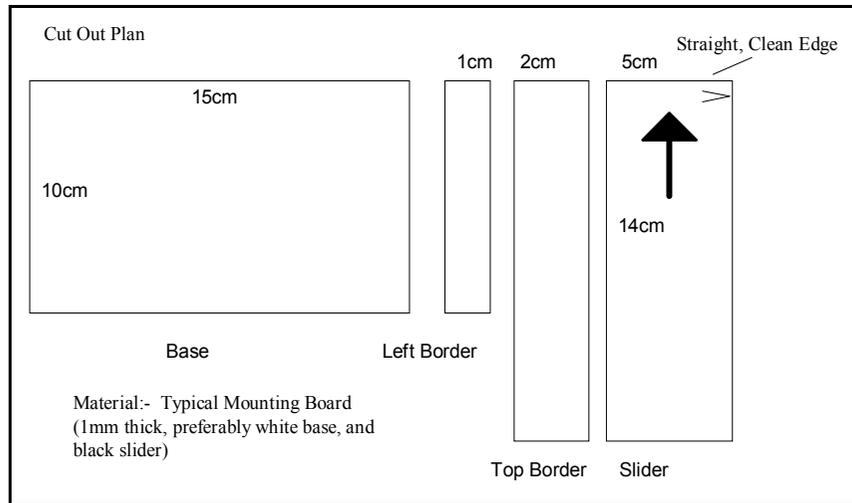




Plans for a cardboard grey scale template



Scale Ruler

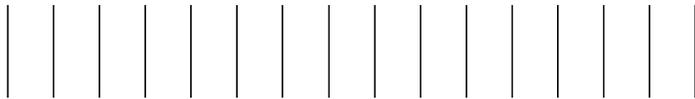
Spacing = 6.0 mm (0.24 inches)

Greyscale Markings

Black end

White End

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1



Once made, the grey scale can be trimmed (the final size should be 90x6mm) and attached to the front panel of the Analyser with a low strength adhesive. Suitable adhesives (such as Blu Tack or Prit Stick) will allow removal and replacement of the scale should you wish to change the paper type. (The grey scale supplied with the unit should be removed before attaching your own.)

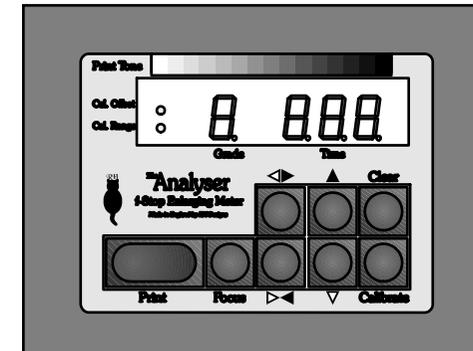
Remember, when you attach the grey scale to your unit, align it carefully in the aperture with the black end to the right!



The Analyser

Enlarging Meter and Timer

Instructions for use



*Our policy is one of continuous improvement, therefore the information in this document is subject to change without prior notice. This document is copyright ©1996-7 and may not be copied or reproduced in any form without the permission of RH Designs.
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CONTENTS OF THE PACKAGE

TheAnalyser package contains the following items: the Analyser control box together with its remote sensor, a mains lead fitted with a plug, and two IEC connectors for your enlarger and safelight. If any of these items are missing or damaged contact your supplier immediately.

CAUTION

Please read these instructions carefully and fully before installing or using your Analyser.

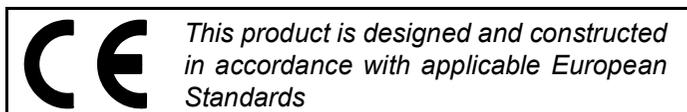
WARNING: THIS APPLIANCE MUST BE EARTHED

The mains lead supplied with the unit is fitted with a moulded plug suitable for use with the standard mains outlets in your country. If the lead is not suitable, obtain a replacement. If this is not possible, the plug must be cut off leaving as little free lead as possible *and disposed of immediately*. Severe electric shock hazard will exist if a cut-off plug is plugged into a live outlet! A suitable replacement plug should then be fitted to the lead. If a fused plug is used, it should be fitted with a 5A fuse.

For continued protection against fire hazard, replace only with the same type and rating of fuse. (Fuse rating T5A.) Repair service is available - return the unit to RH Designs if repairs become necessary. ***Do not attempt to open the unit or to remove any covers. Doing so may expose dangerous voltages.*** Do not drop the unit or subject it to mechanical shock or extremes of temperature or humidity. Like other electronic equipment, The Analyser can be damaged by water or chemical spillage. Do not install this equipment where it may be subject to water or chemical spillage or splashes. Should such spillage occur, disconnect the equipment from the mains supply before attempting to clean it.

GUARANTEE

This equipment is guaranteed against faulty components or manufacture for a period of two years from the date of original purchase. Should a fault develop within this period, please telephone us for advice before returning the unit. If there is a fault, we will repair or replace (at our option) the equipment at no charge. This guarantee does not affect your statutory rights. Damage due to misuse of the equipment, and any consequential loss arising out of the use or misuse of the equipment are not covered by this guarantee.



Notes.





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PLEASE NOTE:

The cable between the main control box and the remote sensor is not detachable. This avoids the reliability problems which can result from connectors. Please do not subject the cable to unnecessary strain.
 The grey scale is attached with a low-tack adhesive deliberately, to allow its easy removal and replacement.

SAFETY WARNING:

This unit is designed for the control of photographic enlargers and safelights only. Connection of any other equipment to this unit may result in fire or shock hazard and will invalidate all warranties.



Introduction

Thank you for choosing The Analyser, the f-stop timer / meter designed *by* photographers *for* photographers. They say that ‘necessity is the mother of invention’; that is certainly true in the case of the Analyser which is the result of three years development and refinement. Since darkrooms are potentially hazardous places, please read the installation and safety parts of this guide before setting up or using your new timer.

