Projection Kinescopes

FORCED-AIR COOLED
ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION
20 FT. x 15 FT. PROJECTED PICTURES

For Black-and-White Projection Systems in Theater and Closed-Circuit Television Applications

ELECTRICAL

Heater, for Unipotential Cathode		
Voltage (AC or DC)	6.6 ± 5%	V
Current	0.62	A
Focusing Method	Electrostatic	
Deflection Method	Magnetic	
Deflection Angle (Approx.)	35°	
Direct Interelectrode Capacitances (Approx.)		
Grid No.1 to all other electrodes	12	pF
Cathode to all other electrodes	6	pF

OPTICAL

Faceplate	Spherical, Non-Browning Glass	
Quality Rectangle of Faceplate (See Dimensional Outline)	5 x 3-3/4	in
Refractive Index of Faceplate	1.469	
Projection-Throw Distance for 20 ft x 15 ft Picture	60	feet
Phosphor	Aluminized P4-Silicate-Sulfide Type	
Luminescence	White	
Persistence	Medium	

MECHANICAL

Air Flow to Face . . . . . 40 cfm

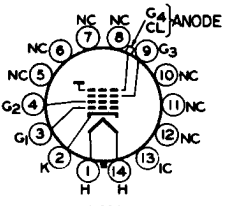
The specified air flow should be delivered perpendicularly from a nozzle having a diameter of about 2 inches onto the face of the tube while it is in operation. See REFLECTIVE OPTICAL SYSTEM. In a typical system with air filter, the total system static pressure is approximately 0.25 inch of water. The cooling air must not contain water, dust, or other foreign matter. The air-cooling system should be electrically interconnected with the anode power supply to prevent operation of the tube without cooling.

Cooling of the tube by a tangential flow of air across its face is not recommended because the temperature gradient produced across the face may result in immediate or delayed cracking of the face.

Operating Position	Any
Tube Dimensions	
Overall Length	19-1/2 ± 5/8 in
Greatest Diameter of Bulb (Excluding side cap or cable)	7 ± 3/16 in
Cap	Medium (JEDEC No.C1-5)
Base	Plastic Filled, Small-Shell Diheptal 14-Pin, (JEDEC No.B14-15)

TERMINAL DIAGRAM (Bottom View)

Pin 1 - Heater
Pin 2 - Cathode
Pin 3 - Grid No.1
Pin 4 - Grid No.2
Pin 5 - No Connection
Pin 6 - No Connection
Pin 7 - No Connection
Pin 8 - No Connection
Pin 9 - Grid No.3
Pin 10 - No Connection
Pin 11 - No Connection
Pin 12 - No Connection
Pin 13 - Internal Connection—
Do Not Use
Pin 14 - Heater
Cap - Anode (Grid No.4, Collector)



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Note: Socket contacts for Pins No.5, 6, 7, 8, 10, 11, 12, and 13 should be removed so that maximum insulation is provided for Pin No.9.

CATHODE-DRIVE[a] SERVICE

Absolute-Maximum Ratings

Anode-to-Grid-No.1 Voltage[b]	80000	V
Grid-No.3-to-Grid-No.1 Voltage	20000	V
Grid-No.2-to-Grid-No.1 Voltage	1300	V
Cathode-to-Grid-No.1 Voltage		
Positive bias value	250	V
Negative bias value	0	V
Peak negative value	2	V
Average Anode Current[b]	2	mA
Peak Heater-Cathode Voltage		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds	410	V
After equipment warm-up period	150	V
Heater positive with respect to cathode	150	V

Equipment Design Ranges

With any anode-to-grid-No.1 voltage (E_{c4g1}) between 70000[c] and 80000 volts and grid-No.2-to-grid-No.1 voltage (E_{c2g1}) between 400 and 850 volts

Grid-No.3-to-Grid-No.1 Voltage for Focus	20% to 22.6% of E_{c4g1}	V
Grid-No.2-to-Grid-No.1 Voltage for Visual Extinction of Focused Raster when Circuit Design Utilizes Fixed Cathode-to-Grid-No.1 Voltage (E_{kg1})	2.58 to 3.87 times E_{kg1} plus E_{kg1} voltage	V
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level) to White-Level Value	Same values as fixed cathode-to-grid-No.1 voltage except video drive is a negative voltage	

→ Indicates a change.

