



Suppression of Arc-Over, Corona, and High-Voltage Leakage in the 5TP4 Kinescope

Because the 5TP4 projection kinescope is operated at 27,000 volts, it requires, in common with other high-voltage equipment, certain precautions to minimize possibilities of failure due to humidity, dust, and corona. The tube itself has certain features designed to suppress corona, arc-over, and high-voltage leakage so that maximum life and optimum performance will result if the precautions given in this Note are observed.

Humidity Considerations

When humidity is high, a continuous film of moisture may form on untreated glass. This film, if a high-voltage gradient is present, may permit sparking to take place over the glass surface. In order to minimize the formation of continuous moisture films, the glass cone of the 5TP4 bulb is treated with moisture-repellent insulating coating. This insulating coating must not be scratched, must be kept clean and free from contamination such as finger marks, and must not be washed with any liquid likely to soften or dissolve lacquers. Any damage to the coating or any contamination on the surface may result in sparking over the cone of the bulb.

Dust Considerations

The high voltage applied to the tube increases the rate at which dust is precipitated on tube and optical surfaces. The rate of precipitation is further accelerated in the presence of corona. Such dust not only decreases the insulation of the bulb coating, but also reduces the amount of light transmitted by the optical system. It usually consists of fibrous materials and may contain soluble salts. The fibers absorb and retain moisture; the soluble salts provide electrical leakage paths that increase in conductivity as the humidity increases. Because a film of dust can nullify the protection provided by the insulating coating on the bulb cone, the tube and optical system should be protected as much as possible from dust.



Corona Considerations

A high-voltage system may be subject to corona, especially when the humidity is high, unless suitable precautions are taken. Corona, which is an electrical discharge appearing on the surface of a conductor when the voltage gradient exceeds a certain value, causes deterioration of organic insulating materials, induces arc-over at points and sharp edges, and forms ozone, a gas which is deleterious to many insulating materials. Sharp points or other irregularities on any part of the high-voltage system may increase the possibility of corona and should be avoided. Instead, use smooth, rounded contours and surfaces. In particular, sharp points on negative electrodes are even more likely to cause corona than those on positive electrodes. In the design of 5TP4 equipment, the bulb support and connector assemblies should have smooth, rounded contours and should be provided with suitable cable terminals. Adequate distances to ground must be maintained. Sharp points or irregularities on grounded surfaces around the tube and support must be removed.

To avoid the possibility of corona developing between the bulb and the metal support ring, a band of conductive coating in contact with the second-anode contact button is applied to the 5TP4 around the rim of the bulb. If a properly designed metal support ring is used, no corona will occur between the bulb and support. If the support is made of an insulating material, however, corona may occur unless the portions of the support assembly near the tube face are made conductive. Both the insulating and conductive coatings on the 5TP4 are black in order to reduce reflection of light and resultant loss of picture contrast.

The conductive coating on the neck of the bulb, which is provided primarily to prevent corona between yoke and the glass neck, must be grounded, preferably, by means of a grounding clamp at the base end of the coating. The clamp should not grip the neck so tightly that it sets up glass strains which may eventually cause cracks, but it should exert sufficient pressure to insure good contact. The resistance of the coating is sufficient to prevent damping of the deflection yoke. Because of this high resistance, a contact area at least one-quarter of one square inch should be used. This coating must not be scratched and must never be washed with liquids likely to soften or dissolve lacquers.

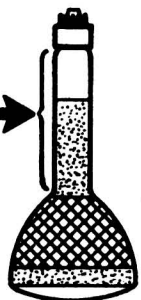
As further precautions to prevent corona, the deflection yoke must present a smooth surface electrically to the bulb support ring. The contour of the yoke winding should approximate the contour of the bulb, departing gradually from it toward the outer edge of the winding. The yoke windings must not touch the cone of the bulb above the reference line (approximately at junction of cone and neck).

Tube Handling

Because finger marks may cause high-voltage leakage paths, the following caution is included in every tube carton. It is recommended that a similar notice be prominently displayed on equipment using the 5TP4 and be included in the service bulletin.



ALWAYS HANDLE
this tube by **NECK** →
or by that part
of bulb
having
conductive band →



NEVER HANDLE
this tube by that
part of bulb cone
having the
INSULATING
COATING ←

Finger prints or dust on the insulating coating may cause electrical breakdown during humid weather.

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