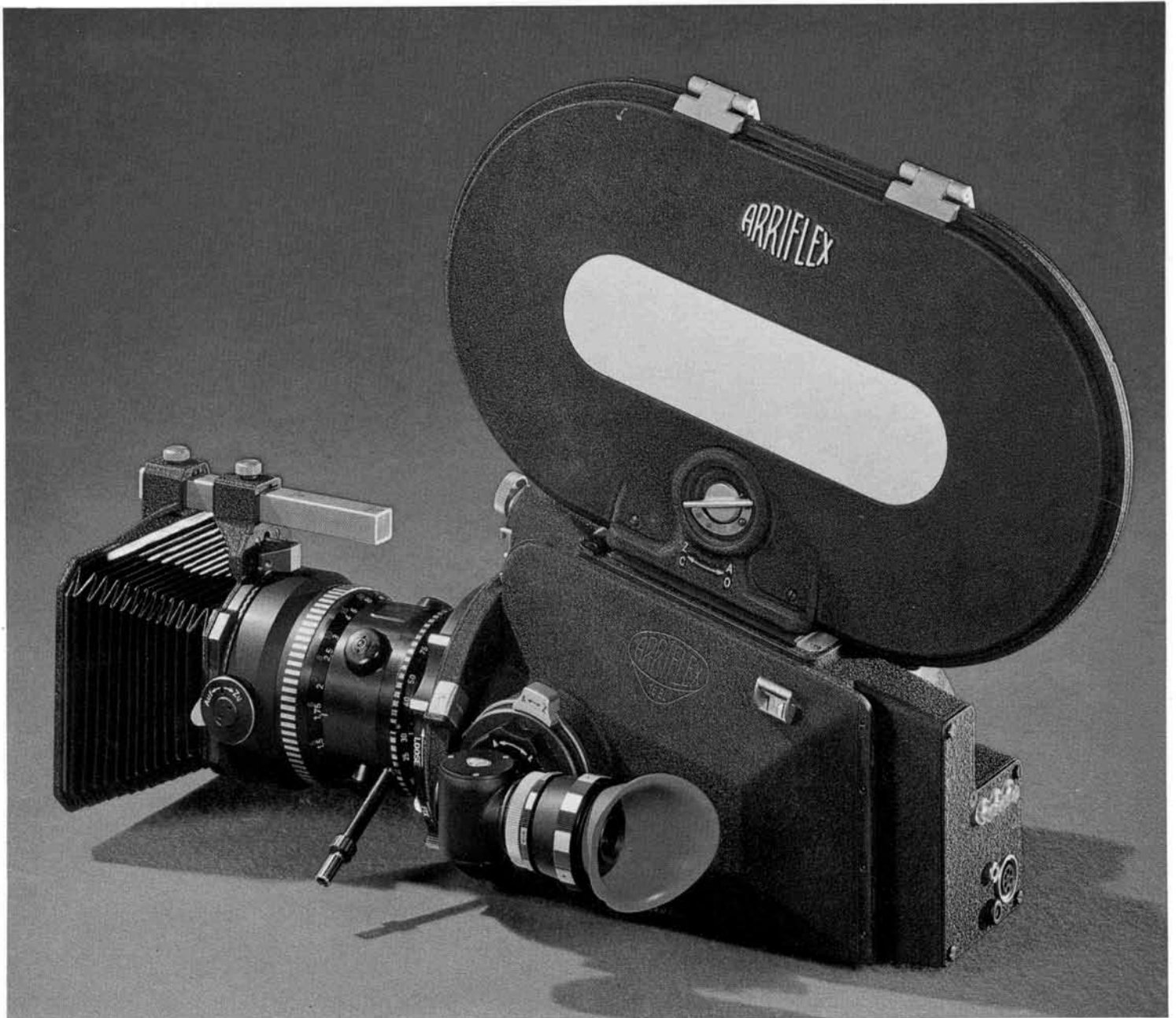




**ARRIFLEX 16 BL**  
**the Quiet**  
**16 mm mirror-shutter professional**  
**motion picture camera**  
**for location synchronous**  
**sound filming**



# ARRIFLEX 16 BL

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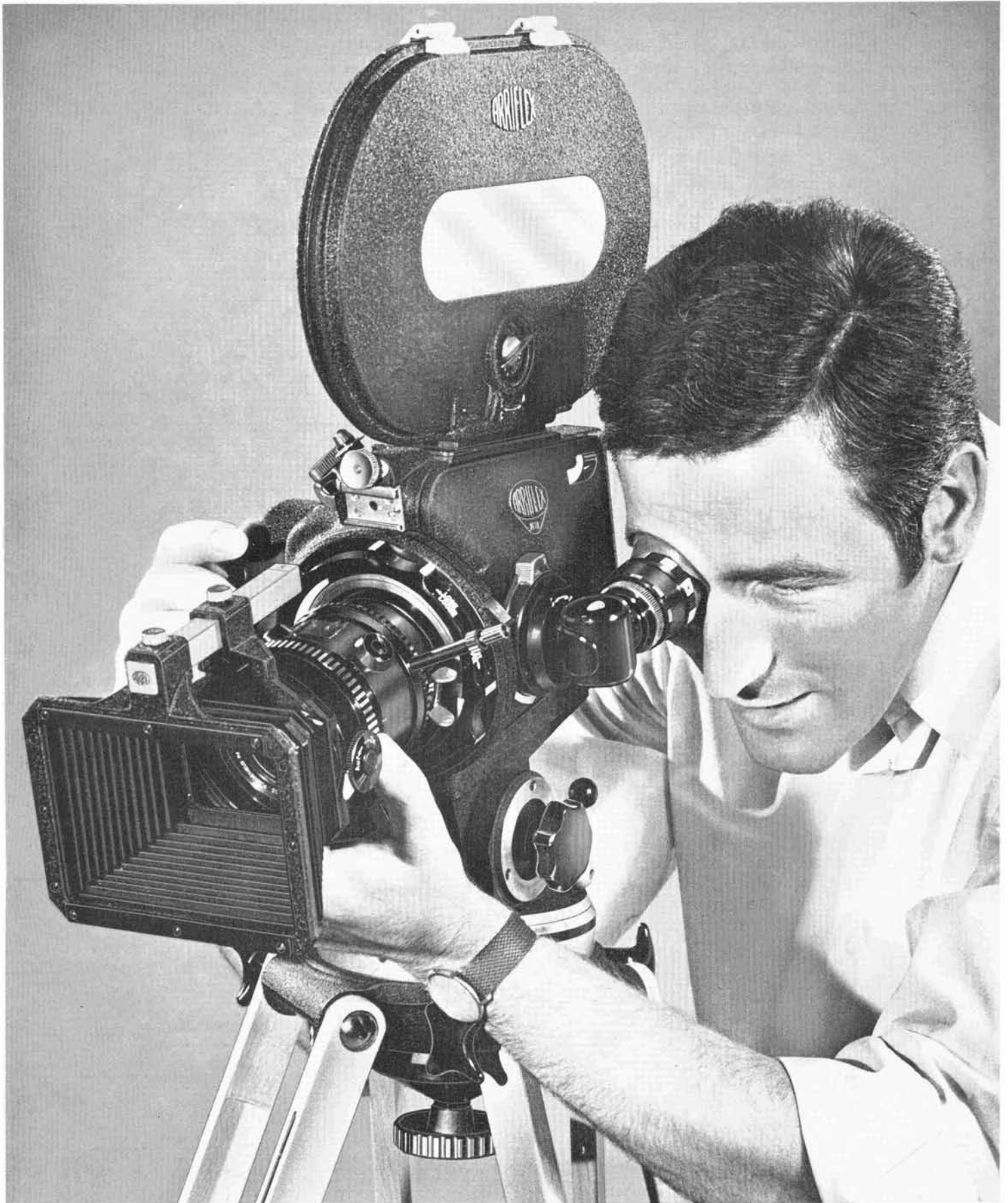
## The Basic Design

On what considerations did ARNOLD & RICHTER base the design of the ARRIFLEX 16 BL? First and foremost, the objective was to develop a QUIET camera, of professional caliber, for location sound filming — a camera that would provide high quality, sharp, steady pictures and operating economy.

Not least important, the design objectives also included versatility, convenience, compact light weight, and rugged, reliable performance. THE ARRIFLEX 16 BL satisfies these requirements in an ideal way. The classic ARRIFLEX design, because of its outstanding features and proven performance, was chosen as the basis for the development of the ARRIFLEX 16 BL.

The letters BL in the camera's designation come from the word "blimp". They signify that the ARRIFLEX 16 BL is self-blimped. This is in contrast to earlier cameras, which must be placed in a special blimp to reduce camera noise for sound filming. The decision in favour of a self-blimped construction was reached after a great deal of serious consideration to every aspect of camera design. Self-blimped construction incorporates many advantages — however, the decisive advantage lies in the fact that it makes it possible to build the famous ARRIFLEX movement into the ARRIFLEX 16 BL. This movement uses a double-cam pull-down mechanism, and a separate closed-cam registration pin system — the movement is distinguished by its ability to be used for forward and reverse operation, high precision, long life and reliability under the most adverse conditions. It meets and exceeds the most exacting standards for picture steadiness. It represents precision and reliability far beyond the usual, run-of-the-mill camera mechanism. The 16 BL is the product of a no-compromise design, made possible only by the special construction in which the entire film mechanism is acoustically isolated from the camera housing. A matching concept is used in the design of the 400 ft. magazine and the basic, interchangeable lenses. As a result, ARNOLD & RICHTER is able to offer a rugged, reliable camera in the ARRIFLEX tradition with a residual noise level down as low as 31 dB (Weighted A).

ARRIFLEX 16 BL



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# ARRIFLEX 16 BL – Basic Data In Brief:

## QUIET CAMERA OPERATION

Residual noise level of the ARRIFLEX 16 BL measures 31 dB (Weighted A) at 1 meter (3 ft) in front of the lens. Quiet operation, together with compact size and light weight, makes the ARRIFLEX 16 BL ideal for location sound filming.

## FILM REGISTRATION

The 16 BL movement operates forward and reverse. A high precision cam-operated pulldown and registration pin system, together with precision film guides, provides picture steadiness that is limited only by the slitting and perforation tolerances of the film itself.

## MIRROR-SHUTTER REFLEX SYSTEM

The 16 BL incorporates the world famous ARRIFLEX mirror-shutter reflex design. The rotating mirror-shutter, together with high aperture optics, provides the brightest, clearest reflex image available on any camera. Refinements of the reflex system include interchangeable ground glass, automatic closure eyepiece, and interchangeable viewfinder. The Offset Viewfinder is available as an accessory and has particular importance; it provides more convenient handling and camera balance for handheld (shoulder position) filming.

## LENS SYSTEM

Prime lens: the ARRIFLEX 16 BL is designed to use zoom lenses as the prime lens, in line with modern, professional filming practice. A selection of specially housed zoom lenses is available.

Universal lens housing: the ARRIFLEX 16 BL system provides also for the use of many fixed focal length lenses and Quiet camera operation, in conjunction with the Universal lens housing. The 16 BL lens system covers also matte boxes and filter holders for every professional need.

## EXPOSURE CONTROL SYSTEM

Among many options, the 16BL user may order the camera with a built-in Exposure Control System. Precise exposure reading is seen through the viewfinder. Exposure measurements are made behind the lens. The ARRIFLEX Exposure Control System is an important "First"; it is an exposure control system of professional caliber, available for the first time in a professional motion picture camera.

## MOTORIZED ZOOM DRIVE

Selected 16 BL zoom lenses may be provided with a motorized zoom drive, in a system which offers important advantages in smooth zoom motion, efficiency and convenience.

## MOTOR DRIVES

Electric motors are available to fulfil every professional requirement. Motor types include:

**Universal 12 volt DC motor:** this motor operates as a governor controlled motor and in conjunction with the Arri Electronic Manual Variable Speed Control, may also be used for variable speed operation, from approximately 10 to 40 fps.

Universal 12 volt DC motor with Tuning Fork or Crystal Control: in this combination, high precision, 24 fps or 25 fps operation is provided. An accuracy of  $\pm 0.005\%$  is consistently maintained. This makes it possible to do synchronous sound recording without cable connection. The Control offers a) Crystal Control; b) power line frequency control; c) conventional governor control; and d) variable speed ranging from 10 to 40 fps.

**Synchronous motors:** synchronous motors are available in several types to provide sound speeds of 24 fps (or 25 fps). There are motor types available for all the commonly available power line characteristics, i. e., 50/60 cycles; 110/240 volts; single phase/three phase.

## TACHOMETER AND FOOTAGE COUNTER

ARRIFLEX 16 BL cameras are supplied with a 0–50 fps tachometer as standard equipment. This essential feature enables the cameraman to verify camera speed at any time. A digital counter, calibrated in meters (or feet) counts either forward or reverse and is standard on all ARRIFLEX 16 BL cameras.

## FILM MAGAZINES

A gear-driven, quick-change 120 m (400 ft) magazine is at the heart of the 16 BL filming system. The all-gear driven mechanism is noise insulated so that the magazine makes no significant addition to noise level. The magazine provides almost universal usefulness in that 120 m (400 ft) core-wound rolls may be used, or 30 and 60 meter (100 ft or 200 ft) daylight spools may be used. A special 360 m (1200 ft) magazine is also available.

