Focusing knob
- 9 - Vertical adjustment knob
- 10 - Rapid vertical adjustment handle
- 11 - Enlarger head carrier
- 12 - Condenser lamphouse
- 13 - Column head for condenser lamphouse
- 14 - Filter drawer in condenser lamphouse
- 15 - 45° mirror
- 16 - TRINEG negative carrier
- 17 - Adjustable masking strips
- 18 - Lens stage
- 19 - Support arms
- 20 - Small locking knob for support arms
- 21 - Large locking knob for baseboard adjustment
- 22 - Milled baseboard clamping knob
- 23 - Rollers
- 24 - Foot pedal for baseboard adjustment

CLS 1000 colour head

- 25 - Colour head
- 26 - White-light lever
- 27 - Column head with upgraded counterweight spring
- 28 - Wall fixing bracket
- 29 - Filter scales
- 30 - Filter control knobs
- 31 - 13×18 cm (5×7 inch) mixing box

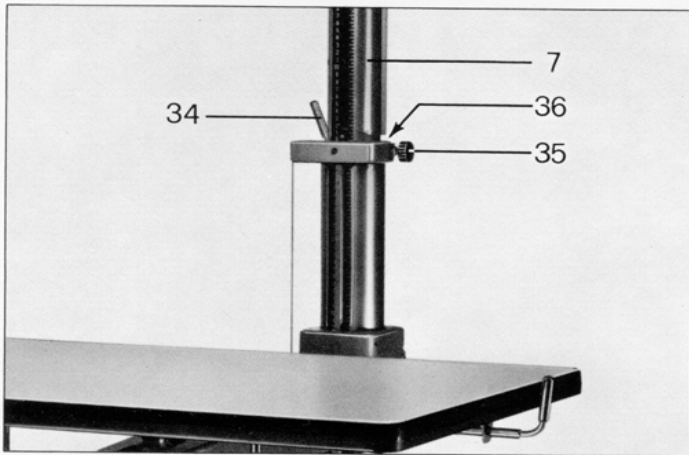




B) Assembly

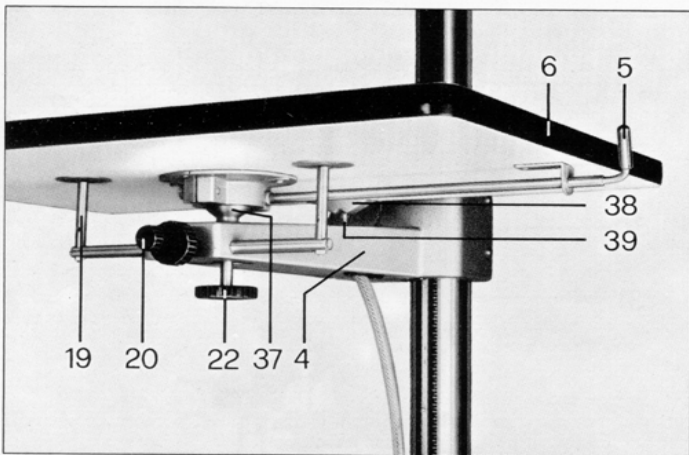
The base and lower column

Place the base (1) on the floor. Insert the lower column (3), with its scales (32) facing forward, into the base and secure with the clamp (33).



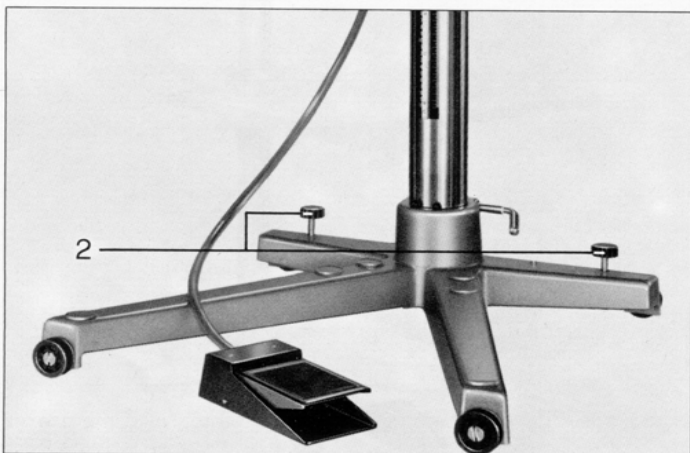
The upper section

Slack off the clamping lever (34) and the milled screw (35) and insert the upper column (7) into the lower column. Tighten the milled screw (35); this must engage in the slot (36) in the upper column. Finally tighten the clamping lever (34).



The baseboard

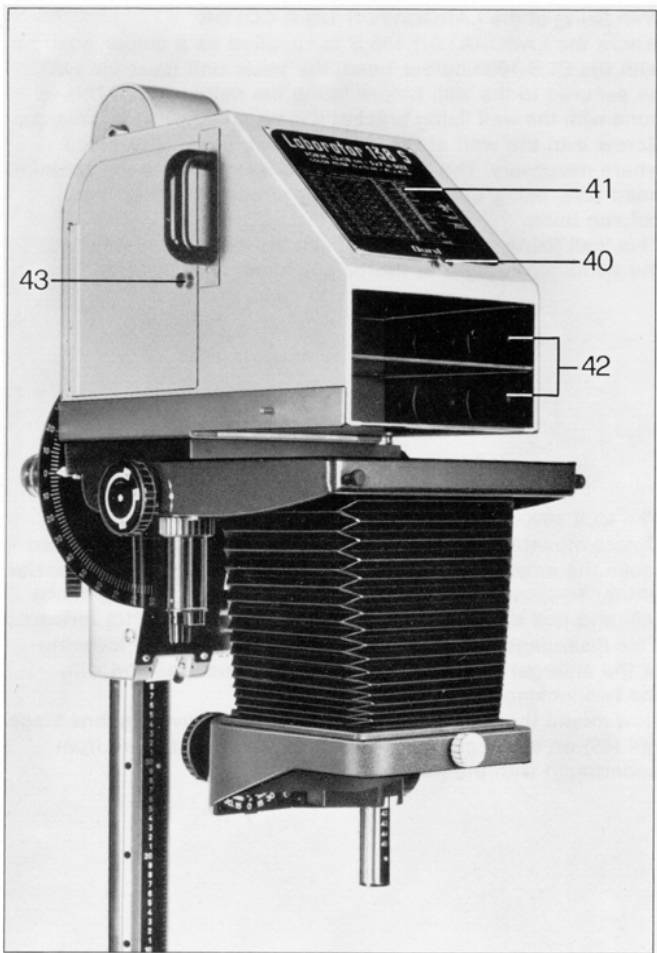
Mount the baseboard (6) by placing its ball joint (37) onto the baseboard carrying arm (4) and securing it from underneath with the milled knob (22) which is already in position. The clamping lever (5) must face to the right so that the centering guide (38) on the baseboard mates with the levelling screw (39) on the baseboard arm. Slack off the clamping lever (5) and the small locking knob (20), swing the support arms (19) upwards, then tighten the two clamping controls again. This ensures accurate levelling of the baseboard.



Once the unit is in the required location, minor unevenness of the floor can be compensated for with the two levelling screws (2). These also lock the unit against lateral movement. When the LABORATOR 138 S is to be used for horizontal projection, accurate alignment with the projection surface is only possible if the unit runs on rails. Either T- or L-section rails can be used for this purpose, either anchored into a concrete floor or bolted down. See page 14 for details of the configuration and dimensions of the rails required.

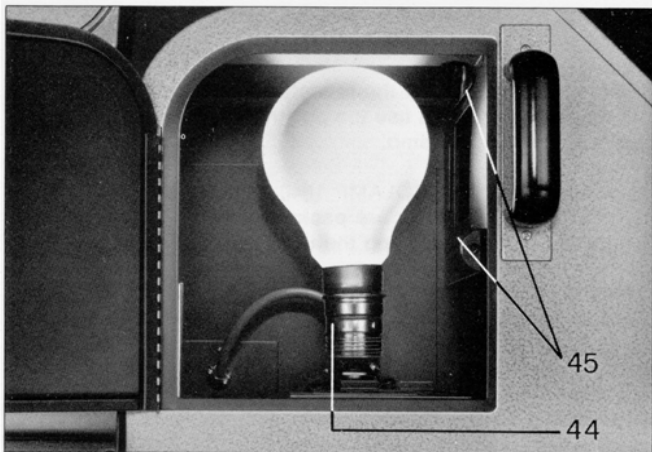
Note

The scope for horizontal projection is more limited with the LABORATOR 138 S COLOR (see page 13).



The condenser lamphouse

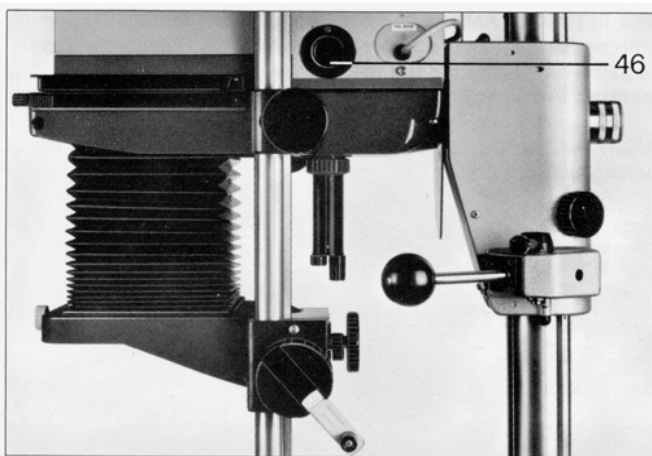
Where the LABORATOR 138 S is ordered as a black-and-white enlarger with condenser lamphouse, this is already factory-mounted on the enlarger head. Slack off the milled screw (40), swing up the mirror cover (41), withdraw the 45° mirror, remove all packaging material and replace the mirror. Push the appropriate LATICO condensers (available extra), with their convex sides facing each other, into the guides (42). Remove the TRINEG negative carrier when changing condensers.



Fitting the opal lamp

Unscrew the milled screw (43), open the lamphouse cover and screw the lamp into the fitting (44). Plug the lead from the lamphouse into the mains supply – via an exposure timer if required. To ensure even illumination of the whole image area with the larger negative sizes use large-envelope Durst opal lamps (Order code: OPAL 200/300/500 watts). For smaller negatives up to 6×9 cm or 2½×3½ inches, standard opal lamps are suitable. Check every lamp before use; hold it against a strong light to show up possible flaws in the glass or burning deposits inside. Such deposits may form as a result of frequent voltage fluctuations or after prolonged use and lead to uneven illumination. With lamps above 250 watts use the heat filter (available extra, Order code: LACALO) in the guides (45).

For lamps over 300 watts always use the LAFAN 138 fan (available extra). Attach the hose from the LAFAN to the condenser lamphouse after removing the cover (46).



