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Tube Tips



A NEWSLETTER TO THE BROADCASTING INDUSTRY
RCA TUBE DIVISION HARRISON, N. J.

750-Mesh Ruling Engine Developed by RCA

RCA recently developed and put into operation a precision-built machine capable of ruling perpendicular sets of parallel lines which number at least 750 to the linear inch. The ruled surfaces produced by this machine are used as forms for consistently reproducing the fine-mesh screens required by image orthicons and vidicons. The width of these precision-ruled lines is no thicker than the filament spun by spiders.

The development and construction of a ruling machine is a unique RCA achievement. When RCA attempted to surmount the first problems of design, a careful search revealed no experienced manufacturers. For information, RCA development engineers studied designs of three basic types of ruling machines.

Investigations showed that few ruling engines were ever built alike, verifying the surmise that they are not merely mechanical assemblies, but works of art. The three basic types of ruling engines, mentioned above, were available for study at Johns Hopkins University.

The room housing the RCA ruling engine is temperature-controlled. Temperature changes would cause imperfections in the ruled lines, so the room is maintained to within one-half degree of the optimum operating temperature. Vibration is another critical factor, and the machine, therefore, is mounted on an eight-ton, cast-concrete inertia block which is in turn spring-mounted on top of pilings which rest on bedrock 20 feet below ground level. The base casting for the new RCA ruling engine weighs about two-and-one-half tons. It is supported on the concrete inertia block by three one-inch steel balls.

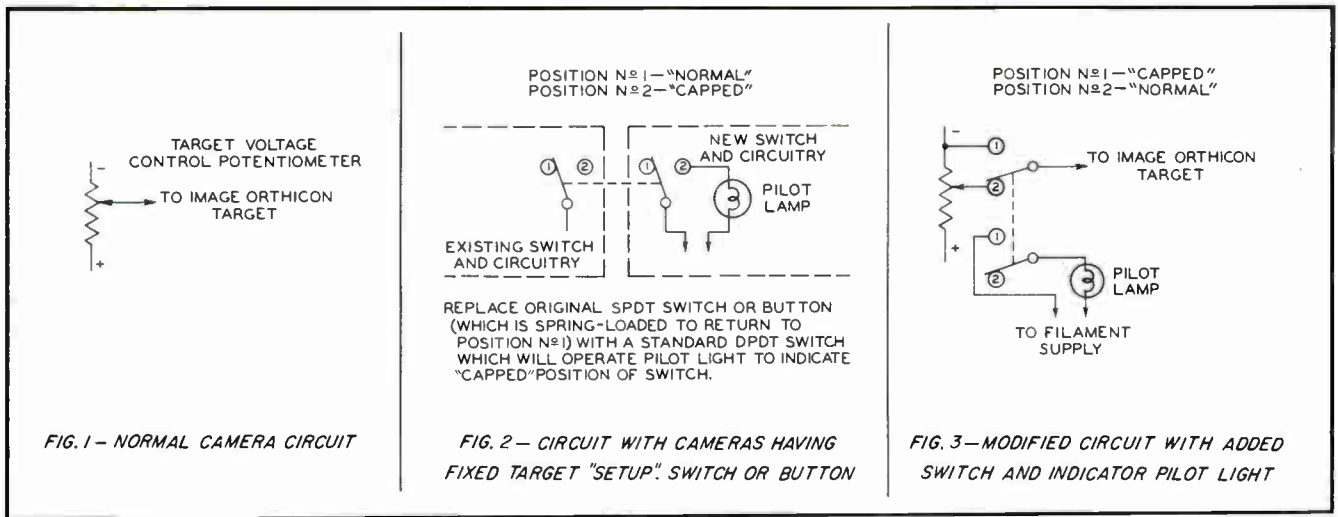
With this ruling engine, RCA is producing highly satisfactory glass mesh masters for the high-quality 750-mesh screens used in various types of RCA tubes. Called Micro-Mesh, the 750-mesh screen eliminates mesh pattern and moiré effects, and at the same time improves picture-detail contrast in the RCA-5820 image orthicon for black-and-white and the RCA-6474/1854 image orthicon for color-TV service. It also minimizes the beat pattern between the color sub-carrier and the frequency generated by the beam scanning the mesh-screen pattern.



