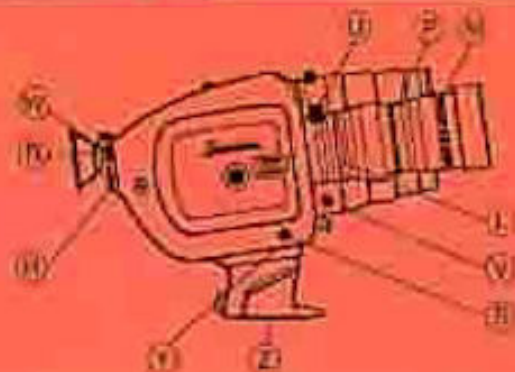
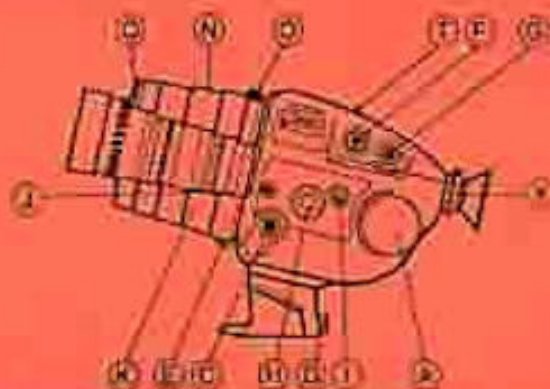


*Beaulieu* 4008 ZM





# Specifications of the 4008 ZM



Every page will bring you proof that Beaulieu has fitted its new cinecamera with the most advanced features; they incidentally are also the most dependable. In order to achieve such unusually brilliant performance, electronics and miniaturization techniques have to be used. These techniques, which have now been in use for many years, have reached the peak of perfection; they ensure even greater operating reliability and simplicity of action than other mechanical means.

- A - Battery
- B - Battery charging socket
- C - Master switch
- D - 3-position power-supply switch
- E - Release button and cable-release socket
- F - Emulsion-speed setting system
- G - Filming-speed selector
- H - Frame counter
- I - Footage counter
- J - Focussing-screen retracting knob
- K - Automatic diaphragm control system (Reglomatic — Beaulieu Patent)
- L - Manual diaphragm-setting ring
- M - Focussing ring
- N - Electric zoom
- O - Electric zoom control contacts
- P - Manual zoom control ring
- Q - Electric zooming-speed adjustment knob
- R - Remote control socket
- S - Single-frame release socket
- T - Variable-shutter setting knob
- U - Microcinematography control lever
- V - Automatic maximum-aperture and telephoto lens-position setting button
- W - Viewfinder
- X - Viewfinder eyepiece focussing ring
- Y - Artificial light filter-slide slot
- Z - Wrist-strap screw socket

## LENS

Interchangeable, 1" C mount - 32 threads per inch - Standard extension - Angenieux fl. 1.9 Zoom lens, focal length 8 to 64 mm (.315" to 2.520"), fitted with the Beaulieu "Reglomatic" automatic diaphragm, a variable-speed electric drive for the focal-

length adjustment ring (zoom), and with a macro cinematographic control lever which allow filming at distances of 1 mm (less than 1/25") to infinity (smallest field covered: 21 x 15.5 mm, or .827" x .610").

## ELECTRICAL SPECIFICATIONS

The camera's consumption is naturally dependent on the filming speed. It lies between 300 mA at 18 fps and 500 mA at 70 fps. Battery-charge check built in.

## POWER SUPPLY

Nickel-Cadmium accumulator batteries fitting into the camera (interchangeable containers). Current: 250 mA. Fully charged, the battery's capacity is sufficient for shooting 8 to 12 cartridges at 18 fps.

The batteries are charged from the wall socket with a dual-voltage 30 mA charger.

The batteries can be charged from various types of 12-V batteries (car, boat, plane, etc.), using a special charger.

## LOADING

Immediate, with standard 30-ft Super 8 cartridges.

## VIEWFINDER

Super-luminous reflex viewfinder. A mirror set at 45° on the gullotine-type shutter alternately directs all the light on to the film or into the viewfinder. "Fine-grain" ground-glass focussing screen. Viewfinder eyepiece magnification: x 27.

## FILMING SPEEDS

An electronically regulated electric motor gives very stable filming at whatever speed is chosen (between 2 and 70 fps).

