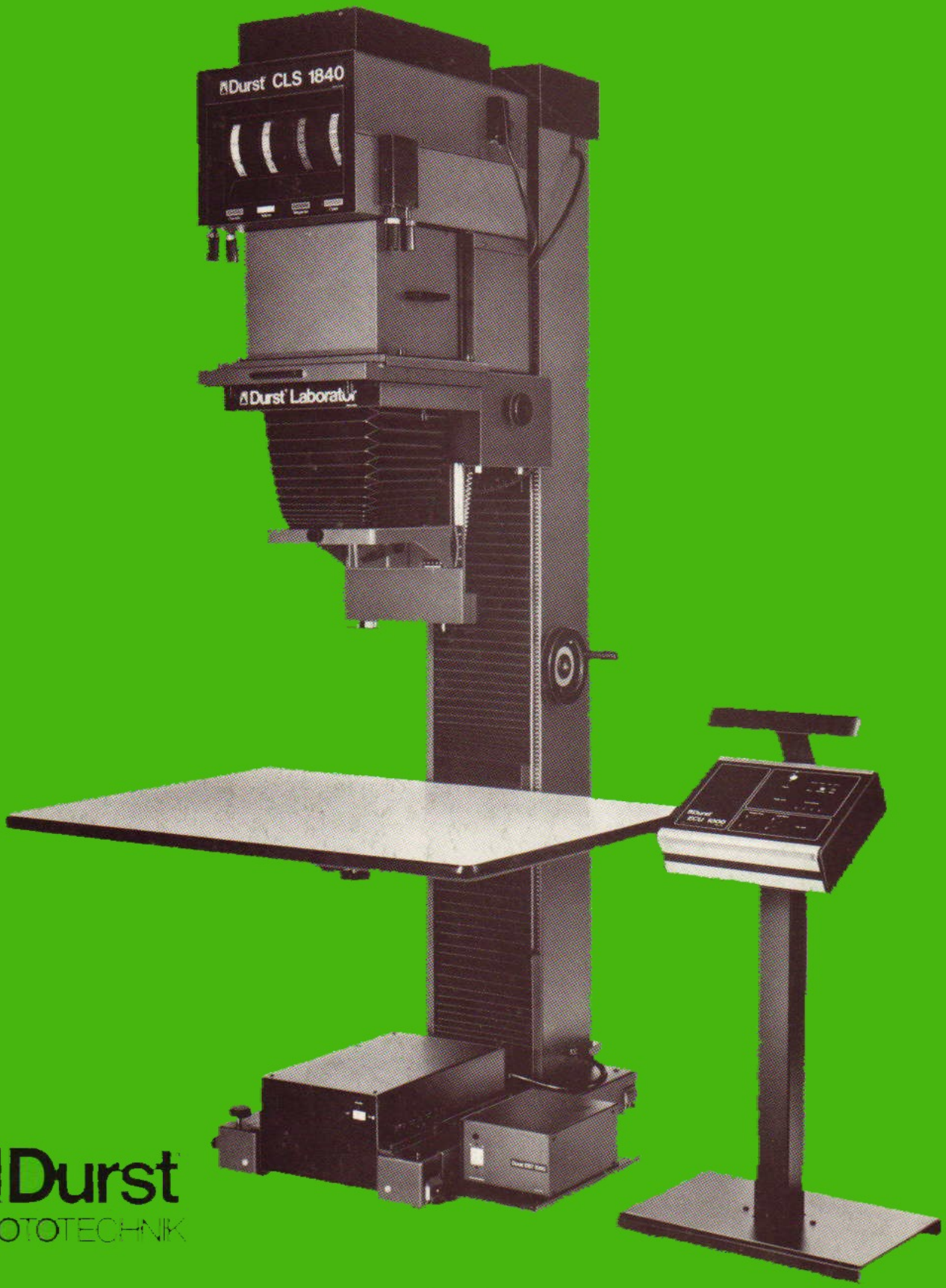
Durst LABORATOR 1840

Operating manual



Durst
PHOTOTECHNIK

With the Durst LABORATOR 1840 you now own a quality product made by Durst Phototechnik GmbH of Bolzano, Italy, which offers utmost precision and workmanship in manufacture and quality control. With its highly convenient handling and perfect operation, this high-performance unit will serve you well for all colour and black-and-white enlarging.

With this instruction manual we hope to make you thoroughly familiar with the unit, its handling and its capabilities. This is obviously essential for successful operation - so please take the trouble to read this manual thoroughly. The more familiar you are with all functions and operations, the more likely it is that you will avoid annoying failures or even damage.

We wish you much success with your Durst LABORATOR 1840 enlarger. In case of queries our technical service is always at your disposal.

Durst Phototechnik GmbH, Bolzano, Italy

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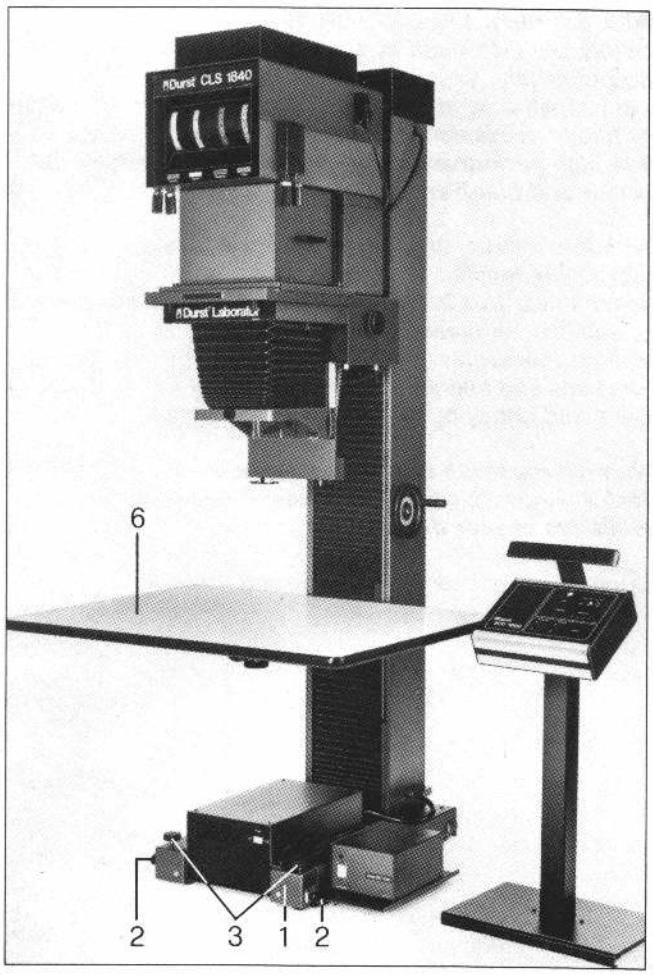
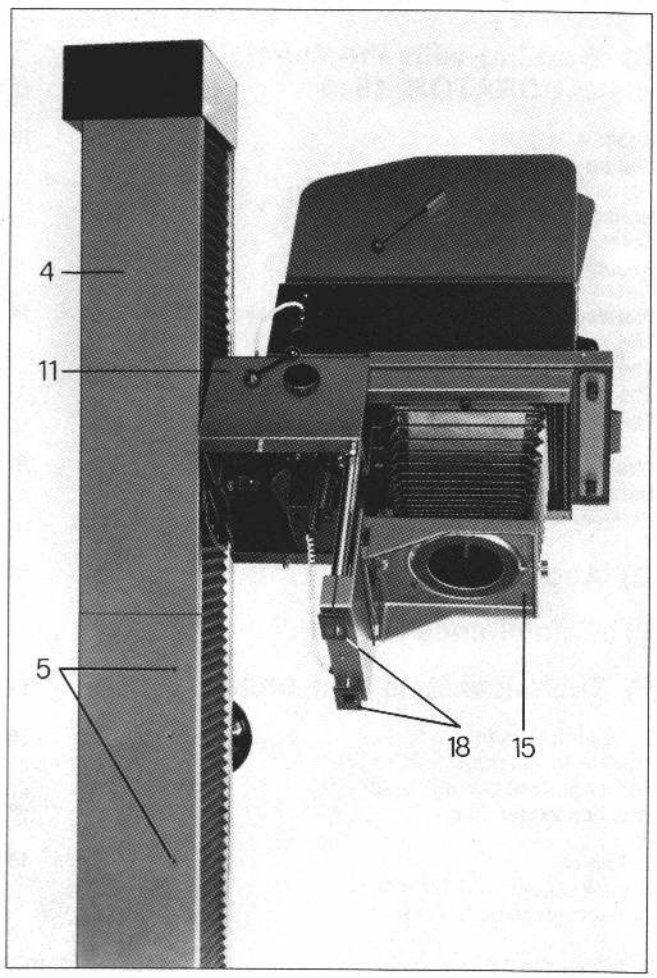


A) General characteristics of the unit and applications of the Durst LABORATOR 1840

Characteristics of the enlarger
The Durst LABORATOR 1840 is a universal high-performance enlarger for colour and black-and-white transparency originals up to a usable size of 25×25 cm (10×10 inches).
The Durst LABORATOR 1840 is available as a colour enlarger with the CLS 1840 colour head or as a black-and-white enlarger with the condenser head. Two-speed motors operate the vertical adjustment of the enlarger head and focusing; they are controlled from a movable control desk or by a remote control unit (available extra).
The control desk provides central controls for entering the exposure time, switching the lamp on and off for focusing, releasing, interrupting and terminating the exposure. The baseboard arm is manually adjustable by a crank drive.
A rigid stand ensures precise alignment of the three optical planes with vertical and horizontal projection.
Three negative carrier systems are available for different applications:

- LARANEG: Universal register negative carrier with centering provision (standard carrier supplied with enlarger)
- NEGATEIL 1800 N: Accessory multi-exposure negative carrier
- NEGAROLL 205: Accessory aerial film carrier

Applications and scope
- Vertical and horizontal projection;
- Enlargements from any colour negative and transparency as well as black-and-white enlargements;
- Production of transparency and reflection duplicates.



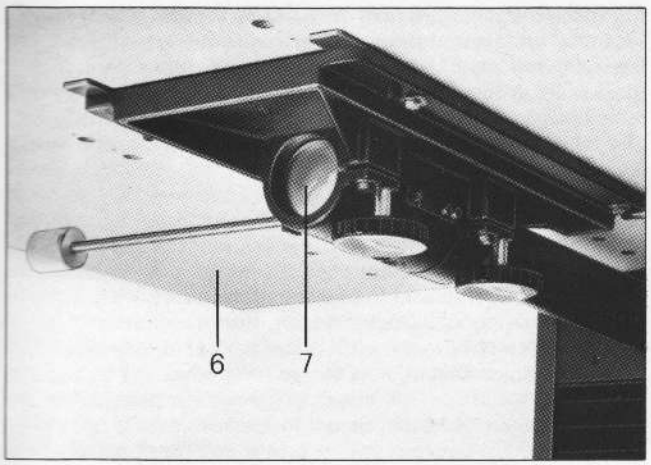
B) Features and assembly of the enlarger

1. Features and assembly of the basic unit

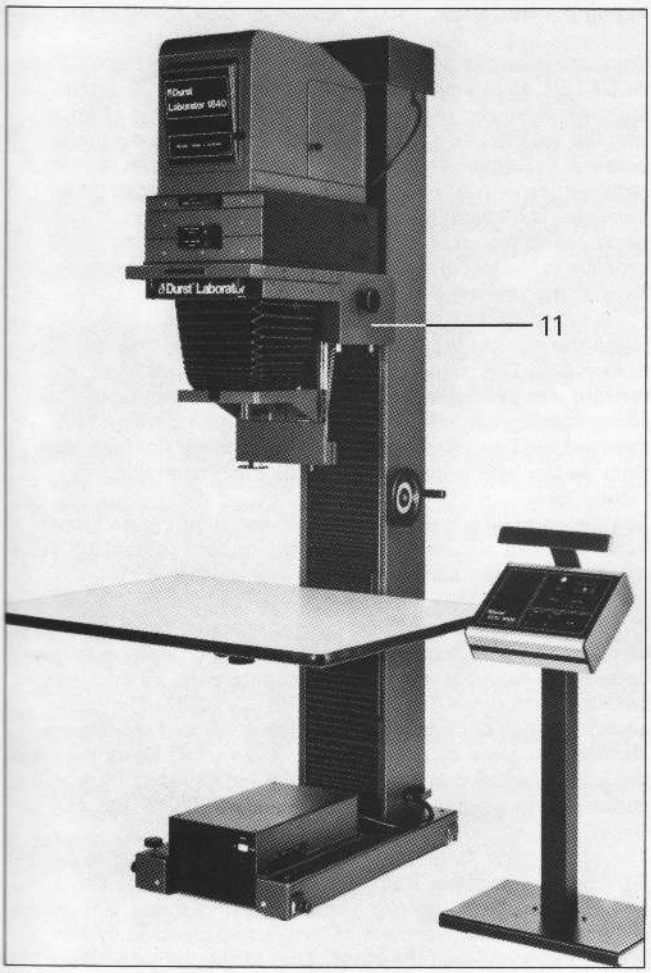
The base and column
The U-shaped base (1) runs on rollers for easy lateral movement of the unit. The rollers are locked by three milled clamping screws (2) at the sides. The height of the rollers can also be adjusted in the base (1) by the three milled levelling screws (3) to compensate for any unevenness in the floor.

