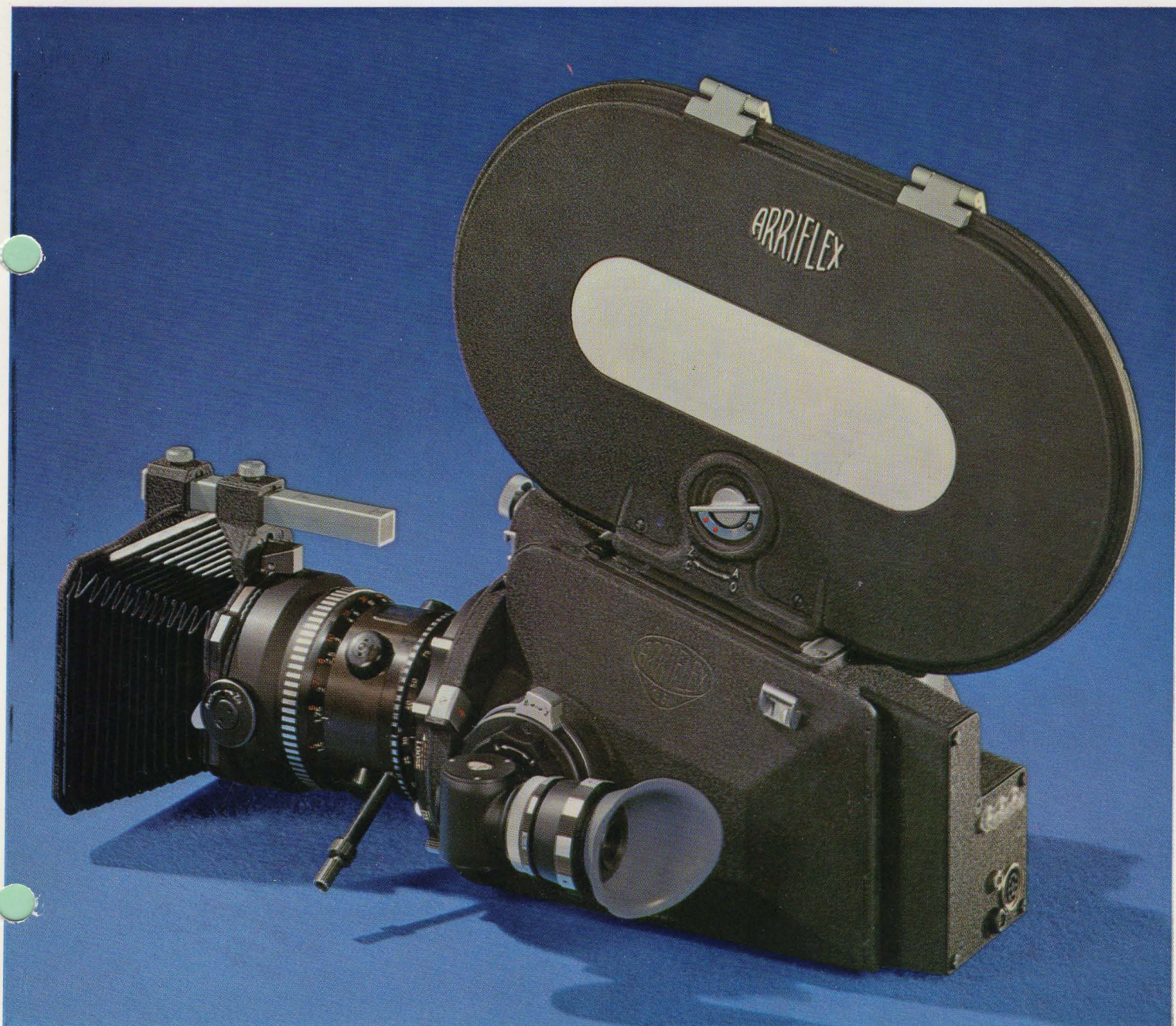




ARRIFLEX 16 BL
the Quiet
16 mm mirror-shutter professional
motion picture camera
for location synchronous
sound filming



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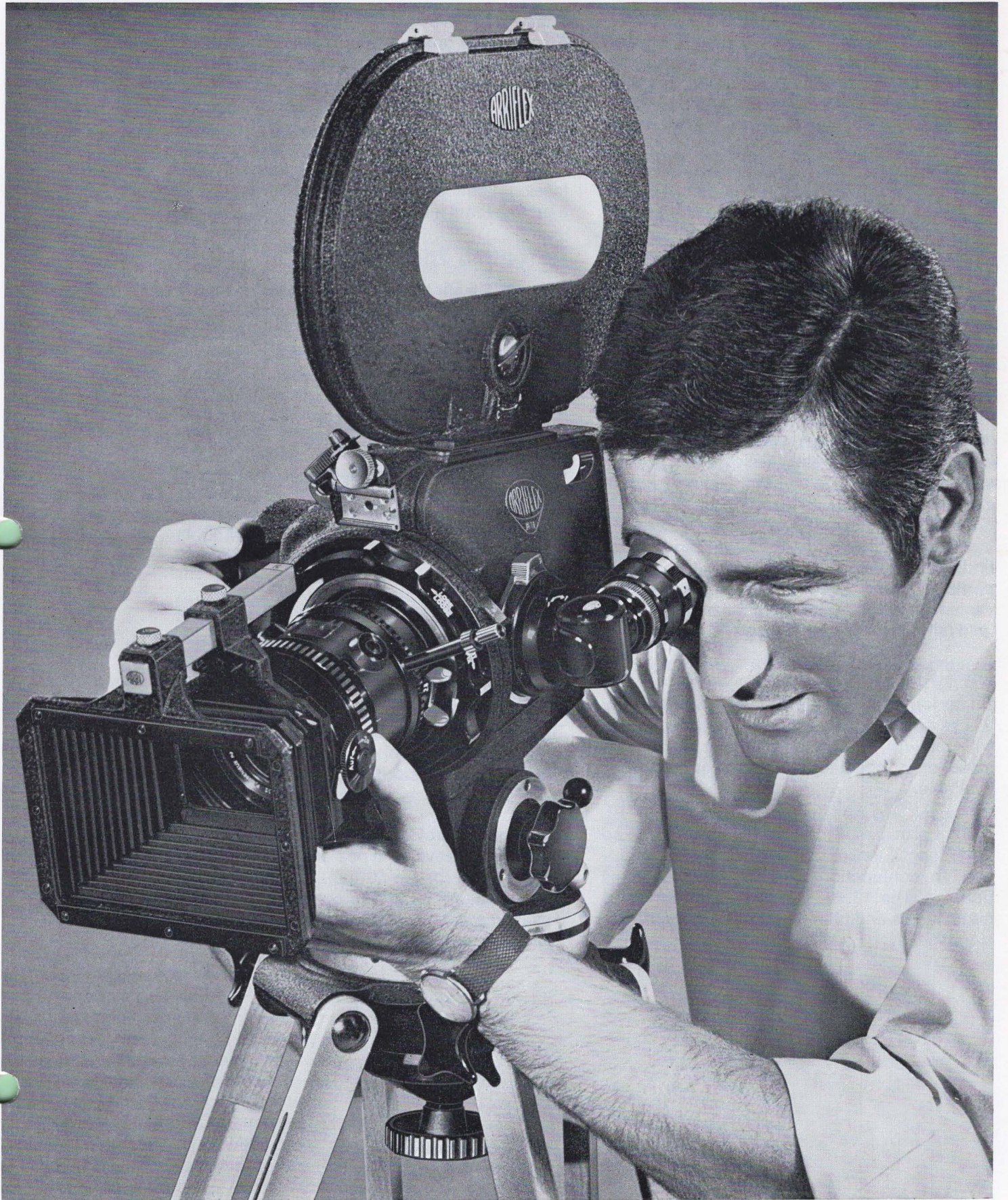
The Basic Design

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 pulldown 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 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 30 dB (Weighted A)



ARRIFLEX 16 BL - Basic Data In Brief:

QUIET CAMERA OPERATION

Residual noise level of the ARRIFLEX 16 BL measures <30 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 in 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 hand-held (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 16 BL 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 automatic start-marker, and a supplementary cuemarker 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 wide range of power supplies is available for the ARRIFLEX 16 BL. These include 12 volt ARRIFLEX Dryfit-PC batteries, with either 2.6 or 5.2 Ah capacity. These batteries are available with a special automatic charger. Also available 12 volt, 4 and 6 Ah nickel-cadmium batteries and special charger: special, slide-in nickel-cadmium batteries for precision tuning fork motor control, etc.

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 provide 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.

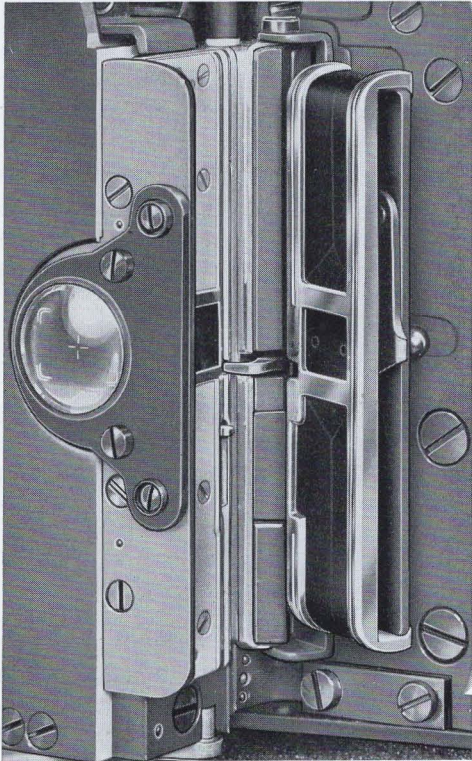
CAMERA WEIGHT

The complete ARRIFLEX 16 BL, with Angénieux 12–120 mm Varifocal lens and 400 ft. (120 meter) quick-change magazine 7.5 kg (16 lbs. 5 oz.)

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

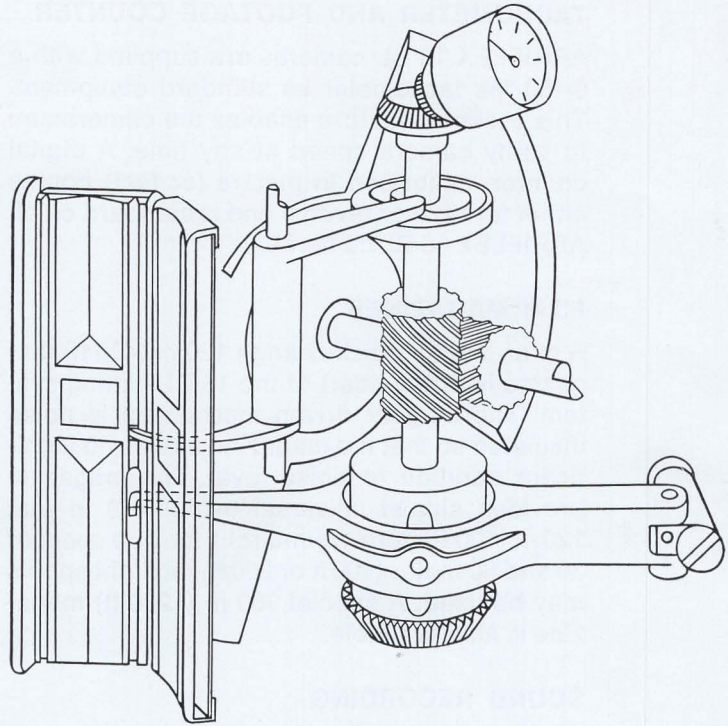


The Film Channel Film Gate Open

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 pulldown 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.



Principle of the ARRI Film Drive Mechanism

In the ARRIFLEX 16 BL, the high precision of the film pulldown 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 16BL 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

The rotating mirror-shutter in the ARRIFLEX 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° to the lens axis. 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.