The Analyser is not an ‘automatic meter’, it does not replace the intelligence or stifle the creativity of the photographer. The design allows you to pre-visualise and manipulate the print according to your taste.

The Analyser is intended for Black and White printing, using fixed and variable contrast papers. Built-in basic calibration suits Ilford Multigrade IV RC paper together with Ilford’s Under-the-Lens Multigrade Filter Set, although the calibration can be modified to suit your own equipment, preferred materials and methods. The use of discrete filters will ensure best results with minimum calibration. The Analyser uses a remote sensor which measures a 5 mm diameter spot of the projected image. The control box displays grade and exposure information as well as controlling the enlarger and safe-light. It is the control and presentation of the exposure information which is significantly different to other meters.

Features

Print Tone Control

The Analyser can record and display up to eight spot measurements from the negative image area, and will suggest an initial exposure based on the average tonal value for the selected paper contrast grade. Each exposure reading is shown as a print tone by a 15 segment bargraph, adjacent to a printed grey scale. It is possible, after the initial measurement(s) have been taken, to use this bargraph to indicate the print tones for different combinations of exposure and paper contrast without making a print.

Development Control

The Analyser can be used as a densitometer on the projected negative image. Each time a measurement is made, the display shows the image intensity in relation to the brightest sample taken. In combination with a controlled exposure of the negative with a reference subject (e.g. a Zone System test), negative contrast control and film to film development consistency can be assessed.



Checking the Installation

When you have completed the wiring, plug the Analyser’s mains lead into a convenient socket and switch on. The safelight (if connected) should illuminate. If it does not, or the timer display does not come on, switch off and check your wiring, and any fuses. If everything is satisfactory, press Focus. The enlarger should now switch on. Again, if it does not, or the timer display does not come on, switch off and check your wiring, and any fuses. If everything is satisfactory, you are ready to start printing.

Helpline

If you need any more help or information, contact RH Designs on 01442 258111 during office hours, or otherwise on 01442 244907. An answering service is available on both numbers.

Bibliography

The following books contain helpful information on monochrome printing. This is by no means an exhaustive list, nor is it in any order of preference.

Nocon, Gene: “Photographic Printing”, 2nd edition, Virgin

Ephraums, Eddie: “Creative Elements”, 21st Century

Ephraums, Eddie: “Gradient Light”, Working Books

Rudman, Tim: “The Photographers Master Printing Course”, Mitchell Beazley



Connecting Your Enlarger and Safelight

CAUTION: Before proceeding further, in the interests of safety disconnect the Analyser's mains lead from the supply socket.

In most cases, you will need to remove the existing mains plug from your enlarger and replace it with one of the IEC connectors supplied with the Analyser. A wiring diagram is shown in fig.18. If you are in any doubt as to how safely to wire up the connectors, consult a qualified electrician. When you have fitted the connector, plug it into the Enlarger socket at the back of the Analyser.

Similarly, if you wish to use the automatic safelight switching facility, fit the second IEC connector to your safelight mains lead and plug it into the Safelight socket at the back of the Analyser. **NOTE:** Sodium safelights such as the Duka 50 must NOT be connected to the timer as they must be left switched on.

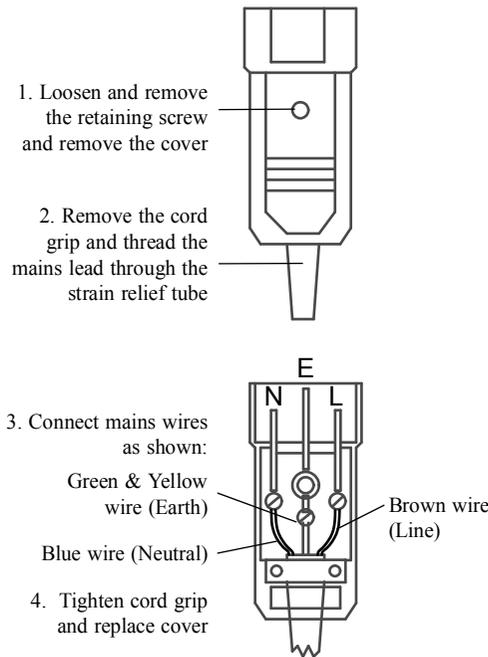


Fig.18 Connector Wiring Diagram



Vibration Free prints

A unique feature of the Analyser is the use of a four second delay between pressing the Print button and the enlarger switching on. This allows vibrations from the desk (and floorboards!) to die down, and time for dodging tools or hands to be placed in the light path. This feature can be disabled.

Automatic Intelligent Test Strips

The Analyser has the ability to make 7 test strips in 1/5th or 1/10th stop increments centred about the displayed exposure time. This is achieved with just one button press in association with a test strip mask. Incremental exposures for test strips are controlled to the nearest 1/10th second.

F-Stop Exposure Times

Exposure times can vary between 1.5 and 97 seconds and are controlled to the nearest 1/10 second. These exposure times are calculated in equal exposure steps. For low contrast grades 00 to 3.5, 1/5th stop exposure steps are used, and for higher grades, 1/10th stop steps. The exposure can be adjusted manually using the exposure override buttons both before and after exposure metering.

Calibration

The in-built calibration suits Ilford Multigrade paper but can be modified to cover many different enlarger / paper combinations. In conjunction with the automatic test strip maker, it is possible to identify and program an exposure compensation for each contrast grade and additionally allow the contrast range of each grade to be altered for individual taste. Four separate calibration sets can be programmed, to accommodate four different materials e.g. RC and FB papers, or matt and gloss surfaces. Instructions are included for you to make your own custom print grey-scale which will maximise the accuracy of the Analyser's readings.