For the following 9 typical filming speeds, exposure times are:

Speed in fps	2	4	8	16	25	36	50	70
$\frac{1}{X}$ sec.	1/2	1/4	1/8	1/16	1/25	1/36	1/50	1/70

## PHOTOCELL

High-sensitivity reflex cell. It receives all the light rays coming through the lens, and is powered by the camera's Nickel-Cadmium battery.

This cell triggers the micromotor driving the electronically-controlled iris diaphragm of the lens itself (Reglomatic); this control is performed by a shock-proof galvanometer (Gossen) fitted with a checking pointer visible in the viewfinder.

A potentiometer adjusts the system according to the emulsion speed set (10 to 400 ASA). It is interconnected with the filming-speed mechanism.

## VARIABLE SHUTTER

Variable-slot shutter with a "locked" position at half-aperture. Allows fade-ins and fade-outs.

## COUNTERS

**Footage counter:** a mechanical counter, graduated in feet and in meters. It shows the length of film already exposed. Automatic re-zeroing.

**Frame counter:** graduated from 0 to 100. A milled knob allows zero setting.

## RELEASE

- normal filming: by simultaneously depressing the power-supply switch and the release button.
- continuous filming: by locking the power supply switch and by rotating the release button through 90°.
- single-frame filming: by use of a flexible cable release.
- remote control: by line, radio, intervalometer, etc.

## ACCESSORIES

(supplied with the camera)  
• charger • wrist strap • hand blower • rubber eye-shield (for viewfinder eyepiece).

## Other accessories:

- Independent battery container and charging unit • Connecting plug and cord for the camera • Charging cord for use with 12-V batteries (car, boat, etc.) • Microscope adaptor tube • Adaptor tube for 24 x 36 mm miniature camera lenses • angular 1-ft release cable • Camera case

## WEIGHT

Body without fittings 900 g (1.98 lbs)  
Lens 600 g (1.32 lbs)  
Total weight 1,500 g (3.30 lbs)

## DIMENSIONS

Overall length 260 mm (10.24 ins.)  
Overall height 170 mm (6.70 ins.)  
Breadth 70 mm (2.76 ins.)





**Hervic**  
CORPORATION

CINEMA  *Beaulieu*

EXECUTIVE OFFICE  
34225 VENTURA BOULEVARD  
SHERMAN OAKS, CALIFORNIA 91403  
(213) 872-2860 • (213) 863-2395

EASTERN REGIONAL OFFICE  
5 CAROTA DRIVE  
LAKE SUCCESS, NEW YORK 11040  
(516) 328-8325 • (516) 328-3336

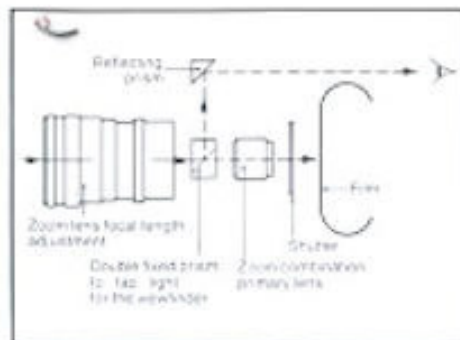
YAIR GREENBERG  
Operations Manager

*Beaulieu*  
**4008 2M**  
MADE IN FRANCE

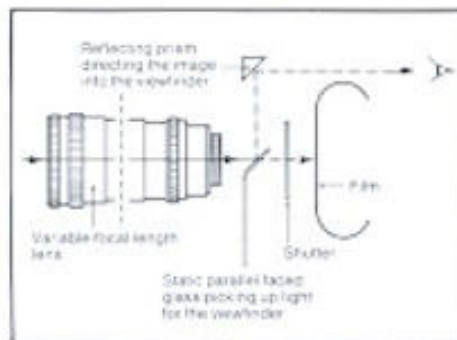


# Viewing the shot...

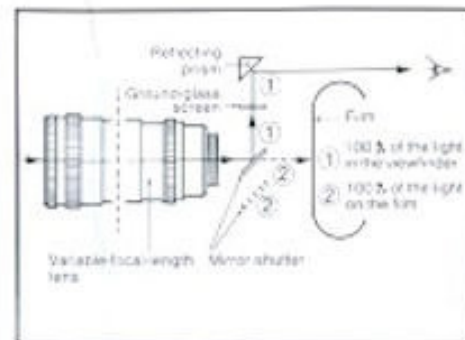
100% light on the film...  
100% light on the giant-screen viewfinder



*Reflex viewing with light picked up inside the lens*



*Reflex viewing with parallel semi-reflecting mirror built into the camera*



*Reflex viewing with mirror-carrying shutter*

## REFLEX VIEWFINDER

Reflex viewing is a must, for several reasons: you have to frame your shot according to aesthetic imperatives, you have to be able to center a close-up subject perfectly, and you have to vary your framing according to the focal length you are using. Now the reflex system is the only one which will allow you to observe and to select, through the lens, the very picture you will later see on the film.