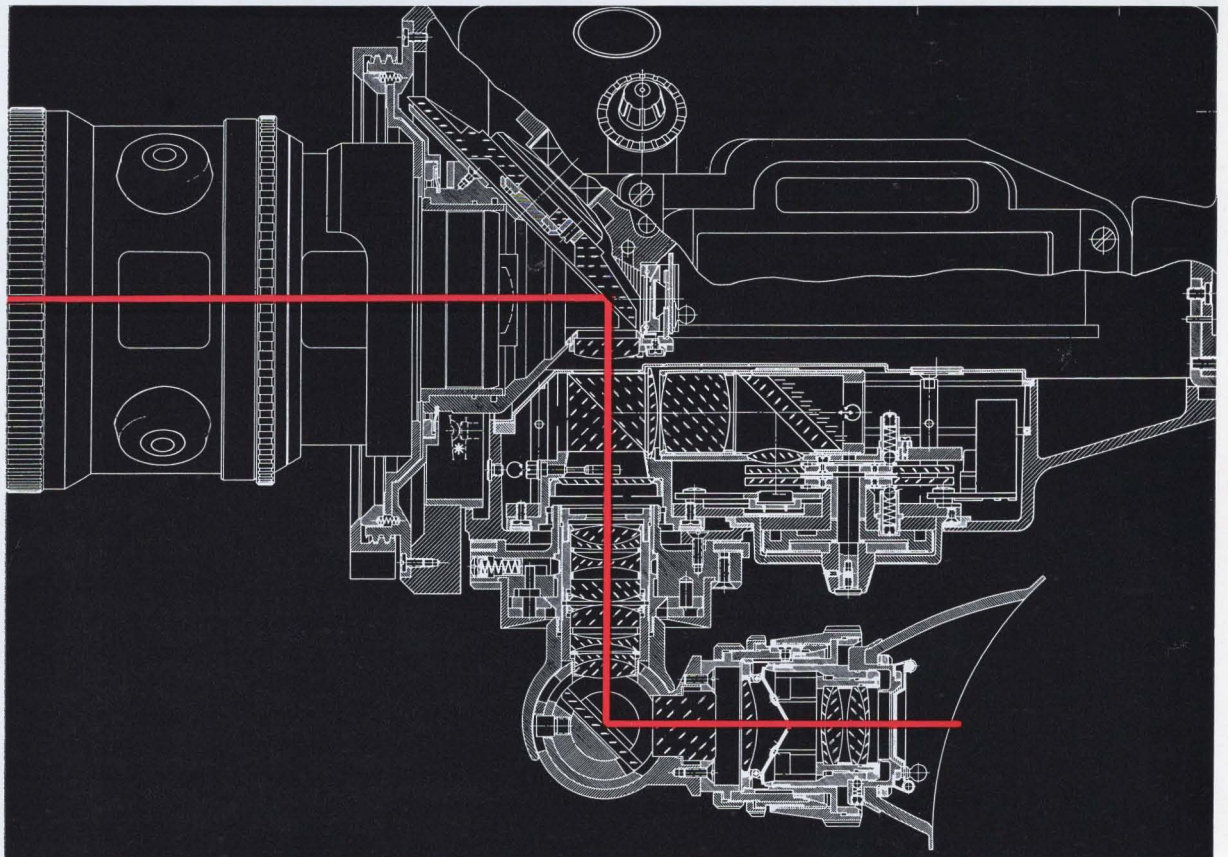
The ground glass itself can be be interchanged by the cameraman without special tools. Individual ground glass assemblies are available to show normal camera aperture, television safe action projector aperture etc.

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° positions. A portion of the finder may also be pivoted approx. 15° 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.

The Mirror-Reflex System of the ARRIFLEX 16 BL with built-in Exposure Control System



ARRIFLEX Professional Exposure Control System

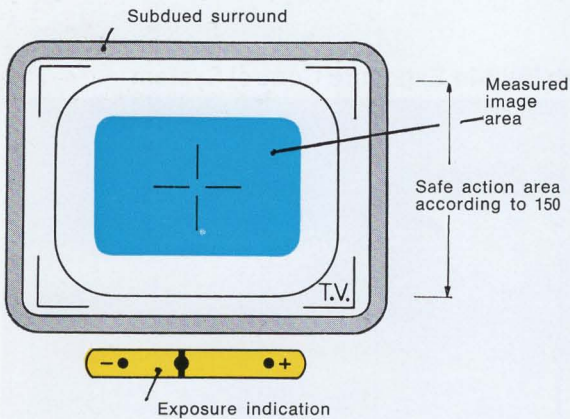
The Exposure Control System measures light behind the lens, in a central circular area equal to 50% of the 16 mm aperture. All factors which influence exposure are automatically taken into account, such as light transmission of the lens, F-stop, lens extension, lens field angle, filters, etc.

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 film speeds 16-500 ASA/13-28 DIN and camera speeds of 24-50 fps. The Exposure Control System is energized from the camera battery 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. from 50501 to 50700, consult Arnold & Richter or authorized ARRIFLEX agents.

Ground glass image and exposure indication as seen in viewfinder

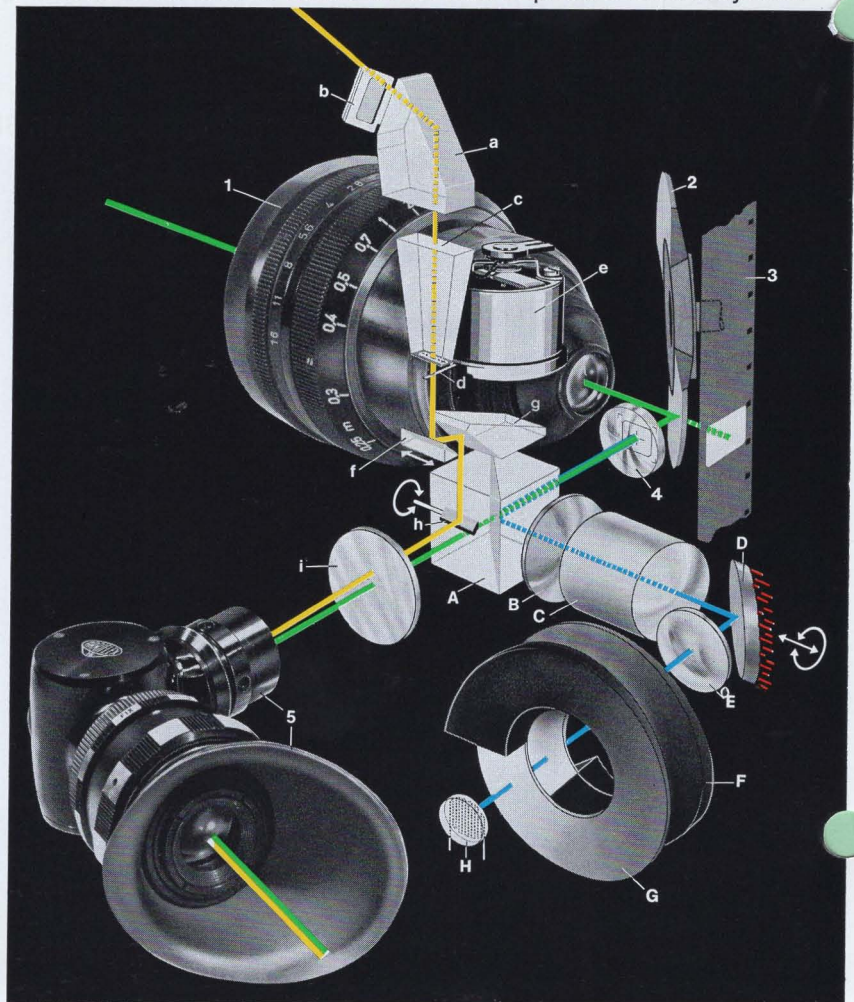


- = Indication of correct film exposure
- + Overexposure by about one stop
- ● Underexposure by about one stop

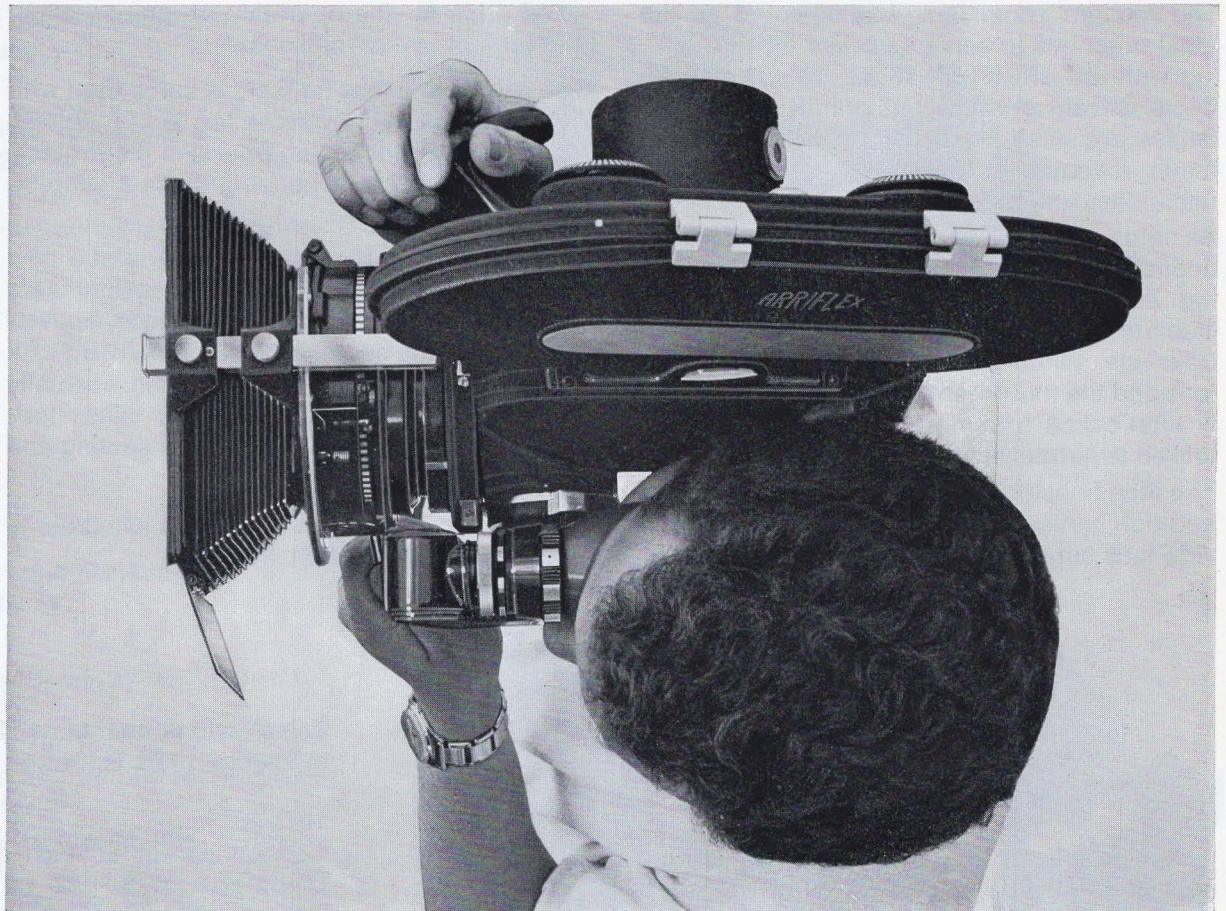
Symbols in the functional schematic:

- 1-5 Taking and viewfinder light path —
- A-H Measuring light path —
- a-i Light path for projection of meter reading —
- Separated infrared "IR" —

Functional schematic of the 16 BL CdS exposure control system



Handheld Filming with the ARRIFLEX 16 BL

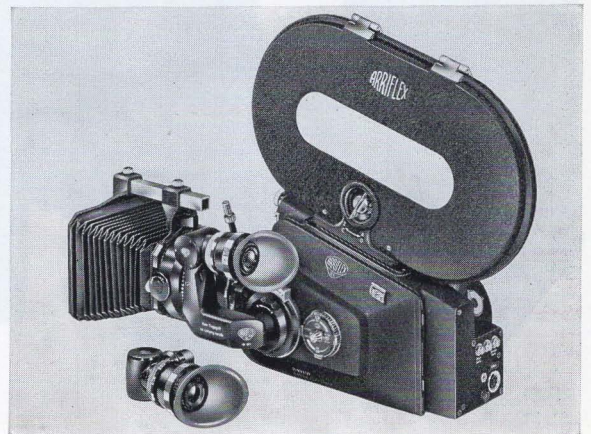


The ARRIFLEX 16 BL serves with equal facility the needs of classic tripod supported camera methods, and modern, mobile, handheld techniques.

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.

Camera with standard viewfinder, offset viewfinder and operating controls for data input in the exposure control system.



Zoom Lenses, Matte Box and Filters

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.

