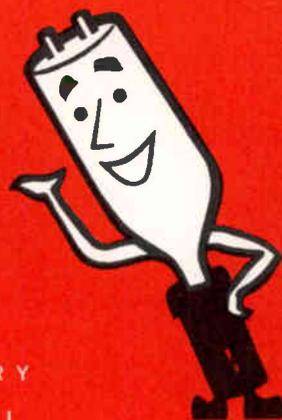
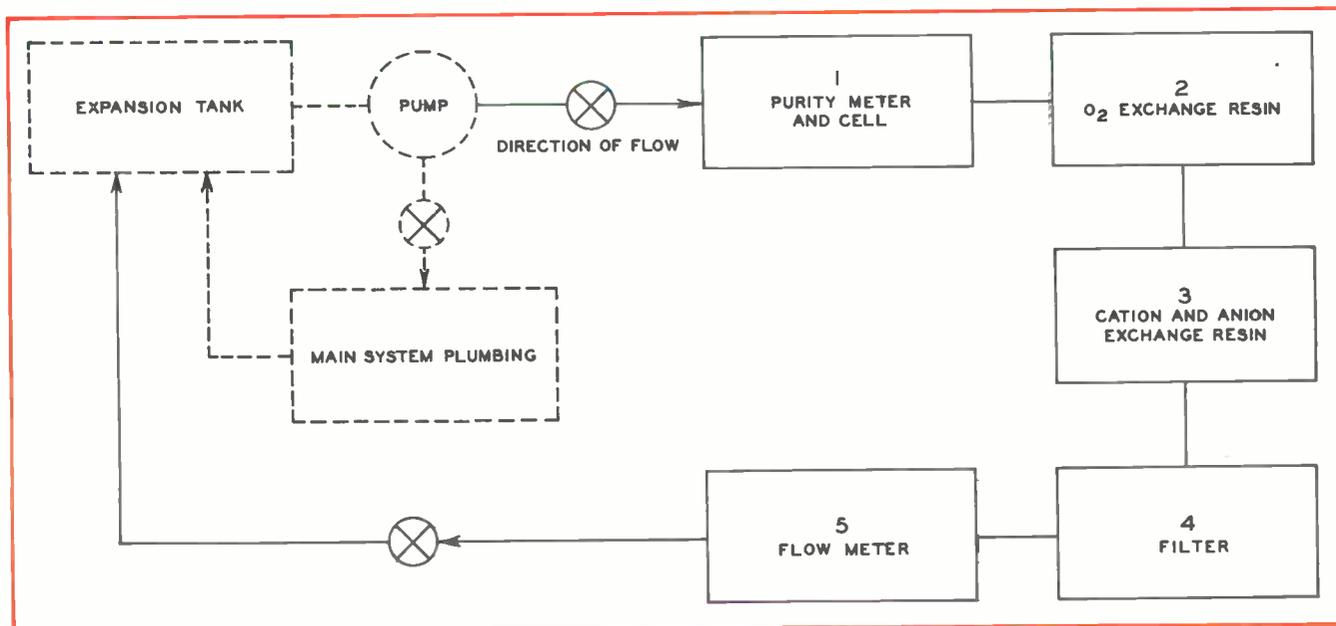




Tube Tips



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



BLOCK DIAGRAM OF A WATER REGENERATION LOOP: (1) Resistivity cell (0.1 cell constant) and meter, such as Barnstead PM-146 meter with B-001 cell. Optional test equipment. (2) Oxygen adsorbent resin, such as Duolite S-10 in BD-2 Bantam Demineralizer. (3) Mixed bed demineralizer, such as Barnstead Type M in BD-2 Bantam Demineralizer. (4) Sub-micron filter, such as Barnstead MF-25. (5) Flow meter. [The above items may be purchased from the Barnstead Still & Sterilizer Co., 2 Lanesville Terrace, Boston 31, Mass.]

Water Purity Considerations for RCA-6448 and RCA-6806

Television broadcasters should give careful attention to the purity of water used for cooling the beam power tube types RCA-6448 and -6806. This attention will be rewarded with increased tube life and lowered maintenance costs.