What choice of technical solutions did BEAULIEU have when fitting up the new 4008 ZM?

### 1 - Production of a reflex virtual image by picking up light from the object lens?

This is a method widely used in amateur cine-cameras. The image is picked up inside the lens, in front of the diaphragm, by two bonded 45° prisms with one semi-reflecting surface: part of the light intended to produce an image on the film is thus directed towards the viewfinder, in order that the image may be observed. This system gives a very luminous image under all conditions, for diaphragm aperture has no incidence on luminosity in the viewfinder, but it appreciably reduced the amount of light reaching the film, and makes lens exchanges impossible. Moreover, in current practice, it only gives a "virtual" image.

### 2 - Reflex viewing with a semi-reflecting mirror built into the camera?

This system consists in placing between lens and film a thin sheet of semi-reflecting glass set at 45°; it takes up part of the light coming from the lens before its passage through the shutter, and directs it into the viewfinder.

Closely related to that previously described, this system makes it possible to change object lenses, but means that viewing is dependent on the aperture, limiting viewfinder luminosity and not making full use of the lens' definition (duplication of the image); it is moreover fragile where maintenance is concerned.

### 3 - Reflex viewing with a prism built into the camera?

This system, whose characteristics are in many respects similar to those of the previous system, does not have its fragility but causes a modification in the lens' optical extension, therefore calling for specially corrected object lenses — in other words, non-standard lenses.

### 4 - Reflex viewing with a mirror-carrying shutter?

A guillotine-type shutter set at 45° acts as support for a

mirror. During the time of exposure, the shutter mirror allows all the light rays to impinge on the film. While the film is moving from one frame to the next, all the light is directed into the viewfinder.

This system, which is 100% luminous, gives a viewing image free from any degradation. The luminosity available for viewing is so great that it allows an image magnification of  $\times 30$ , and that a ground-glass focussing screen should be put between lens and viewfinder whenever pin-point focussing is necessary. As against this, when the camera is running, the image seen in the viewfinder flickers (alternating motion of the shutter mirror), and the degree of machining accuracy required to produce the parts is such (less than one micron —  $1/1,000$  mm —  $0.00003937$  inch) that their cost price is, quite naturally, high.

Where BEAULIEU is concerned, the choice made was based on the following criteria:

- Best possible definition on the film
- large-magnification viewfinder
- pin-point focussing
- interchangeable lenses

After studying these various reflex viewing systems, it was found that only the mirror-shutter type would comply with all these various imperatives; that is why it is fitted on the 4008 ZM.



*An original refinement for yet easier "pin-point" focussing*

A simple pressure on button(V), and your diaphragm opens wide while the lens assumes the "telephoto" position. Maximum diaphragm aperture and the very small depth of field in the telephoto position are essential to the finest appreciation of pin-point focus.

