

FOCAL POINTS



From **WOLLENSAK** *The Latest in Optical, Electro-Mechanical Developments*

VOL. 2

JANUARY 1966

No. 1

NEW TV AUTO ZOOM



A smaller and lighter weight remotely controlled zoom lens for TV Vidicon camera use, the Model III, has been introduced as a replacement for the existing unit. This new lens should be of special interest to users having applications that require a compact camera system because of space limitations. The smaller configuration also permits its use in many existing environmental enclosures and underwater housings.

With a zoom ratio of 5:1, the lens can be supplied in either of two focal length ranges. A 30-150mm f/2.7 version gives a horizontal field angle of 30° to 6°; a 60-300mm f/5.4 version gives one-half this angular coverage.

Optical performance of the lens meets the demands of today's high resolution camera systems, with better than 900 TV lines horizontal resolution. One lens system can be changed to the other by the use of focal length converters available as accessory items. A $\frac{2}{3}$ closeup supplementary lens is also available for subject distances from 36" to 72".

New motors and gearing permit rapid and smooth changes of zoom, focus, and iris functions. The speeds of these functions are variable, depending on the rate setting the operator selects on the control box. Mechanical limit stops with a slip clutch are used at the end of zoom, focus, and iris travel for trouble-free service. The Model III can be supplied with either 50V DC or 3V DC subminiature motors that are shielded to minimize radio interference.

A new ruggedly constructed two-part optical assembly facilitates mounting the lens to the camera. The "C" mount adapter assembly has been re-designed to fit most single lens industrial cameras as well as the recessed turrets of professional studio-type cameras.

The Model III Auto Zoom lens is available on special order with "non-browning" glass for use in radiation environments.

ULTRA-FAST RECORDING LENS

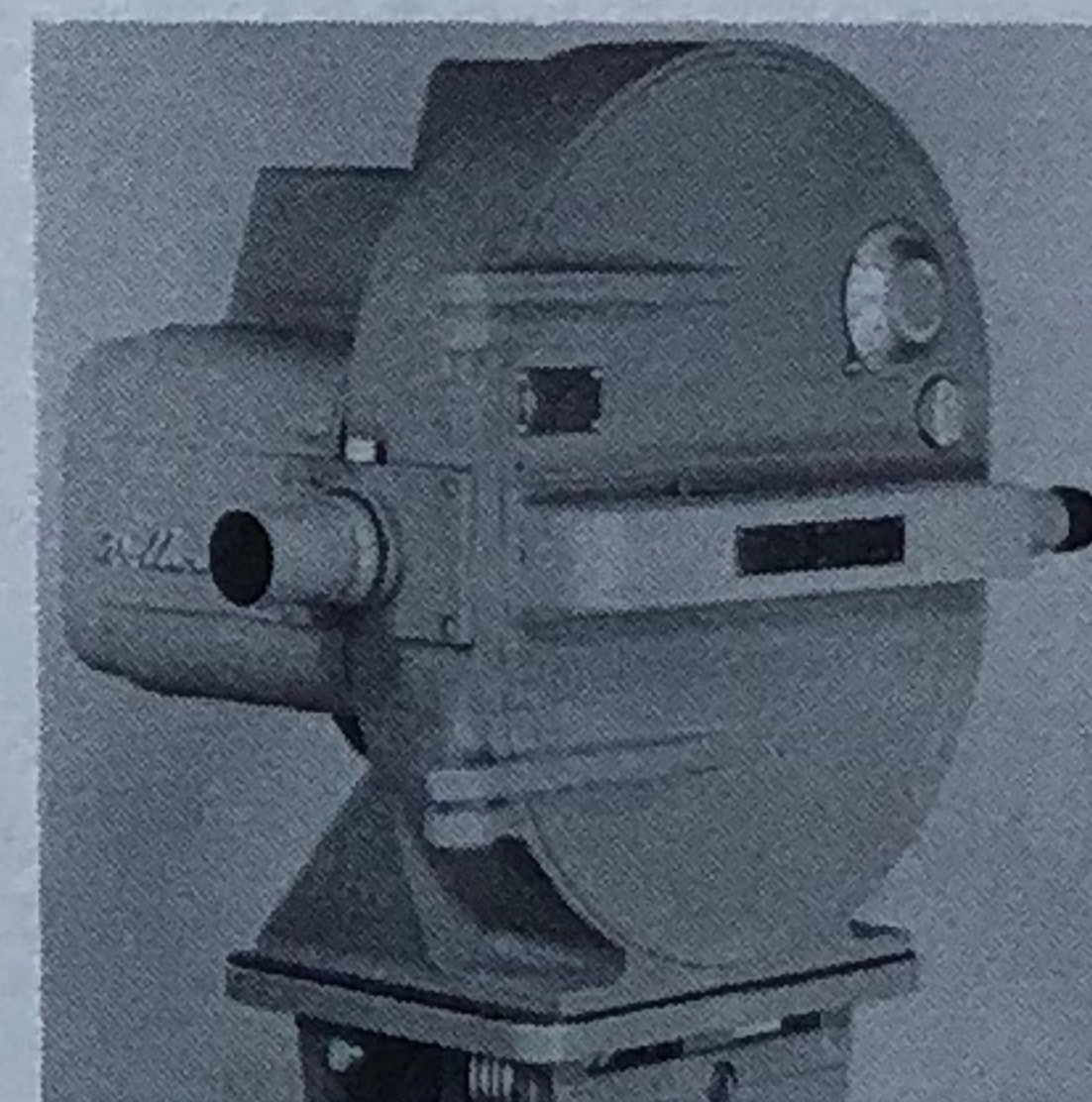
The lens specifications for certain oscillographic recording applications have called for faster and faster lenses in recent years. Whereas apertures of f/1.9 or f/1.5 may still be considered adequate for most uses, the recording of certain high speed transients requires higher light transmission.

