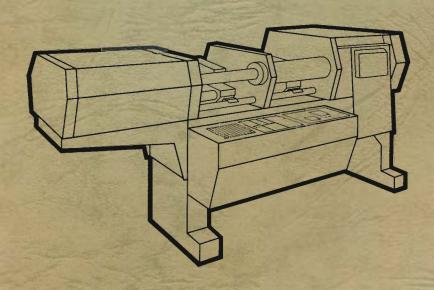


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Dr.-Ing. Rudolf Hell GmbH Postfach 6229 D 2300 Kiel 14 Telefon: (0431) 20011 Telex: 0292858

Chromagraph DC 300 B Multi-Color System



Operating Manual

Order Number 3012-B3e-8003

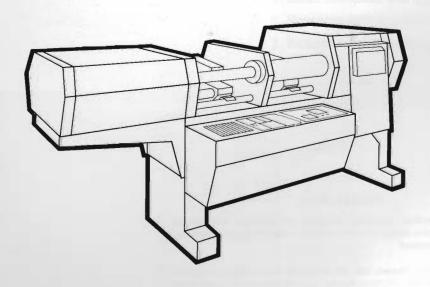


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Please Note

This Manual describes apparatus including all auxiliary and special equipment. The items delivered in any particular case will be in accordance with the Delivery Contract.

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DR. - ING. RUDOLF HELL GMBH - D 2300 KIEL 14



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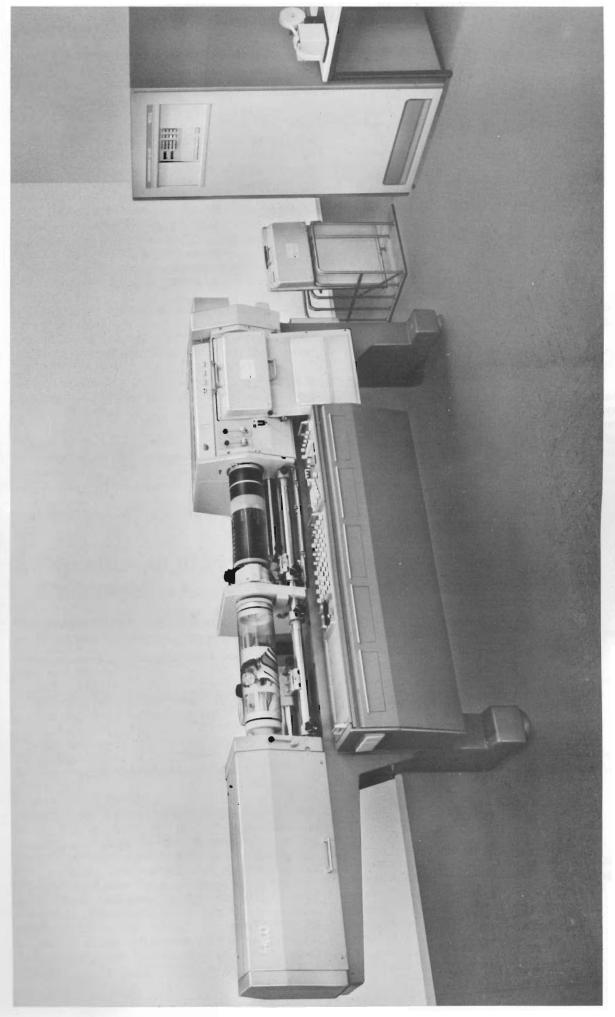
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1. Introduction

In the form of the Chromagraph DC 300, the graphic industry has an electronically controlled color scanner at its disposal, which produces color separations for all printing processes in a very short time. By means of this color scanner, many individual processes in conventional reproduction techniques have been combined into one operation. Many characteristics of the former versions of the Chromagraph have been retained in the DC 300, and many additional, technical properties have been featured. The following properties are still available in the scanner:

- The DC 300 is, like all other Chromagraphs, a daylight scanner. It is particularly suited to the operator: it can be operated better in sunlit workrooms than in an illuminated darkroom.
- Screened or unscreened color-corrected separations for offset, letterpress or gravure can be produced by the DC 300.
- The originals may be color transparencies or reflection copies.
- By means of a control mask, two or more originals may be merged and/or lettering may be inserted using the DC 300.
- Using the MULTI-COLOR equipment it is possible to expose two color separations simultaneously, one beneath the other.

In addition to the properties mentioned above, the Chromagraph DC 300 possesses some other technical characteristics:

- —The reproduction scale is adjustable from 20% to 1685%.
- All sizes of originals up to 16 x 24" can be scanned,

- the small to medium-sized originals being held on the drum by vacuum.
- By means of a semi-automatic vacuum film-mounting device, several film sizes between 10×24 cm and 16×20 " can be used.
- The color computer enables correction of all four color separations to be made before the first separation.
- The exposing lamp is electronically stabilized to prevent re-calibration during the service life of the lamp.
- The expected density or screen-dot size can be exactly checked on a digital meter.
- Electronic silhouetting in any rectangular form is feasible by means of tabulators.
- The DC 300 operates at 140 lines/cm (350 lines/inch) with a high cross-feed speed of 9 cm/min (3.54 inches/min).
- For checking purposes, an electronic 17-step gray scale may be exposed on the film by pressing a pushbutton.
- The exposure of register marks near the separation film can be performed by means of an exact mechanical system.

These few indications show the range of possibilities available to the practised operator. This operating manual, therefore, does not only provide information about the production of successful color separations, but also provides the operator with information which will help him to understand the electronic and technical details of the machine. He is then able to advantageously apply the Chromagraph DC 300 to the requirements of a special production procedure.

2. Construction of the Equipment

The equipment comprises the scanning machine, electronics cabinet, and power supply cabinet.

The main assemblies of the scanning machine are: The base frame with

lamp compartment, scanning device for originals, scanning device for control mask, exposing compartment,

the color computer, the control section, the power supply and picture lamp insert.

2. 1. Base Frame

The base frame is made of gray cast iron and reinforced by cast-iron ribs. Two rigid, lateral sections guarantee stability, thus ensuring perfect functioning of the precision-adjusted scanning and exposing mechanism. The color computer and control section are mounted on the front of the base frame. An insert in the left-hand support of the base frame incorporates the facilities for the supply of different voltages and a vacuum pump which produces the vacuum for positioning the originals on the drum. A second insert in the right-hand support comprises further facilities for the power supply.

Lamp Compartment (left side of machine)

The lamp compartment contains the lamp house and the scanning cross-feed drive.

Lamp House

A halogen lamp serves as the light source for scanning. The light is projected via a mirror, a diaphragm, and the optical systems of the various attachments to the transparency illumination arm on to the surfaces of the transparent scanning drums.

The lamp house and the scanning head are rigidly connected by means of a tube. The lamp house carries the transparency illumination arm which can be equipped with different attachments.

Scanning Cross-feed Drive

A stepping motor drives the cross-feed spindle for the scanning head and the lamp house with transparency illumination arm via a spiral gearing.

A worm wheel pivoted to the underside of the lamp house engages the spindle. If the worm wheel is arrested by its electro-magnetic brake, the scanning cross-feed begins at the same moment. The exposing side controls the moment of braking, so that the

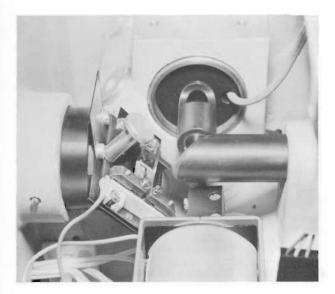


Fig. 2-2 Lamp House (Section)

scanning for all color separations is started true-to-register. The cross-feed direction is switchable so that right-reading and wrong-reading color separations can be produced.

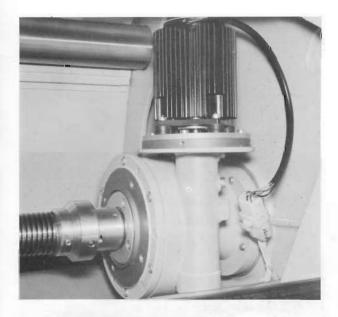


Fig. 2-3 Scanning Cross-feed (Motor, Gear, and Spindle)

Scanning Drums

Large, medium, and small scanning drums are available, which can be inserted as required. The scanning drums can be easily removed so that the originals may be mounted on the drums outside the machine by means of mounting aids. In the case of the medium and small scanning drums, the originals are held in position by vacuum.



Fig. 2-4 Small, Large, and Medium Scanning Drums in Stand

Scanning Head

The scanning head is used for transparency and reflection-copy scanning. It contains:

- the halogen lamp with lens holder and 5 light cables,
- the scanning optics,
- the optical viewing system which can be moved into the light path,
- the color filters,
- the main and unsharp-masking apertures, and in the multiplier insert
- the photomultipliers.

Three interchangeable lenses are available for matching the different diameters of the scanning drums. The scanning head has a lever for focusing the scanning optics.

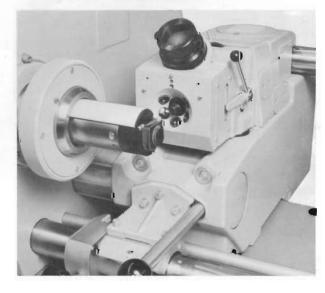


Fig. 2-5 Scanning Head with Lens for Large Scanning Drum

Next to the scanning lens are five lens systems which project the light from the light cables on to the spot to be scanned during reflection-copy scanning.

The cross-feed direction is switchable so that right-reading and wrong-reading color separations can be produced.

Scanning Illumination for Transparency Scanning

The light sent by the halogen lamp into the transparency illumination arm during transparency scanning is projected by a lens in the transparency arm attachment on to the transparency. When using other scanning drums, the transparency arm attachment as well as the lens in the scanning head should be changed.

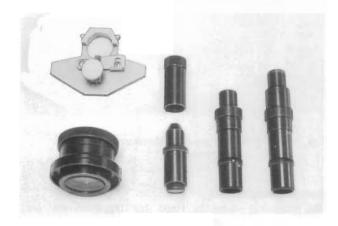


Fig. 2-6 Scanning Lenses with Holder and Viewing Magnifier



Fig. 2-7 Transparency Illumination Arms

Scanning Device for Control Mask

This scanning device comprises the mask drum, the mask scanning head with multiplier unit, and the controls for electronic silhouetting.

Mask Drum

The mask drum is used for mounting the photographically or manually produced control mask, which controls insertion of lettering, line subjects, etc. as well as merging of certain picture subjects.

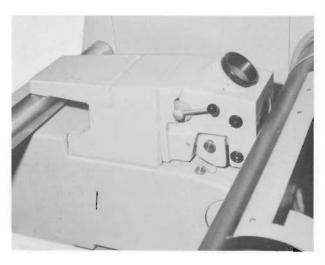


Fig. 2-8 Mask Scanning Head



Fig. 2-9 Operator Control Panel of Electronics Cabinet

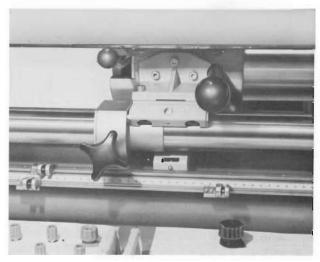


Fig. 2-10 Tabulator Rail for Adjusting the Silhouetting (Start of Picture - End of Picture) in Cross-feed Direction

Mask Scanning Head

The mask scanning head is used for scanning the control mask (reflection copy). Near the scanning lens are 3 lens systems which project the light from the light cables on to the spot of the control mask to be scanned. Moreover, the mask scanning head contains an optical viewing system which can be moved into the light path, color filters, two photomultipliers.

Controls for Electronic Silhouetting

A keyboard on the operator control panel of the electronics cabinet is available for adjusting electronic silhouetting in circumferential direction. By means of this keyboard the distances of picture beginning and picture end from the upper edge of the film are fed to the computer.

Silhouetting in cross-feed direction is adjusted on a tabulator rail below the guide tube for the mask scanning head.

Exposing Compartment

The exposing compartment on the right-hand side of the machine is closed by a light-tight cover. The compartment contains the darkly anodised exposing drum, the exposing head, and some components for the cross-feed drive. The front cover of the exposing compartment is formed by the front panel with holder for the film cassette.



Fig. 2-11 Exposing Drum with Register Pins and Vacuum Channels, Viewed through the Front Panel with the Cassette Removed

Exposing Drum

The exposing drum forms one mechanical unit with the mask drum, optically separated by a light trap in the protective support. The film is held by vacuum on the exposing drum. A four-pin register system ensures exact mounting of the film. The asynchronous motor for driving the drum is situated in the right-hand support.

Exposing Head

Two different upper parts of the exposing head are required for exposing continuous-tone films or lith films, the most important difference lying in the exposing aperture. The width of the exposing aperture in the exposing head for continuous-tone separations is automatically switched over during the transition from 140 to 200 I/cm (350 to 500 lines/inch), whereas the aperture in the exposing head for screened separations is fixed.

A glow lamp, which is electronically stabilized to prevent re-calibration during the service life or replacement of the lamp, serves as exposing lamp.

The exposing head and the mask head are connected by means of a rigidly fixed tube. The nut segment is situated below the exposing head and can be engaged from the mask scanning head by means of a lever.

Exposing Cross-feed Drive

The exposing head is connected with the spindle into which the nut segment engages. The right-hand support houses the motor and gear for the spindle drive.

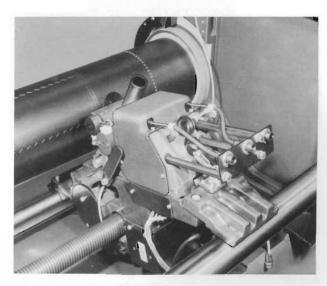


Fig. 2-12 Exposing Head

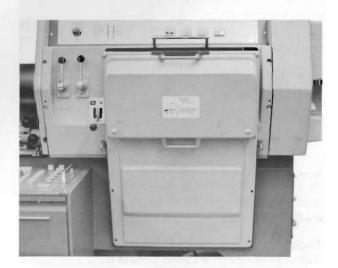


Fig. 2-13 Front Panel with Cassette Swivelled upwards

Front Panel and Film Cassette

The front panel comprises mainly the controls required for mechanically mounting the films on the exposing drum. It is only possible to mount films successively and true-to-register by mechanical means. (The operator has only to place the cassette with the film on to the pins of the front panel and the films are then mounted or lifted off by means of a lever.)

Fig. 2-14 shows the operating levers on the front panel.



Fig. 2-14 Operator Control Panel above the Front Panel

Operator Control Panel

Above the front panel on the exposing compartment is situated an operator control panel. It contains the switch for setting the densities of the gray-scale steps. Next to it are located two rows of pilot lamps for machine functions. Furthermore there are four pairs of pushbuttons for switching the machine functions on and off.

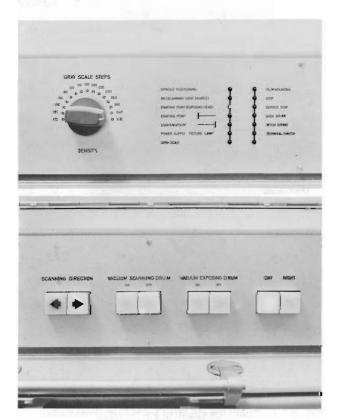


Fig. 2-15 Operator Control Panel

Frequency Generation

This device serves to generate the initial clock for the entire plant. The clock frequency is in a determined constant relationship with respect to the number of revolutions of the main drum.

The frequency generation comprises:

- The screen disk on the shaft end of the main drum,
- the screen-disk head and the circuitry for the frequency generation, both on the center support, and
- the two plug-in circuit boards "frequency multiplier II" in the electronics cabinet.

2. 2. Power Supply

The facilities for the power supply of the scanning machine are located on two inserts, which are installed on the right and left sides of the base frame. The master switch for the power supply of the scanning machine and the electronics cabinet is located outside on the right-hand support of the scanning machine.



Fig. 2-16 Master Switch

Power Supply Insert

This insert is situated on the right-hand side of the base frame and contains the below assemblies for the power supply:

- The contactor by which the equipment is connected to the network,
- the protective switch and the power relay for the motor of the pump which produces the vacuum for the exposing drum,
- the relay by which the picture lamp insert is connected to the supply network,
- the protective switch, the control relay, and the braking control for the main drive motor,
- the power supplies, the control relays, the triggering, the output stages for the drive motors of the scanning and the exposing cross-feed drives, as well as the positioning for the scanning cross-feed,
- the start logics with the time switch for the motors,
- the transmitter and the voltage stabilizer for the power supply of the multiplier inserts,
- the constant-current source for the exposing head for screened color separations,
- the supply with + 24 V D.C.



Fig. 2-17 Power Supply Insert

The circuits and the supply for the pump drive are separately fused on the input side. The protective switches and fuses are installed on the front panel of the insert.

Picture Lamp Insert

This insert is situated on the left-hand side of the base frame. It accommodates the facilities for the supply of different voltages and also the vacuum pump for the scanning drum.

Via transformers, rectifiers, and stabilizers D.C. volt-

- + 250 V for the ignition of the exposing lamp,
- + 11 V for the picture lamps of original scanning,
- + 5.5 V for the picture lamp of mask scanning,
- $\begin{pmatrix} 15 \text{ V} \\ 15 \text{ V} \end{pmatrix}$ for the control section and
- 5 V for the other electronics of the scanning machine are generated from 220 V A.C.

The circuits and the supply for the pump drive are separately fused on the input side. The fuses are located on the front panel of the insert.

2. 3. Color Computer

(refer to pull-out diagram in the appendix)

The color computer is an analog computer compiled of integrated circuits. The operating elements are contained on its top and facilitate simultaneous adjustment of all four color separations, concerning correction and size, before the first separation is exposed. The controls for selective color correction are located under a cover on the left-hand end of the color computer.

Other operating controls are located in front of the sliding flaps in the panelling.

A digital meter on top of the computer permits an immediate check of the values set (e.g. color portions of the four separations at any place on the picture), by directly indicating the film density to be expected.

2. 4. Control Section

(refer to pull-out diagram in the appendix)

The control section located at the right of the color computer combines the most important control functions of the machine. The operating elements and the patch panel for the control mask are located on the top. In the lower left-hand corner of the operator control panel are the controls for film linearization. Other operating elements are located behind a sliding flap of the front panelling.

2. 5. Electronics Cabinet

The electronics cabinet houses the frequency generation and a digital scale computer with core memory. If the machine is equipped with electronic screening, this cabinet contains additionally the screen computer with a second memory.

Two stabilizers are built in for the supply of the electronics located in the cabinet and, if necessary, a third stabilizer for the second core memory.

The operator control panel on the front side of the electronics cabinet contains the keyboard with doublespaced digital display for the input of the positioning measures in circumferential direction and the code numbers for scale adjustment, four pushbuttons for the operating sequence, and four pushbuttons for the selection of the output pitch.

Covered by the cabinet door, pilot lamps are arranged to the left of the pushbuttons of the operator control panel. A switch, also covered by the door, is located right to the operator control panel and serves to monitor the different voltages.



Fig. 2-18 Operator Control Panel of Electronics Cabinet

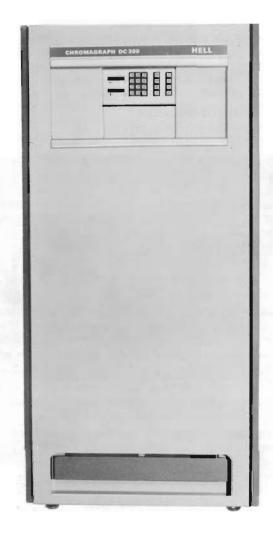


Fig. 2-19 Electronics Cabinet

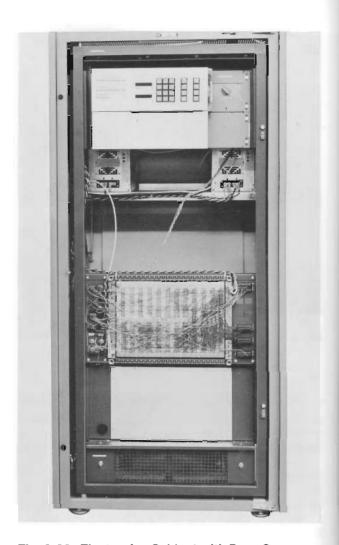


Fig. 2-20 Electronics Cabinet with Door Open

3. Operating Elements

3. 1. Color Computer

(refer to pull-out diagram in appendix B)

3. 1. 1. Selective Correction

BLUE	_	Yellow	(1)
	_	Magenta	(9)
	—	Cyan	(17)
	_	Black	(25)

These controls selectively affect blue towards + or — in the corresponding color separations yellow, magenta, cyan or black, depending upon the position of the COLOR SEPARATION switch (49).