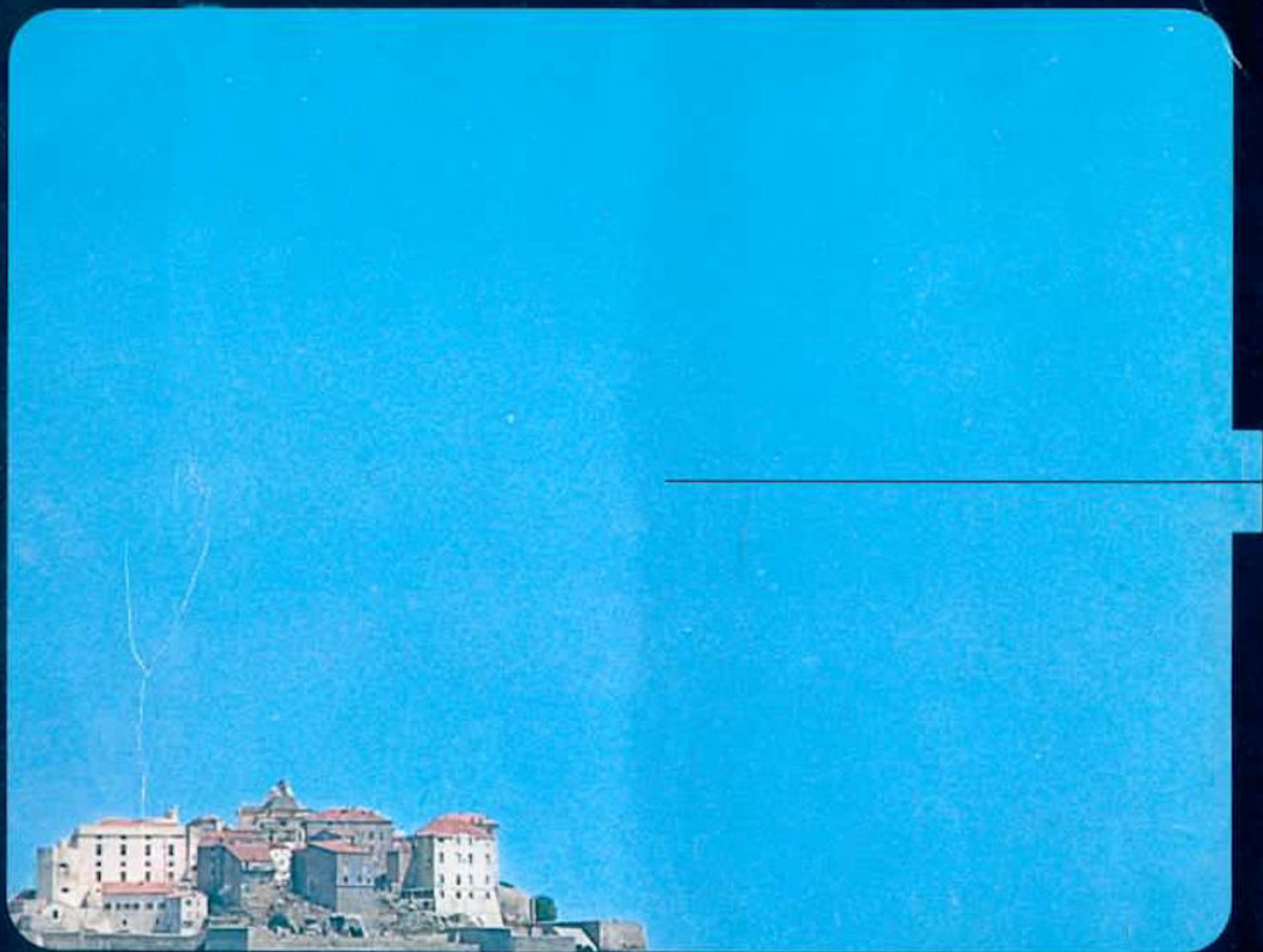
## GIANT-SCREEN VIEWFINDER

This viewfinder, with its powerful eyepiece, gives an unusually large magnification of the image. The actual magnification has been calculated to cover the eye's widest field. Enlarged and luminous, the scene being filmed can be seen in its finest details.

It would be possible to adopt an even greater magnification, but the eye would then no longer instantaneously cover the entire image. The viewfinder includes a battery-charge-check and cell-reaction-check pointer, and a film-movement indicator. The viewfinder eyepiece can be adjusted for best possible viewing by the operator.

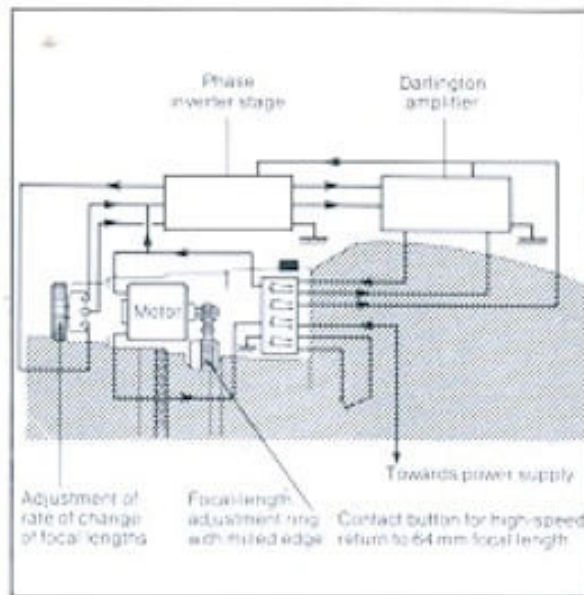
*The giant-screen viewfinder covers the eye's maximum field*







# variable, progressive -speed electric Zoom (2-12 seconds)



*Diagram of the Zoom's electric controls.*



*Setting zooming speed  
(from 2 to 12 secs.).*



*Zoom forward and reverse  
movement switches.*

The Zoom system is a progressive combination of focal lengths stretching from wide-angle to telephoto effects. It allows the operator to adjust focal length as he will, and thus to obtain the most striking, or the most suitable, framing for the scene being filmed. Modifications in framing produced while filming give an effect of increasing or decreasing distance (Known as the "optical dolly shot"). In order to facilitate the smoothness of this type of shot, particularly when filming without a tripod, certain cinecameras are fitted with an electrically-controlled zooming system.

