ELECTRON TUBES

RCA Application Note

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May 2, 1949

Recommendations for Support and Insulation of Kinescope RCA-16AP4

The structural features of the RCA-16AP4 kinescope require the use of new techniques for supporting the tube, masking the picture face, and insulating the metal cone. This Note discusses these matters and makes recommendations.

Support and Insulation

The support for the 16AP4 should be designed to provide proper positioning of the tube and adequate insulation of the metal cone for a voltage which may be as high as 15,500 volts (absolute maximum rating) above ground. The tube should be supported at the large end and at the neck. Suitable support can be provided by the use of insulators at the cone rim and the deflecting yoke at the neck. To provide adequate insulation, each insulator should have a minimum surface creepage distance of two inches and an air path of at least one inch. Fig. 1 illustrates a suitable mounting arrangement in which the insulators are slotted to provide adjustment for the cone end of the tube in directions perpendicular to its axis. Motion of the tube in either axial direction can be controlled by suitable positioning of the deflecting yoke and mask. The total force exerted on the face plate by the mask should be just sufficient to maintain contact between the deflecting yoke and the flared portion of the glass neck. The force applied should not exceed approximately 10 pounds distributed over an area of at least 1/4 square inch. When the tube is properly positioned the cone is supported at its large end and the yoke serves only as support for the neck. No bending stress should be applied to any portion of the glass neck. The deflecting yoke and focusing coil should be axially aligned with the tube neck so that little effort is required to slide the neck through these components when the tube is placed in position.

Shipment of the receiver with the kinescope in position may be permissible if additional supports are provided to prevent the application of any bending stress to the glass neck and to minimize shock impact on the glass face of the tube.

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Masking Arrangements

Employment of a mask which does not provide adequate insulation may result in picture distortion and unstable operation. Because the glass of the face plate has relatively low electrical resistance, the mask should be designed so that the parts of the mask which bear on the face plate have low leakage and adequate insulation for 15,500 volts. A suitable mask is illustrated in Fig. 2. The area of contact between this mask and the face plate is restricted to four bosses which are located to provide more than the minimum required creepage distance of two inches between the cabinet and face plate.

Grounding Considerations

When the receiver is in operation, static electricity may collect on electrically isolated mounting screws and other metallic objects which touch the mask or support insulators or which are close (within a few inches) to the cone. If any of these metallic parts is touched, the static charge may cause a shock which, although not dangerous, is annoying. Should any of these parts discharge by arc-over to ground, noise, evidenced by clicks in the sound and "snow" or bright spots in the picture, may be produced. To prevent the accumulation of these static charges, any metallic part, including screws, ornaments, and the loudspeaker, which touches the mask or insulators or is located near the metal cone should be connected to ground through a relatively low resistance. These parts may be effectively and inexpensively grounded by means of wires, strips of metallic foil, or electrically conductive paint.

Layout Considerations

Corona and arc-over may occur in high-voltage systems in spite of design precautions to prevent such discharges. In order to minimize the interference produced should corona or arcing develop, it is important to locate the antenna lead-in and input terminals as far away from high-voltage components including the cone as the chassis arrangement will permit. It is also recommended that any high-gain amplifier in the rf, if, or video circuits be placed as far away from the high-voltage circuit as possible. This requirement is especially important for those amplifier stages which operate at a low signal level.

Servicing Precautions

It is desirable that some means be provided to prevent contact with the cone when the receiver chassis is operated outside the cabinet for factory or service adjustments. A sheet of polyethylene with a minimum thickness of 0.01 inch can be wrapped around the cone to protect most of the exposed area, leaving only the formed section at the large end of the tube, to which the high-voltage contact is made, exposed. The glass at the small end of the cone should be covered for a distance of 1 to 1-1/2 inches. The position of the polyethylene sheet on the cone is illustrated in Fig. 3.

