

ELECTRONIC TUBE REFERENCE

7086

Specialized - Thyatron electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

THYRATRON

Xenon thyatron for heavy controlled-power service. Its unusually high heater demand indicates substantial gas-discharge current capability.

GENERAL CHARACTERISTICS

|                     |                   |                      |               |
|---------------------|-------------------|----------------------|---------------|
| BASE DESIGNATION    | —                 | BASE PINS            | —             |
| NOMINAL HEATER      | 220 V / 2.5 A     | PARALLEL HEATER      | — / —         |
| HEATING             | Indirect          | SERIES OPERATION     | Not specified |
| CATHODE ARRANGEMENT | Separate cathodes | SECTION CONSTRUCTION | Similar       |

SECTION RATINGS

|                                                                     |
|---------------------------------------------------------------------|
| SECTION1 Thyatron                                                   |
| No fixed ratings recorded.                                          |
| Source-derived section; promoted values populated where applicable. |

7086 XENON THYRATRON Forced-Air Cooled 11-3/4" Overall Length High Peak Current Negative-Control Triode Type 4-{/2" Diameter Bulb TENTATIVE DATA RCA-7086 is a three—electrode, forced-air Design features of the 7086 include the use cooled xenon thyatron having a negative-control of acopper grid having high heat conductivity to characteristic, high commutation factor, and provide cool operation of the grid and resultant relatively shortdeioni- reduced grid emission; a large cup-shaped anode zation time. [t is de- with a copper face to provide uniform heat dis- signed primarily foruse tribution over the faced area; and heavy copper inapplications in which filament leads and terminals. The cup-shaped high peak currents are anode forms one end of the tube and is in direct required such as in contact with the ambient air. The grid is ter- welding and in X-ray minated in a large area metal band which is a tube operation. [t can part ofthe tube envelope and thus is effectively also be used fo

## SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

# 1940 RCA

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1940 RCA

## Section 1 · Thyatron

| OTHER                                                                                                        |                 |                                                                                                          |
|--------------------------------------------------------------------------------------------------------------|-----------------|----------------------------------------------------------------------------------------------------------|
| PARAMETER                                                                                                    | PUBLISHED VALUE | CONDITION / NOTE                                                                                         |
| voltage (AC) v & « v ¢ ¢« «<br>v « « « « 2.5 % 5% volts                                                      | 5 V             | voltage (AC) v & « v ¢ ¢« « v « « « « 2.5 % 5% volts                                                     |
| X-ray tube control cir-<br>Current at 2.5 volts . + . &<br>« & & &                                           | 92 V            | X-ray tube control cir- Current at 2.5 volts . + . & « & & & 92 amp                                      |
| the tubes are operated Grid<br>to filament « o « « & v o &<br>& &                                            | 7.5 pF          | the tubes are operated Grid to filament « o « « & v o & & & 7.5 uuf                                      |
| 2 seconds and an "off"<br>Maximum Critical Grid<br>Current for                                               | 2 s             | 2 seconds and an "off" Maximum Critical Grid Current for                                                 |
| period of %4 seconds,<br>instantaneous anode volts =<br>650                                                  | 50 V            | period of %4 seconds, instantaneous anode volts = 650 . . 50 wamp                                        |
| Under conditions: 10000-ohm<br>grid                                                                          | 10000 ohm       | Under conditions: 10000-ohm grid                                                                         |
| 400 amperes and an average<br>anode current of  [27<br>resistor, returns to<br>filament                      | 27 A            | 400 amperes and an average anode current of   [27 resistor, returns to filament                          |
| at FS?, anode voltage<br>between                                                                             | 100 V           | at FS?, anode voltage between 100                                                                        |
| mits the control of 280<br>amperes rms through the and<br>700 volts, and plate load                          | 700 V           | mits the control of 280 amperes rms through the and 700 volts, and plate load                            |
| of 2000 OhMS v & v v ¢ & & o<br>& « « &                                                                      | 100 ohm         | of 2000 OhMS v & v v ¢ & & o & « « & 100                                                                 |
| of 100 milliamperes at a<br>voltage suitable for<br>operating Position « « & ¢«<br>v ¢ & & v v v ¢ 4 « « 4 . | 4 V             | of 100 milliamperes at a voltage suitable for operating Position « « & ¢« v ¢ & & v v v ¢ 4 « « 4 . JADY |