**What choice of technical solutions did BEAULIEU have when fitting up the 4008 ZM?**

## **1 - The single-speed electric Zoom?**

This is the simplest and least expensive technical solution, but limited in its possibilities, for a same constant speed of approach or recession is not suitable for all subjects.

## **2 - The multiple-speed electric Zoom?**

This system, more adaptable than the first, allows complementary zooming effects. It is however usually limited to 2 or 3 fixed speeds.

## **3 - The variable-speed electric Zoom?**

This solution, technically perfect but costly, had hitherto been used on TV cameras for live broadcasting. It allows all dolly-shot effects: very quick fades from one sequence to the next, acceleration or retardation of approach or recession effects, immediate framing changes. BEAULIEU has selected this professional technique, and adapted it to the requirements of the amateur cameraman.

The time of variation of the 4008 ZM's zoom is of great amplitude, with a 1 : 6 ratio (times of 2 to 12 secs.), going from barely perceptible motion to very fast apparent displacement of the subject.

If a steady dolly shot is required, an electronic regulation system ensures constant speed throughout the range of focal lengths. Generally speaking, on electric zooming devices, an immediate stop is impossible. In order to eliminate mechanical inertia, BEAULIEU has made use of a series of so-called "all-or-nothing" microswitches which immediately halt movement.

The 4008 ZM's electric zoom can also be operated manually.

*A new style in dolly shots: accelerate or slow down zooming speed — while actually zooming!*







# point-blank range macro- cinematography

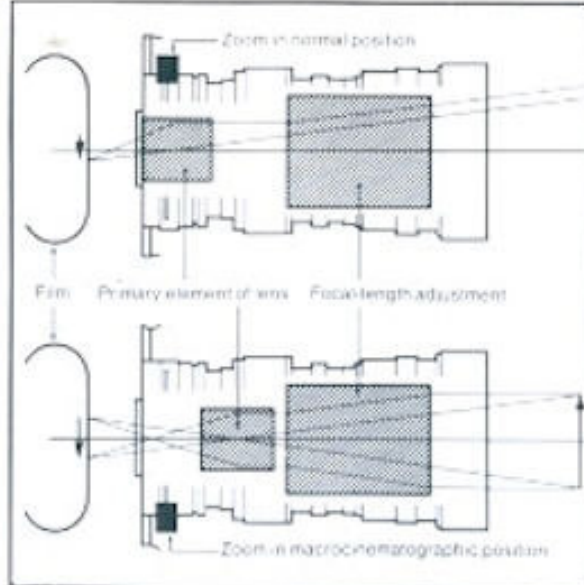
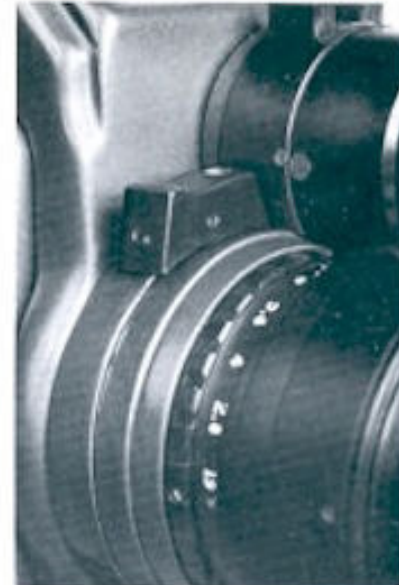


Diagram showing the principle of the Zoom-macro



Macro lever head in uppermost position (normal use).



Macro lever head in low position (short-range use).

A mere coin, filmed so close up that it fills the whole screen, takes on the aspect of a *basso-relievo* and is seen in quite an unusual light.

This is macrocinematographic magic—an unprecedented occasion for the amateur to achieve amazing effects from the most trifling objects—and to give his films a personal artistic angle lending them the professional touch.

But if macrocinematography was to be made really accessible, special additional lenses and accessories required by most cinecameras had to be done away with.

