TO UNLOCK BINDER

1. Place binder on table in full open position.

T.P.D

- Press lever at bottom center of binder to release locking wire along center of metal, while, at the same time, pressing down on opened pages of binder.
- 3. Press folding back of binder together to get largest possible opening between ends of prongs.

TO CLOSE BINDER

Close cover. Binder locks automatically for immediate re-use.

RCA Electron Tube Handbook HB-3

This Handbook of data on RCA electron tubes has been compiled to meet the requirements of electronicequipment design engineers primarily but will prove helpful to anyone having need for technical information which can be kept up to date. Its convenient loose-leaf form permits the revision of data on existing types and the addition of data on new types as they are made available. The material is arranged in Sections divided by tabbed separators to facilitate quick reference.

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PREFACE

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Components

RCA TUBE Handbook HB-3

GENERAL SECTION

The information in this Section, in general, applies to all classes of RCA tubes. It includes such material as the Table of Contents for all Sections; Index of Tube Types arranged in numerical-alphabeticalnumerical sequence; list of preferred types; list of not-recommended types; interchangeability list; discussion of ratings; outlines; cap and base drawings; as well as other general information of interest to the equipment designer.

For further Technical Information, write to Commercial Engineering, Tube Division, Radio Corporation of America, Harrison, N. J.

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Sheets in the RCA Electron Tube Handbook are arranged in the Table of Contents in order of appearance in each section. The Index of Types, which follows the Table of Contents, lists type numbers in numerical-alphabeticalnumerical sequence.

The Table of Contents and Index of Types may be used to determine:

(1) location of individual sheets

(2) completeness of Handbook

(3) arrangement of Handbook sheets

Reference is to front of sheet only unless otherwise indicated. Date appearing on sheet is identified by month and year only (e.g., 4-71).

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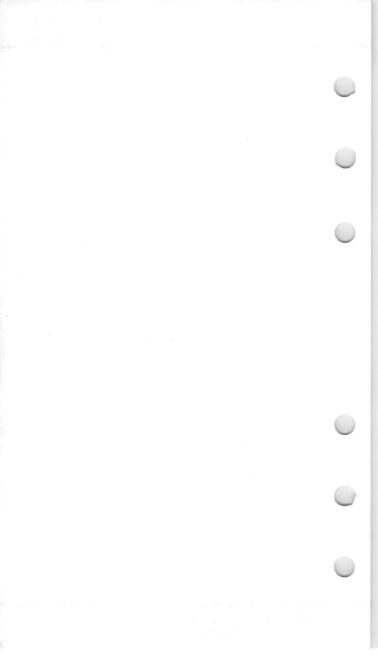
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- D = Receiving- Type Industrial Tube
- F = Thyratron, Ignitron, & Glow-Discharge Tube
- G = General
- P = Photosensitive Device
- R = Receiving Tube
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AND THEIR SIGNIFICANCE

A rating is a designation, as established by definite standards, of an operating limit of a tube. Tubes are rated by either of two systems, i.e., the "absolute maximum" system or the "design-center maximum" system. Of the two, the absolute maximum system is the older and dates back to the beginning of tubes. With either system, each maximum rating for a given tube type must be considered in relation to all other maximum ratings for that type, so that no one maximum rating will be exceeded in utilizing any other maximum rating. For convenience in referring to these two systems, the former will hereinafter be called the "absolute system," and the latter, the "design-center system."

In the absolute system,* the maximum ratings shown for each type thus rated are limiting values above which the serviceability of the tube may be impaired from the viewpoint of life and satisfactory performance. Therefore, in order not to exceed these absolute ratings, the equipment designer has the responsibility of determining an average design value for each rating below the absolute value of that rating by an amount such that the absolute values will never be exceeded under any usual condition of supply-voltage variation, load variation, or manufacturing variation in the equipment itself.

The equipment should be designed to operate the filament or heater of each tube type at rated normal value for full-load operating conditions under average voltage-supply conditions. Variations from this normal value due to voltage-supply fluctuation or other causes, should not exceed ± 5 per cent unless otherwise specified by the tube manufacturer.

^{*} Types rated according to the absolute system have no identification on their data pages issued prior to April 1, 1942. Sheets issued after that date carry the statement "Maximum Ratings Are Absolute Values" preceding the ratings.



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In the design-center system ** adopted by the receiving-tube industry late in 1939, the maximum ratings shown for each type thus rated are working design-center maximums. The basic purpose underlying this system is to provide satisfactory average performance in the greatest number of equipments on the premise that they will not be adjusted to local power-supply conditions at time of installation. In the setting up of design-center ratings, consideration has been given to three important kinds of power supply commonly in use, i.e., a-c and d-c power lines, storage battery with connected charger, and dry batteries.

In the case of a-c or d-c power lines, the maximum ratings for tubes rated according to the designcenter system have been chosen so that the tubes will give satisfactory performance at these maximum ratings in equipment operated from powerline supplies whose normal voltage including normal variations fall within ± 10 per cent of a specified center value. In other words, it is basic to the design-center system of ratings for tubes operated from power-line supplies that filaments or heaters as well as positive- and negative-potential electrodes may have to operate at voltages differing as much as ± 10 per cent from their rated values. It also recognizes that equipment may occasionally be used on power-line supplies outside the normal range, but since such extreme cases are the exception, they should be handled by adjustment made locally.

The choice of ± 10 per cent takes care of voltage differences in power lines in the U.S.A. where surveys have shown that the voltages delivered fall within ± 10 per cent of 117 volts. Therefore, satisfactory performance from tubes rated according to the design-center system will ordinarily be obtained

^{**} Types rated according to the **design-center system** are identified on their data pages either by a large star in the index corner or by the statement "Maximum Ratings Are Design-Center Values" preceding the ratings. This statement is used on sheets issued since April 1, 1942.



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anywhere in the U.S.A. in equipment designed so that the design-center maximum ratings are not exceeded at a line-voltage-center value of 117 volts. While 117 volts represents present-day conditions, the design-center system permits the utilization of a new line-center value as new surveys may indicate the necessity for such a change.

In the case of storage-battery-with-charger supply or similar supplies, the normal battery-voltage fluctuation may be as much as 35 per cent or more. This fluctuation imposes severe operating conditions on tubes. Under these conditions, latitude for operation of tubes is provided for by the stipulation that only 90 per cent of the design-center maximum values of plate voltages, screen-supply voltages, dissipations, and rectifier output currents is never exceeded for a terminal potential at the battery source of 2.2 volts per cell. While a tube's operating voltages in this service will at times exceed the maximum values, satisfactory performance with probable sacrifice in life will be obtained.

In the cases of dry-battery supply and rectified a-c supply for 1.4-volt tubes, recommended design practice is given in RMA Standard M8-210.

RMA Standard M8-210 (Jan. 8, 1940 Rev. 11-40) is reproduced here for the convenient reference of design engineers with permission of the Engineering Department of the Radio Manufacturers Association. Although worded to cover only receiving tubes, it can be applied to any tube having design-centersystem ratings.

* * *

It shall be standard to interpret the ratings on receiving types of tubes according to the following conditions:

1. CATHODE—The heater or filament voltage is given as a normal value unless otherwise stated. This means that transformers or resistances in the heater or filament circuit should be designed to op-

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erate the heater or filament at rated value for fullload operating conditions under average supplyvoltage conditions. A reasonable amount of leeway is incorporated in the cathode design so that moderate fluctuations of heater or filament voltage downward will not cause marked falling off in response; also, moderate voltage fluctuations upward will not reduce the life of the cathode to an unsatisfactory degree.

A. 1.4-Volt Battery Tube Types-The filament power supply may be obtained from dry-cell batteries, from storage batteries, or from a power line. With dry-cell battery supply, the filament may be connected either directly across a battery rated at a terminal potential of 1.5 volts, or in series with the filaments of similar tubes across a power supply consisting of dry cells in series. In either case, the voltage across each 1.4-volt section of filament should not exceed 1.6 volts. With power-line or storage-battery supply, the filament may be operated in series with the filaments of similar tubes. For such operation, design adjustments should be made so that, with tubes of rated characteristics, operating with all electrode voltages applied and on a normal line voltage of 117 volts or on a normal storage-battery voltage of 2.0 volts per cell (without a charger) or 2.2 volts per cell (with a charger). the voltage drop across each 1.4-volt section of filament will be maintained within a range of 1.25 to 1.4 volts with a nominal center of 1.3 volts. In order to meet the recommended conditions for operating filaments in series from dry-battery. storage-battery, or power-line sources it may be necessary to use shunting resistors across the individual 1.4-volt sections of filament.

B. 2.0-Volt Battery Tube Types—The 2.0-volt line of tubes is designed to be operated with 2.0 volts across the filament. In all cases the operat-



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ing voltage range should be maintained within the limits of 1.8 volts to 2.2 volts.

2. POSITIVE POTENTIAL ELECTRODES — The power sources for the operation of radio equipment are subject to variations in their terminal potential. Consequently, the maximum ratings shown on the tube-type data sheets have been established for certain Design Center Voltages which experience has shown to be representative. The Design Center Voltages to be used for the various power supplies together with other rating considerations are as given below:

A. AC or DC Power Line Service in U.S.A.—The design center voltage for this type of power supply is 117 volts. The maximum ratings of plate voltages, screen-supply voltages, dissipations, and rectifier output currents are design maximums and should not be exceeded in equipment operated at a line voltage of 117 volts.

B. Storage-Battery Service—When storage-battery equipment is operated without a charger, it should be designed so that the published maximum values of plate voltages, screen-supply voltages, dissipations, and rectifier output currents are never exceeded for a terminal potential at the battery source of 2.0 volts per cell. When storagebattery equipment is operated with a charger, it should be designed so that 90% of the same maximum values is never exceeded for a terminal potential at the battery source of 2.2 volts.

C. "B"-Battery Service—The design center voltage for "B" batteries is the normal voltage rating of the battery block, such as 45 volts, 90 volts, etc. Equipment should be designed so that under no condition of battery voltage will the plate voltages, the screen-supply voltages, or dissipations ever exceed the recommended respective maximum values shown in the data for each tube type by more than 10%.

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D. Other Considerations

a. Class A_1 Amplifiers—The maximum plate dissipation occurs at the "Zero-Signal" condition. The maximum screen dissipation usually occurs at the condition where the peak-input signal voltage is equal to the bias voltage.

b. Class B Amplifiers—The maximum plate dissipation theoretically occurs at approximately 63% of the "Maximum-Signal" condition, but practically may occur at any signal voltage value.

c. Converters—The maximum plate dissipation occurs at the "Zero-Signal" condition and the frequency at which the oscillator-developed bias is a minimum. The screen dissipation for any reasonable variation in signal voltage must never exceed the rated value by more than 10%.

d. Screen Ratings—When the screen voltage is supplied through a series voltage-dropping resistor, the maximum screen voltage rating may be exceeded, provided the maximum screen dis sipation rating is not exceeded at any signal condition, and the maximum screen voltage rating is not exceeded at the maximum-signal condition. Provided these conditions are fulfilled, the screen-supply voltage may be as high as, but not above, the maximum plate voltage rating.

3. TYPICAL OPERATION — For many receiving tubes, the data show typical operating conditions in particular services. These typical operating values are given to show concisely some guiding information for the use of each type. They are not to be considered as ratings, because the tube can be used under any suitable conditions within its rating limitations.

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RECEIVING TUBES

The ratings of all receiving tubes currently used in new equipment are set up according to the designcenter system. Older and obsolescent types of receiving tubes still have absolute maximum ratings because these types are used only for renewal purposes and, therefore, design-center values are of no practical value. Receiving-tube types rated on the design-center system are identified in the Receiving-Tube Section either by a large star in the index corner of each data page or by the statement "Maximum Ratings Are Design-Center Values" preceding the ratings on each data page.

TRANSMITTING TUBES

The ratings of transmitting tubes grouped in the Transmitting-Tube Section are on the basis of the absolute system. This system enables the transmitter design engineer to choose his design values so as to obtain maximum performance within the tube ratings. Such design procedure has been considered practical for large transmitters where adequate controls are usually incorporated in the design, and ordinarily an experienced operator is present to make any necessary adjustments.

The maximum ratings given for each transmitting type on its data pages apply only when the type is operated at frequencies lower than some specified value which depends on the design of the type. As the frequency is raised above the specified value, the radio-frequency currents, dielectric losses, and heating effects increase rapidly. Most types can be operated above their specified maximum frequency provided the plate voltage and plate input are reduced in accordance with the information given in the table "Transmitting-Tube Ratings vs Operating Frequency" in the front part of the Transmitting-Tube Section.

For certain air-cooled transmitting tubes, two sets



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of absolute maximum values are shown to meet diversified design requirements. One set is designated as CCS (Continuous Commercial Service) ratings, while the other is called ICAS (Intermittent Commercial and Amateur Service) ratings.

Continuous Commercial Service is defined as that type of service in which long tube life and reliability of performance under continuous operating conditions are the prime consideration. To meet these requirements, the CCS ratings have been established.

Intermittent Commercial and Amateur Service is defined to include the many applications where the transmitter design factors of minimum size, light weight, and maximum power output are more important than long tube life. These various factors have been taken into account in establishing the ICAS ratings.

Under the ICAS classification are such applications as the use of tubes in amateur transmitters, and the use of tubes in equipment where transmissions are of an intermittent nature. The term "intermittent" is used to identify operating conditions in all applications other than amateur in which no operating or "on" period exceeds 5 minutes and every "on" period is followed by an "off" or standby period of at least the same or greater duration.

ICAS ratings are considerably higher than CCS ratings. They permit the handling of greater power, but tube life under ICAS conditions, of course, is reduced. However, the transmitter designer may very properly decide that a small tube operated with ICAS ratings better meets his requirements than a larger tube operated with CCS ratings. Although such use involves some sacrifice in tube life, the period over which tubes will continue to give satisfactory performance in intermittent service can be extremely long depending on the exact nature of the service.



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The choice of tube operating conditions best fitted for any particular application should be based on a careful consideration of all pertinent factors.

RECTIFIER TUBES

Rectifier tubes used principally in receiving equipment are rated according to the design-center system, while those used primarily in transmitting and laboratory equipment are rated according to the absolute system. The method of identifying which rating system is used for any rectifier tube in this Handbook is the same as that for other tubes in the particular section of the Handbook in which data for the rectifier tube are given.

The ratings of rectifier tubes are based on fundamental limitations in the operation of the tubes themselves, and in general include the following: maximum peak inverse plate voltage, maximum peak plate current, and maximum d-c output current.

Maximum peak inverse plate voltage is the highest instantaneous plate voltage which the tube can withstand recurrently in the direction opposite to that in which it is designed to pass current. For mercuryvapor tubes and gas-filled tubes, it is the safe top value to prevent arc-back in the tube operating within the specified temperature range.

In determining peak inverse plate voltage on a rectifier tube in a particular circuit, the equipment designer should remember that the relations between peak value of inverse plate voltage, rms value of input voltage, and average value of output voltage, depend largely on the characteristics of the particular rectifier circuit and the power supply. Furthermore, the presence of transients, such as line surges and keying surges, or waveform distortion, may raise the actual inverse plate voltage to a peak higher than that calculated for sine-wave voltages. Therefore, the **actual** inverse plate voltage on a rec-



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tifier tube should never exceed the maximum peak inverse plate voltage rating for that tube. The peak inverse plate voltage may be determined with an electronic peak voltmeter of the self-contained battery type.

In single-phase, full-wave rectifier circuits with sinewave input and pure resistance load, the peak inverse plate voltage is approximately 1.4 times the rms value of the plate-to-plate voltage supply. In single-phase, half-wave circuits with sine-wave input and pure resistance load, the peak inverse plate voltage is approximately 1.4 times the rms value of the plate voltage supply, but with condenser input to filter, the peak inverse plate voltage may be as high as 2.8 times the rms value of the plate voltage supply.

Maximum peak plate current is the highest instantaneous plate current that a tube can safely carry recurrently in the direction of normal current flow. The safe value of this peak current in hot-cathode types of rectifier tubes is a function of the electron emission available and the duration of the pulsating current flow from the rectifier tube in each halfcycle.

The value of peak plate current in a given rectifier circuit is largely determined by filter constants. If a large choke is used at the filter input, the peak plate current is not much greater than the load current; but if a large condenser is used at the filter input, the peak current may be many times the load current. In order to determine accurately the peak plate current in any rectifier circuit, the designer should measure it with a peak-indicating meter or use an oscillograph.

Maximum d-c output current is the highest average plate current which can be handled continuously by a rectifier tube. Its value for any rectifier tube type is based on the permissible plate dissipation of that type. Under operating conditions involving a rapidly



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repeating duty cycle (steady load), the average plate current may be measured with a d-c meter. In the case of certain mercury-vapor tubes where the load is fluctuating, it is necessary to determine the average current over the time interval specified on the data pages for these types.

In addition to the above ratings for rectifier tubes, other ratings may be set up for a rectifier tube when the service in which the tube is to be used makes such ratings essential for satisfactory performance. Such ratings are: maximum surge plate current, and maximum heater-cathode potential.

Maximum surge plate current is the highest value of abnormal peak currents of short duration that should pass through the rectifier tube under the most adverse conditions of service. This value is intended to assist the equipment designer in a choice of circuit components such that the tube will not be subjected to disastrous currents under abnormal service conditions approximating a short circuit. This surge-current rating is not intended for use under normal operating conditions because subjecting the tube to the maximum surge current even only once may impair tube life. If the tube is subjected to repeated surge currents, its life will be seriously reduced or even terminated.

Maximum heater-cathode potential is the highest instantaneous value of voltage that a rectifier tube can safely stand between its heater and cathode. This rating is applied to certain rectifier tubes having a separate cathode terminal and used in applications where excessive potential may be introduced between heater and cathode. For convenience, this rating is usually given as a d-c value.

CATHODE-RAY TUBES

The ratings of some cathode-ray tubes are set up on the absolute system while others are set up on the design-center system. Initially, cathode-ray tubes

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were all rated according to the absolute system. With the advent of television which presented design conditions similar to those in the receiving-set field, the method of rating popular types of cathoderay tubes was changed to the design-center system. More recently, because of procedure standardized by the RMA Cathode-Ray-Tube Committee, newer types of cathode-ray tubes are being rated on the absolute system. Cathode-ray types rated according to the design-center system are identified in the Cathode-Ray Types Section by a statement to that effect just ahead of the maximum ratings on each data page. The data pages of types rated according to the absolute system have either (1) no identifying statement as to the rating system, or (2) an identifying statement that the ratings are according to the absolute system.

PHOTOTUBES

The ratings of all phototubes in the Phototube Section are on the absolute maximum basis. This basis enables the designing engineer to choose design values so as to obtain optimum performance within tube ratings. In the case of gas phototubes, the value to which the plate voltage and the plate current can be raised is abruptly limited by ionization effects. If these are allowed to occur, they may ruin the photosurface almost instantly. While phototubes in general might be rated on the design-center basis, such a procedure, with provision for an adequate factor of safety to take care of all conditions of operation, would impose undue limitations on the use of gas phototubes.

MISCELLANEOUS SPECIAL TUBES

The ratings of some of the various tube types grouped in the Miscellaneous-Types Section are according to the design-center system while others are according to the absolute system. Miscellaneous types rated on the design-center basis are identified

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by a statement to that effect on the data pages or else refer back for ratings to a receiving-tube type whose rating basis is explained under TUBE RATINGS—Receiving Tubes. The data pages of types rated according to the absolute system have either (1) no identifying statement as to the rating system, or (2) an identifying statement that the ratings are according to the absolute system.

CHARACTERISTICS and TYPICAL OPERATING CONDITIONS

In addition to showing the ratings of each tube type, the data pages for many of the types in this Handbook include "characteristics," such as amplification factor, plate resistance, and transconductance, which help to distinguish between the electrical features of the respective types. Usually, the characteristics shown for any type are obtained for that type in class A service: where class A data are given for the type, the characteristics are included with that data for convenience. Based on a large number of tubes of a given type, the values shown for these characteristics are average values.

Range of Characteristics—The equipment designer should bear in mind that individual tubes of a given type may have characteristics values either side of the average values shown for the type. He should also realize that these characteristics change during the life of individual tubes. In designing equipment, therefore, he should allow for the maximum cumulative variation of any characteristic from the average value of that characteristic as shown in the tabulated data for the type. The exact percentage of the variation will be different for different types of tubes depending on the design of the tubes and their intended application, but in general the designer should consider a probable plus or minus variation of not less than 30 per cent.

Furthermore, the equipment designer should recog-



(continued from preceding page)

nize the desirability of designing equipment so that the full range of the operating characteristics of tubes will be utilized. If this practice is not followed, he imposes on the equipment user special replacement problems in that the user will have to select tubes suitable for use in the equipment, and may not be able to obtain the full life capability of such tubes.

Typical Operating Values—Also included on the data pages is information on typical operating conditions for most of the various tubes when used in particular services. These typical operating values are intended to show concisely some guiding information for the use of each type. They must not be considered as ratings because each type can, in general, be used under any suitable conditions within its rating limitations. In referring to these values for transmitting tubes, it should be noted that the power output value is not a rating. It is an approximate tube output, i.e., tube input minus plate loss. Circuit losses must be subtracted from tube output in determining useful output.

Datum Point for Electrode Potentials—In the data for any type in the Handbook, the values for grid bias and positive-potential-electrode voltages are given with reference to a specified datum point as follows. For types having filaments heated with d.c., the negative filament terminal is taken as the datum point to which other electrode voltages are referred. For types having filaments heated with a.c., the mid-point (i.e., the center tap on the filament-transformer secondary, or the mid-point on a resistor shunting the filament) is taken as the datum point. For types having equipotential cathodes indirectly heated, the cathode is taken as the datum point.

Grid Bias vs Filament Excitation—If the filament of any type for which data are given on a d-c basis is to be operated with an a-c supply, the given grid



(continued from preceding page)

bias should be increased by an amount approximately equal to one half the rated filament voltage and be referred to the filament mid-point. Conversely, if it is required to use d-c filament excitation on any filament type for which the data are given on an a-c basis, the grid-bias values as given on the data pages should be decreased by an amount approximately equal to one half the rated filament voltage and be referred to the negative filament terminal instead of the mid-point as in a-c operation.

In practice, the necessity for following this rule dep nds on circuit conditions and operating requirements. If the bias is relatively small compared with the filament voltage and hum is a consideration, adjustment of the grid bias is ordinarily essential. Conversely, if the bias is relatively large compared with the filament voltage, adjustment of the grid bias may be unnecessary.

When filament excitation of tubes used as Audio Amplifiers is changed from d.c to a.c., the grid return should, in general, be shifted to the mid-point of the filament circuit to minimize hum, and the bias adjusted accordingly. When the excitation is changed from a.c. to d.c., bias adjustment depending on the relative values of bias and filament voltage may be required to provide the full signalhandling capability of the tubes.

When filament excitation of tubes used as R-F Amplifiers is changed, bias adjustment is not required unless the change makes the circuit critical as to hum or signal-handling capability. For example, in class C amplifiers, the bias is usually so large in comparison with the filament voltage that adjustment is generally unnecessary.

Grid Current and Driving Power—The typical values of d-c grid current and driving power shown for triodes and tetrodes in class B r-f service and in class C service are subject to variations depending on the impedance of the load circuit. High-impe-



(continued from preceding page)

dance load circuits require more grid current and driving power to obtain the desired output. Lowimpedance circuits need less grid current and driving power, but plate-circuit efficiency is sacrificed. In comparison, the d-c grid current and driving power shown for beam tubes and pentodes in class B r-f service and in class C service are not as critical to variations in load-circuit conditions. In any event, sufficient grid current should be used so that the stage is "saturated," i.e., so that a small change in grid current results in negligible change in power output. Regardless of the type of tube used, the driving stage should have a tank circuit of good regulation and should be capable of delivering power in excess of the indicated power by a factor of several times. Call and the second second



AND THEIR USE

In electron tubes, a cathode is an electrode which is the primary source of electron or ion emission. There are two broad classes of cathodes, i.e., hot and cold. 'Hot cathodes' are defined as cathodes which are heated or otherwise operate at elevated temperature (frequently incandescent) in order to function as emitters. In contrast, "cold cathodes' are defined as cathodes which do not rely on heat or on elevated temperature in order to function as emitters.

HOT CATHODES

Hot cathodes commonly in use in electron tubes are classified as directly heated, indirectly heated, and ionic-heated.

A directly heated cathode, or filament-cathode, is a wire or ribbon which is heated by the passage of current through it. It is further classified by identifying the filament material or the electron-emitting material. Such materials in regular use are pure tungsten, thoriated tungsten, and metals coated with alkaline-earth oxides. Each of these materials has distinctive advantages which are utilized in the design of tubes for particular applications.

PURE-TUNGSTEN FILAMENTS are used in certain tubes, especially those for high-voltage transmitting service. Since these filaments must operate at a high temperature of about 2500°C (a dazzling white) to emit sufficient electrons, a relatively large amount of filament power is required. The operating life of these filaments is determined by the rate of tungsten evaporation. Their failure, therefore, occurs through decreased emission or burn-out.

Pure-tungsten filaments give best life performance when they are operated so as to conserve their emitting capability. They are designed with voltage and current ratings in accord with the service expected of the particular tube type. However, in applications where the normal emission at rated voltage is not

JUNE 1, 1943

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CATHODES 1



(continued from preceding page)

required, the filament can be operated at a somewhat reduced voltage. The extent of the reduction depends on the peak emission requirements of the application as well as on the percentage regulation of the filament voltage. When these are known, the correct operating filament voltage for any tungstenfilament type can be calculated from its filamentemission characteristic. The permissible regulation in transmitters may be checked by reducing the filament voltage (with the transmitter under normal operation) to a value such that reduction in output can just be detected. The filament voltage must then be increased by an amount equivalent to the maximum percentage regulation of the filament-supply voltage and then increased further by approximately 2 per cent to allow for minor variations in emission of individual tubes. It follows that the better the regulation, the less the filament operating voltage and, therefore, the longer the filament life.

It should be noted that a reduction of 5 per cent in the filament voltage applied to tubes with pure-tungsten filaments will approximately double their life. A reduction of 15 per cent will increase the filament life almost tenfold.

During long or frequent standby periods, pure-tungsten-filament tubes may be operated at decreased filament voltage to conserve life. When the average standby time is an appreciable portion of the average duty cycle and is less than 2 hours, it is recommended that the filament voltage of all but the largest types be reduced to 80 per cent of normal; and that for longer periods, the filament power be turned off. For the largest types, such as the 898, it is recommended that the filament voltage be reduced to 80 per cent of normal during standby operation up to 12 hours; and that for longer periods, the filament power be turned off.

For turning on filament power, a filament starter should be used so as to increase the voltage gradually and to limit the high initial rush of current through



(continued from preceding page)

the filament. It is important that the filament current never exceed, even momentarily, a value of more than 150 per cent of normal, unless the tube data specify otherwise. Similarly, as an added precaution, the filament power should be turned off gradually to prevent cooling strains in the filament.

THORIATED-TUNGSTEN FILAMENTS are now used mainly in certain transmitting and special tubes. Thoriated-tungsten filaments are made from tungsten impregnated with thoria. Due to the presence of thorium, these filaments liberate electrons at a more moderate temperature of about 1700°C (a bright yellow), and are, therefore, much more economical of filament power than are pure-tungsten filaments. The operating life of thoriated-tungsten filaments is ordinarily ended by a decrease in electron emission. Decreased emission, however, may be caused by the accidental application of too high filament, screen, or plate voltage. If the over-voltage has not been continued for a long time, the activity of the filament can often be restored by operating the filament at its normal voltage for 10 minutes or longer without plate, screen, or grid voltage. The reactivation process may be accelerated by raising the filament voltage to not higher than 120 per cent of normal value for a few minutes. This reactivation schedule is often effective in restoring the emission of thoriated-tungsten filaments in tubes which have failed after normal service. Sometimes a few hundred hours of additional life may be obtained after reactivation.

The operating voltage of a thoriated-tungsten filament should, in general, be held to within ± 5 per cent of its rated value. However, in transmitting applications where the tube is lightly loaded, the filament may be operated on the low side—as much as 5 per cent below normal voltage. As conditions require, the voltage should be increased gradually to maintain output. Toward the end of life, additional service may be obtained by operating the fila-



(continued from preceding page)

ment above its rated voltage. It should be noted that a tube having a thoriated-tungsten filament should never be operated under emission-limited conditions since this type of operation may overheat the tube and cause permanent loss of emission.

During standby periods in transmitting service, thoriated-tungsten filaments may be operated according to the following recommendations to conserve life. For short standbys of less than 15 minutes duration, the filament voltage of all but the largest types should be reduced to 80 per cent of normal; for longer periods, the filament power should be turned off. For the largest types, such as the 827-R and 861, it is recommended that the filament voltage be reduced to 80 per cent of normal during standby operation up to 2 hours; and that for longer periods, the filament power be turned off.

COATED FILAMENTS are used in receiving tubes, certain transmitting tubes, most mercury-vapor rectifiers, and some special tubes. Coated filaments employ a relatively thick coating of alkaline-earth compounds on a metallic base as a source of electronic emission. The metallic base carries the heating current. These filaments operate at a low temperature of about 800°C (a dull red) and require relatively little power to produce a copious supply of electrons.

For proper performance of these types, rated filament voltage should, in general, be applied at the filament terminals. However, when coated-filament, high-vacuum tubes are used in transmitting service with light loading, the filament voltage may be reduced as much as 5 per cent below normal to conserve life. Then, as conditions require, the voltage should be increased gradually to maintain output. Toward the end of life, the gradual increase may be carried above rated filament voltage to obtain additional service. In the case of gas or vapor tubes, it is important that these types be operated, in general, at rated filament voltage. However, if the line regu-



(continued from preceding page)

lation regularly and consistently does not exceed 1 to 2 per cent, it is practical to reduce the filament voltage slightly (not over 5 per cent) with benefit to tube life.

During standby periods of less than 15 minutes, the filament voltage of quick-heating, high-vacuum types, such as the 1616 and 1624, should be reduced to 80 per cent of normal; for longer periods, the filament power should be turned off. In contrast, the voltage of coated filaments in gas or vapor tubes should not be reduced during standbys except under conditions explained in the preceding paragraph. In general, the filament voltage of small and medium types, such as the 866-A/866 and 872-A/872, should be maintained at normal rated value during standbys up to 2 hours; for longer periods, the filament power should be turned off. For large types, such as the 857-B, the filament voltage should be maintained at normal rated value during standbys up to 12 hours; for longer periods, the filament power should be turned off.

After having given normal service or after having been operated at excessive voltage, coated filaments lose their emission. When such is the case, their usefulness may be considered as terminated.

An indirectly heated cathode, or heater-cathode, consists of a heater wire enclosed in a thin metal sleeve coated on the outside with electron-emitting material similar to that used for coated filaments. The sleeve is heated by radiation and conduction from the heater through which current is passed. Useful emission does not take place from the heater wire. An important feature of this kind of cathode construction is that the functions of heating and emission can be independent of each other.

HEATER-CATHODES, or unipotential cathodes as they are frequently called, are used in high-vacuum tubes operating at low plate voltage, such as receiv-



(continued from preceding page)

ing tubes, low-power transmitting tubes, and small special tubes. They also find application in mercuryvapor tubes and in cathode-ray tubes. Heater-cathodes, like coated filaments, provide a copious supply of electron emission at low cathode temperature (a dull red).

For proper performance of heater-cathode tubes, rated heater voltage should, in general, be applied at the heater terminals. However, when heatercathode high-vacuum tubes are used in transmitting service and are lightly loaded, the heater voltage may be reduced as much as 5 per cent below normal to conserve life. As conditions require, the voltage should be increased gradually to maintain output. Toward the end of life, the gradual increase may be carried above rated heater voltage to obtain additional service.

During standby periods of less than 15 minutes, the heater voltage of high-vacuum tubes should be maintained at normal rated value; for longer periods, the heater power should be turned off. In the case of vapor or gas tubes, the heater voltage should be maintained at normal during standby periods up to 12 hours; for longer periods, the heater power should be turned off.

An ionic-heated cathode is one which liberates electrons when it is subjected to intense positive ion bombardment. The bombardment may be so intense as to raise the temperature of the cathode, frequently causing it to become visibly hot. The ionicheated cathode in radio tubes has found application in gas rectifiers intended primarily for automobile receiver service.

COLD CATHODES

The designation "cold cathode" is commonly used in referring to those cathodes which emit electrons when they are subjected to bombardment by other electrons, ions, or metastable atoms. Cathodes of



(continued from preceding page)

this type are sometimes designated as secondaryemission cathodes. They are used in certain glowdischarge tubes, and also in multiplier phototubes where they contribute to electron multiplication in the successive dynode stages.

Not customarily referred to as cold cathodes, although they are such, is another group of emitters known as photocathodes. By definition, a photocathode is one which emits electrons when it is energized with radiant flux, such as light, infra-red radiation, or ultra-violet radiation. Such cathodes are used in phototubes. When used in gas phototubes, these cathodes not only emit under the influence of radiant flux but also as a result of bombardment and thus become partial secondary-emission cathodes.

Photocathodes are classified according to the spectral response characteristics of their respective photoactive surfaces. The S1 photosurface gives high response to red and near infra-red radiation. The S2 photosurface is similar to the S1 surface but extends somewhat further into the infra-red region. The S3 photosurface has a spectral response characteristic which is closest to that of the eye. The S4 photosurface has exceptionally high response to blue and blue-green radiation with negligible response to red radiation.

Exposure of photocathodes to intense light, such as direct sunlight, may decrease the sensitivity of the tubes in which they are used, even though there is no voltage applied. The magnitude and duration of the decrease depend on the length of the exposure. Permanent damage to a phototube may result if it is exposed to radiant energy so intense as to cause excessive heating of the cathode.

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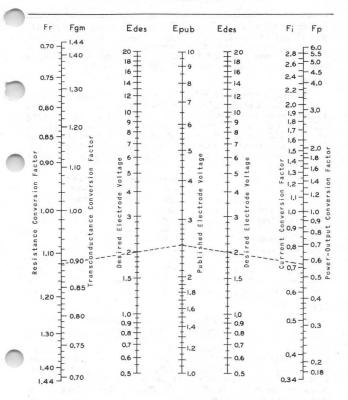
รับ (คนไปเป็นหนึ่ง เป็นสาร์ 20 พาการ 20 20 ครับรับโดย การสมสร้าง 45 และไม่ระ เป็นเป็นครับได้ เป็นที่ได้ 20 พักษณ์ รับราย เป็นไป (10 คนไป) (10 พักษณ์ รับราย เป็นไป (10

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CONVERSION FACTORS



CONVERSION FACTOR NOMOGRAPH

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The Conversion Factor Nomograph shown above may be used to determine the approximate characteristics of an electron tube when all the electrode voltages are changed in the same proportion from the published or measured values.

The conversion factors obtained from the nomograph are applicable to triodes, tetrodes, pentodes, and beam power tubes when the plate voltage, grid-No.1 voltage, and grid-No.2 voltage are changed simultaneously by the same factor. They may be used for any class of tube operation (class A, AE₁, AB₂, B, or C).

The nomograph may be used to determine the proper value for each conversion factor for a specified relationship (F_{e})

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CONVERSION FACTORS



CONVERSION FACTORS

between published or measured values (E_{pub}) and desired values (E_{des}) of operating voltage. The dashed lines on the nomograph indicate the correct procedure for determining each of these conversion factors when it is desired to reduce the operating electrode voltage from 250 to 200 volts.

EXAMPLE

Published characteristics for a typical pentode are listed below for a plate voltage of 250 volts. If it is desired to determine the characteristics of this tube for a plate voltage of 200 volts, the voltage conversion factor, Fe, is equal to 200/250 or 0.8. The values for the other conversion factors are obtained from the nomograph. By use of these factors characteristics values at aplate voltage of 200 volts are obtained.

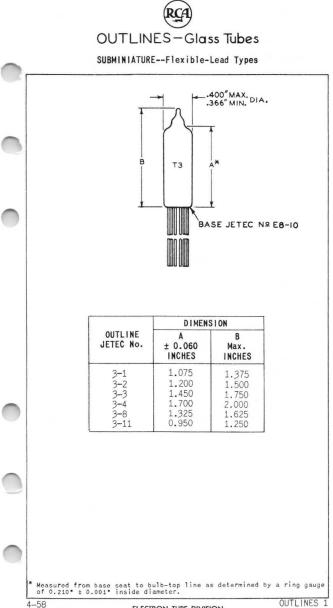
	1		Published Value	Conversion Factor	Desired Value	
Plate Voltage			250	0.8	200	volts
Grid-No.2 Voltage			250	0.8	200	volts
Grid-No. Voltage			- 15	0.8	-12	volts
Plate Current			30	0.72	21.6	ma
Grid-No.2 Current			6	0.72	4.3	ma
Plate Resistance (Approx	x.).		0.13	1.12	0.15	megohm
Transconductance			2000	0.89	1780	µmhos
Load Resistance			10000	1.12	11200	ohms
Total Harmonic Distortio	on .		10	unchanged	10	%
MaxSignal Power Output	t		2.5	0.57	1.42	watts

LIMITATIONS

Because this method for conversion of characteristics is necessarily an approximation, progressively greater errors will be introduced as the voltage conversion factor (Fe = E_{des}/E_{pub}) departs from unity. In general, it may be assumed that results obtained will be approximately correct when the value of Fe is between 0.7 and 1.5. When Fe is extended beyond these limits (down to 0.5 or up to 2.0), the accuracy becomes considerably reduced and the results obtained can serve only as a rough approximation.

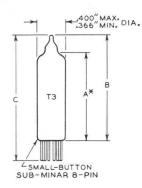
It should be noted that this method does not take into account the effects of contact potential or secondary emission in electron tubes. Contact potential, however, may safely be neglected for most applications because its effects are noticeable only at very low grid-No.1 voltages. Secondary emission may occur in conventional tetrodes at low plate voltages. For such tubes, therefore, the use of conversion factors should be limited to regions of the plate characteristic in which the plate voltage is greater than the grid-No.2 voltage. For beam power tubes, the regions of both low plate currents and low plate voltages should also be avoided.

4-56



OUTLINES-Glass Tubes

SUBMINIATURE--Small-Button Sub-Minar 8-Pin Base Types

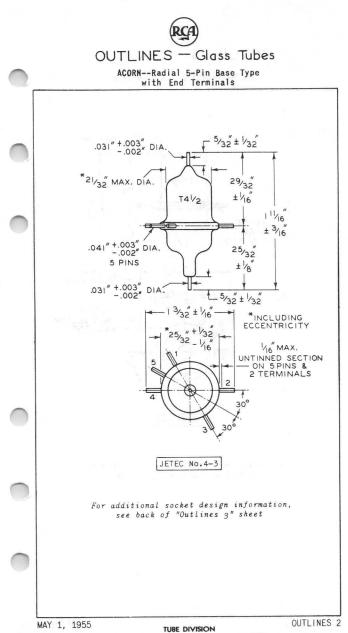


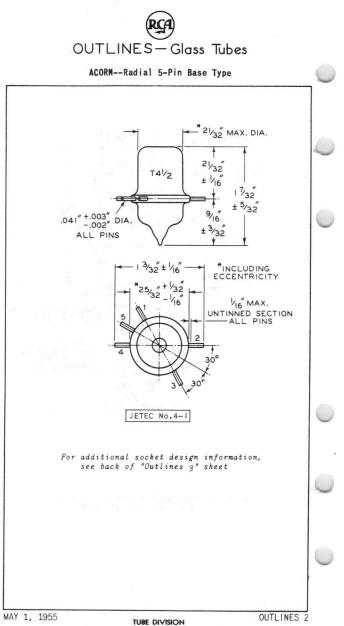
	DIMENSION				
OUTLINE JETEC No.	A ± 0.060 INCHES	B Max. INCHES	C Max. INCHES		
3-5 3-9 3-10 3-12 3-13 3-14 3-15	1.200 1.075 1.450 0.950 1.325 1.575 1.700	1.500 1.375 1.750 1.125 1.625 1.875 2.000	1.750 1.625 2.000 1.500 1.875 2.125 2.250		

* Measured from base seat to bulb-top line as determined by a ring gauge of 0.210" ± 0.001" inside diameter.

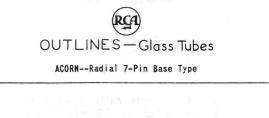
OUTLINES 1

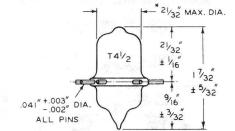
ELECTRON TUBE DIVISION

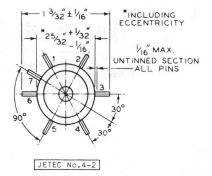




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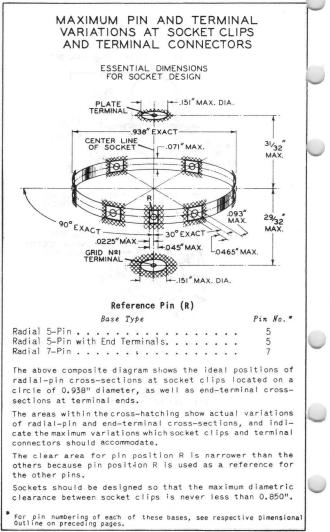
For additional socket design information, see back of this sheet

MAY 1, 1955

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY OUTLINES 3



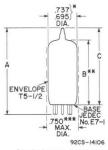
ACORN TYPES



MAY 1, 1955

OUTLINES 3

MINIATURE - Miniature 7-Pin Base Types with T5-1/2 Bulbs



DIMENSIONS IN INCHES

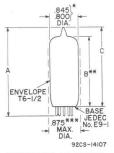
OUTLINE	DIMENSIONS (INCHES)				
DRAWING	A		C		
NUMBER (JEDEC)	Max	Min	Max	Max	
- 5-1 5-2 5-3	1.625 1.750 2.125 2.625	.906 1.031 1.406 1.906	1.094 1.219 1.594 2.094	1.3/5 1.500 1.875 2.375	

- Major diameter as checked by ring gauges of 0.25 inch thickness. The maximum gauge should clear the bub above 0.38 inch from the base seat and the minimum gauge should not.
- Measured from the base seat to the bulb-top line as determined by a ring gauge of 0.437 inch I.D.
- *** The diameter of the boundary cylinder as defined by the barriers of the pin alignment gauge (Gauge No.GE7-1, Sheet 24, Section 3 of EIA Standard RS-209A).

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Harrison, N. J.

MINIATURE — Noval 9-Pin Base Types with T6-1/2 Bulbs

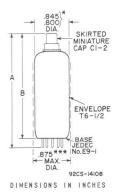


OUTLINE	DIMENSIONS (INCHES)						
DRAWING	Α	A B					
NUMBER (JEDEC)	Max	Min	Max	Max			
6-1 6-2 6-3 6-4	1.750 2.187 2.625 3.062	1.469 1.906	1.219 1.656 2.094 2.531	1.937 2.375			





DIMENSIONS IN INCHES



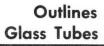
OUTLINE	DIMENSIONS (INCHES)			
DRAWING	Α	В		
NUMBER (JEDEC)	Max	Min	Max	
6–5 6–6 6–7**** 6–8	1.969 2.406 2.844 3.281	1.437 1.875 2.312 2.750	1.687 2.125 2.562 3.000	

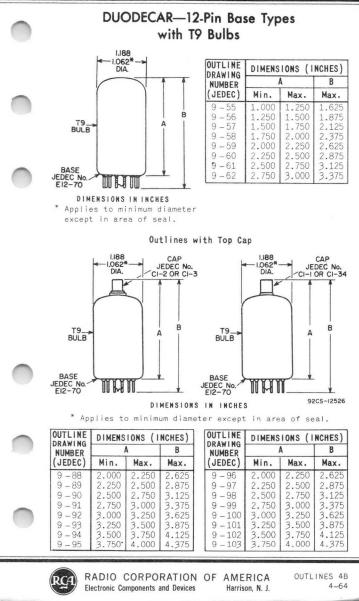
* Major diameter as checked by ring gauges of 0.25 inch thickness. The maximum gauge should clear the bulb above 0.38 inch from the base seat

- and the minimum gauge should not. ** Measured from the base seat to the bulb-top line as determined by a ring gauge of 0.437 inch 1.D.
- *** The diameter of the boundary cylinder as defined by the barriers of the pin alignment gauge (Gauge No.GE9-1, Sheet 30, Section 3 of EIA Standard RS-209A).
- **** Jedec Outline No.6-7 may also use non-standard CI-33 cap.

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



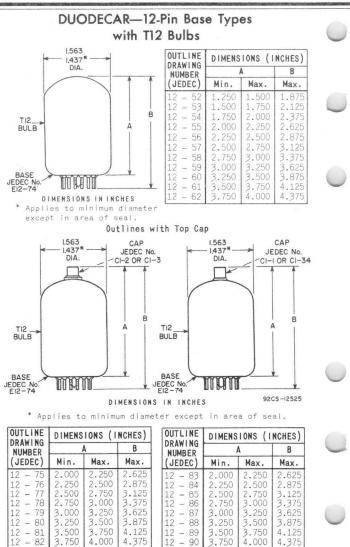




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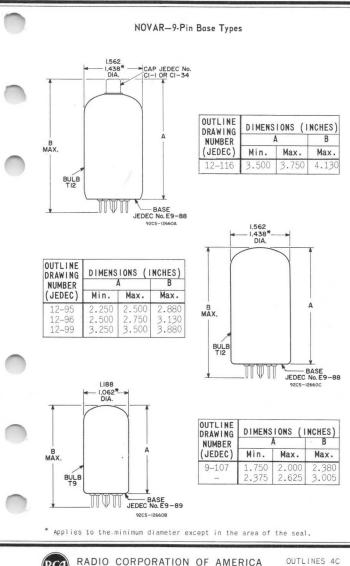
RADIO CORPORATION OF AMERICA **Electronic Components and Devices** Harrison, N. J.