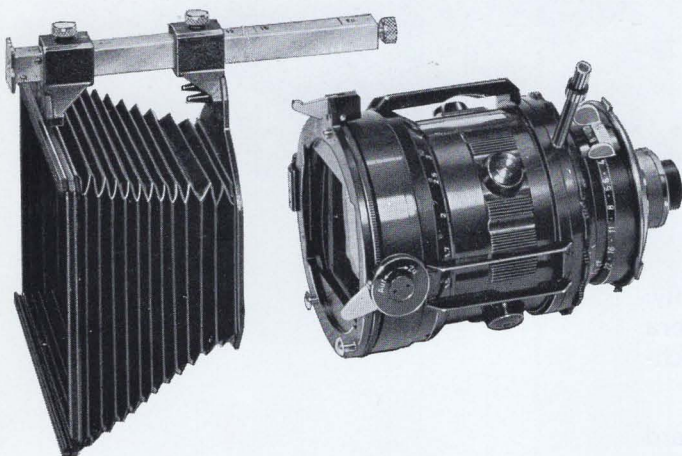
The lens housing limits noise radiation, and in addition serves to protect the lens and to provide lens support. The housing provides over-

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 3" x 3" (75 x 75 mm) filters, or for a plane-parallel clear glass. The front of the lens housing takes a snap-on adjustable matte box.

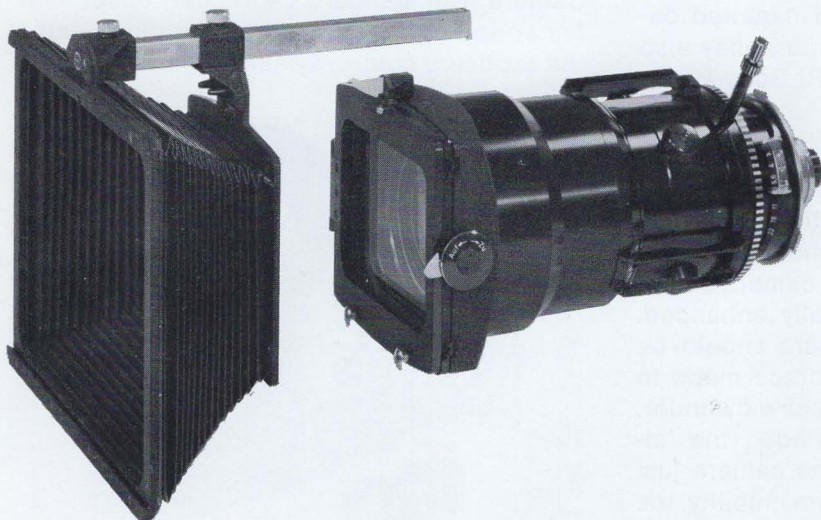
The lens proper is seated by means of a new Bayonet Lock Lens Mount. This is a significant improvement in mounts for all larger heavier lenses, and has been adopted for all ARRIFLEX cameras. The mount is made from specially fabricated wear-resistant steel. The lock mechanism provides superior lens seating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

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



Zeiss Vario Sonnar Lens 10x10, 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 accessory: matte box

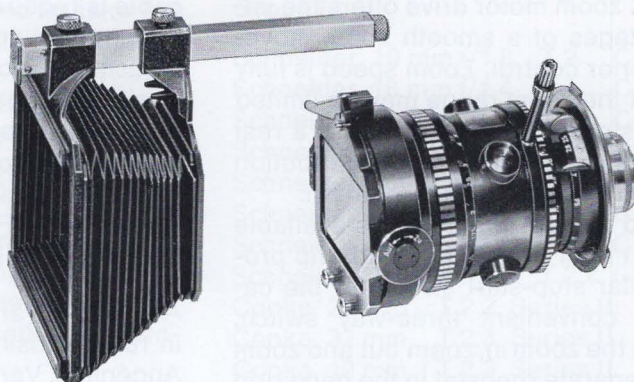


Schneider Variogon Lens 10 x 10, f/2 in Special 16 BL Housing

10 to 100 mm
Horizontal angular field from 55° to 6°
Diaphragm f/2—f/22
Range settings 30" (0.75 mm) to ∞
with filter holder and square protecting glass,
4" x 4" suitable for:
Square 100 mm x 100 mm ARRI glass filters
Square 4" x 4" Kodak Wratten filters
Round ARRI 110 mm polarizing filters
Essential accessory: matte box

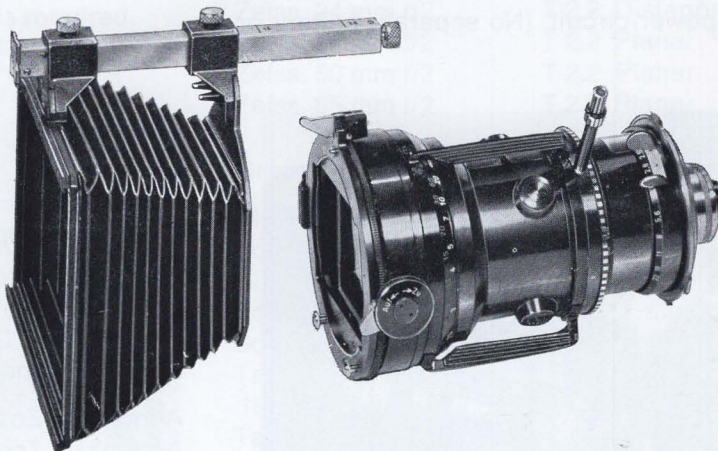
**Angénieux Varifocal Lens 6x12.5, f/2.2
in Special 16 BL Housing**

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,
3¼" suitable for
Filter Series IX
Essential accessory matte box



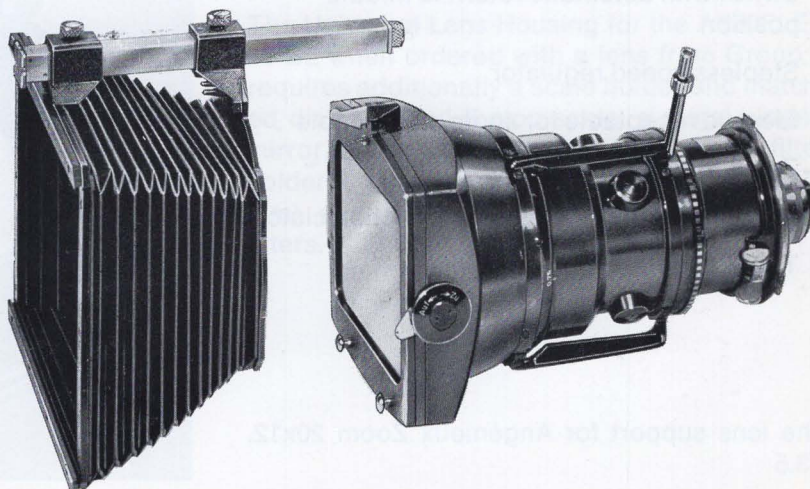
**Angénieux Varifocal Lens 10x12, f/2.2
in Special 16 BL Housing**

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
ARRI fading system with polarizing filters
Supplementary lens No. 1 Focusing range
33" – 61" (0.85 – 1.55 m)
Supplementary lens No. 2, Focusing range
25 – 34" (0.65 – 0.87 m)
Essential accessory matte box



**Angénieux Varifocal Lens 10x9.5 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" (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 accessory matte box



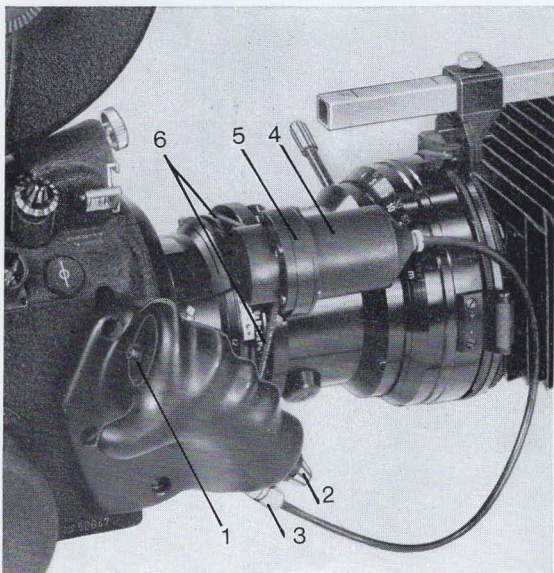
Motor-Driven Zoom Control

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 10 x 10 lens
in 16 BL housing



- 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

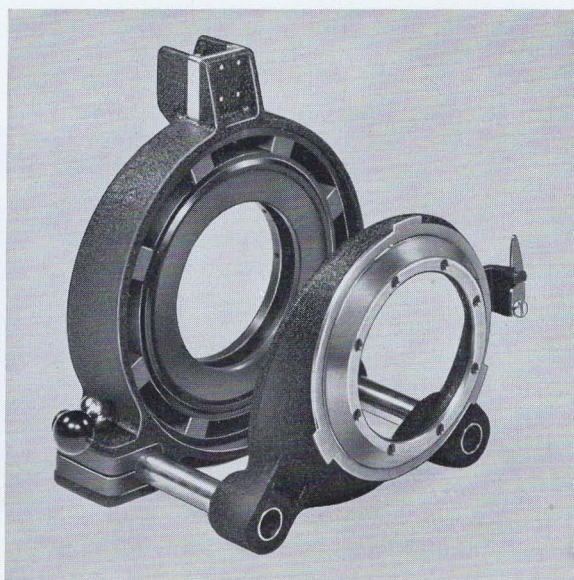
The lens support for Angénieux Zoom 20x12, f/3.5

16 BL Lens Supports

Easily mounted lens supports are available for the following unblimped zoom lenses.

The ARRI 16 S/M universal matte box can be attached to the front of these supports.

Angénieux Zoom	f/2,2	12	–	120 mm
Angénieux Zoom	f/3,5	12	–	240 mm
Angénieux Zoom	f/3,2	25	–	250 mm
Zeiss Vario-Sonnar	f/2,8	10	–	100 mm
Zeiss Vario-Sonnar	f/2	12,5	–	75 mm
Schneider Variogon	f/2	10	–	100 mm
Schneider Variogon	f/4	80	–	240 mm

