

The most advanced enlarging system.  
Designed for the most demanding darkroom professional.

- The 45 MXII Enlarger
- The Dichro 45 Computerized Colorhead
- The D.A.T.A. Module



**BESELER**



Since its introduction in 1954, the Beseler 45M series of enlargers has represented the ultimate in quality and capability for the professional photographer. Rigid, versatile, and incomparably engineered, the line seemed immune to obsolescence, beyond improvement.

But as photographers made greater demands on their enlargers, Beseler made advancements in technology, resulting in possibilities undreamed of a decade ago. The result was an even better 45M.

Beginning with the basic condenser enlarger, we then added greater height for 16x20 on-baseboard capability and increased distortion-control facilities, retaining the tried-and-true features, such as unique motorized elevation control and the incredibly rigid chassis.

The next target was the colorhead.

Our objectives were to incorporate the three criteria by which all colorheads are judged: brightness normally found only in condenser illumination; evenness of illumination and uniformity of color mixing.

We not only achieved these goals; we surpassed them—adding two unprecedented features: electronically controlled color repeatability and incremental accuracy.

The result was a redefinition of the colorhead, the revolutionary Dichro 45 computerized colorhead, setting new standards by which all others would be measured.

And now, the final breakthrough in the process, making the world's most advanced enlarging system even more sophisticated, the introduction of the Beseler D.A.T.A. module.

**The D.A.T.A. Module by Beseler.** The little black box that has advanced darkroom technology by light years.

The command control center behind the Dichro 45, our D.A.T.A. module is actually many devices incorporated into a single "little black box." It consists of a microprocessor-controlled digital color analyzer, enlarging timer with quartz crystal accuracy, custom-designed LED illuminated keyboard and magnetic card reader which enters and stores data. The D.A.T.A. module measures the color and amount of light

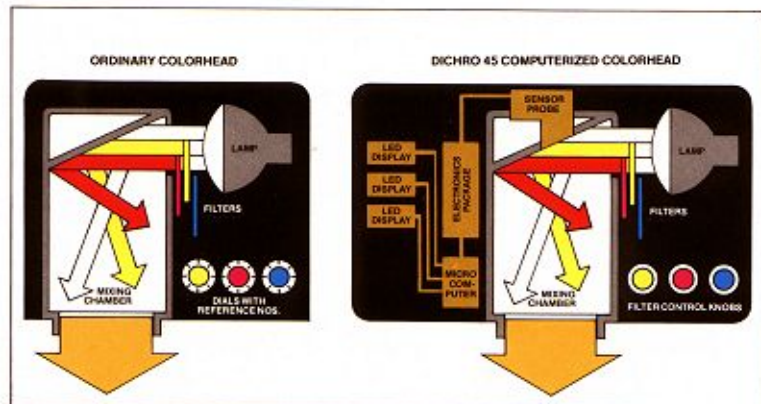
at the baseboard and transmits it to the colorhead for processing and display. The result is an extremely high level of control, saving you time and money by reducing remakes.

For serious professional printers, there is only one system to consider. The Beseler 45MXII Enlarger. The Dichro 45 Computerized Colorhead. And the wave of the future, available today, the D.A.T.A. Module.

sought to control those variables. The result is the Dichro 45 Computerized Colorhead employing the latest in microelectronic, optical and mechanical technologies.

### Dichro 45 Computerized Colorhead illumination: both even and brilliant

You need brilliant illumination to keep exposures short and to avoid reciprocity problems. And you also need illumination which is even, corner-to-corner and center to edge, for optimum print qual-



**Ordinary colorhead:** Numbered dials show reference points only. Accuracy and repeatability are always questionable.

**Beseler's Dichro 45 Computerized Colorhead:** Sensor probe measures true color of light inside the mixing chamber. Microcomputer feeds information to LED displays allowing precise incremental changes and repeatability.