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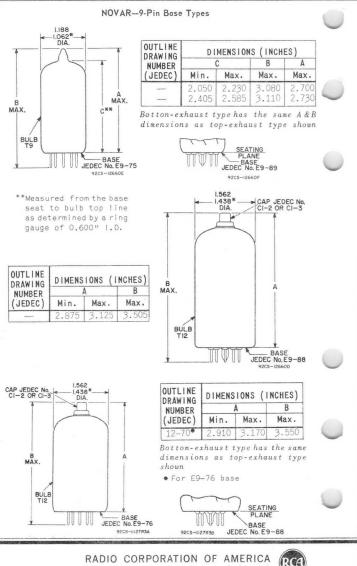


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Electronic Components and Devices

AMERICA Harrison, N. J. OUTLINES 4C



Electronic Components and Devices

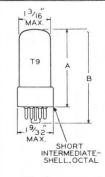
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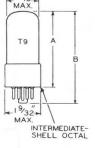


OUTLINES-Glass Tubes

GLASS OCTAL--Octal Base Types with T9 Bulbs

13/16.





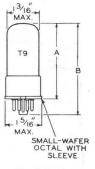
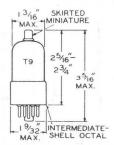




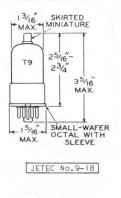
Fig.2

Fig.3

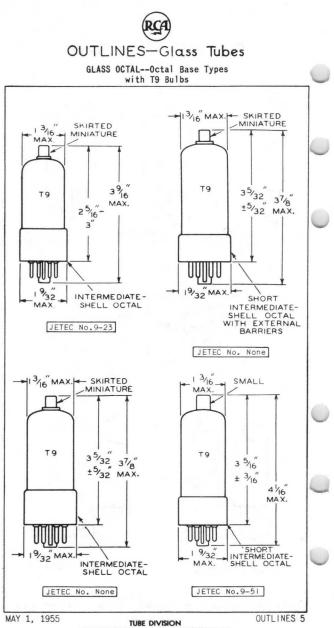
	OUTLINE		DIMENSION			
JETEC No.			A	В		
Fig. I	Fig.2	Fig.3	Max. INCHES	Max. INCHES		
-	9-1	-	1-3/4*	2-5/16		
-	9-7	-	2-1/2	3-1/16		
9-41	9-11	9-12	2-3/4	3-5/16		
· _	9-13	-	2-13/16	3-3/8		
-	9-15	-	2-7/8	3-7/16		
-	9-33	-	3-1/4	3-13/16		

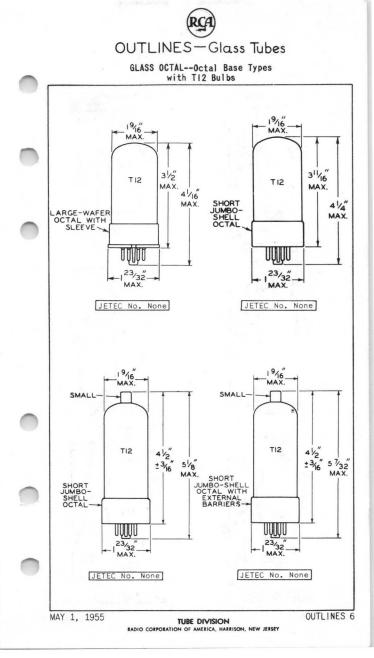


JETEC No.9-17



* For electron-ray tubes, the seated neight is 1-11/16*+1/16*-1/4*. MAY 1, 1955 TUBE DIVISION OUTLINES 5







OUTLINES-Glass Tubes

GLASS OCTAL--Octal Base Types with ST Bulbs

11% MAX.

13/16, MAX. 2

STI2

υψ

13/16 -

STI2

UUUU

STI6

DÓIÓD

SKIRTED

33/4

±5/32

SMALL-SHELL OCTAL

SKIRTED

4 5/32 ± 5/32

SMALL-SHELL OCTAL

SMALL

4 31/32

±5/32

MEDIUM-SHELL OCTAL

511/16

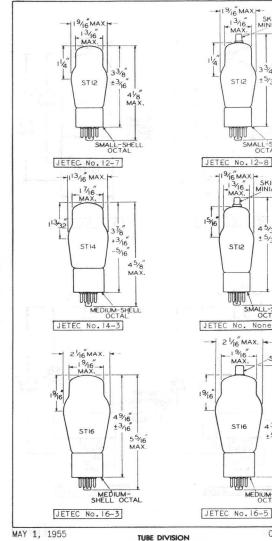
MAX.

None 2 1/16 MAX.

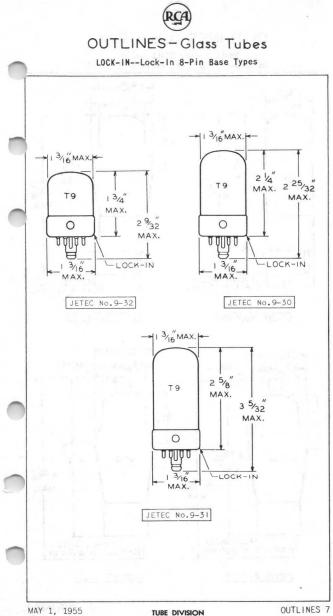
4 7/8" MAX.

415/32

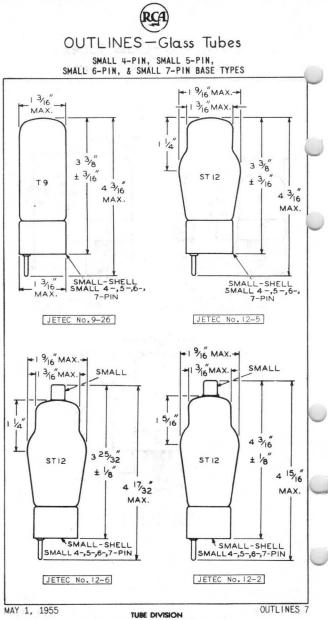
MAX.

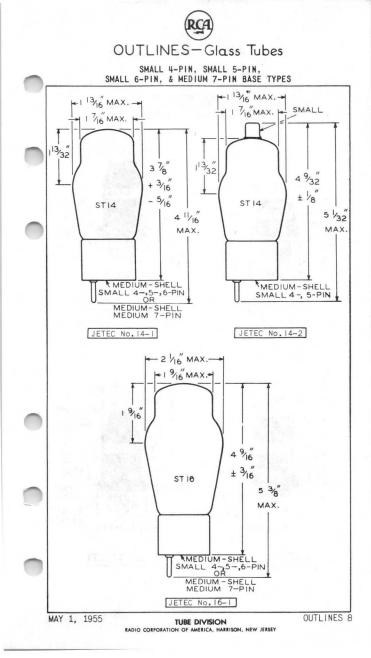


OUTLINES 6

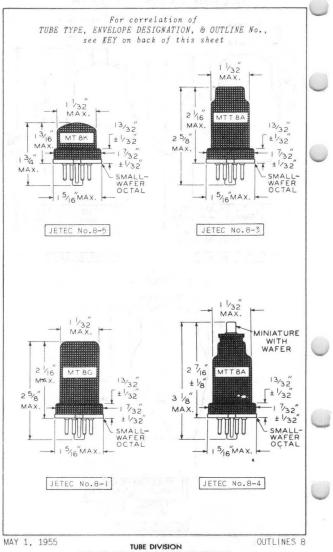


TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

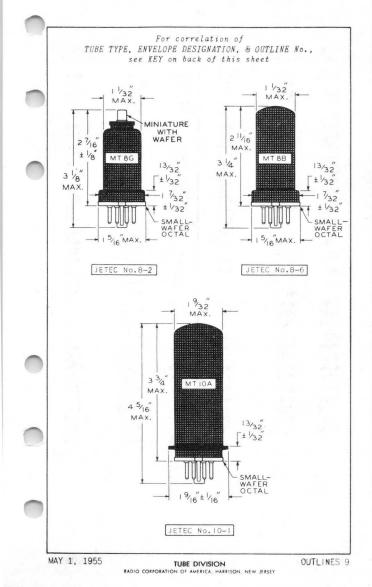




OUTLINES-Metal Tubes







OUTLINES - Metal Tubes

KEY

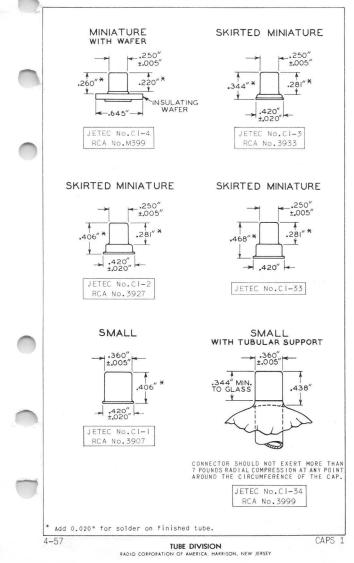
Type No. D	Envelope esignation	Outline Jetec No.	Type No.	Envelope Designation	Outline Jetec No.
0Z4 5T4 5W4 5Z4 6A8	MTT8A MT10A MT8B MT8B MT88	8-3 10-1 8-6 8-6 8-4	6ST7 6SZ7 6V6 6X5 12A6	MT8G MT8G MT8B MT8B MT8B	8–1 8–1 8–6 8–6 8–6
6AB7 6AC7 6AG7 6B8 6C5	MT8G MT8G MT8B MTT8A MT8G	8-1 8-1 8-6 8-4 8-1	12C8 12H6 12K8 12SA7 12SC7	MTT8A MT8K MT8G MT8G MT8G MT8G	8-4 8-5 8-2 8-1 8-1
6F5 6F6 6H6 6J5 6J7	MTT8A MT8B MT8K MT8G MTT8A	8-4 8-6 8-5 8-1 8-4	12SF5 12SF7 12SG7 12SH7 12SJ7	MT8G MT8G MT8G MT8G MT8G MT8G	8–1 8–1 8–1 8–1 8–1
6K7 6K8 6L6 6L7 6N7	MTT8A MT8G MT10A MTT8A MT8B	8-4 8-2 10-1 8-4 8-6	12SK7 12SQ7 12SR7 12SW7 12SW7	MT8G MT8G MT8G	8-1 8-1 8-1 8-1 8-1
6Q7 6R7 6S7 6SA7 6SB7-Y	MTT8A MTT8A MT8G MT8G MT8G	8-4 8-4 8-2 8-1 8-1	25A6 25L6 25Z6 502-A 1611	MT8B MT8B MT8B MT8G MT8B	8-6 8-6 8-1 8-6
6SC7 6SF5 6SF7 6SG7 6SH7	MT8G MT8G MT8G MT8G MT8G	8-1 8-1 8-1 8-1 8-1 8-1	1612 1613 1614 1619 1620	MTT8A MT8B MT10A MT10A MT18A	8-4 8-6 10-1 10-1 8-4
6SJ7 6SK7 6SQ7 6SR7 6SS7	MT8G MT8G MT8G MT8G MT8G	8-1 8-1 8-1 8-1 8-1	1621 1622 1631 1632 1634	MT8B MT10A MT10A MT8B MT8G	8-6 10-1 10-1 8-6 8-1
			5693	MT8G	8-1

MAY 1, 1955

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY OUTLINES 9

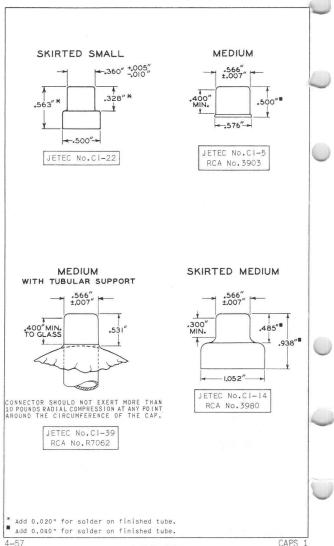


1-TERMINAL TYPES (CAPS)



BASES

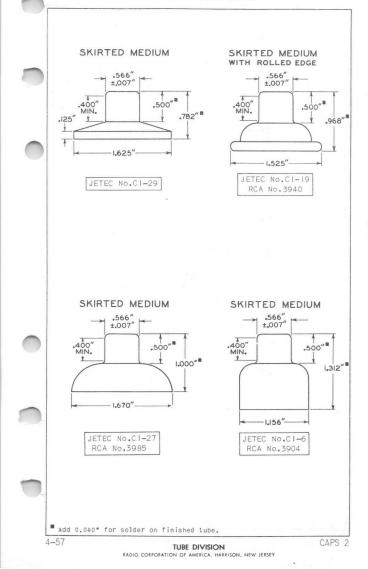
1-TERMINAL TYPES (CAPS)

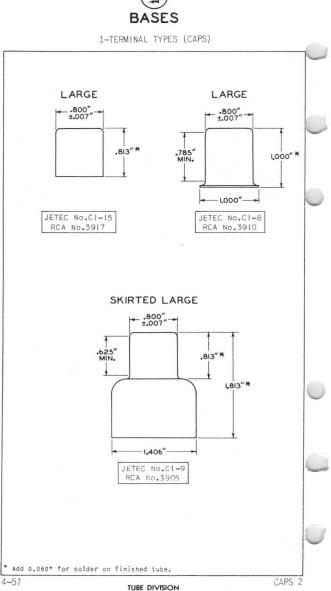


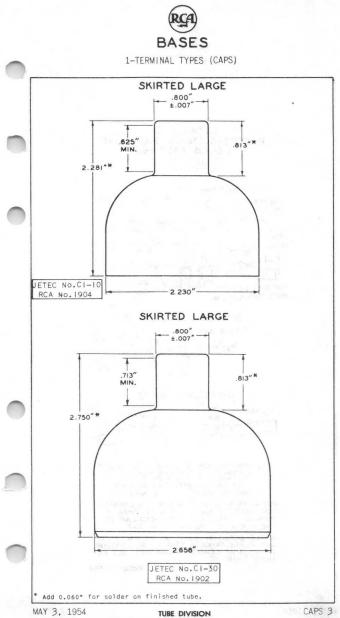
TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



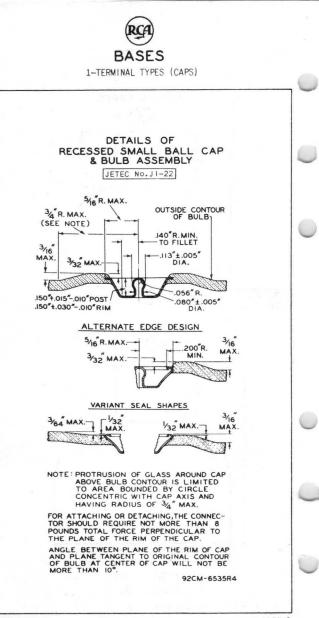
1-TERMINAL TYPES (CAPS)







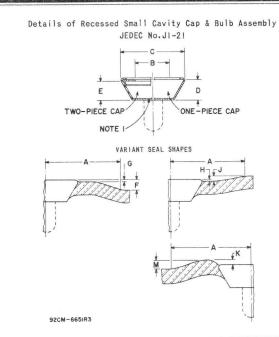
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



MAY 3, 1954

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY CAPS 3

Caps (1-Terminal Types)



DIMEN- SION	INCHES			MILLIMETERS			NOTEO
	Min	Nom	Max	Min	Nom	Max	NOTES
А		-	0.750	-	-	19.05	2
B C	0.307	0.312	0.317	7.798	7.925	8.051	
С	-		0.570	-	-	14.47	
D	0.153	-	0.173	3.89	-	4.39	
E	0.136	-	0.166	3.46	-	4.21	
FG	-	-	0.188	-	-	4.78	
G	-	-	0.031	-	-	0.78	
Н	-	-	0.031	-	-	0.78	
J		-	0.047	-	-	1.19	3
K	-	-	0.094	-	-	2.38	
M	-	-	0.188	-	-	4.78	

See Notes on reverse side.



RADIO CORPORATION OF AMERICA Electronic Components and Devices

Harrison, N. J.

CAPS 4 10-65

Bases

Caps (1-Terminal Types)

Note I: Connector shall not extend beyond this line. Bottom contour optional.

Note 2: Protrusion or depression of glass around cap above bulb contour is limited to areas bounded by circle concentric with cap axis and having radii as shown above.

Note 3: When measured in a plane perpendicular to axis of contact cone.

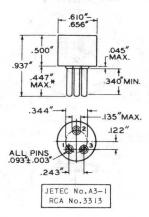
Note 4: When attaching or detaching the connector the total force required should not exceed eight pounds as applied perpendicular to the plane of the rim of the cap.

Note 5: The angle between plane of the rim of the cap and plane tangent to original contour of bulb at center of cap shall not exceed 10° .





SMALL-SHELL PEEWEE 3-PIN



Base-pin positions are held to tolerances such that entire length of pins will enter flat-plate gauge (JETEC No.GA3-1) having thickness of 1/4" and three holes with diameters of 0.1030"-0.1035" so located on a 0.3440" \pm 0.0005" diameter circle that the distance along the chord between two adjacent hole centers is 0.2340" \pm 0.0005" and the distance along the chord between the remaining pin and the distance pins 0.3175" \pm 0.0005".

Pin fit in gauge is such that gauge together with supplementary weight totaling 2 pounds will not be lifted when pins are withdrawn.

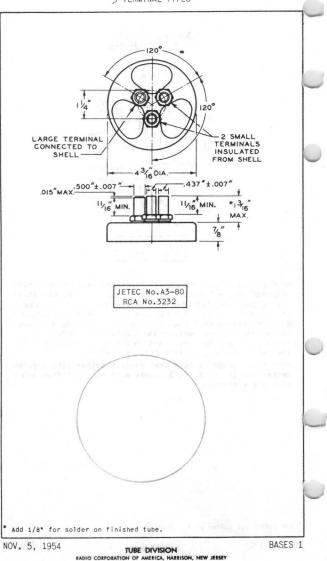
* Add 0.020" for solder on finished tube.

NOV. 5, 1954

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY BASES 1



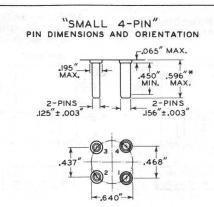
3-TERMINAL TYPES





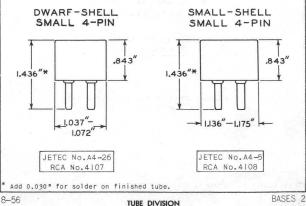
BLG

4-PIN TYPES



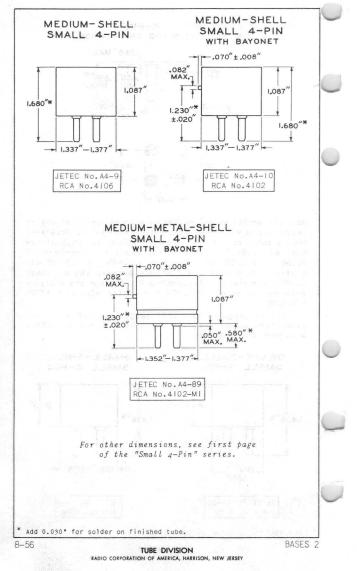
Base-pin positions are held to tolerances such that entire length of pins will enter flat-plate gauge (JETEC No.GA4-1) having thickness of 1/4" and four holes, two with diameters of 0.1650" \pm 0.0005" and two with diameters of 0.1340" ± 0.0005" so located on a 0.6400" ± 0.0005" diameter circle that the distance between the adjacent 0.1650" diameterpins is 0.4680" ± 0.0005" and the distance between the adjacent 0.1340" diameter pins is 0.4370" ± 0.0005".

Pin fit in gauge is such that gauge together with supplementary weight totaling 4 pounds will not be lifted when pins are withdrawn.



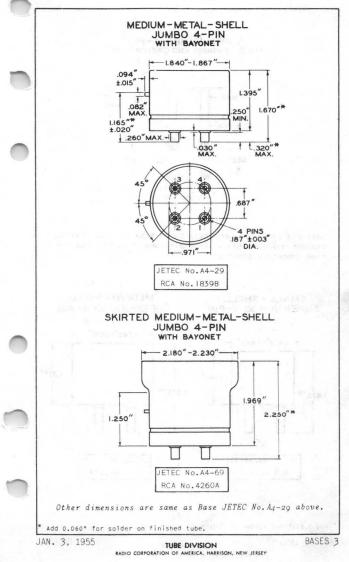


4-PIN TYPES



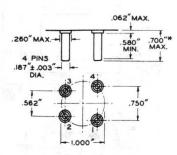


4-PIN TYPES

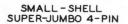




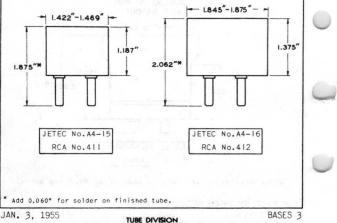
SUPER-JUMBO 4-PIN PIN DIMENSIONS AND ORIENTATION



Base-pin positions are held to tolerances such that pin centers may deviate a maximum distance of 0.010" from their true geometric position.



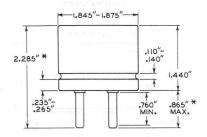
MEDIUM-SHELL SUPER-JUMBO 4-PIN





4-PIN TYPES

MEDIUM-METAL-SHELL SUPER-JUMBO 4-PIN



Detail of Groove



JETEC No.A4-81

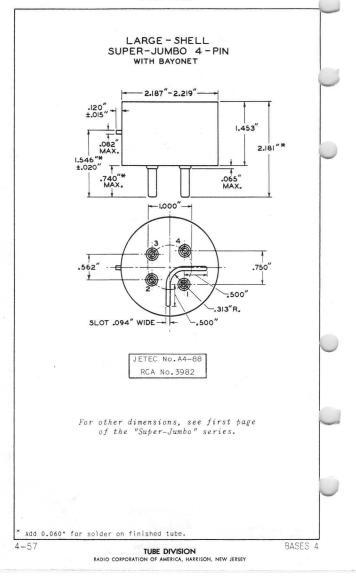
For other dimensions, see first page of the "Super-Jumbo" series.

* Add 0.060" for solder on finished tube.

4-57

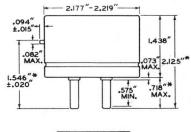
TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY BASES 4







LARGE - METAL - SHELL SUPER - JUMBO 4 - PIN WITH BAYONET





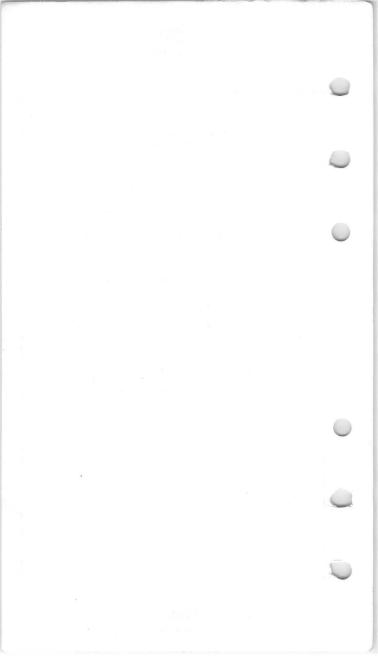
For other dimensions, see first page of the "Super-Jumbo" series.

Add 0.060" for solder on finished tube.

4-57

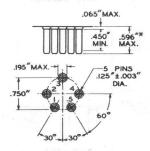
BASES 4A

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



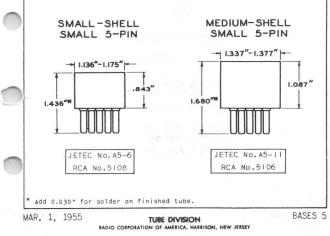


"SMALL 5-PIN" PIN DIMENSIONS AND ORIENTATION

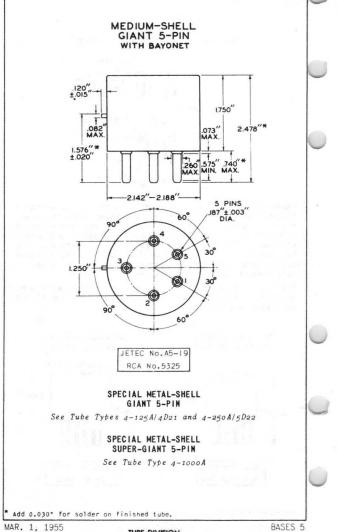


Base-pin positions are held to tolerances such that entire length of pins will enter flat-plate gauge (JETEC No.GA5-[]) having thickness of 1/4" and five holes with diameters of 0.1560" \pm 0.0005" so located on a 0.7500" \pm 0.0005" diameter circle that the distance between centers of the four adjacent holes is 0.3750" \pm 0.0005" and the distance between the center of the remaining hole and its adjacent hole centers is 0.5300" \pm 0.0005".

Pin fit in gauge is such that gauge together with supplementary weight totaling 4 pounds will not be lifted when pins are withdrawn.







TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



SMALL-SHELL DUODECAL 5-PIN

For details of this base, see corresponding DUODECAL 12-PIN type

DWARF-SHELL OCTAL 5-PIN SMALL-SHELL OCTAL 5-PIN SMALL-SHER OCTAL 5-PIN SMALL-WAFER OCTAL 5-PIN WITH SLEEVE INTERMEDIATE-SHELL OCTAL 5-PIN SHORT INTERMEDIATE-SHELL OCTAL 5-PIN SHORT INTERMEDIATE-SHELL OCTAL 5-PIN WITH EXTERNAL BARRIERS MEDIUM-SHELL OCTAL 5-PIN SHORT JUMBO-SHELL OCTAL 5-PIN

For details of above bases, see corresponding OCTAL 8-PIN type

SMALL RADIAL 5-PIN

See OUTLINES--Glass Types

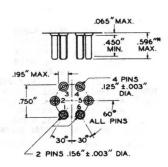
MEDIUM-MOLDED-FLARE SEPTAR 5-PIN

See Tube Type 4-65A

MAR. 1, 1955

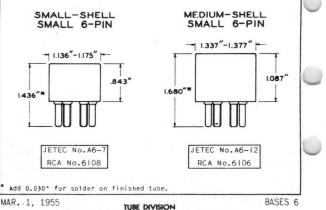


"SMALL 6-PIN" PIN DIMENSIONS AND ORIENTATION

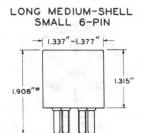


Base-pin positions are held to tolerances such that entire length of pins will enter flat-plate gauge (JETEC No.GAG-1) having thickness of 1/4" and six holes, two adjacent with diameters of 0.1650" \pm 0.0005" and four with diameters of 0.1360" \pm 0.0005" so located on a 0.7500" \pm 0.0005" diameter circle that the distance between any two adjacent hole centers is 0.3750" \pm 0.0005".

Pin fit in gauge is such that gauge together with supplementary weight totaling 4 pounds will not be lifted when pins are withdrawn.







RCA No.6105

For other dimensions, see first page of the "Small 6-Pin" series.

SMALL-SHELL DUODECAL 6-PIN

For details of this base, see corresponding DUODECAL 12-PIN type

SMALL-SHELL OCTAL 6-PIN INTERMEDIATE-SHELL OCTAL 6-PIN SHORT INTERMEDIATE-SHELL OCTAL 6-PIN WITH EXTERNAL BARRIERS MEDIUM-SHELL OCTAL 6-PIN SHORT JUMBO-SHELL OCTAL 6-PIN SMALL-WAFER OCTAL 6-PIN SMALL-WAFER OCTAL 6-PIN WITH SLEEVE

For details of above bases, see corresponding OCTAL-8 PIN type

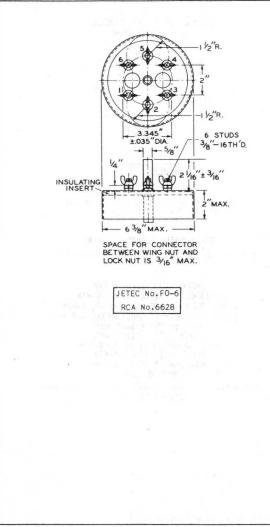
* Add 0.030" for solder on finished tube.

MAR. 1. 1955

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



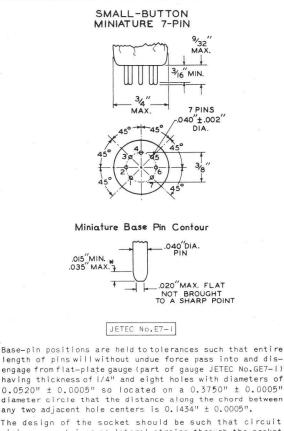
6-TERMINAL TYPES



MAR. 1, 1955

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

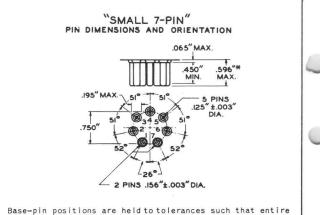




The design of the socket should be such that circuit wiring can not impress lateral strains through the socket contacts on the base pins. The point of bearing of the contacts on the base pins should not be closer than 1/8" from the bottom of the seated tube.

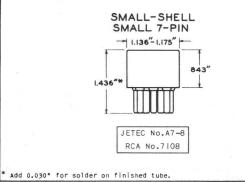
* This dimension around the periphery of any individual pin may vary within the limits shown.





Base-pin positions are held to tolerances such that entire length of pins will enter flat-plate gauge (JETEC No.6A7-1f having thickness of 1/4" and seven holes, two adjacent with diameters of 0.1650" \pm 0.0005" and five with diameters of 0.1360" \pm 0.0005" so located on a 0.7500" \pm 0.0005" diameter circle that the distance between centers of the adjacent 0.1650" diameter holes is 0.3288" \pm 0.0005" and the distance between centers of the adjacent 0.1360" diameter holes is 0.3229" \pm 0.0005".

Pin fit in gauge is such that gauge together with supplementary weight totaling 4 pounds will not be lifted when pins are withdrawn.

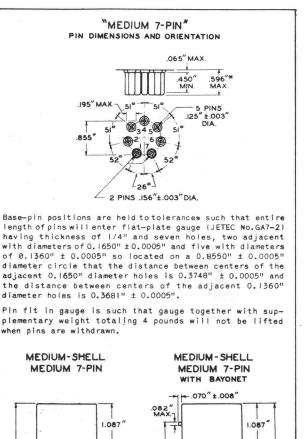


MAY 1, 1955

BASES 8

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





MAY 1, 1955

1.680"*

1 33

- 11

JETEC No. A7-13

Add 0.030° for solder on finished tube.

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

1.230"# ±.020"

1.337

-1.377

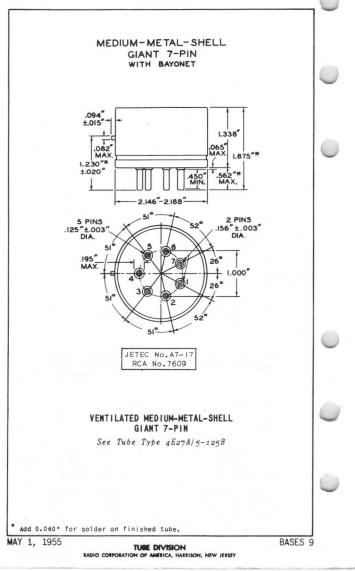
JETEC No. A7-14

RCA No.7302

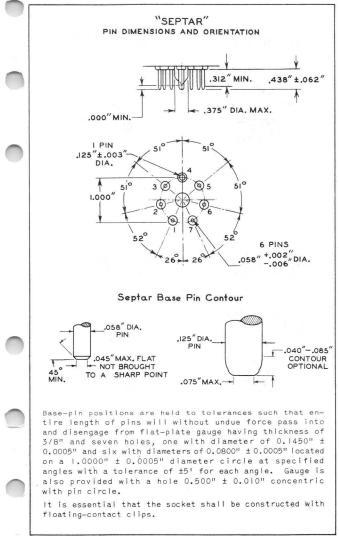
BASES 9

1.680"

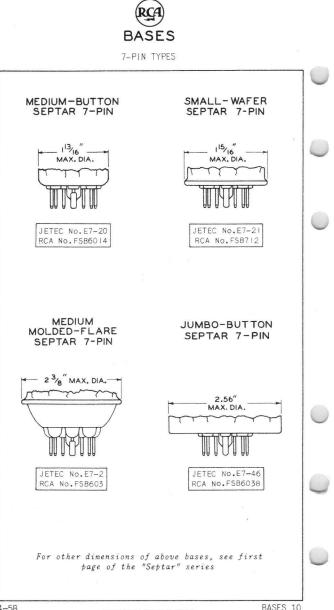








4-58



ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

4-58



SMALL-SHELL DUODECAL 7-PIN

For details of this base, see corresponding SMALL-SHELL DUODECAL 12-PIN type

SMALL-BUTTON EIGHTAR 7-PIN

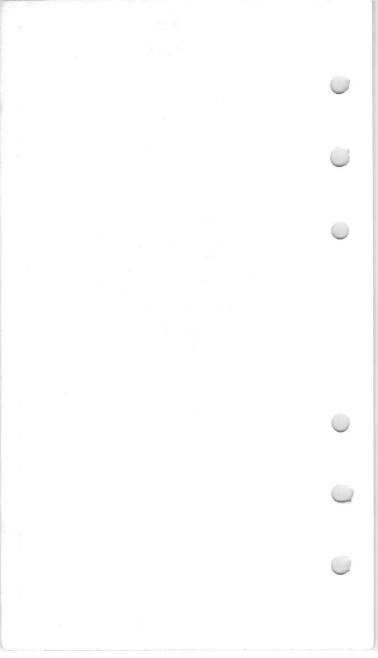
For details of this base, see corresponding SMALL-BUTTON EIGHTAR 8-PIN type

SMALL-SHELL OCTAL 7-PIN

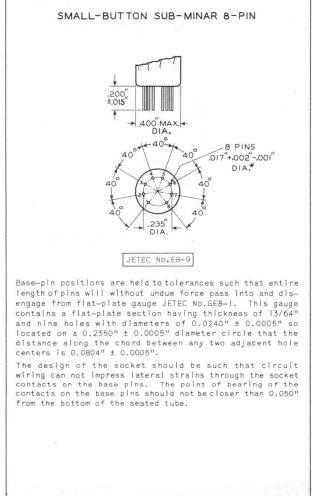
SHORT INTERMEDIATE-SHELL OCTAL 7-PIN SHORT INTERMEDIATE-SHELL OCTAL 7-PIN WITH EXTERNAL BARRIERS INTERMEDIATE-SHELL OCTAL 7-PIN SHORT MEDIUM-SHELL OCTAL 7-PIN WITH EXTERNAL BARRIERS, STYLES A AND B MEDIUM-SHELL OCTAL 7-PIN SHORT JUMBO-SHELL OCTAL 7-PIN WITH EXTERNAL BARRIERS SMALL-WAFER OCTAL 7-PIN SMALL-WAFER OCTAL 7-PIN WITH SLEEVE

For details of above bases, see corresponding OCTAL 8-PIN type

> SMALL RADIAL 7-PIN See OUTLINES--Glass Tubes



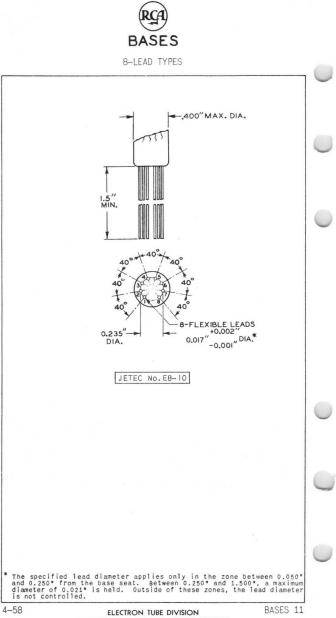




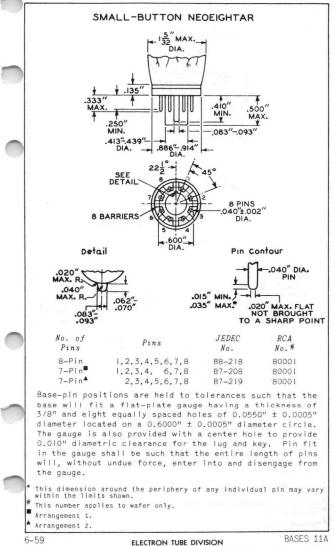
The specified pin diameter applies only in the zone between 0.050" from the base seat and the end of the pin.

4-58

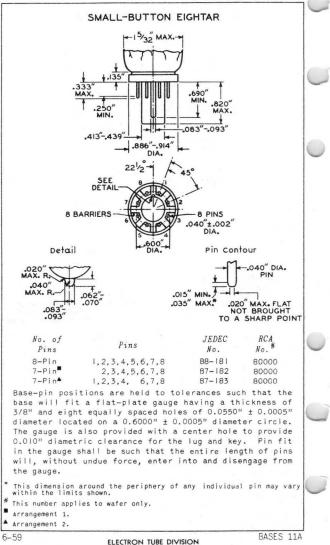
ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





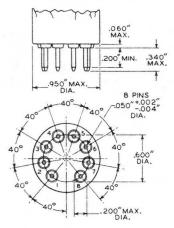




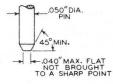




SMALL-BUTTON NEODITETRAR 8-PIN



Neoditetrar-Base Pin Contour





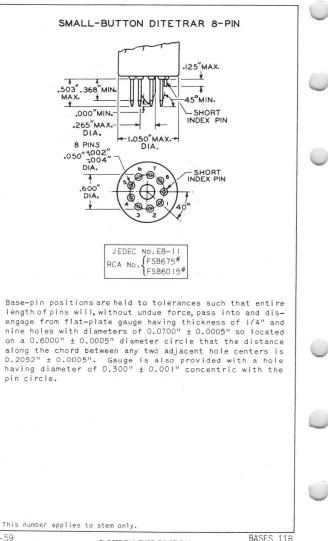
Base-pin positions are held to tolerances such that entire length of pins will, without undue force, pass into and disengage from flat-plate gauge having thickness of 1/4" and nine holes with diameters of $0.0700^{\circ} \pm 0.0005^{\circ}$ so located on a $0.6000^{\circ} \pm 0.0005^{\circ}$ diameter circle that the distance along the chord between any two adjacent hole centers is $0.2052^{\circ} \pm 0.0005^{\circ}$.

This number applies to stem only.

6-59

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY BASES 11B

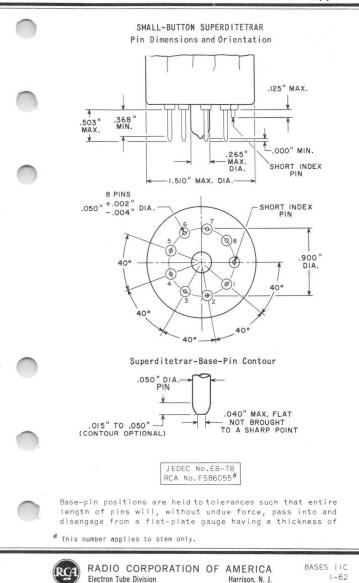




ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6-59

8-Pin Types



8-Pin Types

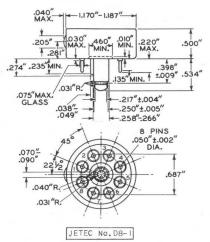
1/4" and nine holes with diameters of 0.0700" \pm 0.0005" so located on a 0.9000" \pm 0.0005" diameter circle that the distance along the chord between any two adjacent hole centers is 0.3078" \pm 0.0005". Gauge is also provided with a hole having diameter of 0.300" \pm 0.001" concentric with the pin circle.



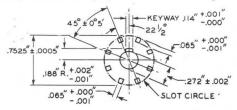
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.





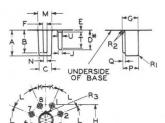


Base-pin positions are held to tolerances such that entire length of pins will without undue force pass into and disengage from gauge JETEC No.GD8-1. This gauge contains a flat-plate section having thickness of 1/4" and eight slots located and dimensioned as shown on the following diagram. Flat-plate section is also provided with a hole having diameter of $0.272" \pm 0.002"$ concentric with slot circle, and with a keyway as shown on the diagram.





"OCTAL" PIN DIMENSIONS AND ORIENTATION AND INDEX GUIDE



	Min.	Center	Max.	1	Min.	Center	Max.
A	.550"	.560"	.570"	L	-	45 ⁰	-
В	.490"	.500"	.510"	M	. 3'05"	.312"	.317"
С	.300"	.308"	.315"	N	.075"	.080"	.085"
D	. 427"	.437"	. 447 "	P	.343"	.353"	. 363"
Ε	-	-	.050"	Q	.040"	.047"	.055"
F	.085"	.090"	.095"	RI	-	.031"	-
G	.352"	.362"	.372"	R ₂	-	-	.050"
н		.687"	-	R ₃	-	.040"	-
J	.090"	.093"	.096"	T	.340"	-	-
K	-	22.5°	-	U	-	-	.135"

Base-pin positions are held to tolerances such that entire length of pins will enter flat-plate gauge (JETEC No.GB8-1) having thickness of 1/4" and eight holes with diameters of $0.1030" \pm 0.0005"$ so located on a $0.6870" \pm 0.0005"$ diameter circle that the distance along the chord between any two adjacent hole centers is $0.2629" \pm 0.0005"$.

Pin fit in gauge is such that gauge together with supplementary weight totaling 2 pounds will not be lifted when pins are withdrawn.

* Add 0.030" for solder on finished tube.

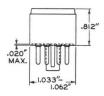
BASES 12

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

10-56

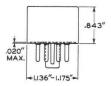
8-Pin Types

DWARF-SHELL OCTAL



No. of Pins		Pins			JÊDEC No.	RCA No.	
5-Pin	١,	3,	5,	7,8	B5-45	-	

SMALL-SHELL OCTAL



No. of Pins	Pins	JEDEC No.	RCA No.
8-Pin	1,2,3,4,5,6,7,8	B8- I	8529
7-Pin	1,2,3,4,5, 7,8	B7-2	7529
6-Pin	1,2,3, 5, 7,8	B6-3	6529
5-Pin	1,2, 4, 6, 8	B5-5	5529

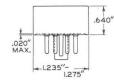
For other dimensions, see first page of the "Octal" series



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. BASES 13 1-62

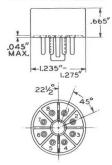
8-Pin Types

SHORT INTERMEDIATE-SHELL OCTAL



No. of Pins	Pins	JEDEC No.	RCA No.
8-Pin	1,2,3,4,5,6,7,8	B8-46	8555
7-Pin	1,2,3,4,5, 7,8	B7-47	7555
6-Pin	1,2,3; 5, 7,8	B6-48	6555
5-Pin	1,2, 4, 6, 8	B5-49	5555

SHORT INTERMEDIATE-SHELL OCTAL WITH EXTERNAL BARRIERS



No. of Pins	Pins	JEDEC No.	RCA No.
8-Pin	1,2,3,4,5,6,7,8	B8-58	8565
7-Pin ^a	1,2,3,4,5, 7,8	B7-59	7565
7-Pin ^b	1,2,3, 5,6,7,8	B7-211	-
6-Pin ^a	1,2,3, 5, 7,8	B6-60	6565
6-Pin ^b	2,3,4,5, 7,8	B6-84	6765
5-Pin ^a	1,2, 4, 6, 8	B5-62	5565
5-Pinb	2,3, 5, 7,8	B5-85	5765
5-Pin ^c	2, 4,5, 7,8	B5-187	-
	For other dimensions,	see first	
	page of the "Octal"	series	
angement 1.			

Arra b Arrangement 2.

a

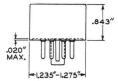
c Arrangement 3.

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



8-Pin Types

INTERMEDIATE-SHELL OCTAL



No. of Pins	Pins	JEDEC No.	RCA No.
8-Pin	1,2,3,4,5,6,7,8	B8-6	8537
7-Pin ^a	1,2,3,4,5, 7,8	B7-7	7537
7-Pin ^b	1,2,3, 5,6,7,8	B7-166	39100
6-Pin ^a	1,2,3, 5, 7,8	B6-8	6537
6-Pinb	2,3,4,5, 7,8	B6-81	6737
5-Pina	1,2, 4, 6, 8	B5-10	5537
5-Pin ^b	2,3, 5, 7,8	B5-82	5737

For other dimensions, see first page of the "Octal" series

a Arrangement 1.
b Arrangement 2.

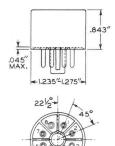


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

BASES 14 3-61

8-Pin Types

INTERMEDIATE-SHELL OCTAL WITH EXTERNAL BARRIERS



No. of Pins	Pins	JEDEC No.	RCA No.
8-Pin	1,2,3,4,5,6,7,8	B8-142	8566
7-Pin	1,2,3,4,5, 7,8	B7-143	7566
6-Pin ^a	1,2,3, 5, 7,8	B6-144	6566
6-Pin ^b	2,3,4,5, 7,8	B6-145	6766
6-Pin ^c	2,3, 5,6,7,8	B6-229	39111
5-Pin ^a	1,2, 4, 6, 8	B5-146	5566
5-Pin ^b	2,3, 5, 7,8	B5-147	5766

For other dimensions, see first page of the "Octal" series

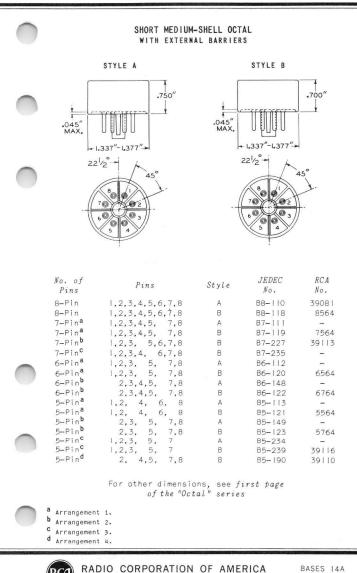
a Arrangement 1.

b Arrangement 2.

C Arrangement 3.



8-Pin Types



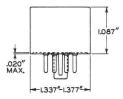
Harrison, N. J.

