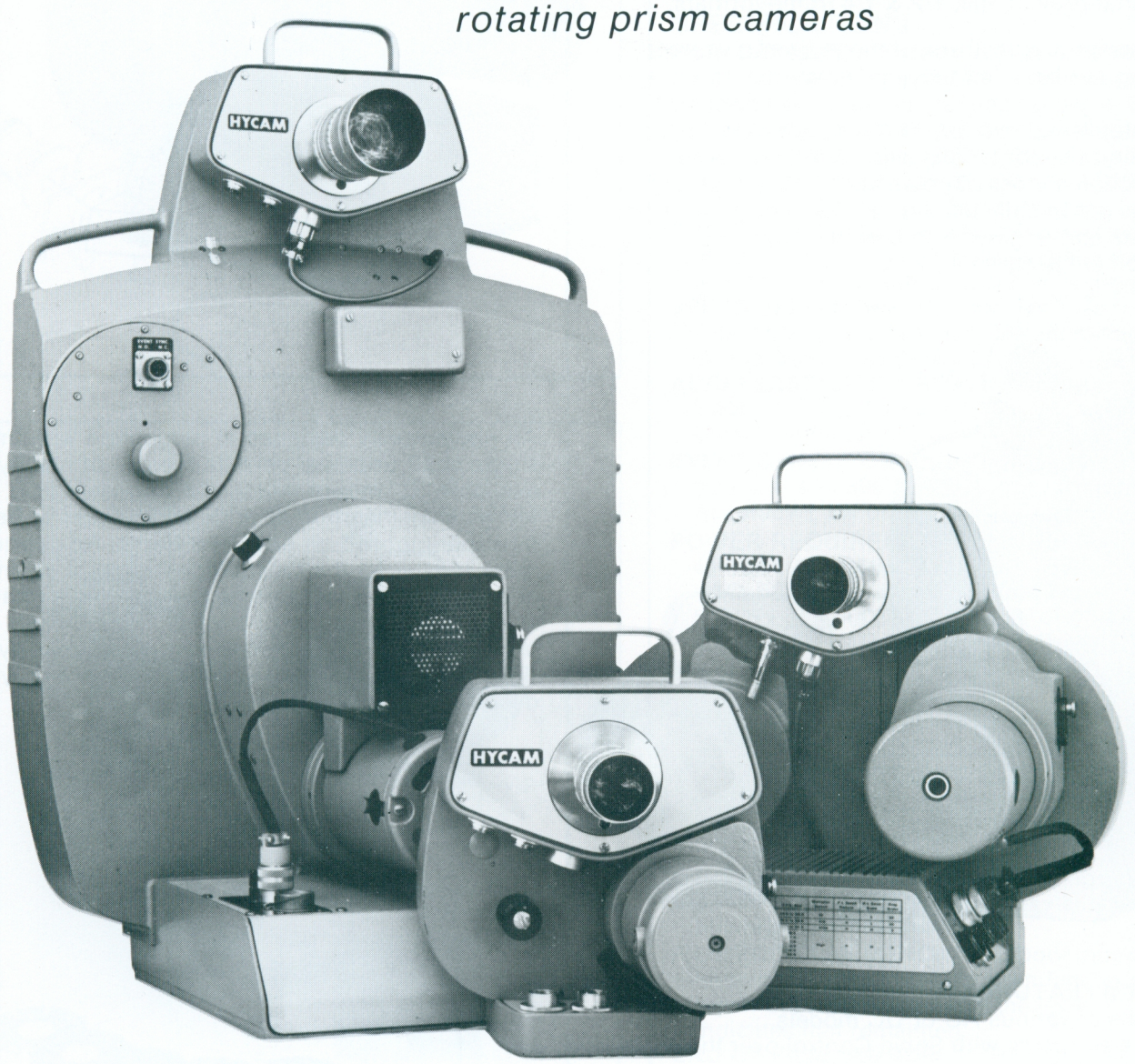
REDLAKE CORPORATION

PRECISION PHOTO-INSTRUMENTATION SYSTEMS

the HYCAM® II

family of high speed 16mm rotating prism cameras

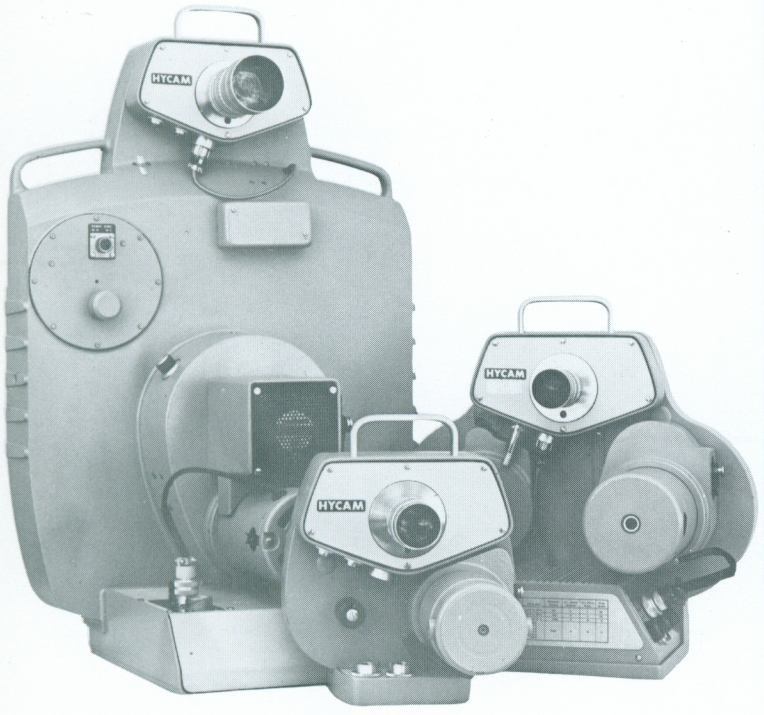


REDLAKE CORPORATION 15005 Concord Circle, Morgan Hill, California 95037 (408) 779-6464 Telex 757592

The Redlake Corporation Hycam II family of rotating prism cameras represents the latest advances in high speed camera design technology. The Hycam II incorporates a completely new generation electronic control system with speed regulation over the camera's entire range including its top speed of 11,000 frames per second.

The Hycam II is available in various AC & DC models with 100, 400 & 2,000 foot film capacities. This broad range of model configurations provide the flexibility to meet varying photo-instrumentation needs. Camera speeds up to 44,000 frames per second are achieved with interchangeable optical heads that provide full, 1/2 & 1/4 frame formats.