Measurement Range

The Analyser calculates exposure times to the nearest 1/10th EV steps. It has an in-built 9 stop working range, and will give out of range warnings for dark and light extremes.

Instructions - Basic Use

Setting Up

To set up The Analyser for use, follow the instructions in the Installation Guide on Page 23 of this booklet. After checking the installation, switch on at the rear. The display will check all segments, show the calibration set in use and then display the standard grade (2) and print time (15.0). The safe-light should be on

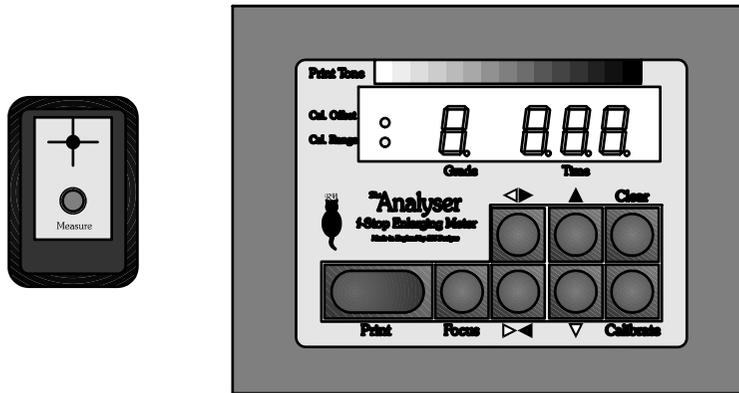


Fig.1. The Remote Sensor and Control Box Front Panel

and the enlarger off. The front panel of the main unit and its display and controls are illustrated in Fig. 1. The remote sensor contains the sensor and a push button switch: care should be exercised in handling the remote sensor.

Controls

There are 8 buttons on the control box (refer to Fig.1):

1. = Darker (Exposure Increase) button
2. ☞ Lighter (Exposure Decrease) button
3. ⚙ Harder (Contrast Increase) Button
4. ?d Softer (Contrast Decrease) Button
5. Print Print start button
6. Focus Enlarger on/off toggle button
7. Clear Clear measurements / test strip / calibration
8. Calibrate Calibration button

In addition, the Remote Sensor has one push-button which is used to initiate a light measurement.

Darker =

Increases exposure by one fifth or one tenth stop before or after making an exposure measurement.

Installation Guide

CAUTION: Like other electronic equipment, the Analyser can be damaged by water or chemical spillage. Do not install this equipment where it may be subject to water or chemical spillage or splashes. Should such spillage occur, disconnect the equipment from the mains supply before attempting to clean it. Do not install this equipment where it may be subjected to extremes of temperature or humidity.

Conventional Enlargers

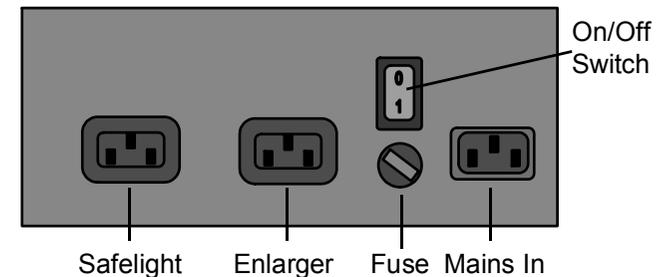
The Analyser functions as a mains switch, and in most cases installation simply consists of connecting the timer to the mains, and then connecting the enlarger's mains lead to the socket at the rear of the unit. Most conventional enlargers use low voltage bulbs fed from a transformer (e.g. Durst, LPL etc.), and the Analyser can control such loads of up to 750W (most enlargers are 100 - 250W). The Leitz Focomat has a built-in transformer and can be connected directly. If your enlarger is of this type, go to "Connecting your enlarger and safelight".

Cold Cathode Enlargers

Most Cold Cathode enlargers can be safely controlled by the Analyser; the timer's internal relays can cope with the high switch-on currents demanded by such enlargers. The maximum rating of the relays is 10A surge. If you are in doubt, consult the manufacturer of your enlarger, or RH Designs direct.

Stabilisers

Most stabilisers will work quite happily with the Analyser; the mains input to the stabiliser unit should be connected to the Analyser's Enlarger socket. The De Vere Transtab unit has connections for a timer and a dedicated connecting lead is available from us. If you are in doubt, consult the manufacturer of your stabiliser, or RH Designs direct.



The Analyser Rear Panel



Message and Error Displays

There are a number of special messages and error displays which may appear during use of the Analyser:

Fig 8. Much too bright (out of measurement range): **HI**

Fig 9. Much too dark (out of measurement range): **LO**

Fig 10. More than 8 samples on a single image, or a test strip sequence is close to extreme exposure times: **EEE**

Fig 11. Display of exposure offset (in this case -10 steps): **C-10**

Fig 12. Test Strip Mode display: **L 9.9**

Fig 13. Programming of no print delay (in calibration mode): **d off**

Fig 14. Display of calibration offset (in this case -3 steps, grade 2): **2 - 3**

Fig 15. Display of calibration contrast (in this case ISO174, grade 0): **0174**

Fig 16. Indication of calibration set in use: **PAP2**



Lighter **B**

Decreases exposure by one fifth or one tenth stop before or after making an exposure measurement.

Harder **S**

Changes the tonal and exposure values to suit a higher contrast paper by one half grade.

Softer **?d**

Changes the tonal and exposure values to suit a lower contrast paper by one half grade.

Print

(The Print button or optional foot-switch.) This will do one of two things:

- With the enlarger off it will initiate a print exposure of the displayed time, extinguishing the safe-light.
- With the enlarger on it will commence a test strip sequence, with further presses for each subsequent strip exposure.

Focus

This toggles the enlarger light on and off. (Measurements can obviously only be taken with the enlarger on.) During Calibration mode, subsequent presses of the Focus button change and exit the calibration mode.

