



Tube Tips



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

Neuhauser Improves First Version of Electronic Lens Cap

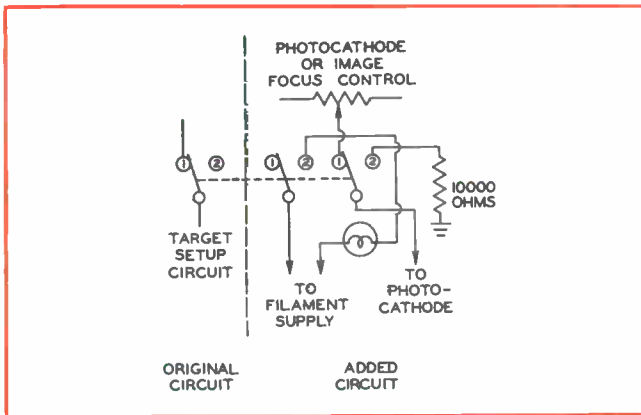


Figure 1. Circuit and switch modifications for cameras having fixed target setup switch or button (Position 1, "Normal;" Position 2, "Capped"). The SPDT switch or button in original circuit spring-loaded to return to position No. 1 is replaced by a triple-pole, double-throw switch (or suitable rotary switch).

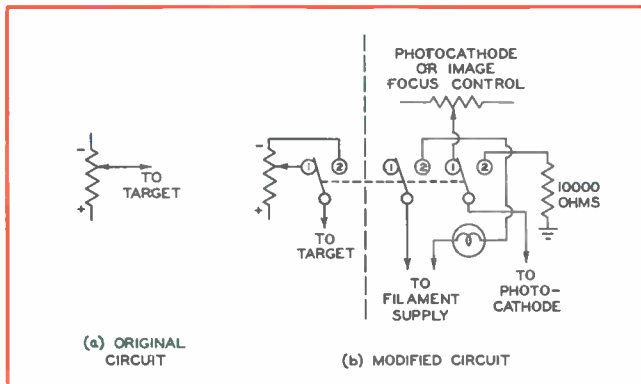


Figure 2. a. Target voltage control potentiometer as connected in cameras not having target setup switch. b. Circuit modification for cameras not having fixed setup switch. The triple-pole, double-throw switch is added and connected as shown in diagram (Position 1, "Normal;" Position 2, "Capped").

In a recent technical paper by R. G. Neuhauser, RCA Electron Tube Division engineer, a discussion of the use of an electronic lens cap for image orthicon cameras to increase the effective image orthicon tube life was presented. According to Mr. Neuhauser, the life of an RCA-5820 image orthicon or an RCA-6474/1854 image orthicon is proportional to the amount of charge drawn through the target. To prolong the life of either of these types, it is essential to cap the lens to prevent using up the available life time when no useful picture is required from the camera.

Mr. Neuhauser now points out that in the use of his original electronic lens cap circuit, a temporary type of image burn-in may be encountered with image orthicon tubes having a high amount of usage (due to the secondary emission changes on the target caused by photo-electron bombardment). A modified electronic lens cap is described which will completely eliminate any temporary type of image burn-in that might occur in image orthicons, while the tube is "capped," regardless of the amount of usage.

To provide an electronic lens cap, the camera control unit under the video man's control can be equipped with a triple-pole, two-position rotary or toggle switch. When the switch is flipped to the "capped" position, a contact in one section of the switch removes the positive voltage usually applied to the target and substitutes a negative voltage of at least 2 volts. The negative bias thus applied to the target prevents any current flow through the target. In the "capped" position, another contact in the second section of the switch cuts off the flow of photo-electrons from the photocathode and thereby prevents the occurrence of any secondary emission at the target. This action 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 switch is set to "normal" position. Camera match and all other setups are maintained.

New Name for Old Friend

The RCA Tube Division will now be known as the RCA Electron Tube Division, according to a recent announcement from the office of D. Y. Smith, Vice President and General Manager. Mr. Smith indicated that the new name more precisely defines the type of products manufactured and merchandised by the Division.