In the yellow separation, blue should be adjusted mainly by the COLOR CORRECTION-WHITE COLORS-Yellow control (56).

CYAN	Yel	low .	(2)
	Mag	genta	(1	0)
	— Суа	an	(1	8)
	— Bla	ck	(2	26)

These controls selectively affect cyan towards + or — in the corresponding color separations yellow, magenta, cyan or black, depending upon the position of the COLOR SEPARATION switch (49).

In the cyan separation, cyan should be adjusted mainly by the COLOR CORRECTION-BLACK COLORS-Cyan control (61).

These controls selectively affect green towards + or — in the corresponding color separations yellow, magenta, cyan or black, depending upon the position of the COLOR SEPARATION switch (49).

In the magenta separation, green should be adjusted mainly by the COLOR CORRECTION-WHITE COLORS-Magenta control (57).

YELLOW —	Yellow	(4)
_	Magenta	(12)
_	Cyan	(20)
_	Black	(28)

These controls selectively affect yellow towards + or — in the corresponding color separations yellow, magenta, cyan or black, depending upon the position of the COLOR SEPARATION switch (49).

In the yellow separation, yellow should be adjusted mainly by the COLOR CORRECTION-BLACK COLORS-Yellow control (59).

RED — Yellow	(5)
 Magenta 	(13)
— Cyan	(21)
- Black	(29)

These controls selectively affect red towards + or — in the corresponding color separations yellow, magenta, cyan or black, depending upon the position of the COLOR SEPARATION switch (49).

In the cyan separation, red should be adjusted mainly by the COLOR CORRECTION-WHITE COLORS-Cyan control (58).

These controls selectively affect magenta towards + or — in the corresponding color separations yellow, magenta, cyan or black, depending upon the position of the COLOR SEPARATION switch (49).

In the magenta separation, magenta should be adjusted mainly by the COLOR CORRECTION-BLACK COLORS-Magenta control (60).

The selective-correction controls LIGHT RED (7, 15, and 23) especially affect the light red tones in the yellow, magenta, and cyan separations. They co-operate with the STARTING POINT control (31) which determines the starting point of the LIGHT RED controls on the color scale between white and red.

DARK	BROWN	-	Yellow	(8)
		_	Magenta	(16)
		_	Cyan	(24)
STARTING	POINT			(32)

The selective-correction controls DARK BROWN (8, 16, and 24) only affect the dark brown tones in the yellow, magenta, and cyan separations. They cooperate with the STARTING POINT control (32) which determines the starting point of the DARK BROWN controls on the color scale between white and dark brown.

3.1.2. Color Separation (Color Mixture) Control (33) Switch (34)

The control (33) has three marked positions which correspond to an uncorrected magenta, cyan or yellow separation. These three color separations can be variably mixed with this control, i. e. magenta and cyan as well as cyan and yellow (similar to split-filter exposure in photography). With the switch (34), this mixture is added to the respective color separation to be produced. It is a four-position switch: three positions for setting the respective color separation to which the mixture signals from control (33) shall be added, and the OFF position.

3.1.3. LOCAL TONE AND COLOR CORRECTION — GRADATION Control (35)

The effect of this control corresponds to that of the GRADATION MIDDLE TONES controls. It sets the tone values, i.e. the densities or percent dot sizes ranging from the highlight to the shadow area.

- FILM DENSITY Controls

HIGHLIGHT Control (36)

SHADOW Control (37)

These two controls set the required density values or percent dot sizes for local tone and color correction.

3.1.4. TEST Controls

- Yellow (38)

- Magenta (39)

— Cyan (40)

- Switch (41)

The TEST controls are used for service purposes. With the controls (38, 39, and 40), any value between "0" and "100" can be set, by-passing the scanning insert for "White 1". In this case, the switch (41) should be in TEST position.

In OPERATING position, the multipliers are switched on. During normal operation, the switch must always be in this position.

In "Ground" position \dashv , the offset alignment for the color computer is performed.

3.1.5. ORIGINAL POS/NEG Switch (42)

- NEG position: Scanning of unmasked color negatives.
- POS position: Scanning of positive originals, transparencies, and reflection copies.
 In POS position, positions 1-4 may be selected for the spreading of light colors:
- POS 1: In this position, the light white and black colors are corrected less than the full colors.
- POS 2: In this position, the light colors are corrected as much as the full colors.
- Pos 3 and POS 4: In these positions the light colors are corrected more than the full colors. The effect is stronger in position 4 than in position 3.

3.1.6. TYPE OF GRADATION Switch (43)

This switch pre-selects the gradation for the required printing process.

Position 1: GRAVURE

Position 2: LETTERPRESS/OFFSET Position 3: SCREEN ("Contact screen")

Position 4: "Contact screen and electronic screen"

Position 5: "Electronic screen"

In switch positions 2, 3, and 5 the gray balance is automatically switched on by the COLOR SEPARATION switch (49).

In switch positions 1 and 2, the digital meter (47) indicates density values, in positions 3, 4, and 5, percent dot sizes.

3.1.7. DETAIL CONTRAST — INTENSITY Control (44) STARTING POINT Control (45)

The DETAIL CONTRAST controls increase the detail sharpness by means of unsharp-masking (increase in contrast at the contours).

The INTENSITY control (44) determines the increase in detail for all contours of the original.

The STARTING POINT control (45) improves the adaptation of coarse detail intensity to grainy originals.

For this purpose, it determines the threshold value beyond which coarse detail shall become effective. In position "1", the steepening of the coarse detail in direction "Black" is additionally suppressed, so that the steepening adjusted with the INTENSITY control (44) is only effective in direction "White".

3.1.8. DIGITAL METER (47)

The digital meter indicates the values for picture adjustment ("0" — "100"), the film density values for continuous-tone separations (density values), and the values for screened separations (percent dot sizes). - Moreover, voltage values can be read off in conjunction with the MEASURE switches. How the values are to be read off, is explained on measuring sheets M 1 to M 6 in chapter 10.

3.1.9. MEASURE 1 Switch (48)

This switch connects the controls assigned to the individual measuring positions with the meter.

3.1.10. COLOR SEPARATION (49)

These switches select the required color separation. The switch positions are marked with the separation colors.

Note:

There are two COLOR SEPARATION switches 49/1 and 49/2 for MULTI-COLOR operation. If only 49 is stated in the Operating Manual this refers to switch 49/1. The second switch is always denominated as 49/2.

3.1.11. COLOR SHIFT COMPENSATION

- —White pushbutton WHITE ADJUSTMENT/WITH COLOR SHIFT COMPENSATION (50) By means of this pushbutton, the multipliers in the scanning head are calibrated on clear glass or on "picture white" of the original to "60" or "0", thus eliminating a color shift in the "picture white".
- Blue pushbutton WHITE ADJUSTMENT/WITHOUT COLOR SHIFT COMPENSATION (51)
 By means of this pushbutton, the "picture white" of the original is set, maintaining the color shift.

3.1.12. COLOR CORRECTION

- WHITE COLORS Controls - Yellow (56)

- Magenta (57)

— Cyan (58)

These controls correct the white colors in the yellow, magenta and cyan separations. For normal operation the controls are pre-set according to a table.

- BLACK COLORS Controls - Yellow (59)

- Magenta (60)

- Cyan (61)

These controls correct black colors in the yellow, magenta, and cyan separations. For normal operation, the controls are pre-set according to a table.

3.1.13 PICTURE ADJUSTMENT

- With the control HIGHLIGHT (62) Yellow, Magenta, and Cyan the "picture white" is set to "100".
- With the control SHADOW (63) Yellow, Magenta, and Cyan - and control SHADOW (63) - Black - the "picture black" is set to "0".
- —With the control PICTURE ADJUSTMENT HIGH-LIGHT (52) - Yellow, Magenta, and Cyan - the "picture white" of the original is set to "100" in the brightest separation channel, with the pushbutton WHITE ADJUSTMENT/WITHOUT COLOR SHIFT

COMPENSATION (51) depressed. The color shift in the "picture white" of the original is maintained.

3.1.14. FILM DENSITY

Control FILM DENSITY — HIGHLIGHT (64) Y, M, C, B
 Control FILM DENSITY — SHADOW (65) Y, M, C, B

The HIGHLIGHT (64) and SHADOW (65) controls set

the required density values for the four continuous-tone color separations and the required percent dot sizes for the four screened color separations.

For this purpose, the MEASURE 1 switch (48) should be in FILM DENSITY position and the COLOR SEPARATION 1 switch (49) should be set to the required color separation.

- LIMITERS - HIGHLIGHT (68)

- SHADOW (69)

These two controls limit the film density.

The HIGHLIGHT control (68) limits the film density in the highlight area. The SHADOW control (69) limits the film density in the shadow area.

3.1.15. UNDER - COLOR REMOVAL — ADDITION OF COLOR

The controls 70 (75), 73 (79), and 74 (75) as well as 88 (89) are double-type controls which are arranged one above the other.

The control with the lower number is always the lower one whereas the upper control has the higher number.

— UNDER-COLOR REMOVAL — Yellow (70)

- Magenta (70)

— Cyan (70)

The three lower controls determine how much the neutral tones in the black areas of the individual color separations are to be brightened up.

- STARTING POINT Control (73)

This control determines the point from which undercolor removal is to become effective.

- GRAY BALANCE Control (74)

This control determines the degree of brightening up in the yellow and magenta separations in order to obtain a neutral gray reproduction in offset and letterpress.

— ADDITION OF COLOR — Yellow (75)

- Magenta (75)

— Cyan (75)

— Black (75)

The upper controls determine the intensity of addition of color in the picture shadows with color shift (without affecting the black colors) so that they may be reproduced as neutral "black". Moreover, enhancement of the drawing can be achieved in the shadows if a stronger color shift is applied. A skeleton-type of separation may be produced as a black color separation.

- STARTING POINT Control (79)

The upper control determines the point of the gradation from which addition of color is to become effective.

UNDER-COLOR REMOVAL/ADDITION OF COLOR-OFF Pushbutton (80)

This pushbutton switches off under-color removal or addition of color to check whether hues have been changed and if so, how much.

3.1.16 GRADATION

— MIDDLE TONES Controls — Yellow (81)

- Magenta (81)

- Cyan (81)

— Black (81)

These controls set the tone values, i.e. the densities or percent dot sizes in the middle tones. They are effective in the yellow, magenta, cyan or black separation, according to the position of the COLOR SEPARATION switch (49).

- CATCHLIGHTS - Switch (85)

- STEEPNESS (86)

- STARTING POINT (87)

The two controls STEEPNESS (86) and STARTING POINT (87) in conjunction with the switch (85) set to the corresponding position enhance the drawing by changing the gradation in the lightest areas of the original.

The STEEPNESS control (86) determines the degree of brightening-up.

The STARTING POINT control (87) determines the tone value from which steepening is to become effective.

Switch (85) has the following positions:

Switch position OFF: In this position, highlight dropout is switched off.

Switch position WITHOUT COLORS: In this position, only neutral highlights are steepened.

Switch position MIXED: In this position, also light colors are steepened.

Switch position WITH COLORS: In this position, all highlight values are steepened, irrespective of whether they are neutral tones or colors.

Switch position DROP-OUT: In this position, the effect is stronger than in position WITHOUT COLORS.

- Control HIGHLIGHT CONTRAST (88) Y, M, C, B

- Control SHADOW CONTRAST (89) Y, M, C, B

These gradation controls set the tone values, densities or percent dot sizes in the highlight and shadow areas of the yellow, magenta, cyan, and black separation.

Important

If the GRADATION MIDDLE TONES controls (81), HIGHLIGHT CONTRAST control (88), and SHADOW CONTRAST control (89) are misadjusted, the gradation curve may be inverted.

3.1.17. Covered Operating Elements on the Color Computer

- COARSE DETAIL SWITCH - OVER (183)

In certain details of the picture and by means of a distorted control mask it is possible to switch back to 1/3 the steepening of the details adjusted with the CONTRAST DETAIL INTENSITY control (44).

Select the used mask colors (e.g. RED, BLUE or RED/BLUE) with this switch.

 MEASURE 3 (180), MEASURE 4 (181) Switches, Sockets 1, 2 and 3

When the MEASURE 1 switch (48) is in position "0" (lowest position) and the TEST switch (41) on —,

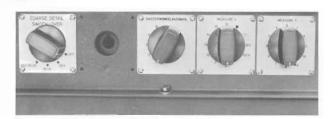


Fig. 3-1 Covered Operating Elements on the Color Computer

internal alignment of the color computer can be checked by turning the MEASURE 3 (180) and MEASURE 4 (181) switches. With the last four positions of the MEASURE 4 (181) switch, the digital meter is connected to socket 2 (+) and 3 (—) and can be used for any service tests.

Socket 1 (___) is connected with the electronics.

3.1.18. Pushbuttons on the Left-hand Side-wall of the Color Computer (Fig. 3-2)

- Pushbutton (132)

This pushbutton has no function.

- Pushbutton (133)

Pressing this pushbutton switches on the transparency illumination lamp. A built-in time switch switches off the illumination after 3 minutes.

- Pushbutton (134)

This pushbutton switches on the light spot magnification, i.e. as long as the pushbutton is kept depressed.

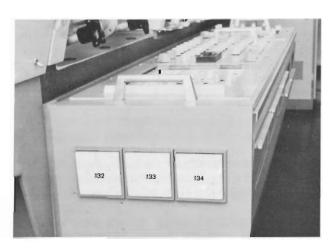


Fig. 3-2 Pushbuttons on the Left-hand Side-wall of the Color Computer

3. 2. Control Section

(refer to pull-out diagram in appendix B)

3.2.1. MEASURE 2 Switch (90)

This switch connects the assigned pushbuttons and controls with the meter. For this purpose, the MEAS-URE 1 switch (48) should be in MEASURE 2 position.

3.2.2. Pushbuttons 91...96

- POS Pushbutton (91)

Pressed to produce a positive separation.

- NEG Pushbutton (92)

Pressed to produce a negative separation.

— Pushbutton Switch (93) (Electronic Gray Scale)

By pressing this switch an electronically produced 17-step gray scale is exposed on the film.

When the switch is actuated, the machine cannot be started.

— Pushbutton: WA (94) (White Alignment Mask)
When this pushbutton is pressed after the scanning light spot of the mask head was moved to quasi white with clear film on a mask, the white alignment of the two signal channels of the mask head is carried out automatically.

— Pushbutton: M (95) (Mask Assignment)

This pushbutton alters the signal path in the scanner. (Refer to the diagram "Signal Path in the Color Computer" in Appendix B.) The electronic mask system is now switched before the scale electronics. Several signals from the color computer controlled by the mask can then be sent to the exposing section. When using local tone and color correction and coarse-detail changeover simultaneously.

- Pushbutton: R (96) (Regulation)

With the pushbutton pressed, the photomultiplier in the light negative-feedback circuit of the exposing lamp is illuminated by a calibration lamp. The voltage value adjusted behind the photomultiplier can be indicated on the digital meter by turning the MEASURE 1 switch (48) to position MEASURE 2 and the MEASURE 2 switch (90) to position EXPOSING LAMP REGUALTION, while the R pushbutton (96) lights. Note the values for continuous- tone and screened separations so that the multiplier may be adjusted to its correct operating range when changing from continuous-tone to screened separations and vice versa. These values are also important for a multiplier change, and greatly influence the operating current of the exposing lamp.

3.2.3. Pushbuttons 97 . . . 101

- TEST EXPOSURE — Pushbutton: (97) — Pushbutton: (98)

The test exposure is used to expose a light and a dark control strip on to the film. It is independent of the exposing lamp of the scanner and serves for checking the developer. Pressing the pushbutton (97) exposes a dark strip; pressing the pushbutton (98) exposes a light strip. The width of the control strip to be exposed depends upon how long the respective pushbutton is kept depressed. For greater measuring precision, the exposed strip should be at least 1 cm wide.

- SCANNING LIGHT SOURCE

— Pushbutton:

— Pushbutton:

— Pushbutton:

— Pushbutton:

— ON (101)

Pressing a pushbutton releases the respective light path.

Pushbutton (99) switches the scanning light source for reflection copy scanning.

Pushbutton (100) switches the scanning light source for transparency scanning.

Pushbutton (101) ON opens the shutter in the scanning light path.

3.2.4. FILM LINEARIZATION — Controls 102 to 107a The purpose of film linearization is to produce a linear relationship between the computed voltage used for exposure and the actual density obtained on the film. To each control is assigned a determined density or percent dot size.

Control	Continuous-tone (Density)	Screening (Percent Dot Size)
102	0.30	14 %
103	0.50	28 %
104	0.80	49 %
105	1.10	63 %
106	1.40	85 %
107	1.70	100 %
107a	_	1 %

3.2.5. EXPOSING LAMP CURRENT (147)

The exposing current is set with the high-voltage control EXPOSING LAMP CURRENT (147). It serves also for re-calibrating the once determined control value.

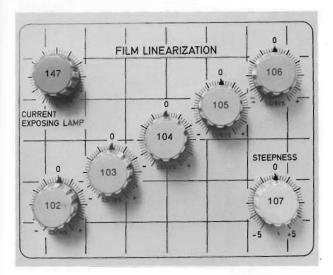


Fig. 3-3 Film Linearization and Control for Exposing Lamp Current

3.2.6. Operating Elements of the Control Mask Electronics

- Row of pushbuttons	 Pushbutton: Red 	(108)
	 Pushbutton: Blue 	(109)

Basic adjustment of the white level

- Pushbutton: R-B (110)

— Pushbutton: T_R (111)

— Pushbutton: TB (112)

- THRESHOLD - Control: RED (113) - Control: BLUE (114)

The red pushbutton (108) and the blue pushbutton (109) are used for aligning the mask scanning head. (Basic setting of white level.)

With pushbutton R-B (110) pressed, the difference between the two mask signals is indicated.

Pushbutton T_R (111) in conjunction with the RED control (113) sets the threshold for the red mask color.

Pushbutton $T_{\mbox{\footnotesize{B}}}$ (112) in conjunction with the BLUE control (114) sets the threshold for the blue mask color.

- —Lamp (115 black) lights up when the mask scanning head is positioned on the black mask area.
- Lamp (116 red) lights up when the mask scanning head is positioned on the red mask area.
- Lamp (117 blue) lights up when the mask scanning head is positioned on the blue mask area.
- Lamp (118 white) lights up when the mask scanning head is positioned on the white mask area.
- Lamp (119]) lights up when electronic silhouetting is switched on.

- ANALOG pushbutton switch (120)

By actuating this switch the machine is switched over to analog operation. Reproductions can be produced in the scales 100 %, 200 %, and 400 %, when the corresponding scanning drum size is used. The associated scale code number must be keyed in.

- Pushbutton PICTURE (121), Lamp (121 L)

This pushbutton is pressed for setting up the picture independently of the position of the mask scanning head. The corresponding lamp (121 L) lights up.

- Pushbutton D 1 (122), Lamp (122 L), Density Control (122 R)

With density pushbutton D 1 (122) pressed, any film density can be set with the corresponding density control (122 R), independently of the position of the mask scanning head. — The corresponding lamp (122 L) lights up. In conjunction with local tone and color correction (insertion of 2 plugs and pressing of 2 pushbuttons), a certain density can be added or subtracted. — Lamp (122 L) and another lamp (121 L to 126 L) light up.

Pushbutton D 2 (123), Lamp (123 L), Density Control (123 R)

With density pushbutton D 2 (123) pressed, any film density can be set with the corresponding density control (123 R), independently of the position of the mask scanning head. — The corresponding lamp (123 L) lights up. In conjunction with local tone and color correction (insertion of 2 plugs and pressing of 2 pushbuttons), a certain density can be added or subtracted. — Lamp (123 L) and another lamp (121 L to 126 L) light up.

