

DiaCal

...the Grayscale Calibration Software for your Filmrecorder

User's Guide



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1 Preface

A few explanatory words about the system's requirements, the structure of the user's guide itself and some of the basic concepts employed should make using our program easier. In this user's guide you will find a description of the Version DiaCal for calibration.

The hardlock version of the software needs the hardlock plug for connection to the parallel interface.

The version 'DiaCal softreg' without hardlock protection is only runnable after registration with MOPS.

1.1 What can the Application do?

With the help of the film recorder calibrator **DiaCal**, you will be able to adjust the colors and brightness of your exposures to the correct gray tones. In order to do this, the Look-Up Table (LUT) of the film recorder is changed correspondingly. The LUT can also be stored and re-loaded like a file. In addition, it is also possible to export it in the RasterPlus® CCF format of Graphx Inc. (USA) as well as in the IMAGE Assist® format for MAC of McLain Imaging (USA).

There are two possibilities for calibrating the film recorder.

- With densitometric calibration, the data are determined with the help of a transmitted-light color densitometer and entered into the program. Then the program computes a new LUT, which is stored and transmitted to the film recorder.
- With manual calibration you have the option of using the mouse to change the LUT (presented graphically as a curve). This al-

tered LUT can also be stored and transmitted to the film recorder.

In principle, the results of both calibrated and uncalibrated LUTs can be checked through making a test picture.

1.2 System Requirements

- An IBM compatible PC with at least a 80386 processor, Windows 95® or Windows NT® 4.0 (with CD-ROM).
- A CCG, Agfa or Matrix film recorder
- A National Instruments® GPIB card with a GPIB32 driver or an Adaptec® SCSI card with an ASPI32 driver for connection to the film recorder.
- For the densitometric calibration, you will require a transmitted-light color densitometer.

1.3 About this User's Guide

The varying typographies in the user's guide have the following meanings:

References to operations which are described more thoroughly in another part of the user's guide give you the appropriate page number.

Cross references to menu items of the program are printed in a different type face. First, there is the menu item from the menu bar; this is followed by a vertical line | followed by the appropriate command, e.g. File|Open.

File names are printed in BLOCK LETTERS. Keys which can be operated with the mouse are between pointed > brackets <.

If you are supposed to enter something, the name of the corresponding *command line* will be in italics and what you are expected to enter will be in **boldface type**.

2 Installation

2.1 Installation of the SCSI Card

For installation of the Adaptec® SCSI card please read the corresponding user's guide. The installation of the Windows ASPI driver is important. You can check the installed SCSI device by calling up the Adaptec SCSI Interrogator (SCSI Explorer). Your film recorder must be detected here and here you can also find the SCSI address (Id.-No.) of the recorder.

2.2 Installation of the GPIB Card

For the installation of the GPIB card (AT-GPIB or GPIB-PCI from National Instruments®) please read the corresponding user's guide. The test programs supplied with the card (IBDIAG and IBTEST) must go through without an error message.

2.3 Installation of the Software

The installation of the hardlock version under Windows NT requires the according administrator privilege.

Insert the CD into the CD-ROM drive. The installation program will start automatically. If not, select the CD-ROM drive in the Windows Explorer and doubleclick the file called 'Setup'. Then choose the language, you want to use with DiaCal and click the button > DiaCal <.

After the installation is completed, connect the hardlock plug to the parallel interface of your computer. In case a parallel printer cable is plugged in, connect this to the backside of the hardlock plug.

Instead of this you can also install the version **DiaCal softreg** without hardlock protection. Therefore you need a second license with a new registration number. To install the DiaCal softreg call up the menu item `Install|DiaCal softreg` in the installation program. For being able to use this version it has to be registered with MOPS Computer (see chapter 'Registration' at page 11).

When the window with the software licensing agreement appears, click `>yes<` if you accept the conditions.

After a window with information about registering the software (which you can leave by clicking `>Next<`) you will be asked to enter your name, the name of your firm and the serial number (to be found on the enclosed registration card or disk). Only when these entries have been made, you will be able to click `>Next<`.

Attention: If the hardlock version of the program is installed with a wrong serial number, the program does not run properly. You have to repeat the installation.

For the installation of **DiaCal softreg** you only need the first five figures as serial number. The next five figures are automatically generated by the computer during installation. The last eight figures will be given to you by us at registration.

Check the folder into which the program is to be copied. If you wish to accept the pre-setting, then click `>Next<`. If you like to have it in a different folder, then click `>Look-up<`, enter the desired folder and click `>OK<`.

After you have decided whether you wish to read the README file now or later, the installation is completed.

2.4 Installation of the Hardlock Modul

For working with DiaCal software connect the hardlock plug to the parallel interface of your computer. In case a parallel printer cable is plugged in, connect this to the backside of the hardlock plug.

During the installation of the DiaCal software the hardlock modul is automatically installed.

The installation of the hardlock version under Windows NT requires the according administrator privilege.

Under windows NT the program HINST.EXE is automatically started. If the error message "Unable to load hardlock driver" is reported when starting DiaCal, there is the possibility of subsequently starting HINST.EXE separately after the installation of DiaCal. Therefore in the installation program call up the menu item Install|Install Hardlock for Windows NT.

Attention: If under Winows NT an old version of the Hardlock driver Hardlock.sys is installed, please first deinstall this version (see chapter 'Deinstallation' at page 13).

First put the CD in the CD drive. The DiaCal installation program will start automatically. If not double click on the program SETUP.EXE on the CD. Choose the language (english or german) and then click on DiaCal. The installation begins.

When the window with the software licensing agreement appears, click >yes< if you accept the conditions.

After a window with information about registering the software (which you can leave by clicking >Next<) you will be asked to enter your name, the name of your firm and the serial number (to be found on the enclosed registration card or disk). Only when these entries have been made, you will be able to click >Next<.

Check the directory into which the program is to be copied. If you wish to accept the pre-setting, then click >Next<. If you would

like to have it in a different directory, then click >Look-up<, enter the desired directory and click >OK<.

After you have decided whether you wish to read the README-File now or later, the installation is completed.

2.5 Registration

2.5.1 Registration of the Hardlock Version

The software of the Hardlock version is only runnable with the Hardlock plug connected to the printer interface. During installation you have to type in the complete registration number which you find on the CD.

Attention: If the hardlock version of the program is installed with a wrong serial number, the program does not run properly. You have to repeat the installation.

We recommend to register the software with the enclosed registration card via Fax or via Email.

2.5.2 Registration of the Version Without Hardlock

ATTENTION: During registration, all of the application's module windows (calibration window, log window, ...) must be closed.

This software can only function if after being installed it is also registered with MOPS Computer. In return you do not need the hardlock plug. You will receive a registration number which is to be entered in the text field via the menu item Help |Registration. Otherwise, the software cannot function.

Registration takes place in the following manner:

- The first part of the registration number contains a five-figure serial number. The serial number is entered during installation and is to be found on the disk label and the enclosed registration card.
- The second part (five figures) is generated automatically during installation.
- The third part (eight figures) will be given to you by us at registration.

In order to register the application, we first need your name/your firm's name/address/Tel./Fax or E-mail address together with the first two parts of the registration number (to be found in the dialog box). Then we can give you the third part of the registration number. Enter it in the input field and confirm it by clicking >OK<.

In order to receive the registration number, please send the enclosed registration card to:

MOPS Computer GmbH
Geringhoffstr. 46
D-48163 Münster
Germany

Fax: + 49 251 788225
e-mail: MOPS.Computer@t-online.de

2.6 Deinstallation

Only Windows NT:

The hardlock module can only be removed under Windows NT by restarting the installation program. Therefore call up the menu item `Install|Deinstall Hardlock for Windows NT`.

Therupon the hardlock module will be deinstalled.