## SOUND RECORDING

The ARRIFLEX 16 BL offers the film maker complete sound capability, that is single system, double system, either or both. **Double-system:** the 16 BL has every facility for professional, double-system synchronous sound filming. Facilities include 50 cycle (or 60 cycle) Pilotone-signal generator and automatic start-marker as standard equipment; a supplementary cue marker is supplied as standard equipment.

**Single-system:** the 16 BL is wired and equipped for quick conversion to single-system sound, capable of surprisingly high quality. Sound modules and matching recording amplifiers are available as accessories.

## POWER SUPPLIES

A variety of power supplies is available for the ARRIFLEX 16 BL. Included are long-life, reliable nickel-cadmium batteries in different capacities and configurations, and a Regulated Power Supply which operates from standard 117 volt, 60 cycle power lines and puts out 12 volts, D. C. suitable for the 16 BL.

## TRIPODS AND CAMERA SUPPORT

A new ARRIFLEX tripod designed specifically for the 16 BL is now available. In addition, a variety of tripods, panheads, shoulder pods and body braces provides camera support suitable for every type of filming.

## CARRYING CASES

A sturdy case with hammered aluminium exterior is designed to accommodate a complete 16 BL outfit including two 400 ft magazines. A smaller, matching case will take four 400 ft (120 meter) quick-change magazines. A lightweight, handy, simulated leather carrying case is also available for the ARRIFLEX 16 BL camera complete.

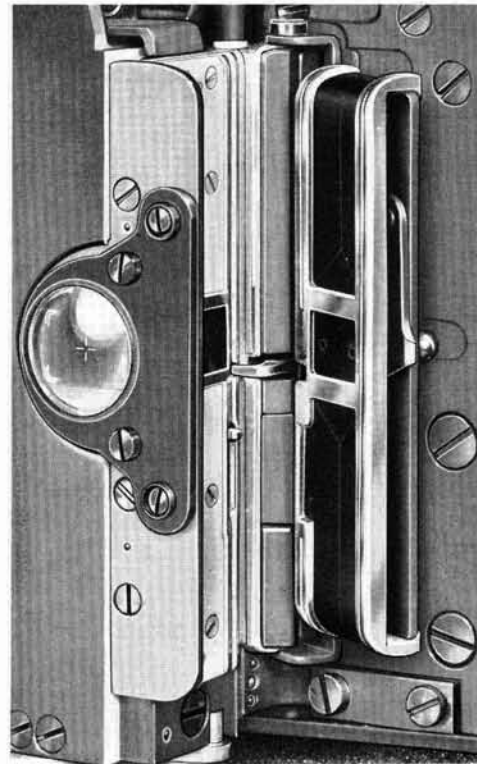
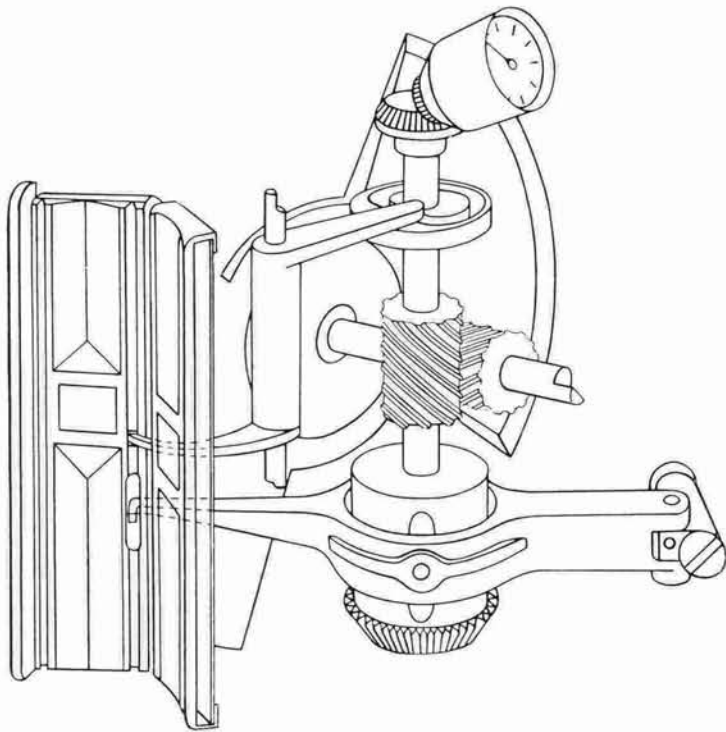
## CAMERA WEIGHT

The complete ARRIFLEX 16 BL, with Angénieux 12–120 mm Varifocal lens and 400 ft. (120 meter) quick-change magazine; 7.85 Kg (17.30 lbs.).

## DIMENSIONS

Camera with Angénieux 12–120 mm Varifocal lens, 400 ft. (120 meter) magazine, but without matte box, measures 515 mm (20.3 in.) long, 270 mm (10.6 in.) wide and 370 mm (14.56 in.) high.

## Film Drive Mechanism and Film Guides



The Film Channel, Film Gate Open

The performance of any professional motion picture camera depends completely upon the ingenuity and the dedication that has gone into the design and manufacture of the basic movement. In the ARRIFLEX 16 BL, the movement is an engineering achievement in rugged, enduring precision. The pull-down claw and the registration pin are each activated by separate, ultra-precise cams. Each cam is made so that it imparts positive controlled motion. Nothing in this movement depends on springs — each pin, as it engages the film, is controlled by positively driven motion. Similarly, as a pin is disengaged from the film, it is again done with controlled, positively driven motion.

This unique design assures frame-by-frame registration and frame-line accuracy to highest international standards. Moreover, this accuracy is maintained over many hundreds of thousands of feet of film, at all camera operating speeds, and under the most difficult working conditions.

The claw and registration pin interact in such a way, that one or the other is engaged in film perforations at every moment of the operating cycle. Thus, loss of loop is prevented irrespective of gravity forces (filming in aeroplanes). All parts subject to wear are made of hardened steel, specially treated to insure long life.

In the ARRIFLEX 16 BL, the high precision of the film pull-down and registration mechanism is matched by an equally fine film guide system. Together, these closely related subsystems insure sharp, steady pictures on the screen, crisp, high quality prints in duplication — maximum clarity and detail no matter whether duplication is 16 to 16 mm, 16 to 35 mm, or 16 to 8 mm. The 16 BL film guide system consists of an aperture plate in front of the film, and a balanced pressure plate behind. Together, these two ensure that the film lies flat and perfectly true in the focal plane. In addition, the 16 BL has a lateral guide system — this consists of a precisely located, fixed guide rail on the right and a spring loaded pressure rail on the left.

All parts that come into contact with the film are of special stainless steel, compressed under high pressure, lapped and then either hard chrome plated, or subject to other special surface treatment. Film is guided gently, for maximum safety and guided firmly for optimum picture quality. The film pressure plate can be opened wide to facilitate threading. The pressure pad can be easily detached for easy access for cleaning.

## The Mirror-Reflex System

Of all the designs devised for reflex viewing in a motion picture camera, the mirror-shutter system, pioneered by ARNOLD & RICHTER is by far the best. The mirror-shutter in the ARRI-FLEX 16 BL is a two-blade configuration and serves both as a shutter and as a front surface mirror. It is mounted at an angle of  $45^\circ$  to the lens axis, and is itself a critically important sub-assembly of the camera. It must be fabricated and mounted to precise optical standards.

The mirror-shutter design provides a double advantage: it gives the brightest, clearest image that can be obtained in any viewfinder system. At the same time, the design is such that when the shutter is open to expose film, there is nothing between the film and the lens — nothing to scatter light, nothing to degrade picture quality in any way. When the shutter is closed, it serves as a front surface mirror, and all the light goes to the viewfinder. The image shown in the viewfinder is correct from left to right, upright and parallax free. It shows the field, focus, and depth of field identical with that recorded on film.

The ground glass itself can be interchanged by the cameraman without special tools. Individual ground glass assemblies are available to show normal camera aperture, television safe action, projector aperture, etc.

The reflex system includes an interchangeable viewfinder. The standard finder is seated in a special receptacle and the entire external finder may be rotated on its own axis and locked into any one of four  $90^\circ$  positions. A portion of the finder may also be pivoted approx.  $15^\circ$  in the horizontal plane. An accessory Offset Finder is also available. In this case, the finder is offset in such a way, that the camera, handheld, is positioned lower down and farther back. The result is a lower center of gravity, superior balance and handling for handheld (shoulder positioned) filming.

With both viewfinders, the ground glass image is viewed through the 10x magnifying eyepiece. The eyepiece features an automatic closure mechanism, which opens automatically when pressure is applied to the rubber eyecup, and closes automatically when pressure is removed. Accidental film fogging through the viewfinder is prevented automatically. The mechanism may be locked open if desired. The anatomical eyecup is rotatable (for left or right eye). A receptacle is included in the eyecup for the installation of a prescription spectacle lens when needed. In most cases, the diopter adjustment built into the eyepiece itself provides all needed, individual correction.



# ARRIFLEX Professional Exposure Control System

The ARRIFLEX Exposure Control System for the 16 BL marks an important "First": an exposure metering system of professional caliber, built into a professional motion picture camera for the first time.

The Exposure Control System measures light behind the lens, in a central circular area equal to 50% of the 16 mm aperture. All factors which influence exposure are automatically taken into account, such as light transmission of the lens, F-stop, lens extension, lens field angle, filters, etc.

An important distinction of the ARRIFLEX 16 BL Exposure Control System lies in the fact that while it senses light behind the lens, it accomplishes this without placing prisms, semi-transparent mirrors, or other optical devices between the taking lens and the film. This meets the vital professional requirement that there be nothing between lens and film to scatter light or degrade picture quality. The light sensing elements are in the **viewfinder** system — **not in the filming system**. Yet, identical exposure readings are made, no matter whether the camera is running or still. The meter system is fully temperature compensated.

Maximum flexibility and utility are realized through input settings to the metering system, for films speeds 16-500 ASA/13-28 DIN and camera speeds of 24-50 fps. The Exposure Control System is energized from the camera batte-

ry via a special miniaturized voltage stabilizer. Stray light, entering through the viewfinder eyepiece, is absorbed and has no effect on meter indications.

ARRIFLEX 16 BL cameras can be supplied with this advanced system factory installed, as an optional extra. On cameras already in the field, those with Serial No. 50701 and higher, the Exposure Control System can be installed in combination with a new camera door.

For these conversions and for installations in cameras with Serial Nos. 50700 and lower, consult Service Department, Arriflex Corporation of America, Woodside, N. Y. 11377

## Meter indication visible in the finder



Indication of correct film exposure

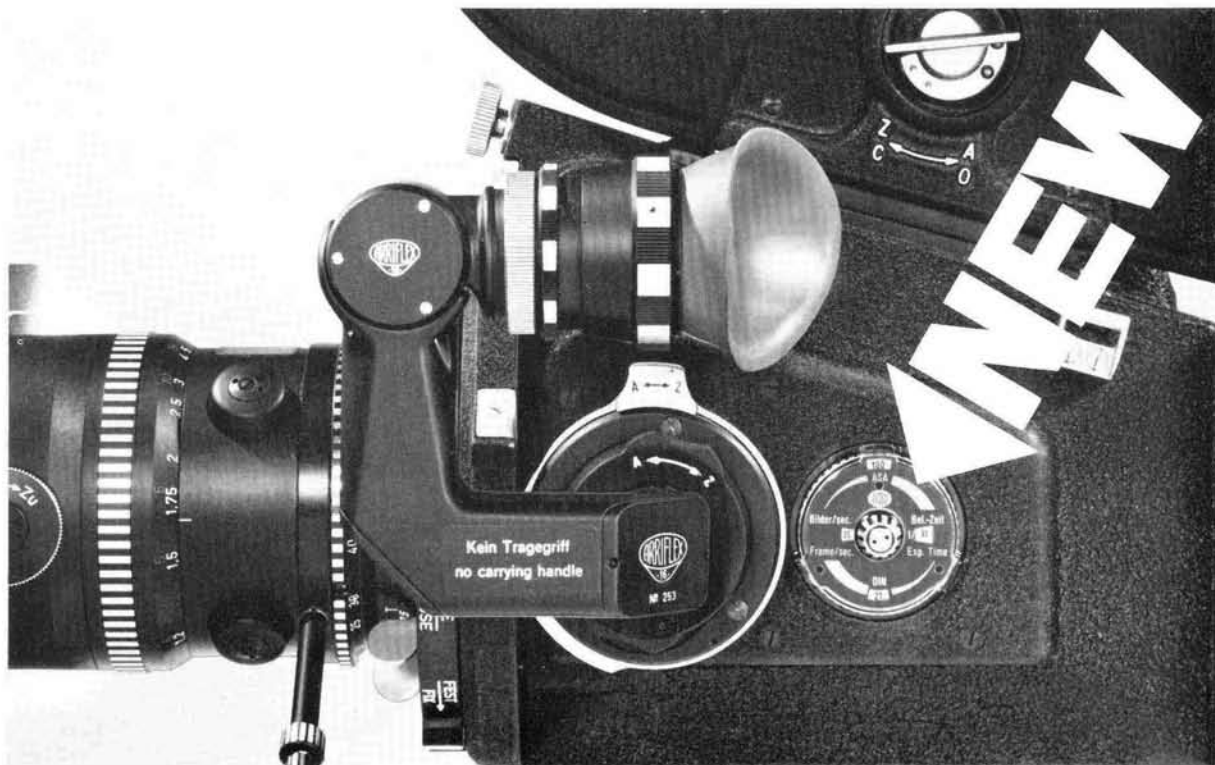


Overexposure by about one stop



Underexposure by about one stop

16 BL with Exposure Control System ▼



## Handheld Filming with the ARRIFLEX 16 BL



The ARRIFLEX 16 BL serves with equal facility, the needs of classic tripod supported camera methods, and modern, mobile, handheld techniques.