The benefits and features of the Hycam II exceed anything available in todays marketplace. But the proof of any high speed camera is the confidence level established in a day to day operation. Reliability is synonymous with Hycam since its introduction almost 20 years ago. Thousands of cameras are in daily use around the world assisting scientists and engineers in their research and development programs.



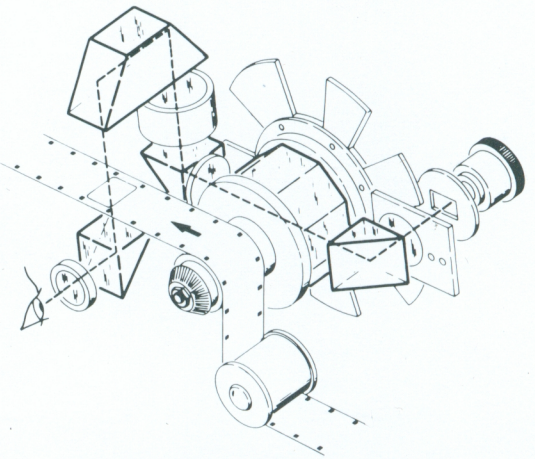
HYCAM II FEATURES INCLUDE:

- Choice of various AC or DC models.
- New electronics with Servo Control over the entire speed range.
- Field convertible to AC or DC operation.
- Event synchronizer with isolated electronic control.
- New style electronic film run-out switch.
- Remote START/STOP control.
- Camera READY & RUN indicators.
- Built-in crystal controlled Timing Pulse Generator.
- Shutter Pulse Output for strobe synchronization or camera run indication.