### The Beseler Dichro 45 Computerized Colorhead. The professional colorhead, redefined.

- Microcomputer controlled color repeatability
- Precise incremental filtration accuracy
- Unbeatable brightness for short exposures
- Incomparably even illumination
- Beseler exclusive Dual Dichro condenser/diffusion illumination
- Virtually mistake-proof operation
- Fits most professional 4x5 enlargers

A day in the life of a professional photographer is filled with challenges. To meet them, it's essential that you control as many variables as possible—especially when you step into the darkroom. You can purchase large quantities of sensitized material with the same emulsion numbers and you can monitor processing temperatures and chemicals, but until now, until the advent of space age technology, there were uncontrollable variables in the colorhead itself. Summoning up 110 years of manufacturing experience and an extensive background in color analyzer technology, Beseler

ity. Until now, you could have one or the other, but not both. The Dichro 45 Computerized Colorhead's new wide-beam lamp technology coupled with permanent, fade-free dichroic filters and a unique mixing chamber design give you the incredible speed comparable to a condenser head plus unparalleled evenness of illumination.

### Total color repeatability with incremental accuracy

As an experienced printer you know it is often impossible to make precisely identical prints on different days, or on different enlargers, because of a host of variables. The Beseler Dichro 45 changes that. Now, for the first time, color output is totally repeatable, and you can adjust it with precise incremental accuracy. That means that 30 magenta is always 30 magenta. And a change of 01 is always a change of 01. The Dichro 45 is forever true to itself, and can be calibrated to match other Dichro 45's perfectly.

### The self-reading "smart" Dichro 45

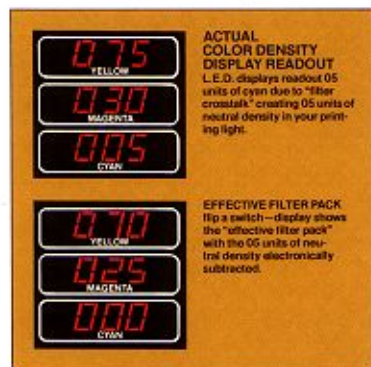
How can color output be made totally repeatable? The answer, at least on the surface, is startlingly simple: a micro-



computer, linked with other electronic devices, which reads the actual light going to the negative stage. And amazingly the cost of the complete Dichro 45 Computerized Colorhead is comparable with that of ordinary colorheads!

### Saves you time, paper and chemicals

Suddenly, all those mysterious, unexplainable color shifts in printing are gone. Because the filtration you set is the filtration you get. The usual mechanical filter dials are gone. In their



place are unique digital displays which read-out the precise color of the light at that instant. Now, for the first time, any setting, any adjustment is exact and repeatable. You'll have far better prints, more productive days, with much less wasted time and materials.

**The Dichro 45 "talks" to you**  
It tells you the things you need to know. It has the capability to provide a wide variety of control data and to display the information. It will show you, for example, the actual color density of the three primary components of the white light; flip a switch and it displays your effective filter pack, with any neutral density automatically subtracted.

Thanks to the computer, it is almost impossible to make a mistake. It indicates which of 4 mixing chambers is in place, so you'll never accidentally use the wrong one. If filters have been retracted into the white light position for

focusing, it warns you. If you try to make an exposure anyway, the Paper Saver Circuit will cause the LED's to blink on and off: "FILTR OUT."