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Grid-No.3 Current	See footnote[d]	
Grid-No.2 Current	-15 to +15	μA

Examples of Use of Design Ranges

For anode-to-grid-No.1 voltage of	*75000*	*V*
Grid-No.3-to-Grid-No.1 Voltage for Focus	15000 to 17000	V
Grid-No.2-to-Grid-No.1 Voltage for Visual Extinction of Focused Raster when Circuit Design Utilizes Fixed Cathode-to-Grid-No.1 Voltage (E_{kg1}) of 125 V	447 to 609	V
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level) to White Level Value	-125	V

Maximum Circuit Value

Grid No.1 Circuit Resistance	1.5	megohms

GRID-DRIVE[e] SERVICE

Absolute-Maximum Ratings

Anode-to-Cathode Voltage[b]	80000	V
Grid-No.3-to-Cathode Voltage	20000	V
Grid-No.2-to-Cathode Voltage	1050	V ←
Grid-No.1-to-Cathode Voltage		
Negative bias value	250	V
Positive bias value	0	V
Peak positive value	2	V
Average Anode Current[b]	2	mA
Peak Heater-Cathode Voltage		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds	410	V
After equipment warm-up period	150	V
Heater positive with respect to cathode	150	V

Equipment Design Ranges

With any anode voltage (E_{c4k}) between 70000[c] and 80000 volts and grid-No.2 voltage (E_{c2k}) between 400 and 600 volts

Grid-No.3 Voltage for Focus	20% to 22.6% of E_{c4k}	V
Grid-No.2 Voltage for Visual Extinction of Focused Raster when Circuit Design Utilizes Fixed Grid-No.1 Voltage (E_{c1k})	2.58 to 3.87 times E_{c1k}	V
Grid-No.1 Video Drive from Raster Cutoff (Black Level) to White-Level Value	Same value as fixed grid-No.1 voltage except video drive is a positive voltage	
Grid-No.3 Current	See footnote[d] ←	
Grid-No.2 Current	-15 to +15	μA

← Indicates a change.

Examples of Use of Design Ranges

For anode voltage	*75000*	*V*
Grid-No.3 Voltage for Focus.	15000 to 17000	V
Grid-No.2 Voltage for Visual Extinction of Focused Raster when Circuit Design Utilizes Fixed Grid-No.1 Voltage (E_{c1k}) of -155 V.	400 to 600	V
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level) to White-Level Value	155	V
Maximum Circuit Value		
Grid-No.1 Circuit Resistance	1.5	megohms

[a] Cathode drive is the operating condition in which the video signal varies the cathode potential.

[b] The product of anode-to-grid-No.1 voltage, or anode-to-cathode voltage, and average anode current should be limited to 160 watts.

[c] Brilliance and definition decrease with decreasing anode-to-grid-No.1 voltage or anode-to-cathode voltage. In general, the anode-to-grid-No.1 voltage or the anode-to-cathode voltage should not be less than 70000 volts.

[d] Grid-No.3 current will be approximately 10% to 5%, or less, of anode current. However, a grid-No.3 leakage current of up to 15 μA may be present.

[e] Grid drive is the operating condition in which the video signal varies the grid-No.1 potential.

GENERAL CONSIDERATIONS

The high voltages at which this type is operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the enclosing of high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

In the use of this tube, it should always be remembered that high voltages may appear at normally low-potential points in the circuit because of capacitor breakdown or incorrect circuit connections, and that the tube surface maintains a static charge for some time after the power has been turned off. Therefore, before any part of the circuit or the tube is touched, the power-supply switch should be turned off, both terminals of high-voltage capacitors should be grounded, and the terminals of the high-voltage power supply should be grounded. After these steps have been taken and before touching the tube, discharge the anode terminal, the surface of the faceplate, and the coated surface of the cone by use of a suitable wand which is connected to ground. It is to be noted that the entire surface of the cone and of the faceplate will not be discharged by touching the wand to a single point on either surface, because the surfaces have high resistance. Therefore, to discharge each surface, it will be necessary to sweep over the entire surface with the wand.

The *fluorescent screen,* utilizing phosphor No.4 of the silicate-sulfide type, is aluminized. The white fluorescence of the screen has a color temperature of approximately 6300° K.

The spectral energy emission characteristic is shown in *Spectral-Energy Emission Characteristic of Phosphor No.4.* The persistence of the phosphorescence is such that its brightness does not exceed 7 per cent of the peak value in 33 milliseconds after excitation is removed.

Darkening of face occurs during normal operation of the tubes with resulting decrease in the light transmitted by the face. The rate of darkening increases rapidly with increase in anode voltage, is proportional to the beam current, and is inversely proportional to the scanned area. The darkening develops rapidly during initial operation; thereafter, a gradual increase in the amount of darkening will be observed during the life of the tube.