How to Get More Hours from an RCA-6166 VHF Power Tetrode

TV broadcasters can increase the life of their RCA-6166 VHF power tetrodes if they follow these seven rules: • hold the filament voltage at 5 volts—at tube terminals • keep air-cooling system clean to prevent tube and circuit damage caused by overheating • if power amplifier uses spring-finger socket contacts—make sure each finger is clean and has ample tension for good contact (to prevent arcing) • handle 6166 carefully to avoid damage through mechanical shock • operate 6166 within RCA ratings (follow instructions packed with each tube) • operate spare tubes periodically • test each 6166 in actual operation as soon as you receive it.

Starting with this issue, your favorite newsletter (RCA TUBE TIPS, of course) has a "new look." This new format better reflects the reading requirements of these modern times. It should be speedier and easier to read. We certainly hope you like it.



Electronic 'Lens Cap' for Image-Orthicon Cameras

According to a technical paper by R. G. Neuhauser, RCA Tube Division engineer, the use of an electronic "lens cap" for an image-orthicon camera can greatly increase effective tube life. The electronic lens cap is an extremely simple and practical device.

The life of an RCA-5820 image-orthicon tube or an RCA-6474/1854 image-orthicon tube is proportional to the amount of charge drawn through the target. To prolong the life of either of these types, it is essential to prevent using up the available life time when no useful picture is required from the camera. Tube life can be prolonged by capping the lens of the image-orthicon camera when a picture is not required.

Lens capping, however, has not been easy to accomplish because of difficulties involved in studio and layout. In spite of the high resolves of many studio supervisors to institute practices which will prolong tube life, the camera man usually keeps the camera open and operating.

The "lens-capping" function can be performed electronically in a very simple way. The camera control unit under the video man's control is provided with a simple toggle switch which is flipped to remove the positive voltage usually applied to the target and to substitute a negative voltage of at least 2 volts. The negative bias thus applied to the target prevents any current flow through the target and effectively "caps" the lens electronically. No other operating condition is changed, nor is the camera setup changed. The picture will be restored to its original setup within 0.1 second when the "cap" switch is set to "normal" position. Camera match and all other setups are maintained. Electronic capping is equally applicable to color and to black-and-white cameras. Because it does not "decommission" the camera or other circuitry, the video man can be sure of proper camera operation by observing the monitor during "lens capped" intervals.

The electronic lens cap can be used to extend the life of image-orthicons in the following manner. After a camera has been focused on a stationary set, the lens-cap switch is then flipped to "capped" position. The video man can make a periodic check of the scene by flipping the switch to "uncapped" and "capped" positions. The camera can remain focused on a scene, a card, or a set "all day" without burn-in when it is "capped" with the electronic lens cap.

The video operator can make a practice of flipping "off" all cameras he is not using during setup or rehearsal and be assured of an accurate setup when electronically uncapping the cameras. This technique is useful, because the camera can be focused on a scene and turned on only as needed.

The electronic lens cap can be installed in two ways. Figure 1 shows a normal camera circuit, without incorporation of the electronic-lens-cap switch. In cameras having a target setup switch (see Figure 2), the spring-loaded switch can be replaced by a two-position switch in which the "set-for-cutoff" position can also be used as the "capped" position.

In other cameras (see Figure 3), the switch can be installed to short out the arm of the target-control potentiometer to the negative end of the potentiometer, or to switch the lead to the target from the arm of the target potentiometer to the negative end of the target potentiometer. In all cases, a double-pole switch should be used to provide the video man with a visual indication of the position of the lens-cap switch. A small, colored pilot lamp connected to the filament circuit of the camera control and operated by the second half of the switch will perform this function.

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Camera tubes used in color-television broadcast service were discussed in another technical paper by RCA Tube Division engineer Neuhauser. This paper was presented at a recent meeting of the Society of Motion Picture and Television Engineers in Los Angeles.

