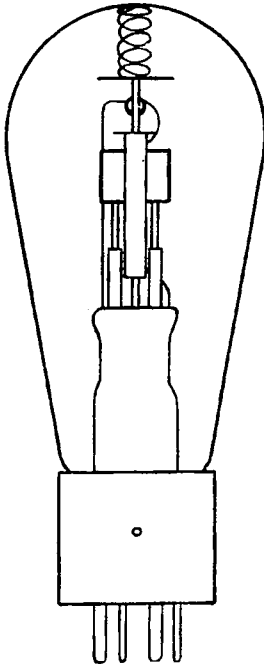


## RECTIFIER TUBE

EL 302.5  
RMA Type 3B21

Full-wave Rectifier  
Graphite Anodes and Argon Gas Filling



|                                            |                        |
|--------------------------------------------|------------------------|
| D-c. Amperes Output (Max. Rated)           |                        |
| D-c. Meter Value -Continuous               | 1                      |
| D-c. Meter Value -Surges less than 3 sec.  | 1.25                   |
| Oscillograph Peak-Continuously recurring   | 3                      |
| Peak Inverse Volts (Max. Instantaneous)    | 500                    |
| A-c. Volts per Anode                       | See table below 25-175 |
| Average Arc Drop Volts                     |                        |
| Highest Tube                               | 12                     |
| Average Tube                               | 9                      |
| Filament                                   |                        |
| Volts                                      | 2.5                    |
| Amperes                                    | 5.5±0.5                |
| Heating Time                               | Approx. 15 sec.        |
| Starting Volts (Instantaneous)             |                        |
| Highest Tube                               | 30                     |
| Average Tube                               | 20                     |
| Max. A-c. Short-circuit Current (0.1 sec.) | 60A                    |
| Overall Dimensions                         | 2-5/8 x 5-5/8±1/4"     |
| Weight                                     | 2 Ozs.                 |
| Connections                                | 4-prong UX Radio Base  |
| Ambient Temperature Limits                 | -40 to +65°C.          |

The maximum anode voltage rating of the tube depends upon the maximum current output as is shown in the following table:

| Maximum D-c. Amperes Output |       |              | Maximum A-c.<br>Volts per Anode |
|-----------------------------|-------|--------------|---------------------------------|
| Continuous                  | Surge | Oscillograph |                                 |
| 0.4                         | 0.5   | 1.2          | 175                             |
| 1.0                         | 1.25  | 3.0          | 145                             |
| 1.25                        | 1.5   | 3.75         | 55                              |

These ratings are based on reasonably steady load conditions. If the load fluctuates violently from one second to the next it is advisable to operate the tube well below rated current.

It is preferable, but not essential, to light the filament before applying d-c. load. If omitted, each cold start at 1 ampere, 145 volts per plate consumes approximately one hour of tube life.

ELECTRONS, INC. of Delaware  
127 Sussex Avenue  
Newark, N. J.

## RECTIFIER TUBE

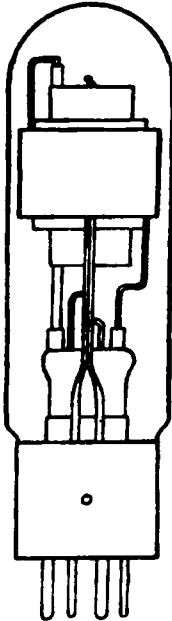
EL 10

RMA Type 3B22

**Full-wave Rectifier  
Tantalum Anode and Xenon Gas Filling**

|                                            |     |
|--------------------------------------------|-----|
| <b>D-c. Amperes Output (Max. Rated)</b>    |     |
| D-c. Meter Value-Continuous                | 1.0 |
| D-c. Meter Value-Overload less than 3 sec. | 1.5 |
| Oscillograph Peak-Continuously recurring   | 4.0 |

|                                                |        |
|------------------------------------------------|--------|
| <b>Peak Inverse Volts (Max. Instantaneous)</b> | 725    |
| <b>A-c. Volts per Anode</b>                    | 12-250 |



|                               |    |
|-------------------------------|----|
| <b>Average Arc Drop Volts</b> |    |
| Highest Tube                  | 10 |
| Average Tube                  | 8  |

|                 |                  |
|-----------------|------------------|
| <b>Filament</b> |                  |
| Volts           | 2.5              |
| Amperes         | 6.0±0.5          |
| Heating Time    | Approx. 20 secs. |

|                                       |    |
|---------------------------------------|----|
| <b>Starting Volts (Instantaneous)</b> |    |
| Highest Tube                          | 15 |
| Average Tube                          | 12 |

|                                                   |     |
|---------------------------------------------------|-----|
| <b>Max. A-c. Short-circuit Current (0.1 sec.)</b> | 60A |
|---------------------------------------------------|-----|

|                           |                         |
|---------------------------|-------------------------|
| <b>Overall Dimensions</b> | 1-9/16 x 5 1/2 x 1 1/2" |
| <b>Weight</b>             | 2 1/2 Ozs.              |

|                    |                                |
|--------------------|--------------------------------|
| <b>Connections</b> | Standard 4-prong UX Radio Base |
|--------------------|--------------------------------|

|                                   |               |
|-----------------------------------|---------------|
| <b>Ambient Temperature Limits</b> | -40 to +65°C. |
|-----------------------------------|---------------|

It is preferable to light the filament before applying d-c. load. If omitted, each cold start consumes tube life and at anode voltages above 115V may blow the primary fuse.

The socket should be so connected that the a-c. voltage measured from each filament contact is lower to the anode contact directly opposite than to the anode contact diagonally opposite with the tube removed and some load connected. This phasing of the filament voltage relative to the anode voltage insures a lower arc drop and somewhat longer life.

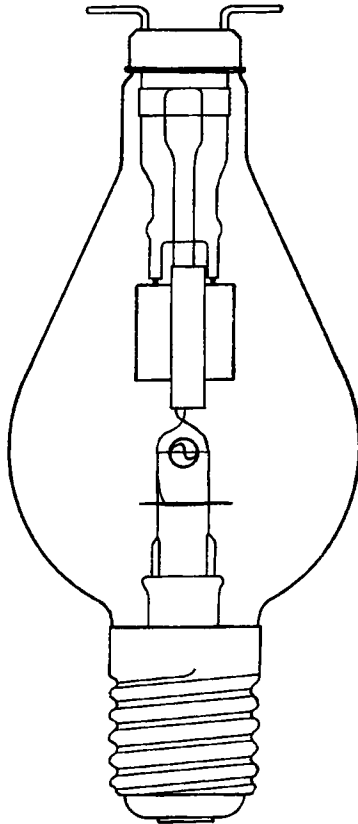
**ELECTRONS, INC.  
127 Sussex Avenue  
Newark, N. J.**

RECTIFIER TUBE

EL 5B  
Standard

RMA type 4B22

Full-wave Rectifier  
Graphite Anodes and Argon Gas Filling



|                                            |                                                      |
|--------------------------------------------|------------------------------------------------------|
| D-c. Amperes Output (Max. Rated)           |                                                      |
| D-c. Meter Value -Continuous               | 5                                                    |
| D-c. Meter Value -Surges less than 3 sec.  | 6                                                    |
| Oscillograph Peak-Continuously recurring   | 15                                                   |
| Peak Inverse Volts (Max. Instantaneous)    | 340                                                  |
| A-c. Volts per Anode                       | 18-120                                               |
| Average Arc Drop Volts                     |                                                      |
| Highest Tube                               | 11                                                   |
| Average Tube                               | 9                                                    |
| Filament                                   |                                                      |
| Volts                                      | 2.5                                                  |
| Amperes                                    | 12±1                                                 |
| Heating Time                               | Approx. 20 secs.                                     |
| Starting Volts (Instantaneous)             |                                                      |
| Highest Tube                               | 25                                                   |
| Average Tube                               | 16                                                   |
| Max. A-c. Short-circuit Current (0.1 sec.) | 300A                                                 |
| Overall Dimensions                         | $3\frac{5}{8} \times 8\frac{1}{4} \pm \frac{1}{2}$ " |
| Weight                                     | 6 Ozs.                                               |
| Connections                                |                                                      |
| Anode                                      | Pins at top for clip connection                      |
| Filament                                   | Mogul Screw Socket                                   |
| Ambient Temperature Limits                 | -40 to +65°C                                         |

The EL 5B Standard is intended for service where steady output currents up to 5 amperes are desired. It should not be used where the load has large and continuously repeated fluctuations.

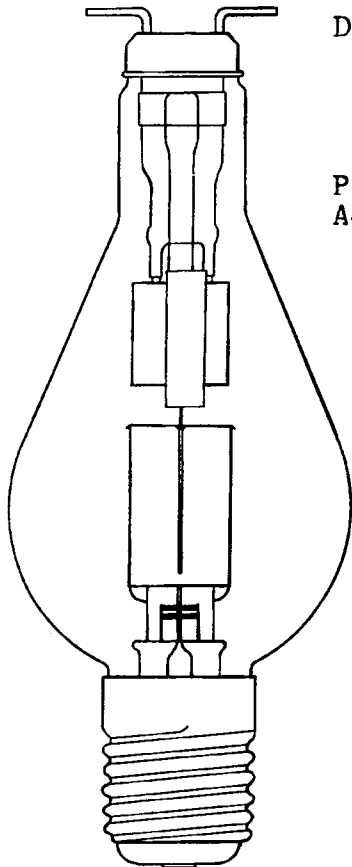
It is essential that the filament be lit before applying d-c. load at all loads above 2 amperes or anode voltages above 90 volts per anode. Load and filament heating applied simultaneously at lower currents are permissible but consume tube life.

ELECTRONS, INC. of Delaware  
127 Sussex Avenue  
Newark, N. J.

## RECTIFIER TUBE

EL 5BHD  
Heavy Duty

RMA Type 4B23

Full-wave Rectifier  
Graphite Anodes and Argon Gas Filling

|                                            |                                 |
|--------------------------------------------|---------------------------------|
| D-c. Amperes Output (Max. Rated)           | 5                               |
| D-c. Meter Value -Continuous               | 7.5                             |
| D-c. Meter Value -Surges less than 5 sec.  | 15                              |
| Oscillograph Peak-Continuously recurring   |                                 |
| Peak Inverse Volts (Max. Instantaneous)    | 425                             |
| A-c. Volts per Anode                       | 35-150                          |
| Average Arc Drop Volts                     |                                 |
| Highest Tube                               | 14                              |
| Average Tube                               | 11                              |
| Filament                                   |                                 |
| Volts                                      | 2.5                             |
| Amperes                                    | 17±1½                           |
| Heating Time                               | Approx. 2 min.                  |
| Starting Volts (Instantaneous)             |                                 |
| Highest Tube                               | 50                              |
| Average Tube                               | 20                              |
| Max. A-c. Short-circuit Current (0.1 sec.) | 300A                            |
| Overall Dimensions                         | 3¼ x 8½±½"                      |
| Weight                                     | 7 Ozs.                          |
| Connections                                |                                 |
| Anode                                      | Pins at top for clip connection |
| Filament                                   | Mogul Screw Socket              |
| Ambient Temperature Limits                 | -40 to +65°C                    |

The EL 5B Heavy Duty has a much larger heat shielded cathode than the EL 5B Standard and is designed for service where the load fluctuates violently, or where exceptionally long life is desired. Load and filament voltage may be applied simultaneously without immediate damage, but life is materially shortened by each such cold start.

ELECTRONS, INC. of Delaware  
127 Sussex Avenue  
Newark, N. J.

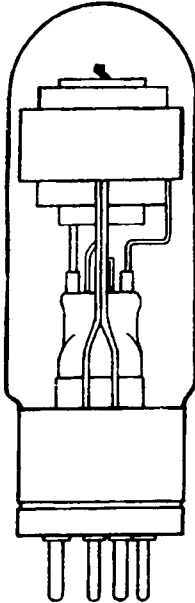
# RECTIFIER TUBE

EL 3C  
RMA Type 4B24

Full-wave Rectifier  
Tantalum Anode and Xenon Gas Filling

D-c. Amperes Output (Max. Rated)  
D-c. Meter Value - Continuous 2.5  
D-c. Meter Value - Overload less than 3 sec. 3.7  
Oscillograph Peak-Continuously recurring 10.0

Peak Inverse Volts (Max. Instantaneous) 725  
A-c. Volts per Anode 12-250



Average Arc Drop Volts  
Highest Tube 10  
Average Tube 8

Filament  
Volts 2.5  
Amperes 11.5±1  
Heating Time Approx. 30 secs.

Starting Volts (Instantaneous)  
Highest Tube 15  
Average Tube 12

Max. A-c. Short-circuit Current (0.1 sec.) 150A

Overall Dimensions 2 x 7½"  
Weight 5 Ozs.

Connections #412 4-prong Industrial Base\*

Ambient Temperature Limits -40 to +65°C

It is preferable to light the filament before applying d-c. load. If omitted, each cold start consumes tube life and at anode voltages above 115V may blow the primary fuse.

The socket should be so connected that the a-c. voltage measured from each filament contact is lower to the anode contact directly opposite than to the anode contact diagonally opposite with the tube removed and some load connected. This phasing of the filament voltage relative to the anode voltage insures a lower arc drop and somewhat longer life.

\*This tube is also available with a special 4-prong tungar type base, the type number being EL 3CF.

ELECTRONS, INC.  
127 Sussex Avenue  
Newark, N. J.

# RECTIFIER TUBE

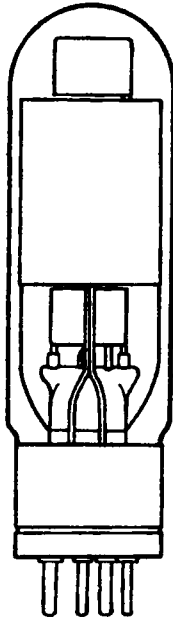
EL 6C

RMA Type 4B25

Full-wave Rectifier  
Tantalum Anode and Xenon Gas Filling

D-c. Amperes Output (Max. Rated)  
D-c. Meter Value - Continuous 6.4  
D-c. Meter Value - Overload 3 sec. or less 9.6  
Oscillograph Peak-Continuously recurring 25.6

Peak Inverse Volts (Max. Instantaneous) 725  
A-c. Volts per Anode 15-250



Average Arc Drop Volts  
Highest Tube 10  
Average Tube 8

Filament  
Volts 2.5  
Amperes 17\*2  
Heating Time Approx. 40 secs.

Starting Volts (Instantaneous)  
Highest Tube 18  
Average Tube 13

Max. A-c. Short-circuit Current (0.1 sec.) 360A

Overall Dimensions 2 x 7 1/2 x 1 1/2"  
Weight 6 Ozs.

Connections #412 4-prong Industrial Base\*

Ambient Temperature Limits -40 to +65°C

The filament must be lit before applying d-c. load at voltages in excess of 115V per anode. At lower anode voltages this precaution is preferable but not essential.

The socket should be so connected that the a-c. voltage measured from each filament contact is lower to the anode contact directly opposite than to the anode contact diagonally opposite with the tube removed and some load connected. This phasing of the filament voltage relative to the anode voltage insures a lower arc drop and somewhat longer life.

\*This tube is also available with a special 4-prong tungar type base, the type number being EL 6CF.

ELECTRONS, INC.  
127 Sussex Avenue  
Newark, N. J.

# ELECTRONS, INCORPORATED

127 SUSSEX AVENUE

RECTIFIER TUBES

NEWARK 4, N. J.

TYPE 5664 (C1B/A)

THYRATRON

## GENERAL CHARACTERISTICS

A temperature free inert gas filled grid controlled triode designed for precise control.

## ELECTRICAL

|                                                |                        |
|------------------------------------------------|------------------------|
| Filament-----                                  | Coated                 |
| Voltage-----                                   | 2.5 volts              |
| Current-----                                   | 6.3 $\pm$ 0.8 amps.    |
| Heating Time-----                              | 25 seconds             |
| Average Tube Voltage Drop-----                 | 8 volts                |
| Grid Characteristics                           |                        |
| Maximum De-ionization Time-----                | approx. 1 millisenond  |
| Critical Grid Voltage at 750 peak fwd. volts-- | -4.0 $\pm$ 2 volts     |
| Critical Grid Current-----                     | less than 5 microamps. |
| Critical Anode Voltage @ +4 grid volts-----    | 30 volts               |
| Maximum Negative Grid Voltage-----             | 100 volts              |
| Grid to anode capacitance-----                 | approx. 2 u u f        |
| Grid to Filament Capacitance-----              | approx. 7.5 u u f      |

## MECHANICAL

|                            |              |
|----------------------------|--------------|
| Type of Cooling-----       | convection   |
| Temperature Limits-----    | -55 to +70°C |
| Mounting Position-----     | Any          |
| Basing Designation-----    | 3 G          |
| Base-----                  | A4-10        |
| Cap-----                   | C1-5 medium  |
| Weight-----                | 3 oz.        |
| Maximum Overall Dimensions |              |
| Length-----                | 4 3/4 in.    |
| Diameter-----              | 1 9/16 in.   |

## MAXIMUM RATINGS

|                                                     |            |
|-----------------------------------------------------|------------|
| Peak Inverse Voltage-----                           | 1250 volts |
| Peak Forward Voltage-----                           | 750 volts  |
| Peak Anode Current-----                             | 8 amps.    |
| Overload Average Anode Current Less Than 3 sec.---- | 1.5 amps.  |
| Average Continuous Anode Current-----               | 1.0 amps.  |
| AC Short-Circuit Current (0.1 sec.)-----            | 77 amps.   |

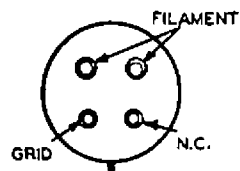
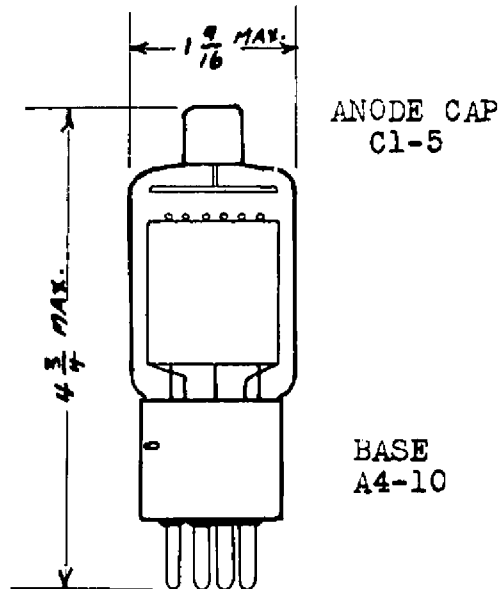
All values are for returns to the filament center tap.

Sponsor:           ELECTRONS, INC.                   Newark, New Jersey

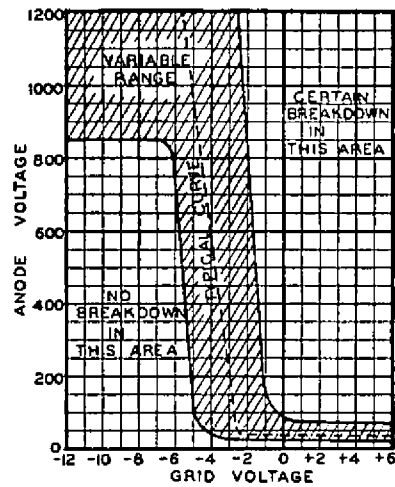
Date:             August 20, 1947

from RMA release #609, Sept. 25, 1947

OUTLINE  
Thyratron 5664



BOTTOM VIEW  
OF BASE



**CONTROL CHARACTERISTICS**

ELECTRONS, INC.  
127 Sussex Ave.  
Newark 4, N. J.

# ELECTRONS, INCORPORATED

127 SUSSEX AVENUE

RECTIFIER TUBES

NEWARK 4, N. J.

TYPE 5683 ~~4C1P/A~~

THYRATRON

## GENERAL CHARACTERISTICS

A temperature free inert gas filled grid controlled triode designed for precise control.

## ELECTRICAL

|                                                |                     |
|------------------------------------------------|---------------------|
| Filament-----                                  | Coated              |
| Voltage-----                                   | 2.5 volts           |
| Current-----                                   | 6.3 $\pm$ 0.8 amps. |
| Heating Time-----                              | 25 seconds          |
| Average Tube Voltage Drop-----                 | 8 volts             |
| Grid Characteristics                           |                     |
| Maximum De-ionization Time-----approx.         | 1 millisecond       |
| Critical Grid Voltage at 750 peak fwd volts -- | -4.0 $\pm$ 2 volts  |
| Critical Grid Current-----less than            | 5 microamps.        |
| Critical Anode Voltage @ + 4 grid volts-----   | 30 volts            |
| Maximum Negative Grid Voltage-----             | 100 volts           |
| Grid to anode capacitance-----                 | approx. 2 u u f     |
| Grid to Filament Capacitance-----              | approx. 7.5 u u f   |

## MECHANICAL

|                            |                     |
|----------------------------|---------------------|
| Type of Cooling-----       | convection          |
| Temperature Limits-----    | -55 to +70°C        |
| Mounting Position-----     | Any                 |
| Basing Designation-----    | 4AX                 |
| Base-----                  | A4-10               |
| Weight-----                | 3 oz.               |
| Maximum Overall Dimensions |                     |
| Length-----                | 4 $\frac{1}{2}$ in. |
| Diameter-----              | 1-9/16 in.          |

## MAXIMUM RATINGS

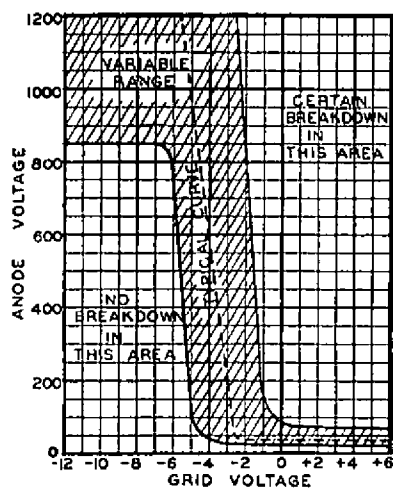
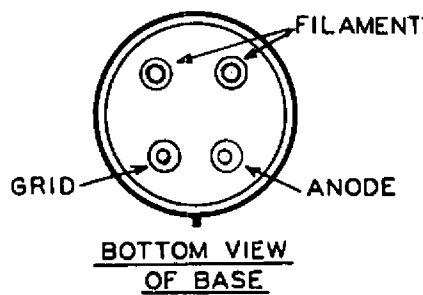
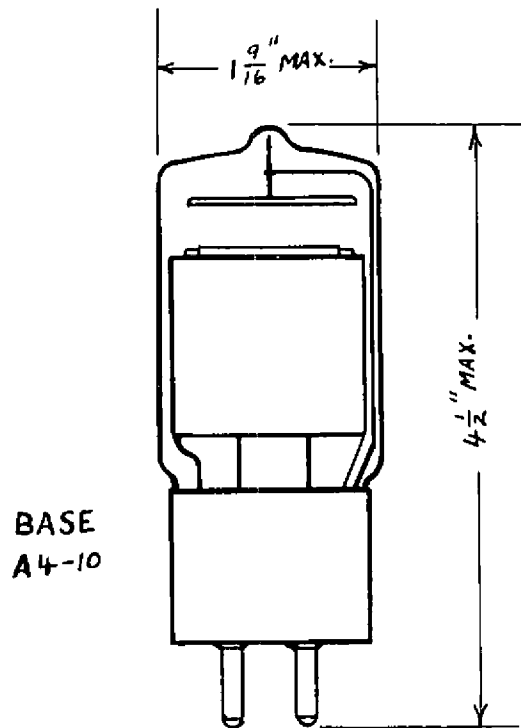
|                                                    |            |
|----------------------------------------------------|------------|
| Peak Inverse Voltage-----                          | 1250 volts |
| Peak Forward Voltage-----                          | 750 volts  |
| Peak Anode Current-----                            | 8 amps.    |
| Overload Average Anode Current Less Than 3 sec.--- | 1.5 amps.  |
| Average Continuous Anode Current-----              | 1.0 amps.  |
| AC Short-Circuit Current (0.1 sec.)-----           | 77 amps.   |

All values are for returns to the filament center tap.

