DESCRIPTION AND RATING

THREE-GUN TRI-COLOR PICTURE TUBE

11 1/2 by 8 5/8-INCH PICTURE SIZE

15-INCH ROUND, GLASS	FACEPLATE - SPHERICAL, CLEAR
FOCUS - ELECTROSTATIC	CONVERGENCE - ELECTROSTATIC
DEFLECTION - MAGNETIC	EXTERNAL CONDUCTIVE COATING
45-DEGREE DEFLECTION ANGLE	METAL-BACKED PHOSPHOR-DOT SCREEN

The 15GP22 is a direct-view tri-color picture tube capable of reproducing either full-color or black-and-white transmissions. It has three separate electron guns and a phosphor-dot screen on which are deposited small dots of blue, green and red phosphor arranged in triangular groups. There are approximately 195,000 such groups or a total of 585,000 dots. A perforated mask between the guns and the screen permits the beam from any one gun to strike phosphor dots of only one color. Thus, the three guns produce independent pictures, in the three different colors, which appear to be superimposed because of the close spacing of the dots. Proper registration of the three pictures is achieved through electrostatic convergence of the beams. The screen provides an 11 1/2 by 8 5/8-inch picture with rounded sides and has a metal backing to prevent ion-spot blemish and to increase light output. An external conductive coating serves as a filter capacitor when grounded.

TECHNICAL INFORMATION

GENERAL

Electrical

Heater Voltage	6.3	Volts
Heater Current	1.8 ± 10%	Amperes
Focusing Method - Electrostatic		
Convergence Method - Electrostatic		
Deflecting Method - Magnetic		
Deflection Angle, approximate		
Horizontal	45	Degrees
Vertical	35	Degrees
Direct Interelectrode Capacitances, approximate		
Cathodes (of All Three Guns Tied Together Externally)		
To All Other Electrodes	17.5	uuf
Grid-No. 1 (of Any Gun) to All Other Electrodes		
Except No. 1 Grids of Other Two Guns	7.5	uuf
Grid-No. 3 (of All Three Guns Tied Together Internally)		
To All Other Electrodes	12	uuf
Grid-No. 4 (Common to the Three Guns) to All Other Electrodes	7	uuf
External Conductive Coating to Anode		
Maximum	3000	uuf
Minimum	1500	uuf

GENERAL (CONT'D)

Optical

Phosphor - P22, Three Phosphors Collectively
Fluorescent Color of Separate Phosphors - Blue, Green, Red
Phosphorescent Color of Separate Phosphors - Blue, Green, Red
Persistence - Medium, Three Phosphors Collectively

Screen
Plate - Gray
Light Transmission, approximate — 70 Percent
Type-Metal-backed Phosphor-dot
Area — 88 1/2 Square Inches

Faceplate - Clear

Mechanical

Over-all Length	26 1/8	Max Inches
Greatest Bulb Diameter	14 5/8 ± 5/32	Inches
Screen Dimensions, with rounded sides		
Horizontal	11 1/2	Inches
Vertical	8 5/8	Inches
Greatest Metal-flange Diameter	15 3/4	Max Inches
Neck Length	10 3/8	Inches
Anode Contact - Metal Flange		
Base - Small-shell Bidecal 14-Pin, B14-103		
Basing, JETEC Designation - 20A		
Mounting Position - Any		
Net Weight, approximate	25	Pounds

MAXIMUM RATINGS - Design-Center Values ◊

Anode Voltage †	20,000	Max Volts DC
Anode Input Δ	15	Max Watts
Grid-No. 4 (Converging Electrode)	11,000	Max Volts DC
Grid-No. 3 (Focusing Electrode)	5,000	Max Volts DC
Grid-No. 2 Voltage, Each Gun	500	Max Volts DC
Grid-No. 1 Voltage, Each Gun		
Negative-bias Value	200	Max Volts DC
Positive-bias Value	0	Max Volt DC
Positive-peak Value	2	Max Volts
Peak Heater-cathode Voltage, Each Gun		
Heater Negative with Respect to Cathode		
During Equipment Warm-up Period not to Exceed 15 Seconds	410	Max Volts
After Equipment Warm-up Period	180	Max Volts
Heater Positive with Respect to Cathode	180	Max Volts

CHARACTERISTIC RANGE VALUES FOR EQUIPMENT DESIGN
Anode Voltage 18,000 to 20,000 Volts, Anode Input 15 Watts