| PARAMETER                                                                                            | PUBLISHED VALUE | CONDITION / NOTE                                                                                      |
|------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------|
| anode current of 160 amperes and a maximum nozzle located about 12 inches from the anode end of      | <b>12 A</b>     | anode current of 160 amperes and a maximum nozzle located about 12 inches from the anode end of       |
| average anode current of 40 amperes, the anode cup and permitted to flow freely around the           | <b>40 A</b>     | average anode current of 40 amperes, the anode cup and permitted to flow freely around the            |
| surface) . . . . . 300 max. o anode voltages should be 900 out of phase for optimum                  | <b>900 V</b>    | surface) . . . . . 300 max. o anode voltages should be 900 out of phase for optimum                   |
| Weight (Approx.) e e e e e e e 3 lbs voltages between 600 and 120° out of phase. In poly             | <b>120 V</b>    | Weight (Approx.) e e e e e e e 3 lbs voltages between 600 and 120° out of phase. In poly              |
| Forward. . « « + + 4 . 650 max. 650 max. volts "Standard on Electron Tubes: Methods of Testing,      | <b>1950 V</b>   | Forward. . « « + + 4 . 650 max. 650 max. volts "Standard on Electron Tubes: Methods of Testing, 1950  |
| Inverse. . . . . 650 max. 650 max. volts (50 IRE 7.52)" available from The institute of Radio        | <b>7.52 V</b>   | Inverse. . . . . 650 max. 650 max. volts (50 IRE 7.52)" available from The institute of Radio         |
| GRID VOLTAGE: Englneers, 1 East 79 St, New York 21, N. Y. Also                                       | <b>21 V</b>     | GRID VOLTAGE: Englneers, 1 East 79 St, New York 21, N. Y. Also                                        |
| conduction . . . . . --150 max. -150 max. volts involve anode supply voltage (Epp) of 300 volts, gri | <b>300 V</b>    | conduction . . . . . --150 max. -150 max. volts involve anode supply voltage (Epp) of 300 volts, grid |
| Average, during tube supply voltage (Ecc) of -150 volts, grid resistor rq)                           | <b>-150 V</b>   | Average, during tube supply voltage (Ecc) of -150 volts, grid resistor rq)                            |
| conduction . . . . . -10 max. --10 max. volts of 5000 ohms and anode current (Ip) of                 | <b>23 V</b>     | conduction . . . . . -10 max. --10 max. volts of 5000 ohms and anode current (Ip) of 23 amperes.      |
| Peak « « « ¢ « « o . . 160 max. 400 max. amp decay in amperes per microsecond just before conduction | <b>400 A</b>    | Peak « « « ¢ « « o . . 160 max. 400 max. amp decay in amperes per microsecond just before conduction  |
| AVERage. « « « o & o 10 max.®0 7 max. amp ceases and the rate of inverse voltage rise in volts       | <b>7 V</b>      | AVERage. « « « o & o 10 max.®0 7 max. amp ceases and the rate of inverse voltage rise in volts        |