When the enlarger is used for horizontal projection, it may be mounted on rails for precise movement towards or away from the projection surface.
The enlarger column (4) contains two shafts. The upper one serves for motorised head adjustment, the lower one for manual adjustment of the baseboard. Two openings (5) permit regular lubrication of the shafts.

The motorised vertical movement of the lens board (15) is actuated via two racks. The bottom end of the lens board (15) carries limit switches (18) for the lens board (15) and the enlarger head carriage (11).



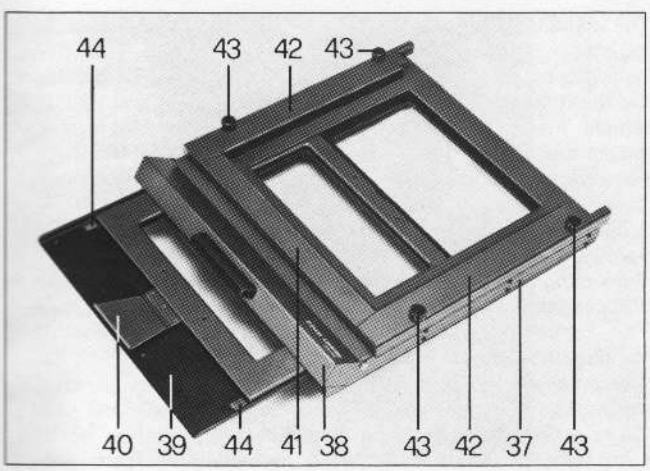
The baseboard or vacuum easel
Once the basic unit is set up in the designated location, mount the baseboard (6) or the vacuum easel (available separately - Order code: GRAVACOP) on the baseboard arm (7). Screw in four bolts from underneath, using the spanner supplied. The vacuum easel can be centered below the optical axis with the accessory centering unit (Order code: VAZENT). This ensures precise alignment of the projected image with the suction channels.
Level the baseboard or vacuum easel by adjusting the four grub screws on the baseboard arm.



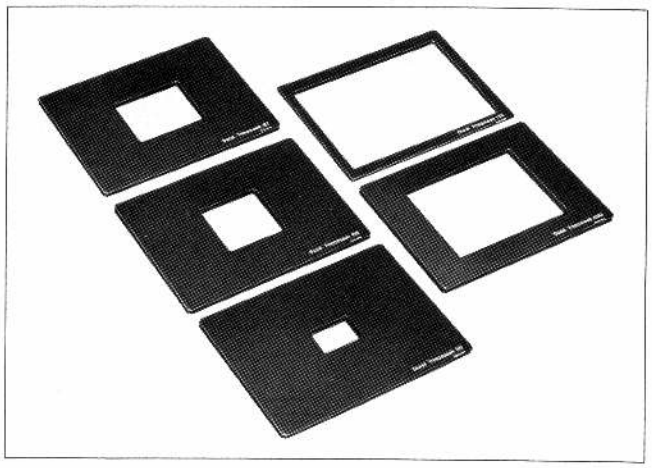
Fitting the LARANEG universal register negative carrier
The LARANEG negative carrier for film sizes up to 25×25 cm or 10×10 inches is the standard carrier supplied with the LABORATOR 1840. It uses a carrier retaining frame (37) which is firmly fixed in the enlarger head carriage (11) by two locking screws.
Raise the closing bracket (38) and fully push in the negative carrier (39) itself. The return spring pushes the negative carrier (39) slightly forward into the register fitting where it locks by engagement of the locking key (40).
Push in the light trapping strip (41) between the two lateral cover strips (42). The light trapping strip (41) must be removed when changing the mixing box. On releasing the locking screws (43) the cover strips (42) may be lifted off or adjusted relative to the mixing box.
The light trapping and cover strips (41 and 42) are not needed with the condenser head.

A centering device in the LARANEG negative carrier permits stepless alignment with the optical axis. After slackening off the milled screws underneath the negative carrier you can use the centering strip to move off-centre originals into the optical axis. Tightening the milled screws firmly secures the negative carrier.
The carrier is normally equipped with two plane-parallel glass plates (Order code: REGLAS 205). The upper section can swing back together with the glass and remains open. You can remove the glass by slightly tilting it.
To avoid Newton's rings, the upper negative carrier glass may be replaced by a surface-treated glass plate (Order code: REGLAS 205 AN).

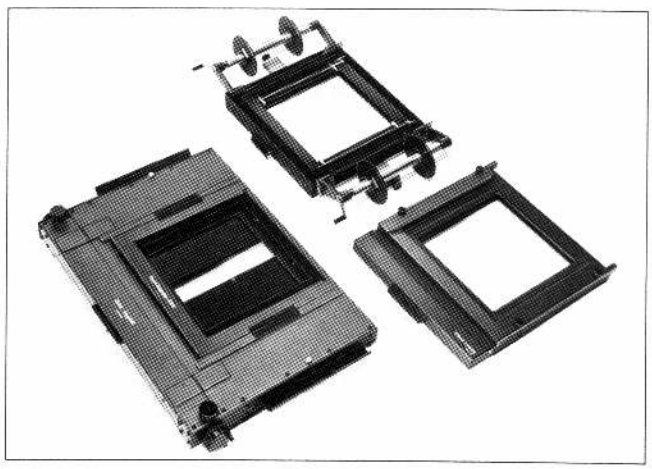
The upper glass plate holds the film flat in the negative carrier. To prevent the negative from shifting when inserting the carrier in the retaining frame, the carrier my be closed by the sliding latches (44) at the sides. That facilitates insertion of the carrier in the retaining frame (37) even with horizontal projection.
The standard equipment of the negative carrier includes a register pin bar for the LORVALO register pin system. Alternatively, the LORVALO pin bar may be replaced by the enclosed register pin bar for the Durst MIVALO register system.



For register work use the LAGRAFI 138 (13×18 cm or 5×7 inch films) or LAGRAFI 184 (18×24 cm or 8×10 inch films) inserts. These register inserts carry LORVALO and MIVALO register pins and replace the lower glass plate in the negative carrier. For 6×6 cm ($2^1/_4 \times 2^1/_4$ inch) and 4×5 inch films fit the TRIGRAFI 66 or 450 register inserts (with MIVALO register pins) in the LARADAP adapter supplied and insert the combination in the lower negative carrier section in place of the glass plate.

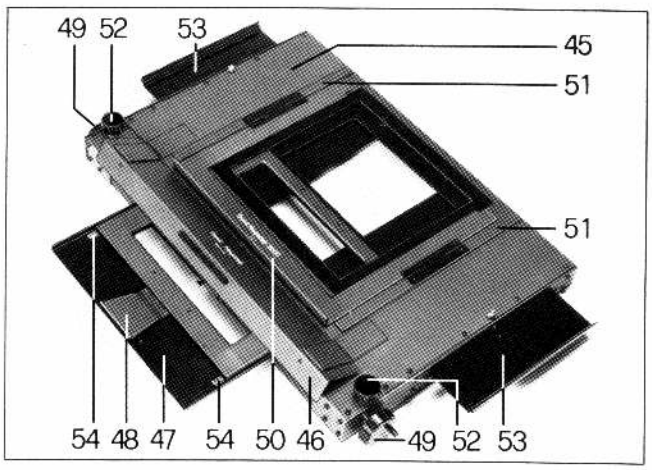


For glassless enlargements, TRINOMASK metal format mask sets may be inserted in upright or horizontal orientation together with the LARADAP adapter. In this case the upper glass plate or the whole upper section of the negative carrier is removed.
The following pairs of TRINOMASK metal format masks are available separately:
TRINOMASK 35:
For 35 mm films
TRINOMASK 66:
For 6×6 cm (2¼×2¼ inch) films
TRINOMASK 67:
For 6×7 cm (2¼×2¼ inch) films
TRINOMASK 450
For 4×5 inch or 10×12.5 cm films
TRINOMASK 138
For 13×18 cm (5×7 inch) films



Fitting the NEGATEIL 1800 N multi-exposure negative carrier

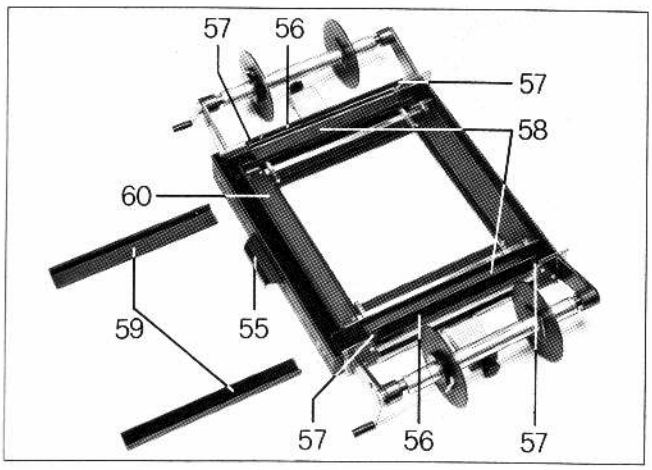
For giant enlargements and horizontal projection the accessory NEGATEIL 1800 multi-exposure negative carrier is recommended. Push the negative carrier retaining frame (45) fully into the enlarger head carriage (11). Tighten the securing screw at the right-hand collar to eliminate all lateral movement between the carrier retaining frame and the enlarger head carriage. The clamping collars can move sideways; to secure them, swing the collars down and push into the machined grooves in the underside of the enlarger head carriage, then fix with the locking screws.



Raise the closing bracket (46) and fully push in the negative carrier (47). The return spring pushes the carrier slightly forward into the register fitting where it locks by engagement of the locking key (48). Push the light trapping frame (50) between the two lateral guides (51) to prevent light leakage. Remove the light trapping frame (50) when changing the mixing box.
The light trapping frame (50) is not used with the condenser head. Remove also the retaining springs for the light trapping frame (50) on the carrier retaining frame (45).

The NEGATEIL 1800 negative carrier takes all film sizes from 35 mm up to 25×25 cm (10×10 inches). The negative carrier consists of an upper and a lower section, each with a plane-parallel glass plate (Order code: REGLAS 205). The top section swings back together with the glass and stays open. Remove the glass by slightly tilting it. To avoid Newton's rings, the upper negative carrier glass may be replaced by a surface-treated glass plate (Order code: REGLAS 205 AN).

The upper glass plate holds the film flat in the negative carrier. To stop the negative from moving when inserting the negative carrier (47) in the carrier retaining frame (45), lock the top and bottom sections of the carrier together by the sliding latches (54) at the sides. That facilitates insertion of the carrier in the retaining frame even with horizontal projection.



The standard equipment of the negative carrier includes a register pin bar for the LORVALO register system. This may be replaced if required by the enclosed register pin bar for the Durst MIVALO register system. The LAGRAFI and TRIGRAFI register inserts and the glassless TRINOMASK metal format masks are used in the same way as with the LARANEG negative carrier (see page 5 and above).

A centering device in the NEGATEIL 1800 N negative carrier permits stepless alignment with the optical axis. After slackening off the milled screws (52) on top of the sectional film carrier you can move off-centre originals into the optical axis. Tightening the same milled screws (52) firmly locks the negative carrier again.
When making sectional enlargements of a film original, rotating the knobs (49) at the sides permits stepless adjustment of the negative carrier by 120 mm to shift it to the left or right away from the optical axis. The upper reference scale at the

front of the negative carrier shows the lateral displacement relative to the optical axis. The lower reference scale which is laterally adjustable and lockable, permits individual settings.

Two laterally adjustable masking plates (53) mask down the required section of the film.

Giant enlargement sizes may run up to about 8×10 m or over 25×30 feet in size. As roll paper is however available only in a maximum width of some 1.27 m or 50 inches, such giant enlargements usually have to be made in sections depending on the required print width. Instead of moving the unexposed paper, the multi-exposure negative carrier permits movement of the negative being projected. The paper strip always remains on the same level on the wall, namely centered with the optical axis, while the negative is shifted stripwise in the carrier. The movement of the negative can be set on, and read off, the reference scales.