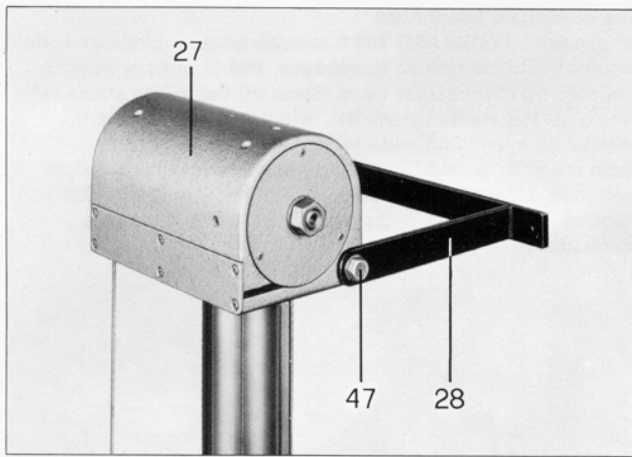
Condenser combinations with the opal lamp

The condenser combination required depends on the focal length of the lens and with a given focal length sometimes also on the magnification. The tables on page 21 list condenser combinations with opal lamps.

Condenser combinations with the point source lamp

For maximum sharpness, detail resolution and shortest exposure times with highest contrast, the PULAM/VARIPUT point source lighting is recommended. When using the PULAM point source lamp, the LABORATOR 138 S should also be fitted with surface-coated negative carrier glasses (REGLAS 139 T), a surface-coated 45° mirror (LASPE T) and surface-coated condensers (LATICO T).

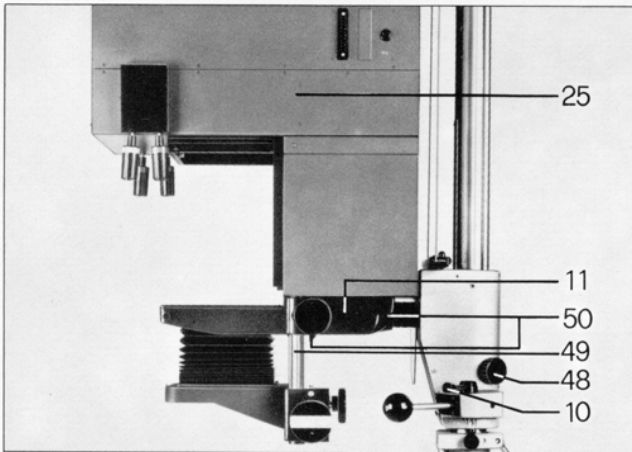
The condenser combinations with the point source lamp are different from the combinations with opal lamps (see page 21).



Wall fixing of the LABORATOR 138 S COLOR

Where the LABORATOR 138 S is supplied as a colour enlarger with the CLS 1000 colour head, the basic unit must always be secured to the wall before fitting the colour head. This is done with the wall fixing bracket (28) supplied with the enlarger. Screw it to the wall at the correct level, using wall plugs where necessary. The bracket is then connected to the column head (27), using the two bolts (47) already fitted on the column head.

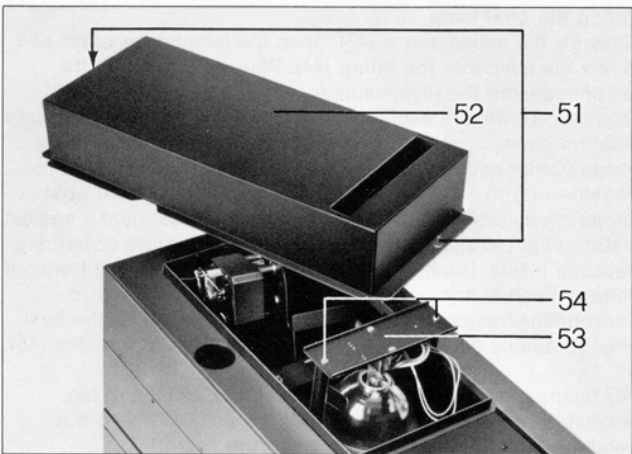
This wall fixing is essential to keep the enlarger stable with the additional weight of the colour head.



The CLS 1000 colour head

Before mounting the separately packed CLS 1000 colour head move the enlarger head (11) as far down as possible for easier fitting. To lower the head, first release the two locking knobs (48) and pull the rapid vertical adjustment handle (10) forward. This disengages the friction drive and permits free lowering of the enlarger head. Secure it in the bottom position with the two locking knobs (48).

Now mount the CLS 1000 colour head (25) above the lens stage rail (49) on the negative carrier stage (11) and secure from underneath with the four screws (50).



Fitting the reflector and tungsten-halogen lamp

Note:

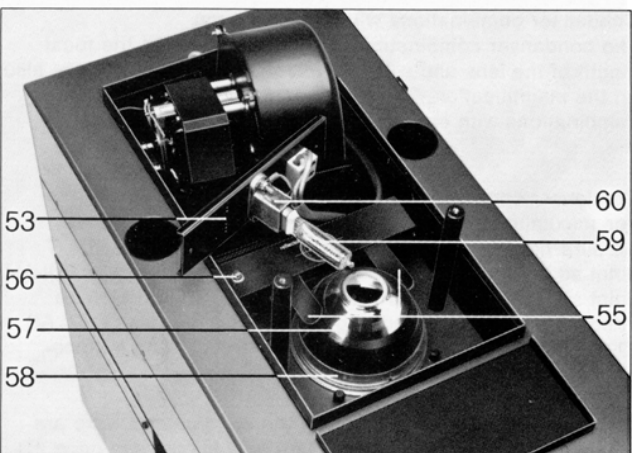
Never touch the inside of the reflector or the lamp envelope with the fingers. Always use the polythene glove supplied with the tungsten-halogen lamp.

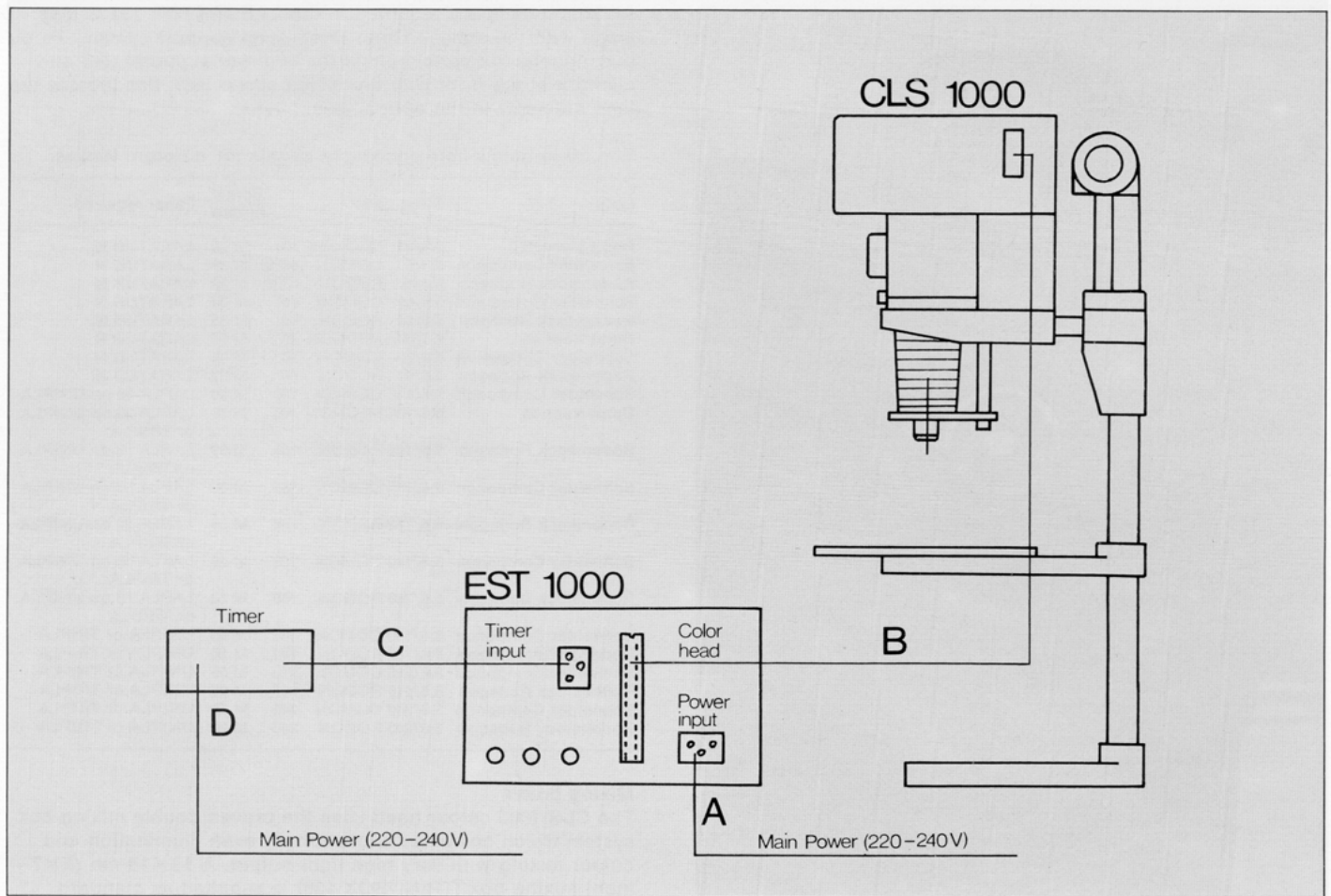
The special 1000 watt COLAMP 1840 tungsten-halogen lamp and the dichroic reflector are packed separately and are fitted as follows before connecting the unit.

Press the locking studs (51) and remove the lamphouse cover (52). A securing bracket (53) is now accessible inside the colour head. Unscrew the two milled screws (54) to remove this bracket, press the locking button (56) and swing up the reflector holder with the retaining springs (55). Then place the dichroic reflector (57) on the reflector base (58) and secure the reflector holder with the pressure springs (55) and the locking button (56).

Next fit the COLAMP 1840 tungsten-halogen lamp (59) in the lamp socket (60) of the securing bracket (53). Then insert the tungsten-halogen lamp in the reflector and screw down the securing bracket (53) with the two milled screws.

Finally replace the lamphouse cover (52) and secure with the locking buttons (51).

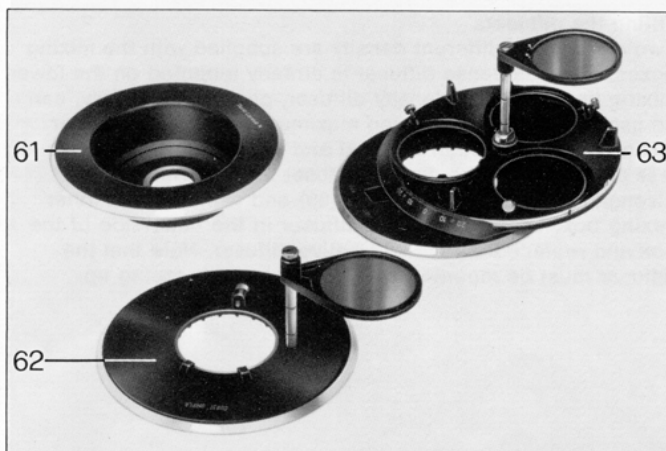




Connecting the CLS 1000 colour head

After mounting the colour head and fitting the tungsten-halogen lamp, connect the voltage stabiliser as follows:

- Plug the cable (A) into the « Power input » socket on the EST and connect to a mains supply socket.
- Plug the cable (B) supplied into the « Color head » socket on the EST and the socket on the CLS 1000 colour head.
- Use the cable (C) supplied to connect an exposure timer to the « Timer input » socket.
- Connect the exposure timer in turn directly to the mains supply (D).