The electronic lens cap can be installed in two ways. In cameras having a target-setup switch (see Figure 1), the spring-loaded switch is replaced by a triple-pole, double-throw switch and the "set-for-cutoff" position is also used as the "capped" position. In other cameras (see Figure 2), the switch is 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 either type camera, the second contact in the second section of the lens-cap switch breaks the connection between the photocathode and the photocathode potentiometer, and grounds the photocathode through a 10,000-ohm resistor. To provide the video man with a visual indication of the position of the lens-cap switch, a small, colored pilot lamp is connected to the filament circuit of the camera control and operated by the third section of the lens-cap switch.

Electronic capping is equally applicable to color and to black-and-white cameras. Because it does not "de-commission" 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 flipped to "capped" position. The video man can make a periodic check of the scene by flipping the switch to "normal" 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 accurate setups when electronically uncapping the cameras. This technique is useful, because each camera can be focused on a scene and turned on only as needed.

TV Broadcasters Can Eliminate Heater Burnout in Various Kinescope Types

Difficulty has been experienced by some television broadcasters in the proper use of RCA flying-spot scanner types, transcriber kinescope types, and projection kinescope types -5AUP24, -5TP4, -5WP11, -5WP15, -5AZP4, -5ZP16, -7NP4, -7WP4, -1818P1, -1818P11, and -1818P27. The difficulty resolves itself in burned-out heaters which occur when circuits have not been properly designed for these particular types.

The respective technical bulletin for each of the above types recommends that the mid-tap or one side of the heater winding should be connected directly to the cathode to minimize the possibility of heater burnout. This connection will also minimize the possibility of damage due to heater-cathode shorts produced by arcing between heater and cathode when a possible momentary internal arc causes the voltage between the heater and cathode to exceed the maximum heater-cathode ratings.

When, in some circuit designs, the heater is not connected directly to the cathode, precautions must be taken to hold the peak heater-cathode voltage to the maximum values shown in the tabulated data contained in each tube's respective technical bulletin.

Technical bulletins on the above types are available to television broadcasters, on request, from RCA Commercial Engineering, 415 S. 5th St., Harrison, N. J.

Radio Station WLOF's RCA-892-R's Give Record-Breaking Performance



W. D. Daniel, chief engineer for WLOF, Orlando, Fla., recently reported on the excellent performance and long life experienced in the use of two RCA-892-R power triodes. The two tubes were used as the modulators in an RCA-BTA-5F radio broadcast transmitter.

Mr. Daniel stated in a letter to RCA that "the tubes were installed on August 28, 1950, and were replaced on April 21, 1956, for a total service time for both tubes of 82,647 hours.

"We believe this to be a little unusual, but have discovered from other chief engineers with similar equipment that we seem to be getting above the average service from our RCA-892-R's. May I also add that in the so-called RCA receiving-type tubes it is not unusual for us to get from 8,000 to 10,000 hours service.

"As you may have guessed, we are sold on RCA tubes -keep up the good work, it makes us money."

RCA Transistors Used in Pocket FM Communications Receiver

Broadcast engineers attending the Southwest Institute of Radio Engineers Show, held at the Shamrock Hotel, Houston, Tex., on April 11-13, saw—for the first time anywhere—an RCA all-transistorized, pocket-size, FM radio receiver designed for commercial mobile communications.

Following nationwide field tests, the new micro-miniature receiver will be commercially available later in 1957. The new unit is a forerunner of a complete line of revolutionary RCA transistor-type receivers and transmitters for commercial communications. These future types of equipment will be designed to operate in the 50-, 150-, and 450-Mc bands, and will incorporate such features as person-to-person private communication, absentee notification of messages received, and

battery-saving operation with the utilization of RCA transistors.

RCA's transistorized 150-Mc FM receiver is a single-channel device designed for any frequency between 148 to 174 Mc. Fully transistorized and using printed circuitry, this pocket-size double superheterodyne FM receiver incorporates its own antenna and loudspeaker, which obviates the requirement of a separate earpiece. The receiver can be directly contacted by the sending station without the need for additional equipment.