In order to completely erase **DiaCal** from your computer, proceed as follows:

First click `>Start<` and then choose `>Options<`. Under `>Options<`, click `>System Control<`. After a double click on `>Software<` you can choose from the list the program you wish to erase (here: DiaCal). A click at `>Add/Erse<` will remove the application from your computer.

2.7 Adjusting the Recorder Type and the Interface

During the first start of the already installed program, choose the model of film recorder you are using from the list provided. The following dialog window will open automatically.

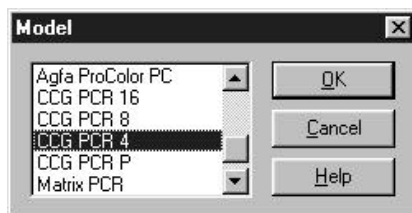


Illustration 1: Selection of the model of film recorder

The scroll along the side of the list makes it possible for you move up and down within the list. Mark your film recorder model and confirm the choice with OK.

>Help< makes a window visible which contains another short description of the dialog box. All the dialog boxes described below also contain such a >Help< option.

After the recorder model has been chosen and confirmed another dialog box will be opened automatically. With this dialog box you can choose the interface to which the recorder will be connected. You have the choice between the GPIB or the SCSI interface.

The appropriate interface card must be installed in the computer along with the corresponding software.

If the appropriate interface is available, an "ok" will appear in the status column after you have clicked >Apply<.

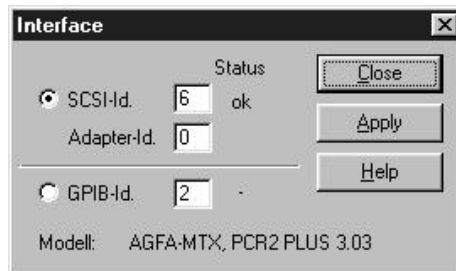


Illustration 2: Dialog box Interface

The address entered into the program (SCSI-Id. Or GPIB-Id) must be the same (Default values: GPIB = 2, SCSI = 6).

Enter the adapter id, if the film recorder is connected to a SCSI card with the adapter id of 1, 2 or 3.

If your computer has more than one GPIB card installed and the film recorder is connected to a second card, than change the entry in the appropriate INI-file (DIACAL.INI). Clicking >Help< will provide a full description.

The following chapter explains some of the basic concepts in the use of the film recorder calibrator DiaCal.

3 Some Basic Concepts

3.1 The window Densitometric Calibration

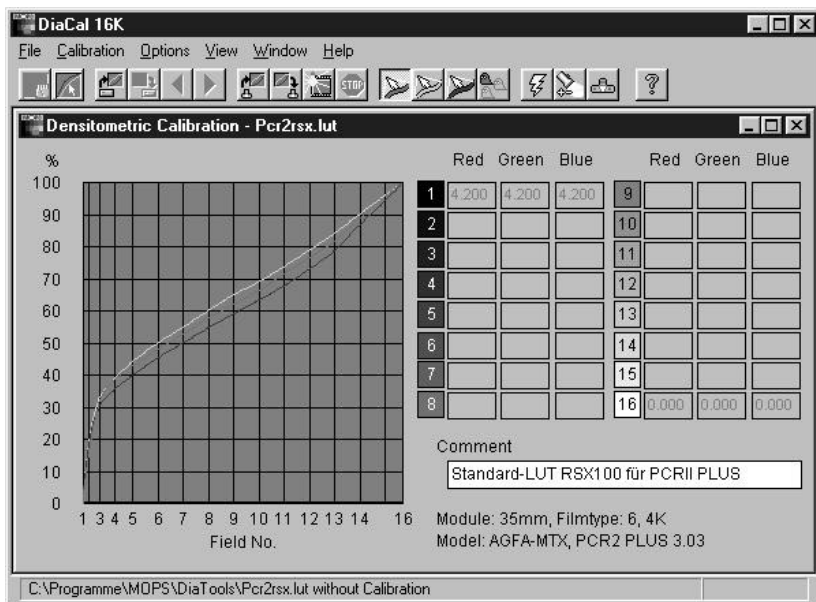


Illustration 3: Window for Densitometric Calibration

In the illustration you can see the program window for densitometric calibration with the following elements:

- In the top row is the menu line for the choice of menu.
- In the row below you will find the so-called symbol or icon bar. With the symbol bar, you can call up the most important commands with a simple mouse click.
- The left half of the main window area shows a Look-Up Table on a gray grid. The vertical column of numbers on the left side gives the values of the Look-Up Table in per cent (0 - 100%).

The horizontal row of numbers below indicates the allocation to the test picture's individual test fields.

- In the right-hand section is a table for entering the measurement values. In the field below, you can record comments on your calibration curve. Below this field are two lines which indicate the module of the film recorder being used, the number of the film type, the resolution setting of the film recorder and the model of the film recorder.

3.2 Look-Up Table (LUT)

The Look-Up Table converts the input values of the film recorder for the brightness of the three colors red, green and blue into a value which can be used for controlling the beam intensity of the cathode ray tube. In this way it is possible to adapt the exposure to the spectral sensitivity of different film materials.

3.3 Start LUT

Start LUT (Look-Up Table) is the LUT with which a calibration begins. This is the LUT which is used to expose the first test pictures, using the 16 shades of gray defined in the program. This will then be used as the basis for the densitometric readings.

As a rule, it is a good idea to begin with the LUT which has been stored in the film recorder for the type of film being used. It is also possible, however, to begin with a linear LUT. In some cases an additional re-calibration may become necessary.

3.4 LUT Files

LUT files (Look-Up Table files) are files which are generated by this application and read by it. They contain the Look-Up Tables, the brightness, contrast and repetition values of the individual colors as well as the measured intensity values of the test pictures. The data from all a film's calibration procedures are stored in the same file.

LUT files are pure text files which can be processed with a text editor.

3.5 CCF Files

CCF (Color Correction Files) are files which store the Look-Up Table of a film recorder in the RasterPlus® file format of Graphx Inc. (USA). CCF files can be exported via the menu item `File|Save as...` They can be read using the menu item `File|Open...`

3.6 Reference Files

Reference files (*.REF) contain the desired values for the color density of the 16 gray level fields in the test pictures. During densitometric calibration, the LUT is changed so that the density values and the reference values converge. Reference files can be opened, changed and stored. In this case the display of the LUT table is switched over to a display of the density values of the reference file.

The calibration of slide films and negative films differ in the reference file used. Generally, the setting for slide films is `POSITIVE.REF`

and for negative films `NEGATIVE.REF`. You can also make your own reference file.

4 Test Picture

In the middle of the test pictures which can be exposed with this program there are either one, four or sixteen test areas. These test areas are in the center because the brightness of the electron beam is usually somewhat diminished around the edges. With larger formats (e.g. 6x6) the test areas are still large enough to be measured with a densitometer, even if 16 test areas are used. With the 36x24 mm format it is better to use four test areas per picture so that you need a total of four pictures for one calibration. The number of test areas per picture and/or the number of required test pictures with all test areas can be set using the menu item `Options| Test Pattern...` The test areas are gradated in their brightness so that there is a scale of gray values from black (area 1) through various shades of gray up to white (area 16).