Clear

This key will do one of four things:

- Clear any measurement values from memory, but retain the last exposure time.
- Abort a test strip sequence in-between strip exposures.
- Clear any calibration offset or contrast adjustment during the calibration procedure.
- Abort a print exposure when held depressed for one second.

Calibrate

This key performs two functions. A press and hold (for one second or more) of this key initiates the calibration mode sequence. To clear any calibration offsets and return to factory calibration, press Clear whilst in calibration mode. Press Calibrate briefly in calibration mode or normal operation to select the next



calibration set for modification or metering.

Measure

This button, located on the remote sensor, is used to take light measurements. It functions only when the enlarger lamp is illuminated.

Understanding the Display

The display shows paper grade, exposure time, density, exposure compensation, and simple messages at different times. Half grades are indicated by a decimal point after the grade number. The very low contrast grade 00 is shown by a small "o". The display's standard format is:

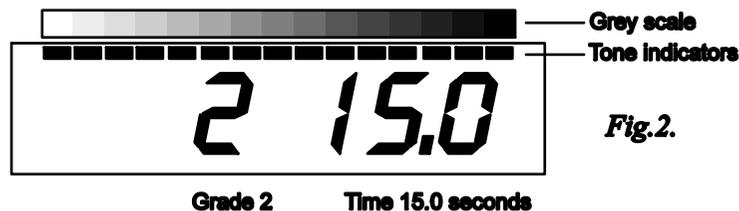


Fig.2.

If the enlarger is turned on (press Focus) and a measurement taken from the shadow area of the negative, the display will firstly show BUSY. After the measurement value has settled the display shows the negative density for a brief time and then shows the grade and the new exposure time. A typical display would be:-

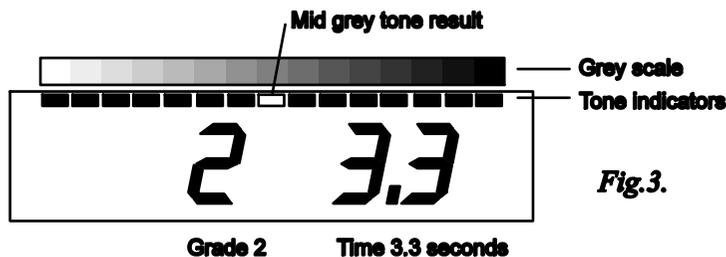


Fig.3.

If another measurement is now taken, from a highlight area of the negative then the display will be similar to that in Fig.4. This shows the exposure for the average of the two measurements and the placement of each of the measured areas in print tones.

If a contrast change button is pressed the Grade indicator will change to either '2.' or '1.', (the "." indicating a half grade) and the exposure time will change to give the same mid tone. In addition the tone indicators will change to show the effect



GRADE	PAPER TYPE				
	MG4RC	MG4FB	MCP	MCC	RR
00	175	165	-	-	-
0	155	145	130	140	-
1	135	135	110	120	150
2	112	102	90	100	120
3	93	83	75	85	90
4	65	65	60	70	70
5	48	48	50	55	-

MG4RC	Ilford Multigrade IV resin coated
MG4FB	Ilford Multigrade IV fiber
MCP	Agfa Multicontrast Premium (RC)
MCC	Agfa Multicontrast Classic (fibre)
RR	Agfa Record Rapid (graded fibre base)

PRE-SET PAPER SETTINGS	
PAP1	MG4RC using Multigrade Filters
PAP2	MCP using filters
PAP3	MG4RC using Y/M filtering on a colour enlarger
PAP4	MG4FB using filters

GRADE	PAP1		PAP2		PAP3		PAP4	
	OFFSET	RANGE	OFFSET	RANGE	OFFSET	RANGE	OFFSET	RANGE
00	0	175	-1	145	0	175	0	165
0	0	155	-1	125	1	155	0	145
1	0	135	-1	115	0	135	0	135
2	0	112	-1	92	-1	112	0	102
3	0	93	-1	78	3	93	0	83
4	0	65	-2	65	0	65	0	65
5	0	48	-2	58	0	48	0	48

GRADE	FILTER SETTINGS	
	Y	M
0	90	0
0.5	78	5
1	68	10
1.5	49	23
2	41	32
2.5	32	42
3	23	56
3.5	15	75
4	6	102
4.5	0	150
5	0	200+

The filter settings in the table are a guide only, and apply to those enlargers using Kodak units. Enlarger and paper manufacturers publish similar tables and these should be used where available. Note that a true grade 5 is not available on most colour heads.



measurement to get a meter reading, (for the identified grade), of about 15 seconds.

Start the test strip sequence by pressing the Print button; the enlarger will extinguish.

Fix a piece of paper to your template with some tape and uncover all the paper. Press the Calibrate Button to initiate a 15 stage test strip. ('Grey' is displayed briefly).

Using the Print button, expose, then slide the mask over the paper and repeat until the sequence finishes. As with a normal test strip sequence, Clear will abort this process.

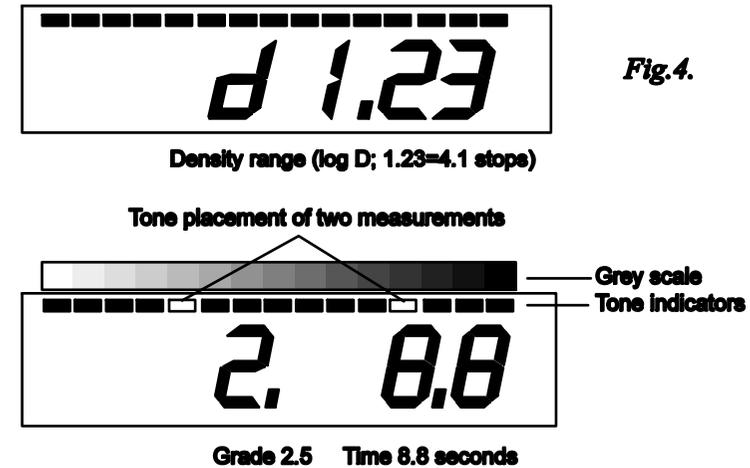
Last but not least, develop with your standard settings, fix, dry and trim to fit for the aperture provided; refer to the diagrams on the back cover.

