
ARRIFLEX
16SR
ARRI

Experienced motion picture and television professionals all over the world continually give our engineering staff new impetus for performance-improving innovations. To meet the most exacting demands, our firm has produced an up-to-the-minute, highly versatile system für 16 mm synchronous picture-sound shooting:

The ARRIFLEX 16 SR

A camera with a technical conception which will fully satisfy every requirement of film-making techniques today and tomorrow. A camera that once again bears witness to our vast know-how. A motion picture camera with all the matchless merits of ARRIFLEX precision and dependability. Its highly functional, compact and light-weight construction incorporates full operational symmetry, easy-to-service modules, and built-in control electronics and maximum operating convenience. Designed for shooting from the shoulder or a stand. But above all, a camera with an extremely low noise level.

The steadily growing demand from all countries in the world is clear evidence of the success of the ARRIFLEX 16 SR as a universal camera for television synch work, for motion picture production, for documentaries, news-gathering, TV features and in the service of modern science.

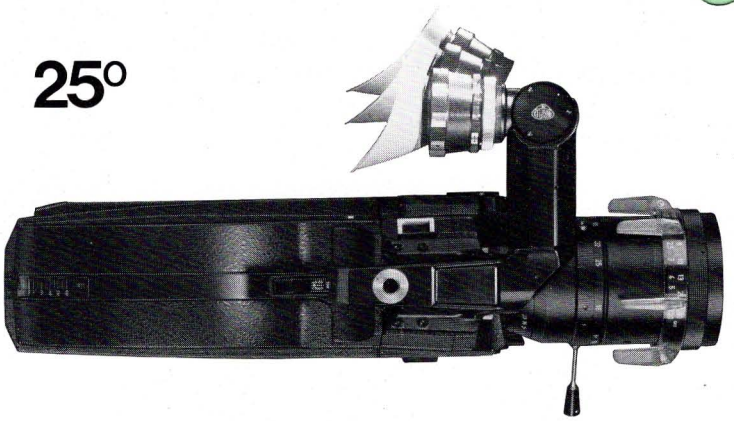
For the ARRIFLEX 16 SR, a complete range of accessories is available for location, studio and underwater shooting. From the time coding system to the complete video synchronizing system, from the ultrafast ARRIFLEX/ZEISS lenses to the ARRIMARIN UW housing.

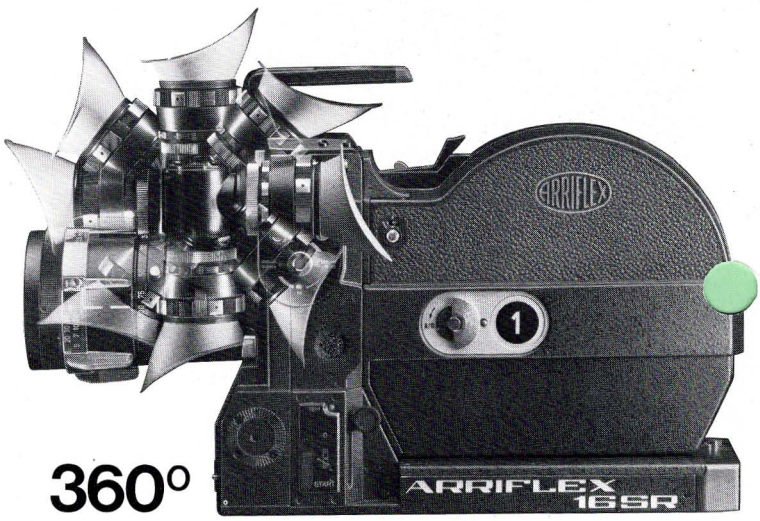
Viewfinder with Full Operational Symmetry

The ARRIFLEX 16 SR is the world's first professional motion picture camera built for total operational symmetry. It therefore permits holding, focusing and release with either hand.

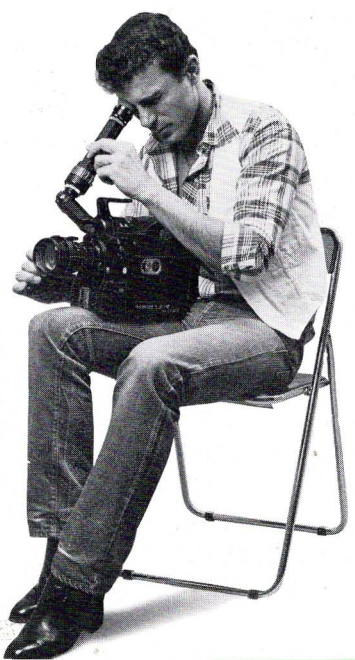
Especially the new, bright-image viewfinder system with single 180° open-sector mirror shutter which always stops in the closed position enables fast framing and greater operating flexibility. The finderscope can be pivoted through 190° from right to left. The finder image can thus be viewed with the right or the left eye. Furthermore, the viewfinder system can be rotated through a full 360°. In addition, the eyepiece can be pivoted through 25°. All together, these features enable the cameraman to adjust the eyepiece to the optimal position for every shooting situation. At the same time, the cameraman is given the best possible view of the scene with the eye not applied to the viewfinder. A great advantage is the possibility of adjusting the viewfinder for an optimal distance between eye and camera base plate for on-the-shoulder shooting.

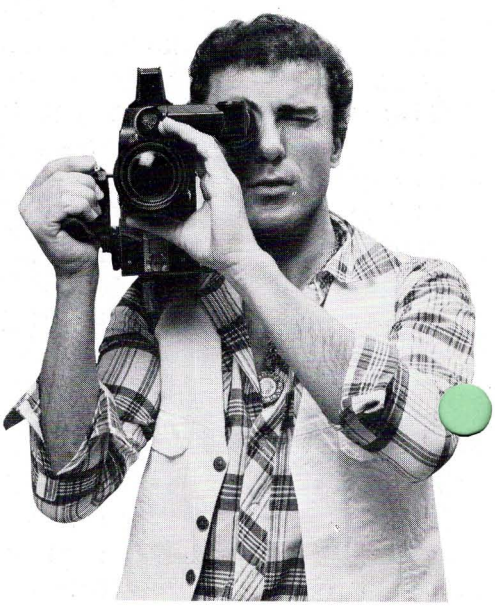
The 16 SR viewfinder system incorporates an interchangeable, fibreoptics focusing screen with vacuum-deposited format markings. It gives a considerably brighter, brilliant image with much better detail visibility.