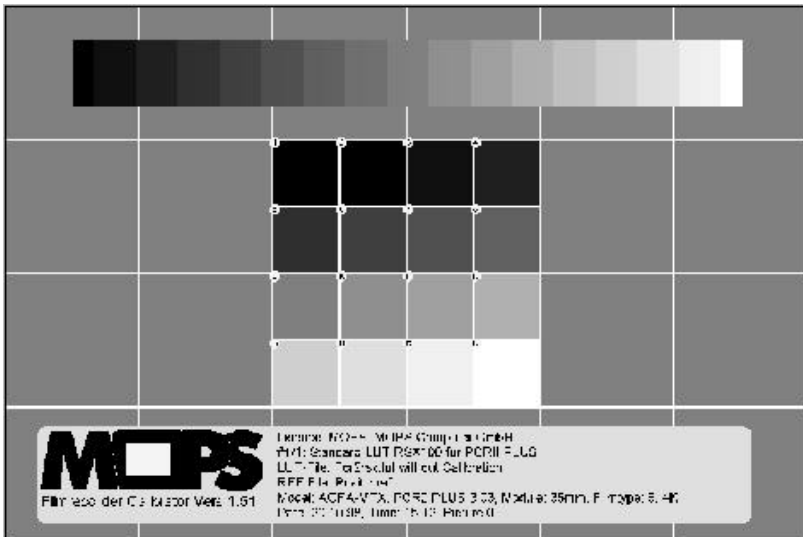


Illustration 4: View of test pattern

The following data are also recorded on the test pictures: the commentary, the names of the LUT and reference file, the model

of film recorder, the camera module, the number of the film type, resolution, date, time, and exposure number. As can be seen in the above illustration, the test picture can be displayed through the menu item `File|View Test Pattern`.

5 Practical Operation

5.1 Quick Operation with a Mouse

The simplest way to operate the program is to use a mouse to point and click the appropriate commands in the symbol (or icon) bar. This bar varies according to which part of the program is active. Below, in the so-called status line, is a description of the function of the symbol which the mouse is pointing at. Beginning on page 35 there is an overview of all the symbols in all the various parts of the program.



Illustration 5: Icons of the modul 'densitometric calibration'

The commands can also be called up using the menu. The menu can be found above the symbol bar.

5.2 Densitometric Calibration

Using this function, you can calibrate the film recorder with the help of a transmitted-light color densitometer. It is called up via the menu item `File|Calibration` or through the symbol bar



You will find the individual steps of densitometric calibration in the calibration menu.

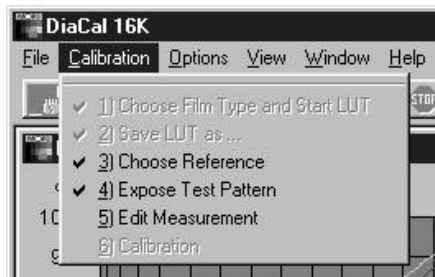




Illustration 6: Menu Calibration

All calibration steps which cannot be called up are presented as gray, all calibration steps which have been completed have a checkmark  next to them. The next step in calibration can be called up via the symbol .

The following procedure is recommended:

- 1) Begin with the menu item `File|Linear`. Call up the menu item `Calibration|1)Choose Film Type and Start LUT`. In the dialog box which is then displayed, set it for the desired film type and resolution (cf. the illustration on the following page).

Here you can choose the Start-LUT with which you wish to begin calibration. You have two possibilities: "linear" or "loading from the film recorder". Generally speaking, you can work with the second possibility which is the default setting (see also page 29).

- 2) Click the menu item `Calibration|2)Save LUT as ...`. You will now be asked to give the LUT-file a name. If you wish, you can use the name which has been pre-set in the dialog window. It contains the current date and a consecutive number. This name is to be used later, when you transmit the calibration data to the film recorder. The name is also visible on the test picture. All calibration data is stored in the LUT-file.

- 3) With the menu item Calibration|3)Choose Reference you define the appropriate reference file. Generally, the choice for slide film is Positive.ref and for negative film NEGATIVE.REF. You can also make your own reference file, however (cf. page 64).
- 4) With the menu item Calibration|4)Expose the Test Pattern, you begin the exposure of the test picture. You can set the number of test pictures (cf. page 20) under the menu item Options|Test Picture...

After exposure, have the film developed. With negative film you don't need to make paper prints.

- 5) After clicking the menu item Calibration|5)Edit Measurement, the program is ready to receive the measurement data of the densitometer for the individual test fields. They are to be entered in the table on the right of the program window using the keyboard. If, however, you have Agfa's DENS 1 or Barbierie's Densy 250E/450E densitometer then the data are to be read in via the serial interface of your computer.. (See page 50 for setting the densitometer).
- 6) When you have finished entering the measurement values, click the menu item Calibration|6) Calibration in order to carry out the calibration. It is advisable to then carry out another test exposure (step 4) and once again measure the gray level fields. (Step 5). If necessary, you can repeat steps 6, 4 and 5 for re-calibration.

If having carried out the densitometric calibration several times and you are still not satisfied with the results (for example, if you want warmer shades of gray) then you still have the option of making a reference file of your own (see page 64).

You can leave the calibration program at any time (menu item File|Close) if you wish to interrupt calibration.. If you wish to

continue calibration later, load the file through the menu item `File|Open...` using the file name from step 2.

Important Note:

If later you wish to expose pictures, be sure that the corresponding LUT in the film recorder is active. With newer film recorders, we recommend that after you have transmitted a LUT to the film recorder, you call up the command "Store LUT" from the menu of the film recorder. Otherwise, the LUT which has been transmitted will be over written every time the film recorder is reset.

5.3 Manual Calibration

This function is called up through the menu item `File|Manual Calibration` or through the symbol bar. The following screen will appear

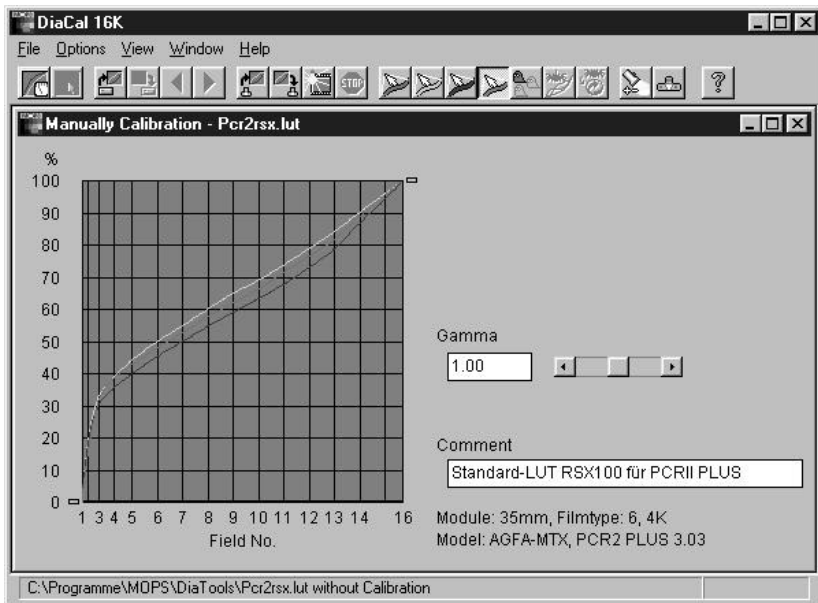


Illustration 7: Window for manually calibration

This function makes the manual adjustment of the film recorder's LUT possible. With the help of the mouse, each individual color curve can be moved up and down at will and at any point. In addition, each color curve can be foreshortened or stretched. In order to do so, there are markers to the left and right of the diagram. These markers can be moved using the mouse. First choose the desired color, using either the menu options or the symbol bar.

In the input field *Gamma*, a gamma value can be set which has an effect on the LUT(s). In this way, the pictures to be exposed can be made darker or lighter. This has no effect on the impression the colors make. A value higher than 1 makes the pictures brighter, one lower than 1 makes them darker. The value which has been entered is only displayed so long as the LUT file hasn't been closed or stored. Otherwise the value 1.00 appears. The gamma value always refers to the LUT values after loading or after the last time the file was stored.

In the commentary field below, you can record your comments on the calibration curve. Below this field are two lines which indicate the module of the film recorder, the number of the film type, the resolution which has been set on the film recorder and the model of film recorder. These data and the commentary will also be exposed on the test picture to serve as a record.

