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1. INTRODUCTION AND QUICK START INSTRUCTIONS

Thank you for buying the JOBO ColorLine 7000, a precision color and density measurement instrument utilizing the latest technology. All types of films can be handled with only one calibration. The ColorLine 7000 also allows you to set the slope correction for each of the three colors in each separate program channel.

The ColorLine 7000 offer many helpful functions for making color negatives and B/W prints. It also allows you to use B/W and B/W Variocontrast materials. The unit comes pre-calibrated for several popular color papers. These factory-loaded programs allow you to quickly get good results with many of the most common popular papers used with color negative films.

To take full advantage of all the features of the ColorLine 7000, please read this manual before use.

QUICK START INSTRUCTIONS

The pre-calibrated channels are as follows:

Channel 1	Agfa Papers
Channel 2	Fuji Papers
Channel 3	Kodak Ultra II
Channel 4	Konica/Tetenal

These calibrations can be used as a starting point helping you to get perfect enlargements in minimum time (see chapter 2.2.1 on full integration measurement).

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PROCEDURE:

- 1. Switch on the ColorLine 7000
- 2. Select the channel No. for the paper used by using the ' $\blacktriangle \nabla$ ' button
- 3. Insert the negative into the enlarger carrier
- 4. Press the "LAMP" key
- 5. Adjust enlargement to the size you want
- 6. Swing in the red filter holder (w/o red filter) with diffuser disc
- 7. Place measuring probe on the baseboard in the center of the image and press the "ANALYSE" button
- 8. Adjust the enlarger filters so that the analyzer display reads 0-0-0
- 9. Adjust the lens aperture (F-stops) so that an exposure time of 2-5 seconds is displayed
- 10. Press the "LAMP" key, analysis is now finished.
- 11. Remove measuring probe and diffuser disc
- 12. Press the "LAMP" key
- 13. Put paper in the enlarger carrier
- 14. Press the "START/STOP" button to start exposure

Important: Do not alter the pre-calibrated channels if your first enlargement is not perfect and corrections to the program are needed. Should you nevertheless want to alter the pre-calibrated channels, press the CAL-button and record the data or enter the original values from the pre-program into another empty channel (channels 5-50 are empty; see chapter 7.1 "Copy channel").

PROCEDURE:

- 1. Switch on the ColorLine 7000
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1.1 THE JOBO COLORLINE 7000

Your new JOBO Colorline 7000 is a precision color and density measuring instrument for use when making both color and black and white prints from negatives and transparencies. By comparing the color and brightness of enlarger light with stored values known to give prints with neutral color balance and correct density, it enables the user to accurately reproduce those conditions, reliably producing high quality prints.

It offers the choice of four measurement techniques, full integration, partial integration, spot and multi-spot measurements to cope with a wide variety of printing applications. The ColorLine 7000 can also be used as a transmission densitometer.



The ColorLine 7000 consists of a control unit, a measuring probe and a power supply unit. The measuring probe can be fitted with two panels, one transparent with a central aperture, used for full integration and 'spot' measurement, the other serves as a diffuser for partial integration measurement and a circular diffuser for full integration measurement. The use of these panels is explained in the appropriate sections of this manual. The analyzer also includes a foot switch and black and white, color negative and positive gray films for calibration purposes. The probe is mounted on a tilting base to correct for cosine error when a spot or partial integration measurement is being taken off axis, and again this facility is described in chapter 2.2.5.

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1.2 INSTALLATION



(The plug system and accessories supplied will vary according to the national system in use.)

The unit can then be switched on using the switch on the power supply. The ColorLine will 'beep', and carry out a self-check including the enlarger lamp. It will then standby for instructions. It is a good idea to leave the unit switched on for approximately 5 minutes to allow the circuits to stabilize before use.

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1.3 THE CONTROL PANEL

The ColorLine 7000 control panel is fitted with a 3 line LCD display, four 3 digit LED numeric displays, and eleven function buttons. The LCD display shows the current status of the ColorLine 7000. It will also indicate the progress of any procedure selected, and prompt for any actions needed.



The four LED displays show exposure time and filtration values for yellow, magenta and cyan colors.

The Main Function Buttons:

'Analyse'

The 'analyse' button is used to take a color measurement. It is also used to take and store multiple readings when used in the multi-point spot measurement mode.

'Lamp'

This switches the enlarger lamp on and off.

'Start/Stop'

This button starts and stops a timed exposure when the analyzer is in 'Ready' mode, and exits any other mode. When pressing the "Start/Stop" button, the unit returns to 'Ready' mode.

The other function buttons are:

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'+' and '-' buttons:

These buttons are used to change values displayed on the LCD or LED displays. They can be also used to change exposure times when the ColorLine 7000 is used as a manual timer in 'Ready' mode.

'Menu' button:

The 'Menu' button calls up the User Menu. Six sub-menus can be accessed in turn, the 'BASIC', 'STATISTIC', 'CALIBRATE', 'GRADE', 'SETUP' and 'SPECIAL' function groups.

'Cal' button:

This button allows direct access to the calibration values and measurement conditions so that changes can be made to individual channels manually.