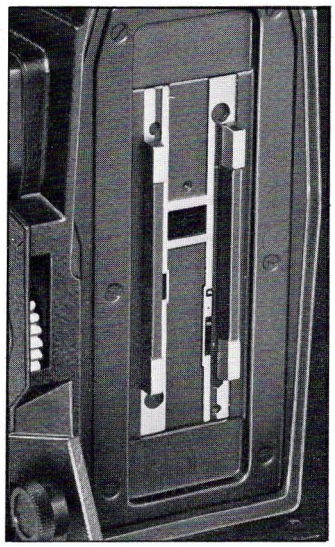


The finder extension tube with erecting straight-line prism and relay



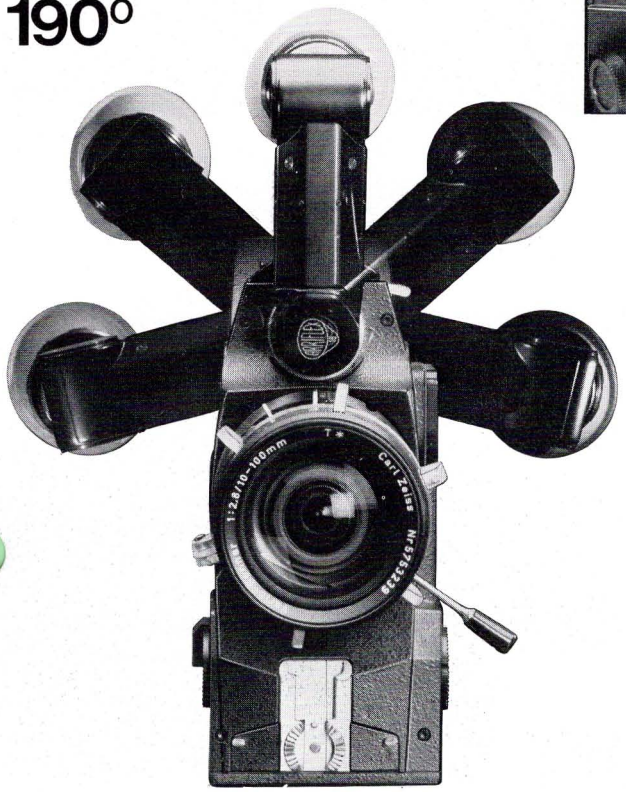


optics, which is available as an accessory, facilitates viewing even under the most difficult shooting conditions. For instance, when shooting from the hip or over obstacles or with the cameraman lying or sitting. In addition, the finderscope extension tube makes the cameraman's work easier when panning from tripod.



abrasion - resistant surface with good gliding properties. The gap formed between the front aperture plate and the back plate when the magazine is mounted prevents any appreciable frictional stress and thus ensures the best possible protection of the film. A small, spring-loaded pressure plate forming part of the magazine back plate presses the film into the flat position in the focal plane required for exposure.

190°



Film Transport and Film Guides

The heart of the ARRIFLEX 16 SR is the new, kinematic, articulated drive capable of framing rates from 5 to 75 fps. The register pin stops the film in the film channel during the exposure phase absolutely positively with an image steadiness of ≦1 % of the image height. This precision is absolutely unaffected by climatic conditions. The ARRIFLEX 16 SR runs perfectly within a temperature range from -25° to +55°C (-12,5 ° F to 131,0° F).

The precision film channel comprises the aperture plate with lateral film guides, and the back plate mounted on the magazine. The design of the film channel guarantees maximum operating safety of the fast-change magazine system. The film-guiding elements have a highly

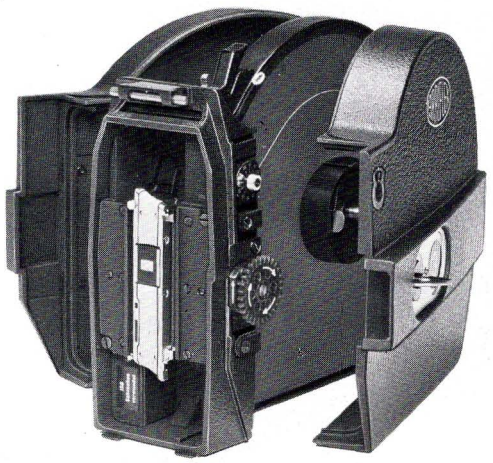
The Handy, Space-saving, Coaxial, Fast-Change Magazine

The coaxial 16 SR fast-change magazine is a true two-compartment magazine. It has a maximum capacity of 120 m of film on a plastic core. Where a higher noise level can be tolerated, 30 or 60 m daylight-loading spools may also be used. Magazines can be changed in seconds.

The symmetrical back platen gives an extremely simple and clear-cut film channel. The feed and take-up loops can be checked from the outside before mounting the magazine.

The magazine covers are hinged and of sandwich construction to prevent resonance.

A scale at the back indicates the unexposed film reserve. When using daylight-loading spools, the length of exposed film is shown by a counter in the side of the magazine.



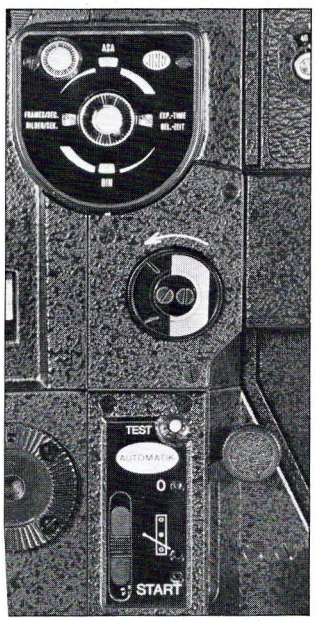
TTL Follow-Pointer Exposure Measurement and Exposure Automation

The conception of this extremely accurate and robust ARRIFLEX exposure metering system guarantees optimum measuring precision. Former reservations of some cameramen with regard to built-in exposure meters in a professional camera have proved unfounded in practice. The measuring accuracy of the built-in CdS exposure meter cannot be equalled by any external exposure meter. In the meantime, CdS follow-pointer exposure meters have demonstrated their reliability in every respect over the course of years in three ARRIFLEX camera models. TTL metering takes into account nearly all the variable components in the imaging optical train of the objective lens. Only when polarizing filters are used is it necessary to allow for the filter factor when setting the exposure data.

