



# 21ALP4-A KINESCOPE

21ALP4-A

RECTANGULAR GLASS TYPE  
LOW-VOLTAGE FOCUS

ALUMINIZED SCREEN  
MAGNETIC DEFLECTION

## 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. . . . . 6  $\mu\text{f}$

Cathode to all other electrodes. . . . . 5  $\mu\text{f}$

External conductive coating to ultor. . . . .  $\begin{cases} 750 \text{ max.} & \mu\text{f} \\ 500 \text{ min.} & \mu\text{f} \end{cases}$

Faceplate, Spherical . . . . . Filterglass

Light transmission (Approx.) . . . . . 75%

Phosphor (For curves, see front of this Section) . P4—Sulfide Type  
Aluminized ←

Fluorescence . . . . . White

Phosphorescence. . . . . White

Persistence. . . . . Short

Focusing Method. . . . . Electrostatic

Deflection Method. . . . . Magnetic

Deflection Angles (Approx.):

Diagonal . . . . .  $90^\circ$

Horizontal . . . . .  $85^\circ$

Vertical . . . . .  $68^\circ$

Ion-Trap Gun . . . . . Requires External Single-Field Magnet

Tube Dimensions:

Overall length . . . . .  $20" \pm 3/8"$

Greatest width . . . . .  $20-1/4" \pm 1/8"$

Greatest height. . . . .  $16-3/8" \pm 1/8"$

Diagonal . . . . .  $21-3/8" \pm 1/8"$

Screen Dimensions (Minimum):

Greatest width . . . . .  $19-1/8"$

Greatest height. . . . . 15"

Diagonal . . . . .  $20-1/4"$

Projected area . . . . . 255 sq. in.

Weight (Approx.) . . . . . 24 lbs

Mounting Position. . . . . Any

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

Bulb . . . . . J171 ( $90^\circ$ ) ←

Base . . . . . Small-Shell Duodecal 6-Pin (JETEC No.B6-63)

Basing Designation BOTTOM VIEW . . . . . 12L

Pin 1 — Heater

Pin 2 — Grid No.1

Pin 6 — Grid No.4

Pin 10 — Grid No.2

Pin 11 — Cathode

Pin 12 — Heater

Cap — Ultor

(Grid No.3,

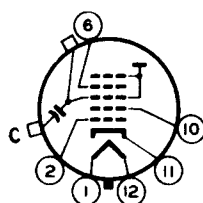
Grid No.5,

Collector)

C — External

Conductive

Coating



•: See next page.

← Indicates a change.

NOV. 1, 1955

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2IALP4-A



# 2IALP4-A

## KINESCOPE

### GRID-DRIVE<sup>▲</sup> SERVICE

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

#### Maximum Ratings, Design-Center Values:

|                                          |            |       |
|------------------------------------------|------------|-------|
| ULTOR <sup>•</sup> VOLTAGE . . . . .     | 18000 max. | volts |
| GRID-No.4 VOLTAGE:                       |            |       |
| Positive value . . . . .                 | 1000 max.  | volts |
| Negative value* . . . . .                | 500 max.   | volts |
| GRID-No.2 VOLTAGE . . . . .              | 500 max.   | volts |
| GRID-No.1 VOLTAGE:                       |            |       |
| Negative bias value . . . . .            | 125 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 . . .     | 180 max.   | volts |
| Heater positive with respect to cathode. | 180 max.   | volts |

#### Equipment Design Ranges:

*With any ultor voltage ( $E_{c5k}$ ) between 14000\* and 18000 volts and grid-No.2 voltage ( $E_{c2k}$ ) between 200 and 500 volts*

|                                                                     |                                          |           |
|---------------------------------------------------------------------|------------------------------------------|-----------|
| Grid-No.4 Voltage for Focus with Ultor                              |                                          |           |
| Current of 100 $\mu$ amp. . . . .                                   | -0.4% to +2.2% of $E_{c5k}$              | volts     |
| Grid-No.1 Voltage for Visual Extinction of Focused Raster . . . . . | -9.3% to -24% of $E_{c2k}$               | volts     |
| Grid-No.1 Video Drive from Raster Cutoff (Black Level):             |                                          |           |
| White-level value (Peak positive)                                   | 9.3% to 24% of $E_{c2k}$                 | volts     |
| Grid-No.4 Current . . . . .                                         | -25 to +25                               | $\mu$ amp |
| Grid-No.2 Current . . . . .                                         | -15 to +15                               | $\mu$ amp |
| → Ion-Trap Magnet Current (Average)** . . . . .                     | $\sqrt{\frac{E_{c5k}}{16000}} \times 30$ | ma        |
| → Minimum Field Strength of PM Ion-Trap Magnet§ . . .               | $\sqrt{\frac{E_{c5k}}{16000}} \times 33$ | gausses   |
| Field Strength of Adjustable Centering Magnet. . .                  | 0 to 8                                   | gausses   |

<sup>▲</sup> Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.