Grid-No. 4 (Converging Electrode) Voltage §	42.5 to 51	Percent of Anode Voltage
Grid-No. 3 (Focusing Electrode) Voltage	12 to 19	Percent of Anode Voltage
Grid-No. 2 Voltage for Visual Extinction of Focused Raster with Grid-No. 1 Voltage at a Fixed Value, Each Gun	2 to 4.5	Times Grid-No. 1 Voltage

Grid-No. 1 Voltage for Visual Extinction of Focused Raster with Grid-No. 2 Voltage at a Fixed Value, Each Gun	22.5 to 50	Percent of Grid-No. 2 Voltage
Grid-No. 4 Current	-5 to +5	Microamperes
Grid-No. 3 Current, maximum	300	Microamperes
Grid-No. 2 Current	-15 to +15	Microamperes
Beam Current Ratio to Produce Illuminant C White (6740 K)		
Red Gun to Green Gun	4:1 to 1:1	
Blue Gun to Green Gun	1.5:1 to 0.5:1	
Maximum Raster Shift in Any Direction from Screen Center ‡	1 1/4	Inches

EXAMPLES OF USE OF RANGE VALUES
Anode Voltage 20,000 Volts

Grid-No. 4 (Converging Electrode) Voltage §	8500 to 10200	Volts
Grid-No. 3 (Focusing Electrode) Voltage	2400 to 3800	Volts
Grid-No. 2 Voltage for Visual Extinction of Focused Raster with Grid-No. 1 Voltage of -70 Volts, Each Gun	140 to 315	Volts
Grid-No. 1 Voltage for Visual Extinction of Focused Raster with Grid-No. 2 Voltage of 200 Volts, Each Gun	-45 to -100	Volts

CIRCUIT VALUES

Grid-No. 1 Circuit Resistance, Each Gun, maximum	1.5	Megohms
Dynamic Converging Voltage, approximate π	900	Volts
Dynamic Focusing Voltage, approximate π	225	Volts

◊ The maximum ratings provide a ten-percent safety factor in accordance with the standard design-center system of rating cathode-ray tubes; that is, the tube will withstand the combined effects of variations in line voltage and components provided the maximum design-center values are not exceeded by more than ten percent.

† The aquadag coating, aperture mask, and metal screen-backing, which are connected together within the tube, are referred to herein as the anode.

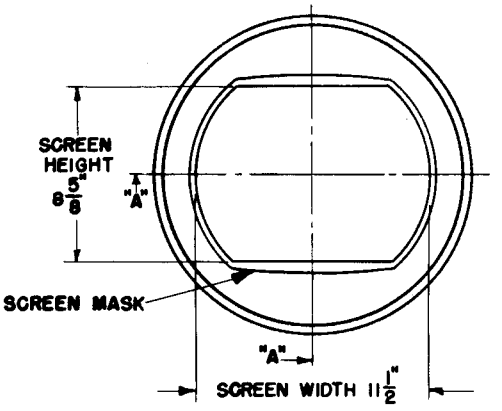
If this tube is operated at voltages in excess of 16,000 volts, x-ray radiation shielding may be necessary to avert possible danger of personal injury from prolonged exposure at close range. The protective face-viewing window of apparatus using tubes of this type may provide such a safeguard. If the radiation measured in contact with this window does not exceed 6.25 milliroentgens per hour, the window will normally provide adequate protection.

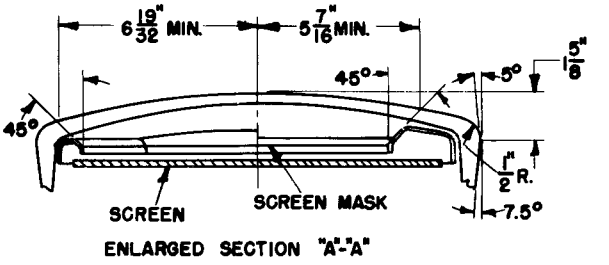
Δ Anode input equals the product of anode voltage and anode current, the latter being measured at the anode contact with a direct-current ammeter.

§ Does not include the d-c component of the dynamic coverging voltage.

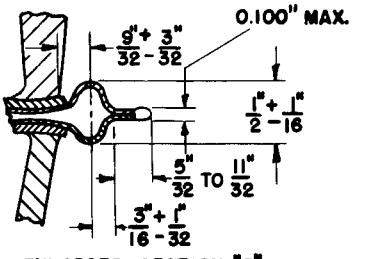
‡ Centering of the raster on the screen is accomplished by passing direct current of the required value through each pair of deflecting coils to compensate for the raster shift resulting from optimum adjustments for convergence, color purity, and concentricity.