Pure distilled water, when introduced into the water-cooling system, becomes contaminated by the system components. For example, in a copper-plumbing system, the presence of oxygen and carbon dioxide enhances the dissolution of copper into the system water and its subsequent deposition as copper oxide on the hot plate structure of the tube. The rate of formation of this oxide is dependent on the operating plate dissipation of the tube, and the amount of copper, oxygen, and carbon dioxide in the water system. Eventually the amount of precipitated oxide may reach a magnitude such that it will thermally insulate the plate from the water and cause the plate to crack because of insufficient cooling.

It is essential that high-quality water be used to fill the system initially, that provision be made for continu-

ous regeneration (purification) of the system water, and that steps be taken to eliminate, insofar as possible, the sources of contamination. These requirements are necessary to prevent scale formation, corrosion, and excessive electrolysis. Any one of these conditions can greatly reduce tube life. Corrosion and electrolysis contribute to water contamination. Furthermore, they can destroy the tube elements, ducts, and fittings.

Some of the contaminants which are conducive to scale formation include oxygen, carbon dioxide, metal ions, and organic solids. The most thorough means for determining the quality of the system water is by a complete chemical analysis. Such an analysis can be performed by a qualified testing laboratory. In a well-maintained system, the following contaminants should not be present in excess of the following concentrations:

Copper	0.05 part per million by weight
Oxygen	0.5 part per million by weight
Carbon dioxide	0.5 part per million by weight
Total Solids	3.0 pts. per million by weight

A suggested method of achieving suitable quality of the system water is as follows:

1. Use only distilled water to fill the system. The use of distilled water avoids the introduction of organic or colloidal matter that may exist in deionized water.
2. To maintain acceptable quality, continuous regeneration (purification) of the water in the system is necessary. This regeneration can be achieved by passing a portion of the flow through suitable ion exchangers and filters. A recommended regeneration loop is shown in the block diagram. Operation of the regeneration loop should be in accord with recommendations of the manufacturer of each component with regard to pressure, temperature, and maintenance of the individual components.
3. The efficiency and life of the regeneration loop may be improved by retarding the rate of recontamination of the water by foreign matter. The use of tin-lined plumbing reduces the rate of water contamination by dissolved metals. Pipe lines should be connected to the water tank below the water

level to minimize turbulence and thus to decrease absorption of gases by the water. It is also to be noted that any contaminating gases should be excluded from the expansion chamber in the closed water system.

4. In order to minimize electrolysis, the plate water column (water path between plate and ground) resistance should have a value not less than 20 megohms.

Although an accurate chemical analysis is the absolute method of checking system-water quality, a measurement of the water resistivity may be used as a guide to determine whether ionized contaminants are excessive. Dissolved gases, metals, and other contaminants reduce the resistivity of the water in varying amounts. Some contaminants, such as oxygen, have no direct effect, while others, such as carbon dioxide, greatly reduce the resistivity. However, if the specific resistivity of the water falls below 2 megohm-cm, it can be assumed that the contaminants are excessive. Also, if the p^H of the water is outside of the range from 6.8 to 7.2, the water contains excessive contaminants.

6448 and 6806 Operating Hints

Here are a couple of suggestions to follow when operating RCA-6448 and -6806 beam power tubes:

- When starting the filament, turn up the voltage control slowly. A minimum of 30 seconds should be used to reach full operating filament voltage.
- When turning off the filament, turn down the

voltage control slowly. Allow a minimum of 30 seconds to reduce the voltage to zero.

Following the above hints will reduce the stresses set up in the filament strands due to starting surges and possible non-uniform heating and cooling of the filament structure.

Preventing 'Suck-In' in the RCA-6166

In some television broadcast installations, the RCA-6166 is being improperly operated and tube failure results. Improper operation causes the tube to overheat which, in turn, causes the glass to melt and "suck-in" due to the high vacuum in the tube. "Suck-in" leaves a hole in the glass envelope and the tube is then inoperable.