Pushbutton D 3 (124), Lamp (124L), Density Control (124 R)

With density pushbutton D 3 (124) pressed, any film density can be set with the corresponding density control (124 R), independently of the position of the mask scanning head. — The corresponding lamp (124 L) lights up. In conjunction with local tone and color correction (insertion of 2 plugs and pressing of 2 pushbuttons), a certain density can be added or subtracted. — Lamp (124 L) and another lamp (121 L to 126 L) light up.

Pushbutton D 4 (125), Lamp (125 L), Density Control (125 R)

With density pushbutton D 4 (125) pressed, any film density can be set with the corresponding density control (125 R), independently of the position of the mask scanning head. — The corresponding lamp (125 L) lights up. In conjunction with local tone and color correction (insertion of 2 plugs and pressing of 2 pushbuttons), a certain density can be added or subtracted. — Lamp (125 L) and another lamp (121 L to 126 L) light up.

- Pushbutton LOCAL CORR. (126), Lamp (126 L)

With this pushbutton pressed, local tone and color correction can be set with controls (33-37), independently of the position of the mask scanning head.

- Pushbutton MASK + TEST (127)

After pressing this pushbutton, the scanner is switched over to control mask, operation. This means that the signals picture, D1, D2, D3, D4, and LOCAL CORR. (= local tone and color correction), depending upon programming on the patch panel, are exclusively released by the control mask; electronic silhouetting for exposure on the film is also released. Pushbuttons 121, 122, 123, 124, 125 and 126 are automatically released when the scanner is started. The pushbutton (127) is also used for testing the pilot lamps of the control section.

3.2.7. START Pushbutton (128) STOP Pushbutton (129)

The START pushbutton (128) is pressed to start the machine, provided that all start conditions are fulfilled. (Any pressed pushbuttons, 121-126, will jump out.) The scanner automatically switches over to control mask operation. The STOP pushbutton (129) is pressed to stop the machine. For service purposes, the electronic silhouetting process can be switched on and off by these pushbuttons.

3.2.8. Vacuum Gauges

 VACUUM SCANNING DRUM 	(130)
 VACUUM EXPOSING DRUM 	(131)

The two vacuum gauges indicate the vacuum applied to the scanning and exposing drums of the scanner.

3.2.9. Covered Operating Elements on the Control Section

— Pushbutton D = 0 (137)

Pressing this pushbutton D=0 switches off the exposing lamp. The pushbutton is used to check the line sharpness.

- Pushbutton "Re-start" (\$\subseteq (138)

Pressing pushbuttons START (128) and (138) allows re-starting of the machine when the exposing head is positioned at the start limit.

— Pushbutton "Electrical Coupling OFF" → (139) Pressing pushbutton → decouples the scanning head drive so that the scanning head can be freely moved, with the machine running.

- Pushbutton + (182) "Register Marks"

This pushbutton functions in conjunction with the assigned locking lever ⇒ (medium lever in Fig. 2-14). The locking lever holds the exposing drum in a fixed position. With the exposing drum in this position and the pushbutton (182) pressed, several register marks are exposed on to the borders of the film.

- Film Linearization 1 % Control - (107 a)

This control is used to adjust the film linearization for screened separations. Correct adjustment allows the operator to retain a light screen dot.

Pushbutton Switch for Mask Signal Delay (184 ... 187)

The signal delay avoids the formation of white contours if different pictures are successively exposed together. Press the switch associated with the mask color which sets the density towards "0".

- Socket RS (188)

Connection for triggering an oscillograph.

- FORMAT Switch (190)

When using the MULTI-COLOR equipment, this switch serves for the input of the used film format. The switch has the following positions:

NORMAL	no MULTI-COLOR operation
NOTHINAL	no worn-oocon operation
F1	18 × 24 cm
F2	24 × 30 cm
F3	30 × 40 cm
F 4	40×50 cm
F5	14"× 17"
F6	14"× 18"
F7	16"× 20"

- DIDIGI Switch (189)

The toggle switch has the positions NORM and DIDIGI. During operation it must always be set to the NORM position. The DIDIGI position is intended only for servicing purposes.

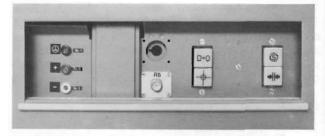


Fig. 3-4 Covered Operating Elements on the Control Section

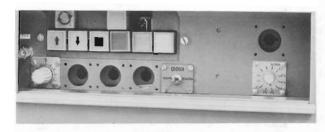


Fig. 3-5 Covered Operating Elements on the Control Section

3. 3. White Alignment for Scanning Signal

Pushbutton WHITE ADJUSTMENT/WITH COLOR SHIFT COMPENSATION (50)

(round white pushbutton on the operator control panel of the color computer)

With this pushbutton the multipliers in the scanning head on the "picture white" of the original are calibrated to "60" for the three color channels and to "0" for the unsharp-masking channel.

Pushbutton WHITE ADJUSTMENT/WITHOUT COLOR SHIFT COMPENSATION (51)

(round **blue** pushbutton on the operator control panel of the color computer)

The "picture white" of the original is set by means of this pushbutton, maintaining the color shift.

3. 4. Scanning Unit

3.4.1. Lever for Changing the Scanning Drums (200)

For removing the large or medium scanning drums, pull the spring-loaded left-hand hollow bearing by means of the lever to the left into the bearing support so that the scanning drum, which is clamped between the holding cone of the hollow bearing and the cone of the flange, can be withdrawn. For this purpose, pull out the lever and swing it to the left.

3.4.2. Manipulation Bar on the Scanning Head (201)

The manipulation bar (201) which is equipped with a ball head, facilitates the exact positioning of the scanning head in cross-feed direction.



Fig. 3-6 White Alignment for Scanning Signal

3.4.3. Stops for the Scanning Head (202 and 203)

The start and stop positions of the scanning head are fixed by means of shiftable and lockable stops on the left (202) and on the right (203) of the scanning head. In the start position the scanning head is held to the stop by means of magnets. The scanning head is stopped when it runs against the stop fixed in the stop position. This also switches off the cross-feed drives of mask and exposing heads.

3.4.4. Manipulation Bar on the Mask Head (204)

The manipulation bar (204) which is equipped with a ball head, facilitates the exact positioning of the mask head and the rigidly connected exposing head in cross-feed direction.

3.4.5. Stops for the Mask Head (205 and 206)

The start and stop positions of the mask head and the connected exposing head are fixed by means of the shiftable stops on the right and left of the mask head. The left-hand stop (205) for the start position can be locked. Mask and exposing heads are stopped when the mask head runs against the right-hand stop (206). This also switches off the cross-feed drive of the scanning head.

3.4.6. Lever for the Nut Segment (207)

By means of the lever which is fixed to the mask head, the nut segment on the exposing head is mechanically forced into engagement with the spindle for the exposing cross-feed. This provokes the cross-feed of the mask and exposing heads (lever up = disengaged, lever down = engaged). During the engaging process, the cross-feed drive for the scanning head is switched on simultaneously.

3.4.7. Setting Scales (208 to 211)

Two scales for positioning the control mask and the scans and a third scale for positioning the register marks are mounted on the mask drum. All scales have a division in centimeters as well as inches. Zero of the scale below the reference mark corresponds to the upper edge of the mounted film.

The wrong-reading scale (208) is used in the case of very exact, repeatable positioning of the mask and reproduction on the film with the help of the optical viewing system. (The scale is right-reading when looking through the optical system.)

The two scales below the reference mark (211) on the protective support show a right-reading inscription. The left-hand scale (209) is used for setting the picture beginning and the picture end in circumferential direction (line beginning and line end). The right-hand scale (210) is used for positioning the register marks.

3.4.8. Tabulator Rail (212 to 214)

Shilhouetting in cross-feed direction is exactly adjusted on the tabulator rail (212). A tab on the upper toothed rack (213) effects the beginning of silhouetting, while the end of silhouetting is caused by the tab on the lower toothed rack (214). The start of the scanning head is caused also by the lower tab. Beginning and end of a further silhouetting process can be effected with the second tabs.

3.4.9. Brake Lever (215)

By means of actuating and engaging the brake lever, the main drum is braked and fixed.

3.4.10. Register Marks Lever (216)

If register marks are to be exposed on the four color separations, the marks must be positioned on exactly the same spot on all separations.

A device is actuated with the lever (216) that renders it possible to fix the main drum repeatedly in the same position.

3.4.11. Film-mounting Lever (217)

The automatic mounting and dismounting of the film to be exposed (from cassette to exposing drum and from exposing drum to cassette) is controlled with this lever.

3.4.12. Vacuum Tap (218)

The vacuum of the exposing drum is interrupted by opening this tap (218). This becomes necessary when the film is mounted.

3.4.13. Main Switch (219)

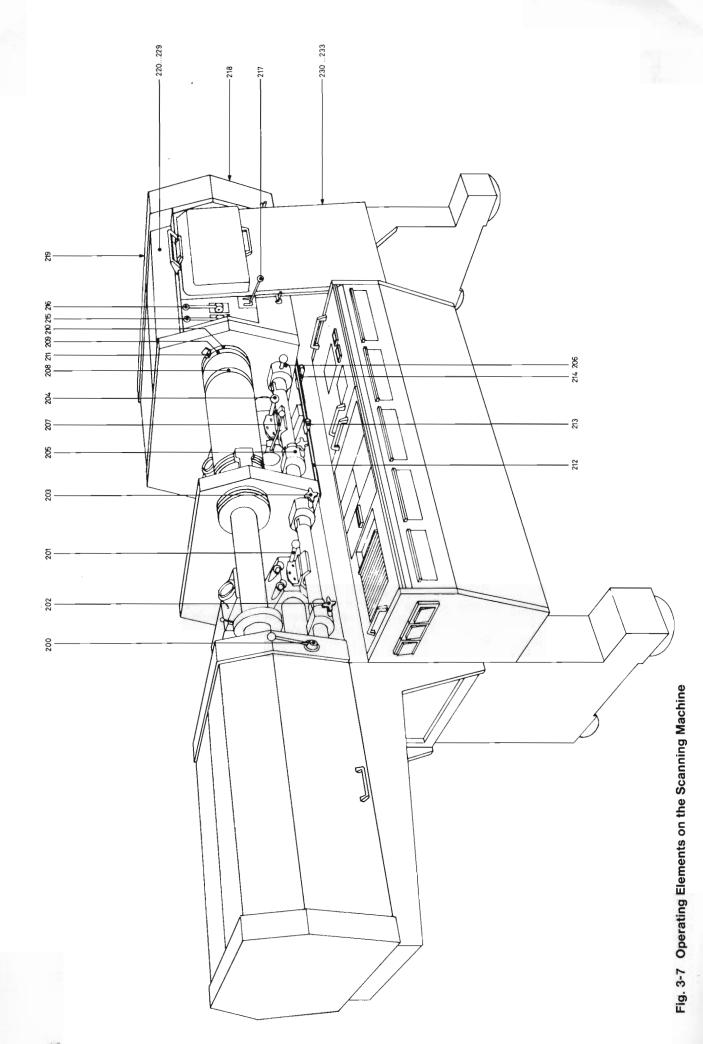
The equipment is connected with the exterior power supply or disconnected from it with the main switch (219).

3.4.14. Operator Control Panel (220 to 229)

(Refer to pull-out diagram in Appendix B)

— Switch GRAY SCALE STEPS/DENSITY 1.7...0.3 (220)

This switch is an auxiliary device for the film linearization by which the 15 density steps of the electronic gray scale (1.7..0.3) can be selected individually.



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Fig. 3-8 Operator Control Panel above the Front Panel

The signal of the selected density is switched to the film linearization when the switch (93) is pressed.

The density value is indicated on the digital meter (47) when the MEASURE 1 switch (48) is in position FILM DENSITY and the SEPARATION/NEG pushbutton (92) was pressed.

- Light-emitting diodes (221)

13 light-emitting diodes are assigned to determined operating conditions of the scanning unit. When the condition of the determined functional component excludes an accurate operation, the associated diode lights up. The machine cannot be started as long as the diode lights. If a diode in the left-hand row lights up, however, the machine can be started by pressing the SERVICE START pushbutton (230).

Denomination of the individual diodes and their meaning:

SPINDLE POSITIONING

The spindle is not in the determined position which is the same for each start. (This is important in order to obtain the utmost accuracy when the scanning start is repeated.)

ON (SCANNING LIGHT SOURCE)

The scanning light source is not yet switched on.

STARTING POINT (EXPOSING HEAD)

The mask head is not on the left-hand stop.

STARTING POINT

The selected scanning direction is right, the scanning head, however, is not on the left-hand stop.

STARTING POINT -

The selected scanning direction is left, the scanning head, however, is not on the right-hand stop.

POWER SUPPLY PICTURE LAMP

The picture lamp is not provided with the required voltage.

GRAY SCALE

The I "Electronic Gray Scale" switch (93) on the control section is switched on.

FILM MOUNTING

This diode lights as long as the film-mounting lever is actuated and thus not in its normal position.

STOP

The STOP switch on the control section is switched on

SERVICE STOP

The SERVICE STOP switch (321) on the power supply insert is switched on.

SHOE BRAKE

The shoe brake for the main drum is applied.

MOTOR BRAKE

The automatic motor brake is functioning.

TERMINAL SWITCH

The mask head is on the right-hand stop.

Pushbutton pair SCANNING DIRECTION ◆ ► (222 / 223)

The original is scanned in the direction indicated by the illuminated pushbutton. A change in the scanning direction can be effected by pressing the nonilluminated pushbutton.

Pushbutton pair VACUUM SCANNING DRUM ON/OFF (224/225)

The vacuum for the scanning drum is either switched on or off by pressing these pushbuttons. When the vaccum is switched on, the ON pushbutton (224) lights up.

Pushbutton pair VACUUM EXPOSING DRUM ON / OFF (226 / 227)

The vacuum for the exposing drum is either switched on or off by pressing these pushbuttons. When the vacuum is switched on, the ON pushbutton (226) lights up.

- Pushbutton pair DAY / NIGHT (228 / 229)

Pressing the DAY pushbutton (228) sets the machine to stand-by. Pressing the NIGHT pushbutton (229) switches off the machine. The electronics are switched off with the exception of some stabilizing voltages. The actual operating condition is indicated by the lamp that lights up.

3.4.15. Power Supply Insert (230 to 233)

The operating elements are covered by caps.

- Pushbutton pair SERVICE START/SERVICE STOP (230/231)

Pressing the START pushbutton (230) starts the machine for test purposes even when the required operating conditions are not completely fulfilled. When the pushbutton was pressed, the START pushbutton (128) on the operating panel of the control section lights up.

Pressing the STOP pushbutton (231) switches the machine off.

- J-contactor (232)

Via the motor protection switch the drum motor is connected with the exterior power supply.

- Q-contactor (233)

Via the motor protection switch the drive motor of the pump for the production of the vacuum for the scanning drum is connected with the exterior power supply.

3. 5. Electronics Cabinet

All values set on the operator control panel are only fed into the electronics when the machine is started. The settings for the following separation can therefore be performed already during operation.

3.5.1. Keyboard and Electronic Display (150 to 154) (Refer to pull-out diagram in Appendix B)

The distances for positioning the reproduction in circumferential direction (silhouetting) and the values for the reproduction scale in horizontal and vertical directions are fed to the computers with the keyboard (152). The values are indicated by two four-digit, electronic displays (150 and 151). The indicated value is overwritten by the following input.

Switching over from the input for silhouetting to the input for the reproduction scale and vice versa is carried out with the SCALE/BORDER switch (155). Due to the switch-over the keyed-in pair of numbers is displayed again.

If during the input the last figure that was keyed in shall be cancelled, press the ← pushbutton (154). Pressing the CL pushbutton (153) causes cancelling of the complete four-digit number in the memory and on the display.

For silhouetting, the upper electronic display (150) shows the keyed-in figure for the distance from the upper edge of the film to the beginning of the line \Box . The lower display (151) shows the figure for the distance to the end of the line \Box .

For the reproduction scale, the upper electronic display (150) indicates the fed number for the horizontal direction \leftrightarrow , and the lower display (151) indicates the fed number for the vertical direction \updownarrow .

The input of the respective figures is always carried out from the left to the right, i.e. starting with the figure of the most significant decade (in the case of silhouetting 10² and 10³ for scale).

For technical reasons, the data for silhouetting should be fed before the figures for the scale.

3.5.2. SCALE / BORDER Switch (155)

The SCALE/BORDER pushbutton switch (155) serves for the switch-over of the keyboard. The switch must be released during the input of the figures for the reproduction scale. (The pushbutton of the switch does not light up.)

The pushbutton switch must be pressed during the input of the silhouetting figures (positioning of the reproduction). (The pushbutton lights up.)

The machine must be started only after releasing the pushbutton switch.

3.5.3. MULT. Switch (156)

In connection with the mask electronics it is possible to expose a scanned picture line several times when the pushbutton of the switch is pressed. The pushbutton lights up.

3.5.4. FINE Switch (157)

Switching over from normal to fine operation is carried out with the FINE switch (157). When the switch is released, the machine is set to normal operation. Pressing the pushbutton switches the machine over to fine operation. The pushbutton lights up.

The advantage of fine operation is the better resolution in circumferential direction. Format reductions, however, have to be put up with (see table of reproduction scales). It is recommended to use the fine operation in the case of reductions since a better sharpness is achieved in the reproduction.

3.5.5. GR Pushbutton (158)

The lamp of the pushbutton lights up in case of a failure in the electronics of the cabinet. Pressing the pushbutton resets several electronic components of the cabinet. This eliminates the failure in most cases so that the lamp extinguishes. The machine can be started five seconds after the failure was eliminated.

3.5.6. Lines Pushbuttons (159 to 162)

The number of exposed lines per inch (lines per centimeter) determines the resolution in cross-feed direction. By means of the four pushbuttons the resolution can be selected as follows:

350 lines/inch (140 I/cm) - pushbutton 350 (159) 500 lines/inch (200 I/cm) - pushbutton 500 (160) 750 lines/inch (300 I/cm) - pushbutton 750 (161) 1000 lines/inch (400 I/cm) - pushbutton 1000 (162) The pushbutton associated to the selected resolution lights up. When the number of lines is changed, the display of the changed number is automatically erased. When the machine is switched over from night to day operation and a line number is not yet selected, the GR pushbutton (158) lights up. It also lights up when a line number is selected instead of the screen width in case of a machine with electronic screening.

Attention: In the bottom of the swivel frame of the electronics cabinet (accessible with door open), is located a filter in the suction opening for cold air. This filter should be cleaned at intervals, depending on environmental conditions, otherwise overheating of the electronic assemblies may occur. It is recommended to clean the filter every two weeks with a vacuum cleaner, with the machine switched off, and to change the filter every 6 months. A used filter should on no account be re-inserted. Do not operate the machine without an air filter (See chapter 12.14.7.)

4. Functional Description

4. 1. Signal Path from Scanning to Exposure

(refer to graphs in appendix B)

With reflection-copy scanning, the light from the picture lamp reaches the picture area to be scanned via 5 light guides and 5 condensers. With transparency scanning, it falls on to the picture area via a transparency illumination arm and a lens.

The light from the center of the scanned picture area is projected through the scanning lens on to the main aperture and passes, in the main channel, via gray filters, interference filters and color separation filters to three multipliers. The interference filters split the light. The portion of light surrounding the center of the scanned picture area passes through the unsharp-masking aperture to the unsharp-masking channel and reaches a multiplier, via gray filters and color filters. A blue, green or red filter can be moved into the light path, depending upon the color separation to be produced.

The output signals from the four multipliers of the scanning head are transmitted via low-noise amplifiers to the input stages of the color computer which are logarithmic circuit boards to convert the picture signals into density values. Logarithmation is not based purely on mathematics, but also considers the physiology of the human eye with respect to reproduction. The output signals from the logarithmic circuit boards are used for color correction. The color correction of the white colors located above the gray line towards the white level and that of the black colors located below the gray line towards the black level are carried out independently of each other. This is similar to compensative masking in conventional reproduction techniques. The mask constitutes the difference between the separation channel and a determined mixing proportion of the two other channels. The masking intensity is set with controls COLOR CORRECTION-WHITE COLORS/ BLACK COLORS (56-58/59-61). For the primary and secondary colors, additional color-correction controls are provided with which these colors can be selectively corrected, i.e. without affecting adjacent colors.