The 16 BL is normally supplied with a Standard (Type A) Viewfinder. With this finder, the 16 BL is equipped perfectly for tripod mounted camera work. In this form, the camera may also be used handheld with the ARRI Body Brace designed for the purpose.

Viewfinders for the ARRIFLEX 16 BL are interchangeable (on cameras with Serial Nos. 50701 and up). For handheld filming, the 16 BL may be equipped with the ARRI Offset (Type B) Viewfinder. With this accessory, camera balance and handling are substantially enhanced. For extended filming, the camera should be mounted on the special body brace made to take full advantage of the offset viewfinder. However, with the offset viewfinder, the improved positioning will place the camera just on the shoulder, and for maximum mobility, the camera may be used this way without a brace.

Standard Viewfinder  
and Offset Viewfinder



# Prime Lenses

The modern zoom lens was selected as the ideal objective to serve as prime lens for filming with the ARRIFLEX 16 BL. This choice reflects current professional practice. Varifocal lenses are used more and more on location filming, because of their convenience, universal usefulness and high quality.

As noted earlier, the mechanism of the 16 BL is acoustically insulated inside the camera housing. Zoom lenses for the ARRIFLEX 16 BL are insulated similarly inside their own special housings. When mounted to the camera, the lens and the movement become a single, rigidly interlocked assembly. The lens housing is locked separately to the camera housing.

The lens housing limits noise radiation, and in addition serves to protect the lens and to provide lens support. The housing provides over-

sized grips for the operation of lens controls, and large, easy-to-read scales.

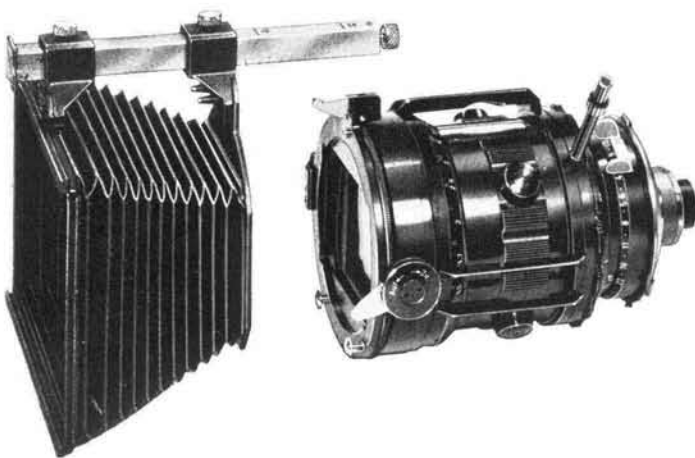
The front of the lens housing is completed with an interchangeable holder for "3x3" (75x75 mm) filters, or for a plane-parallel clear glass. The front of the lens housing takes a snap-on adjustable matte box.

The lens proper is seated by means of a new Bayonet Lock Lens Mount. This is a significant improvement in mounts for all larger, heavier lenses, and has been adopted for all ARRIFLEX cameras. The mount is made from specially fabricated wear-resistant steel. The lock mechanism provides superior lens seating and alignment.

The following varifocal lenses are available in special ARRIFLEX 16 BL housings:

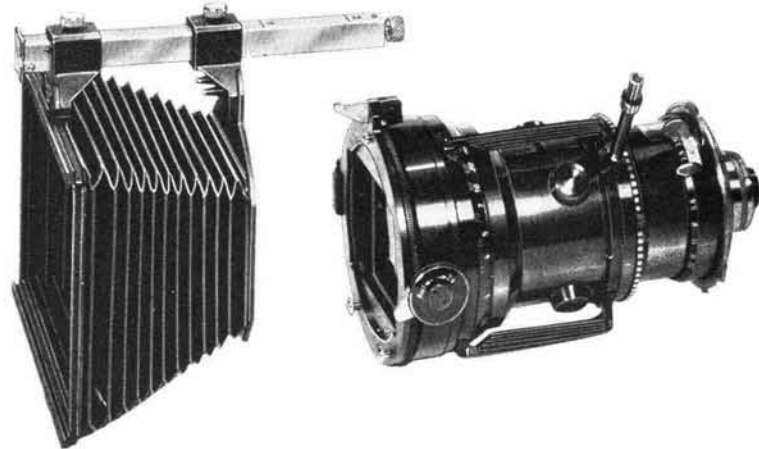
## NEW!

### Zeiss Vario Sonnar Lens 10 x 10, f/2.8 in Special 16 BL Housing



10 to 100 mm  
Horizontal angular field from 55° to 6°  
Diaphragm: f/2.8 – f/22  
Range settings: 3.3 ft (1 m) to ∞  
with filter holder and square protecting glass  
75 x 75 mm, suitable for:  
Square 75 x 75 mm ARRI glass filters  
Square 3" x 3" Kodak Wratten filters  
Round ARRI 94 mm polarizing filters  
Essential accessories: matte box

### Angénieux Varifocal Lens 10 x 12, f/2.2 in Special 16 BL Housing

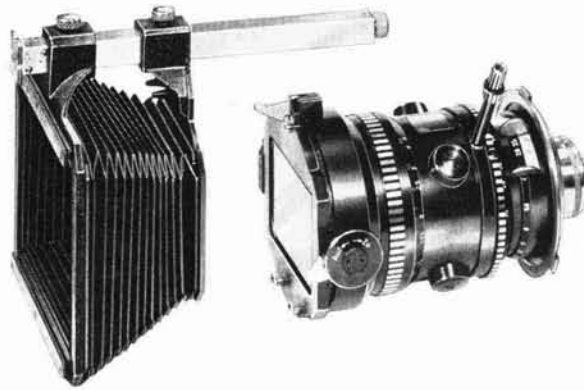


12 to 120 mm  
Horizontal angular field from 47° to 5°  
Diaphragm: f/2.2 – f/22  
Range settings: 5 ft (1.5 m) to ∞  
with filter holder and square protecting glass  
75 x 75 mm, suitable for:  
Square 75 x 75 mm ARRI glass filters  
Square 3" x 3" filters  
Round ARRI 94 mm polarizing filters

## Zoom Lenses, Matte Box and Filters

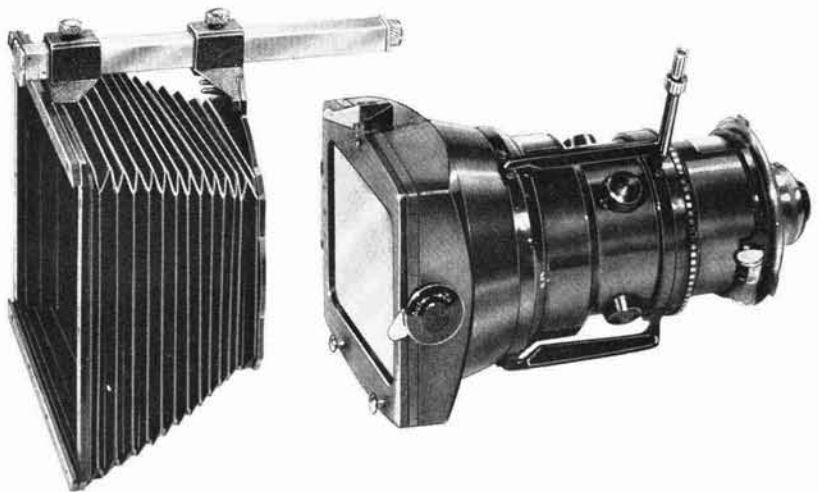
### Angénieux Varifocal Lens 6 x 12.5, f/2.2 in Special 16 BL Housing

12.5 to 75 mm  
Horizontal angular field from 44° to 8°  
Diaphragm: f/2.2 – f/22  
Range settings: 4 ft (1.2 m) to ∞ with filter holder and round protecting glass, 3 1/4", suitable for:  
Filter Series IX



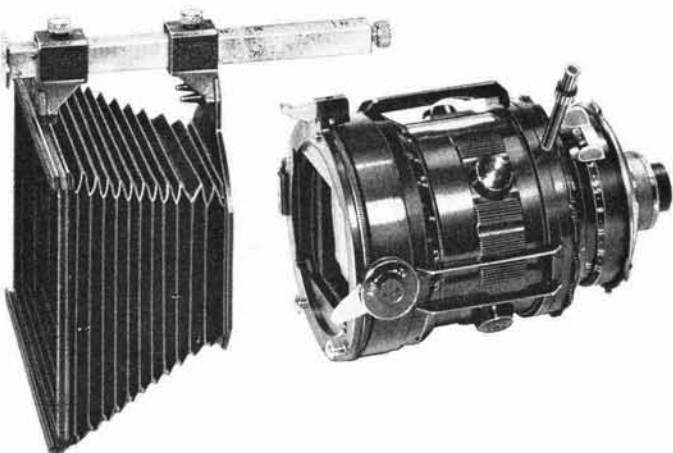
### Angénieux Varifocal Lens x 10 x 9.5, f/2.2 in Special 16 BL Housing

9.5 to 95 mm  
Horizontal angular field from 57° to 6°  
Diaphragm: f/2.2 – f/22  
Range settings: 30 in. (0.75 m) to ∞ with filter holder and square protecting glass 4" x 4", suitable for:  
Square 100 x 100 mm ARRI glass filters  
Square 4" x 4" filters  
Round ARRI 110 mm polarizing filters  
Essential accessories: matte box



### Zeiss Vario Sonnar Lens 6 x 12.5, f/2 in Special 16 BL Housing

12.5 to 75 mm  
Horizontal angular field from 44° to 8°  
Diaphragm: f/2 – f/22  
Range settings: 3.3 ft (1 m) to ∞ with filter holder and square protecting glass 75 x 75 mm, suitable for:  
Square 75 x 75 mm ARRI glass filters  
Square 3" x 3" filters  
Round ARRI 94 mm polarizing filters  
Essential accessories: matte box



## Motor-Driven Zoom Control

The ARRIFLEX zoom motor drive offers the important advantages of a smooth zoom movement and superior control. Zoom speed is fully adjustable and the zoom range may be limited by adjustable stops. The motor drive is a real help to the cameraman, and a real contribution to smooth zoom movement on the screen.

A special hand grip for the 16 BL is available with the zoom motor drive. The hand grip provides the regular stop-start switch for the camera, plus a convenient three-way switch, which controls the zoom in, zoom out and zoom stop-start. A separate rheostat in the hand grip provides control of zoom speed. A special, auxiliary control may also be supplied, to control the zoom motor from the panhead handle. The zoom motor is powered from the camera's regular power circuit. (No separate battery or

cable is required.) A toothed belt links the motor and the zoom movement of the lens. An adjustable friction clutch protects the motor against overloading and at the same time permits the cameraman to zoom manually when desired. The zoom motor drive runs very quietly and does not add significantly to over-all noise level. The ARRI motor drive is currently available for the following 16 BL lenses:

Angénieux Varifocal 10 x 12 lens

in 16 BL housing

Angénieux Varifocal 10 x 9.5 lens

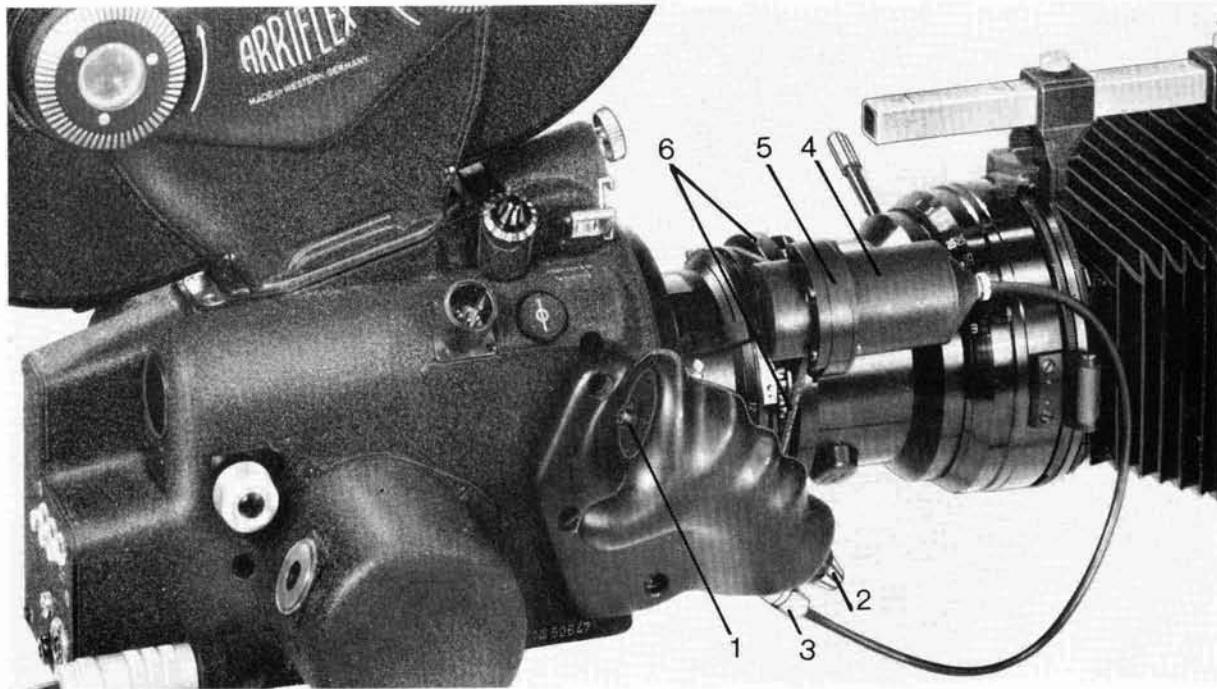
in 16 BL housing

Zeiss Vario Sonnar 6 x 12.5 lens

in 16 BL housing

Zeiss Vario Sonnar 10 x 10 lens

in 16 BL housing



### Electric Zoom Drive

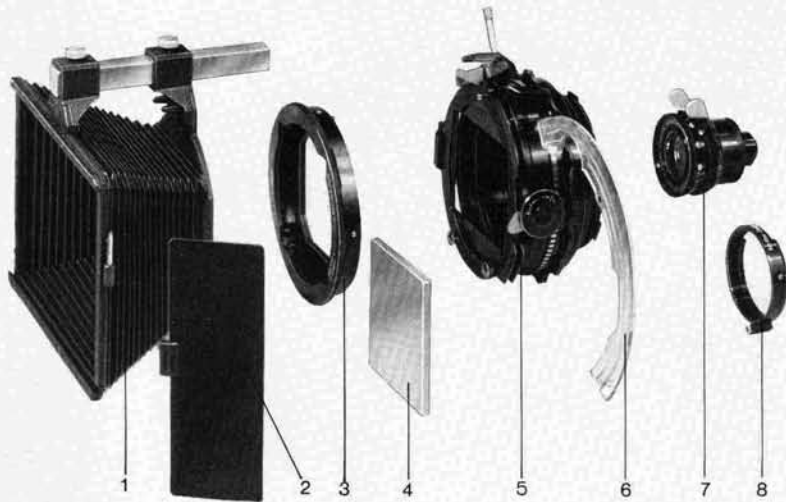
- 1 Switch with automatic return to middle position
- 2 Stepless speed regulator
- 3 Electric receptacle for zoom motor cable
- 4 Zoom motor
- 5 Motor gearing with adjustable friction clutch
- 6 Toothed belt

# 16 BL Universal Lens Housing

The ARRIFLEX 16 BL is designed to take full advantage of the quality, versatility and convenience of the zoom lens, and to use it as a universal lens. However, the 16 BL is also readily used with fixed focal length lenses.

Where noise level is a consideration, the ARRI Universal Lens Housing must be used, and any one of the lenses listed below in Group I may be accommodated. The operating characteristics of the 16 BL with the Universal Lens Housing, remain ideally suited for location synchronous sound filming.

Where noise level is not important, lenses from either Group I or Group II may be used, simply by mounting the fixed focal length lens on the camera in place of the universal lens. No housing or other adapter of any kind is required.



## Universal Lens Blimp

- 1 Matte box
- 2 Mirror
- 3 Filter holder
- 4 Filter or plane-parallel glass
- 5 Lens blimp
- 6 Scale plate
- 7 Lens
- 8 Diaphragm driver ring

## Group I

Schneider	10 mm f/1.8	T 2	Cinegon
Schneider	28 mm f/2	T 2.2	Cine Xenon
Schneider	35 mm f/2	T 2.2	Cine Xenon
Schneider	40 mm f/2	T 2.2	Cine Xenon
Schneider	50 mm f/2	T 2.2	Cine Xenon
Schneider	75 mm f/2	T 2.2	Cine Xenon
Cooke	25 mm T 2.2	Series III	
Cooke	32 mm T 2.3	Series II	
Cooke	40 mm T 2.3	Series II	
Cooke	50 mm T 2.3	Series II	
Cooke	75 mm T 2.3	Series II	
Zeiss	8 mm f/2	T 2.4	Distagon
Zeiss	16 mm f/2	T 2.4	Distagon
Zeiss	24 mm f/2	T 2.4	Distagon
Zeiss	32 mm f/2		Planar
Zeiss	50 mm f/2	T 2.2	Planar
Zeiss	85 mm f/2	T 2.2	Planar
Zeiss	85 mm f/2		Sonnar

## Group II

Kilfitt	40 mm f/2.8 Makro-Kilar	(focuses to 4")
Kilfitt	90 mm f/2.8 Super Makro-Kilar	
Schneider	18 mm f/1.8	
Schneider	100 mm f/2	
	T 2.2	Cinegon
	T 2.2	Cine Xenon
Taylor, Taylor & Hobson:		
	18 mm T 2.2	Cooke Speed Panchro Series III
Taylor, Taylor & Hobson:		
	100 mm T 2.8	Cooke Deepfield Panchro
Kinoptik:		
Tegea	5.7 mm Extreme Wide Angle Lens f/1.8	T 2 with built-in filter slot for 2"x2" glass filters

The Universal Lens Housing for the ARRIFLEX 16 BL when ordered with a lens from Group 1, requires additionally a scale holder and matched distance and F stop scale, a metal hinged mirror, and a diaphragm coupling ring. A filter holder is supplied suitable for 3" x 3" (75 x 75 mm) and round 94 mm diameter polarizing filters.

# Camera Motor Drives



The 12 v D. C. Universal Motor is shown at the left with its matching power cable. The 117 c, 60 cycle Synchronous Motor, complete with

cable and D. C. Module for the automatic Start Marking system is shown at the right.

## The 12 V DC Universal Motor

Drive motors for the camera are readily interchanged, and several different motor types and motor controls are a part of the complete Arriflex 16 BL system. The 12 v D. C. Universal Motor is considered standard, because of its broad general usefulness. In most applications, the motor is powered by an Arriflex 12 v battery and it functions as a DC governor controlled motor. In this mode, it is suited perfectly for all synchronous sound systems which use 1/4" tape machines for the audio. The motor has a governor mechanism which will operate the camera at 24 fps (or at 25 fps) with a speed accuracy better than  $\pm 1.5\%$ .

The usefulness of the motor is made „universal“ by the fact that this same drive is utilized in the Arriflex Precision Crystal Control System, which provides for Pilotone "cordless" sync and other advanced applications. See Page 21 for complete details.

## The Variable Speed Control

A solid-state low loss Variable Speed Control is available as an accessory for the 12 V DC Universal motor. The control will operate the motor from standard 12 V battery supplies at any speed between 10 and 40 fps. The speed control may be mounted on the panhead handle. The Variable Speed Control adds significantly to the versatility of the Universal motor.

## Synchronous Motor

The 16 BL, 117 V, 60 cycle Synchronous Motor is designed to run the camera at sound speed (24 fps). This motor provides the simple, low-cost drive needed to run the Arriflex 16 BL synchronously with sound recorder and/or other professional equipment. It is also a good choice where there is ready access to power



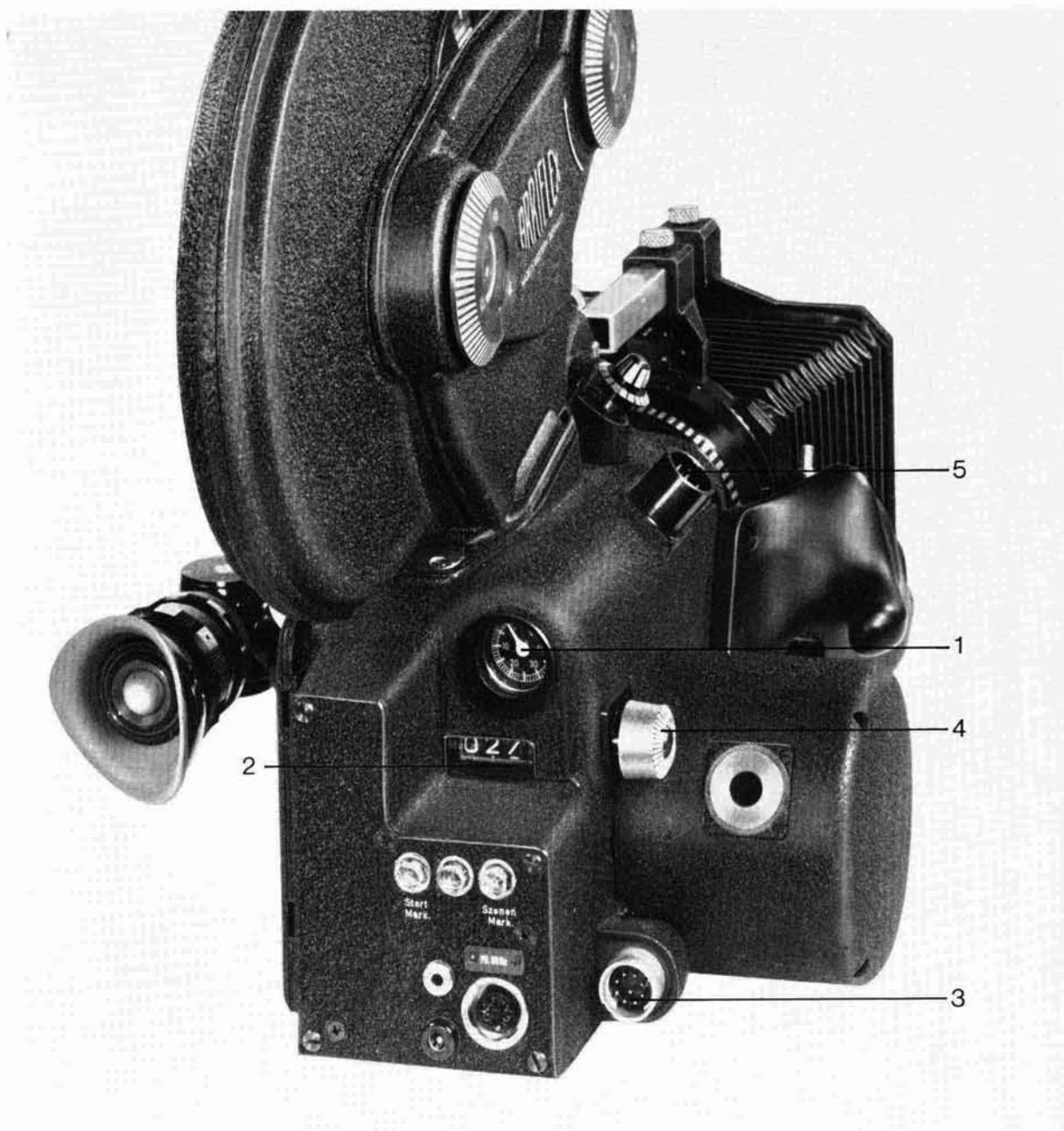
Variable Speed Control Attachment, for use with 12 v, D. C. Universal Motor

lines and the camera is to be run at 24 fps.

The power cable for the 16 BL sync motor comes wired with a miniature DC supply. The DC serves to power the automatic start-mark system of the camera. It is worth noting that the 60 cycle Pilotone signal of the camera may always be picked up no matter which motor drive is used. The Pilotone signal frequency is always an exact reflection of true camera speed.

The extensive accessory system of the 16 BL includes also other types of synchronous motors, including motors for operation from 220 V, 50 cycle power lines. These motors may be run at 24 fps or 25 fps (for European TV) by means of change gears. For further information about special synchronous motors, please write, describe application, camera speed required and power line characteristics.