•, \*, #, \*\*, §: See next page.

→ Indicates a change.

NOV. 1, 1955

TUBE DIVISION

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# 21ALP4-A

## KINESCOPE

21ALP4-A

### Examples of Use of Design Ranges:

|                                                                              |             |             |           |
|------------------------------------------------------------------------------|-------------|-------------|-----------|
| <i>With ultor voltage of</i>                                                 | 16000       | 18000       | volts     |
| <i>and grid-No.2 voltage of</i>                                              | 300         | 400         | volts     |
| Grid-No.4 Voltage for<br>Focus with Ultor<br>Current of 100 $\mu$ amp. . . . | -65 to +350 | -75 to +400 | volts     |
| Grid-No.1 Voltage for<br>Visual Extinction of<br>Focused Raster . . . . .    | -28 to -72  | -37 to -96  | volts     |
| Grid-No.1 Video Drive<br>from Raster Cutoff<br>(Black Level):                |             |             |           |
| White-level value<br>(Peak positive)                                         | 28 to 72    | 37 to 96    | volts     |
| Minimum Field Strength of<br>PM Ion-Trap Magnet . . . .                      | 33          | 35          | gausses ← |

### Maximum Circuit Values:

|                                        |          |         |
|----------------------------------------|----------|---------|
| Grid-No.1-Circuit Resistance . . . . . | 1.5 max. | megohms |
|----------------------------------------|----------|---------|

### CATHODE-DRIVE<sup>■</sup> SERVICE

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

### Maximum Ratings, Design-Center Values:

|                                                                       |            |       |
|-----------------------------------------------------------------------|------------|-------|
| ULTOR <sup>●</sup> -TO-GRID-No.1 VOLTAGE. . . . .                     | 18000 max. | volts |
| GRID-No.4-TO-GRID-No.1 VOLTAGE:                                       |            |       |
| Positive value . . . . .                                              | 1000 max.  | volts |
| Negative value* . . . . .                                             | 500 max.   | volts |
| GRID-No.2-TO-GRID-No.1 VOLTAGE . . . . .                              | 625 max.   | volts |
| GRID-No.2-TO-CATHODE VOLTAGE . . . . .                                | 500 max.   | volts |
| CATHODE-TO-GRID-No.1 VOLTAGE:                                         |            |       |
| Positive bias value. . . . .                                          | 125 max.   | volts |
| Negative bias value. . . . .                                          | 0 max.     | volts |
| Negative peak value. . . . .                                          | 2 max.     | volts |
| PEAK HEATER-CATHODE VOLTAGE:                                          |            |       |
| Heater negative with respect to cathode:                              |            |       |
| During equipment warm-up period<br>not exceeding 15 seconds . . . . . | 410 max.   | volts |
| After equipment warm-up period . . . . .                              | 180 max.   | volts |
| Heater positive with respect to cathode.                              | 180 max.   | volts |

● The "ultor" 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 21ALP4-A, the ultor function is performed by grid No.5. Since grid No.5, grid No.3, and collector are connected together within the 21ALP4-A, they are collectively referred to simply as "ultor" for convenience in presenting data and curves.

\* This value has been specified to take care of the condition where an ac voltage is provided for dynamic focusing.

■ 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.

\*, \*\*, §: See next page.

← Indicates a change.



# 2IALP4-A

## KINESCOPE

### Equipment Design Ranges:

With any ultor-to-grid-No.1 voltage ( $E_{c5g1}$ ) between 14000\* and 18000 volts  
and grid-No.2-to-grid-No.1 voltage ( $E_{c2g1}$ ) between 220 and 620 volts