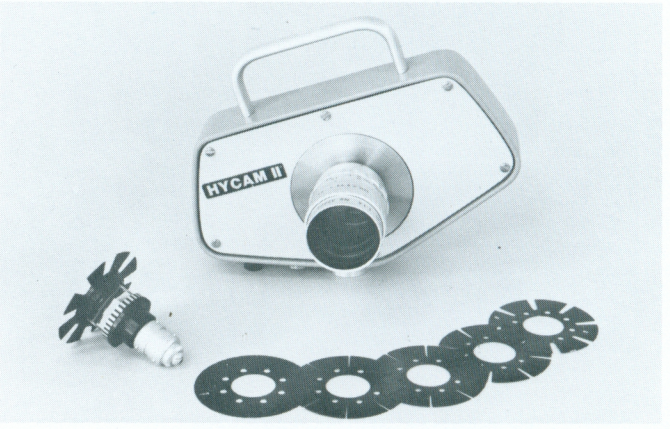
Traditional Hycam benefits include: Interchangeable shutters, use of standard "C" mount lenses, glass reticles for printing grids or cross hairs on film, LED timing lights, oscillo and streak kits for continuous recording, spool adapters, split-reels and a host of accessory items.

HYCAM II PATENTED OPTICAL SYSTEM

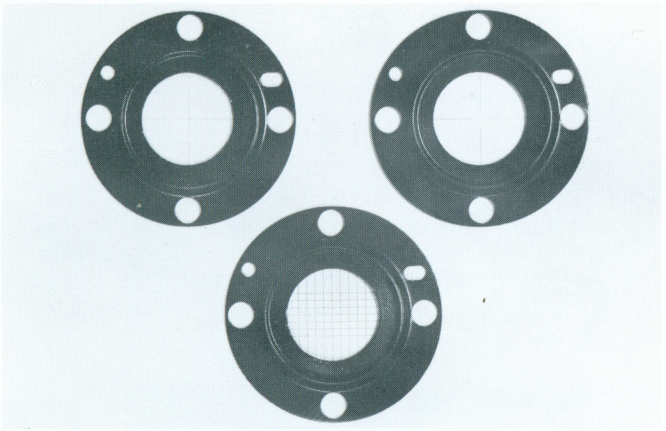
The heart of the Hycam II is its unique optical system which combines the sprocket, rotating prism and shutter assembly on a single shaft. This design eliminates any relative motion between the film sprocket and the rotating prism, resulting in consistent image registration on continuously moving film. Uniform exposure over the entire format is an additional benefit provided by this system.



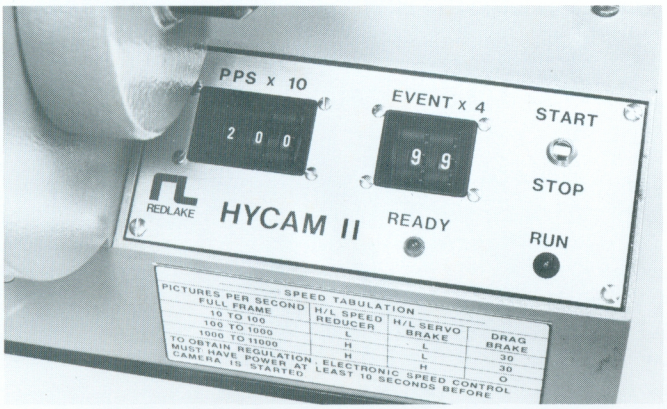
An optical relay designed in conjuction with the single shaft principal permits the use of readily available "C" mount lenses. This concept also allows easy insertion of grids and reticles to be be superimposed on each film frame. An aperture mask located at the focal plane insures a distinct and even frame line. Constant exposure is retained at the top and bottom of the frame even when narrow shutter discs are utilized. Additional Hycam II features, benefits and specifications are fully described on the following pages.