C) Operation

Lenses

The LABORATOR 138 S can be used with lenses of focal lengths from 50 to 240 mm. Three different lens boards or panels are available extra:

- (1) The LARATUB N (61) lens tube for lenses from 50 to 80 mm focal length
- (2) The single UNIPLA panel (62) for lenses from 100 to 240 mm focal length.
- (3) The TRIPLA lens turret (63) for three lenses of focal lengths from 105 to 240 mm.



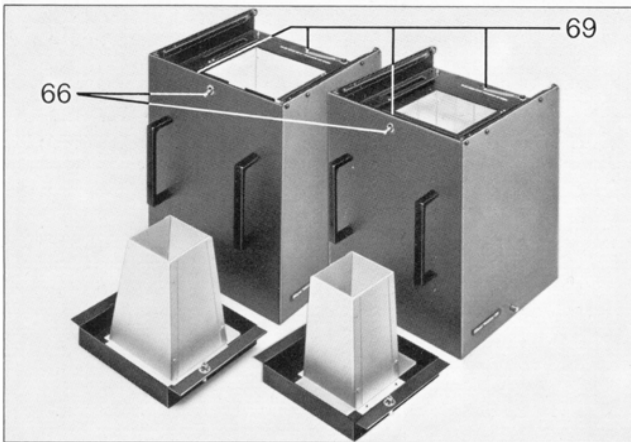
All lens panels are mounted in the LABORATOR 138 S lens stage with the special Durst three-point support system. To do this, engage the panel behind the two rear supports (64) and clamp it at the front with the milled screw (65); this locates the lens precisely in the optical axis.

The table below lists accessory panels for different lenses.

Lens	Durst code	Screw thread	Panel required
Durst Neon	2.8/50 NEONON 50	M 39	LARATUB N
Schneider Componon	2.8/50 COMON 5028	M 39	LARATUB N
Rodenstock Rodagon	2.8/50 RODON 5028	M 39	LARATUB N
Schneider Componon	5.6/60 COMON 60	M 39	LARATUB N
Rodenstock Rodagon	5.6/60 RODON 60	M 39	LARATUB N
Durst Neon	5.6/80 NEONON 80	M 39	LARATUB N
Schneider Componon	5.6/80 COMON 80	M 39	LARATUB N
Rodenstock Rodagon	5.6/80 RODON 80	M 39	LARATUB N
Schneider Componon	5.6/100 COMON 100	M 50	LAPLA 50 on UNIPLA or TRIPLA
Durst Neon	5.6/105 NEONON 105	M 39	LAPLA 39 on UNIPLA or TRIPLA
Rodenstock Rodagon	5.6/105 RODON 105	M 39	LAPLA 39 on UNIPLA or TRIPLA
Schneider Componon	5.6/135 COMON 135	M 50	LAPLA 50 on UNIPLA or TRIPLA
Rodenstock Rodagon	5.6/135 RODON 135	M 39	LAPLA 39 on UNIPLA or TRIPLA
Schneider Componon	5.6/150 COMON 150	M 50	LAPLA 50 on UNIPLA or TRIPLA
Rodenstock Rodagon	5.6/150 RODON 150	M 50	LAPLA 50 on UNIPLA or TRIPLA
Schneider Componon	5.6/180 COMON 180	M 50	UNIPLA or TRIPLA
Rodenstock Rodagon	5.6/180 RODON 180	M 50	UNIPLA or TRIPLA
Schneider Componon	5.6/210 COMON 210	M 55	UNIPLA or TRIPLA
Rodenstock Rodagon	5.6/210 RODON 210	M 58	UNIPLA or TRIPLA
Schneider Componon	5.6/240 COMON 240	M 66	UNIPLA or TRIPLA
Rodenstock Rodagon	5.6/240 RODON 240	M 72	UNIPLA or TRIPLA

Mixing boxes

The CLS 1000 colour head uses the proven double mixing box system which combines exceptionally even illumination and colour mixing with very high light output. A 13×18 cm (5×7 inch) mixing box (TRINOBOX 138) is supplied as standard with the LABORATOR 138 S COLOR. It consists of an upper and a lower mixing box.



Two further mixing boxes are available extra for the following sizes. Again each consists of an upper and a lower mixing box: 10×12.7 cm or 4×5 inches (TRINOBOX 450), and sizes up to 6×9 cm or 2½×3½ inches (TRINOBOX 69).

To ensure optimum quality, the mixing boxes for each film size are always changed in pairs – upper and lower together.

Note:

Before removing the lower mixing box withdraw the negative carrier.

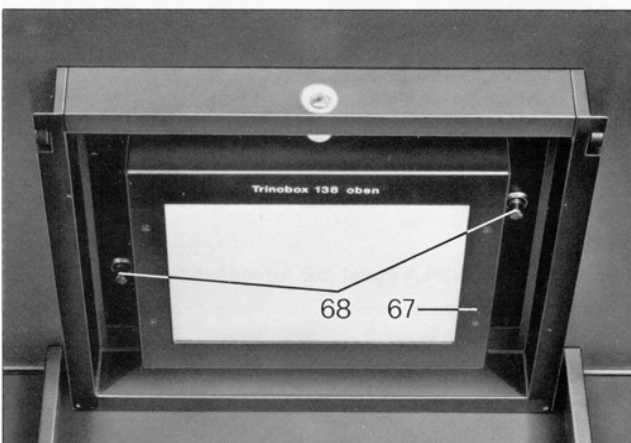
Press the locking button (66), then pull out the TRINOBOX mixing box.

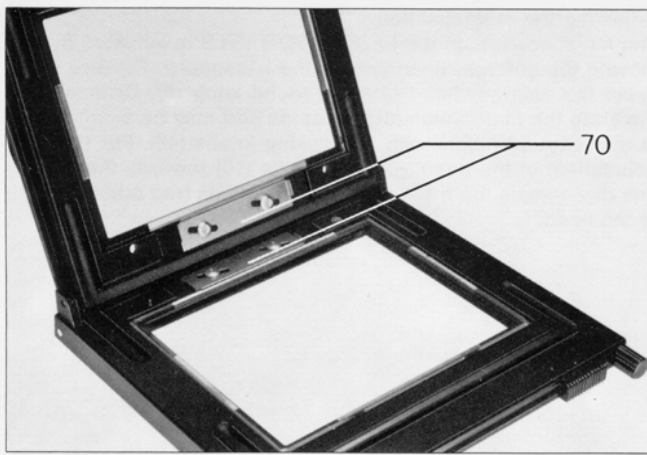
To remove the upper mixing box (67) press the two locking buttons (68).

The size designation of the upper and lower mixing boxes used must always match, for instance with upper TRINOBOX 138 at the top, the lower TRINOBOX 138 must be used below.

Fitting the diffusers

Two diffusers of different density are supplied with the mixing boxes. The less dense diffuser is already mounted on the lower mixing box. The high-density diffuser, packed separately, can be used in place of this when maximum evenness of colour mixing and illumination are vital and the length of exposure is less critical. To fit the denser diffuser in the lower box, first disengage the securing springs (69) and withdraw the inner mixing box. Then release the diffuser in the underside of the box and replace it by the alternative diffuser. Note that the diffuser must be mounted with its convex side facing up.





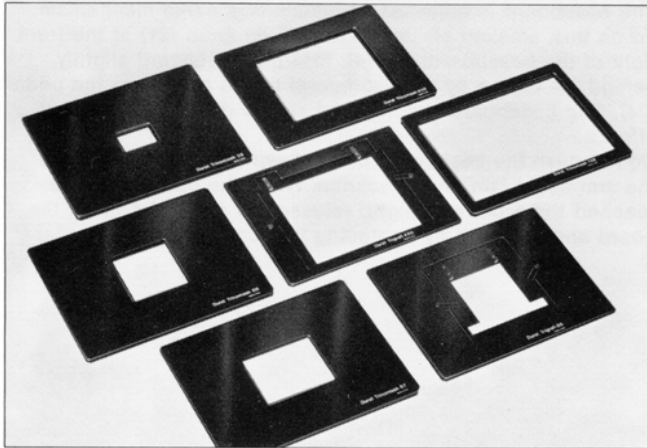
The negative carrier

The TRINEG negative carrier is supplied complete with glasses. These are inserted in the TRINEG after installing one sliding catch (70) in each half.

Accessories available separately include:

Register inserts in the following sizes:

- TRIGRAFI 66 (6×6 cm or 2¹/₄×2¹/₄ inches), and
- TRIGRAFI 450 (10×12.7 cm or 4×5 inches).



Glassless masks of the following sizes:

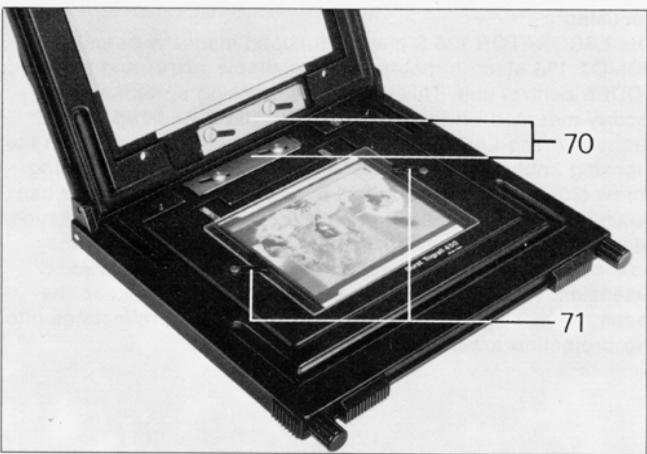
- TRINOMASK 35 (24×36 mm)
- TRINOMASK 66 (6×6 cm or 2¹/₄×2¹/₄ inches)
- TRINOMASK 67 (6×7 cm or 2¹/₄×2³/₄ inches)
- TRINOMASK 92 (9×12 cm or 3¹/₂×4³/₄ inches)
- TRINOMASK 450 (10×12.7 cm or 4×5 inches)
- TRINOMASK 138 (13×18 cm or 5×7 inches)
- Special TRINOMASK S

are available as accessories.

The TRINEG negative carrier and TRIGRAFI 66 and 450 register inserts carry register pins for the Durst MIVALO register system.

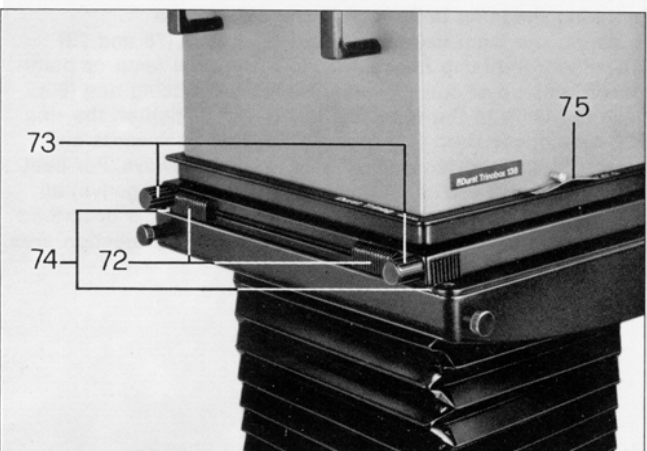
Also available separately are anti-Newton glasses for the register inserts:

- TRIGLAS 66 AN for the TRIGRAFI 66
- TRIGLAS 450 AN for the TRIGRAFI 450
- REGLAS 139 AN for the standard TRINEG negative carrier.