| PARAMETER                                                                                                       | PUBLISHED VALUE | CONDITION / NOTE                                                                                                |
|-----------------------------------------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------|
| 0.1 second maximum . %000<br>max. 4000 max. amp<br>Continuous Service is<br>defined as service where            | <b>4000 A</b>   | 0.1 second maximum . %000 max. 4000 max.<br>amp Continuous Service is defined as service<br>where               |
| Average positive . . . 2.0<br>max. 2.0 max. amp                                                                 | <b>2 A</b>      | Average positive . . . 2.0 max. 2.0 max. amp                                                                    |
| anode negative . . . 0.1<br>max. 0.1 max. amp conduction<br>does not take place as often<br>as every cycle      | <b>100 mA</b>   | anode negative . . . 0.1 max. 0.1 max. amp<br>conduction does not take place as often as every<br>cycle         |
| RANGE . . . . =55 to +75 -55<br>to +75 oc Averaged over any<br>period of 15 seconds maximum                     | <b>15 s</b>     | RANGE . . . . =55 to +75 -55 to +75 oc<br>Averaged over any period of 15 seconds<br>maximum.                    |
| Averaged over any period of<br>36 seconds maximum                                                               | <b>36 s</b>     | Averaged over any period of 36 seconds<br>maximum.                                                              |
| Power Utilizing Inverse-<br>Parallel Circuit of Fig.6:<br>Averaged over the "on"<br>period of                   | <b>2 s</b>      | Power Utilizing Inverse-Parallel Circuit of Fig.6:<br>Averaged over the "on" period of 2 seconds                |
| AC Anode-Supply voltage<br>(RMS). . . . . 220 volts<br>average or the rms load<br>current is reduced but the    | <b>220 V</b>    | AC Anode-Supply voltage (RMS). . . . . 220 volts<br>average or the rms load current is reduced but the          |
| Grid-Bias voltage. . . « . .<br>+ « « .+ -50 volts severity<br>of duty on the 7086 is not<br>reduced            | <b>7086 V</b>   | Grid-Bias voltage. . . « . . + « « .+ -50 volts<br>severity of duty on the 7086 is not reduced.                 |
| Grid-Pulse voltage . + v v «<br>& o o « & 60 volts the time<br>at which the incoming and<br>outgoing tubes have | <b>60 V</b>     | Grid-Pulse voltage . + v v « & o o « & 60 volts<br>the time at which the incoming and outgoing<br>tubes have    |
| Peak « v ¢ v v ¢ v v e e e e<br>e e e 400 amp oidal supply                                                      | <b>400 A</b>    | Peak « v ¢ v v ¢ v v e e e e e e e 400 amp oidal<br>supply.                                                     |
| Average' [ T                                                                                                    | <b>127 A</b>    | Average' [ T 127 amp                                                                                            |
| Load RMS Demand Current. + o<br>« o o o«                                                                        | <b>280 A</b>    | Load RMS Demand Current. + o « o o o« 280<br>amp                                                                |
| Grid-Circuit Resistance. . .<br>« . + .« . 0.1 max. megohm<br>of the 7086 may be impaired<br>from the viewpoi   | <b>7086 ohm</b> | Grid-Circuit Resistance. . . « . + .« . 0.1 max.<br>megohm of the 7086 may be impaired from the<br>viewpoint of |
| Filament Current . . . . . 1<br>87                                                                              | <b>97 A</b>     | Filament Current . . . . . 1 87 97 amp                                                                          |
|                                                                                                                 |                 |                                                                                                                 |

| PARAMETER                                                                                                     | PUBLISHED VALUE   | CONDITION / NOTE                                                                                            |
|---------------------------------------------------------------------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------------------------|
| Peak Tube voltage Drop . .<br>1,2 - 40 volts never be<br>exceeded under any usual<br>condition of             | <b>40 V</b>       | Peak Tube voltage Drop . . 1,2 - 40 volts never<br>be exceeded under any usual condition of                 |
| Critical Anode Voltage . .<br>1,3 - 100 peak volts supply-<br>voltage variation, load<br>variation, or        | <b>100 V</b>      | Critical Anode Voltage . . 1,3 - 100 peak volts<br>supply-voltage variation, load variation, or             |
| Note t: With 2.5 volts rms<br>on filament                                                                     | <b>2.5 V</b>      | Note t: With 2.5 volts rms on filament.                                                                     |
| Note 2: With peak anode<br>current of 400 amperes<br>provided The maximum fault<br>anode current rating shown | <b>400 A</b>      | Note 2: With peak anode current of 400<br>amperes provided The maximum fault anode<br>current rating shown  |
| tied to anode through a<br>10,000~-ohm resistor. second<br>maximum) that should pass<br>through the           | <b>10000 ohm</b>  | tied to anode through a 10,000~-ohm resistor.<br>second maximum) that should pass through the               |
| Note 3: The voltage at<br>terminal F is in phase with<br>the tube under the most<br>adverse conditions of ser | <b>3 V</b>        | Note 3: The voltage at terminal F is in phase<br>with the tube under the most adverse conditions<br>of ser- |
| FS. Grid resistor = 0 to<br>100,000 ohms. equipment<br>designer in a choice of<br>circuit com                 | <b>100000 ohm</b> | FS. Grid resistor = 0 to 100,000 ohms.<br>equipment designer in a choice of circuit com-                    |
| of the filamentand for<br>maximum tube life, the<br>voltage at approximating a<br>short circuit. It is not in | <b>1 V</b>        | of the filamentand for maximum tube life, the<br>voltage at approximating a short circuit. It is not<br>in- |
| RANGE IS FOR CONDITIONS WHER<br>lead should be hard soldered<br>to a                                          | <b>225 A</b>      | RANGE IS FOR CONDITIONS WHER lead<br>should be hard soldered to a 225-ampere                                |
| Ef=25 VOLTS AC £5%.CIRCUIT<br>RETURNS TO FILAMENT TERMI                                                       | <b>5 V</b>        | Ef=25 VOLTS AC £5%.CIRCUIT RETURNS TO<br>FILAMENT TERMI-                                                    |
| GRID RESISTOR = 0 TO (                                                                                        | <b>0 ohm</b>      | GRID RESISTOR = 0 TO (00000 OHMS                                                                            |
| rents may reach a value as<br>high as {                                                                       | <b>20 A</b>       | rents may reach a value as high as {20 amperes                                                              |
| E¢= 2.5VOLTS AC PHASE<br>CIRCUIT                                                                              | <b>2.5 V</b>      | E¢= 2.5VOLTS AC PHASE CIRCUIT                                                                               |
| same manner as other tube<br>ratings. The tempera- GRID<br>RESISTOR=I0000 OHMS CURVE <br>A\GLE¥   RETURN TO   | <b>0 ohm</b>      | same manner as other tube ratings. The<br>tempera- GRID RESISTOR=I0000 OHMS<br>CURVE  A\GLE¥   RETURN TO    |