In the present version of the program it is not possible to alter all of the LUTs with the mouse at the same time. In this case the program defaults to the red LUT. Foreshortening and stretching, however, is possible with all LUTs.

The following procedure is recommended for manual calibration:

- 1a) First enter the film type that you wish to calibrate and then load the LUT from the film recorder or
- 1b) Begin with a linear LUT as the basis for calibration, then enter the film type you wish to calibrate and send the linear LUT to the film recorder or
- 1c) Open an already existing LUT-file for re-calibration and send this LUT to the film recorder.
- 2) If you've begun with 1a or 1b, then store the LUT. A file name will be suggested which contains the date and a number.
- 3) Expose the test pictures on the film recorder.
- 4) Develop the film .
- 5) Re-open the LUT file which had been opened as in 1c or stored as in 2.
- 6) Change LUT with the mouse.

In the diagram the dark values are on the left (beginning with Field 1) and the brightness values are on the right (this applies to slides). Now you have to try (and this may take several tries) to shift the color curves so that in the next exposure you

can achieve the desired shades of color and degrees of brightness in the measurement areas.


Suppose for example, the brighter surfaces have a bluish cast. Then you pull the blue curve down a bit on the right, thereby reducing the amount of blue in the exposure.

- 7) Store LUT-file.
- 8) Send LUT-file to film recorder.
- 9) Expose test picture.
- 10) Develop film
- 11) If necessary repeat the process, beginning with step 5.

Important Tip:

In order to later expose pictures with the film recorder, be certain that the corresponding LUT is active. With newer film recorders, we recommend that after you have transmitted a LUT to the film recorder, you call up the command, "Store LUT" from the menu of the film recorder. Otherwise, the LUT which has been transmitted will be over written every time the film recorder is reset.

6 Recorder Controls

This part of the program makes it possible for you to operate the film recorder using the software when the controls have been activated either through the symbol bar  or through the menu item Options|Setup Filmrecorder...

Using the dialog box which now becomes visible, you can set the film type, the resolution and the exposure counter. In addition, you can call up the control panel on window for the film recorder itself: loading, removing or advancing film. In addition, it is also possible to carry out a CRT balance, start a reset of the film recorder and set a LUT data range.

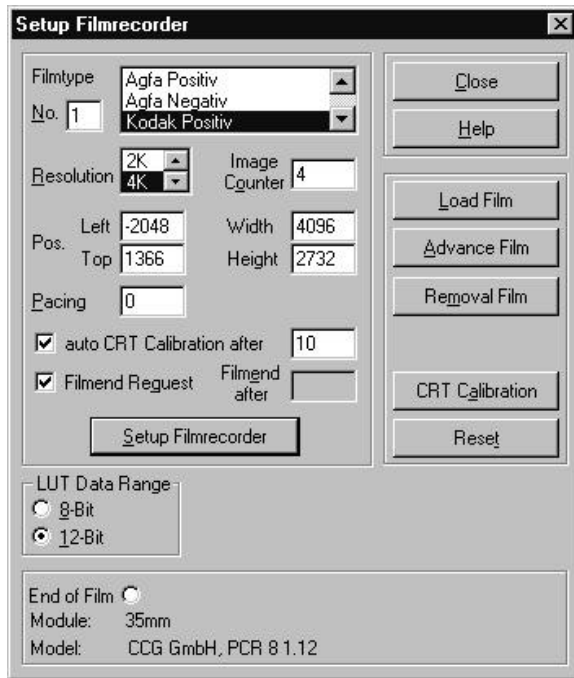


Illustration 8: Dialog box Setup Filmrecorder

In the lower part of the dialog box is a data display with the end-of-film signal, the resolution setting in Pixels (width by height), the camera module as well as the film recorder model.

All the data displayed corresponds to the values currently set on your film recorder and have been adapted to the options on the recorder which has been connected.

The Individual Functions:

6.1 Film Type

Enter the desired *film type number* in the input field or choose it from the list of films given and then click >Setup Filmrecorder<.

6.2 Resolution

In the *resolution field* click either no. 2 or no. 4 (in the 16K version with the corresponding recorder there is also 8 or 16). Then click >Setup Filmrecorder<.

The pictures will then be exposed with the following number of lines: 2K (or 2048), 4K (or 4096), 8K (or 8192) or 16K (or 16384).

6.3 Exposure Counter

The active exposure counter of the film recorder will be displayed in the input field. If you wish to re-set the exposure counter, then enter the desired number in the *exposure counter input field* and click >Setup Filmrecorder<

If you wish one or more blank frames, then either enter the corresponding *exposure number* in the input field or use the plus sign followed by the number of blank frames. Then click >Advance Film<.

Example: +2

(See also 6.6 Advance Film, page 33)

6.4 Image position, Image width and height

In the field pos. and width / height you see the actual status of position and size of the image on the CRT.

You can change these values manually if you want to have a different image area and a different starting point of the image on the CRT. This is useful when imaging on cinefilms or on parts of sheet films.

The preset values for the standard 24x36mm slide filmes at 4k resolution are:

left:	-2048	width:	4096
top:	1366	height:	2732

The zero point of the CRT co-ordinates is in the middle of the CRT area. This means that the starting point has a negativ value and the starting points for the left and top are half of the width and heights values.

Activating the button: >Setup Filmrecorder< the changed values are saved in DiaTools/DiaCal according to the actual modul and the resolution.

These values are also stored temporally in the film recorder and were reset to default with every reset of the film recorder. DiaTools/DiaCal automatically sends the changed values every time before sending the image data. If the last stored values in DiaTools/DiaCal are different to the actual values in the film recorder you will be asked whether to use the stored or the default values.

6.5 Pacing

The pacing value creates a delay between the individual lines of the exposure process. This can be of use with highly complex graphics as a way of suppressing any brightness strips which might occur during exposure. If this should happen, set a higher pacing value. There is a range of between 3 and 225.

Some recorders operate with a 0 setting and this corresponds to the highest possible speed.

6.6 Film end query

If the film end query is set, (check box *Filmend Request* active) the end of film signal of film recorder will be used. Otherwise, the number of images per film can be entered. If the recorder reaches this number, the further exposure will be interrupted and a notification will appear on the screen.

To activate or deactivate the check box, click on it with the mouse. If it is deactivated, enter the number of the last image on the film. To confirm the entries, click on >Setup Filmrecorder<.

6.7 Load Film

This function is called up after inserting a new film . This saves having to call up this function through the menu of the film recorder.

6.8 Advance Film

If you wish to have a blank frame, click this switch. In the case of several blank frames, enter the number of the frame to which you wish to advance. You may also simply enter the number of blank frames, preceded by a plus sign (e.g. +2).

The >Cancel< key will also interrupt the film advance in case you accidentally enter too high a number.

6.9 Unload Camera

This function is called up on after the film has been removed. It resets the exposure counter back to zero.

6.10 CRT Calibration

By using this switch, the CRT calibration (system calibration) can be done "by hand".

The CRT calibration is the internal brightness balance of the picture tube.

If you activate '*auto CRT Calibration after*' the calibration of the CRT is running after the numbers of images that you have entered.

6.11 Reset

The >Reset< switch resets the film recorder. This option, however, is only available when a GPIB card is being used.

6.12 LUT Data Range

Depending on the model of film recorder, the LUT can be transmitted with a data range of between 8 and 12 bit. Since 12 bit offers 4,096 different brightness values and 8 provides only 256, the gradations of the Look-Up-Table at 12 bit are much finer. With film recorders that cannot support a 12 bit data range, the selection field is gray and can't be clicked.

7 Looking-Up

From the main window you can call up the various functions via either the file menu or the symbol bar. The structure of the menu depends on the window in which you happen to be. Commands which are not available are shown in a lighter shade of gray.

This chapter will explain all the menu items in order.