A full frame optical head with sprocket and rotating prism assembly is illustrated above. Six separate shutter discs are easily exchanged to provide shutter speeds to one microsecond. Full, ½ and ¼ frame optical heads are interchangeable between 100, 400 & 2,000 foot Hycam II cameras.



The design of the Hycam II optical head has a convenient location where a glass reticle may be inserted. Eight reticles are available in multiple grid & cross hair patterns and provide fixed reference markers on film when desired. These markers are particularly useful when extracting displacement measurements with a film analyzer.



The new generation Hycam II electronic system utilizes an array of digital thumb wheel switches to select camera speed and to set the event synchronizer circut. Camera speeds are selectable in increments of 10, from 80 to 11,000 frames per second. The event synchronizer of trigger circut is fully isolated from all other camera power and logic functions and produces a contact closure when the selected film footage is reached. This permits the camera to synchronize the start of an external test event when the camera reaches the optimum speed. Control panel functions include a local START/STOP switch with ready & run indicator lights.

All Hycam II optical heads can be fitted with optional LED timing lights. A built-in crystal controlled timing pulse generator is also available for use with the LED timing lights. Selectable frequencies are: 100,1,000 and 5,000 Hz. A 3-position rotary switch is located on the bottom surface of the optical head to select the desired pulse rate. A 2-pin connector adjacent to the rotary switch accepts externally applied timing or event signals.

SPECIFICATIONS COMMON TO ALL HYCAM II MODELS

OPTICAL SYSTEM: Rotating Prism with integral sprocket and shutter on a single shaft assembly with companion relay optics. All optics are high-efficiency anti reflection (HEA) coated to provide maximum transmission in the visible spectrum.

OPTICAL HEAD: A modular unit which contains the complete optical system and key mechanical elements from the objective lens mount to the film plane. Heads are interchangeable between all Hycam II cameras.

FULL FRAME HEAD: Utilizes an 8 sided rotating Prism with an aperture size of: .295" X .410".

HALF FRAME HEAD: Utilizes a 16 sided rotating Prism with an aperture size of: .147" x .410".

QUARTER FRAME HEAD: Utilized a 32 sided rotating Prism with an aperture size of: .074" x .410".

OPTICAL TRANSMISSION: f/3.2 geometric aperture, f/3.8 to f/4.0 transmittance.

LENS MOUNT: ASA "C" mount standard.

VIEW FINDER: 5X viewfinder and focusing gate with ground glass furnished with each camera. Provides full field viewing.

SHUTTER: Interchangeable segmented disc type. Standard shutter ratio is: 1/2.5 or 144° opening.

FILM TRANSPORT: Continuous flow, with the sprocket shaft assembly and film take-up spool driven by a single motor.

FILM TYPE: Accepts 16mm motion picture film perforated 2 sides, on daylight loading spools. 0.2994" (standard pitch) or 0.3000" (Hi-Speed pitch) per ASA standards PH 22.110 and PH 22.5.

END OF FILM SWITCH: Stops camera at film run out.

EVENT SYNCHRONIZER: Provides a contact closure or contact opening to trigger an external event when camera reaches a pre-selected footage. This circuit is isolated from all other camera control electronics.

SHUTTER PULSE SYNC UNIT: Provides output pulse which is synchronized with shutter open interval. Pulse characteristics: 10V to 15V square wave positive pulse.

CAMERA START/STOP: Local ON/OFF toggle switch and remote control by external contact closure.