Fitting the NEGAROLL 205 aerial film carrier

A special accessory is the NEGAROLL 205 carrier for handling aerial films. The carrier takes aerial films up to 240 mm ($9^1/_2$ inches) wide and up to 60 m or 190 feet long. It replaces the standard LARANEG carrier supplied with the enlarger.

The aerial film carrier includes two plane-parallel glass plates (Order code: ROLGLAS 205). To avoid Newton's rings, the upper glass plate may be replaced by a surface-treated glass (Order code: ROLGLAS 205 AN).

To replace the glass plates, unscrew the glass retaining clips on the top and bottom sections of the carrier, using the Allen key supplied, and retighten the screws after inserting the glasses.

Push the full film spool on to one of the two spool sleeves and secure with the two guide flanges. Push two further flanges onto the other spool sleeve and secure in the appropriate position for the required film width. Push the two spool sleeves over their spool holders and fix with the crank.

Pull forward the handle (55) and swing back the top carrier section. Draw the film across the carrier to the empty spool sleeve and attach it in the slot. Then insert the two light trapping strips (56), with the felt-lined edges downwards, into the fittings (57) at the side. Close the negative carrier and push the NEGAROLL 205 fully into the enlarger head carriage.

To secure, swing down the movable clamping sleeves at the sides and push them into the machined grooves in the underside of the enlarger head carriage (11), then lock with the fixing screws. To advance the film, pull the handle (55) forward. This raises the top section of the film carrier and the film can be advanced by turning one of the two cranks.

The standard version of the NEGAROLL 205 aerial film carrier is intended for use with the CLS 1840 colour head. If the carrier is to be used with the condenser head, remove the front light trapping strip (60) and replace the lateral light trapping strips (58) by the alternative light trapping strips (59) supplied. When fitting the light trapping strips (59) the felt-lined sides must face inwards.

Fitting the lenses

The LABORATOR 1840 can use lenses of all focal lengths from 50 to 360 mm. The standard LARATUB lens tube is used for the 50 and 80 mm lenses. The single-lens VAPLA panel is available as an extra for 300 and 360 mm lenses or the single-lens UNIPLA panel for lenses from 100 to 240 mm. The TRIPLA lens turret takes three lenses of focal lengths up to 240 mm.

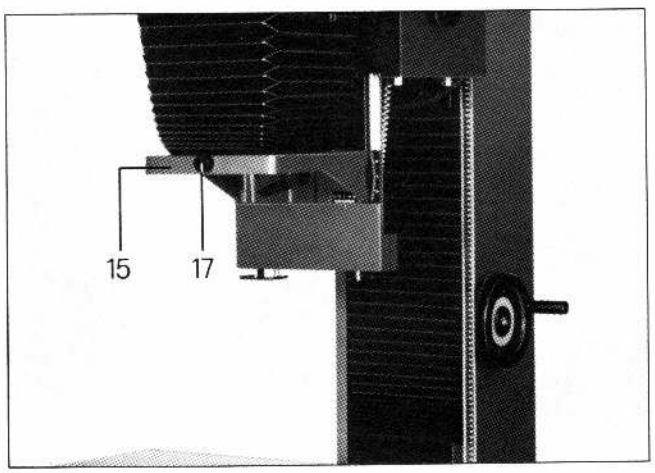
Fully screw the selected lens from underneath into the appropriate panel or tube. Then insert the panel or tube with the lens or lenses into the three-point support of the lens board (15) and secure it with the milled screw (17) so that the aperture scale is visible from the front.
The panels other than the LARATUB lens tube are fitted with a swing-in red filter which may be removed by slackening off a grub screw.
The table on page 16 shows the required lens panels for the different focal lengths.

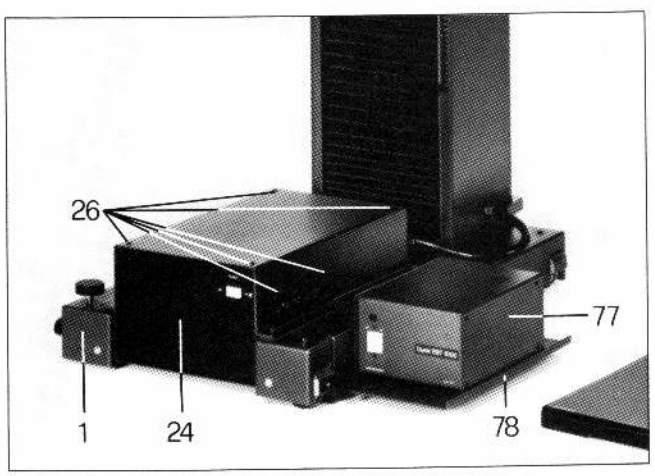
Mounting the power unit and voltage stabiliser

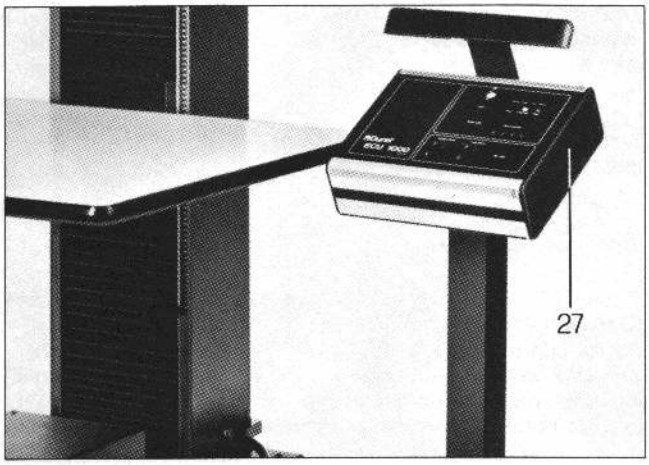
Secure the power unit (24) between the legs of the U-base (1) with two screws. The EST 1000 voltage stabiliser (77) is mounted on the support (78) supplied, which is pushed between the power unit and the base and secured with two socket-head screws.
Normally the power unit (24) is supplied set to a 220 volts mains supply. Adjust the power unit as follows for a 240 volts mains supply: Unscrew the six screws (26), remove the cover and refit the AMP plug from 220 volts to the next flat pin for 240 volts.

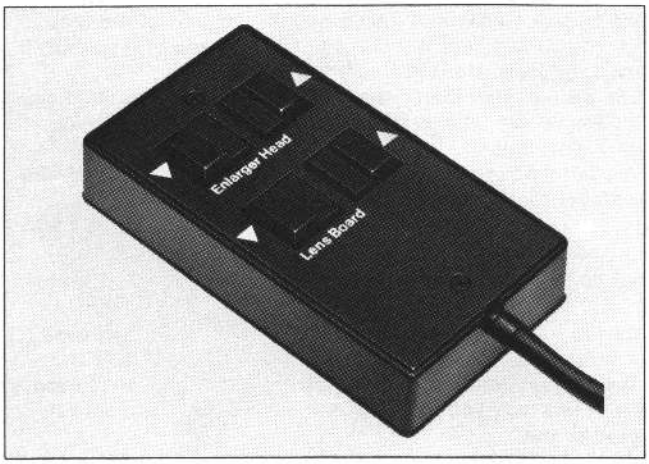
The power unit contains five fuses:

Fuse 1 «Line»	10 amps slow-blow, mains supply
Fuse 2 «Transformer»	1.6 amps slow-blow; power unit transformer
Fuse 3 «Motor Head»	1.25 amps slow-blow; enlarger head movement
Fuse 4 «Auxiliary»	6.3 amps slow-blow; voltage stabiliser or accessories output
Fuse 5 «Time output»	5 amps slow-blow; for colour head and EST 1000 or condenser head output









Operation of the ECU 1000 control desk

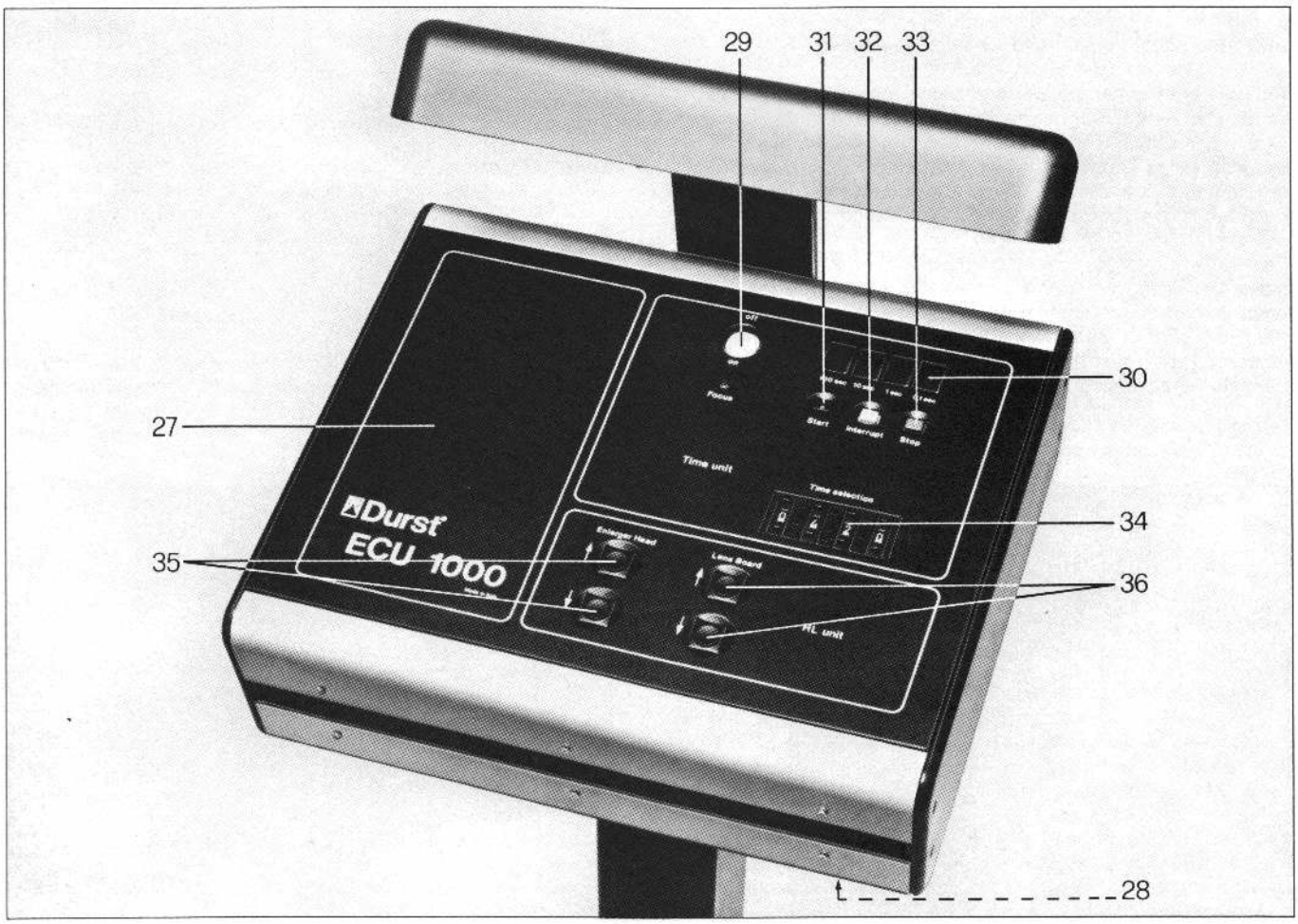
The control desk (27) covers all main operations from a central control point. The control desk is illuminated by a safelight matched to the spectral sensitivity of most sensitised materials. This lighting can be switched off.
To adjust the magnification and focus push the «Focus» switch (29) to «on». Set the required exposure time – up to 999.9 seconds – by the «Time selection» controls (34): this time appears in the digital read-out (30). On pressing the illuminated «Start» key (31) the preset exposure time runs down to zero.