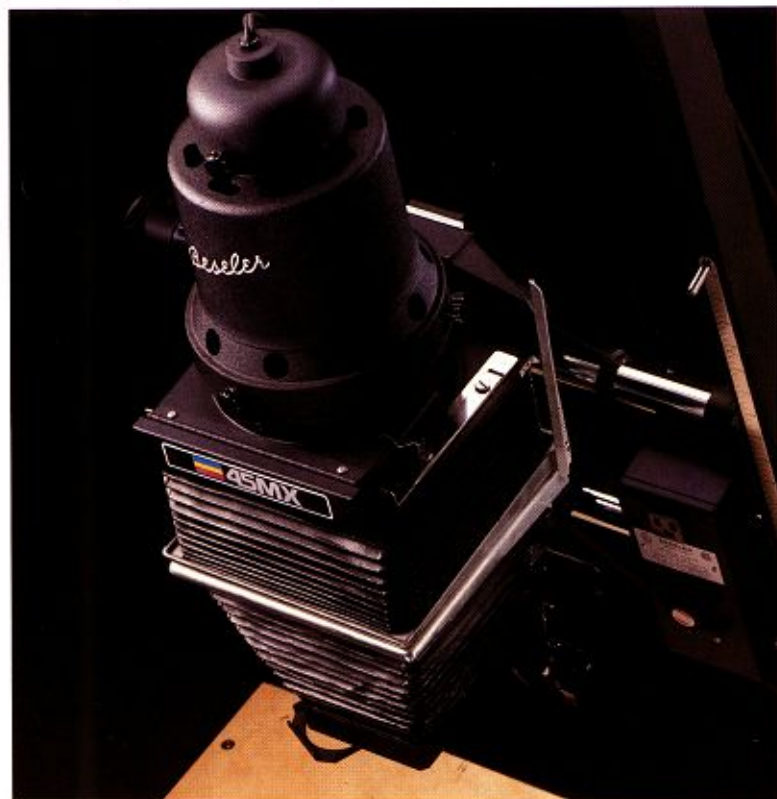
### Voltage-stabilized

Since virtually all professional color printers require stabilized colorheads, the Dichro 45 features a built-in stabilizer. It is coupled with a new, custom-developed 82-volt quartz halogen dichroic-reflector lamp and a highly efficient cooling system. These components keep the Dichro 45 running

or spotless color. Naturally, the dichroic filters are as ideal for variable-contrast black-and-white as they are for color printing. Now you can have the ideal light source for every print you make!

### The big, new 45MXII...a fitting chassis for the superb Dichro 45!

You will recognize the massive chassis of the 45MXII—in appearance, quality and ruggedness, it's a lot like the famed Beseler 45M series of enlargers. Over the years, this line has seen many design improvements, resulting in the 45MXII.



45MXII enlarger with standard MX condenser head...motorized, supremely rigid, with 16 x 20 on-baseboard capability and increased distortion control facilities.

bright and cool, even after hours of printing.

### Another Beseler exclusive: Dual Dichro

The Dichro 45, when used on Beseler 45M series enlargers, is the first and only 4x5 colorhead with Beseler's famed Dual Dichro capability. That means you can always choose either diffusion or condenser illumination, whether you're printing color or black-and-white, whether you're using the dichroic filters or not. In moments, you can switch from condenser—for plenty of snap in a black-and-white product shot—to diffusion—for a pleasing black-and-white portrait

### 16x20 height plus rigidity to match

The 45MXII prints bigger than ever, so you can easily make 16x20 enlargements on a 1" easel. For such high magnifications, you'll need great rigidity, and the double-column triangular truss design of the 45MXII is unbeatably rugged.

### Exclusive motorized magnification control

The 45MXII is the only enlarger with the ultimate convenience of motorized magnification control as a standard, built-in feature. And whether you focus right-or-left-handed, it is unbeatably precise, thanks to a superb rack-and-pinion design.

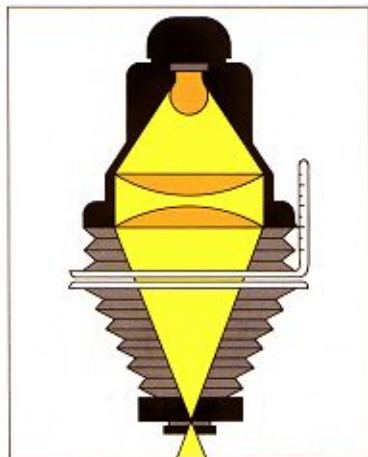


## Increased distortion control

Want to straighten up perspective errors on a tall building—or create your own special distortion? The facilities are built-in. Additional tilts have been included to make "scheimpflug" corrections easier.