7.1 The Menu Structure









Depending on the program window which is in use, the menu line will show various menu items. In the Densitometric Calibration window there are the following menu items: File, Calibration, Options, Display, Window and Help. You can call up one of these menus either by simply clicking it or by holding down the Alt key and striking the appropriate underlined letter. The menu is now opened and the sub-points are available.

These sub-points vary with the program status, but all are listed in alphabetical order.

7.2 The Symbol Bar

Using the symbol bar you can call up various commands by simply clicking with the mouse. This is for calling up commands quickly, but they can also be reached through the menu. The symbol bar is horizontal and is located under the menu bar.

Switch	Action	Menu Command
	Load and display exposure	File Load Image
	Calibration with a color densitometer	File Calibration
	Manual setting of the LUT	File Manual Calibration
	Opening a LUT file	File Open...
	Storing of a LUT file	File Save
	Loading a previous LUT	View Load previous LUT
	Loading the following LUT	View Load next LUT
	Transmit LUT to film recorder	File Send LUT to Filmrecorder
	Loading LUT from film recorder	File Download LUT from Filmrecorder
	Expose picture	File Load LUT from Filmrecorder or File Inspect and Expose
	Terminate exposure immediately	File Stop
	Work on red LUT	Options Red LUT
	Work on green LUT	Options Green LUT
	Work on blue LUT	Options Blue LUT

Switch	Action	Menu Command
	Work on all LUTs simultaneously	Options All LUTs
	Show only one LUT	Options Show only one LUT
	Show previous LUTs	Options Show previous LUTs
	Set back LUT	Options Undo LUT changes
	Calibration steps 1 to 6	Calibration 1 to 6
	Setting brightness, contrast and repetition	View Brightness, Contrast, Repetition
	Call up film recorder controls	Options Setup Filmrecorder
	Display on-line help	Help Help

If you point to one of the symbols for a moment, its function will be indicated in the status line (the lowest line in the program window)

7.3 File Menu

Depending on the window which has been called up, the File Menu has different forms, e.g.:

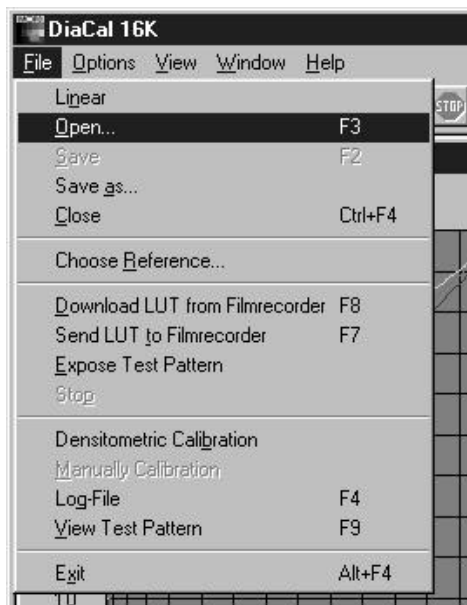


Illustration 9: Menu File of the Modul 'Densitometric Calibration'

The individual commands and their meaning is as follows:


Close	Closes the active window
Densitometric Calibration	Calls up the densitometric calibration
Download LUT from Filmrecorder	Gets the LUT from the film recorder
Exit	Ends the application
Expose Test Pattern	Exposes the test pictures in the film recorder
Linear	Produces a linear (un-named) LUT
Log-File	Shows the log book entries
Log-File Delete	Removes all log book entries

Manual Calibration	Calls up manual calibration
Open	Opens an already existing LUT file
Save	Stores the LUT file being used
Save as...	Stores the LUT being used under another file name
Send LUT to Filmrecorder	Transmits the LUT being used to the film recorder
Stop	Immediately terminates the exposure
Reference File	Determines the appropriate reference file
View Test Pattern	Shows the test picture that is to be exposed (preview).


7.3.1 File | Close

The menu item `File|Close` closes the active window. If there is an altered LUT file which has not yet been stored, a question will appear on the screen to ask if you wish to store it.

7.3.2 File | Densitometric Calibration

This command (which can also be called up using the symbol ) makes available the program module for densitometric calibration. The menu item Calibration appears in the menu line and this in turn gives access to further commands. For the calibration process itself, see pp. 22

7.3.3 File | Download LUT from Filmrecorder

If you have already called up the densitometric calibration or the manual calibration, you can get the LUT from the film recorder by using the menu item File|Download LUT from Filmrecorder or the symbol . The LUT will then be displayed in the diagram. In addition, the values for brightness, contrast, and the repetition rates as well data on the camera module and the film recorder model will also be loaded from the recorder.

7.3.4 File | Exit

If there is still a LUT file in one of the program windows the changes in which have not yet been stored, you will be asked, "Active LUT not stored! Store the LUT now?" before the program ends. >Cancel< makes it possible for you to continue working; with >Yes< you can store the LUT before the end of the program. You may also be asked for the file name. Otherwise, this menu item ends the application.

7.3.5 File | Expose Test Pattern

This command exposes the test picture, as required for calibration or evaluation of the gray levels. First load the desired LUT file or use a LUT from your film recorder.

With densitometric calibration, this command is normally unnecessary because the test exposure is one step in the calibration (see page 23).

See page 55 for the test picture options.

7.3.6 File | Linear

The menu item Linear creates a new linear LUT which does not have a file name yet.

7.3.7 File | Log-File

This menu item shows the log book in which the film exposures have been registered. You can always check the log book to find out which files have been exposed and how long the exposure was.

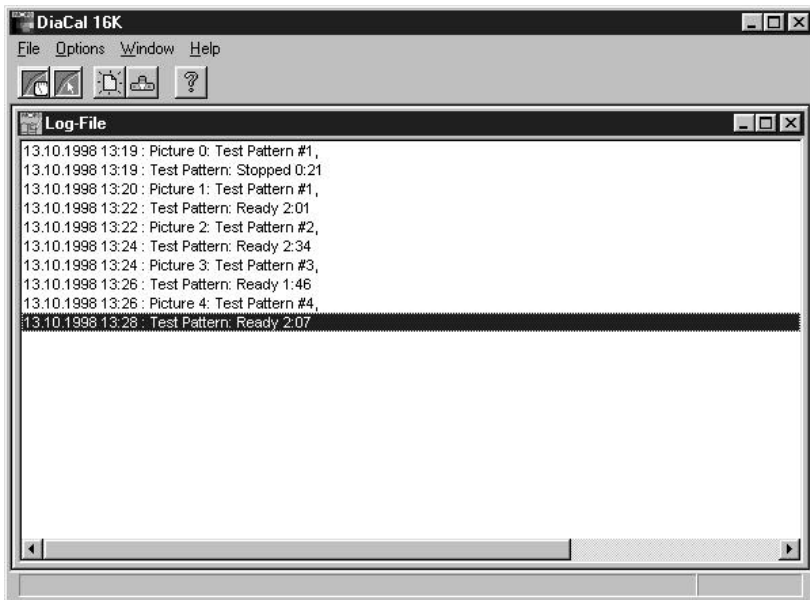


Illustration 10: Window Log-File

The Log-File records when (date and time) which exposures (exposure counter number) were successfully exposed with which file (path and file name) and how long the exposure time was. In addition, any errors or terminations on the part of the user are also


noted. This gives you a good overview of the activities of your film recorder. The Log Book file DIATOOLS.LOG is a pure text file which can be worked on with a word processing program. You will find them in the same index as the EXE-file of the program (in most cases C:\PROGRAMME\MOPS\DIATOOLS).

The Log Book file can be erased with the `File|Log-File Delete`. When you continue work, a new Log Book file will be created.

7.3.8 File | Log-File Delete

If you call up this menu item, the content of the Log Book (see p. 41) will be erased. Just to make sure that nothing you still want gets lost, you will be asked to confirm the erasure before it takes place. Here, you have the possibility of clearing out the Log Book from time to time so that you have a better overview of the material in it.