The *anode connection* is made to the medium cap on the side of the bulb. The anode connector should have a ball-type corona shield with a diameter of about 1-1/2 inches in order to prevent corona.

OPERATING HINTS

1. Never apply power input to the screen suddenly because immediate or delayed cracking of the face may result. Always increase or decrease the anode current gradually.

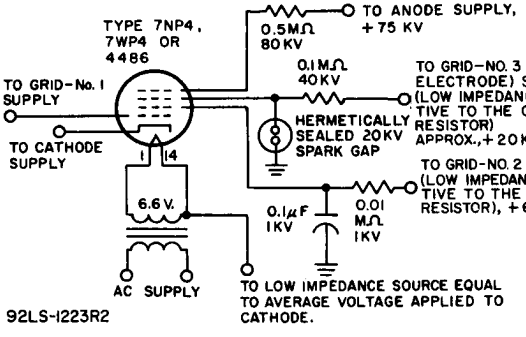
2. Never exceed the rated maximum anode current of 2 milliamperes.

3. Never overscan the screen because the beam will strike the neck and liberate occluded gas which may cause internal arcing.

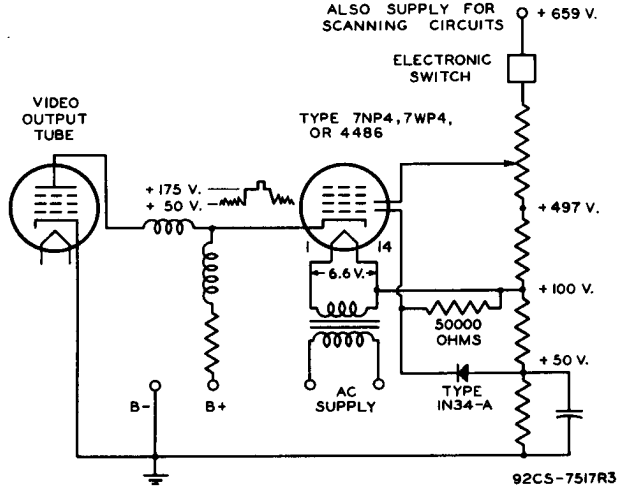
4. Never fail to operate this tube in its equipment at intervals of about 2 months to keep the tube in condition.

For X-radiation shielding considerations, see sheet
X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES
at front of this section

SCHEMATIC DIAGRAM OF CIRCUIT SHOWING PROTECTIVE ELEMENTS EMPLOYED TO PREVENT TUBE DAMAGE



SCHEMATIC DIAGRAM SHOWING PRINCIPLES OF CATHODE DRIVE AS WELL AS METHOD FOR AUTOMATICALLY PROTECTING THE TUBE AGAINST OVERDRIVE AND SCANNING FAILURE



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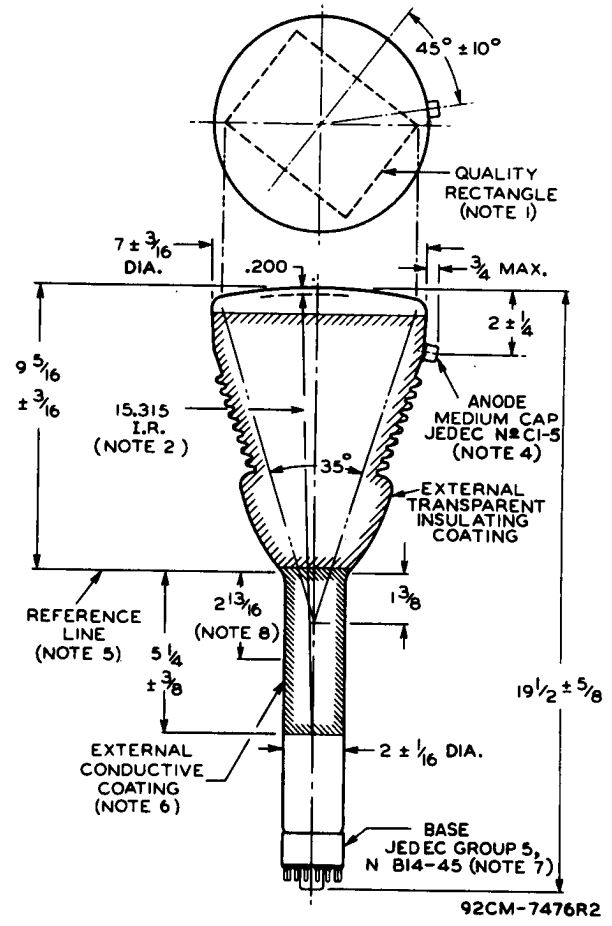
DIMENSIONAL OUTLINE



DIMENSIONS IN INCHES

See Notes on next page.