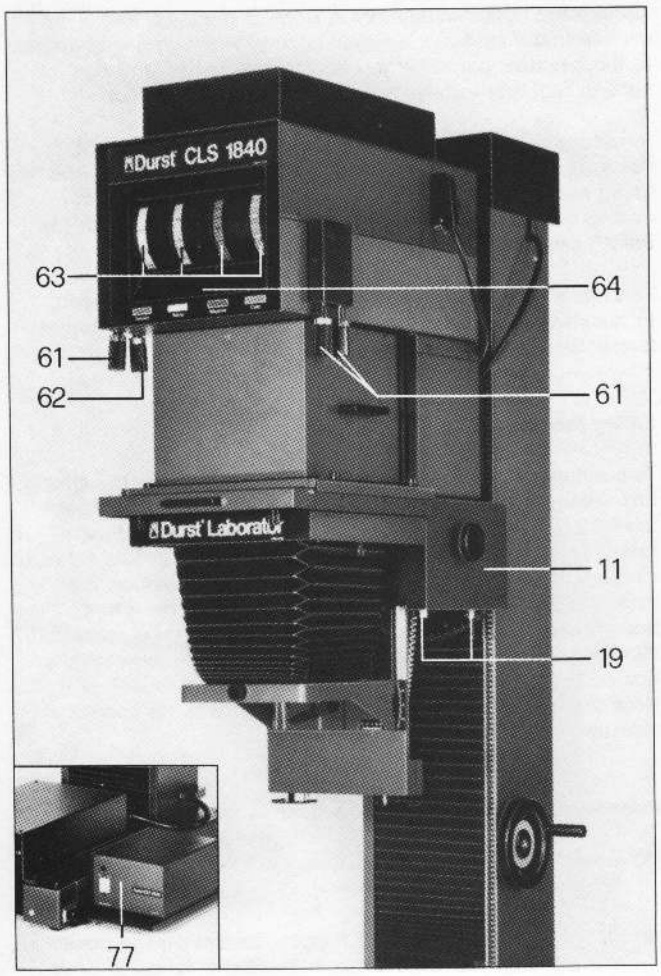
Once the «Start» key is pressed, the exposure may be interrupted by pressing the «Interrupt» key (32); the remaining time then appears in the digital display (30).
Allowing for the exposure already made, any required correction may be carried out by the «Time selection» controls (34) and stored by pressing the «Stop» key (33).
The «Stop» key (33) also terminates a started exposure: the digital display (30) then again shows the time originally entered with the «Time selection» controls (34).

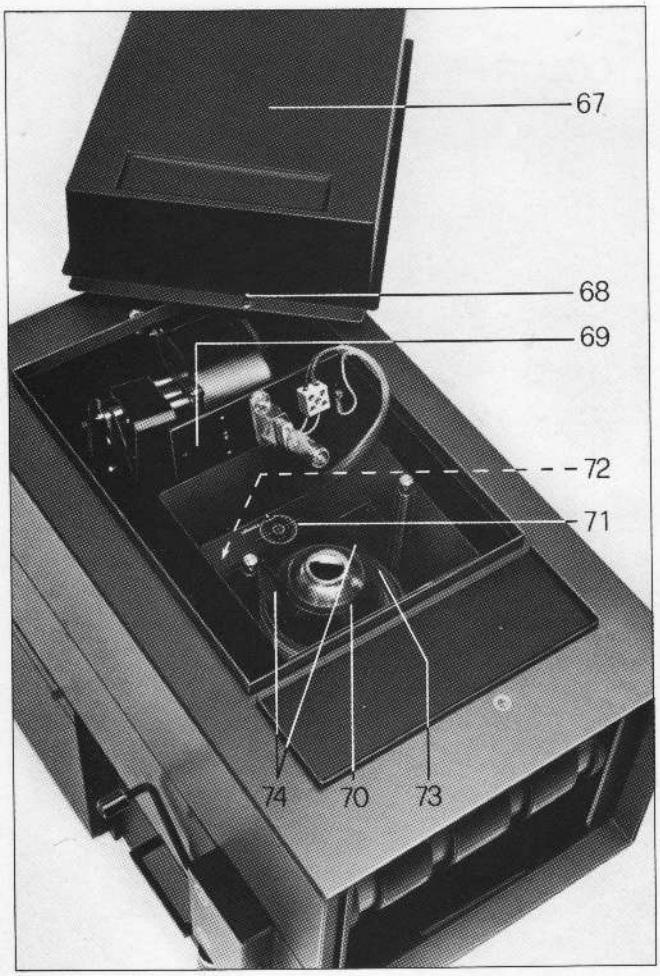
The motorised enlarger head and lens board adjustments (image size and focus) are controlled by the «Enlarger Head» (35) and «Lens Board» (36) keys. This motorised adjustment is possible at two speeds:

Slight key pressure : Slow movement
Heavier key pressure : Fast movement

When the unit is used for horizontal projection, a remote control unit (Order code: DESKMES 1000) is available with an 8 m (26 foot) cable and connector. The remote control unit plugs into the socket (28) on the control desk.







2. Features and assembly of the CLS 1840 colour head

The Durst CLS 1840 colour head

The CLS 1840 colour head covers a maximum film size of 25×25 cm or 10×10 inches with high light output, ideal colour mixing and even illumination for efficient operation with vertical and horizontal projection.

The features of the CLS 1840 colour head are:
- 1000 watts light output by a single special tungsten-halogen lamp.
- Continuously adjustable dichroic yellow, magenta and cyan filters (densitometric values 0 to 130). The filter and density settings appear on the scales (63) on the front of the colour head.
- The light intensity is continuously adjustable over a range of up to two lens stops by a built-in density control. This allows exposures to be made at constant exposure times at the optimum working aperture of the lens without reciprocity failure problems.
- Built-in electronically controlled shutter and pre-heated tungsten-halogen lamp. This ensures that the exposure is always made while the tungsten-halogen lamp is burning at its correct colour temperature, with no afterglow. Pre-heating the tungsten-halogen lamp extends its life and ensures that the lamp reaches its correct colour temperature faster.
- The scale illumination incorporates a special filter to protect colour papers against fogging. When not required, the scale lighting may be shut off by closing the flap (64).
- Efficient cooling of the colour head even during prolonged exposures is ensured by using a built-in fan with automatic switching.
- Infrared- and ultraviolet-absorbing filters are fitted as standard.
- The EST 1000 voltage stabiliser keeps the output constant over an input range from 180 to 260 volts and is protected by a 10 amp slow-blow fuse. It compensates voltage fluctuations from +10 % to — 15 % within 0.3 second.

Mounting and securing the colour head

Mount the CLS 1840 colour head on the enlarger head carriage (11) of the LABORATOR 1840 and secure from underneath with the four hexagonal bolts (19). To facilitate filter and density settings, push the extension rods supplied into the filter control knobs (61) of the appropriate colours and into the density control knob (62) .

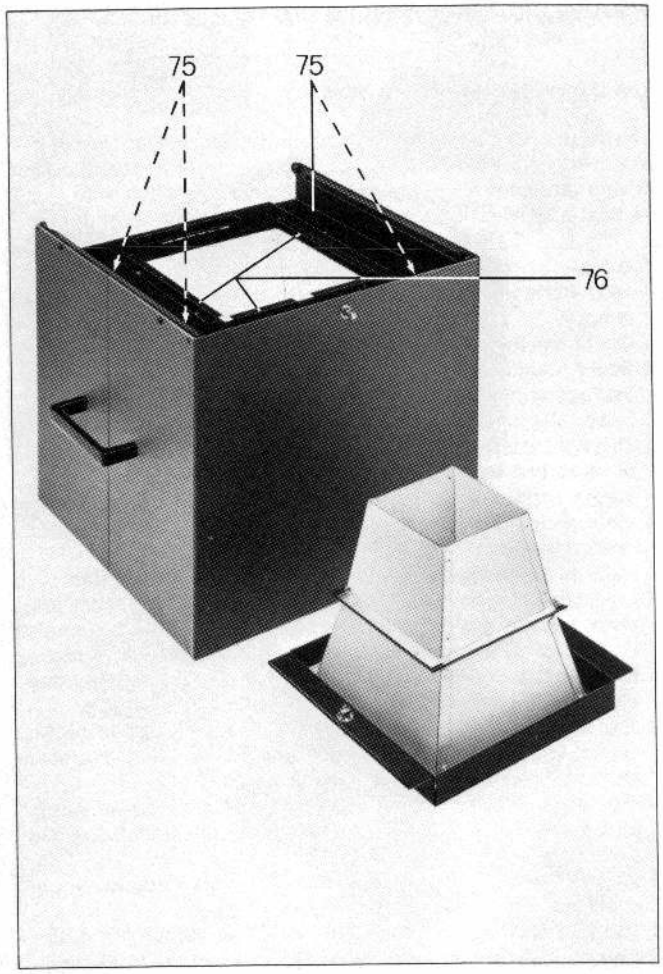
Fitting the tungsten-halogen lamp and reflector

Press the two locking studs (68) and remove the lamphouse cover (67) at the top of the CLS 1840. This reveals the lamp bracket (69) which may be removed after unscrewing the two fixing screws.
Press the locking button (72) and swing open the reflector holder (71). Insert the reflector (70) with the cut-out at the rear, then secure with the locking button (72). Then insert the tungsten-halogen lamp in the lamp holder. Never touch the lamp envelope with the hand but always with the glove supplied.

Next introduce the tungsten-halogen lamp mounted on the lamp bracket (69), with the shielding plate to the rear (to shield the lamp against the direct air stream of the fan) into the reflector (70) and secure the lamp bracket (69) with the two fixing screws. Replace the lamphouse cover and secure by pushing down the two studs (68).
The CLS 1840 colour head is supplied complete with a tungsten-halogen lamp (Order code: COLAMP 1840).

Fitting the mixing boxes

The new design of the mixing box system provides improved light distribution. The unit consists of an upper section that



centers the light immediately in front of the lamp and a lower section that distributes the light cone over the film area utilised in the negative carrier. The upper and lower mixing box section together form a unit with the code LARABOX.

Introduce the upper section of the appropriate LARABOX upwards into the CLS 1840 colour head and secure with the two fixing knobs provided. Push the guide rollers of the lower mixing box section into the guides provided underneath the colour head and secure with the fixing knob.

The upper and lower mixing box sections may be changed to match the film size and inserted for upright or horizontal format orientation.