A new seven-element high resolution 52mm f/1.0 lens has been designed for these special CRT recording uses. It covers a diagonal of 4½" (12½° - ½ angle), at reduction ratios of between 4.4 and 4.0 to 1. Resolution values at maximum aperture is 50-line pairs/mm AWAR (Average Weighted Area Resolution). It is designed for use with a P-11 phosphor, having a peak sensitivity at 4600 Å. Distortion characteristics will vary somewhat depending upon the ratio selected, but at 4.4X the maximum value is +0.6%.

This lens is currently being manufactured mounted in the new Pi-Alphax Instrumentation Shutter for accurate speeds and long service. Other mountings are available on special order.

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NEW 35MM OSCILLO-STREAK CAMERA



Essentially a 35mm version of the model WF-22S Fastax 16mm 400-ft. Oscillo-Streak Camera, the new WF-12S Camera with its larger recording area permits improved recording of CRT display data.

Having a speed range of 20-200 ft/second, this new model transports film at a maximum rate nearly twice that of the older cameras and can be operated at any speed selected within this range. Stop and re-start operation is possible at all speeds. The camera will accelerate to 100 ft./second with a fully-loaded supply spool in less than 1.0 second. Braking efficiency is achieved by a dynamic brake on the drive motor and a synchronized magnetic brake on the takeup motor and feed spindle. An integral optical type 10X viewfinder is provided for focusing and a separate reflex finder for full-field viewing. Two high intensity NE2J neon lamps provide time data. A vernier type footage counter shows film remaining. Lenses having a different focal length than the 35mm f/2.0 Raptar supplied are available for various combinations of tube size, reduction ratio, and working distance.

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LENS RESOLUTION — TV vs PHOTOGRAPHIC

The resolution of photographic lenses is commonly expressed in lines per millimeter, or more accurately, line pairs per millimeter in the optical-photographic industry. A line pair is a black line of given width, and the "white" space of equivalent width. In the television field lines per inch or TV lines per inch of picture height is the term used. In addition to the obvious difference in the unit of measurement, TV line resolution counts both the black and white lines that must be discriminated on a test chart.

To convert from TV lines to Photographic Resolution:

$$\begin{aligned} \text{TV Lines} &= (25.4 \times .375'' \times 2) \times (\text{Photographic Resolution}) \\ &= (19.05 \times (\text{Photographic Resolution})) \end{aligned}$$

Where:

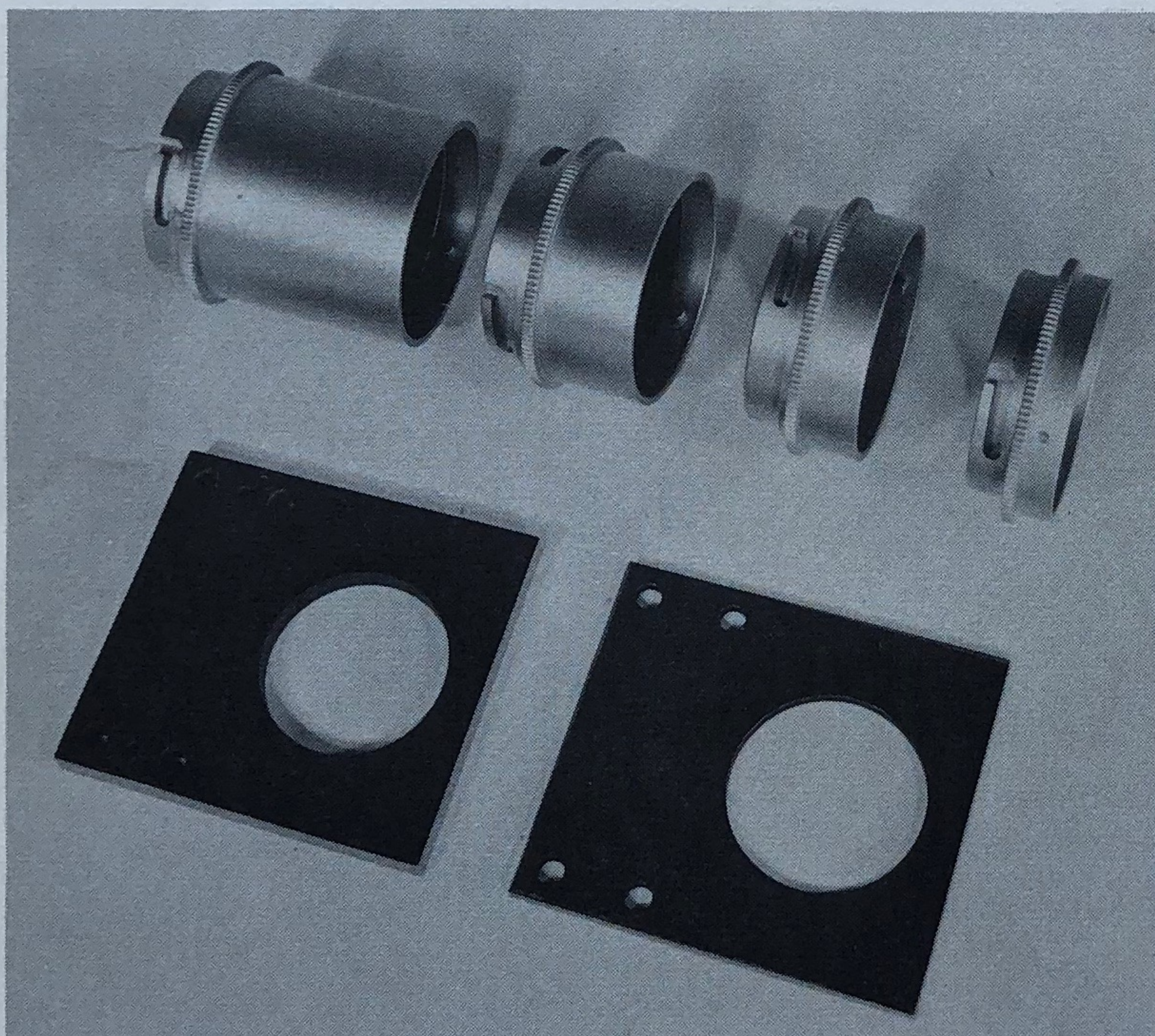
25.4 is the millimeter to inch conversion.

.375'' is the picture height of Vidicon.

2 is the line count factor.

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HELP FOR HIGH-SPEED CLOSE-UPS



When a larger image size is wanted for a high-speed camera study and the camera is moved close to the subject, this distance may become too short for the focusing range of the lens being used. This happens frequently when using long focal length lenses which have a small focusing range.