| PARAMETER                                                                                        | PUBLISHED VALUE | CONDITION / NOTE                                                                                  |
|--------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------|
| conveniently be measured with temperature-sensi-ANODEVOLTAGE (WITH B                             | <b>1805 V</b>   | conveniently be measured with temperature-sensi- ANODEVOLTAGE (WITH B 1805 F                      |
| RESPECT TO VOLTAGE AT c 0° F                                                                     | <b>0 V</b>      | RESPECT TO VOLTAGE AT c 0° F                                                                      |
| stud so that I-1/2 inches of the free end extends DC GRID SUPPLY VOLTS 92CS                      | <b>-9426 V</b>  | stud so that I-1/2 inches of the free end extends DC GRID SUPPLY VOLTS 92CS -9426                 |
| not less than 60 seconds after application of range, and independent of grid bias. Conduction    | <b>60 s</b>     | not less than 60 seconds after application of range, and independent of grid bias. Conduction     |
| tions of operation to prevent exceeding the HGRID RESISTOR =                                     | <b>0 ohm</b>    | tions of operation to prevent exceeding the HGRID RESISTOR = 0 OHMS                               |
| The anode voltages at which the %7086 ls o                                                       | <b>1 V</b>      | The anode voltages at which the %7086 ls o                                                        |
| tube and its associated apparatus, especially all C A AMPEREIS]=                                 | <b>771 A</b>    | tube and its associated apparatus, especially all C A AMPEREIS]= 771 ,n                           |
| housing is opened, and should prevent the closing DC GRID VOLTS                                  | <b>92 V</b>     | housing is opened, and should prevent the closing DC GRID VOLTS 92CS                              |
| The 7086 has a critical grid voltage which                                                       | <b>7086 V</b>   | The 7086 has a critical grid voltage which                                                        |
| E $\phi$ = 2.5VOLTS AC GRID CIRCUIT   puase values shownin Fig.l. From them he can determine     | <b>2.5 V</b>    | E $\phi$ = 2.5VOLTS AC GRID CIRCUIT   puase values shownin Fig.l. From them he can determine      |
| VOLTAGE (WITH RE=   A 0.01 FS o                                                                  | <b>0 V</b>      | VOLTAGE (WITH RE=   A 0.01 FS o                                                                   |
| SPECT TO VOLTAGE  B 0.1 FS 0 prevent conduction until it is desired, but also                    | <b>0 V</b>      | SPECT TO VOLTAGE  B 0.1 FS 0 prevent conduction until it is desired, but also                     |
| ~-?5 -20 -5 ~10 -5 [+] The anode voltage for the 7086 may be obtained                            | <b>7086 V</b>   | ~-?5 -20 -5 ~10 -5 [+] The anode voltage for the 7086 may be obtained                             |
| 7086 may be accomplished by varying the amplitude to 180° minus the angle of lag. Maximum dc out | <b>180</b>      | 7086 may be accomplished by varying the amplitude to 180° minus the angle of lag. Maximum dc out- |
| phasing a peaked grid voltage with respect to the to 180°, no conduction occurs                  | <b>180 V</b>    | phasing a peaked grid voltage with respect to the to 180°, no conduction occurs.                  |