The setting ranges comprise frame rates from 25 to 64 frames/sec. and DIN values from 13–28 (16–500 ASA).

Regardless of the focal length of the lens used, in the 16 SR exposure metering system about 30% of the image area is measured in the centre by the photoresistor.

Within this area, in contrast to the selective measurement that is also possible with zoom lenses, the integral metering system evaluates the full subject contrast.



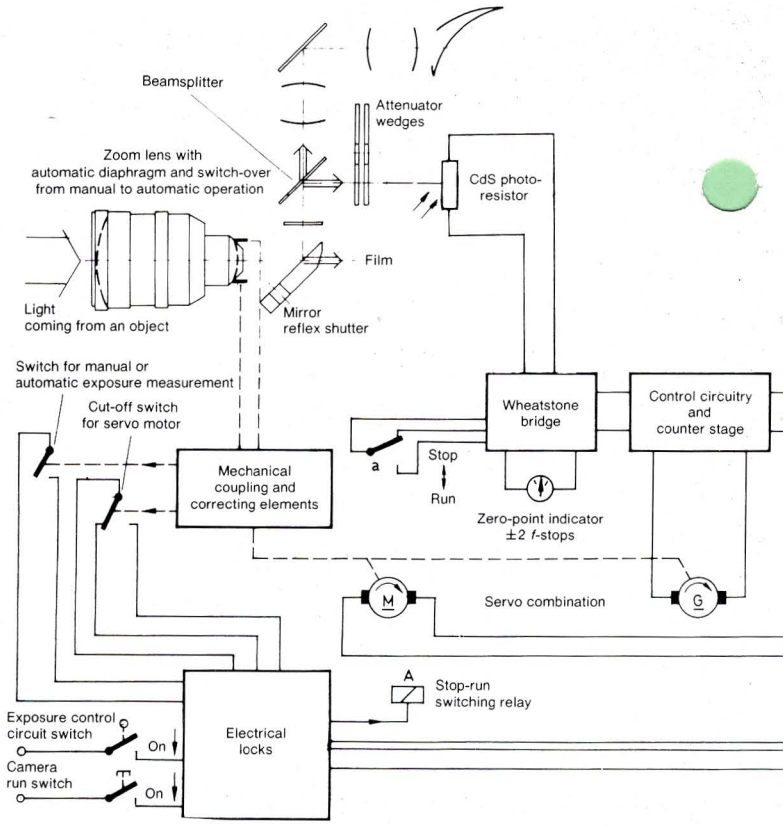
The meter indicator is visible in the viewfinder. The indication range is ±2 stops.

ARRI has gone to considerable lengths with respect to the optical system transmitting light to the photoresistor. The measuring light reaching the CdS photoresistor is split off from the viewfinder beam. Film speed and frame rate are set by attenuation of the measuring light by means of two adjustable neutral grey wedges, one for each parameter. This ensures an absolutely constant operating level of the photoresistor under all shooting conditions. An infrared absorbing filter eliminates the substantially greater proportion of infrared in artificial light as compared to daylight.

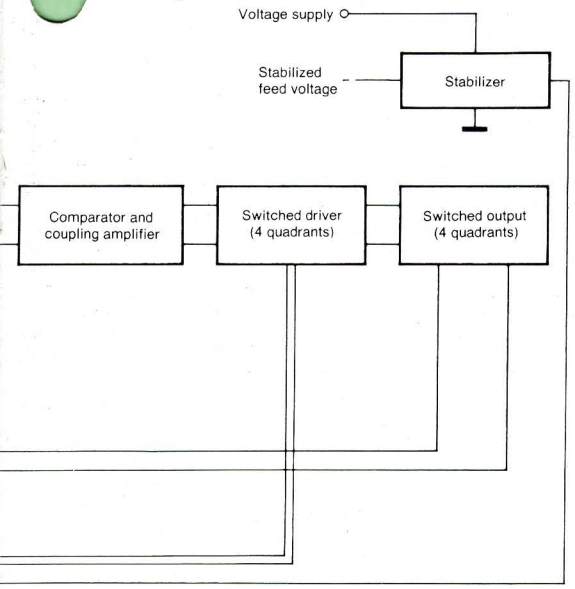
The varying quantity of light that reaches the CdS photoresistor when the camera is at a standstill or running is compensated for electronically.

Current for the exposure meter is supplied by the camera battery.

One version of the ARRIFLEX 16 SR for still faster operation is equipped with



automatic exposure control. A signal from the exposure meter controls the diaphragm-adjusting motor via a servo-amplifier. Selection of this mode of operation, and the return to manual control,

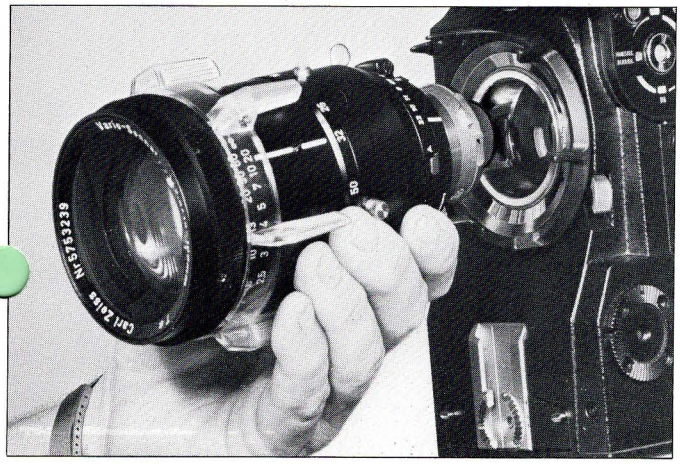


is effected quickly and simply with the f-stop ring, so that intermittent special lighting effects can be achieved. Correct exposure settings can be checked in the viewfinder. Just as with follow-pointer exposure metering, when using automatic exposure control the f-stop setting of the last take is stored indefinitely.