Moreover, there are additional controls for light red and dark brown tones (SELECTIVE CORRECTION 7, 15, 23, 31, and 8, 16, 24, and 32). Furthermore, any main channel can be mixed with portions from the secondary channels (similar to the split-filter method in conventional reproduction techniques).

By means of the ORIGINAL POS/NEG switch (42), the function of color correction can be influenced. For example, light hues may be color-corrected more strongly. This switch is also used to switch from positive to negative originals.

Color correction is followed by HIGHLIGHT PICTURE ADJUSTMENT (62) which occurs separately for all three color channels. The corrected signals from the three main channels reach the COLOR SEPARATION switch (49) as well as the black computer in which the black portion is deduced from the three color signals and also delivered to the COLOR SEPARATION switch (49). This switch is turned to the required separation, i.e. one of the three corrected color signals or the black signal is fed to the following computer assemblies.

The selected signal is transmitted to the shadow regulator stage in which the range of gradation, undercolor removal and addition of color are standardized (SHADOW PICTURE ADJUSTMENT (63)). In addition, an automatic neutral balance is introduced at this point and under-color removal and addition of color are added to the main signal, if required. NEUTRAL TONES UNDER-COLOR REMOVAL (70), ADDITION OF COLOR (75).

The output from the shadow regulator stage controls the gradation stages where the fixed gradations (TYPE OF GRADATION switch (43) provided for the different printing processes can be varied by means of the MIDDLE TONES (81) gradation controls for the four color separations and the HIGHLIGHT CONTRAST (88) and SHADOW CONTRAST (89) controls. Moreover, the following signals are fed at this point: CATCHLIGHTS (85), DETAIL CONTRAST (44, 45). The signal added by the highlight drop-out circuit is set with the STEEP-NESS control (86), the starting point (original density value) being determined with the STARTING POINT control (87). This results in a more or less steep

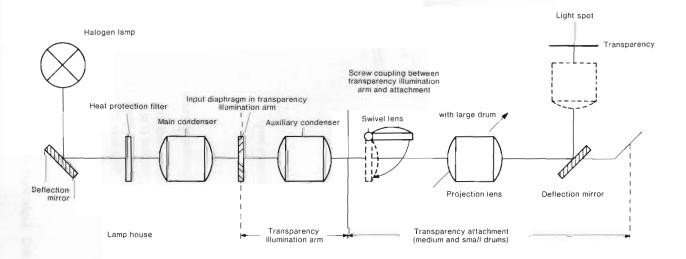


Fig. 4-1 Light Path in Transparency Scanning

Fig. 4-2 Light Path in Scanning Head

gradation curve starting from a determined density value. With switch (85), the effect of highlight drop-out can be varied so that all tones or only neutral tones can be selectively steepened.

Due to the automatic white alignment, the size of the signal in the unsharp-masking channel is matched to the main channel, so that the difference between both channels is "0" on a uniform area of the original.

We have now the corrected picture signal provided with a determined gradation and detail enhancement.

This signal is transmitted to the electronics cabinet where it is digitized for size change and loaded into a core memory for storage, the loading speed depending upon the required reproduction scale.

The picture signal is read out of the core memory by means of a write clock and fed to the film density stage. By pressing the ANALOG pushbutton (120), digital enlargement is by-passed.

In the film density stage, the HIGHLIGHT and SHADOW FILM DENSITY controls (64, 65) set the required film densities for the color separations and controls HIGHLIGHT and SHADOW LIMITERS (68, 69), the film densities can be limited to maximum and minimum densities.

At this point, the signal for local tone and color correction, if available, is also added to the picture signal, by means of the control section.

The picture signal is passed to the inverter board where pressing of the POS (91) or NEG (92) pushbutton determines whether a separation positive or negative is to be produced. Then the densities are dropped in by means of control mask and control section.

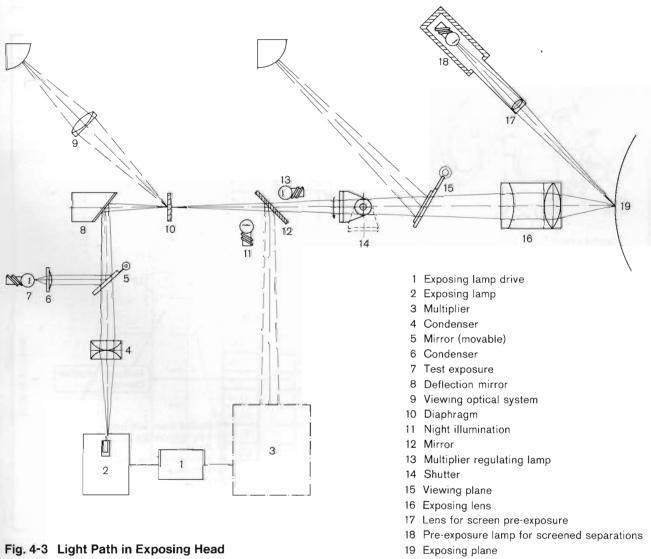
Pressing the pushbutton (93) (electronic gray scale) exposes a 17-step gray scale on to the film for test purposes.

The inverter board then controls the output amplifier which supplies the current for the exposing lamp. By correspondingly setting the FILM LINEARIZATION controls (102-107 a), the relationship of this current to the computer voltage can be changed so that a linear relationship is obtained between the film density and the computer voltage; i. e. the film density (separation density or exposed density) of a picture spot can be read on the scale of the meter when setting up to scan.

Via a condenser, a deflection mirror, and an exposing aperture, light from the exposing lamp reaches the exposing lens and then the exposing drum.

A built-in regulator circuit keeps the light emitted by the exposing lamp constant and compensates ageing of the exposing lamp.

Test exposures can be made using the test-exposure lamp in the exposing head as an independent light source. Test-exposure pushbuttons (97) and (98).



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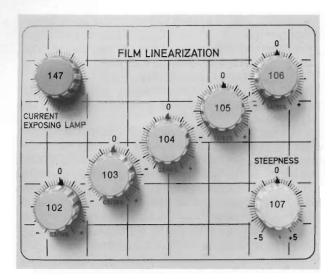


Fig. 4-4 Film Linearization and Control for Exposing Lamp Current

4. 2. Signal Path in Mask Scanning Head

The design of the mask scanning head is largely identical with that of the scanning head. The differences between the optical systems are due to the fact that the scanning head serves for scanning transparencies

whereas the mask scanning head is used for scanning specially prepared control masks which are reflection copies. (Fig. 4-5) The light from the scanning lamp is projected to the mask area to be scanned, via mirrors and condensers.

The light emerging from the aperture passes to an interference filter. Each of the two light beams produced reaches a multiplier, via a prism. A blue separation filter is positioned before one of the multipliers, a red separation filter before the other.

Depending upon the mask area scanned, the multipliers receive more or less light, producing correspondingly changed signals for the control section.

The control mask may contain up to four colors (red, blue, black, and white) so that four different voltage conditions result during scanning. After decoding, they are converted into the four switching commands "white", "black", "red", and "blue" (control section).

Table 4. 1. Light Transmittance of Separation Filters for Different Mask Colors

Mask Color	Red Separation Filter	Blue Separation Filter
	ies .	
White	Much light	Much light
Black	Little light	Little light
Red	Much light	Little light
Blue	Little light	Much light

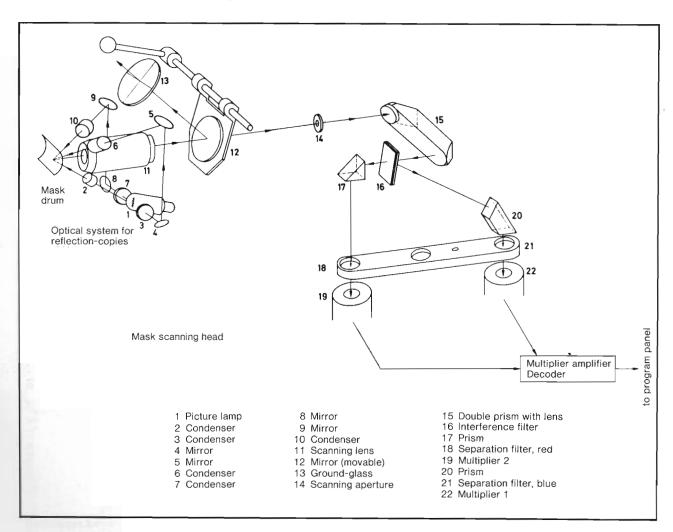


Fig. 4-5 Light Path in Mask Scanning Head

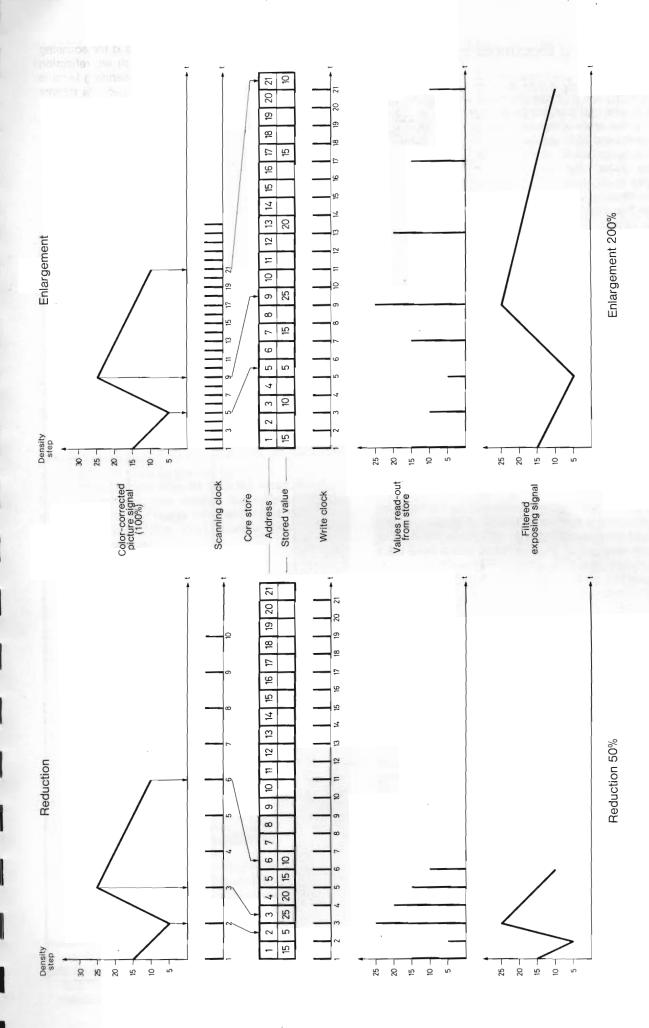


Fig. 4-6 Principle of Electronic Scale Change

4. 3. Principle of Electronic Scale Change

The scale change in circumferential direction is performed by stretching or compressing in time the signal arriving at the scale computer. The processes of 200 % enlargement and 50 % reduction using a large scanning drum are described by means of a strongly simplified example. First, the signal supplied by the color computer is digitized. For this purpose, the whole possible density range is divided into a finite number of steps so that a definite density step is assigned to each arriving value of the continuous signal. Fig. 4-6 only shows the first 25 density steps. At a particular instant, the density steps just present are evaluated and loaded into a core store. The core store has a definite number of memory locations which are numbered and thus addressable. The number of the location is its address, the number stored being termed storage word (density steps).

The read-in and read-out speeds of the core store employed are less than a microsecond. The upper line of the core store represented in Fig. 4-6 contains the first 21 addresses and the lower line the density steps stored. It can be seen that the scanned values of the density steps are sequentially loaded into the corresponding locations. By means of the write clock, the corresponding density step is again read out of the core store at the instants shown and converted back into a signal voltage. This signal is filtered. The required output voltage thus produced controls the film density board.

The electronic scale is only determind by the relationship between the number of scanning clocks and the number of write clocks. With all reductions, the density steps are read out of the core store which have been scanned during the previous drum revolution.

The scale computer ranges from 20 % to 422 %. For great enlargements, smaller scanning drums are used. Due to the smaller diameter, optical enlargement by factor 2 is achieved by means of the medium drum and by factor 4 by means of the small drum. This means that with the small drum enlargements of up to almost \times 17 are feasible.

The scale change in cross-feed direction is performed by different speeds of the exposing and scanning heads. The cross-feed of the exposing head depends only upon the required number of lines: 350, 500, 750 or 1000 lines/inch (140, 200, 300 or 400 lines/cm). The speed of the scanning head is higher or lower by the factor of the scale change set. Both heads are driven by stepping motors, the motor speeds being proportional to the scanning and write clocks. The required clocks are produced by the scale electronics.

4. 4. Calculating a Pure, Electronic Scale from the Table Value

To be able to position a color separation more exactly than a few tenths of a millimeter on the exposing film, it is necessary to know whether the electronic scale $M_{\rm el}$ is smaller than 100 % (reduction) or larger or the same (both are regarded as enlargement). The following formulae enable this to be calculated:

M _{el} - M _{Tab}		Drum	Factor
------------------------------------	--	------	--------

Large drum : $M_{el} = M_{Tab}$	1/1
Medium drum: $M_{el} = M_{Tab}$	1/2
Small drum : $M_{el} = M_{Tab}$	1/4

4. 5. The Electronic Gray Scale

The electronic gray scale is produced in the scale electronics. 17 voltage steps (i.e. 17 gray values of the digital electronics) are exposed on to the film.

	Density	Percent Dot Size
1.	0,20	0
2.	0,30	1
3.	0,40	7
4.	0,50	14
5.	0,60	21
6.	0,70	28
7.	0,80	35
8.	0,90	42
9.	1,00	49
10.	1,10	56
11.	1,20	63
12.	1,30	70
13.	1,40	77
14.	1,50	85
15.	1,60	92
16.	1,70	100
17.	1,80	100

Fig. 4-7 Electronic Gray Scale Exposed in NEG (92)
Position with Densities and Percent Dot
Sizes Obtained after Film Linearization

The gray scale is exposed on the film when the pushbutton switch (93) is pressed. The order in which the steps appear on the film depends on the position of the SEPARATION POS (91) and SEPARATION NEG (92) pushbutton switches. Fig. 4-7 shows the gray scale in NEG position.

If the machine is switched to FINE (157) or MULT. (156) mode of operation, a 17-step gray scale is exposed. If the electronic scale is superimposed in the ANALOG operation, the beginning and the end of the exposed scale differ from the one exposed during DIGITAL operation. In the ANALOG operation details are exposed which are faded out by special electronics in the DIGITAL operation.

The differences are:

- 1) The first step of the gray scale is larger than normal.
- The last step of the gray scale is divided by an additional (17th) separating line. The density,

however, is exposed over the whole circumference up to the beginning of the first step of the next rotation.

To obtain screen dots in the highlights, expose a positive black color separation with the switch in position SCREEN. The change in gradation will affect the electronic gray scale.

In addition to easy operation, the gray scale has two other advantages: Between the steps is a line of medium density which enables the steps to be separated at the ends as well. However, the first gray-scale step must be above the first dividing line.

The second advantage is that the electronic gray scale is not grainy, thus facilitating measurement.

The gray scale is a most suitable check for the developing process. For example, if a large number of films are exposed by electronic gray scale once a month and narrow strips cut out of these films, one strip can be developed each day, thus ensuring a check of the constancy of the developing process.

5. Pre-operational Set-up

5. 1. Changing the Medium and Large Scanning Drums

Utmost care should be taken when changing the scanning drum, lens or transparency attachment. The use of force should also be avoided when handling these assemblies. This applies not only to optical assemblies but also to the left-hand thrust bearing of the drum support (Fig. 5-1), since a knock would damage the bearing.

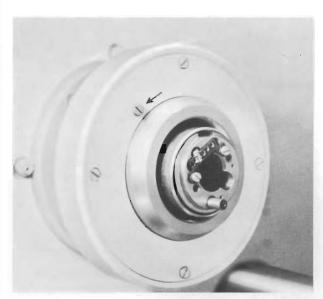


Fig. 5-1 Left-hand Thrust Bearing of Scanning Drum Support and Transparency Illumination Arm with Attachment Removed

Proceed as follows:

- Loosen the limit stops.
- Move the scanning head to the left-hand limit.
- Turn the drum so that the drive pin on the right-hand side is up.

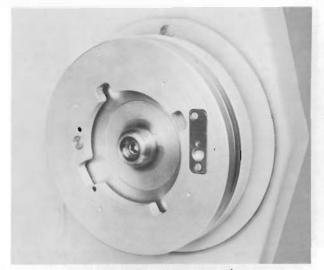


Fig. 5-2 Right-hand Bearing of Scanning Drum with Clamping Device for Small Scanning Drum

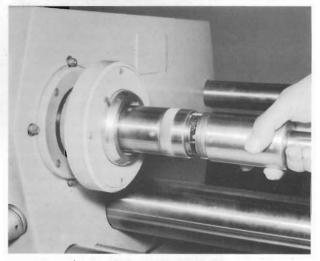


Fig. 5-3 Changing the Transparency Illumination Arm Attachment (for Small Scanning Drum)

- Apply the brake.
- Hold the right-hand end of the drum with the right hand and press against the left-hand bearing. With the left hand, move the lever on the left-hand bearing support of the scanning drum to the left and loosen the thrust bearing.
- Move the drum upwards with the right hand and carefully withdraw the drum over the transparency illumination arm attachment.
- Demount the transparency illumination arm attachment by loosening the threaded ring of the transparency illumination arm and withdrawing the attachment (Fig. 5-3).
- Change the scanning lens. It is advisable to use a lens wrench for demounting the lens for the large scanning drum. Unscrew the lens by turning it counterclockwise. Before inserting the other lens, mount the lens holder (Fig. 2-6).
- Fit the appropriate transparency illumination arm attachment.
- Mount the medium scanning drum. Carefully insert the left-hand thrust bearing.

5. 2. Mounting the Scanning Head with the Small Scanning Drum

In general, the manipulations for this procedure are the same as described in paragraph 5.1. However, in the case of the small scanning drum (Fig. 5-4), which facilitates enlargements up to 1685%, it should be noted that faults in the drum will have a corresponding effect.

Proceed as follows, under the condition that no drum, lens and transparency illumination arm are mounted:

- Fit the lens. Mount the lens holder, then insert the lens (right-hand thread).
- Mount the transparency arm attachment (Fig. 5-3).
 Check the correct position of transparency illumination arm attachment and small scanning drum by careful insertion.
- Mount the small scanning drum by applying the brake and loosening the clamping ring on the right-hand side of the scanning drum (Fig. 5-4) by a quarter-turn towards the rear. Hold the small scanning drum with the left hand and insert the four cams shifted by 90° into the corresponding recesses of the right-hand thrust bearing. (One cam is wider so that the mounting position of the small scanning drum is fixed.)

Hold the bearing disc with the right hand and turn the small scanning drum towards the operator (approx. 30°) with the left hand.

Tighten the clamping ring (forward).

5. 3. Changing the Exposing Heads

- At the rear of the exposing compartment, turn the knurled screw towards the right to unlock the cover.
- Hinge up the cover. The exposing-lamp current is automatically reduced to 10 mA by means of a microswitch. This current is required to adjust the exposing lamp.

Attention: Do not press the microswitch.

- On the left-hand side of the exposing head, swivel the unlocking lever inwards.
- Loosen the mounting at the rear of the exposing head.
- —With the left hand, grip the rear rods and hold the exposing head in a horizontal position. With the right

- hand, withdraw the exposing head upwards without inclining it.
- Take the other exposing head in a similar way.
- Ensure exact focusing of the lens and correct setting of the iris diaphragm.
- Fit the exposing head and secure it with the two locks.
- Check with a magnifier that the exposing aperture is centered on the light spot. Otherwise, check the position of the exposing head.
- Check that all suction holes of the exposing drum are open.
- Close the cover and press it down so that it locks.