3-61

Electron Tube Division

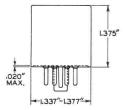
8-Pin Types

MEDIUM-SHELL OCTAL



No. of Pins	Pins	JEDEC No.	RCA No.
8-Pin	1,2,3,4,5,6,7,8	B8-11	8533
7-Pin	1,2,3,4,5, 7,8	B7-12	7533
6-Pin	1,2,3, 5, 7,8	B6-13	6533
5-Pin ^a	1,2, 4, 6, 8	B5-15	5533
5-Pin ^b	2,3, 5, 7,8	B5-224	5733

LONG MEDIUM-SHELL OCTAL



No. of Pins	Pins	JEDEC No.	RCA No.
8-Pin	1,2,3,4,5,6,7,8	B8-65	8545
5-Pin	2,3, 5, 7,8	85-80	5545

For other dimensions of above bases, see first page of the "Octal" series

a Arrangement 1. b Arrangement 2.

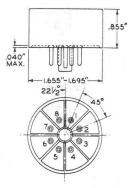
RADIO CORPORATION OF AMERICA Electron Tube Division



Harrison, N. J.



SHORT JUMBO-SHELL OCTAL WITH EXTERNAL BARRIERS



No.of Pins	Pins	JETEC No.	RCA No.
8-Pin	1,2,3,4,5,6,7,8	B8-71	8556
7-Pin	1,2,3,4,5, 7,8	B7-72	7556
6-Pin	1,2,3, 5, 7,8	B6-73	6556
5-Pin	1,2, 4, 6, 8	B5-74	5556

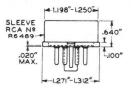
For other dimensions, see first page of the "Octal" series

JULY 1, 1955



	SMALL-WAFER (DCTAL	
	.020" MAX.	± 1.100″	
No. of Pins	Pins	JETEC No.	RCA No.
8-Pin 7-Pin 6-Pin 5-Pin	1,2,3,4,5,6,7,8 1,2,3,4,5, 7,8 1,2,3, 5, 7,8 1,2, 4, 6, 8	88-21 87-22 86-23 85-25	8527 7527 6527 5527

SMALL-WAFER OCTAL WITH SHORT SLEEVE



No. of	Pins	JETEC	RCA
Pins		No.	No.
8-Pin	1,2,3,4,5,6,7,8	88-44	-

For other dimensions of above bases, see first page of the "Octal" series

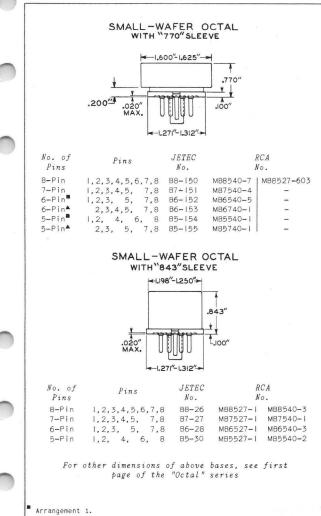
JULY 1, 1955

BASES 15

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



8-PIN TYPES



- Arrangement 2.
- 7-58



SMALL-WAFER OCTAL WITH "950" SLEEVE - 1.600-1.625 950" ¥ .100" .200" .020 MAX. < 1.271-1.312"→ No. of JETEC RCA Pins Pins No. No. 8-Pin 1,2,3,4,5,6,7,8 B8-191 MB8540-8 7-Pin 1,2,3,4,5, 7,8 B7-192 MB7540-5 1,2,3, 5, 7,8 2.3,4,5, 7,8 6-Pin B6-193 MB6540-6 2,3,4,5, 7,8 1,2, 4, 6, 8 6-Pin▲ B6-194 MB6740-2 5-Pin

B5-195

B5-196

MB5540-3

MB5740-2

For other dimensions of above base, see first page of the "Octal" series

7,8

2.3. 5.

Arrangement 1. Arrangement 2.

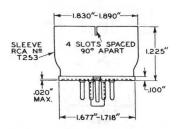
5-Pin▲

7-58

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY BASES 16



LARGE-WAFER OCTAL WITH FLARED SLEEVE

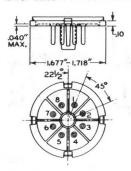


No. of	Pins	JETEC	RCA
Pins		No.	No.
8-Pin	1,2,3,4,5,6,7,8	-	-

For other dimensions, see first page of the "Octal" series

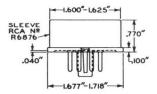


LARGE-WAFER OCTAL WITH EXTERNAL BARRIERS



No.of	Pins	JETEC	RCA
Pins		No.	No.
8-Pin	1,2,3,4,5,6,7,8	B8-94	8554

LARGE-WAFER OCTAL WITH EXTERNAL BARRIERS AND SLEEVE



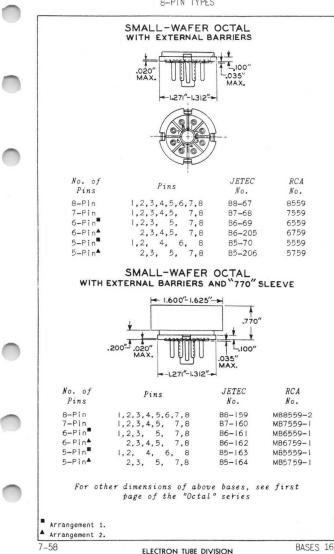
No.of	Pins	JETEC	RCA
Pins		No.	No.
8-Pin	1,2,3,4,5,6,7,8	B8-98	-

For other dimensions of above bases, see first page of the "Octal" series

JULY 1, 1955

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

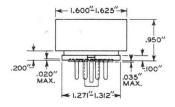




RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



SMALL-WAFER OCTAL WITH EXTERNAL BARRIERS AND "950" SLEEVE



No. of Pins	Pins	JETEC No.	RCA No.
8-Pin	1,2,3,4,5,6,7,8	B8-197	MB8559-4
7-Pin	1,2.3,4,5, 7,8	B7-198	MB7559-2
6-Pin	1,2,3, 5, 7,8	B6-199	MB6559-2
6-Pin▲	2,3,4,5, 7,8	B6-200	MB6759-2
5-Pin	1,2, 4, 6, 8	B5-201	MB5559-2
5-Pin≜	2,3, 5, 7,8	B5-202	MB5759-2

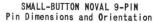
For other dimensions of above base, see first page of the "Octal" series

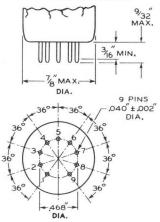
Arrangement 1.
Arrangement 2.

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY BASES 16A

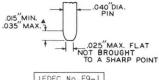
7-58

9-Pin Types





Noval-Base-Pin Contour





Base-pin positions are held to tolerances such that entire length of pins will, without undue force, pass into and disengage from gauge JEDEC No.GE9-1. This gauge contains a flat-plate section having thickness of 1/4" and ten holes with diameters of 0.0520" \pm 0.0005" so located on a 0.4680" \pm 0.0005" diameter circle that the distance along the chord between any two adjacent hole centers is 0.1446" \pm 0.0005".

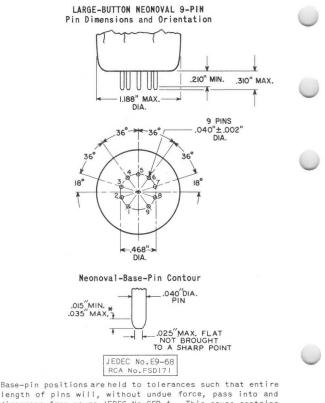
The design of the socket should be such that circuit wiring can not impress lateral strains through the socket contacts on the base pins. The point of bearing of the contacts on the base pins should not be closer than 1/8" from the bottom of the seated tube.

This dimension around the periphery of any individual pin may vary within the limits shown. The surface of the pin is convex or conical in shape and not brought to a sharp point.



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. BASES 18 7-61

9-Pin Types



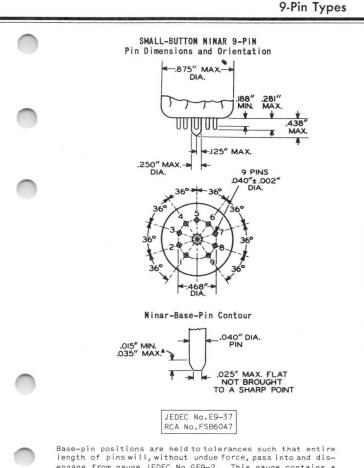
length of pins will, without undue force, pass into and disengage from gauge JEDEC No.GE9-4. This gauge contains a flat-plate section having thickness of l/4" and ten holes with diameters of $0.0520"\pm 0.0005"$ so located on a $0.4680"\pm 0.0005"$ diameter circle that the distance along the chord between any two adjacent hole centers is $0.1446"\pm 0.0005"$.

The design of the socket should be such that circuit wiring can not impress lateral strains through the socket contacts on the base pins. The point of bearing of the contacts on the base pins should not be closer than 1/8" from the bottom of the seated tube.

* This dimension around the periphery of any individual pin may vary within the limits shown. The surface of the pin is convex or conical in shape and not brought to a sharp point.

> RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.





length of pins will, without undue force, pass into and disengage from gauge JEDEC No.6E9-2. This gauge contains a flat-plate section having thickness of 0.250" and ten holes with diameters of 0.0520" \pm 0.0005" so located on a 0.4680" \pm 0.0005" diameter circle that the distance along the chord between any two adjacent hole centers is 0.1446" \pm 0.0005". Gauge is also provided with a hole 0.281" minimum diameter concentric with the pin circle.

This dimension around the periphery of any individual pin may vary within the limits shown. The surface of the pin is convex or conical in shape and not brought to a sharp point.



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. BASES 18A 7-61

9-Pin Types

SMALL-BUTTON NINAR 9-PIN (CONT'D)

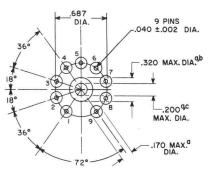
The design of the socket should be such that circuit wiring can not impress lateral strains through the socket contacts on the base pins. The point of bearing of the contacts on the base pins should not be closer than 1/8" from the bottom of the seated tube.



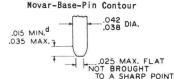


Electron Tube Division

Bases 9-Pin Types



NOVAR Pin Dimensions and Orientation



92CS-11128RI

DIMENSIONS IN INCHES

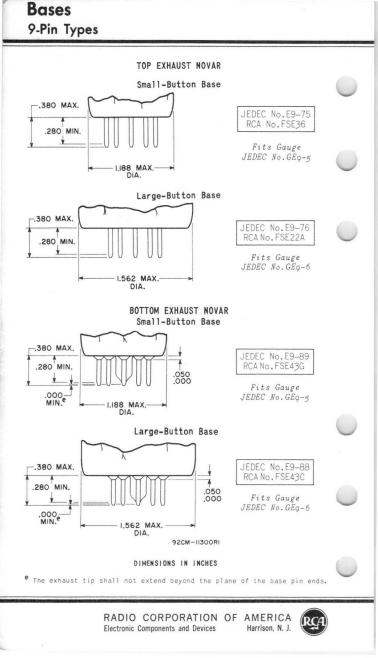
Base-pin positions are held to tolerances such that entire length of pins will, without undue force, pass into and disengage from flat-plate gauge having a thickness of 0.350° and ten holes with diameters of $0.0520^{\circ} \pm 0.0005^{\circ}$ so located on a $0.6870^{\circ} \pm 0.0005^{\circ}$ diameter circle that the distance along the chord between any two adjacent hole centers is $0.2123^{\circ} \pm 0.0005^{\circ}$. Gauge is also provided with a hole $0.330^{\circ} \pm 0.0005^{\circ} = 0.000^{\circ}$ diameter concentric with the pin circle.

- ^a This dimension applies only to JEDEC Base Nos. E9-88 and E9-89.
- b Limit of exhaust tube fillet diameter.
- C Exhaust tube maximum diameter.

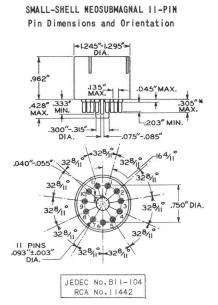
d This dimension around the periphery of any individual pinmay vary within the limits shown. The surface of the pin is convex or conical in shape and not brought to a sharp point.



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. BASES 18B 2-65



11-Pin Types



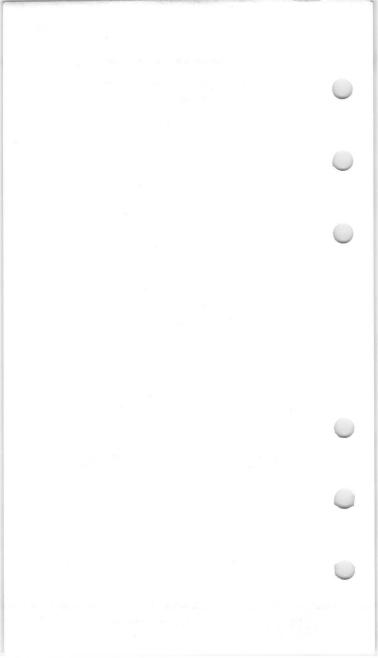
Base-pin positions are held to tolerances such that entire length of pins will enter flat-plate gauge (JEDEC Group 2, No.GBII-2) having thickness of I/4" and eleven holes with diameters of 0.1030" \pm 0.0005" so located on a 0.7500" \pm 0.0005" diameter circle that the distance along the chora between any two adjacent hole centers is 0.213" \pm 0.0005". Pin fit in gauge is such that gauge together with sup-

plementary weight totaling 3 pounds will not be lifted when pins are withdrawn.

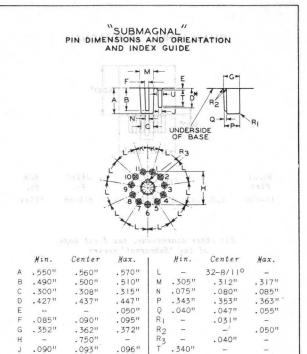
* Add 0.030" for solder on finished tube.



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. BASES 18C 7-61







Base-pin positions are held to tolerances such that entire length of pins will enter flat-plate gauge (JETEC No.GBII-2) having thickness of 1/4" and eleven holes with diameters of 0.1030" ±0.0005" so located on a 0.7500" ±0.0005" diameter circle that the distance along the chord between any two adjacent hole centers is 0.2113" ± 0.0005".

U

Pin fit in gauge is such that gauge together with supplementary weight totaling 3 pounds will not be lifted when pins are withdrawn.

Add 0.030" for solder on finished tube.

16-4/110

JULY 1. 1955

J K

TUBE DIVISION

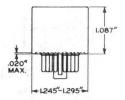
BASES 19

.135"

RADIO CORPORATION OF AMERICA: HARRISON, NEW JERSEY



SMALL-SHELL SUBMAGNAL



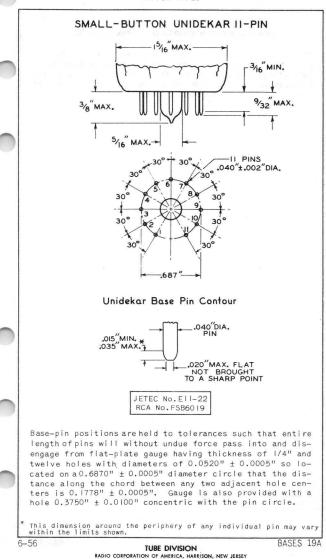
No.of	Pins	JETEC	RCA
Pins		No.	No.
II-Pin	1,2,3,4,5,6,7,8,9,10,11	BII-88	11344

For other dimensions, see first page of the "Submagnal" series

JULY 1, 1955

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY BASES 19







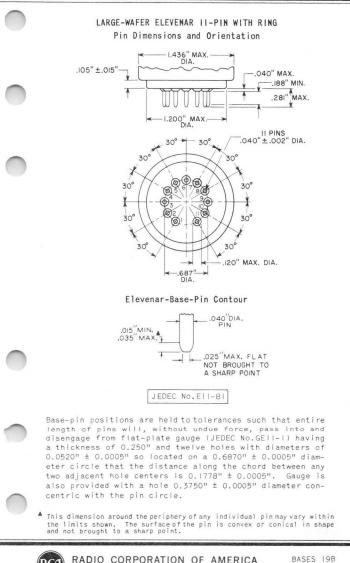
SMALL-BUTTON UNIDEKAR II-PIN (CONT'D)

The design of the socket should be such that circuit wiring can not impress lateral strains through the socket contacts on the base pins. The point of bearing of the contacts on the base pins should not be closer than 1/8" from the bottom of the seated tube.

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

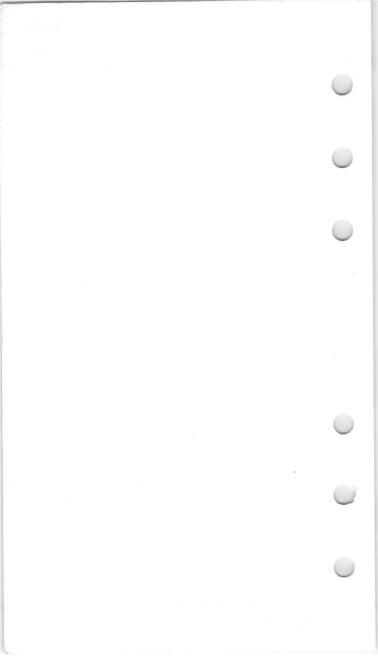
6-56

11-Pin Types



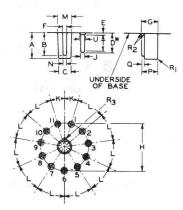
Electron Tube Division

AMERICA Harrison, N. J. BASES 19B 3-62





"MAGNAL" PIN DIMENSIONS AND ORIENTATION AND INDEX GUIDE



	Min.	Center	Max.		Min.	Center	Max.
Α	.550"	.560"	.570"	L	-	32-8/110	-
В	.490"	.500"	.510"	M	.305"	.312"	.317"
C	.300"	.308"	.315"	N	.075"	.080"	.085"
D	. 427"	.437"	. 447"	P	.343"	. 353"	.363"
E	-	-	.050"	Q	.040"	.047"	.055"
F	.085"	.090"	.095"	RI	-	.031"	-
G	.352"	.362"	.372"	R ₂	-	-	.050"
н	-	1.063"	-	R ₃	-	.040"	-
J	.090"	.093"	.096"	T	.340"	-	-
к	-	16-4/11 ⁰	-	U	-	-	.135"

Base-pin positions are held to tolerances such that entire length of pins will enter flat-plate gauge (JETEC No.GBII-I) having thickness of 1/4" and eleven holes with diameters of 0.1030" $\pm 0.0005"$ so located on a 1.0630" $\pm 0.0005"$ diameter circle that the distance along the chord between any two adjacent hole centers is 0.2995" $\pm 0.0005"$.

Pin fit in gauge is such that gauge together with supplementary weight totaling 3 pounds will not be lifted when pins are withdrawn.

* Add 0.030" for solder on finished tube.

JULY 1, 1955

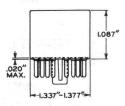
TUBE DIVISION

BASES 20

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

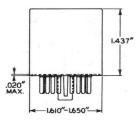


SMALL-SHELL MAGNAL



No.of	Pins	JETEC	RCA
Pins		No.	No.
II-Pin	1,2,3,4,5,6,7,8,9,10,11	B11-33	11247

MEDIUM-SHELL MAGNAL



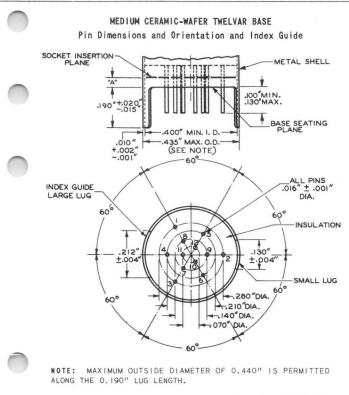
No.of	Pins	JETEC	RCA
Pins		No.	No.
II-Pin	1,2,3,4,5,6,7,8,9,10,11	B11-66	11248

For other dimensions of above bases, see first page of the "Magnal" series

JULY 1, 1955

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

12-Pin Types



No. of Pins			Pins			Dimension "A" Max.	JEDEC No.		
12 - Pin	1,2,3	,4,5	,6,7,8,9	,10,	11,12	0.040"	E12-64	-	
7 - Pin ^a	1,2,	4,	6,7,	10,	12	0.040"	E7-83	-	
7 - Pin ^b	1, 3	, 5	,6,7,	10,	12	0.020"	E7-77	-	
5 - Pin ^c	2,	4,	8,	10,	12	0.040"	E5-79	-	
5 - Pin ^d	2,	4,	8,	10,	12	0.040"	E5-65	-	

a Pins 3.5,8,9 are of a length such that their ends do not touch the socket insertion plane. Pin 11 is omitted.

b Pins 2,4,8.9 are of a length such that their ends do not touch the socket insertion plane. Pin 11 is omitted.

C Pin 7 is of a length such that its end does not touch the socket insertion plane. Pins 1,3,5,6,9,11 are omitted.

d Pins 1,3,5,6,7,9 are of a length such that their ends do not touch the socket insertion plane. Pin 11 is omitted.



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. BASES 20pA 1-63

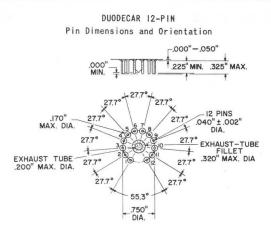
12-Pin Types

Base-pin positions and lug positions shall be held to tolerances such that entire length of pins and lugs will without undue force pass into and disengage from flat-plate gauge (JEDEC No.GE12-5) having thickness of 0.250" and twelve holes of $0.0350" \pm 0.0005"$ diameter located on four concentric circles as follows: Three holes located on 0.2800" $\pm 0.0005"$, three holes located on 0.2100" $\pm 0.0005"$, three holes located on 0.2100" $\pm 0.0005"$, three holes located on 0.2100" $\pm 0.0005"$, three holes located on 0.1400" $\pm 0.0005"$ diameter circles at specified angles with a tolerance of $\pm 0.08^{\circ}$ for each angle. In addition, gauge provides for two curved slots with chordal lengths of 0.2270" $\pm 0.0005"$ and 0.1450" $\pm 0.0005"$ located on 0.4200" $\pm 0.005"$ diameter circle concentric with pin circles at 180° $\pm 0.08^{\circ}$ and having a width of 0.0230"

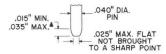
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



12-Pin Types



Duodecar-Base-Pin Contour



Base-pin positions are held to tolerances such that entire length of pins will, without undue force, pass into and disengage from flat-plate gauge having a thickness of 0.250" and thirteen holes with diameters of 0.0520" ± 0.0005" so located on a 0.7500" ± 0.0005" diameter circle that the distance along the chord between any two adjacent hole centers is 0.1795" ± 0.0005". Gauge is also provided with a hole 0.375" ± 0.005" - 0.000" diameter concentric with the pin circle.

This dimension around the periphery of any individual pin may vary within the limits shown. The surface of the pin is convex or conical in shape and not brought to a sharp point.



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. BASES 20qA 3-62

12-Pin Types

SMALL-BUTTON DUODECAR 12-PIN LARGE-BUTTON DUODECAR 12-PIN



JEDEC No.E12-70



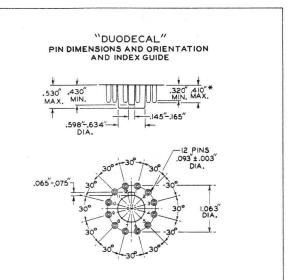
JEDEC No. E12-74

Fits Gauge JEDEC No. GE12-3 Fits Gauge JEDEC No. GE12-4



RADIO CORPORATION OF AMERICA Harrison, N. J. **Electron Tube Division**





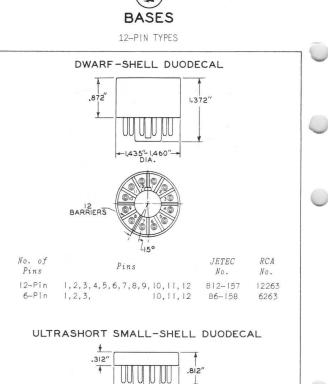
Base-pin positions are held to tolerances such that entire length of pins will enter flat-plate gauge (JETEC No.GB12-1) having thickness of 1/4" and twelve holes with diameters of 0.1030" \pm 0.0005" so located on a 1.0630" \pm 0.0005" diameter circle that the distance along the chord between any two adjacent hole centers is 0.2751" \pm 0.0005".

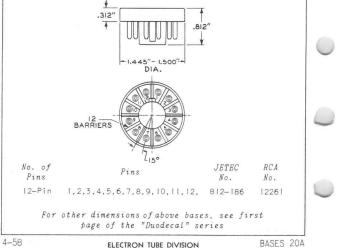
Pin fit in gauge is such that gauge together with supplementary weight totaling 3 pounds will not be lifted when pins are withdrawn.

* Add 0.030* for solder on finished tube.

ELECTRON TUBE DIVISION

BASES 20A



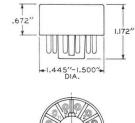


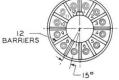
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

BASES 20A





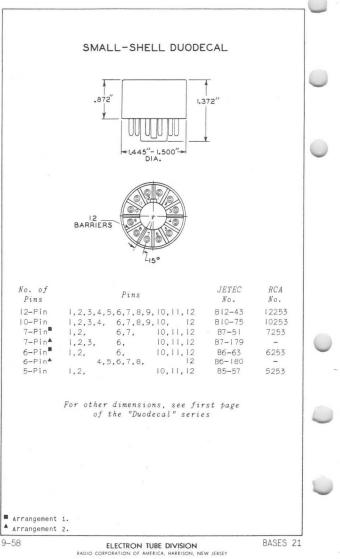


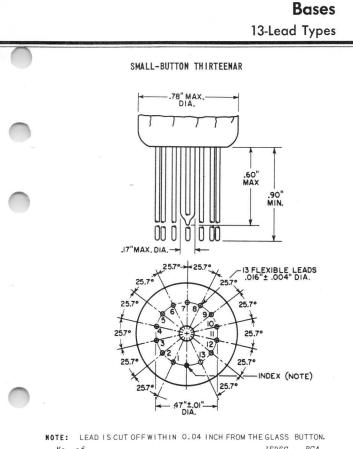


No. of Pins		Pins		JETEC No.	RCA No.
12-Pin	1,2,3,4	,5,6,7,8	9,10,11,12	B12-207	12267
6-Pin	1,2,	6,	10,11,12	B6-203	6267

For other dimensions, see first page of the "Duodecal" series



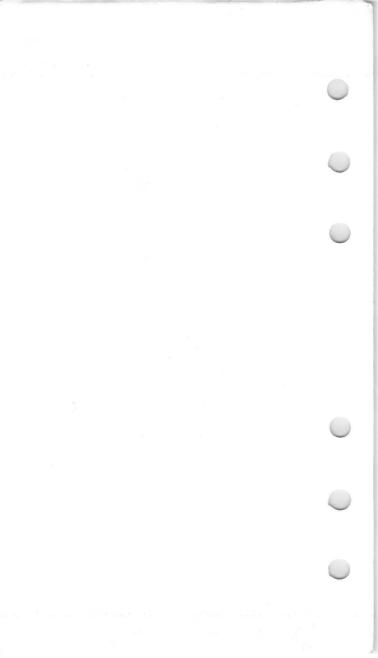




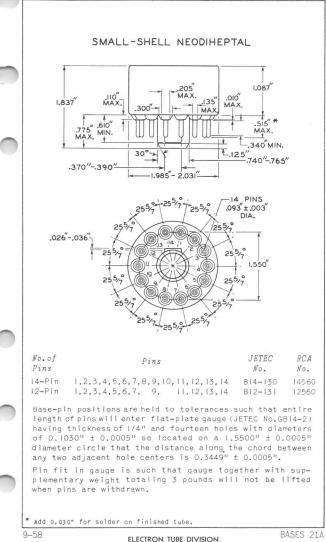
No. of Leads	Leads	JEDEC No.	RCA No.
13-Lead	1,2,3,4,5,6,7,8,9,10,11,12,13	E13-71	-
12-Lead	1,2,3,4,5,6,7,8,9,10,11,12,	EI2-72	-

▲ Lead 13 is cut off within 0.04 inch from the glass button.

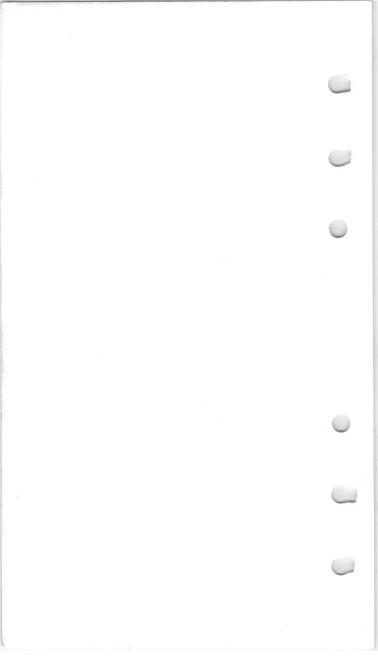
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. BASES 21pA 10-60



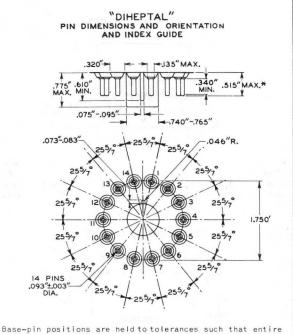




RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY







Base-pin positions are held to tolerances such that entire length of pins will enter flat-plate gauge (JETEC No.GBI4-1) having thickness of 1/4" and fourteen holes with diameters of 0.1030" \pm 0.0005" so located on a 1.750" \pm 0.0005" diameter circle that the distance along the chord between any two hole centers is 0.3895" \pm 0.0005".

Pin fit in gauge is such that gauge together with supplementary weight totaling 3 pounds will not be lifted when pins are withdrawn.

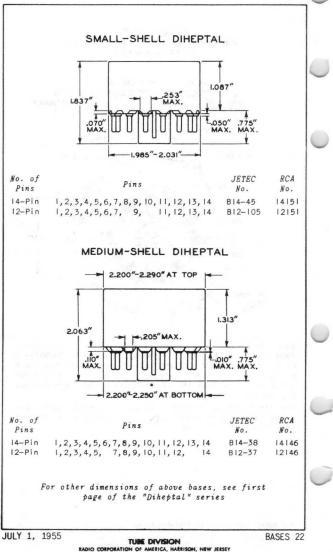
* Add 0.030" for solder on finished tube.

JULY 1, 1955

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY BASES 22

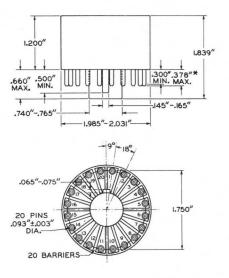
BASES

14-PIN TYPES





SMALL-SHELL BIDECAL



No. of	Pins	JETEC	RCA
Pins		No.	No.
20-Pin	I through 20	B20-102	20158

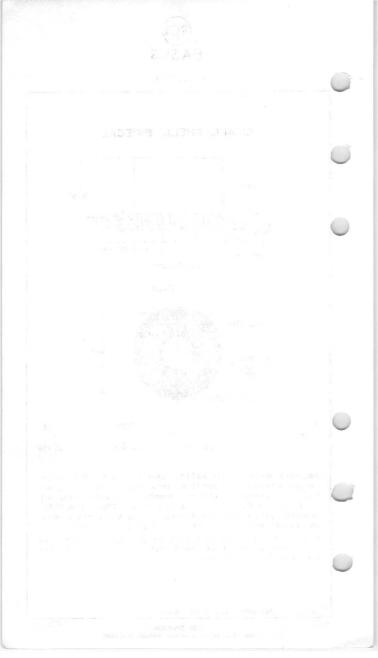
Base-pin positions are held to tolerances such that entire length of pins will enter flat-plate gauge (JETEC No.GB20-1) having thickness of 1/4" and twenty holes with diameters of 0.1030" \pm 0.0005" so located on a 1.7500" \pm 0.0005" diameter circle that the distance along the chord between any two adjacent hole centers is 0.2738" \pm 0.0005".

Pin fit in gauge is such that gauge together with supplementary weight totaling 3 pounds will not be lifted when pins are withdrawn.

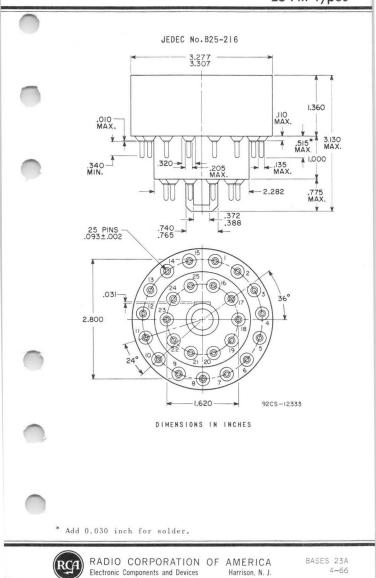
* Add 0.030" for solder on finished tube.

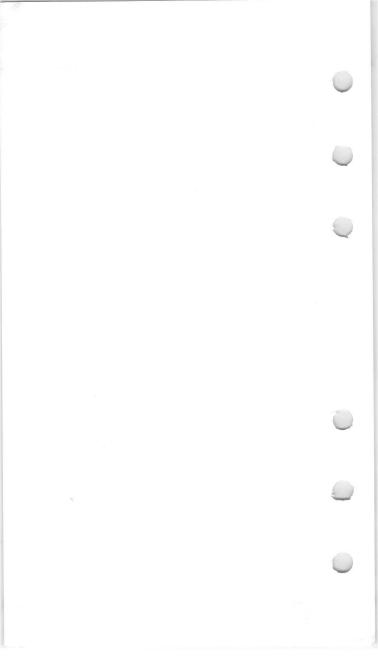
4-56

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY EASES 23



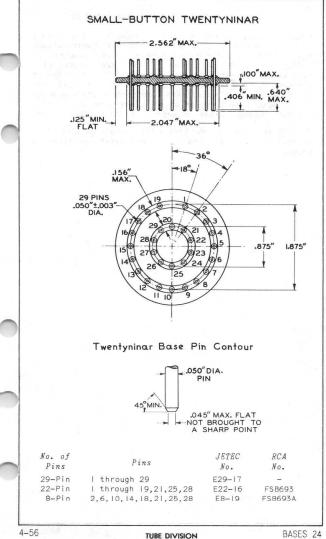
Bases 25-Pin Types







29-PIN TYPES



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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29-PIN TYPES

SMALL-BUTTON TWENTYNINAR (CONT'D)

Base-pin positions are held to tolerances such that entire length of pins will enter flat-plate gauge having thickness of 3/8" and twenty-nine holes with diameters of 0.0700" \pm 0.0005", nineteen of which are located with hole centers corresponding to the specified location of pin centers on a 1.8750" \pm 0.0005" diameter circle, and ten of which are located with hole centers corresponding to the specified location of pin centers on a 0.8750" \pm 0.0005" diameter circle concentric with the 1.8750" circle.

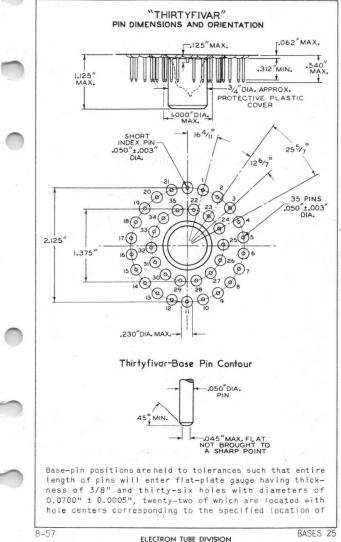
Pin fit in gauge is such that entire length of pins wili, without undue force, enter into and disengage from the gauge.

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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35-PIN TYPES



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



35-PIN TYPES

THIRTYFIVAR (CONT'D)

pin centers on a 2.1250" \pm 0.0005" diameter circle, and fourteen of which are located with hole centers corresponding to the specified location of pin centers on a 1.3750" \pm 0.0005" diameter circle concentric with the 2.1250" circle.

Pin fit in gauge is such that entire length of pins will, without undue force, enter into and disengage from the gauge. Gauge is also provided with a hole 1.000" diameter minimum concentric with pin circles.

SMALL-BUTTON THIRTYFIVAR

3¹/6["]DIA. MAX.

No.of Pins	Pins	JETEC No.	RCA No.
35-Pin	l through 35	E35-28	-
33-Pin	Omit pins 24 and 30	E33-29	-
31-Pin	Omit pins 24 and 30; pins 23 and 31 are	E31-36	-
	trimmed to same di- mension as index		
	pin.		1
21-Pin	I through 21	E21-40	-

For other dimensions of above base, see first page of the "Thirtyfivar" series

BASES 25

ELECTRON TUBE DIVISION

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RCA TUBE Handbook HB-3

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CATHODE-RAY TUBE, STORAGE TUBE, & MONOSCOPE SECTION

This Section contains data for black-andwhite and color TV picture tubes, oscillograph tubes, special-purpose kinescopes, storage tubes, and monoscopes.

For further Technical Information, write to Commercial Engineering, Tube Division, Radio Corporation of America, Harrison, N. J.

SEPARATOR

Greatest Deflection Angle (Approx.) Degrees	Heater Volts/mA	Focus- ing Method §	Design- Maximum Anode Volts	RCA Type
EL	ECTROSTAT	CDEFLEG	TION TYPI	E
Round Glas	s Envelope			
	6.3/600	E	6500	7JP4
м	AGNETIC DE	FLECTION	TYPES	
Round Glas	s Envelope			
50	6.3/600	E	29,500	5TP4
52	6.3/600	M	15,500	16LP4A
55	6.3/600	M	13.000	10 BP4A
55	6.3/600	M	13,000	10FP4A
55	6.3/600	M	13.000	12KP4A
60	6.3/600	M	16,500	16DP4A
70	6.3/600	M	17,500	16WP4A
Rectangula	r Metal Envela	pe		1
70	6.3/600	M	17.500	17CP4d
70	6.3/600	E	17,500	17TP4 ^d
Rectangula	Glass Envelo	ope		
Conventio	nal Rectangul	ar Glass Ty	pes	
70	6.3/600	M	17,500	16RP4B
70	6.3/600	M	15,500	16TP4
70	6.3/600	M	17,500	17BP4D
70	6.3/600	E	17,500	17HP4C
70	6.3/600	E	17,500	17LP4B
70	6.3/600	M	20,000	17QP4B
70	6.3/600	M	20,000	20DP4D
70 70	6.3/600	E	17,500	20HP4E
70	6.3/600 6.3/600	M E	20,000 20,000	21EP4C 21FP4D
70	6.3/600	M	20,000	21FP4D 21WP4B

RBA Electronic Components

PICTURE TUBE GUIDE 1 1-68

Black-and-White Picture Tubes

Greatest Deflection Angle (Approx.) Degrees	Heater Volts/mA	Focus- ing Method §	Design- Maximum Anode Volts	RCA Type
Rectangular	Glass Envel	ope Cont'	d	
Conventio	nal Rectangu	lar Glass T	ypes	
70	6.3/600	E	20,000	21XP4B
70	6.3/600	E	20,000	21YP4B
70	6.3/600	M	20,000	21ZP4C
72	6.3/600	E	22,000	21AVP4C
72	6.3/600	M	20,000	21AWP4A
90	6.3/600	E	9000	8DP4
90	8.4/450	E	15.500	14ATP4
90	6.3/600	E	15,500	14WP4
90	6.3/600	E	17,500	17BJP4
90	6.3/600	E	17,500	17CFP4
90	6.3/600	E	17,500	17CYP4
90	6.3/600	M	20,000	21AMP4B
90	6.3/600	E	22,000	21CBP4A
90	6.3/600	E	22,000	21DLP4
90	6.3/600	E	22,000	21DSP4 ^b
90	6.3/600	E	22,000	24AEP4
90	6.3/600	E	22,000	24ATP4 ^b
90	6.3/600	E	22,000	24AUP4
90	6.3/600	М	22,000	24CP4B
90	6.3/600	M	22,000	27RP4A
. 92	6.3/600	E	20,000	19BDP4 ^b
92	6.3/600	E	22,000	23AHP4
92	6.3/600	E	22,000	23ASP4
92	6.3/600	E	25,000	23BJP4 ^b
92	6.3/450	E	22,000	23CGP4
94	6.3/600	E	23,000	23DAP4b
110	6.3/450	E	15,000	11CP4

RBA Electronic Components

PICTURE TUBE GUIDE 1

Greatest Deflection Angle (Approx.) Degrees	Heater Volts/mA	Focus- ing Method §	Design- Maximum Anode Volts	RCA Type
	r Glass Envel			
Conventio	nal Rectangul	ar Glass T	ypes	
110	8.4/450	E	17,500	17CDP4
110	6.3/600	E	17,500	17CSP4
110	2.68/450	E	17,500	17DAP4
110	6.3/600	E	23,000	17DKP4
110	6.3/450	E	17,500	17DQP4
110	2.68/450	E	17,500	17DRP4
110	6.3/600	E	20,000	17DSP4
110	6.3/450	E	17,500	17DXP4
110	6.3/450	E	20,000	17EFP4
110	6.3/600	E	20,000	21CQP4
110	6.3/600	E	22,000	21DEP4
110	6.3/600	E	20,000	21DFP4
110	6.3/450	E	20,000	21DHP4
110	6.3/600	E	20,000	21EQP4
110	6.3/600	E	22,000	21FAP4
110	6.3/600	E	20,000	21FDP4
110	6.3/600	E	22,000	23ARP4
110	6.3/600	E	22,000	23DBP4b
110	6.3/600	E	22,000	24AHP4
110	6.3/600	E	22,000	24BAP4b
110	6.3/600	E	20,000	24BEP4
114	6.3/450	E	20,000	16AYP4
114	2.68/450	E	20,000	19ABP4
114	6.3/450	E	17,500	19AHP4
114	6.3/450	E	20,000	19AJP4b
114	6.3/600	E	23,000	19AVP4
114	6.3/450	E	23,000	19AYP4

Electronic RG/1 Components

PICTURE TUBE GUIDE 2 1-68

Greatest Deflection Angle (Approx.) Degrees	Heater Volts/mA	Focus- ing Method §	Design- Maximum Anode Volts	RCA Type
	Glass Envel			
1	nal Rectangul	1	1 1	
114	6.3/600	E	23,000	19BTP4
114	6.3/600	E	20,000	19CHP4b
114	6.3/450	E	20,000	19CMP4b
114	6.3/600	E	20,000	19CXP4b
114	6.3/600	E	20,000	19XP4
114	6.3/600	E	20,000	19YP4
114	6.3/450	E	22,000	20 R P 4
114	6.3/450	E	23,500	23CQP4
114	6.3/600	E	23,500	23FP4A
114	6.3/600	E	22,000	23MP4
114	6.3/600	E	22,000	23NP4 ^b
Bi-Panel R	ectangular Gl	ass Types		
92	6.3/600	E	22,000	23BDP4d
92	6.3/600	E	25,000	23BKP4
92	6.3/600	E	25,000	23BLP4 ^e
92	6.3/600	E	25,000	23BTP4
92	6.3/600	E	22,000	23YP4
110	6.3/600	E	22,000	23BGP4 ^b
110	6.3/450	E	23,000	23BQP4
110	6.3/450	E	23,000	23CBP4 ^d
110	6.3/600	E	22,000	23CP4
110	6.3/600	E	23,500	23CP4A
110	6.3/600	E	22,000	23EP4b
110	6.3/600	E	22,000	23GP4
110	6.3/450	E	22,000	23JP4 ^b
114	6.3/600	E	20,000	19AFP4
114	6.3/600	E	20,000	19AUP4d

RBA Electronic Components

PICTURE TUBE GUIDE 2

black and trinic riciole lobes	B	lac	k-anc	-W	hite	Picture	Tubes
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Greatest Deflection Angle (Approx.) Degrees	Heater Volts/mA	Focus- ing Method §	Design- Maximum Anode Volts	RCA Type
	Glass Envelo			1
	Rectangular		1	
92	6.3/600	E	25,000	23EYP4 ^b
110	6.3/450	E	15,000	11GP4
110	6.3/450	E	23,000	23FRP4b
110	6.3/600	E	23,000	23FSP4
114	6.3/600	E	23,000	19EBP4
114	6.3/450	E	21,000	19EGP4b
Banded Re	ctangular Gla	ss Types		
90	12.0/75	E	12,000	9WP4
92	6.3/450	E	25,000	23EKP4
92	6.3/600	E	25,000	23ENP4
92	6.3/600	E	25,000	23FBP4 ^e
94	6.3/450	E	23,500	23EZP4 b,
110	6.3/450	E	15,000	11HP4A
110	6.3/450	E	16,000	12BNP4A
110	4.2/450	E	14,000	12CNP4
110	6.3/600	'E	23,000	23ETP4
110	6.3/450	E	23,000	23FDP4b
110	6.3/450	E	23.000	23FMP4b
110	6.3/450	E	23,000	23GJP4Ab
110	6.3/600	E	23,000	23GSP49
110	6.3/450	E	22,000	23GWP4b
110	6.3/450	E	23,000	23HFP4A
110	6.3/450	E	23,000	23HGP49
110	6.3/450	E	23,500	23HUP4Ab
110	6.3/450	E	22,000	23HWP4Ab
110	6.3/450	E	23,000	23HXP4
110	6.3/450	E	23,000	23JEP4
110	6.3/450	E	23,500	23JGP4 ^b
114	6.3/450	E	20,000	16BGP4
114	6.3/450	E	20,000	16CHP4Ab
114	6.3/450	E	18,000	16CMP4A
114	6.3/450	E	22,000	17EMP4b

RBA Electronic Components

PICTURE TUBE GUIDE 3 1-68

Greatest Deflection Angle (Approx.) Degrees	Heater Volts/m A	Focus- ing Method §	Design- Maximum Anode Volts	RCA Type
	Glass Envel ectangular Gla		d	
114	6.3/450	E	23,000	19DQP4
114	6.3/600	E	23,000	19DRP4
114	6.3/600	E	20,000	19DSP4 ^b
114	6.3/450	E	20,000	19EAP4b
114	6.3/450	E	22,000	19DUP4 ^b
114	6.3/600	E	18,000	19EHP4A
114	6.3/450	E	21,000	19ENP4Ab
114	6.3/450	E	23,500	19FEP4B ^b
114	6.3/450	E	18,000	19FJP4A
114	6.3/450	E	23,000	19FLP4
114	6.3/600	E	23,000	19FNP49
114	6.3/450	E	20,000	19FQP4b,g
114	6.3/450	E	23,000	19GEP4A9
114	6.3/450	E	23,000	19GJP4A
114	6.3/450	E	23,000	20 SP 4 ^b
114	6.3/450	E	23,000	20TP4
114	6.3/450	E	23,000	21FVP4
114	6.3/450	E	22,000	21FYP4b,g
114	6.3/450	E	23,500	21GAP4Ab
114	6.3/450	E	23,000	23EQP4
114	6.3/600	E	23,000	23ERP4

BA Electronic Components

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PICTURE TUBE GUIDE 3

	Color	Picture	Tubes	
Greatest Deflection Angle (Approx.) Degrees	Heater Volts/mA	Focus- ing Method §	Design- Maximum Anode Volts	RCA Type
	ROUND G	LASS ENV	ELOPE	
Conventiona	l Types			
45 70 70 70 70	6.3/1800 6.3/1600 6.3/1800 6.3/1800 6.3/1800	E E E E	22,000 27,500 27,500 27,500 27,500	15GP22 21CYP22A 21FBP22 21FBP22A 21GUP22 ^f
Integral Pro	tective Windo	w Types		
70 70 70	6.3/1800 6.3/1800 6.3/1800	E E E	27,500 27,500 27,500	21FJP22 ^d 21FJP22A ^d 21GVP22 ^d , f
	ROUND M	ETAL ENV	'ELOPE	
70	6.3/1800	Е	27,500	21AXP22A
	RECTANGUL	AR GLASS	ENVELOPE	
Conventiona				5.6
90 90 90 90 90 90	6.3/900 6.3/900 6.3/900 6.3/900 6.3/900 6.3/900	E E E E E	22,500 27,500 27,500 27,500 27,500 27,500	15KP22 ^f 19EXP22 ^f 19GVP22 ^f 22KP22 ^f 25BP22A ^f 25YP22 ^f
Integral Pro	tective Windo	w Types		
90 90 90	6.3/900 6.3/900 6.3/900	E E E	22,500 27,500 27,500	15LP22 ^{d, f} 19EYP22 ^{d, f} 19GWP22 ^d ,
90 90	6.3/900 6.3/900	E E	27,500 27,500	22JP22d, f 25AP22Ad,
90 90 92	6.3/900 6.3/1350	E E E	27,500 27,500 27,500	25XP22d, f 23EGP22A

RBA Electronic Components

PICTURE TUBE GUIDE 4 1-68

Greatest Deflection Angle (Approx.) Degrees	Heater Volts/mA	Focus- ing Method §	Design- Maximum Anode Volts	RCA Type
Banded Typ	es			
90	6.3/900	E	22,500	15NP22f
90	6.3/900	E	27,500	19HCP 22 ^f

Color Picture Tubes

Test Picture Tubes

	ROUND G	LASS EN	VELOPE	
53	6.3/600	E	20,000	5AXP4
	RECTANGUL	AR GLA	S ENVELO	PE
70	6.3/1800	E	27,500	1828P22
90	6.3/600	E	22,000	8XP4
90	6.3/900	E	27,500	1830P22
10	6.3/600	E	22,000	8YP4

§ E = Electrostatic; M = Magnetic

Cylindrical Faceplate

b Low G2 Type

c Internal Magnetic Shield

d Faceplate Treated

e Low G2 Type, Faceplate Treated

f Hi-Life type, features rare-earth red-emitting phosphor

9 Integral Mounting Lugs

CATHODE-RAY TUBE, STORAGE TUBE, & MONOSCOPE CLASSIFICATION CHART

	SPECIAL	-PURPO	SE KIN	ESCOPES				
	Approx. Bulb Dia. Inches	Focus- ing Method	De- flec- tion Meth- od	Minimum Screen Size Inches	Maximum Anode Volts ^a	Tube Type		
	Monitor 7	Types						
•	7 7 85 85 10 175 215	M E E E E E E	M M M M M M M M M M	6-1/2 6 7-13/16b 7-3/4b 9-1/8 15-9/16b 20-1/4b	8,000 12,000 14,000c 22,000c 20,000 22,000c 22,000c	7CP4 7TP4 8HP4 8NP4 10SP4 17DWP4 21EYP4		
	Display Cathode-Ray Tube							
	12 ^b	E	м	Has in- tegral protec- tive window	16,000	4557		
	Projectio	n Types						
	5 7 7 7	E E E	M M M M	4-1/2d 5 x 3-3/4e 5 x 3-3/4e 5 x 3-3/4e	80,000c	5AZP4 7NP4 7WP4 4486		
	View-Fir	nder Type						
0	5 Transcril	M Der Type	M	4-1/4	8,000	5FP4A		
	5	E	м	4-1/4	27,000	5WP11		
0	b Diagon	etic. •Center va	lues un	less otherwi	se noted.			
•		circle dia rectangle						

RBA Electronic Components

CLASSIFICATION CHART 1 5-69

CATHODE-RAY TUBE, STORAGE TUBE, & MONOSCOPE CLASSIFICATION CHART

FLYING	G-SPOT C	ATHOD	E-RAY TUE	BES		
Approx. Bulb Dia. Inches	Focus- ing Method	De- flec- tion Meth- od	Phosphor ^a	Maximum Anode Volts	Tube Type	0
Black-an	d-White Te	levision	Types			
5 5	E	M M	P15 P16	27,000 ^b 27,000 ^b	5WP15 5ZP16	
Color-Te	elevision T	уре				
5	E	м	P 24	27,000 ^b	5AUP24	-
MONOS	COPES					0
Approx. Bulb Dia. Inches	Focus- ing Method	De- flec- tion Meth- od	Features	Maximur Anode Volts ^c	n Tube Type	
2	E	E	Customized metal stencil electrode pattern	2,500d	4560	
5	E	м	Indian Head Pattern	1,500 ^b	2F21	
5	E	м	Pattern individually styled to customer requirement		1699	0
E = Elec M = Magr	trostatic. netic.					
	neet Featur n-center vo		orescent Sci	eens.		
	n-electrode					
d Absol	ute-maximu	m value.				