## Condenser enlarging

You can order the 45MXII with a standard condenser head—it's a superlative enlarger for black-and-white, and, of course, includes a filter drawer for color printing with CP filters. The "cone of light" focusing condenser system means



**Beseler's exclusive "Cone-of-Light" principle:** The adjustable focusing condenser system maximizes brightness and evenness of illumination for all negative sizes subminiature through 4x5—no extra, expensive condenser sets to buy.

you will never have to switch condensers when you change formats.

## For your Beseler enlarger

If you already own any Beseler 45M series enlarger, the incredible Dichro 45 Computerized Colorhead fits without adaptation.

## For other enlargers too!

Custom mounting kits are available to fit the Dichro 45 Computerized Colorhead to the Omega D2, D5 and D6, or the Durst Pro and Laborator 1200 models. Depending on make and model, some assembly and custom fitting may be required. When used on these enlargers the Dichro 45 can be used only for diffusion printing. A special model is available for the Beseler 23C.

## So advanced, yet so inexpensive

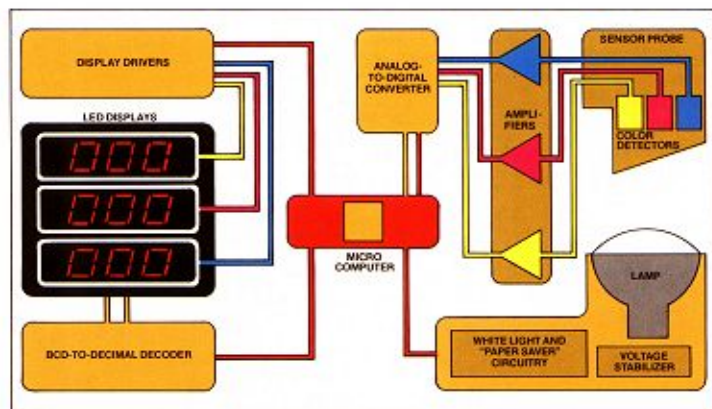
With all the advanced technology designed into the Dichro 45, you might expect it to cost far more than ordinary colorheads. Surprisingly, it doesn't. Beseler has made it easy to own the most up-to-date, the very finest there is. Why not ask for a demonstration today at your Beseler professional dealer?

# The Dichro 45 Computerized Colorhead: An Inside Look

The Dichro 45 utilizes a dedicated Single-Chip 3870 Microcomputer programmed by Beseler's Microcomputer Design Group to serve as the basic function-controller in the electronics package. Though only about 1/4-inch square, the microcomputer can collect data, make decisions and calculations, and provide output, commands and control signals. It is a proven unit, having been used in

to-Decimal Decoder which then provides a signal to select the proper Light-Emitting Diode (LED) display. The second signal supplies the selected display with the appropriate information.

All of these operations take place every 1/10th of a second so that any variation in the color of light is detected, processed and relayed to the display 10 times every second.



more than a million sophisticated electronic devices.

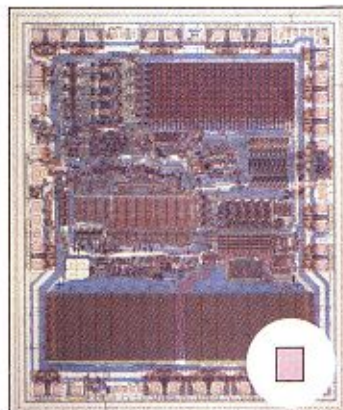
Other electronic components include a quartz crystal oscillator, 9 integrated circuits, including 3 Metal Oxide Silicon Field Effect Transistor (MOSFET) Operational Amplifiers and 3 Opto-Isolators. The microcomputer chip itself contains the equivalent of 32,000 discrete electronic components such as transistors, diodes and resistors.

## What happens when you turn on the Dichro 45

Three solid-state photo detectors are an integral part of the probe assembly which plugs into the mixing chamber to read the actual color of the light. These particular detectors were chosen because they are extremely sensitive, do not have the infrared response problems of silicon photo diodes, and closely match the spectral sensitivity of color photographic materials.