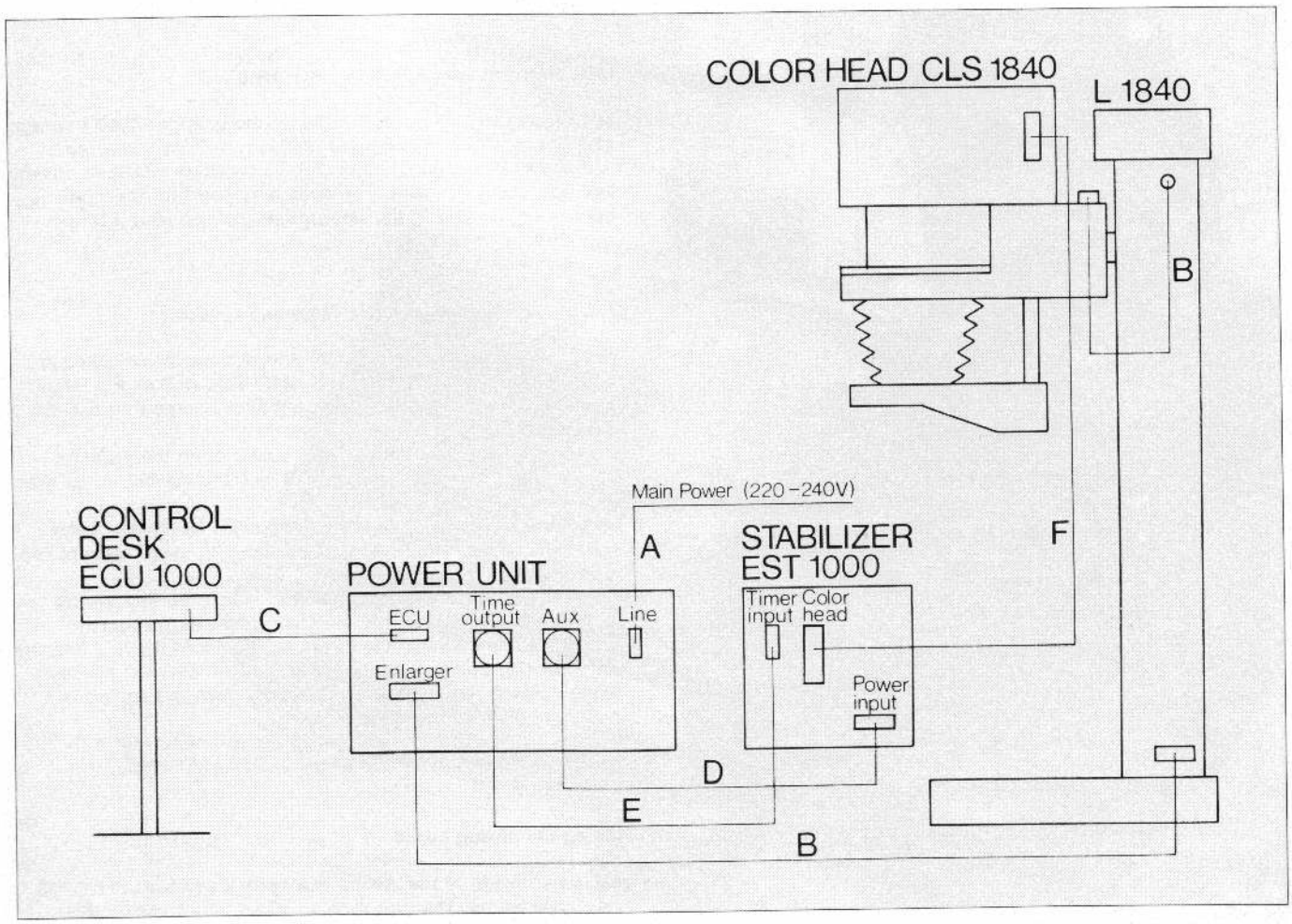
Fitting the diffusers

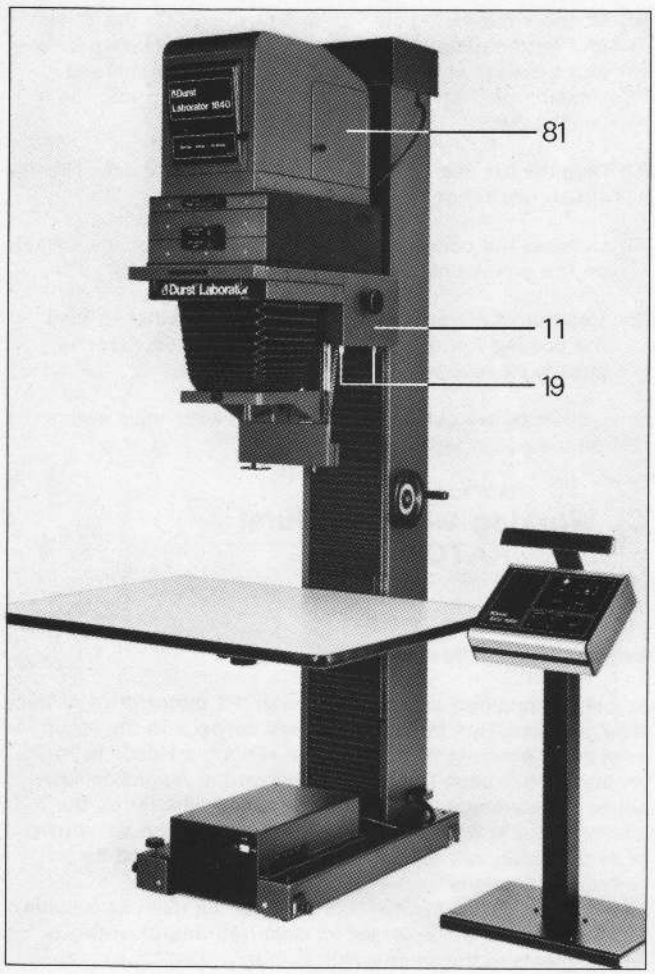
Two diffusers of different density are supplied with the mixing box. The less dense diffuser is already mounted in the lower mixing box section. The more dense diffuser, packed separately, may replace the less dense diffuser and should be used when particularly even colour mixing and illumination are essential. To fit the more dense diffuser in the lower box, first remove the inner mixing box by releasing the appropriate locking knobs (75). Then release the diffuser underneath the box and replace it by the alternative diffuser.
Note that the diffuser should be mounted with its convex side upwards.

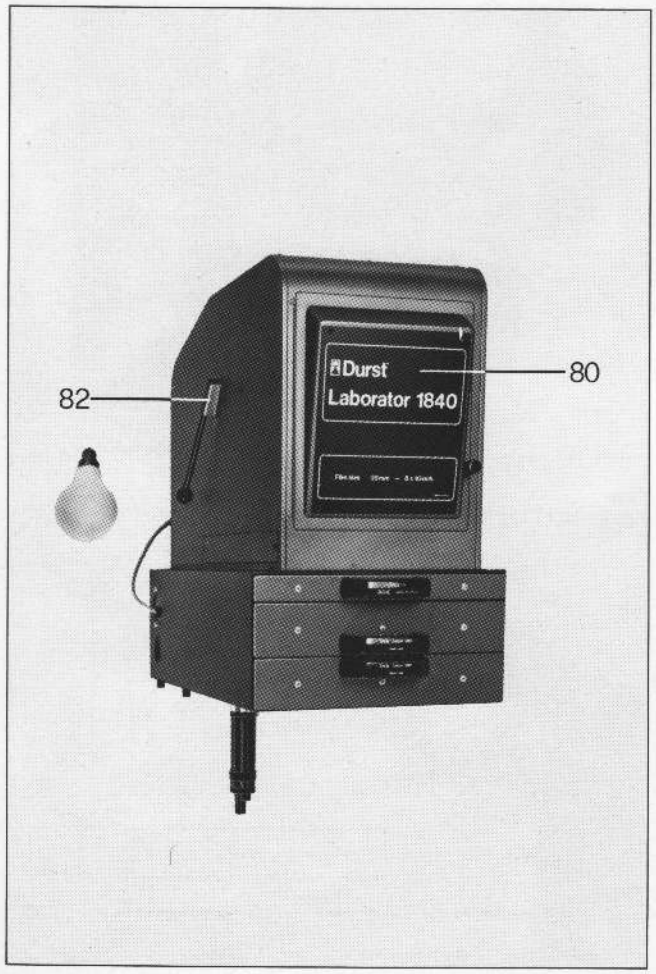
Connecting the CLS 1840 colour head

(A) Connect the mains power supply to the «Line» socket (220-240 volts) on the power unit.

(B) Connect the multi-pole «Enlarger» socket on the power unit for the motorised enlarger head and focusing drive







to the socket at the base of the column and similarly plug the cable from the column top into the lamphouse.

(C) Plug the flat cable from the ECU 1000 control desk into the «ECU» socket on the power unit.

(D) Connect the power supply to the EST 1000 by a lead from the «Aux» socket of the power unit to the «Power input» socket on the EST 1000.

(E) Connect the EST 1000 to the power unit via a cable plugged into the «Timer input» socket on the EST 1000 and into the «Time output» socket on the power unit.

(F) Connect the EST 1000 to the CLS 1840 colour head via the multi-pole connections marked «Colour Head» on the EST 1000 and the CLS 1840 colour head.

Once all items are connected up, switch on the main switches (25 and 79) on the power unit (24) or on the EST 1000 (77).

3. Features and assembly of the condenser head

The condenser head

The condenser lamphouse contains a vertically mounted lamp, light from this passes through a heat filter, is concentrated by a condenser and reaches a hinged mirror. With large film sizes the lever (82) swings aside this mirror so that the light passes to a second mirror. This ensures fully even illumination even with large film formats. The mirror or mirrors reflect the light through 90° onto the horizontal condensers which concentrate the light beam into the lens. This concentration ensures high light intensity with suitably short exposure times.
In addition to the interchangeable condensers, the condenser lamphouse contains a filter drawer to take 30×30 cm ($11\frac{3}{4} \times 11\frac{3}{4}$ inch) colour or variable-contrast filters.

Choose the appropriate condenser combinations for best lighting and evenness of the illumination. The correct condenser combination depends on the focal length of the lens and in certain cases even on the magnification with the same lens (see page 17).

Also available as an extra are opal lamps of 200, 500 and 1000 watts with a specially large envelope (Order code: OPAL 200/500 and 1000). Frequent voltage fluctuations and long operation eventually cause scorching deposits which can lead to uneven illumination. The lamp should therefore be checked periodically.

To reduce heat in the condenser lamphouse the use of the WAHAL heat filter is recommended. This goes into the filter drawer.

Mounting and securing the condenser head

Mount the condenser head on the enlarger head carriage (11) and secure it from underneath with the four hexagonal bolts (19).

Fitting the surface-silvered mirror

Open the front panel (80) and insert the surface-silvered mirror into the guides.

Fitting the filter drawer

Introduce the guide frame (marked with a white dot) for the filter drawer into the upper channels of the condenser housing making sure the white dots are aligned. The filter drawer itself (FILCA) goes into the top section.

Fitting the supplementary LAZUCO 181 condenser

Open the side panel (81) of the lamphouse and introduce the supplementary LAZUCO 181 condenser into the front channel, with the convex lens surface facing forward.

Fitting the main condensers

Introduce the condenser guide frame (marked with two dots) into the lower channels with the dot marks correctly aligned. Depending on the lens fitted, introduce the two appropriate LACON condenser lenses (see page 17) with the convex surfaces facing each other. These go in the enlarger head underneath the filter drawer.

Fitting the opal lamp

Open the side panel (81) and screw the opal lamp into its fitting.
The standard condenser head kit includes a 300 watt opal lamp. This has an extra large envelope to ensure even illumination over the whole film area when using large formats.

Connecting a cooling fan

For lamps over 300 watts an accessory LAFAN 138 cooling fan is essential. Connect the LAFAN 138 with the air hose either to the left- or right-hand lamphouse opening. The fan is powered from the «Aux» outlet on the power unit.

Connecting the condenser head

(A) Connect the mains supply to the «Line» socket (220-240 volts) on the power unit.

(B) Connect the multi-pole «Enlarger» socket on the power unit for the motorised enlarger head and focusing drive to the socket at the base of the enlarger column and similarly plug the cable from the column top into the lamphouse.

(C) Plug the flat cable from the ECU 1000 control desk into the «ECU» socket on the power unit.

(D) Connect the condenser head to the «Time output» socket on the power unit.

(E) Use the «Aux» output on the power unit either to feed the cooling fan or as an outlet for other accessories (maximum 1000 watts at 220-240 volts).

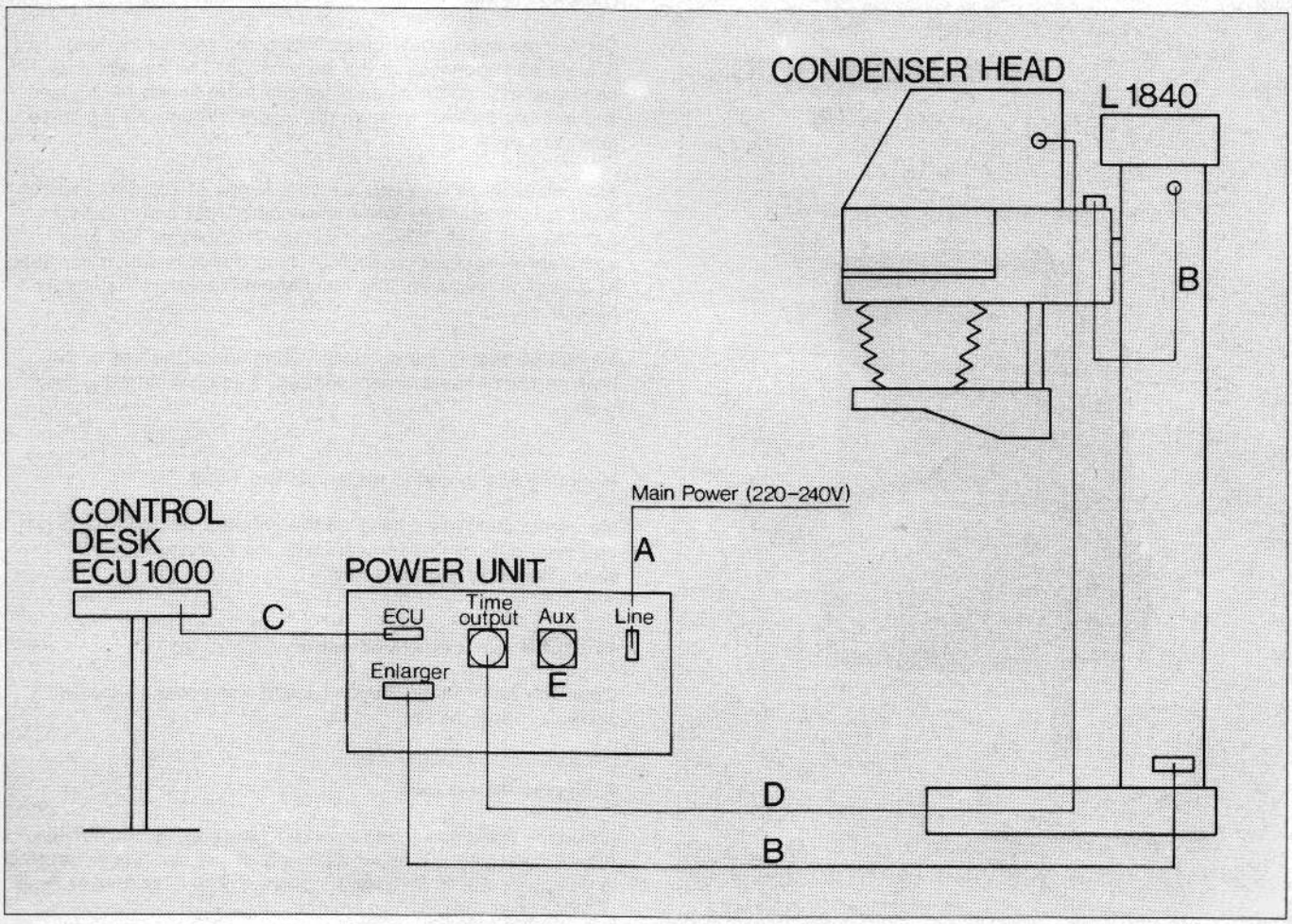
Once all items are connected up, switch on the main switch (25) on the power unit (24).