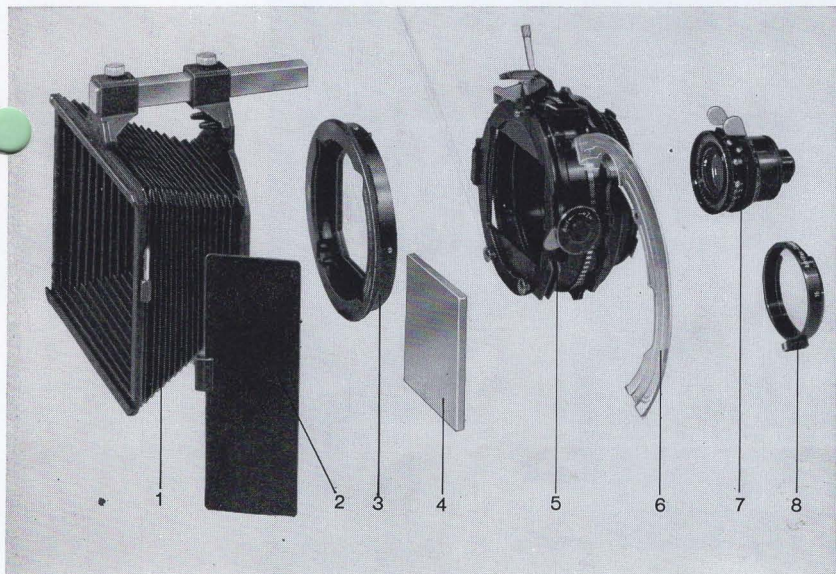


16 BL Universal Lens Housing

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

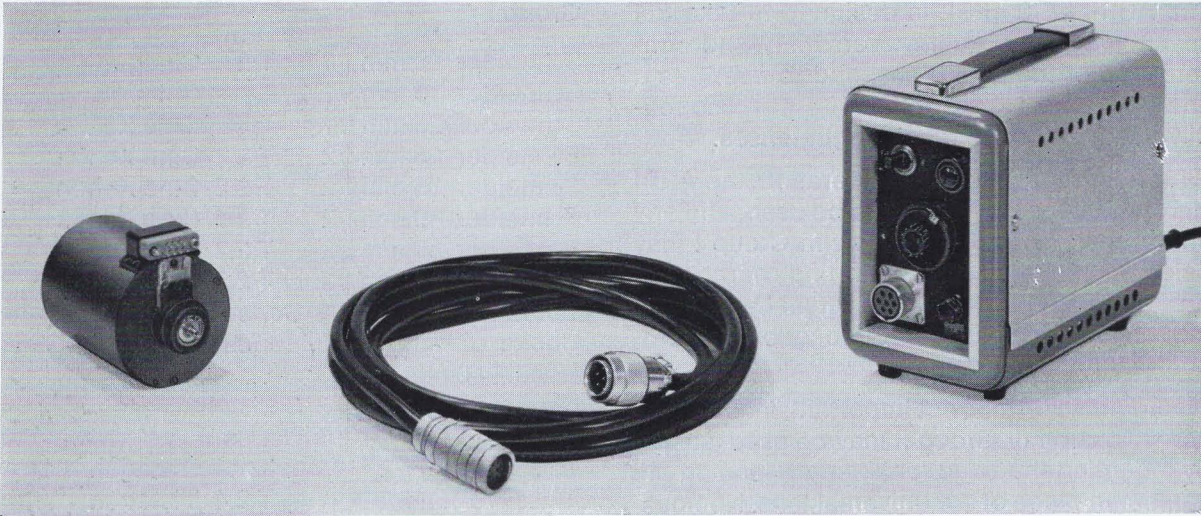
Schneider	10 mm f/1.8	T 2	Cinegon
Schneider	16 mm f/1.4		Cinegon
Schneider	25 mm f/1.4		Cine Xenon
Schneider	28 mm f/2	T 2.2	Cine Xenon
Schneider	35 mm f/2	T 2.2	Cine Xenon
Schneider	40 mm f/2	T 2.2	Cine Xenon
Schneider	50 mm f/2	T 2.2	Cine Xenon
Schneider	75 mm f/2	T 2.2	Cine Xenon
Cooke	25 mm	T 2.2	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 I
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 2.2	Distagon
Zeiss	32 mm f/2	T 2.2	Planar
Zeiss	50 mm f/2	T 2.2	Planar
Zeiss	85 mm f/2	T 2.2	Planar

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	T 2.2	Cinegon
Schneider	100 mm f/2	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 Deep Field 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 I, 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 DC Universal Motor (not illustrated)

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 DC 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 $\pm 1.5\%$. (Note: this same motor may also be used with the ARRIFLEX precision crystal control listed below.)

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.

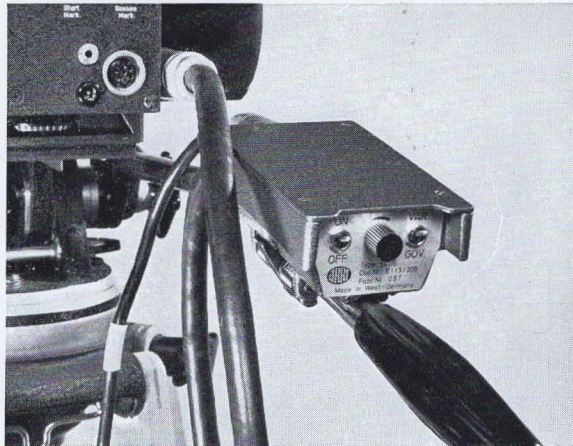
ARRIFLEX Precision Crystal Control

For details, see page 21

Synchronous Motors

As part of its complete accessory system two different synchronous motors are available for the ARRIFLEX 16 BL. Whenever there is access to power lines, when films are being made under studio conditions, or when it is desired to run the ARRIFLEX 16 BL in synchronization with professional, perforated film recorders, these motors make excellent choices.

Synchronous motor 42 V camera cable and power supply unit



Manual control attachment

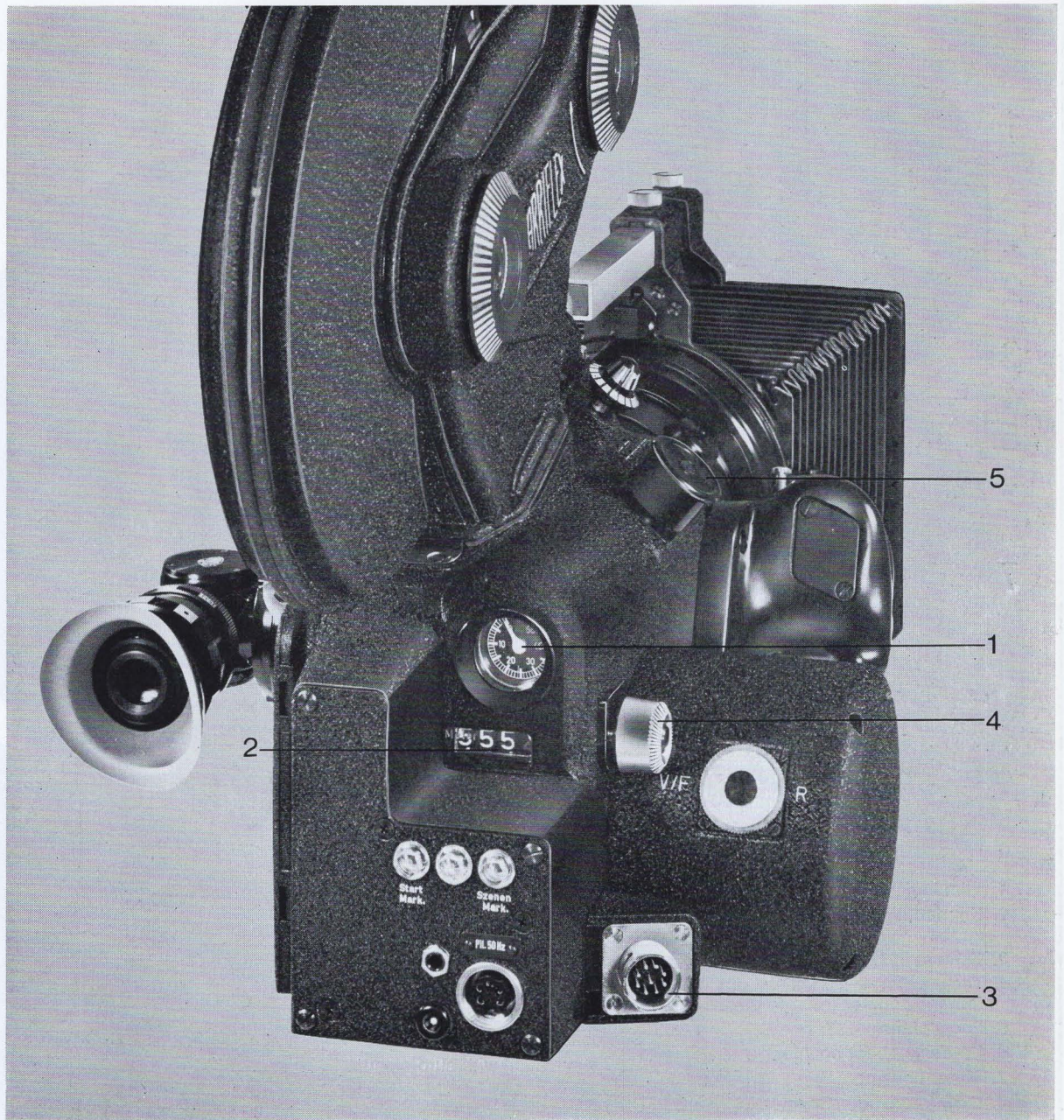
42 V Synchronous Motor

This motor with matching power supply unit, is available in models for 50 cycle and 60 cycle power lines. Each type includes an input selector for use on power lines with voltages from 110 to 240 (See illustration). The power supply unit serves to step line voltage down to 42 volts, and to supply the DC power needed for the 16 BL automatic start marking system, and the CdS exposure control system.

117 V Synchronous Motor (not illustrated)

This motor is designed to operate directly from 117 volt power lines. Models are available for operation from either 50 cycle or 60 cycle power lines. A small module is included to supply DC output for the automatic start marking system, and the CdS exposure control system.

Tachometer and Footage Counter

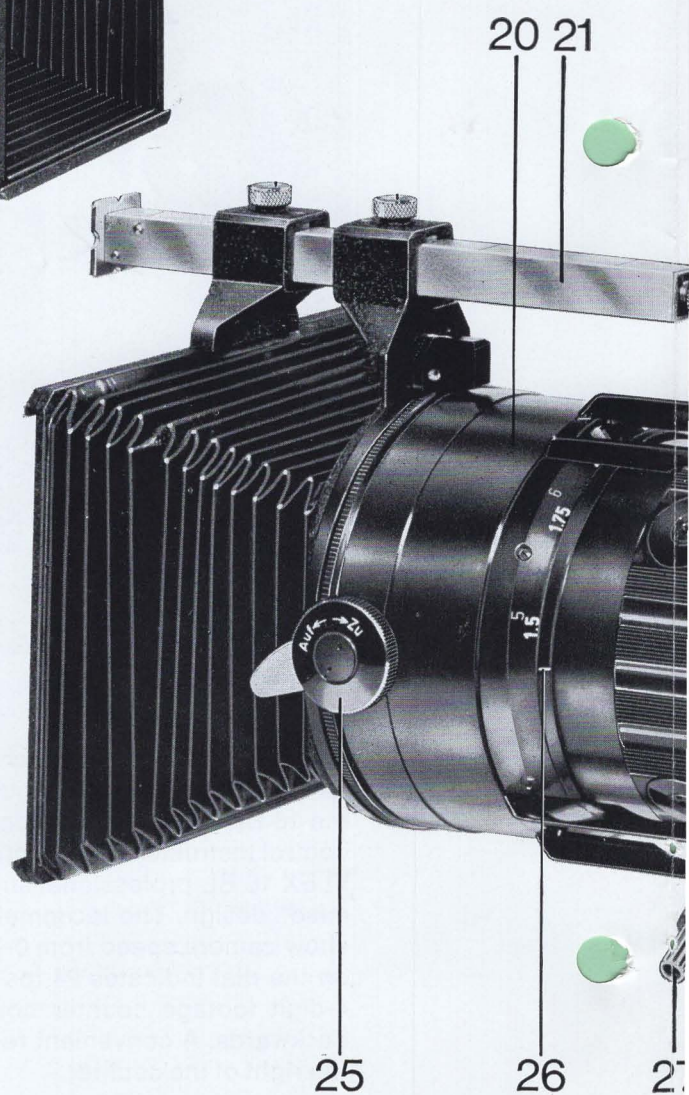
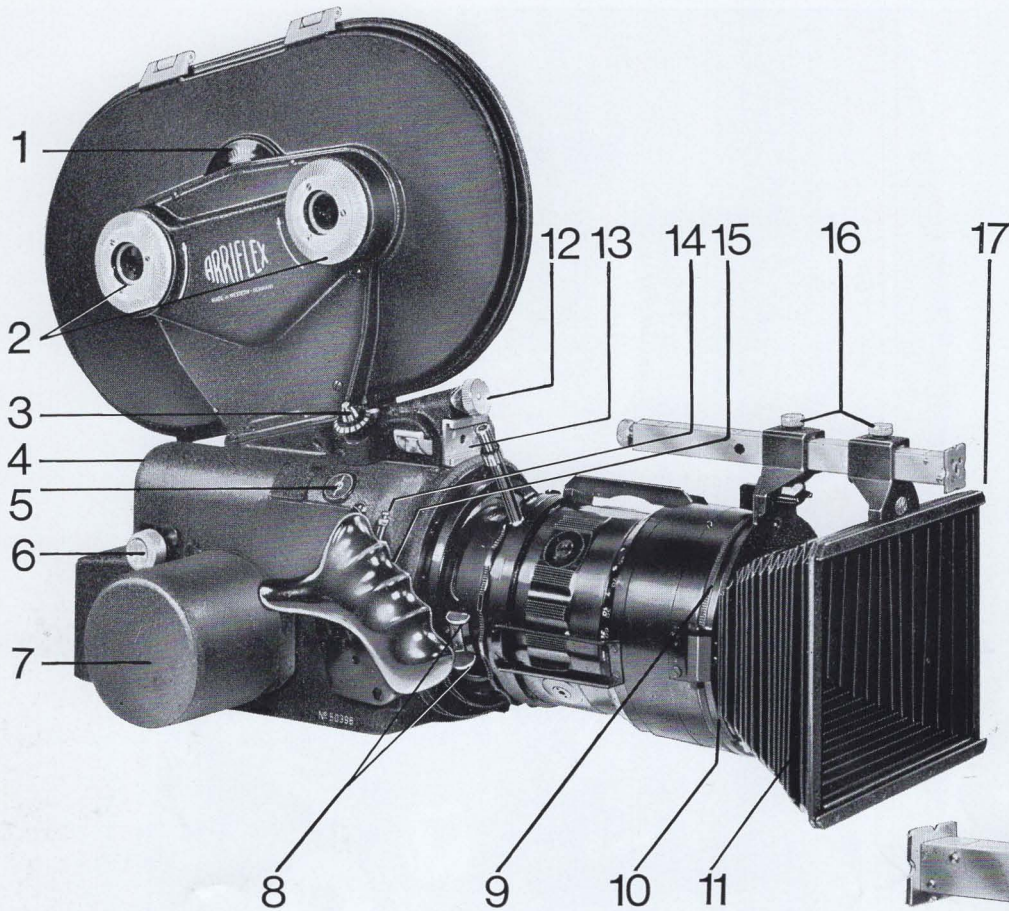