π Peak to peak value. This a-c voltage, essentially parabolic in wave-form, is synchronized with scanning and does not include any voltage developed during the blanking time.

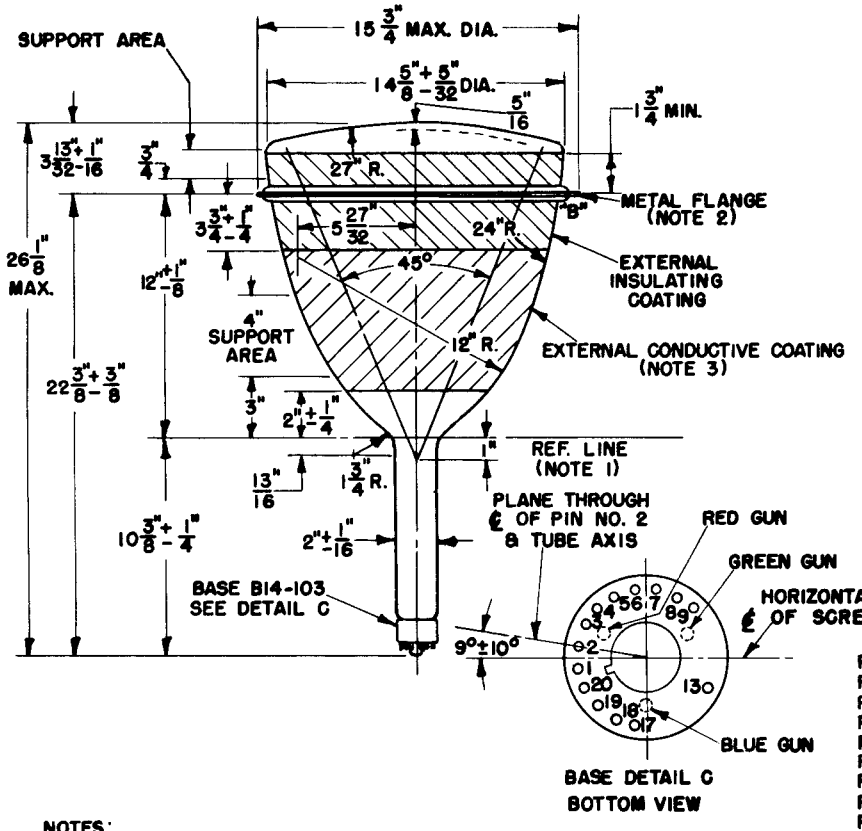




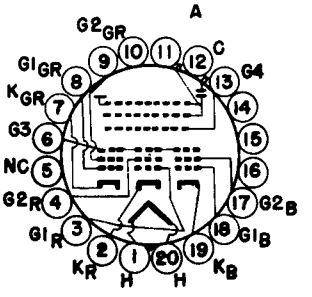
ENLARGED SECTION "A"-"A"



ENLARGED SECTION "B"



BASE DETAIL C
BOTTOM VIEW



BASING DIAGRAM
20A

PIN 1 - HEATER
PIN 2 - CATHODE } RED GUN
PIN 3 - GRID NO. 1 }
PIN 4 - GRID NO. 2 }
PIN 5 - NO CONNECTION
PIN 6 - GRIDS NO. 3
PIN 7 - CATHODE } GREEN GUN
PIN 8 - GRID NO. 1 }
PIN 9 - GRID NO. 2 }
PIN 13 - GRID NO. 4
PIN 17 - GRID NO. 2 } BLUE GUN
PIN 18 - GRID NO. 1 }
PIN 19 - CATHODE }
PIN 20 - HEATER
A - ANODE (METAL FLANGE)
C - CONDUCTIVE COATING

NOTES:

1. REFERENCE LINE IS DETERMINED BY THE POSITION WHERE A 2.400" ±.001" DIAMETER RING GAGE WILL REST ON CONE.
2. ADEQUATE INSULATION MUST BE PROVIDED FOR METAL FLANGE WHICH IS AT ANODE POTENTIAL.
3. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

K69087-72A637

March 10, 1954

Outline
15GP22

TUBE DEPARTMENT

GENERAL ELECTRIC

Schenectady 5, N. Y.