Because all of the components are miniature types, the receiver measures $2\frac{3}{4}$ inches wide, 1 inch deep, and $6\frac{1}{2}$ inches high, and operates with self-contained flashlight-type mercury batteries. Power consumption of the transistors used in the unit is only a small fraction of one watt.

This experimental receiver can be carried in the pocket in the "on" position and can be used to take direct or relayed transmissions from both fixed and mobile stations. The carrier can hear all messages transmitted by the sending station on any single VHF channel in the 150-Mc band which the receiver has been factory-adjusted to detect. The exceptionally low power requirements which result from the low power-drain characteristics of the RCA transistors contained in the receiver makes possible efficient, continuous "on" operation over greatly extended periods of time.

RCA Announces New Vidicon Tube

A new Vidicon camera tube designated RCA-6198-A was recently announced by the RCA Electron Tube Division. The new Vidicon utilizes a photoconductive layer as its light-sensitive element and has a sensitivity which permits televising scenes with 100 to 200 foot-candles of incident illumination on the scene. The resolution capability of the 6198-A is approximately 600 television lines and it has a spectral response which approaches that of the human eye.

The design of the 6198-A features a structure without a side-tip which allows the use of a longer deflecting yoke than can be permitted with tubes which have the side-tip structure. The longer yoke offers the advantages of less deflecting power, and a narrower deflection angle which effectively reduces deflection distortion and improves center-to-edge focus of the beam.

Measuring only about 1 inch in diameter and $6\frac{1}{4}$ inches in length, the 6198-A lends itself to lightweight, compact TV cameras. The 6198-A Vidicon camera tube is directly interchangeable with the 6198.

Distributor Resale price (optional) of the RCA-6198-A is \$285.00.

Two-Week Vacation Shutdown Scheduled

Now is the time to again start checking to make sure that you or your local RCA distributor have an ample supply of all the spare tubes you may need to take care of your demands during the RCA Electron Tube Division's annual two-week vacation period. All tube manufacturing operations of the Division will shut down for employee vacations at the close of business Friday, July 12th, and will not resume operations until Monday, July 29th.

Full-scale product shipments cannot be guaranteed during the vacation shutdown; however, the Division's warehouses will operate with reduced staffs to handle product orders available from stock. Urgent correspondence and inquiries will be maintained as usual.

How to Get More Hours from an RCA-6146 Beam Power Tube

The life of an RCA-6146 beam power tube can be increased if these 12 simple procedures are followed:

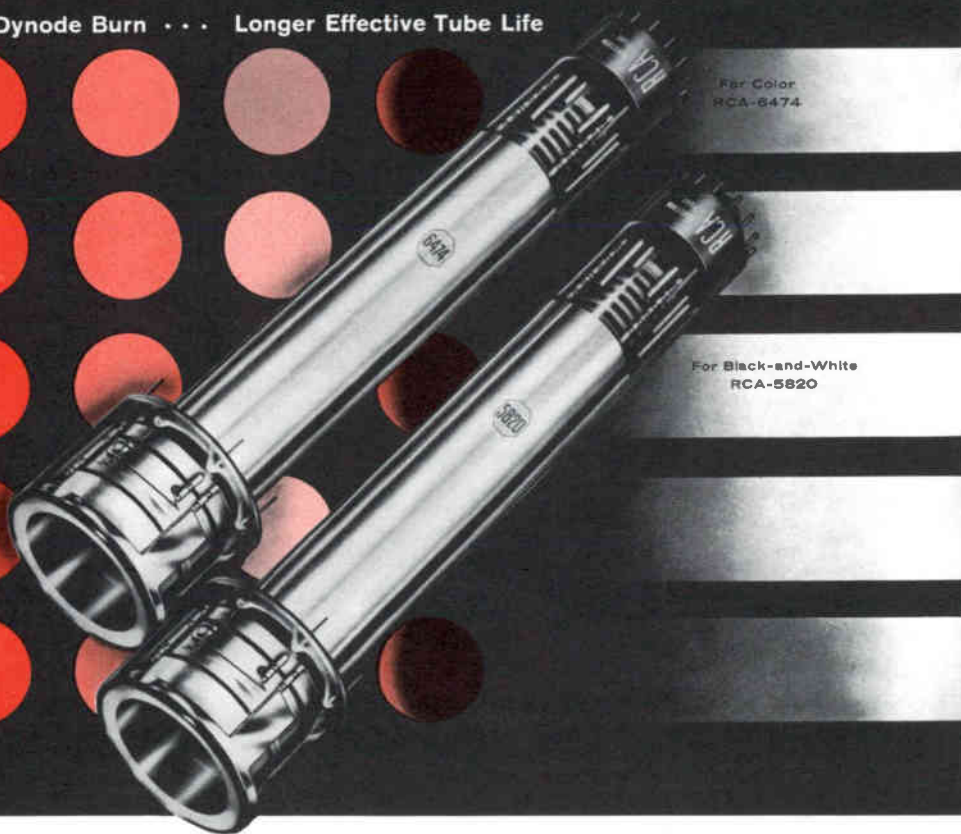
- Hold heater voltage at 6.3 volts—at tube terminals.
- Provide for adequate ventilation around tube to prevent tube and circuit damage caused by overheating.
- Keep shiny shielding surfaces away from tube to prevent heat reflection back into tube.
- Design circuits around tube to use lowest possible value of resistance in grid circuit and screen circuit.
- In high-frequency service, operate tube under load conditions such that maximum rated plate current flows at the plate voltage which will give maximum rated input.
- Have overload protection in plate and screen circuits to protect tube in the event of driver failure.
- See that plate shows no color when operated at full ratings (CCS or ICAS conditions).
- Reduce B+ or insert additional screen resistance when tuning under no-load conditions to prevent exceeding grid-No. 2 input rating.
- Maintain tuning and loading adjustment precisely so that tube will not be subjected to excessive overload. The 6146 is a high-gain, high-perveance tube and can be more easily overloaded through circuit misadjustments than older types not having such features.
- Use adequate grid drive, keeping within maximum grid-current and screen-dissipation ratings of tube. Too little grid drive can cause high plate dissipation.
- Make connections to plate with flexible lead to prevent strain on cap seal.
- Operate 6146 within RCA ratings as shown in technical bulletin available on request from RCA Commercial Engineering, Harrison, N. J.



Another RCA Advancement in **Image-Orthicon** Development

SUPER-DYNODE

Freedom from Dynode Burn . . . Longer Effective Tube Life



For Color
RCA-6474

For Black-and-White
RCA-5820



RCA, pioneer in the development of Image Orthicons, announces SUPER-DYNODE design—a major camera tube advancement that (1) improves picture quality, (2) simplifies camera-chain operation, and (3) lengthens effective tube life.

In black-and-white TV-camera operation, for instance, the new SUPER-DYNODE RCA-5820 substantially reduces dynode texture during "low-key" scenes and "mood" shots. In color TV-camera work, for example, SUPER-DYNODE RCA-6474's save adjustment time on dark-shading, reduce color shift in dark areas, and make it possible to set decelerator grid voltage at the best value for highlight uniformity—throughout the useful life of the tube.

RCA-5820's and -6474's with the new SUPER-DYNODE design are directly interchangeable with all previous RCA-5820's and -6474's—without change in camera circuitry. You install an RCA SUPER-DYNODE Image Orthicon—and you're ready to shoot. No stabilizing runs to bother with. No dynode burn-off required.

SUPER-DYNODE RCA-5820's for black-and-white are already available at your RCA Tube Distributor. SUPER-DYNODE RCA-6474's for color will be available soon. For technical details on RCA Image Orthicons, write RCA, Commercial Engineering, Section , Harrison, N. J.

Advantages of SUPER-DYNODE

For black-and-white

- Less dynode texture in "low-key" scenes

For color and black-and-white

- Easy to adjust dark-shading
- More uniform picture background
- Decelerator-grid voltage can be set at optimum value for highlight uniformity—throughout tube life
- Minimum undesirable background texture in low-light areas
- Cleaner colors in the dark areas

Improved efficiency

- No dynode stabilizing time needed
- No dynode burn-off required
- Longer tube life than ever

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