## Tachometer and Footage Counter



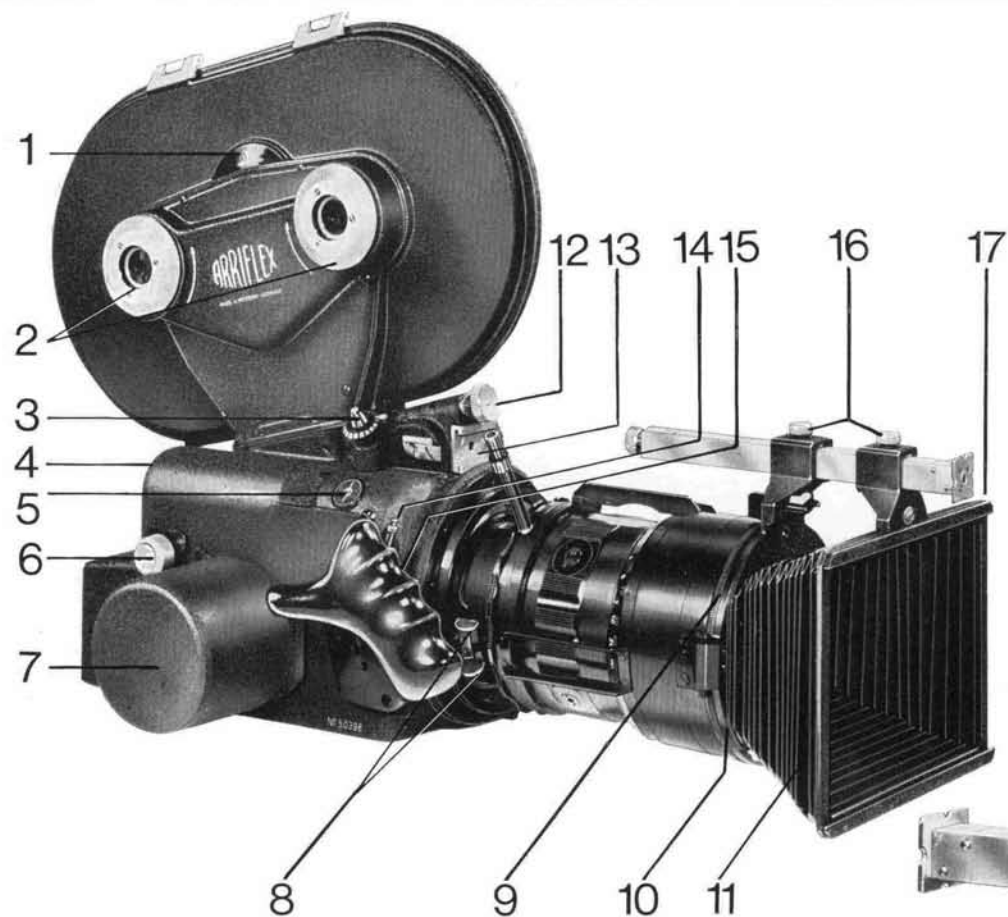
A “frames-per-second” tachometer and a digital footage counter are housed in the back of the 16 BL camera. Inclusion of these essential control instruments is representative of ARRIFLEX 16 BL professionalism and “no-compromise” design. The tachometer is calibrated to show camera speed from 0–50 fps. A red mark on the dial indicates 24 fps sound speed. The 4-digit footage counter counts forward and backwards. A convenient re-set knob is just to the right of the counter.

### Rear View of the ARRIFLEX 16 BL

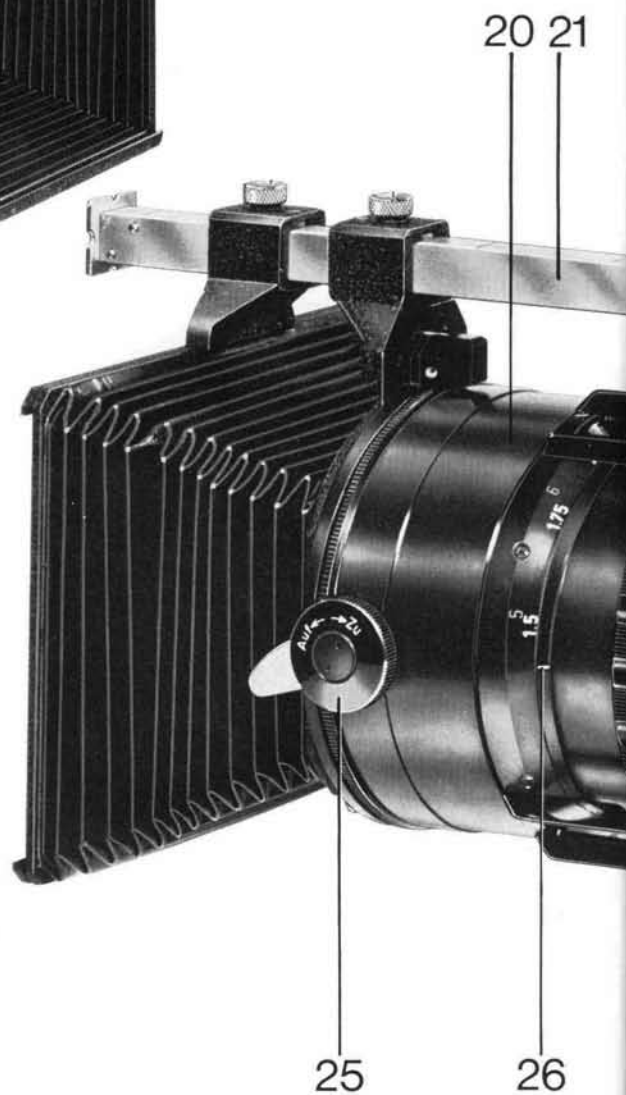
- 1 Tachometer
- 2 Counter
- 3 Battery cable receptacle
- 4 Counter re-set knob
- 5 Sound connector for single-system sound module

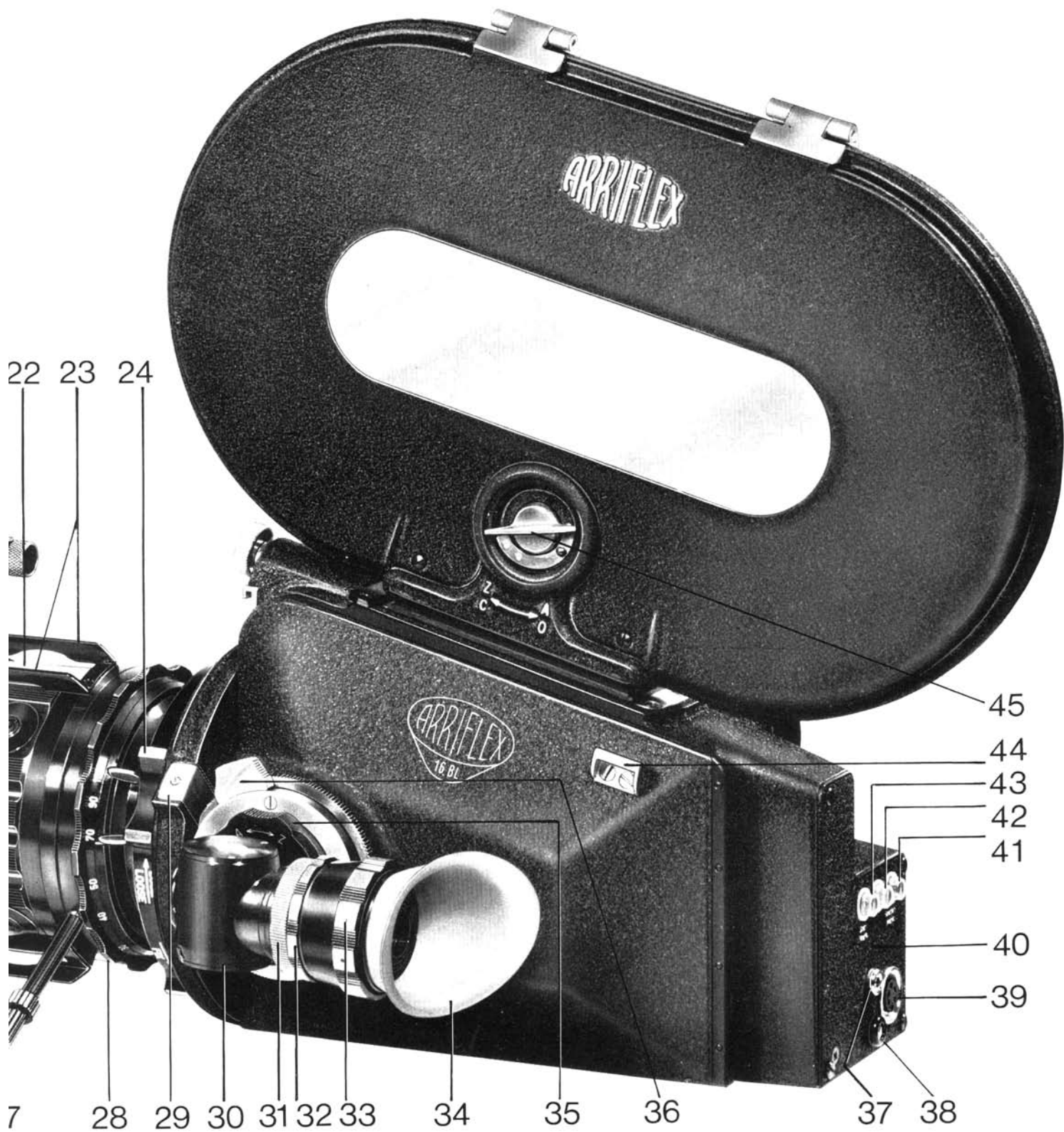


# ARRIFLEX 16 BL

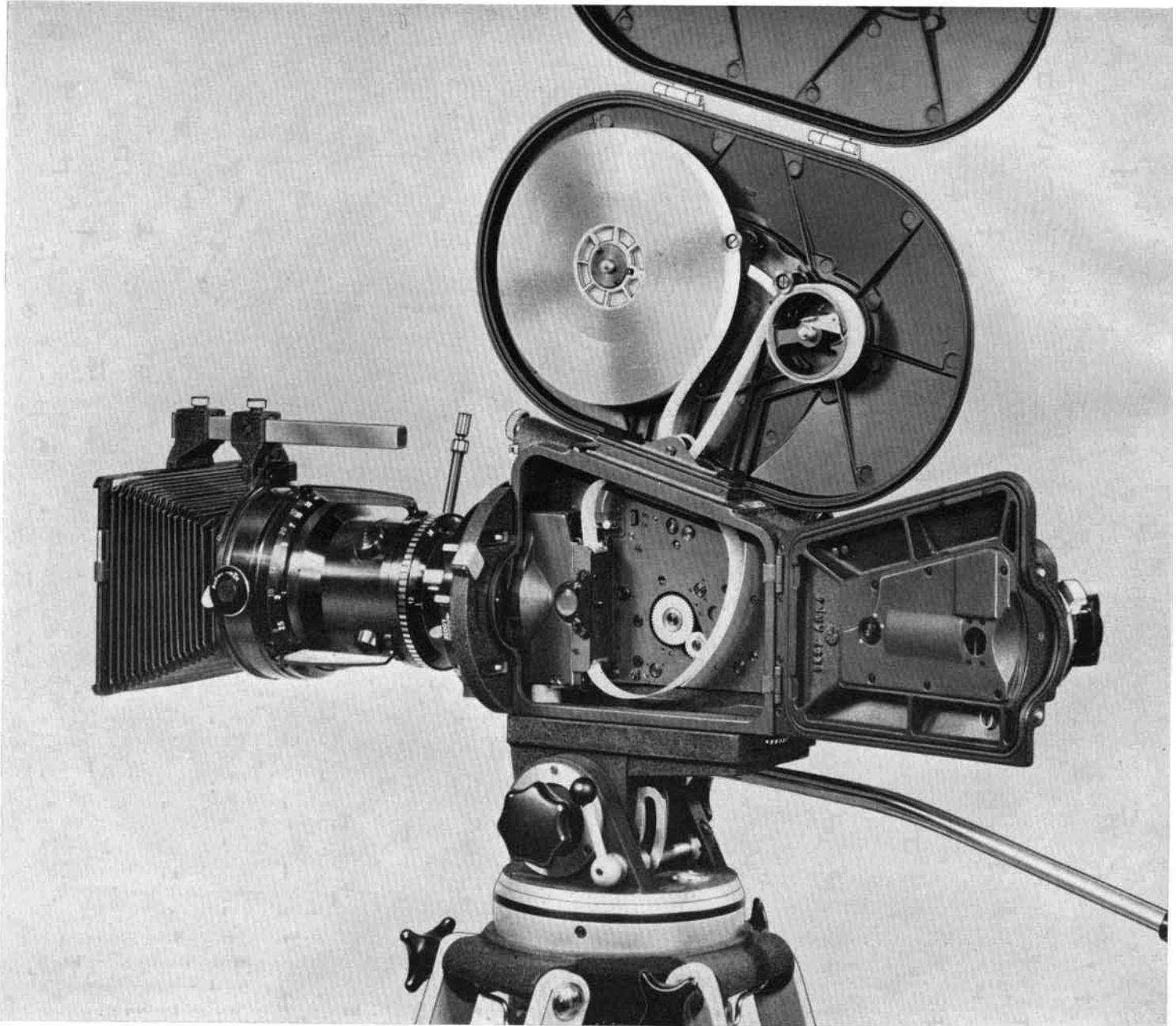


- |  |  |
|--|--|
| 1. Film indicator  | 23. Focusing grips                           |
| 2. Knurled, spring-loaded take-up knobs                                | 24. Lock ring for lens housing               |
| 3. Camera inching knob   | 25. Latch for filter holder door             |
| 4. Tachometer, 0-50 fps and digital footage counter (refer to page 15) | 26. Distance scale index mark                |
| 5. Focal plane   | 27. Adjustable zoom lever                    |
| 6. Re-set knob for counter   | 28. Zoom movement ring                       |
| 7. Motor housing   | 29. Lens lock                                |
| 8. Diaphragm adjustment lever  | 30. 10x eyepiece with auto-closure mechanism |
| 9. Filter holder   | 31. Retaining ring for eyepiece              |
| 10. Filter door  | 32. Lock ring diopter adjustment             |
| 11. Matte box  | 33. Diopter adjustment ring                  |
| 12. Magazine gib lock  | 34. Rubber eye cup                           |
| 13. Shoe for carrying handle or Universal matte box                    | 35. Retaining lock for viewfinder            |
| 14. Main stop-start switch   | 36. Camera door lock                         |
| 15. Anatomical handgrip  | 37. Outlet for earphones                     |
| 16. Knurled screws for bellows adjustment                              | 38. Outlet for manual edge-marker            |
| 17. Matte holder   | 39. Pilotone outlet                          |
| 20. Lens housing   | 40. Replaceable start-mark module            |
| 21. Matte box boom   | 41. Indicator light for edgemarker           |
| 22. Plexiglass window  | 42. Running light                            |
|  | 43. Indicator light for start-marker         |
|  | 44. Eyelet for neck strap                    |
|  | 45. Magazine cover lock                      |





## The 16 BL 400 ft (120 m) Quick-Change Magazine



The ARRIFLEX 16 BL illustrated with magazine and camera doors open to show film path. (The ARRI exposure control system is built into the inside of the camera door.)