7.3.9 File | Manual Calibration

This calls up the program window for manual calibration, as is described on page 25. The manual calibration can also be reached using the symbol .

7.3.10 File | Open

The menu item `File|Open` shows a dialog window for opening files. LUT files, REF files or CCF files can be loaded.

The two lists on the right makes it possible for you to choose the desired index and the drive. On the bottom left the desired file

formats can be set and above that the name of the desired file can be clicked. A double click will load them directly; after a single click you confirm the choice with >OK<

7.3.11 File | Save

The menu item `File|Save` stores the LUT file on a disk or on the hard disk. If the file does not have a name yet, then the dialog window "Store File Under" will be opened. Here, you can re-name the file or store it in another index. In this case, a file name will be suggested automatically.

7.3.12 File | Save as...

The menu item `File|Save as...` opens the dialog window "File Store as". With this window you can store the file under the name you give it or put it into another index or drive. A file name with the current date and a consecutive number will be suggested automatically.


In the dialog window it is possible to enter the new file name together with its drive and index. If you use an already existing file name, then you will be asked if the existing file is to be overwritten.

In addition, this menu item can be used to export the calibration data in the CCF Format of RasterPlus[®] by Graphx Inc. (USA) and in the format of IMAGE Assist[®] for MAC by the firm McLain Imaging (USA). In this case, choose the CCF format or the Image-Assist-MAC format under "File Type". Then change the file names if necessary and store the file. The file can be used to transmit the calibration data to the film recorder, using RasterPlus with Windows or IMAGE Assist on a MAC computer.

Note:

The values for brightness and repetition rate are not supported in the export files. This means that you should be certain the values being used in the film recorder are the same as those in the original LUT file.


7.3.13 File | Send LUT to Filmrecorder

After you have already called up the densitometric calibration or the manual calibration, both the menu item `File|Send LUT to Filmrecorder` or the symbol  make it possible to transmit the LUT visible in the diagram to the film recorder.

If they are non-zero, the values for brightness, contrast and repetition rates will also be transmitted.

If you wish to store the LUT in your film recorder permanently, consult the film recorder user's guide. With newer film recorders you will require a USER film type and/or have to call up the menu item 'Save LUT.'

7.3.14 File | Stop

With this command or with the symbol  you can **immediately** terminate the exposure process. This will be noted in the Log Book (page 41) as "User Termination" together with the date and time.

The film recorder leaves the frame unexposed or semi-exposed and when called up again it will start with the next frame.

7.3.15 File | Reference File


Using this menu item, you can determine the desired reference file REF (see page 18) for the calibration process. The name of the reference file will be stored in the LUT file.

For slides, it is standard to use the file POSITIVE.REF; for negative film the file NEGATIVE.REF. If you wish to make a reference file of your own, see the Appendix, page 64.

7.3.16 File | View Test Pattern

This menu item displays the test picture the way it was exposed on the film. With 4 or 16 test pictures, only the first one will be shown with the corresponding gray values. Depending on how you set the number of test pictures, only the first field, the first four fields or all 16 fields will be visible. See page 55 for setting the number of test pictures. With negative films, the fields on the edge of the picture are black instead of gray.

7.4 Calibration Menu

This menu is only accessible if you have already called up the densitometric calibration (see page 22 for the procedure and page 39 for the selections available). With manual calibration, this menu is not present. Densitometric calibration can be called up fastest by using the symbol .

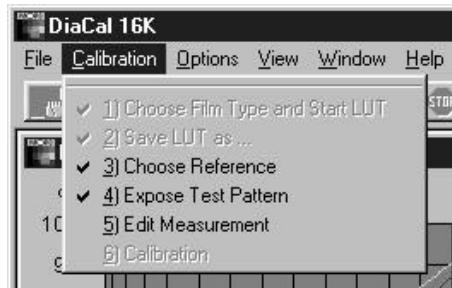




Illustration 11: Menu Calibration

The calibration process has already been described in detail in the "Practical Operation" section (see pp. 22), so here, we will concentrate more on the additional support. The only menu items which can be called up are those which can or must be used as the next step in the calibration process. If, for example, you have called up the menu item File|Linear all the menu items are gray (and therefore inaccessible) except for 1) Choose Film Type, Set Start-LUT. Calibration steps which have already been carried out have a checkmark  next to them.

With the help of the symbol , you can carry out the next calibration step directly.

If you position the mouse indicator above the symbol, the status bar will show the next calibration step which will be called up after clicking.

7.4.1 Calibration | 1) Choose Film Type and Start-LUT

If you click this command, the dialog window for film recorder controls is opened and here you can make a number of pre-settings. What is particularly important is setting the Start-LUT, i.e. whether you want to begin with a linear LUT or with a LUT from the film recorder which corresponds to the film type being used. You will find a detailed description on pages 29 ff.

7.4.2 Calibration | 2) Save LUT as...

You will be asked to give the LUT file a name. At the same time, a file name with the current date and a consecutive number will be suggested. Using this name, you can later load the LUT file at any time and then, for example, transmit the calibrated LUT to the film recorder.

7.4.3 Calibration | 3) Choose Reference

Here, the reference file is defined. Normally, slide film will use the file Positive. ref and negative film s the file Negative. Ref. The reference file contains the desired values for the density of the test fields on the test pictures. In densitometric calibration the LUT is altered so as to be closer to the density values of the reference file.

If you would prefer to make your own reference file, please consult page 64.

7.4.4 Calibration | 4) Exposing Test Pattern

The test picture will consist of one, four or sixteen pictures, depending on the number which have been set (see page 55). A total of 16 different gray levels are required, beginning with a black surface (Field 1) through various levels of gray to a white field (Field 16). With this menu item you begin exposure. All data regarding the test picture are noted on the test picture itself. In this way, you will always have at your disposal the following information: the commentary text, the file name, the name of the reference file, the file series, the module name, the film type setting, the resolution as well as date, time and picture number.

7.4.5 Calibration | 5) Edit Measurement

When you have the test picture, use a densitometer to measure the density or percentage values of the different surfaces. These values are then to be entered into the corresponding input fields of the film recorder calibrator.

If you have an Agfa Densitometer DENS 1 or Barbieri Densy 250E/450E or XRite 310/810, then you can read in the values using a serial interface (see page 50). This saves reading and typing in the values. Set the cursor in the input row whose field you wish to measure. The program automatically enters the measured values in the input fields and then positions the cursor on the next line.

The parameters of the seriell interface (baudrate and dataformat etc.) are fixed. The baudrate of the densitometers had to be 1200. With the Agfa DENS1 adjust the switch on the bottum to BR1200, with the densitometer Densy 250E/450E use the dataformat "Barbieri" in the densitometer menue.

If you have a densitometer without a seriell interface, choose *Manual Input*.

7.4.6 Calibration | 6) Calibration

This menu item computes the corrected LUT from the density values which have been entered, so that the density values of the next test picture will be closer to those of the reference file.

After the calibration process, the diagram shows the new LUT which you can use for a subsequent calibration or for your exposures.

7.5 Options Menu

In this menu as well, which sub-items are displayed depends on which part of the program you are using at the time.

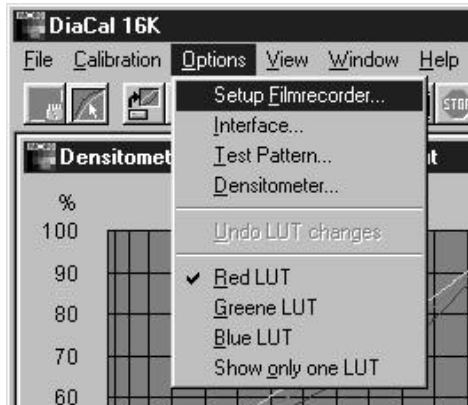


Illustration 12: Menu Options

All commands in alphabetical order.