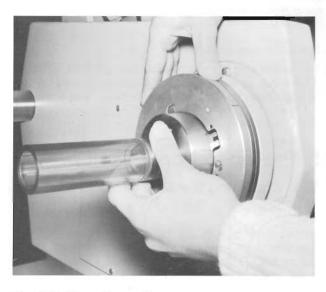


Fig. 5-4 Mounting or Demounting the Small Scanning Drum



Fig. 5-5 Mounting or Demounting the Exposing Head for Halftone Separations

5. 4. Film-mounting Device

5.4.1. Loading and Inserting the Cassette

The cassettes for the Chromagraph DC 300 should be properly adjusted to the supporting bolts and register pins of the scanner to ensure perfect film transport. The weight of the cassette has been kept as light as possible to facilitate operation. This does not mean that the cassette should be thrown down on to the mounting table or supporting pins!

Proceed as follows:

- —To load the cassette, place it on the mounting table with the black side upwards. At the end, the mounting table should be equipped with a border against which the bottom edge of the cassette can be pushed.
- With both hands, pull up and push back the knobs in the rear half of the cassette. The opening for the film opens in the front half of the cassette.
- —With the left hand, open the pressure sheet metal (upwards) and hold it.
- Hang the punched film for continuous-tone separations with the emulsion down over the register pins.
 Always place the film against the left-hand border of the cassette.

Mounting sequence for screened separations:

- 1. Contact screen, emulsion up
- 2. Lith film, emulsion down

It is recommended that four cassettes be used so that the contact screens may remain in the cassettes (Fig. 5-6).

- Lower the pressure sheet metal on to the film.
- Close the cassette.
- Hold the cassette with both hands and hang it over the supporting pins on the scanner (Fig. 5-7).
 Engage the locking handle.
- —With both hands, pull the knobs at the rear away from the operator and press down. The cassette will open.



Fig. 5-6 Four Cassettes with Stand

5.4.2. Mounting the Film

Attention

Positioning of the drum for the film transfer is controlled by a cam disk and a locking wheel. To prevent damage to both parts, the film should only be mounted and demounted when the drum is stationary.

- Switch on the vacuum for the exposing drum.
- Actuate and hold the vacuum tap tight. (The vacuum drops down.)
- Move the film-mounting lever to "Mounting" (upper right-hand) position.
- The drum makes a complete turn. Pull the lever upwards. The register pins on the drum engage in the holes provided in the cassette.
 - Release the vacuum lever. Hold the lever 3 to 4 seconds. The drum takes up the film. The vacuum reading increases (vacuum gauge).
- Push the film-mounting lever downwards and move up halfway (as far as the protrusion).
- Allow the mask drum to make 3 to 4 turns.
- The vacuum should increase clearly.
- The film is mounted. Return the film-mounting lever to "0" position.



Fig. 5-7 Loosely Inserted Cassette

5.4.3. Demounting the film

- Move the film-mounting lever to "Demounting" (upper left-hand) position.
- The mask drum turns towards the operator.
- Allow the mask drum to make 1 to 2 turns.
- —Close the cassette. With both hands, pull up the knobs at the rear.
- Remove the cassette and place it on the mounting table with the black side upwards.
- With both hands, pull up and simultaneously push back the knobs.
- The cassette opens.
- Tilt down the cassette with front part. The exposed film falls towards the front and can be removed or mounted again for another exposure, i.e. insertion.

Attention

No remains of film should remain in the cassette, otherwise the next film cannot be properly demounted.

Two knurled screws are located at the lower edge of the cassette. When these screws are loosened it is possible to spread top and bottom in order to pull out a caught film.

5. 5. Film Linearization

5.5.1. Explanation of the Expression, and of the Auxiliary Equipment Required

5.5.1.1. Explanation of the Expression Film Linearization

In the exposing head, the signal voltage causes a certain current "I" to flow in the exposing lamp circuit. The light from this lamp produces screen dots of percent dot size ("% DS") or a continuous-tone density "D" on the film. The relationship between the signal voltage and "% DS" or "D" is not linear. This means that a double signal voltage does not produce a double screen dot size or density.

The indication of the digital meter is proportional to the output voltage of the color computer.

If the output voltage of the color computer is connected directly to the input terminal of the exposing head, it is not possible for the digital meter to give a direct indication of the "D" or "% DS" of the separation film.

The "film linearization" stage alters the path of the signal voltage so that the meter reading is exactly adapted to the film gradation of the exposing head. If the operator performs the film linearization correctly and checks it once a day, the densities or screen dot sizes in the color separations can always be read off on the meter. The value \mathbb{R} (= Regelung, Setting) obtained in the adjustment of the film linearization should be checked after each set of color films at least, and if necessary readjusted with the EXPOSING LAMP CURRENT control (147).

For linearization in screened and continuous-tone working there are two procedures in each case.

5.5.1.2. Pre-exposure for Screening

Pre-exposure in conjunction with the contact screen is used to produce screen dots with a sub-threshold exposure. This enables the sensitivity (speed) of the lith film to be used to better advantage.

The adjustment procedure is as follows:

- Set the TYPE OF GRADATION switch (43) to position 3 (SCREEN).
- Mirror on mask scanning head down. (Black mask color)
- Insert the plug of the patch panel into the socket at the crosspoint "Black lamp" (115) - pushbutton D1 (122).
- Set the MEASURE 1 switch (48) to FILM DENSITY.
- By means of D 1 control (122 R) adjust the film density to 0 % (dot percentage value).
- Open the cover of the exposing compartment.
- On the exposing head for screened color separations, set the pre-exposure switch located on the printed circuit board to position "1".
- Close the cover of the exposing compartment.
 Mount the lith film and contact screen and expose about 2 cm.
- Remove the film.
- Set pre-exposure switch to position "2".
- In darkroom, fit film onto register pins.
- Mount the film and contact screen and expose 2 cm.
- Using the same procedure, set all switch positions and perform exposures.
- Process the film.
- Select the switch position in which sub-threshold dots are just not visible (screen dots without black cores), e.g.

sub-threshold dot in switch position "4", select switch position "5".

5.5.1.3. The Electronic Gray Scale

For description, see chapter 4.5. and Fig. 4-7.

An exposure of the electronic gray scale is made on the film when the pushbutton (93) is operated.

5.5.2. Film Linearization for Screening

5.5.2.1. Preparations for Linearization

- Perform the white alignment for the scanning signal according to paragraph 5.11., and for the mask signal as per paragraph 5.16.
- Adjustment of pre-exposure for screening if used (see paragraph 5.5.1.2.).
- Setting of the current. The first adjustment is to 28 mA in order to ensure adequate exposure in the first exposure.

Exposing current setting:

Set MEASURE 1 switch (48) to position MEASURE 2. Set MEASURE 2 switch (90) to position EXPOSING LAMP CURRENT. The digital meter shows the current in mA.

For the preliminary adjustment of the current, all seven FILM LINEARIZATION controls (102...107 and 107 a) are set to "0".

MEASURE 1 switch (48) in position FILM DENSITY. Press D 1 pushbutton (122), turn D 1 control (122 R) until the digital meter reads 100 %.

MEASURE 1 switch (48) in position MEASURE 2.

MEASURE 2 switch (90) in position EXPOSING LAMP CURRENT. Turn the PICTURE LAMP CURRENT control (147) on the attachment of the mask scanning head until the digital meter reads 35 mA. The current is then reduced to the desired value of 28 mA. This method is to be recommended for the following reasons: With a percent dot size of 100, if the current is increased to 28 mA from a lower value, the exposing electronics may oscillate. This oscillation gives rise to a current reading which is too high and therefore false.

If it should be found during the film linearization process that the initial current adjustment is insufficient for the linearization, a correction must be made by means of the PICTURE LAMP CURRENT control (147).

Important

If the MEASURE 2 switch (90) is in position EXPOSING LAMP CURRENT, the "D — O" pushbutton (137) behind a sliding panel on the control section is lit, and the current indicated by the digital meter with the MEASURE 1 switch (48) in the corresponding position flows through the circuit of the exposing lamp. It is therefore recommended that the MEASURE 2 switch (90) should be returned to position (the home position) as soon as possible.

5.5.2.2. Film Linearization for Screening with the Electronic Gray Scale and the Screen Dot Size Diagram

- Carry out preparation for linearization as described in paragraph 5.5.2.1.
- Operate the SCANNING LIGHT SOURCE ON pushbutton (101).
- MEASURE 1 switch (48) in position MEASURE 2.
- Measure 2 switch (90) in position EXPOSING LAMP REGULATION. Press pushbutton ℝ (96) and note

- the reading on the digital meter (47), which appears after approx. 10 seconds, into the Form No. 4.
- Expose the electronic gray scale and process the film.
- During the development, measure the percent dot sizes of the gray scale steps:
- -Set the MEASURE 2 switch (90) to position L.
- Press the NEG pushbutton (92).
- Press the ____ pushbutton (93).
- Set the GRAY SCALE STEPS switch (220) successively from 1.70...0.30, according to 100%...1%, and plot the curve of the light values (LW), indicated on the digital meter (47), into Form No. 4, Film Linearization / Halftone.

Attention: The exposed electronic gray scale has 17 density steps (see Fig. 4-7). With the GRAY SCALE STEPS switch (220), only the 15 steps 100 %...1 %, which correspond to the density values 1.70...0.30, can be selected. These are the steps 16...2 of the electronic gray scale. Starting with step 16 of the electronic gray scale (100 screen dot size or density 1.70), enter the indicated light values into Form No. 4.

 Measure the exposed electronic gray scale with a densitometer and also enter the percentage values for the dot sizes into Form No. 4.

Attention: The screen dot sizes measured on the film must be entered into the form beginning with step 17 (100%). Consequently the first two steps on the exposed film must have the screen dot size 100%.

 Plot the curve of the light values against the screen dot sizes in the Form No. 4.

If the exposed electronic gray scale has no screen dot size of 100% in step 16 when a new exposing lamp with an adjusted current of 28 mA is used, check first whether the film is sufficiently developed. If developer and developing process are completely accurate, check whether the iris diaphragm on the exposing head is sufficiently open. Increase the exposing current only when the diaphragm was already set to 1. Even in case of an old exposing lamp the current must not exceed 30 mA.

Adjusting the Film Linearization Controls

- Set the FILM LINEARIZATION control 1 % (107 a) to "0".
- —Set the MEASURE 1 switch (48) to position FILM DENSITY.
- Set the GRAY SCALE STEPS switch (220) to 1.70 (100%).
- Press the NEG pushbutton (92).
- —Set the MEASURE 1 switch (48) to position MEASURE 2.
- Set the MEASURE 2 switch (90) to L.
- With the FILM LINEARIZATION control 100 % (107), set the light value obtained from the light value/ screen dot size diagram for 100 %.
- Set the GRAY SCALE STEPS switch (220) to 0.30 (1%)
- With the FILM LINEARIZATION control 1 % (107 a), adjust the light value obtained from the light value/ screen dot size diagram for 1 %.
- Set the GRAY SCALE STEPS switch (220) to 1.40
- —With the FILM LINEARIZATION control 85 % (106), adjust the light value resulting from the light value/ screen dot size diagram for 85 %.

- Set the GRAY SCALE STEPS switch (220) to 1.00 (49%).
- With the FILM LINEARIZATION control 49 % (104), adjust the light value obtained from the light value/ screen dot size diagram for 49 %.
- Set the GRAY SCALE STEPS switch (220) to 0.50 (14%).
- With the FILM LINEARIZATION control 14 % (102), adjust the light value resulting from the light value/ screen dot size diagram for 14 %.
- Check the adjustments carried out so far and, if necessary, improve them until optimum values are achieved.
- Set the GRAY SCALE STEPS switch (220) to 1.30 (70 %).
- With the FILM LINEARIZATION control 63 % (105), adjust the light value obtained from the light value/ screen dot size diagram for 63 %.
- Set the GRAY SCALE STEPS switch (220) to 0.80 (35%).
- With the FILM LINEARIZATION control 28 % (103), adjust the light value resulting from the light value/ screen dot size diagram for 28 %.
- Check all the adjustments carried out so far and, if necessary, improve them until optimum values are achieved.
- Switch off the _____ pushbutton (93).
- Set the MEASURE 2 switch (90) to
- Set the MEASURE 1 switch (48) to position FILM DENSITY.
- For checking purposes, expose an electronic gray scale. Develop the film and measure the gray scale with a densitometer. When the obtained densities are plotted in a coordinate system against those specified, the result should be a straight line. When the film linearization is finished, enter the settings for all 7 controls into Form no. 4.

The settings of the individual FILM LINEARIZATION controls (102 to 107 a) must not be changed any more, only when the film linearization must be carried out anew for another film material.

The film linearization should be checked several times each day by means of exposing an electronic gray scale at the end of a scan.

This completes the basic setting of the equipment. The equipment is now ready for screening.

In the event of a change from screening to continuoustone operation, it is only necessary to set up the film linearization values that were noted down and the continuous-tone control.

If after the adjustment of the film linearization for a screen dot size of 100% the measured value is greater than 30 mA, the film and the development should be checked. If this current is exceeded, there may be losses in sharpness.

5.5.2.3. Film Linearization for Screening with a Scanned Gray Scale and the Light Screen Dot Size Diagram

This type of linearization is somewhat more tedious. It should therefore only be used if the electronic gray scale is faulty.

a) Preparation for Linearization

Proceed as described in paragraph 5.5.2.1. In addition:

Fit the medium or large scanning drum.

- Fix the gray scale to be scanned, e.g. the AGFA-GEVAERT transparent stepped wedge, to the scanning drum.
- Defocus the scanning lens (so that the grain is not reproduced).
- Select the enlargement so that the complete gray scale comes into the film.
- —Turn PICTURE ADJUSTMENT-HIGHLIGHT control (62) to the left stop, then to the right until the nose points downwards (display "100").
- Set UNDER-COLOR REMOVAL controls (70)

to position 0.

— Set ADDITION OF COLOR controls (75)

to position 0.

— Set LIMITERS (68-69) to position 0.

— Set DETAIL CONTRAST INTENSITY control (44) to position 0.

— Set DETAIL CONTRAST STARTING POINT control (45) to position 1.

- Set TYPE OF GRADATION switch (43)

to position 3 SCREEN ("contact screen").

- Set gradation control MIDDLE TONES-Yellow (81) to position 5.
- Set gradation control MIDDLE TONES-Magenta (81) to position 5.
- Set gradation control MIDDLE TONES-Cyan (81) to position 7.
- Set gradation control MIDDLE TONES-Black (81) to position 5.
- Set gradation control HIGHLIGHT CONTRAST (88) to position 2.
- Set gradation control SHADOW CONTRAST (89) to position 5.
- Press NEG pushbutton (92).
- Press pushbutton + (100).
- Operate the ON pushbutton switch (101).
- All LINEARIZATION controls (102-107 a) in

position 0.

- Press PICTURE pushbutton (121).
- Set the ORIGINAL POS/NEG switch (42) to position POS 2.
- Set COLOR SEPARATION switch (49) to position "Cyan".
- Set MEASURE 1 switch (48) to position FILM DENSITY.
- Press D 1 pushbutton (122) on the control section and adjust to "100%", with density control D 1 (122 R).
- Set the "pre-exposure" switch to the position previously determined (paragraph 5.5.1.2., Preexposure for Screening).
- MEASURE 1 switch (48) in position MEASURE 2.
- MEASURE 2 switch (90) in position EXPOSING LAMP CURRENT.
- Check adjustment "100 %" and "28 mA".
- MEASURE 2 switch (90) in position
- Set the MEASURE 1 switch (48) to position PICTURE ADJUSTMENT.
- Move the scanning light spot to the lightest step of the gray scale to be scanned.
- Raise the mirror.
- Press the white pushbutton WHITE ADJUSTMENT WITH COLOR SHIFT COMPENSATION (50).
- Lower the mirror.
- Move the scanning light spot to darkest step of

- the gray scale to be scanned.
- Raise the mirror.
- By means of the PICTURE ADJUSTMENT SHADOW control (63) adjust to 0.
- Set the MEASURE 1 switch (48) to position FILM DENSITY.
- By means of the FILM DENSITY SHADOW control (65) adjust to 1 %.
- Move the scanning light spot to the lightest step of the gray scale to be scanned.
- MEASURE 1 switch (48) in position FILM DENSITY.
- By means of the FILM DENSITY HIGHLIGHT control (64) adjust to 100 %.
- Check that an indication of 1 % and 100 % is obtained. If this is not the case, repeat the adjustments.
- Check positioning (see chapter 5.14.).
- Lower the mirror on the mask scanning head.
- --- Mount the film.
- Push the scanning and exposing heads to the lefthand starting block.
- Press the START pushbutton (128) and allow the equipment to run up to speed.
- Lock the cross-feed lever on the mask scanning head in the down position.
- Scan the gray scale and then switch off.
- Process the film.

b) Production of an E/D Diagram

- Enter percent dot sizes on Form VoB 7211 no. 4. For this purpose:
- Operate SCANNING LIGHT SOURCE ON pushbutton switch (101).
- Press PICTURE pushbutton (121).
- Set the scanning light spot to the first step of the gray scale.
- Read the resulting percentage value and enter the reading on the form.
- MEASURE 1 switch (48) in position MEASURE 2.
- MEASURE 2 switch (90) in position L (light value).
- Read the resulting light value and enter the result on the form.
- Set the scanning light spot to the second step of the gray scale.
- Measure 1 switch (48) in position FILM DENSITY.
- Read the percentage value and enter the result on the form.
- MEASURE 1 switch (48) in position MEASURE 2.
- Read the indicated light value and enter the result on the form.
- Repeat the process in the same sequence for all steps of the gray scale and enter the results on the form.
- Read the steps of the exposed gray scale (integral screen density) with the densitometer.
- Convert the percent dot size and enter the values on the form.

— Plot the curves of the light value (LW) against the recorded dot size (%) on the form no. 4. From the curve obtained, the light values required for the individual FILM LINEARIZATION controls (102...107 and 107 a) can be read.

c) Film Linearization

- COLOR SEPARATION switch (49) in position "Cyan".
- TEST switch (41) in position OPERATING.
- Operate SCANNING LIGHT SOURCE ON pushbutton switch (101) to the ON position.
- ★ Press the PICTURE pushbutton (121).
- MEASURE 1 switch (48) in position FILM DENSITY.
- Press D 1 pushbutton (122) and adjust to "100%" with the associated density control (122 R).
- Press D 2 pushbutton (123) and adjust to "85%" with the associated density control (123 R).
- Press D 3 pushbutton (124) and adjust to "49%" with the associated density control (124 R).
- Press D 4 pushbutton (125) and adjust to "14%" with the associated density control (125 R).
- Swing the mirror on the scanning head down.
- Press the LOCAL CORR. pushbutton (126) and adjust to "1%" with the associated LOCAL TONE AND COLOR CORRECTION - SHADOW control (37).
- The MEASURE 2 switch (90) remains in the position L (light value).
- Press D 1 pushbutton (122); the meter (47) should read "100 %".
- MEASURE 1 switch (48) in position MEASURE 2.
- Read off the light value for dot size 100 % from the diagram, and set up with the FILM LINEARIZATION-STEEPNESS - 100 % control (107).
- Press TK pushbutton (126).
- MEASURE 1 switch (48) in position FILM DENSITY.
 Check whether a value of "1 %" is indicated.
- MEASURE 1 switch (48) in position MEASURE 2.
- Read the light value for 1 % from the diagram and set up by means of the FILM LINEARIZATION control 1 % (107 a).
- Press D 2 pushbutton (123).
- MEASURE 1 switch (48) in position FILM DENSITY.
 Check whether a reading of "85%" is obtained.
- MEASURE 1 switch (48) in position MEASURE 2.
- Read the light value for 85 % from the diagram and set same up with the FILM LINEARIZATION control 85 % (106).
- Press D 3 pushbutton (124).
- MEASURE 1 switch (48) in position FILM DENSITY.
 Check whether a reading of "49 %" is obtained.
- MEASURE 1 switch (48) in position MEASURE 2.
- Read the light value for 49 % from the diagram and set same up with the FILM LINEARIZATION control 49 % (104).
- Press D 4 pushbutton (125).
- MEASURE 1 switch (48) in position FILM DENSITY.
 Check whether a reading of "14%" is obtained.
- MEASURE 1 switch (48) in position MEASURE 2.
- Read the light value for 14 % from the diagram and set same up with the FILM LINEARIZATION control 14 % (102).
- MEASURE 1 switch (48) in position FILM DENSITY.
 Repeat the adjustment process from ★ in the sequence given until all values are reliably obtained.
- ★★ Press D1 pushbutton (122).
 - MEASURE 1 switch (48) in position FILM DENSITY.
 Adjust to "63 %" with the density control (122 R).
 - Press D 2 pushbutton (123) and adjust to "28%"

- with the density control (123 R).
- Press D 1 pushbutton (122) and check whether a value of "63%" is indicated.
- MEASURE 1 switch (48) in position MEASURE 2.
- Read the light value for 63 % from the diagram and set same up with the FILM LINEARIZATION control 63 % (105).
- Press D 2 pushbutton (123).
- MEASURE 1 switch (48) in position FILM DENSITY.
 Check whether a reading of "28 %" is obtained.
- Read the light value for 28% from the diagram and set same up with the FILM LINEARIZATION control 28% (103).
 - Repeat the adjustment process from ** in the sequence given until all values are obtained reliably.
- Record all settings of the FILM LINEARIZATION controls on the form.
- MEASURE 1 switch (48) in position MEASURE 2.
- MEASURE 2 switch (90) in position EXPOSING LAMP REGULATION.
- Press pushbutton R (96). Read the value obtained and record same on the form.