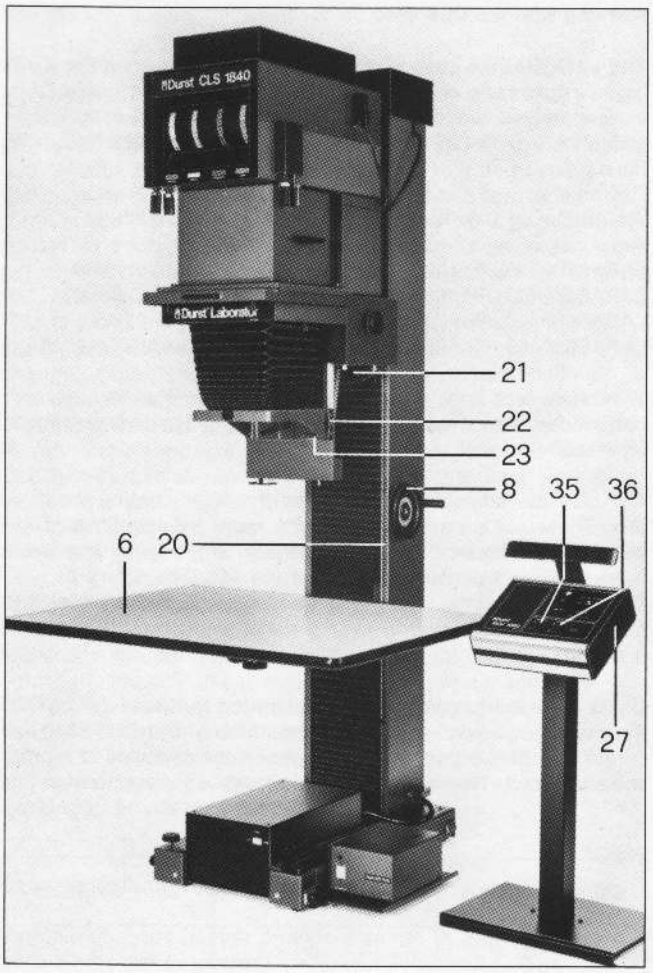
C) Working with the Durst LABORATOR 1840

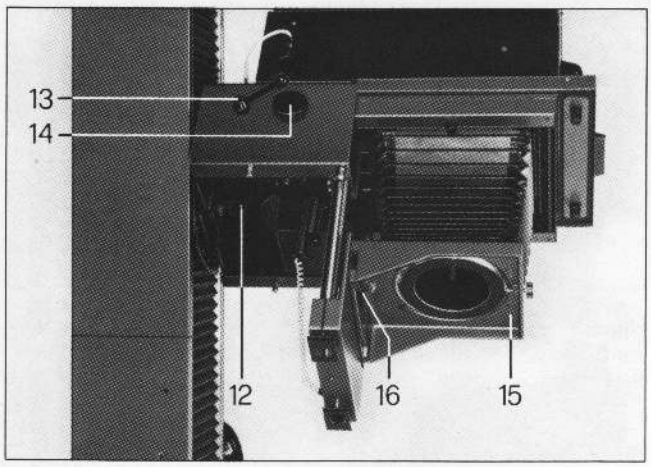
General

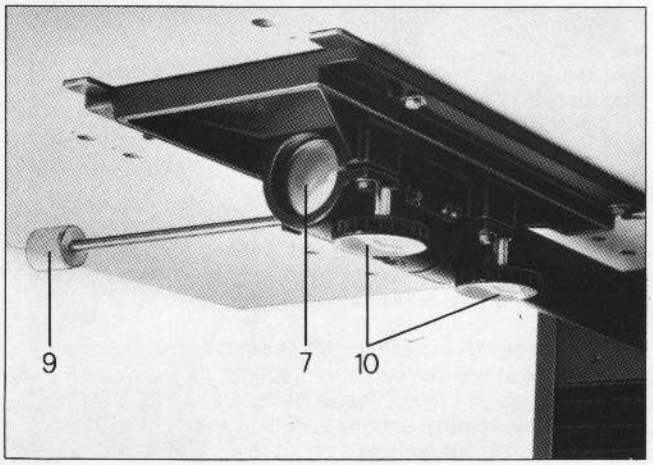
Setting the magnification

Adjust the required magnification with the motor drive of the enlarger head. Run the enlarger head carriage to the required position by pressing the appropriate «Enlarger Head» keys (35) on the control desk (27). Depending on the magnification, adjust the baseboard (6) manually by the crank (8) on the column. Usually it is more convenient to keep the baseboard in its top position. Lower the baseboard as required for high magnifications or selective enlargements.
The scales on the LABORATOR 1840 can be used as a guide when setting up the enlarger to make reprints of previous enlargements to the same size.









The LABORATOR 1840 has the following scales:

Scale (20): Vertical adjustment of the enlarger head and of the baseboard in cm
Scale (21): Enlarger head tilt for distortion control
Scale (22): Lateral lens tilt for distortion control
Scale (23): Lateral shift of the optical axis.

Focusing

For focusing operate the appropriate «Lens Board» keys (36) and check the image sharpness visually. Both the size adjustment and the focus may be operated by an accessory remote control.

Horizontal projection

The LABORATOR 1840 can also be used for horizontal projection. This involves tilting the enlarger head carriage through 90° to the left or right. First unlock the centering bolt (12) and the locking lever (13). Now tilt the enlarger head sideways by pushing it and turning the milled knob (14); this can be operated from both sides. If you stop turning the milled knob (14), the head remains fixed in whatever position it has reached.

Engagement points indicate the exact 90° tilt of the enlarger head for horizontal projection. For horizontal projection lock the enlarger head in addition with the centering bolt (12).

To return to the vertical position, release the lock, swing the enlarger head back to vertical while turning either knob (14) and lock again with the centering bolt (12).

Where precise alignment and movement relative to the projection surface is required, the enlarger may be mounted on commercially available T-rails.

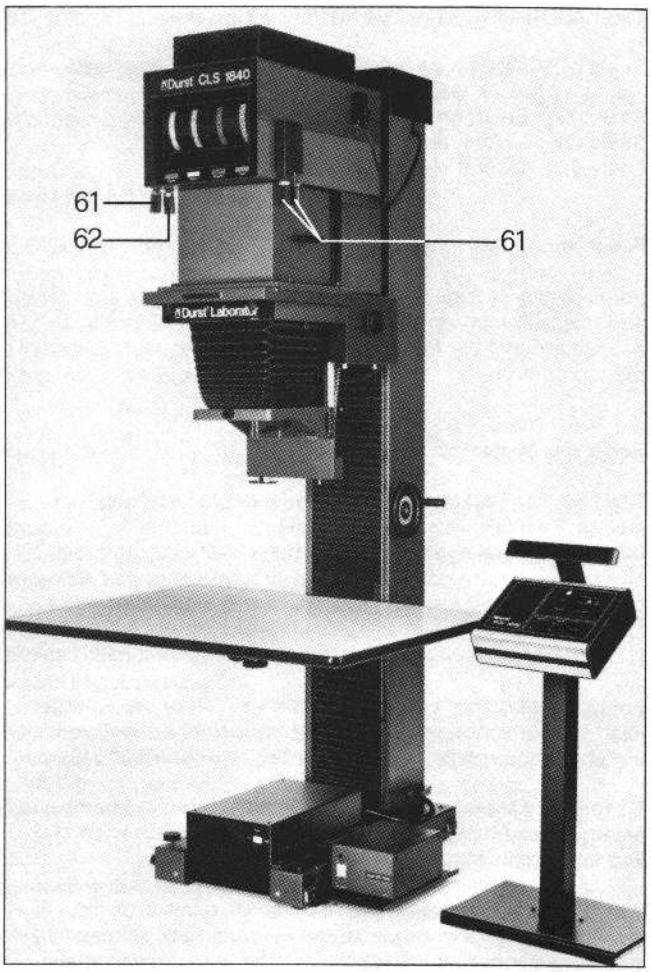
Correcting converging verticals

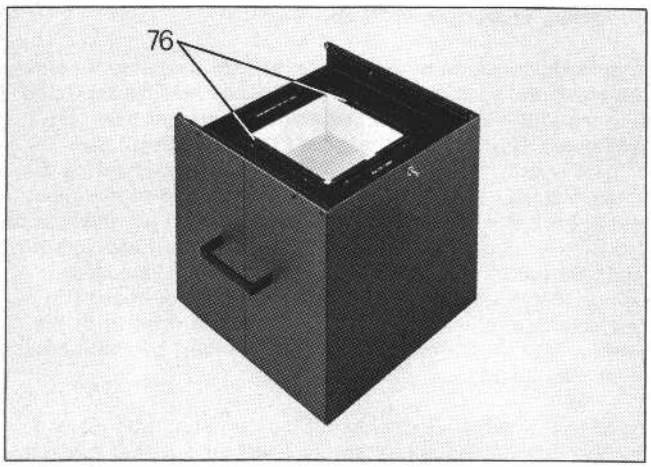
If verticals converge in the picture through a camera tilt during the exposure, such unwanted convergence may be corrected with the LABORATOR 1840 by tilting the enlarger head, the lens board (15) and the baseboard (6). Slacken off the centering bolt (12) and the locking lever (13), then swing the enlarger head by gently pressing it in the required direction and at the same time turning the milled knob (14) – this can be operated from both sides. To lock the enlarger head with a slight tilt (up to 5-7°) with the locking bolt (12) released, tighten the locking lever (13). To swing the lens board (15) first unlock the locking lever (16). To permit rotation of the TRIPLA lens turret, the locking lever (16) must be returned to its stop position.

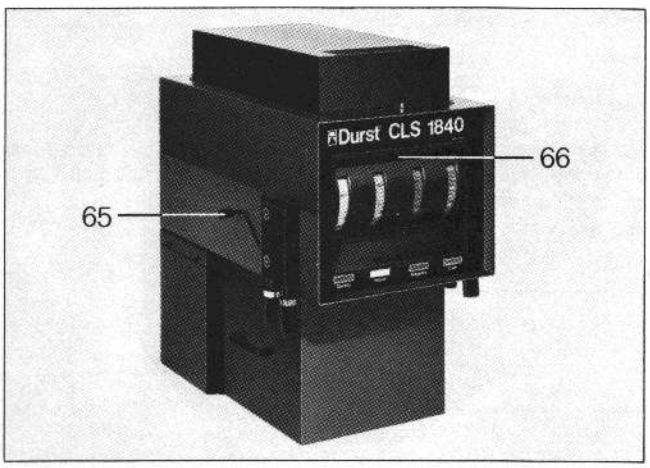
To tilt the baseboard, slacken off the centering bolt (9) and the two locking knobs (10) on the baseboard carrier arm. To maintain sharp focus over the whole image area with the tilt features in use, extend the depth of field by stopping down the lens by at least two stops.

Reductions

For reduction, use a lens of a focal length equal to the diagonal of the required image. For instance when reducing an 18×24 cm or 8×10 inch original to 6.5×9 cm or $2^1/_2 \times 3^1/_2$ inches, use a 105 mm lens.







Working with the CLS 1840 colour head

The LABORATOR 1840 with the CLS 1840 colour head is a high-performance enlarger for all colour work and duplication. In its standard version the colour head is supplied complete with a LARABOX 205 mixing box for 20×25 cm and 8×10 inch films.