A “frames-per-second” tachometer and a digital footage counter are housed in the back of the 16 BL camera. Inclusion of these essential control instruments are representative of ARRIFLEX 16 BL professionalism and “no-compromise” design. The tachometer is calibrated to show camera speed from 0–50 fps.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

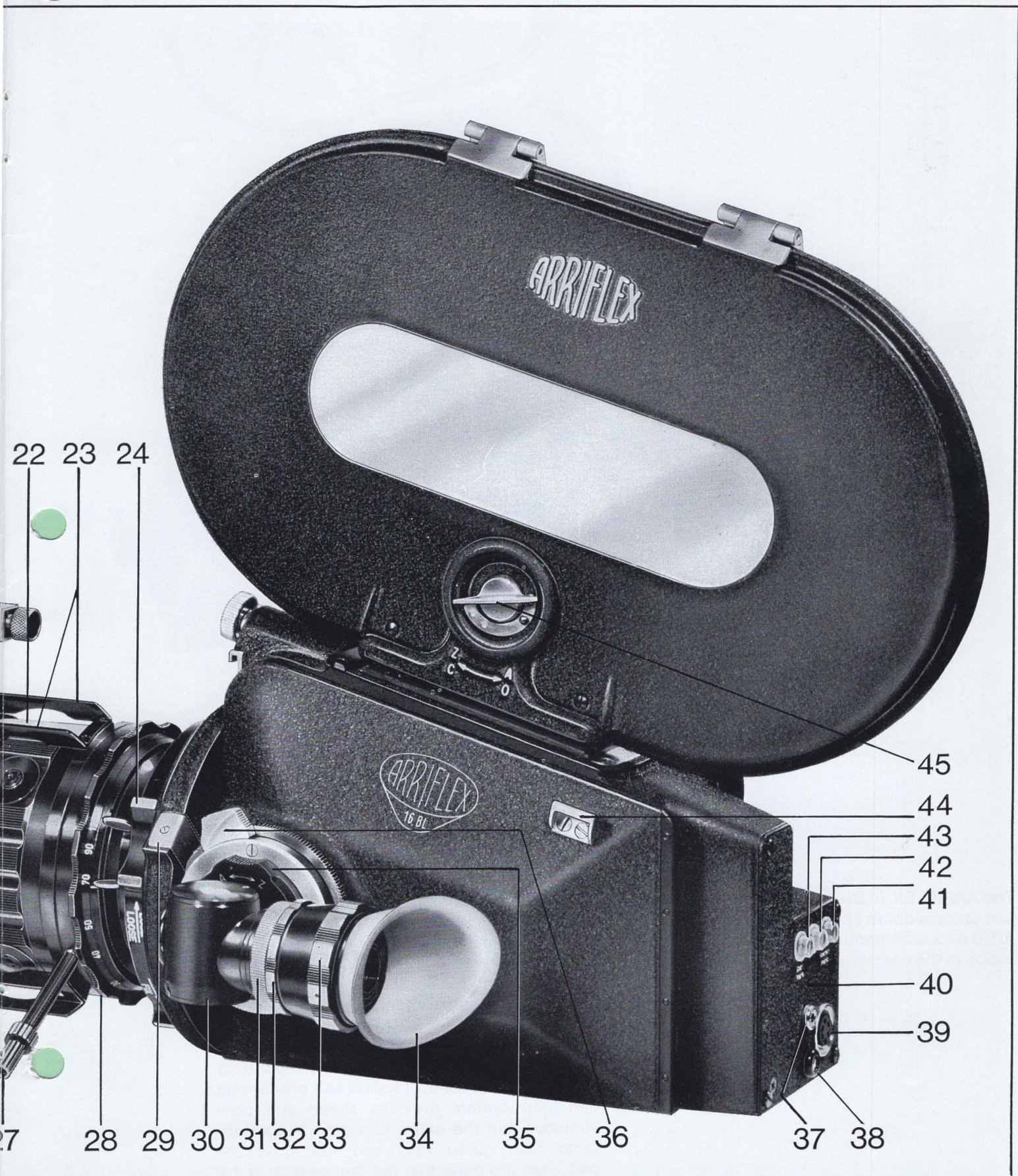
Rear View of the ARRIFLEX 16 BL

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

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. 10 x 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 and pilot light |
| | 43. Indicator light for start-marker |
| | 44. Eyelet for neck strap |
| | 45. Magazine cover lock |



22 23 24

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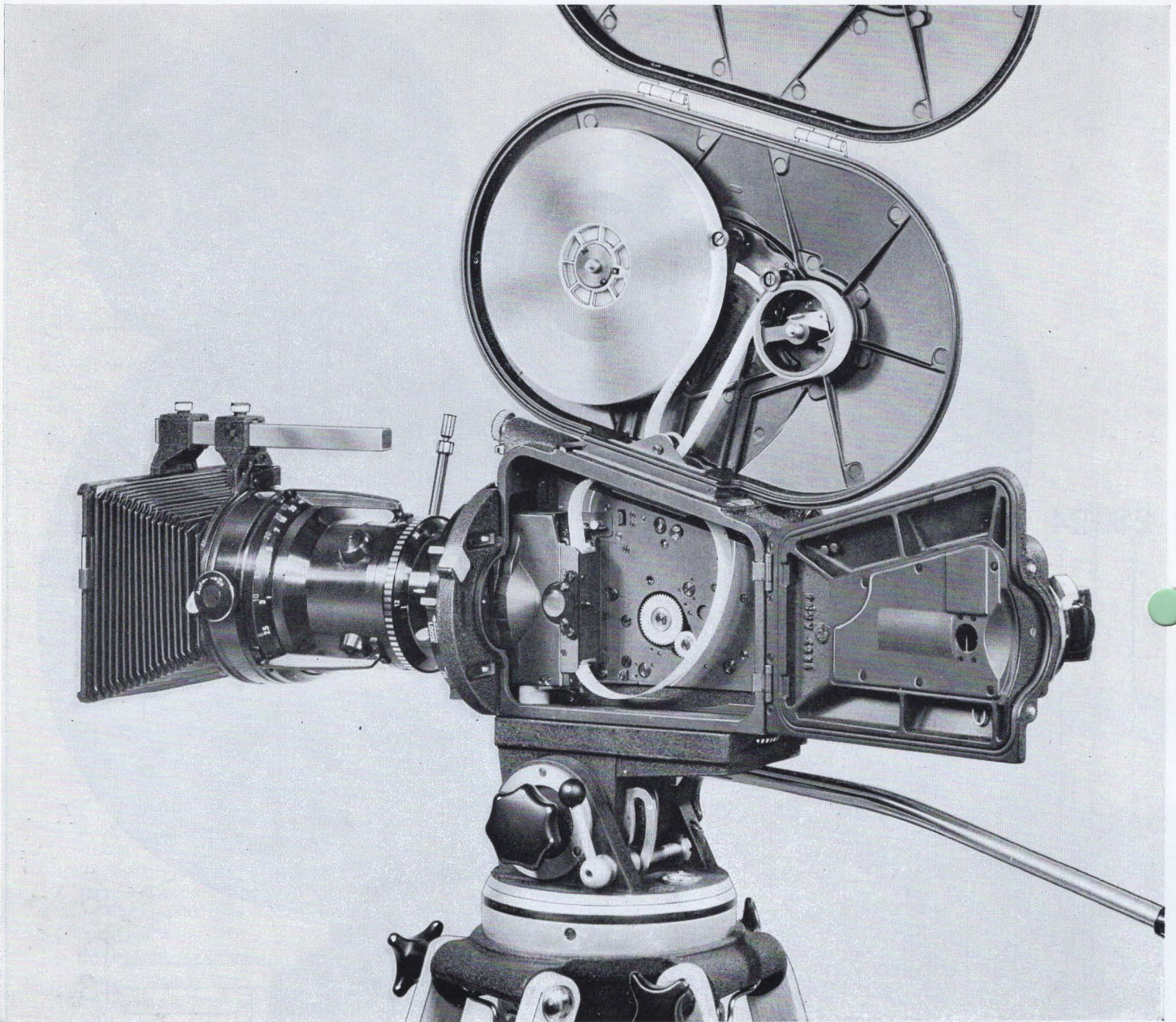
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The 16 BL 400 ft (120 m) Quick-Change Magazine



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.)

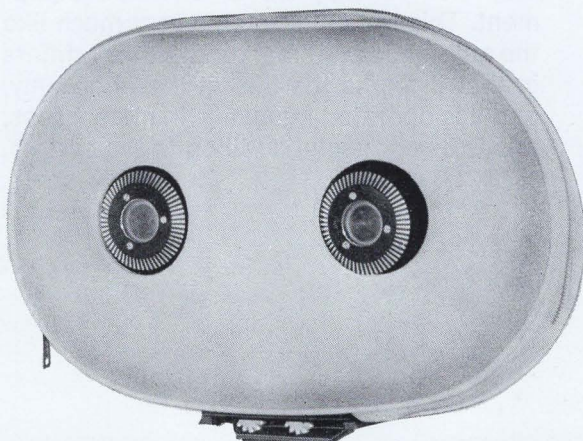
The 400 ft quick-change magazine for the 16 BL is the result of 50 years of experience with the design and manufacture of cameras and film handling systems. The 400 ft magazine is gear driven and features internal film sprockets. It is of the single compartment displacement type, much like the one for 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, is 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. Indicator scales may be calibrated in feet or meters, according to order.



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

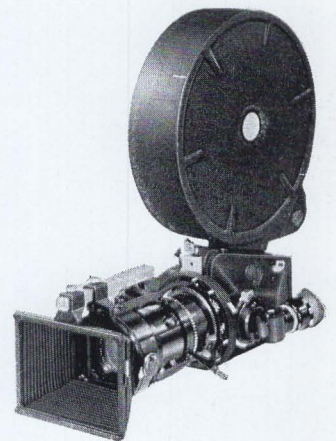
The Slip-on Magazine Cover

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. An additional cue marker or scene marker may also be 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.