If your grey scale is too soft (i.e. the white and black are too grey) repeat at a half-grade harder setting. If it is too hard, repeat at a half-grade softer setting.

Suggested filter settings for colour heads, and suggested ISO(R) values

The use of proprietary under-the-lens filters gives accurate grades, short print times, and minimum enlarger movement during multiple printing. If you wish to use a colour head, the table on page 21 gives Ilford's suggested Yellow and Magenta filter settings for colour enlargers using Kodak units. Exposure index is (nominally) constant over the grade range so that minimal compensation is required. Note that with nearly all colour heads, grades 00 and 5 are not available. Similar tables can be obtained from published literature (see bibliography) and from paper and equipment manufacturers. The table also gives the ISO(R) values for Ilford Multigrade IV and Agfa Multicontrast (Premium and Classic) papers. These values are suggested as a starting point for the contrast settings in the Analyser's calibration tables.

As shipped from the factory, PAP1 is set up for Ilford MGIV RC using filters, PAP2 for Agfa, PAP3 for Ilford with Y/M filtering and PAP4 for Ilford MGIV FB using filters. **NOTE:** The settings in PAP2, PAP3 and PAP4 are offsets to the basic calibration (PAP1), and so pressing Clear during calibration of ANY table will restore basic PAP1 settings (i.e. MGIV RC with Filters). If you wish to retain any of the preset calibrations for PAP2-4, make a note of the settings before making any adjustments. The table opposite lists the settings preset at the factory.



of changing paper grade.

Exposure Metering

For accuracy, all metering is carried out with **no filters in the enlarger** and with **all safe-lighting turned off**.

Switch the enlarger on with the Focus button and compose and focus the image. Ensure that there are no filters in the light path (set colour / VC enlarger heads to White Light). Using the Contrast Change buttons, select the grade of paper you want to use. Press the Clear button to erase any previously stored light values.

Position the remote sensor in a shadow (clear negative) area of the image and press the Measure button. The safelight will extinguish, and after a short delay whilst the sensor settles, the message 'BUSY' is shown on the display followed by a brief display of the density (d0.00). Finally the suggested exposure time as shown as in Fig 3.

Next take a second reading with the remote sensor in a highlight (dense negative) part of the image and press the Measure button. After a longer delay (allowing the light sensor to react to the lower light level), the measured density range in logarithmic units is shown temporarily followed by the new exposure time and two print tone indications as shown in Fig.4.

If either the extreme left or right hand LEDs flash, the print will have pure white and black tones respectively (i.e. highlight or shadow detail will be lost).



If both outer LEDs flash then the density range is too great for the paper grade chosen and will result in loss of both highlight and shadow detail. If on the other hand the two LEDs are close together, the density range is too small and the resulting print will be soft, with no true white or black. By adjusting the contrast grade setting, it should be possible to set the density range such that it just covers white to black; this will give a print with a full range of tones. (It is not necessary to repeat measurements when adjusting grade or exposure time; the Analyser stores the light readings. However, if you change the enlarger's lens aperture because the exposure time is too long or too short, then new measurements must be taken.)

Up to eight separate measurements may be taken with the overall exposure being based on the mean of the extreme light readings. The various intermediate tones will be displayed on the bar graph adjacent to the grey scale. This is useful in confirming highlight, shadow and mid tone placement. If more than eight measurements are attempted, the last will be ignored and the display will indicate an error (see Message and Error Displays, page 22).

Press Clear to erase the stored measurements at any time.

To change the calibration set being used, press Calibrate briefly. The display will momentarily indicate the set in use. When the Analyser is first switched on, calibration set 1 (called PAP1) will always be selected. The display PAP1, PAP2 etc. is shorthand for Paper 1, Paper 2 etc.

Printing

Turn the enlarger light off with the Focus button, position the paper in the easel, select the filtration, filter or paper for the displayed grade and press the Print button. There is a 4 second delay before the exposure starts to enable vibrations to die down and to enable you to pick up dodging tools etc. The enlarger will expose the paper for the displayed time, and the display will count down to zero in order to facilitate dodging or burning in. The print exposure may be cancelled at any time by pressing any button for 1 second.

Adjusting the Desired Result

Once a set of measurements have been taken, and even after making a print, it is possible to modify the contrast and exposure settings to achieve the desired result. Until the Clear button is pressed it is possible to reprint or take more measurements, or to modify grade and exposure.

Changing the exposure time will shift all the print tones darker or lighter in 1/5th or 1/10th stop steps, depending on the grade. The exposure compensation (in simple to remember steps) is shown on the display for a short time, after which



It is only necessary to do this once for each paper type since The Analyser can use the same grey-scale for all the paper grades. For best results you need to make a good 15 step test strip, starting on a near white, finishing on a near black and with a good mid tone in the middle. To achieve this full range of tones you need to:

1. Identify the grade of paper whose contrast range is closest to ISO(R) 84, or approximately 3 stops.
2. Ensure that the meter exposure calibration for this grade is accurate and a blank negative prints a shade lighter than a Kodak grey card. (About 2 stops darker than white paper)