The following four further mixing boxes are available separately:
LARABOX 100: For films up to 25×25 cm (10×10 inches)
LARABOX 130: For films up to 13×18 cm (5×7 inches)
LARABOX 450: For films up to 4×5 inches (10×12.5 cm)
LARABOX 69: For films up to 6×9 cm ($2^1/_4 \times 3^1/_4$ inches)

To ensure best light output, colour mixing and even illumination, always use the correct mixing box for the film size to be handled.

The dichroic filters are adjusted by the filter control knobs (61). These are so arranged that the more frequently used yellow and magenta filter controls are at the right and the cyan filter and density controls at the left. The filters of the CLS 1840 colour head are non-fading dichroic filters and provide stepless filtration over a densitometric range from 0 to 130.

If you are used to colour heads calibrated in Kodak CP or CC filter values, you will notice that the filters of the CLS 1840 colour head have considerably higher filter densities at similar scale settings. The following table shows equivalents.

FILTER VALUES

Durst densities	Kodak CC/CP and Ciba 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

Without supplementary filters the highest filter settings of the CLS 1840 colour head is thus equivalent to CC or CP filter densities of about 195.

The supplementary filter (see illustration on page 10)

For higher filter densities the yellow/magenta supplementary filter (70 yellow + 35 magenta) supplied with the enlarger may be inserted in the fitting (76) provided for the purpose. This allows you to enlarge colour negatives where even a filter setting of 130 is inadequate.

The white-light setting

For focusing with colour papers (or black-and-white enlargements on variable-contrast papers) the filter and density settings of the colour head may be instantly swung out of the light path with the white-light lever (65).

The « White light » indication (66) shows that the filters and density control are moved out of the light path. After adjusting the image size and focus, the white-light lever (65) returns the filters and density control back into the light path to exactly the selected settings.

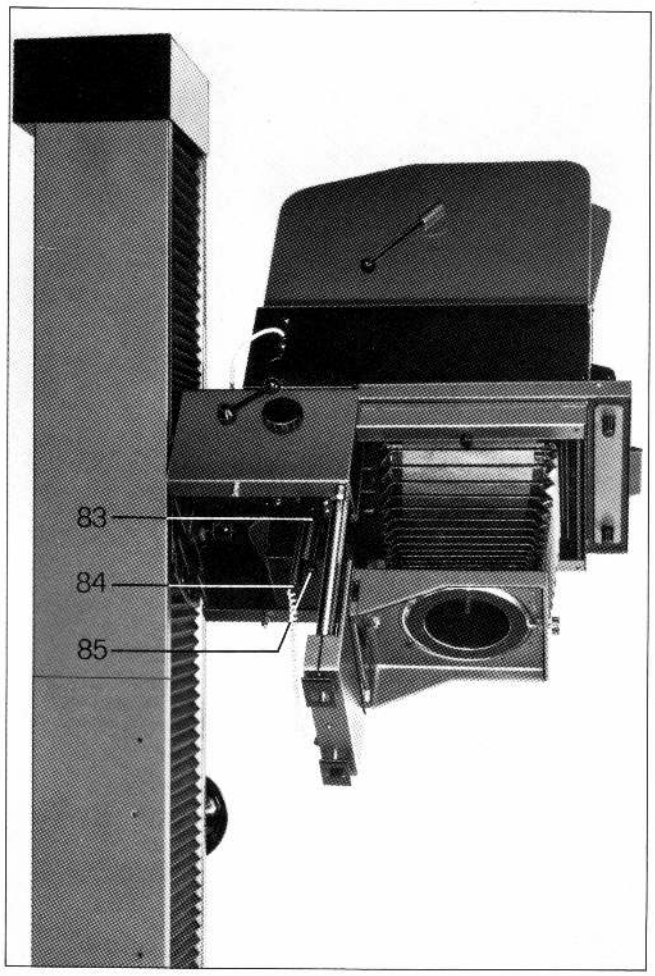
The density control

The density control of the CLS 1840 allows you to expose at the lens' optimum working aperture and with a constant exposure time most of the time. To make sure of this, start by selecting the best working aperture and adjust the density control with the density control knob (62) to a mid-setting that permits opening as well as closing of the density control. If the magnification changes or the films to be enlarged are denser or thinner, the density control permits stepless adjustment over a range equivalent to 2 lens stops to maintain the ideal exposure time without altering the lens aperture. This is particularly useful when the lens has no continuous aperture adjustment. If you use a colour analyser, follow any change of the density control by a further density reading. The density control is also specially useful at low magnifications where the high light intensity of the CLS 1840 leads to very short exposure times at the normal lens aperture. This has certain drawbacks, in particular that local control by shading (dodging) or burning in is almost impossible with short exposure times. The usual remedy is to stop down the enlarging lens and possibly move in all three filters.

Both these methods have shortcomings: At very small apertures beyond f/22 diffraction at the edges of the iris diaphragm impairs image definition; while moving a third filter into the light path (usually cyan) may involve elaborate and time-consuming resetting for just a single enlargement. The density control on the other hand reduces the light intensity without affecting the filter settings and also permits smaller enlargements with reasonable exposure times at an optimum working aperture between f/8 and f/16.

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 the 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	30 yellow	25 yellow
2	15 yellow	00
3	00	15 magenta
4	130 magenta	170 magenta
5	Not available	Not available

Grade 4 with Kodak Polycontrast can only be achieved with a supplementary filter. Setting a filter value in the colour head increases the required exposure time. So multiply the normal exposure found by the factor for the filtration below.

Filter setting	Factor	Filter setting	Factor
15 yellow	1.06	60 yellow	1.17
30 yellow	1.11	25 magenta	1.31
50 yellow	1.15	130 magenta	2.04

With the Durst CLS 1840 you can also compensate the exposure increase with the density control.

Working with the condenser head

The LABORATOR 1840 with the condenser head is a proven combination for black-and-white enlargements. The standard outfit includes two LACON 380 N condensers for film sizes from 10×12.5 cm (4×5 inches) to 25×25 cm (10×10 inches). Further condensers are available (see page 17) separately for the smaller film sizes or for obtaining certain magnifications or reductions.

Centering the lamp

Center the lamp after sharply focusing a projected image and at the full lens aperture. Remove the focusing negative from the negative carrier. If the projected area now shows dark or hot spots, the opal lamp needs centering for even baseboard illumination. To adjust the opal lamp up or down slightly slacken off the clamping ring (83), raise or lower the lamp as required and tighten the clamping ring (83) again. The lower milled knob (84) adjusts the lamp position forward and back. The milled knob on the shorter shaft (85) controls lateral adjustment. Keep the lens at full aperture only for lamp centering. For all enlarging stop down the lens by at least 2 stops to ensure even sharpness and illumination over the whole projected image.

Enlargements on variable-contrast papers

For these you require variable-contrast filters from Kodak or Ilford. The filters are placed in the filter drawer of the enlarger and yield a range of four gradations (altogether 7 including 3 intermediate values). Check the manufacturer's data for the required variable-contrast filter densities for the different gradations. The filter set includes a small calculator to work out exposure factors.

D) Accessories

For professional applications with the Durst L 1840 enlarger, colour analysers, processors and extensive accessories are available. For further information please contact your local Durst agency.

E) Maintenance

The Durst LABORATOR 1840 with its two lighting systems is designed to meet the highest demands with the minimum of maintenance. It retains its high efficiency even in the toughest operating conditions.
Approximately once a month lubricate the two shafts through the openings (5) in the column. (Add a few drops of medium lubricating oil after every hundred adjustments).
Periodically clean the negative carrier glasses and lenses with a chamois leather or an antistatic brush or cloth. The lens surfaces have an anti-reflection coating, so wipe them carefully to avoid scratching the coating.

Periodically remove the air filter at the rear of the colour head and clean it to maintain optimum cooling and to avoid soiling the dichroic filters.
From time to time also clean the filters of the colour head with a pad of cotton wool soaked in alcohol.
The diffusers of the mixing boxes, the heat filter underneath the tungsten-halogen lamp of the colour head and the condensers in the condenser lamphouse also need occasional cleaning.

Before opening the colour head or the condenser lamphouse for repairs or lamp changing always check first that the current supply is disconnected. Best of all, unplug the enlarger from the mains supply.

F) Technical data and tables

1. Technical data

The basic enlarger

Maximum film size	: 25×25 cm (10×10 in.)
Overall height with CLS 1840 colour head	: Approx. 2810 mm (110.6 in.)
Overall height with condenser head	: Approx. 2700 mm (106.3 in.)
Optical axis/column distance	: Approx. 495 mm (19.5 in.)
Heighest level of optical axis for horizontal projection	: Approx. 2070 mm (81.8 in.)
Lowest level of optical axis with horizontal projection	: Approx. 1300 mm (51.2 in.)
Roller separation	: 800 mm (31.5 in.)
Space requirement	: Approx. 140×140 cm (55.1×55.1 in.)
Baseboard size	: 90×110 cm (35.4×43.3 in.)
Vacuum easel size	: 65×85 cm (25.6×33.5 in.)
Usable vacuum easel area	: 60×70 cm (23.6×27.6 in.)
Power supply	: 220/240 volts, 50/60 Hz
Current consumption	: Approx. 500 watts
Maximum permissible loading (of power unit)	: Approx. 1500 watts
Net weight (standard version)	: Approx. 130 kg (287 lbs)

The CLS 1840 colour head

Light source	: 1000 watt, 120 volt tungsten-halogen lamp
Mains supply	: – EST 1000 voltage stabiliser and mains adapter – Mains supplies of 220/240 volts, 50/60 Hz – Stabilising range 180 to 260 volts – Output voltage of the EST 1000: 120 volts ± 1 %
Power consumption	: 1200 watts
Filters	: Dichroic yellow, magenta and cyan; density range 0 to 130
Supplementary filter	: Approx. 70 yellow + 35 magenta, 18×18 cm (7.1×7.1 in.) large
Density control	: 0 to 60 densitometric units (equivalent to 2 lens stops)
Mixing boxes	: Interchangeable
Size	: Approx. 65×44×71 cm (25.6×17.3×28.0 inches)
Net weight	: Approx. 33 kg (73 lbs)

The condenser head

Light source	: Opal lamp, 300 watts up to 1000 watts
Mains supply	: 220/240 volts, 50/60 Hz
Lighting system	: Deflecting mirrors and condensers
Cooling	: Fan
Filter drawer	: 30×30 cm (11.8×11.8 in.)
Power consumption	: Up to 1200 watts
Size	: Approx. 61×57×38 cm (24.0×22.4×15.0 in.)
Net weight	: Approx. 43.5 kg (96 lbs)