To avoid such improper operation, it is essential that the probe and meter (MI-19330-Item 13) furnished as part of the RCA-TT-10AH television transmitter be calibrated as a unit for the particular transmitter and used in accord with the instructions given in the transmitter instruction book IB-36102.

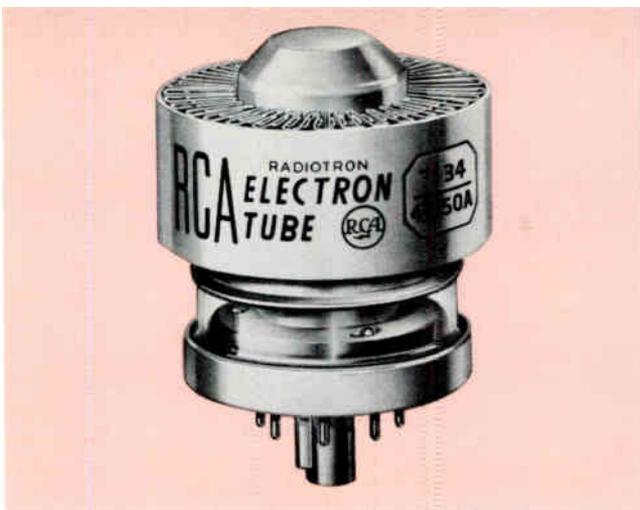
A small variation in the amount of probe insertion can produce a considerable variation in meter readings under the same operating conditions. Although each meter has been calibrated in an operating transmitter at the factory, this calibration may not be exactly correct for the transmitter with which the meter will ultimately be used. The rf probe and meter can be used as an indication of increased or decreased loading while making final tuning adjustments. An increased meter reading indicates decreased loading.

Before operating the 6166, refer to the tune-up and operating procedure given in the instruction manual for the equipment in which the tube is to be used. It is recommended procedure to adjust the equipment for operation under heavy plate-loading conditions and with only sufficient rf drive to provide the required power output.

Extreme care should be taken during tune-up as well

as in regular service to avoid—even momentarily—operation of the 6166 under conditions of insufficient plate loading or excessive rf drive. These undesirable operating conditions, especially at the upper end of the VHF range, will produce excessively high seal and bulb temperatures and may result in "suck-in" of the glass envelope or other damage to the tube.





New Beam Power Tubes

The RCA Electron Tube Division recently announced the commercial availability of two new beam power tubes designated as RCA-7034/4X150A and -7035/4X150D. These two new tube types are superior to the existing types RCA-4X150A and -4X150D and are, respectively, designed to replace these latter types.

The 7034 and 7035 utilize a specially designed, high-efficiency radiator which is hard soldered directly to the plate for better heat transfer. As a consequence, the 7034 and 7035 have a maximum plate-dissipation rating of 250 watts, as compared with 150 watts for the older types—with no sacrifice in tube reliability.

Furthermore, the 7034 and 7035, at frequencies up to 150 Mc, have a maximum plate-voltage rating of 2000 volts compared with 1250 volts for the older types and can, therefore, provide substantially higher power output at such frequencies. The 7034 and 7035 offer greater output capability in the design of new equipment and greater operating reliability in existing equipment.

Price Schedule Effective August 1st

The RCA Electron Tube Division has prepared a new 8-page Distributor Resale Price Schedule (Form PLH-101A) which confirms additions, deletions, and changes to August 1, 1957. It contains complete up-to-date facts and figures on approximately 465 RCA industrial receiving, power, cathode-ray, and phototube types, including their optional resale prices, capsule descriptions, approximate shipping weights, and adjustment codes.

A copy of the new schedule is enclosed with chief engineers' copies of this issue of TUBE TIPS. For additional copies of the Distributor Resale Price Schedule, see your RCA distributor or write RCA Order Service, 34 Exchange Place, Jersey City 2, N. J.