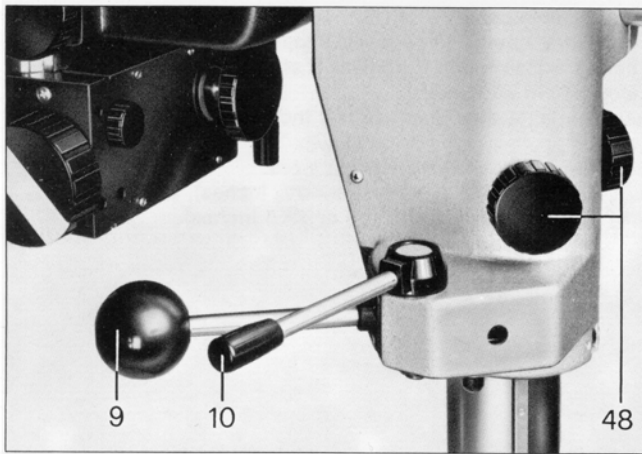
When using the TRIGRAFI 66 or 450 register inserts, remove both glasses from the TRINEG carrier after first pushing aside the catches (70) at the rear ends of the TRINEG. Insert the TRIGRAFI register insert required in the lower section of the negative carrier and secure with the sliding catch (70). The film placed on the lower glass plate of the TRIGRAFI register insert is pressed down by the upper glass plate and the springs (71).

When using glassless TRINOMASK masks note that the mask without lettering and the slightly smaller opening should be placed in the lower section of the negative carrier and the matching part, as described, in the upper section.



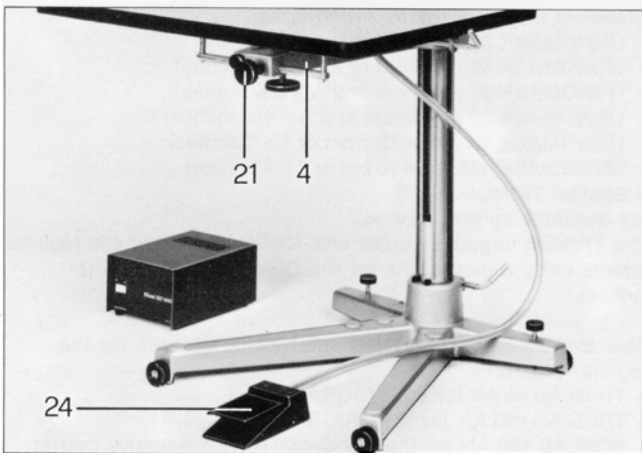
The TRINEG negative carrier has individually adjustable masking strips to mask down the image area. Use the two sliding controls (72) on the negative carrier for horizontal mask adjustment and the knobs (73) for vertical adjustment. Do not use the masking strips as format masks.

To fit the negative carrier with its masks or other fittings push it forward over the bearing rollers (74) of the negative carrier stage as far as it will go. It is then held in place by two springs (75). To remove the TRINEG carrier simply pull it out.



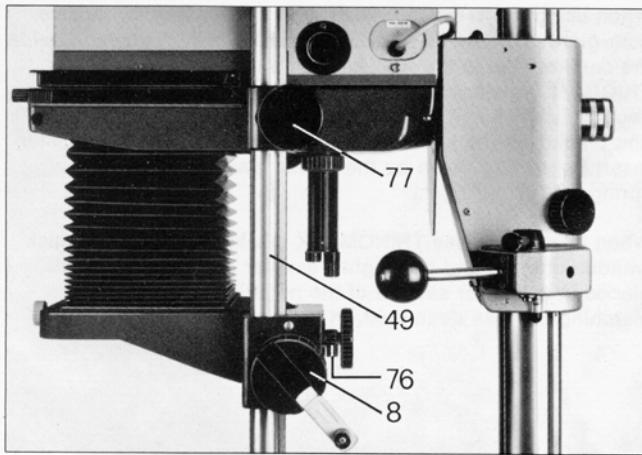
Adjusting the magnification

The magnification on the LABORATOR 138 S is adjusted by moving the enlarger head and/or the baseboard. To raise or lower the enlarger head turn the round knob (9). On releasing the knob the head automatically stops and may be secured at the required height with the locking knobs (48). For rapid adjustment of the head pull the handle (10) towards the head; this disengages the friction drive and permits free adjustment of the head.



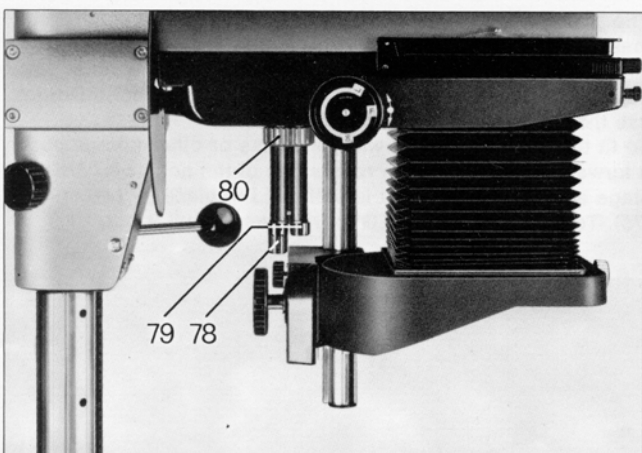
The baseboard is adjusted by means of a servo mechanism. To do this, slacken off the large locking knob (21) at the front right of the baseboard arm (4), grip the baseboard slightly behind the centre by the two lateral edges and press the pedal (24). The baseboard can then be raised or lowered without effort.

Do not push the baseboard up or down by force, otherwise the arm could jam on the column. When the baseboard has reached the required height, release the pedal, let go of the board and secure it by tightening the locking knob (21).



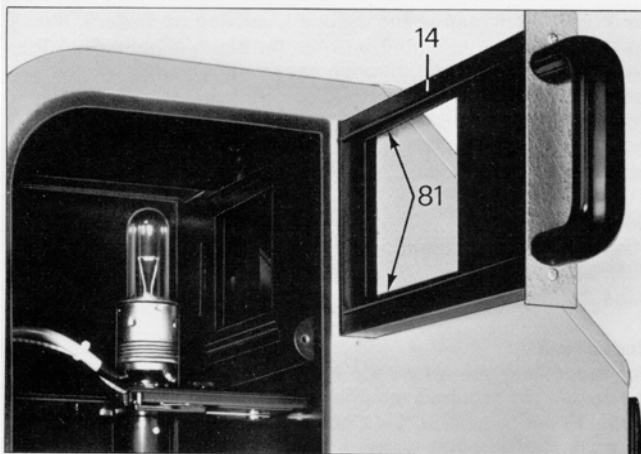
Focusing

The LABORATOR 138 S may be focused manually or with the FOMOT 138 electric motor drive (available extra) and the FODES control unit. This motorised focusing system may be factory-mounted on the LABORATOR 138 S or fitted subsequently. The LABORATOR 138 S is focused manually with the focusing knob (8) on the lens stage. Check that the securing screw (76) behind the knob has been released. This screw can be used to lock the lens stage, for instance for large print runs. After releasing the locking knob (77) the focus rail (49) may be moved up or down to adjust the range of the bellows extension. When using lenses of short focal length keep the focus rail as short as possible to avoid possible reflections into the projection area.



Centering the lamp in the condenser lamphouse

To center the lamp use the adjustment knobs (78 and 79) underneath the lamp house. To move the opal lamp or point source lamp up or down, slightly loosen the locking ring (80), move the lamp to the required height and re-tighten the ring (80). The longer knob (78) adjusts the lamp backwards and forwards, the shorter knob (79) adjusts it sideways. For best adjustment push the negative carrier (without a negative) all the way into the enlarger head. Adjust the controls described above until the lighting is even over the whole projection area.

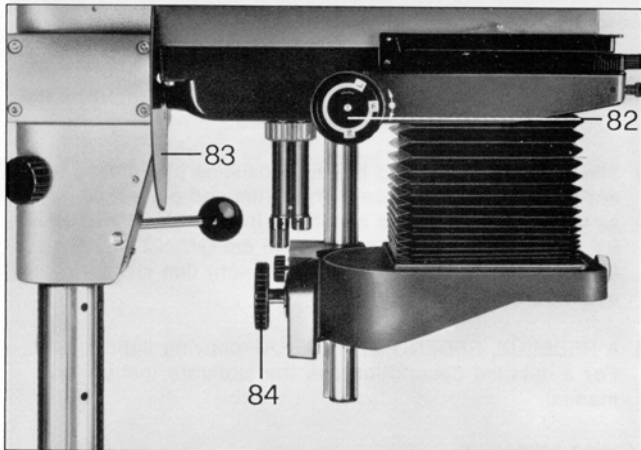


When using a point source lamp the filament should also be exactly parallel with the filter drawer (14). With the point source lamp, enlargements are always made at full lens aperture. With opal light sources full aperture is only required for centering the lamp and for focusing; for enlarging the lens is then stopped down by at least two stops to its working aperture. This is essential to ensure even definition and illumination over the whole projection area.

The filter drawer

The condenser lamphouse of the LABORATOR 138 S has a filter drawer (14) which accepts 12×12 cm ($4\frac{3}{4} \times 4\frac{3}{4}$ inch) filters. The drawer is removable for easy insertion of the filters. Glass mounted filters are held in place with the spring retaining strips (81).

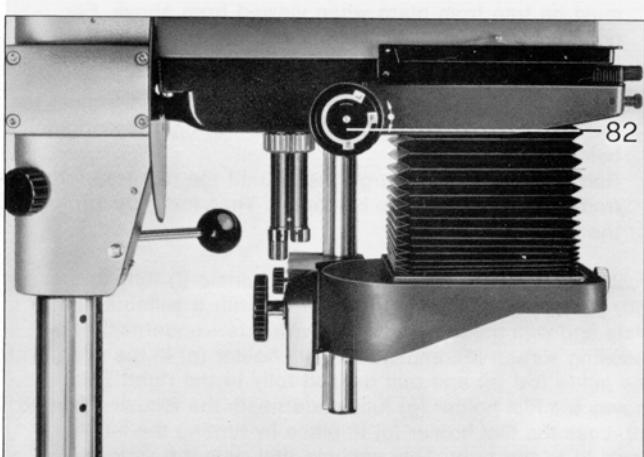
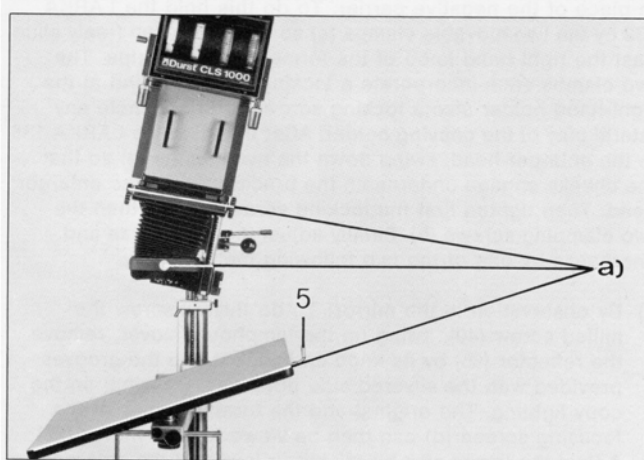
Colour filters may also be mounted underneath the lens. The most convenient means of doing this is with the LATIRAD filter turret (available extra) which is mounted on the red-filter shaft of the UNIPLA or TRIPLA lens boards.