Sponsor:           ELECTRONS, INC.                      Newark, New Jersey

Date:               Nov. 7, 1947

OUTLINE  
Thyratron 5683



**CONTROL CHARACTERISTICS**

ELECTRONS, INC.  
127 Sussex Ave.  
Newark 4, N. J.

# ELECTRONS, INCORPORATED

127 SUSSEX AVENUE

RECTIFIER TUBES

NEWARK 4, N. J.

TYPE 5684 (C37/A)

THYRATRON

## GENERAL CHARACTERISTICS

Inert Gas Filled Grid Controlled Triode designed for precise motor speed control, ignitron firing, and welding control.

## ELECTRICAL

|                                              |                  |
|----------------------------------------------|------------------|
| Filament-----                                | Coated           |
| Voltage-----                                 | 2.5 volts        |
| Current-----                                 | 9+2 amps.        |
| Heating Time-----                            | 30 secs.         |
| Average Tube Voltage Drop-----               | 10 volts         |
| Grid Characteristics                         |                  |
| Maximum de-ionization time-----approx.       | 1 millisecond    |
| Critical Grid Voltage at 1000 P. F. V. ----- | -6.0+1.8 volts   |
| Critical Grid Current-----Less than          | 10 microamps.    |
| Critical Anode Voltage @ +4 grid volts-----  | 75 volts max.    |
| Grid to Anode capacitance-----               | Approx. 2 u u f  |
| Grid to Filament capacitance-----            | Approx. 14 u u f |
| Maximum Negative Grid Voltage-----           | 100 volts        |

## MECHANICAL

|                            |               |
|----------------------------|---------------|
| Type of Cooling-----       | Convection    |
| Temperature Limits-----    | -55 to +70 °C |
| Mounting Position-----     | Any           |
| Basing Designation-----    | 4CF           |
| Base-----                  | Metal A4-10   |
| Cap-----                   | Cl-5 medium   |
| Maximum Overall Dimensions |               |
| Length-----                | 6.25 in.      |
| Diameter-----              | 1.57 in.      |
| Weight-----                | 6 oz.         |

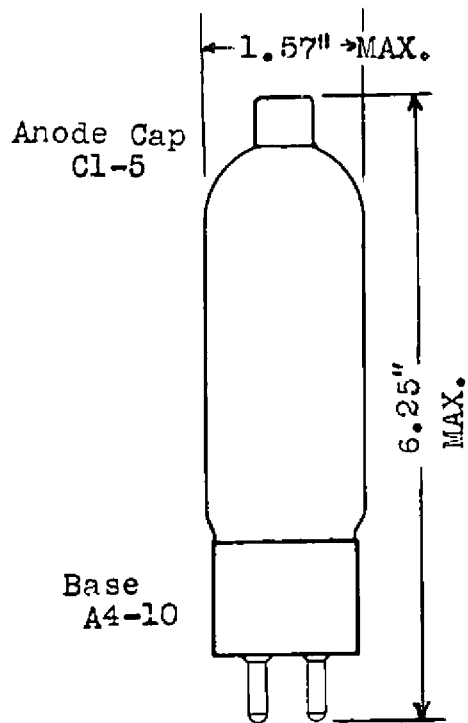
## MAXIMUM RATING

|                                              |            |
|----------------------------------------------|------------|
| Peak Inverse Voltage-----                    | 1250 volts |
| Peak Forward Voltage-----                    | 1000 volts |
| Peak Anode Current-----                      | 30.0 amps. |
| Overload Anode Current less than 3 sec.----- | 3.7 amps.  |
| Average Anode Current-----                   | 2.5 amps.  |
| AC Short-Circuit Current (0.1 sec.)-----     | 300 amps.  |

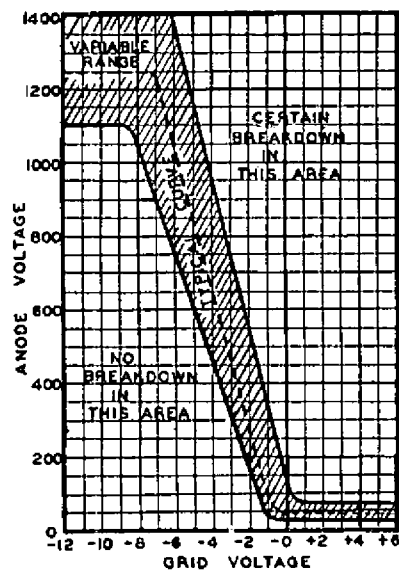
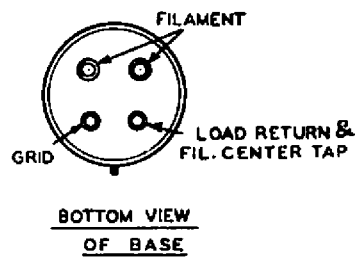
All values are for returns to the filament center tap.

Sponsor:       ELECTRONS, INC.       Newark, New Jersey

Date:       Nov. 7, 1947



OUTLINE  
THYRATRON 5684



CONTROL CHARACTERISTICS

ELECTRONS, INC.  
127 Sussex Ave.  
Newark 4, N. J.

# ELECTRONS, INCORPORATED

127 SUSSEX AVENUE

RECTIFIER TUBES

NEWARK 4, N. J.

TYPE 5685 (C6J/A)

THYRATRON

## GENERAL CHARACTERISTICS

A temperature free inert gas filled grid controlled triode designed for precise control.

## ELECTRICAL

|                                               |                         |
|-----------------------------------------------|-------------------------|
| Filament-----                                 | Coated                  |
| Voltage-----                                  | 2.5 volts               |
| Current-----                                  | 21+2 amps.              |
| Heating Time-----                             | Approx. 60 seconds      |
| Average Tube Voltage Drop-----                | 9 volts                 |
| Grid Characteristics                          |                         |
| Maximum De-ionization Time-----               | Approx. 1 millisecond   |
| Critical Grid Voltage at 1000 peak fwd. volts | -4.6+1.6                |
| Critical Grid Current-----                    | less than 10 microamps. |
| Critical Anode Voltage @ +4 grid volts-----   | 75 volts max.           |
| Maximum Negative Grid Voltage-----            | 100 volts               |
| Grid to anode capacitance-----                | approx. 4 u u f         |
| Grid to Filament Capacitance-----             | approx. 21 u u f        |

## MECHANICAL

|                            |              |
|----------------------------|--------------|
| Type of Cooling-----       | convection   |
| Temperature Limits-----    | -55 to +70°C |
| Mounting Position-----     | Vertical     |
| Basing Designation-----    | 4AV          |
| Base-----                  | Per Outline  |
| Cap-----                   | Per outline  |
| Weight-----                | 7 Oz.        |
| Maximum Overall Dimensions |              |
| Length-----                | 9.5 in.      |
| Diameter-----              | 2.1 in.      |

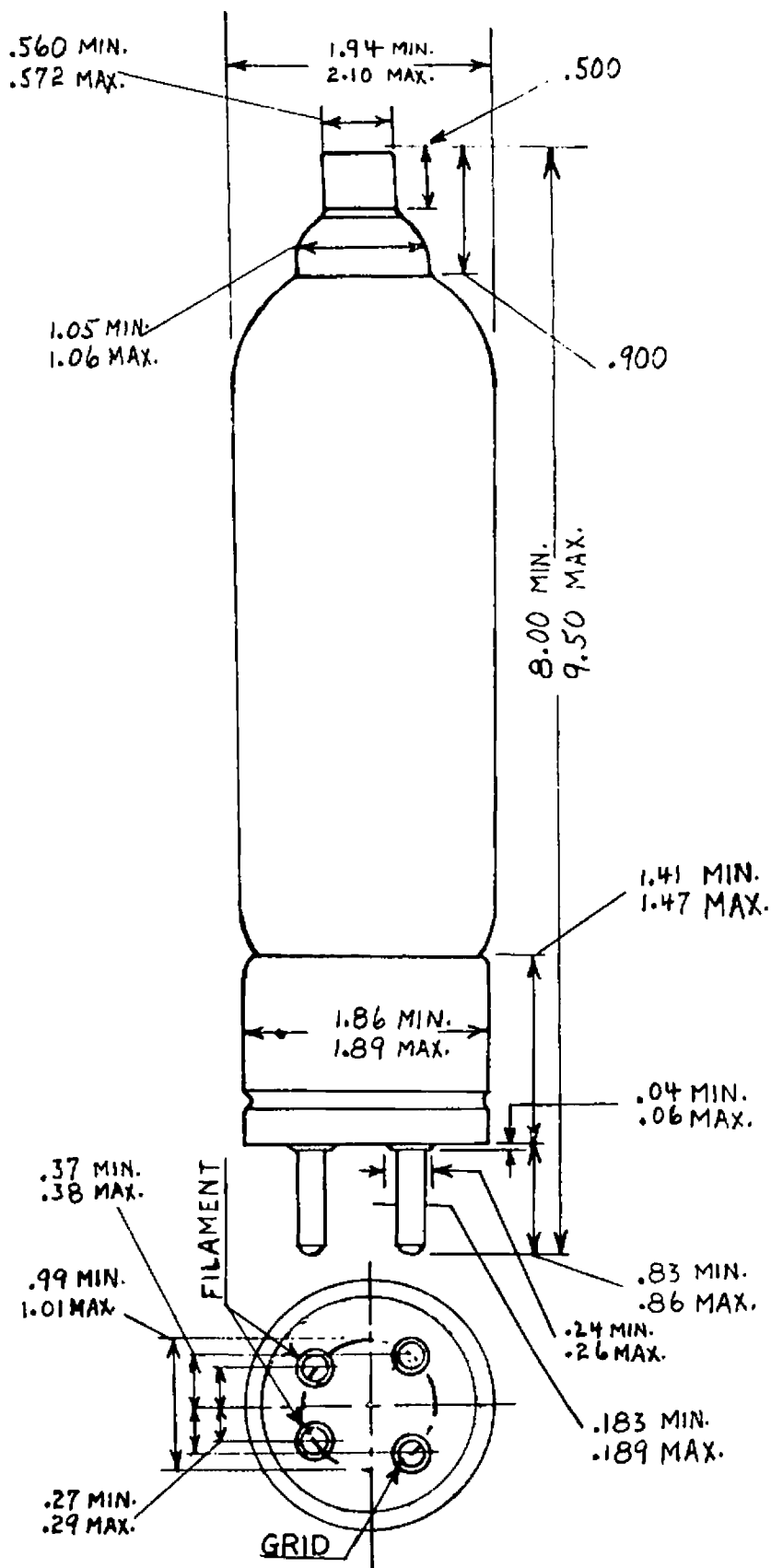
## MAXIMUM RATINGS

|                                                    |            |
|----------------------------------------------------|------------|
| Peak Inverse Voltage-----                          | 1250 volts |
| Peak Forward Voltage-----                          | 1000 volts |
| Peak Anode Current-----                            | 77 amps.   |
| Overload Average Anode Current Less Than 3 sec.--- | 12.8 amps. |
| Average Continuous Anode Current-----              | 6.4 amps.  |
| AC Short-Circuit Current (0.1 sec.)-----           | 770 amps.  |

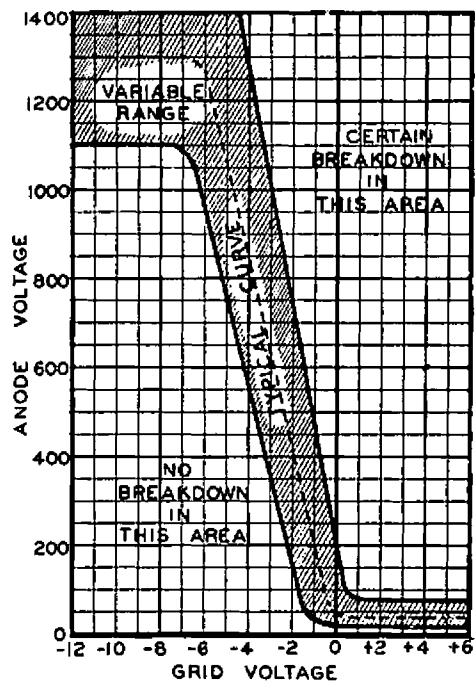
All values are for returns to the filament center tap.

Sponsor:           ELECTRONS, INC.                               Newark, New Jersey

Date:               Nov. 7, 1947



OUTLINE  
Thyratron 5685



ELECTRONS, INC.  
127 Sussex Ave.  
Newark 4, N. J.

# ELECTRONS, INCORPORATED

RECTIFIER TUBES  
GRID CONTROL RECTIFIER TUBES

127 SUSSEX AVENUE

NEWARK 4, N. J.

R. M. A. Type 5892

Hot Cathode Gas Rectifier

## General Characteristics

Inert Gas Filling  
Half Wave Rectifier

## Electrical

|                                     |                  |
|-------------------------------------|------------------|
| Filament -----                      | Coated           |
| Voltage -----                       | 2.5 Volts        |
| Current -----                       | 21 Amps.         |
| Heating Time -----                  | Approx. 60 Secs. |
| Approximate Tube Voltage Drop ----- | 9 volts          |
| Starting Voltage -----              | 30 volts(max.)   |

## Mechanical

|                                  |               |
|----------------------------------|---------------|
| Type of Cooling -----            | Convection    |
| Temperature Limits(Ambient)----- | -55 to +75°C. |
| Mounting Position -----          | Vertical      |
| Base -----                       | A4-81         |
| Cap -----                        | C1-5          |
| Base Connections -----           | 2P            |
| Maximum Overall Dimensions       |               |
| Length -----                     | 9.5 in.       |
| Diameter -----                   | 2.1 in.       |

## Maximum Ratings

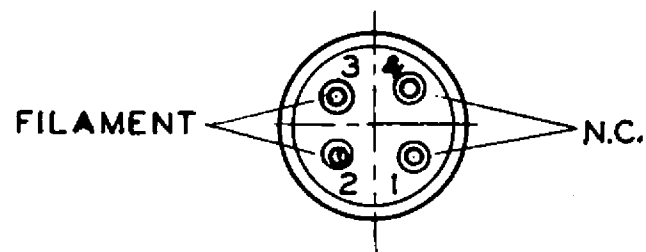
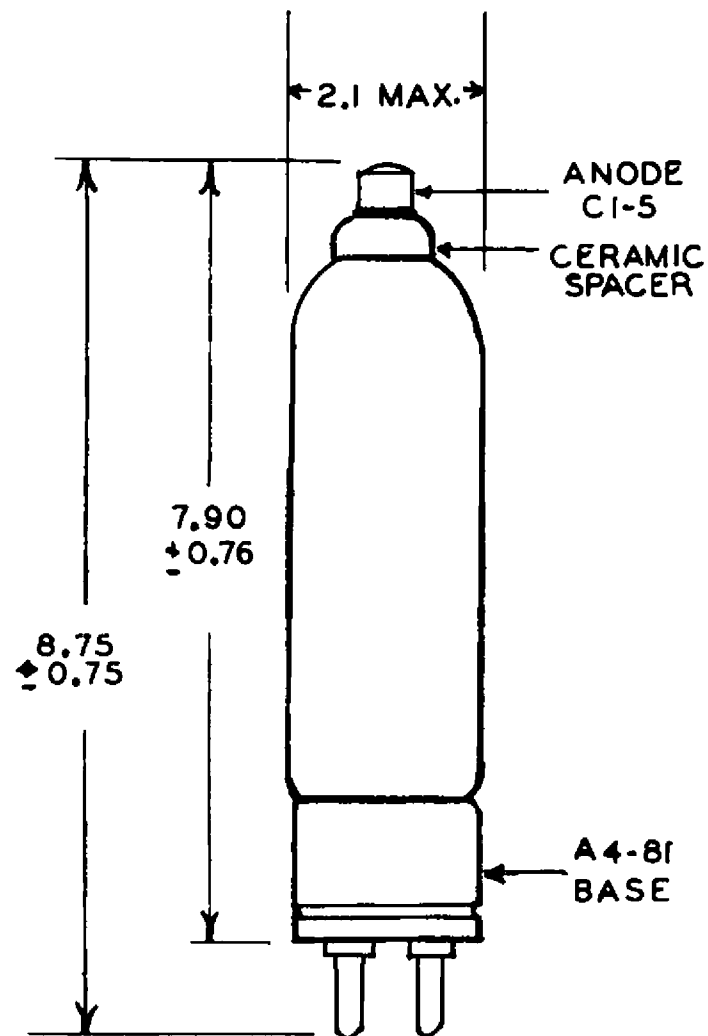
|                                     |            |
|-------------------------------------|------------|
| Peak Inverse Voltage -----          | 920 Volts  |
| Peak Anode Current -----            | 40 Amps.   |
| Average Anode Current -----         | 6.4 Amps.  |
| Averaging Time for Anode Current -- | 4.5 Secs.  |
| Maximum Frequency -----             | 350 cycles |

Date: March 21, 1950

from RMA release #858, May 4, 1950

OUTLINE

R.M.A. TYPE 5892

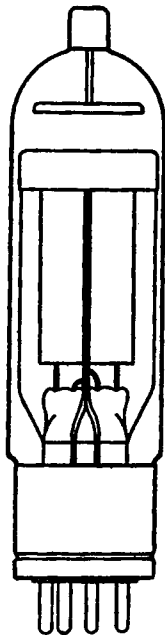


# RMA Type 5C21

## GRID CONTROL RECTIFIER TUBE

EL C6J

Tantalum Anode and Xenon Gas Filling



|                                            |      |
|--------------------------------------------|------|
| D-c. Amperes Output (Max. Rated)           |      |
| D-c. Meter Value-Continuous                | 6.4  |
| D-c. Meter Value-Overload less than 3 sec. | 12.8 |
| Oscillograph Peak -Continuously recurring  | 77   |

|                                         |      |
|-----------------------------------------|------|
| Peak Forward Volts (Max. Instantaneous) | 750  |
| Peak Inverse Volts (Max. Instantaneous) | 1250 |

|                             |    |
|-----------------------------|----|
| Average Arc Drop Volts      |    |
| Highest Tube at end of life | 12 |
| Average Tube                | 9  |

|              |                 |
|--------------|-----------------|
| Filament     |                 |
| Volts        | 2.5             |
| Amperes      | 21±2A           |
| Heating Time | Approx. 60 sec. |

|                                |                        |
|--------------------------------|------------------------|
| Grid Characteristics           |                        |
| Critical Grid Volts @ p.f.v.   | -3.5±1.5               |
| Critical Grid Current          | Less than 10 Microamps |
| Maximum Negative Grid Volts    | 100                    |
| Starting Volts (Instantaneous) |                        |
| Highest Tube                   | 75                     |
| Average Tube                   | 40                     |
| Maximum De-ionization Time     | Approx. 1 Millisecond  |

|                           |               |
|---------------------------|---------------|
| Grid-anode Capacitance    | Approx. 4 uuf |
| Grid-filament Capacitance | 21 uuf        |

|                                            |      |
|--------------------------------------------|------|
| Max. A-c. Short-circuit Current (0.1 sec.) | 770A |
|--------------------------------------------|------|

|                    |         |
|--------------------|---------|
| Overall Dimensions | 2 x 9½" |
| Weight             | 7 ozs.  |

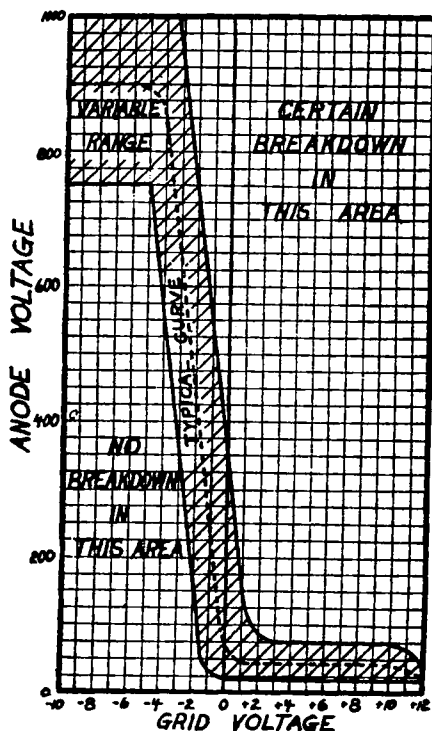
|                 |                               |
|-----------------|-------------------------------|
| Connections     |                               |
| Filament & Grid | #412 4-prong Industrial Base  |
| Anode           | #3903 Cap at top (0.55" dia.) |

|                            |               |
|----------------------------|---------------|
| Ambient Temperature Limits | -40 to +65°c. |
|----------------------------|---------------|

The filament must be lit before the d-c. load is applied.