The 400 ft quick-change magazine for the 16BL is the result of 50 years of experience with the design and manufacture of cameras and film handling systems. The 400 ft magazine is gear driven and features internal film sprockets. It is of the single compartment displacement type, much like the one on the ARRIFLEX 35 and the ARRIFLEX 16 M. This system combines the best of quick-change speed and operating reliability. The built-in sprocket and pre-formed film loop system provides speed and convenience, but the entire film gate — aperture plate side guide rails and rear pressure pad — all the parts that put film exactly in the focal

plane at the moment of exposure, are built into the camera head for safety and reliability. Every detail of the 16 BL 400 ft magazine is designed to satisfy the special needs of the professional film maker. The all-gear drive mechanism is insulated from the magazine chamber to match the Quiet characteristics of the 16 BL. The magazine is made to accept 400 ft of colour, or 500 ft of black and white film wound on darkroom cores. Film on 100 ft and 200 ft daylight spools may also be used. The magazine drive adapts itself automatically to forward or reverse. The throat of the magazine has a labyrinth construction to be lightproof and to handle film with maximum safety. The magazine throat cover plate is easily removed for inspection and cleaning. A "permanent" expansion take-up core in the magazine adds to reliability, handling speed and convenience.



View of left side of 400 ft magazine for ARRIFLEX 16 BL.



View of right side of 400 ft magazine which has been fitted with slip-on, padded cover.

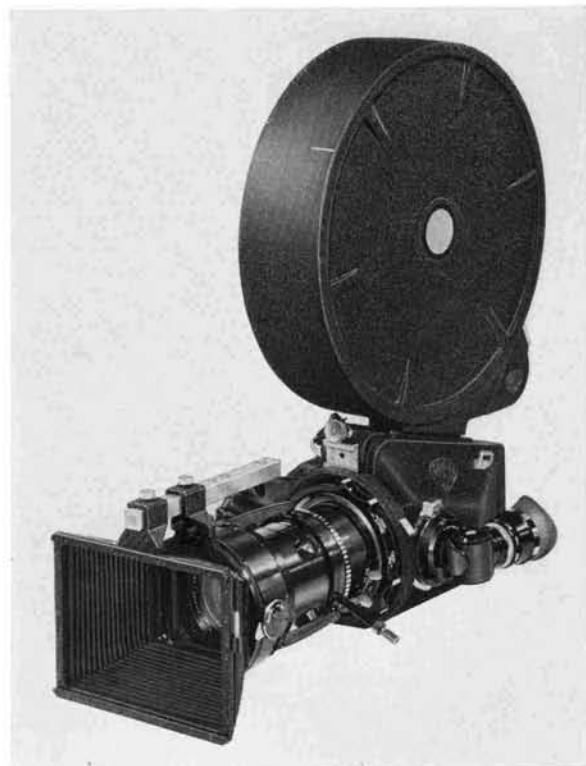
### The Slip-on Magazine Cover

For the 400 ft quick-change magazine for the ARRIFLEX 16 BL, we supply a padded slip-on magazine cover. This protects the magazine to a great extent against external influences. It not only insulates the film in the magazine against excessive heat in bright sunlight, but also protects it from moisture in rainy weather. In addition, this slip-on cover acts as supplementary sound-insulation. The magazine with this added protection can be easily mounted on the camera.

### THE 1200 FT (360 m) COAXIAL MAGAZINE

The 1200 ft magazine for the 16 BL is particularly advantageous for sports, television shows, industrial applications, and wherever long, uninterrupted filming is essential. The magazine has the same quick-change feature as the 400 ft magazine.

The 1200 ft magazine is a double compartment type. The two film chambers are coaxial. In a large magazine like this, this design provides advantages in compactness, and light weight. Handling is particularly improved, because balance does not change significantly, as the 1200 ft of film is passed from one compartment to the other. This magazine is not noise insulated.



## **Synchronous Sound Filming with the ARRIFLEX 16 BL**

The ARRIFLEX 16 BL offers the film maker complete sound capability. The 16 BL has every essential facility needed for modern location double-system, Pilotone sound filming. The camera may also be adapted, in the field, for single-system sound. This unusual flexibility enables the film maker to tailor his sound system according to the requirements of the assignment. This camera is matched perfectly always — never overloaded with unnecessary equipment — never lacking essential capability. Each sound system in its own way, makes picture and sound films of outstanding quality.

## **Double-System Sound Pilotone System with Automatic Start-Marking**

The ARRIFLEX 16 BL is completely equipped for Pilotone synchronous sound recording. These facilities include the following:

1. A miniature generator is built into the camera to develop the 60 cycle synchronizing signal which is the heart of the Pilotone system. (The camera may also be readily equipped for 60 cycles/24 fps, 50 cycles/24 fps and 50 cycles/25 fps.) The Pilotone signal appears across pins 1 and 2 at the five pin outlet at the back of the camera. Pin 2 is connected to ground. The signal is carried to the tape recorder via a light connecting cable and recorded on the tape via the Pilotone recording head. The 60 cycle output of the camera is suitable for Pilotone, Neopilot and Rangertone systems, and for most of the tape recorders widely used for this purpose.
2. Standard equipment on the camera also includes a startmarker which establishes start marks on the film and sound track automatically each time the camera is started if the Pilotone cable is connected. A relay energizes the marking lamps and supplies a DC voltage for the 1000 cycle start mark oscillator which is in many tape recorders. The start marker fogs whole frames of film at the beginning of the scene and operates automatically.
3. A 1000 cycle oscillator, built on a plug-in circuit board, may be supplied as an optional extra and installed in the camera to provide the sound track start mark signal, for those tape machines that do not have their own oscillators (not for Neopilot heads).
4. A cue marker (or scene marker) is supplied as standard equipment. This system operates very much like the automatic start marker system. It differs in that it marks the film at the edge only, and it is operated manually. In many cases, this is a very useful addition to the system.

# Precision Motor Control

In terms of sound recording, this is a technique that provides all the advantages of Pilotone recording without the handicap of the Pilotone connecting cable. The Crystal Control system is ideal for all those location synchronous sound filming jobs where the conventional Pilotone cable would be awkward or impossible to use. The ARRIFLEX Crystal Control at the camera and the ARRIFLEX 50/60 cycle oscillator at the recorder are important, advanced techniques for location sound filming.

The ARRI precision motor control is a high precision, battery operated control unit for the 12 volt DC Universal motor. The Control makes it possible to do location sound filming in perfect synchronization, using the Pilotone technique, but without any connection whatever between the ARRIFLEX 16 BL camera and the tape recorder.

The control system consists of two main sections:

- I. The Precision Crystal Control together with the 12 volt DC Universal motor (at the camera);
- II. The miniature, precision, 50/60 cycle crystal oscillator (at the tape recorder).

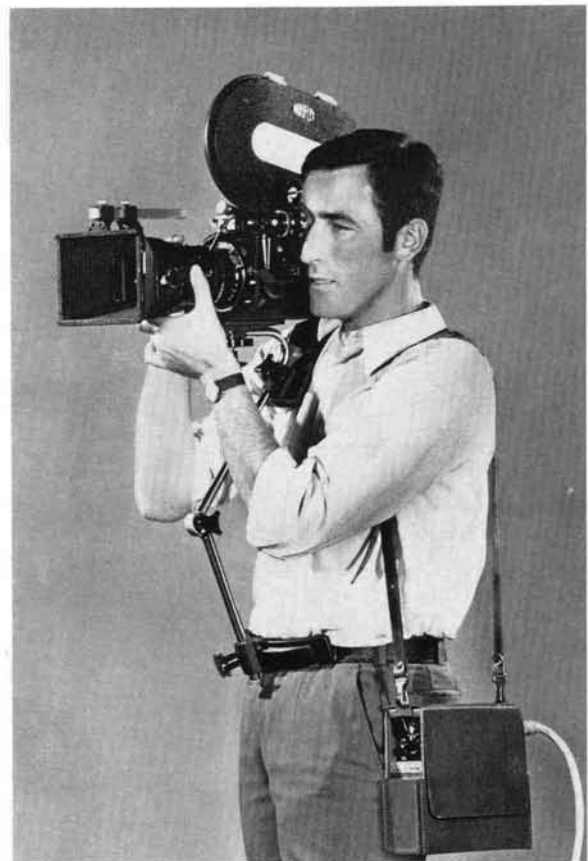
## I. The Precision Crystal Control

The ARRIFLEX precision motor control is a sophisticated, electronic regulator for the 12 volt DC Universal motor. The circuitry includes a crystal oscillator, whose function is to develop a highly precise reference frequency. This frequency is a constant. The Universal motor itself generates an output frequency of its own. This is a variable. This frequency is a direct reflection of motor speed. If motor speed changes, however slightly, the output frequency varies proportionately.

The function of the main control circuit therefore, is to compare the frequency and phase from the oscillator reference and the frequency from the motor, and, to control the flow of direct current to the motor. If the output signal developed by the motor deviates in frequency or phase from that of the reference oscillator, a corresponding change in current flow to the motor is made instantly. The circuit functions with such sensitivity, speed and precision, that motor speed and camera speed, for all practical purposes, is nearly perfect. The motor functions at a constant speed accuracy of  $\pm .005\%$ . The Precision Motor Control is designed to regulate the Universal motor in four different modes: 1.— to control the motor with reference to a crystal controlled oscillator reference fre-



Synchronous double-system picture-sound recording without cable connections between camera and tape recorder



## Classic Double-System Synchronous Sound

quency as described above; 2.— the control may also be used to regulate the Universal motor speed with reference to line frequency. In this set-up, the control is connected to the power line. The motor itself continues to be DC operated from the battery — however, speed control now uses line frequency as a reference instead of the crystal.

The Universal motor then runs synchronously with other cameras, film recorders or other machines using synchronous motors; 3. — by means of a multivibrator, the control will also run the Universal motor at variable speeds from 10 to 40 fps; 4. — the control may be switched to run the Universal motor as a regular, governor controlled motor. This forms an important standby reserve in case of emergency.

The Precision Motor Control may be set to operate in connection with either 50 cycle or 60 cycle systems. Interchangeable, slide-on batteries are attached to the control to form an integrated power supply and control unit.

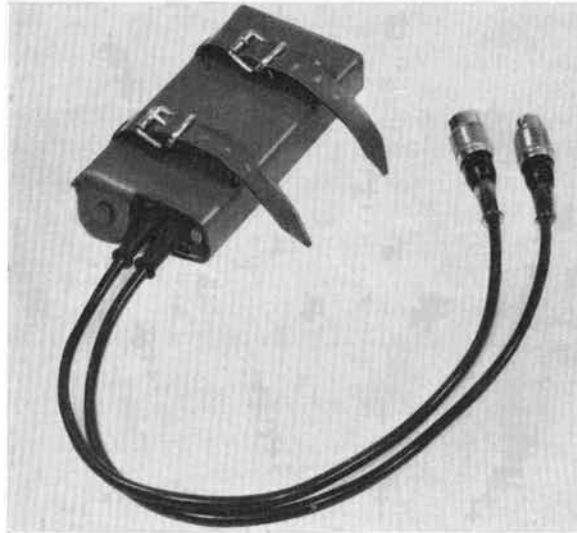
The high-order accuracy and the versatility of the ARRIFLEX Precision Motor Control system are such that several cameras may be operated in synchronization with a single sound recorder. The system may also be used to play back a pre-recorded sound track and to keep one or more ARRIFLEX cameras filming in synchronization with the track.

### II. The Precision 50/60 Cycle Crystal Oscillator (For the tape recorder)

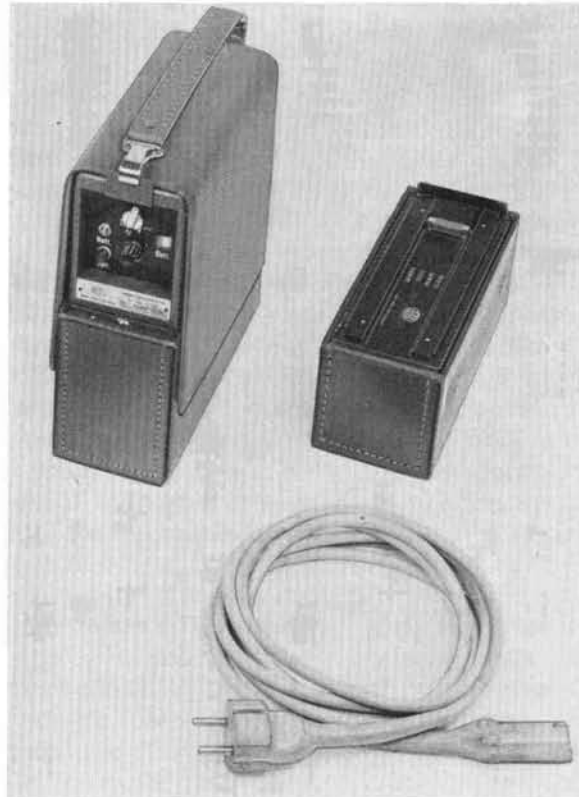
The ARRIFLEX miniature 50/60 cycle oscillator is the second part of the complete Control System. This unit is used at the tape recorder. It develops the 60 cycle signal (or 50 cycle) which is recorded on the tape as the Pilotone signal. The 60 cycle frequency has the same high-order precision as the Crystal Control at the camera. There is no link needed between the ARRIFLEX 16 BL and the tape recorder — no cable, no radio frequency carrier, nothing. The camera and recorder are linked only by their speed accuracy. The miniature oscillator may be switched to either 60 (or 50) cycles and is available in several variations for use with any of the portable, professional tape recorders now in general use. Generally, it is equipped with plugs for Nagra 3 P.