Correcting converging verticals

For such correction the three optical planes (negative, lens and projection plane) should be tilted towards each other in such a way that their extensions intersect at (a). This ensures that the projected image is sharp over its whole area without further stopping down. This correction of verticals and distortion control is possible in three different ways with the LABORATOR 138 S. All three yield equally good results.

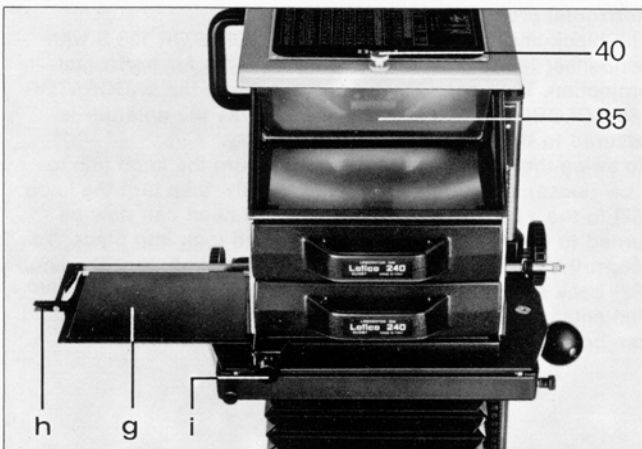
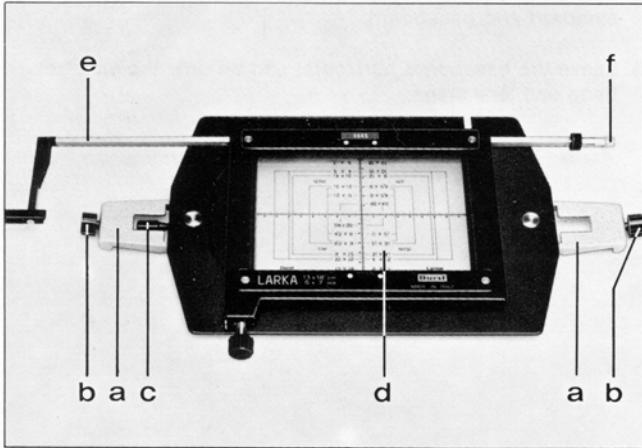
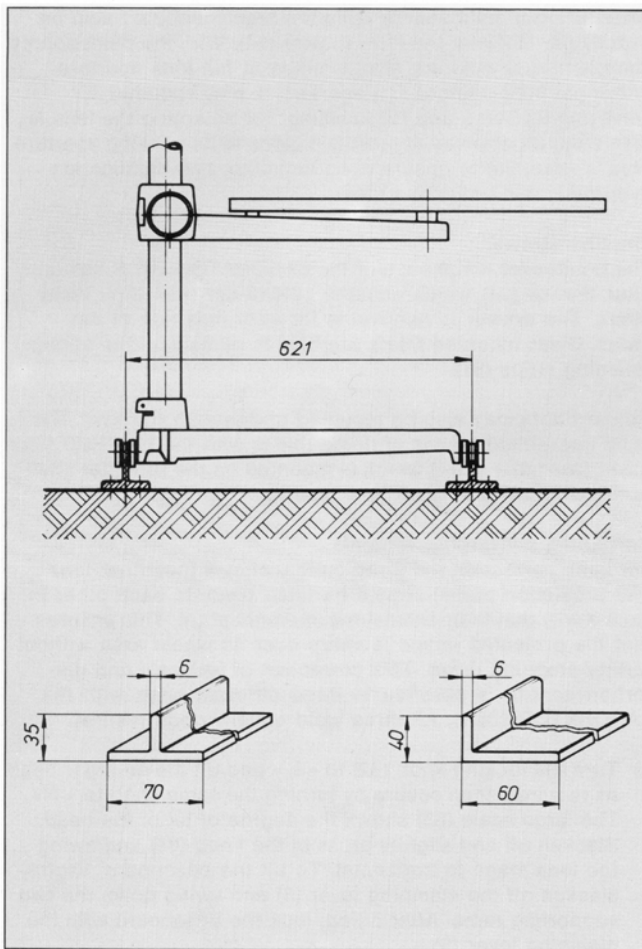
- Turn the locking knob (82) to « L » and tilt the enlarger head as required, then secure by turning the same knob to « F ». The large scale (83) shows the degree of tilt of the head. Slacken off and slightly press in the knob (84) and swing the lens stage to horizontal. To tilt the baseboard, slightly slacken off the clamping lever (5) and swing down the two supporting arms. After tilting, lock the baseboard with the clamping lever (5).
- Leave the enlarger head vertical and tilt only the lens standard and baseboard.
- Leave the baseboard horizontal and tilt only the enlarger head and lens stage.



Horizontal projection

The black-and-white version of the LABORATOR 138 S with condenser lamphouse is eminently suitable for horizontal projection. The scope for this is limited with the LABORATOR 138 COLOR with CLS 1000 colour head as the enlarger is secured to the wall for maximum stability.

To swing the enlarger horizontally first turn the knob (82) to « L » (loose), tilt the enlarger head slightly, then turn the knob (82) to the « 90° » position. The enlarger head can now be turned to the horizontal position and will lock into place. To return the enlarger head to its vertical position, turn the knob (82) back to « L » and then, gently raising the head, to « 90° ». The enlarger head now stops in its exact vertical position and can be secured by turning the knob (82) to position « F ».



As already indicated in the assembly section on page 6, the enlarger must be mounted on rails for exact alignment to the projection surface. The diagram shows suitable rail types and dimensions.

To facilitate focusing with horizontal projection the use of the motorised FOMOT 138/FODES focusing system (available extra) is recommended.

Note:

The condenser combinations for horizontal projection are different from those for vertical projection. See tables on page 21.

Reductions

For reductions use a lens the focal length of which just covers the size of the required reduction. For instance when reducing a 13×18 cm original to 6×9 cm, the lens should cover the 6×9 cm size, in other words a 105 mm focal length. For reductions with a 50 mm lens, mount this on the flat LAPLA 39 panel to enable the lens to come near enough to the base-board.

Copying

The following special accessories are required when using the LABORATOR 138 S as a copying camera:

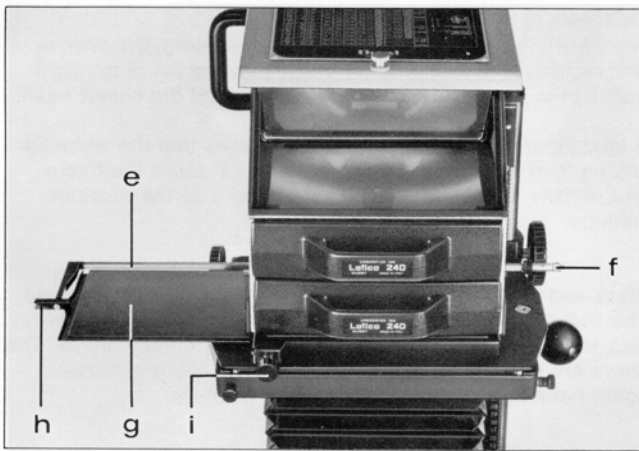
- 1) The LARKA 138 copying holder consisting of a closed frame and a ground glass screen. Sheet film and plate holders as well as reducing and sheet film inserts for 4.5×6, 6.5×9, 9×12, 10×15, 12×16.5 and 13×18 cm (1³/₄×2¹/₄, 2¹/₂×3¹/₂, 3¹/₂×4³/₄, 4×6, 4³/₄×6¹/₂ and 5×7 inch) film sizes are available separately.
- 2) A REBELUX, REBENIT or REBEHAL copying lighting unit. For a detailed description see the separate instruction manual.

Copying procedure

Fully insert the LARKA 138 copying holder in the enlarger head in place of the negative carrier. To do this hold the LARKA 138 by the two movable clamps (a) so that these can freely slide past the right-hand knob of the format masking strips. The two clamps each incorporate a locking screw (b) and at the right-hand holder also a locking screw (c) to eliminate any lateral play of the copying holder. After inserting the LARKA 138 in the enlarger head, swing down the two clamps (a) so that the cheeks engage underneath the bracing ribs of the enlarger head. Then tighten first the locking screw (c) and then the two clamping screws (b). Finally adjust the image size and sharpness by one of the two following methods:

- a) By observation in the mirror: To do this, unscrew the milled screw (40), swing up the lamphouse cover, remove the reflector (85) by its knob and slide it into the grooves provided with the silvered side downwards. Switch on the copy lighting. The original and the format frames of the focusing screen (d) can then be viewed in the mirror (85). Adjust the image size by raising or lowering the enlarger head and focus by turning the appropriate knob. The original must be free from glare when viewed from above. For optimum sharpness in copying stop down the lens (preferably to f/11).
- b) By projection: Switch on the enlarger lamp and project the format frames of the focusing screen (d) onto the original being copied. Raise or lower the enlarger head until the required format frame covers the area to be copied. Then focus by turning the appropriate knob.

Push the guide rod (e) with its milled handle (f) fully to the left, push the film holder (g) – loaded with a suitable film or plate and with the slide facing downwards – underneath the focusing screen (d), engage the film holder (g) in the clip (h) of the guide rod (e) and pull the rod fully to the right. This moves the film holder (g) fully underneath the focusing screen (d). Lock the film holder (g) in place by turning the milled knob (i) to the right. This ensures that only the slide is



withdrawn for the exposure. To open the film holder (g) push the guide rod (e) fully to the left. The degree of opening of the slide can be adjusted by turning the milled knob (f) of the guide rod (e). Now expose by switching the copying lighting on and off. Finally close the slide by pulling the guide rod (e) to the right again. Turn the milled knob (i) to the left, then push the guide rod (e) to left. This withdraws the closed film holder (g) from the frame; it can then be removed by releasing the clip (h).