Attention

The adjustment of the controls must not be changed any more.

- MEASURE 1 switch (48) in position FILM DENSITY.
- MEASURE 2 switch (90) in position
- TEST switch (41) to OPERATING.
- All gradation controls on 5.

This concludes the basic setting of the equipment. The equipment is now ready for contact screening.

Attention

If, after the film linearization has been adjusted for a dot size of 100 %, a reading of more than 28 mA is obtained, the film and the processing must be checked, because if this current value is exceeded, losses of sharpness may occur.

5.5.3. Film Linearization for Continuous-tone Separations

5.5.3.1. Preparation for Linearization

The same steps must be taken as in the case of film linearization for screening. These are described in paragraph 5.5.2.1.

Adjust a current of 22 mA instead of 28 mA.

5.5.3.2. Film Linearization for Continuous-tone Separations with Electronic Gray Scale and Light Density Diagram

- Press the SCANNING LIGHT SOURCE ON pushbutton switch (101).
- MEASURE 1 switch (48) in position MEASURE 2.
- MEASURE 2 switch (90) in position EXPOSING LAMP REGULATION. Press pushbutton ℝ (96) and note the reading of the digital meter (47), which appears after approx. 10 seconds, into Form No. 5.
- FILM LINEARIZATION control 1 % (107 a) in position "0".
- Expose electronic gray scale and process film.
- During the processing, measure the density values of the gray scale steps:
- Set the MEASURE 2 switch (90) to L.
- Press the NEG pushbutton (92).
- Press the ____ pushbutton (93).

— Set the GRAY SCALE STEPS switch (220) successively from 1.70 to 0.30, and plot the curve of the light values (LW), which are indicated on the digital meter (47), into Form no. 5, Film Linearization/Continuous-tone.

Attention: The exposed electronic gray scale has 17 density steps (see Fig. 4-7). With the GRAY SCALE STEPS switch (220) only the 15 steps 1.70...0.30 can be selected. These are the steps 16...2 of the electronic gray scale. Starting with step 16 of the electronic gray scale (density 1.70), enter the indicated light values into Form No. 5.

 Measure the exposed electronic gray scale with a densitometer and enter the density values also on Form No. 5.

Attention: The density values measured on the film must be entered into the form beginning with step 17 (density 1.80).

 Plot the light value/density diagram with the measured values on Form No. 5.

If the exposed electronic gray scale has no density of 1.70 in step 16 when a new exposing lamp with an adjusted current of 22 mA is used, check first if the film is sufficiently developed. If developer and developing process are completely accurate, check whether the iris diaphragm on the exposing head is sufficiently open. Increase the exposing current only when the diaphragm was already set to 1. Even in case of an old exposing lamp the current must not exceed 30 mA.

Adjusting the Film Linearization Controls

- Set the FILM LINEARIZATION control 1 % (107 a) to position "0".
- —Set the MEASURE 1 switch (48) to position FILM DENSITY.
- Set the GRAY SCALE STEPS switch (220) to 1.70.
- Press the pushbutton (93). (The digital meter (47) reads a density of 1.70.)
- —Set the MEASURE 1 switch (48) to position MEASURE 2.
- Set the MEASURE 2 switch (90) to position L.
- With the FILM LINEARIZATION control 1.70 (107), set the light value resulting from the light/density diagram for D = 1.70.
- Set the GRAY SCALE STEPS switch (220) to 1.40.
- With the FILM LINEARIZATION control 1.40 (106), adjust the light value obtained from the diagram for D = 1.40.
- Set the GRAY SCALE STEPS switch (220) to 0.90.
- With the FILM LINEARIZATION control 0.80 (104), adjust the light value resulting from the diagram for D = 0.90.
- Set the GRAY SCALE STEPS switch (220) to 0.30.
- With the FILM LINEARIZATION control 0.30 (102), adjust the light value obtained from the diagram for D = 0.30.
- Check the adjustments carried out so far and, if necessary, improve them until optimum values are achieved.
- Set the GRAY SCALE STEPS switch (220) to 1.20.
- —With the FILM LINEARIZATION control 1.10 (105), adjust the light value resulting from the diagram for D = 1.20.
- Set the GRAY SCALE STEPS switch (220) to 0.50.
- With the FILM LINEARIZATION control 0.50 (103), adjust the value obtained from the diagram for D = 0.50.

- Check all adjustments carried out so far and, if necessary, improve them until optimum values are achieved.
- Release the pushbutton (93).
- Set the MEASURE 1 switch (48) to position FILM DENSITY.
- Set the MEASURE 2 switch (90) to position
 ...
- For checking purposes, expose an electronic gray scale. Develop the film and measure the gray scale with a densitometer. When the obtained densities are plotted in a coordinate system against those specified, the result should be a straight line.

When the film linearization is finished, enter the settings for all 7 controls into Form no. 5.

The settings of the individual FILM LINEARIZATION controls (102 to 107 a) must not be changed any more, only when the film linearization must be carried out anew for another film material.

The film linearization should be checked several times each day by means of exposing an electronic gray scale at the end of a scan.

This completes the basic settings of the equipment. The equipment is now ready for continuous-tone work.

In the event of a change from continuous-tone to screening, it is only necessary to set up the film linearization values that were noted down and the screen control.

5.5.3.3. Film Linearization for Continuous-tone Separations with a Scanned Gray Scale and the Light Density Diagram

This type of linearization is somewhat more tedious. It should therefore only be used if the electronic gray scale is faulty.

a) Preparation for Linearization

Proceed as described in paragraph 5.5.3.1. In addition:

- Fix the gray scale to be scanned, e.g. the AGFA-GEVAERT transparent stepped wedge, to the scanning roller.
- Fit the continuous-tone head.
- Blank off the suction ducts in accordance with the size of film used. (A sample film for each size of film used should be kept in readiness.)
- Press the DAY pushbutton (228).
- Use the medium or large scanning drum.
 Choose the enlargement so that the whole of the gray scale comes on the film.
- Press the 500 lines / inch pushbutton (160).
- Operate the ON pushbutton (101).
- Turn PICTURE ADJUSTMENT-HIGHLIGHT control (62) to the left stop, then to the right until the nose points downwards (display "100").
- UNDER-COLOR REMOVAL controls (70)

in position 0.

- ADDITION OF COLOR controls (75) in position 0. - LIMITERS (68-69) in position 0.
- DETAIL CONTRAST INTENSITY control (44)

in position 0.

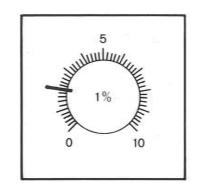
— DETAIL CONTRAST STARTING POINT control (45)

in position 1.

Percent Dot Size/Integrated Halftone Density

Integrated Screen Density	Percent Dot Size %	Integrated Screen Density	Percent Dot Size %	Integrated Screen Density	Percent Dot Size	
0.00	0	0.22	39	0.48	67	
0.01	2	0.23	41	0.50	68	
0.02	4	0.24	42	0.52	70	
0.03	7	0.25	43	0.54	71	
0.04	9	0.26	45	0.56	72	
0.05	- 11	0.27	46	0.58	74	
0.06	13	0.28	47	0.60	75	
0.07	15	0.29	48	0.64	77	
0.08	17	0.30	50	0.68	79	
0.09	19	0.31	51	0.72	81	
0.10	20	0.32	52	0.76	82	
0.11	22	0.33	53	0.80	84	
0.12	24	0.34	54	0.84	85	
0.13	26	0.35	55	0.88	87	
0.14	27	0.36	56	0.92	88	
0.15	29	0.37	57	0.96	89	
0.16	30	0.38	58	1.00	90	
0.17	32	0.39	59	1.10	92	
0.18	33	0.40	60	1.25	94	
0.19	35	0.42	62	1.50	97	
0.20	36	0.44	63	1.75	98	
0.21	38	0.46	65	2.00	99	

REGULATION:	Mymmymy 1
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	85 % +5 0 days 100 % +5



Film Linearization / Screen

FORM NO. 4

VOB 7211

Film	: MP/Ortho Kodalith	Gray-scale Step	% Meter	mA	% Film
	Kodalith	1	0	_	-
Film Processor	Processor	2	1	5'8	_
D 1	MO Double a	3	7	5,3	
Developer	MP Developer	4	14	7,4	_
T*	111 1111	5	21	9,9	4
Time	: 24 INCH	6	28	12,4	13
	28°C/82°F	7	35	14,4	19
Temperature	28 4/82-4	8	42	16,3	27
0 1 101		9	49	19,2	39
Control Strip	- 1	10	56	22,4	48
Casad		11	63	26,0	58
Speed		12	70	30,3	67
Gradient		13	77	37,8	77
Gradient	:	14	85	47.4	83
100 BC 10		15	92	74,1	94
Iris Diaphragm		16	100	97,3	100
Dro ovnosuro		17	100	_	100
Pre-exposure					

PERCENT DOT SIZE 100 90 80 80 -70 70 60 -**50** — 50 40 ~ 30 - 32 20 20 -10 -10 70 50 80 100 40 90 **CHROMAGRAPH DC 300**

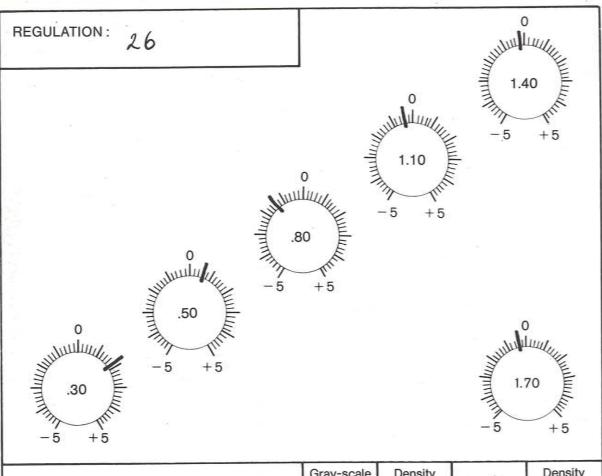
Date:

fitted on

Operator:

Exposing Lamp

29.1.76



Film : CSF I

Film Processor: PAKO

Developer : 47c

Time : 24 INCH

Temperature : 28°C/82°F

Control Strip

Speed

Gradient

Iris Diaphragm:

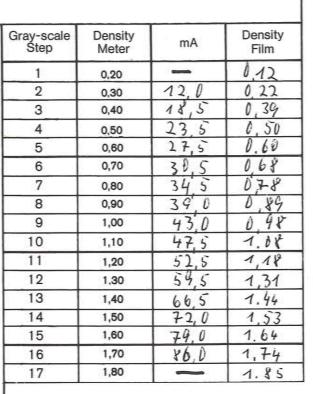
Exposing Lamp

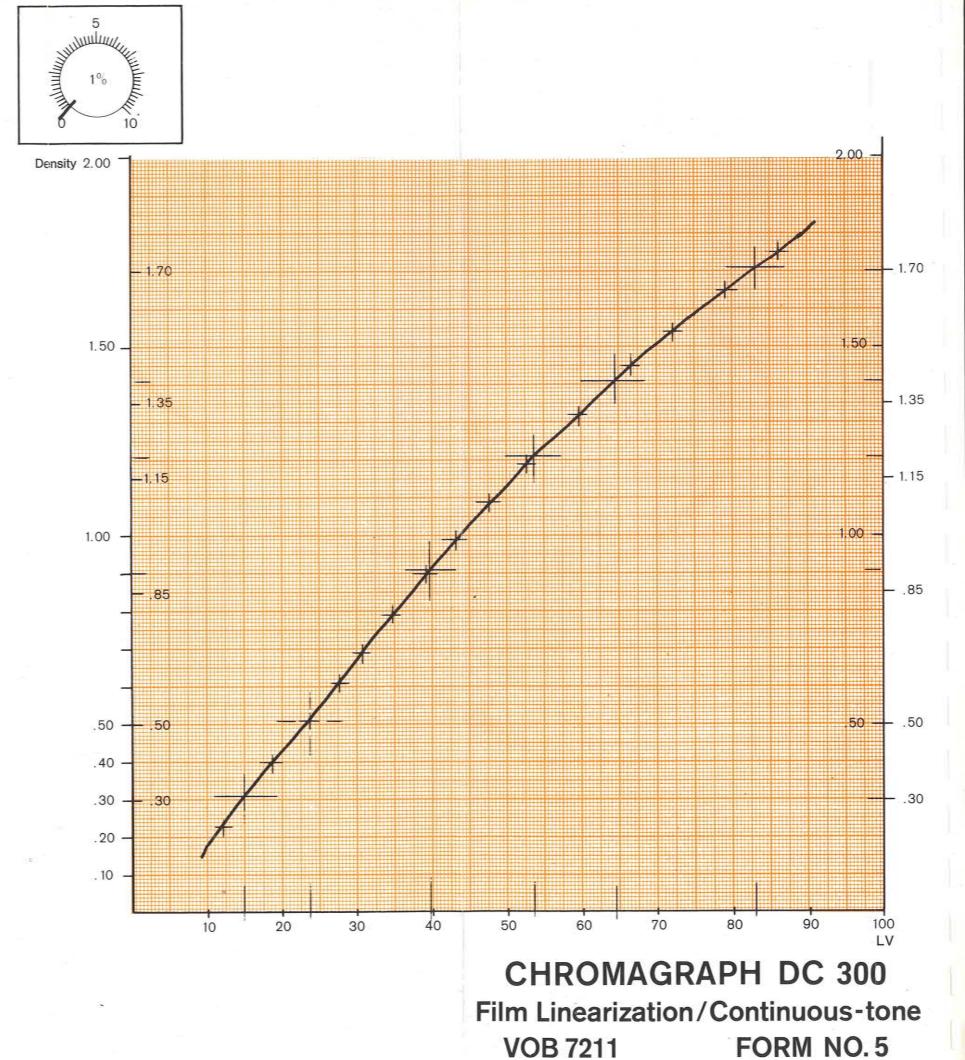
fitted on

Operator:

Date:

29. 1.76





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- TYPE OF GRADATION switch (43) in position GRAVURE. (Even although continuous-tone separations are to be prepared later for offset or letterpress printing)
- Gradation control MIDDLE TONES-Yellow (81)

in position 5.

- Gradation control MIDDLE TONES-Magenta (81) in position 5.
- Gradation control MIDDLE TONES-Cyan (81)

in position 7.

- Gradation control MIDDLE TONES-Black (81)

in position 5.

- Gradation control HIGHLIGHT CONTRAST (88)

in position 2.

- Gradation control SHADOW CONTRAST (89)

in position 5.

- Press NEG pushbutton (92).
- Press pushbutton + (100).
- Operate ON pushbutton switch (101).
- All linearization controls (102-107 a) in position 0.
- Press PICTURE pushbutton (121).
- ORIGINAL POS/NEG switch (42) in position POS 2.
- COLOR SEPARATION switch (49) in position "Cyan".
- MEASURE 1 switch (48) in position FILM DENSITY.
- Press the D 1 pushbutton (122) on the control section and adjust to 1.80 with the associated density control D1 (122 R).
- —Set the MEASURE 1 switch (48) to position MEASURE 2.
- —Set the MEASURE 2 switch (90) to position EXPOSING LAMP CURRENT.
- Check settings "1.80" and "22 mA".
- Set the MEASURE 1 switch (48) to position PICTURE ADJUSTMENT.
- Set the MEASURE 2 switch (90) to position .
- Move the scanning light spot to the lightest step of the gray scale to be scanned.
- Raise the mirror.
- Press the white pushbutton WHITE ADJUSTMENT WITH COLOR SHIFT COMPENSATION (50).
- Lower the mirror.
- Move the scanning light spot to the darkest step of the gray scale to be scanned.
- Raise the mirror.
- By means of the PICTURE ADJUSTMENT-SHADOW-Y, M, C control (63) adjust to 0.
- —Set the MEASURE 1 switch (48) to position FILM DENSITY.
- By means of the FILM DENSITY SHADOW "Cyan" control (65) adjust to 0.20.
- Move the scanning light spot to the lightest step of the gray scale to be scanned.
- —Set the MEASURE 1 switch (48) to position FILM DENSITY.
- By means of the FILM DENSITY HIGHLIGHT control (64) adjust to 1.80.
- Check whether the densities 0.20 and 1.80 are indicated. If necessary, repeat the adjustments.
- Insert the program plug into the cross point -PICTURE socket (see chapter 7.3.).
- Check positioning (see chapter 5.14.).
- Lower the mirror on the mask scanning head.
- Mount the film.
- Push the scanning and exposing heads to the lefthand starting block.
- Press the START pushbutton (128) and allow the equipment to run up to speed.
- Lock the advance lever on the mask scanning head in

- the down position.
- Scan the gray scale.
- Switch the equipment off.
- Process the film.

b) Production of an E/D Diagram

- Plot the density values against the light values on VoB 7211 Form no. 5. For this purpose:
- Operate the SCANNING LIGHT SOURCE ON pushbutton switch (101).
- Operate PICTURE pushbutton (121).
- Set the scanning light spot to the first step of the gray scale.
- Read the resulting density value and enter on the form.
- MEASURE 1 switch (48) in position MEASURE 2.
- MEASURE 2 switch (90) in position L (light value).
- Read the resulting light value and enter the result on the form.
- Set the scanning light spot to the second step of the gray scale.
- MEASURE 1 switch (48) in position FILM DENSITY.
- Read the indicated density value and enter on the form.
- MEASURE 1 switch (48) in position MEASURE 2.
- Read the indicated light value and enter the result on the form.
- Repeat the process in the same sequence for all steps of the gray scale and enter the results on the form.
- Measure the steps in the exposed gray scale with the densitometer.
- Enter the results on the form. Draw the E/D curve.
- The required light values for the individual FILM LINEARIZATION controls (102 - 107 a) can be read off the curve thus obtained.

c) Film Linearization

- TEST switch (41) in position OPERATING.
- Press PICTURE pushbutton (121).
- Lower the mirror in the scanning head.
- MEASURE 1 switch (48) in position FILM DENSITY.
- By means of the FILM DENSITY SHADOW "Cyan" control (65) set up the density "1.7".
- Press D 1 pushbutton (122) and set up the density "1.40" by means of the associated density control (122 R).
- Press D 2 pushbutton (123) and set up the density "1.10" with the associated density control (123 R).
- Press D 3 pushbutton (124) and set up the density "0.80" with the associated density control (124 R).
- -- Press D 4 pushbutton (125) and set up the density "0.50" with the associated density control (125 R).
- Press LOCAL CORR. pushbutton (126) and set up the density "0.30" by means of the LOCAL TONE AND COLOR CORRECTION-FILM DENSITY-SHADOW control (37).
- -- The MEASURE 2 switch (90) remains in the position L (light value).
- ★ Press PICTURE pushbutton (121). A density reading of "1.7" should be obtained.
- MEASURE 1 switch (48) in position MEASURE 2.
- Read off the light value for density "1.70" from the diagram and set up same with the FILM LINEARI-ZATION-STEEPNESS control 1.70 (107).
- Press D1 pushbutton (122).
- MEASURE 1 switch (48) in position FILM DENSITY.
 Check whether density 1.40 is indicated.
- MEASURE 1 switch (48) in position MEASURE 2.