Blue LUT	Selection of the blue LUT
Densitometer...	Makes the setting of a densitometer type possible, which automatically takes over data.
Green LUT	Selection of the green LUT
Interface...	Makes possible the setting of the Id. No. of the SCSI or the primary address of the GPIB interface.
Setup Filmrecorder...	Makes different controls and setting possible
Show only one LUT	Only the chosen LUT of a particular color is displayed

Show previous LUTs	Also displays the unchanged LUTs
Model...	Setting of the film recorder model
Red LUT	Selection of the red LUT
Test Pattern...	Selection of particular test pictures to be processed and determining the number of test pictures.
Undo LUT changes	Restores the original LUT of the color which has been set.

7.5.1 Options | Blue LUT

With this menu item you can select the blue LUT to be worked on.

With densitometric calibration:

Using `Options|Show only one LUT`, you can make sure that the input fields only accept the measurement values of the color chosen.

7.5.2 Options | Densitometer...

This option makes it possible for you to set a densitometer whose measured data can be read directly into the program via an interface which also has to be set.

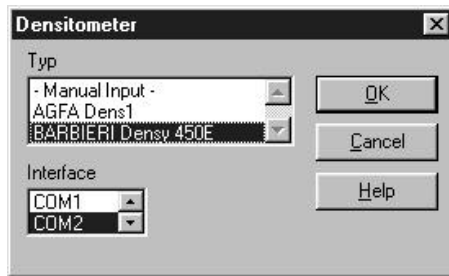


Illustration 13: Dialog box Densitometer

Now, you have to choose the interface, where the densitometer is connected with your computer. Yet, we support three densitometers. The DENS1 from Agfa and the Densy 250E/450E from Babrbieri or the XRite 310/810.

If you don't have one of these densitometer, you have to choose '- Manual Input-'.

7.5.3 Options | Green LUT

With this menu item you can select the green LUT to be worked on.

With densitometric calibration:

Using Options|Show only one LUT, you can make sure that the input fields only accept the measurement values of the color chosen.

7.5.4 Options | Interface

Here you can set which interface the film recorder is to be connected to. As interface, either the GPIB or the SCSI are available. The appropriate interface card and the corresponding software must be installed in the computer.

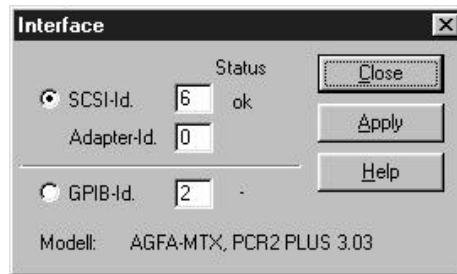


Illustration 14: Dialog box Interface

For the GPIB interface a primary address has to be set on the film recorder which is identical with the number in the input field. The pre-setting is 2.

For the SCSI interface an ID Number has to be set on the film recorder which is identical with the number in the input field. The pre-setting is 6.

If the corresponding interface is not available to the computer, the input field is gray.

If your computer has more than one SCSI or GPIB card and the film recorder is connected to a second card, change the entry in the appropriate INI file (DIACAL.INI). A more detailed description can be found by clicking >Help<.

This menu item is available only if neither the windows for the densitometric nor the manual calibration have been called up.

7.5.5 Options | Model

Click this command for setting your film recorder model

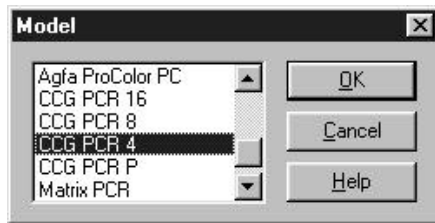


Illustration 15: Dialog box Model

You can use the scroll to move up and down in the list of selections. Mark your recorder model and confirm it with >OK<.

This menu item is only available if neither the windows for densitometric nor manual calibration have been called up.


7.5.6 Options | Red LUT

With this menu item you can select the red LUT to be worked on.

With densitometric calibration:

Using the menu item Options|Show only one LUT you can be sure that the input fields only accept the measurement values of the color chosen.

7.5.7 Options | Setup Filmrecorder

The film recorder controls (which also can be activated by clicking the symbol ) offer a variety of settings for the film recorder: film type, resolution, exposure counter.

Other control possibilities which are also present are: Loading film, removing film, film advance. In addition, it is possible to do a CRT balance, to trigger a resetting of the film recorder and set the LUT data range. Use of the film recorder controls is explained more thoroughly beginning on page 29.

7.5.8 Options | Show only one LUT

Only those LUTs which have been chosen via the menu items Red LUT, Green LUT or Blue LUT are displayed with the corresponding color. When entering the measurement values in the densitometric calibration, only the input fields of the color chosen are effected. The other fields will be skipped.

7.5.9 Options | Show previous LUTs

The original LUTs are shown in the diagram with additional dots. For manual changes of the LUT, displaying the original curve can be very helpful.

7.5.10 Options | Test Pattern...

This menu item makes it possible to set the number of test pictures per calibration as well as the exposure of certain test pictures, e.g. test picture no. 1 or test pictures 2 through 4.

The number of test pictures determines the number of the total of 16 required test areas on a picture and thereby also the size of the test area. The test areas have to be large enough that they can be measured by the densitometer. For the 24x36 format there will usually be four such areas; for larger film formats (6x6), one is usually adequate. Since the number of test pictures depends on the film recorder camera module being used, the setting can only be made by previously getting the LUT from the film recorder or opening a LUT file. Clicking >OK< will confirm the setting; the switch >Terminate< will end the dialog box without changing the setting.

To choose a test picture, enter the number of the test pictures which are to be exposed into the text line. You have the following possibilities:

- the word "All"
- the numbers of the desired test pictures, separated by commas.
Example: "1,3,4" exposes test pictures 1, 3 and 4.
- a number followed by a minus sign will expose all the required test pictures, beginning with number 2
- numbers separated by a hyphen: "4-7" will expose pictures 4 through 7
- A combination of the above possibilities, each possibility separated from the others by a comma.

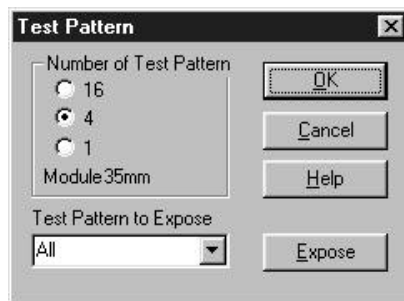


Illustration 16: Dialog box Test Pattern

The switch >Expose< will then carry out the exposure of the test pictures.

7.5.11 Options | Undo LUT changes

This menu item reverses color changes made in the LUT. The original LUT of the color chosen will be restored.

7.6 View Menu

This menu makes the following commands available:

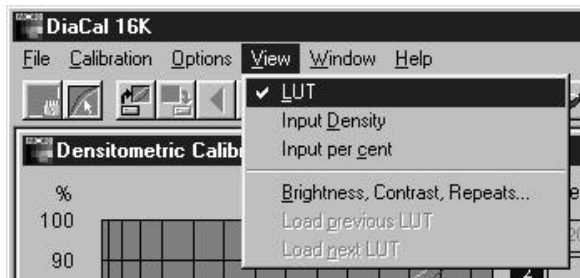


Illustration 17: Menu View

Brightness, Contrast and Repetitions...

Displays and alters the values for brightness, contrast and repetition

Input of Density Data

Switches the display to a logarithmic presentation of the density values

Input of Percentages

Switches the display to a linear presentation in % of the measured values

Loading of Following LUT

Loading of Preceding LUT

These two menu items make it possible to "browse" backwards and forwards through the various LUTs of a calibration.