'Yes'

This button will start a function in the user menu, confirm a procedure, and exit a function saving any new data in memory.

'No'

The 'No' button will terminate a procedure without changing old data in memory.

Foot Switches:

Up to two foot switches can be connected to the ColorLine 7000. A foot switch connected to the right hand socket will act as a 'Start/Stop' button, and a foot switch connected to the left hand socket will act as a 'Lamp' button. One foot switch is supplied with the ColorLine 7000, a second can be ordered from your JOBO reseller (Item No. 6201).

2. GETTING STARTED

2.1 PAPER TYPES

All color analyzers need to be calibrated so that particular combinations of paper and measurement techniques can be reproduced accurately. With the ColorLine 7000, up to 99 different combinations can be permanently stored in separate memory channels for instant recall.

These channels are programmed at the factory so that channels 1 - 50 are preset for color negative use, channels 51 - 70 are preset for color positive paper, channels 71 - 85 are preset for graded black and white papers, and channels 86 - 99 are for variable contrast (VC) black and white papers.

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These channels can be re-allocated to suit personal choice using the following procedure:

- Make sure ColorLine 7000 is in 'Ready' mode.
- Select desired channel No. using $\Delta \nabla'$ buttons.
- Press 'Cal' button.
- Press '****' button four times until paper type blinks in LCD display.
- Press either '+' or '-' buttons until required paper type is displayed (NEG, POS, B&W or VC).
- Press 'Yes' to store new setting in memory.

2.2 MEASUREMENT TECHNIQUES

2.2.1 Full Integration

The full integration measurement technique uses the principle that if all the colors in a scene are mixed together, they will produce a neutral gray. This is the simplest form of color measurement, and is recommended for the beginner. The full integration technique will give good results for most natural landscape scenes, and should be used until experience has been gained in the use of the ColorLine 7000. In this technique, the measurement probe is used without a cover in the center of the baseboard directly under the lens. Diffusing material is supplied with the ColorLine 7000, and this should be fitted in place of the red filter material in the swing holder directly by the enlarger lens.

Errors can arise if one color dominates the scene. Situations where this can occur include photographs of brightly colored cars or large areas of grass lawns, for instance. To correct these situations, the ColorLine 7000 can be used with two other measurement techniques, 'partial integration' and 'spot'.

These channels can be re-allocated to suit personal choice using the following procedure:

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2.2.2 Partial Integration

The partial integration technique uses a rectangular diffuser which slides into channels provided at the top of the measuring probe. The image is projected undiffused on to the enlarger baseboard, and the probe is used to select a small area of the image free of dominant colors



2.2.3 Spot Measurement

Spot measurement is used when a particular tone needs to be reproduced from print to print. The specific tone can be a skin tone, a gray tarmac road, green grass, or a highlight tone just showing detail like snow or a white-washed building. This method has the advantage of accuracy, and it isn't necessary to choose an area of different tones as in the partial integration technique.



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2.2.4 Multiple Spot Measurement

This technique is useful when an average of several spot measurements is required - when measuring large areas of grass, or differing skin tones, for examples.

2.2.5 Probe Angle

In both the spot and partial integration techniques, the measurement area may well be off center and towards the edges of the scene. To compensate for this, the probe is fitted with a tilt mechanism to correct for the angle of incidence of the enlarger light. The angle can be easily set by ensuring that the shadow of the center aperture in the transparent plate for spot measurements is concentric with the cell aperture. The probe assembly should be tilted and rotated on the enlarger baseboard to achieve this.





The measurement technique used for each channel is stored in the analyzer's memory. Symbols are used for each technique at the end of the first line in the LCD display as follows:

- Full integration
- □ Partial integration
- Spot and Multi-Spot

These measurement techniques are stored using the following procedure:

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3. COLORLINE 7000 CALIBRATION

3.1 CALIBRATION USING A 'KNOWN' PRINT

This is the simplest way of calibrating the ColorLine 7000, but it requires that a 'perfect' print be prepared first using manual filtration and exposure techniques. This 'reference' print is then used to calibrate the analyzer. It is important to choose an average scene without any particularly dominant colors. The daylight color balance

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The reference print should be made immediately before the calibration process is started, and the print exposure time noted. The film (negative or positive) should be left in the enlarger carrier, and the magnification, filtration and lens aperture settings must be exactly the same as those used for the reference print.

The procedure is as follows:

- Make sure ColorLine 7000 is in 'Ready' mode.
- Select the calibration channel number, method of measurement and paper type of the channel to be calibrated
- Press the 'Menu' button. The LCD panel will display the 'Basic' sub-menu, and 'Known Image' starts blinking.
- Press 'Yes' to confirm choice.
- The LCD panel will then prompt to insert film in the enlarger carrier.
- Confirm by pressing 'Yes'. The enlarger lamp is turned on.
- Make sure probe is set for the measurement method used, and position probe at the first measurement position.
- Confirm the measurement position by pressing "Yes" or press "Analyse", up to 20 times max., for further measurement points with multiple spot measurement. After termination of last measurement press "Yes" to confirm.
- Enter the exposure time used for the reference print using the +/- buttons. It may be necessary to keep the +/- buttons pressed for a longer time.
- Store the new calibration in the analyzer's memory by pressing 'Yes'. Pressing "No" will terminate this procedure without storing the new value.

