



5ZP16

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FLYING-SPOT CATHODE-RAY TUBE

HIGH RESOLUTION CAPABILITY

ALUMINIZED SCREEN

ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

For use as scanner in high-quality flying-spot video-signal generators

DATA

General:

Heater, for Unipotential Cathode:

Voltage 6.3 ac or dc volts

Current $0.6 \pm 10\%$ amp

Direct Interelectrode Capacitances:

Grid No.1 to all other electrodes 8 μf Cathode to all other electrodes 5 μf External conductive neck coating to ultor. $\left\{ \begin{array}{l} 500 \text{ max. } \mu\text{f} \\ 100 \text{ min. } \mu\text{f} \end{array} \right.$

Faceplate, Flat Clear Glass

Phosphor (For curves, see front of this Section) P16
Aluminized

Fluorescence—

Visible radiation Violet

Invisible radiation Near Ultraviolet

Phosphorescence—

Persistence of visible radiation Very Short

Persistence of invisible radiation Very Short

Focusing Method Electrostatic

Deflection Method Magnetic

Deflection Angle (Approx.) 40°

Tube Dimensions:

Overall length $14\text{--}3\frac{7}{8}" \pm \frac{3}{8}"$ Greatest diameter of bulb $5" \pm \frac{1}{8}"$ Minimum Useful Screen Diameter $4\text{--}1\frac{1}{4}"$ Weight (Approx.) $1\text{--}1\frac{1}{2}$ lbs

Operating Position Any

Cap. Recessed Small Cavity (JETEC No.J1-21)

Socket See Operating Considerations

Base Small-Shell Duodecal 7-Pin (JETEC No.87-51)

Basing Designation for BOTTOM VIEW 12C

Pin 1—Heater

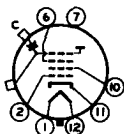
Pin 2—Grid No.1

Pin 6—Grid No.3

Pin 7—Internal
Connection—
Do Not Use

Pin 10—Grid No.2

Pin 11—Cathode



Pin 12—Heater

Cap—Ultor

(Grid No.4,
Collector)C—External
Conductive
Neck Coat-
ing

Maximum Ratings, Design-Center Values:

ULTOR VOLTAGE 27000 max. volts

GRID-No.3 VOLTAGE 7000 max. volts

GRID-No.2 VOLTAGE 350 max. volts

← Indicates a change.



5ZP16

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GRID-No.1 VOLTAGE:

Negative bias value.	150 max.	volts
Positive bias value.	0 max.	volts
Positive peak value.	2 max.	volts

PEAK HEATER-CATHODE VOLTAGE:

Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds		
	410 max.	volts
After equipment warm-up period		
	150 max.	volts
Heater positive with respect to cathode.		
	150 max.	volts

Equipment Design Ranges:

For any ultor voltage (E_{c4}) between 20000* and 27000 volts

Grid-No.3 Voltage for focus with ultor current of 25 μ a or less.		
	20.5% to 26.5% of E_{c4}	volts
Grid-No.2 Voltage for visual extinction of undeflected focused spot when circuit design utilizes fixed grid-No.1 voltage.		
	2 to 5 times E_{c1}	volts
Grid-No.1 Voltage for visual extinction of undeflected focused spot when circuit design utilizes fixed grid-No.2 voltage.		
	-20% to -50% of E_{c2}	volts
Grid-No.2 Current.		
	-15 to +15	μ a

Examples of Use of Design Ranges:

For ultor voltage of		20000	27000	volts
Grid-No.3 Voltage for focus with ultor current as indicated.				
	4100 to 5300	5500 to 7100	volts	
Grid-No.2 Voltage for visual extinction of undeflected focused spot when circuit design utilizes fixed grid-No.1 voltage of -70 volts.				
	140 to 350	140 to 350	volts	
Grid-No.1 Voltage for visual extinction of undeflected focused spot when circuit design utilizes fixed grid-No.2 voltage of 200 volts.				
	-40 to -100	-40 to -100	volts	
Ultor Current.				
	25	15	μ a	

Maximum Circuit Values:

Grid-No.1-Circuit Resistance	1.5 max.	megohms
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* Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 20,000 volts.

→ Indicates a change.



5ZP16

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OPERATING CONSIDERATIONS

X-Ray Warning. X-ray radiation is produced at the face of the 5ZP16 when it is operated at its normal ultor voltage. These rays can constitute a health hazard unless the tube is adequately shielded for X-ray radiation. Although relatively simple shielding should prove adequate, make sure that it provides the required protection against personal injury.

The base pins of the 5ZP16 fit the Duodecal 12-contact socket. The socket contacts corresponding to the vacant pin positions (pin positions 3, 4, 5, 8, and 9) should be removed in order to provide the maximum insulation for the high-voltage pins 6 and 7. The socket should be made of high-grade, arc-resistant, insulating material and should preferably be designed with baffles.

Resolution of better than 1000 lines at the center of the reproduced picture can be produced by the 5ZP16 when it is operated with 27,000 volts on the ultor. At lower ultor voltages, the resolution capability decreases. To obtain high resolution in the horizontal direction, it is necessary to use a video amplifier having a bandwidth of about 20 megacycles.

The *ultraviolet output* of the 5ZP16 is a linear function of the ultor current. For any particular value of ultor current, the ultraviolet output is approximately 50 per cent higher when the 5ZP16 is operated with 27,000 volts on the ultor than when operated with 20,000 volts.