CONSTRUCTION: Cast aluminum alloy.

FINISH: Exterior: Tough epoxy paint, light and medium tan (missile range white is optional).

Interior: All non-working surfaces flat black.

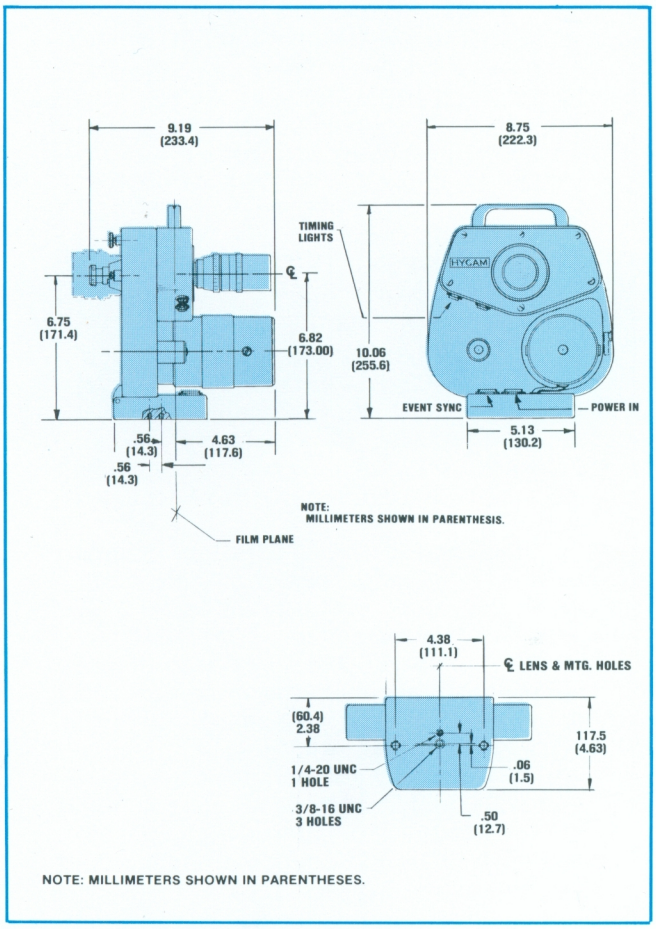
CABLES: Power and remote control cables furnished.

STANDARD ACCESSORIES FOR ALL HYCAM II MODELS

- Dual LED Timing lights.
- Built-in Timing Light Generator: 100,1,000 & 5,000 Hz.
- Interchangeable shutters.
- Glass reticles with cross hairs or grid patterns.
- Spool adapters & Split reels.
- Oscillo and streak kits.
- Carrying case for camera & accessories.
- 90 volt battery pack for Series 41 cameras.

See price schedule for a complete list of options & accessories. Including: Lenses, Tripods, Mounts, Lighting equipment, etc.

HYCAM® II Series 40 Cameras



DESCRIPTION

The Series 40 is the smallest member of the Hycam family of high speed cameras. It is ideal for those applications where small size and maximum portability are needed. This camera utilizes the new generation electronic speed control system which is packaged in a separate module or a variable autotransformer for unregulated speeds up to 8,000 full frames per second.

SPECIFICATIONS

FILM CAPACITY: 16mm x 100 feet acetate base film or 16 mm x 125 feet 4 mil. polyester base film.

ELECTRONIC SPEED CONTROL RANGE: 80 to 3,500 frames per second (full frame). 200 to 7,000 frames per second (half frame). 400 to 14,000 frames per second (quarter frame).

UNREGULATED SPEED CONTROL RANGE: 80 to 8,000 frames per second (full frame). By use of a separate 115 VAC variable autotransformer which varies the voltage to the motor from 0 to 300 volts. Speeds with half & quarter frame heads increase accordingly.

SPEED SELECTOR: Thumb wheel speed selector switch in 10 FR./SEC. increments to 3,500 FR./SEC. self-locking at each position.