All of the above values are for returns to the filament center tap.

ELECTRONS, INC.  
127 Sussex Avenue  
Newark 4, N. J.



**RADIO MANUFACTURERS ASSOCIATION**  
**ENGINEERING DEPARTMENT**

**ELECTRONIC**  
**TUBE CHARACTERISTICS**

TYPE 5C3Q

Release No. 394

November 30, 1944

(Grid Controlled Rectifier)

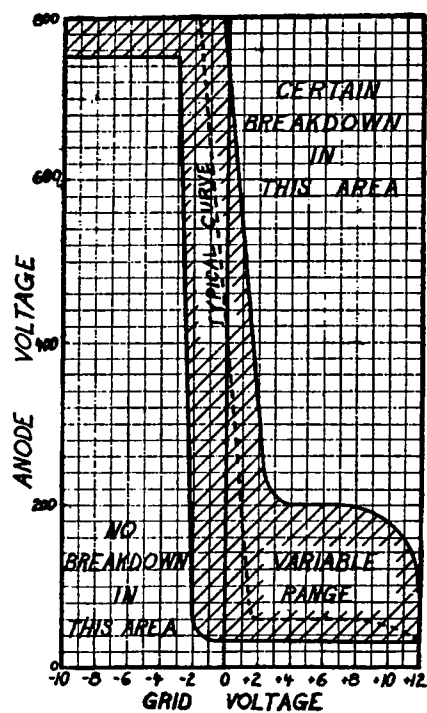
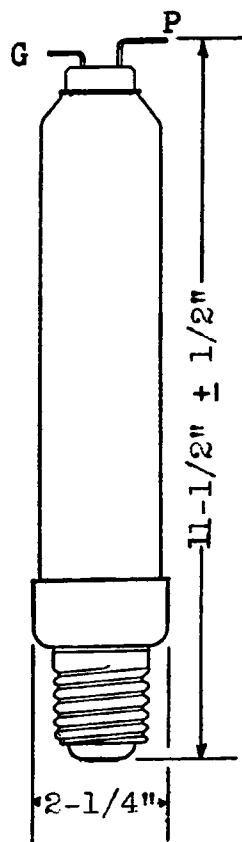
sponsored by  
Electrons, Inc.

GENERAL CHARACTERISTICS

|                                             |                         |
|---------------------------------------------|-------------------------|
| Filament                                    |                         |
| Voltage                                     | 2.5 volts               |
| Current                                     | 23 ± 3 amps             |
| Heating Time                                | 1 Min. (approx)         |
| Ambient Temperature                         | -40°C to +65°C          |
| Average Arc Drop                            |                         |
| Average Tube                                | 9 volts                 |
| Highest tube or end of life                 | 14 volts                |
| Inter-electrode Capacitance (approx)        |                         |
| Grid to anode                               | 10 uuf                  |
| Grid to filament                            | 10 uuf                  |
| Control Characteristics                     |                         |
| Critical Grid Voltage @ p.f.v.              | -1.5 to 4.0             |
| Critical grid current                       | less than 10 uamp       |
| Maximum Negative Grid Voltage               | 100 volts               |
| Starting Voltage (instantaneous)            |                         |
| Average Tube                                | 50 volts                |
| Highest tube                                | 200 volts               |
| De-ionization Time (approx)                 | 1 millisecond           |
| Overall Dimensions                          | 2-1/4" x 11-1/2" ± 1/2" |
| Weight                                      | 12.5 oz.                |
| Connections                                 |                         |
| Filament                                    | Mogul Screw             |
| Anode                                       | High Prong (marked "P") |
| Grid                                        | Low Prong (marked "G")  |
| Max. Ratings                                |                         |
| D-C Output (Continuous)                     | 5 amp                   |
| D-C Output (*Surges less than<br>3 seconds) | 10 amp                  |
| Peak Output (Continuously recurring)        | 75 amp                  |
| Peak Forward Voltage (Instantaneous)        | 750 volts               |
| Peak Inverse Voltage (Instantaneous)        | 1250 volts              |
| A.C. Short Circuit Current (0.1 sec)        | 600 amp                 |

\*As observed on d-c meter

# RMA TYPE 5C30



Type     **6013**  
Hot Cathode Gas Rectifier

General Characteristics

Inert gas filled  
Half Wave Rectifier

Electrical

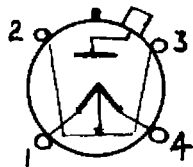
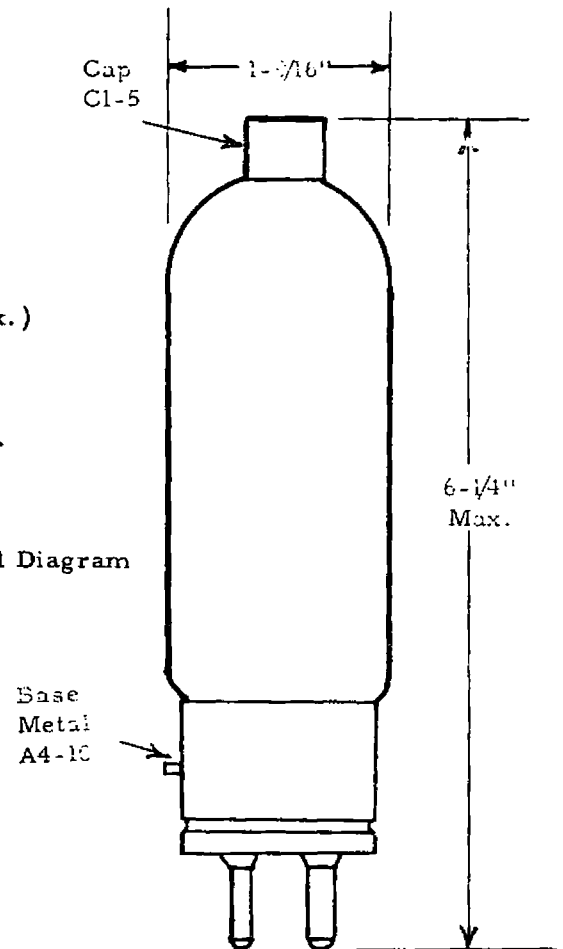
|                               |                 |
|-------------------------------|-----------------|
| Filament                      | Coated          |
| Voltage                       | 2.5 volts       |
| Current                       | 9 $\pm$ 2 amps  |
| Heating Time                  | 30 secs         |
| Approximate Tube Voltage Drop | 9 volts         |
| Starting Voltage              | 30 volts (max.) |

Mechanical

|                            |                      |
|----------------------------|----------------------|
| Type of Cooling            | Convection           |
| Temperature Limits         | -55 to +75°C.        |
| Mounting Position          | Any                  |
| Base                       | Metal A4-10          |
| Cap                        | C1-5                 |
| Basing Designation         | See Terminal Diagram |
| Maximum Overall Dimensions |                      |
| Length                     | 6-1/4"               |
| Diameter                   | 1-9/16"              |
| Weight                     | 4 ozs.               |

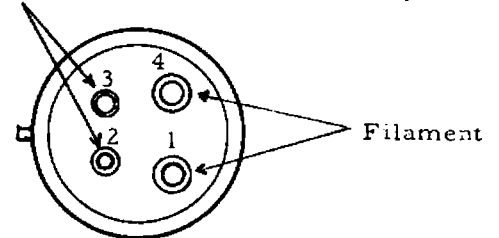
Maximum Ratings

|                                  |           |
|----------------------------------|-----------|
| Peak Inverse Voltage             | 920 volts |
| Peak Anode Current               | 20 amps   |
| Average Anode Current            | 2.5 amps  |
| Averaging Time for Anode Current | 7 secs.   |



**ELECTRONS, INCORPORATED**  
127 SUSSEX AVENUE  
NEWARK 4, N. J.

Load Return & Filament Center Tap



OUTLINE 6013

RELEASE 1134, PAGE 3

# ELECTRONS, INCORPORATED

RECTIFIER TUBES  
GRID CONTROL RECTIFIER TUBES

127 SUSSEX AVENUE  
NEWARK 4, N. J.

Type R. T. M. A. 6015

Hot Cathode Gas Rectifier

## General Characteristics

Inert gas filled  
Half Wave Rectifier

## Electrical

|                               |                 |
|-------------------------------|-----------------|
| Filament                      | Coated          |
| Voltage                       | 2.5 volts       |
| Current                       | 21 $\pm$ 2 amps |
| Heating Time                  | 60 secs         |
| Approximate tube voltage drop | 9 volts         |
| Starting voltage              | 30 volts (max.) |

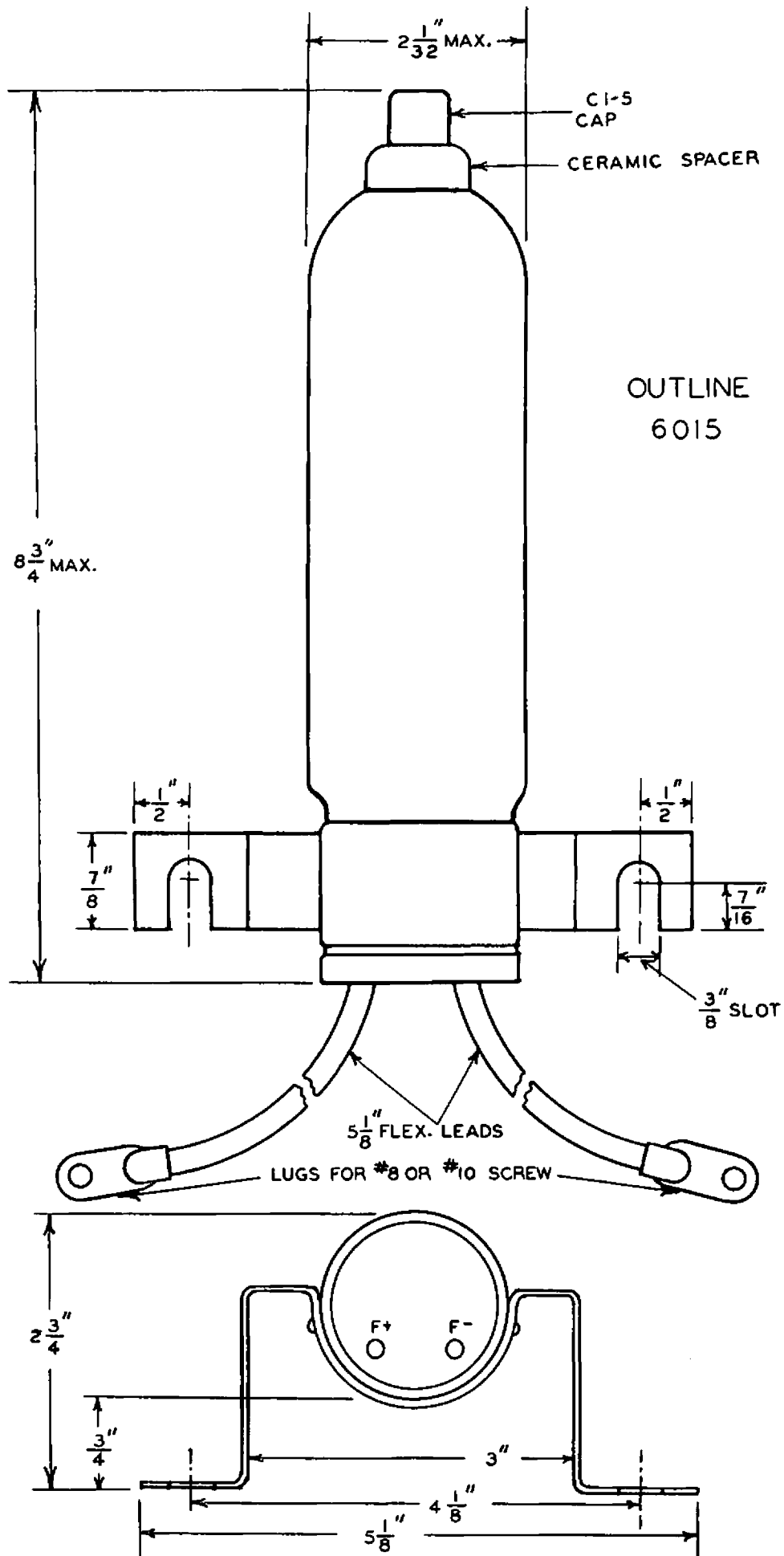
## Mechanical

|                            |                                      |
|----------------------------|--------------------------------------|
| Type of Cooling            | Convection                           |
| Temperature Limits         | -55 to +75°C                         |
| Mounting Position          | Vertical                             |
| Base                       | Bracket for panel mounting           |
| Cap                        | C1-5 with ceramic insulator          |
| Base Connections           | Flexible leads. See outline drawing. |
| Maximum overall dimensions |                                      |
| Length                     | 8-3/4"                               |
| Diameter                   | 2"                                   |
| Weight                     | 6 ozs.                               |

## Maximum Ratings

|                                  |           |
|----------------------------------|-----------|
| Peak Inverse Voltage             | 920 volts |
| Peak Anode Current               | 40 amps   |
| Average Anode Current            | 6.4 amps  |
| Averaging Time for Anode Current | 7 secs    |

February 26, 1951



PROPOSED TENTATIVE SPECIFICATION FOR ELECTRON TUBE TYPE 6231  
THE PROVISIONS OF SPECIFICATION JAN-1A APPLY TO THIS SPECIFICATION

Description: Thyatron, Inert Gas Triode

| Ratings:    | Ef<br>V | Epp<br>Vac | epx<br>v | epy<br>v | Ec<br>V | Ib<br>Adc | ib<br>a | tk<br>sec     | tk<br>sec | TA<br>°C     | Bulb T<br>°C  | F<br>cps | ehk<br>v | Alt<br>ft |
|-------------|---------|------------|----------|----------|---------|-----------|---------|---------------|-----------|--------------|---------------|----------|----------|-----------|
| Absolute    |         |            |          |          |         |           |         |               |           |              |               |          |          |           |
| Max.        | 14±5%   | 350        | 500      | 500      | -100    | 5         | 30      | 120<br>(min.) | --        | -55to<br>+75 | 175<br>Note 6 | 500      | ±50      | 65000     |
|             | 28      | --         | --       | --       | --      | --        | --      | 25            | 35        | --           | --            | --       | --       | --        |
| Test Cond:  | 14      | --         | --       | --       | --      | --        | --      | --            | --        | --           | --            | 60       | --       | --        |
| **Weight:   |         |            |          |          |         |           |         |               |           |              |               |          |          |           |
|             |         |            |          |          |         |           |         |               |           |              |               |          |          |           |
| **Height:   |         |            |          |          |         |           |         |               |           |              |               |          |          |           |
|             |         |            |          |          |         |           |         |               |           |              |               |          |          |           |
| **Base:     |         |            |          |          |         |           |         |               |           |              |               |          |          |           |
|             |         |            |          |          |         |           |         |               |           |              |               |          |          |           |
| **Anode:    |         |            |          |          |         |           |         |               |           |              |               |          |          |           |
|             |         |            |          |          |         |           |         |               |           |              |               |          |          |           |
| **Cathode:  |         |            |          |          |         |           |         |               |           |              |               |          |          |           |
|             |         |            |          |          |         |           |         |               |           |              |               |          |          |           |
| **Envelope: |         |            |          |          |         |           |         |               |           |              |               |          |          |           |
|             |         |            |          |          |         |           |         |               |           |              |               |          |          |           |

| REF:     | TEST                            | CONDITIONS                                                                                                                                                                                          | MIN.                         | MAX.            | UNITS            |
|----------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------------|------------------|
|          | Stabilization                   | I=5.0 Adc min;Epp=130 Vac max;Rg=10000 ohms;grid connected to anode                                                                                                                                 | t: 16                        | --              | hrs.             |
| F-4      | Life Test                       | Operation (1) Group D                                                                                                                                                                               | t: 500                       | --              | hrs.             |
| F-4b     | Life Test End Point             | Tube Voltage Drop<br>Operation (1)<br>Grid Current                                                                                                                                                  | Etd: --<br>Ecc: --<br>ic: -- | 16<br>-20<br>10 | Vdc<br>Vdc<br>ua |
| F-6b(9c) | **Vibration                     | Notes 1 and 2                                                                                                                                                                                       |                              |                 |                  |
| F-6b(9e) | **Shock<br>**Heater Cycling     | 200 g, 1 millisecond, Note 2<br>Ef=14.7V;3 min. on, 3 min. off                                                                                                                                      | t: 1000                      | --              | cycles           |
| F-6i     | Heater Current                  |                                                                                                                                                                                                     | If: 2.35                     | 2.75            | A                |
| F-6s(1)  | Grid Voltage for Conduction     | Ebb=500 Vdc;Rg=10000 ohms max;Rp=750 to 5000 ohms                                                                                                                                                   | Ecc: --                      | -20             | Vdc              |
| F-6s(2)  | *Anode Voltage for Conduction   | Rg=10000 ohms max;<br>Ecc=+20 Vdc                                                                                                                                                                   | Ebb: --                      | 26              | Vdc              |
| F-6t     | Tube Voltage Drop               | Ib=5.0 Adc;Epp=130 V ac max; Rg=10000 ohms;grid connected to anode; Note 3                                                                                                                          | Etd: --                      | 12.5            | Vdc              |
| F-6u     | Operation (1)<br>*Operation (2) | Ib=5.0 Adc;Rg=10000 ohms<br>Epp=350 Vac<br>Ib=2.2 Adc;F=1250 cps ib=4.4a<br>Rg=10000 ohms;epx=epy=500v min. ;<br>Ecc= -55 V dc max.;current conduc-<br>tion angle=180°;Deionization Time= 200 usec. | Ecc: --<br>t: 30             | -20<br>--       | Vdc<br>secs.     |

| REF: | TEST            | CONDITIONS                                                               | MIN.    | MAX. | UNITS |
|------|-----------------|--------------------------------------------------------------------------|---------|------|-------|
| F-6v | † Peak Emission | ib=30a. ; Note 4                                                         | etd: -- | 70   | v     |
| F-6x | Grid Current    | Rg=10000 and 1 meg; Ib=5.0 Adc<br>t=15 secs; Epp=350 V ac min;<br>Note 5 | ic: --  | 10   | ua    |

Note 1: Each tube shall be vibration-cycled over the range 10-55 cps, continuously varied, for a 5-minute period in each position specified. The tubes shall be vibrated with Ib=5 A dc.

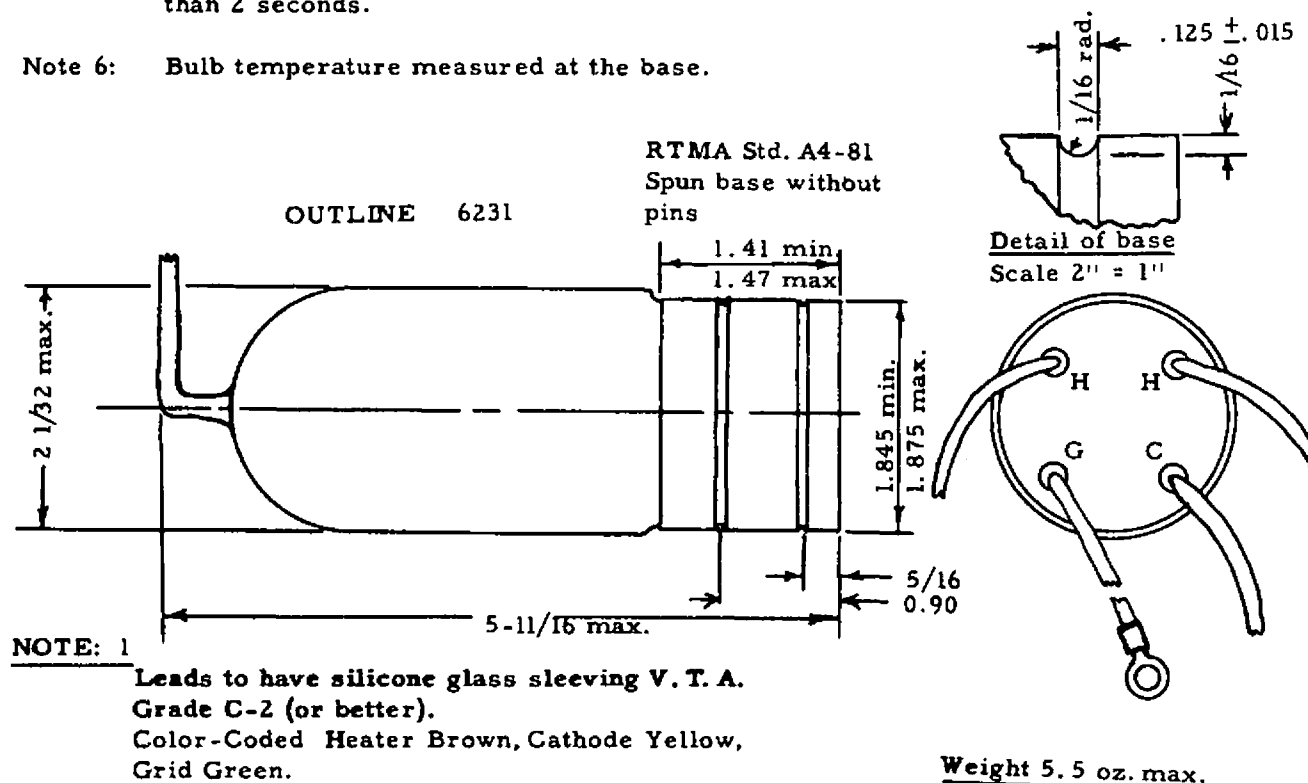
Note 2: The tubes tested shall not show intermittent or permanent interelectrode shorts or mechanical failures. After testing, the tubes shall comply with Operation (1) (F-6u) and Heater Current (F-6i) tests.