For automatic exposure control, the use of ARRIFLEX 16 SR lenses with spring-loaded diaphragm is essential.

The Lenses and Mounting them on the Camera

For the ARRIFLEX 16 SR, special zoom lenses are available with automatic spring-loaded diaphragm and steel bayonet mount.



In addition, all hitherto available zoom lenses and fixed focal length lenses which fit the 16 BL can be used.

The ZEISS SUPER SPEED LENSES deserve special mention. Their performance surpasses all previous lenses and they are distinguished by extraordinarily good contrast, especially for night shooting. Consequently, they give good detail resolution in the foreground coupled with very good depht penetration.

Spring-loaded Diaphragm and Shutter Stopping Automation

For the first time in a professional motion picture camera, the lens has been equipped with an automatic spring-loaded diaphragm. So the iris diaphragm is always wide open for focusing. It is stopped down to the working aperture only prior to switching on the camera. The spring-loaded diaphragm can be actuated with the camera body switch and the special handgrip switch. When the camera is stopped, the diaphragm automatically opens to its maximum aperture.

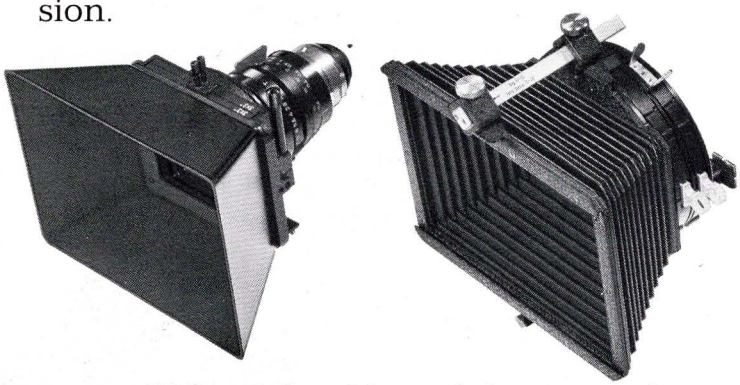
The spring-loaded diaphragm system affords the cameraman considerably more operational convenience, particularly in fast newsgathering work. When lenses with spring-loaded diaphragms are used, the ARRIFLEX 16 SR can be operated with fully automatic exposure control.

An automatic mirror shutter stopping mechanism guarantees that the crystal-controlled motor always stops the mirror shutter in the closed position when the camera is switched off.

Matte Boxes

The **bellows-type matte box** with one fixed slot and a rotatable stage for two 75 x 75 mm, or 100 x 100 mm or 94 mm diam. filters and with adaptor rings for the various lenses is attached by screwing its lower boom into the matte box mount at the front of the camera.

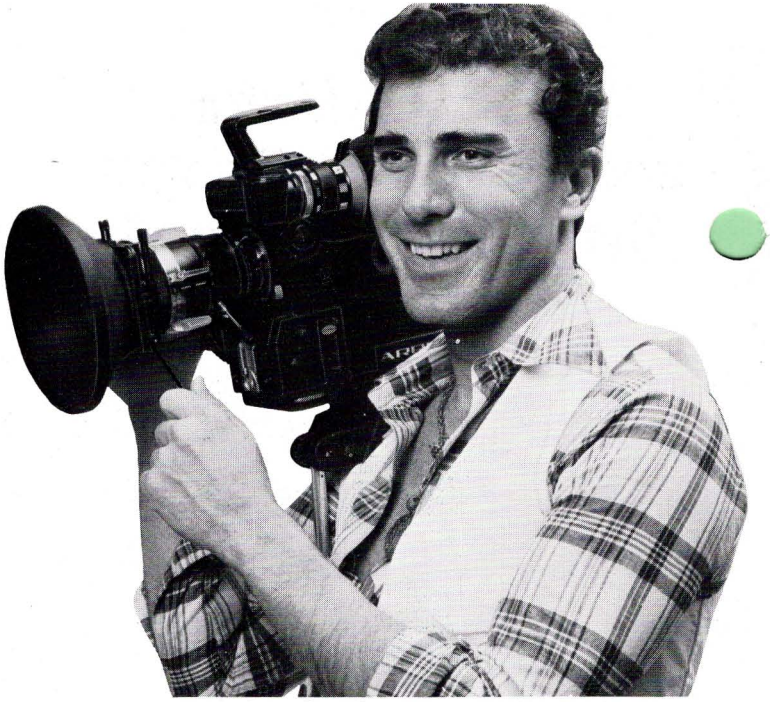
The new **light-weight matte box** screws on to the front of the lens. An adaptor ring matching the lens diameter ensures that it is seated firmly. For zoom lenses a round rubber hood and for fixed focal length lenses a rectangular rubber tube are supplied as lens hoods. The light-weight matte box is used predominantly for newsgathering, so a rotatable filter stage is unnecessary. A holder takes two 3 x 3" filter frames. When using the Vario-Sonnar 10–100 mm, to ensure smooth focusing the focusing lever is displaced forward by means of a detachable extension.



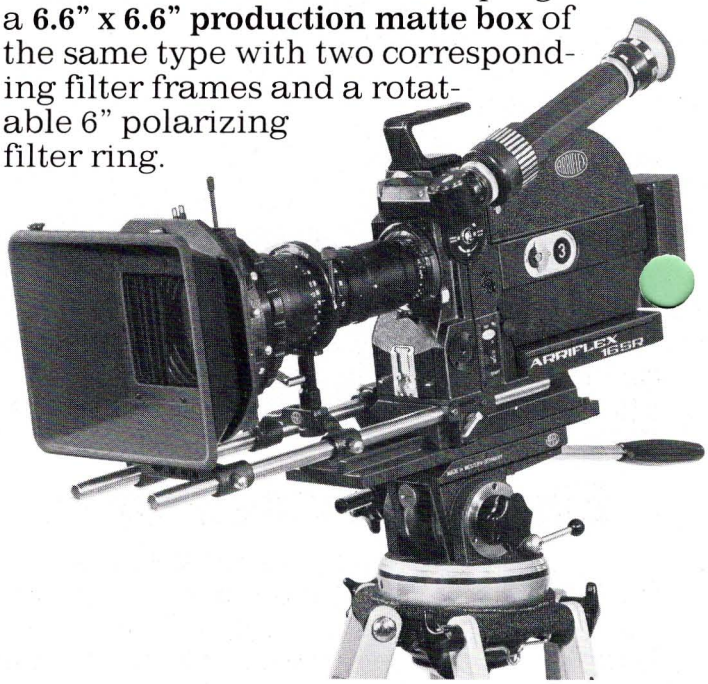
If fixed focal length lenses with a rotatable frontring are used, we recommend an additional support with which the light-weight matte box is mounted in the front accessory shoe.