|                                                                               |                                           |           |
|-------------------------------------------------------------------------------|-------------------------------------------|-----------|
| Grid-No.4-to-Grid-No.1 Voltage for Focus with Ultor                           |                                           |           |
| Current of 100 $\mu$ amp. . . . .                                             | 0% to 2.6% of $E_{c5g1}$                  | volts     |
| Cathode-to-Grid-No.1 Voltage for Visual Extinction of Focused Raster. . . . . | 8.5% to 19.4% of $E_{c2g1}$               | volts     |
| Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level):            |                                           |           |
| White-level value                                                             |                                           |           |
| (Peak negative)                                                               | 8.5% to 19.4% of $E_{c2g1}$               | volts     |
| Grid-No.4 Current. . . . .                                                    | -25 to +25                                | $\mu$ amp |
| Grid-No.2 Current. . . . .                                                    | -15 to +15                                | $\mu$ amp |
| → Ion-Trap Magnet Current (Average)** . . . . .                               | $\sqrt{\frac{E_{c5g1}}{16000}} \times 30$ | ma        |
| → Minimum Field Strength of PM Ion-Trap Magnet§ . . . . .                     | $\sqrt{\frac{E_{c5g1}}{16000}} \times 33$ | gausses   |
| Field Strength of Adjustable Centering Magnet . . . . .                       | 0 to 8                                    | gausses   |

### Examples of Use of Design Ranges:

|                                       |       |       |       |
|---------------------------------------|-------|-------|-------|
| With ultor-to-grid-No.1 voltage of    | 16000 | 18000 | volts |
| and grid-No.2-to-grid-No.1 voltage of | 300   | 400   | volts |

|                                                                               |          |                |
|-------------------------------------------------------------------------------|----------|----------------|
| Grid-No.4-to-Grid-No.1 Voltage for Focus with Ultor                           |          |                |
| Current of 100 $\mu$ amp. . . . .                                             | 0 to 415 | 0 to 470 volts |
| Cathode-to-Grid-No.1 Voltage for Visual Extinction of Focused Raster. . . . . | 25 to 58 | 34 to 78 volts |
| Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level):            |          |                |
| White-level value                                                             |          |                |
| (Peak negative)                                                               | 25 to 58 | 34 to 78 volts |
| → Minimum Field Strength of PM Ion-Trap Magnet . . . . .                      | 33       | 35 gaussess    |

### Maximum Circuit Values:

|                                        |          |         |
|----------------------------------------|----------|---------|
| Grid-No.1-Circuit Resistance . . . . . | 1.5 max. | megohms |
|----------------------------------------|----------|---------|

\*, \*\*, §: See next page.

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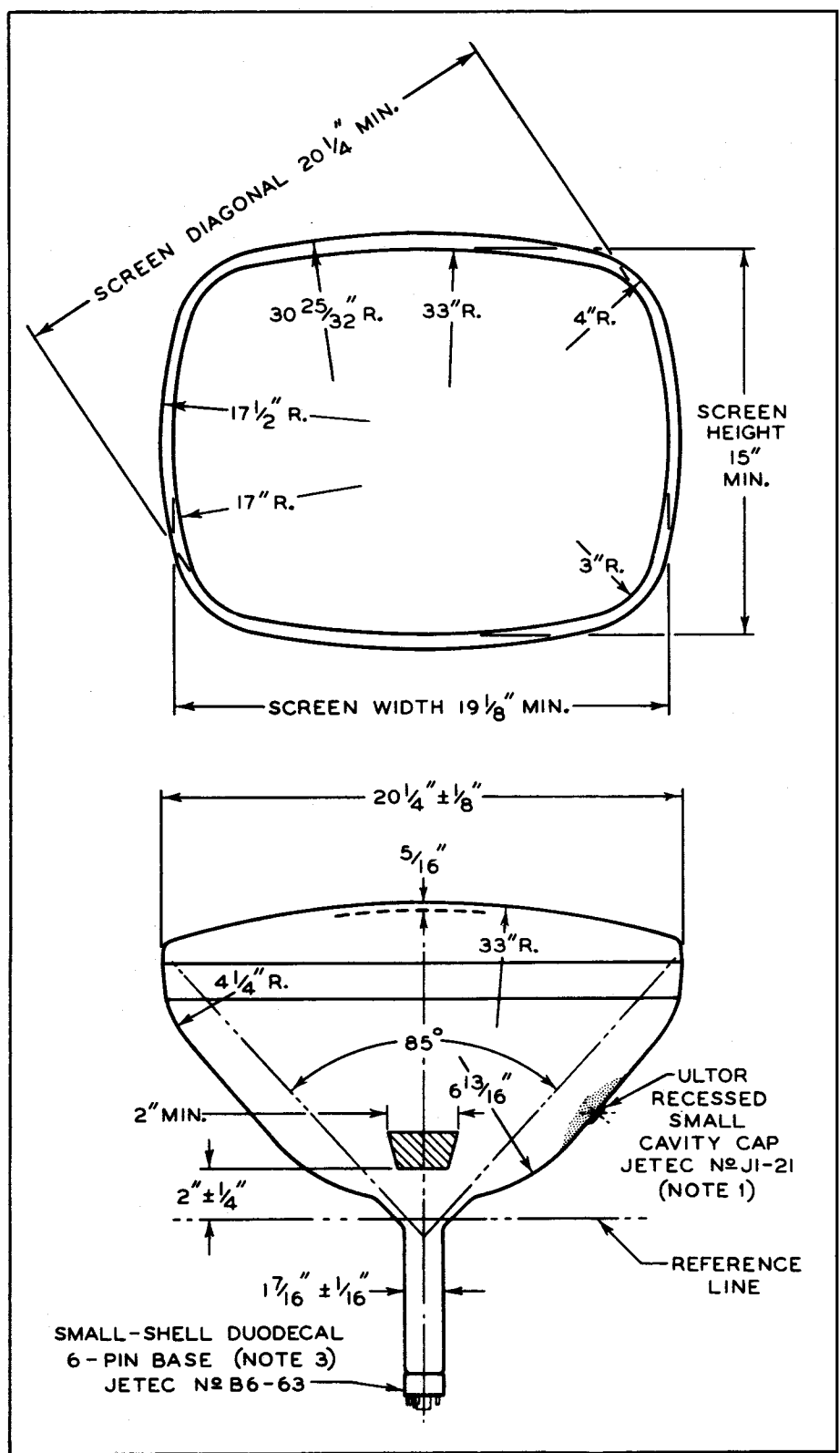
- # Brilliance and definition decrease with decreasing ultor voltage or ultor-to-grid-No.1 voltage. In general, the ultor voltage or ultor-to-grid-No.1 voltage should not be less than 14000 volts.
- \*\* For JETEC Ion-Trap Magnet No.117, or equivalent, located with the trailing edge of the pole pieces located over the gap between grid No.1 and grid No.2 and rotated to give maximum brightness.
- § For specimen PM ion-trap magnet, such as Heppner Model No.E437, or equivalent, located in optimum position and rotated to give maximum brightness. For a given equipment application, the tolerance range for the strength of the PM ion-trap magnet should be added to the minimum value. The maximum strength of this magnet should not exceed the specified minimum value by more than 6 gauss. This procedure will insure use of a PM ion-trap magnet allowing adequate adjustment to permit satisfactory performance without loss of highlight brightness.