ACCELERATION: (With Electronic Control) 1.5 seconds to 3,000 FR./SEC., utilizes 50' of film to reach speed (nominal).

EVENT SYNCHRONIZER: 2 digit thumbwheel selector in 1 foot increments. Accuracy ± 5% or better.

POWER REQUIREMENTS: MODEL: 40-0090 115V ± 10VAC, 50/60 Hz. with 15 AMP circuit. MODEL: 40-0093 230V ± 20VAC, 50/60 Hz. with 10 AMP circuit.

VARIABLE AUTOTRANSFORMER

POWER REQUIREMENTS: MODEL: 40-0035 115VAC 50/60 Hz. with 20 AMP circuit. Variable output 0 to 300 volts.

MOUNTING PROVISIONS: Bottom surface has standard 1/4" - 20 threaded tripod hole & 3 ea. 3/8" - 16 holes.

DOOR ASSEMBLY: Hinge type, swings down 90° for loading.

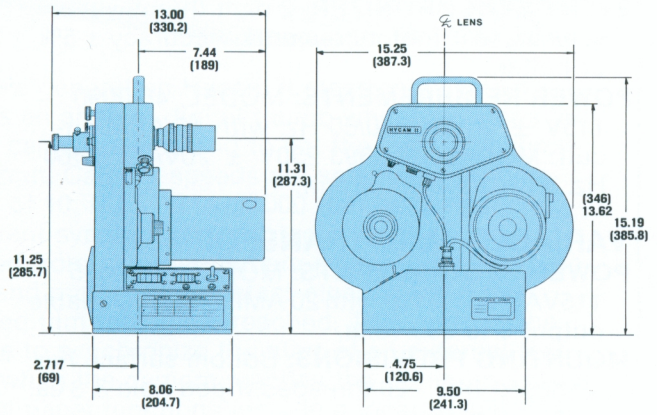
END OF FILM SWITCH: Automatically stops camera when end of film is reached.

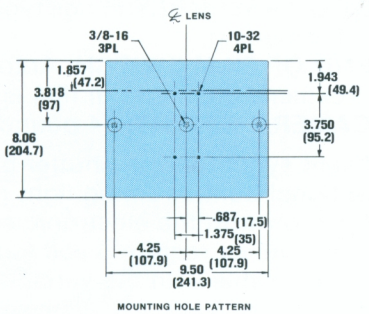
CAMERA WEIGHT: 14 pounds, less film & lens.

Event synchronizer, shutter pulse sync unit and optional built-in timing light generator only function with the electronic speed control unit. These items require 5 volt logic level which is not available with the variable auto transformer.

See price schedule for a complete list of accessory and optional items.

HYCAM® II Series 41 Cameras





MOUNTING HOLE PATTERN

NOTE: MILLIMETERS SHOWN IN PARENTHESES.

DESCRIPTION

The Series 41 Hycam is the most popular 16mm rotating Prism camera in use today. Its broad speed range, flexible performance and easy operation have made the 400 foot Hycam the first choice in rotating prism cameras. Recently introduced improvements include new generation electronics, AC or DC power options and other subtleties to further expand the capabilities of this versatile Hi-Speed recording instrument. Your existing Series 41 Hycam cameras can also be updated with the improvements described in the following specifications.

SPECIFICATIONS

FILM CAPACITY: 16mm x 400 feet acetate base film or 16mm x 450 feet 4 mil. polyester base film.

SPEED RANGE: 80 to 11,000 frames per second (full frame). 200 to 22,000 frames per second (half frame). 400 to 44,000 frames per second (quarter frame).

SPEED CONTROL: Electronic Servo control, provides regulation over entire speed range to ± 1% or 1 full frame whichever is greater.

SPEED SELECTOR: Thumbwheel speed selector switch in 10 FR./SEC. increments. Self-locking at each position.