The signals from these detectors are fed into 3 MOSFET Operational Amplifiers which increase the strength of the signals.

The signals then go into a multi-channel Analog-to-Digital Converter which, controlled by the microcomputer, converts the signal into computer language. The microcomputer reads and stores this data, performs arithmetic functions, and outputs two simultaneous signals. The first goes to a Binary Coded Decimal (BCD)-



Control central of the Dichro 45...a single-chip microcomputer. Actual size of chip is 173x208 mils.

The microcomputer also performs a number of other functions: ■ Controls the Analog-to-Digital Converter. ■ Controls the BCD-to-Decimal Decoder. ■ Controls the mixing chamber identification circuitry. ■ Controls the white light and Paper Saver circuitry. ■ Performs all data processing functions. ■ Controls the lamp circuitry. ■ Performs a self-test function for the operation of the program itself as well as a check on all digits in the LED display.



# Featuring Beseler's exclusive D.A.T.A. Module

- Microprocessor-controlled digital color analyzer
- Enlarging timer with quartz crystal accuracy
- Magnetic card reader for storing and retrieving data
- LED-illuminated keyboard
- Multi-channel probe

## The Beseler D.A.T.A. Module:

The many capabilities of this remarkable command control center are indicated in part in the explanation of its name.

D.A.T.A. stands for Data Access Timer Analyzer Module, a new concept in color printing control.

Data Access describes the Data Handling and Input/Output functions of the module. Its built-in magnetic card reader enables the module to "read data from" and "write data to" a specially designed D.A.T.A. card which looks like an ordinary credit card. The unique keyboard lets you manually enter data into the internal memory of the colorhead itself.

The D.A.T.A. Module can use and store many types of data, including analyzer programs, colorhead-memory offsets, specific information about a

particular negative or slide, automatic variable contrast control, paper/film emulsion and density control.

The timer function lets the module address the quartz crystal oscillator which is built into the Dichro 45 Colorhead, providing an enlarging timing capability unequalled for accuracy and repeatability, controlled by the onboard microcomputer.

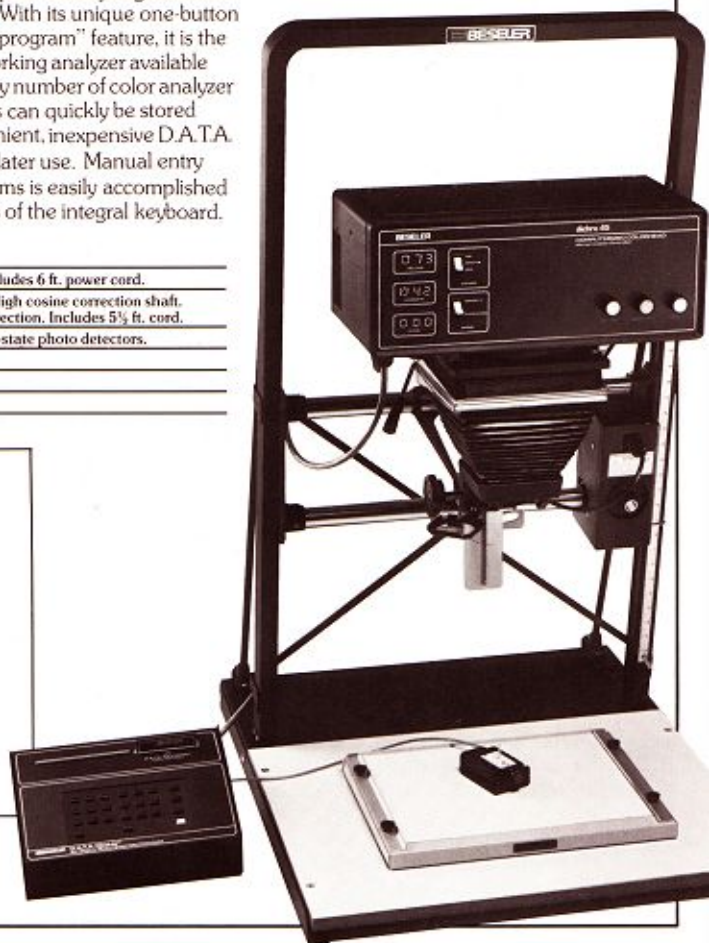
The analyzer function refers to the D.A.T.A. Module's ability to perform as a Multiple-Memory Digital Color Analyzer. With its unique one-button "push-to-program" feature, it is the fastest working analyzer available today. Any number of color analyzer programs can quickly be stored on convenient, inexpensive D.A.T.A. cards for later use. Manual entry of programs is easily accomplished by means of the integral keyboard.