RBA Electronic Components

CLASSIFICATION CHART 1

CATHODE-RAY TUBE, STORAGE TUBE, & MONOSCOPE CLASSIFICATION CHART

Phosphor	Approx.	Max.	Tube
	Bulb	Anode	Type
	Dia.	Voltsa	
	Inches		
Electrostat	ic-Deflection &	& Focus Type	e s
P1	1	1,500	1EP1
P1	2	1,100	2AP1A
P1	2	2,500	2BP1
P1	2	600	902A
Pl	3	1,500	3AP14
Pl	3	2,750	3AQP
P1	3	2,000	3BP1/
Pl	3	2,500	3KP1
Pl	3	2,500	3RP1
P1	3	2,500	3RP14
P1	3	2,500	3WP1
Pl	5	2,000	5BP14
P1	5	2,500	5UP1
P1	7	4,000	7U P 1
Pl	5	2,800 ^b	4499
P2	1	1,500	1EP2
P7	3	2,500	3 K P 7
P7	3	2,500	3RP7
P7	5	2,500	5U P 7
P11	1	1,500	1EP11
P11	2	2,500	2BP11
P11	3	2,500	3KP11
P11	3	2,500	3WP11
P11	5	2,500	5UP11
P31	5	2,500	5UP3
P31	7	4,000	7UP31

RBA Electronic Components

CLASSIFICATION CHART 2 5-69

CATHODE-RAY TUBE, STORAGE TUBE, & MONOSCOPE CLASSIFICATION CHART

Phosphor	Approx.	Max.	Tube
	Bulb	Post	Type
	Dia.	Accel-	
	Inches	erator	
		Volts	
Electrostati	c-Deflection &	Focus Type	es With
Post-Deflec	tion Accelera	tor	
P1	3	4,000	3JP1
P1	5	6,000	5ABP1
P1	5	6,000	5ADP1
P1	5	4,000	5CP1A
P7	3	4,000	3JP7
P7	5	6,000 ^b	4510
P11	5	6,000	5ABP11
P11	5	4,000	5CP11A
P31	5	6,000	5ABP31
P31	5	6,000	5ADP31
P31	5	8,000 ^b	4489
P31	7	8,000 ^b	4490
P31	8	8,000 ^b	4491
Phosphor	Approx.	Max.	Tube
	Bulb	Anode	Type
	Dia.	Volts	
	Inches		
Magnetic-De	flection & Fo	cus Types	
P7	5	8,000	5FP7A
P7	7	8,000	7BP7A
P7	7	8,000	7MP7

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Electronic Components

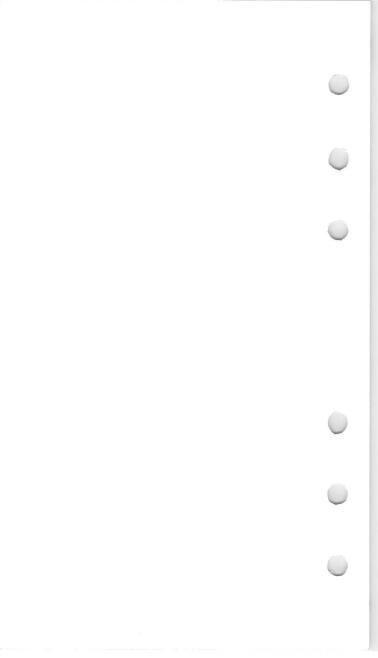
CATHODE-RAY TUBE, STORAGE TUBE, & MONOSCOPE CLASSIFICATION CHART

Name	Description	Tube Type
Display	Ruggedized, 5 ¹¹ -diameter type having electrostatic-focus and deflection writing gun	2053
Display	Ruggedized, 10 ¹¹ -diameter type having electrostatic-focus and deflection writing gun	4412
Display	5"-diameter type having elec- trostatic-focus and magnetic- deflection writing gun	4454
Display	5"-diameter type having elec- trostatic-focus and deflection writing gun	6866
Display	5"-diameter type having elec- trostatic-focus and magnetic- deflection writing gun	7183A
Display	Ruggedized, 5"-diameter type having two electrostatic-focus and deflection writing guns	7268B
Display	5"-diameter type having elec- trostatic-focus and deflection writing gun	7315
Radechon	Single-beam barrier-grid type for digital data storage	6499
Radechon	Variant of 6499 for binary mem- ory systems in computers	1858
Graphechon	Single-converter type with read- ing gun and writing gun	7539

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Electronic Components

CLASSIFICATION CHART 3 5-69



RCA PICTURE TUBE

Replacement Classification Keys

▲ Replacement information is based primarily on electrical and mechanical similarity of the picture-tube types covered. The technician should make certain that replacement is in accord with all safety precautions required by the TV receiver for picture-tube insulation or mechanical mounting.

A. RCA type does not require an external ion-trap magnet.

B. The ball-type anode contact must be replaced with cavity-type contact.

C. Neck length and/or overall length of RCA type is slightly greater.

D. Direct replacement.

E. The RCA replacement type is electrically interchangeable-Mechanical modifications to the receiver may be required.

F. The RCA replacement type has a 6.3-volt/600-milliampere heater. The receiver picture tube heater circuit must be modified to use this replacement type.

G.A conversion Kit (RCA Part No. 12B202) is available for RCA receivers.

H. The RCA replacement type is mechanically interchangeable— Electrical modifications to the receiver may be required.

J. The RCA replacement is directly interchangeable in most cases; however, in some cases the red cathode lead may have to be interchanged with the blue or green cathode leads to obtain satisfactory black-and-white tracking. Replacement information is packed with the tube.

K. Pin No. 6 (focusing electrode) of the RCA replacement must be connected to Pin No. 11 at the socket. The original tube did not require an external voltage for focus.

L. The RCA replacement type is electrically interchangeable – Mounting hardware may have to be modified to accept the replacement type. In some small-cabinet receivers, the replacement may not be feasible.

M. The RCA replacement type is electrically interchangeable – The receiver socket should be replaced by RCA Part No. 112579, Eby Sales Co. Part No. 49-13DD, or equivalent.

N. A conversion Kit (RCA Part No. 12B101) is available for RCA receivers.

P. External conductive coating must be gounded.

* Band around periphery of tube panel must be gounded and isolated from the ac line voltage.



Type To Be ★ Replaced	Replaced By RCA Type		Type To Be ★ Replaced	Replaced By RCA Type		0
Color Pi	cture Tubes					Ŭ
11SP22 11WP22	C-11WP22	D	19HFP22	H-19GWP22 C-19GWP22/	D	
15AEP22 15AFP22 15AGP22	H-15AEP22 C-15AEP22	* D D	19HJP22 19HKP22	19EYP22 H-19HCP22/ 19HKP22	•D	0
15LP22	H-15LP22 C-15LP22	D		C-19HCP22/ 19HKP22	•D	
15NP22	H-15NP22 C-15NP22	* D * D	19HNP22	H-19HNP22 C-19HNP22	*D *D	
15SP22	H-15AEP22 C-15AEP22	* D * D	19HQP22	H-19G VP22 C-19G VP22/ 19E XP22	D	0
15TP22	H-15NP22 C-15NP22	* D * D	19HRP22	H-19GWP22 C-19GWP22/	D	•
15WP22	H-15LP22 C-15LP22	D	19HXP22	19EYP22 H-19HCP22/	D	
15XP22	H-15NP22 C-15NP22	* D * D	101170122	19HKP22 C-19HCP22/	*D	
17EZP22 17FAP22	H-17EZP22 C-17EZP22	* D * D	19JBP22	19HKP22 H-19GVP22	•D D	
19EXP22	H-19GVP22 C-19GVP22/ 19EXP22	D	19JDP22 19JGP22	C-19GVP22/ 19EXP22 H-19JWP22 C-19JWP22	D D D	
19E Y P22 19F M P22 19F X P22	H-19GWP22 C-19GWP22/	D	19JHP22	H-19GWP22 C-19GWP22 / 19EYP22	D	
19GSP22 19GVP22 19GVP22/	19E YP22 H-19G VP22 C-19G VP22/	D	19JKP22	H-19GWP22 C-19GWP22/ 19EYP22	D	
19E XP22 19GWP22	19E XP22 H-19GWP22	D	19JWP22	H-19JWP22 C-19JWP22	D	\bigcirc
19GWP22/ 19EYP22	C-19GWP22/ 19EYP22	D	21AXP22 21AXP22A 21AXP22A	C-21AXP22A C-21CYP22A C-21FBP22	D CN CJN	
19G XP22 19G YP22	H-19GVP22 C-19GVP22/ 19EZP22	C C	21AXP22	H-21GUP22 C-21GUP22/	CJN	
19GZP22	H-19GWP22 C-19GWP22/ 19EYP22	D	21CYP22 21CYP22A	21FBP22A C-21CYP22A C-21FBP22	CJN D J	
19HBP22	H-19GWP22 C-19GWP22/ 19EYP22	D		H-21GUP22 C-21GUP22/ 21FBP22A	J	
19HCP22 19HCP22/ 19HKP22	H-19HCP22/ 19HKP22 C-19HCP22/ 19HKP22	• D • D	21FBP22 21FBP22A	C-21FBP22 H-21GUP22 C-21GUP22/ 21FBP22A	J D	0

▲ See Replacement information in front of this guide.

Electronic Components

B//

INTERCHANGEABILITY GUIDE 1

	Type To Be ★ Replaced	Replaced By RCA Type		Type To Be ★ Replaced	Replaced By RCA Type	
	21F JP22 21F JP22A 21F KP22	C-21F JP22 H-21G VP22 C-21G VP22/	J D	25AEP,22	H-25YP22 C-25YP22/ 25BP22A	D
	21GFP22 21GLP22	21F JP22A H-22 JP22 C-22 JP22	L L	25AFP22	H-25XP22 C-25XP22/ 25AP22A	D
	21GRP22 21GUP22	H-21GUP22	D	25AGP22 25AJP22	H-25A JP22 C-25A JP22	• D • D
	21GUP22/ 21FBP22A	C-21FBP22 C-21GUP22/ 21FBP22A	D	25ANP22 25AP22 25AP22A	H-25XP22 C-25XP22/ 25AP22A	D
	21GVP22 21GVP22/	H-21GVP22 C-21FJP22	D	25AQP22	201112211	
3	21GVP22/ 21FJP22A	C-21GVP22/ 21FJP22A	D	25ASP22 25AWP22 25AXP22	H-25A JP22 C-25A JP22	• D • D
	21GWP22	H-22JP22 C-22JP22	L	25AZP22		
	21G XP22 21G YP22	H-21GVP22 C-21FJP22 C-21GVP22/	D D	25BMP22	H-25XP22 C-25XP22/ 25AP22A	D
		21FJP22A H-22UP22	•D	25BP22	H-25YP22 C-25YP22/	D
	22ADP22 22AGP22	C-22UP22	•D	25BP22A	25BP22A H-25XP22	D
	22A HP22 22JP22	H-22JP22 C-22JP22	D	25CP22A	C-25XP22/ 25AP22A	D
	22KP22	H-22KP22	D	25FP22 25FP22A	H-25YP22 C-25YP22/	D
	22LP22	C-22JP22 H-22JP22 C-22JP22		25GP22	25BP22A H-25XP22 C-25XP22/	D
	22QP22 22RP22	H-22KP22 C-22KP22	D D D	25GP22A	25AP22A H-25YP22	D
	22SP22	H-22JP22 C-22JP22	D	25RP22	C-25YP22/ 25BP22A	D
	22UP22	H-22UP22 C-22UP22	•D •D	25SP22	H-25XP22 C-25XP22/ 25AP22A	D
	22XP22 22YP22	H-22JP22 C-22JP22	D	25VP22	H-25XP22 C-25XP22/	D
	23EGP22 23EGP22A	C-23EGP22 C-23EGP22A	D	25WP22	25BP22A	D
	25ABP22	H-25XP22 C-25XP22/ 25AP22A	D	25XP22 25XP22/ 25AP22A	H-25XP22 C-25XP22/ 25AP22A	D
	25 4 0 0 2 2	H-25AJP22	• D	25YP22 25YP22/	H-25YP22	D
	25ADP22	C-25AJP22 C-25AJP22	• D	25BP22A	C-25YP22/ 25BP22A	D

★ See note on back of sheet 2 of this guide.
▲ See Replacement information in front of this guide.

Electronic Components

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Туре			Туре			
To Be \star	Replaced By		To Be \star	Replaced By		
Replaced	RCA Type		Replaced	RCA Type		
25ZP22	H-25XP22 C-25XP22/	D	490BGB22	H-19GVP22 C-19GVP22/	D	
	25AP22A	D		19E X P 22	D	
370AB22 370CB22	H-15NP22 C-15NP22	• D • D	490BHB22	H-19GWP22 C-19GWP22/	D	
490AB22	H-19G VP22	J		19EYP22	D	1
490ACB22 490ADB22	C-19G VP22/ 19E XP22	J	490BNB22	H-19JWP22 C-19JWP22	D	-
490AEB22 490AFB22	H-19GWP22 C-19GWP22/	J	490BRB22	H-19GWP22 C-19GWP22/	D	
490AGB22	19E YP22	J		19EYP22	D	
490A HB22	H-19G VP22 C-19G VP22/ 19E XP22	J	490BVB22 490BXB22	H-19JWP22 C-19JWP22	D	
490AHB22A		J 	490CB22	H-19GVP22	J	
490416224	C-19G VP22/ 19E XP22	D	490DB22 490EB22 490EB22A	C-19GVP22/ 19EXP22	J	
490AJB22 490AJB22A	H-19GWP22 C-19GWP22/	D	490FB22 490GB22			
-	19EYP22	D	490HB22	H-19GVP22	D	
490AKB22	H-19GVP22	J	490JB22	C-19GVP22/	-	
490A LB22 490A MB22	C-19G VP22/ 19E XP22	J	490JB22A	19E XP22	D	
490ANB22	102/11/22	J	490KB22 490KB22A	H-19GVP22 C-19GVP22/	J	
490ARB22	H-19GWP22 C-19GWP22/	J	490LB22 490MB22	19EXP22	J	
	19E Y P22	J	490NB22	H-19GWP22	J	
490ASB22	H-19GWP22 C-19GWP22/	D	490RB22 490SB22 490TB22	C-19GWP22/ 19EYP22	J	
1000 1 0 00	19E YP22	D	4901B22 490UB22	H-19GVP22 C-19GVP22/	J	
490BAB22	H-19G VP22 C-19G VP22/	D		19EXP22	J	
	19E XP22	D	490VB22	H-19GWP22 C-19GWP22/	J	
490BCB22	H-19GWP22	D		19EYP22	J	
	C-19GWP22/ 19EYP22	D	490WB22	H-19GVP22 C-19GVP22/	J	
490BDB22	H-19GWP22	J	490XB22	19EXP22 H-19GWP22	<u>J</u>	
	C-19GWP22/ 19EYP22	J	490YB22 490YB22 490ZB22	C-19GWP22/ 19EYP22	J	

The type to be replaced may have a manufacturer's coding prefix such as AN, C, CR, H, HR, OC, RE, REA, etc. Since these prefixes do not affect the electrical characteristics or interchangeability of the type, the prefixes have been omitted from type numbers in this column.

▲ See Replacement information in front of this guide.

Electronic

Components GUIDE 2

INTERCHANGEABILITY

		INTERC	НА	RCA PI	CTURE T	UBE
0	Type To Be ★ Replaced	Replaced By RCA Type		Type To Be ★ Replaced	Replaced By RCA Type	
	Black &	White Picture	Tub	es	5	
	7JP4 8DP4 9AEP4 9WP4 10ATP4 11AP4 11BP4	7JP4 8DP4 9AEP4 9WP4 10ATP4 11HP4A	D + D + D + D + D + D	16BQP4 16CHP4 16BVP4 16BWP4 16CAP4 16CEP4 16CHP4 16CHP4A	16CMP4 16ATP4 16CMP4A 16BGP4 16CMP4A 16CMP4A 16CMP4A	•C •E •D •D •D
0	11CP4 11GP4 11HP4	11CP4 11GP4 11HP4A	+ D + D	16CJP4 16CMP4 16CMP4A	16CMP4A	*D
	11HP4A 12BNP4 12BNP4A	12BNP4A	* D	16CTP4 16CUP4 16CVP4	16BGP4 16CMP4A 16CHP4A	*C *C *CE
	12CFP4 12CGP4	12CNP4 12BNP4A	* D * D	16KP4 16KP4A	16RP4B	A
	12CNP4 12DEP4 12DFP4	12CNP4 12DEP4 12DFP4	* D * D * D	16QP4 16RP4 16RP4/	16RP4B 16RP4B	AP
	12DSP4 14NP4	12DSP4 14WP4	D	16KP4 16RP4A 16RP4A/ 16KP4A		
	14NP4A 14RP4 14RP4A 14SP4			16RP4B 16TP4	16RP4B 16TP4	D
0	14WP4 14WP4/ 14ZP4	14WP4	D	16UP4 16XP4 17AP4	16RP4B 16RP4B 17BP4D	ACP AP ACP
	14ZP4 14ZP4/ 14WP4			17ATP4 17ATP4/ 17AVP4	17BJP4	A
0	16ASP4 16AXP4	16CMP4A	• E	17ATP4A 17ATP4A/ 17AVP4A		
	16A YP4 16BFP4 16BGP4 16BKP4 16BMP4	16BGP4 16CMP4A 16BGP4 16CHP4A 16BGP4	* E * C * D * C * C * CE	17A VP4 17A VP4/ 17A TP4 17A VP4A 17A VP4A/ 17A TP4A		

▲ See *Replacement information* in front of this guide.

Electronic Components

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IDE

Type To Be ★ Replaced	Replaced By RCA Type		Type To Be ★ Replaced	Replaced By RCA Type	
17BJP4	17BJP4	D	17FP4		
17BP4	17BP4D	AP	17FP4A		
17BP4A	17BP4D	A	17HP4		
17BP4B			17HP4/ 17RP4	17HP4C	A
17BP4C			17HP4A	17111 40	
17BP4D	17BP4D	D	17HP4B		
17BRP4	17DSP4	A	17HP4B/ 17RP4C		
17BUP4	17BJP4	A	17HP4C	17HP4C	D
17BZP4	17DSP4	D			
17BZP4/		_	17JP4	17BP4D	<u>A</u>
17CAP4/ 17CKP4			17KP4	17HP4C	AK
17BZP4/			17KP4A	471.040	
17CAP4/			17LP4 17LP4/	17LP4B	A
17CKP4/			17VP4		
17BRP4 17CAP4			17LP4A		
17CBP4	17BJP4	A	17LP4A/ 17VP4B		
17CFP4	17CFP4		17LP4B	171 040	D
17CKP4	17DSP4	D	170P4	17LP4B 17QP4B	A
17CLP4	17D3F4	AP	17QP4	T/QP4B	A
17CTP4	17EFP4	D D	17QP4B	17QP4B	D
17CWP4	17DSP4	D	17RP4	17HP4C	A
17CYP4	17CFP4	D	17RP4C		
17DAP4	17DAP4	D	17SP4	17LP4B	AK
17DAP4	17EFP4	 P	17UP4	17QP4B	A
17DKP4	17DSP4	C	17VP4	17LP4B	A
17DLP4	17DSP4		17VP4/ 17LP4		
17DQP4	17DQP4	D	17VP4B		
17DRP4	17DRP4	D	17YP4	17QP4B	A
17DSP4	17DSP4	D	19ABP4	19ABP4	D
17DTP4	17DSP4	c	19ACP4	19CHP4	D
17DXP4	17DXP4	D	19ADP4	19AVP4	D
17DZP4	170714	U	19AFP4	19AFP4	D
17EAP4	17HP4C	AK	19AGP4	19AVP4	С
17EBP4	17EFP4	D	19A HP4	19AYP4	D
17EFP4	17EFP4	D	19AJP4	19AJP4	D
17EMP4	17EMP4	* D	19AKP4	19AVP4	D
17EWP4	17EWP4	* D	19ANP4	19A YP4	c
17FCP4	17FCP4	* D	19ARP4	19AFP4	D
▲ See Repl	acement inform	ation in		s guide.	
			- State of the second second		

Electronic Components

RB/A

INTERCHANGEABILITY GUIDE 3

To Be *Replaced By Rechared BY ReplacedTo Be *Replaced BY Replaced19ATP419AFP4C19AUP419AFP4C19AUP419AFP4D19AVP419AYP4D19AVP419AYP4D19AVP419AYP4D19AVP419AYP4D19AVP419AYP4D19AVP419AYP4D19AVP419AYP4D19AZP419AYP4D19AZP419AYP4D19AZP419AYP4D19BLP419AYP4D19BLP419AYP4D19BLP419AYP4D19BLP419AYP4D19BLP419AYP4D19BLP419AYP4D19BLP419AYP4D19BLP419AYP4D19BLP419AYP4D19BLP419AYP4D19BLP419AYP4D19BLP419AYP4D19BLP419AYP4D19BLP419AYP4D19BLP419AYP4D19BLP419AYP4D19CAP419AYP4D19CAP419AYP4D19CAP419AYP4D19CAP419CAP4D19CAP419CAP4D19CAP419CAP4D19CAP419CAP4D19CAP419CAP4D19CAP419CAP4D19CAP419CAP4D <tr< th=""><th></th><th>Туре</th><th></th><th></th><th>Туре</th><th></th><th>-</th></tr<>		Туре			Туре		-
19A TP419A FP4C19D HP419D KP419D KP4 \cdot D19A UP419A VP419A VP4D19D KP419D KP419D KP4 \cdot D19A VP419A VP4D19D LP419D CP419D RP4 \cdot E19A XP419A VP4D19D CP419D CP419D CP4D19A ZP419A VP4D19D CP419D CP419D CP4D19B ZP419A VP4D19D CP419D CP4C19D CP419B MP419A VP4D19D CP419D CP4C19B MP419A VP4C19D CP419D CP4C19B MP419A VP4D19E CP419D CP4D19B MP419A VP4C19E CP419D CP4D19B MP419A VP4D19E CP419D CP4D19C CP419C CP419C CP419D CP4D19C CP419C CP419C CP419D CP4D19C CP419C CP419C CP419C CP419C CP419C CP419C CP419C CP419C CP4D19C CP419C CP419C CP419C CP419C CP419C CP419C CP419C CP419C CP4D19C					To Be \star		
19A UP4 $19A FP4$ D $19A VP4$ $19A VP4$ $19A VP4$ D $19A VP4$ $19A VP4$ $19A VP4$ D $19A YP4$ $19A YP4$ D $19B DP4$ $19B VP4$ D $19B DP4$ $19B VP4$ D $19B PP4$ $19A VP4$ D $19E PP4$ $19C P4$ $19C P4$ $19C P4$ $19C P4$ D $19C P4$ $19C P4$ <		Replaced	RCA Type	A	Replaced	RCA Type	A
19A VP4 $19A VP4$ D $19AWP4$ $19A VP4$ D $19AXP4$ $19A VP4$ D $19AYP4$ $19A VP4$ D $19AZP4$ $19A VP4$ D $19AZP4$ $19A VP4$ D $19BP4$ $19A VP4$ D $19CP4$ $19A VP4$ D $19CP4$ $19A VP4$ D $19CP4$ $19CP4$ D $19CP4$ <		19ATP4	19AFP4	С	19DHP4	19DSP4	*D
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		19AUP4	19AFP4	D	19DKP4	19DRP4	* E
19A XP4 19A YP4 D 19A YP4 19A YP4 D 19A ZP4 19A VP4 D 19B ZP4 19A VP4 D 19B DP4 19B DP4 D 19B DP4 19B VP4 D 19B LP4 19A VP4 D 19E LP4 19D LP4 19E LP4 19C LP4 19A VP4 D 19C LP4 19A VP4 D 19C LP4 19A VP4		19A VP4	19AVP4	D	19DLP4	19CHP4	D
19AYP4 $19DP4$ $19DP4$ $19DP4$ $19DP4$ $1DPP4$	0	19AWP4	19AYP4	С	19DNP4	19DRP4	* E
19AZP4 19AVP4 D 19BDP4 19BDP4 D 19BDP4 19BDP4 D 19BHP4 19AVP4 D 19CAP4 19AVP4 D 19CAP4 19CHP4 D 19CAP4 19CHP4 D 19CAP4 19CHP4 D 19CAP4			19AYP4	D	19DQP4	19DQP4	* D
198DP4 198DP4 198DP4 190DP4					19DRP4	19DRP4	* D
198HP4 19AVP4 D 198HP4 19AVP4 D 198LP4 19AVP4 C 198HP4 19AVP4 D 198HP4 19CHP4 D 198HP4 19CHP4 D 198HP4					19DSP4	19DSP4	* D
198LP4 19AVP4 C 198MP4 19AVP4 C 198MP4 19AVP4 C 198RP4 19DRP4 C 198RP4 19DRP4 C 198RP4 19AVP4 C 198RP4 19CHP4 D 198RP4 19CHP4 D 198RP4 19CHP4 D 199CHP4 19CHP4 D 199CP4					19DTP4	19DQP4	* C
198MP4 19AFP4 C 198MP4 19AFP4 C 198RP4 19DRP4 C 198RP4 19AVP4 C 198RP4 19CP4 D 198RP4 19CP4 D 198RP4 19CP4 C 199CP4 19CHP4 D 199CP4 19CHP4 D 199CP4 19CHP4 D 199CP4 19CHP4 D 199CP4	-	19BHP4	19AVP4		19DUP4	19DUP4	* D
198RP4 19DRP4 • E 198SP4 19AVP4 C 198DP4 19AVP4 C 198DP4 19AVP4 C 198DP4 19AVP4 C 198DP4 19AVP4 D 198DP4 19CP4 19BPP4 199CP4 19CHP4 D 198CP4 <td></td> <td></td> <td>19AVP4</td> <td></td> <td>19DWP4</td> <td>19DQP4</td> <td>* D</td>			19AVP4		19DWP4	19DQP4	* D
198SP4 19AVP4 C 198SP4 19AVP4 C 198DP4 19AVP4 C 198DP4 19AVP4 C 198DP4 19AVP4 D 198DP4 19CP4 19EP4 199CP4 19CHP4 D 199CP4 19DP4 D 199CP4 19DP4 D 198CP4		19BMP4	19AFP4	C	19EAP4	19FEP4B	* D
198 TP4 198 VP4 198 VP4		19BRP4	19DRP4	* E	19EBP4	19E BP4	* D
198VP4 19AVP4 D 198WP4 19AVP4 D 198WP4 19AYP4 D 198XP4 19CAP4 19CAP4 199CP4 19CHP4 D 198XP4 19CHP4 D 198XP4 <td></td> <td></td> <td>19AVP4</td> <td>С</td> <td>19EDP4</td> <td>19DRP4</td> <td>* D</td>			19AVP4	С	19EDP4	19DRP4	* D
198WP4 19AYP4 D 198XP4 19AYP4 D 198XP4 19AYP4 E 19CAP4 19AYP4 E 19CAP4 19AYP4 E 19CAP4 19AYP4 C 19CAP4 19AYP4 C 19CAP4 19CAP4 19CAP4 19CAP4 19CAP4 D 19CAP4 <td></td> <td></td> <td>194 VP4</td> <td></td> <td>19EFP4</td> <td>19DSP4</td> <td>* D</td>			194 VP4		19EFP4	19DSP4	* D
198 XP4 19A YP4 19 196 XP4 19A YP4 19 197 CP4 19C P4 19C P4 197 CP4 197 CP4 197 CP4 197 CP4 197 CP4					19EGP4	19EGP4	* D
19CAP4 19AVP4 C 19CAP4 19CXP4 D 19CP4 19CXP4 D 19CFP4 19CHP4 D 19CKP4 19CHP4 D 19CKP4 19CHP4 D 19CKP4 19CHP4 D 19CKP4 19CHP4 D 19CMP4 19CMP4 D 19CMP4						19DRP4	* D
19CDP4 19CXP4 D 19CFP4 19CHP4 D 19CFP4 19CHP4 D 19CHP4							
19CFP4 19CHP4 CE 19CFP4 19AVP4 D 19CFP4 19CHP4 D 19EP4 19EP4 C 19CJP4 19AVP4 D 19EP4 19EP4 C 19CJP4 19AVP4 D 19EP4 19EP4 C 19CJP4 19AVP4 D 19EP4 19EP4 C 19CJP4 19CHP4 E 19ENP4 19ENP4 D 19CLP4 19BDP4 D 19ESP4 19DRP4 D 19CMP4A 19CMP4 D 19ESP4 19DRP4 D 19CMP4A 19CMP4 D 19EVP4 19DQP4 D 19CMP4 19CMP4 D 19FP4 19EP4 D 19CVP4 19CMP4 D 19FP4 19DQP4 D 19CYP4 19DQP4 C<							
19CHP4 19CHP4 19CHP4 19EHP4							
19CJP4 19AVP4 D 19CJP4 19AVP4 D 19CKP4 19CHP4 E 19CLP4 19BDP4 D 19CMP4 19CMP4 D 19CMP4							* C
19CKP4 19CHP4 E 19CLP4 19BDP4 D 19CMP4 19CMP4 D 19CMP4 19CMP4 D 19CMP4 19CMP4 D 19CMP4A 19CMP4 D 19CMP4 19CMP4 C 19CMP4 19DMP4 C 19CMP4 19DMP4 C 19CMP4 19DMP4 D 19CMP4 <td></td> <td>-</td> <td></td> <td></td> <td></td> <td>19FEP4B</td> <td>* D</td>		-				19FEP4B	* D
19CLP4 19BDP4 D 19CMP4 19CMP4 D 19CMP4 19CMP4 D 19CMP4A 19CMP4 D 19CMP4 19DMP4 D 19CMP4 19DMP4 D 19CMP4 19DMP4 D 19DMP4 <td></td> <td></td> <td></td> <td></td> <td></td> <td>19D8P4</td> <td>* D</td>						19D8P4	* D
19CMP4 19FMP4							
19CMP4A 19CXP4 19EVP4 19DQP4 0 19CQP4 19CXP4 D 19EVP4 19DQP4 + D 19CRP4 19BDP4 D 19EVP4 19EVP4 19EVP4 + D 19CSP4 19CHP4 D 19EVP4 19EVP4 + D 19EVP4 19CSP4 19CHP4 D 19FP4 19EOP4 + D 19CVP4 19CXP4 19CHP4 D 19FP4 19DQP4 + D 19CYP4 19AVP4 C 19FP4 19FP4 19FP4 + D 19CZP4 19DQP4 + E 19FEP4A 19FEP4A + D 19FEP4A 19DCP4 19DRP4 + D 19FJP4 19DQP4 + D 19DEP4 19AVP4 E 19FJP4 19DQP4 + D 19DEP4 19AVP4 E 19FJP4 19DQP4 + D 19DEP4 19CHP4 D 19FJP4 19FLP4 + D 19DFP4 19CHP4 D							
19CQP4 19CXP4 D 19CRP4 19BDP4 D 19CSP4 19BDP4 D 19CVP4 19CHP4 D 19CVP4 19CMP4 C 19CVP4 19DOP4 C 19CVP4 19DOP4 C 19CVP4 19DOP4 C 19FEP4A 19FEP4A 19FEP4B 19DCP4 19DRP4 C 19DEP4 19AVP4 E 19DEP4 19CHP4 D 19DEP4 19CHP4 D 19FEP4 19FEP4 19FEP4 19DEP4 19CHP4 D 19FEP4 19FEP4 19FEP4							
19CSP4 19CHP4 D 19CUP4 19CMP4 D 19CVP4 19CMP4 D 19CVP4 19CXP4 D 19CYP4 19CYP4 D 19CYP4 19AVP4 C 19CZP4 19DQP4 *E 19DAP4 *E 19DCP4 19DRP4 19DCP4 19DRP4 19DEP4 19AVP4 19DEP4 19AVP4 19DEP4 19AVP4 19DEP4 19CHP4			19CXP4	D	19EWP4		
19CUP4 19CMP4 D 19CXP4 19CXP4 D 19CXP4 19CXP4 D 19CYP4 19CXP4 D 19CYP4 19AVP4 C 19CZP4 19DQP4 *E 19DAP4 *E 19DCP4 19DRP4 19DCP4 19DRP4 19DCP4 19DRP4 19DCP4 19DRP4 19DEP4 19AVP4 19DEP4 19CHP4 19DEP4 19CHP4 19DFP4 19FLP4 19FEP4 19FLP4 19FEP4 19FLP4 19FEP4 19FLP4		19CRP4	198DP4	D	19EZP4	19EZP4	* D
19COP4 19CMP4 D 19FCP4A 19CXP4 19CXP4 D 19FCP4A 19CYP4 19AVP4 C 19FEP4A 19FEP4B *D 19DZP4 19DAP4 *E 19FEP4A 19FEP4A 19FEP4A *D 19DZP4 19DRP4 *E 19FEP4A 19FEP4A *D 19FEP4A 19DCP4 19DRP4 *D 19FLP4A 19FLP4A *D 19DEP4 19AVP4 E 19FLP4 19DQP4 *D 19DEP4 19AVP4 E 19FLP4 19FLP4 *D 19DEP4 19CHP4 D 19FLP4 19FLP4 *D 19DEP4 19CHP4 D 19FSP4 19FEP4B *D		19CSP4	19CHP4	D			
19CYP4 19AVP4 C 19CZP4 19DQP4 *E 19DAP4 *E 19DCP4 19DRP4 19DCP4 19DRP4 19DEP4 19DRP4 19DEP4 19AVP4 19DEP4 19AVP4 19DEP4 19CHP4 19DEP4 19CHP4 19DEP4 19CHP4 19FEP4 19FLP4 19FEP4 19FLP4 19FEP4 19FLP4	-	19CUP4	19CMP4	D		190004	* D
13CTP4 13AVT4 C 19FEP4A 19CZP4 19DQP4 *E 19FEP4B 19FEP4B •D 19DCP4 19DRP4 *D 19FJP4 19DQP4 *D 19DEP4 19AVP4 E 19FJP4 19DQP4 *D 19DEP4 19AVP4 E 19FJP4A 19FJP4A *D 19DEP4 19CHP4 E 19FJP4A 19FJP4A *D 19DEP4 19CHP4 E 19FJP4A *D 19FJP4A *D		19CXP4	19CXP4	the state of the s		1055515	
19CZP4 19DQP4 • E 19DAP4 • E 19DCP4 19DRP4 19DCP4 19DRP4 19DEP4 19AVP4 19DEP4 19CHP4 19DEP4 19CHP4 19FP4 19FLP4 19FP4 19FLP4 19FP4 19FLP4			19A VP4	С		19FEP4B	* D
19DCP4 19DRP4 *D 19DCP4 19DRP4 *D 19FJP4 19DQP4 *D 19FLP4 19FLP4 *D			19DQP4	* E		19FFP4B	* D
19DEP4 19AVP4 E 19F JF4A 19F LP4 • D 19DEP4 19CHP4 E 19F LP4 19F LP4 • D 19DEP4 19CHP4 D 19FSP4 19F LP4 • D			100 884		19F JP4		
19DEP4 19CHP4 D 19FSP4 19FEP4B * D						1051.04	
		13DFF4	ISCHF4				

▲ See Replacement information in front of this guide.

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Туре			Туре			
To Be ★	Replaced By		To Be ★	Replaced By		
Replaced	RCA Type		Replaced	RCA Type		\bigcirc
19FWP4	19A YP4	D	21AFP4	21 YP4B	AP	. •
19GAP4	19GAP4	*D	21ALP4	21CBP4A	AP	
19GBP4	19DQP4	*E	21ALP4A			
19GEP4	19GEP4A	*D	21ALP4B			
19GEP4A			21ALP4B/			
19GFP4			21ALP4A			
19GHP4	19DUP4	*C	21AMP4	21AMP4B	A	\smile
19GJP4	19DQP4	*D	21AMP4A			
19GJP4A			21AMP4B	21AMP4B	D	
19GNP4	19DRP4	*D	21ANP4	21CBP4A	AP	
19GRP4	19DQP4	•D	21ANP4A			
19GTP4	19FEP4B	* C	21AP4	21ZP4C	G	
19XP4	19AVP4	D	21AQP4	21AMP4B	AP	
19YP4	19AVP4	C	21AQP4A			
19ZP4	19AVP4	D	21ASP4	21XP4B	AP	
20CP4	20DP4D	ACP	21ATP4	21CBP4A	AP	
20CP4A	20DP4D	AC	21ATP4A			
20CP4B	20DP4D	ACP	21ATP4A/			
20CP4C			21ATP4			
20CP4D	20DP4D	AP	21ATP4B			
20DP4A	2001 10		21AUP4	21AVP4C	A	
20DP4A/	20DP4D	A	21AUP4A			
20CP4A		-	21AUP4B 21AUP4B/			
20DP4B	20DP4D	AP	21AUP4A			
20DP4C	200140		21AUP4C	21AVP4C	D	
20DP4C/	20DP4D	A	21AVP4		A	
20CP4D			21AVP4/	21AVP4C	A	
20DP4D	20DP4D	D	21AUP4			
20RP4	20RP4	* D	21AVP4A			
20SP4	20SP4	*D	21AVP4B			
20TP4	20TP4	*D	21AVP4B/			
20XP4			21AVP4A			
20YP4	20SP4	* D	21AVP4B/ 21AUP4B			
20ZP4	20SP4	* D	21AVP4A			
21ACP4	21AMP4B	A	21AUP4A			
21ACP4/			21AVP4C	21AVP4C	D	
21AMP4			21AWP4	21AWP4A	A	
21ACP4A 21ACP4A/			21AWP4A	21AWP4A	D	
21AMP4A			21A YP4	21XP4B	A	
21ACP4A/		8	21BAP4	21CBP4A	D	
21ACP4A/		54 GF 1	21BCP4	21 YP4B	C	
21BSP4/			21BDP4	21AVP4C	D	
21AMP4A			21BNP4	21CBP4A	D	
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▲ See Replacement information in front of this guide.

Electronic Components

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INTERCHANGEABILITY GUIDE 4

RCA PICTURE TUBE

	Туре	D	See.	Туре	D D.	4 ⁶
-	To Be ★ Replaced	Replaced By RCA Type		To Be ★ Replaced	Replaced By RCA Type	
	21BSP4	21AMP4B	A	21EP4A	21EP4C	A
-	21BTP4	21CBP4A	A	21EP4B		
-	21CBP4	21CBP4A		21EP4C	21EP4C	D
	21CBP4A 21CBP4A/ 21CBP4A/ 21CBP4/			21EQP4 21ESP4 21ETP4	21EMP4/ 21EQP4	D
	21CMP4 21CBP4B			21EVP4	21FDP4	CF
	21CEP4 21CEP4 21CEP4A	21EMP4/ 21EQPA	D	21FAP4	21EMP4/ 21EQP4	D
-	21CMP4	21CBP4A	A	21FDP4	21FDP4	D
-	21CQP4	21CQP4	D	21FLP4	21CBP4A	D
-	21CUP4	21AMP4B	A	21FP4	21FP4D	AP
-	21CVP4	21CBP4A	D	21FP4A 21FP4C	21FP4D	A
-	21CWP4	21CBP4A	A	21FP4D	21FP4D	D
3	21CXP4	21DSP4	D	21FVP4	21FVP4	* D
1	21CZP4	21EMP4/ 21EQP4	A	21FWP4 21FZP4		
	21DAP4 21DEP4	21DEP4A	D	21GAP4 21GAP4A	21GAP4A	* D
	21DEP4A		- 5.	21 KP4 21 KP4A	21FP4D	AK
	21DEP4A/			21MP4	21YP4B	E
	21DEP4/ 21CZP4			21WP4 21WP4A	21WP4B	A
-	21DFP4	21EMP4/	D	21WP4B	21WP4B	D
-		21EQP4		21XP4	21XP4B	A
	21DHP4	21DHP4	D	21XP4A		
	21DLP4	21DLP4	D	21XP4B	21XP4B	D
3	21DMP4	21EMP4/ 21EQP4	D	21 YP4 21 YP4A	21YP4B	A
	21DNP4	21CBP4A	AP	21YP4B	21YP4B	D
-	21DQP4	21DLP4	D	21ZP4	21ZP4C	AP
	21DRP4	21CBP4A	D	21ZP4A	21ZP4C	A
-	21DSP4	21DSP4	D	21AP4B 21ZP4C	217040	
_	21EAP4	21FDP4	F	23ACP4	21ZP4C. 23YP4	D
	21EDP4 21EMP4	21EMP4/ 21EQP4	D	23AFP4	23174	
	21EMP4/			23AGP4	23CP4	С
- (21EQP4	245240		23AHP4	23AHP4/	D
	21EP4	21EP4C	AP	23A KP4	23FP4A	С

▲ See Replacement information in front of this guide.