D) Colour enlargements

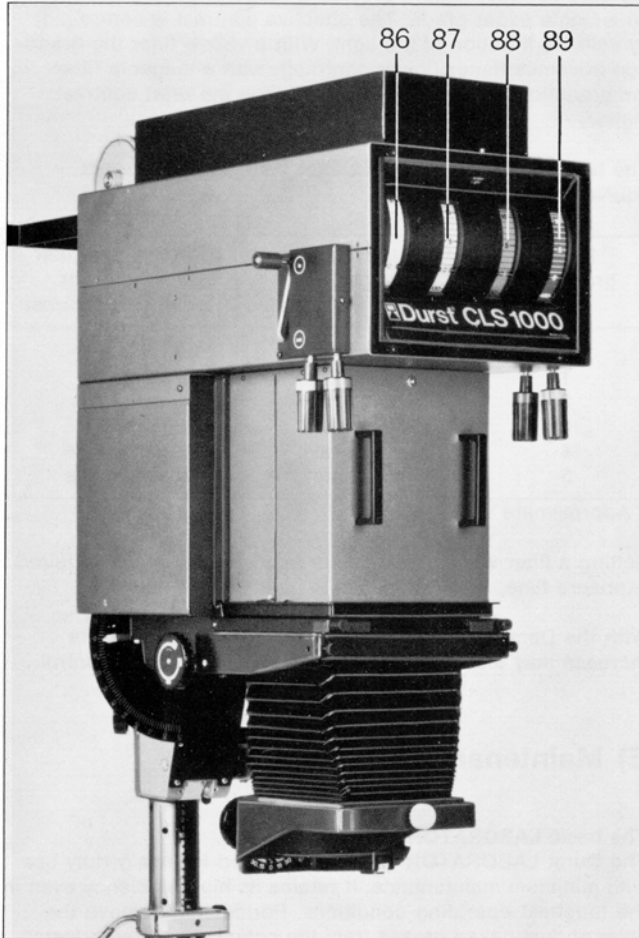
Filter settings

The dichroic yellow, magenta and cyan filters for subtractive colour control in the CLS 1000 cover densitometric steps from 0 to 130. These and the variable density control described below are adjusted with the appropriate knobs on the colour head. Scales show the settings of the variable density control (86), yellow filter (87), magenta filter (88) and cyan (89).

If you are used to colour heads calibrated in Kodak CP or CC filter values, you will notice that the filters of this colour head have considerably higher filter densities at similar scale settings.

The following table shows equivalents.

Durst densities	Filter values	
	Kodak CC/CP densities	Agfa densities
0	0	0
10	15	20
20	30	40
30	45	60
40	60	80
50	75	100
60	90	120
70	105	140
80	120	160
90	135	180
100	150	200
110	165	220
120	180	240
130	195	260



The variable density control

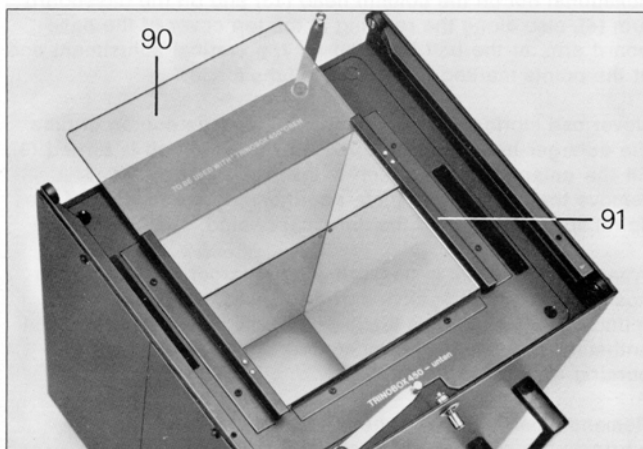
In addition to the filters, the CLS 1000 colour head has a variable density control for stepless adjustment of the light intensity over a range of 60 density steps (2 lens stops). In many cases – for instance with films of different density or when changing the magnification – this permits exposures at a constant time and at the optimum lens aperture – only the light intensity is adjusted with the knob (86). This also eliminates colour and density variations resulting from exposure changes (reciprocity failure effects). The table below shows the equivalent density settings of the density control.

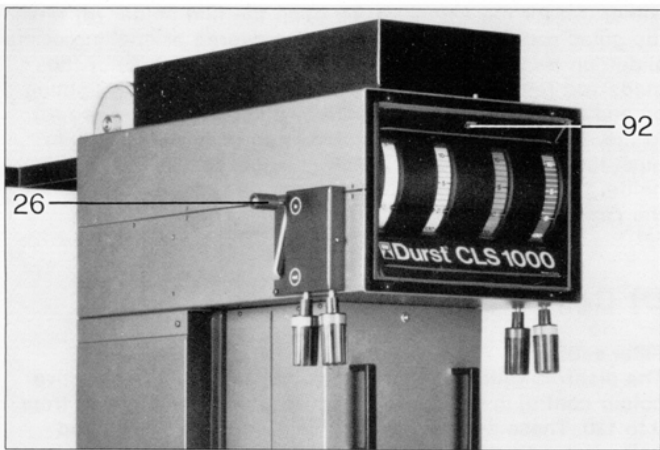
Density control settings	Change in lens stops
0	Working aperture of lens
15	W.A. stopped down by 1/2 f-stop
30	W.A. stopped down by 1 f-stop
45	W.A. stopped down by 1 1/2 f-stops
60	W.A. stopped down by 2 f-stops

Supplementary filters

Should the density range of the normal filters be inadequate, for instance with old unmasked or other specially off-balance negatives, use the supplementary filter (90) supplied. This has a density equivalent to about 70 yellow plus 35 magenta and increases the overall filter density to about 200 yellow and 165 magenta.

The 12.5×15 cm (5×6 inch) supplementary filter is pushed into the filter guides (91) of the mixing box in use. When not in use, store the supplementary filter carefully to avoid scratching.





The white-light setting

For adjusting the magnification and for focusing, the filter as well as the density diaphragm may be swung out of the light path by the lever (26) on the left-hand side of the colour head.

A light signal (92) on the front panel shows that the white-light setting is in use. For exposure or colour analysis the filters and density diaphragm swing back exactly to the previous settings.

Black-and-white enlargements with the CLS 1000 colour head

The CLS 1000 colour head with its diffused lighting system is also extremely suitable for black-and-white enlargements. The filters are in this case set to zero. The density diaphragm again permits adjustment of the light intensity.

Black-and-white enlargements on variable contrast papers

Variable contrast papers provide a range of print gradations on a single paper grade. The effective contrast is controlled by suitable filtration of the light. With a yellow filter the gradation becomes flatter (lower contrast); with a magenta filter the gradation becomes steeper and thus the print contrast higher.

The table below shows basic filter settings for different equivalent paper grades.

Paper grade No.	Colour head filter settings* for Ilfospeed Multigrade	Colour head filter settings* for Kodak Polycontrast
0	60 yellow	50 yellow
1	25 yellow	15 yellow
2	10 yellow	00 —
3	35 magenta	25 magenta
4	130 magenta	Not available
5	Not available	Not available

* Approximate values

Setting a filter value in the colour head increases the required exposure time.

With the Durst COLOR LABORATOR 138 S the exposure increase may also be compensated with the density control.

E) Maintenance

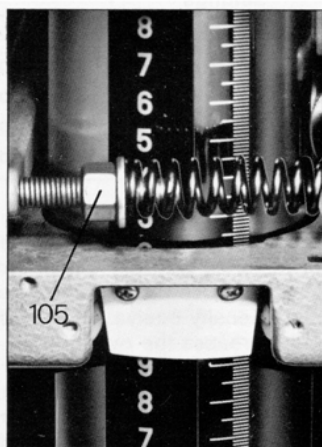
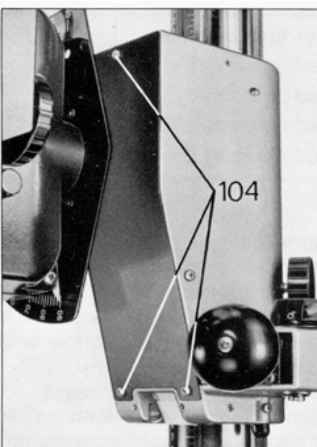
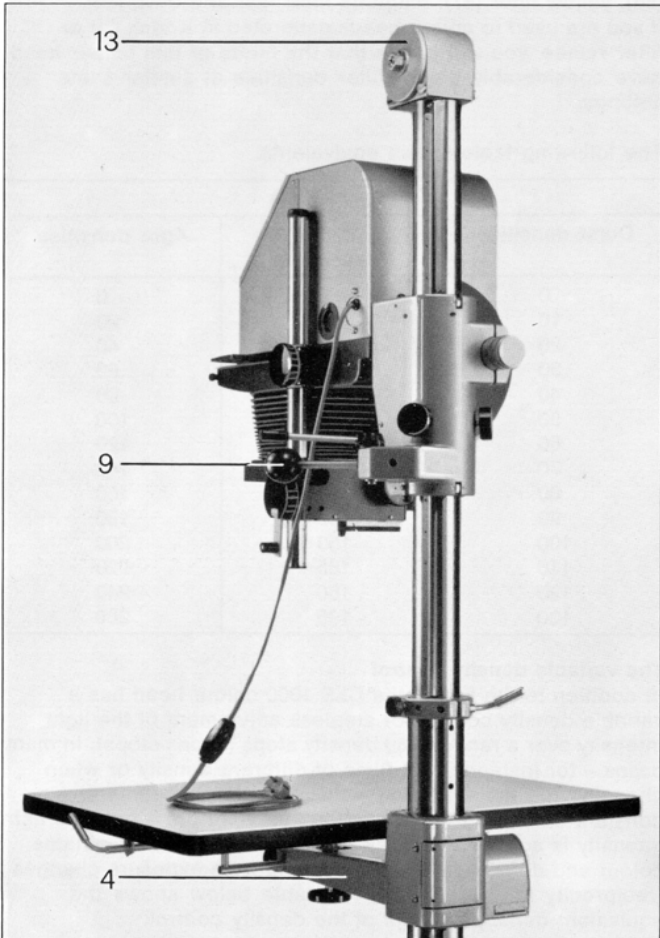
The basic LABORATOR 138 S enlarger

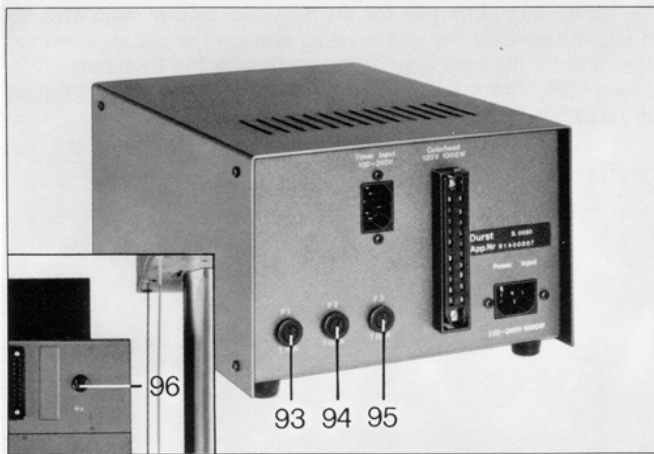
The Durst LABORATOR 138 S is designed for heavy-duty use with minimum maintenance. It retains its high efficiency even in the toughest operating conditions. Periodically remove the layer of dust-caked grease from the columns and relubricate the columns and guide rails. Also add oil at the point above the hexagonal nut on the column head (13) and on the baseboard arm (4), also along the red ring at the top cover of the baseboard arm, at the ball knob (9) for the vertical adjustment and at the points marked in red on the lens stage.

Never use lubricants containing acid. If in the course of time the enlarger head should slip when the ball knob is turned (9), tilt the enlarger head, unscrew the three screws (104), remove the black cover plate and increase the tension of the spiral spring by turning the nut (105) behind.