- Read the light value for density 1.40 from the diagram and set up same with the FILM LINEARI-ZATION control 1.40 (106).
- Press D 3 pushbutton (124).
- MEASURE 1 switch (48) in position FILM DENSITY.
 Check wether density 0.80 is indicated.
- MEASURE 1 switch (48) in position MEASURE 2.
 Read light value for density 0.80 from the diagram and set same up with the FILM LINEARIZATION control 0.80 (104).
- Press TK pushbutton (126).
- MEASURE 1 switch (48) in position FILM DENSITY.
 Check whether density 0.30 is indicated.
- Measure 1 switch (48) in position MEASURE 2.
- Read the light value for density 0.30 from the diagram and set same up with the FILM LINEARI-ZATION control 0.30 (102).
- MEASURE 1 switch (48) in position FILM DENSITY.
- Repeat the adjustments from ★ in the same sequence until the required results are obtained.

★★ Press D 2 pushbutton (123).

- MEASURE 1 switch (48) in position FILM DENSITY.
 Check whether density 1.10 is indicated.
- MEASURE 1 switch (48) in position MEASURE 2.
- Read the light value for density 1.10 from the diagram and set same up with the FILM LINEARI-ZATION control 1.10 (105).
- Press D 4 pushbutton (125).
- MEASURE 1 switch (48) in position FILM DENSITY.
 Check whether density 0.50 is indicated.
- MEASURE 1 switch (48) in position MEASURE 2.
- Read the light value for density 0.50 from the diagram and set same up with the FILM LINEARIZA-TION control 0.50 (103).
- Repeat the adjustments from ★★ in the same sequence until the required results are obtained.
- -- Enter all settings of the FILM LINEARIZATION control on the form.
- MEASURE 1 switch (48) in position MEASURE 2.
- MEASURE 2 switch (90) in position EXPOSING LAMP REGULATION.
- Press 🔞 (96) pushbutton, note the reading and enter same on the form.

Attention

The control settings must not be changed any more.

- MEASURE 2 switch (90) in position
- MEASURE 1 switch (48) in position FILM DENSITY.
- TEST switch (41) to OPERATING.
- All gradation controls to 5.

This completes the basic settings of the equipment. The equipment is now ready for continuous-tone operation.

Attention

If more than 22 mA are measured for density 1.70 after film-linearization setting, film and processing should be checked as the sharpness decreases when the current is exceeded.

5. 6. Setting the Film Density

Prior to producing the first separation, the density range of the color separations between highlight and shadow is set by means of the FILM DENSITY controls. Begin first of all with the SHADOW controls, since these influence the HIGHLIGHT controls.

Proceed as follows:

- The basic setting of the white levels for the scanning head should be performed already. (See chapter 5.11.)
- Set the MEASURE 1 switch (48) to position PICTURE ADJUSTMENT.
- Set "100" with the PICTURE ADJUSTMENT HIGH-LIGHT controls (62).
- -- Hinge down the mirror.
- Set "0" with PICTURE ADJUSTMENT SHADOW control (63).
- Set the MEASURE 1 switch (48) to FILM DENSITY.
- Set the COLOR SEPARATION switch (49) to "Cyan".
- With control FILM DENSITY SHADOW "Cyan" (65) set the required film density for shadows (e.g. 98 % for screened separations and density 1.70 for continuous-tone separations).
- Hinge up the mirror.
- With control FILM DENSITY HIGHLIGHT "Cyan" (64) set the required film density for highlights (e.g. 5 % for screened separations and density 0.30 for continuous-tone separations). Repeat the same setting for magenta and yellow. For this purpose, switch the COLOR SEPARATION 1 switch (49/1) to the respective color separation.
- Set the COLOR SEPARATION switch (49) to "Black".
- Hinge down the mirror.
- With control FILM DENSITY SHADOW "Black" (65) set the required value for black (e.g. 75% for screened separations and density 1.40 for continuous-tone separations).
- Hinge up the mirror.
- With control FILM DENSITY HIGHLIGHT (64) set the required value for white (e.g. 0 % for screened separations and density 0.10 for continuous-tone separations).

This setting is required only for the basic setting of the film density (see chapter 5.6.) and for picture calibration with the blue pushbutton WHITE ADJUSTMENT/WITH-OUT COLOR SHIFT COMPENSATION (51) (see chapter 6.1.2.2.).

5. 7. Selecting and Aligning the Unsharp-masking Filters

Normally, a green filter in the unsharp-masking channel is used for scanning, i.e. the magenta symbol must be set on the unsharp-masking filter wheel. In special cases, e.g. when scanning fine colored lines (maps, ornaments, embroideries, etc.), optimum matching of the unsharp-masking signal to the originals is required. For this purpose, the corresponding color symbol is set on the unsharp-masking filter wheel for each color separation.

Selection of Unsharp-masking Filters

Color Separation	Symbol	Filter		
Cyan separation Magenta separation Yellow separation Black separation	Cyan symbol Magenta symbol Yellow symbol Magenta symbol	Red filter in light path Green filter in light path Blue filter in light path Green filter in light path		

The WHITE 2 alignment is performed automatically when carrying out the WHITE 1 alignment (see chapter 3.3.).

The unsharp-masking filter must be selected before the white alignment is performed. This is why the white alignment must be repeated when the unsharp-masking filter wheel, which normally is set to the magenta symbol, is turned to the cyan or yellow symbol after the alignment.

5. 8. Judging and Classifying Originals

First the gradation of the original should be judged. Originals with tonal areas of equal importance will be reproduced by means of the pre-programmed gradation (all GRADATION controls to "5"). For light originals (over-exposed transparencies, etc.) a darker gradation should be selected by setting the (GRADATION) MIDDLE TONES controls to "4" instead of "5". For dark originals (under-exposed transparencies, etc.) a lighter gradation should be selected by setting the MIDDLE TONES controls to "6" instead of "5". In general, originals can be classified by three gradations: light, middle, and dark.

Originals can be classified as follows:

- First-class originals having a barely visible color cast in highlights and shadows. Faithful reproduction is required.
- Color cast in highlights and/or shadows. Faithful reproduction is required.
- Color cast in highlights and/or shadows. Neutral reproduction is required, i.e. the color cast shall be removed.
- Originals lacking in highlights and/or shadows. Faithful reproduction is required.

Measuring Originals with a Densitometer

The original should be measured with a densitometer and its density range be checked. Do not consider reflections and deep shadows. In addition, it should be checked that the picture highlight is lighter than the pure primary colors and secondary colors.

Example: Pure red, when measured through a red filter, must not give a lower density than picture highlight.

Note: Yellow (especially that in Ektachrome transparencies), when measured through a red filter, sometimes gives a lower density than picture highlight. To determine the color cast of an original, measure through a red, green, and blue filter and compare the three densities. Picture highlight may be considered to have no color cast when the three densities differ by 0.05 or less.

Important

When working with an original, the intensity of which was achieved by silver bromide grains (e.g. gray scales or black/white pictures), the so-called Callier effect should be taken into account.

5. 9. Mounting the Originals

5.9.1. Mounting the Original on the Medium or Small Scanning Drum (by Vacuum)

The original is held in position on the small and medium scanning drums by vacuum. Moreover, an oil layer is applied between the original and the glass plate to prevent Newton's rings. When an oil layer is applied, the original can be mounted on the scanning drum with the layer side up (for better focusing).

Mounting of the original requires maximum care. This presents no difficulties when the original is placed into a mask and then taped to the drum (Fig. 5-8). Mounting is also facilitated by the fact that preparations can be made on a light table. To avoid jumps in density and therewith faulty exposures, the density of the mask should be 0.8 to 1.0. At the junction between the original and the mask, the density difference should be small. The difference in thickness between original and the mask should also be minimized. Corresponding masks are among the accessories.

Proceed as follows:

- —Turn the scanning drum so that the horizontal suction groove is up.
- Lock the scanning and exposing drums with the brake lever.
- Place the original into the cut-out portion of the mask and tape it carefully.
- Remove fingerprints and other impurities from the original.
- Secure strips of adhesive tape on all four sides of the mask (A, B, C, D) (Fig. 5-8).
- Place the original so that the longer side or the longer side of a cut-out section lies on the drum in circumferential direction.
- Take the mask with original, attach the upper strip of adhesive tape "D" to the scanning drum, and hold the mask. The upper edge of the original should be placed against the suction groove running across the drum. Be careful that the suction groove is not on the image. The right edge of the original should be placed against the suction groove running across the drum. The adhesive tapes must cover the suction grooves completely.

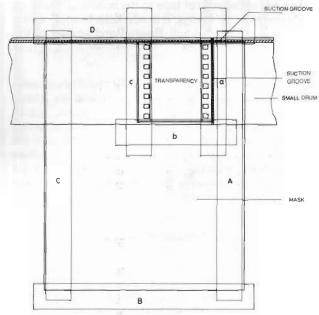


Fig. 5-8 Transparency with Mask

- Clean the scanning drum. With the oil gun, apply oil to the scanning drum where the middle of the original will be positioned.
 - For sizes 24×36 mm and 6×6 cm use approximately 0.6 ml of oil. The required quantity of oil should be applied without bubbles. Place the mask with original in contact with the scanning drum, and use a cloth to carefully tape the other three sides of the mask to the scanning drum. Gently rubbing with the cloth, evenly distribute the oil under the original; avoid bubbles.

The oil should be distributed under the whole area of the original and the adjoining portions of the mask. It need not be distributed under the whole mask area. Be careful not to apply oil to the strips of adhesive tape which hold the mask on the scanning drum.

- Switch on the vacuum for the scanning drum.
- Improve the oil distribution under the original if necessary. With the cloth, gently rub towards the suction groove to remove excess oil. The oil layer should be free from bubbles.

Important

When the transparency is properly applied to the drum by vacuum, the vacuum should not be switched off before the set of color separations is produced. If the Chromagraph is switched to NIGHT, the vacuum pump will stop.

5.9.2. Mounting all Sizes except Small-size Transparencies on the Medium and Large Scanning Drums (without Vacuum)

- Place the original with the emulsion side up on millimeter foil and take an exact squaring. Engrave small marks on the edge of the original, corresponding to the desired cut-out.
- Turn the original and fasten an adhesive tape with half of its width at the upper edge and lower edge.
- Turn the scanning drum so that the suction groove is up. In case of the large scanning drum, take the register pins as reference line. Lock the scanning and exposing drums with the brake lever.
- Place the punched holes of the original over the register pins or place the beginning of the transparency over the start line and attach each original with the upper strip of tape to the scanning drum. To prevent Newton's rings, it is advisable to apply a very thin layer of a good anti-Newton ring powder to the original or to the drum.

Attention

When using Rutherford Contact Aid instead of oil, make sure that the powder is fresh. It should be evenly distributed as accumulations produce faulty, grainy spots on the separations. Therefore, it is recommended to vigorously shake the bottle and then to wait until the somewhat heavier agglomerations deposit before applying Rutherford Contact Aid. The tube of the bottle should be positioned a few centimetres above the powder.

Warning

Be careful not to breathe in the anti-Newton ring powder and observe the manufacturer's instructions.

—With the aid of a cloth for optical systems, the originals are drawn on to the scanning drum, under uniform pressure. Without reducing the pressure, stroke the cloth over the edge of the original so that the lower strip of adhesive tape adheres to the drum and the original is fixed.

Important

To prevent the photomultipliers in the scanning head recording an unnecessarily large black-white transition, it is recommended to cover those transparent parts of the scanning drum which are also scanned during transparency scanning with a medium-density material such as thin tissue paper.

— Adjust the scanning lens with the focusing lever so that the grain of the original appears sharp in the viewing window. Since the drum is round, the sharpness must be adjusted while viewing the center of the graticule. Maximum precision can be achieved with a small illuminated area (use a magnifier).

5.9.3. Focusing of Small-size Transparencies

In general, small-size transparencies will be considerably enlarged (six times or more) after scanning. For this reason, particular care should be taken when using such originals to obtain sufficient sharpness. This applies to both scanning and exposure. The scanning lens can be focused on the dye layer of the separation color to be scanned, using a magnifier. For a black separation, focus on the blue layer.

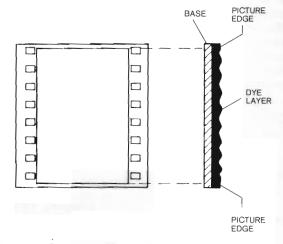


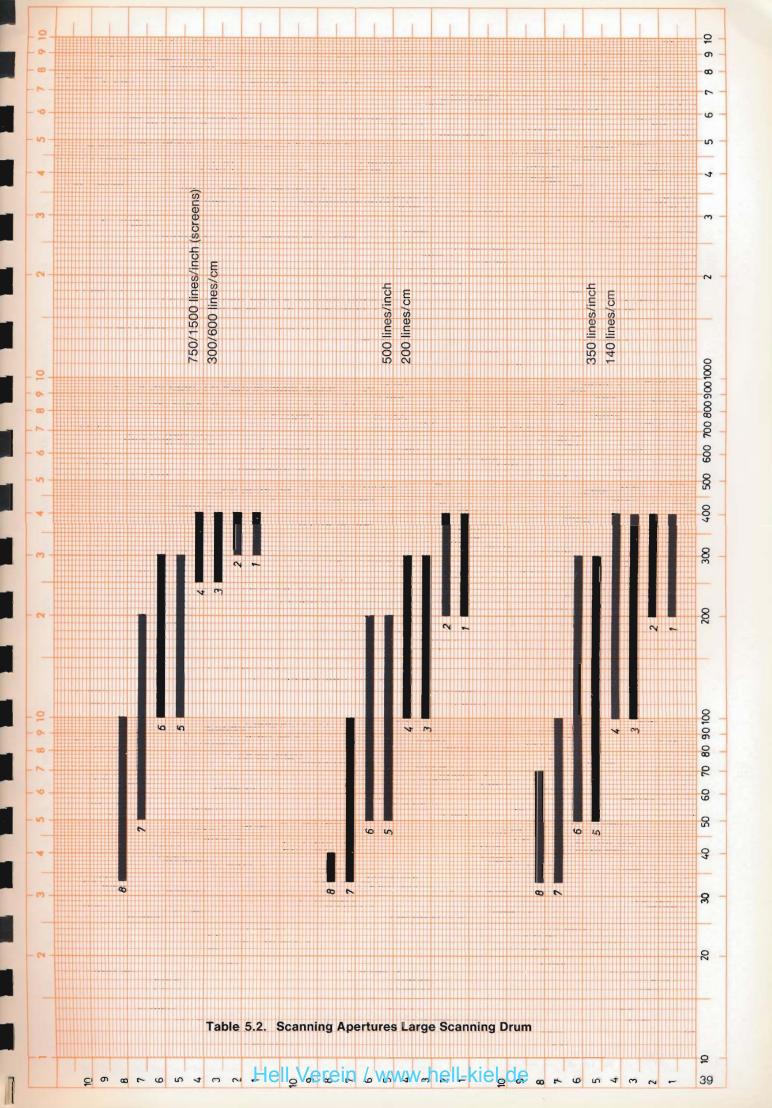
Fig. 5-9 Cross-section of Transparency

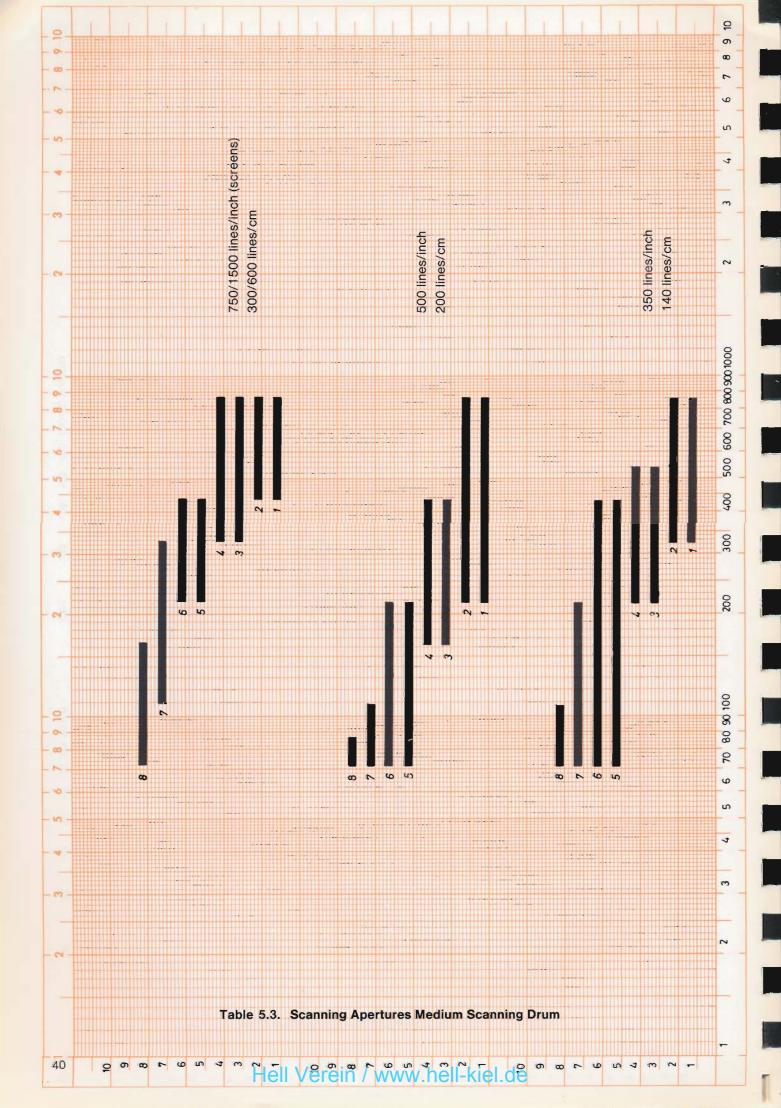
A check can be easily made as follows:

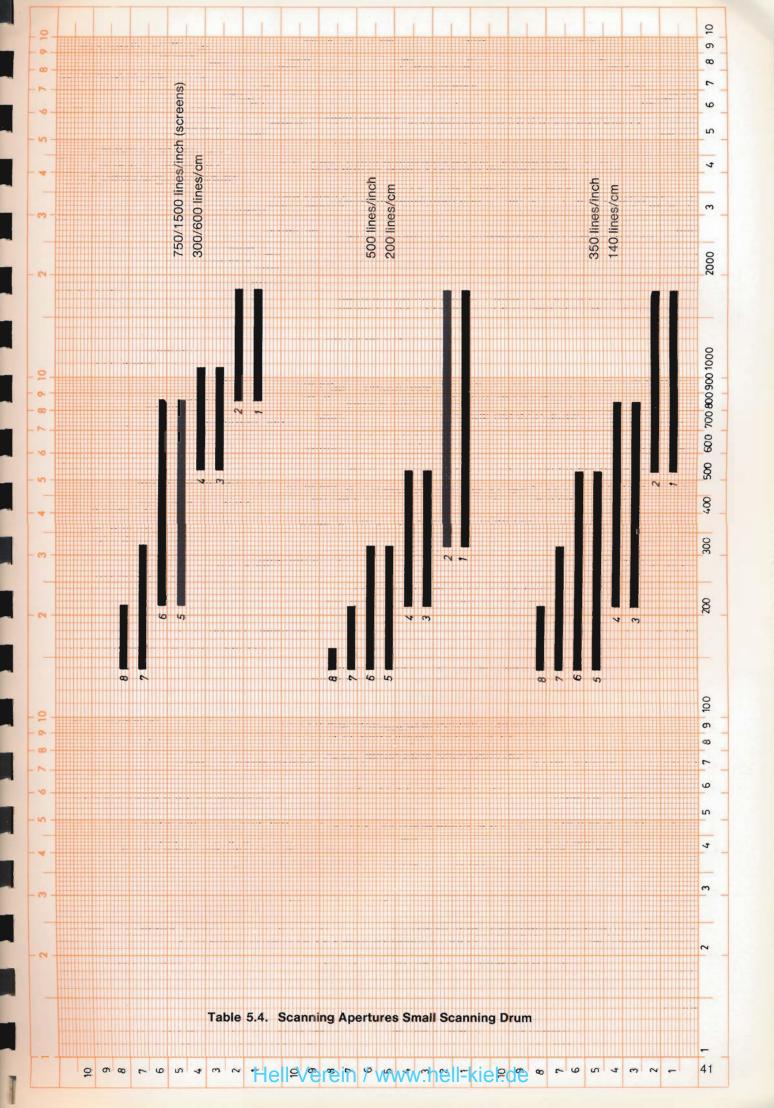
- Mount a small-size transparency of optimum sharpness in the center of the scanning drum and mark this spot, for example with a wax pencil, for possible further small-size transparencies.
- Select a color separation, focus the scanning lens and expose a film. Note the basic adjustment of the lens. Then move the lens in one direction until a slight unsharpness can be noticed.
- Again expose a film without re-calibration.
- From its basic adjustment, slightly defocus the lens in the other direction; expose a film.
- Compare the three separations and find out which lens setting gives the greatest sharpness.