Note 3: Wattmeter Method: With an alternating current source and resistive load, measure the power loss in the tube with a wattmeter so that the current coil is in series with and the voltage coil across the tube. The tube voltage drop (Etd) is the total power loss minus the coil loss under load, divided by the average, or dc. current (Ib).

Note 4: Connect grid to anode through 10,000 ohm resistor. Adjust Epp and Rp to give required current.

Note 5: Operate tube at least 5 minutes prior to test. Operation may be optional Epp but Ib must be 5.0 Adc min. To test, switch to test voltage and Ib=5.0 Adc in less than 2 seconds.

Note 6: Bulb temperature measured at the base.



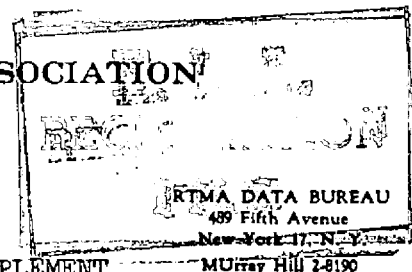
ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 4, New Jersey

**RADIO - TELEVISION MANUFACTURERS ASSOCIATION**  
**ENGINEERING DEPARTMENT**



March 13, 1953

Release No. 1134 SUPPLEMENT



To Tube Engineers

Please attach the following data to Release No. 1134 as supplementary data on the Type 6231 Thyatron tube, registered by Electronics, Inc., on Jan. 30, 1953. The 6231 is an inert gas filled grid controlled rectifier (Triode) designed for inverter operation.

Maximum Ratings (absolute values)

|                                            |                       |
|--------------------------------------------|-----------------------|
| Peak Inverse Voltage                       | 500 volts             |
| Peak Forward Voltage                       | 500 volts             |
| Bulb Temperature at base                   | 175° C                |
| Cathode Current (DC meter value)           |                       |
| Peak (oscilloscope continuously occurring) | 30 amperes            |
| Average                                    | 5 amperes             |
| Surge (maximum duration 0.1 sec.)          | 180 amperes           |
| Maximum Averaging Time                     | 30 Seconds            |
| Maximum Heater - cathode voltage (peak)    | +50 volts             |
| Frequency (maximum)                        | 500 cycles per second |
| Ambient Temperature Limits                 | -55° to +75° C        |

Electrical Data

|                                 |                      |
|---------------------------------|----------------------|
| Filament (heater) voltage       | 14 +5% Volts         |
| Filament (heater) current @14 V | 2.55 ± 0.20 amperes  |
| Cathode Heating Time            |                      |
| @ 14 V                          | 60 seconds minimum   |
| @ 28 V                          | 25 seconds minimum   |
| @ 28 V                          | 35 seconds maximum   |
| Average Arc Drop Volts          | 12.5 volts (maximum) |
| Deionization Time (approximate) | 200 micro seconds    |

Grid Characteristics

|                                              |                   |
|----------------------------------------------|-------------------|
| Critical grid volts at anode volts 350 Vac   | -20.0 V (maximum) |
| Critical grid current at anode volts 350 Vac | 10 ua (maximum)   |
| Critical Anode volts at +20 grid volts       | 26 V (maximum)    |

Mechanical Data

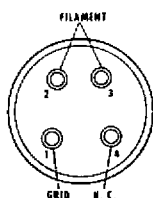
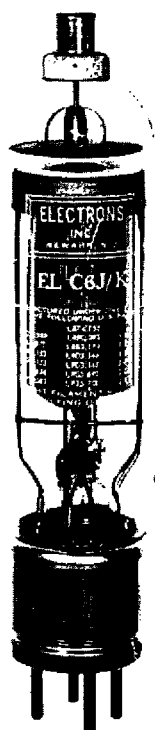
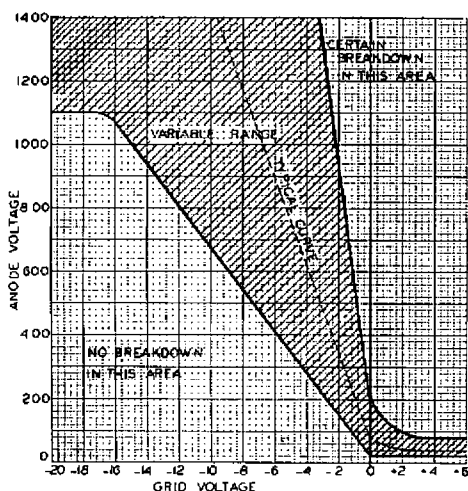
|                            |                          |
|----------------------------|--------------------------|
| Type of cooling            | Convection               |
| Mounting position          | Any                      |
| Net Weight (maximum)       | 8 ounces                 |
| Base                       | A4-81 without pins       |
| Cap                        | Flexible (outline)       |
| Connections                | Outline                  |
| Maximum overall dimensions |                          |
| Diameter                   | 2 $\frac{1}{32}$ inches  |
| Length                     | 5 $\frac{13}{16}$ inches |
| Shock Rating               | 200 G                    |
| Cathode                    | Coated Unipotential      |

RRBetcher:mg

Very truly yours,  
*Ralph R. Betcher*  
Radio Television Manufacturers Association

## GRID CONTROL RECTIFIER TUBE

## Xenon Gas Filling

BOTTOM VIEW  
OF BASE

|                                                         |                      |
|---------------------------------------------------------|----------------------|
| Maximum Rated Anode Current                             |                      |
| D-c. Meter Value-Continuous                             | 6.4 amps             |
| D-c. Meter Value-Overload less than 3 sec.              | 12.8 amps            |
| Averaging Time                                          | 6 secs               |
| Oscillograph Peak-Continuously recurring                | 77 amps              |
| Peak Forward Voltage (Max. Instantaneous)               | 1000 volts           |
| Peak Inverse Voltage (Max. Instantaneous)               | 1250 volts           |
| Max. Commutation Factor (V/usec x A/usec)               | 130                  |
| Filament                                                |                      |
| Voltage                                                 | 2.5 volts            |
| Current                                                 | 21±2 amps            |
| Heating Time (minimum)                                  | 60 secs              |
| Average Arc Drop                                        |                      |
| Average Tube                                            | 11 volts             |
| Highest Tube                                            | 15 volts             |
| Anode Starting Voltage @ +3V d-c grid voltage           |                      |
| Average Tube                                            | 40 volts             |
| Highest Tube                                            | 80 volts             |
| Max. Anode Emission                                     | 100 uamps            |
| Grid Characteristics                                    |                      |
| Critical Grid Voltage @ 1000 p.f.v.                     | -2.0 to -15 volts    |
| Critical Grid Current                                   | Less than 20 uamps   |
| Grid-Anode Capacitance                                  | approx. 5 uuf        |
| Grid-Filament Capacitance                               | approx. 21 uuf       |
| Maximum Negative Grid Voltage                           | 100 volts            |
| Deionization Time                                       | Less than 1000 usecs |
| Max. Peak A-c Fault Current<br>(Max. duration 0.1 sec.) | 770 amps             |
| Ambient Temperature Limits                              | -55° to +75° C       |
| Overall Dimensions                                      | 2-1/32" x 8-3/4" max |
| Weight                                                  | 7 ozs.               |

Connections  
 Filament and Grid Metal industrial base A4-81  
 Anode C1-5 cap (0.56" dia.) with ceramic insulator.

The filament must be lit before drawing d-c. load current

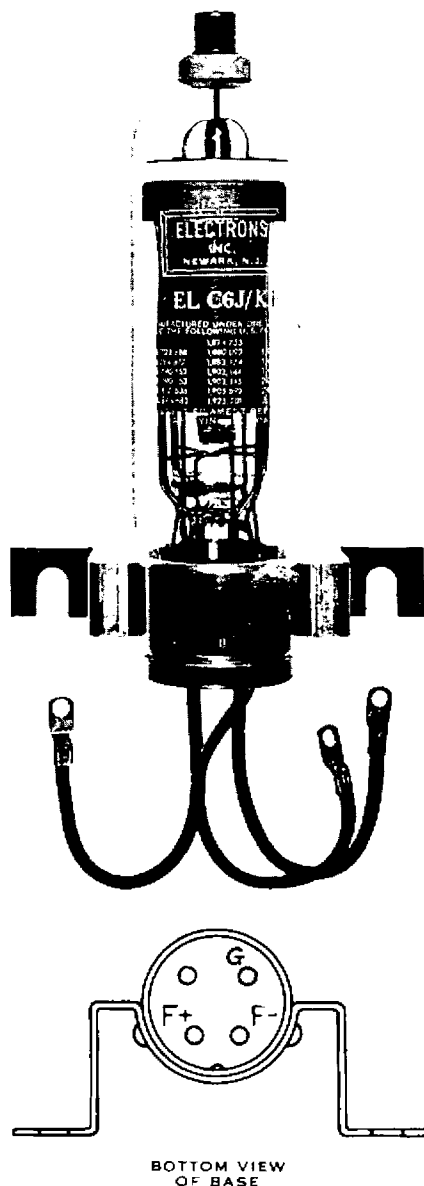
The anode is designed to operate at red heat when under full load. All of the above values are for returns to the filament transformer center tap. Filament pin #2 should be negative with respect to pin #3 during the anode conduction period.

The Engineering Manual contains additional information which should be considered in the circuit design.

ELECTRONS, INCORPORATED  
 127 Sussex Avenue  
 Newark 3, New Jersey

## GRID CONTROL RECTIFIER TUBE

## Xenon Gas Filling



|                                            |            |
|--------------------------------------------|------------|
| Maximum Rated Anode Current                |            |
| D-c. Meter Value-Continuous                | 6.4 amps   |
| D-c. Meter Value-Overload less than 3 sec. | 12.8 amps  |
| Averaging Time                             | 6 secs     |
| Oscillograph Peak-Continuously recurring   | 77 amps    |
| Peak Forward Voltage (Max. Instantaneous)  | 1000 volts |
| Peak Inverse Voltage (Max. Instantaneous)  | 1250 volts |
| Max. Commutation Factor (V/usec x A/usec)  | 130        |

|                        |                       |
|------------------------|-----------------------|
| Filament               |                       |
| Voltage                | 2.5 volts             |
| Current                | 21 $\frac{1}{2}$ amps |
| Heating Time (minimum) | 60 secs               |

|                  |          |
|------------------|----------|
| Average Arc Drop |          |
| Average Tube     | 11 volts |
| Highest Tube     | 15 volts |

|                                               |          |
|-----------------------------------------------|----------|
| Anode Starting Voltage @ +3V d-c grid voltage |          |
| Average Tube                                  | 40 volts |
| Highest Tube                                  | 80 volts |

|                     |           |
|---------------------|-----------|
| Max. Anode Emission | 100 uamps |
|---------------------|-----------|

|                                     |                    |
|-------------------------------------|--------------------|
| Grid Characteristics                |                    |
| Critical Grid Voltage @ 1000 p.f.v. | -2.0 to -15 volts  |
| Critical Grid Current               | Less than 20 uamps |
| Grid-Anode Capacitance              | approx. 5 uuf      |
| Grid-Filament Capacitance           | approx. 21 uuf     |

|                                                         |                      |
|---------------------------------------------------------|----------------------|
| Maximum Negative Grid Voltage                           | 100 volts            |
| Deionization Time                                       | Less than 1000 usecs |
| Max. Peak A-c Fault Current<br>(Max. duration 0.1 sec.) | 770 amps             |

|                            |                |
|----------------------------|----------------|
| Ambient Temperature Limits | -55° to +75° C |
|----------------------------|----------------|

|                    |                            |
|--------------------|----------------------------|
| Overall Dimensions | 2-3/4" x 5-3/16" x 8" Max. |
|--------------------|----------------------------|

|        |        |
|--------|--------|
| Weight | 8 ozs. |
|--------|--------|

|                   |                                               |
|-------------------|-----------------------------------------------|
| Connections       |                                               |
| Filament and Grid | 6-1/8" flexible leads with lugs for #10 studs |
| Anode             | C1-5 cap (0.56" dia.) with ceramic insulator  |

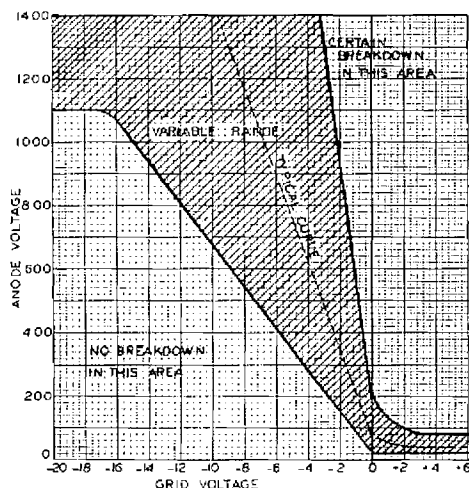
Panel-mounted on two 1/4" studs 4-1/8" apart.

The filament must be lit before drawing d-c. load current

The anode is designed to operate at red heat when under full load.

All of the above values are for returns to the filament transformer center tap. Filament lead F- should be negative with respect to F+ during the anode conduction period.

The Engineering Manual contains additional information which should be considered in the circuit design.

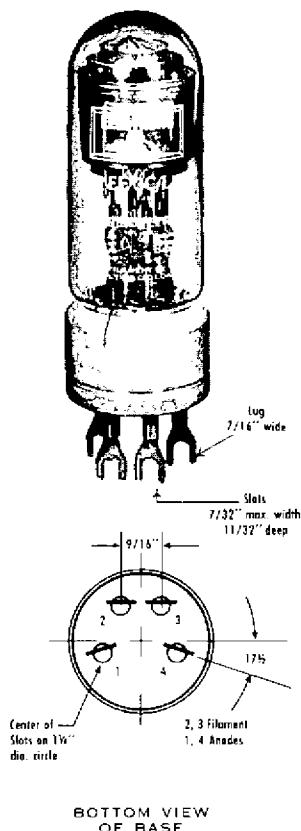


3/15/60

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## FULL-WAVE RECTIFIER TUBE

## TANTALUM ANODES AND XENON GAS FILLING



|                                                         |                       |
|---------------------------------------------------------|-----------------------|
| Maximum Rated Current per Tube                          |                       |
| D-c. Meter Value-Continuous                             | 2.5 amps              |
| D-c. Meter Value-Overload less than 3 sec.              | 3.7 amps              |
| Averaging Time                                          | 4.5 secs              |
| Oscillograph Peak-Continuously recurring                | 10 amps               |
| Peak Inverse Voltage (Max. Instantaneous)               | 725 volts             |
| Max. Commutation Factor (V/usec x A/usec)               | 0.66                  |
| Max. Anode Supply Frequency                             | 250 cps               |
| Filament                                                |                       |
| Voltage                                                 | 2.5 volts             |
| Current                                                 | 11.5 $\pm$ 1 amps     |
| Heating Time (minimum)                                  | 30 secs               |
| Average Arc Drop                                        |                       |
| Average Tube                                            | 8 volts               |
| Highest Tube at end of life                             | 13 volts              |
| Anode Starting Voltage (Instantaneous)                  |                       |
| Average Tube                                            | 12 volts              |
| Highest Tube                                            | 15 volts              |
| Max. Peak A-c Fault Current<br>(Max. duration 0.1 sec.) | 150 amps              |
| Ambient Temperature Limits                              | -55° to +75° C        |
| Mounting Position                                       | Any                   |
| Overall Dimensions                                      | 2-3/16" x 7-3/4" max. |
| Weight                                                  | 6 ozs.                |
| Connections                                             | Lug type base         |

The filament must be lit before drawing d-c. load current.

All of the above values are for returns to the filament transformer center tap.

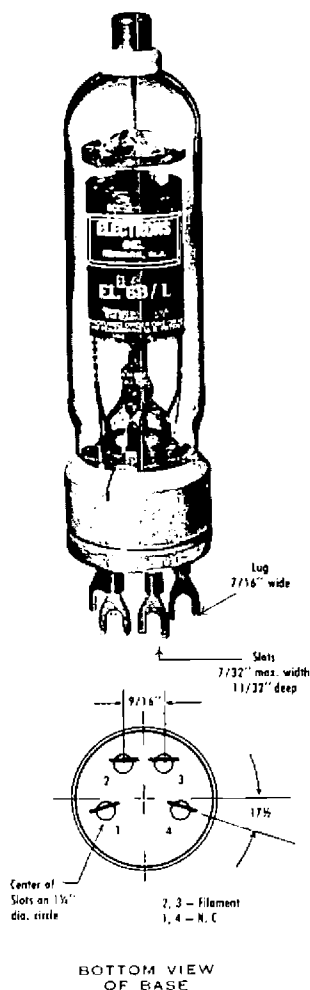
The filament voltage should be phased so the a-c. voltage (with the tube out of the socket and some d-c. load connected) from pin #1 to pin #2 is lower than from pin #1 to pin #3. This phasing of filament voltage relative to anode voltage insures a lower arc drop and somewhat longer life.

The Engineering Manual contains additional information which should be considered in the circuit design.

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## HALF-WAVE RECTIFIER TUBE

### TANTALUM ANODE AND XENON GAS FILLING



|                                                                                                |                                              |
|------------------------------------------------------------------------------------------------|----------------------------------------------|
| Maximum Rated Anode Current                                                                    |                                              |
| D-c. Meter Value-Continuous                                                                    | 6.4 amps                                     |
| D-c. Meter Value-Overload less than 3 sec.                                                     | 12.8 amps                                    |
| Averaging Time                                                                                 | 7 secs                                       |
| Oscillograph Peak-Continuously recurring                                                       | 77 amps                                      |
| Peak Inverse Voltage (Max. Instantaneous)                                                      | 920 volts                                    |
| Max. Commutation Factor (V/usec x A/usec)<br>at a maximum initial inverse voltage of 325 volts | 5.0                                          |
| Filament                                                                                       |                                              |
| Voltage                                                                                        | 2.5 volts                                    |
| Current                                                                                        | 21 ± 2 amps                                  |
| Heating Time (minimum)                                                                         | 60 secs                                      |
| Average Arc Drop                                                                               |                                              |
| Average Tube                                                                                   | 9 volts                                      |
| Highest Tube                                                                                   | 12 volts                                     |
| Anode Starting Voltage (Instantaneous)                                                         |                                              |
| Average Tube                                                                                   | 12 volts                                     |
| Highest Tube                                                                                   | 30 volts                                     |
| Max. Peak A-c Fault Current<br>(Max. duration 0.1 sec.)                                        | 770 amps                                     |
| Ambient Temperature Limits                                                                     | -55° to +75° C                               |
| Overall Dimensions                                                                             | 2-3/16" x 9-1/4" max.                        |
| Weight                                                                                         | 7 ozs.                                       |
| Connections                                                                                    |                                              |
| Filament                                                                                       | Lug type base                                |
| Anode                                                                                          | C1-5 cap (0.56" dia.) with ceramic insulator |

The filament must be lit before drawing d-c. load current.

The anode is designed to operate at red heat when under full load.

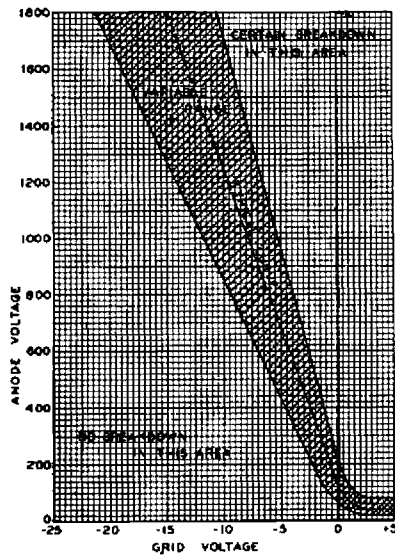
All of the above values are for returns to the filament transformer center tap. Filament pin #2 should be negative with respect to pin #3 during the anode conduction period.

The Engineering Manual contains additional information which should be considered in the circuit design.

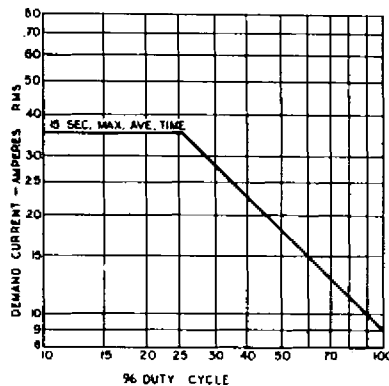
ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

# GRID CONTROL RECTIFIER TUBE Xenon Gas Filling

6984 EL C4H-1  
6985 EL C4H-2  
6986 EL C4H-3  
8065 EL C4H-4  
8066 EL C4H-5



Control  
Characteristic



Back-To-Back  
Contactor Rating

Two tubes connected in inverse parallel demand current with full conduction during each half cycle.

## Maximum Rated Anode Current

|                                              |            |
|----------------------------------------------|------------|
| D-c. Meter Value — Continuous                | 4.0 amps   |
| D-c. Meter Value — Overload less than 3 sec. | 8.0 amps   |
| Averaging Time                               | 15 secs    |
| Oscillograph Peak — Continuously recurring   | 50 amps    |
| Peak Forward Voltage (Max. Instantaneous)    | 1700 volts |
| Peak Inverse Voltage (Max. Instantaneous)    | 1700 volts |

|                                                                      |           |
|----------------------------------------------------------------------|-----------|
| Max. Commutation Factor ( $V/\mu\text{sec} \times A/\mu\text{sec}$ ) | 130       |
| Min. Frequency                                                       | 25 cycles |

## Filament

|                        |                 |
|------------------------|-----------------|
| Voltage                | 2.5 volts       |
| Current                | $17 \pm 2$ amps |
| Heating Time (minimum) | 60 secs         |

## Average Arc Drop

|              |          |
|--------------|----------|
| Average Tube | 11 volts |
| Highest Tube | 15 volts |

## Anode Starting Voltage @ +3V d-c grid voltage

|              |          |
|--------------|----------|
| Average Tube | 40 volts |
| Highest Tube | 80 volts |

|                            |                      |
|----------------------------|----------------------|
| Max. Anode Reverse Current | 100 $\mu\text{amps}$ |
|----------------------------|----------------------|

## Grid Characteristics

|                                     |                               |
|-------------------------------------|-------------------------------|
| Critical Grid Voltage @ 1700 p.f.v. | —10.0 to —20.0 volts          |
| Critical Grid Current               | Less than 20 $\mu\text{amps}$ |
| Grid-Anode Capacitance              | approx. 5 $\mu\text{mf}$      |
| Grid-Filament Capacitance           | approx. 21 $\mu\text{mf}$     |

|                               |           |
|-------------------------------|-----------|
| Maximum Negative Grid Voltage | 100 volts |
|-------------------------------|-----------|

|                   |                                 |
|-------------------|---------------------------------|
| Deionization Time | Less than 1000 $\mu\text{secs}$ |
|-------------------|---------------------------------|

|                                                      |          |
|------------------------------------------------------|----------|
| Max. Peak A-c Fault Current (Max. duration 0.1 sec.) | 500 amps |
|------------------------------------------------------|----------|

|                            |                |
|----------------------------|----------------|
| Ambient Temperature Limits | —55° to +75° C |
|----------------------------|----------------|

Overall Dimensions.....(See outline drawing on back page)

The filament must be lit before drawing load current.