The paper reviewed tubes currently used and those which have been found basically unsuitable for color-TV cameras. It also covered the general requirements for tubes to be used in color-TV pickup applications; evaluation of the basic performance characteristics of various camera tubes including vidicons and image orthicons now in use; characteristics which limit the number of tube types usable for color TV; and various quality problems involved in color-TV pickup, and the methods used to overcome these problems. The conclusion of the paper evaluated operating devices which are used to improve color-TV pickup performance.

Mr. Neuhauser's paper will be published in the *Journal of the SMPTE*. When available, reprints will be supplied on request to Commercial Engineering, RCA Tube Division, 415 S. 5th St., Harrison, N. J.

Field Engineering Staff Offers Technical Aid to Stations

Field engineers attached to the distributor sales organization of the RCA Tube Division are aiding broadcasters on certain technical or operational problems involving RCA power tubes used in AM, FM, and VHF- and UHF-TV transmitter equipment; cameras and studio equipment; speech and modulation equipment, and power supply systems.

The majority of tube application problems encountered by the RCA field engineering staff are rapidly solved by mail or telephone correspondence. The observations and experiences of the field engineer are then recorded and relayed to various technical engineering groups for valuable guidance in future development of new and improved RCA tubes and equipment for broadcasters.

Broadcasters who need technical advice on RCA tubes should contact J. J. Kelley or R. E. Johnson, RCA Tube Division, 415 S. 5th St., Harrison, N. J. Letters should contain the following information: (1) specific problem; (2) quantity, type, and serial number—if any—of RCA power tubes involved; (3) if more than one tube is involved, whether or not all became involved at the same time; (4) type of circuit in which problem has arisen; (5) length of operation of RCA tubes in that circuit, and (6) date tubes were delivered.

RCA Announces Two New Test Instruments

Two new test instruments recently announced by RCA should be of interest to broadcast engineers. These new test instruments are the WA-44B Audio Signal Generator and the WR-61B Color-Bar Generator.

The versatile WA-44B Audio Signal Generator is especially useful in applications in the radio and television broadcast field. Other applications include engineering field laboratories, high-fidelity, and radio and TV servicing.

Covering the range of 11 to 100,000 cps in four bands with output up to 15 volts, the WA-44B can measure intermodulation distortion and frequency response in amplifiers, input and output impedances of amplifiers, and resonant frequencies of loudspeakers. The generator can also be used to determine the values of unknown inductances and capacitances.

Features of the WA-44B are as follows: output flat within 1 db over the entire frequency range of the instrument; total harmonic distortion 2% or less from 30 to 15,000 cps; and a frequency stability within $\pm 3\%$ under normal operating conditions.

Engineered to give long, trouble-free performance, the WA-44B will speed the testing and servicing of any equipment which utilizes an audio signal.

The WR-61B Color-Bar Generator is designed for use in checking the overall operation of color-TV receivers or monitors, and for adjusting their color phasing and matrixing circuits. It produces 10 simultaneous color bars (without switching), including the bars corresponding to the R-Y, B-Y, G-Y, I, and Q signals. The bars are accurately spaced at 30-degree phase intervals.

Luminance signals are provided at the edges of the color bars to check the registration of the luminance and chrominance signals. In addition, special 189-Kc pedestals, adjustable in amplitude, are provided in the output signal to facilitate checking of color circuitry.

A video output of either positive or negative polarity is available at a front-panel terminal for troubleshooting color monitors.

Front-panel adjustments are provided for the amplitudes of the color-burst and sub-carrier signals, and for the removal of the 189-Kc pedestals in the output signal.

A built-in rectifier circuit, for use with an external *VoltOhmyst*®, facilitates measurement and adjustment of sync and sub-carrier amplitudes.

The unit is supplied with a shielded rf-output cable for connection to balanced 300-ohm inputs, and a shielded video cable for connection to 75-ohm video circuits.