When the unit is not in use, raise the enlarger head to its top position. Dust the negative carrier glasses, condensers and reflector with a chamois leather or a soft brush. The use of an anti-static medium is recommended. Do not leave the lamp burning when not in use.

Remember also to keep the lower column clean and to lubricate the servo adjustment of the easel.





The CLS 1000 colour head

The CLS 1000 also needs no maintenance. In case of faults in the electronic system or mechanism always call in a Durst service engineer.

Important:

Before attempting any form of servicing (repairs, lamp changing etc.) check that the unit is switched off and the mains lead disconnected. The manufacturer assumes no responsibility for any damage caused by not observing this safety precaution.

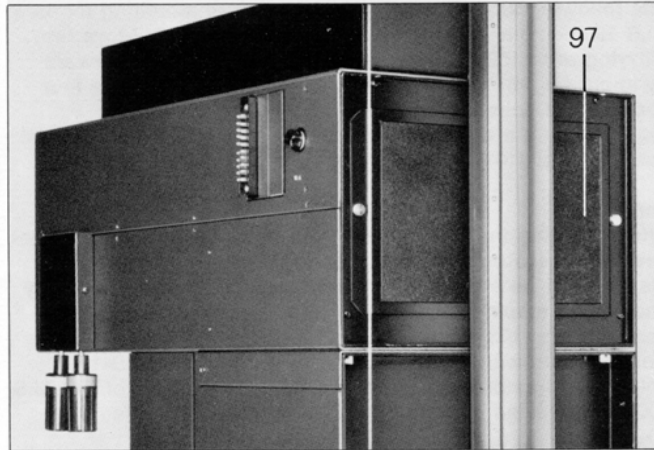
Changing the lamp

If a failed lamp needs replacing proceed as instructed for fitting the lamp in the « Assembly » section.

Fuses

Check or replace the appropriate fuses when the following items fail:

- (93) – F1, 10 amps slow-blow – Failure of the lamp, the shutter and cooling fan
- (94) – F2, 0.8 amp slow-blow – Failure of the lamp and the shutter
- (95) – F3, 0.8 amp slow-blow – Failure of the fan
- (96) – Fuse on the CLS 1000.



The colour filter unit

From time to time clean the filters and also the diffusers of the mixing boxes carefully with a wad of cotton wool soaked in alcohol.

The air filter (97) of the fan at the rear of the colour head should also be removed and cleaned (tapped out or washed) regularly to ensure optimum cooling and to avoid soiling of the filters. Always store the CLS 1000 colour mixing head in a dust-free place when not in use.

For further information or technical help please contact our main agent in your country.



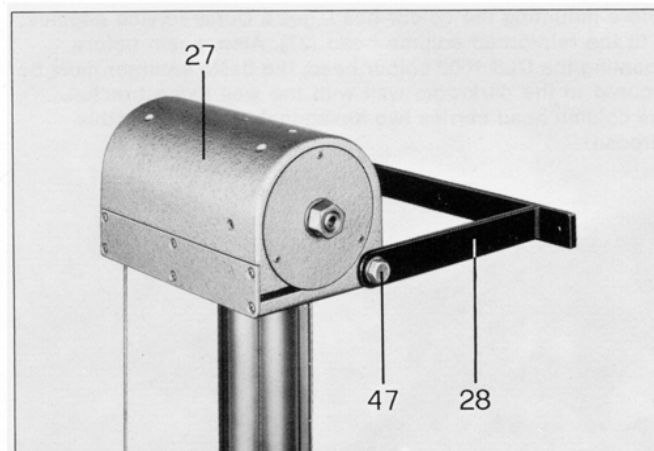
F) Conversion instructions

Mounting the CLS 1000 colour head on the LABORATOR 138 S (with old NEGA 138 negative carrier)

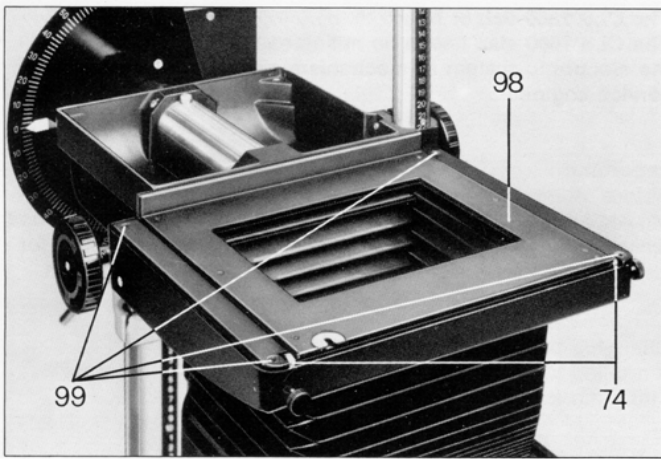
The CLS 1000 can be fitted subsequently on any LABORATOR 138 S enlarger.

This requires the following three kits:

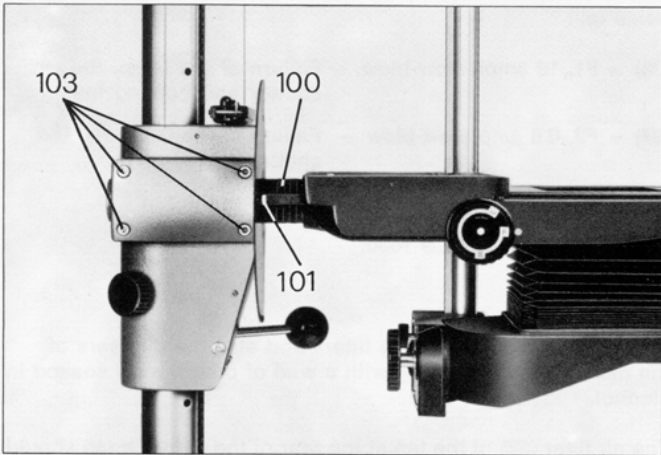
- COLIKIT 1000/138 – Consisting of the CLS 1000 colour head complete with 13×18 cm (5×7 inch) TRINOBOX 138 mixing box, EST 1000 electronic voltage stabiliser and a COLAMP 1840 special 1000 watt 120 volt tungsten-halogen lamp
- LATRIKIT 1000 – Consisting of the TRINEG negative carrier complete with REGLAS 139 glasses and supporting plate for the negative carrier
- TRIHELMKIT 1000 – Consisting of a column head with upgraded counterweight spring and wall fixing bracket.



Before mounting the colour head get a Durst service engineer to fit the column head with the upgraded counterweight spring. Also, before mounting the CLS colour head, the basic enlarger must be secured to the darkroom wall with the wall fixing bracket (28). Two exagonal bolts (47) are provided for this purpose on the column head (27).



The supporting plate (98) for the negative carrier must also be changed. Unscrew the four screws, remove the old supporting plate and fix the new supporting plate with the four new screws (99). The bearing rollers (74) should be at the front of the negative carrier holder.



The following further step is required before mounting the new CLS 1000 colour head on the LABORATOR 138 S: Move the carrying arm (100) complete with the enlarger head forward by about 4.5 cm. This can easily be done slackening the four socket head bolts (103). Also unscrew the scale pointer mounted on the enlarger head and replace it with the new scale pointer (101) supplied in the kit.

Important:

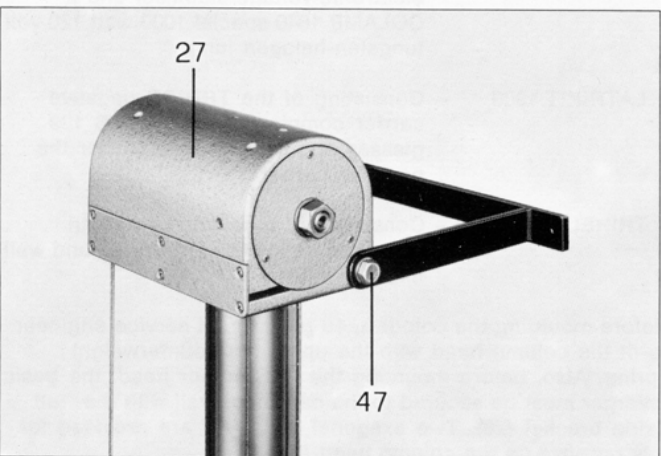
After adjusting the enlarger head ensure that the pointer is set exactly to zero on the scale. The film, lens and projection planes must be absolutely parallel to each other. If necessary check with a spirit level. Finally retighten the four socket head screws (103).

Now proceed with fitting the wall fixing and the CLS 1000 colour head as described on page 8. For operation of the CLS 1000 colour head and the TRINEG negative carrier see pages 10 and 11.

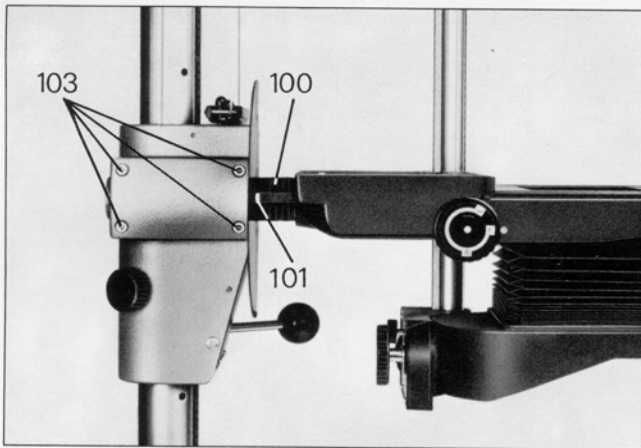
Mounting the CLS 1000 colour head on the LABORATOR 138 S BW (with TRINEG negative carrier)

The LABORATOR 138 S BW with condenser lamphouse and TRINEG negative carrier can be fitted with the CLS 1000 colour head. The following two kits are required for this.

- COLIKIT 1000/138 - Consisting of the CLS 1000 colour head complete with 13×18 cm (5×7 inch) TRINOBOX 138 mixing box, EST 1000 electronic voltage stabiliser and a COLAMP 1840 special 1000 watt 120 volt tungsten-halogen lamp.
- TRIHELMKIT 1000 - Consisting of a column head with upgraded counterweight spring and wall fixing bracket.



Before mounting the colour head, get a Durst service engineer to fit the reinforced column head (27). Also, again before mounting the CLS 1000 colour head, the basic enlarger must be secured to the darkroom wall with the wall fixing bracket. The column head carries two hexagonal bolts (47) for this purpose.



The following further step is needed before mounting the new CLS 1000 colour head on the LABORATOR 138 S: Move the carrying arm (100) complete with the enlarger head forward by about 4.5 cm. This can easily be done slackening off the four crosshead screws (103). Also unscrew the scale pointer mounted on the enlarger head and replace it with the new pointer (101) supplied in the kit.

Important:

After adjusting the enlarger head, ensure that the pointer is set exactly to zero on the scale. The film, lens and projection planes must be absolutely parallel to each other. If necessary check with a spirit level.

Finally tighten again the four socket head screws (103). Now proceed with fitting the wall fixing bracket and the CLS 1000 colour head as described on page 8. For operation of the CLS 1000 colour head see page 10.

Fitting the new TRINEG negative carrier in the LABORATOR 138 S (with old NEGA 138 carrier)

The LABORATOR 138 S with condenser lamphouse can be fitted with the TRINEG negative carrier.