Note 1: When viewed from the face of the tube, the minor axis of the 5 x 3-3/4 inch quality rectangle is located 45° ± 10° in a counter-clockwise direction from a plane through the anode terminal and the tube axis.

Note 2: Inside surface of faceplate within the quality rectangle may vary ± 0.006" from the spherical surface having a 15.315 inch radius.

Note 3: Inside surface of faceplate within the quality rectangle may vary ± 0.006 inch from the spherical surface having a 20.3 inch radius (Type 7WP4 only).

Note 4: The plane through Base Pin No.9 and the tube axis may vary from the plane through the anode terminal and the tube axis by an angular tolerance (measured about the tube axis) of ± 10°. The anode terminal is on same side as Pin No.9.

Note 5: Reference line is determined by position where gauge 2.100 ± 0.001 inch I.D. and 3 inches long will rest on bulb cone.

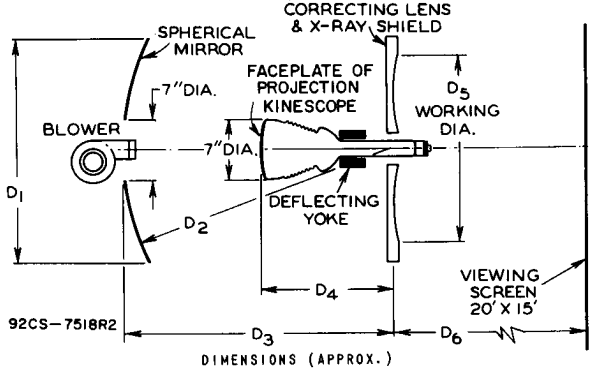
Note 6: External conductive coating must be grounded.

Note 7: Socket for this base should not be rigidly mounted, it should have flexible leads and be allowed to move freely. Socket contacts for Pins 5, 6, 7, 8, 10, 11, 12, and 13 should be removed in order to provide maximum insulation for Pin No.9.

Note 8: Effective deflecting field must be within this space.

REFLECTIVE OPTICAL SYSTEM

Arrangement of Typical Optical System and Air-Cooling System for Theater-Television Projector Using Reflective Optical Principles and 7NP7



DIMENSIONS (APPROX.)

D_1	26 inch Diameter	D_4	15 inches
D_2	30 inch Radius	D_5	21.5 inches
D_3	30 inches	D_6	60 feet

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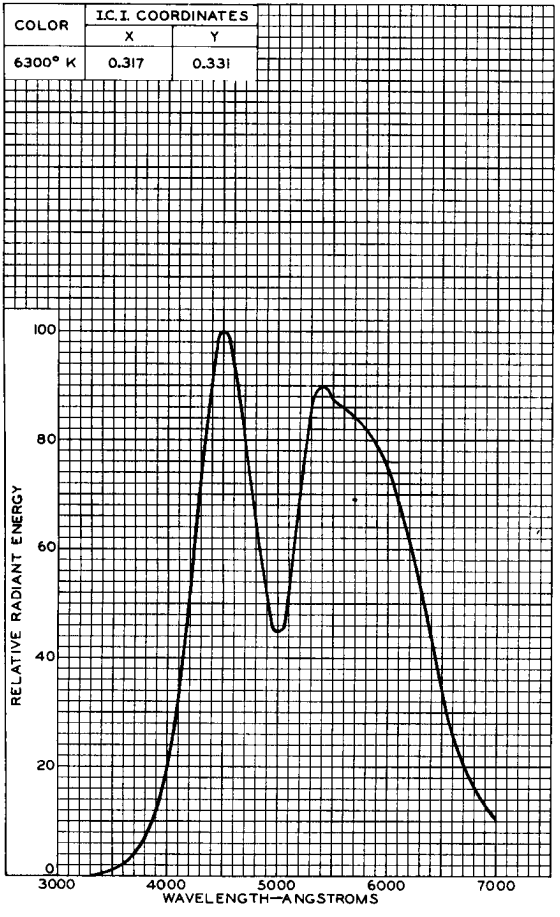
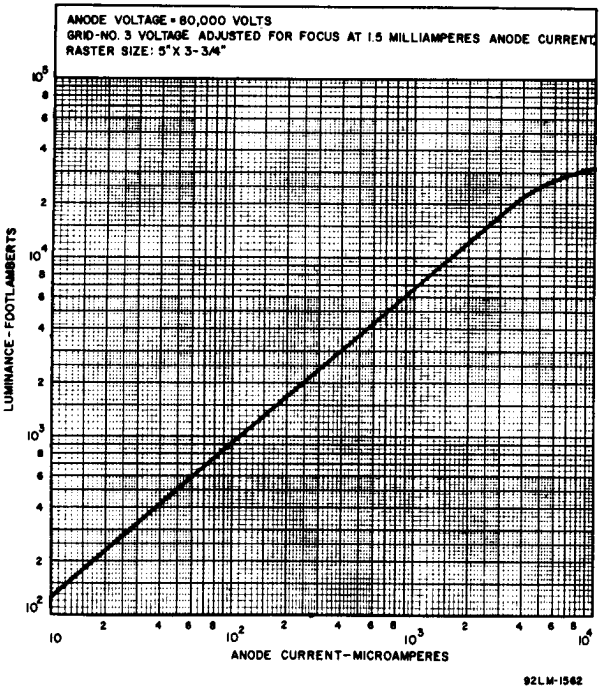
Spectral-Energy Emission Characteristic of Phosphor No.6