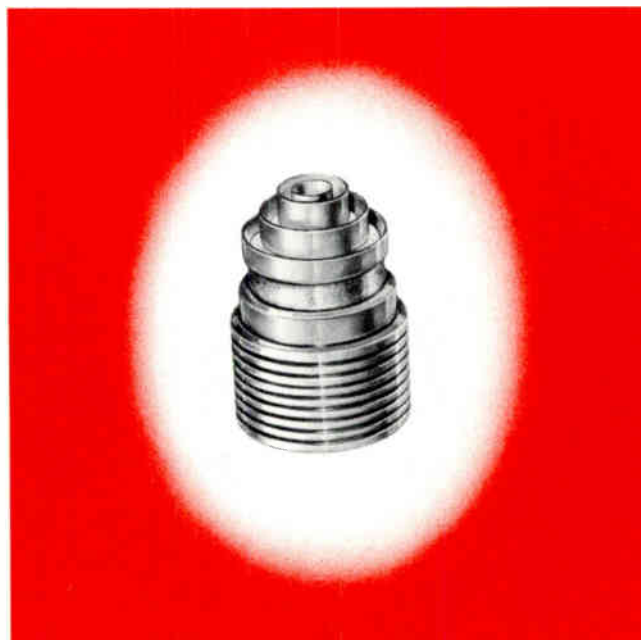
New RCA Tube Types

RCA-3WP1, -3WP2, and -3WP11 are three-inch oscillograph tubes of the electrostatic-focus and electrostatic-deflection type featuring extremely high deflection sensitivity. Each has a flat face, a minimum useful screen diameter of $2\frac{3}{4}$ inches, and a maximum overall length of $11\frac{5}{8}$ inches.

The 3WPI has a medium-persistence phosphor for general oscillographic use, the 3WP2 utilizes a long-persistence phosphor for temporary recording of electrical phenomena, and the 3WP11 employs a short-persistence phosphor for applications involving photographic recording of electrical phenomena.

RCA-6816 and -6884 are small, forced-air-cooled beam power tubes for use as UHF power amplifiers, oscillators, and frequency multipliers, as well as af power amplifiers and modulators in compact mobile and fixed station equipment. The tubes differ only in heater voltage and current. Maximum plate-dissipation rating is 115 watts, modulator and cw service. For cw, they can be operated with full ratings to 1200 Mc and with reduced ratings to 2000 Mc. Maximum overall length is 1.955 inches; maximum diameter, 1.265 inches.

Distributor Resale prices (optional) are as follows: RCA-3WP1, \$30.35; RCA-3WP2, \$31.10; RCA-3WP11, \$31.10; RCA-6816, \$60.00; RCA-6884, \$60.00.