Underscanning over a protracted period should be avoided because an underscanned area of the screen will be burned and thus give diminished radiation when the raster is again scanned to full size and be slightly noticeable in the reproduced picture. Furthermore, it is inadvisable to permit a modulated stationary pattern to remain more than a few minutes on the face of the tube. If it remains for a longer time, the phosphor will be burned unevenly over the pattern area.

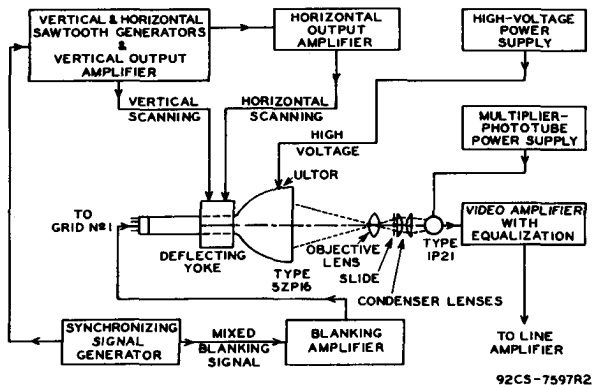
Never allow the beam to remain stationary, even momentarily, because the high peak energy in the beam will seriously damage the screen. Provision should be made to prevent such a possibility. Provision should also be made in equipment design to insure that the ultor voltage will drop as fast as the scanning current when the equipment is turned off; or to bias grid No. 1 to beam-current cutoff when the equipment is turned off.

← indicates a change.



5ZP16

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BLOCK DIAGRAM OF FLYING-SPOT VIDEO-SIGNAL
GENERATOR SYSTEM FOR SLIDE TRANSPARENTIES

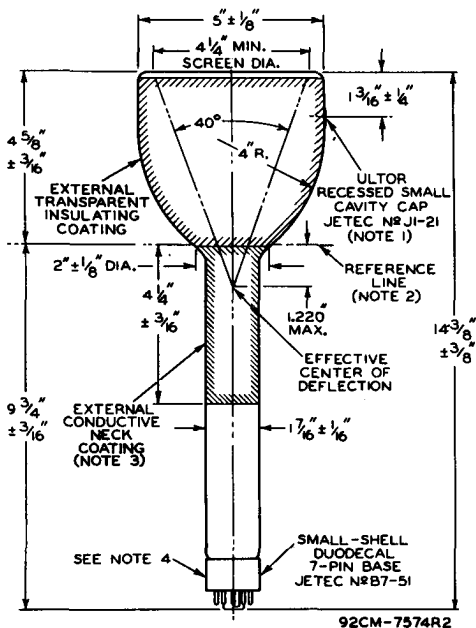
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5ZP16

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5ZP16



NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION 3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm 10^\circ$. THE ULTOR TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION 3.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No. 110 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY INTERSECTION ON PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 3: EXTERNAL CONDUCTIVE NECK COATING MUST BE GROUNDED.

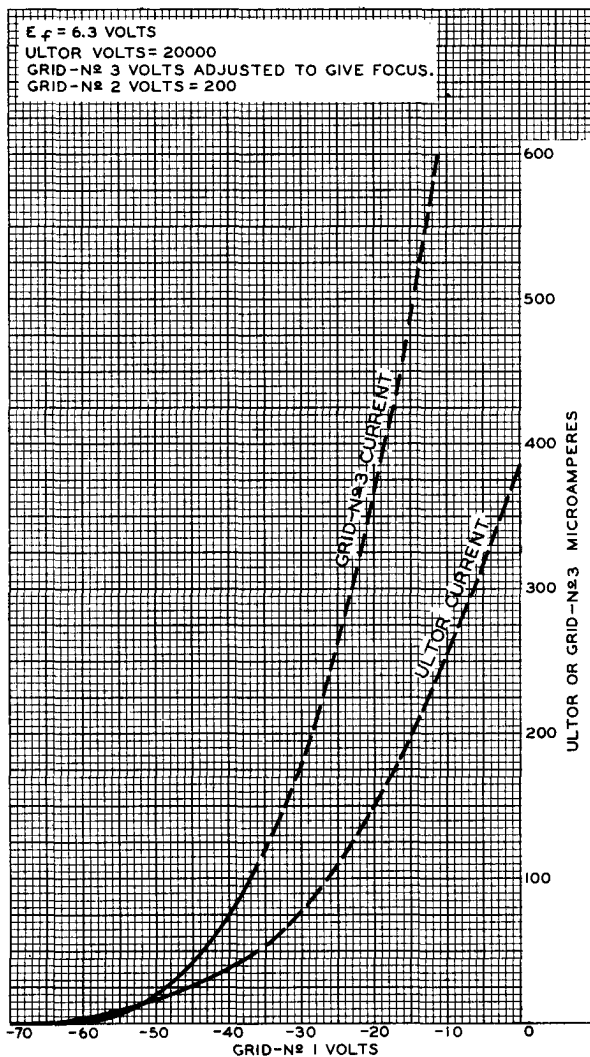
NOTE 4: $\angle$ OF BULB WILL NOT DEVIATE MORE THAN 2° IN ANY DIRECTION FROM THE PERPENDICULAR ERECTED AT THE CENTER OF THE BOTTOM OF THE BASE.

5ZP16



5ZP16

AVERAGE CHARACTERISTICS



ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7575RI



5ZP16

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