The D.A.T.A. Module connects to the Dichro 45 colorhead by means of a 24-pin connector.

In partnership, the D.A.T.A. module and the Dichro 45 offer you speed, accuracy, repeatability and convenience never before available integrated into a single instrument. With the 45MXII enlarger as its core, this system is unsurpassed in every way.

## SPECIFICATIONS

CONSOLE DIMENSIONS	11 1/2" W X 3 1/2" H X 9" D. Includes 6 ft. power cord.
PROBE DIMENSIONS	4" W X 1 1/2" H X 2 3/8" D. 1" High cosine correction shaft. Probe tilts 30° in either direction. Includes 5 1/2 ft. cord.
PHOTO SENSORS	Probe incorporates 3 solid-state photo detectors.
SHIPPING DIMENSIONS	12 1/2" W X 5 1/4" H X 12 1/2" D.
SHIPPING WEIGHT	9 lbs.
TIMING RANGE	0.1 sec. to 999.9 secs.





SPECIFICATIONS	45MXII with Condenser Lamphouse (#8215 & #8121)	45MXII with Dichro 45 Computerized Colorhead (#8215 & #8282)																																																
OPTICAL SYSTEM	Double optical glass condensers with exclusive "Cone of Light" focusing system	1. Diffusion: with 4X5 mixing chamber included 2. Condenser option: Usable in condenser mode with optional Condenser #8115 and Mixing Chamber #8294 **																																																
FILM FORMATS	110 size to 4"X5" with complete rotating carrier capability (No additional condensers required)	110 size to 4"X5" with complete rotating carrier capability																																																
NEGATIVE CARRIERS AVAILABLE	Popular formats, 110 thru 4"X5", plus Negatrans® & Negafat®	Popular formats, 110 thru 4"X5", plus Negatrans® & Negafat®																																																
APPROX. MAXIMUM MAGNIFICATION (On 1" high easel)	<table border="1"> <thead> <tr> <th>Film Size</th> <th>Lens</th> <th>Magnification</th> </tr> </thead> <tbody> <tr><td>110</td><td>25mm</td><td>33X</td></tr> <tr><td>35mm</td><td>50mm</td><td>16.5X</td></tr> <tr><td>6X6cm</td><td>75mm</td><td>11.5X</td></tr> <tr><td>6X7cm</td><td>90mm</td><td>9X</td></tr> <tr><td>6X9cm</td><td>105mm</td><td>7.5X</td></tr> <tr><td>4"X5"</td><td>135mm</td><td>6X</td></tr> <tr><td>4"X5"</td><td>150mm</td><td>5X</td></tr> </tbody> </table>	Film Size	Lens	Magnification	110	25mm	33X	35mm	50mm	16.5X	6X6cm	75mm	11.5X	6X7cm	90mm	9X	6X9cm	105mm	7.5X	4"X5"	135mm	6X	4"X5"	150mm	5X	<table border="1"> <thead> <tr> <th>Film Size</th> <th>Lens</th> <th>Magnification</th> </tr> </thead> <tbody> <tr><td>110</td><td>25mm</td><td>38X</td></tr> <tr><td>35mm</td><td>50mm</td><td>19X</td></tr> <tr><td>6X6cm</td><td>75mm</td><td>12X</td></tr> <tr><td>6X7cm</td><td>90mm</td><td>9.5X</td></tr> <tr><td>6X9cm</td><td>105mm</td><td>8X</td></tr> <tr><td>4"X5"</td><td>135mm</td><td>6X</td></tr> <tr><td>4"X5"</td><td>150mm</td><td>5X</td></tr> </tbody> </table>	Film Size	Lens	Magnification	110	25mm	38X	35mm	50mm	19X	6X6cm	75mm	12X	6X7cm	90mm	9.5X	6X9cm	105mm	8X	4"X5"	135mm	6X	4"X5"	150mm	5X
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ENLARGING LAMP	PH212 150 Watt Opal lamp (#8100)	82V, 250 watt Quartz Halogen Dichroic reflector lamp (#8108)																																																
COOLING SYSTEM	Convection	Built-in centrifugal blower																																																
COLOR FILTERS	Filter drawer to use 6"X6" CP filters	Built in stepless fade free Dichroic interference filters																																																
MAXIMUM FILTER READINGS IN MAGENTA, YELLOW & CYAN	Not applicable	Actual Color Values*																																																