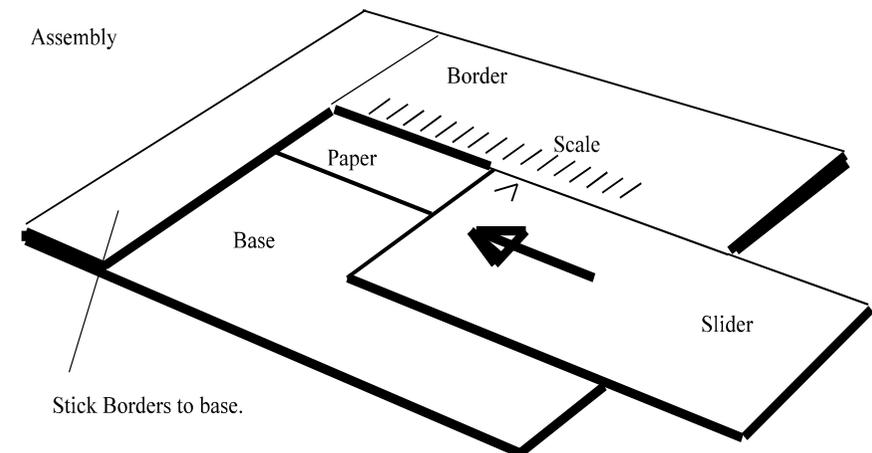
To identify this grade (normally Grade 3 or 3.5), use manufacturer's literature or scan through the contrast calibration settings in the meter whilst in the calibration mode. Half grades can be used if appropriate.

To verify the exposure is accurate, follow the instructions in 'How to Determine Exposure Compensation'. Half grades can be used if appropriate.

Making the Grey Scale

The scale is made using an extended (15 step) test strip sequence on a blank image. To make a neat scale, which has the same spacing as the bar graph LED's, a simple cardboard template design is described with a sample ruler on page 26 of this booklet.

Fix the template to the enlarger baseboard with some sticky tape, and put a blank negative into the enlarger. Take a measurement so that the mid-grey LED lights and an exposure time is shown. If necessary adjust the aperture and repeat the





The contrast setting can be derived by determining the accuracy of the grey scale endpoints or by recording the difference in negative densities which reproduce as near white and black in a final print. (The factory settings are derived by examining a contact sheet of 35mm negatives. These negatives are made by photographing an evenly illuminated wall, in half stop steps, from -5 to +6 stops compensation. These negatives are projected in the enlarger and negative densities recorded with the Analyser. Contact sheet images are selected that represent near white and black [D0.03 and D1.9] and the density difference of the respective negatives is programmed into the software.)

Alternatively a small adjustment can be made as follows. With the lens stopped down and with a blank negative in the enlarger, take a meter reading for the appropriate grade to be calibrated, and reduce the suggested exposure time until the extreme left bar-graph LED lights up. Make a test strip with this exposure time and with the appropriate paper/ grade/ filter setting. Examine the test strip and decide on the position on the test strip where the tone matches the palest tone

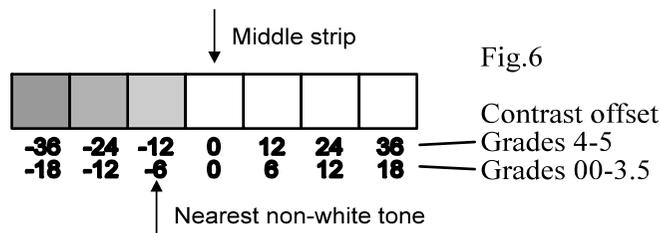


Fig.6

on the Analyser's grey scale, with respect to the middle strip. If it is in the middle, then no adjustment is required. If it is to the left of the middle then the contrast range needs to be decreased. In the example in Fig.6 the matching non-white tone is one step to the left of the middle, so the contrast range needs reducing by 6 (for grades 00 to 3) or by 12 (for grades 4 and 5).

If you are attempting to calibrate a new paper type, first of all enter the manufacturer's published ISO(R) settings into the Analyser's calibration table you intend using (PAP1, PAP2, etc). If figures are not available, start with either of those listed (i.e. Ilford or Agfa) on page 21 of this handbook.

Advanced Calibration. Making your own Grey Scale.

This section describes how to make your own grey-scale to replace the one that comes with the unit. Making your own enhances the accuracy of print predictions for your own paper, enlarger and chemicals. It takes a little concentration to do this the first time, but it is worth it.



the display will show a new exposure time calculated to the nearest 1/10th second.

When a print tone lies outside the limits of the paper range a flashing LED at the ends of the bargraph will be displayed to show excessive under / over exposure.

Changing the contrast grade setting will display a new set of print tones based on the measurements you have taken and at the same time clear any temporary exposure compensation. (If you find yourself using a consistent exposure compensation then it is handy to write it on the box of paper and use the calibration procedure to store this value as a calibration offset.)

Test Strips

The automatic test strip feature allows fine tuning of the print around the judged or metered time by bracketing a print with -3, -2, -1, 0, +1, +2 and +3 exposure compensation steps. These steps can be 1/5th or 1/10th stops, depending upon print grade.

After making a judgement of the required exposure or by taking measurements, check the enlarger light is on and press the Print button. The grade display is replaced by the message 't xx.x' (where xx.x is the first strip exposure time) and the enlarger lamp will extinguish. After each exposure the equivalent total exposure and incremental time is displayed.

Put the test strip mask in place with the paper and uncover all the strips. Press Print again to expose all the strips. Cover the first strip and press the Print button again for the second exposure. Repeat this another five times for the remaining uncovered strips. Each strip will receive an incremental exposure giving you a test strip in 1/10th or 1/5th stop steps. After the last exposure strip the normal display and mode is resumed. Whilst the enlarger is on, pressing any button for one second will abort the exposure and subsequently pressing Clear will abort the test strip sequence.