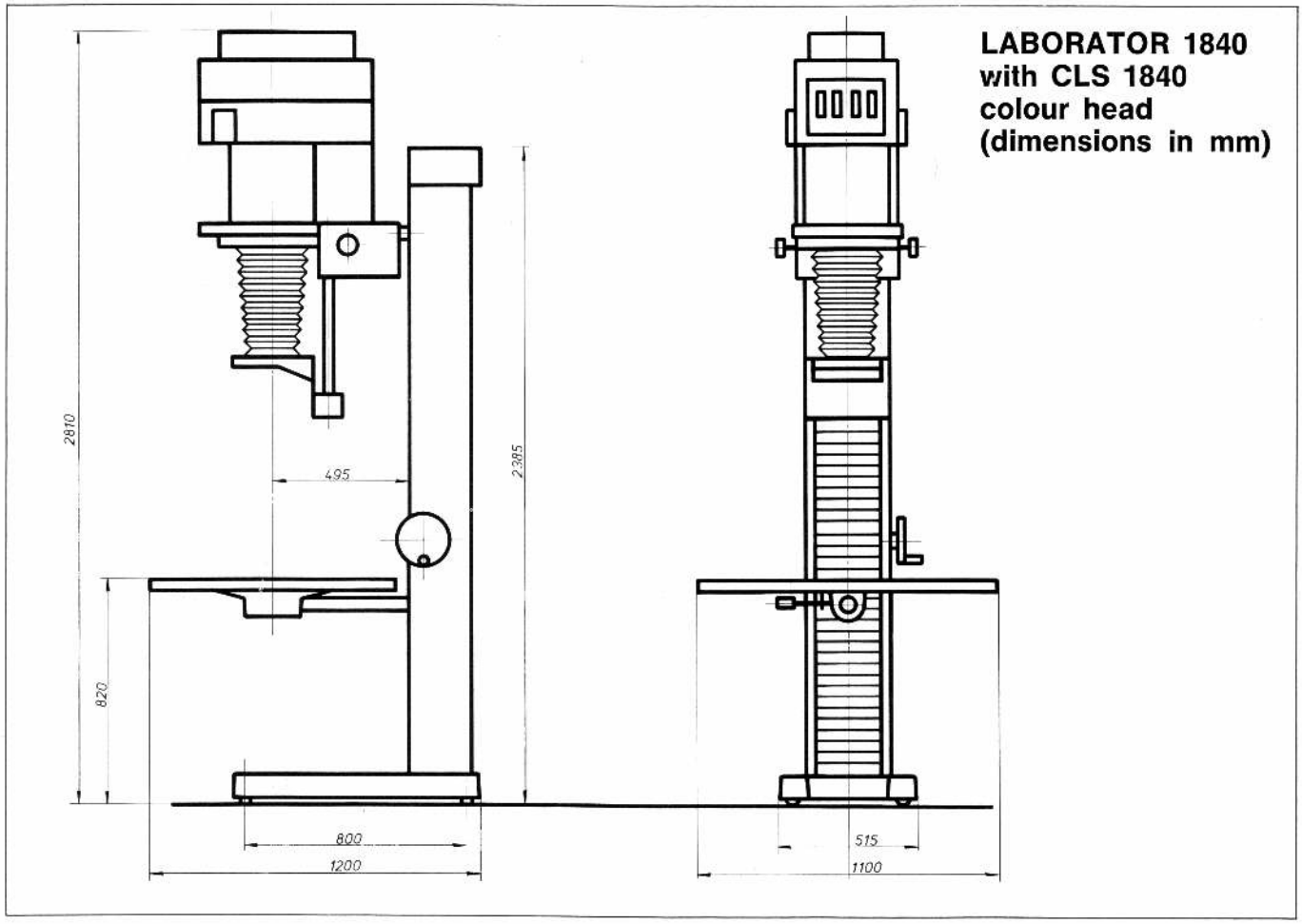
2. Tables

Magnification and reductions

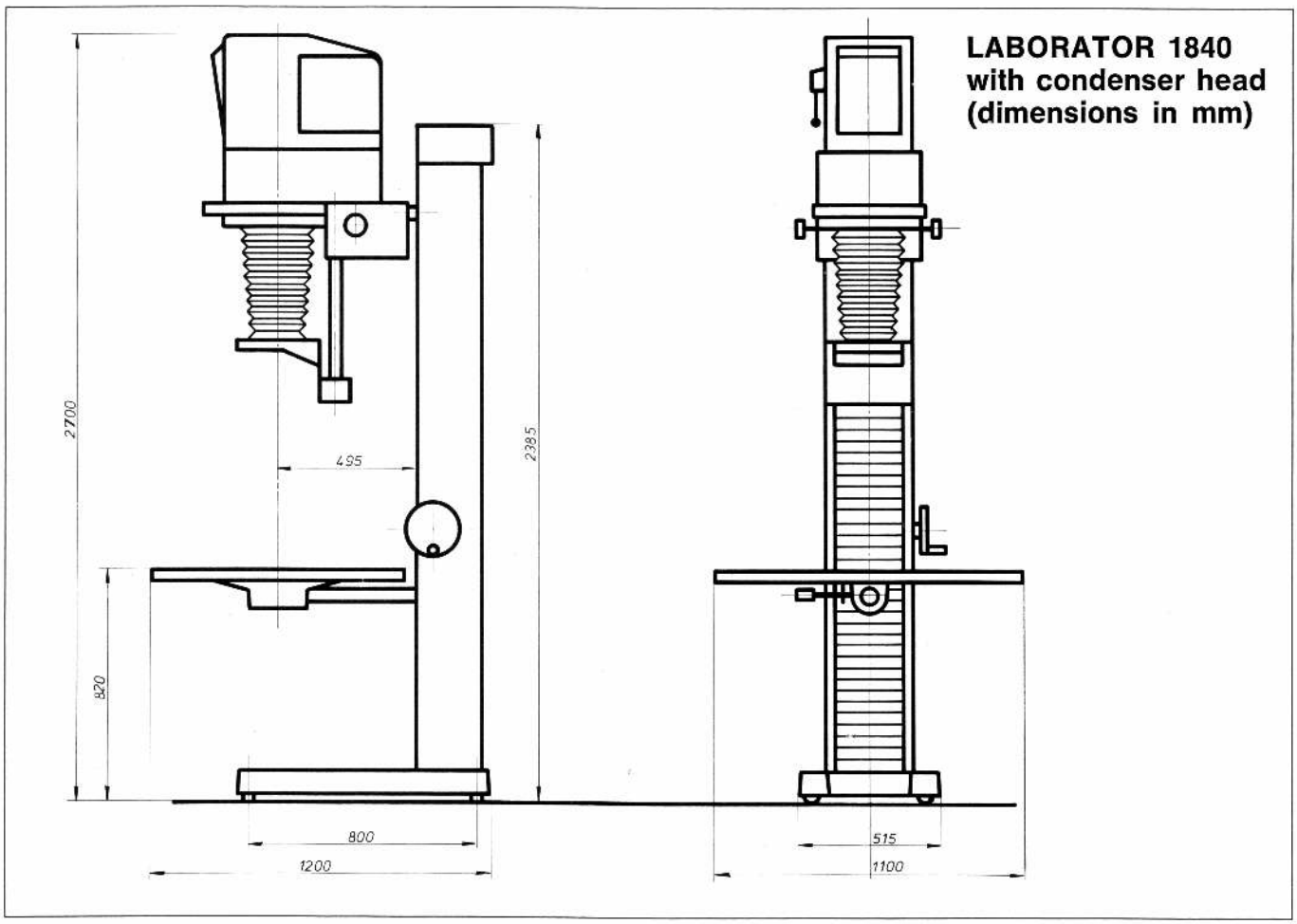
Focal length of lens	Lens board	Linear magnification max.	min.
50 mm	LARATUB	31 ×	7 ×
80 mm	LARATUB	19 ×	3.5 ×
100 mm	LAPLA-UNIPLA or TRIPLA	14.5 ×	2 ×
105 mm	LAPLA-UNIPLA or TRIPLA	14 ×	2 ×
135 mm	LAPLA-UNIPLA or TRIPLA	10.5 ×	0.75 ×
150 mm	LAPLA-UNIPLA or TRIPLA	9 ×	0.4 ×
180 mm	LAPLA-UNIPLA or TRIPLA	7 ×	0.4 ×
210 mm	LAPLA-UNIPLA or TRIPLA	6 ×	0.45 ×
240 mm	LAPLA-UNIPLA or TRIPLA	5 ×	0.5 ×
300 mm	VAPLA	3.5 ×	0.7 ×
360 mm	VAPLA	2.5 ×	0.8 ×

Condenser combinations

Focal length of lens mm / (inches)	Film size mm / (inches)	Linear magnification min.	Linear magnification max.	Condenser combinations (in addition to LAZUCO)	Mirror setting V H
360 14	200×250 8×10	0.9×	2.5×	380/380	H
300 12	200×250 8×10	0.6×	1.3×	380/380	H
	180×240 6½×8½	1.3×	2.8×	382/382	V
		2.8×	4.0×	380/380	V
240 9½	130×180 5×7	0.4×	1.3×	380/380	H
		1.3×	5.0×	380/250	H
210 8½	130×180 5×7	0.3×	1.1×	380/380	H
		1.1×	3.0×	380/250	H
		3.0×	6.2×	380/252	H
180 7⅛	100×150 4¼×6½	0.3×	0.9×	380/380	H
		0.9×	6.0×	380/252	H
		6.0×	7.5×	250/252	H
150 6	100×125 4×5	0.25×	0.7×	380/380	H
		0.7×	2.5×	250/380	H
		2.5×	9.5×	250/180	H
135 5¼	85×100 3¼×4¼	0.25×	0.9×	250/380	H
		0.9×	1.0×	250/180	H
100 4	65×90 2½×3½	0.2×	0.5×	382/382	H
		0.5×	1.0×	380/180	H
		1.0×	4.0×	250/160	H
		4.0×	18.2×	250/130	H
80 3⅛	60×60 2¼×2¼	3.8×	21.0×	180/130	H
60 2⅜	40×40 1½×1½	5.0×	26.5×	160/130	H
50 2	24×36 35 mm	6.7×	33.0×	160/130	H



LABORATOR 1840 with CLS 1840 colour head (dimensions in mm)



LABORATOR 1840 with condenser head (dimensions in mm)

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Zusatzblatt zur Bedienungsanleitung Durst LABORATOR 1840

Siehe Seite 4, Kapitel „B) Ausstattung und Aufstellen des Vergrößerungsgerätes", vorletzter Absatz

Die zwei Öffnungen (5) dienen zum zeitweiligen Ölen der Spindeln. Dabei müssen der Gerätekopfträger (11) sowie der Tischträger ganz nach unten gebracht werden. Vergewissern Sie sich, daß das Messingrohr im Inneren des Stativs mit den beiden Öffnungen (5) übereinstimmt.

Supplement Durst LABORATOR 1840 Instruction Manual

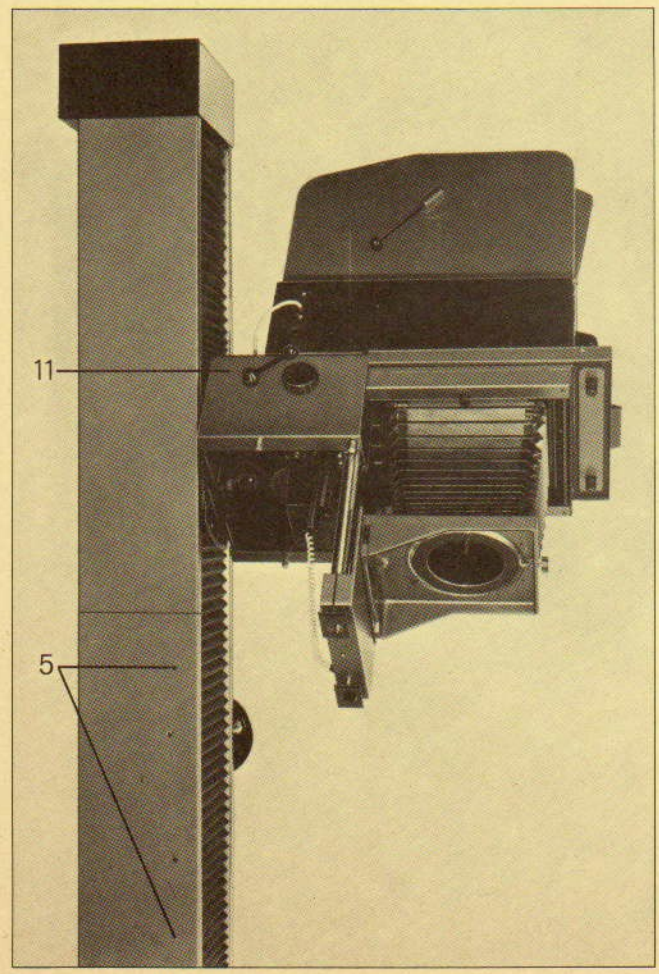
Page 4, section „B) Features and setting-up of the enlarger", penultimate paragraph

The two openings (5) serve for the temporary lubrication of the spindles. This requires the enlarger head support (11) as well as baseboard support to be lowered as much as possible. Make sure the brass tube at the inside of the enlarger stand coincides with the two openings (5).

Addenda au mode d'emploi Durst LABORATOR 1840

Voir page 4, chapitre „B - Equipement et installation de l'agrandisseur" - avant-dernier alinéa

Les deux ouvertures (5) servent au graissage régulier des pivots. A cet effet, il faut porter en leur position la plus basse le support de la tête de l'appareil (11) ainsi que le support du tableau. Assurez-vous que le tube en laiton à l'intérieur du pied coïncide avec les deux ouvertures (5).



Foglio aggiuntivo alle istruzioni per l'uso Durst LABORATOR 1840

Vedi capitolo „B) Caratteristiche e messa in opera dell'ingranditore", penultimo capoverso a pagina 4

Di tanto in tanto le due viti senza fine devono essere oleate attraverso gli appositi fori (5). A tale scopo il braccio di supporto della testata (11) come pure il braccio di supporto del piano di proiezione devono essere portati nella loro posizione più bassa, accertandosi che il tubicino di ottone all'interno dello stativo si trovi in corrispondenza dei due fori (5).

Hoja adicional de las instrucciones de uso Durst LABORATOR 1840

Ver página 4 capítulo „B) Equipo y montaje de la ampliadora" penúltimo párrafo

Los dos orificios (5) sirven para la lubrificación periódica de los husillos. En este caso es preciso bajar completamente el soporte del cabezal del aparato (11) y el soporte de mesa. Cerciórese de que el tubo de latón en el interior de la columna de soporte coincida con los dos orificios (5).