**RCA-19XP4**

**PICTURE TUBE**

Low-Voltage Electrostatic Focus  
114° Magnetic Deflection  
Aluminized Screen  
Rectangular Glass Type  
Requires No Ion-Trap Magnet  
15-1/8" x 12" Screen  
16-3/4" Max. Bulb Diagonal  
11-5/8" Max. Overall Length

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**RCA-19XP4** is a directly viewed, rectangular glass picture tube having an aluminized screen 15-1/8" x 12" with nearly straight sides and slightly rounded corners, and a minimum projected screen area of 172 square inches. Maximum overall length is 11-5/8".

**Electrical:**
- Heater Current at 6.3 volts: 600 ± 30 ma
- Heater Warm-up Time (Average): 11 seconds
- Heater warm-up time is defined as the time required in the test circuit shown in Fig. 1 for the voltage (E) across the heater terminals to increase from zero to 5 volts.
- Direct interelectrode Capacitances: Cathode to all other electrodes: 5 μF
  - Grid to all other electrodes: 6 μF
  - External conductive coating to ulti: 1500 max. μF
- Focusing Method: Electrostatic
- Deflection Method: Magnetic Diagonal: 114°  
  - Horizontal: 102°  
  - Vertical: 85°
- Electron Gun Type: Requiring No Ion-Trap Magnet

**Optical:**
- Faceplate: Filterglass
- Light transmission at center (Approx.): 70%
- Phosphor: PH-Sulfide Type, Aluminized
- Fluorescence: White
- Phosphorescence: White
- Persistence: Medium Short

**Mechanical:**
- Tube Dimensions:
  - Overall length: 11-3/8" ± 1/4"
  - Greatest width: 16-13/32" ± 1/8"
  - Greatest height: 13-11/32" ± 1/8"
  - Diagonal: 18-5/8" ± 1/8"
  - Neck length: 4-1/8" ± 1/8"
- Radius of curvature of faceplate:
  - External surface: 48°  
  - Internal surface:
    - In plane of diagonal deflection: 30°  
    - In plane of horizontal deflection: 30°  
  - Screen Dimensions (Minimum):
    - Greatest width: 15-1/8"
    - Greatest height: 12"
    - Projected area: 172 sq. in.
    - Cap: Recessed Small Cavity (JEDEC No. J1-21)
    - Base: Small-Button Remington 7-Pin, Arrangement 4 (JEDEC No. 87-208)
    - Basing: 8HR
    - Weight (Approx.): 14 lbs
    - Operating Position: Any

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The 19XP4 features an envelope having relatively flat, compound radius faceplate and special internal conturing in the deflecting yoke region to obtain 114° deflection with 110° deflecting components.

Other design features of the 19XP4 include a very short electron gun that minimizes deflection distortion and requires no ion-trap magnet; a neck diameter of 1-1/8"; an external conductive bulb coating; and a "neoeightar" 7-pin base of the integral glass-button type having straight through leads fitted with an indexing plug.
GRID-DRIVE® SERVICE

Unless otherwise specified, voltage values are positive with respect to cathode.

Maximum and Minimum Ratings, Design-Maximum Values:

ULTOR® VOLTAGE: 20000 max. volts (11000 min. volts)

GRID-No.4 VOLTAGE: 1100 max. volts
Positive value: 550 max. volts
Negative value: 550 max. volts

GRID-No.2 VOLTAGE: 200 max. volts
Positive value: 100 max. volts
Negative value: 100 max. volts

GRID-No.1 VOLTAGE: 220 max. volts
Negative peak value: 158 max. volts
Positive bias value: 0 max. volts
Positive peak value: 2 max. volts

HEATER VOLTAGE: 6.9 max. volts (5.7 min. volts)

PEAK HEATER-CATHODE VOLTAGE:
Heater negative with respect to cathode:
During equipment warm-up period not exceeding 15 seconds: 450 max. volts
After equipment warm-up period: 200 max. volts
Heater positive with respect to cathode: 200 max. volts

Equipment Design Ranges:
With any ultron voltage ($E_{UH}$) between 11000 and 20000 volts and grid-No.2 voltage ($E_{G2}$) between 220 and 550 volts:
- Grid-No.4 voltage for focus: 0 to 400 volts
- Grid-No.1 voltage ($E_{G1}$) for visual extinction of focused raster: See Raster-Cutoff-Range Chart for Grid-Drive Service
- Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak positive): Same value as determined for $E_{G1}$ except video drive is a negative voltage
- Grid-No.4 Current: -25 to +25 µA
- Grid-No.2 Current: -15 to +15 µA
- Field Strength of Adjustable Centering Magnet: 0 to 8 gausses

Examples of Use of Design Ranges:
With ultron voltage of 16000 volts and grid-No.2 voltage of 400 volts:
- Grid-No.4 voltage for focus: 0 to 400 volts
- Grid-No.1 voltage for visual extinction of focused raster: -36 to -94 volts
- Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value: 36 to 94 volts

Maximum Circuit Values:
Grid-No.1-Circuit Resistance: 1.5 max. megohms

CATHODE DRIVE® SERVICE

Unless otherwise specified, voltage values are positive with respect to grid No.1.

