Multicon—A New TV Camera Tube

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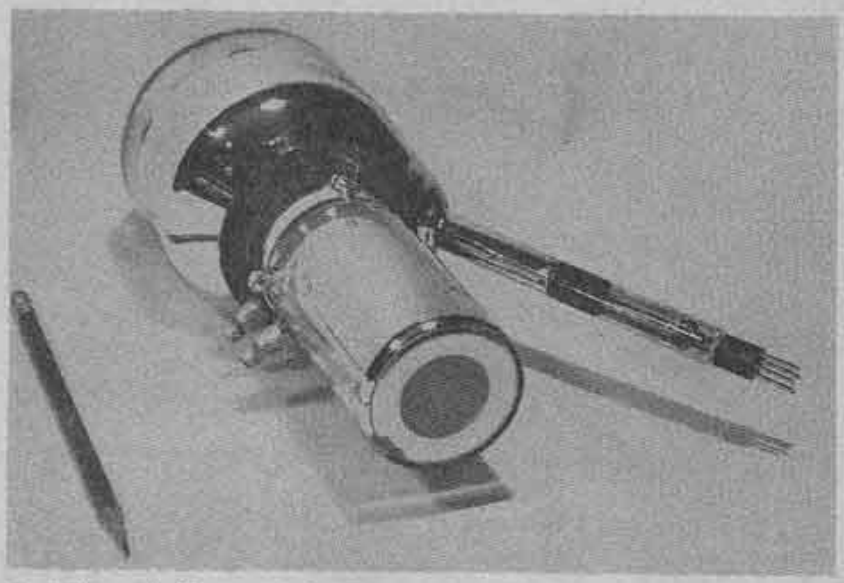


Fig. 1: Photograph of the new "multicon" TV camera tube. Operation is similar to image iconoscope

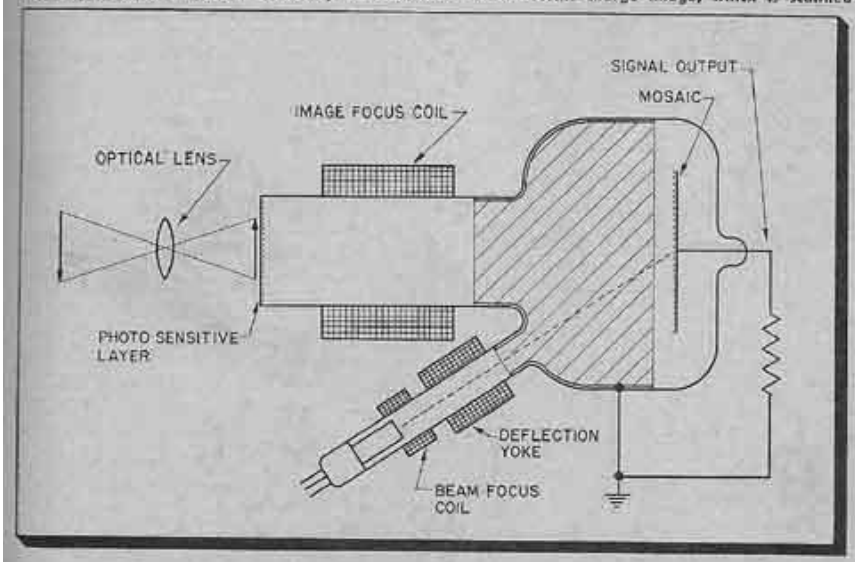
Heart of recently announced low-cost camera is 9-inch long image iconoscope, not used previously in U. S. commercial stations. Unit features high sensitivity, eliminates need for blowers and heaters

THE "multicon" is a new television camera tube having operating characteristics similar to those employed in the image iconoscope. Tubes falling into this general category have not been used heretofore in the United States for commercial broadcasting but are currently being used rather extensively in Europe for studio work. The "multicon" is manufactured by Philips, in Eindhoven, Holland. (See Fig. 1.)

The principle of operation for this type tube very briefly is as follows: The optical image is focused on a photosensitive layer which is deposited on the inner surface of the flat face plate of the tube. (See Fig. 2.) Photo-electrons emitted from this surface are accelerated toward the mosaic by a suitable electric field established within the tube envelope. The photo-electron streams are focused by means of the image focus coil on the surface of the mosaic. The mosaic surface is made up of a vast number of microscopic particles deposited on an insulating plate. The particles are insulated from one another and consist of material which is a good secondary emitter. The photo-electron streams cause a charge image to be formed on the mosaic surface by virtue of secondary emission.

The charge image is scanned by an electron beam produced by an electron gun, magnetic focus coil, and magnetic deflection yoke. As the beam passes over the charge image on the mosaic, a variation in net charge on its surface takes place, the amount of variation depending upon the charge condition of the elements being scanned. (i.e. the number of secondary electrons released from the mosaic by the photo-electrons.) As was mentioned, the mosaic surface consists of isolated microscopic particles deposited on an insulating plate. The opposite side of the insulating medium is covered with a conductive layer known as the signal plate. Each particle in the mosaic can be considered to be "capacitively coupled" to the signal plate. The variation in net charge on the mosaic is transferred via capacity to the signal plate which in turn is connected through a suitable glass seal to an external load resistance. The resulting current variations in this load resistance produce the video output voltage.

Fig. 2: In operation, light striking photo-sensitive layer causes photo-electrons to be emitted and accelerated toward mosaic. Secondary emission from mosaic forms charge image, which is scanned



The principle by which the video signal is obtained from the mosaic will be recognized as being similar to that of the iconoscope tube. The iconoscope tube is currently used as the pickup device in almost every film system now in commercial use. Its ability to give high definition pictures with no tendency to "burn in" or stick are well known. The multicon retains these good qualities and the addition of an image section leads to several advantages which war-

(*Continued on page 125*)

Camera Tube

(*Continued from page 57*)

rant mention. The sensitivity of the tube is increased many fold and the photo-cathode dimensions are reduced. This permits the use of inexpensive (standard 16MM) lenses and enables the tube to operate with excellent signal-to-noise ratio in studio application with the incident light levels now used in television studios. It is possible with the use of an image focus coil of special design, to "enlarge" the charge image on the mosaic by a ratio of approximately 3 to 1 by means of a remotely operated, continuously variable resistance network. The image remains in focus at all times and the video output signal remains constant. The effect is to "dolly in" or "zoom" toward the subject without moving the camera or employing an expensive and heavy optical lens system. This principle permits the camera control operator to change the apparent subject to camera distance by means of a simple control.

Even with the addition of the image section, the tube is considerably smaller than other tubes used in television broadcasting. (See Fig. 2) The overall length measures slightly more than nine inches. The tube operates within wide temperature limits and eliminates the need for blowers and heaters to control the ambient temperature. The moderate tube size, small lenses, and the lack of a need for heaters permit a smaller camera head design.

The multicon is the heart of the new camera in the general purpose TV camera chain developed by Standard Electronics Corp., 285-289 Emmett Street, Newark, N.J. to meet the need for a simple, inexpensive pickup system. The new camera, reportedly, can be used with equal effectiveness on motion picture film, live talent and on still slides or opaques.

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