*For X-ray shielding considerations, see sheet  
X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES  
at front of this Section*

2IALP4-A



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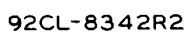
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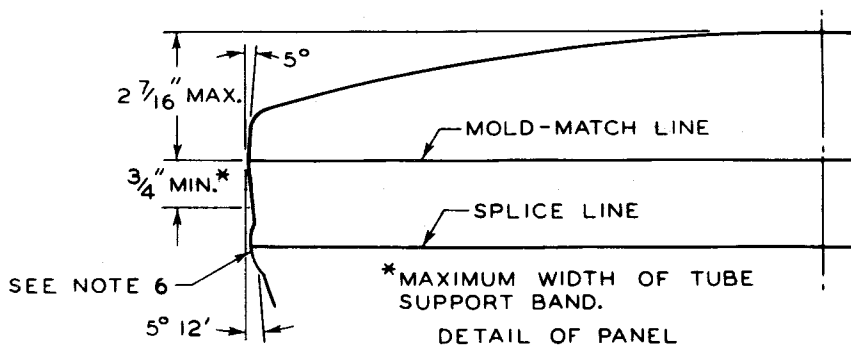
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2IALP4-A



## 2IALP4-A KINESCOPE



**NOTE 1:** THE PLANE THROUGH THE TUBE AXIS AND PIN No.6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF  $\pm 30^\circ$ . ULTOR TERMINAL IS ON SAME SIDE AS PIN No.6.

**NOTE 2:** WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No.116 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

**NOTE 3:** SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 3".

**NOTE 4:** THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT AREA OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THE CONTACT AREA SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