The above values are for return to filament transformer center tap.

Filament phasing during conduction must be as indicated on drawings.

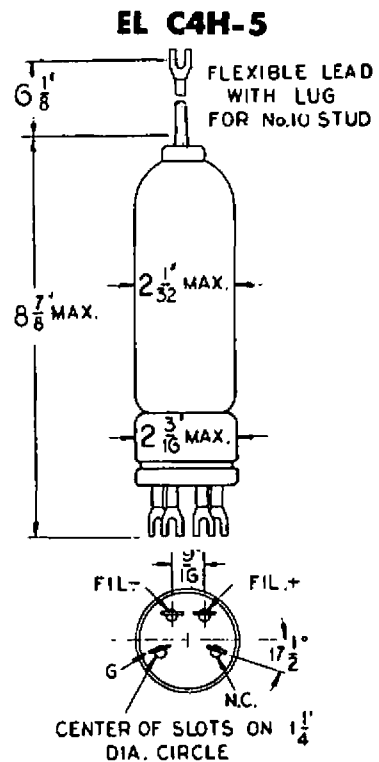
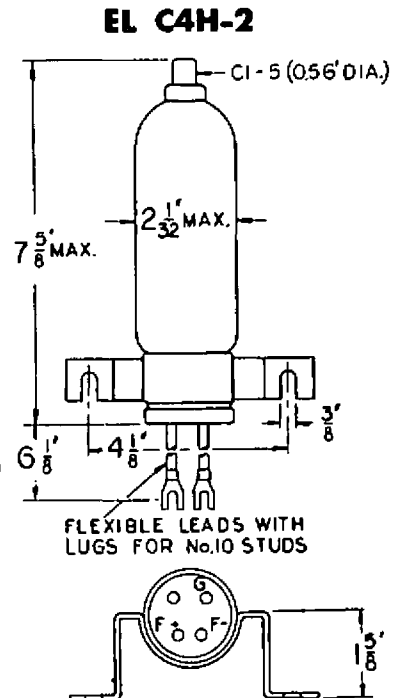
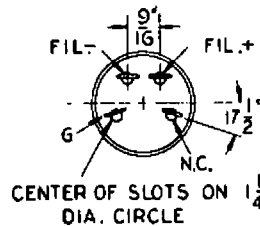
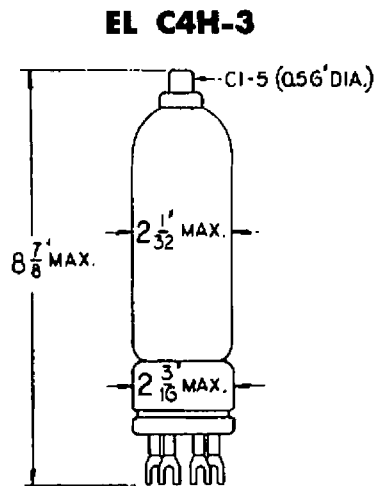
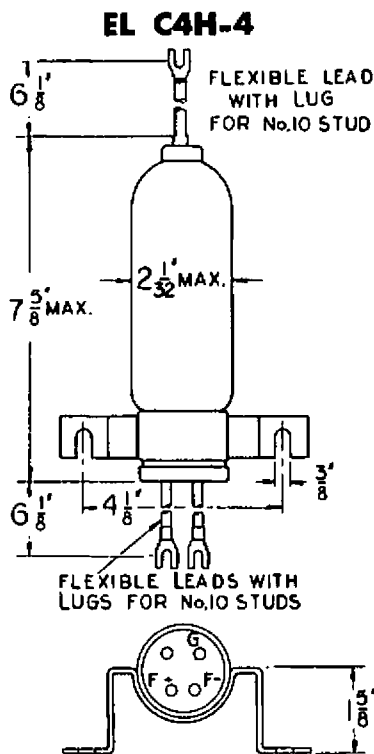
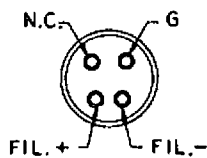
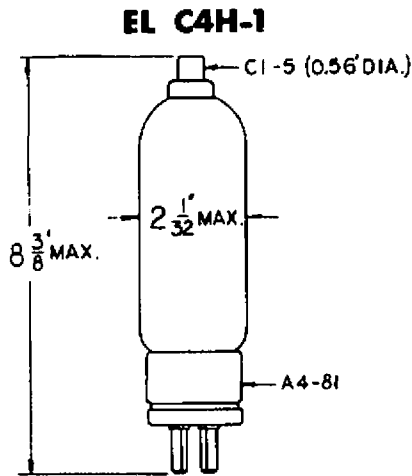
The Engineering Manual contains additional information which should be considered in circuit design.

EL C4H-1  
EL C4H-2  
EL C4H-3  
EL C4H-4  
EL C4H-5

## OUTLINE DRAWINGS

### EL C4H Series

(NOTE: Dimensions nominal unless otherwise stated.)

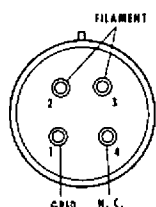
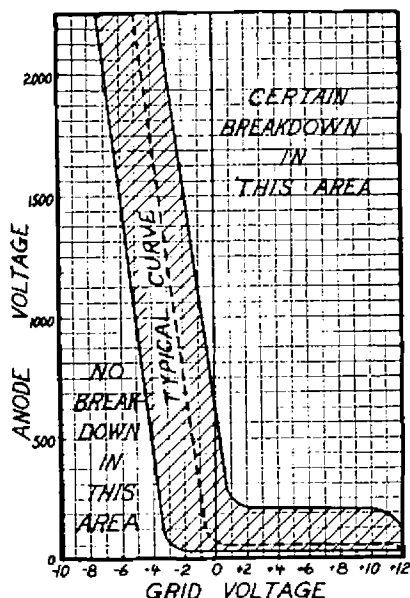


**ELECTRONS**  
I N C O R P O R A T E D

127 SUSSEX AVENUE, NEWARK 3, N. J.

## GRID CONTROL RECTIFIER TUBE

## TANTALUM ANODE AND XENON GAS FILLING

BOTTOM VIEW  
OF BASE

|                                            |           |
|--------------------------------------------|-----------|
| Maximum Rated Anode Current                |           |
| D-c. Meter Value-Continuous                | 6.4 amps  |
| D-c. Meter Value-Overload less than 3 sec. | 12.8 amps |
| Averaging Time                             | 6 secs    |
| Oscillograph Peak-Continuously recurring   | 77 amps   |

|                                           |            |
|-------------------------------------------|------------|
| Peak Forward Voltage (Max. Instantaneous) | 2000 volts |
| Peak Inverse Voltage (Max. Instantaneous) | 4000 volts |

|                                                                                                |      |
|------------------------------------------------------------------------------------------------|------|
| Max. Commutation Factor (V/usec x A/usec)<br>at a maximum initial inverse voltage of 300 volts | 0.66 |
|------------------------------------------------------------------------------------------------|------|

|                        |                 |
|------------------------|-----------------|
| Filament               |                 |
| Voltage                | 2.5 volts       |
| Current                | 24 $\pm$ 2 amps |
| Heating Time (minimum) | 50 secs         |

|                             |          |
|-----------------------------|----------|
| Average Arc Drop            |          |
| Average Tube                | 9 volts  |
| Highest Tube at end of life | 12 volts |

|                                                        |           |
|--------------------------------------------------------|-----------|
| Anode Starting Voltage (D. C.) @ +4V d-c. grid voltage |           |
| Average Tube                                           | 50 volts  |
| Highest Tube                                           | 200 volts |

|                                     |                    |
|-------------------------------------|--------------------|
| Grid Characteristics                |                    |
| Critical Grid Voltage @ 2000 p.f.v. | -5 $\pm$ 2 volts   |
| Critical Grid Current               | Less than 10 uamps |
| Grid-Anode Capacitance              | approx. 5 uuf      |
| Grid-Filament Capacitance           | approx. 25 uuf     |

|                               |                      |
|-------------------------------|----------------------|
| Maximum Negative Grid Voltage | 300 volts            |
| Deionization Time             | Less than 1000 usecs |

|                                                         |          |
|---------------------------------------------------------|----------|
| Max. Peak A-c Fault Current<br>(Max. duration 0.1 sec.) | 770 amps |
|---------------------------------------------------------|----------|

|                            |                |
|----------------------------|----------------|
| Ambient Temperature Limits | -55° to +75° C |
|----------------------------|----------------|

|                    |                        |
|--------------------|------------------------|
| Overall Dimensions | 2-9/16" x 11-1/2" Max. |
| Weight             | 10 ozs.                |

|                   |                                         |
|-------------------|-----------------------------------------|
| Connections       |                                         |
| Filament and Grid | Metal super jumbo 4-pin base #4310      |
| Anode             | C1-5 cap at top (0.56" dia.) with skirt |

The filament must be lit before drawing d-c. load current.

The anode is designed to operate at red heat when under full load.

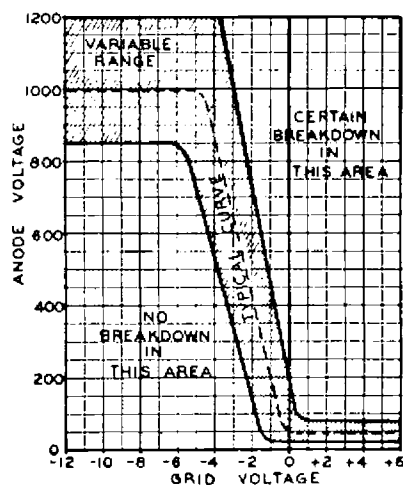
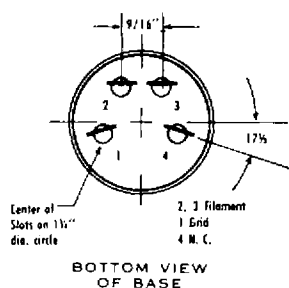
All of the above values are for returns to the filament transformer center tap. Filament pin #3 should be negative with respect to pin #2 during the anode conduction period.

The Engineering Manual contains additional information which should be considered in the circuit design.

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## GRID CONTROL RECTIFIER TUBE

## TANTALUM ANODE AND XENON GAS FILLING



|                                            |           |
|--------------------------------------------|-----------|
| Maximum Rated Anode Current                |           |
| D-c. Meter Value-Continuous                | 6.4 amps  |
| D-c. Meter Value-Overload less than 3 sec. | 12.8 amps |
| Averaging Time                             | 6 secs    |
| Oscillograph Peak-Continuously recurring   | 77 amps   |

|                                           |            |
|-------------------------------------------|------------|
| Peak Forward Voltage (Max. Instantaneous) | 750 volts  |
| Peak Inverse Voltage (Max. Instantaneous) | 1250 volts |

|                                                                                                |      |
|------------------------------------------------------------------------------------------------|------|
| Max. Commutation Factor (V/usec x A/usec)<br>at a maximum initial inverse voltage of 350 volts | 0.66 |
|------------------------------------------------------------------------------------------------|------|

|                        |           |
|------------------------|-----------|
| Filament               |           |
| Voltage                | 2.5 volts |
| Current                | 21±2 amps |
| Heating Time (minimum) | 60 secs   |

|                             |          |
|-----------------------------|----------|
| Average Arc Drop            |          |
| Average Tube                | 9 volts  |
| Highest Tube at end of life | 12 volts |

|                                                        |          |
|--------------------------------------------------------|----------|
| Anode Starting Voltage (D. C.) @ +4V d-c. grid voltage |          |
| Average Tube                                           | 40 volts |
| Highest Tube                                           | 75 volts |

|                                    |                    |
|------------------------------------|--------------------|
| Grid Characteristics               |                    |
| Critical Grid Voltage @ 750 p.f.v. | -3.5±1.5 volts     |
| Critical Grid Current              | Less than 10 uamps |
| Grid-Anode Capacitance             | approx. 4 uuf      |
| Grid-Filament Capacitance          | approx. 21 uuf     |

|                               |                      |
|-------------------------------|----------------------|
| Maximum Negative Grid Voltage | 100 volts            |
| Deionization Time             | Less than 1000 usecs |

|                                                         |          |
|---------------------------------------------------------|----------|
| Max. Peak A-c Fault Current<br>(Max. duration 0.1 sec.) | 770 amps |
|---------------------------------------------------------|----------|

|                            |                    |
|----------------------------|--------------------|
| Ambient Temperature Limits | -55° to +75° C     |
| Overall Dimensions         | 2-3/16" x 10" Max. |
| Weight                     | 8 ozs.             |

|                   |                                               |
|-------------------|-----------------------------------------------|
| Connections       |                                               |
| Filament and Grid | Lug type base                                 |
| Anode             | C1-5 cap (0.56" dia.) with ceramic insulator. |

The filament must be lit before drawing d-c. load current.

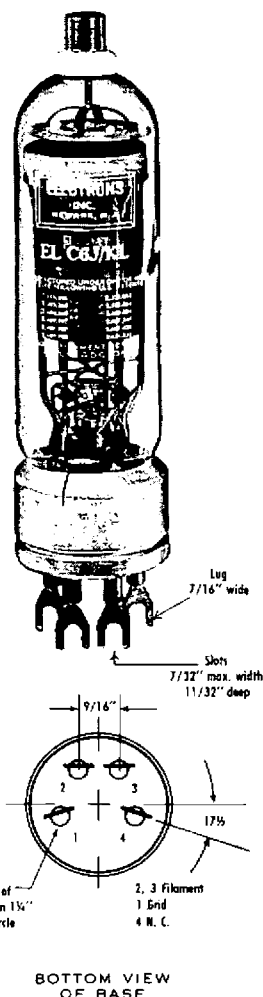
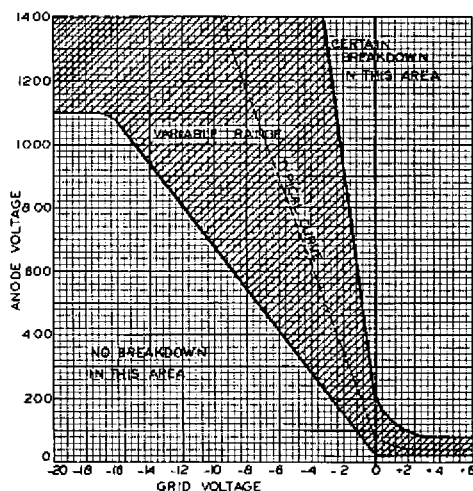
The anode is designed to operate at red heat when under full load. All of the above values are for returns to the filament transformer center tap. Filament pin #2 should be negative with respect to pin #3 during the anode conduction period.

The Engineering Manual contains additional information which should be considered in the circuit design.

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## GRID CONTROL RECTIFIER TUBE

## Xenon Gas Filling

BOTTOM VIEW  
OF BASE

|                                            |            |
|--------------------------------------------|------------|
| Maximum Rated Anode Current                |            |
| D-c. Meter Value-Continuous                | 6.4 amps   |
| D-c. Meter Value-Overload less than 3 sec. | 12.8 amps  |
| Averaging Time                             | 6 secs     |
| Oscillograph Peak-Continuously recurring   | 77 amps    |
| Peak Forward Voltage (Max. Instantaneous)  | 1000 volts |
| Peak Inverse Voltage (Max. Instantaneous)  | 1250 volts |
| Max. Commutation Factor (V/usec x A/usec)  | 130        |

|                        |           |
|------------------------|-----------|
| Filament               |           |
| Voltage                | 2.5 volts |
| Current                | 21±2 amps |
| Heating Time (minimum) | 60 secs   |

|                  |          |
|------------------|----------|
| Average Arc Drop |          |
| Average Tube     | 11 volts |
| Highest Tube     | 15 volts |

|                                               |          |
|-----------------------------------------------|----------|
| Anode Starting Voltage @ +3V d-c grid voltage |          |
| Average Tube                                  | 40 volts |
| Highest Tube                                  | 80 volts |

|                            |           |
|----------------------------|-----------|
| Max. Anode Reverse Current | 100 uamps |
|----------------------------|-----------|

|                                     |                    |
|-------------------------------------|--------------------|
| Grid Characteristics                |                    |
| Critical Grid Voltage @ 1000 p.f.v. | -2.0 to -15 volts  |
| Critical Grid Current               | Less than 20 uamps |
| Grid-Anode Capacitance              | approx. 5 uuf      |
| Grid-Filament Capacitance           | approx. 21 uuf     |

|                                                         |                       |
|---------------------------------------------------------|-----------------------|
| Maximum Negative Grid Voltage                           | 100 volts             |
| Deionization Time                                       | Less than 1000 usecs  |
| Max. Peak A-c Fault Current<br>(Max. duration 0.1 sec.) | 770 amps              |
| Ambient Temperature Limits                              | -55° to +75° C        |
| Overall Dimensions                                      | 2-3/16" x 9-1/4" max. |
| Weight                                                  | 8 ozs.                |

|                   |                                               |
|-------------------|-----------------------------------------------|
| Connections       |                                               |
| Filament and Grid | Lug type base                                 |
| Anode             | C1-5 cap (0.56" dia.) with ceramic insulator. |

The filament must be lit before drawing d-c. load current

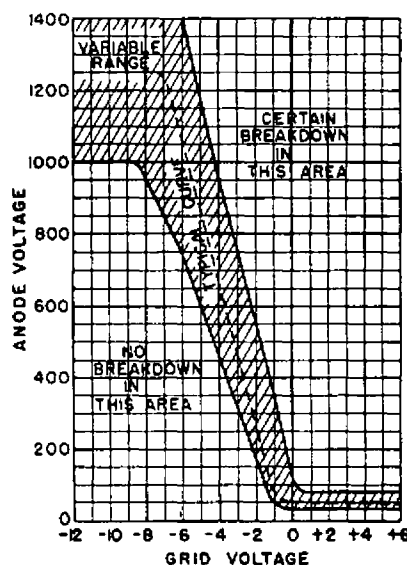
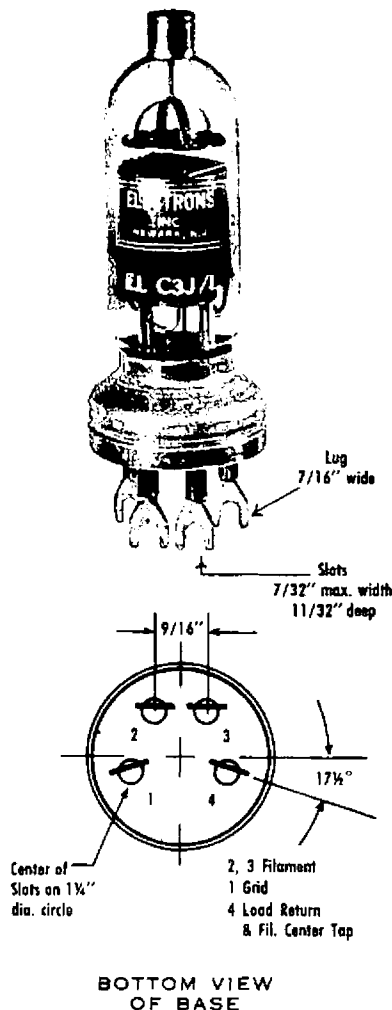
The anode is designed to operate at red heat when under full load. All of the above values are for returns to the filament transformer center tap. Filament pin #2 should be negative with respect to pin #3 during the anode conduction period.

The Engineering Manual contains additional information which should be considered in the circuit design.

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## GRID CONTROL RECTIFIER TUBE

## TANTALUM ANODE AND XENON GAS FILLING



|                                                                                                |                              |
|------------------------------------------------------------------------------------------------|------------------------------|
| Maximum Rated Anode Current                                                                    |                              |
| D-c. Meter Value-Continuous                                                                    | 2.5 amps                     |
| D-c. Meter Value-Overload less than 3 sec.                                                     | 3.7 amps                     |
| Averaging Time                                                                                 | 4.5 secs                     |
| Oscillograph Peak-Continuously recurring                                                       | 30 amps                      |
| Peak Forward Voltage (Max. Instantaneous)                                                      | 900 volts                    |
| Peak Inverse Voltage (Max. Instantaneous)                                                      | 1250 volts                   |
| Max. Commutation Factor (V/usec x A/usec)<br>at a maximum initial inverse voltage of 350 volts | 0.66                         |
| Filament                                                                                       |                              |
| Voltage                                                                                        | 2.5 volts                    |
| Current                                                                                        | 9+2 amps                     |
| Heating Time (minimum)                                                                         | 30 secs                      |
| Average Arc Drop                                                                               |                              |
| Average Tube                                                                                   | 10 volts                     |
| Highest Tube at end of life                                                                    | 14 volts                     |
| Anode Starting Voltage (D.C.) @ +4V d-c grid voltage                                           |                              |
| Average Tube                                                                                   | 40 volts                     |
| Highest Tube                                                                                   | 75 volts                     |
| Grid Characteristics                                                                           |                              |
| Critical Grid Voltage @ 900 p.f.v.                                                             | -5.7 ± 1.9 volts             |
| Critical Grid Current                                                                          | Less than 10 uamps           |
| Grid-Anode Capacitance                                                                         | approx. 2 uuf                |
| Grid-Filament Capacitance                                                                      | approx. 14 uuf               |
| Maximum Negative Grid Voltage                                                                  | 100 volts                    |
| Deionization Time                                                                              | Less than 1000 usecs         |
| Max. Peak A-c Fault Current<br>(Max. duration 0.1 sec.)                                        | 300 amps                     |
| Ambient Temperature Limits                                                                     | -55° to +75° C.              |
| Mounting Position                                                                              | Any                          |
| Overall Dimensions                                                                             | 2-3/16" x 6-3/4" max.        |
| Weight                                                                                         | 5 ozs.                       |
| Connections                                                                                    |                              |
| Filament and Grid                                                                              | Lug type base                |
| Anode                                                                                          | Cl-5 cap at top (0.56" dia.) |

The filament must be lit before drawing d-c. load current.