| PARAMETER                                                                                             | PUBLISHED VALUE | CONDITION / NOTE                                                                                      |
|-------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------|
| 180°, change in amplitude of the grid voltage will adequate to swing the grid weli{ into the positive | <b>180 V</b>    | 180°, change in amplitude of the grid voltage will adequate to swing the grid weli{ into the positive |
| than 180°, change in amplitude of the grid voltage IW, N                                              | <b>180 V</b>    | than 180°, change in amplitude of the grid voltage IW, N                                              |
| half-cycle of anode voltage. Initiation of con                                                        | <b>4 V</b>      | half-cycle of anode voltage. Initiation of con- 3 4                                                   |
| connect the load to the anode voltage supply for                                                      | <b>3 V</b>      | connect the load to the anode voltage supply for 3                                                    |
| to control the output voltage over a wider range, DUTY-PER CENT                                       | <b>-9435 V</b>  | to control the output voltage over a wider range, DUTY-PER CENT 02C5-9435                             |
| the anode voltage by about I700, conduction 7086 in AC Voltage Control Service                        | <b>7086 V</b>   | the anode voltage by about I700, conduction 7086 in AC Voltage Control Service.                       |
| that the grid voltage lags the anode voltage by tude and lagging the anode voltage by about           | <b>900 V</b>    | that the grid voltage lags the anode voltage by tude and lagging the anode voltage by about 900,      |
| less than 170°, tube conduction is initiated over to provide control of the dc output voltage from    | <b>170 V</b>    | less than 170°, tube conduction is initiated over to provide control of the dc output voltage from    |
| peaked grid voltage is a preferred method in that circuit of Fig.6. When the timed gate provides      | <b>6 V</b>      | peaked grid voltage is a preferred method in that circuit of Fig.6. When the timed gate provides      |
| voltage lags the anode voltage up to 1800, tube amperes which when multipliedby the value of          | <b>2.22 V</b>   | voltage lags the anode voltage up to 1800, tube amperes which when multipliedby the value of 2.22     |
| in the positive half-cycle. The conduction angle, amperes. Starting at the 89-ampere,                 | <b>100 A</b>    | in the positive half-cycle. The conduction angle, amperes. Starting at the 89-ampere, 100%-duty       |
| AC Voltage Control TABLE                                                                              | <b>1 V</b>      | AC Voltage Control TABLE 1                                                                            |
| 60 CPS H lay = Average DC Output Current Pp = Peak Load Volt-amperes                                  | <b>60 V</b>     | 60 CPS H lay = Average DC Output Current Pp = Peak Load Volt-amperes                                  |
| Q O * k= 1/2 number of turns in secondary of transformer To                                           | <b>2 s</b>      | Q O * k= 1/2 number of turns in secondary of transformer To                                           |

| PARAMETER                                                                                   | PUBLISHED VALUE | CONDITION / NOTE                                                                            |
|---------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------|
| (ACVoltage Controb 460                                                                      | <b>40 V</b>     | (ACVoltage Controb 460 - - - 40'                                                            |
| (DC Voltage Control) 460 205 40                                                             | <b>8 V</b>      | (DC Voltage Control) 460 205 40 8 -                                                         |
| (DC Voltage Control) 460 410 80                                                             | <b>32.5 V</b>   | (DC Voltage Control) 460 410 80 32.5 -                                                      |
| ' Averaged over any period of 36 seconds max imum                                           | <b>36 s</b>     | ' Averaged over any period of 36 seconds max imum.                                          |
| seconds and "off" period of 34 seconds. & Averaged over any period of 15 seconds max i mum, | <b>15 s</b>     | seconds and "off" period of 34 seconds. & Averaged over any period of 15 seconds max i mum, |
| this 45° line, the average current through each amperes (left horizontal line of Fig        | <b>5 A</b>      | this 45° line, the average current through each amperes (left horizontal line of Fig.5}     |

| CHARACTERISTIC                                                                                 |                 |                                                                                                 |
|------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------|
| PARAMETER                                                                                      | PUBLISHED VALUE | CONDITION / NOTE                                                                                |
| supply voltage is 220 Direct Interelectrode Capacitances                                       | <b>220 V</b>    | supply voltage is 220 Direct Interelectrode Capacitances                                        |
| Grid-Circuit Resistance. . . . . 0.1 megohm The angle of phase retard is the angle by which th | <b>0.1 ohm</b>  | Grid-Circuit Resistance. . . . . 0.1 megohm The angle of phase retard is the angle by which the |
| Sufficient anode-circuit resistance, includ-MEf=2.5VOLTS AC                                    | <b>2.5 V</b>    | Sufficient anode-circuit resistance, includ-MEf=2.5VOLTS AC                                     |
| control is available. If the grid voltage lags Fig.5 – Current Demand Characteristic of Type   | <b>5 V</b>      | control is available. If the grid voltage lags Fig.5 — Current Demand Characteristic of Type    |

## TUBE TINKER

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