LUT

Displays the LUT

7.6.1 View | Brightness, Contrast, Repeats...

Using this menu item you can see (and, if necessary, change) the film recorder's tables for brightness, contrast and repetition of red, green and blue. The illustration below shows the dialog window:

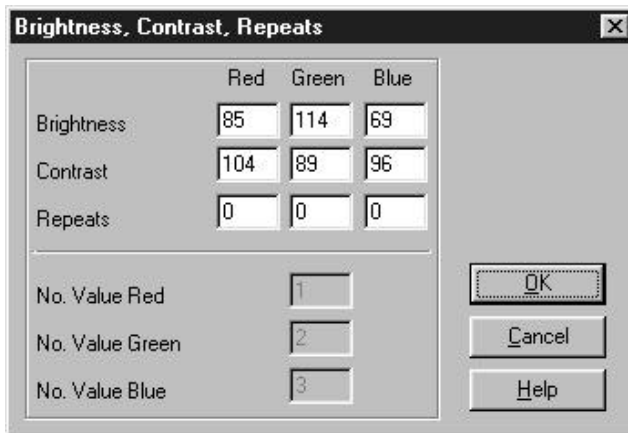


Illustration 18: Dialog box: Brightness, Contrast, Repeats

The values displayed can be altered. They originate either from the opened LUT file or directly from the film recorder. So, if you have neither got the LUT from the ilm recorder nor loaded a LUT file, all values are set at zero.

The meaning of the individual values is described below:

Brightness:

The brightness values alter the brightness of the beam in your film recorder's cathode ray tube. They describe the colors red, green and blue separately. Changing the brightness values effects all the test fields of the test picture, but has a particularly strong effect on the bright fields 12 to 16. The units in which these values are expressed are arbitrary, but a lower value indicates greater brightness and/or less density on the film .

Contrast:

The contrast values alter the brightness of the cathode ray tube's beam, particularly in fields 1 to 11. They describe the colors red, green and blue separately. The units in which these values are expressed are arbitrary, but a lower value indicates greater brightness and/or less density on the film

Brightness or contrast values which are too low can lead to a calibration error in the film recorder. In this case it is best to increase the repetition rate. In order to correct the calibration error, you must make sure that the corresponding values for brightness and contrast are set back.

One possibility is to change the values by hand using the menu of the film recorder. Another possibility is to change the film type and then return to the original film type. If all else fails, you can set the film recorder back to its original position.

Be careful, however: If you do so, all the individual settings will be lost. You can read more about this in the operating manual of your film recorder.

Repetitions:

The number of repetitions indicates how often an individual color is repeated during the exposure process. Zero means a simple exposure with no repetitions. By repeating the exposure you can increase the amount of light during the exposure even if the brightness of the cathode-ray tube has already reached its maximum or if the brightness shouldn't be increased because the beam diameter is becoming larger.

By doubling the number of exposure procedures (doubling the repetition value and raise it by 1), the test fields of the test picture are each made roughly 0.3 density units brighter.

Number of the Table Entry:

The table entry describes the place in a table which are taken by the three values described above. In newer film recorders these

numbers are already determined and you needn't change them. With older film recorders, certain settings can be stored in places in the table which are still free. A total of eight table entries are available.

7.6.2 View | Input Density

Switches the display to a logarithmic presentation of the density values.

A surface can be made black using the density values or through percentage values. This menu item makes it possible to enter measured density values. Density values are expressed logarithmically. A value of zero means the maximum white value. Black surfaces attain density values of 3.0 to 4.2.

An example: A surface with a density of 4 will block off all but 1/10,000th of the original light.

7.6.3 View | Input per cent

Switches the display to a linear expression in %.

The measured values are given in %.

The blackness of a surface can be expressed using density values or percentages. This menu item makes it possible to enter the measured percentages. A value of 0% means the maximum black value. A white surface has by definition a value of 100.

7.6.4 View | Load next LUT

7.6.5 View | Load previous LUT

All the data for a calibration are stored in a single LUT file. Using these two menu items, you can browse backwards and forwards among the calibrations which have already been made. You can also take another look at the uncalibrated LUTs. The number of the calibration or the word "Uncalibrated" will appear in the status line after the file name.

7.6.6 View | LUT

This switches the display to a presentation of the LUT. Zero is the maximum black value. A white surface has a value of 100%

7.7 Window Menu

The Window Menu contains commands for positioning and arranging windows.

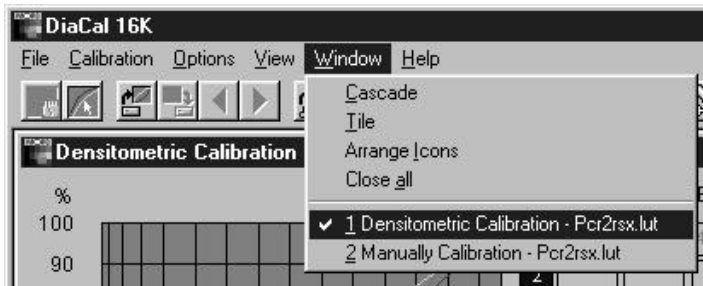


Illustration 19: Menu Window

Arrange Icons	All the windows which have been reduced to symbols are arranged in a grid
Cascade	All windows which have not been reduced to symbols are arranged overlapping each other
Close all	All open windows are closed
Tile	All windows which have not been reduced to symbols are arranged side-by-side

7.7.1 Window | Arranging Icons

All the windows which have been reduced to symbols become re-arranged along the lower edge of the main window.

7.7.2 Window | Cascade

Beginning at the upper left in the client area, all the windows are arranged overlapping, but with their titles visible.

7.7.3 Window | Close all

All open windows become closed.

7.7.4 Window | Tile

All windows which are open (not reduced to symbols) are arranged side-by-side without overlapping.

7.7.5 Window | (Number)

If you have several windows open, you can use this option to bring one of them to the foreground.

7.8 Help Menu

The Help Menu offers the following options:

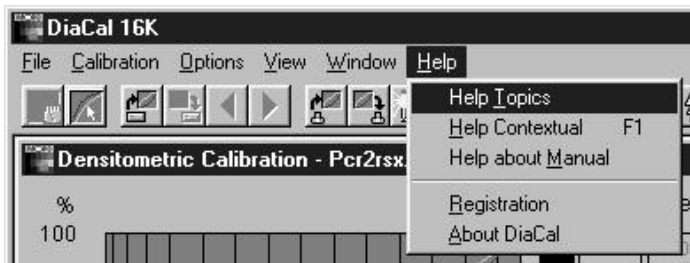


Illustration 20: Menu Help

The table of contents of the user's guide, activation of contextual help, help with the use of the help option itself and information about the FilmKalibrator program.

7.8.1 Help | Contextual Help

This option provides help regarding the window which is open at the moment.

7.8.2 Help | Help Topics

This commands opens the Help File's table of contents.

7.8.3 Help | Help about Manual

Here you will receive assistance in using the Help File itself

7.8.4 Help | About DiaCal

This command opens a window where you will find the version and serial number of this program as well as the name of the licensee.

8 Appendix

8.1 Drag & Drop with the Windows Explorer

Files can be opened in the DiaCal application by simply taking them from Windows-Explorer and putting them in the main window or the application's icon ("drag & drop"). This applies to files of the "LUT", "REF", "CCF" or "IA" types.

8.2 Making a Reference File

In order to make a reference file, first call up the densitometric calibrator. Then click the menu item `File|Open...`. The dialog window `Opening` will then become visible. Set the dialog window for reference file and then choose the reference file you wish to change (e.g. the file `POSITIVE.REF` for slide films)

The density values of the file chosen are shown in the diagram on the left and given in numbers on the right. The reference curve can be changed at will by changing the numbers. You can record a corresponding text in the commentary line. Then store the reference curve under another name (`Menu File|Save as...`). The new reference is now available for further calibrations.

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We would be very grateful for any suggestions or comments which could help us improve either the software or the user's guide.

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