FILTER VALUE DISPLAY	Not applicable	Variable brightness L.E.D. display of actual magenta, yellow and cyan filtration in precise 01 increments																																																
WHITE LIGHT LEVER	Not applicable	Yes, with L.E.D. indicator and "Paper Saver Circuit" to prevent accidental exposure to white light																																																
ULTRAVIOLET FILTRATION	Use CP UV filter in filter drawer	Built into mixing chambers																																																
INFRARED FILTRATION	Built into condenser assembly	Built into mixing chambers																																																
ACCESSORY FILTER HOLDER (For red safety and special effects filters)	Included	Included																																																
RED SAFETY FILTER	Included	Included																																																
LENSBOARDS	"Snap-in" metal lensboards available for all popular lenses	"Snap-in" metal lensboards available for all popular lenses																																																
ELEVATION CONTROL	Motorized with manual ultra-precise fine adjustment	Motorized with manual ultra-precise fine adjustment																																																
ELEVATION LOCK	Not required due to use of unidirectional drive gear	Not required due to use of unidirectional drive gear																																																
FOCUSING CONTROL	Rack and pinion with dual left and right hand controls and focus lock	Rack and pinion with dual left and right hand controls and focus lock																																																
MOVEMENTS FOR MAXIMUM COMPOSITION CONTROL	1. Rotating negative carriers 2. Lateral shifting carriage	1. Rotating negative carriers 2. Lateral shifting carriage																																																
BASEBOARD DIMENSIONS	25 1/2" X 20 1/8"	25 1/2" X 20 1/8"																																																
COLUMN DESIGN	Dual triangular truss utilizing large inverted U-shaped girder	Dual triangular truss utilizing large inverted U-shaped girder																																																
DIMENSIONS (Fully extended)	57 1/2" H. X 25 1/2" W. X 30 1/2" D.	54 1/2" H. (59 1/2" in condenser mode) X 25 1/2" W. X 30 1/2" D.																																																
WEIGHT (Shipping weight)	*#8215 Chassis 60 lbs. (80 lbs.) *#8121 Lamphouse 10 3/4 lbs. (11 1/4 lbs.)	*#8215 Chassis 60 lbs. (80 lbs.) *#8282 Computerized Colorhead 16 lbs. (24 1/4 lbs.)																																																
SHIPPING DIMENSIONS	*#8215 Chassis (49 1/2" X 26 1/4" X 16 1/2") *#8121 Lamphouse (8 1/2" X 7 3/4" X 21 1/2")	*#8215 Chassis (49 1/2" X 26 1/4" X 16 1/2") *#8282 Computerized Colorhead (24 1/2" X 16 1/4" X 16 1/4")																																																
ACCESSORIES	Complete line of glass and glassless Negative Carriers, Negatrans®, Negafat®, Lensboards, Polycontrast Filter Set, Portrait and Soft Focus Filters	Complete line of glass and glassless Negative Carriers, Negatrans®, Negafat®, Lensboards, Portrait and Soft Focus Filters																																																
ELECTRICAL SPECIFICATIONS (USA)	#8215 Chassis	#8121 Condenser Lamphouse	#8282 Computerized Colorhead																																															
VOLTAGE	105-130 VAC (120V nominal)	0-130 VAC (120V nominal)	105-130 VAC (120V nominal)																																															
POWER SUPPLY/STABILIZER	Not applicable	Not applicable	Built-in																																															