The channel selected is now calibrated. The calibration can now be checked by pressing 'Analyse' at each of the probe positions used for calibration. After the final position is measured, the analyser should read 0 - 0 - 0 filtration, and the time displayed should equal the exposure time used for the reference print.

Remove the film from the enlarger carrier.

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Remove the film from the enlarger carrier.

3.2 SELF-CALIBRATION USING A GREY TONE NEGATIVE

This method of calibration uses the ColorLine 7000 to automatically produce a neutral gray print. The technique is straightforward, and requires no skills in evaluating color casts or density values. For this reason, this is the calibration technique recommended for beginners.

A number of test pieces of paper need to be prepared, each approximately 9x12cm in size. Four of these can be cut from an $8 \times 10^{\circ}$ ($18 \times 24 cm$) piece of paper. Eight of these should be enough for calibration, and any left over can be used for further calibration or for slope correction tests. These test pieces should be kept in a light-tight paper safe.

The procedure consists of first analyzing a neutral gray negative, then exposing and processing a test piece of paper. After the analyzer measures a reference white tone, the test piece is analyzed. The process is repeated until a perfect gray tone is obtained. The LCD panel on the ColorLine 7000 will prompt each step of the calibration process as it proceeds.

Calibration procedure:

- Adjust enlargement to 20x25cm
- Make sure ColorLine 7000 is in 'Ready' mode.
- Check the calibration channel No., the paper type and set full integration measurement technique. Press "Yes".
- Press 'Menu' three times. LCD panel will display 'Calibrate' sub-menu, the function 'Auto Cal' starts to blink. Press "Yes" to confirm.
- LCD panel will prompt 'Calibrate? Yes/No'. Press "Yes" to confirm.
- Process one piece of unexposed paper for the reference white tone and press 'Yes'.
- Insert the gray film into the enlarger carrier and press 'Yes'
- LCD panel will now display 'Analyse 5s'. Place the probe on the baseboard under the lens, and null the displayed color values using the enlarger filtration. Vary the lens aperture or enlarger ND filter system so the displayed time reads 5 seconds. Press "Yes" to confirm.
- At this stage, the analyzer will check if filtration and time is correct. If not, it will offer the option to repeat the 'analyse' function. Otherwise, move probe away and place a test sheet of paper on the baseboard. Press 'Start/Stop'.
- The analyzer will expose the paper for 5 seconds, and prompt 'Process gray paper'. Process paper and press 'Yes'.

You now have a white reference print and the first gray test print. The next stage is to measure the neutrality of this gray using the ColorLine 7000's transmission densito-

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- The analyzer will expose the paper for 5 seconds, and prompt 'Process gray paper'. Process paper and press 'Yes'.

You now have a white reference print and the first gray test print. The next stage is to measure the neutrality of this gray using the ColorLine 7000's transmission densito-

meter function. In turn, the LCD panel will prompt to remove film, open diaphragm, move filters out of the optical path, and remove the gray negative from the enlarger carrier.

- The LCD panel will prompt 'Put white paper'. Place the probe on the baseboard under the lens, place the white processed test print on the probe covering it completely, and press 'Yes'.
- The ColorLine 7000 will then take a few seconds to analyze the white test print. When all the readings have settled, press 'Yes'.
- The LCD panel will prompt 'Put gray paper'. Without moving the probe, remove the white test print and replace it with the gray test print. Press 'Yes'.
- The ColorLine 7000 will then analyze the gray test print and display the color values. When all the readings have settled, record these readings and press 'Yes'.

The ColorLine 7000 will then display the existing calibration values, which should be now recorded and give the option of replacing these with the new values just determined. Press "Yes" to store the new values.

This calibration process will need to be repeated several times before a satisfactory gray tone is achieved. The ColorLine 7000 will accept a gray tone as neutral if the color values are in the range of 55 - 60 units , and the difference between any two numbers is not more than +/- two units. If a satisfactory gray tone has not been achieved, the LCD panel will prompt 'Next loop. Yes / No'. Pressing 'Yes' will repeat the calibration, 'No' will abandon the process.

3.3 POSITIVE-POSITIVE SELF CALIBRATION

The procedure described above will calibrate the ColorLine 7000 for use with the color negative process. The same basic procedure can be used to calibrate the analyzer when prints are being made from transparencies using the color reversal printing process. In this case, 'NEG' should be changed to 'POS' in the calibration channel settings, and the mounted gray scale transparency should be used instead of the gray test negative. The white reference print should be exposed to the enlarger light with the lens at full aperture for at least ten seconds before processing. meter function. In turn, the LCD panel will prompt to remove film, open diaphragm, move filters out of the optical path, and remove the gray negative from the enlarger carrier.

- The LCD panel will prompt 'Put white paper'. Place the probe on the baseboard under the lens, place the white processed test print on the probe covering it completely, and press 'Yes'.
- The ColorLine 7000 will then take a few seconds to analyze the white test print. When all the readings have settled, press 'Yes'.
- The LCD panel will prompt 'Put gray paper'. Without moving the probe, remove the white test print and replace it with the gray test print. Press 'Yes'.
- The ColorLine 7000 will then analyze the gray test print and display the color values. When all the readings have settled, record these readings and press 'Yes'.