**What choice of technical solutions did BEAULIEU have when fitting up the new 4008 ZM?**

## 1 - Displacement of the intermediate Zoom lenses?

Displacement of individual lenses inside the object-lens system allows regular variation of focussing between infinity and 1.2 inches, using the distance ring.

This system however limits the use of the lens to a determined focal length (usually telephoto). Change of framing, thanks to the Zoom device, becomes impossible: the camera's position with regard to the subject has to be changed.

## 2 - Displacement of the Zoom system's rear lenses?

Conventionally speaking, macrocinematographic effects are obtained by fitting intermediate extension rings between the camera body and the lens, thus lengthening the optical extension, the rear group of lenses being displaced. In order to avoid modifying the basic lens' qualities of definition, BEAULIEU has managed to build the principle of this increase of focal length into the object lens itself, by displacing the rear group of lenses.

**What is the advantage?** You can now film up to a distance of 1 mm (less than  $1/25''$ !) from the lens front, at any focal length, and thus avoid moving the camera in order to frame.

Since the zoom system remains usable, perfect focus may be achieved by means of the electric zooming device.

A change in the position of the macro lever while filming will result in complete absence of focus; this can be a most spectacular way of going from one sequence to the next (soft-focus fade).

*In greatest macrociné magnification position, the field covered on this coin (shown in its true size on (right) 1 mm (rather less than  $3/64''$ ) from the lens is  $21 \times 15.5$  mm (or  $53/64'' \times 39/64''$ )!*









# Speeds

ranging from  
2 to 70 fps  
—and  
electronically

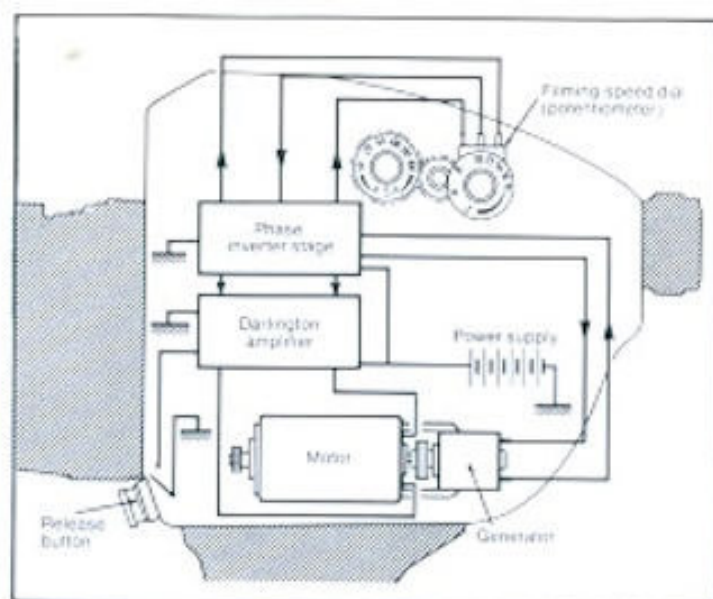


Diagram of speed regulation

The Super 8 normal filming speed is 18 fps. This is the slowest speed at which correct movement reproduction is achieved. In case of subsequent sound effects or commentary, a speed of 24 fps or 25 fps, according to countries, is necessary. In order to adjust sequence motion according to subjects, it is desirable that filming speed should be variable, so as to obtain on projection either an "acceleration" effect (filming speeds of less than 18 fps) or a slow-motion effect (filming speeds in excess of 18 fps).

**What choice of technical solutions did BEAULIEU have when fitting up the new 4008 ZM?**

Two systems are possible : a mechanical process, or an electronic device.

## 1 - Centrifugal (and therefore mechanical) regulation?

Classic motor. Leaves you the choice of several speeds. To keep them constant, one of the possibilities for stabilization is the adoption of a Watt-type regulator connected to the drive shaft. Acting by centrifugal force, it cuts off the power supply when the chosen speed is exceeded. This solution, which is both relatively simple and inexpensive, is perfectly satisfactory for a limited range of 2 or 3 speeds corresponding to notches on the "filming-speed" dial-switch cannot, of course, be changed, and is therefore bereft of any intermediate adjustments. With it, filming at a speed below 8 fps is unthinkable - and very seldom is it possible to film at over 32 fps.

## 2 - Transistorized electronic regulation?

Transistorized regulation systems allow a classic motor to withstand large speed variations without loss of power



Filming speed selector

while ensuring perfect rotational steadiness at all possible r.p.m.. The principle is as follows : should the motor's speed drop, the voltage delivered by the generator drops; at this moment, a transistorized amplifier feeds the motor a higher amperage, thus allowing it to resume its normal speed. This feed-back mechanism naturally acts the other way, should the motor's speed increase.