The anode is designed to operate at red heat when under full load.  
All of the above values are for returns to the filament center tap.

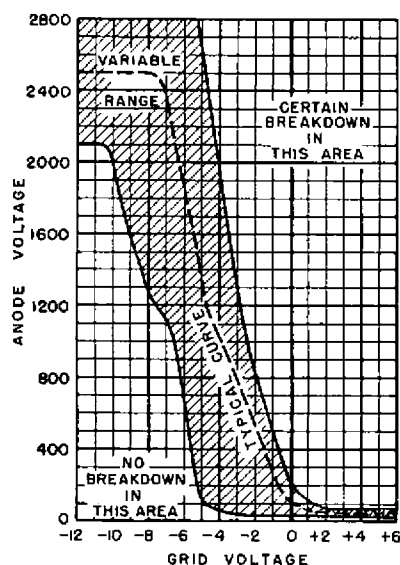
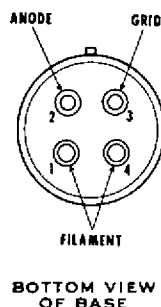
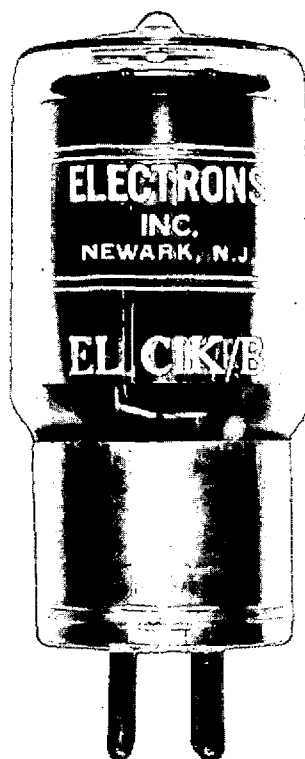
The Engineering Manual contains additional information which  
should be considered in the circuit design.

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## GRID CONTROL RECTIFIER TUBE

(Tentative Data)

## TANTALUM ANODE AND XENON GAS FILLING



|                                                                                                                                                           |                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| Maximum Rated Anode Current                                                                                                                               |                                       |
| D-c. Meter Value-Continuous                                                                                                                               | 1.0 amp                               |
| Averaging Time                                                                                                                                            | 4.5 secs                              |
| Oscillograph Peak-Continuously recurring                                                                                                                  | 8.0 amps                              |
| Max. Short Circuit Current (0.1 sec.)                                                                                                                     | 77 amps                               |
| Peak Forward Voltage (Max. Instantaneous)                                                                                                                 | 2000 volts                            |
| Peak Inverse Voltage (Max. Instantaneous)                                                                                                                 | 2000 volts                            |
| Minimum total effective anode to anode commutating inductance for peak inverse duty in excess of 1250 v must be 0.6 mh/volt of peak inverse above 1250 v. |                                       |
| Max. Commutation Factor (V/usec x A/usec) at a maximum initial inverse voltage of 700 volts                                                               | 0.04                                  |
| Filament                                                                                                                                                  |                                       |
| Voltage                                                                                                                                                   | 2.5 volts                             |
| Current                                                                                                                                                   | 6.3±0.8 amps                          |
| Heating Time (minimum)                                                                                                                                    | 25 secs                               |
| Average Arc Drop                                                                                                                                          |                                       |
| Average Tube                                                                                                                                              | 8 volts                               |
| Highest Tube at end of life                                                                                                                               | 14 volts                              |
| Anode Starting Voltage (D.C.) @ +4V d-c. grid voltage                                                                                                     |                                       |
| Average Tube                                                                                                                                              | 25 volts                              |
| Highest Tube                                                                                                                                              | 75 volts                              |
| Grid Characteristics                                                                                                                                      |                                       |
| Critical Grid Voltage @ 2000 p.f.v.                                                                                                                       | -7.0±3.0 volts                        |
| Critical Grid Current                                                                                                                                     | Less than 5 uamps                     |
| Grid-Anode Capacitance                                                                                                                                    | approx. 1 uuf                         |
| Grid-Filament Capacitance                                                                                                                                 | approx. 10 uuf                        |
| Maximum Negative Grid Voltage                                                                                                                             | 100 volts                             |
| Deionization Time                                                                                                                                         | Less than 500 usecs                   |
| Ambient Temperature Limits                                                                                                                                | -55° to +75° C                        |
| Mounting Position                                                                                                                                         | Any                                   |
| Overall Dimensions                                                                                                                                        | 1-9/16" x 4-3/8" Max.                 |
| Weight                                                                                                                                                    | 3 ozs.                                |
| Connections                                                                                                                                               |                                       |
| Filament, Grid and Anode                                                                                                                                  | Metal medium 4-pin bayonet base A4-10 |
| The filament must be lit before drawing d-c. load current.                                                                                                |                                       |
| The anode is designed to operate at red heat when under full load.                                                                                        |                                       |
| All of the above values are for returns to the filament transformer center tap.                                                                           |                                       |
| The Engineering Manual contains additional information which should be considered in the circuit design.                                                  |                                       |

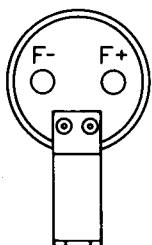
5/1/58

from JEDEC release #3770, June 18, 1962

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## HALF-WAVE RECTIFIER TUBE

### TANTALUM ANODE AND XENON GAS FILLING



BOTTOM VIEW  
OF BASE

|                                                                        |                                                |
|------------------------------------------------------------------------|------------------------------------------------|
| Maximum Rated Anode Current                                            |                                                |
| D-c. Meter Value-Continuous                                            | 16 amps                                        |
| D-c. Meter Value-Overload less than 10 sec.                            | 32 amps                                        |
| Averaging Time                                                         | 7 secs                                         |
| Oscillograph Peak-Continuously recurring                               | 96 amps                                        |
| Max. Instantaneous Short Circuit Current (0.1 sec.)                    | 1000 amps                                      |
| Peak Inverse Voltage (Max. Instantaneous)                              | 620 volts                                      |
| Max. Commutation Factor (V/usec x A/usec)                              | 0.66                                           |
| Filament                                                               | 2.5 volts                                      |
| Current                                                                | 36 $\pm$ 3.5 amps                              |
| Heating Time (minimum)                                                 | 3 min.                                         |
| Average Arc Drop                                                       |                                                |
| Average Tube                                                           | 7 volts                                        |
| Highest Tube at end of life                                            | 10 volts                                       |
| Anode Starting Voltage (Instantaneous)                                 |                                                |
| Average Tube                                                           | 12 volts                                       |
| Highest Tube                                                           | 30 volts                                       |
| Ambient Temperature Limits                                             | -55° to +75° C                                 |
| Overall Dimensions                                                     | 2-1/4" x 15-3/4" Max.                          |
| Weight                                                                 | 15 ozs.                                        |
| Connections                                                            |                                                |
| Filament                                                               | 5-1/8" flexible leads, lugs for 1/4" studs     |
| Anode                                                                  | 5-1/8" flexible lead at top, lug for 1/4" stud |
| Vertical panel-mounted on two 1/4" studs 14" apart on a vertical line. |                                                |

The filament must be lit before drawing d-c. load current.

The anode is designed to operate at red heat when under full load.

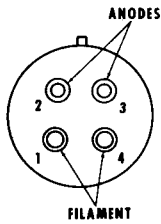
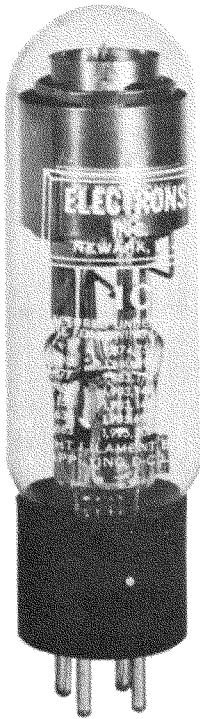
All of the above values are for returns to the filament transformer center tap. Filament lead F- should be negative with respect to F+ during the anode conduction period.

The Engineering Manual contains additional information which should be considered in the circuit design.

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## FULL-WAVE RECTIFIER TUBE

## TANTALUM ANODES AND XENON GAS FILLING

BOTTOM VIEW  
OF BASE

|                                                     |                                 |
|-----------------------------------------------------|---------------------------------|
| Maximum Rated Current per Tube                      |                                 |
| D-c. Meter Value-Continuous                         | 1.0 amp                         |
| D-c. Meter Value-Overload less than 3 sec.          | 1.5 amps                        |
| Averaging Time                                      | 4.5 secs                        |
| Oscillograph Peak-Continuously recurring            | 4.0 amps                        |
| Max. Instantaneous Short Circuit Current (0.1 sec.) | 60 amps                         |
| Peak Inverse Voltage (Max. Instantaneous)           | 725 volts                       |
| Max. Commutation Factor (V/usec x A/usec)           | 0.66                            |
| Max. Anode Supply Frequency                         | 250 cps                         |
| Filament                                            |                                 |
| Voltage                                             | 2.5 volts                       |
| Current                                             | $6.0 \pm 0.5$ amps              |
| Heating Time (minimum)                              | 20 secs                         |
| Average Arc Drop                                    |                                 |
| Average Tube                                        | 8 volts                         |
| Highest Tube at end of life                         | 13 volts                        |
| Anode Starting Voltage (Instantaneous)              |                                 |
| Average Tube                                        | 12 volts                        |
| Highest Tube                                        | 15 volts                        |
| Ambient Temperature Limits                          | -55° to +75° C                  |
| Mounting Position                                   | Any                             |
| Overall Dimensions                                  | 1-9/16" x 6" Max.               |
| Weight                                              | 2-1/2 ozs.                      |
| Connections                                         | Medium 4-pin bayonet base A4-10 |

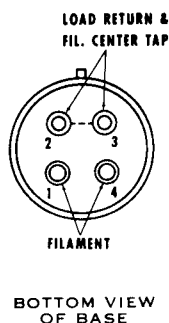
The filament must be lit before drawing d-c. load current

All of the above values are for returns to the filament transformer center tap.

The filament voltage should be phased so the a-c. voltage (with the tube out of the socket and some d-c. load connected) from pin #1 to pin #2 is lower than from pin #1 to pin #3. This phasing of filament voltage relative to anode voltage insures a lower arc drop and somewhat longer life.

The Engineering Manual contains additional information which should be considered in the circuit design.

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey



## HALF-WAVE RECTIFIER TUBE

(Tentative Data)

### TANTALUM ANODE AND XENON GAS FILLING

|                                                     |                                       |
|-----------------------------------------------------|---------------------------------------|
| Maximum Rated Anode Current                         |                                       |
| D-c. Meter Value-Continuous                         | 2.5 amps                              |
| D-c. Meter Value-Overload less than 10 sec.         | 3.7 amps                              |
| Averaging Time                                      | 7 secs                                |
| Oscillograph Peak-Continuously recurring            | 20 amps                               |
| Max. Instantaneous Short Circuit Current (0.1 sec.) | 300 amps                              |
| Peak Inverse Voltage (Max. Instantaneous)           | 920 volts                             |
| Max. Commutation Factor (V/usec x A/usec)           | 0.66                                  |
| Filament                                            |                                       |
| Voltage                                             | 2.5 volts                             |
| Current                                             | 9±2 amps                              |
| Heating Time (minimum)                              | 30 secs                               |
| Average Arc Drop                                    |                                       |
| Average Tube                                        | 9 volts                               |
| Highest Tube at end of life                         | 12 volts                              |
| Anode Starting Voltage (Instantaneous)              |                                       |
| Average Tube                                        | 12 volts                              |
| Highest Tube                                        | 30 volts                              |
| Ambient Temperature Limits                          | -55° to +75° C                        |
| Mounting Position                                   | Any                                   |
| Overall Dimensions                                  | 1-9/16 x 5-1/2" max.                  |
| Weight                                              | 3 ozs.                                |
| Connections                                         | Metal medium 4-pin bayonet base A4-10 |
| Anode                                               | C1-5 cap at top (0.56" dia.)          |

The filament must be lit before drawing d-c. load current.

The anode is designed to operate at red heat when under full load.

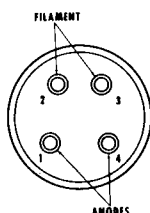
All of the above values are for returns to the filament center tap.

The Engineering Manual contains additional information which should be considered in the circuit design.

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## FULL-WAVE RECTIFIER TUBE

## TANTALUM ANODES AND XENON GAS FILLING

BOTTOM VIEW  
OF BASE

|                                                     |                             |
|-----------------------------------------------------|-----------------------------|
| Maximum Rated Current per Tube                      |                             |
| D-c. Meter Value-Continuous                         | 2.5 amps                    |
| D-c. Meter Value-Overload less than 3 sec.          | 3.7 amps                    |
| Averaging Time                                      | 4.5 secs                    |
| Oscillograph Peak-Continuously recurring            | 10 amps                     |
| Max. Instantaneous Short Circuit Current (0.1 sec.) | 150 amps                    |
| Peak Inverse Voltage (Max. Instantaneous)           | 725 volts                   |
| Max. Commutation Factor (V/usec x A/usec)           | 0.66                        |
| Max. Anode Supply Frequency                         | 250 cps                     |
| Filament                                            |                             |
| Voltage                                             | 2.5 volts                   |
| Current                                             | $11.5 \pm 1$ amps           |
| Heating Time (minimum)                              | 30 secs                     |
| Average Arc Drop                                    |                             |
| Average Tube                                        | 8 volts                     |
| Highest Tube at end of life                         | 13 volts                    |
| Anode Starting Voltage (Instantaneous)              |                             |
| Average Tube                                        | 12 volts                    |
| Highest Tube                                        | 15 volts                    |
| Ambient Temperature Limits                          | -55° to +75° C              |
| Mounting Position                                   | Any                         |
| Overall Dimensions                                  | 2-1/32" x 7-1/2" Max.       |
| Weight                                              | 5 ozs.                      |
| Connections                                         | Metal industrial base A4-81 |

The filament must be lit before drawing d-c. load current.

All of the above values are for returns to the filament transformer center tap.

The filament voltage should be phased so the a-c. voltage (with the tube out of the socket and some d-c. load connected) from pin #1 to pin #2 is lower than from pin #1 to pin #3. This phasing of filament voltage relative to anode voltage insures a lower arc drop and somewhat longer life.

The Engineering Manual contains additional information which should be considered in the circuit design.

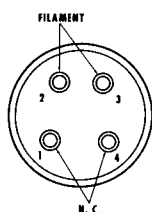
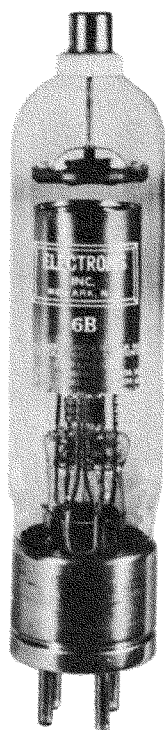
EL 3CF

Ratings and characteristics of the EL 3CF are the same as for the EL 3C. The only difference is a special base of 1.54" maximum diameter.

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## HALF-WAVE RECTIFIER TUBE

## TANTALUM ANODE AND XENON GAS FILLING

BOTTOM VIEW  
OF BASE

|                                                     |                                              |
|-----------------------------------------------------|----------------------------------------------|
| Maximum Rated Anode Current                         |                                              |
| D-c. Meter Value-Continuous                         | 6.4 amps                                     |
| D-c. Meter Value-Overload less than 10 sec.         | 12.8 amps                                    |
| Averaging Time                                      | 7 secs                                       |
| Oscillograph Peak-Continuously recurring            | 40 amps                                      |
| Max. Instantaneous Short Circuit Current (0.1 sec.) | 770 amps                                     |
| Peak Inverse Voltage (Max. Instantaneous)           | 920 volts                                    |
| Max. Commutation Factor (V/usec x A/usec)           | 0.66                                         |
| Filament                                            |                                              |
| Voltage                                             | 2.5 volts                                    |
| Current                                             | 21±2 amps                                    |
| Heating Time (minimum)                              | 60 secs                                      |
| Average Arc Drop                                    |                                              |
| Average Tube                                        | 9 volts                                      |
| Highest Tube                                        | 12 volts                                     |
| Anode Starting Voltage (Instantaneous)              |                                              |
| Average Tube                                        | 12 volts                                     |
| Highest Tube                                        | 30 volts                                     |
| Ambient Temperature Limits                          | -55° to +75° C                               |
| Overall Dimensions                                  | 2-1/32" x 9" Max.                            |
| Weight                                              | 6 ozs.                                       |
| Connections                                         |                                              |
| Filament                                            | Metal industrial base A4-81                  |
| Anode                                               | C1-5 cap (0.56" dia.) with ceramic insulator |

The filament must be lit before drawing d-c. load current.

The anode is designed to operate at red heat when under full load.

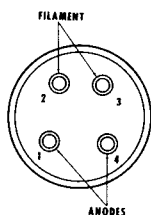
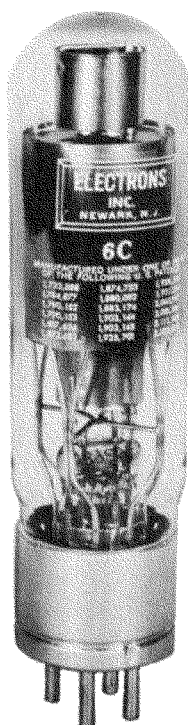
All of the above values are for returns to the filament transformer center tap. Filament pin #2 should be negative with respect to pin #3 during the anode conduction period.

The Engineering Manual contains additional information which should be considered in the circuit design.

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## FULL-WAVE RECTIFIER TUBE

## TANTALUM ANODES AND XENON GAS FILLING

BOTTOM VIEW  
OF BASE

|                                                     |                             |
|-----------------------------------------------------|-----------------------------|
| Maximum Rated Current per Tube                      |                             |
| D-c. Meter Value-Continuous                         | 6.4 amps                    |
| D-c. Meter Value-Overload less than 3 sec.          | 9.6 amps                    |
| Averaging Time                                      | 4.5 secs                    |
| Oscillograph Peak-Continuously recurring            | 25.6 amps                   |
| Max. Instantaneous Short Circuit Current (0.1 sec.) | 360 amps                    |
| Peak Inverse Voltage (Max. Instantaneous)           | 725 volts                   |
| Max. Commutation Factor (V/usec x A/usec)           | 0.66                        |
| Max. Anode Supply Frequency                         | 250 cps                     |
| Filament                                            |                             |
| Voltage                                             | 2.5 volts                   |
| Current                                             | 17 $\frac{1}{2}$ amps       |
| Heating Time (minimum)                              | 40 secs                     |
| Average Arc Drop                                    |                             |
| Average Tube                                        | 8 volts                     |
| Highest Tube at end of life                         | 13 volts                    |
| Anode Starting Voltage (Instantaneous)              |                             |
| Average Tube                                        | 13 volts                    |
| Highest Tube                                        | 18 volts                    |
| Ambient Temperature Limits                          | -55° to +75° C              |
| Overall Dimensions                                  | 2-1/32" x 8" Max.           |
| Weight                                              | 6 ozs.                      |
| Connections                                         | Metal industrial base A4-81 |

The filament must be lit before drawing d-c. load current.

All of the above values are for returns to the filament transformer center tap.

The filament voltage should be phased so the a-c. voltage (with the tube out of the socket and some d-c. load connected) from pin #1 to pin #2 is lower than from pin #1 to pin #3. This phasing of filament voltage relative to anode voltage insures a lower arc drop and somewhat longer life.

The Engineering Manual contains additional information which should be considered in the circuit design.

EL 6CF

Ratings and characteristics of the EL 6CF are the same as for the EL 6C. The only differences are the overall length which is 8.5" max., 7.0" min., and the base which is a special 4-prong base of 1.54" max. diameter.

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## HALF-WAVE RECTIFIER TUBE

### TANTALUM ANODE AND XENON GAS FILLING

|                                                     |  |           |
|-----------------------------------------------------|--|-----------|
| Maximum Rated Anode Current                         |  |           |
| D-c. Meter Value-Continuous                         |  | 6.4 amps  |
| D-c. Meter Value-Overload less than 10 sec.         |  | 12.8 amps |
| Averaging Time                                      |  | 7 secs    |
| Oscillograph Peak-Continuously recurring            |  | 40 amps   |
| Max. Instantaneous Short Circuit Current (0.1 sec.) |  | 770 amps  |

Peak Inverse Voltage (Max. Instantaneous) 920 volts

Max. Commutation Factor (V/usec x A/usec) 0.66

#### Filament

|                        |           |
|------------------------|-----------|
| Voltage                | 2.5 volts |
| Current                | 21±2 amps |
| Heating Time (minimum) | 60 secs   |

#### Average Arc Drop

|                             |          |
|-----------------------------|----------|
| Average Tube                | 9 volts  |
| Highest Tube at end of life | 12 volts |

#### Anode Starting Voltage (Instantaneous)

|              |          |
|--------------|----------|
| Average Tube | 12 volts |
| Highest Tube | 30 volts |

Ambient Temperature Limits -55° to +75° C

Overall Dimensions

2-1/32" x 8-1/4" Max.

Weight

7 ozs.