Electronic Components

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Туре			Туре			
То Ве 🔺	Replaced By		То Ве ★	Replaced By		
Replaced	RCA Type		Replaced	RCA Type		
23ALP4	23CQP4	D	23DLP4	23ENP4	*C	
23ANP4	23BKP4	D	23DLP4A			
23ARP4	23ARP4	D	23DNP4	23BKP4	D	
23ASP4	23ASP4	D	23DP4	23CP4	С	
224 TR4	23BKP4		23DQP4	23BKP4	M	
23ATP4	230KF4 23AHP4/	D	23DSP4 23DSP4A	23ENP4	*M	
23AUP4	234114/		23DTP4	23E KP4	*D	
23AVP4	23CP4	С	23DXP4	23CP4	D	
23AWP4	23BJP4	С	23DYP4	23ETP4	* P	
23BAP4	23CP4	С	23DZP4	23EQP4	*D	
23BDP4	23YP4	D	23ECP4	23ENP4	*E	
23BFP4	23FP4A	С	23EDP4	23EKP4	* E	
23BGP4 23BHP4	23BGP4	D	23E HP4 23E KP4	23EKP4	*D	
23BJP4	23BJP4	D	23E LP4			
23BKP4 23BLP4	23BKP4	D	23EMP4 23ENP4	23ENP4	* D	
23BMP4	23YP4	D	23EP4	23EP4	D	
23BNP4	23CP4	D	23EQP4	23EQP4	* D	
23BP4	23CP4	C	23ESP4	23HFP4A	* D	
23BQP4	23BQP4	D	23ETP4	23ETP4	* D	
23BCP4	23BQF4 23YP4	D	23EWP4 23EWP4A	23EQP4	* D	
23BVP4			23E YP4	23EYP4	D	
23BWP4	005 140 4		23EZP4	23EZP4	* D	
23BXP4	23EKP4	*E	23FBP4	23ENP4	* D	
23BZP4 23CBP4	23CGP4		23FCP4	23GJP4A	* D	\bigcirc
23CEP4	23BQP4	D	23FDP4			
	23ARP4		23FEP4	23ENP4	* D	
23CGP4 23CP4	23CGP4	D	23FHP4	23GJP4A	* D	
23CP4 23CP4A	23CP4	D	23F JP4	23ETP4	*D	
23CQP4	23CQP4	D	23FLP4	23E KP4	* D	
23CUP4	23CP4	С	23FMP4	23HFP4A	* D	
23CZP4	23A HP4	D	23FP4 23FP4A	23FP4A	D	
23DAP4	23DAP4	D	23F RP4	23FRP4	* D	
23DBP4	23DBP4	D	23FSP4	23FSP4	* D	
23DBP4	23DBP4 23EKP4	*D	23FVP4	23HFP4A	* D	
▲ See Replacement information in front of this guide.						

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Electronic INTE Components GUID

INTERCHANGEABILITY GUIDE 5

RCA PICTURE TUBE

	Туре		1	Туре	
		Deplored By		To Be * Replaced By	
-	To Be \star		· .	and a second sec	
	Replaced	RCA Type		Replaced RCA Type	
	23FZP4	23GSP4	* D	23XP4 23YP4	D
	23GBP4	23HFP4A	* D	23YP4	A
	23GEP4	23ENP4	* D	24ADP4 24CP4B	A
	23GFP4	23HGP4	* D	24ADP4/	
	23GJP4	23GJP4A	* D	24VP4A/ 24CP4A/	
	23GJP4A			24CP4A/ 24TP4	
	23GP4	23CP4	D	24AEP4 24AEP4	D
	23GSP4	23GSP4	* D	24AHP4 24AHP4	D
	23GTP4	23ETP4	* D	24ALP4 24AHP4	D
	23GUP4	23F RP4	* D	24ANP4 24AEP4	A
	23G VP4	23HUP4A	* D	24AUP4 24AUP4	A
	23GWP4	23GWP4	* D	24AVP4 24BEP4	F
-	23G XP4	23GSP4	* D	24BEP4 24BEP4	D
	23GZP4	23EKP4	* E	24CP4 24CP4B	D
	23HFP4	23HFP4A	* D	24CP4A 24CP4B	A
	23HFP4A 23HGP4	23HGP4	* D	24CP4B 24CP4B	D
	23HLP4	23GSP4	* D	24DP4 24AEP4	A
	23HP4	23CP4	D	24DP4A	
	23HQP4	23HGP4	* D	24DP4A/	
	23HRP4	23HWP4A		24YP4	AP
	23HSP4	231100144	* C	24 <u>QP4</u> 24 <u>CP4B</u> 24 <u>TP4</u> 24 <u>CP4B</u>	AF
	23HUP4	23HUP4A	* D	241F4 24CF4B	~
	23HUP4A	25110144	- 0	24VP4A	
	23HWP4	23HWP4A	* D	24XP4 24CP4B	AP
	23HWP4A	23HWP4A	* D	24YP4 24AEP4	A
	23HXP4	23HFP4A	* D	24ZP4 24EAP4	D
	23HYP4	23JEP4	* D	230RB4 9WP4	*D
	23JAP4	23GJP4A	* D	310AVB4 12CNP4	*D
	23JBP4	23FSP4	*C	470ACB4 19AYP4	D *D
	23JEP4	23JEP4	*D	500KB4 20TP4 SG10FP4A 10 FP4 A	D
	23JGP4	23FRP4	*D	SG14WP4 14WP4	D
1	23JHP4	23HFP4A	*D	SG16KP4A 16RP4B	D
	23JLP4	23HUP4A	*D	SG17BJP4 17BJP4	D
	23JP4	23JP4	D	SG17BP4B 17BP4D	D
	23KP4	23FP4A	С	SG17CKP4 17DSP4	D
	23KP4A				D
	23LP4	23ETP4	*D	SG17LP4A 17LP4B	D
	23MP4	23FP4A	D	SG17QP4A 17QP4B SG20CP4D 20DP4D	D C
1	23MP4/			SG21ACP4A 21AMP4B	D
	23MP4A/			SG21ALIPAR 21AVPAC	D
	23WP4			SG21AUP4B 21AVP4C SG21AWP4 21AWP4A	D
	23MP4A			SG21DEP4A21EMP4/	D
	23NP4	23NP4	D	21EQP4	
-	23QP4	23CP4	D	SG21EP4B 21EP4C SG21FLP4 21CBP4A	D
	23TP4	23YP4	D	SG21FLP4 21CBP4A SG21FP4C 21FP4D	D
	23UP4	23BQP4	D	SG21WP4A 21WP4B	D
	23WP4	23FP4A	D		1.11
	A See Rei	nlacement infor	mation	in front of this guide	

(

▲ See *Replacement information* in front of this guide.

Electronic Components

RB/A

INTERCHANGEABILITY GUIDE 6 8-70

Type To Be ★ Replaced By Replaced RCA Type ▲	Type To Be ★ Replaced By Replaced RCA Type ▲
SG21XP4A 21XP4B D	SG24AEP4 24AEP4 D
SG21YP4A 21YP4B D	SG24CP4A 24CP4B D
SG21ZP4B 21ZP4C D	

▲ See Replacement information in front of this guide.

Electronic Components

INTERCHANGEABILITY GUIDE 6

Safety Precautions For Color Picture Tubes

WARNING

X-Radiation:

Operation of the referenced color picture tube at abnormal conditions which exceed the 0.5 mR/h isodose-rate curve shown for this tube may produce soft X-rays which may constitute a health hazard on prolonged exposure at close range unless adequate external shielding is provided. Therefore, precautions must be exercised during servicing of TV receivers employing this tube to assure that the anode voltage and other tube voltages are adjusted to the recommended values so that the Design-Maximum Ratings will not be exceeded.

This color picture tube incorporates integral X-radiation shielding and must be replaced with a tube of the same type number or an RCA recommended replacement to assure continued safety.

Implosion Protection:

This picture tube employs integral implosion protection and must be replaced with a tube of the same type number or an RCA recommended replacement to assure continued safety.

Shock Hazard:

The high voltage at which the tube is operated may be very dangerous. Design of the TV receiver should include safeguards to prevent the user from coming in contact with the high voltage. Extreme care should be taken in the servicing or adjustment of any high-voltage circuit.

Caution must be exercised during the replacement or servicing of the picture tube since a residual electrical charge may be contained on the high-voltage capacitor formed by the external and internal conductive coatings of the picture tube funnel. To remove any undesirable residual high-voltage charges from the picture tube, "bleed off" the charge by shorting the anode contact button, located in the funnel of

Safety Precautions For Color Picture Tubes

the picture tube, to the external conductive coating before handling the tube. Discharging the high voltage to isolated metal parts such as cabinets and control brackets may produce a shock hazard.

Tube Handling:

Picture tubes should be kept in the shipping box or similar protective container until just prior to installation. Wear heavy protective clothing, including gloves and safety goggles with side shields, in areas containing unpacked and unprotected tubes to prevent possible injury from flying glass in the event a tube breaks. Handle the picture tube with extreme care. Do not strike, scratch or subject the tube to more than moderate pressure. Particular care should be taken to prevent damage to the seal area.

The equipment manufacturer should provide a warning label in an appropriate position on the equipment to advise the serviceman of all safety precautions.

SAFETY PRECAUTIONS



FEATURES OF FLUORESCENT SCREENS

The fluorescent screens of the cathode-ray tubes covered in this Section are identified according to phosphor number, e.g., P1, P2, P4, P5, P7, etc.

Phosphor P1 produces a brilliant spot having yellowish-green fluorescence and medium persistence. Types having this phosphor are particularly useful for general oscillographic applications in which recurrent-wave phenomena are to be observed visually.

Phosphor P2 is a medium-persistence screen which exhibits yellowish-green fluorescence and phosphorescence. The phosphorescence may persist for over a minute under conditions of adequate excitation and low-ambient light. Types utilizing this phosphor are particularly useful for observing either low- ormedium-speed non-recurring phenomena.

Phosphor P4 is a highly efficient screen having white fluorescence and medium-short persistence. Types having this phosphor are of particular interest for television picture tubes.

Phosphor P5 produces a highly actinic spot having blue fluorescence and medium-short persistence. Types having this phosphor are especially useful in photographic applications involving film moving at very high speeds.

Phosphor P7 is a very long-persistence, cascade (two-layer) screen. During excitation by the electron beam, this phosphor produces a purplish-blue fluorescence. After excitation, the screen exhibits a yellowish-green phosphorescence which persists for several minutes. Types having this phosphor are particularly useful where either extremely low-speed recurrent phenomena or medium-speed non-recurrent phenomena are to be observed.

Phosphor P11 produces a brilliant actinic spotof blue fluorescence and medium-short persistence to permit its use in all photographic applications except those in which film moves at high speed. P11 screens, because of their unusually high brightness characteristic, may also be used for visual observation of phenomena.

Phosphor P12 is a long-persistence phosphor which exhibits both yellowish-orange fluorescence and phosphorescence. Types utilizing this phosphor are particularly useful for observing low- and medium-speed recurring phenomena.

Phosphor P14 is a long-persistence cascade (two-layer) screen. During excitation by the electron beam, this phosphor exhibits purplish-blue fluorescence. After excitation, it exhibits a yellowish-orange phosphorescence which persists for a little over a minute. Types utilizing this phosphorare particularly useful for observing either low- and medium-speed non-recurring phenomena or high-speed recurring phenomena.



FEATURES OF FLUORESCENT SCREENS

Phosphor P15 has radiation in the visible green region and in the invisible near-ultraviolet region. The ultraviolet radiation has short persistence which is appreciably shorter than that of the visible radiation. This phosphor finds application in flying-spot cathode-ray tubes.

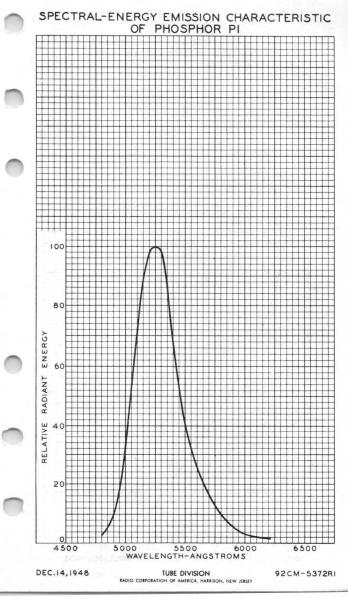
Phosphor P16 has violet as well as near-ultroviolet fluorescence and phosphorescence with very short persistence. This phosphor has a stable, exponential decay characteristic and is particularly useful for the high-speed scanning requirements of a flying-spot video-signal generator.

Phosphor P20 has high luminous efficiency, yellow-green fluorescence and medium-short persistence. The screen may be used in applications requiring relatively short persistence and good visual efficiency.

Phosphor P22 is the designation for three separate phosphors used in combination in a color picture tube. The separate phosphors are blue, green, and red, respectively. The persistence of the group phosphorescence is classified as medium.

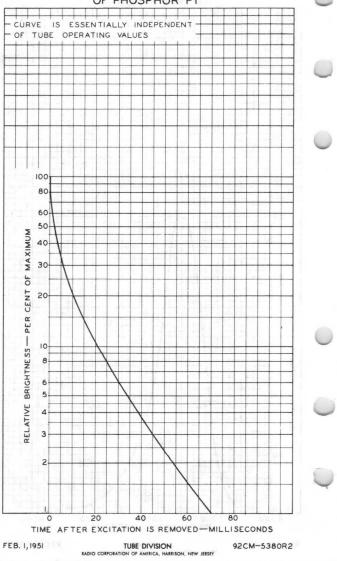
Phosphor P24 is a short-persistence phosphor with green fluorescence and phosphorescence. Its spectral-energy emission characteristic has sufficient range to provide useable energy over the visible spectrum required for generating color signals from color transparencies.



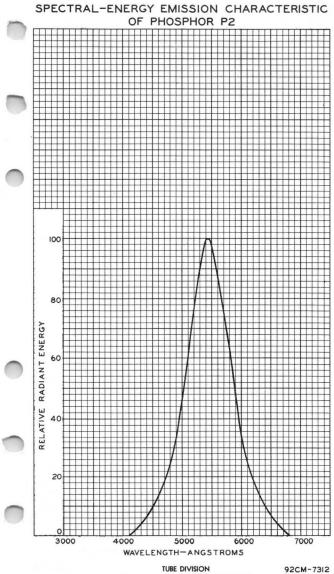




PERSISTENCE CHARACTERISTIC



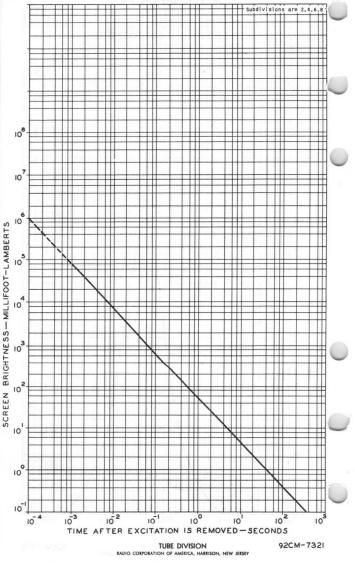


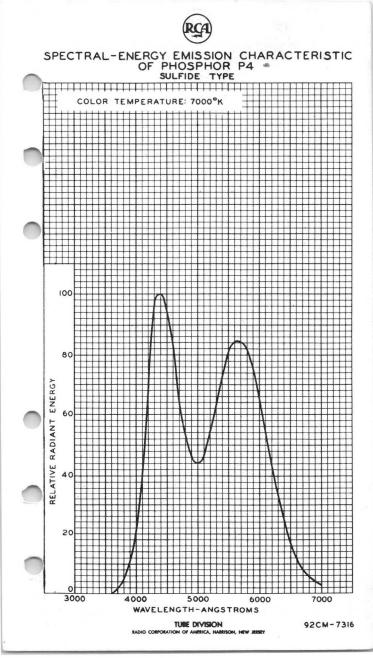


RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



PERSISTENCE CHARACTERISTIC OF PHOSPHOR P2







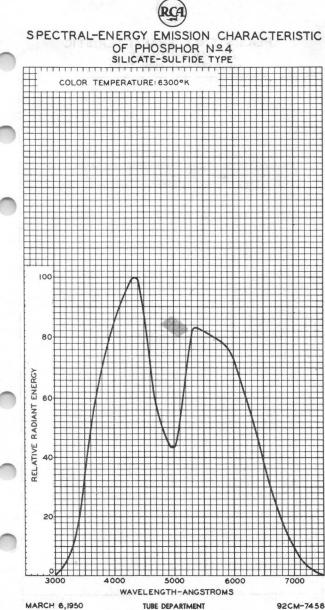
PERSISTENCE CHARACTERISTIC OF PHOSPHOR P4 SULFIDE TYPE

FOR KINESCOPES

The persistence of the phosphorescence is such that its brightness does not exceed 7 per cent of the peak value in 33 milliseconds after excitation is removed.

FOR OSCILLOGRAPH TUBES

The persistence characteristics of the phosphorescence are the same as those shown for the P11 phosphor.



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



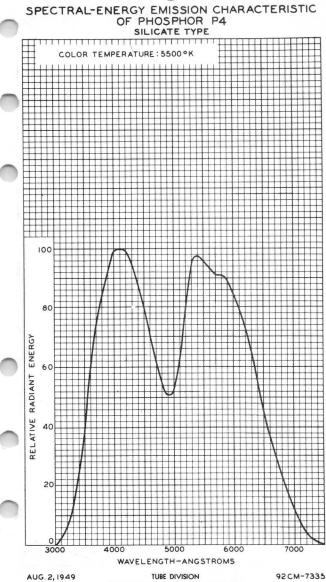
PERSISTENCE CHARACTERISTIC OF PHOSPOR Nº 4 SILICATE-SULFIDE TYPE

The persistence of the phosphorescence is such that its brightness does not exceed 7 per cent of the peak value in 33 milliseconds after excitation is removed.



TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY PERSIST. P4 SIL.-SUL.





RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

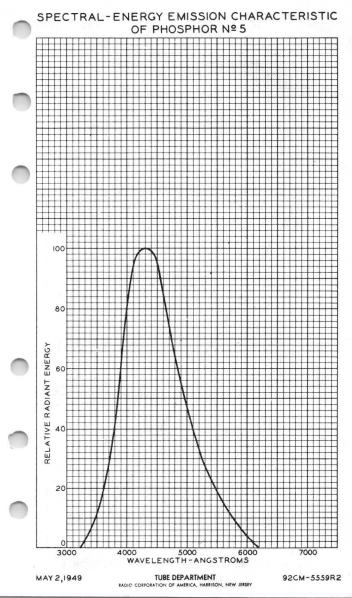


PERSISTENCE CHARACTERISTIC OF PHOSPOR P4 SILICATE TYPE

The persistence of the phosphorescence is such that its brightness does not exceed 7 per cent of the peak value in 33 milliseconds after excitation is removed.

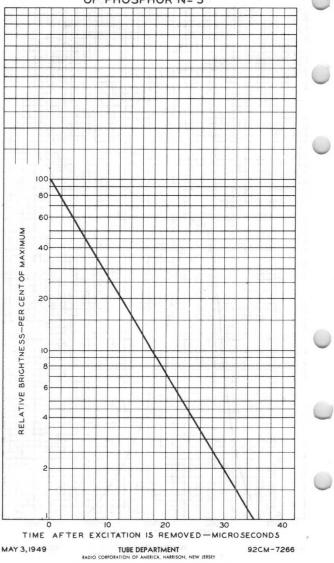
PERSIST. P4 SILICATE

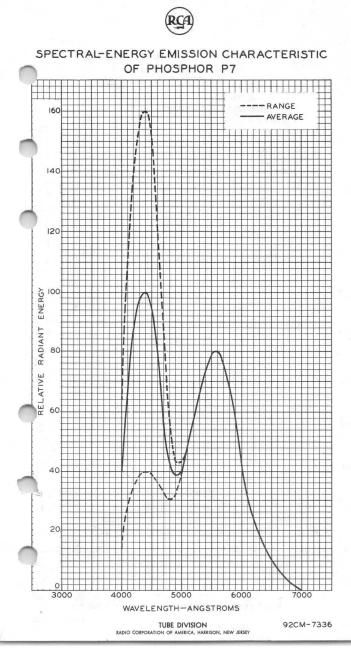


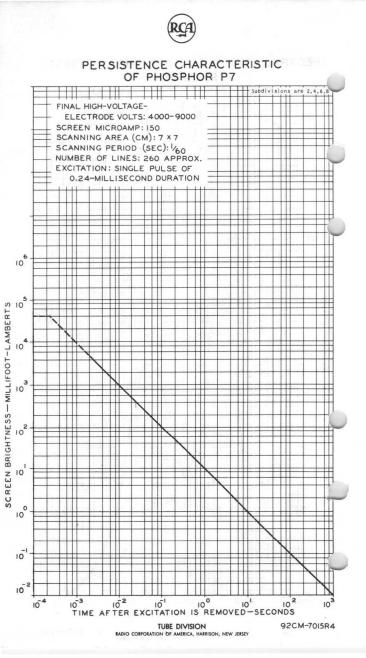




PERSISTENCE CHARACTERISTIC OF PHOSPHOR № 5

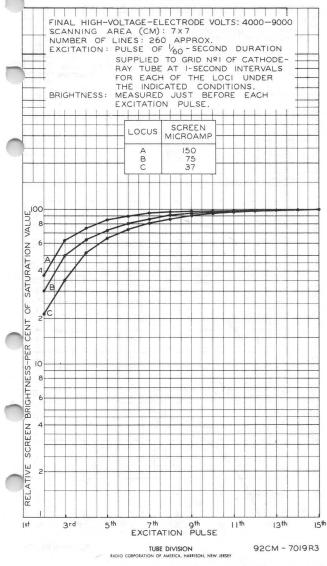






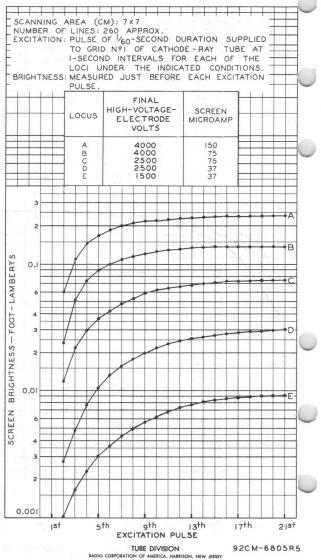


BUILDUP CHARACTERISTICS OF PHOSPHOR P7



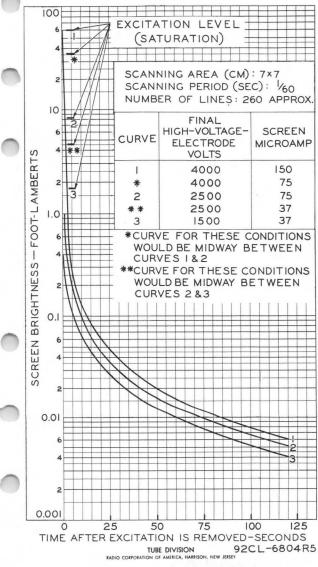


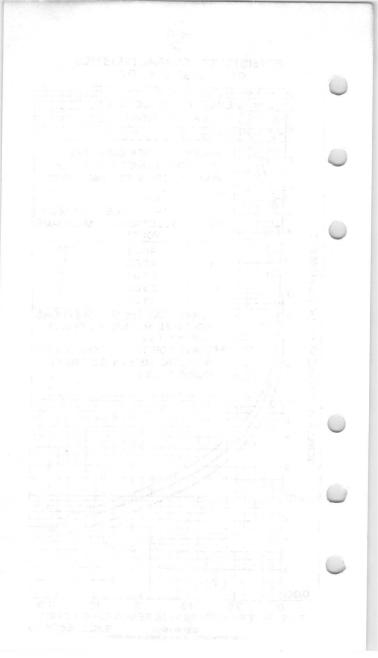
BUILDUP CHARACTERISTICS OF PHOSPHOR P7



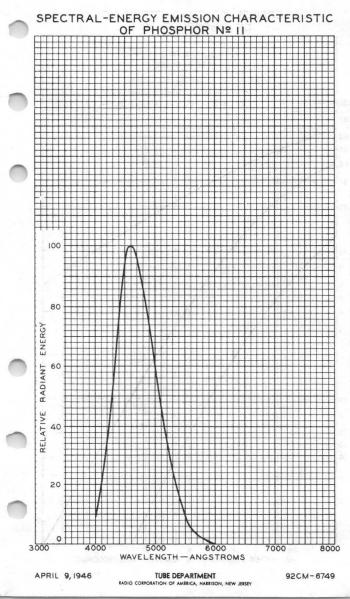


PERSISTENCE CHARACTERISTICS OF PHOSPHOR P7



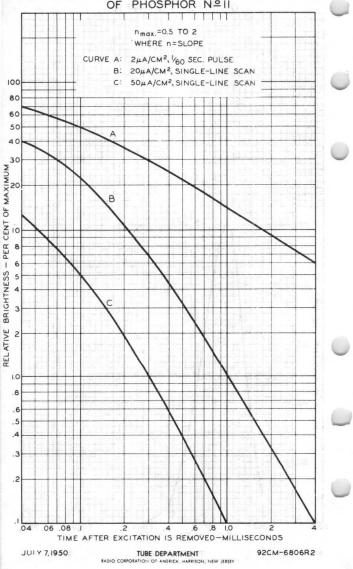




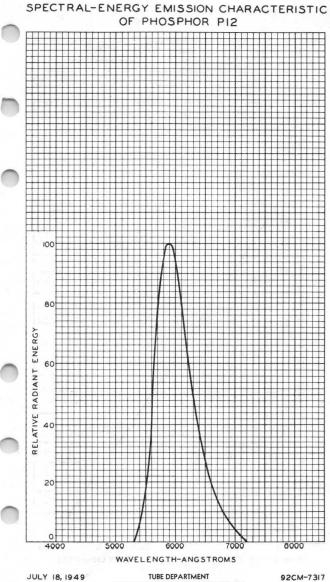




PERSISTENCE CHARACTERISTICS OF PHOSPHOR NºII



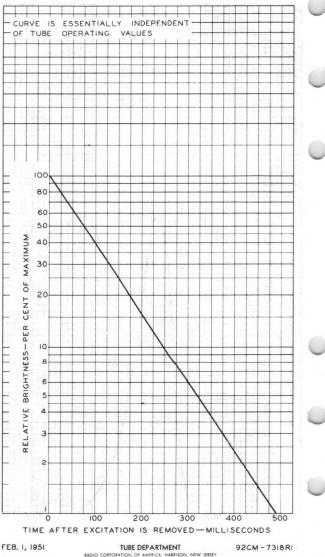




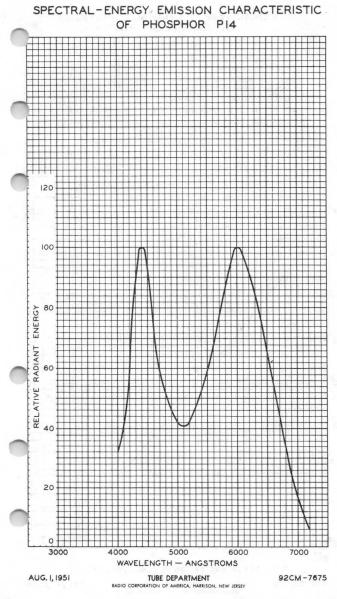
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

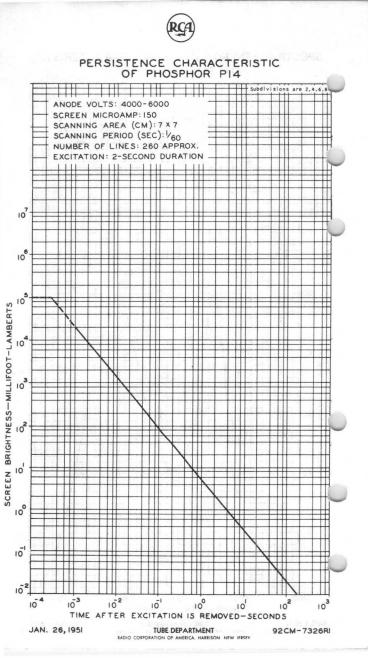


PERSISTENCE CHARACTERISTIC OF PHOSPHOR PI2



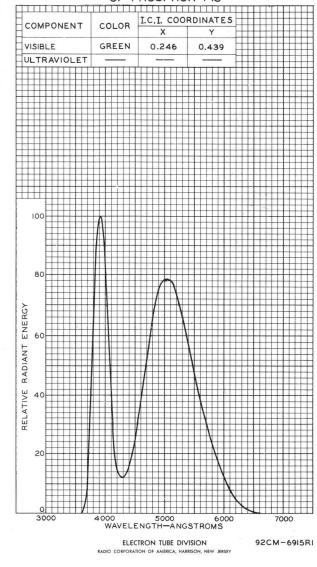






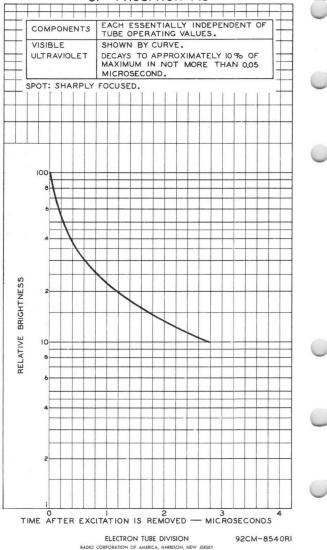


SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR PI5



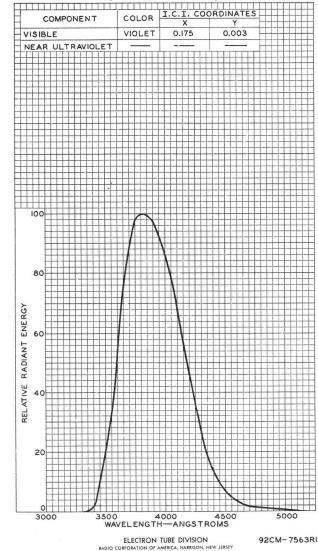


PERSISTENCE CHARACTERISTIC OF PHOSPHOR PI5



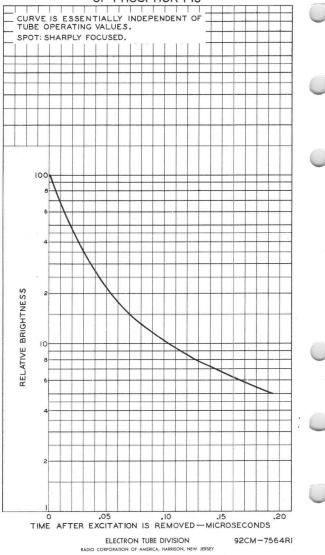


SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR PI6

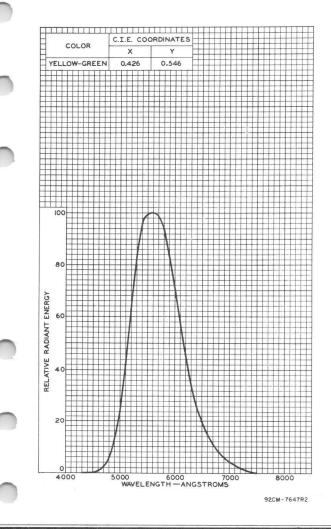




PERSISTENCE CHARACTERISTIC OF PHOSPHOR PI6



Spectral-Energy Emission Characteristic



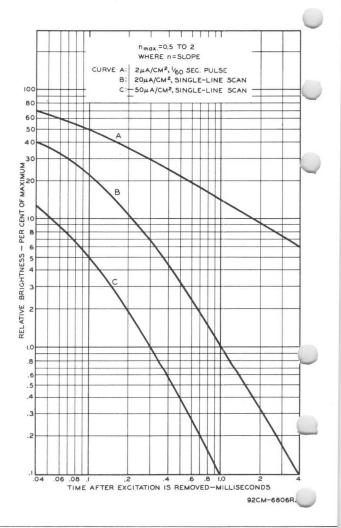


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Harrison, N. J.

GROUP PHOS-PHOR P20 4-66





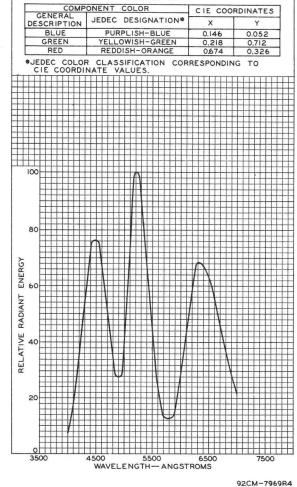
DATA 2

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



SPECTRAL-ENERGY EMISSION CHARACTERISTIC

SIMULTANEOUS EXCITATION OF BLUE PHOSPHOR, GREEN PHOSPHOR, AND RED PHOSPHOR TO PRODUCE 8500° K +27 M.P.C.D. WHITF (X=0.287,Y=0.316).





RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. GROUP PHOS-PHOR P22 10-60

PERSISTENCE CHARACTERISTIC

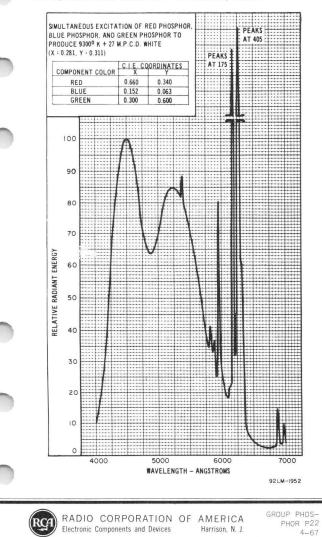
The persistence of the group phosphorescence is such that its brightness does not exceed 7 per cent of the peak value in 33 milliseconds after excitation is removed.



Group Phosphor P22 New Rare-Earth (Red), Sulfide (Blue & Green) Type^a

Spectral-Energy Emission Characteristic

a The relative intensities of the narrow-emission bands of the red phosphor are dependent on the resolution of the measuring device.



Group Phosphor P22 New Rare-Earth (Red), Sulfide (Blue & Green) Type

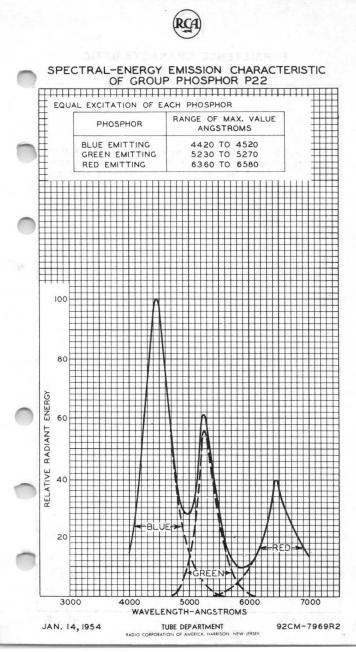
PERSISTENCE CHARACTERISTIC

The persistence of the group phosphorescence is medium short. Persistence of the component phosphors is such that after excitation is removed, brightness decays to a level not exceeding 10 per cent of the initial value in:

22 microseconds (Approx.).					-	.Blue	phosphor
60 microseconds (Approx.).	×	•		×		Green	phosphor
1 millisecond (Approx.)						 . Red	phosphor



GROUP PHOS-PHOR P22 RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

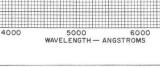




PERSISTENCE CHARACTERISTIC OF GROUP PHOSPHOR P22

The persistence of the group phosphorescence is such that its brightness does not exceed 7 per cent of the peak value in 33 milliseconds after excitation is removed.

Group Phosphor P22 Rare-Earth (Red), Sulfide (Blue & Green) Type Spectral-Energy Emission Characteristic The relative intensities of the narrow-emission bands of the red phosphor are dependent on the resolution of the measuring device. SIMULTANEOUS EXCITATION OF RED PHOSPHOR, BLUE PHOSPHOR, AND GREEN PHOSPHOR TO PRODUCE 9300° K + 27 M.P.C.D. WHITE (X= 0.281, Y= 0.311). C.I.E. COORDINATES COMPONENT COLOR x Y RED 0.676 0.324 BLUE 0.155 0.06 0.290 0.590 GREEN PEAKS IN THIS AREA HAVE BEEN REDUCED BY A FACTOR OF 5. 100



GROUP PHOS-9-65

92CM-13088 RI



90

80

70

50

30

20

10

0

RADIANT ENERGY 60

RELATIVE 40

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AMERICA Harrison, N. J.

Group Phosphor P22

Rare-Earth (Red), Sulfide (Blue & Green) Type

PERSISTENCE CHARACTERISTIC

The persistence of the group phosphorescence is medium short. Persistence of the component phosphors is such that after excitation is removed, brightness decays to a level not exceeding 10 per cent of the initial value in:

22 microseconds (Approx.) Blue phosphor

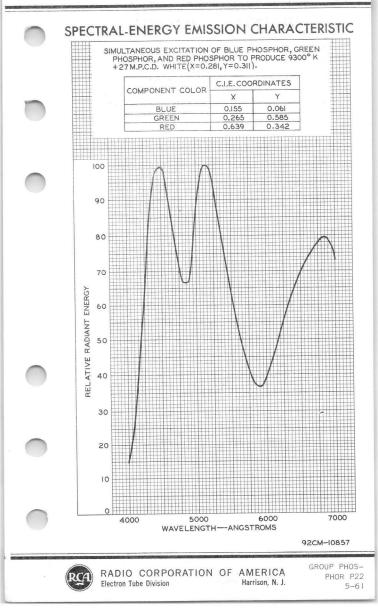


GROUP PHOS-PHOR P22

RADIO CORPORATION OF AMERICA Electronic Components and Devices

Group Phosphor P22

All-Sulfide Type



Group Phosphor P22

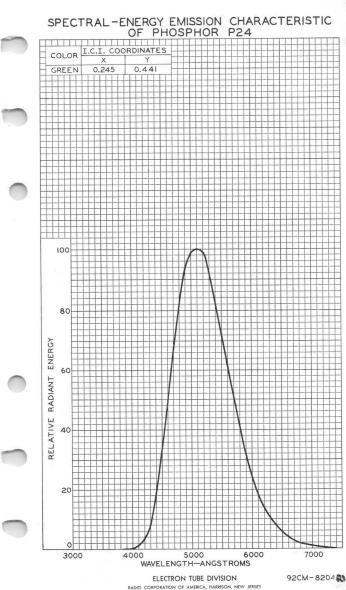
All-Sulfide Type

PERSISTENCE CHARACTERISTIC



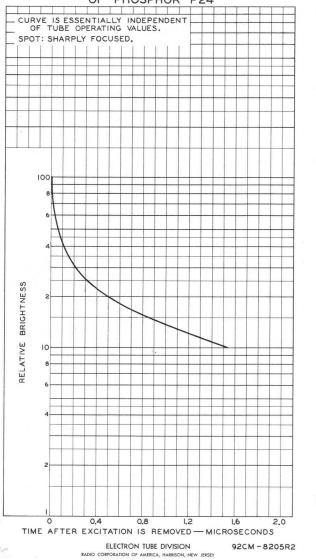
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



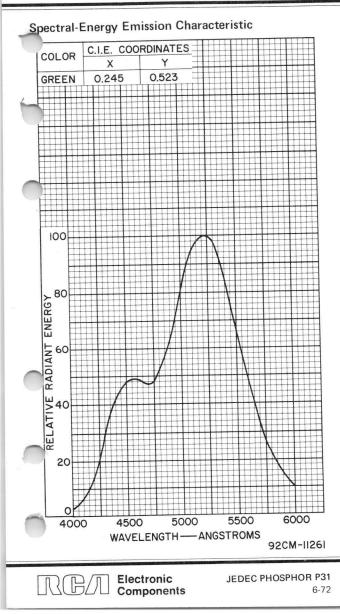




PERSISTENCE CHARACTERISTIC OF PHOSPHOR P24

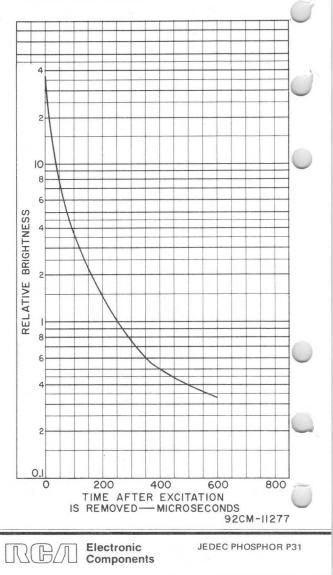


JEDEC PHOSPHOR P31



JEDEC PHOSPHOR P31





Picture-Tube Dimensional Outlines

The Dimensional Outlines on the following pages provide the basic dimensions of RCA Picture Tubes. These Dimensional Outlines are classified by Bulb Designations in accordance with the designation system established by the American Standards Association. Tube neck length, tube overall length, base designation, and the configuration of the external conductive coating (when used) are not shown on these Dimensional Outlines. These items are covered on the data sheets for specific picture-tube types.

The terms used in the picture-tube data sheets to describe the Type of External Conductive Coating and the Contact Area for Grounding are defined below:

Type of External Conductive Coating

Regular Band. A band of external conductive coating of uniform height covering part of the bulb funnel. The band may entirely encompass the funnel except for an insulated area in the region of the anode (ultor) contact.

Modified Band. A coating configuration similar to a Regular Band except for special contouring of the upper and/or lower edges.

Special. A coating configuration not defined in the industry specification for the tube type.

Contact Area for Grounding

Near Reference Line. Refers to the position of the contact area usually employed for grounding a Regular or Modified Band of external conductive coating. A spring-finger contact mounted on the deflecting yoke or on the tube mounting assembly is normally employed for grounding the external conductive coating.

Special. Indicates that one or more contact areas for grounding the external conductive coating other than the area near the reference line are provided in the industry specification for the tube type.

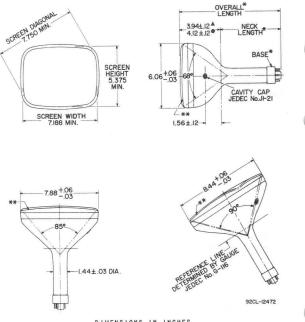


CRT OUTLINES 1 4-65

Dimensional Outline Bulb J67-1/2 A

FOR PICTURE TUBES UTILIZING BULB J67-1/2 A

(For bulbs with and without integral protective window)



DIMENSIONS IN INCHES

See data for specific tube type. Integral protective window is indicated. For bulb without protective window. For bulb with protective window. RADIO CORPORATION OF AMERICA CRT

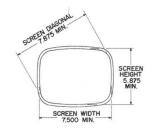
OUTLINES 1

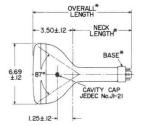
Electronic Components and Devices

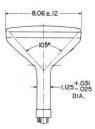


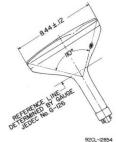
Dimensional Outline Bulb J67-1/2 B

FOR PICTURE TUBES UTILIZING BULB J67-1/2 B









DIMENSIONS IN INCHES

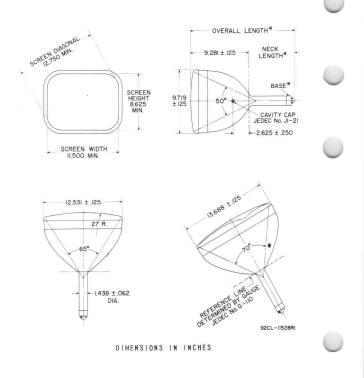
* See data for specific tube type.



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. CRT OUTLINES IA 4-65

Dimensional Outline Bulb J109-1/2 A/C

FOR PICTURE TUBES UTILIZING BULB J109-1/2 A/C

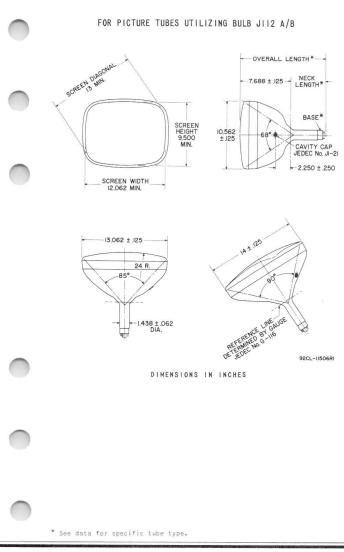


* See data for specific tube type.

OUTLINES IA

RADIO CORPORATION OF AMERICA Electronic Components and Devices







RADIO CORPORATION OF AMERICA Electronic Components and Devices

Harrison, N. J.

CRT OUTLINES 2 4-65



Bulb J125 A

FOR PICTURE TUBES UTILIZING BULB J125 A AND PROTECTIVE WINDOW (FP125 A) OVERALL SCREEN DIAGONAL LENGTH* 6.312 NECK LENGTH* ±.188 BASE * SCREEN HEIGHT 10.250 2 11.094 85° ±.125 MIN. 5 JEDEC No. JI-21 -1.500 ± .125 SCREEN WIDTH 15.625 ±.125 13,703 ± 125 25.88 R. 102° .125 +.043 GE DIA. 126 BC 92CL-12264RI DIMENSIONS IN INCHES

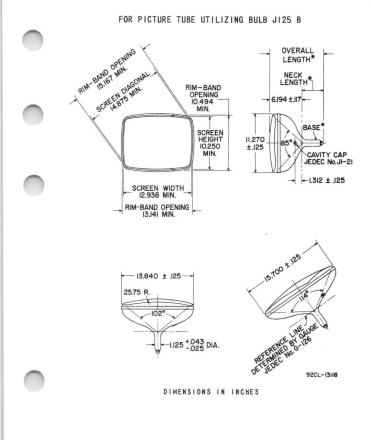
* See data for specific tube type.