These regulation phenomena occur within a few thousandths of a second. They are permanently effective, thus ensuring perfectly regular film movement. Over and above perfect steadiness of pace, another advantage is that a very wide range of filming speeds becomes available, both where slow and high speeds are concerned - and this continuously, all intermediate speeds being usable - even in the middle of a sequence !

That is why BEAULIEU has chosen this solution, which allows the 4008 ZM to go right down to 2 fps when filming a static, poorly-lit subject (1/7 sec. exposure), and to climb up to 70 fps for slow-slow-motion effects. You can change filming speeds while filming, for the automatic diaphragm control is coupled with the camera filming-speeds control.

*Between 2 and 70 fps, the BEAULIEU 4008 ZM's range of filming speeds makes it possible to accelerate a movement to maximum, or to slow it down with extreme accuracy.*







# The automatic diaphragm

reacts  
and adapts  
instantaneously  
at the slightest  
change  
in lighting!

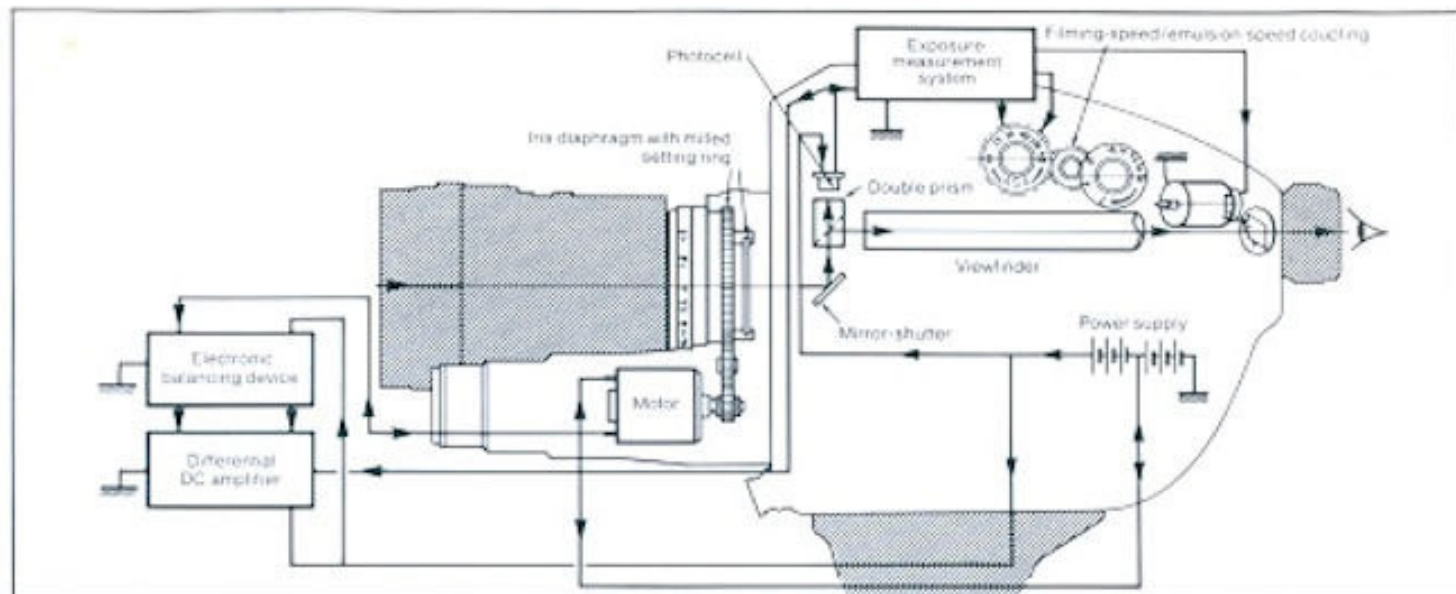


Diagram of Reglomatic system

Any film-maker having an eye for quality always used to consider that a photocell was an indispensable adjunct to his cine-camera. Modern cameras are now fitted with built-in exposure meters which automatically set the diaphragm according to luminosity, emulsion speed, and the filming speed chosen.

What choice of automatic diaphragms did BEAULIEU have when designing the 4008 ZM?

There are two types of automatic diaphragms:

## 1 - Galvanometer-type automatic diaphragm

This system is made up of a galvanometer whose pointer is replaced by a metal strip a few hundredths of a millimeter thick, acting as an iris blade.