#### Connections

|                                                                             |                                               |
|-----------------------------------------------------------------------------|-----------------------------------------------|
| Filament                                                                    | 5-1/8" flexible leads with lugs for #10 studs |
| Anode                                                                       | C1-5 cap (0.56" dia.) with ceramic insulator  |
| Vertical panel-mounted on two 1/4" studs 4-1/8" apart on a horizontal line. |                                               |

The filament must be lit before drawing d-c. load current.

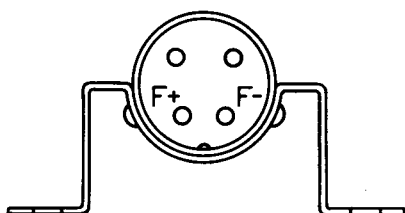
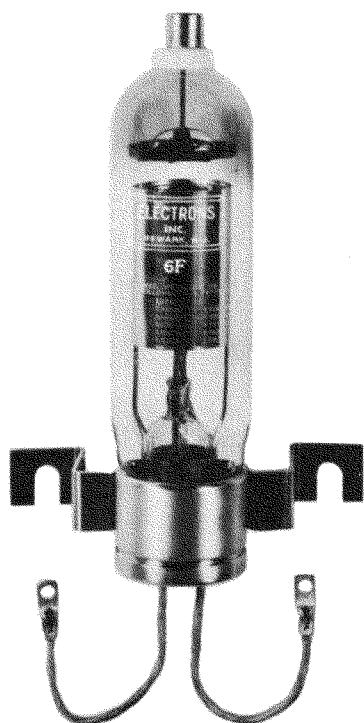
The anode is designed to operate at red heat when under full load.

All of the above values are for returns to the filament transformer center tap. Filament lead F- should be negative with respect to F+ during the anode conduction period.

The Engineering Manual contains additional information which should be considered in the circuit design.

ELECTRONS, INCORPORATED

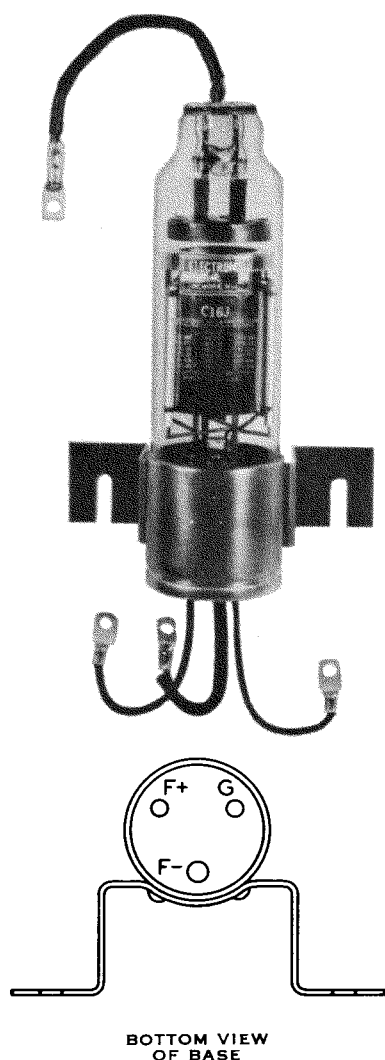
127 Sussex Avenue  
Newark 3, New Jersey



BOTTOM VIEW  
OF BASE

## GRID CONTROL RECTIFIER TUBE

## TANTALUM ANODE AND XENON GAS FILLING



|                                                     |      |          |
|-----------------------------------------------------|------|----------|
| Maximum Rated Anode Current                         |      |          |
| D-c. Meter Value-Continuous                         | 16   | 18 amps  |
| D-c. Meter Value-Overload less than 3 sec.          | 24   | 24 amps  |
| Averaging Time                                      | 4.5  | 4.5 secs |
| Oscillograph Peak-Continuously recurring            | 160  | 100 amps |
| Max. Instantaneous Short Circuit Current (0.1 sec.) | 1000 | amps     |

|                                           |            |
|-------------------------------------------|------------|
| Peak Forward Voltage (Max. Instantaneous) | 1000 volts |
| Peak Inverse Voltage (Max. Instantaneous) | 1250 volts |

|                                                                                                |      |
|------------------------------------------------------------------------------------------------|------|
| Max. Commutation Factor (V/usec x A/usec)<br>at a maximum initial inverse voltage of 330 volts | 0.66 |
|------------------------------------------------------------------------------------------------|------|

|                        |           |
|------------------------|-----------|
| Filament               |           |
| Voltage                | 2.5 volts |
| Current                | 31+3 amps |
| Heating Time (minimum) | 60 secs   |

|                             |          |
|-----------------------------|----------|
| Average Arc Drop            |          |
| Average Tube                | 11 volts |
| Highest Tube at end of life | 14 volts |

|                                                        |          |
|--------------------------------------------------------|----------|
| Anode Starting Voltage (D. C.) @ +4V d-c. grid voltage |          |
| Average Tube                                           | 40 volts |
| Highest Tube                                           | 75 volts |

|                                     |                      |
|-------------------------------------|----------------------|
| Grid Characteristics                |                      |
| Critical Grid Voltage @ 1000 p.f.v. | -4.0 $\pm$ 2.2 volts |
| Critical Grid Current               | Less than 10 uamps   |
| Grid-Anode Capacitance              | approx. 8 uuf        |
| Grid-Filament Capacitance           | approx. 29 uuf       |

|                               |           |
|-------------------------------|-----------|
| Maximum Negative Grid Voltage | 100 volts |
|-------------------------------|-----------|

|                   |                      |
|-------------------|----------------------|
| Deionization Time | Less than 1000 usecs |
|-------------------|----------------------|

|                            |                |
|----------------------------|----------------|
| Ambient Temperature Limits | -55° to +75° C |
|----------------------------|----------------|

|                    |                                |
|--------------------|--------------------------------|
| Overall Dimensions | 4-1/8" x 6-5/8" x 10-1/2" Max. |
|--------------------|--------------------------------|

|        |             |
|--------|-------------|
| Weight | 14-1/2 ozs. |
|--------|-------------|

## Connections

F+ 5-5/8" flexible lead with plain lug for 1/4" stud

F- 5-5/8" flexible lead with plain lug for 1/4" stud

G 5-5/8" green flexible lead with yellow insulated  
lug for 1/4" stud

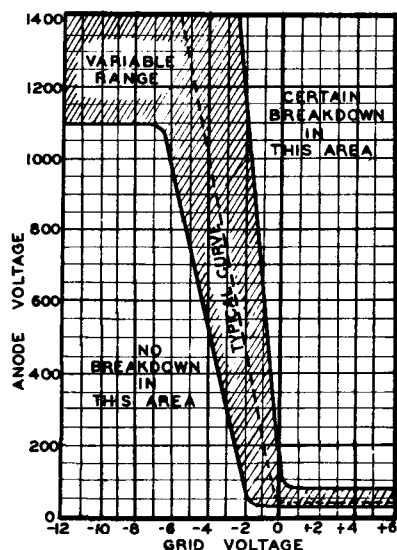
Anode 7-1/4" flexible lead at top- lug for 1/4" stud

Vertical panel-mounted on two 1/4" studs 5" apart on a horizontal line.

The filament must be lit before drawing d-c. load current.

The anode is designed to operate at red heat when under full load. All of the above values are for returns to the filament transformer center tap. Filament lead F- should be negative with respect to F+ during the conduction period.

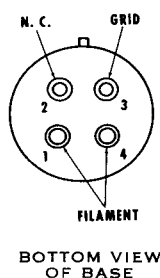
The Engineering Manual contains additional information which should be considered in the circuit design.



ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## GRID CONTROL RECTIFIER TUBE

## TANTALUM ANODE AND XENON GAS FILLING



## Maximum Rated Anode Current

|                                                     |          |
|-----------------------------------------------------|----------|
| D-c. Meter Value-Continuous                         | 1.0 amp  |
| D-c. Meter Value-Overload less than 3 sec.          | 1.5 amps |
| Oscillograph Peak-Continuously recurring            | 8.0 amps |
| Max. Instantaneous Short Circuit Current (0.1 sec.) | 77 amps  |

|                                           |            |
|-------------------------------------------|------------|
| Peak Forward Voltage (Max. Instantaneous) | 750 volts  |
| Peak Inverse Voltage (Max. Instantaneous) | 1250 volts |

|                                                   |      |
|---------------------------------------------------|------|
| Max. Commutation Factor (V/usec x A/usec)         | 0.15 |
| at a maximum initial inverse voltage of 500 volts |      |

## Filament

|                        |                    |
|------------------------|--------------------|
| Voltage                | 2.5 volts          |
| Current                | $6.3 \pm 0.8$ amps |
| Heating Time (minimum) | 25 secs            |

## Average Arc Drop

|                             |          |
|-----------------------------|----------|
| Average Tube                | 8 volts  |
| Highest Tube at end of life | 14 volts |

## Anode Starting Voltage (D.C.) @ +4V d-c. grid voltage

|              |          |
|--------------|----------|
| Average Tube | 30 volts |
| Highest Tube | 75 volts |

## Grid Characteristics

|                                    |                      |
|------------------------------------|----------------------|
| Critical Grid Voltage @ 750 p.f.v. | $-4.0 \pm 2.0$ volts |
| Critical Grid Current              | Less than 5 uamps    |
| Grid-Anode Capacitance             | approx. 2 uuf        |
| Grid-Filament Capacitance          | approx. 7.5 uuf      |

|                               |           |
|-------------------------------|-----------|
| Maximum Negative Grid Voltage | 100 volts |
|-------------------------------|-----------|

|                   |                      |
|-------------------|----------------------|
| Deionization Time | Less than 1000 usecs |
|-------------------|----------------------|

|                            |                                  |
|----------------------------|----------------------------------|
| Ambient Temperature Limits | $-55^{\circ}$ to $+75^{\circ}$ C |
|----------------------------|----------------------------------|

|                   |     |
|-------------------|-----|
| Mounting Position | Any |
|-------------------|-----|

|                    |                                |
|--------------------|--------------------------------|
| Overall Dimensions | $1-9/16'' \times 4-3/4''$ Max. |
|--------------------|--------------------------------|

|        |        |
|--------|--------|
| Weight | 3 ozs. |
|--------|--------|

## Connections

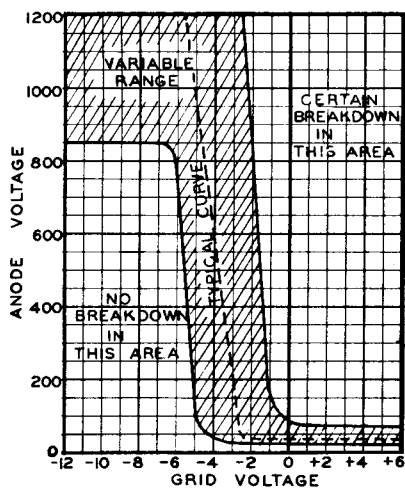
|                   |                                 |
|-------------------|---------------------------------|
| Filament and Grid | Medium 4-pin bayonet base A4-10 |
| Anode             | C1-5 cap at top (0.56" dia.)    |

The filament must be lit before drawing d-c. load current.

The anode is designed to operate at red heat when under full load.

All of the above values are for returns to the filament transformer center tap.

The Engineering Manual contains additional information which should be considered in the circuit design.

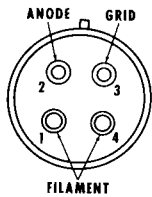
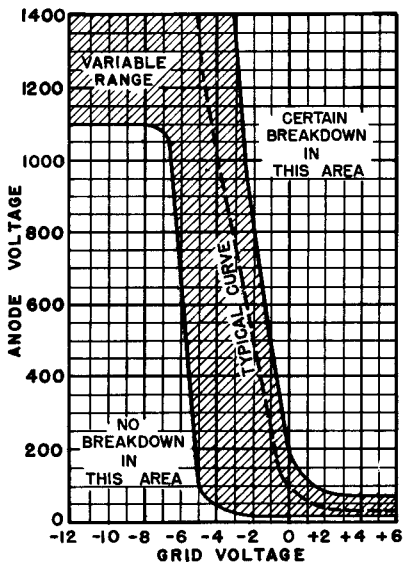


ELECTRONS, INCORPORATED

127 Sussex Avenue  
Newark 3, New Jersey

## GRID CONTROL RECTIFIER TUBE

## TANTALUM ANODE AND XENON GAS FILLING

BOTTOM VIEW  
OF BASE

|                                                     |          |
|-----------------------------------------------------|----------|
| Maximum Rated Anode Current                         |          |
| D-c. Meter Value-Continuous                         | 1.0 amp  |
| Averaging Time                                      | 4.5 secs |
| Oscillograph Peak-Continuously recurring            | 8.0 amps |
| Max. Instantaneous Short Circuit Current (0.1 sec.) | 77 amps  |

|                                           |            |
|-------------------------------------------|------------|
| Peak Forward Voltage (Max. Instantaneous) | 1000 volts |
| Peak Inverse Voltage (Max. Instantaneous) | 1250 volts |

|                                                                    |      |
|--------------------------------------------------------------------|------|
| Max. Commutation Factor ( $V_{\text{usec}} \times A/\text{usec}$ ) | 0.15 |
| at a maximum initial inverse voltage of 500 volts                  |      |

|                        |                    |
|------------------------|--------------------|
| Filament               |                    |
| Voltage                | 2.5 volts          |
| Current                | $6.3 \pm 0.8$ amps |
| Heating Time (minimum) | 25 secs            |

|                             |          |
|-----------------------------|----------|
| Average Arc Drop            |          |
| Average Tube                | 8 volts  |
| Highest Tube at end of life | 14 volts |

|                                                        |          |
|--------------------------------------------------------|----------|
| Anode Starting Voltage (D. C.) @ +4V d-c. grid voltage |          |
| Average Tube                                           | 25 volts |
| Highest Tube                                           | 75 volts |

|                                     |                      |
|-------------------------------------|----------------------|
| Grid Characteristics                |                      |
| Critical Grid Voltage @ 1000 p.f.v. | $-4.5 \pm 2.0$ volts |
| Critical Grid Current               | Less than 5 uamps    |
| Grid-Anode Capacitance              | approx. 1 uuf        |
| Grid-Filament Capacitance           | approx. 10 uuf       |

|                               |                                  |
|-------------------------------|----------------------------------|
| Maximum Negative Grid Voltage | 100 volts                        |
| Deionization Time             | Less than 500 usecs              |
| Ambient Temperature Limits    | $-55^{\circ}$ to $+75^{\circ}$ C |
| Mounting Position             | Any                              |
| Overall Dimensions            | $1-9/16'' \times 4-1/4''$ max.   |
| Weight                        | 3 ozs.                           |

|                           |                                       |
|---------------------------|---------------------------------------|
| Connections               |                                       |
| Filament, Grid, and Anode | Metal medium 4-pin bayonet base A4-10 |

The filament must be lit before drawing d-c. load current.

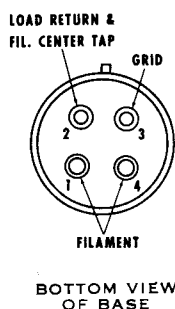
The anode is designed to operate at red heat when under full load. All of the above values are for returns to the filament transformer center tap.

The Engineering Manual contains additional information which should be considered in the circuit design.

ELECTRONICS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## GRID CONTROL RECTIFIER TUBE

## TANTALUM ANODE AND XENON GAS FILLING



## Maximum Rated Anode Current

|                                                     |          |
|-----------------------------------------------------|----------|
| D-c. Meter Value-Continuous                         | 2.5 amps |
| D-c. Meter Value-Overload less than 3 sec.          | 3.7 amps |
| Averaging Time                                      | 4.5 secs |
| Oscillograph Peak-Continuously recurring            | 30 amps  |
| Max. Instantaneous Short Circuit Current (0.1 sec.) | 300 amps |

|                                           |            |
|-------------------------------------------|------------|
| Peak Forward Voltage (Max. Instantaneous) | 900 volts  |
| Peak Inverse Voltage (Max. Instantaneous) | 1250 volts |

|                                                                                                |      |
|------------------------------------------------------------------------------------------------|------|
| Max. Commutation Factor (V/usec x A/usec)<br>at a maximum initial inverse voltage of 350 volts | 0.66 |
|------------------------------------------------------------------------------------------------|------|

## Filament

|                        |                |
|------------------------|----------------|
| Voltage                | 2.5 volts      |
| Current                | 9 $\pm$ 2 amps |
| Heating Time (minimum) | 30 secs        |

## Average Arc Drop

|                             |          |
|-----------------------------|----------|
| Average Tube                | 10 volts |
| Highest Tube at end of life | 14 volts |

## Anode Starting Voltage (D. C.) @ +4V d-c. grid voltage

|              |          |
|--------------|----------|
| Average Tube | 40 volts |
| Highest Tube | 75 volts |

## Grid Characteristics

|                                      |                      |
|--------------------------------------|----------------------|
| Critical Grid Voltage @ 900 p. f. v. | -5.7 $\pm$ 1.9 volts |
| Critical Grid Current                | Less than 10 uamps   |
| Grid-Anode Capacitance               | approx. 2 uuf        |
| Grid-Filament Capacitance            | approx. 14 uuf       |

|                               |           |
|-------------------------------|-----------|
| Maximum Negative Grid Voltage | 100 volts |
|-------------------------------|-----------|

|                   |                      |
|-------------------|----------------------|
| Deionization Time | Less than 1000 usecs |
|-------------------|----------------------|

|                            |                 |
|----------------------------|-----------------|
| Ambient Temperature Limits | -55° to +75° C. |
|----------------------------|-----------------|

|                   |     |
|-------------------|-----|
| Mounting Position | Any |
|-------------------|-----|

|                    |                   |
|--------------------|-------------------|
| Overall Dimensions | 1-9/16" x 6" max. |
|--------------------|-------------------|

|        |        |
|--------|--------|
| Weight | 3 ozs. |
|--------|--------|

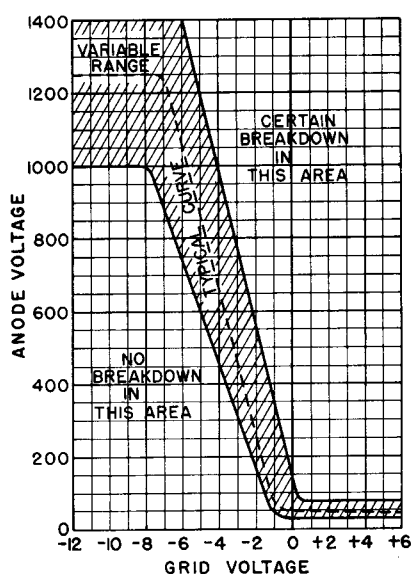
## Connections

|                   |                                       |
|-------------------|---------------------------------------|
| Filament and Grid | Metal medium 4-pin bayonet base A4-10 |
| Anode             | C1-5 cap at top (0.56" dia.)          |

The filament must be lit before drawing d-c. load current.

The anode is designed to operate at red heat when under full load. All of the above values are for returns to the filament center tap.

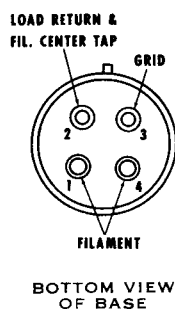
The Engineering Manual contains additional information which should be considered in the circuit design.



ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## GRID CONTROL RECTIFIER TUBE

## TANTALUM ANODE AND XENON GAS FILLING



## Maximum Rated Anode Current

|                                                     |          |
|-----------------------------------------------------|----------|
| D-c. Meter Value-Continuous                         | 2.5 amps |
| D-c. Meter Value-Overload less than 3 sec.          | 3.7 amps |
| Averaging Time                                      | 4.5 secs |
| Oscillograph Peak-Continuously recurring            | 30 amps  |
| Max. Instantaneous Short Circuit Current (0.1 sec.) | 300 amps |

|                                           |            |
|-------------------------------------------|------------|
| Peak Forward Voltage (Max. Instantaneous) | 1000 volts |
| Peak Inverse Voltage (Max. Instantaneous) | 1250 volts |

|                                                                                                |      |
|------------------------------------------------------------------------------------------------|------|
| Max. Commutation Factor (V/usec x A/usec)<br>at a maximum initial inverse voltage of 350 volts | 0.66 |
|------------------------------------------------------------------------------------------------|------|

## Filament

|                        |                |
|------------------------|----------------|
| Voltage                | 2.5 volts      |
| Current                | 9 $\pm$ 2 amps |
| Heating Time (minimum) | 30 secs        |

## Average Arc Drop

|                             |          |
|-----------------------------|----------|
| Average Tube                | 10 volts |
| Highest Tube at end of life | 14 volts |

## Anode Starting Voltage (D. C.) @ +4V d-c. grid voltage

|              |          |
|--------------|----------|
| Average Tube | 40 volts |
| Highest Tube | 75 volts |

## Grid Characteristics

|                                     |                      |
|-------------------------------------|----------------------|
| Critical Grid Voltage @ 1000 p.f.v. | -6.0 $\pm$ 1.8 volts |
| Critical Grid Current               | Less than 10 uamps   |
| Grid-Anode Capacitance              | approx. 2 uuf        |
| Grid-Filament Capacitance           | approx. 14 uuf       |

## Maximum Negative Grid Voltage

100 volts

## Deionization Time

Less than 1000 usecs

## Ambient Temperature Limits

-55° to +75° C

## Mounting Position

Any

## Overall Dimensions

1-9/16" x 6" max.

## Weight

3 ozs.

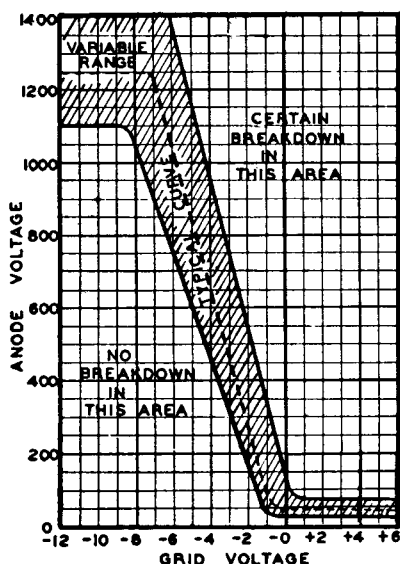
## Connections

|                   |                                       |
|-------------------|---------------------------------------|
| Filament and Grid | Metal medium 4-pin bayonet base A4-10 |
| Anode             | C1-5 cap at top (0.56" dia.)          |

The filament must be lit before drawing d-c. load current.