CRT OUTLINES 2

RADIO CORPORATION OF AMERICA Electronic Components and Devices



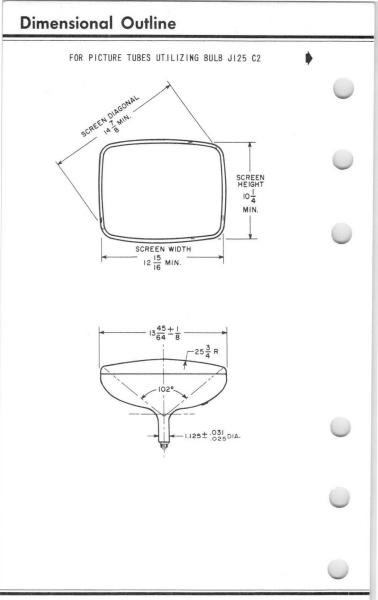
Bulb J125 B



* See data for specific tube type.



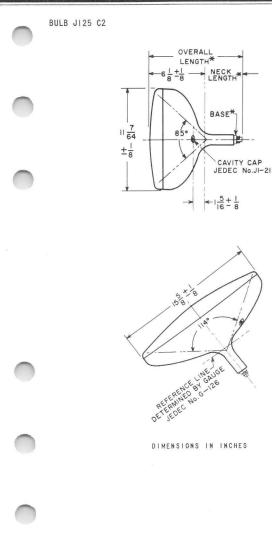
RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. CRT OUTLINES 3 4-65



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



Bulb J125 C2



* See data for specific tube type.

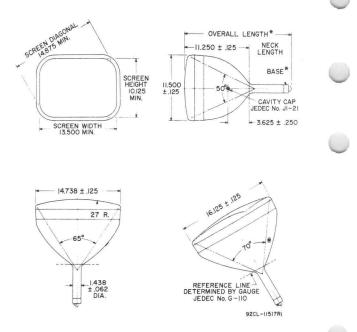
RCA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. CRT OUTLINES 4 10-65

92CL-12037

Dimensional Outline Bulb J129 A/B

FOR PICTURE TUBES UTILIZING BULB J129 A/B



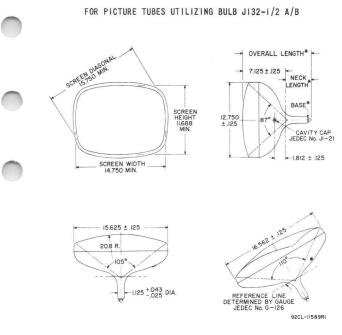
DIMENSIONS IN INCHES

* See data for specific tube type.

CRT OUTLINES 4 RADIO CORPORATION OF AMERICA Electronic Components and Devices



Dimensional Outline Bulb J132-1/2 A/B



DIMENSIONS IN INCHES

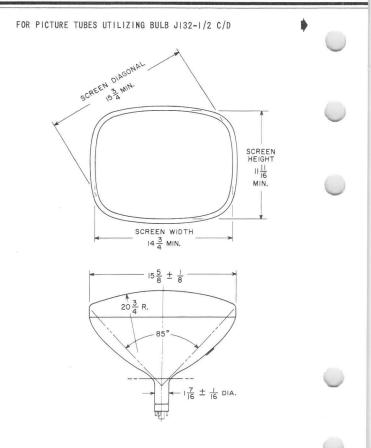
* See data for specific tube type.



RADIO CORPORATION OF AMERICA Electronic Components and Devices

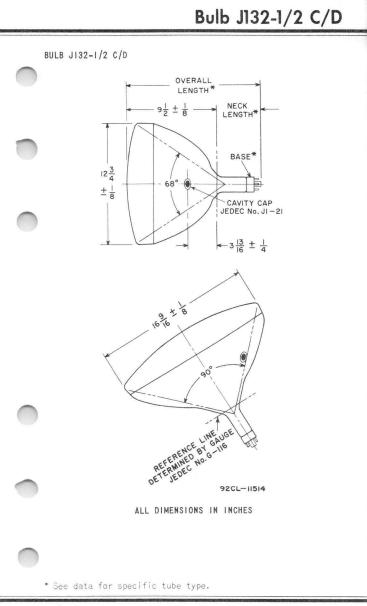
Harrison, N. J.

OUTLINES 5 10-65



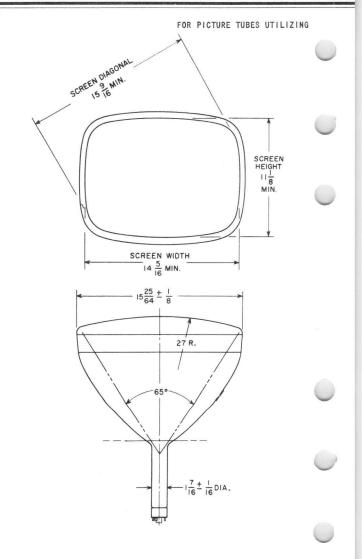
RADIO CORPORATION OF AMERICA Harrison, N. J. Electronic Components and Devices







RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 6 3-62

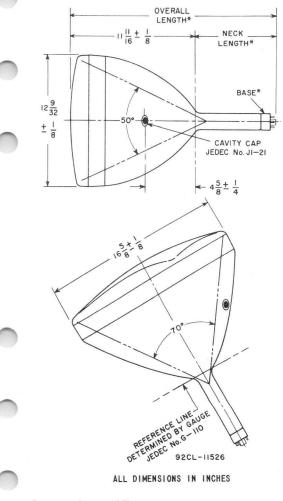


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



Bulb J133 B/D

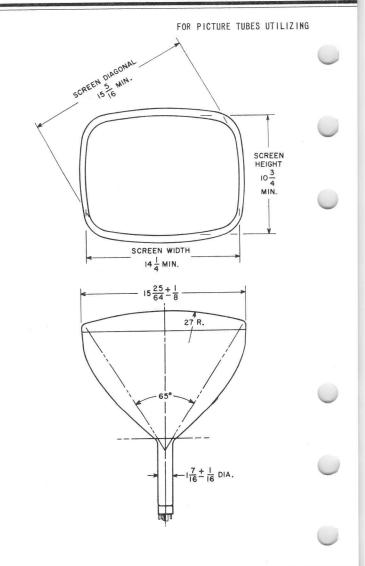
BULB JI33 B/D



* See data for specific tube type.



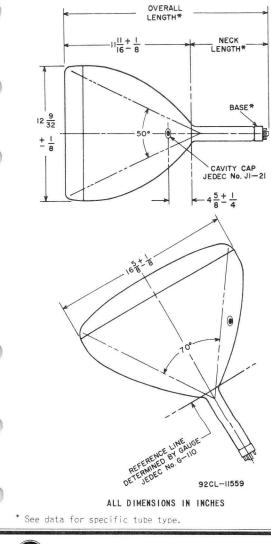
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 7 3-62



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



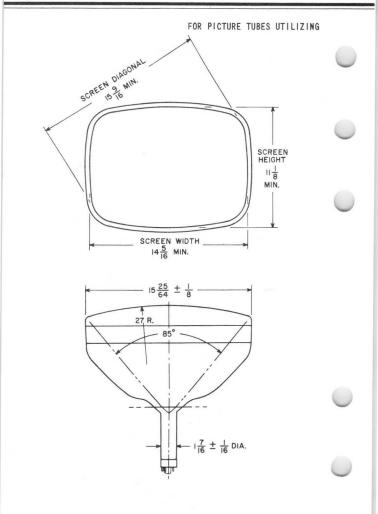
BULB JI33 C/E



Electron Tube Division

RADIO CORPORATION OF AMERICA Harrison, N. J.

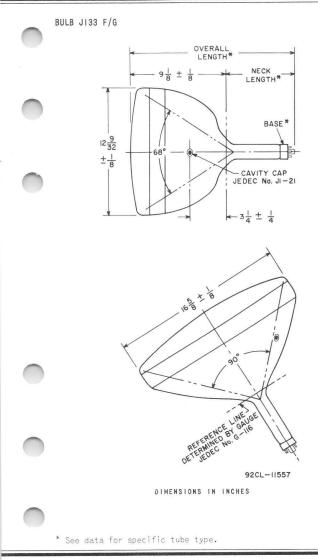
CRT OUTLINES 8 3-62



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.





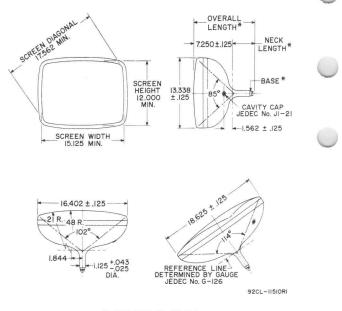




RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. CRT OUTLINES 9 10-65

Bulb J149 A

FOR PICTURE TUBES UTILIZING BULB J149 A



DIMENSIONS IN INCHES

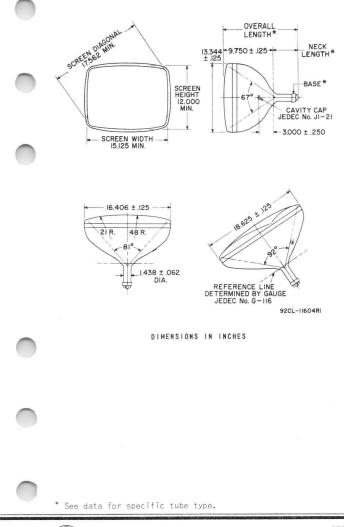
* See data for specific tube type.

CRT OUTLINES 9 RADIO CORPORATION OF AMERICA Electronic Components and Devices



Bulb J149 B



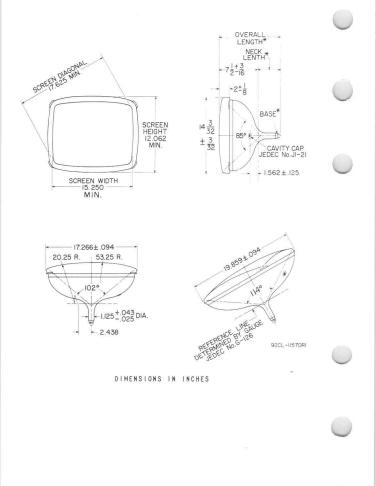


RADIO CORPORATION OF AMERICA Electronic Components and Devices

Harrison, N. J.

CRT OUTLINES 11 10-65

FOR PICTURE TUBES UTILIZING BULB J149 C AND PROTECTIVE PANEL



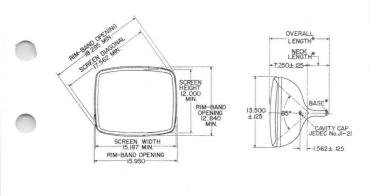
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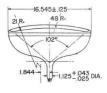
CRT

RADIO CORPORATION OF AMERICA Electronic Components and Devices











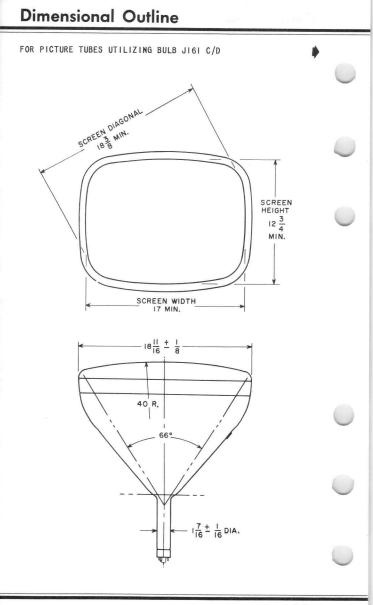
DIMENSIONS IN INCHES

*See data for specific tube type.



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

CRT OUTLINES 12 10-64

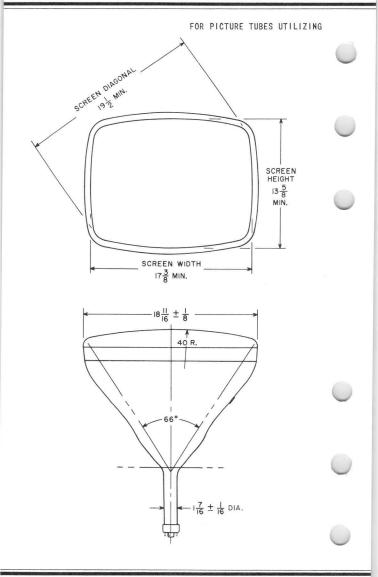




BULB JIGI C/D OVERALL LENGTH* $14\frac{1}{4} \pm \frac{3}{16}$ NECK LENGTH* BASE* 14 15 509 - 18 CAVITY CAP JEDEC No.JI-21 $\leftarrow 6\frac{5}{8} + \frac{1}{4}$ 2032 18 0 10° REFERENCE LINE REFERENCE DI GAUGE DET JEDEC NO. G-110 92CL-11597 ALL DIMENSIONS IN INCHES * See data for specific tube type.



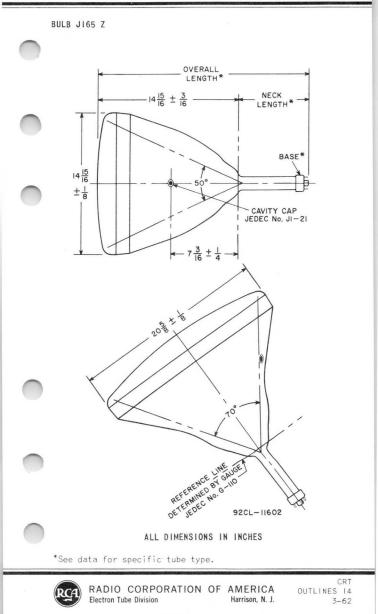
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 13 3-62

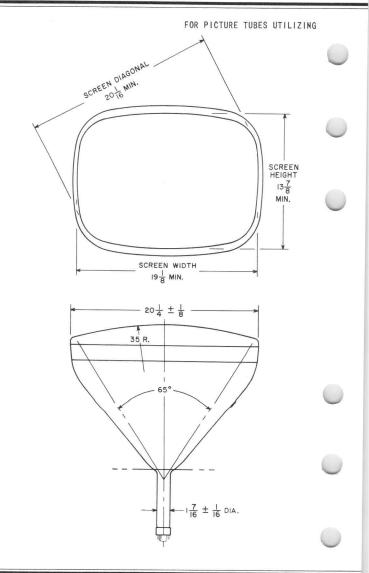


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



Bulb J165 Z

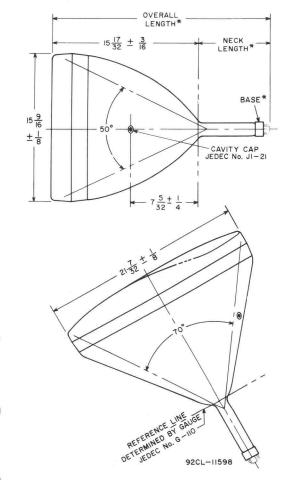






Bulb J170 A/C

BULB JI70 A/C

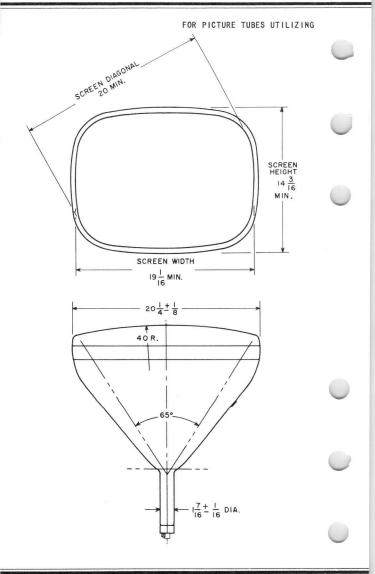


ALL DIMENSIONS IN INCHES

* See data for specific tube type.



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 15 3-62

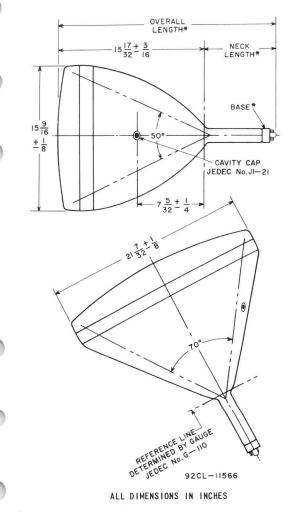


RADIO CORPORATION OF AMERICA Harrison, N. J. **Electron Tube Division**



Bulb J170 B/D

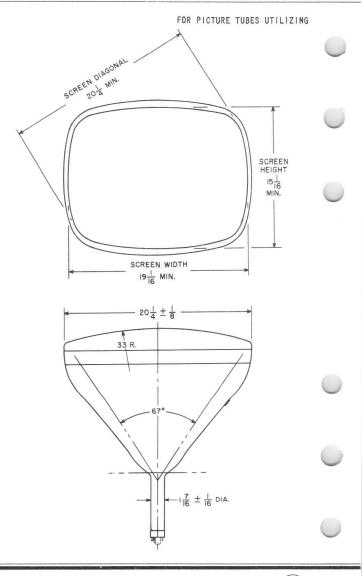
BULB JI70 B/D



* See data for specific tube type.



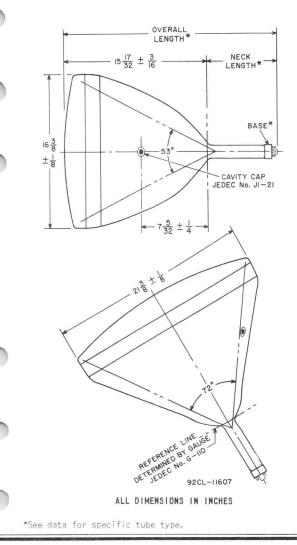
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 16 3-62



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

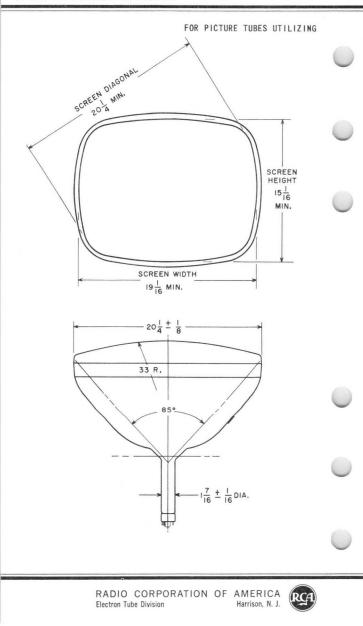


BULB JI71 B/F

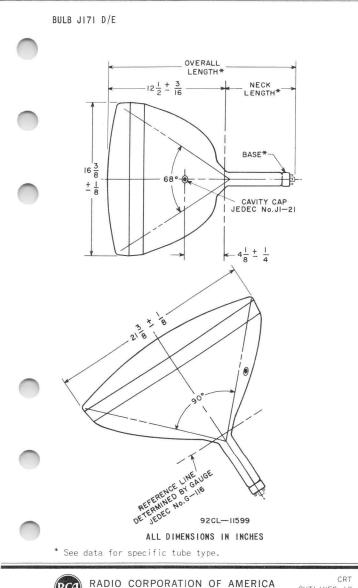




RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 17 3-62

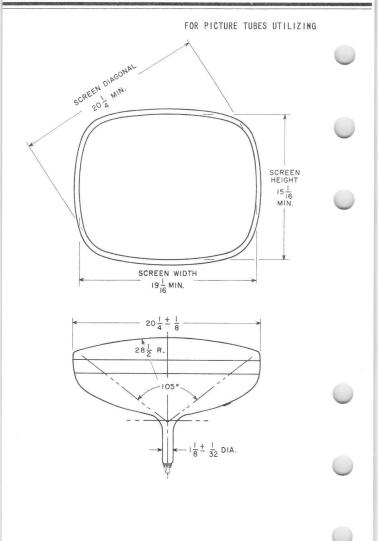


Bulb J171 D/E



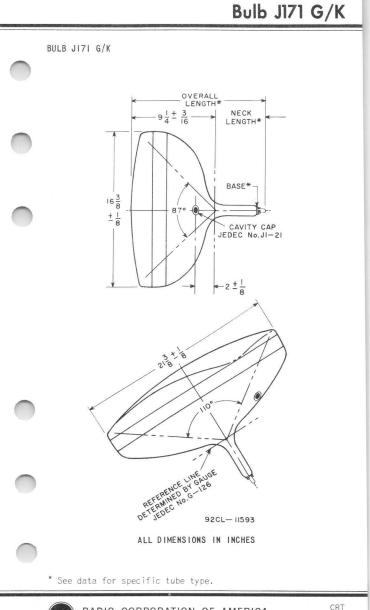
Electron Tube Division

AMERICA Harrison, N. J. CRT OUTLINES 18 3-62



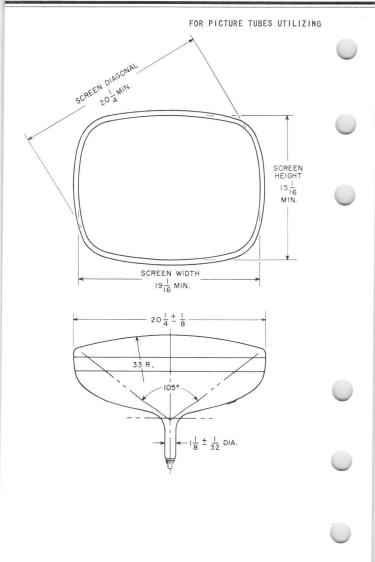
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



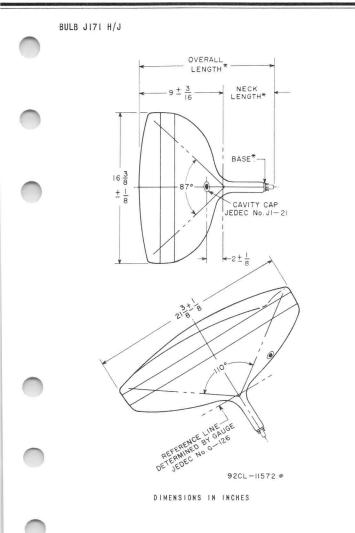


RCA RA

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 19 3-62







*See data for specific tube type.



RADIO CORPORATION OF AMERICA Electronic Components and Devices

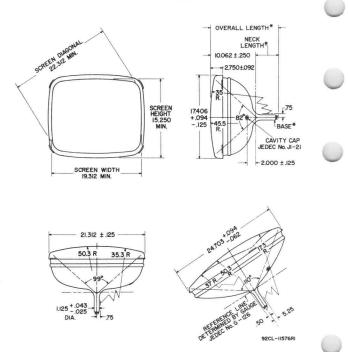
Harrison, N. J.

CRT OUTLINES 20 4-65



Bulb J187 A

FOR PICTURE TUBES UTILIZING BULB J187A AND PROTECTIVE PANEL FP198



DIMENSIONS IN INCHES

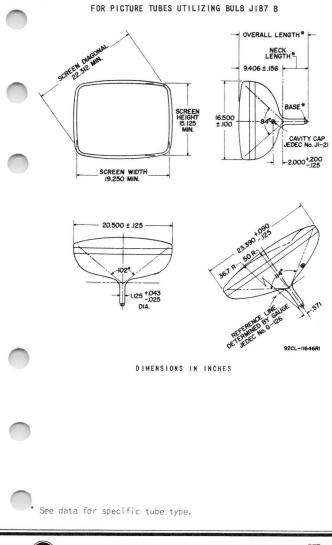
* See data for specific tube type.

CRT OUTLINES 20

RADIO CORPORATION OF AMERICA Electronic Components and Devices

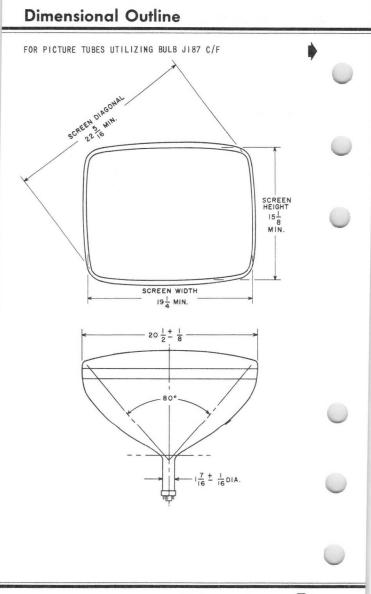
Harrison, N. J.





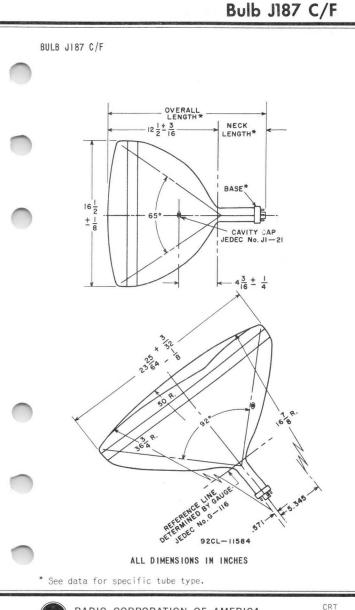
Electronic Components and Devices

CRT RADIO CORPORATION OF AMERICA OUTLINES 22 Harrison, N. J. 4-65



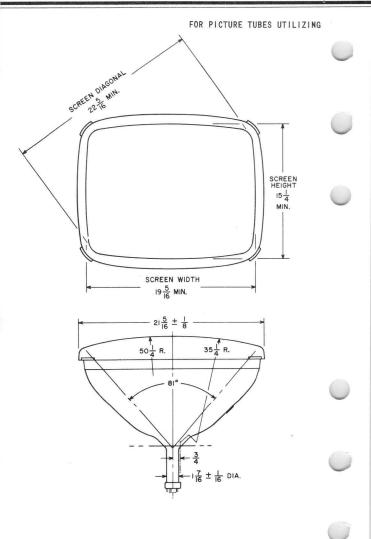
RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



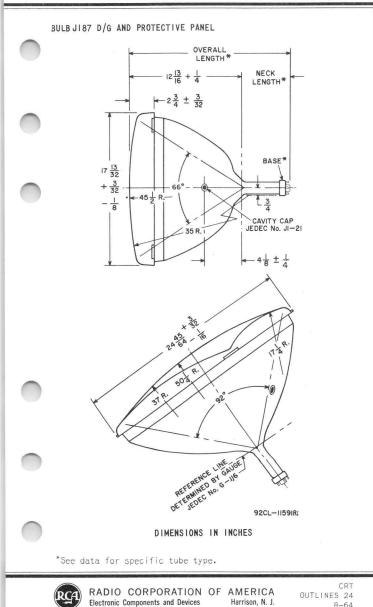




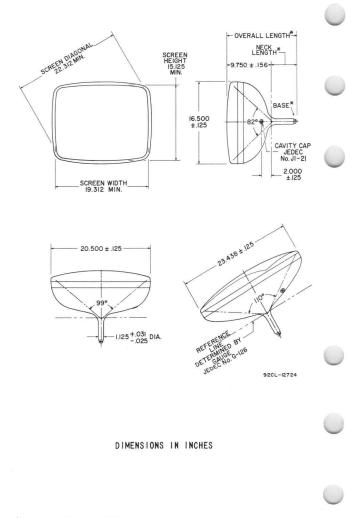
RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. OUTLINES 23 3-62







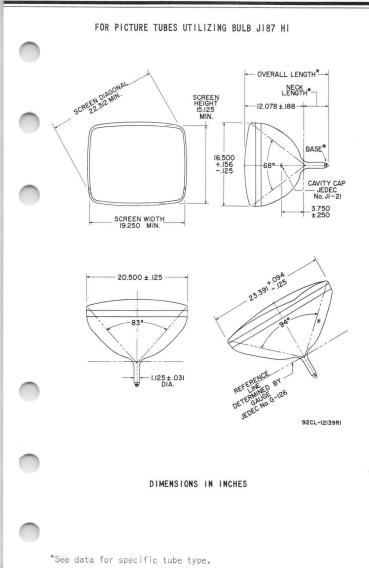
FOR PICTURE TUBES UTILIZING BULB J187 E



*See data for specific tube type.

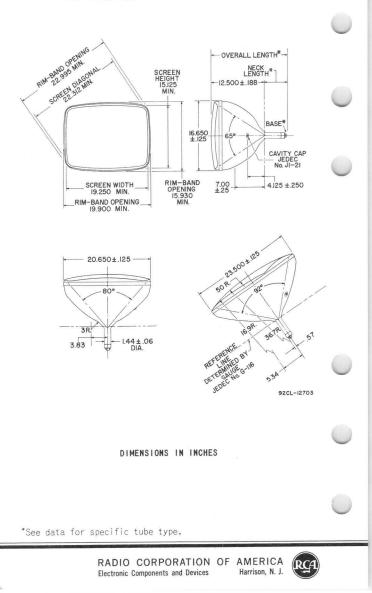
RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.





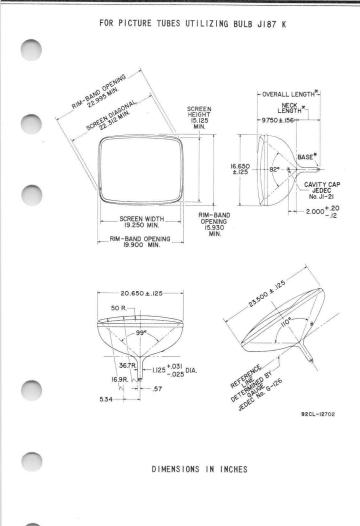
RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

CRT OUTLINES 25 8-64 FOR PICTURE TUBES UTILIZING BULB J187 J





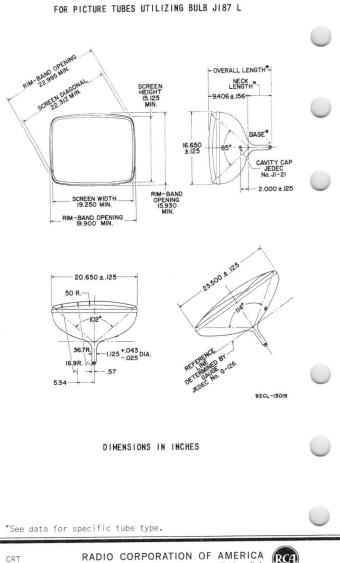
Bulb J187 K



*See data for specific tube type.



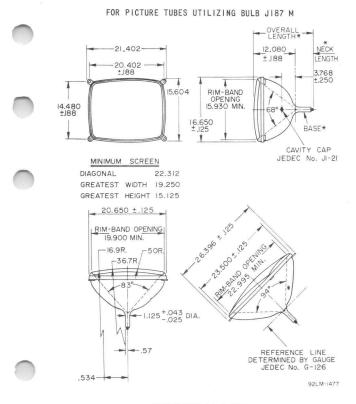
RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. CRT OUTLINES 26 4-65



Electronic Components and Devices OUTLINES 26

Harrison, N. J.

Bulb J187M



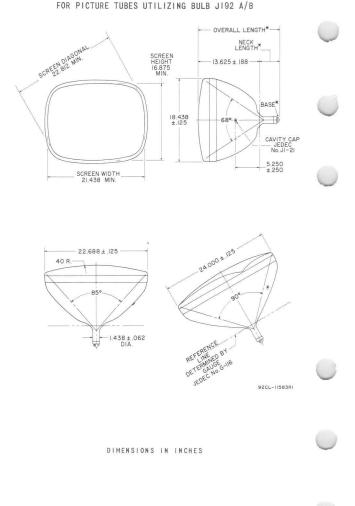
DIMENSIONS IN INCHES

* See data for specific tube type.



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

CRT OUTLINES 26A 10-66



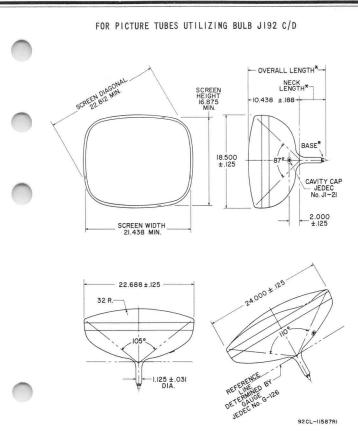
* See data for specific tube type.

RADIO CORPORATION OF AMERICA Electronic Components and Devices

Harrison, N. J.



Dimensional Outline Bulb J192 C/D

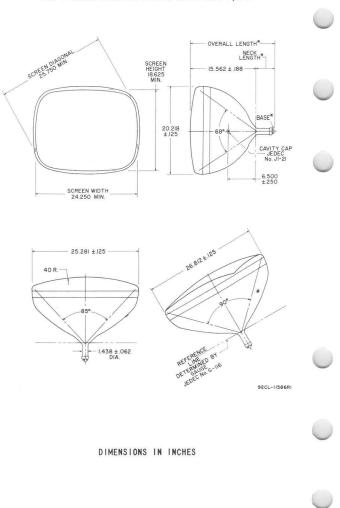


DIMENSIONS IN INCHES

*See data for specific tube type.



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. CRT OUTLINES 27 8-64



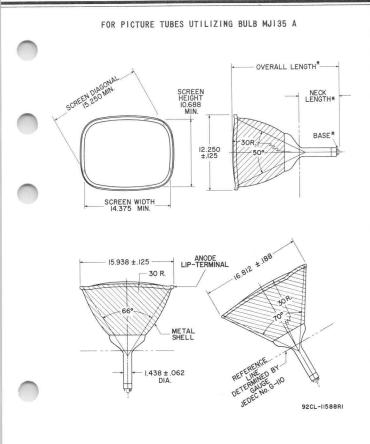
FOR PICTURE TUBES UTILIZING BULB J214-1/2 A

*See data for specific tube type.

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



Dimensional Outline Bulb MJ135 A



DIMENSIONS IN INCHES

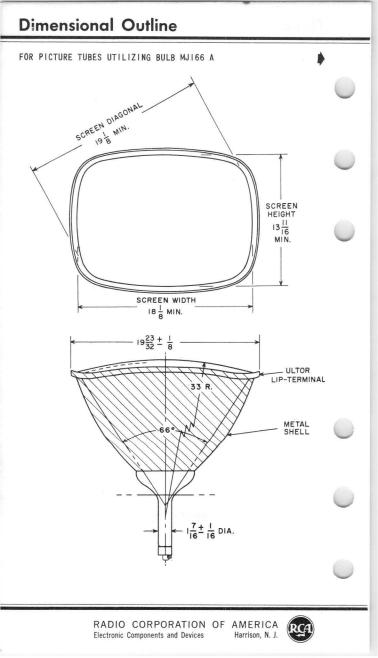
*See data for specific tube type.

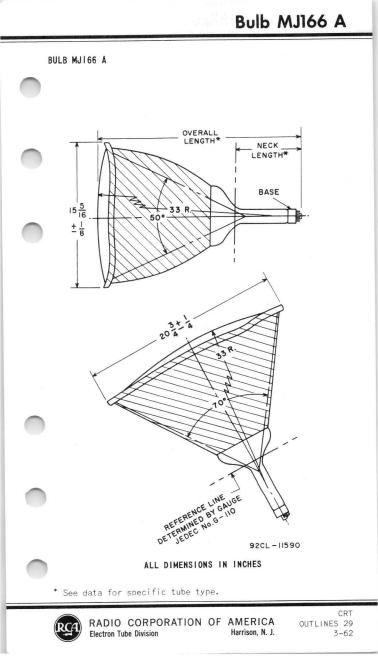
RCA

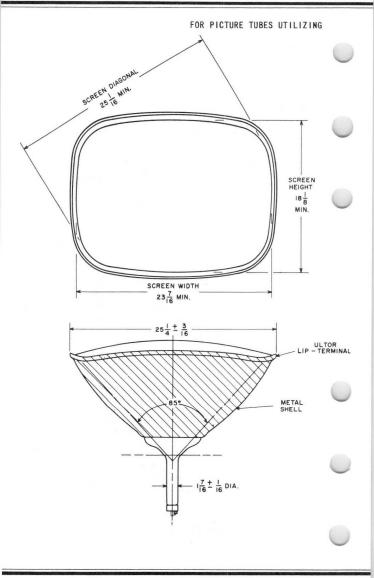
RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

RICA OUT

CRT OUTLINES 28 8-64





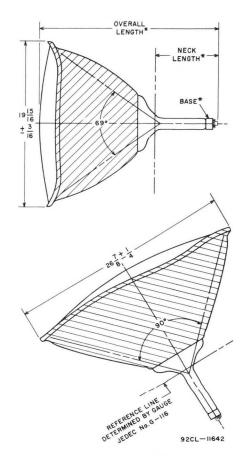


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.







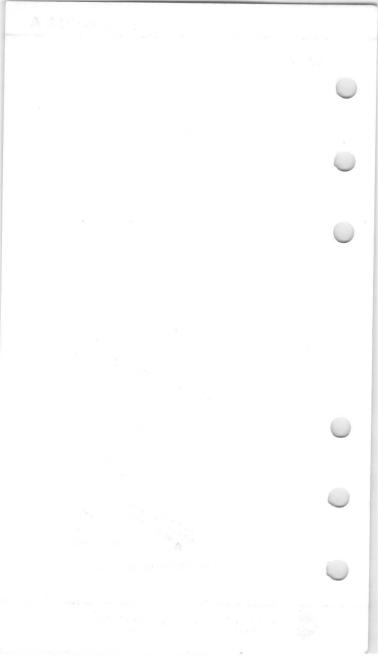


ALL DIMENSIONS IN INCHES

* See data for specific tube type.

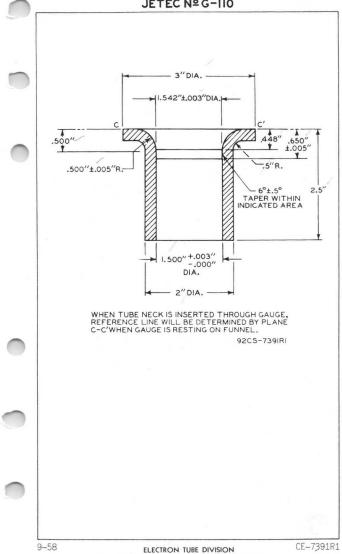


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. CRT OUTLINES 30 3-62

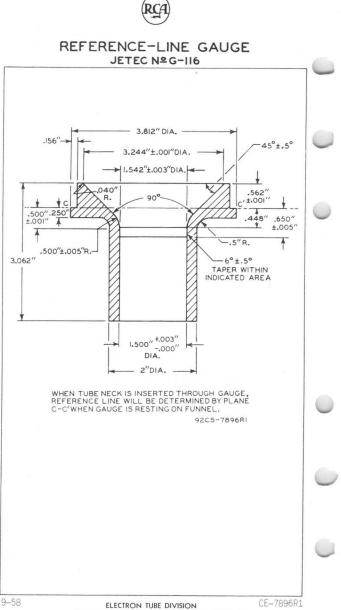




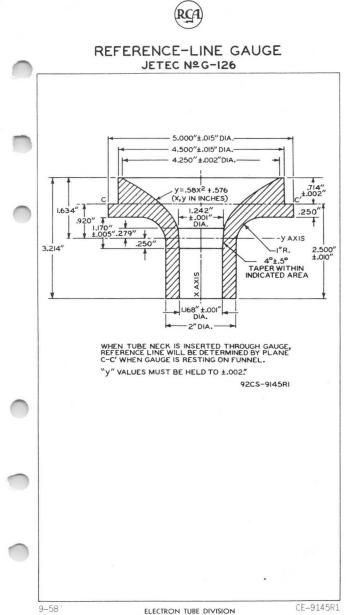
REFERENCE-LINE GAUGE JETEC Nº G-II0



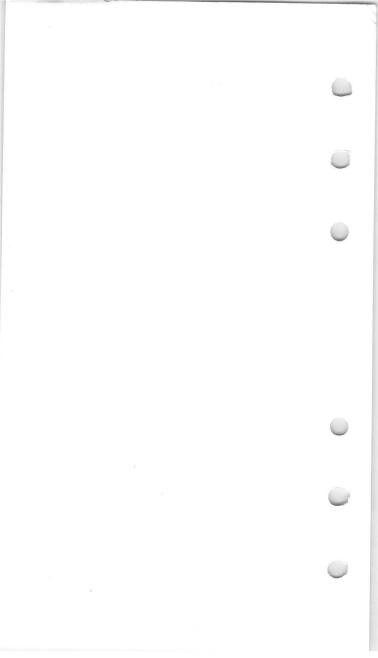
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



X-Radiation Precautions

For Cathode-Ray Tubes

WARNING

All types of cathode-ray tubes may be operated at voltages (where ratings permit) up to 16 kilovolts without personal injury on prolonged exposure at close range.

Above 16 kilovolts, special shielding precautions for ${\rm X}$ radiation may be necessary.



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. X-RADIATION PRECAUTIONS 3-62

Definitions

Of Cathode-Ray-Tube Terms

Ultor. The "ultor" in a cathode-ray tube is the element to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection.

Post-Ultor. The "post-ultor" in a cathode-ray tube is the element to which is applied a dc voltage higher than the ultor voltage for accelerating the electrons in the beam after its deflection.

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.





1EDI

OSCILLOGRAPH TUBE

OSCILLO ELECTROSTATIC FOCUS	ELECTROSTATIC DEFLECTION
	DATA
General:	
	a head of the second
Heater, for Unipotential Ca	
Voltage	6.3 ac or dc volt
Direct Interelectrode Capac	
Grid No.1 to all other el	
Deflecting electrode DJ	
deflecting electrode D.	
Deflecting electrode DJ3	
deflecting electrode D.	
DJ1 to all other electroo	des5 μμ
DJ2 to all other electroo	
DJ3 to all other electroo DJ4 to all other electroo	
	Clear Glas
Phosphor (For Curves, see	front of this Section) P
	Gree
Phosphorescence	Gree
Persistence	
Focusing Method	
Deflection Method	Electrostati
Maximum Overall Length	
Maximum Diameter	1-1/4" ± 1/16 eter
Minimum Useful Screen Diame Mounting Position	
Weight (Approx.)	
Base Small-Buttor	n Unidekar 11-Pin (JETEC No.E11-22
Basing Designation for BC	DTTOM VIEW
Pin 1-Heater	Pin 8-Ultor
Pin 2 - Heater	(Grid No.2,
Pin 3-Grid No.1	Grid No.4,
Pin 4 - Cathode	Collector)
Pin 5-Grid No.3	Pin 9-Deflecting
Pin 6-Deflecting	V HALL FIGURE
Electrode 3	DJ2
DJ4	Pin 10 - Deflecting Electrode
Pin 7 - Deflecting Electrode	
DJz	Pin 11 - Internal
	Connection-
	Do Not Use
	are nearer the screen
DJ_3 and DJ_4	are nearer the base

RADIO CORPORATION OF AMERICA, HARRISON, NEW IERSEY



IEP!