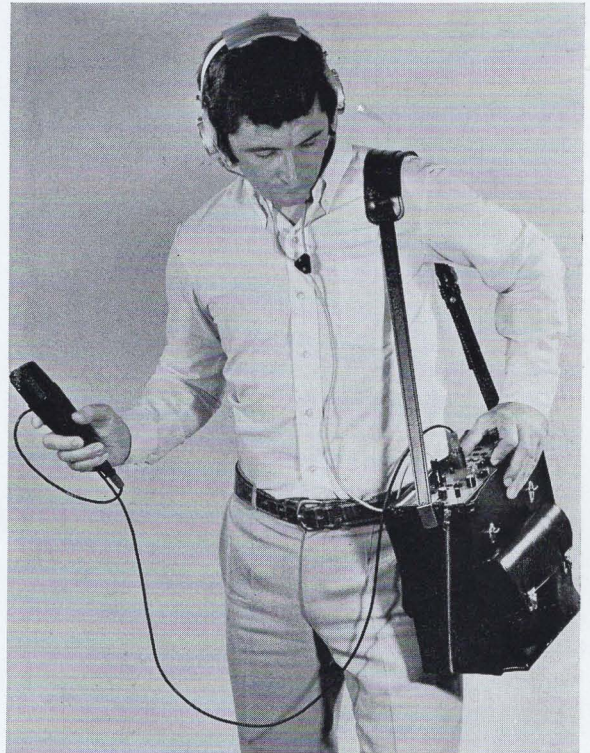
The control system consists of two main sections

- 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)

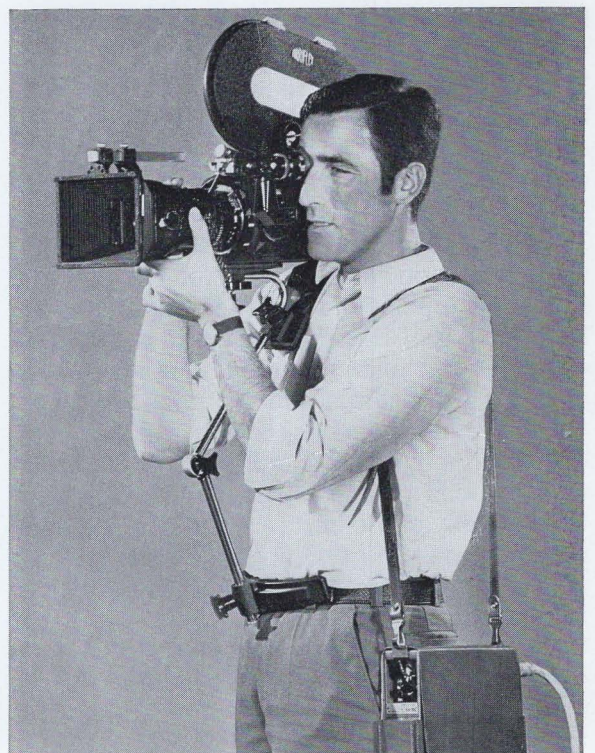
I. The Precision Crystal Control

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 ARRIVOX-TANDBERG 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.

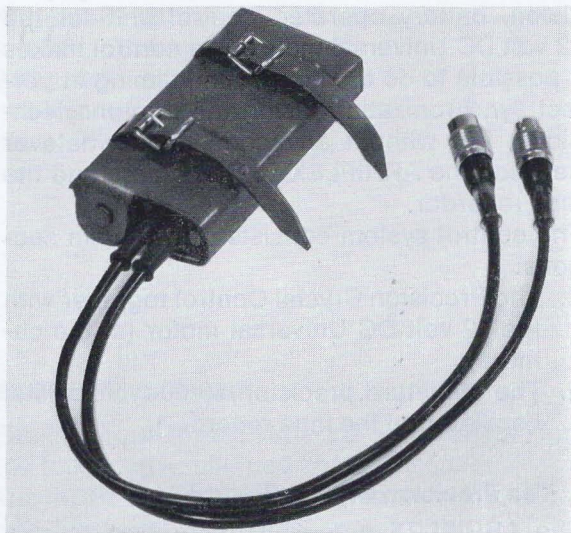
The high-order accuracy and the versatility of the ARRIFLEX Precision Motor Control system are such that several cameras may be operated in synchronization with a single sound recorder The system may also be used to play back a pre-recorded sound track and to keep one or more ARRIFLEX cameras filming 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 (or Tuning Fork) 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. Please indicate on order for which tape recorder the oscillator is to be used

Control unit with battery slide-in units 6 Ah and 4 Ah NC and power cable for mains synchronized operation of camera with simultaneous re-charging of the built-in batteries

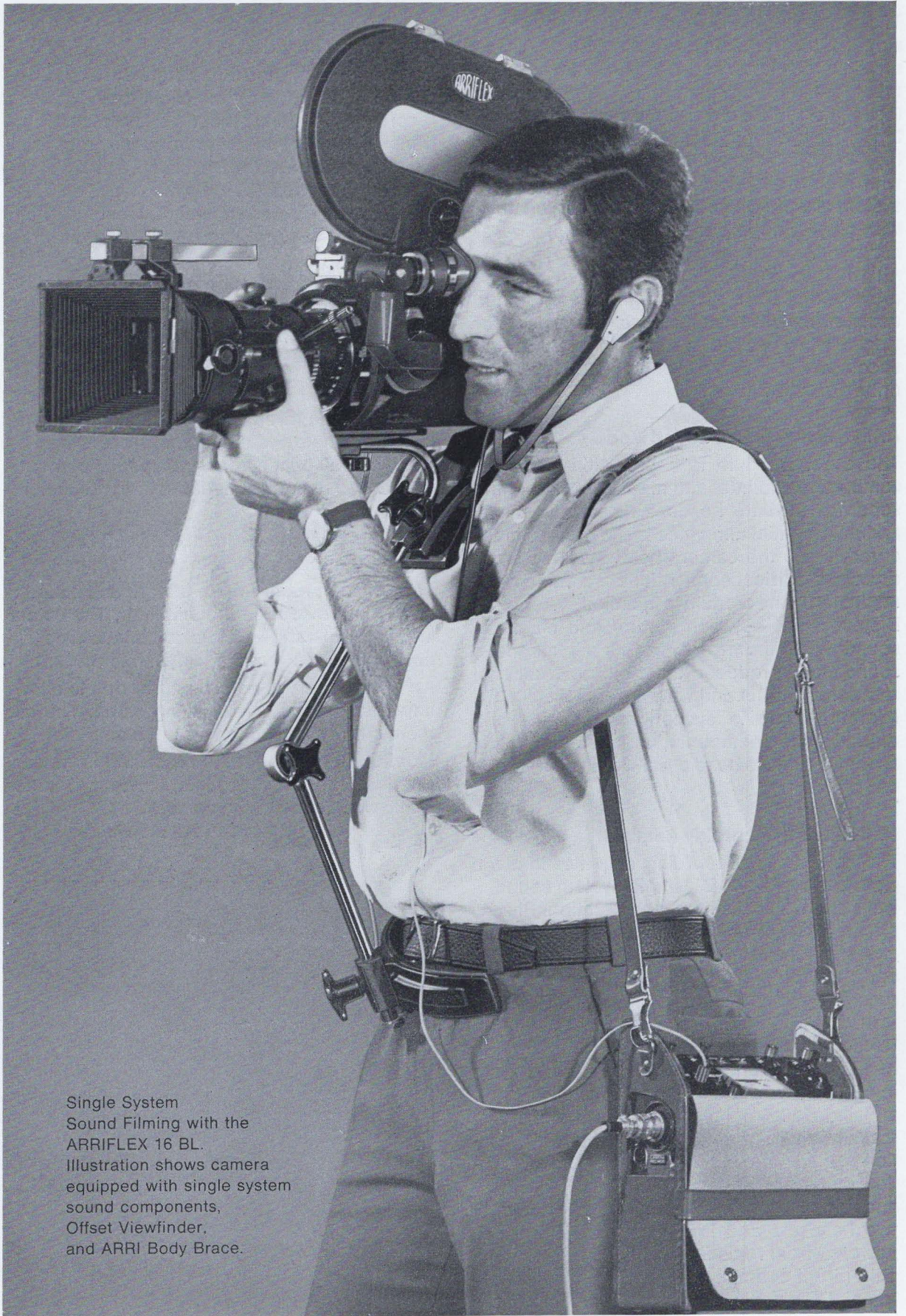
The ARRIFLEX 16 BL is suited perfectly to the Pilotone system, but it is by no means limited to one technique. The 16 BL is readily used in traditional double-system sound set-ups. Whenever filming is done under studio-like conditions and/or a synchronously driven film recorder is used for the audio, 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 16BL 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 headset 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.

Flat-bed Amplifier

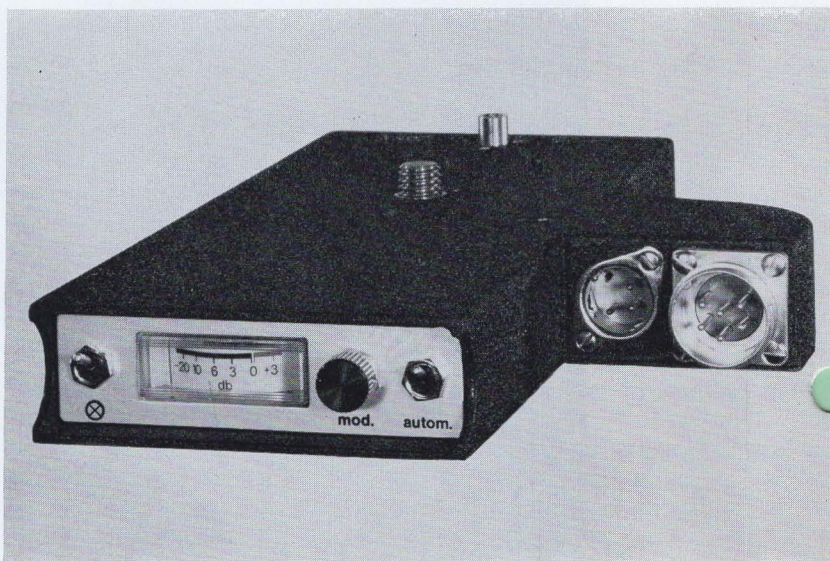
The new ARRI flat-bed amplifier can be used instead of the three-channel amplifier for one-channel single-system sound recording. Its small overall dimensions and special contours enable it to be accommodated integrally on the camera.

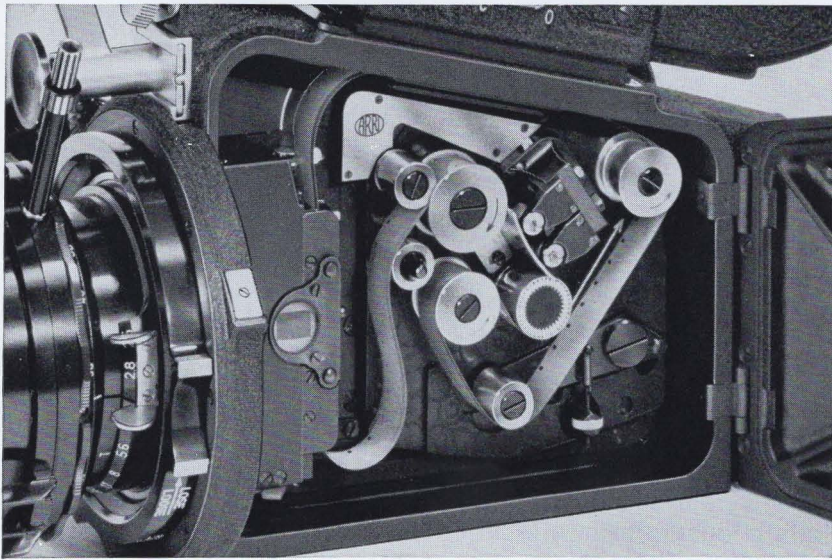
The amplifier has one input for a 200 Ohm dynamic microphone, rewirable for 50 Ohms.

For one-man recording of picture and sound a limiter is provided in the amplifier. The extensive control range allows for unattended recording of sound with high dynamic content.

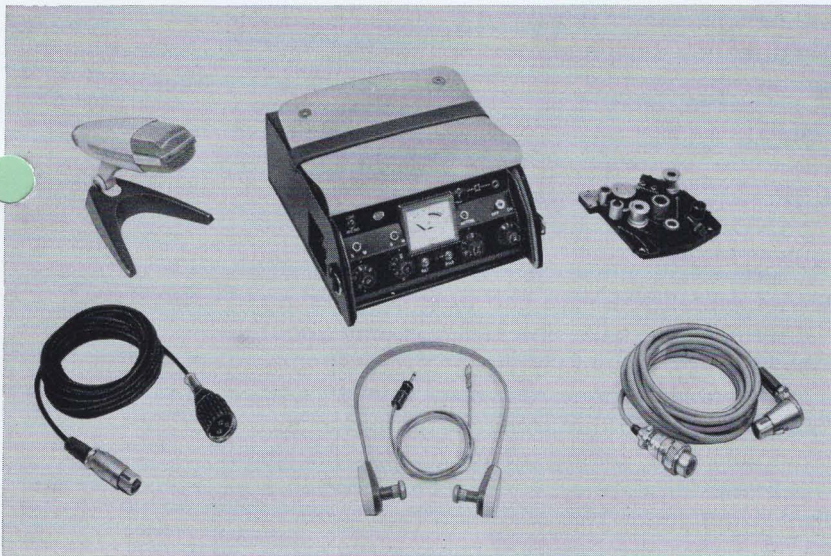
An extra battery is not necessary due to a low-impedance voltage stabilizing stage. The camera battery is used to power the amplifier.

Monitoring control of the recording is via earphones. The direct/tape switch-over is automatic when starting the camera.