Maximum and Minimum Ratings, Design-Maximum Values:

ULTOR®-TO-GRID-No.1 VOLTAGE: 20000 max. volts (11000 min. volts)

GRID-No.4-TO-GRID-No.1 VOLTAGE: 1100 max. volts
Positive value: 550 max. volts
Negative value: 550 max. volts

GRID-No.2-TO-GRID-No.1 VOLTAGE: 700 max. volts
Positive value: 350 max. volts
Negative value: 350 max. volts

GRID-No.2-TO-CATHODE VOLTAGE: 600 max. volts
Positive peak value: 220 max. volts
Positive bias value: 154 max. volts
Negative bias value: 0 max. volts
Negative peak value: 2 max. volts

HEATER VOLTAGE: 5.7 min. volts

PEAK HEATER-CATHODE VOLTAGE:
Heater negative with respect to cathode:
During equipment warm-up period not exceeding 15 seconds: 450 max. volts
After equipment warm-up period: 200 max. volts
Heater positive with respect to cathode: 200 max. volts

Equipment Design Ranges:
With any ultron-to-grid-No.1 voltage ($E_{UH}$) between 11000 and 20000 volts and grid-No.2-to-grid-No.1 voltage ($E_{G2}$) between 225 and 700 volts:
- Grid-No.4-TO-GRID-No.1 voltage for focus: 0 to 400 volts
- Cathode-to-GRID-No.1 voltage ($E_{G1}$) for visual extinction of focused raster: See Raster-Cutoff-Range Chart for Cathode-Drive Service
- Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value (Peak negative): Same value as determined for $E_{G1}$ except video drive is a negative voltage
- Grid-No.4 Current: -25 to +25 µA
- Grid-No.2 Current: -15 to +15 µA
- Field Strength of Adjustable Centering Magnet: 0 to 8 gausses

Maximum Circuit Values:
Grid-No.1-Circuit Resistance: 1.5 max. megohms

- The maximum ratings in the tabulated data are established in accordance with the following definition of the Design-Maximum Ratings System for rating electron tubes.

- Design-Maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electron device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.

- The device manufacturer chooses these values to provide acceptable serviceability of the device, taking responsibility for the effects of changes in operating conditions due to variations in device characteristics.

- The equipment manufacturer should design so that initially and throughout life no Design-Maximum value for the intended service is exceeded with a bogey device under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, signal variation, and environmental conditions.

- The "ultron" in a cathode-ray tube is the electrode to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection. In the 19XPAs, the ultron function is performed by grid No.5. Since grid No.5, grid-No.3, and collector are connected together within the 19XPAs, they are collectively referred to simply as "ultron" for convenience in presenting data and curves.

- Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.
Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No. 1 and the other electrodes.

Individual tubes will have satisfactory focus at some value of grid-No. 4 (or grid-No. 1 to grid-No. 1) voltage between 0 and 100 volts with the combined bias voltage and video-signal voltage adjusted to produce an utor current of 100 micrompees.

Distance from Reference Line for suitable PM centering magnet should not exceed 2 1/8". (excluding extraneous fields, the center of the undetected focused spot will fall within a circle having a 5/16 inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as 5/16-inch deflection of the spot from the center of the tube face.

Fig. 1 - Test Circuit for Determining Heater Warm-Up Time.

**OPERATING CONSIDERATIONS**

**X-Ray Warning.** When operated at utor voltages up to 16 kilovolts, the 19XP4 does not produce any harmful X-ray radiation. However, because the rating of this type permits operation at voltages as high as 20 kilovolts (design maximum value), shielding of the 19XP4 for X-ray radiation may be needed to protect against possible injury from prolonged exposure at close range whenever the operating conditions involve voltages in excess of 16 kilovolts.

**Shatter-Proof Cover Over the Tube Face.** Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 19XP4 to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion under some abnormal condition. This safety cover can also provide X-ray protection when required.

Fig. 2 - Raster-Cutoff-Range Chart for Type 19XP4 in Grid-Drive Service.

Fig. 3 - Raster-Cutoff-Range Chart for Type 19XP4 in Cathode-Drive Service.
Fig. 4 - Average Drive Characteristics of Type 19XP4.

Fig. 5 - Average Drive Characteristics of Type 19XP4.
PLANE A THROUGH G ARE NORMAL TO THE TUBE AXIS AND AT FIXED LOCATIONS FROM THE Y AXIS. THESE COORDINATES DESCRIBE THE BORE BULB EXTERNAL CONTOUR IN PLANES THROUGH THE TUBE AXIS AND THE RESPECTIVE FACEPLATE AXES.
NOTES FOR DIMENSIONAL OUTLINE


NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. THE DESIGN OF THE SOCKET SHOULD BE SUCH THAT THE CIRCUIT WIRING CANNOT IMPRESS LATERAL STAINS THROUGH THE SOCKET CONTACTS ON THE BASE PINS. BOTTOM CIRCUMFERENCE OF BASE WAFER WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 1-3/4".

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.
NOTE 5: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.
NOTE 6: MEASURED AT THE MOLD-MATCH LINE.
NOTE 7: BULGE AT SPlice-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.
NOTE 8: UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPlice LINE IS 7/16" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF THE TUBE SUPPORT BAND. TUBE MOUNTING AND YOKE SUPPORT CLAMPS MUST BE SPADED FROM THE TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.

BASING DIAGRAM
Bottom View

PIN 1: HEATER
PIN 2: GRID No.1
PIN 3: GRID No.2
PIN 4: GRID No.4
PIN 5: GRID No.1
PIN 7: CATHODE
PIN 8: HEATER
CAP: ULTORG (Grid No.3, Grid No.5, Collector)
C: EXTERNAL CONDUCTIVE COATING

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