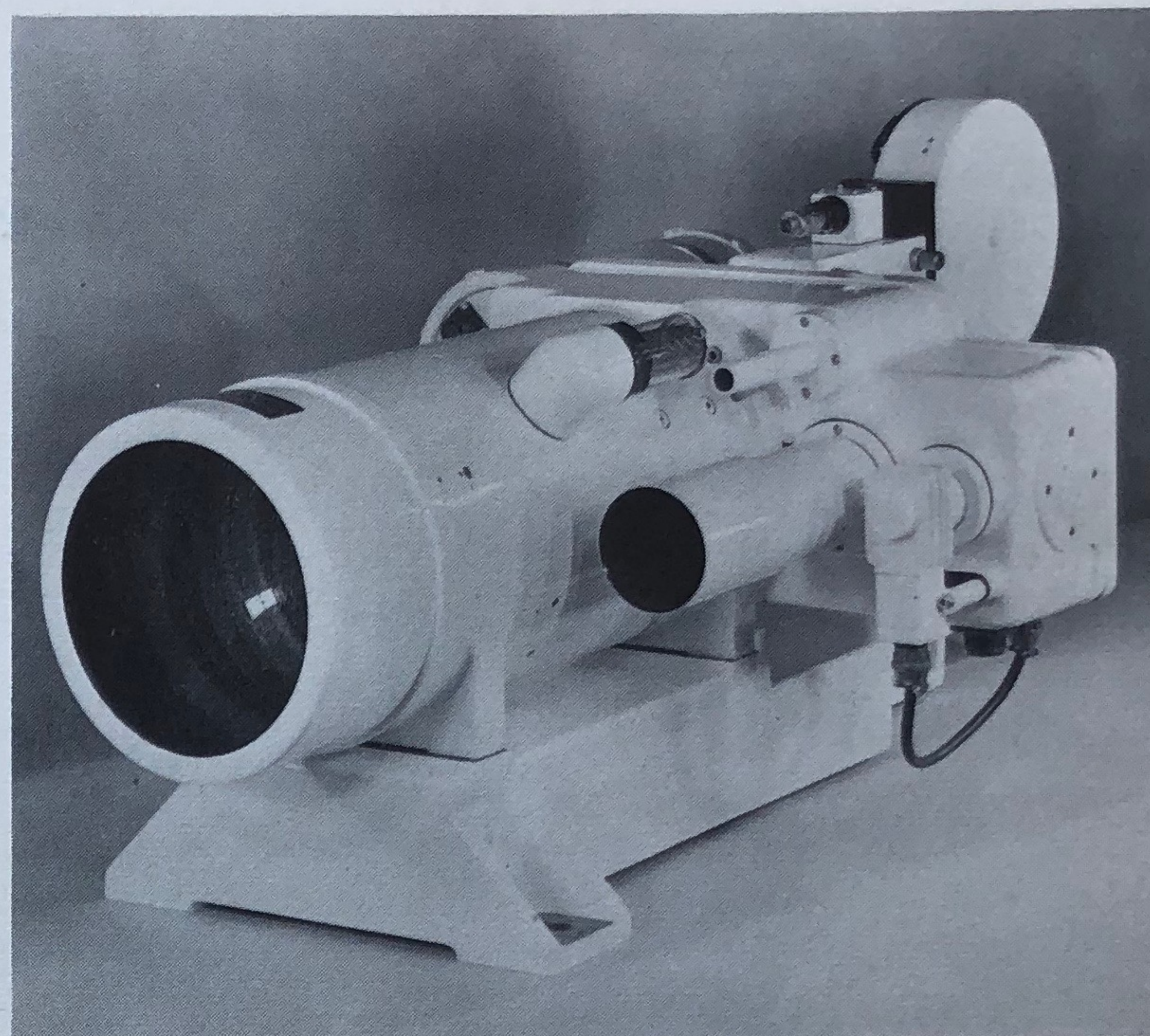
The standard 2'' lens furnished on a 16mm Fastax Camera, with a horizontal coverage of 11.4° focuses from infinity to 28'' by comparison, the 4'' lens focuses down to 8', and the 6'' lens to 20'.

With the proper selection of Extension Tubes or combination of Tubes and Shims, a subject located at almost any distance between the minimum focus distance and that required for unit magnification can be brought into sharp focus.

Four sizes of Extension Tubes (2'', 1'', 5/8'', and 3/8'') and two Lens Plate Shims (1/4'' and 1/8'') are available.

Directions for the use of Extension Tubes and Shims will be sent upon request. This includes formulae for determining the range of distances at which a subject can be focused with a particular lens as well as the exposure modification required.

ANOTHER RADAR BORESIGHT



In two previous issues we have described dual-lens optical boresights, and mentioned the large number of systems we have designed which are at work at tracking sites around the world.

This one differs from the others primarily in its focal length combination — a dual objective lens system consisting of a 40-inch focal length f/6.3 Catadioptric lens and an 8-inch Refractor, mounted side-by-side.

The catadioptric telephoto objective, with its folded reflective optical system, permits the use of a short body tube which has much greater physical stability and gives improved optical performance over a refractive type lens. With simultaneous outputs to a closed circuit TV camera and a 35mm film camera, the operator at a remote control station can monitor the recording and quickly change from one lens to the other. The wide field optical system is used for target acquisition or general observation and the narrow field for tracking at long ranges or close surveillance purposes.

The two lens systems are balanced optically for equal light transmission. A reticle projection system images a graduated reticle at both camera focal planes. The lenses are set at their hyper-focal distance, which calculated for a .002'' circle of confusion, gives a minimum target distance of 711 feet for the 8'' lens and 2.0 miles for the 40'' lens. Total field of view for the Vidicon TV is .88° for the 40'' lens; 4.5° for the 8''. For the 35mm (18 x 24mm) film camera, the fields of view are 1.76° and 8.8° respectively.

For protection of the vidicon against exposure to direct sunlight, a photo cell device initiates shutter closure when the lens system is directed toward the sun.

Several versions of this optical system with modifications in the output have been made to meet specific customer requirements. These include the introduction of an eyepiece in place of one of the cameras for visual observation at the boresight position; two film cameras instead of one film camera and one TV camera. A number of different reticle patterns have likewise been supplied. Other modifications that can be made are adjusting the focus of the lenses for a different target distance, or accommodating more than one target distance through optical compensation. Complete specifications on this system are available on request.

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