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



Complete equipment for single-system sound



Camera/amplifier connection
(including microphone and earphones)

Power Supplies

The ARRIFLEX 16 BL system includes a variety of power supplies. There is a type to suit every need and preference. Listed below are modern lead acid and nickel cadmium types in a variety of sizes, configurations and capacities. Matching battery chargers are available for each type.

The ARRI lead acid batteries are the latest Dryfit PC type. The electrolyte in these batteries is a gelatinized mixture and each cell is hermetically sealed. Leakage, gassing, adding of distilled water and other similar maintenance problems associated with older batteries, are virtually eliminated with Dryfit PC. Shelf life is approximately two years if periodically recharged. Dryfit PC batteries have a service life of approx. 180 full charge/discharge cycles.

Dryfit batteries are attractive because of their low initial cost, and because they are used with a completely automatic charger system.

ARRI nickel cadmium batteries are also hermetically sealed, and require practically no maintenance other than charging. These batteries are distinguished by a long service life. Nickel cadmium batteries may be stored charged or discharged without deterioration. Self-discharge is extremely low. For the semi-automatic charging of all ARRI NC batteries, a low-cost charger is available.

THE BATTERIES

A. Dryfit PC Batteries

Type D 12/2.6 S

12 V, 2.6 Ah. Weight including leather carrying case and strap only about 2 lb 13 oz (1.3 kg). This battery can also be attached to the ARRI shoulder pod

Type D 12/2.6

12 V 2.6 Ah. Including leather carrying case and strap, this battery weighs 3 lb 10 oz (1.63 kg)

Type D 12/5.2

12 V, 5.2 Ah. Its weight including leather carrying case and strap is 6 lb 6 oz (2.9 kg)

ARRI Dryfit batteries have a high capacity even under extreme conditions, since the internal resistance and self-discharge are very low. At temperatures of -20°C (-4°F) 65% of the rated capacity is still available. Apart from normal recharging, which can be done in any position, ARRI Dryfit batteries need no maintenance whatever

Since the water reserve of the electrolyte is

naturally limited, the service life and the possible number of charging cycles of the battery depend largely on the use of a suitable charger which automatically switches off the charging current or cuts it down to a charge-preserving current in order to avoid gas generation. For this purpose, Arnold & Richter had the special charger described below developed

The ARRI Special Charger DL 2 x 4 for ARRI Dryfit Batteries

automatically charges the battery with the prescribed charging current up to the correct voltage. The appropriate charging current and voltage values are automatically controlled and conducted to individual cells via 12-pole cables and connectors. The ARRI Special Charger for ARRI Dryfit batteries has a selector for line voltages of 110 to 250 V, 50/60 cps AC. It is of handy design and tropic resistant, and can also be used for charging Dryfit batteries for other ARRIFLEX cameras.

B. Nickel Cadmium Batteries

Type NC 12/4

Type NC 12/6

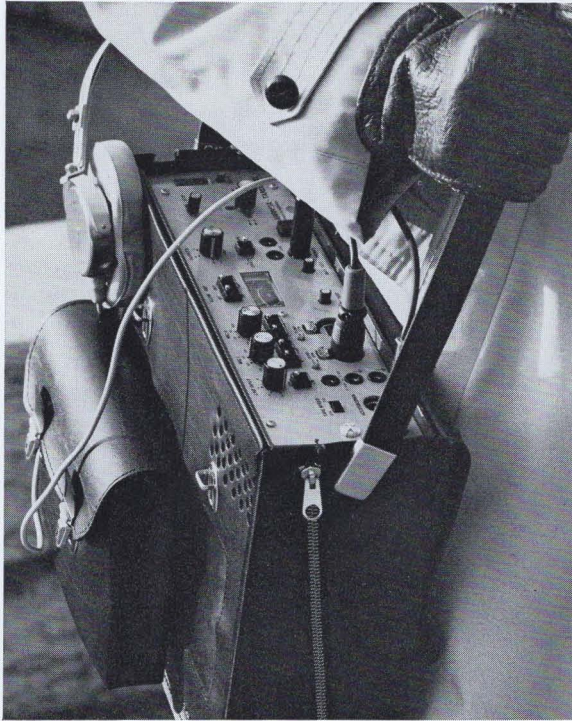
12 V 4 Ah (12 V 6 Ah) The weight, including leather carrying case and strap, is only about 6 lbs (2.75 kg). When fully charged, the capacity is sufficient for approx. 4000 ft./1200 m (6665 ft./2000 m) film run-through. The batteries are distinguished by a long service life, insensitive to full discharge, and they can be stored in a discharged state. The reference resistance of the NC batteries causes the charger to charge automatically with the correct charging current, independent of the respective battery capacity

ARRI Special Charger NCL 16/0.6 for NC Batteries

This charger brings NC batteries up to peak capacity in a maximum time of 14 hours. Charging causes absolutely no damage, since ARRI NC batteries have a reference resistance to control the charging current. The duration of charging is limited by an adjustable timer. The charger has a selector for 110 to 250 Volts, 50 or 60 cps AC. It is of handy design and tropic resistant.

The battery slide-in units of the precision motor control have nickel cadmium batteries with a capacity of 6 or 4 Ah (page 22)

ARRIVOX-TANDBERG Magnetic Tape Recorder



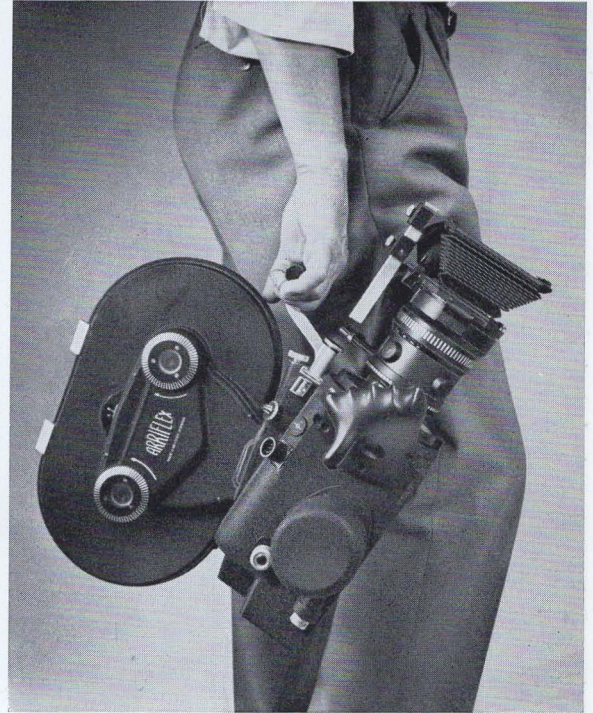
Magnetic Tape Recorder

The ARRIVOX-TANDBERG portable battery-operated tape recorder is the result of a joint development in which both ARNOLD & RICHTER and TANDBERGS RADIOFABRIKK combined their experience in the application and design of professional tape recorders for synchronous operation with motion picture cameras. The ARRIVOX-TANDBERG recorder takes into consideration the special requirements of synchronous operation in connection with the ARRIFLEX cameras and functions with dry cells, accumulators, or which external supplies. Other motion picture cameras equipped with Pilotone generator can of course also be used in conjunction with the ARRIVOX-TANDBERG recorder

Due to the use of the latest technologies, excellent performance data have been combined with utmost reliability

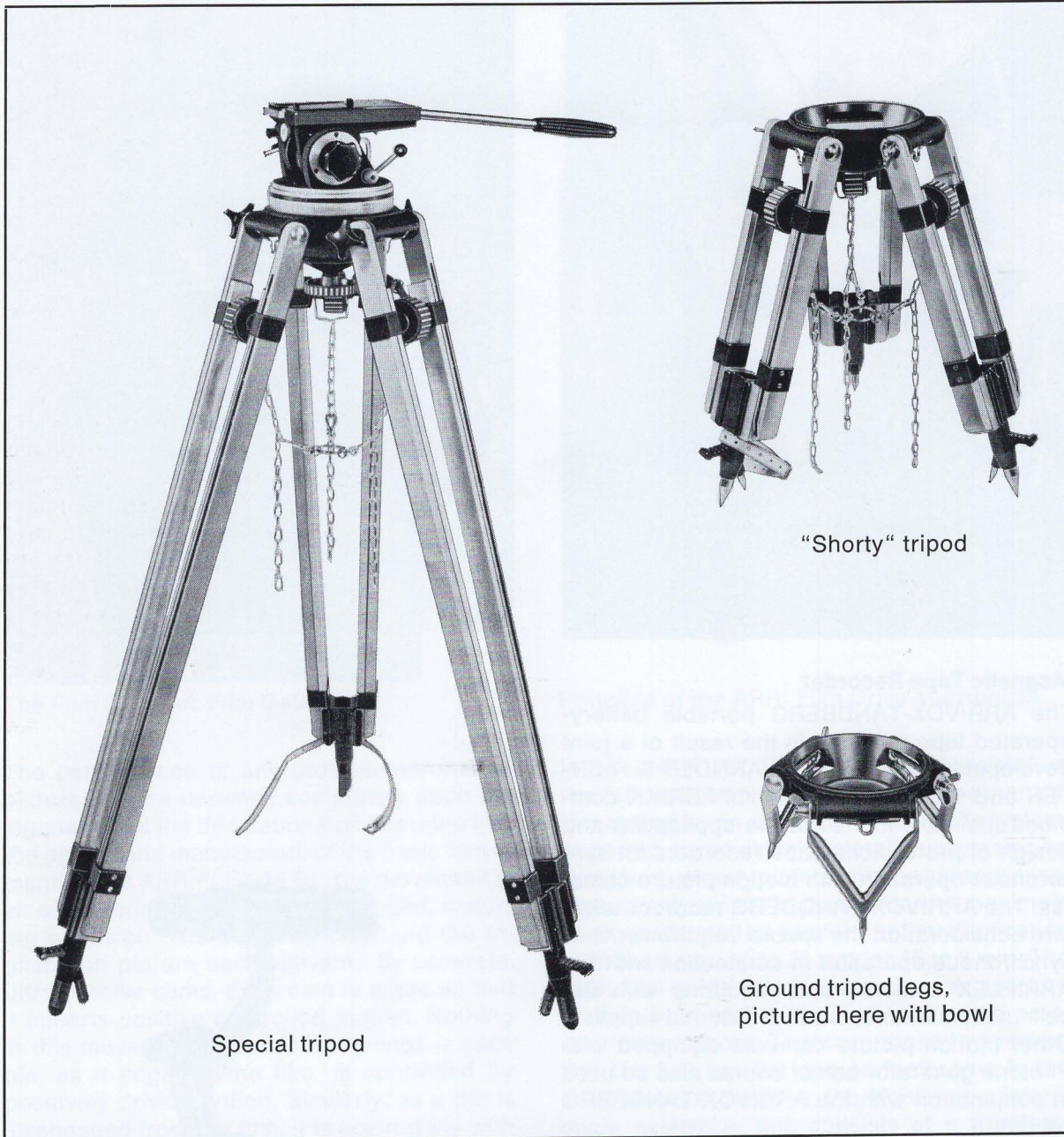
We will gladly send you further information on request.