SILICATE-SULFIDE TYPE



92CM-7458RI

Typical Luminance Characteristic



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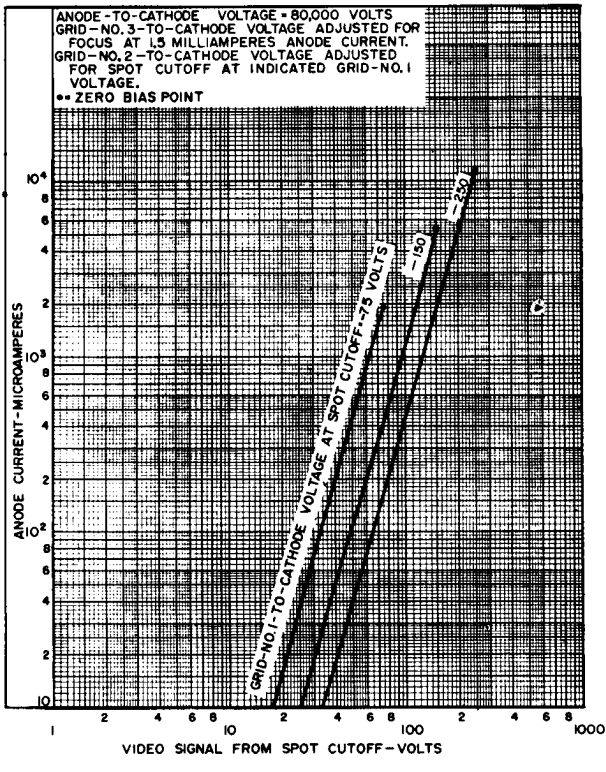
Typical Drive Characteristics

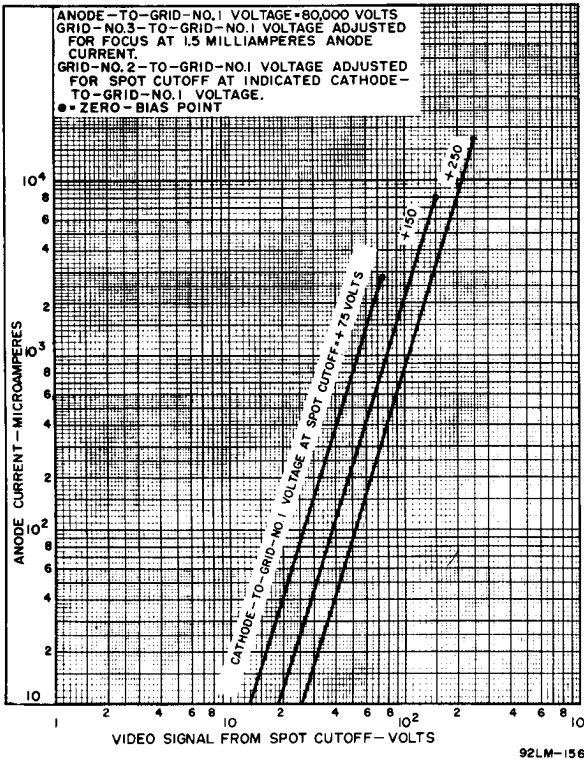
GRID-DRIVE SERVICE



92LM-1564

Typical Drive Characteristics

CATHODE-DRIVE SERVICE



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