Calibration

This feature can be used to adjust the calibrations held in memory, to fine tune the Analyser to your equipment and materials. Any adjustments made will be remembered when the Analyser is switched off. There are four sets of exposure and contrast range calibration adjustments for each full grade; Exposure compensation is based on 1/5th or 1/10th stop steps and contrast adjustments are based on the ISO(R) information often published by paper manufacturers. It is often useful to write the calibration values onto the box of paper currently in use



Operation

To enter the Calibration mode press and hold the Calibrate button for 1 second. The display will flash 'CAL' followed by 'PAPn', where n is the calibration set. The paper grade is shown on the left hand side, with the stored compensation amount on the right. To confirm that this mode is in effect, the Cal. Offset indicator is lit on the left side of the display. The contrast buttons change the paper grade and the time buttons alter the compensation in 1/5th or 1/10th stop steps for the selected paper grade. The display should resemble Fig 14.

Pressing the Calibrate button briefly cycles through the four calibration sets PAP1-PAP4 for selection.

Note that half grade calibrations are not required since The Analyser calculates half grade exposures from the neighbouring full grade values.

(Optional Print Delay)

Press the Print button whilst the Cal. Offset Indicator is lit to toggle the 4 second Print Delay feature on and off. Each time the unit is switched on, the Print Delay is enabled. Fig 13 indicates the Print Delay turned off.

Press the Clear button to clear all the exposure offsets, if required.

Press the Calibrate button to cycle through the four calibration sets.

Press the Focus button again to store the exposure alterations and advance to the contrast adjustment mode.

To confirm this second mode the Cal. Range Indicator is lit to the left of the numeric display with the grade on the left and the ISO(R) rating shown to the right, as in Fig.15. Again, the contrast buttons change grade and the time buttons change the value of the contrast setting.

Press the Clear button to clear all the contrast adjustments, if required.

Press the Focus button again to store the contrast alterations and return the unit to normal operation.

Press the Calibrate button to cycle through the four calibration set. The display momentarily indicates the set in use.

Please refer to the Advanced Calibration section on Page 16 for details on how to determine exposure and contrast adjustments.



particular grade can be calibrated at any time; there is no need to repeat the full procedure if only one grade requires changing.

To match the calibration to the meter grey scale, place a blank negative in the enlarger and take a single meter reading so that the centre LED on the grey scale lights up. Choose the lens aperture such that the indicated exposure time is between 10 and 20 seconds. Make a test strip at this exposure. (Press Print while the enlarger is on to initiate the test strip mode.) You should end up with a test strip which contains a mid grey somewhere. If the grey tone which matches the mid grey of the Analyser's grey scale is in the centre of the test strip, no compensation is necessary. If the strip is too dark or too light so that no area matches the mid grey, increase or reduce the exposure time by 5 steps and repeat.

The exposure compensation is measured in steps, the same steps that the test strip maker uses. The position of the grey tone on the test strip that matches the Analyser's mid grey scale tone, with respect to the central test strip exposure, gives the necessary offset. In Fig.5 the nearest tone to mid grey is one step to the left of the middle, i.e. the whole strip is one step too dark, so the required compensation is -1. This exposure compensation can then be programmed into

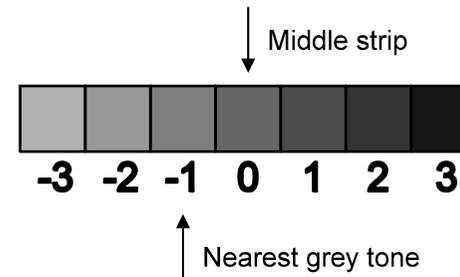


Fig.5

Exposure offset of -1

the meter, for that particular grade, with the calibration procedure.

Calibrations only exist for full grades since half grade calibrations are calculated as the average of the two neighbouring full grade values.

Advanced Calibration. How to Determine Contrast Adjustments

Contrast adjustments are more tricky, and should begin with the built in setting or the paper's ISO(R) setting. ISO(R) is a logarithmic number such that 30 units represents 1 stop of range. So a paper which can accommodate five stops of contrast has an ISO(R) range of 150 and would be equivalent to grade zero. Note that this is referring to *negative* contrast, not *subject* contrast.



Factor: Development time, temperature, dilution, agitation, age and usage.

Result: Change in Contrast, DMax

Factor: Paper age, storage.

Result: Loss of Contrast and Sensitivity

Factor: Safe-lighting, blackout, baseboard reflectance, enlarger light leakage.

Result: Loss in Contrast

Factor: Filter Age, accuracy, type, colour head setting.

Result: Change in contrast.

Factor: Enlarger lamp age, voltage fluctuations, warm up and cool down time.

Result: Change in Exposure

Advanced Calibration Instructions

Introduction

This section describes some of the more advanced calibrations and techniques that make the most of the Analyser's potential. Advanced calibration is worthwhile, especially when you are combining special papers with developer, toner and paper finishes. The purpose of calibration is to match the displayed print tones as closely as possible to the tones on the final print.

Advanced Calibration. How to Determine an Exposure Compensation

The keen user may wish to derive any adjustments for their particular materials or needs by a repeatable process. This can be done by altering the built in calibration to match the printed grey-scale OR by making your own grey-scale OR a combination of both.

A correct grey-scale is one that starts on *near* white, finishes on *near* black. Due to the typical paper characteristics the middle tone is usually a shade lighter than Kodak grey, at about 22% reflectance. You need to adjust the exposure offset for each grade accurately before considering the contrast range adjustment. (Most papers follow the ISO(R) contrast value guidelines, so there is often less need to adjust the contrast calibration anyway).

Because filter factors etc. vary from grade to grade, the Analyser's calibration tables have an offset entry for each individual full grade, so a full calibration requires that a test strip (as described below) is made at each full grade. A



A Note on the Use of Filters and Colour Enlargers for Changing Paper Contrast

The Analyser only stores full grade exposure and contrast settings for convenience and simplicity of calibration. Half grade settings are calculated from a simple average of the two adjacent full grades.