Carrying Handle



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

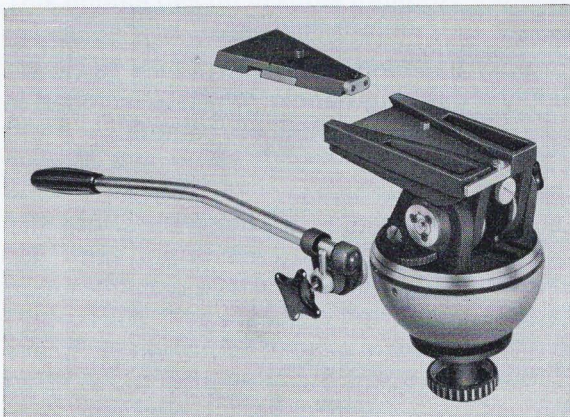
Tripods



Special tripod

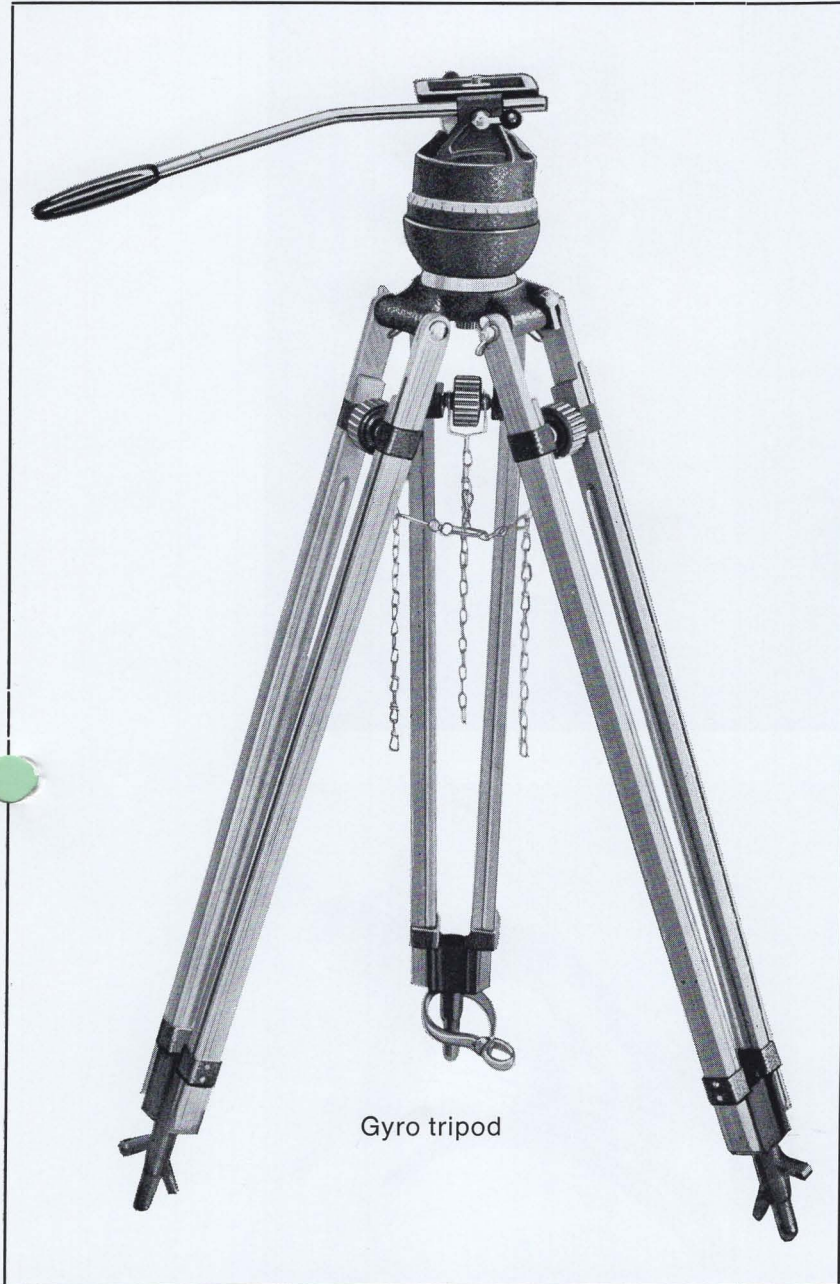
"Shorty" tripod

Ground tripod legs,
pictured here with bowl



Special friction head for the ARRI-FLEX tripods
pictured above

A variety of tripods and body braces, and a series of carrying cases, complete the ARRI-FLEX 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



Gyro tripod

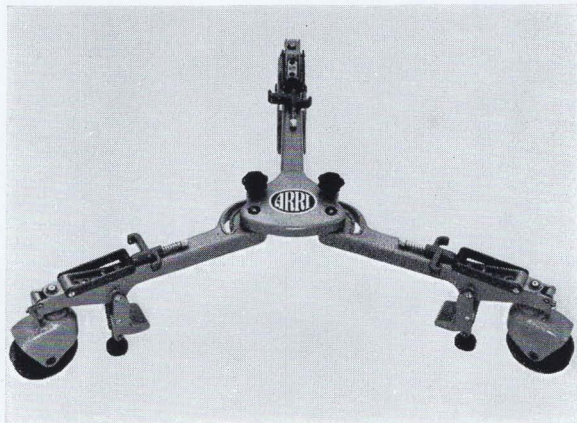
The new Special Tripod for the ARRIFLEX 16 BL

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 camera 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.

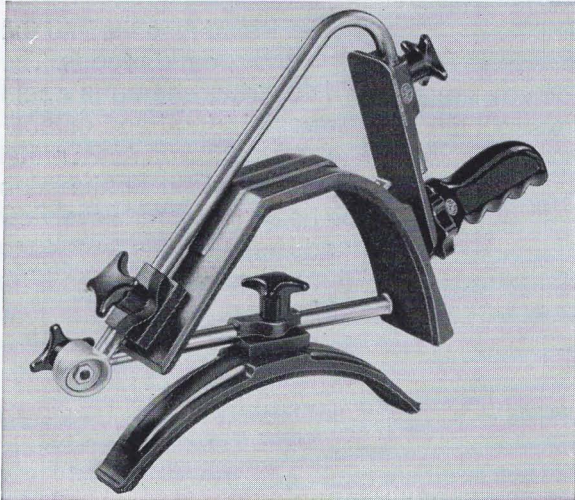
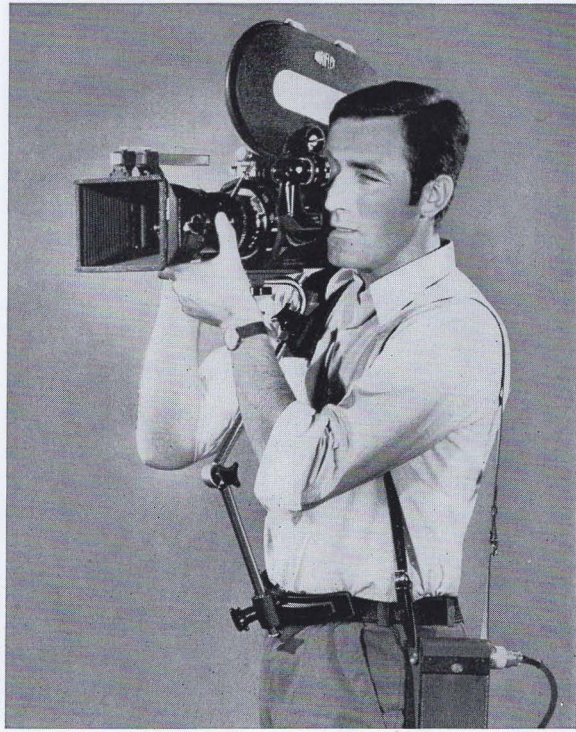
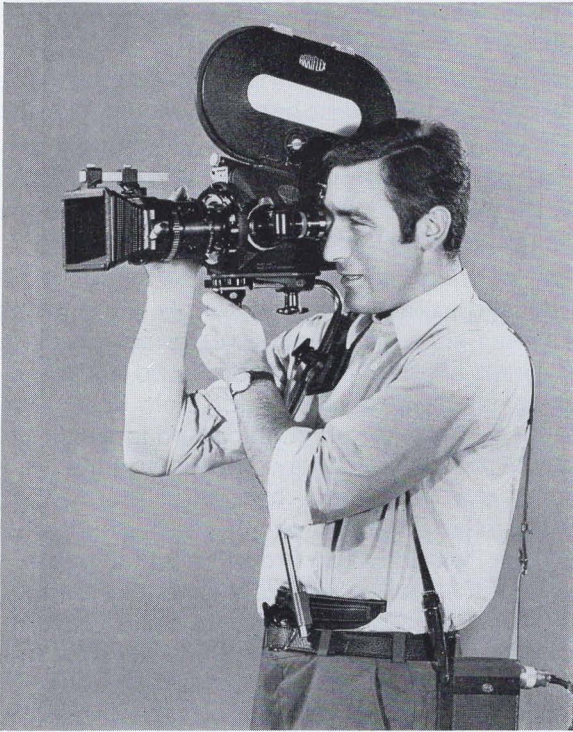
The head of the special tripod also fits into the recess of the "shorty" and ground tripods. The "shorty" tripod (without tripod head) is about half as high as the special tripod and extendable from 25 to 32 in. (65 to 80 cm). ARRI metal ground tripod legs are ideal, in conjunction with bowl and tripod head 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.



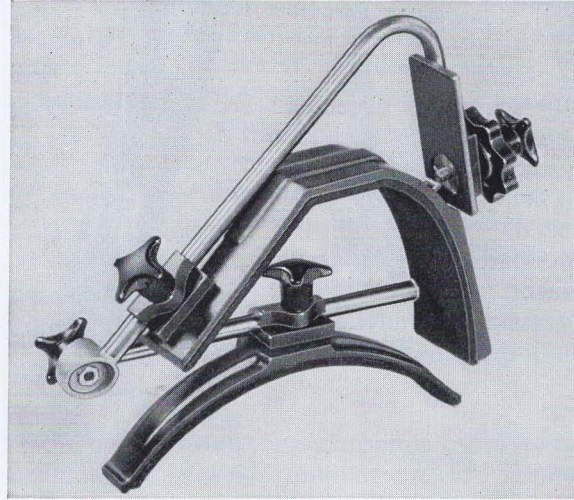
The ARRI Tripod Dolly for all camera tripods

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. For more exacting requirements we recommend the ARRI hydraulic tripod and the ARRI midget dolly.

Shoulder Pods with Brace



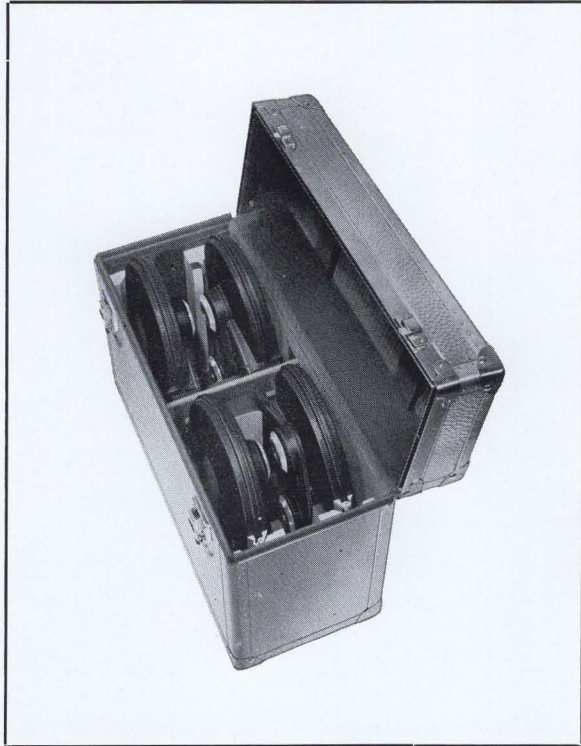
Shoulder pod Finder A



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 Dryfit 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



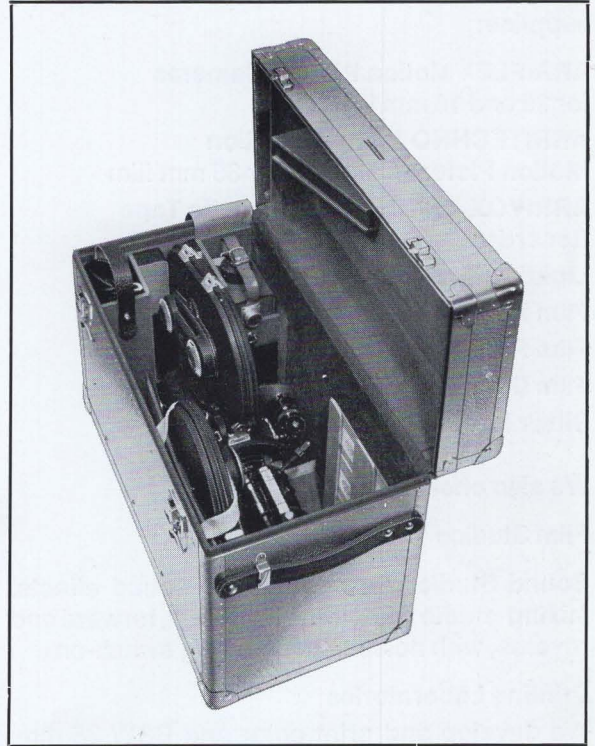
Carrying and Storage Cases

The illustration, top right, shows the aluminum-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

Size approx. $19\frac{1}{4}$ " x $7\frac{1}{2}$ " x $14\frac{1}{2}$ "

Leather Carrying Case



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



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