The light-weight matte box has a wide range of applications, which in many cases will replace the bellows-type lens hood.

The **4" x 4" production matte box**, developed for 16 mm zoom lenses, fixed focal lengths and ultrafast lenses, has three filter planes and affords optimal operating versatility in motion picture production. Two 4" x 4" filter frames are rotatable and slidable for graduated filters. The likewise rotatable filter ring, which can be replaced by an anti-reflection ring, is designed to take a 4½" polarizing filter. The production matte box can be swung out 90° for lens-changing. It is clamped on the support tubes of the bridge plate.



For the Cooke Varotal 9.5–47.5 mm, T 1.5, we have in our 35 mm programme a **6.6" x 6.6" production matte box** of the same type with two corresponding filter frames and a rotatable 6" polarizing filter ring.



The Bridge Plate

The bridge plate enables the weight of the ARRIFLEX 16 SR, including accessories, to be distributed evenly. The base plate of the bridge plate is attached to the camera stand. The upper element, which is attached to the camera, can be moved backwards and forwards in a dovetail guide and clamped after finding the optimal position of the centre of gravity. The camera can be dismounted from the stand in a matter of seconds. The adjustable support tubes in the bridge plate are used to hold long and heavy lenses by means of lens supports and as a holder for the production matte box.

The Drive Motor and its Electric Control System, Pilotone and Start-Marking

A quartz-controlled 12 V DC motor is installed to drive the camera. Frame rates of 24 and 25 frames/sec can be selected. Pilot frequencies of 50 and 60 Hz, proportional to the camera motor speed, can also be selected. Synchronous double-system recording is possible with this camera, using the following methods:

1. Conventional pilotone method, including start-marking (with cable).
2. Quarz pilot frequency method without start-marking, using a quarz-synchronous tape recorder.
3. Quarz-synchronous time-coding method.

The current load of the motor is limited to 5 A. The current load at room temperature is about 1 A. If the camera runs out-of-synch due to too low voltage input or for any other reason, the out-of-synch diode in the viewfinder lights up.

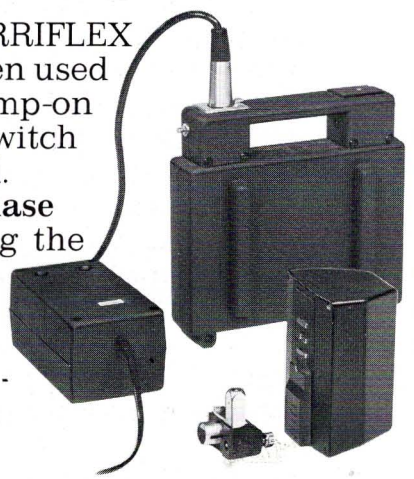
A large range of control units can be connected to the accessories plug to allow a number of other modes of operation.

Electrical Accessories

For regulating running speed with variable frame rates from 5 to 75 frames/sec, the **VSU manual control unit** with built-in remote cut-in and selector switch for constant quartz-controlled operation or variable frame rates has been developed. The VSU is connected to the camera by a cable and, like the following accessories, can be clamped to the panning handle.

For switching the ARRIFLEX 16 SR on and off when used an a stand, the clamp-on **RCSR pan handle** switch has been developed.

The **PHU phase shifter** for correcting the phase relationship of the quartz-controlled camera is used for filming off-TV monitors.

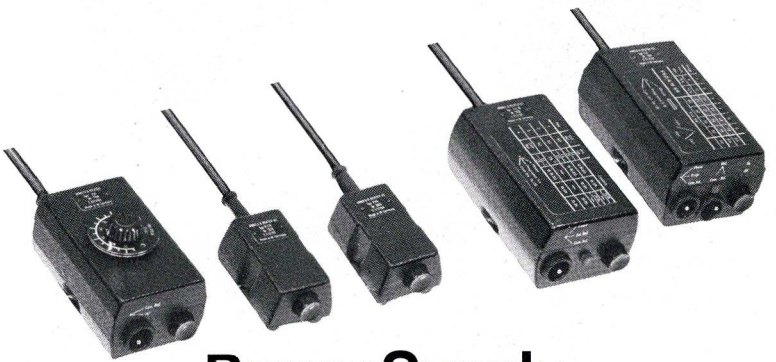


The ARRIFLEX 16 SR can be synchronized with the mains supply, with a second camera or the video signal of a TV monitor. (External signal 50/60 Hz, >1 Vpp, <10 Vpp, sin or pulse, composite video signal.) For this purpose, the **EXS II external synchronizer** is used, which is equipped with composite video signal generator, built-in remote-control switch, out-of-synch indicator, camera selector switch, built-in phase shifter.

The **FSZ II remote control unit** performs all the functions of the previously named control units: On/Off switching, manual control, external synchronization, phase shifter. With the FSZ II, the frame rate can be set in steps from 6 – 75 frames/sec. At all settings the number of frames is quartz-synchronous. External synchronization is also possible at 25, 50 and 75 frames/sec, permitting synchronization with the supply mains for the lighting.

The **NSYTR 2 mains synchronizing transformer** for primary 220 V, 1 V/sec, is used for mains synchronization with the EXS II external synchronizer or the FSZ II.