The ColorLine 7000 will then display the existing calibration values, which should be now recorded and give the option of replacing these with the new values just determined. Press "Yes" to store the new values.

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3.4 SLOPE CORRECTION

The calibration settings made so far are only true for exposure times in the order of 2 - 5 seconds. When longer or shorter exposure times are used, color casts can occur because of reciprocity failure in the paper. With the ColorLine 7000 it is easy to add a 'slope' correction to a channel for each color density.

The 'slope correction' calibration procedure requires $9 \ge 12$ cm test pieces as prepared for self-calibration.

The procedure consists of first analyzing a neutral gray negative, then exposing a test piece of paper at 5 seconds exposure time. This piece of paper is stored whilst a second piece of paper is exposed at 20 seconds, but at a smaller lens aperture. Both pieces of paper are then processed. Both the 5 second test print and the 20 second test print are then analyzed by the ColorLine 7000 in turn, and the difference used to compute the slope correction required. This is then stored in the analyzer's memory for that calibration channel.

The procedure is as follows:

- Select the calibration channel required, film type and measurement technique.
- Press 'Menu' three times.
- Select 'Auto Slope' using the $\mathbf{\nabla}$ button. Press 'Yes' to confirm.
- LCD panel will prompt 'Slope calibr. Yes/No'. Press 'Yes' to confirm.
- Insert neutral gray film (negative or positive) into enlarger carrier. Press 'Yes' to confirm.
- The LCD panel will prompt 'Check 5-20s'. Place probe on the baseboard under the enlarger lens. Null the color readings using the enlarger filters, and check that it is possible to obtain exposures of 5 seconds and 20 seconds by altering the lens aperture only.
- If it is not possible to obtain both exposure times, change the enlarger head position until it is. Press 'Yes' to confirm.
- Set the lens aperture to give a 5 second exposure, and check that the color readings are nulled. Press 'Yes'.
- Note the lens aperture. Press 'Yes'
- Note the enlarger filtration settings. Press 'Yes'.
- Set the probe aside, and place one piece of test paper on the enlarger easel directly under the lens. Press 'Yes'.
- The enlarger will expose the 5 second test print. At the end of the exposure, Press 'Yes', mark the piece as 'print 1' by cutting off a corner, and store in a light-tight paper safe. Press 'Yes' again

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- Set the probe aside, and place one piece of test paper on the enlarger easel directly under the lens. Press 'Yes'.
- The enlarger will expose the 5 second test print. At the end of the exposure, Press 'Yes', mark the piece as 'print 1' by cutting off a corner, and store in a light-tight paper safe. Press 'Yes' again

- Replace the probe on the enlarger baseboard in the same position as before. Set the lens aperture to give a 20 second exposure, and check that the color readings are nulled. Press 'Yes'.
- Set the probe aside, and place one of the test papers on the enlarger easel directly under the lens. Press 'Yes'.
- The enlarger will expose the 20 second test print. At the end of the exposure, Press 'Yes', mark the piece as 'print 2' by cutting off two corners, and store in a light-tight paper safe.
- Process both test prints.

At this stage you have both test prints ready for analysis by the ColorLine 7000 in the transmission densitometer mode.

The procedure is as follows:

- Open the lens aperture to full, remove the grey film from the enlarger carrier, and move the filters out of the optical path. Press 'Yes' to each of the ColorLine 7000 prompts.
- Place 'print 1' on top of the measurement probe so it fully covers the surface, and press 'Yes'.
- The ColorLine 7000 will analyze print 1. Without moving the probe, remove test paper. Press 'Yes'.
- The ColorLine 7000 will analyze 'print 2', and display the density difference compared to print "1". Press 'Yes'.
- If the displayed density difference is less than 2 units, the slope calibration has been successful and the procedure will be terminated. If not, the ColorLine 7000 will ask to repeat (loop) the calibration procedure.

If the channel was self-calibrated using a grey tone negative, the calibration process is now complete.

Important:

If the channel was calibrated using a 'known print', then this calibration may have been altered by the slope calibration process.

The following procedure will correct this:

- Press 'Yes' after successful calibration prompt above.
- Insert the gray film, which you used for slope calibration.
- Move the sensor on the baseboard under the enlarger lens. Press 'Yes'.
- Set the aperture and filtration which was noted at the beginning of the slope calibration. Press 'Yes' after each step.

- Replace the probe on the enlarger baseboard in the same position as before. Set the lens aperture to give a 20 second exposure, and check that the color readings are nulled. Press 'Yes'.
- Set the probe aside, and place one of the test papers on the enlarger easel directly under the lens. Press 'Yes'.
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- The ColorLine 7000 will analyze print 1. Without moving the probe, remove test paper. Press 'Yes'.
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- Press 'Yes' after successful calibration prompt above.
- Insert the gray film, which you used for slope calibration.
- Move the sensor on the baseboard under the enlarger lens. Press 'Yes'.
- Set the aperture and filtration which was noted at the beginning of the slope calibration. Press 'Yes' after each step.