**NOTE 5:** TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.

**NOTE 6:** 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.

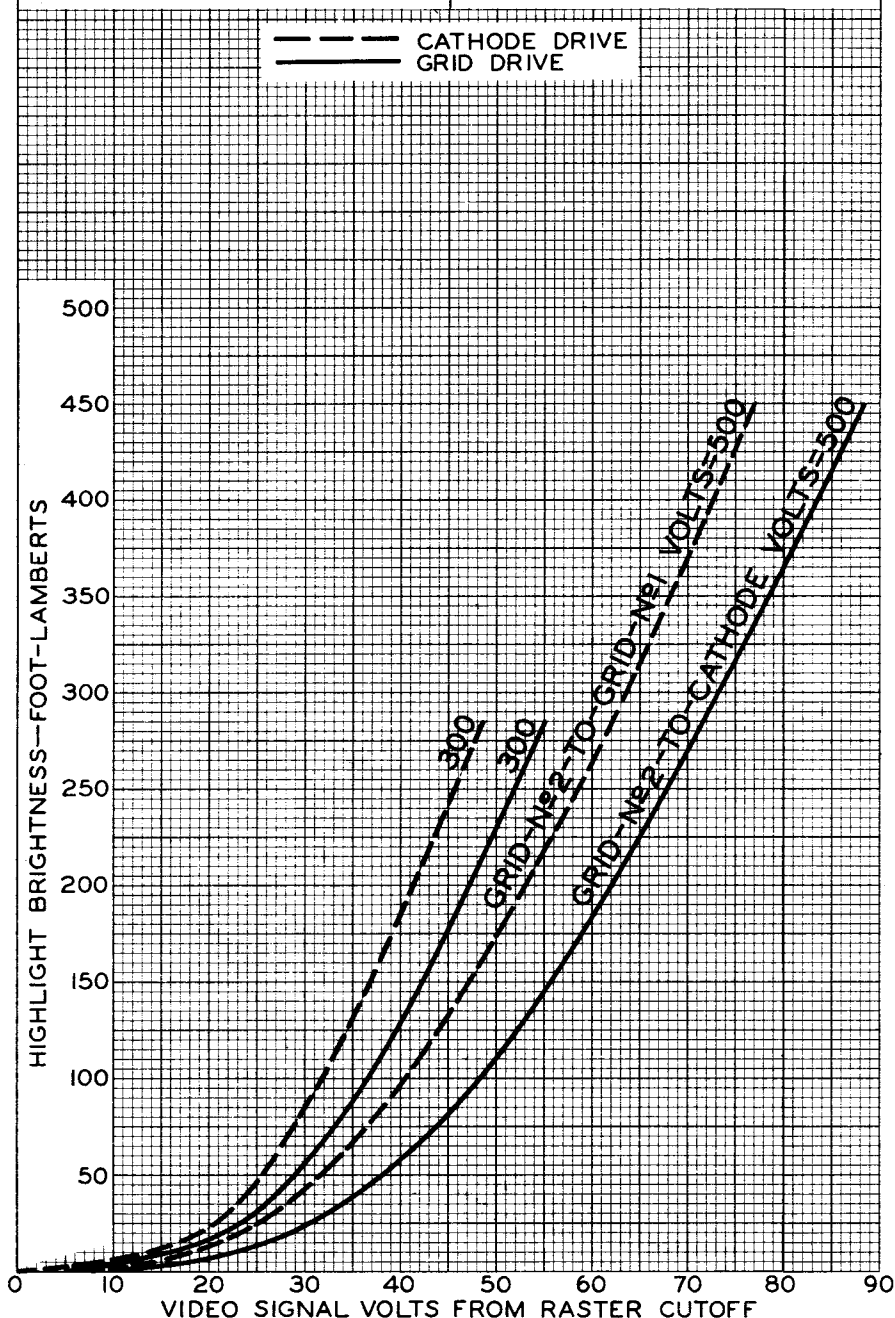


21ALP4-A

21ALP4-A

## AVERAGE DRIVE CHARACTERISTICS

| CATHODE-DRIVE SERVICE                                                                  | GRID-DRIVE SERVICE                                                                     |
|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| $E_f = 6.3$ VOLTS                                                                      | $E_f = 6.3$ VOLTS                                                                      |
| ULTOR-TO-GRID-№1 VOLTS=16000                                                           | ULTOR VOLTS=16000                                                                      |
| CATHODE BIASED POSITIVE<br>WITH RESPECT TO GRID №1<br>TO GIVE FOCUSED RASTER<br>CUTOFF | GRID №1 BIASED NEGATIVE<br>WITH RESPECT TO CATHODE<br>TO GIVE FOCUSED RASTER<br>CUTOFF |
| RASTER FOCUSED AT AVERAGE<br>BRIGHTNESS                                                | RASTER FOCUSED AT AVERAGE<br>BRIGHTNESS                                                |
| RASTER SIZE=18" x 13½"                                                                 | RASTER SIZE=18" x 13½"                                                                 |



21ALP4-A



21ALP4-A

# AVERAGE DRIVE CHARACTERISTICS