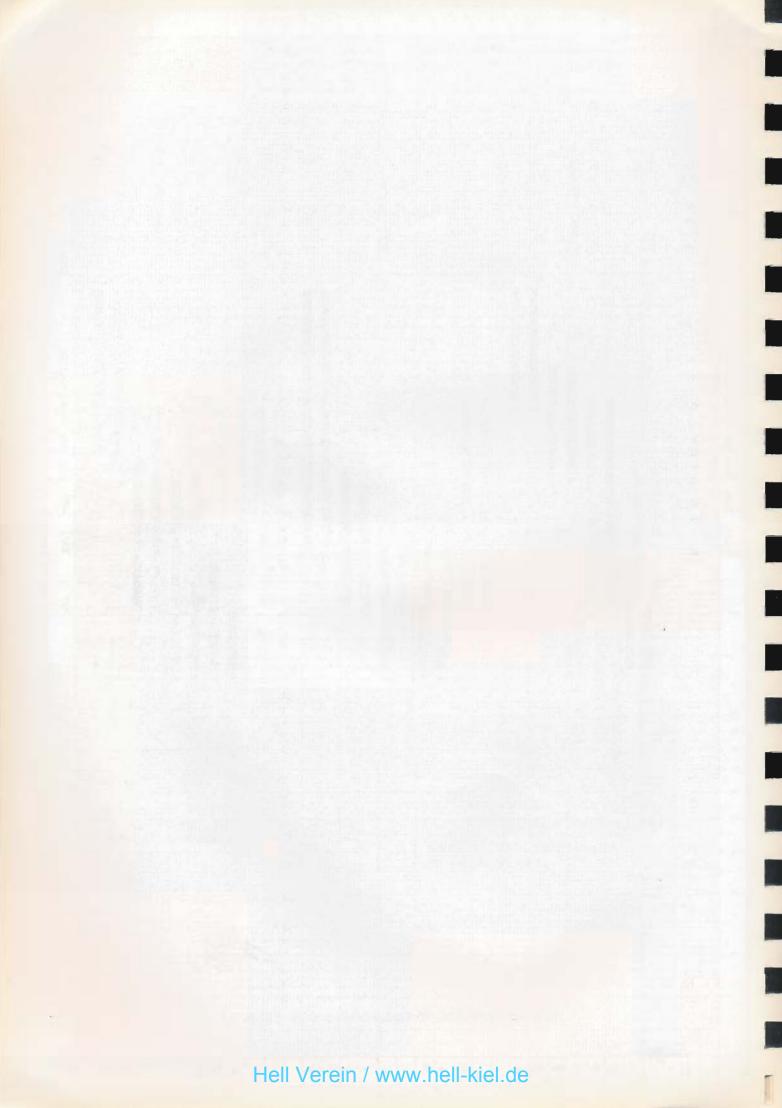
If the setting obtained does not coincide with the focusing of the viewing optical system, a service engineer should perform the re-adjustment.

— Always focus the scanning lens on the small-size transparency, for the focal plane of the small-size transparency does not correspond with the surface of the scanning drum. Moreover, mounting the original is often difficult as its edges are usually so narrow that the adhesive power of normal marking tape is insufficient. Whether the picture rests precisely on









the drum cannot be checked directly because small-size transparencies form a relief-like surface during processing. Only the picture edges remain unchanged. The dye layers of the original are more or less worn away by tanning (see Fig. 5-9). This produces hollow spaces between original and the drum. In order not to increase the size of these hollow spaces, great care should be used that the original lies flat against the drum. It may be necessary to procure especially good-quality masking tape. Focusing is performed in the usual manner. For this purpose, the magnifier should be used and the adjustment of the focus checked on several picture spots. The vacuum for the scanning drum must remain switched on.

5. 10. Selection of the Scanning Apertures

Eight different scanning apertures can be set for scanning originals. Some of them differ only in the size of the unsharp-masking.

Details regarding the size of the spot to be scanned and the unsharp-masking on the film, can be taken from table 5.1.

The aperture to be set for the selected scanning drum, the selected scale, and the selected number of lines per centimeter, can be taken from tables 5.2. to 5.4. (One copy each of these tables are loosely annexed to this description and can thus be consulted if necessary.)

Table 5. 1. Scanning Apertures

Scanning aperture	Siz	e of scar on the fil	nning spot lm (µm)	Unsharp*	Observations		
	1/1 drum (large)	1/2 drum (medium)	1/4 or 1/8 drum (small/smallest)	masking			
1	30	22	15	2 x			
2	30	22	15	4 x			
3	40	30	20	3 x			
4	40	30	20	5 x	57		
5	60	45	30	3 x			
6	60	45	30	5 x	also for reflection-		
7	120	85	60	3 x	copy acanimy		
8	250	180	125	3 x	MARIA		

5. 11. Basic Setting of White Levels for Scanning Head

It must be determined whether the white alignment is carried out with color shift compensation or without color shift compensation.

5.11.1. White Alignment with Color Shift Compensation

This setting is required only for the basic setting of the film density (see chapter 5.6.) and for picture calibration with the blue pushbutton WHITE ADJUSTMENT/WITHOUT COLOR SHIFT COMPENSATION (51) (see chapter 6.1.2.2.).

5.11.1.1. Transparency Scanning

- Switch on the pushbutton switch ON (101).
- Move the scanning head to clear glass.
- Apply the brakes.
- Set the selected aperture.
- Move the unsharp-masking filter wheel to magenta symbol (see chapter 5.7.).
- Press the pushbutton WHITE ADJUSTMENT/WITH COLOR SHIFT COMPENSATION (round white pushbutton).

5.11.1.2. Reflection-copy Scanning

- Switch on the pushbutton switch ON (101).
- Move the scanning head to the white paper surface.
- Apply the brakes.
- Set the selected aperture.
- Move the unsharp-masking filter wheel to magenta symbol (see chapter 5.7.).
- Press the pushbutton WHITE ADJUSTMENT/WITH COLOR SHIFT COMPENSATION (round white pushbutton).

5.11.1.3. Scanning of Color Negatives

- Switch on the pushbutton switch ON (101).
- Move the scanning head to "picture black" (light part in the color negative).
- Apply the brakes.
- Set the selected aperture.
- Move the unsharp-masking filter wheel to magenta symbol.
- Press the white pushbutton WHITE ADJUSTMENT/ WITH COLOR SHIFT COMPENSATION (50).
- Set the MEASURE 1 switch (48) to position PICTURE ADJUSTMENT.
- With the COLOR SEPARATION 1 switch (49/1) determine the lowest value (e.g. cyan) and leave the switch in this position.
- —Set "0" with control PICTURE ADJUSTMENT Y, M, C (63).
- Set the COLOR SEPARATION 1 switch (49/1) to "Black".
- Set "0" with control PICTURE ADJUSTMENT -"Black" (63).
- Release the brakes.
- Move the scanning head to "picture white" (darkest area in the color negative).
- Apply the brakes.
- Set the COLOR SEPARATION 1 switch (49/1) to "Cyan".
- Set to "100" with control PICTURE ADJUSTMENT HIGHLIGHT "Cyan" (62).
- Set the COLOR SEPARATION 1 switch (49/1) successively to magenta and yellow and set to "100" with control PICTURE ADJUSTMENT HIGHLIGHT "Magenta" and "Cyan" (62).
- Release the brakes.

5.11.2. White Alignment without Color Shift Compensation

The setting of the film density as described in chapter 5.6. has already been performed.

5.11.2.1. Transparency Scanning

- Switch on pushbutton switch ON (101).
- Move the scanning head to clear glass.

- Apply the brakes.
- Set the selected aperture.
- Turn the unsharp-masking filter wheel to magenta symbol (see chapter 5.7.).
- Press the white pushbutton WHITE ADJUSTMENT/ WITH COLOR SHIFT COMPENSATION (50).
- Release the brakes.
- Move the scanning head to "picture white".
- Apply the brakes.
- Press and detain the blue pushbutton WHITE ADJUSTMENT/WITHOUT COLOR SHIFT COMPEN-SATION (51).
- Set the MEASURE 1 switch (48) to FILM DENSITY.
- With the COLOR SEPARATION 1 switch (49/1) determine the brightest color channel (e.g. cyan) and maintain the switch in this position.
- With control PICTURE ADJUSTMENT HIGHLIGHT -Y, M, C (62) set the required film density (e.g. 5 % for screened separations and density 0.30 for continuous-tone separations).
- Release the blue pushbutton WHITE ADJUSTMENT WITHOUT COLOR SHIFT COMPENSATION (51).
 The adjusted values are fixed and correspond to the color differences of the original.

5.11.2.2. Reflection-copy Scanning

- Switch on the pushbutton switch ON (101).
- Move the scanning head to the white paper surface.
- Continue as described under chapter 5.11.2.1.

5. 12. Basic Setting of Detail Contrast

The DETAIL CONTRAST (44-45) controls are used to increase the sharpness of all picture contours. Their settings depend upon:

- the enlargement of the separations
- the type of original used, e.g. $21/4" \times 21/4"$ $(6 \times 6 \text{ cm})$ transparencies or duplicates
- the scanning drums used

For great enlargement ratios and small-size transparencies, a lower value should be set than for same-size (1:1) reproduction and duplicates.

Depending on the scanning aperture selected with the aperture wheel, the controls should, for example, be set according to table 5.5.

In position 1 of the control STARTING POINT (45), the steepening of the detail contrast is suppressed additionally in direction "Black" so that the steepening which is adjusted by the INTENSITY control (44) is only effective in direction "White".

Table 5. 5. Detail Contrast

	Detail Contrast				
region.	Starting point (45)	Intensity (44)			
Continuous- tone	6-7	4-7			
Screen	6-7	6-9			

5. 13. Basic Setting of Color Correction Values

For the production of the first color separations, it is advisable to set the controls for color correction according to Table 5.6.; the values given in this table are average values found in practice.

The result will be different when changing the printing inks, the type of original (Agfacolor, Ektachrome, original transparencies or duplicates) or if special requirements need be met.

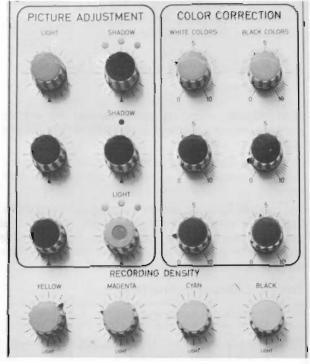


Fig. 5-10 Color Correction Controls

It is advisable to check the colors located at the corners of the color space for the respective color separation, for example:

cyan separation: cyan and red magenta separation: magenta and green yellow separation: yellow and blue as well as the 50 % tones of these colors.

If none of the above colors is over-corrected or undercorrected, all other colors will automatically be corrected sufficiently.

5. 14. Positioning the Color Separation on the Film

Positioning means determining the position of a color separation on the film. This position is determined by the distance between its top contour and the upper film edge, and between the contour at the extreme and the left edge of the film.

The position of the original on the scanning drum and the position of the color separation on the exposing drum can be selected independently from each other.

According to this selection, the scanning and exposing drums are mechanically coupled and the cross-feeds are brought into their start position.

The necessary settings are carried out by means of the keyboard, the flange, the tabulator, and the starting blocks. If it is intended to repeat color separations, setting scales are used as supplementary means.

Table 5. 6. Color Correction

COLOR SEPARATION	SELECTIVE CORRECTION							COLOR CORRECTION White colors Black colors			
	Blue	Cyan	Green	Yellow	Red	Magenta	Light red	Dark brown			~
Value Yellow	-0,51	-0,5	+1	0 +0,5	0	_11.5	0	0	4	2.54	1.52
Control	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(56)	(59)	 (59)
Value Magenta	00,5	-0.51	-0.51.5	-0.5	+0.5	+0.5 +1	0	0	34	34	1 11.5
Control	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(57)	(60)	(60)
Value Cyan	1 +1.5	+1 +1,5	+0.5	00.5	00.5	00.5	0	0	1.52	45.5	22.5
Control	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(58)	(61)	(61)
Value (40 (4)	0	0	0	0	0	0	5	5			
Black 1 (49/1) Control	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)			
Value Black 2 (49/1)	0	0	0	-3	-3	-3	5	5			
Control	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)			İ

(+) turn to the left (-) turn to the right

5.14.1. Positioning without Repetition Accuracy

- Tape the original with angular accuracy on the scanning drum.
- The beginning of the picture must be determined according to the layout, e.g.
 - distance from the perforated film edge 31 mm, distance from the left-hand film edge 40 mm.

5.14.1.1. Setting in Circumferential Direction (31 mm)

- Press the SCALE / BORDER pushbutton switch (155).
- —Press the CL pushbutton (153). (Both displays to 000.0.)
- With the keyboard (152) key in the distance from the upper edge of the film for picture beginning
 □ 031.0 and for picture end □ 500.0.

Attention

The distance between picture beginning and upper film edge must not be less than 10 mm (0.39 in.).

If no specified dimension was determined between picture end and upper film edge, key in 500.0 mm (19.68 in.).

- Turn the main drum so that the value 3.1 of the scale (209) lies below the mark (211) on the protective support.
- Apply the drum brakes.
- Loosen the locking ring on the flange and turn the scanning drum so that the detail at the beginning of the original in circumferential direction lies below the graticule in the viewing tube of the scanning optics. Tighten the locking ring and release the brakes.

5.14.1.2. Setting in Cross-feed Direction (40 mm)

- Lock the lower left-hand tab on the tabulator rail at 40 mm.
 - (Move the lower right-hand and the upper tabs to the right stop.)
- —In order to save scanning time move the mask scanning head so that the feeler of the microswitch for silhouetting on the mask scanning head is positioned at approx. 25 mm of the tabulator.
- Move the starting block against the mask scanning head and lock it.
- According to the scanning direction, move the left or right starting block against the scanning head.
- Move the scanning light spot to the detail for the desired picture start in cross-feed direction. Lock the starting block.

If the machine is to switch off automatically after the end of the picture, this can be done with the right stop below the mask scanning drum. In case of a 22 cm wide color separation, proceed as follows:

- Calculate the end of the scanning process: Add the picture beginning 40 mm = 4 cm from the left picture edge and a safety distance of 2 cm after picture end, and the picture width.
 - (4 cm + 22 cm + 2 cm = 28 cm)
- Move the feeler of the microswitch for silhouetting on the mask scanning head to the 28 cm mark of the tabulator.
- Move the right stop below the mask scanning drum to the left against the mask scanning head and lock it.

5.14.2. Positioning with Repetition Accuracy

If it is desired to repeat color separations, carry out positioning as follows:

—Tape the original with angular accuracy on the scanning drum. Provide the scanning drum with setting scales: one scale in scanning direction (above the start line) and another one, according to the scanning direction, on the left or right side of the drum in circumferential direction (this one may be shortened).

Both scales must be visible in the viewing tube.

Determine the picture beginning according to the layout, e.g.

distance from the perforated film edge 31 mm, distance from the left-hand film edge 40 mm.

5.14.2.1. Setting in Circumferential Direction (31 mm)

- Press the SCALE / BORDER pushbutton (155).
- Press the CL pushbutton (153). (Both displays to 000.0.)
- Key in 031.0 with the keyboard (152).
- Turn the main drum so that the value 3.1 of the scale (209) lies below the mark (211).
- Apply the drum brakes.
- Loosen the locking ring on the flange and turn the scanning drum so that the detail at the beginning of the original in circumferential direction lies below the graticule in the viewing tube of the scanning optics. Tighten the locking ring.
- Bring the scanning optics in front of the setting scale taped in circumferential direction, read the scale value below the graticule in the viewing tube and note it down.

5.14.2.2. Setting in Cross-feed Direction (40 mm)

- Lock the lower left-hand tab on the tabulator rail at 40 mm. (Move the lower right-hand and the upper tabs to the right stop.)
- —In order to save scanning time, move the mask scanning head so that the feeler of the microswitch for silhouetting on the mask scanning head is positioned at approx. 25 mm of the tabulator.
- Move the starting block against the mask scanning head and lock it.
- According to the scanning direction, move the left or right starting block against the scanning head.
- Loosen the main drum.
- Move the scanning optics to the detail at the beginning of the original in cross-feed direction.
- Lock the starting block.
- Turn the scanning drum until the horizontal setting scale lies in front of the optics. Read the scale value in the viewing tube and note it down.

If the machine is to switch off automatically after the end of the picture, this can be done with the right stop below the mask scanning drum. In case of a 22 cm wide color separation, proceed as follows:

- Calculate the end of the scanning process: Add the picture beginning 40 mm = 4 cm from the left picture edge and a safety distance of 2 cm after picture end, and the picture width.
 - (4 cm + 22 cm + 2 cm = 28 cm)
- Move the feeler of the microswitch for silhouetting on the mask scanning head to the 28 cm mark of the tabulator.
- Move the right stop below the mask scanning drum to the left against the mask scanning head and lock it.

When color separation repetitions are produced, the start positions of exposing drum and scanning drum are adjusted **exclusively** according to the noted values for the picture beginning and for the coordinates of the scanning drum. The original on the scanning drum must not be moved.

5. 15. Setting the Threshold Values for the Mask Scanning Head

Threshold values are set as follows:

- Tape the mask with red-blue transition.
- Focus the scanning light spot of the mask scanning head on quasi white (with clear film).
- Set the MEASURE 1 switch (48) to MEASURE 2.
- Set the MEASURE 2 switch (90) to CONTROL MASK ADJUSTMENT.
- Hinge up the mirror. Perform the alignment (see chapter 5.16.).
- Lightly apply the brake so that the mask drum can still be turned manually.
- Press the R-B pushbutton (110). (Fig. 5-11.)
- Turn the mask drum so that the scanning light spot of the mask scanning head illuminates the seam between the read and blue mask colors.
- Carefully move the mask drum until the meter (47) reads "0".
- Press successively pushbuttons "Red" (108) and "Blue" (109) and note the meter reading. (Fig. 5-11.)
- Press the R-B pushbutton (110). Position the mask scanning head on another location of the red-blue transition. Turn the mask drum until the meter reads "0".
- Again press successively pushbuttons "Red" (108) and "Blue" (109) and note the meter reading.
- Repeat the procedure four times. Average the four values noted.
- Press the "T_R" pushbutton (111) and set the average value found with the RED threshold control (113).
- Press the "TB" pushbutton (112) and set the average value found with the BLUE threshold control (114).

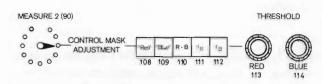


Fig. 5-11 Operating Elements for Setting the White Levels and the Threshold Values for the Control Mask

5. 16. Basic Setting of White Levels for Mask Scanning Head

The white levels for the mask scanning head need be set in the morning after the machine has been switched on, prior to the film linearization, and after the mask has been changed. A setting is also recommended after a longer interruption. Proceed as follows:

- Press the ON pushbutton (101).
- Focus the scanning light spot of the mask scanning head on quasi white (with clear film).
- Press the Wa "White Alignment Mask" pushbutton (94).