- Set time to 5 seconds using the '+' and '-' buttons. Press 'Yes'.
- Remove the film.

The calibration process is now complete.

Calibration procedure with "known print"

- Press 'Yes' after successful calibration prompt above.
- Insert the film used for the original "known image" calibration.
- Move the sensor on the baseboard under the enlarger lens. Press 'Yes'.
- Set the aperture and filtration which was noted at the beginning of the slope calibration. Press 'Yes' after each step.
- Set time to 5 seconds using the '+' and '-' buttons. Press 'Yes'.
- Remove the film.

The calibration process is now complete.

4. COLOR ANALYSIS AND EXPOSURE

4.1 SINGLE READING ANALYSIS

Once calibration is complete, analysis and exposure with the ColorLine 7000 is straightforward. The procedure is as follows:

- Place the original (negative or transparency) in the enlarger carrier
- Make sure the probe is set up for the measurement technique required, and that the correct channel is selected in the analyzer
- Press the 'Lamp' button, and compose the print on the enlarger baseboard.
- Stop the lens down to the required aperture.
- Press the 'analyse' button.
- Swing in the color filters until the analyzer filtration readings are nulled.
- Press 'Lamp' to leave 'analyse' function (lamp is kept on)
- Press 'Lamp' again to switch off enlarger lamp.

then:

- Place the paper on the enlarger baseboard.
- Press 'Start/Stop' again to expose the paper.
- Process the print.

- Set time to 5 seconds using the '+' and '-' buttons. Press 'Yes'.
- Remove the film.

The calibration process is now complete.

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- Press 'Yes' after successful calibration prompt above.
- Insert the film used for the original "known image" calibration.
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- Press 'Lamp' again to switch off enlarger lamp.

then:

- Place the paper on the enlarger baseboard.
- Press 'Start/Stop' again to expose the paper.
- Process the print.

4.2 MULTI-POINT ANALYSIS

The multi-point analysis function of the ColorLine 7000 will allow up to 20 points to be averaged. The procedure is as follows:

- Place the original (negative or transparency) in the enlarger carrier
- Make sure the correct channel is selected in the analyzer.
- Press the 'Lamp' button, and compose the print on the enlarger baseboard.
- Stop the lens down to the required aperture.
- Press 'analyse' button to start analyse.
- Place the probe in the first measurement position, and tilt the probe to correct for any angle.
- Press the 'analyse' button.
- Place the probe in the second measurement position, and correct the probe angle.
- Press the 'analyse' button.
- Repeat the last two actions until all the points (up to 20) have been measured. You can measure more than 20 points, but only the last 20 will be averaged.
- At the final measuring point, do not move the probe, and null the analyzer filtration readings.
- Press 'Lamp' to leave 'analyse' function.
- Press 'Lamp' again to switch off enlarger lamp.
- Place the paper on the enlarger baseboard.
- Press 'Start/Stop' again to expose the paper.
- Process the print.

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- Press 'Lamp' again to switch off enlarger lamp.
- Place the paper on the enlarger baseboard.
- Press 'Start/Stop' again to expose the paper.
- Process the print.

5. RECALIBRATE FUNCTIONS

At any time, a test print can be made to compare with the original test print used for self-calibration. Any changes can then be entered into the analyzer's memory using the recalibrate functions. The 'Recalibrate CAL' function can be used to alter individual channel settings, whilst the 'Recalibrate MASTER' will alter all channel settings for a particular paper type.

First, make a grey test print using the following procedure:

- Insert the grey film into the enlarger carrier, and set the same magnification conditions used for the original self calibration.
- Place the probe under the enlarger lens
- Press 'Analyse'
- Null the analyzer filtration values with the enlarger filters
- Set the exposure time to 5 seconds by varying the lens aperture settings
- Press 'Start/Stop' button
- Place the paper on the enlarger baseboard. Use the same kind of paper as used for the original grey test print.
- Expose the test print by pressing 'Start/Stop'.
- Process.

With both prints, the comparison and recalibration can be made:

- Press 'Menu' three times
- Select 'Recal CAL' or 'Recal MASTER' using '▲▼' buttons. Press 'Yes'.
- Open lens aperture fully. Press 'Yes'
- Move filters out. Press 'Yes'
- Place first grey print on top of the measuring probe, ensuring it covers the surface completely. Press 'Yes'
- When values on LED displays are stable, Press 'Yes' again
- Place second grey print on top of the measuring probe, ensuring it covers the surface completely. Press 'Yes'
- You can now read the differences between the first and second grey prints.
- Press 'Yes' to recalibrate the channel, Press 'No' to abandon the changes.

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6. USING THE COLORLINE 7000 WITH B&W MATERIALS

The ColorLine 7000 can also be used to establish the paper grade required when printing on black and white papers, and to set the required filtration when using variable contrast (VC) papers. These facilities are found in the 'Grade' sub-menu, and three functions are provided, 'find grade', 'grade table', and 'VC table'.