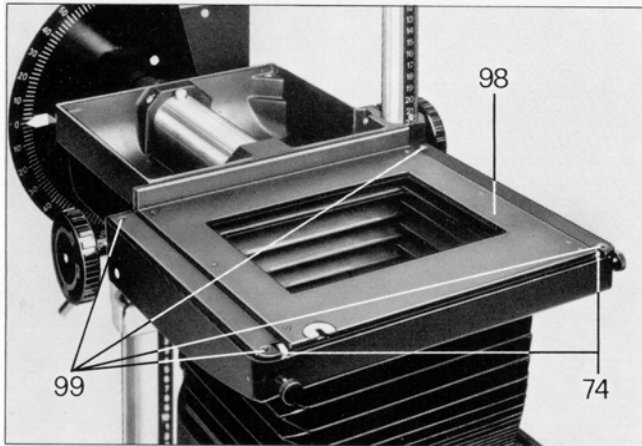
Note: The LABORATOR 138 S with CLS 300 or CLS 301 colour head cannot be fitted with the TRINEG carrier.

To convert the LABORATOR 138 S with condenser lamphouse and old NEGA 138 carrier the following kit is required:

- LATRIKIT 1000 - Consisting of the TRINEG 1000 carrier complete with REGLAS 139 glasses, supporting plate for the negative carrier and adapter No. XB 31405.

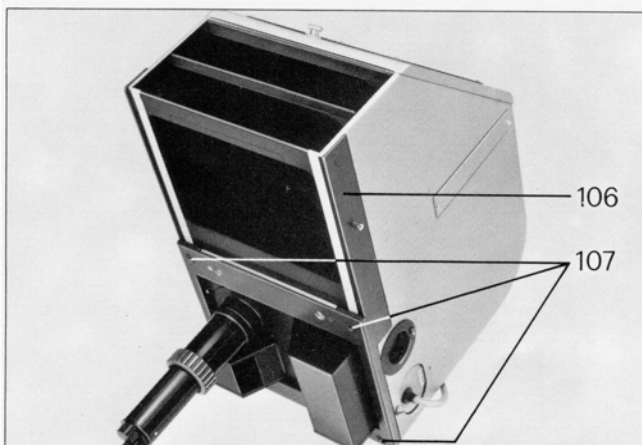


Before fitting the supporting plate for the negative carrier, unscrew the four screws to remove the condenser lamphouse. Then unscrew the four screws holding the old supporting plate, remove the latter, replace by the new supporting plate (98) and secure with the four screws supplied (99). The bearing rollers (74) should be at the front of the negative carrier holder.



Before refitting the condenser lamphouse first fit it with the adapter XB 31405.

Fit the adapter XB 31405 (106) from underneath to the condenser lamphouse, using the two screws (107) supplied - see illustration. Replace the condenser lamphouse and secure from underneath with the four longer screws supplied. For operation of the TRINEG carrier see page 11.



G) Technical data

Dimensions and weights

Negative size	: 13×18 cm (5×7 in.)
Overall height (condenser lamp-house fully raised)	: Approx. 220 cm (86.6 in.)
Overall height (colour head fully raised)	: Approx. 248 cm (97.6 in.)
Column height	: Approx. 208 cm (81.9 in.)
Highest negative carrier level	: Approx. 187 cm (73.6 in.)
Lowest negative carrier level	: Approx. 130 cm (51.2 in.)
Optical axis/column distance (with condenser lamphouse)	: Approx. 36 cm (14.2 in.)
Optical axis/column distance (with colour head)	: Approx. 40.5 cm (15.9 in.)
Baseboard size	: Approx. 60×80 cm (23.6×31.5 in.)
Floor space required	: Approx. 110×110 cm (44×44 in.)
Weight with condenser lamphouse:	Approx. 75 kg (165 lbs)
Weight with CLS 1000 colour head:	Approx. 86 kg (190 lbs)

CLS 1000 colour head

Light source	: 1000 watt 120 volt tungsten halogen lamp, with 10 amp slow-blow fuse on colour head
Filters	: Dichroic yellow, magenta and cyan filters
Filter range	: 0 to 130 densitometric steps
Variable density control	: 0 to 60 densitometric steps (2 lens stops)
Supplementary filter	: 70 yellow plus 35 magenta, can be inserted separately
White light	: Manual white-light control
Mixing box	: 13×18 cm (5×7 inch) double mixing box system
Cooling	: Cooling fan with automatic run on
Size	: Approx. 60×37×62 cm (23.6×14.6×24.4 in.)

EST 1000 voltage stabiliser

Mains supply	: 220 volts, 50-60 Hz
Power consumption	: Approx. 1200 watts
Stabilising range	: 180 to 260 volts
Control precision	: ± 1 %

The latest technical developments are constantly being incorporated into Durst products. Illustrations and descriptions are therefore subject to modification.

**Condenser combinations with opal lamps
VERTICAL PROJECTION**

Focal length of lens, mm (inches)	Nominal negative size, mm (inches)	Linear magnification		Condenser comb.	Top Bottom	Min. dia. of opal lamp, mm
		Min.	Max.			
240 9 1/2	130×180 5×7	1.7×	4.4×	$\frac{240}{240}$		110
		0.9×	1.7×	$\frac{240}{240}$ R		
210 8 1/2	130×180 5×7	1.2×	5.3×	$\frac{240}{240}$		110
		0.7×	1.2×	$\frac{240}{240}$ R		
180 7 1/8	100×150 4 1/4×6 1/2	3.2×	6.6×	$\frac{240}{200}$		110
		0.5×	3.2×	$\frac{240}{240}$		
150 6	100×125 4×5	1.0×	8.5×	$\frac{240}{200}$		90
		0.4×	1.0×	$\frac{240}{240}$		
135 5 1/4	85×100 3 1/4×4 1/4	1.0×	9.5×	$\frac{240}{160}$		110
		0.4×	1.0×	$\frac{240}{240}$		
100 4	65×90 2 1/2×3 1/2	0.3×	2.4×	$\frac{240}{200}$		110
		2.4×	13.0×	$\frac{240}{130}$		
80 3 1/8	60×60 2 1/4×2 1/4	0.6×	17.5×	$\frac{200}{130}$		110
60 2 3/8	32×45 40×40 1 1/2×1 1/2	2.9×	23.5×	$\frac{130}{85}$		65
50 2	24×36 35 mm	3.8×	28.5×	$\frac{130}{85}$		65

**Condenser combinations with point source lamps
VERTICAL PROJECTION**

Focal length of lens, mm (inches)	Nominal negative size, mm (inches)	Linear magnification		Condenser combination	Top Bottom
		Min.	Max.		
240 9 1/2	130×180 5×7	2.2×	4.4×	$\frac{240}{240}$ PT	
		0.9×	2.2×	$\frac{240}{240}$ PT	
210 8 1/2	130×180 5×7	2.1×	5.3×	$\frac{240}{240}$ PT	
		0.7×	2.1	$\frac{240}{240}$ PT	
180 7 1/8	100×150 4 1/4×6 1/2	1.2×	6.6×	$\frac{240}{240}$ T	
		0.5×	1.2×	$\frac{240}{240}$ RT	
150 6	100×125 4×5	2.5×	8.5×	$\frac{240}{200}$ T	
		0.8×	2.5×	$\frac{240}{240}$ T	
		0.4×	0.8×	$\frac{240}{240}$ RT	
135 5 1/4	85×100 3 1/4×4 1/4	1.6×	9.5×	$\frac{240}{200}$ T	
		0.7×	1.6×	$\frac{240}{240}$ T	
		0.4×	0.7×	$\frac{240}{240}$ RT	
100 4	65×90 2 1/2×3 1/2	0.3×	0.6×	$\frac{240}{240}$ PT	
		0.6×	2.0×	$\frac{240}{200}$ T	
		2.0×	5.0×	$\frac{240}{130}$ T	
		5.0×	13.0×	$\frac{200}{130}$ T	
80 3 1/8	60×60 2 1/4×2 1/4	3.6×	17.5×	$\frac{160}{110}$ T	
		1.3×	3.6×	$\frac{200}{130}$ T	
		0.8×	1.3×	$\frac{200}{160}$ T	
		0.6×	0.8×	$\frac{240}{160}$ T	
60 2 3/8	32×45 40×40 1 1/2×1 1/2	4.0×	23.5×	$\frac{130}{85}$ T	
50 2	24×36 35 mm	2.9×	4.0×	$\frac{130}{85}$ T	
50 2	24×36 35 mm	3.8×	28.5×	$\frac{130}{85}$ T	

**Condenser combinations with opal lamps
HORIZONTAL PROJECTION**

Focal length of lens, mm (inches)	Nominal negative size, mm (inches)	Linear magnification		Condenser comb.	Top Bottom	Min. dia. of opal lamp, mm
		Min.	Max.			
240 9 1/2	130×180 5×7	4.4×	21.0×	$\frac{240}{240}$		110
210 8 1/2	130×180 5×7	5.3×	21.0×	$\frac{240}{240}$ H		110
180 7 1/8	100×150 4 1/4×6 1/2	6.6×	26.0×	$\frac{240}{200}$		110
150 6	100×125 4×5	8.5×	30.0×	$\frac{240}{200}$		110
135 5 1/4	85×100 3 1/4×4 1/4	9.5×	39.0×	$\frac{200}{160}$		90
100 4	65×90 2 1/2×3 1/2	12.0×	45.0×	$\frac{200}{130}$		110
80 3 1/8	60×60 2 1/4×2 1/4	17.5×	65.0×	$\frac{160}{130}$		110
60 2 3/8	32×45 40×40 1 1/2×1 1/2	23.5×	92.0×	$\frac{130}{85}$		65
50 2	24×36 35 mm	28.5	102.0×	$\frac{130}{85}$		65

**Condenser combinations with point source lamps
HORIZONTAL PROJECTION**

Focal length of lens, mm (inches)	Nominal negative size, mm (inches)	Linear magnification		Condenser combination	Top Bottom
		Min.	Max.		
240 9 1/2	130×180 5×7	4.4×	22.4×	$\frac{240}{240}$ PT	
210 8 1/2	130×180 5×7	5.3×	8.2×	$\frac{240}{240}$ PT	
180 7 1/8	100×150 4 1/4×6 1/2	8.2×	20.5×	$\frac{240}{240}$ HT	
		6.6×	13.5×	$\frac{240}{240}$ T	
150 6	100×125 4×5	13.5×	27.2×	$\frac{240}{240}$ HT	
		8.5×	32.5×	$\frac{240}{200}$ T	
135 5 1/4	85×100 3 1/4×4 1/4	9.5×	42.0×	$\frac{240}{200}$ HT	
105 4 1/8	65×90 2 1/2×3 1/2	11.8×	47.0×	$\frac{240}{130}$ T	
100 4	65×90 2 1/2×3 1/2	13.0×	45.0×	$\frac{240}{130}$ HT	
80 3 1/8	60×60 2 1/4×2 1/4	17.5×	75.0×	$\frac{160}{110}$ T	
60 2 3/8	32×45 40×40 1 1/2×1 1/2	23.5×	104.0×	$\frac{130}{110}$ T	
50 2	24×36 35 mm	28.5×	116.0×	$\frac{130}{110}$ T	