Of the above-mentioned external accessories, any two can be connected simultaneously to the ARRIFLEX 16 SR with the **ZV accessories connector board.**



Power Supply

The drive motor, follow-pointer exposure meter, automatic exposure control system and all other electrical components are energized by the **12 V, 1.2 Ah NC plug-in SRC 12/1.2 battery**, which is plugged into the back of the camera via an adaptor and needs no cable. At 20°C its capacity is sufficient to expose 6 x 120 m of film.

The **NCL SR III two-output battery charger** is designed for normal and rapid charging, automatic timed switching off and automatic 110/220 V mains voltage selection.

The **Energie Set** comprises the **NC 12/4E camera battery** with a capacity of

4 Ah, with automatic cut-out and the fully insulated **NCL 12/4E battery charger** with automatic 110/220 V mains voltage selection and is designed for rapid charging.

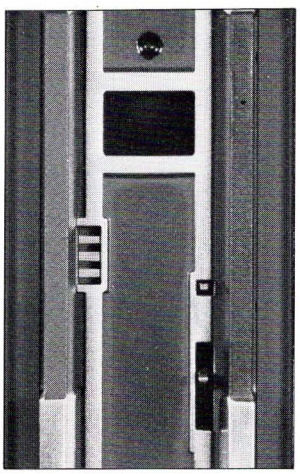
The compact, extremely efficient **PPL 12 V High-capacity Dry Battery** is used mainly when battery charging is impossible. It is not rechargeable. Sufficient capacity to expose 20–30 x 120 m of film is provided.

Incidentally, all 16 BL and 35 BL 12 V batteries can be used for the ARRIFLEX 16 SR with the appropriate KCU or KDU cables.

Time-Coding

The time-coding system was evolved in close collaboration with the IRT (German Institute for Radio Technology).

A coding cycle comprises a full second, that is, 24 or 25 frames. In addition to real time coding in seconds, minutes, hours, day, month and year, the coded camera number is recorded on the film.



With this system, 4 bits per frame in a fixed relationship to the perforations of the film are exposed on the 2 mm wide sound track. The corresponding exposure apertures in front of the LEDs are located in the film channel of the 16 SR two frames below the gate.

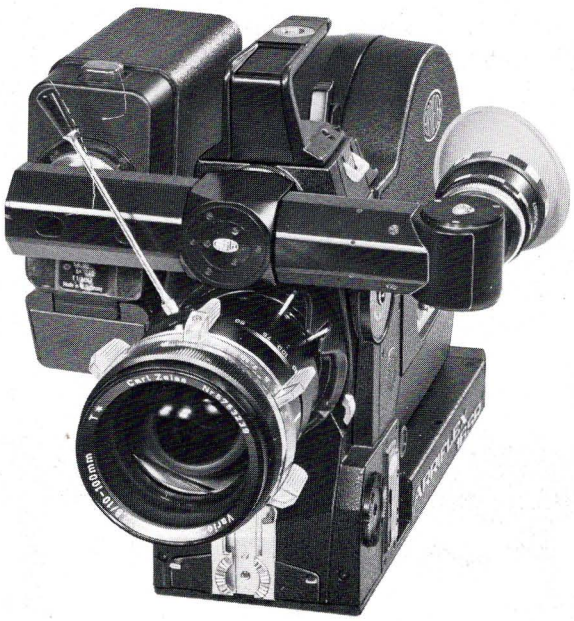
The time code in the same data format is magnetically recorded on the magnetic tape of the likewise quartz-controlled tape recorder.

Automatic or manual read-out systems permit rapid tracing of any desired synchronizing point on the picture and sound tracks for further editing.

The ARRIFLEX 16 SR is designed to accept this system. An integrated wiring harness provides for installation of an LED block. Moreover, every camera is provided with a number code and the connector for the coding generator. The electronics of this new marking system is accommodated in a flat housing which is mounted below the electronics shoe. Time-coding is the only, absolutely reliable marking system for synchronous picture-and-sound recording without start-marking devices and without an address connection between camera and tape recorder.

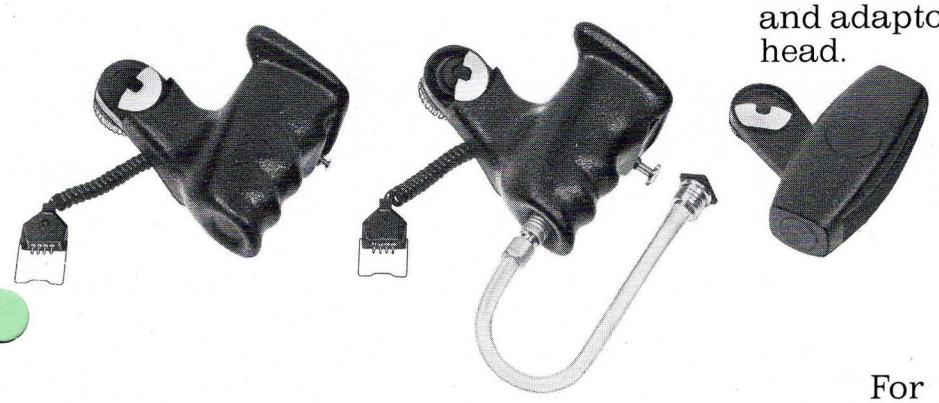
Adaptation of a Video System

The video adaptation enables the director and others working on the production to view the finder image, independently of the cameraman, on any desired number of monitors in accurately framed true perspective during shooting. This set-up saves a very substantial amount of time and costs in various fields of application, from advertising film production to feature film applications, e. g. using a camera crane.



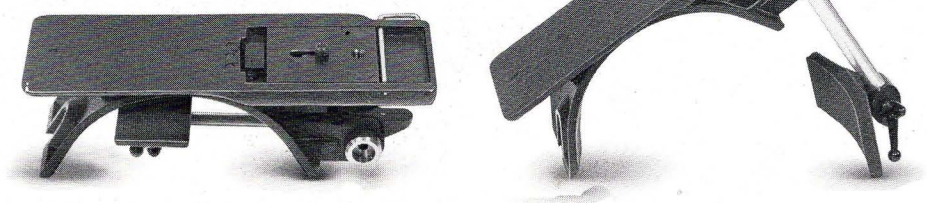
The Handgrips of the ARRIFLEX 16 SR

The standard handgrip with its electric camera release, like another universal handgrip with additional spring-loaded diaphragm actuation via a cable release, is mounted on the right-hand side of the camera housing. A special screw mount allows the handgrips to be adjusted upwards and downwards and to be displaced laterally. A handgrip extension enables the handgrip that is in use to be extended towards the front. For better camera holding, e. g. during shooting from the air, an auxiliary handgrip without a release mechanism is available.