ACCELERATION (TYPICAL): 1.50 seconds to 5,000 FR./SEC., utilizes 75′ of film to reach speed (nominal).

EVENT SYNCHRONIZER: Thumbwheel selector, 4 to 396 feet in 4 foot increments. Accuracy ± 5% or better.

POWER REQUIREMENTS: MODELS: 41-0064, 41-0065 & 41-0066. 115V ± 10 VAC, 50/60 Hz. with 30A circuit.
MODELS: 41-0067, 41-0068 & 41-0069, 230V ± 20 VAC, 50/60 Hz. with 15A circuit.
MODELS: 41-0073, 41-0074 & 41-0075, 60-120V DC provides speeds up to 10,000 full frames per second.

MOUNTING PROVISIONS: Bottom surface has standard 3/8″ - 16 tapped holes in 3 locations plus 4 No. 10-32 tapped holes for mounting dovetail base plate.

DOOR ASSEMBLY: Hinge type, swings down 90° or may be removed for easy access to film chamber.

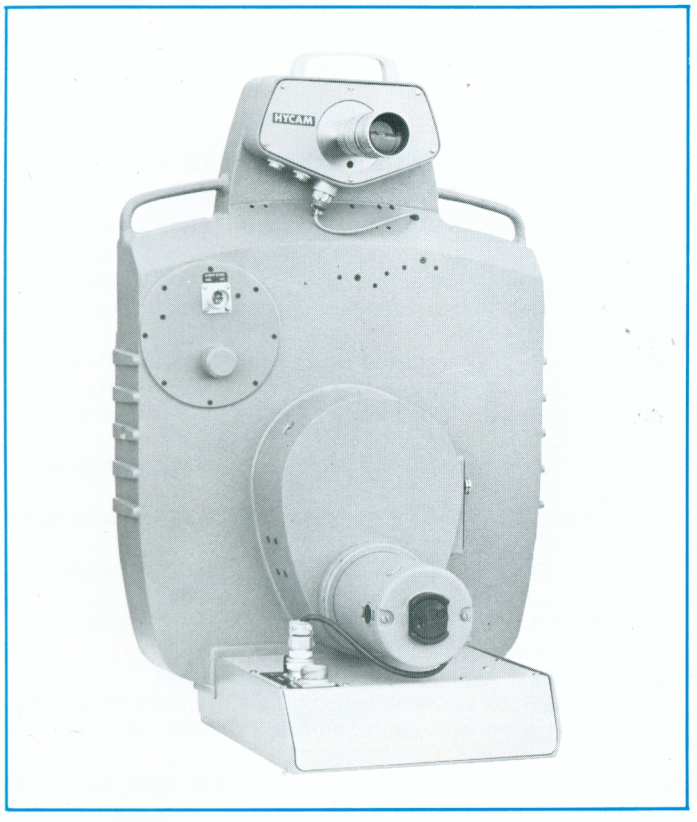
FILM FOOTAGE INDICATOR: Door mounted lever, spring loaded away from film spool. When depressed manually the lever indicates film remaining.