Control unit with battery slide-in units 5 Ah and 3.5 Ah NC and power cable for mains synchronized operation of camera with simultaneous re-charging of the built-in batteries

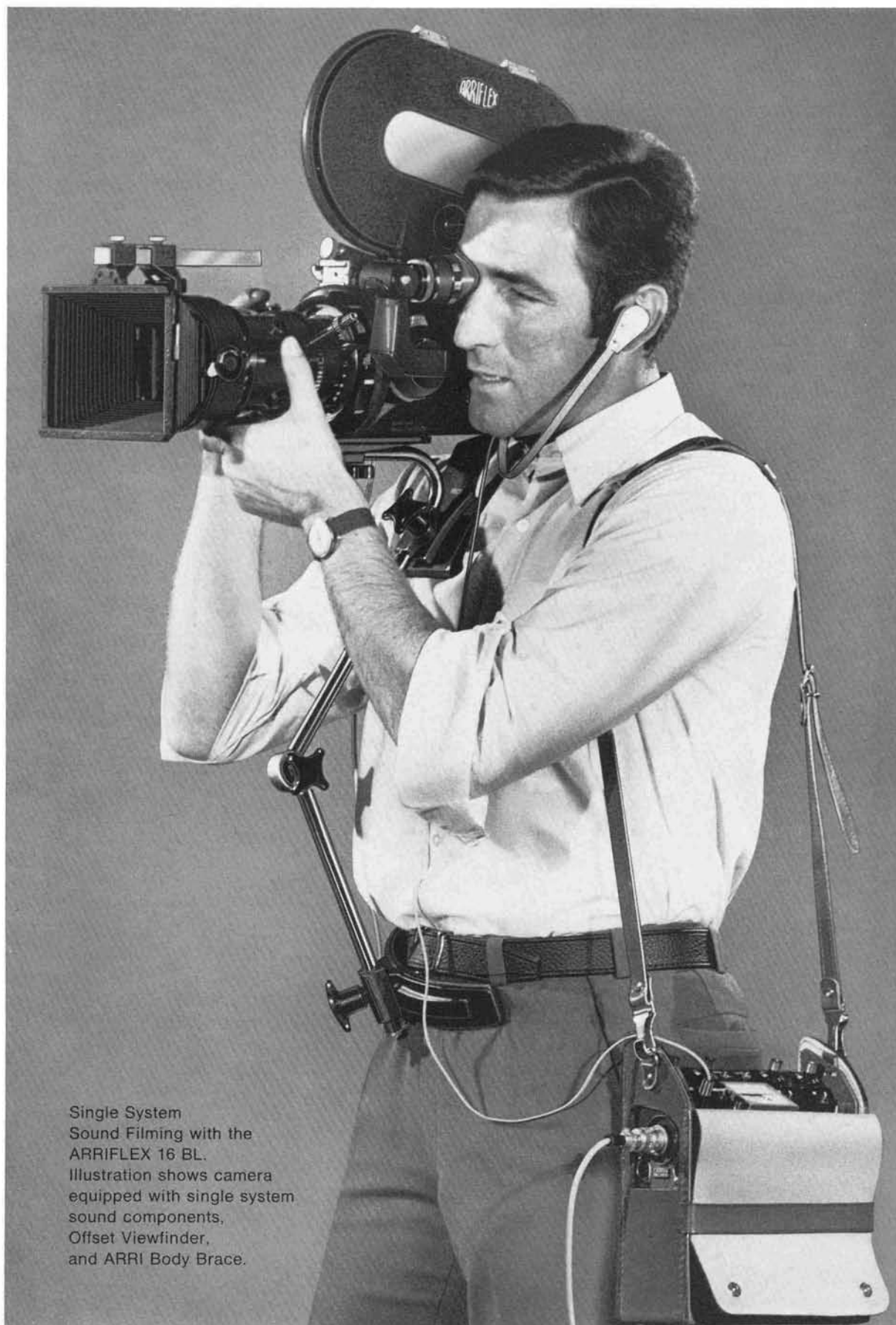
The ARRIFLEX 16 BL is suited perfectly to the Pilotone system, but it is by no means limited to one technique. The 16 BL is readily used in traditional, double-system sound set-ups. Whenever filming is done under studio-like conditions and/or a synchronously driven film recorder is used for the audio, the camera requires no more than its interchangeable Universal motor be replaced by an ARRI synchronous motor. (See page 14 for listing of 16 BL synchronous motor types available.)



Oscillator for tape recorder ▲



## The Single-System Magnetic Sound Module



Single System  
Sound Filming with the  
ARRIFLEX 16 BL.  
Illustration shows camera  
equipped with single system  
sound components,  
Offset Viewfinder,  
and ARRI Body Brace.



## 16 BL Single-System Sound

There are many films that may be made with single-system sound to great advantage. These are films characterized by long, uninterrupted takes, minimum editing and simple production techniques. Films of this nature are needed often in television, public relations, sales, training, etc. These are films that must be made with speed and low cost. The 16 BL, with single-system sound can get this job done – on time, within the budget, and to professional standards.

All 16 BL cameras (Serial No. 50170 and up) are pre-wired for ARRI single-system sound components. The camera is converted for single-system sound in a few minutes without special tools. The main components are described as follows:

### **ARRI Single-System Sound Module**

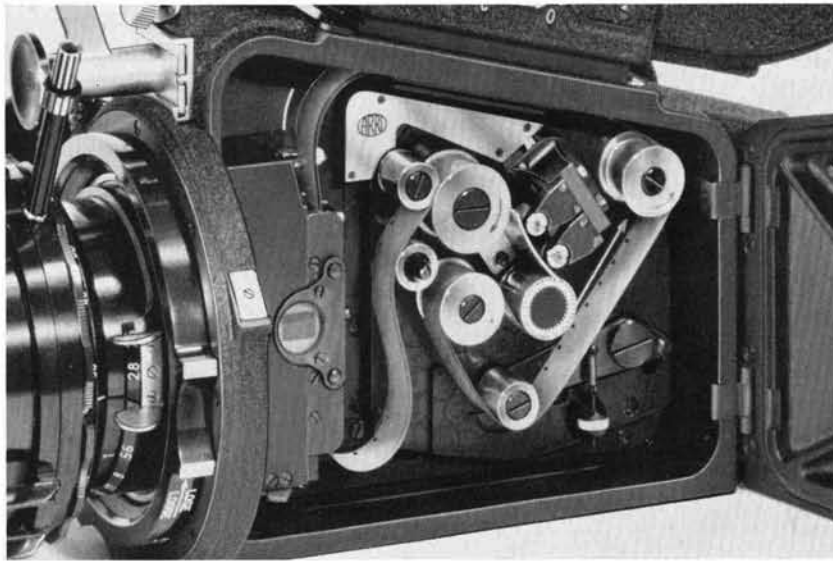
The sound module is a precision-made assembly that includes the magnetic record and separate playback heads, a massive flywheel, and all essential film guides. The module is secured inside the camera head by three small screws. Electrical connections are made automatically as the module is installed.

Displacement between picture and magnetic sound is 28 frames. The 100 mil magnetic sound track produced meets all international standards. Flutter and wow are less than 0.4%. Film threading is exceptionally simple and quick. Heads are mounted on a locating plate, so that the entire head assembly may be replaced by the user.

### **ARRI Mark II Recording Amplifier**

The new Mark II recording amplifier is made expressly for the 16 BL single-system sound. It is a sturdy, all solid state construction. Plug-in circuit boards, silicon transistors and every modern technique is used to bring high quality and utmost reliability to 16 BL single-system recording. Equalization is either SMPTE (USA) or CCIR (European) recording standards (interchangeable plug-in units). The amplifier has two low impedance microphone inputs. Each input has individual speech/music switches and individual gain controls connected to a master gain control. One microphone connection can be switched to line input. The modulation meter shows record level, battery check and bias test. Amplifier output provides for two headsets and line. The Mark II may be powered from replaceable dry cells, rechargeable nickel cadmium batteries or from an external DC supply. Connecting cables and a headset come with the amplifier. (A microphone is not included.)

Performance of the ARRI single-system is designed to match the state-of-the-art. Separate record and playback heads allow monitoring from the film. Broad range frequency response extends to above 8 kc. Distortion, at 100% modulation is approx. 0.6% as measured on Eastman Kodak medium speed Ektachrome film: Signal to noise ratio is approx. 59db (measured with R & S TFA). ARRI single-system sound is engineered to professional standards, to be used for serious, professional work.



Single-system magnetic sound module  
in the film compartment of the ARRIFLEX 16 BL



The equipment required for subsequent instal-  
lation of the magnetic sound module



Connection between camera and amplifier  
(including microphone and earphones)

## Power Supplies

The ARRIFLEX 16 BL accessory system includes power supplies to suit every need and preference.

### Nickel-Cadmium Batteries

Two battery sizes are available. Both of them are outstanding products of advanced nickel-cadmium battery technology. They offer long life, economy and reliability. The batteries require no special maintenance or care, other than keeping them charged, and protecting them against obvious mechanical or electrical abuse. Each battery includes its own miniature charger built into the case. Recharging is a simple straightforward procedure that requires minimal attention.

The 12v/4Ah nickel-cadmium battery is made to be carried over the shoulder (Weight 5.4 lbs. Size 5" x 2-3/4" x 8-1/4" high). It will run the ARRIFLEX 16 BL with 400 ft. magazine for approximately 2000 ft. of film.

The 12v/2.5Ah is a similar, but smaller battery. It may be mounted on the back of the ARRIFLEX Body Brace or carried over the shoulder (Weight: 3.5 lbs. Size: 5-1/2" x 2-1/8" x 5-1/4" high). The pack will run the camera for about 1200 ft.



Nickel Cadmium Batteries for ARRIFLEX 16 BL

### Regulated Power Supply

A very fine, solid-state Power Supply may also be used to drive the ARRIFLEX 16 BL with its 12v D.C. Universal Motor. The Supply operates from 117v, 60 cycle power lines and is designed to put out the well filtered, regulated 12v D.C. required. The Power Supply has four preset voltage outputs and connectors, so that it may be used with any ARRIFLEX camera: 8v-ARRIFLEX 16 S/16 M; 12v-ARRIFLEX 16 BL; 16v-ARRIFLEX 35 and 24v for cameras with special 24v D.C. motors. The supply may also be set for adjustable output, up to a maximum of 32v D.C. 5 amperes, so that it makes a fine D.C. supply for many purposes.



Regulated Power Supply for all ARRIFLEX Cameras

## Carrying Handle



For easy handling of the ARRIFLEX 16 BL we supply a carrying handle, which is fastened in the shoe on the front of the camera.

# Tripods



ARRIFLEX 16 BL Special tripod

"Shorty" tripod

Ground tripod

A variety of tripods and body braces, and a series of carrying cases, complete the ARRIFLEX 16 BL system. Each item is custom designed for the 16 BL. For outstanding features, durability and modest cost, it pays to get ARRI job-matched tripods, braces and carrying cases:

## The new Special Tripod for the ARRIFLEX 16 BL

This new friction tripod was designed for the ARRIFLEX 16 BL, but can also be used for the ARRIFLEX 16 St and ARRIFLEX 16 M.

A wedge plate with 3/8" thread is screwed on to the ARRIFLEX 16 BL, and does not need to be removed for handheld filming.

For working with the tripod, the wedge plate attached to the camera is simply slid into the dovetail shoe. The wedge plate locks itself in position automatically. There is no more fumbling for the threaded tripod hole on the ca-



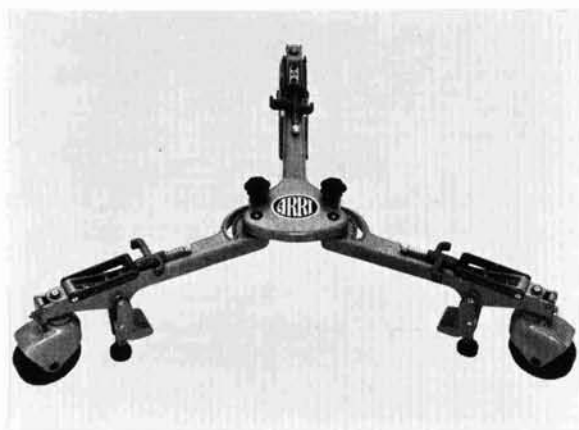
Gyro tripod

mera and no more tightening and loosening of the tripod screw. Safety catches and the ejector make for simple handling. The camera mounting surface of the tripod plate is only 55 mm from the axis of rotation and the optical axis of the camera lies very close to the tripod tilt point. This gives a small tilt radius. Any imbalance of the camera can be offset by a simple centre-of-gravity adjustment by means of a spring-loaded compensating mechanism. The panning arm can be adjusted upwards and downwards, and is detachable.