The Shoulder Pod

The especially small and light-weight 16 SR shoulder pod for optimum camera handling, compactly constructed with steplessly adjustable chest brace, permits vertical adjustment of the upper section with the camera to the cameraman's physique. The ARRIFLEX 16 SR is attached to the shoulder pod with a quick-action lock. Apart from the ARRIFLEX quick-change mounting plates, Cine 60 plates can also be used. In the collapsed state, the shoulder pod can serve as a ground support. This new shoulder pod can also be used for the ARRIFLEX 16 BL with periscopic finder.



The Shoulder Pad

This pad is of resilient plastic, has the same dimensions as the base plate of the electronics shoe of the camera and enables the ARRIFLEX 16 SR to be held on the shoulder more comfortably.

Tripods

The comprehensive ARRIFLEX 16 SR programme includes stands of a great variety of designs for all assignments. With ball and socket, pan and tilt or horizontal and vertical gyro head and with a special friction head. Also available: Leather hoods, tripod spiders, scooters and adaptor plate for ARRIFLEX 35 stand head.

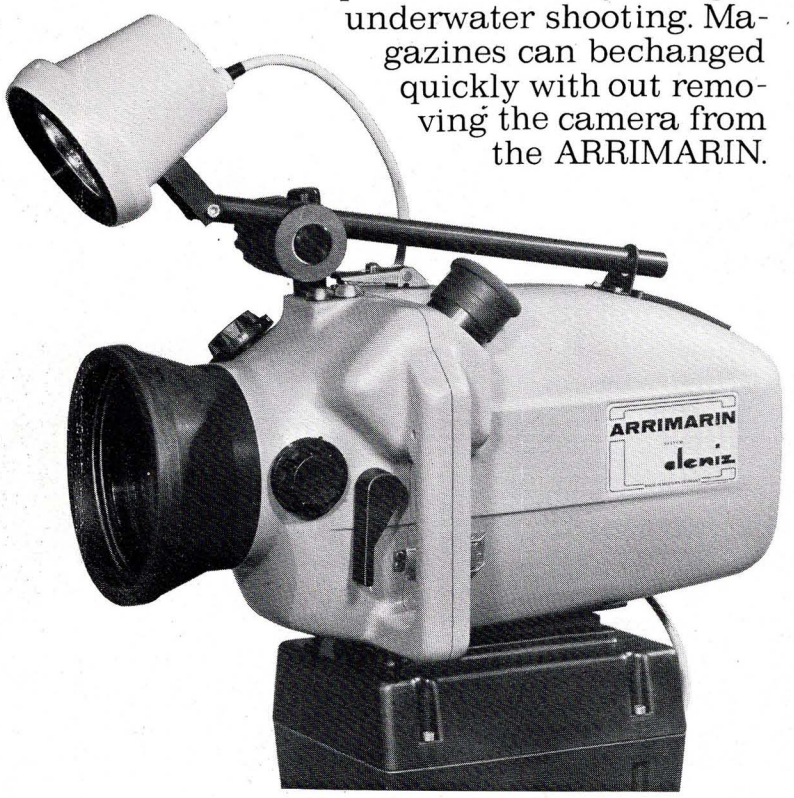
Cases

For transporting and storing the ARRIFLEX 16 SR a small camera case of leather, a camera transport case of aluminium and a leather camera bag are available. In addition: cases of leather and aluminium for two 120 m magazines, the battery charger, the spare battery and lenses.

ARRIMARIN

For underwater filming with the ARRIFLEX 16 SR, we have put a new, ultra-fast, small and light-weight underwater housing on the market with the designation "ARRIMARIN".

The hydrodynamic, functional and compact design made possible by the low silhouette of the ARRIFLEX 16 SR permits fast movement in any direction under water. The ARRIMARIN is pressure-proof down to a depth of 125 m and including the loaded 16 mm motion picture camera weighs only about 20 kg. With its 120 m film capacity, the ARRIFLEX 16 SR is predestined for prolonged underwater shooting. Magazines can bechanged quickly with out removing the camera from the ARRIMARIN.



The large selection of fixed focal length lenses from 5.7 to 85 mm and zoom lenses with extension factors from 1 : 6 to 1 : 15, and the possibility of controlling all functions ensure maximum adjustment flexibility underwater. The 45° angle of the viewfinder ocular is adapted to the normal diving position and allows free visibility of the finder image without hindrance from the diver's gogles. The TTL exposure meter pointer is visible at the side of the groundglass image. Among other things, the ARRIMARIN range of accessories includes an underwater floodlight and various lens tubes.

On request, we shall be glad to send you further information.

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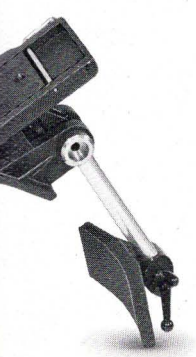