When using a Colour Enlarger head to change print contrast, the exposure adjustment from Grade 00 to 5 is smooth and continuous, so all half grade calculations will be accurate. We recommend that the "constant exposure" filter settings are used; these are a combination of yellow and magenta filtering intended to maintain consistent exposure across the grades. If the simpler single filter settings are used, wider exposure compensation settings will be needed. Published filtration guidelines are given at the end of this section.

Variable Contrast enlarger heads normally incorporate exposure compensation, and will often have neutral density filters in addition. Again, contrast adjustment is smooth and continuous.

If you are using discrete filters, e.g. Ilford's Multigrade Filter Set, the required exposure for grades 4 to 5 is greater than for grades 00 to 3.5. This is equivalent to a halving of paper speed at grades 4 to 5. After exposure compensations have been entered, the calculated exposure for grade 3.5 will normally be about a half stop over as a result. Before printing reduce the print time by 2 or 3 steps.

General User Notes

Judging the Negative

The two negative areas that concern most printers are the shadow and highlight areas. If the negative has been exposed and developed well, both will have detail in them. It is the relative negative density of these textured extremes that often mandates the grade of paper. With variable contrast paper, it is additionally possible to use split-grade exposures and various dodging and burning-in to make the most of the negative.

Contact Sheet Exposures

It is good practice to make a contact sheet of the entire film before printing. To find the maximum information from the film it is best to use a soft grade of paper, i.e. Grade 1 or 0. The meter can be used to determine the optimum exposure for this contact sheet. With no negative in the enlarger, set a medium aperture, turn the enlarger on and measure the white light with a piece of clear negative over the remote sensor window. Check the meter grade setting, and set up the enlarger



filtration.

Using the exposure increase button, increase the time until the LED moves to the far right of the bargraph. Turn the enlarger off with the Focus button and place the contact sheet maker under the enlarger. The Print button should do the rest. If there are some very dark areas on the print, it is sometimes possible to detect the presence of detail by placing the print over a light-box or similar.

Calculating Fog and Flash Exposures

Fog exposures are just faint exposures of a blank image onto paper. They are used to accentuate fine highlight detail. These are simple to calculate with The Analyser. Simply take a meter reading of a dim blank image, and adjust the exposure until a pale tone, or white print tone is indicated. For flashing (non-intrusive fogging), adjust the exposure until the left-hand LED blinks.

Calculating Burning In-Exposures (Single Grade)

Say you have a landscape with a bright sky and that you have already taken some readings of the shadows, grass and sky. If the desired result is to have black shadows with mid grey grass and detail in the sky, it is unlikely that you can achieve this with one exposure. This is where the Analyser excels. Using the contrast and exposure buttons you can determine which grade and exposure is required for the shadows and grass by lining those two LED's against dark and mid grey. The sky reading will probably indicate white. Without making a print, or any further readings, you can adjust the exposure to determine what exposure is required to make the sky a pale grey.

If there is a large difference between the exposure times, simply make the first exposure and then burn in the sky with the second. If the times are quite close, a more accurate method is to burn in the sky with an exposure which is close to

Burn-in Exposure	Exposure Adjustment	
	Grades 00 to 3.5	Grades 4 to 5
+1/3 stop	-8 steps	-16 steps
+1/2 stop	-5 steps	-10 steps
+2/3 stop	-3 steps	-6 steps
+1 stop	Repeat with no change	
+1.5 stops	+3 steps	+6 steps
+2 stops	+6 steps	+10 steps



the difference between the two times.

It is possible to set a defined burning-in exposure in addition to the main exposure. Each exposure step is 1/5th or 1/10th stop, so an extra half stop for grade 3 requires a second print exposure with half the first exposure, or 5 exposure steps less. The following table can be used as a guideline until you become more familiar with the timers' operation. The adjustment to the main exposure for Grade 00 to 3.5 and 4 to 5 respectively are shown to give the extra Burn-In amount.

Calculating Split Grade Exposures

There are some excellent books on the subject which explain the many varied techniques of split exposure and contrast printing. Some examples are listed in the Bibliography. The Analyser can calculate the effect of split grade exposures for a single tone at a time. In the landscape example above, say the first print exposure was at Grade 4, and the sky was a pale grey tone. To calculate the burn in exposure for a moody sky at a softer Grade follow the simple sequence below:

Make the first exposure at Grade 4, noting the sky tone indication. Change the grade setting to say Grade 1, and change the time until the same sky tone indication is shown. Note this exposure time. Change the time to darken the sky tone indication to the desired level. Note this longer exposure time. The required burn in exposure time is the difference between the previous noted times.

Adjusting Exposure and Contrast for Portraiture

The skin tones in a Black and White portrait are critical. After using the Analyser for a short while it will become apparent which print tones best represent skin highlights and shadows. By altering the contrast and exposure settings it will be possible to place the skin tones, clothing and backgrounds on the required grey tones.

The Exposure and Grade Controls and the Grey Scale

The Exposure Increase and Decrease (Darker and Lighter) buttons adjust the exposure in steps of one fifth (grades 00 to 3.5) or one tenth (grades 4 to 5) of a stop. This does not necessarily correspond to one step on the grey scale, so at times you may find that a change in exposure is not enough to change the position of the grey scale LEDs. This will be more noticeable at the softer grades. Also, occasionally, only the darkest or lightest LED may change. This is perfectly normal and is due to the fact that the grey scale's 15 steps cover a wider exposure range on the softer grades of paper. Similar effects may be observed as the paper grade is changed.

The middle grey on the scale lies between the speed point and a standard grey card. It is made using Ilford materials and filters. If the results from your own prints vary a little, please consider all the factors below!