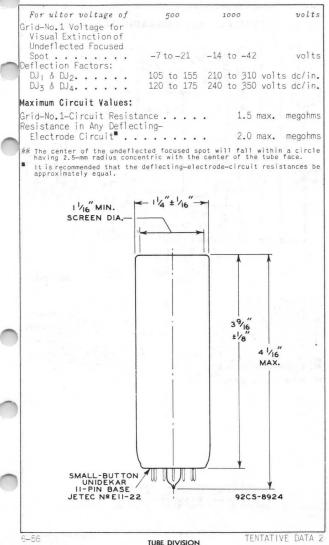
OSCILLOGRAPH TUBE

<pre>with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed ±100. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ and DJ2 is 90° ± 30. Maximum Ratings, Design-Center Values: ULTOR VOLTAGE</pre>	6-56				TENT/	TIVE	DATA 1
with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed $\pm 10^{\circ}$. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is 90° \pm 3°. Maximum Ratings , <i>Design-Center Values</i> : ULTOR VOLTAGE	##: See next page.	ion decrease the IEP1 in lts may be i bient light sential tha therwise, a nning patte	e with d general used und levels t the ul screen rn.	ecreasi servic er cond For tor vol charge			
with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed $\pm 10^{\circ}$. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is 90° \pm 30. Maximum Ratings , <i>Design-Center Values</i> : ULTOR VOLTAGE	for Focus	••				5	
with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed $\pm 10^{\circ}$. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is $90^{\circ} \pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE		0,1	2	100	100		00115
with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed $\pm 10^{\circ}$. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is $90^{\circ} \pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE				500	10/	0	101+c
with respect to DJa, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed $\pm 10^{\circ}$. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is $90^{\circ} \pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values</i> : ULTOR VOLTAGE	DJ1 & DJ2 DJ3 & DJ4 Spot Position	:	24) to 35() v dc/i) v dc/i	n./kv n./kv	of E _{C4} of E _{C4}
with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed $\pm 10^{\circ}$. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is $90^{\circ} \pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values</i> : ULTOR VOLTAGE	Deflection Factors:	• 	-1.	5 to +10	D		µamp
with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed $\pm 10^{\circ}$. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is $90^{\circ} \pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE	Grid-No.3 Current fo Any Operating Con-	r					volts
with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed $\pm 10^{\circ}$. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is $90^{\circ} \pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values</i> : ULTOR VOLTAGE	Grid-No.1 Voltage fo Visual Extinction o	r f			-4		
<pre>with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed ±10°. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is 90° ± 3°. Maximum Ratings, Design-Center Values: ULTOR VOLTAGE</pre>	for Focus		10% to	30% 0	f E _{C⊿}		volts
<pre>with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed ±100. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is 90° ± 30. Maximum Ratings, Design-Center Values: ULTOR VOLTAGE</pre>		recomm	nended	minimu	m ^{and}	1500	volts
<pre>with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed ±100. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is 90° ± 30. Maximum Ratings, Design-Center Values: ULTOR VOLTAGE</pre>		-	betwee	n			
<pre>with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed ±10°. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is 90° ± 3°. Maximum Ratings, Design-Center Values: ULTOR VOLTAGE</pre>						0	
<pre>with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed ±100. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is 90° ± 3°. Maximum Ratings, Design-Center Values: ULTOR VOLTAGE</pre>	Heater negative wi	th respect					
<pre>with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed ±100. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is 90° ± 30. Maximum Ratings, Design-Center Values: ULTOR VOLTAGE</pre>	ANY DEFLECTING ELE	CTRODE	D •••		500	max.	volts
with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed $\pm 10^{\circ}$. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is $90^{\circ} \pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values</i> : ULTOR VOLTAGE	Positive peak valu	e					
<pre>with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed ±10°. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is 90° ± 3°. Maximum Ratings, Design-Center Values: ULTOR VOLTAGE</pre>	Negative bias valu						
with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed $\pm 10^{\circ}$. The angle between the trace produced by DJ3 and DJ4 and the trace produced by DJ3 and DJ4 and the trace produced by DJ1 and DJ2 is $90^{\circ} \pm 3^{\circ}$.	ULTOR VOLTAGE GRID-No.3 VOLTAGE .						
with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10. The angle between the trace produced by DJ3 and DJ4 and its intersection with the plane through the tube axis and the midpoint between pins 9 and 10 does not exceed $\pm 10^{\circ}$.	trace produced by D.	I and DJ2	is 900) ± 30.		DJ4	and the
with respect to DJ4, the spot is deflected toward the midpoint between pins 9 and 10.	intersection with midpoint between pir	the plane is 9 and 1	throu O does	gh the not ex	tube a	uxis 00.	and the
With D_2 positive with respect to D_1 , the spot is deflected toward the midpoint between pins 6 and 7. With D_3 positive	with respect to DJ4, between pins 9 and 2	the spot .0.	is def	ected	toward	the m	nidpoin

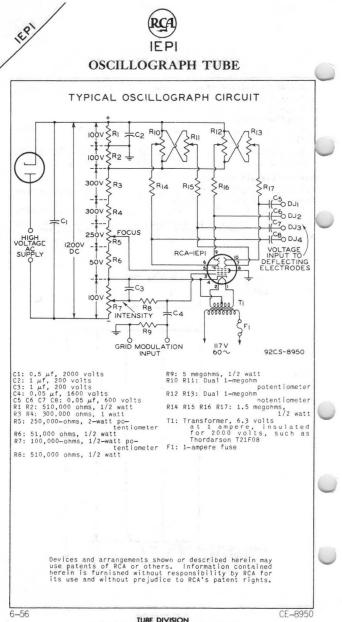


IED,

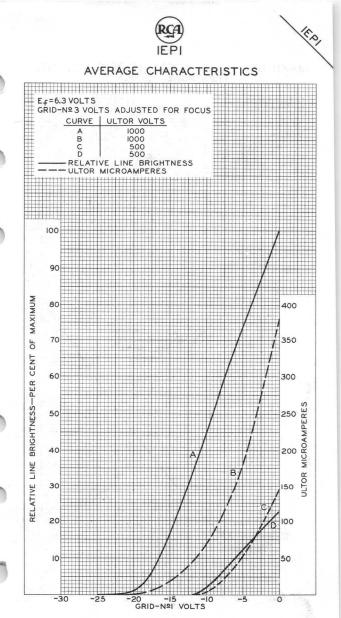
OSCILLOGRAPH TUBE



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

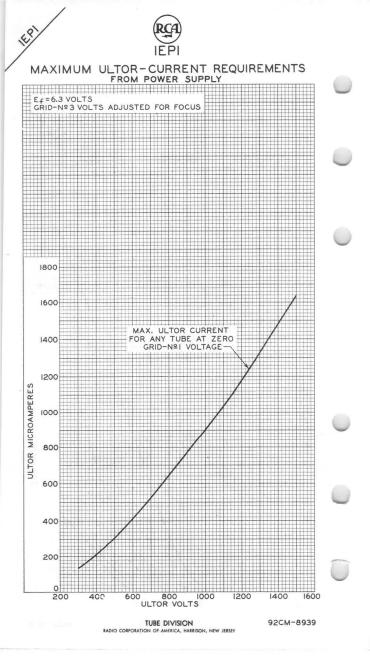


RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



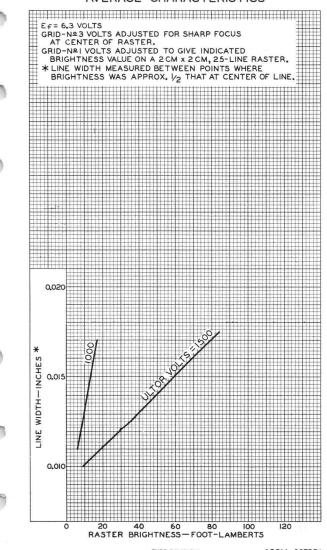
TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-8938



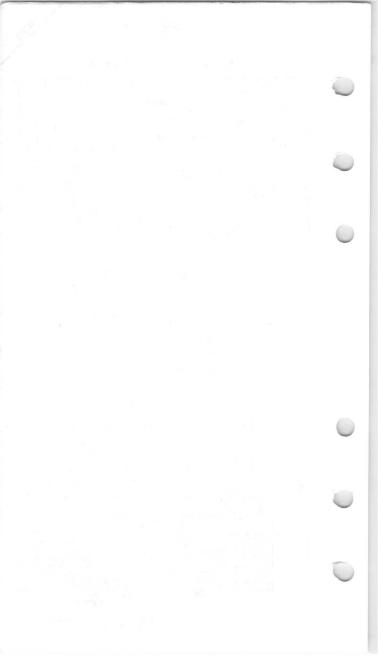


AVERAGE CHARACTERISTICS



TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CM-8975RI

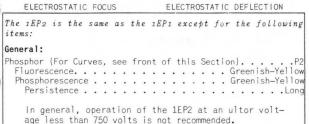
180



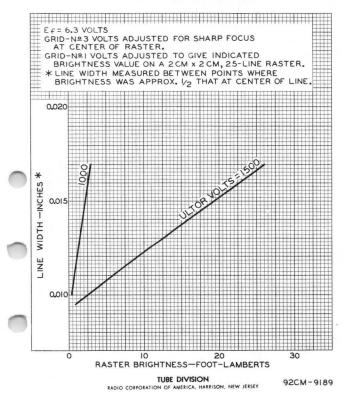


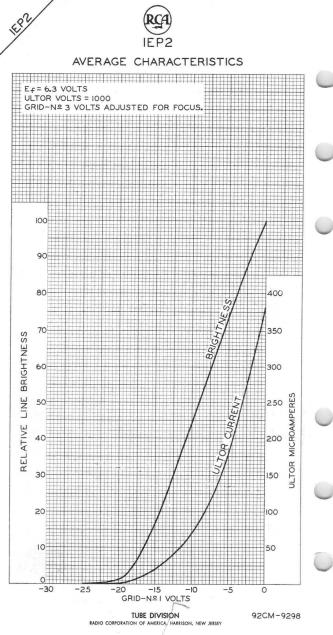
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OSCILLOGRAPH TUBE



AVERAGE CHARACTERISTICS







OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

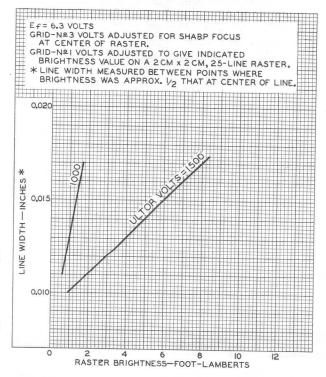
The 1EP11 is the same as the 1EP1 except for the following items:

General:

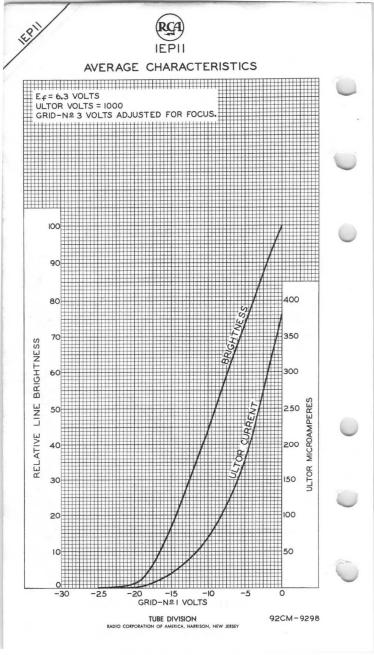
Phosphor (For Cur	ve	s,	St	ee	f	roi	nt	0	f	th	is	Se	ec	ti	on).			. P11
Fluorescence	•	•	•				•		•		÷						•		.Blue
rnosphorescence																		 	.Blue
Persistence .			•	•			•												Short

In general, operation of the 1EP11 at an ultor voltage less than 750 volts is not recommended.

AVERAGE CHARACTERISTICS



103





2801.A

HIGH-VACUUM CATHODE-RAY TUBE

Supersedes Type 2AP1

General:

Heater, for Unipotential Cathode:
Voltage 6.3 ± 10% ac or dc volts
Current 0.6 amp. Direct Interelectrode Capacitances (Approx.):
Grid No.1 to All Other Electrodes 8.0 µµf
Cathode to All Other Electrodes 5.5 µµf
DJ1 to DJ2 0.6 μμf
DJ3 to DJ4 1.1 μμf
DJ1 to All Other Electrodes 8.5 µµf
DJ3 to All Other Electrodes
DJ1 to All Other Electrodes except DJ2 . 8.0 . μμf DJ2 to All Other Electrodes except DJ1 . 4.6 . μμf
DJ3 to A11 Other Electrodes except DJ_1 . 4.0 $\mu\mu f$
DJ4 to A11 Other Electrodes except DJ3. 6.0
Phosphor (For Curves, see front of this Section) No.1
Fluorescence
Persistence
Focusing Method Electrostatic
Deflection Method Electrostatic
Overall Length
Minimum Useful Screen Diameter $\dots \dots \dots$
Mounting Position.
Mounting Position. Any Base
Basing Designation for BUILUM VIEW
Pin 1-Heater (6) Pin 8-Deflecting
Pin 2- Cathode Electrode
Pin 3-Deflecting 4/4 28 DJ2
Electrode DJ1 3 Pin 9-Deflecting
TIT 4- Allode No.1
$\begin{array}{c c} Pin b - Deflecting \\ Electrode DJ4 \end{array} \qquad \begin{array}{c} Pin 10 - Grid No.1 \\ Pin 11 - Heater \end{array}$
Pin 7- Anode No.2.
Grid No.2
DJ_1 and DJ_2 are nearer the screen DJ_3 and DJ_4 are nearer the base
With DJ_1 positive with respect to DJ_2 , the spot is deflected toward pin 4. With DJ_3 positive with respect to DJ_4 , the spot is deflected toward pin 1.
The angle between the trace produced by DJ3 and DJ4 and
its intersection with the plane through the tube axis and
pin I does not exceed 10 ⁰ .
The angle between the trace produced by DJ3 and DJ4 and
the trace produced by DJ1 and DJ2 is $90^{\circ} \pm 4^{\circ}$.
a a second s
JULY 1, 1945 DATA
SULT 1, 1945 RCA VICTOR DIVISION



HIGH-VACUUM CATHODE-RAY TUBE

1			
. (continued from preceding pa	ge)		121-120
Maximum Ratings, Absolute Values:			
ANODE-No.2 & GRID-No.2 VOLTAGE.		max.	volts
ANODE-No.1 VOLTAGE GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:	000	max.	volts
Negative Value	125	max.	volts
Positive Value	0	max.	volts
ANY DEFLECTING ELECTRODE PEAK HEATER-CATHODE VOLTAGE:	660	max.	volts
Heater negative with respect to cathode	125	max.	volts
Heater positive with respect to cathode	10	max.	volts
Typical Operation:			
Anode-No.2&Grid-No.2 Voltage* 500 Anode-No.1 Voltage for Focus	1000		. volts
at 75% of Grid-No.1 Volt- age for Cutoff 125	250		, volts
Grid-No.1 Volt. for Visual Cutoff# -30			, volts
Max. Anode-No.1 Current Range ^A . Between Deflection Sensitivity:			
	0.110		mm/v dc
DJ3 and DJ4 0.260			mm/v dc
Deflection Factor:**			
DJ1 and DJ2 115	230		v dc/in.
DJ3 and DJ4	196	• •	v dc/in.
Brilliance and definition decrease with decrease In general, anode-No.2 voltage should not be 1			
 Individual tubes may require between +20% and with grid-No.1 voltages between zero and cutof 	f.		1
Visual extinction of stationary focused spot. able to ± 50% of these values.	Supply s	hould	be adjust-
See curve for average values.			
Individual tubes may vary from these values by	± 20%.		
Bpot Position:			- 11 V
The undeflected focused spot will fall w centered at the geometric center of the			
one side parallel to the trace produced b			
able test conditions are: anode-No.2 v	oltage,	1000	volts;
anode-No.l voltage, adjusted for focus;			
resistors, I megohm each, connected to			
shielded from all extraneous fields. To	avoid c	lamage	to the
ube, grid-No.l voltage should be near cu ion of anode voltages.	itoff be	efore	applica-
Aaximum Circuit Values:			16.281

Grid-No.1-Circuit Resistance 1.5 max. megohms Impedance of Any Deflecting-Electrode Circuit at Heater-Supply Frequency 1.0 max. megohm

JULY 1, 1945

2APIA

RCA VICTOR DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY DATA 1

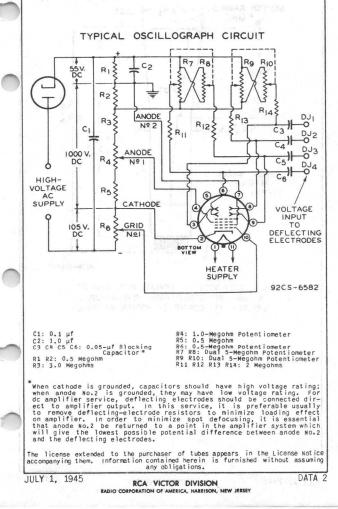


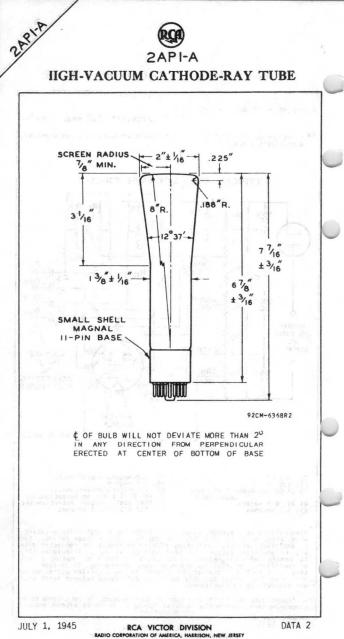
PARKA



Resistance in Any Deflecting-Electrode Circuit▲ 5.0 max. megohms

It is recommended that all deflecting-electrode-circuit resistances be approximately equal.







OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

DATA

General: Heater, for Unipotential Cathode: Voltage..... 6.3 ac or dc volts Current. 0.6 amp Direct Interelectrode Capacitances (Approx.): Grid No.1 to All Other Electrodes. μµf DJ_1 to DJ_2 μµf 2 μµf 11 μµf DJ2 to All Other Electrodes. . 8 μµf DJ2 to All Other Electrodes. . . . 7 μµf DJ₄ to All Other Electrodes. . . - 8 μµf Phosphor (For Curves, see front of this Section) No. 1 Fluorescence . . Green Persistence. . . Medium Electrostatic Focusing Method Deflection Method. Electrostatic 7-5/8" ± 3/16" Overall Length ± 1/16" Greatest Diameter of Bulb. . . 1-3/4" Minimum Useful Screen Diameter Any Mounting Position. . Small-Shell Duodecal 12-Pin Base Basing Designation for BOTTOM VIEW . 12F Pin 8 - Anode No.2, Pin 1-Heater Grid No.2 Pin 2-Grid No.1 Pin 9 - Deflecting Pin 3-Cathode Pin 4 - Anode No.1 Electrode DJ2 Pin 5-Internal Connection-Pin 10 - Deflecting Do Not Use Electrode Pin 6 - Deflecting DJ1 Electrode Pin 11-Internal DJa Connection Pin 7-Deflecting Do Not Use Electrode Pin 12-Heater DJ4 DJ_1 and DJ_2 are nearer the screen DJ_2 and DJ_4 are nearer the base With DJ1 positive with respect to DJ2, the spot is deflected toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin No.4 may vary from the trace produced by DJ1 and DJ2 by an angular tolerance (measured about the tube axis) of 10°. The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 900 ± 30. Indicates a change.

SEPT. 1, 1950

TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY DATA

PADI





OSCILLOGRAPH TUBE

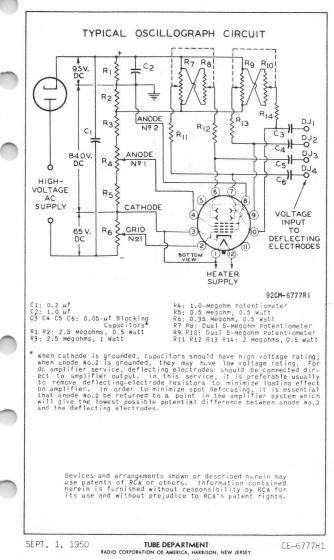
	and an owner water and and the last of the second state of the sec
Maximum Ratings, Design-Center Values:	
ANODE-No.2 VOLTAGE	2500 max. volts 1000 max. volts
GRID-No.1 VOLTAGE: Negative bias value	. 200 max. volts
Positive peak value PEAK VOLTAGE BETWEEN ANODE No.2 AND	. 0 max. volts . 2 max. volts
ANY DEFLECTING ELECTRODE. PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathoo Heater positive with respect to cathoo	
Equipment Design Ranges:	
For any anode-No.2 voltage (E_{b_2}) between	
Anode-No.1 Voltage 15% to 28% of Max. Grid-No.1 Voltage	
for Visual Cutoff 6.75% of E Max. Anode-No.1 Current Range15 to +1	2
Deflection Factors: D1 & D2	5 v dc/in./kv of Eb2 C v dc/in./kv of E _{b2}
	and a second second
Examples of Use of Design Ranges:	
ter miner hard transfer is the	volts
Max. Grid-No.1 Voltage for Visual Cutoff, -67.5 -:	-560 volts 135 volts
	- 310 volts dc/in. - 200 volts dc/in.
Maximum Circuit Values:	the desidence "
Grid-No.1-Circuit Resistance Resistance in Any Deflecting-	1.5 max. megohms
Electrode Ĉircuito Brilliance and definition decrease with decre A value as low as 500 volts is recommended o flection and low room-light levels.	
flection and low room-light levels. It is recommended that the deflecting-elect be approximately equal.	rode-circuit resistances
 Anode No.2 and grid No.2 which are connected 	together within tube, are ict of anode-No.2 voltage ited to 6 watts.
referred to herein as anode No. 2. The produced and average anode-No. 2 current should be lim	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Anode No.2 and grid No.2 which are connected referred to herein as anode No.2. The produ- and average anode-No.2 current should be lim The center of the undeflected, focused spot having a 5.0-mm radius concentric with the c	will fall within a circle enter of the tube face.
referred to herein as anode No.2. The produ and average anode-No.2 current should be lim O The center of the undeflected, focused spot having a 5.0-mm radius concentric with the c	will fall within a circle enter of the tube face.
referred to heréin as anode No.2. The produ and average anode-No.2 current should be lim D The center of the undeflected, focused spot having a 5.0-mm radius concentric with the c	will fall within a circle enter of the tube face. → Indicates a change.

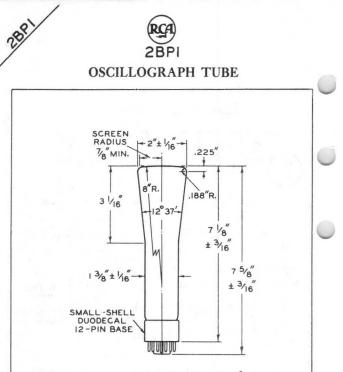
DATA



RED

OSCILLOGRAPH TUBE





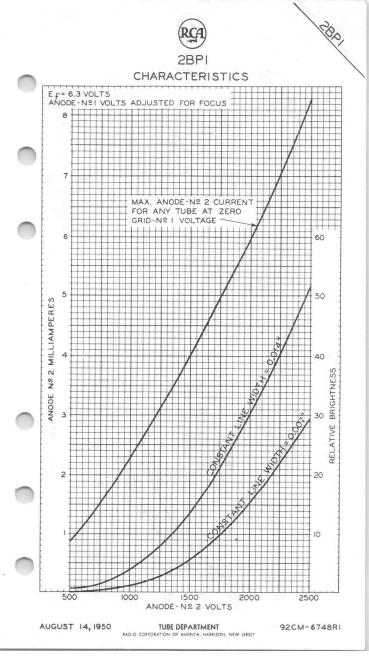
 \mathbb{Q} of bulb will not deviate more than 2^0 in Any direction from the perpendicular erected at the center of bottom of the base.

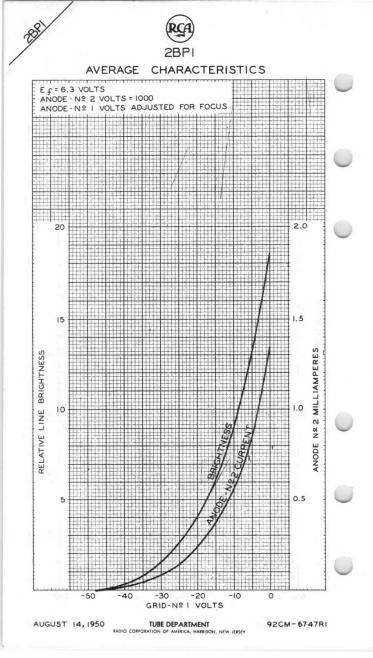
9205-6689

CE-6689

TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

SEPT. 1, 1950







OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS

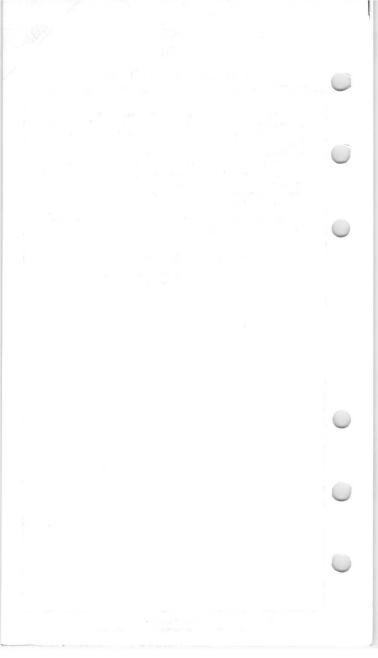
ELECTROSTATIC DEFLECTION

20011

The 2BP11 is the same as the 2BP1 except that it has a phosphor of the short-persistence, blue-fluorescence type designated P11. The blue radiation of the P11 screen is highly actinic and has sufficiently short persistence to permit use of the 2BP11 in all moving film photographic applications without blurring except in those where film moves at a high speed. The 2BP11 is also quite satisfactory for visual observation of phenomena because its phosphor has unusually high brightness for a blue screen.

In general, operation of the 2BP11 at an anode-No.2 voltage less than 1000 volts is not recommended.

THE SPECTRAL-ENERGY EMISSION CHARACTERISTIC and the PERSISTENCE CHARACTERISTIC of the P11 Phosphor are shown at the front of this Section



2F21

MONOSCOPE 5-INCH MAGNETIC-DEFLECTION TYPE Supersedes Type 1800

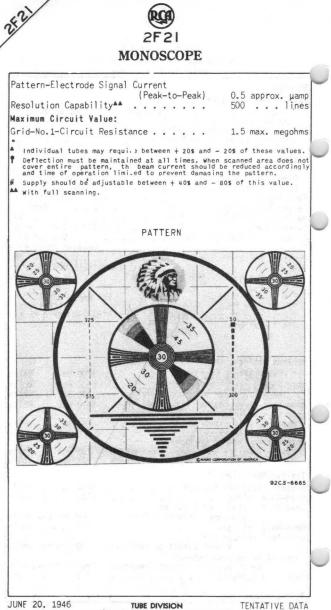
	Supersedes Type 1899
1	General:
	Heater, for Unipotential Cathode: Voltage
	Voltage
1	Grid No.1 to All Other Electrodes 7 µµ
	Pattern Electrode to Grid No.4 5 μμi Pattern:
	Type See illustration on next page Dimensions (Approx.)
	Focusing Method.
Ŋ	Deflection Method Magnetic Maximum Solid Deflection Angle
	Maximum Solid Deflection Angle
	Caps (Two) Recessed Small Bal Mounting Position
	Base
	Pin 1-Heater Pin 2-Grid No.2 Image Pu Pin 6 -Heater End Cap - Pattern
	Pin 1 - Heater Pin 2 - Grid No.2 Pin 3 - Grid No.3 Pin 4 - Grid No.1 Pin 5 - Cathode Pin 5 - Cathode
	Pin 5-Cathode
	Maximum Ratings, Design-Center Values:
	PATTERN-ELECTRODE VOLTAGE 1500 max. volt: GRID-No.4 (COLLECTOR) VOLTAGE 1500 max. volt:
	GRID-No.3 (FOCUSING FLECTRODE) VOLTAGE . 600 max. volt
)	GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:
	Positive Bias Value 0 max. volt
	PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode 125 max. volt
	Heater positive with respect to cathode 125 max. volt Typical Operation: ¶
)	Pattern-Electrode Voltage 1000 volt
	Grid-No.3 Voltage for Focus at
	0.5 µamp Grid-No.4 Current▲ 300 approx. volt Grid-No.2 Voltagevolt
in the second se	Grid-No.1 Voltage for Visual Cutoff on Monitor★ -50 approx. volt
	Internal Resistance between Grid No.4 and Pattern Electrode Greater than 1 meg
	Grid-No.4 Current 0.5 μαm
	¶,≜,∦:-See next page.
	JUNE 20. 1946 THE DIVISION TENTATIVE DAT

JUNE 20, 1946

TENTATIVE DATA

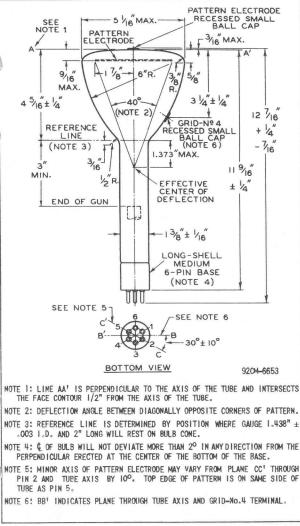
25.21

TUBE DIVISION



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

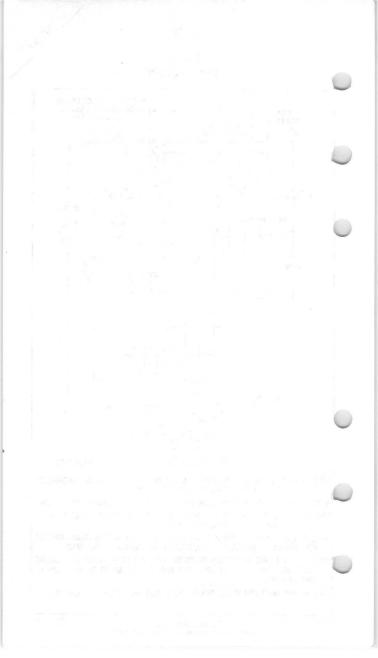
2F2I MONOSCOPE

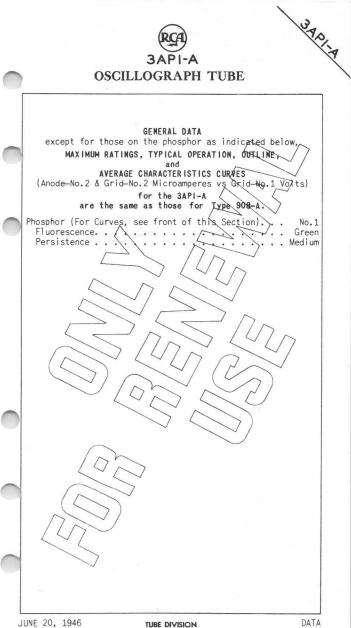


JUNE 20, 1946

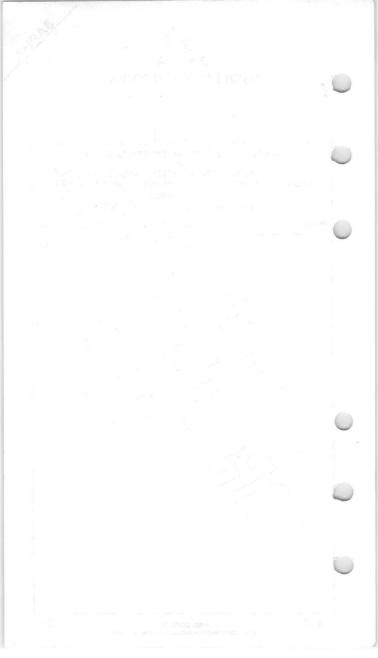
CE-6653

Res 1





RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



3AQPI

Oscillograph Tube

ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

DATA

	General:		
	deneral.		
	Heater, for Unipotential Cathode:		
	Voltage (AC or DC)		. 6.3 volts
÷.	Current		. 0.6 ± 10% amp
	Direct Interelectrode Capacitances (Ap	opro)	<.):
	Grid No.1 to all other electrodes .		. 7.5 μμf
	Cathode to all other electrodes		· 4.3 μμf
	Deflecting electrode DJ1 to deflect	ing	
	electrode DJ2		. 5.2 μμf
	Deflecting electrode DJ ₃ to deflect	ing	
	electrode DJ4		. 7 μμf
	DJ ₁ to all other electrodes		
	DJ_2 to all other electrodes		
	DJ3 to all other electrodes		
	DJ ₄ to all other electrodes		
	Faceplate, Spherical		· · · · Clear Glass
			. Yellowish-Green
	Phosphorescence		
	Persistence		
	Focusing Method		
	Deflection Method		
	Overall Length	•••	$9_{-1}/8" + 1/4"$
	Overall Length		
	Minimum Useful Screen Diameter		
	Useful Scan (Centered with		= >
	respect to tube face):		
	By deflecting electrodes DJ1 & DJ2.		2-3/4"
	By deflecting electrodes DJ ₃ & DJ ₄ .		2-1/4"
	Operating Position		
	Bulb.		J24P1
1	BaseSmall-Shell Duodecal 12-Pin (J	EDEC	Group 4, No. 812-43)
	Basing Designation for BOTTOM VIEW.	• •	••••••••
	Pin 1-Heater	Pin	8-Ultor
	Pin 2-Grid No.1		(Grid No.2,
	Pin 3-Cathode		Grid No.4.
	Pin 4-Grid No.3		Collector)
-	Pin 5-Internal Con-	Pin	9 - Deflecting
2	nection-		Electrode
	Do Not Use		DJ ₂
	Pin 6-Deflecting Electrode	Pin	10 - Deflecting
			Electrode
	Pin 7 - Deflecting	Din	DJ I 11 - Internal Con-
	Electrode	1.111	nection-
	DJA		Do Not Use
1		Pin	12 - Heater
	DJ_1 and DJ_2 are nearer		
	DJ ₁ and DJ ₂ are nearer		
	DUS wha DUy are hearer	ene	vw3c



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 10-60

3AQP1

Maximum and Minimum Rati	ngs,	Dest	ign-	Cen	ter	Va	ilues.			
ULTOR VOLTAGE							2750	max.	volts volts	6
										-
ULTOR INPUT (AVERAGE)								max.	watts	
GRID-No.3 VOLTAGE		• •	• •	•	• •	•	1100	max.	volts	
GRID-No.1 VOLTAGE:							0.00		14	
Negative-bias value		• •	• •	•	• •	٠	_	max.	volts	
Positive-bias value							~	max.	volts	
Positive-peak value						•	2	max.	volts	
PEAK VOLTAGE BETWEEN ULT										6
ANY DEFLECTING ELECTRO							550	max.	volts	-
PEAK HEATER-CATHODE VOLT										
Heater negative with r				thc	de:					
During equipment war										
not exceeding 15 s										
After equipment warm										
Heater positive with r	espec	t to	o ca	the	de.		125	max.	volts	6
										-
Equipment Design Ranges:										
For any ultor voltag	e (Ec	4) 1	betw	een	50	0 0	and 2	750 VC	olts	
Grid-No.3 Voltage										
for focus 16.	5% to	310	Z of	F.					volts	
Negative Grid-No.1	5% 10	21	0 0	-0	4				VUILS	
Voltage for visual										
extinction of										
	of to	C 70	# of	Г					volts	
undeflected spot . 2.8	76 LU	0.7	6 01	CO	4				VUILS	
Grid-No.3 Current										
for any operating condition.	-15	+ 0	10							
	-15	10.	-10						μa	
Deflection Factors:	70	+ ~ (20				deli	n Ilau	of E	
$DJ_1 \& DJ_2 \dots$	73								of Ec4	
$DJ_3 \& DJ_4 \dots$	20	to	20			V	uc/I	1./KV	of Ec4	

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.





3BOLA

HIGH-VACUUM CATHODE-RAY TUBE Supersedes Type 3BP1

General:

Heater, for Unipotential Cathode: Voltage. 6.3 ± 10% ac or dc volts Current. 0.6 amp. Direct Interelectrode Capacitances (Approx.): amp. Grid No.1 to All Other Electrodes. 8.5 µµf DJ1 to DJ2 2.0 µµf DJ3 to DJ4 2.0 µµf DJ1 to All Other Electrodes. 8.0 µµf DJ1 to All Other Electrodes. 8.0 µµf DJ3 to All Other Electrodes. 6.0 µµf DJ3 to All Other Electrodes. 6.0 µµf DJ3 to All Other Electrodes except DJ2 6.0 µµf DJ3 to All Other Electrodes except DJ1 5.0 µµf DJ3 to All Other Electrodes except DJ4 4.0 µµf
Current. 0.6 amp. Direct Interelectrode Capacitances (Approx.): Grid No.1 to All Other Electrodes. 8.5 µµf Cathode to All Other Electrodes. 8.0 µµf DJ1 to DJ2 2.0 µµf DJ3 to DJ4 2.0 µµf DJ1 to All Other Electrodes. 8.0 µµf DJ3 to All Other Electrodes. 8.0 µµf DJ3 to All Other Electrodes. 8.0 µµf DJ3 to All Other Electrodes except DJ2 6.0 µµf DJ1 to All Other Electrodes except DJ1 5.0 µµf DJ2 to All Other Electrodes except DJ2 4.0 µµf
Current. 0.6 amp. Direct Interelectrode Capacitances (Approx.): Grid No.1 to All Other Electrodes. 8.5 µµf Cathode to All Other Electrodes. 8.0 µµf DJ1 to DJ2 2.0 µµf DJ3 to DJ4 2.0 µµf DJ1 to All Other Electrodes. 8.0 µµf DJ3 to All Other Electrodes. 8.0 µµf DJ3 to All Other Electrodes. 8.0 µµf DJ3 to All Other Electrodes except DJ2 6.0 µµf DJ1 to All Other Electrodes except DJ1 5.0 µµf DJ2 to All Other Electrodes except DJ2 4.0 µµf
Grid No.1 to A11 Other Electrodes 8.5
Grid No.1 to A11 Other Electrodes 8.5
Cathode to All Other Electrodes. 8.0 µµf DJ1 to DJ2 2.0 µµf DJ3 to DJ4 2.0 µµf DJ1 to All Other Electrodes. 8.0 µµf DJ3 to All Other Electrodes. 8.0 µµf DJ1 to All Other Electrodes except DJ2 6.0 µµf DJ1 to All Other Electrodes except DJ2 6.0 µµf DJ2 to All Other Electrodes except DJ1 5.0 µµf DJ2 to All Other Electrodes except DJ2 4.0 µµf
DJ1 to DJ2
DJ3 to DJ4
DJ1 to All Other Electrodes 8.0
DJ3 to All Other Electrodes
DJ2 to All Other Electrodes except DJ1 . 5.0 . μμf DJ3 to All Other Electrodes except DJ4 . 4.0 . μμf
DJ2 to A11 Other Electrodes except DJ1 . 5.0 . μμf DJ3 to A11 Other Electrodes except DJ4 . 4.0 . μμf
DJ3 to All Other Electrodes except DJ4 . 4.0 Hut
DJ4 to All Other Electrodes except DJ3. 6.0 µµf
Phosphor (For Curves, see front of this Section) No.1
Persistence. Medium
Focusing Method Electrostatic
Deflection Method Electrostatic
Overall Length
Greatest Diameter of Bulb
Minimum Useful Screen Diameter
Mounting Position
Base Medium Shell Diheptal 12-Pin
Basing Designation for BOTTOM VIEW
Pin 1-Heater (7) (8) Pin 9-Anode No.2,
Fill 2 - Cathode Gild No.2
Pin 4 - Internal Con.
Do Not Use 3 12 DJ2
Pin 5- Anode No.1 Pin 11-Deflecting
Pin 7 - Deflecting KEY Electrode
Electrode DJ3 DJ1
Pin 8-Deflecting Pin 12-No Conn.
Electrode DJ4 Pin 14-Heater
DJ_1 and DJ_2 are nearer the screen
DJ_2 and DJ_2 are nearer the base
4
With DJ1 positive with respect to DJ2, the spot is de-
flected toward pin 5. With DJ 3 positive with respect to
DJ ₄ the spot is deflected toward pin 2.
The angle between the trace produced by DJ_1 and DJ_2 and
its intersection with the plane through the tube axis and
pin 5 does not exceed 10°.
The seals between the terms and a to be sed by and
The angle between the trace produced by DJ_3 and DJ_4 and
the trace produced by DJ_1 and DJ_2 is 90° ± 3°.
Maximum Ratings, Abolute Values:
ANODE-No.2 & GRID-No.2 VOLTAGE
ANODE-No.1 VOLTAGE
DATA
JULY 1, 1945 RCA VICTOR DIVISION PANERICA, HARRISON, NEW JERSEY



3BPIA HIGH-VACUUM CATHODE-RAY TUBE

(continued from preceding page)
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:
Negative Value
PEAK VOLTAGE BETWEEN/ANODE No.2 AND ANY DEFLECTING ELECTRODE 550 max. volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode 125 max. volts
Heater negative with respect to cathode 125 max. volts Heater positive with respect to cathode 10 max. volts
Typical Operation:
Anode-No.2 & Grid-No.2 Voltage 1500 2000 volts Anode No.1 Voltage for Focus
at 75% of Grid-No.1 Volt- age for Cutoff [•] . 430 575volts
Grid-No.1 Volt. for Visual Cutoff# -45 -60 volts
Max. Anode-No.1 Current Range ^A Between -50 and +10 µamp. Deflection Sensitivity:
DJ1 and DJ2 0.169 0.127 mm/v dc
DJ3 and DJ4 0.229 0.172 mm/v dc Deflection Factor:**
DJ1 and DJ2 150 200 v dc/in.
DJ3 and DJ4 111 148 v dc/in.
Individual tubes may require between +20\$ and -30\$ of the values shown with grid-wo.l voltages between zero and cutoff. Visual extinction of stationary focused spot. Supply should be adjust- able to ± 50\$ of these values. See curve for average values. Individual tubes may vary from these values by ± 20\$.
pot Position:
The undeflected focused spot will fall within a 15-mm square entered at the geometric center of the tube face and having one side parallel to the trace produced by D1 and D2. Suit- ble test conditions are: anode-No.2 voltage, 1500 volts; inode-No.1 voltage, adjusted for focus; deflecting-electrode resistors, I megohm each, connected to anode No.2; the tube thielded from all extraneous fields. To avoid damage to the ube, grid-No.1 voltage should be near cutoff before applica- ion of anode voltages.
Maximum Circuit Values.
mpedance of Any Deflecting-Electrode
Circuit at Heater-Supply Frequency 1.0 max. megohm Resistance in Any Deflecting-
Electrode Circuit ^{**} 5.0 max. megohms
It is recommended that all deflecting-electrode-circuit resistances be approximately equal.

RCA VICTOR DIVISION

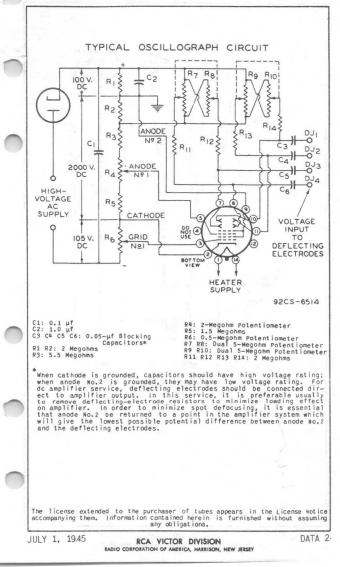
JULY 1, 1945

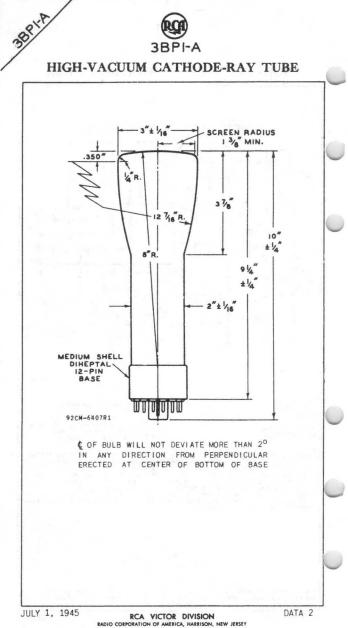
DATA 1



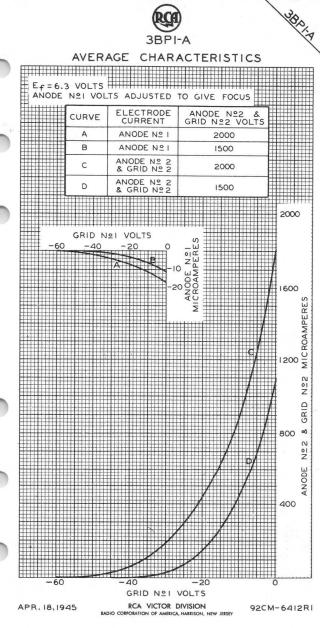
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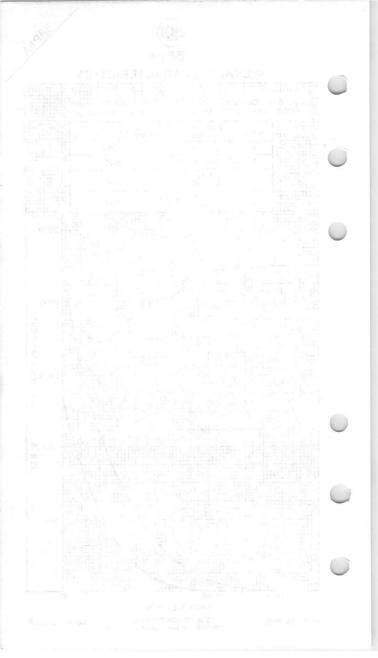














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OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

DATA	
General:	· · ·
General: Heater, for Unipotential Cathode: Voltage	8 μμf 8 μμf 2.5 μμf 2.5 μμf 8 μμf 7 μμf 8 μμf 6 Section) 8 μμf 9 Section) 9 Holdstring 9 Section) 9 Holdstring 10 ± 10 ± 11 JETEC No.J1-22) 2-Pin JETEC No.B12-37
Electrode DJ4	
DJ_1 and DJ_2 are nearer th DJ_3 and DJ_4 are nearer t	
With DJ1 positive with respect to DJ2, toward pin 5. With DJ3 positive with r is deflected toward pin 2.	respect to \mathbb{W}_4 , the spot
The plane through the tube axis and each may vary from the trace produced by DJ ₁ a angular tolerances measured about the Cap (on same side of tube as pin 5), 10	and DJ2 by the following tube axis: Pin 5, 10°;)°.
The angle between DJ1 - DJ2 trace and DJ3-	- DU4 trace is $90^{\circ} \pm 3^{\circ}$.
AUG. 1, 1951 TUBE DEPARTMENT	DATA 1



Maximum Ratings, Design-Center Values:	
ANODE-No.3 VOLTAGE 4000 max. ANODE-No.2 ^D VOLTAGE	volts volts
ANODE-No.2 VOLTAGE 2.3:1 max.	
ANODE-No.1 VOLTAGE 1000 max. GRID-No.1 VOLTAGE:	volts
Negative bias value 200 max.	volts
Positive bias value [•] 0 max. [•] Positive peak value 2 max.	volts
PEAK VOLTAGE BETWEEN ANODE No.2	VOILS
AND ANY DEFLECTING ELECTRODE 500 max.	volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode. 125 max. Heater positive with respect to cathode. 125 max.	volts
induction providence in the pr	VOICS
Equipment Design Ranges:	
For any anode-No.3 voltage (Eb3) between 2000* and 4000	volts
and any anode-No.2 voltage (Eb ₂) between 1500^{**} and 2000	volts
Anode-No.1 Voltage 20% to 34.5% of Eb2	volts
Frid-No.1 Voltaget 1.5% to 4.5% of Eb2	volts
Operating Condition	µamp
Deflection Factors:	ματηρ
When $Eb_3 = 2 \times Eb_2$	
DJ1 & DJ2 85 to 115 v dc/in./kv c	
DJ3 & DJ4 62.5 to 85 v dc/in./kv c	of Eb2
$When \ Eb_3 = Eb_2$ DJ1 & DJ2	f Ebo
DJ3 & DJ4 50 to 68 v dc/in./kv c	
Spot Position #	
Anode No.2 and grid No.2, which are connected together within	tube
Anode No.2 and grid No.2, which are connected together within and referred to herein as anode No.2.	
At or near this rating, the effective resistance of the anode should be adequate to limit the anode-No.2 input power to 6 wat:	supply ts.
It is recommended that anode-No.3 voltage be not less than 3000 for high-speed transients.	volts
* Recommended minimum value of anode-No.2 voltage.	
With heater voltage of 6.3 volts, anode-No.3 voltage of 3 000	volts,
anode-No.2 voltage of 1500 volts, anode-No.1 voltage adjusted for grid-No.1 voltage adjusted to give spot that is just visible	focus, each
deflecting electrode connected through 1-megohm resistor to anode and tube shielded from all extraneous fields, the undeflected fu	No.2,
With heater voltage of 6.3 volts, anode-No.3 voltage of 3 000 - anode-No.2 voltage of 5.50 volts, anode-No.1 voltage adjusted for grid-No.2 voltage adjusted to give spot that is just visible deflecting electrode connected through 1-megohm resistor to anode and tube shielded from all extraneous fields, the undeflectif, spot will fail within a 15-mm square sentered at the geneticit.	center
DJ_1 and DJ_2 .	
: See next page.	