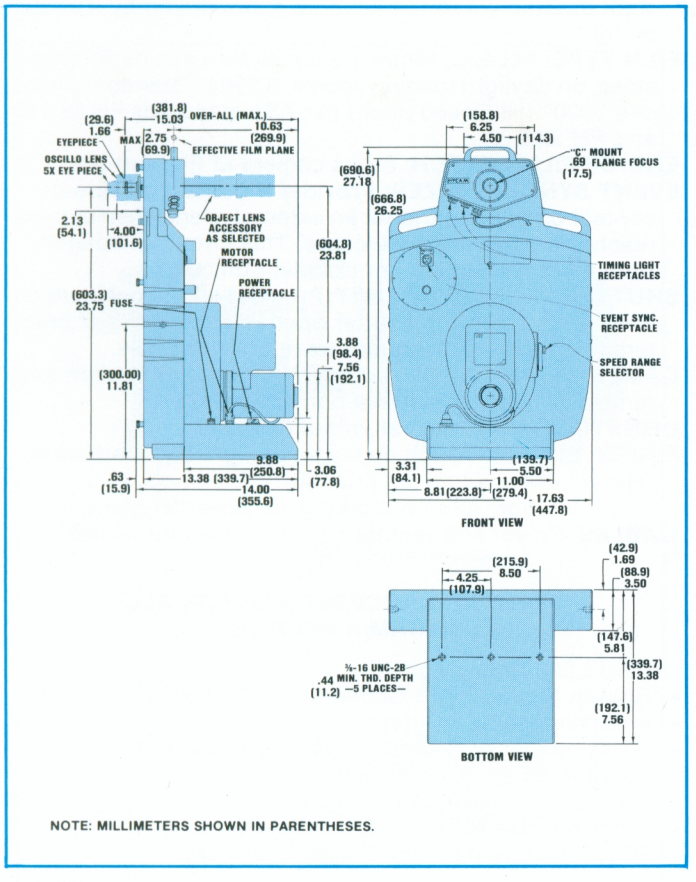
END OF FILM SENSOR: An infrared (IR) sensor automatically stops the camera when the end of film clears the sensor aperture.

SPOOL ADAPTERS: All Series 41 cameras accept accessory adapters for use with 100 foot & 200 foot film spools which reduce end of film chipping & shatter at high speeds.

CAMERA WEIGHT: 32 pounds, all models, less lens and film.

HYCAM® II Series 42 Cameras





NOTE: MILLIMETERS SHOWN IN PARENTHESES.

DESCRIPTION

The Series 42 represents the largest film capacity 16mm High Speed camera available. It was designed for those applications where long recording times are required at relatively high camera speeds. Rocket engine static test firing is a common activity where this type of large film capacity is needed. This model Hycam can be stopped and re-started over its entire speed range.

SPECIFICATIONS

FILM CAPACITY: 16mm x 2,000 feet acetate base film or 16mm x 2,400 feet 4 mil. polyester base film.

SPEED RANGE: Up to 5,000 frames per second (full frame). Up to 10,000 frames per second (half frame). Up to 20,000 frames per second (quarter frame).

SPEED CONTROL: Electronic Servo control provides regulation over entire speed range to ± 1% or one frame whichever is greater.

SPEED SELECTOR: Thumbwheel speed selector switch in 10 FR./SEC. increments. Self-locking at each position.

ACCELERATION (TYPICAL): 7.0 seconds to 2,000 FR./SEC., utilizes 275' of film to reach speed (nominal).

EVENT SYNCHRONIZER Continuously moving dial sets follow arm on film supply. A contact closure or open will occur when pre-set arm position is reached.

POWER REQUIREMENTS: MODELS: 42-0007, 42-0008 & 42-0009 115V. ± 10 VAC, 50/60 Hz. with 30A circuit.
MODELS: 42-0010, 42-0011, & 42-0012, 230V. ± 20 VAC, 50/60 Hz. with 20A circuit.

MOUNTING PROVISIONS: Bottom surface has standard 3/8" - 16 tapped holes in 3 locations plus 1 ea. 3/8" - 16 tapped hole on each side of camera casting.

DOOR ASSEMBLY: Removeable with 5 captive locking screws.

FILM CASSETTES: Each camera is furnished with a pair of interchangeable film cassettes. Supply cassettes pre-loaded in a dark room with film supplied on a "Z" core. When loaded, cassette can be daylight installed & threaded into camera.

FILM FOOTAGE INDICATOR: Follow arm, displacement type, indicates film footage remaining.

END OF FILM SENSOR: An infrared (IR) sensor automatically stops the camera when the end of film clears the sensor aperture.

CAMERA WEIGHT: 82 pounds, all models, less lens and film.

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