High-Quality Color Monitor Tubes Available

A new high-quality color picture tube especially suited for broadcast studio monitor use has now been made available on a limited basis by the RCA Electron Tube Division. Designated as the RCA-1819-P22, the new picture tube meets the high-quality standards demanded by television broadcasters for monitoring applications.

The individual gun resolution as well as the individual field purity and white uniformity limits have been established so that the 1819-P22 is visibly superior to similar types of color picture tubes. The 1819-P22 is a directly viewed picture tube of the metal-shell type and is capable of producing either a full-color or black-and-white picture measuring $19\frac{1}{8}$ inches by $15\frac{1}{4}$

52,560-Hour Service Record

Robert C. Higgy, director of engineering of Ohio State University's Broadcast Station WOSU and WOSU-TV, Columbus, Ohio, recently reported on the excellent performance and long-life record of an RCA-891-R which was put into service 13 years ago.

In a letter to the editor, Mr. Higgy wrote, "This RCA-891-R has been in practically continuous use in our RCA-5DX transmitter since November, 1944, and is still giving satisfactory operation. Our records show—to date—that it has completed 52,560 hours of service."

"This tube is used as a modulator and, of course, is just loafing along, but even filament life of that length of time is surprising. So far as we can determine, the tube is still in very good condition as we can keep the distortion under 2% throughout the entire audio range."

WOSU's 891-R is one of the broadcast power tubes which was rebuilt during World War II in order to help keep the American broadcast stations on-air during a period when it was impossible to obtain new raw materials for non-military end uses. Mr. Higgy's letter relates the experience expressed in the letters of many broadcasters still using these particular tube types.



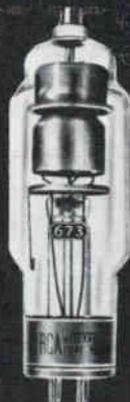
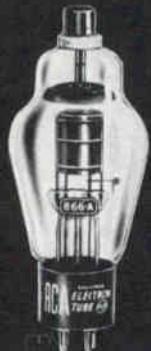
inches with rounded sides and having a projected screen area of 255 square inches. The new picture tube has an internal neck coating having high resistance which eliminates the need for an external resistor between the ultor power supply and the tube. The resistance of the neck coating also permits use of a tube insulating boot having an external conductive coating which, with the metal envelope, forms a supplementary filter capacitor.

Color purity shift of the 1819-P22 is held to a maximum of $\frac{1}{2}$ -inch and screen blemishes of high-intensity and low-intensity spots are specified as 0.050-inch and 0.080-inch maximum.

List price (optional) of the RCA-1819-P22 color picture tube is \$380.00.

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Engineered to keep you "On-Air", RCA high-power rectifier tubes offer you dependability proved by their record of long-term DC power delivery and their high peak-emission capability.

Backed by more than a quarter century of experience in building rectifier tubes for almost every type of transmitter application, RCA high-power rectifier tubes are setting year-after-year records for minimum equipment "down-time"—and low cost per hour of tube operation.

For fast ON-THE-SPOT service in obtaining RCA Rectifier Tubes for broadcast and television applications, call your RCA Tube Distributor.

Two New Superior Rectifiers for
Broadcast and TV Transmitters

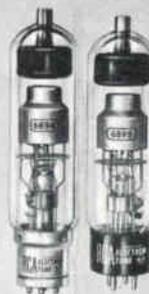
RCA-6894
RCA-6895

Here they are—two new half-wave, mercury-vapor rectifier tubes that offer new capabilities in DC output voltage and power as compared with Types 575-A and 673.

For example:

In new designs, three 6894's or 6895's in a half-wave, 3-phase circuit with in-phase operation are capable of supplying up to 31 kw at a DC output voltage up to about 9,500 volts; or six tubes in a series, 3-phase circuit with quadrature operation can supply up to 143 kw at a DC output voltage up to about 19,000 volts.

As direct replacements for the 575-A and 673 respectively in present transmitters, RCA-6894 and -6895 provide highly reliable



World Radio History



TUBES FOR BROADCASTING

RADIO CORPORATION OF AMERICA
Electron Tube Division, Harrison, N. J.