The head of the special tripod also fits into the recess of the "shorty" and ground tripods. The "shorty" tripod (without tripod head, is about half as high as the special tripod and extendable from 25 to 32 in. (65 to 80 cm). ARRI ground tripods of metal with steel points (without tripod head) are ideal for worm's eye view shots. The gyro tripod is extendable from 43 to 69 in. (1.10 to 1.75 m), the gyro permits high precision pans and tilts.



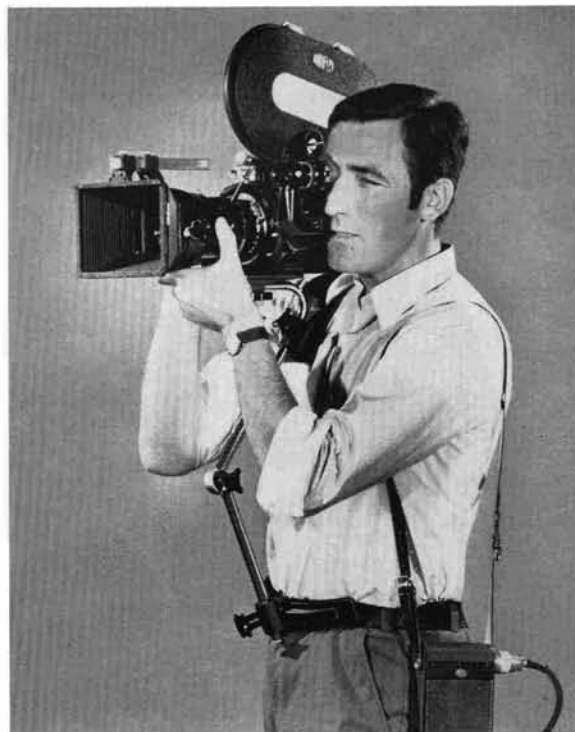
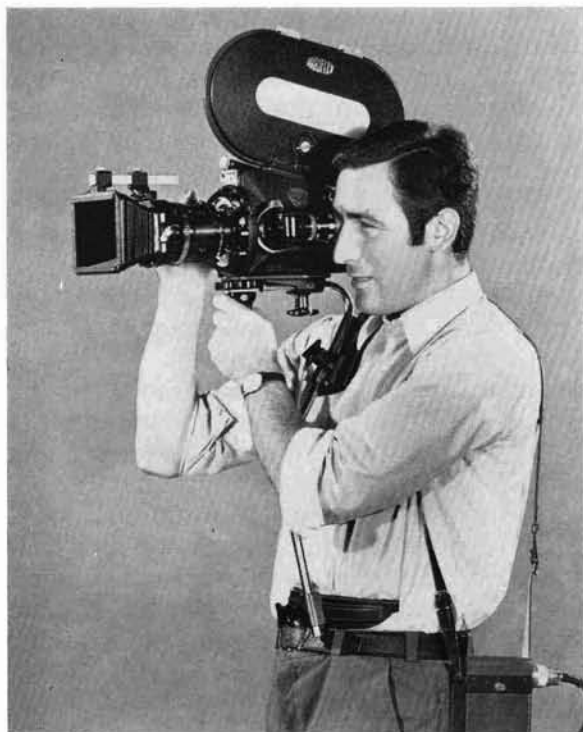
Special friction head for the ARRIFLEX tripods on opposite page



**The ARRI Tripod Dolly for all camera tripods (also with light blimp)**

The dolly can be folded up and transported in any car luggage compartment. At the filming location, the arms are folded out and locked with star knobs. Dolly shots on level ground can be taken without difficulty. The three arms are of special light-metal castings, the wheels are perfectly centred and run smoothly. The dolly wheels can be locked in position by foot-operated toggles.

## Shoulder Pods with Brace



Shoulder pod, Finder A

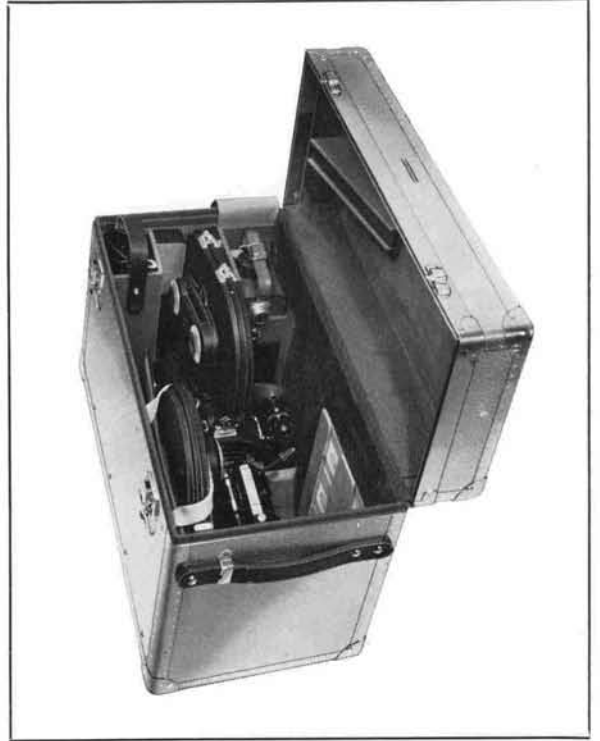
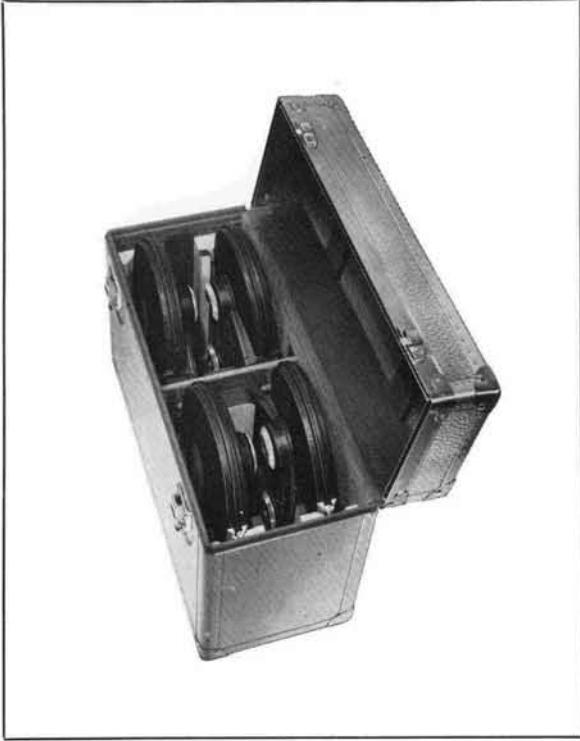


Shoulder pod, Finder B

The cantilever shoulder pod, is intended for the ARRIFLEX 16 BL with the standard finder. If the offset finder (finder B) is mounted, the other shoulder pod, is used. These shoulder pods are universally adjustable, the weight distribution is extremely favourable and very comfortable for the cameraman. An ARRI battery can be attached to the shoulder plate as an additional counterweight, in which case a short battery cable is available. The shoulder pod folds up into a very small space for transport.

## Carrying and Storage Cases

### Leather Carrying Case



### Carrying and Storage Cases

The illustration, top right, shows the aluminium-covered, tropic resistant carrying and storage case for the ARRIFLEX 16 BL, including lenses and mounted 400 ft quick-change magazine, matte box, battery charger, filters, cable and other small accessories.

Top left: Carrying and storage case for four 400 ft magazines for the ARRIFLEX 16 BL.



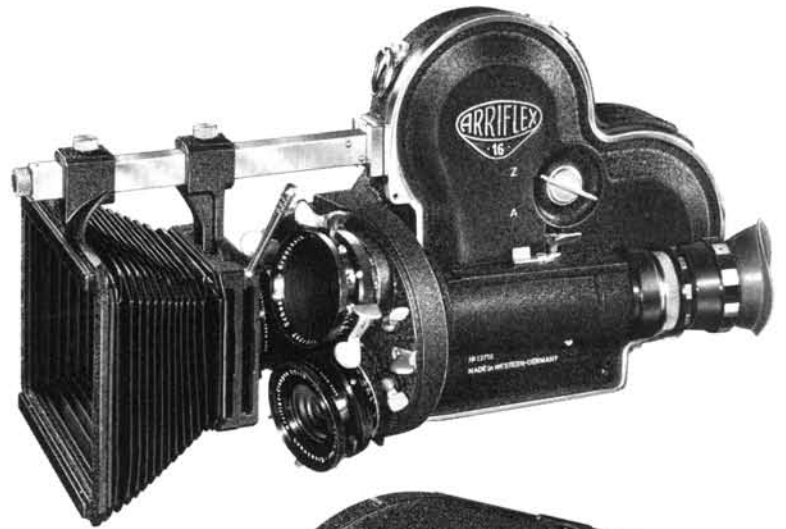
Leather Carrying Case for ARRIFLEX 16 BL and Accessories.

A very good looking, handy carrying case is to be found in the leather case shown above. The case is moulded around the main contours of the 16 BL, resulting in a very light, compact design.

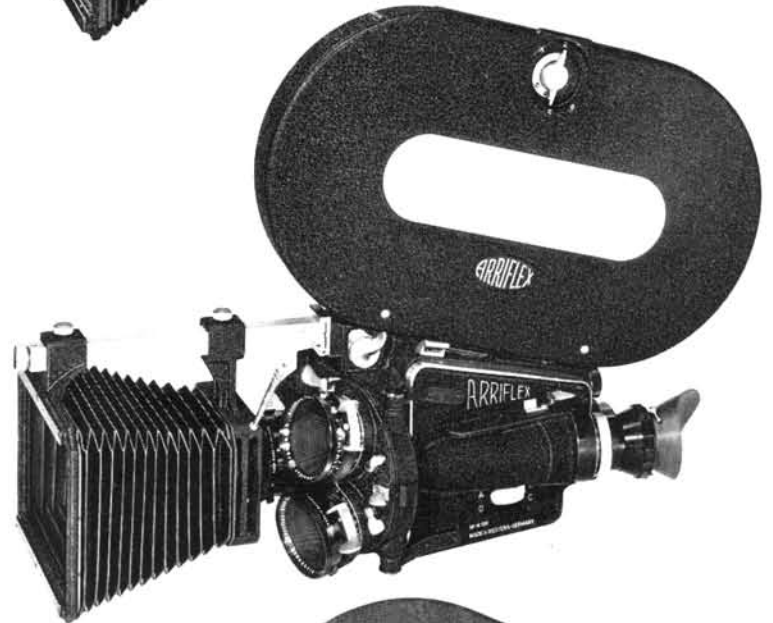


There's an ARRIFLEX for every requirement

**ARRIFLEX® 16 S/B**



**ARRIFLEX® 16 M/B**



**ARRIFLEX® 35  
Model 2 C/B Cameras**



### **ARRIFLEX 16 S/B**

No other camera comes close to the handling ease of the ultra-compact and lightweight ARRIFLEX 16 S/B. Ready-to-film camera weighs just over 8 lbs. with 100 ft. daylight spool, 3 lenses, motor and matte box! Hand-held or on tripod, in the studio or on location, its ruggedness, capability and versatility, as a thoroughly professional filming tool, has made the model 16 S/B world famous.

The ARRIFLEX 16 S/B is a unique combination of the most essential professional features: famed ARRI mirror-shutter reflex viewfinder; ultra-precise registration-pin film movement; three lens divergent turret; frames-per-second tachometer and many others, plus a complete system of accessories. Film capacity from 100' internal spools to 400' external magazines. Also available as model 16 S/B-GS with 60 cycle Pilotone generator and automatic clapstick.

### **ARRIFLEX 16 M/B**

One camera and the choice of three Quick-Change magazines, makes the 16 M/B ideal for the tough, long run jobs, the hand-held grab shots and anything in between. Standard equipment includes a 60 cycle signal generator and automatic clapstick for location sound filming. Its broad capabilities are practically unlimited.

The ARRIFLEX 16 M/B features three Quick-Change magazines (M-200', M-400' and M-1200'); and shares with the famed model 16 S: ARRI mirror-shutter brilliant reflex finder; ultra-precision registration-pin movement; three lens divergent turret; tachometer; frame-and-footage counter and a complete system of professional accessories.

### **ARRIFLEX 35 MODEL 2 C/B CAMERAS**

Compact, versatile and rugged, the ARRIFLEX 35 2 C/B series masters every filming assignment. From launch pad to science laboratory, on location or sound stage, ARRIFLEX 35 cameras are first choice of professionals wherever motion pictures are used to teach, document, influence, entertain or sell.

This advanced model 2 C/B series incorporates improved finder optics: larger field, interchangeable groundglass, and a divisible finder system along with Arriflex's famed mirror-shutter optical system, cardioid film movement and lightweight portability. A ready-to-shoot ARRIFLEX 35 2 C/B with three lenses, 400' magazine and hand-grip motor weighs only 13-1/2 lbs!

Professional filmmakers depend upon the ARRIFLEX 35 2 C/B cameras to deliver theatre-quality footage under any filming conditions—reliably and economically.