The best galvanometer system has two moving blades mounted on pins. When the galvanometer receives from the cell a voltage which varies with light intensity, the blades close to a greater or lesser degree. This device has an undoubted advantage: it is, electrically speaking, extremely simple; as against this, it is very sensitive to shocks (pivot pins and blades), and it does not allow change of lenses. The diaphragm's irregular shape appreciably reduces the object lens's power of resolution.

## 2 - Motor-driven iris diaphragm

An electric motor provides mechanical drive for the built-in diaphragm of a standard lens. The photocell, receiving the light coming through the object lens, analyses this light's intensity and accordingly transmits impulses to a micro-motor directly connected to the diaphragm setting ring. Despite the drawbacks of high cost and of a higher

power consumption than with the galvanometer system, this is the solution BEAULIEU has chosen: it is stronger, and leaves the lens system its full powers of definition, since the iris diaphragm always retains a regular and properly centered shape, irrespective of the aperture used.

**Other advantages:** the lens can be changed for special uses of the camera (long-focus telephoto lenses, or fitting to a microscope).

*On the Beaulieu 4008 ZM, the iris diaphragm responds and adapts immediately to the slightest change in light intensity. The lens can be pointed at any subject without worrying about shadow or full sunlight, for the Beaulieu analyses the required exposure for you and instantly adjusts its own aperture.*







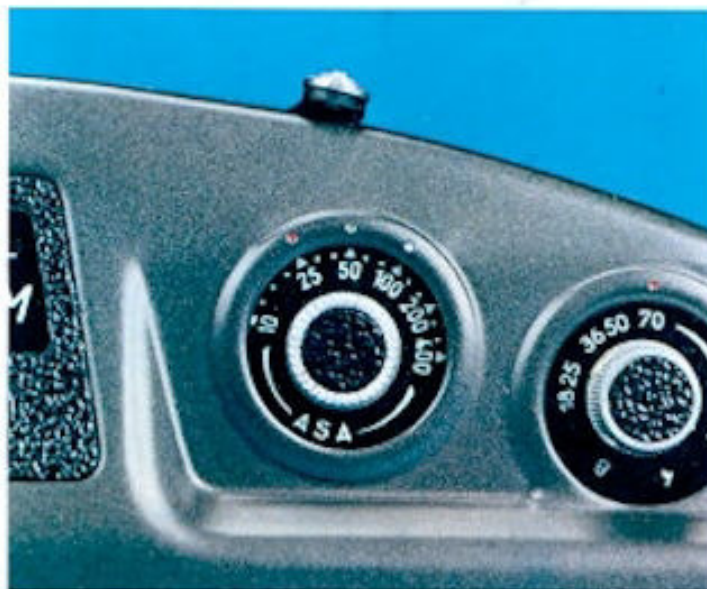
## Interchangeable lenses



The 4008 ZM can take any object-lens system: 24×36 mm miniature camera lenses, 16-mm lenses with a C mount, not to mention sets of rings and tubes for microcinematography.

## Variable shutter

## Single-frame filming socket



Modifying at will the film exposure time, the variable shutter allows fade-ins and fade-outs. It can be locked in the semi-open position (when filming scenes of excessive luminosity (seascapes, snowfields, etc.).



Frame-by-frame filming can be achieved with a flexible release cable screwed into this socket.



# Accessories



## 1 - INDEPENDENT CHARGING CONTAINER

This accessory, which will hold the battery, can be used either to protect it from excessive cold (and thus, from a loss of power) by placing it in the operator's pocket, or to charge batteries outside the camera.



## 2 - CHARGER

This accessory (supplied with every camera) allows battery-charging from a wall socket. (AC).



## 3 - DC CHARGER (FOR USE WITH 12-V BATTERIES)

This device makes it possible to charge the camera battery from a 12-V car, boat or plane battery.



## 4 - REMOTE CONTROL

The 4008 ZM can be remote-controlled by line or radio when filming scenes calling for very discrete operation or under dangerous conditions.



## 5 - ACCUMULATOR BATTERIES

The camera is powered by Nickel-Cadmium accumulator batteries which, when fully charged, will ensure supply for 8 to 12 50-ft Super 8 cartridges, at filming speeds of 15 to 18 fps.



## 6 - REPORTER'S BLACK LEATHER CARRYING CASE, FULLY LINED

Affords perfect protection for the 4008 ZM and all its accessories.





*Beaulieu* **4008 ZM** : The world's most advanced super 8 camera