6.1 FIND GRADE

To find the paper contrast grade required, make sure that the channel selected is set to 'B&W' or 'VC'. Then:

- Insert the B/W-negative in the enlarger carrier.
- Press 'Lamp', compose and focus the image.
- Press 'Menu' four times, 'Find Grade' should be blinking. Press 'Yes'.
- Position the probe over the darkest part of the image that shows detail, tilt the probe to correct for any angle, and press 'Yes'.
- Position the probe over the lightest part of the image that shows detail, tilt the probe to correct for any angle, and press 'Yes'.

The LCD display will then indicate the density difference between the lightest and darkest points selected, together with the recommended paper grade. This grade will then be repeated in the LCD panel when the ColorLine 7000 is used in the 'Analyse' mode for B&W materials.

• Enter 'Ready' mode by pressing 'Yes'.

6.2 GRADE RANGE

The 'grade range' function allows you to define the range of density for each paper contrast grade number. Three sets of values can be stored for three different types or makes of paper. To access the tables, press 'menu' four times, and select 'grade range' using the ∇ button. The paper type (1-3) is displayed in the LCD panel, and the min/max density values are shown for each paper grade in the LED displays (Y = MIN-value, M = MAX-value). Each of these values can be selected using the ' $\Delta \nabla$ ' buttons, and edited using the '+' and '-' buttons. Press 'Yes' to store all changes.

6.3 VC TABLE

This function allows you to select the filtration required to obtain a contrast grade using variable contrast (VC) paper. Three sets of values (filtration, density correction value and grade) can be stored for three different types or makes of paper. To access

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the tables, press 'menu' four times, and select 'VC table' by pressing twice the \bigvee button. After pressing "Yes" the paper type (1-3) is displayed in the lower line of the LCD panel and the yellow and magenta filtration values and the density correction values required, are shown for each papergrade in the LED displays. (D= Gradation, Y=Yellow, M= Magenta, C= Density korrection) The grade can be changed using the

'▲▼' buttons, and the filtration values can be edited using the "+" and "-" buttons to suit the characteristics of different papers. Press "Yes" to store all changes. When pressing "NO", old values will be reinstalled. Attention: Note down old values, before changing them.

Note: The paper grade is changed only with yellow or magenta. Therefore only one filter should be used, in order to keep exposure time down.

6.4 CALIBRATION FOR B&W MATERIALS

The ColorLine 7000 can be calibrated to give exposure measurement for B&W materials using either the 'known print' or 'self calibration' techniques already described. The only exceptions are:

- A neutral grey film is used for the self-calibration procedure.
- The paper grade that was used for the 'known' print is entered after the 'Analyse' button is pressed, but before the exposure time is entered.

6.5 ANALYSIS WITH VC MATERIALS

Because the Colorline 7000 has the ability to store and measure both density and color, it can also be used to select the correct filtration as well as exposure for variable contrast papers. The unit is pre-calibrated with density and filtration values which are suitable for most variable contrast papers, and these can be used as a starting point. The procedure is as follows:

- Establish the contrast grade required using the 'Find Grade' procedure already described.
- Place negative in the enlarger carrier, focus and compose image.
- Press the 'Analyse' button.
- Place the probe on the baseboard, and tilt to correct for any angle.
- Adjust either the yellow or magenta filtration in the enlarger until the LED display reads zero.
- Adjust the lens aperture until the exposure time reads between 5 and 10 seconds.
- Press 'Lamp' key to exit 'analyse' mode.
- Press 'Lamp' key to turn enlarger lamp off.
- Place paper on baseboard, and press 'Start/Stop' to expose print.

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- Press 'Lamp' key to turn enlarger lamp off.
- Place paper on baseboard, and press 'Start/Stop' to expose print.

7. OTHER COLORLINE 7000 FUNCTIONS

7.1 COPY CHANNEL

This function is used to copy all calibration values from one channel to another. The procedure is:

- Press 'Menu' button once to select 'Basic' submenu
- Press $\mathbf{\nabla}$ button once to select 'copy channel'.
- Press 'Yes'; analyzer will show source channel number
- Change source channel number if needed with $\Delta \nabla$ buttons.
- Press 'Yes' to confirm choice
- Analyser will indicate target channel number
- Change target channel number if needed with $\Delta \nabla'$ buttons.
- Press 'Yes', analyzer will ask for confirmation
- Press 'Yes' again, and data will be copied. Press 'No' to abandon copy of data.

7.2 MASTER VALUES

The Master Function allows access to the Master data that controls the calibration of all channels that share the same paper type. This allows a change to be applied across all channels to compensate for a change in developer activity, for instance. The procedure is as follows:

- Press 'Menu' button once to select 'Basic' submenu
- Press ▼ button twice. Press 'Yes' to select 'Master'
- Select density or color display using ' $\blacktriangle \nabla$ ' buttons.
- Enter changes using '+' and '-' buttons
- Confirm changes by pressing 'Yes' button.