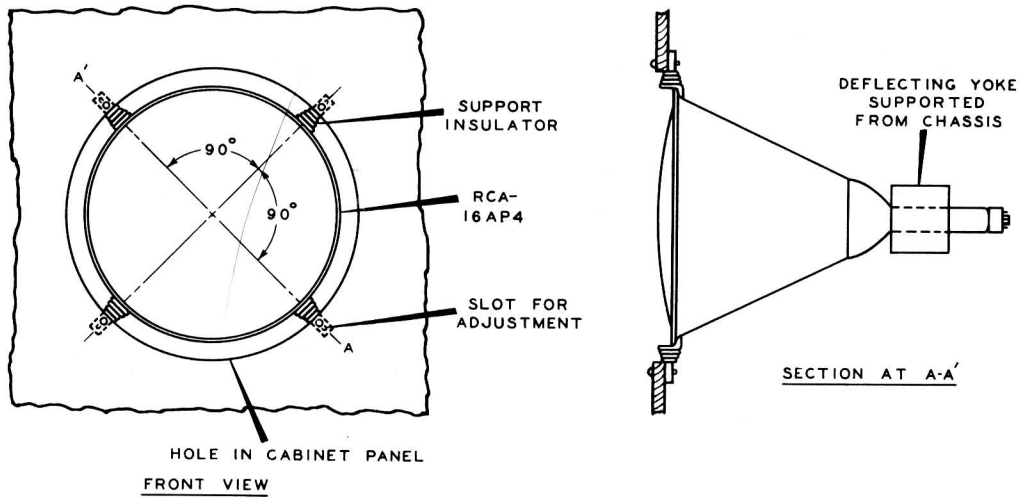

Fig. 1. Mounting Arrangement

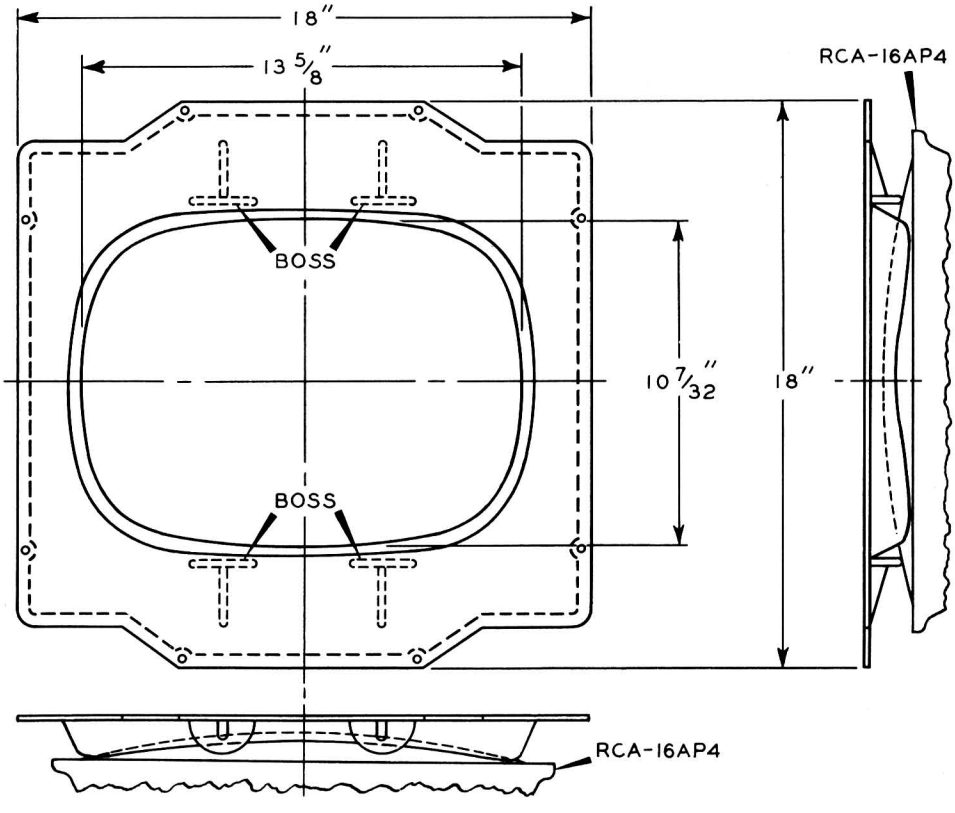

Fig. 2. Dimensions and Position of Picture Mask

Installation of the cover is simplified by cutting the sheet to conform to a developed view of the cone plus sufficient material to provide the necessary overlap of 1 inch. Fig. 4 gives the shape and minimum dimensions for the polyethylene sheet. The cut sheet should be taped to the cone at the points indicated in Fig. 3. Electrical insulating tape with a vinylite plastic back, such as Scotch Electrical Tape #33, is suggested for this purpose.

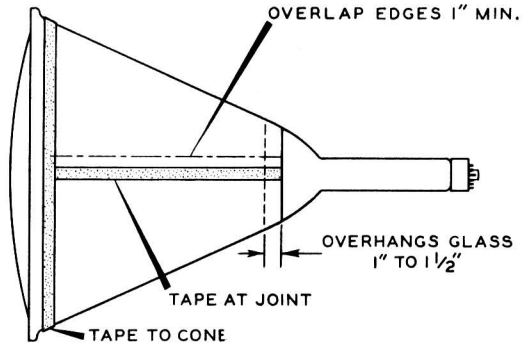

Fig. 3. Position of Polyethylene Protective Sheet

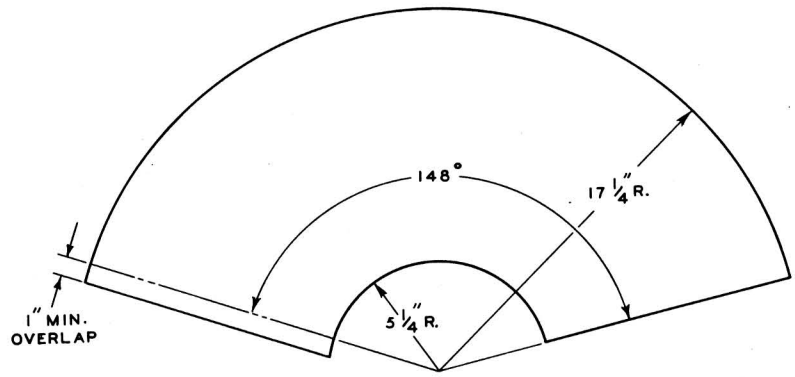

Fig. 4. Dimensions of Polyethylene Protective Sheet