\*Maximum units of filtration vary from one dichroic filter to another and thus vary in all colorheads. Since the Dichro 45 Computerized Colorhead displays the actual color value and not merely a reference number, as in conventional colorheads, the maximum readings will vary from about 180 to 240 units.

#### DICHO 45 COMPUTERIZED COLORHEAD SPECIFICATIONS

LAMP	Custom designed 82V 250 Watt Quartz Halogen Dichroic reflector lamp. (Catalog #8108).
FILTERS	1 1/2" square dichroic interference filters. Vacuum-deposited multi-layer metallic coatings on special tempered glass substrate.
FILTER INSERTION	Multi turn reduction gearing to provide accurate, smooth incremental changes.
INFRARED FILTRATION	2 piece heat absorbing glass built into entrance port of all mixing chambers.
ULTRAVIOLET FILTRATION	Built into all mixing chambers.
PHOTO SENSORS	3 Solid-state photo detectors.
SEPARATION FILTERS	Kodak densitometric band pass filters.
MICROCOMPUTER	3870 single chip microcomputer.
OPERATIONAL AMPLIFIERS	MOSFET type.
DISPLAYS	12-7 segment 0.5" Light Emitting Diodes with variable brightness control.
ELECTRONIC CONSTRUCTION	3-plug-in printed circuit boards containing micro computer, solid state power supply, internal voltage stabilizer, A/D converter, and other discrete solid state devices and 1 hardware connected P.C. board containing 12 display drivers and 12 0.5" 7 segment light emitting diodes.
ADDITIONAL FEATURES	White light lever for filter retraction and "Paper Saver Circuit" to prevent accidental white light exposures and timer input with cord.

#### DICHO 45 COMPUTERIZED COLORHEAD ACCESSORIES

MIXING CHAMBERS	CUSTOM FITTING KITS
*#8293 4X5 (included)	*#8272 For Omega D2, D5, D6 models
*#8292 6X7 (optional)	*#8274 For Durst "Pro"
*#8291 35mm (optional)	*#8276 For Durst Laborator 1200
*#8294 Condenser chamber (optional)	
also requires condenser assembly from #8121 lamphouse.	
(Available separately as #8115)	

Note: Dichro 45 Computerized Colorhead contains a 24 pin connector for use with the D.A.T.A. Module.

#### THE DICHO 45 HAS CONTROLLED THE MAJOR PROBLEMS IN COLOR PRINTING

- You no longer have to worry about these variables:
- Variation in line voltages causes color shifts – and even the best voltage stabilizers do not completely remove them.
  - Enlarging lamps – even those from the same production run – vary in color output. Which way you plug-in the lamp can also produce variations.
  - Even the latest quartz halogen lamps change slightly in color output as they age.
  - Replacing a burned-out lamp has generally meant taking time to completely recalibrate the enlarger's basic filter pack.
  - Dichroic filters differ in their spectral response characteristics – even filters from the same production run.
  - Dichroic filters vary slightly in their spectral response as they are heated.
  - Dichroic filters have "cross-talk" (contamination of colors). For example, a magenta filter may bring a small amount of yellow and/or cyan into the light path.
  - The mechanical cams which move the filters cannot be truly linear.
  - The plastic foam with which mixing chambers are lined has a tendency to discolor with age, producing color shifts.
- While it is not possible to entirely eliminate these variables from any system, the Dichro 45's ability to recognize and display their effects enables the user to accurately control filtration.

All specifications subject to change without notice.

US and other patents applied for.

**BESSELER**

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