7.3 REFERENCE ANALYSE

This special analyse technique should be used for large enlargements or for dense originals to compensate for low light levels at the baseboard. Two measurements are made, one of film color and density without enlarger filters, and one of the enlarger filtration without film. The procedure is as follows:

- Switch off all darkroom safelighting
- Press 'Menu' once to select 'Basic' submenu
- Press ' ∇ ' button three times. Press 'Yes' to select 'Ref analyse'.
- Insert the film in the enlarger carrier, and compose picture on the baseboard. Press 'Yes'

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- Press $\mathbf{\nabla}$ button once to select 'copy channel'.
- Press 'Yes'; analyzer will show source channel number
- Change source channel number if needed with $\Delta \nabla$ buttons.
- Press 'Yes' to confirm choice
- Analyser will indicate target channel number
- Change target channel number if needed with $\Delta \nabla'$ buttons.
- Press 'Yes', analyzer will ask for confirmation
- Press 'Yes' again, and data will be copied. Press 'No' to abandon copy of data.

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The Master Function allows access to the Master data that controls the calibration of all channels that share the same paper type. This allows a change to be applied across all channels to compensate for a change in developer activity, for instance. The procedure is as follows:

- Press 'Menu' button once to select 'Basic' submenu
- Press ▼ button twice. Press 'Yes' to select 'Master'
- Select density or color display using $\Delta \nabla'$ buttons.
- Enter changes using '+' and '-' buttons
- Confirm changes by pressing 'Yes' button.

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- Switch off all darkroom safelighting
- Press 'Menu' once to select 'Basic' submenu
- Press ' ∇ ' button three times. Press 'Yes' to select 'Ref analyse'.
- Insert the film in the enlarger carrier, and compose picture on the baseboard. Press 'Yes'

- Open lens aperture to full. Press 'Yes'
- Move all filters out or set to zero. Press 'Yes'
- Place the probe in the first measurement position, and tilt the probe accordingly to correct for any angle.
- Press "Yes", or for multiple spot measurement press analyze button after each position and terminate multiple spot measurement, pressing "Yes".
- Remove film from carrier without moving sensor probe. Press 'Yes'.
- Close lens aperture to working value. Press 'Yes'
- Move filters back in enlarger head. Press 'Yes'
- Null filter display by adjusting enlarger filtration. Press 'Yes'
- Insert the film in the enlarger carrier. Press 'Yes'
- Place paper on baseboard and expose with 'Start/Stop' button.

7.4 DENSITOMETER

The ColorLine 7000 can be set up as a transmission densitometer to measure both color and density. This is the procedure:

- Switch off all darkroom safelighting
- Press 'Menu' once to select 'Basic' submenu
- Press ▼ button four times. Press 'Yes' to select 'Densitometer'. Absolute values are displayed.
- Move all filters out, and open lens aperture fully
- Position the measuring sensor on the baseboard under the lens, Press 'Yes'. The incident light is set to reference 0.
- The densitometer will now read density and color values of any negative or transparency, which will be placed in the enlarger.
- Press 'Yes' to store current values as a reference.

Future readings will now show the difference between the new reading and the stored reference value. To exit this 'reference density' mode Press 'No'.

- Open lens aperture to full. Press 'Yes'
- Move all filters out or set to zero. Press 'Yes'
- Place the probe in the first measurement position, and tilt the probe accordingly to correct for any angle.
- Press "Yes", or for multiple spot measurement press analyze button after each position and terminate multiple spot measurement, pressing "Yes".
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- Close lens aperture to working value. Press 'Yes'
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7.5 CORRECTION

Often, it is difficult for beginners to define the filtration correction required to remove color casts in prints. The 'Correction' feature will recommend a change to the 'CAL' values once the color and overall density of the print is entered. This is the procedure:

- Press 'Menu' six times. 'Correction' will blink in the display, Press 'Yes'
- Enter the color of the cast from a choice of yellow, magenta, cyan, blue, green, red, orange, violet, or none (for density error only), by using the '▲▼' buttons. Press 'Yes'
- Enter the size of the color error from a choice of small, middle or large by using the '▲▼' buttons. Press 'Yes'
- The ColorLine will then ask if the density of the print is light, normal or dark.
 Enter choice by using the '▲▼' buttons. Press 'Yes'
- Now select the degree of density error small, middle or large by using the
 '▲▼' buttons. Press 'Yes'

The ColorLine 7000 will now display a recommended modification to the CAL values for the channel. Pressing 'Yes' will automatically update the calibration, 'No' will abandon the procedure.

7.6 SLOPE

Press 'Menu' six times, and select 'slope' using the \bigvee button. Press 'Yes' and the analyzer will display slope values stored for any channel. This feature is normally used only to view slope values. It is possible, but not recommended, to change them manually here using the '+' and '-' buttons. If this is done, the channel must be recalibrated using the 'known image' technique.

7.7 DEFAULT

'Default' is accessed through the 'Special' sub-menu and is used to clear the memory of the analyzer completely. Press 'Menu' six times, and select 'default' using the ' $\blacktriangle \nabla$ ' buttons. Press 'Yes'. The analyzer will then ask you to confirm that you still want to proceed before completely erasing all data in the paper calibration channels.

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8. STATISTICS

The Statistics function of the ColorLine 7000 allows a record to be kept of the number of prints processed. This is useful to calculate developer and bleach/fix replenishment rates of continuous or slot processors. Once the print formats have been entered (up to 9), the ColorLine 7000 will automatically calculate the number of prints exposed, and calculate the area of print surface processed.