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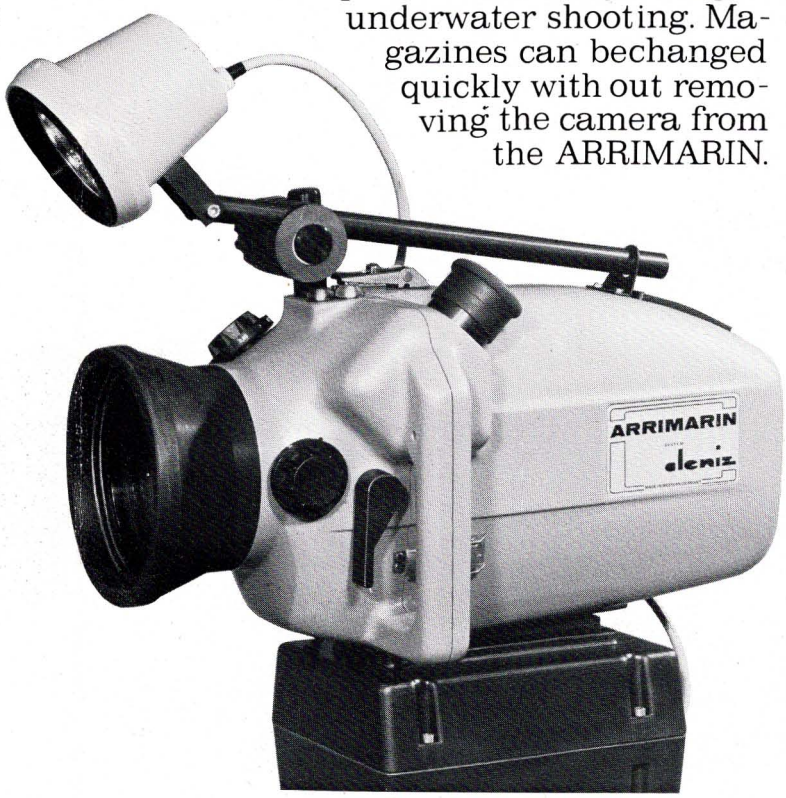

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Technical Data

Dimensions:

Length, measured from lens flange	10.4" (264 mm)
Width	4" (100 mm)
Height	7.7" (195 mm)

Weight of camera:

approx. 12.5 lbs (5.8 kg)

Film width:

16 mm, one-sided or double perforation, B winding

Shutter opening:

180°

Viewfinder magnification:

10-fold

Noise level:

28 ± 2 dB (A)

Drive:

DC motor
Supply voltage 12 V
Crystal accuracy 5 x 10^{-6}

Battery type:

12 V, 1.2 Ah NC

Magazines:

400 ft (120 m) magazines, coaxial double compartment type, daylight reels can be used up to max. 200 ft (60 m)

Temperature range:

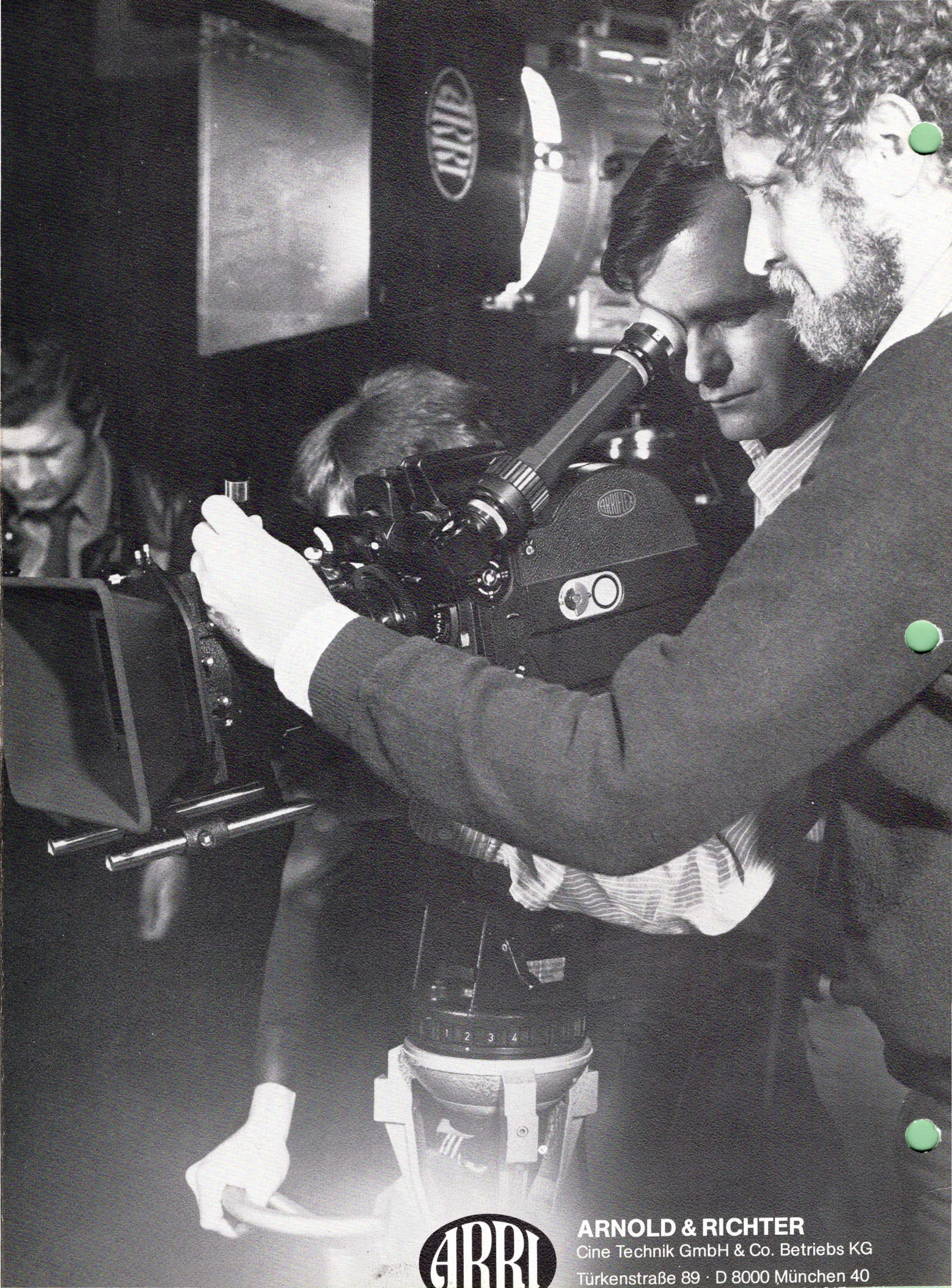
−12.5° F to 131.0° F (−25° C to +55° C)

Exposure Control System:

Film sensivity:
13 – 28 DIN (16 – 500 ASA)

Frame speed:
25 (24) – 64 fps

Indication range:
±2 f-stops



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