The anode is designed to operate at red heat when under full load.  
All of the above values are for returns to the filament center tap.

The Engineering Manual contains additional information which  
should be considered in the circuit design.



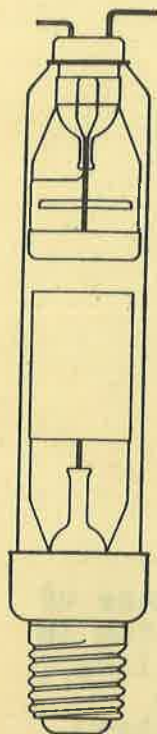
ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

# NAVY TYPE: CEL 1552

## GRID-CONTROL RECTIFIER TUBE

EL C5B

Tantalum Anode and Xenon Gas Filling



|                                            |         |
|--------------------------------------------|---------|
| D-c. Amperes Output (Max. Rated)           |         |
| D-c. Meter Value-Continuous                | 5       |
| D-c. Meter Value-Overload less than 3 sec. | 10      |
| Oscillograph Peak-Continuously recurring   | 75      |
| Peak Forward Volts (Max. Instantaneous)    | 750     |
| Peak Inverse Volts (Max. Instantaneous)    | 1500    |
| Nominal A-c. Volts per Anode               | 110-440 |

|                        |    |
|------------------------|----|
| Average Arc Drop Volts |    |
| Highest Tube           | 12 |
| Average Tube           | 9  |

|              |                |
|--------------|----------------|
| Filament     |                |
| Volts        | 2.5            |
| Amperes      | 23±3           |
| Heating Time | Approx. 1 min. |

|                                |                       |
|--------------------------------|-----------------------|
| Grid Characteristics           |                       |
| Critical Grid Volts @ p.f.v.   | -1.5±1.5              |
| Critical Grid Current          | Below 10 Microamps    |
| Maximum Negative Grid Volts    | 100                   |
| Starting Volts (Instantaneous) |                       |
| Highest Tube                   | 200                   |
| Average Tube                   | 50                    |
| Maximum De-ionization Time     | Approx. 1 Millisecond |

|                        |                |
|------------------------|----------------|
| Grid-anode Capacity    | Approx. 10 uuf |
| Grid-filament Capacity | Approx. 10 uuf |

|                                            |      |
|--------------------------------------------|------|
| Max. A-c. Short-circuit Current (0.1 sec.) | 600A |
|--------------------------------------------|------|

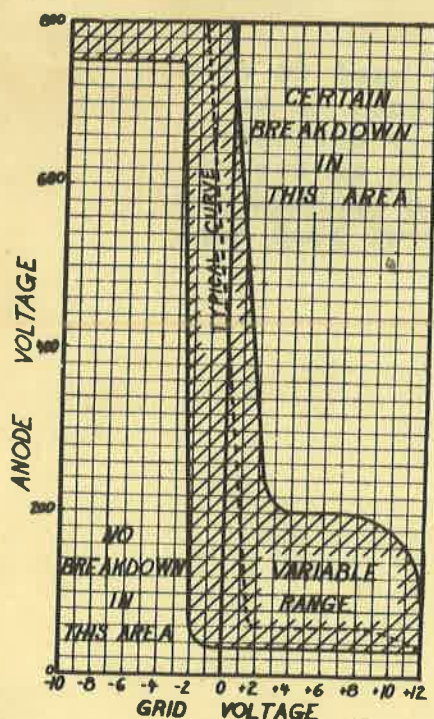
|                    |                            |
|--------------------|----------------------------|
| Overall Dimensions |                            |
| Weight             | 2½ x 11½ x ½"<br>12.5 Ozs. |

|              |                                 |
|--------------|---------------------------------|
| Connections  |                                 |
| Filament     | Mogul Screw Socket              |
| Anode & Grid | Pins at top for clip connection |

|                            |               |
|----------------------------|---------------|
| Ambient Temperature Limits | -40 to +65°C. |
|----------------------------|---------------|

The filament must be lit before the d-c. load is applied.

All of the above values are for returns to the filament center tap.



ELECTRONS, INC.  
127 Sussex Avenue  
Newark, 4, N.J.

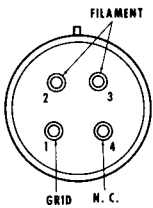
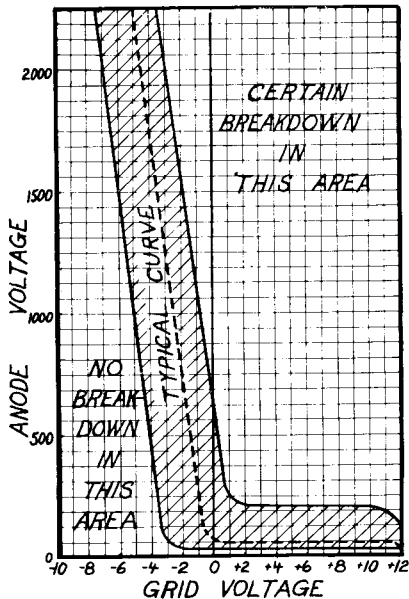
4/17/44

Type CEL 1552 may be used in place of a half-wave rectifier tube of similar rating in the usual rectifier circuits. By controlling initiation of the arc with the grid it is possible to adjust the average or d-c. meter reading of the output of the rectifier from zero to the value it would have if half-wave rectifier tubes were used.

The type CEL 1552 may be used to control the speed of a motor. One method is to connect the armature of a separately excited d-c. shunt motor through the tube to an a-c. line. Voltage applied from grid to cathode may then be used to determine the flow of load current to the motor.

## GRID CONTROL RECTIFIER TUBE

## TANTALUM ANODE AND XENON GAS FILLING

BOTTOM VIEW  
OF BASE

|                                                     |           |
|-----------------------------------------------------|-----------|
| Maximum Rated Anode Current                         |           |
| D-c. Meter Value-Continuous                         | 6.4 amps  |
| D-c. Meter Value-Overload less than 3 sec.          | 12.8 amps |
| Averaging Time                                      | 6 secs    |
| Oscillograph Peak-Continuously recurring            | 77 amps   |
| Max. Instantaneous Short Circuit Current (0.1 sec.) | 770 amps  |

|                                           |            |
|-------------------------------------------|------------|
| Peak Forward Voltage (Max. Instantaneous) | 2000 volts |
| Peak Inverse Voltage (Max. Instantaneous) | 4000 volts |

|                                                                                                |      |
|------------------------------------------------------------------------------------------------|------|
| Max. Commutation Factor (V/usec x A/usec)<br>at a maximum initial inverse voltage of 300 volts | 0.66 |
|------------------------------------------------------------------------------------------------|------|

|                        |                 |
|------------------------|-----------------|
| Filament               |                 |
| Voltage                | 2.5 volts       |
| Current                | 24 $\pm$ 2 amps |
| Heating Time (minimum) | 50 secs         |

|                             |          |
|-----------------------------|----------|
| Average Arc Drop            |          |
| Average Tube                | 9 volts  |
| Highest Tube at end of life | 12 volts |

|                                                        |           |
|--------------------------------------------------------|-----------|
| Anode Starting Voltage (D. C.) @ +4V d-c. grid voltage |           |
| Average Tube                                           | 50 volts  |
| Highest Tube                                           | 200 volts |

|                                     |                    |
|-------------------------------------|--------------------|
| Grid Characteristics                |                    |
| Critical Grid Voltage @ 2000 p.f.v. | -5 $\pm$ 2 volts   |
| Critical Grid Current               | Less than 10 uamps |
| Grid-Anode Capacitance              | approx. 5 uuf      |
| Grid-Filament Capacitance           | approx. 25 uuf     |

|                               |                        |
|-------------------------------|------------------------|
| Maximum Negative Grid Voltage | 300 volts              |
| Deionization Time             | Less than 1000 usecs   |
| Ambient Temperature Limits    | -55° to +75° C         |
| Overall Dimensions            | 2-9/16" x 11-1/2" Max. |
| Weight                        | 10 ozs.                |

## Connections

|                   |                                         |
|-------------------|-----------------------------------------|
| Filament and Grid | Metal super jumbo 4-pin base #4310      |
| Anode             | C1-5 cap at top (0.56" dia.) with skirt |

The filament must be lit before drawing d-c. load current.

The anode is designed to operate at red heat when under full load.

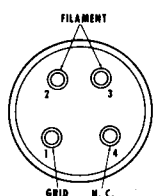
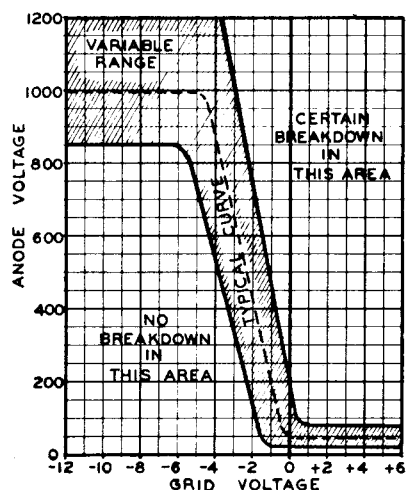
All of the above values are for returns to the filament transformer center tap. Filament pin #3 should be negative with respect to pin #2 during the anode conduction period.

The Engineering Manual contains additional information which should be considered in the circuit design.

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## GRID CONTROL RECTIFIER TUBE

## TANTALUM ANODE AND XENON GAS FILLING

BOTTOM VIEW  
OF BASE

|                                                     |  |           |
|-----------------------------------------------------|--|-----------|
| Maximum Rated Anode Current                         |  |           |
| D-c. Meter Value-Continuous                         |  | 6.4 amps  |
| D-c. Meter Value-Overload less than 3 sec.          |  | 12.8 amps |
| Averaging Time                                      |  | 6 secs    |
| Oscillograph Peak-Continuously recurring            |  | 77 amps   |
| Max. Instantaneous Short Circuit Current (0.1 sec.) |  | 770 amps  |

|                                           |            |
|-------------------------------------------|------------|
| Peak Forward Voltage (Max. Instantaneous) | 750 volts  |
| Peak Inverse Voltage (Max. Instantaneous) | 1250 volts |

|                                                                                                |      |
|------------------------------------------------------------------------------------------------|------|
| Max. Commutation Factor (V/usec x A/usec)<br>at a maximum initial inverse voltage of 350 volts | 0.66 |
|------------------------------------------------------------------------------------------------|------|

|                        |                 |
|------------------------|-----------------|
| Filament               |                 |
| Voltage                | 2.5 volts       |
| Current                | 21 $\pm$ 2 amps |
| Heating Time (minimum) | 60 secs         |

|                             |          |
|-----------------------------|----------|
| Average Arc Drop            |          |
| Average Tube                | 9 volts  |
| Highest Tube at end of life | 12 volts |

|                                                        |          |
|--------------------------------------------------------|----------|
| Anode Starting Voltage (D. C.) @ +4V d-c. grid voltage |          |
| Average Tube                                           | 40 volts |
| Highest Tube                                           | 75 volts |

|                                    |                      |
|------------------------------------|----------------------|
| Grid Characteristics               |                      |
| Critical Grid Voltage @ 750 p.f.v. | -3.5 $\pm$ 1.5 volts |
| Critical Grid Current              | Less than 10 uamps   |
| Grid-Anode Capacitance             | approx. 4 uuf        |
| Grid-Filament Capacitance          | approx. 21 uuf       |

|                               |           |
|-------------------------------|-----------|
| Maximum Negative Grid Voltage | 100 volts |
|-------------------------------|-----------|

|                   |                      |
|-------------------|----------------------|
| Deionization Time | Less than 1000 usecs |
|-------------------|----------------------|

|                            |                |
|----------------------------|----------------|
| Ambient Temperature Limits | -55° to +75° C |
|----------------------------|----------------|

|                    |                       |
|--------------------|-----------------------|
| Overall Dimensions | 2-1/32" x 9-1/2" Max. |
| Weight             | 7 ozs.                |

|                   |                                               |
|-------------------|-----------------------------------------------|
| Connections       |                                               |
| Filament and Grid | Metal industrial base A4-81                   |
| Anode             | C1-5 cap (0.56" dia.) with ceramic insulator. |

The filament must be lit before drawing d-c. load current.

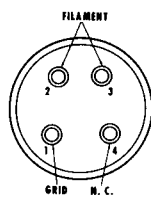
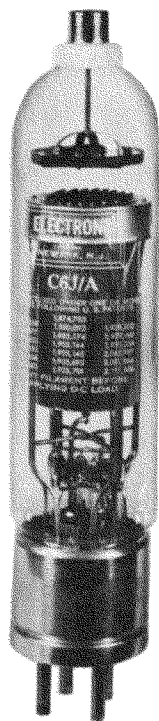
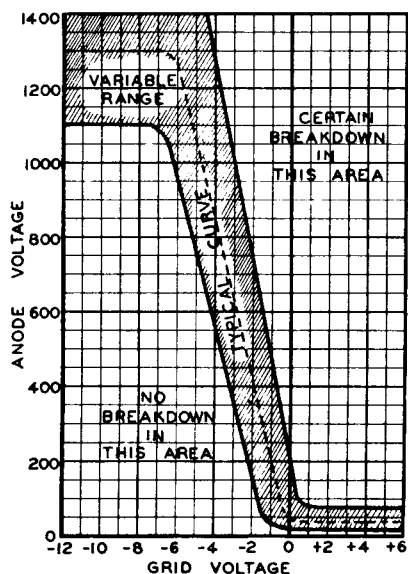
The anode is designed to operate at red heat when under full load. All of the above values are for returns to the filament transformer center tap. Filament pin #2 should be negative with respect to pin #3 during the anode conduction period.

The Engineering Manual contains additional information which should be considered in the circuit design.

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## GRID CONTROL RECTIFIER TUBE

## TANTALUM ANODE AND XENON GAS FILLING

BOTTOM VIEW  
OF BASE

|                                                     |  |           |
|-----------------------------------------------------|--|-----------|
| Maximum Rated Anode Current                         |  |           |
| D-c. Meter Value-Continuous                         |  | 6.4 amps  |
| D-c. Meter Value-Overload less than 3 sec.          |  | 12.8 amps |
| Averaging Time                                      |  | 6 secs    |
| Oscillograph Peak-Continuously recurring            |  | 77 amps   |
| Max. Instantaneous Short Circuit Current (0.1 sec.) |  | 770 amps  |

|                                           |            |
|-------------------------------------------|------------|
| Peak Forward Voltage (Max. Instantaneous) | 1000 volts |
| Peak Inverse Voltage (Max. Instantaneous) | 1250 volts |

|                                                                                                |      |
|------------------------------------------------------------------------------------------------|------|
| Max. Commutation Factor (V/usec x A/usec)<br>at a maximum initial inverse voltage of 350 volts | 0.66 |
|------------------------------------------------------------------------------------------------|------|

|                        |                 |
|------------------------|-----------------|
| Filament               |                 |
| Voltage                | 2.5 volts       |
| Current                | 12 $\pm$ 2 amps |
| Heating Time (minimum) | 60 secs         |

|                             |          |
|-----------------------------|----------|
| Average Arc Drop            |          |
| Average Tube                | 9 volts  |
| Highest Tube at end of life | 12 volts |

|                                                        |          |
|--------------------------------------------------------|----------|
| Anode Starting Voltage (D. C.) @ +4V d-c. grid voltage |          |
| Average Tube                                           | 40 volts |
| Highest Tube                                           | 75 volts |

|                                     |                      |
|-------------------------------------|----------------------|
| Grid Characteristics                |                      |
| Critical Grid Voltage @ 1000 p.f.v. | -4.6 $\pm$ 1.6 volts |
| Critical Grid Current               | Less than 10 uamps   |
| Grid-Anode Capacitance              | approx. 4 uuf        |
| Grid-Filament Capacitance           | approx. 21 uuf       |

|                               |           |
|-------------------------------|-----------|
| Maximum Negative Grid Voltage | 100 volts |
|-------------------------------|-----------|

|                   |                      |
|-------------------|----------------------|
| Deionization Time | Less than 1000 usecs |
|-------------------|----------------------|

|                            |                |
|----------------------------|----------------|
| Ambient Temperature Limits | -55° to +75° C |
|----------------------------|----------------|

|                    |                       |
|--------------------|-----------------------|
| Overall Dimensions | 2-1/32" x 9-1/2" Max. |
|--------------------|-----------------------|

|        |        |
|--------|--------|
| Weight | 7 ozs. |
|--------|--------|

|                   |                                               |
|-------------------|-----------------------------------------------|
| Connections       |                                               |
| Filament and Grid | Metal industrial base A4-81                   |
| Anode             | C1-5 cap (0.56" dia.) with ceramic insulator. |

The filament must be lit before drawing d-c. load current.

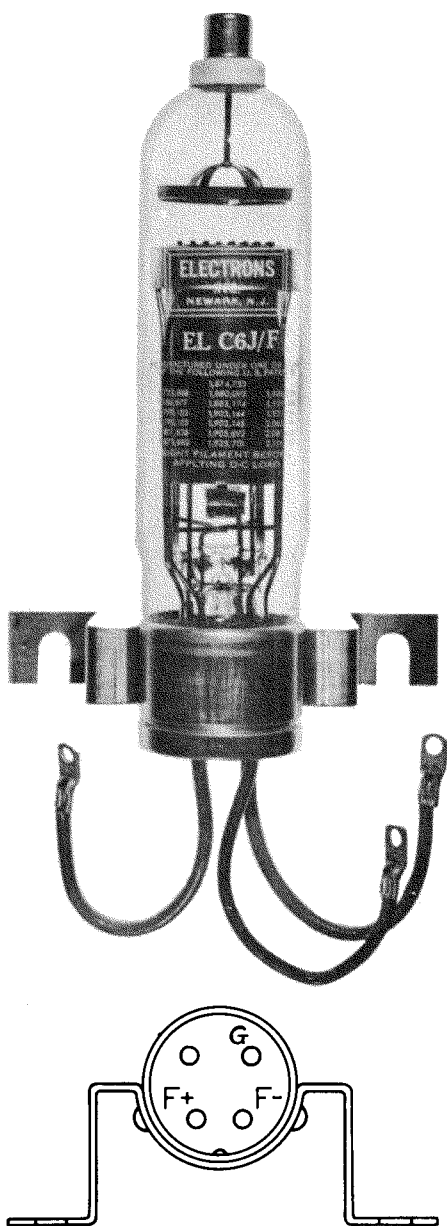
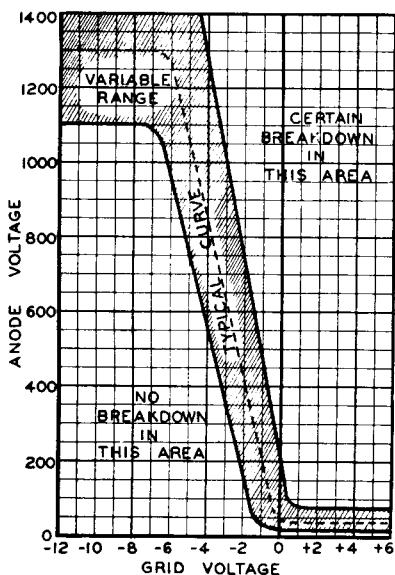
The anode is designed to operate at red heat when under full load. All of the above values are for returns to the filament transformer center tap. Filament pin #2 should be negative with respect to pin #3 during the anode conduction period.

The Engineering Manual contains additional information which should be considered in the circuit design.

ELECTRONS, INCORPORATED  
127 Sussex Avenue  
Newark 3, New Jersey

## GRID CONTROL RECTIFIER TUBE

## TANTALUM ANODE AND XENON GAS FILLING

BOTTOM VIEW  
OF BASE

## Maximum Rated Anode Current

|                                                     |           |
|-----------------------------------------------------|-----------|
| D-c. Meter Value-Continuous                         | 6.4 amps  |
| D-c. Meter Value-Overload less than 3 sec.          | 12.8 amps |
| Averaging Time                                      | 6 secs    |
| Oscillograph Peak-Continuously recurring            | 77 amps   |
| Max. Instantaneous Short Circuit Current (0.1 sec.) | 770 amps  |

Peak Forward Voltage (Max. Instantaneous)

1000 volts

Peak Inverse Voltage (Max. Instantaneous)

1250 volts

Max. Commutation Factor (V/usec x A/usec)

0.66

at a maximum initial inverse voltage of 350 volts

## Filament

Voltage

2.5 volts

Current

21 $\pm$ 2 amps

Heating Time (minimum)

60 secs

## Average Arc Drop

Average Tube

9 volts

Highest Tube at end of life

12 volts

Anode Starting Voltage (D. C. ) @ +4V d-c. grid voltage

Average Tube

40 volts

Highest Tube

75 volts

## Grid Characteristics

Critical Grid Voltage @ 1000 p. f. v.

-4.6 $\pm$ 1.6 volts

Critical Grid Current

Less than 10 uamps

Grid-Anode Capacitance

approx. 4 uuf

Grid-Filament Capacitance

approx. 21 uuf

Maximum Negative Grid Voltage

100 volts.

Deionization Time

Less than 1000 usecs

Ambient Temperature Limits

-55° to +75° C

Overall Dimensions

2-3/4" x 5-3/16" x 8-3/4" Max.

Weight

8 ozs.

## Connections

Filament and Grid

5-1/8" flexible leads with lugs for #10 studs

Anode

C1-5 cap (0.56"dia.) with ceramic insulator

Vertical panel-mounted on two 1/4" studs 4-1/8" apart on a horizontal line.

The filament must be lit before drawing d-c. load current.

The anode is designed to operate at red heat when under full load.

All of the above values are for returns to the filament transformer center tap. Filament lead F- should be negative with respect to F+ during the anode conduction period.

The Engineering Manual contains additional information which should be considered in the circuit design.

ELECTRONS, INCORPORATED

127 Sussex Avenue

Newark 3, New Jersey