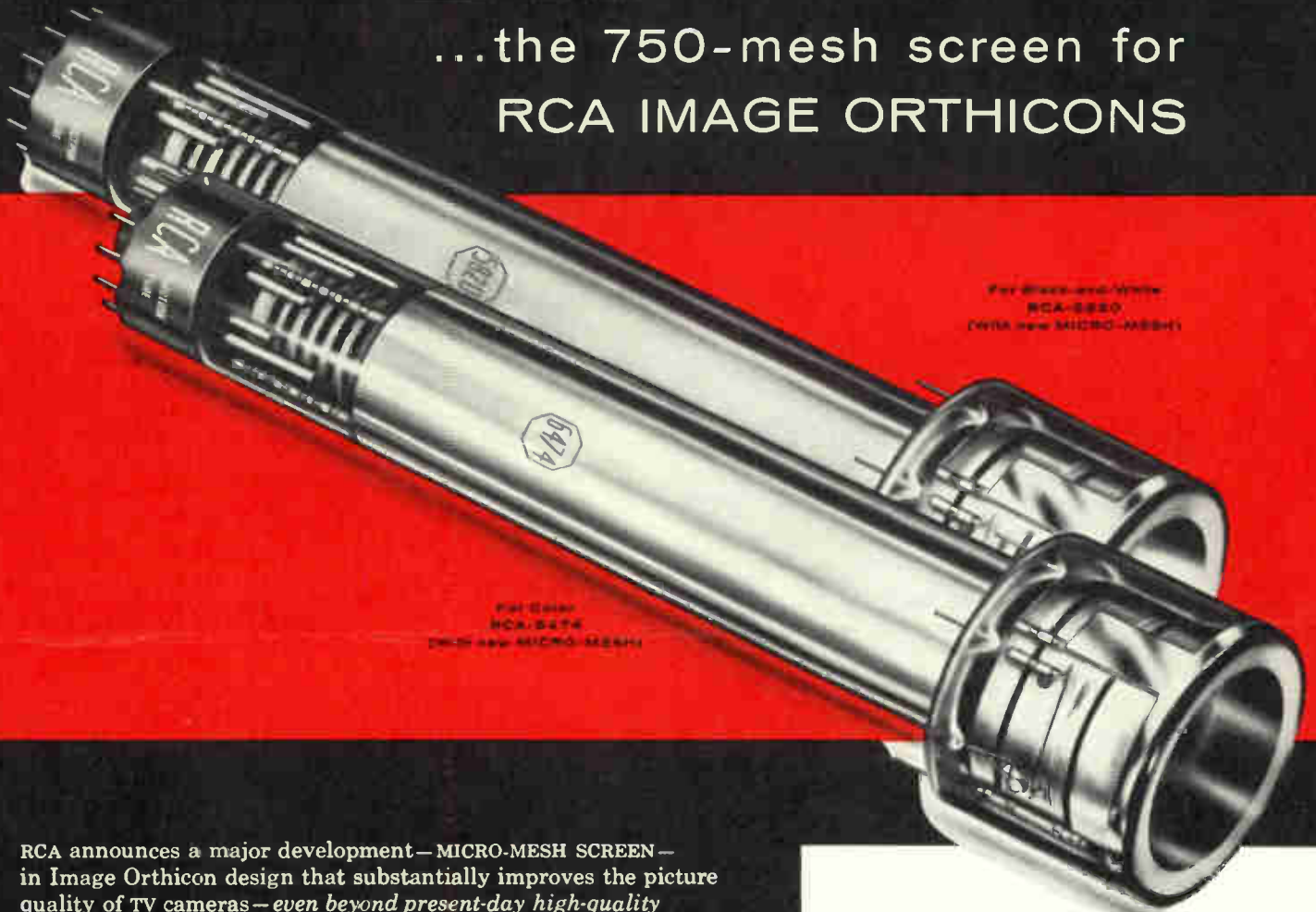


Spotlighting the RCA-6816 forced-air-cooled beam power tube

NOW — Another RCA first in Camera Tubes

MICRO-MESH

...the 750-mesh screen for
RCA IMAGE ORTHICONS



For Black-and-White
RCA 5250
(With new MICRO-MESH)

For Color
RCA 5274
(With new MICRO-MESH)

RCA announces a major development—MICRO-MESH SCREEN—in Image Orthicon design that substantially improves the picture quality of TV cameras—even beyond present-day high-quality standards of performance!

In RCA MICRO-MESH, the fineness of the mesh has been increased from 500 lines per inch to a new high of 750 lines per inch—with a mechanical exactness heretofore unattainable. Here are a few ways this improvement works for you. (1) It eliminates mesh pattern and moiré effect without need for defocusing—both in black-and-white and color. (2) It permits improved picture-detail contrast. (3) It is particularly effective in color cameras where detail contrast cannot be improved by operating the tube above the knee.

Under continuous development for more than 5 years at RCA, MICRO-MESH in RCA Image Orthicons is evidence of RCA's intensive engineering effort to bring telecasters camera tubes of the highest possible quality.

RCA Image Orthicons—with new MICRO-MESH—are available immediately from your RCA Tube Distributor. For technical details on RCA Image Orthicons, write RCA, Commercial Engineering, Harrison, N. J.

ADVANTAGES OF MICRO-MESH

For black-and-white or color

- Eliminates mesh pattern and moiré effect without defocusing.
- More than meets all technical requirements of 525-line TV system.

For color only

- 750-mesh tube with aperture-correction circuit provides 100% response for 350-line information. 500-mesh tube without aperture-correction circuit permits only about 60% response for 350-line information. Although correction circuit can be used with 500-mesh tube, such use emphasizes moiré and beat-pattern problems.
- Minimizes beat pattern between color sub-carrier and frequency generated by beam scanning mesh-screen pattern.
- Improves detail of color pictures.



CAMERA TUBES FOR TELECASTING

RADIO CORPORATION OF AMERICA • HARRISON, N. J.