8.1 FORMATS FUNCTION

This is used to enter the print formats used, in either metric or imperial units, depending on the choice made in the 'Setup' menu. It is important that the format number is always changed when the print size is changed for this feature to work correctly.

- Press 'Menu' twice to enter 'Statistic' sub-menu
- 'Formats' will blink in LCD display, Press 'Yes'.
- The first display will show format number from 1 to 9
- Select format number with '+' and '-' buttons.
- Enter print width and length (Y-value and M-value) by using '▲▼' buttons followed by '+' and '-' buttons.
- Numbers of prints are counted automatically, but can be changed manually in Cyan display by using '+' and '-' buttons
- Press 'Yes' to leave function.

8.2 SQUARE FUNCTION

This function will display the total area of prints made in the LCD display.

- Press 'Menu' twice to enter 'Statistic' sub-menu.
- Press '▼' button once to select 'Square'. Press 'Yes'
- LCD display will indicate total surface of all prints processed.
- Press 'No' to exit display.

8.3 CLEAR

Selecting 'Clear' from the 'Statistic' sub-menu will set print and area counters to zero. Press the MENU button twice followed by the ' ∇ ' button. Press 'Yes' to start deletion. Confirm displayed messages by pressing 'Yes' or 'No'.

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8.4 ENABLE

Select 'Enable' from the 'Statistic' sub-menu and press 'Yes'. The automatic calculation of surface area of exposed prints is started by selecting 'enable or disable' using the ' \blacktriangle ' buttons. Press 'Yes' to confirm.

9. SETUP

The 'Setup' sub-menu is used to set the operating preferences of the ColorLine 7000. 'Setup' is accessed by pressing 'Menu' five times. The functions are then selected using the ' $\blacktriangle \nabla$ ' buttons and confirmed by pressing 'Yes'.

Language

This selects the text language for the LCD display.

Sound

This function enables or disables the sound function when:

- A key is pressed, and/or
- Once per second during exposure, and/or
- at the end of exposure

Log or Time

This function is used to determine the intervals used when setting exposure time. 'Log' will change exposure by 1 LogD unit at a time, whilst 'Time' will alter exposure in steps of 0.1s up to 99secs, and in steps of 1 sec from 100 to 999 secs.

Brightness

This function controls the brightness of the LCD and LED displays as well as the control backlighting. Control can be manual or automatic, depending on ambient lighting levels. The manual values can be set using the '+/-' buttons.

Zero Channel

This function allows either the cyan or magenta channel to be set to zero when the ColorLine 7000 is used in the 'analyse' mode. The cyan channel is usually zeroed for printing from negatives, and the magenta channel is usually zeroed when printing from transparencies.

Unit type

This function chooses metric (cm) or imperial (inch) units in the 'format' function

Accuracy

This function will alter the analyzer filtration readings so they match the enlarger filtration values. It is an adjustment that needs to be done channel by channel. Filtration color is selected using the ' \blacktriangle ' buttons, and values are changed using the '+' and '-' buttons. When done accurately, this adjustment enables filtration readings or recommendations on the analyzer to be entered directly into the enlarger color head.

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10. SPECIFICATIONS

Paper Types:	Color negative, Color Positive, B&W graded, B&W Multi-Contrast	Paper Types:	
Sensor:	3mm spot	Sensor:	
Measurement methods:	Full integral, partial integral, spot and multiple spot	Measurement methods:	
No of channels:	99	No of channe	
Switched Power:	460W / 115V 920W / 230V	Switched Pow	
Light Sensitivity:	0.0025 to 50 Lux	Light Sensitiv	
Exposure Accuracy:	0.01 LogD	Exposure Acc	
Color Balance Accuracy:	0.01 LogD	Color Balanc Accuracy:	
Slope corr. Accuracy:	: 0.2%	Slope corr. A	
No of multiple spot readings per measurement:	1-20	No of multipl spot readings per measuren	
Paper grade range:	0 to 5	Paper grade r	
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Gradation increment:	0.5			
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11. WARRANTY AND LIABILITY

The warranty conditions apply as specified in our General Terms and Conditions.

Within a period of 6 months from the date of delivery, we or one of our after-sales service centers will remedy free of charge any defects or malfunctions - either via replacement delivery or repair, subject to our discretion - which are not covered by our warranty, excluding parts subject to wear.

Repairs are effected at our service center, whereby transport and travel costs are charged to the customer. Any repairs carried out during the warranty period shall not result in any extension of the originally granted warranty period. No regress shall be provided, either during or after the warranty period, for any damage resulting from incorrect handling or intervention by a third party.

We accept no liability for indirect or consequential damage. Consequently, the warranty does not cover any damage resulting from failure or malfunctioning of the unit (loss of earnings, loss of materials), unless such damage is due to gross negligence on the part of the manufacturer.

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JOBO-Labortechnik • Kölner Str. 58 • D-51645 Gummersbach • Tel.: +49 (0) 22 61 / 5 45-0 Fax: +49 (0) 22 61 / 5 45-42 • E-Mail: verkauf.inland@jobo.com • Internet: www.jobo.com Technical modifications are reserved

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