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TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY DATA 1



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OSCILLOGRAPH TUBE

Examples of Use of Design Ranges:

For anode-No.3 voltage of and anode-No.2	2000	3000	4000	volts
voltage of	2000	1500	2000	volts
Anode-No.1 Volt. Grid-No.1 Volt.† Deflection Factors:	400 to 690 -30 to -90	300 to 515 22.5 to -67.5		volts volts
$\begin{array}{c} \text{DJ}_1 & \text{DJ}_2 & \dots \\ \text{DJ}_3 & \text{DJ}_4 & \dots \end{array}$	136 to 184 100 to 136	127 to 173 94 to 128	170 to 230 125 to 170	8

Maximum Circuit Values:

Grid-No.1-Circuit Resistance 1.5 max. megohms Resistance in Any Deflecting-Electrode Circuit[®]. . . 5.0 max. megohms

† For visual extinction of undeflected focused spot.

■ volts dc/in.

It is recommended that the deflecting-electrode-circuit resistances be approximately equal.

OPERATING NOTES

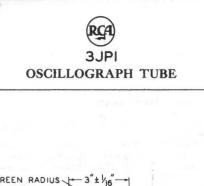
The 3JP1 utilizes a medium-persistence screen having green fluorescence and phosphorescence. The screen has high visual efficiency and exceptionally good brightness contrast between the scanned line and the background. Under conditions of high ambient light, contrast may be maintained by the use of a green filter, such as Wratten No.58.

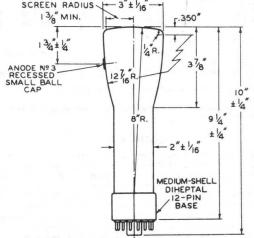
For high-speed scanning, it is recommended that the anode-No.3 (post-deflection accelerator) voltage be not less than 3000 volts, but for low- and medium-speed scanning, anode No.3 maybe operated at a voltage as low as 2000 volts.

Because of its medium persistence, the 3JPL is particularly useful where either medium-speed non-recurring phenomena or medium- and high-speed recurring phenomena are to be observed. The persistence is such that the 3JPL can be operated with scanning frequencies as low as 20 cycles per second without excessive flicker.

AUG. 1, 1951

DATA 2





₡ OF BULB WILL NOT DEVIATE MORE THAN 2⁰ IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT THE CENTER OF BOTTOM OF BASE.

92CM-6583

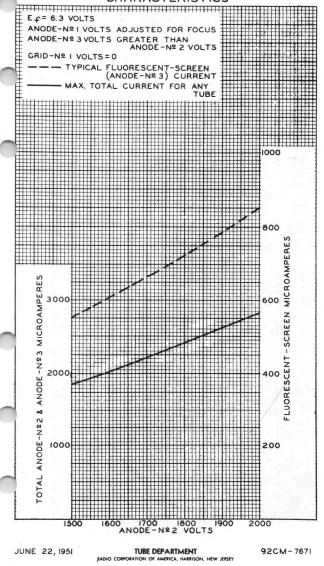
51 **TUBE DEPARTMENT** RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

3JP1



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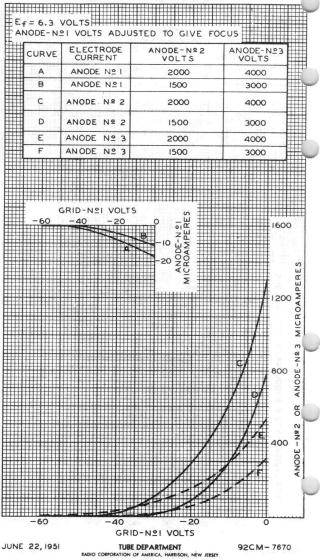
CHARACTERISTICS





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AVERAGE CHARACTERISTICS





POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The 3JP7 is electrically and mechanically like the 3JP1 but utilizes a long-persistence, cascade (twolayer) screen which exhibits bluish fluorescence of short persistence and greenish-yellow phosphorescence which persists for several minutes under conditions of adequate excitation and low ambient light.

Because of its long persistence, the 3JP7 is particularly useful where either low-speed non-recurring phenomena or high-speed recurring phenomena are to be observed.

The persistence is such that the 3JP7 without filter can be operated with scanning frequencies as low as 30 cycles per second without excessive flicker. When used with a yellow filter, such as Wratten No.15 (G), the 3JP7 can be operated with much lower scanning frequencies.

GENERAL DATA, MAXIMUM RATINGS, AND EQUIPMENT DESIGN RANGES

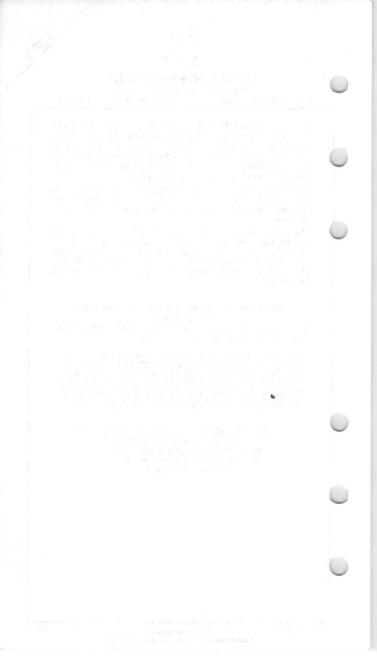
for the 3JP7 are identical with those for the 3JP1 except that Spot Position is defined as follows:

With heater voltage of 6.3 volts, anode-No.3 voltage of 4000 volts, anode-No.2 voltage of 2000 volts, anode-No.1 voltage adjusted for focus, grid-No.1 voltage adjusted to give spot that is just visible, each deflecting electrode connected through 1-megohm resistor to anode No.2, and tube.shielded from all extraneous fields, the undeflected focused spot will fall within a 12-mm square centered at the geometric center of the tube face and having one side parallel to the trace produced by DJ1 and DJ2.

THE SPECTRAL-ENERGY EMISSION CHARACTERISTIC, BUILDUP CHARACTERISTICS, and PERSISTENCE CHARACTERISTICS of the P7 Phosphor are shown at the front of this Section.

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ELECTROSTATIC DEFLECTION

ELECTROSTATIC FOCUS

μµf Deflecting electrode DJ3 to deflecting electrode DJ4. . 2.5 μµf DJ1 to all other electrodes . . 11 μµf DJ2 to all other electrodes . . . 8 μµf 7 DJ3 to all other electrodes . . . μµf DJ4 to all other electrodes . 8 μµf Clear Glass Faceplate Phosphor (For Curves, see front of this Section) P1 Fluorescence. . Green Phosphorescence Green Medium Persistence . . lectrostatic Focusing Method . . . Deflection Method . Electrostatic Overall Length. . . . 11 - 1/2" + 1/4"Greatest Diameter of Eulb . . 3" ± 1/16" Mimimum Useful Screen Diameter. 2-3/4" Weight (Approx.). . . 9 oz . . . Any Mounting Position . J - 24Eulb. Base. Medium-Shell Magnal 11-Pin (JETEC No.B11-66) Basing Designation for BOTTOM VIEW. 11M Pin 1-Heater Pin 8-Deflecting Pin 2-Gria No.1

Electrode DJ2 Pin 9-Deflecting Electrode DJ1 Pin 10-Internal Connection-Do Not Use

Pin 11 - Heater

 DJ_1 and DJ_2 are nearer the screen DJ_3 and DJ_4 are nearer the base

4-56

Pin 3-Cathode

Pin 4 - Grid No.3

Pin 5 - Deflectina

Pin 6 - Deflecting

Pin 7-Ultor

Electrode

Electrode

(Grid No.2, Grid No.4, Collector)

DJ4

- Indicates a change.

DATA 1

Strop

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



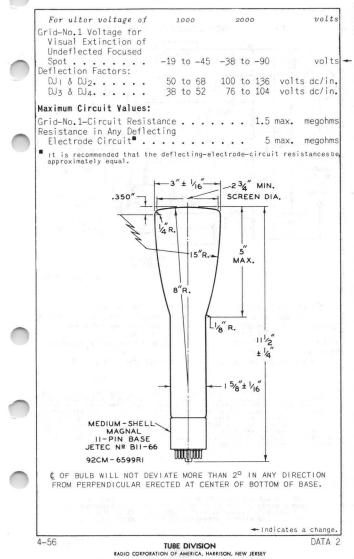
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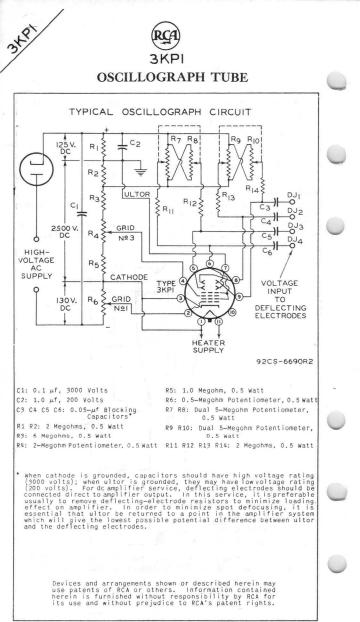
OSCILLOGRAPH TUBE

toward pin 4. With DJ positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values</i> : JLTOR VOLTAGE	ULTOR INPUT (AVERAGE)	4-56		and the second se	DATA 1
toward pin 4. With DJ positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values</i> : ULTOR VOLTAGE 2500 max. volts ULTOR VOLTAGE			→ Indicates a	change.
toward pin 4. With DJ positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\frac{1}{3^{\circ}}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE 2500 max. volts JLTOR NPUT (AVERAGE)	toward pin 4. With DJ positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values</i> : ULTOR VOLTAGE	having 7.5-mm radius concentr	ic with the cent	ter of the tube fa	ace.
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings, Design-Center Values: JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values</i> : ULTOR VOLTAGE	ommended minimum for the 3KP valueaslow as 500 volts may deflection and low ambient-li	1 in general ser be used under co ght levels.	rvice is 1000 volt onditions of low-	s but a velocity
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE				
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE		100 +- 000	200 +- 000	
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE 2500 max. volts JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is $90^{\circ} \pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE	For ultor voltage of	1000	2000	volts
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE 2500 max. volts JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is $90^{\circ} \pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE		langes:		
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values</i> : ULTOR VOLTAGE		Sec. 1		4
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE	DJ3 & DJ4	38 to 52	v dc/in./kv	of ECA
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE	$DJ_1 \& DJ_2 \dots$	50 to 68	v dc/in./kv	of E _C
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE 2500 max. volts JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values</i> : ULTOR VOLTAGE	tion	-15 to +10		μamp
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE	Grid-No.3 Current for Any Operating Condi-		°4	
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE 2500 max. volts JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values</i> : ULTOR VOLTAGE 2500 max. volts ULTOR VOLTAGE	Spot 1.	9% to 4.5% of	Ec	volts
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE				
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE 2500 max. volts JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE 2500 max. volts ULTOR VOLTAGE	Grid-No.1 Voltage for		~4	
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , Design-Center Values: ULTOR VOLTAGE	for Focus 1	16% to 30% of	Ec	volts
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values</i> : ULTOR VOLTAGE				
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE	ror any ultor voltage (Ec	a) between ommended mini	mum* and 2500 1	volts
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE 2500 max. volts ULTOR VOLTAGE	Equipment Design Ranges:	1 hatuaar		
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE		Ject to cathoo	. 120 max.	volts
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE				
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE. SRID-No.3 VOLTAGE. SRID-No.1 VOLTAGE. Negative bias value. Positive bias value. Positive bias value. EXECOMPTION AND	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE	PEAK HEATER-CATHODE VOLTAGE	:		
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE			500 max.	volts
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE. ULTOR VOLTAGE . ULTOR INPUT (AVERAGE) . GRID-No.3 VOLTAGE . Negative bias value . Positive bias value . O max. volts			••• 2 max.	volts
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings, Design-Center Values: JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings, Design-Center Values: ULTOR VOLTAGE				
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by ±10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° ±3°. Maximum Ratings , <i>Design-Center Values:</i> ULTOR VOLTAGE	Negative bias value		200 max.	volts
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values:</i> JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values</i> : ULTOR VOLTAGE			1000 max.	VOITS
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings, Design-Center Values: JLTOR VOLTAGE	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$. Maximum Ratings , <i>Design-Center Values</i> : ULTOR VOLTAGE				
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$.	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° $\pm 3^{\circ}$.				
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toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis).	toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by $\pm 10^{\circ}$ (measured about the tube axis).		2 trace and D	N3 – NJ4 trace	is 900
toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1.	toward pin 4. With DJ positive with respect to DJ4, the spot is deflected toward pin 1.	axis).			-
toward pin 4. With DJ3 positive with respect to DJ4, the spot	toward pin 4. With DJ3 positive with respect to DJ4, the spot	is deflected toward pin 1.			
	With Dia positive with respect to Dia, the past is deflected	toward pin 4. With DJ3 pos	sitive with re	espect to DJ4, t	he spot









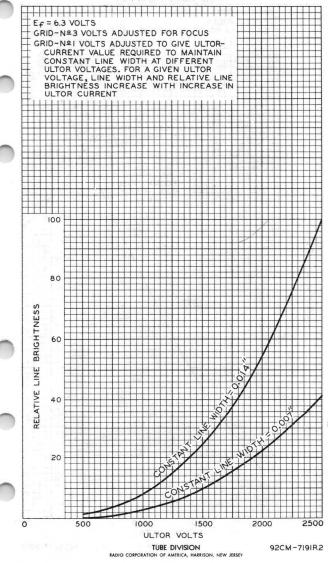
4-56

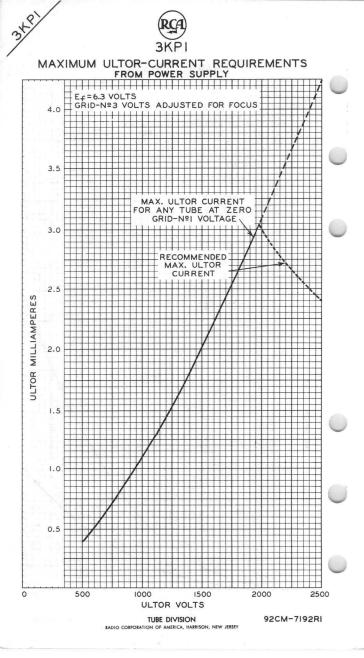
TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY CE-6690R2



18th

CHARACTERISTICS

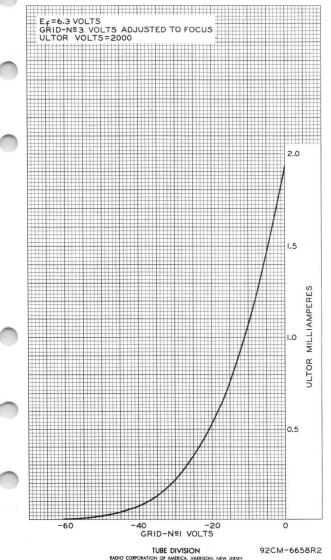


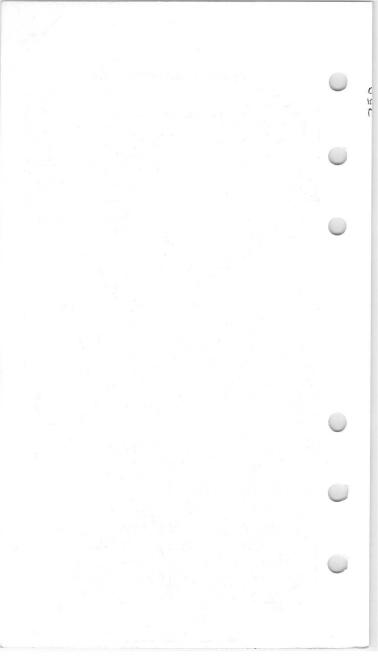




SHE

AVERAGE CHARACTERISTIC









ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

The 3KP4 is the same as the 3KP1 except for the following items:

General:

In general, operation of the 3KP4 at an ultor voltage less than 1500 volts is not recommended.

The PERSISTENCE CHARACTERISTICS

of the P4-sulfide phosphor are the same as those shown for the P11 phosphor at the front of this Section

3KP7

OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

The 3KP7 is the same as the 3KP1 except for the following items:

General:

Phosphor (For Cur	ves,	see	front	of this	Section)	P7
Fluorescence					Purp	ish-Blue ←
Persistence .					Med	ium-Short 🗲
Phosphorescence					Yellow	ish-Green 📥
Persistence .						/ery Long 🛶

In general, operation of the 3KP7 at an ultor voltage less than 1500 volts is not recommended.

3KPII

OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION The 3KP11 is the same as the 3KP1 except for the follow-

ing items: General:

- Indicates a change.



ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

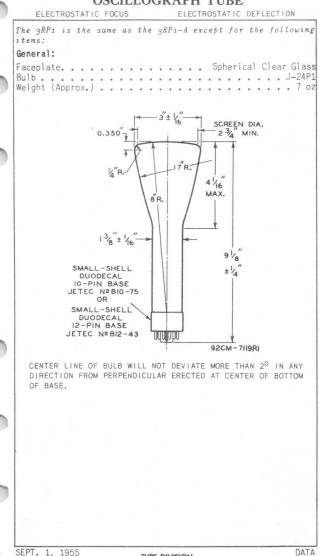
The 3KP16 is the same as the 3KP1 except for the following items:

General:

34.910

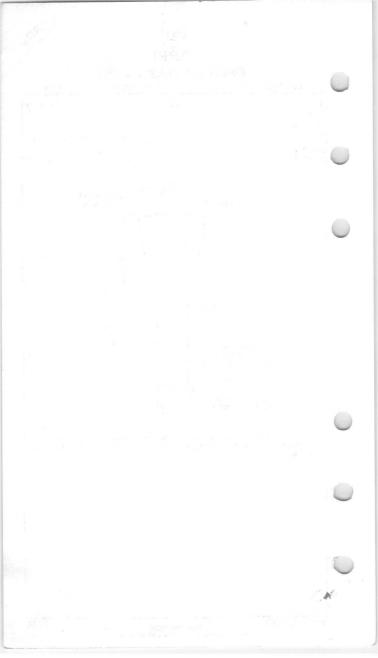
than 1500 volts is not recommended.





DATA

3PD





3RPI-A

OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION DATA General: Heater, for Unipotential Cathode: Voltage 6.3 ac or dc volts Current 0.6 ± 10% . amp Direct Interelectrode Capacitances (Approx.): Grid No.1 to all other electrodes . . . μµf 8 Deflecting electrode DU1 to

deflecting electrode DJ2. Deflecting electrode DJ3 to		2 μμf
Deflecting electrode DJ3 to		station and the
deflecting electrode DJ4.		2 <i>µµ</i> f
DJ1 to all other electrodes	1	.1 μμf
DJ2 to all other electrodes		8 μμf
DJ3 to all other electrodes		
DJ4 to all other electrodes		
Faceplate	Fla	t Clear Glass
Phosphor (For Curves, see from	nt of this Section) P1
Fluorescence		Green
Phosphorescence		
Persistence		
Focusing Method		
Deflection Method		
Overall Length		
Greatest Diameter of Bulb	1	3" ± 1/16"
Minimum Useful Screen Diamete	r	2-3/4"
Mounting Position		2)/4 Δην
Weight (Approx.)		12 07
Bulb		1_2451
Base	adacal 10 Pin (IET	TEC No R10 751
or Small-Shell Du	odecal 12 Pin (JEI	TEC No. 010-73),
Basing Designation for BOTT		
basing besignation for both		
Pin 1 - Heater	Pin 8 -	
Pin 2 - Grid No.1		(Grid No.2,
Pin 3 – Cathode		Grid No.4,
Pin 4 - Grid No.3	0_7	Collector)
Pin 5 ⁴ - Internal S		Deflecting
Connection- a	e sto	Electrode
Do Not Use		DJ2

Pin 6 - Deflecting Electrode DJ3 Pin 7 - Deflecting Electrode DJ4

Pin 10 - Deflecting Electrode DJ1 Pin 11 -Internal Connection-Do Not Use

3RDI.A

Pin 12 - Heater

 DJ_1 and DJ_2 are nearer the screen DJ_3 and DJ_4 are nearer the base

A Pins 5 and 11 are omitted from the 10-pin base.

JULY 1, 1955

TUBE DIVISION

TENTATIVE DATA 1



3RPI-A

OSCILLOGRAPH TUBE

With DJ1 positive with respect to DJ2, the spot is deflected toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1. The plane through the tube axis and pin 1 may vary from the trace produced by DJ3 and DJ4 by 10° (measured about the tube axis). The angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 9001 ± 30. Maximum Ratings, Design-Center Values: ULTOR^O VOLTAGE . . . 2500 max. volts ULTOR INPUT (AVERAGE). 6 max. watts GRID-No.3 VOLTAGE. . . . 1000 max. volts GRID-No.1 VOLTAGE: volts Negative bias value. 200 max. 0 max. volts Positive bias value. 2 max. volts Positive peak value. PEAK VOLTAGE BETWEEN ULTOR AND volts ANY DEFLECTING ELECTRODE 500 max. PEAK HEATER-CATHODE VOLTAGE: 125 max. volts Heater negative with respect to cathode. Heater positive with respect to cathode. 125 max. volts Equipment Design Ranges: For any ultor voltage (E_{C_A}) between 500* and 2500 volts Grid-No.3 Voltage for Focus. 16.5% to 31% of E_{C4} volts Maximum Grid-No.1 Voltage for Visual Extinction of Undeflected Focused volts Spot -6.75% of Eca Grid-No.3 Current for Any Operating Condition µamp -15 to +10 Deflection Factor: 73 to 99 v dc/in./kv of Ec4 52 to 70 v dc/in./kv of Ec4 DJ1 & DJ2. DJ3 & DJ4. Spot Position. . . . ## The "ultor" in a cathode-ray tube is the electrode to which is applied the highest dc voltage for accelerating the electrons in the beam prior to its deflection. In the 3RPL-A, the ultor function is performed by grid No.4, Since grid No.4, grid No.2, and collector are connected to-gether within the 3RPL-A, they are collectively referred to simply as "ultor" for convenience in presenting data and curves. Brilliance and definition decrease with decreasing ultor voltage. A value as low as 500 volts is recommended only for low-velocity de-flection and low ambient-light levels. ## The center of the undeflected focused spot will fall within a circle having 7.5-mm radius concentric with the center of the tube face.

JULY 1, 1955

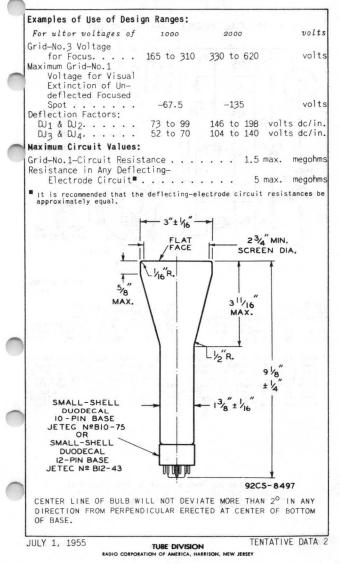
TENTATIVE DATA 1

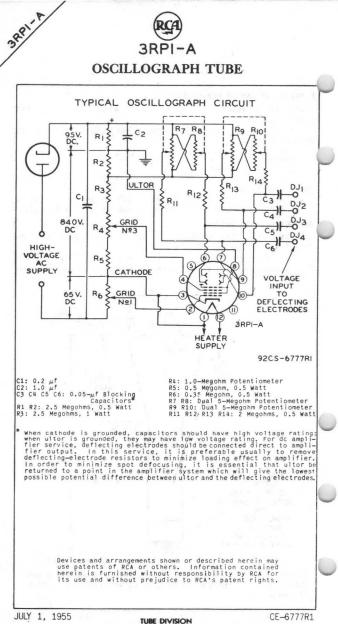
TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



3RDI-R

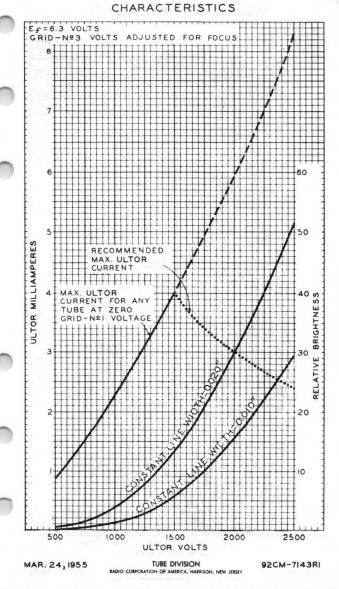
OSCILLOGRAPH TUBE

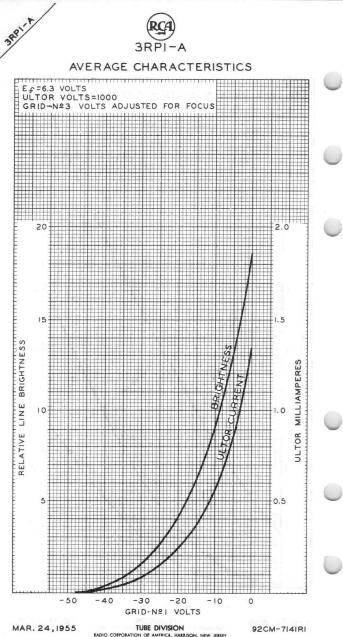




3RPI-A

3RDI.F







ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

BIANDI

DATA	
General:	
Heater, for Unipotential Cathode:	
Voltage 6.3 .	ac or dc volt
Current 0.6 ± 10	9%
Direct Interelectrode Capacitances:	
Grid No.1 to all other electrodes.	
Cathode to all other electrodes	3 to 5.7 μμ
Deflecting electrode DJ to	17+02
deflecting electrode DJ2 Deflecting electrode DJ3 to	1.7 to 3.3 μμ
deflecting electrode D3 to	1 to 2 μμ
Di to all other electrodes.	
deflecting electrode D4 DJ1 to all other electrodes DJ2 to all other electrodes	
DJz to all other electrodes	. 3.5 to 6.8 ши
DJ to all other electrodes	
DJ ₃ to all other electrodes DJ ₄ to all other electrodes Faceplate, Flat Phosphor (For Curves, see front of th	Clear Glas
Phosphor (For Curves, see front of th	is Section) P
Fluorescence	
Phosphorescence	
Persistence	
Focusing Method	Electrostati
Deflection Method Deflecting-electrode	Electrostati
arrangement.	Sac Dimensional Outlin
Overall Length	
Greatest Diameter of Bulb	
Minimum Useful Screen Diameter	
Minimum Useful Scan (Centered with	
respect to tube face):	
By deflecting electrodes DJ1 & DJ2	
By deflecting electrodes DJ3 & DJ4	
Weight (Approx.)	
Mounting Position	
Bulb	10-Pin (JETEC No B10-75)
or Small-Shell Duodecal	12-Pin (JETEC No. B12-43
Basing Designation for BOTTOM VIEW	
Pin 1 - Heater	Pin 8 – Ultor
Pin 2 - Grid No.1	(Grid No.2,
Pin 3 - Cathode 60	Grid No.4,
Pin 4 - Grid No.3	Collector)
Pin 6 - Deflecting) Pin 9 - Deflecting
Electrode 3	Electrode
	DJ4
Pin 7 - Deflecting Electrode	Pin 10 - Deflecting Electrode
DJ ₂	DJ3
002	Pin 12 - Heater
1	THE LE HEALET

TUBE DIVISION

TENTATIVE DATA 1



Maximum Ratings, Design-Center	Values:		
ULTOR VOLTAGE		2500 max.	volts
JLTOR INPUT (AVERAGE)		6 max.	watts
GRID-No.3 VOLTAGE		1000 max.	volts
GRID-No.1 VOLTAGE:			
Negative bias value		200 max.	volts
Positive bias value		0 max.	volts
Positive peak value		0 max.	volts
PEAK VOLTAGE BETWEEN ULTOR AND	ANY		
DEFLECTING ELECTRODE		500 max.	volts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect	to cathode.	180 max.	volts
Heater positive with respect			volts
Equipment Design Ranges:			
For any ultor voltage		recommended	
	nd 2500 volts		
Grid-No.3 Voltage			
for Focus 16.5% 1	0 31% of E _{C4}		volts
Grid-No.1 Voltage			
for Visual Ex-			
tinction of Unde-			
flected Focused			
Spot3% to	-5% of E_{c4}		volts
Grid-No.3 Current			
for Any Operat-			
	5 to +10		μa
Deflection Factors:	5 . 50 F		6.5
		v dc/in./kv	
DJ3 & DJ4 28 Spot Position	.5 to 35 ##	v ac/in./kv	UT EC4
	10 M		
Examples of Use of Design Rang	jes:		
For ultor voltage of 1000	1500	2000	volts
Grid-No.3 Volt-			
age for Focus. 165 to 310	247 to 465	330 to 620	volts
Grid-No.1			
Voltage for			
Visual Ex-			
tinction of			
Undeflected			
Focused Spot30 to -50	-45 to -75	-60 to -100	volts
Deflection			
Factors:			
DJ ₁ & DJ ₂ 41.5 to 50.5	62.3 to 75.8	83 to 101 v	dc/in.
DJ ₃ & DJ ₄ 28.5 to 35	42.8 to 52.5	5/ to /0 v	dc/in.
Brilliance and definition decre	ase with decre	asing ultor v	oltage.
Recommended minimum for the 3WF	1 in general s	ervice is 100	0 volts
⁶ Brilliance and definition decre Recommended minimum for the 3MF but a value as low as 500 volts velocity deflection and low ambie	may be used und nt-light levels	er conditions	OT IOW-
		-	
#: See next page.			
-57		TENTATIVE	DATA 1
TUBE	DIVISION		

34P1



SWRI

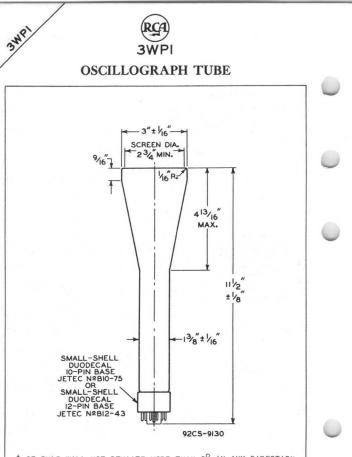
OSCILLOGRAPH TUBE

	id-No.1-Circuit Resistance 1.5 max. megol	hms
	sistance in Any Deflecting- Electrode Circuit	hm:
	SPECIAL PERFORMANCE DATA	
	For ultor voltage of 1500 volts	
-	ne Width ⁴ 0.026 max. in	ncl
	ak Grid-No.1 Drive from Spot Cutoff ⁴	1t:
	ster Shape	
	With grid-wo.1 voltage adjusted to give a spot that is just visib and the tube shielded from all extraneous fields, the center of undeflected focused spot will fall within a circle of 3/16-inch rad concentric with the center of the tube face.	le the iu
	It is recommended that the deflecting-electrode-circuit resistances approximately equal.	b
•	Under the following conditions: heater voltage of 6.3 volts, brightn	
	of 7 foot-lamoerts measured on a 2 × 2 *, 49-ine raster with n in frequency scanning applied to deflecting electrodes DJ1 and DJ2. Line-width measurement, the high-frequency scanning is adjusted give a raster width of 6.9 cm with the grid-No.3 voltage adjusted tracted until the individual scanning lines are just barely dist guishable. Jime width is expressed as the quotient of the contrac raster height measured at the center line of the tube face divided	in- te
ş	Under the following conditions: heater voltage of 6.3 volts, grid-N	0.
	voltage adjusted for focus, and grid-No.1 voltage adjusted to g visible raster. With 49-line raster centered with respect to the t face and size adjusted to give mean dimensions of 1.875° in 1DJ2 dir tion and 1.688° in 3DJ4 direction, all points on the raster will within the area between the two rectangles also centered with resp to the tube face; the one, 1.920° in 1DJ2 direction by 1.730° in 3 direction; the other, 1.830° in 1DJ2 direction and 1.646° in 3 direction.	ub ec li ec DJ
L		
	The deflection factor for either DJ ₃ and DJ ₂ electrodes or DJ ₃ DJ ₄ electrodes for a deflection of less than 75 per cent of the resp tive useful scan will not differ from the deflection factor for corresponding deflecting electrodes at 25 per cent of the useful s by more than 2 per cent.	

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TENTATIVE DATA 2

TUBE DIVISION



 $\mbox{$\xi$}$ of bulb will not deviate more than 2° in any direction from perpendicular erected at center of bottom of base.

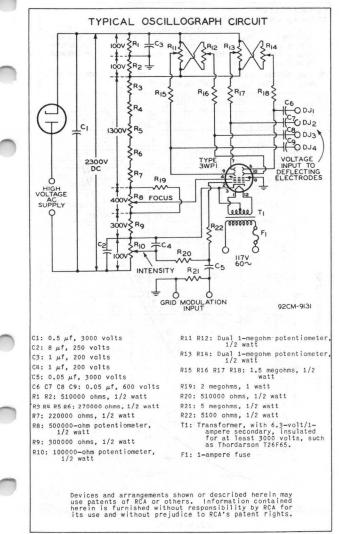
THE PLANE THROUGH THE TUBE AXIS AND PIN 3 MAY VARY FROM THE TRACE PRODUCED BY DJ₁ AND JJ₂ BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 10°. ANGLE BETWEEN DJ₁ - DJ₂ TRACE AND DJ₃ - DJ₄ TRACE IS 90° \pm 1°.

DJ₁ AND DJ₂ ARE NEARER THE SCREEN: DJ₃ AND DJ₄ ARE NEARER THE BASE. WITH DJ₁ POSITIVE WITH RESPECT TO DJ₂, THE SPOT WILL BE DEFLECTED TOWARD PIN 3: LIKEWISE, WITH DJ₃ POSITIVE WITH RESPECT TO DJ₄, THE SPOT WILL BE DEFLECTED TOWARD PIN 12.

CE-9130



OSCILLOGRAPH TUBE



4-57

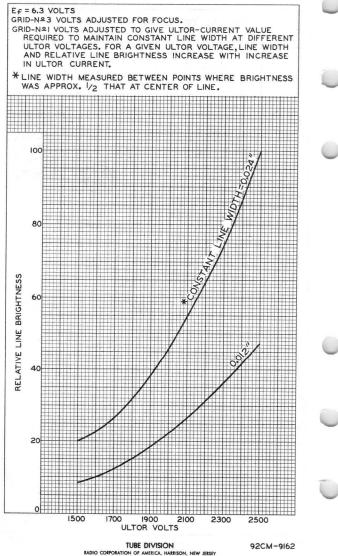
TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY CE-9131

340,



3WP1

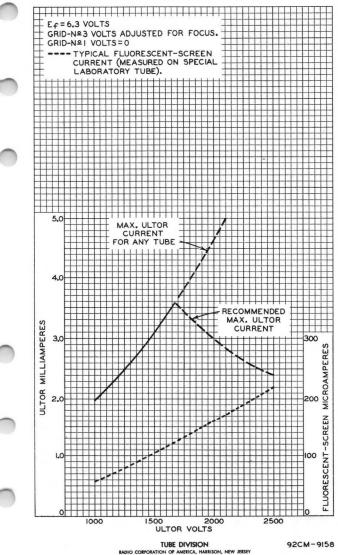
AVERAGE CHARACTERISTICS

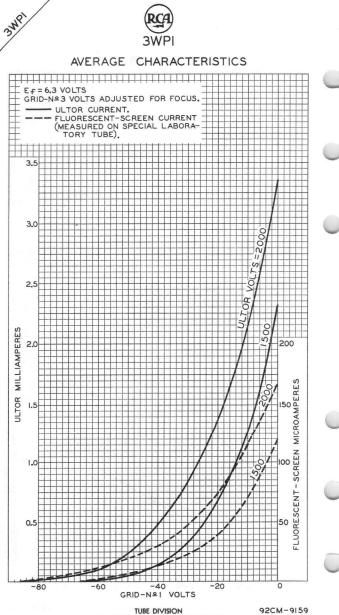




3MR

CHARACTERISTICS





RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



OSCILLOGRAPH TUBE

3MRC LIGHE

ELECTROSTATIC FOCUS EL

ELECTROSTATIC DEFLECTION

The 3WP2 is the same as the 3WP1 except for the following items:

General:

Phosphor (For Curv	ves,	see	э	fr	or	nt	01	F	th	is	S	ec	tic	n)						.P2
Fluorescence									•					Gr	ee	ni	ist	1-1	'el	low
Phosphorescence														Gr	ee	en	ist	1-1	(e)	low
Persistence .			•		•		•		•		•		•	•		•	•		.۱	ong

Line width and drive values for the 3WP2 are the same as those shown for type 3WP1 under the heading SPECIAL PER-FORMANCE DATA and are based upon operation at brightness values calculated from 3WP1 performance.

3WPII OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS ELECTRO

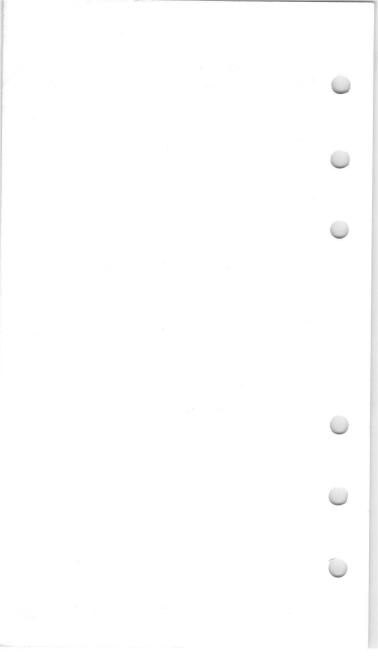
ELECTROSTATIC DEFLECTION

The 3WP11 is the same as the 3WP1 except for the following items:

General:

Phosphor (For Curv	es	s,	Se	ee	fı	ror	١t	of	F 1	th	is	Se	ect	tio	on.).		. P11
Fluorescence																		.Blue
Phosphorescence																		
Persistence .																		Short

Line width and drive values for the 3WP11 are the same as those shown for type 3WP1 under the heading SPECIAL PER-FORMANCE DATA and are based upon operation at brightness values calculated from 3WP1 performance.





OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

SADDI

Current 0.6 Direct Interelectrode Capacitances (Approx.): Grid No.1 to All Other Electrodes 8 Cathode to All Other Electrodes	ordcvolt ат <i>цц</i>
Voltage 6.3 ac c Current 0.6 Direct Interelectrode Capacitances (Approx.): Grid No.1 to All Other Electrodes 8 Cathode to All Other Electrodes 5 9 DJ to DJ2 2.5 DJ to DJ2 1.3 DJ to All Other Electrodes 9 9 DJ2 to All Other Electrodes 9 9 DJ3 to All Other Electrodes 9 9 DJ3 to All Other Electrodes 6 6 Faceplate, Flat 6 Phosphor (For Curves, see front of this Section). Fluorescence and Phosphorescence Persistence of Phosphorescence	ат µµ
Voltage 6.3 ac c Current 0.6 Direct Interelectrode Capacitances (Approx.): Grid No.1 to All Other Electrodes 8 Cathode to All Other Electrodes 5 9 DJ to DJ2 1.3 DJ to All Other Electrodes 9 9 DJ to All Other Electrodes 6 6 Faceplate, Flat	ат µµ
Current 0.6 Direct Interelectrode Capacitances (Approx.): Grid No.1 to All Other Electrodes 8 Cathode to All Other Electrodes	ат µµ
Direct Interelectrode Capacitances (Approx.): Grid No.1 to All Other Electrodes 8 . Cathode to All Other Electrodes 5 . DJ to DJ2	<i>щ</i>
W1 to W2 1.5 DJ3 to DJ4 1.3 DJ1 to All Other Electrodes 9 DJ2 to All Other Electrodes 9 DJ3 to All Other Electrodes 6 DJ4 to All Other Electrodes 6 Faceplate, Flat 6 Phosphor (For Curves, see front of this Section). 7 Fluorescence and Phosphorescence 9	μμ
W1 to W2 1.5 DJ3 to DJ4 1.3 DJ1 to All Other Electrodes 9 DJ2 to All Other Electrodes 9 DJ3 to All Other Electrodes 6 DJ4 to All Other Electrodes 6 Faceplate, Flat 6 Phosphor (For Curves, see front of this Section). 7 Fluorescence and Phosphorescence 9	μμ
W1 to W2 1.3 DJ3 to DJ4 1.3 OJ1 to All Other Electrodes 9 DJ2 to All Other Electrodes 9 DJ3 to All Other Electrodes 6 Faceplate, Flat 6 Florescence and Phosphorescence 7 Persistence of Phosphorescence 7	
U1 to All Other Electrodes 9 DJ2 to All Other Electrodes 9 DJ3 to All Other Electrodes 5 DJ4 to All Other Electrodes 6 Faceplate, Flat 6 Phosphor (For Curves, see front of this Section) 6 Fluorescence and Phosphorescence 6 Persistence of Phosphorescence 6	
U1 to All Other Electrodes 9 DJ2 to All Other Electrodes 9 DJ3 to All Other Electrodes 5 DJ4 to All Other Electrodes 6 Faceplate, Flat 6 Phosphor (For Curves, see front of this Section) 6 Fluorescence and Phosphorescence 6 Persistence of Phosphorescence 6	μ
DJ4 to All Other Electrodes	· · · · µµ
DJ4 to All Other Electrodes	
DJ4 to All Other Electrodes 6 Faceplate, Flat	· · · · ///
-aceplate, Flat	••••
Fluorescence and Phosphorescence	
Fluorescence and Phosphorescence	Clear Glas
Fluorescence and Phosphorescence Persistence of Phosphorescence	F
Persistence of Phosphorescence	. Gree
Focusing Method Fla	Mediu
ocusing method Ele	ectrostati
Focusing Method Ele Deflection Method Ele	ectrostati
Overall Length	3/4" ± 3/8
Greatest Diameter of Bulb 5-14	14" ± 3/32
Winimum Useful Screen Diameter	
Bulb	
Weight (Approx.)	2-1/2 11
Mounting Position	Ar
Mounting Position	C No. J1-22
Base Medium-Shell Diheptal 12-Pin (JETEC	No. B12-37
BOTTOM VIEW	
Pin 1-Heater Pin 9-Ultor	
	id No.2,
	id No.4)
Pin 4 - No Con-	ecting
	trode DJ2
Do Not Use Pin 11 - Defle	
	trode DJ1
Pin 7-Deflecting Pin 12-No. (
Electrode DJ3 Pin 14 - Heate	
Pin 8-Deflecting Cap-Post-	
	id No.5,
Co	llector)
DI and DI are nearer the screen	
DJ_1 and DJ_2 are nearer the screen DJ_3 and DJ_4 are nearer the base	
With DJ_1 positive with respect to DJ_2 , the spot	t is de-
flected toward pin 5. With DJ3 positive with re	espect to
DJ ₄ , the spot is deflected toward pin 2.	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1
	following
The plane through the tube axis and each of the	nd DL by
items may vary from the trace produced by DJ1 and	u 002 09
JUNE 1, 1953 THE DEPARTMENT TENTA	TIVE DATA

5ABPI

SABPI

OSCILLOGRAPH TUBE

●,▲,0,*,**,∦,∦∦,□: Se	Anna Landa Landa Landa			italia e italia e	
Grid-No.1 Volt."	-52 to -87	-39 to -65	-52 to -8	7	volts
for Focus	400 to 690	300 to 515	400 to 69	0 1	olts
Grid-No.3 Volt.		1 3 1 T			
voltage of	2000	1500	2000	1	volts
and ultor	2000	3000	4000		
voltage of	2000	3000	4000		volts
For post-ultor					
Examples of Use of	Design Ran	ges;			
Spot Position		**			
DJ3 & DJA		. 14.5 to 19	.5 v dc/i	n./kvo	f Ec4
DJ1 & DJ2		. 21.5 to 2	9 v dc/i	n./kvo	f Eca
	When Ecs				
$DJ_3 \& DJ_4 \dots$			v dc/i	n./kvo	t Ecq
$DJ_1 \& DJ_2 \dots DJ_3 \& DJ_4 \dots$. 26.5 to 3	6 v dc/i	n./kvo	T Eca
	When Ec5	= 2 x Ec4			19
Deflection Factors		1997			
		-15 to	o +10	• • •	µamp
Grid-No.3 Current Operating Condit	for Any	45.4	110		100
Focused Spot		. 2.6% to 4.	3% of Ec4		volts
Extinction of U		0.071			
Grid-No.1 Voltage			6 A. C.		
Grid-No.3 Voltage		, 20% to 34.	5% of Eca	e	volts
and any ultor vo					
For any post-ulton	r voltage (E	c5) between	2000* and	6000	volts
Equipment Design					17.90
Faulament Bealer	Dongoos				
Heater positive				max.	volts
Heater negative		t to cathode.	125	max.	volts
PEAK HEATERCATHO			000		
ANY DEFL	ECTING ELECT	TRODE	500	max.	volts
Positive peak v PEAK VOLTAGE BETW	FEN LITOP AN		2	IIIdX.	vorts
Positive bias v					volts
Negative bias v					volts
GRID-No.1 VOLTAGE					
GRID-No.3 VOLTAGE			1000	max.	volts
	TO ULTOR VOL	.TAGE	2.3:1	max.	
RATIO OF POST-ULT	OR VOLTAGE				
ULTOR VOLTAGE .			2600		volts
POST-ULTOR VOLTA	GE		6000	max.	volts
Maximum Ratings, 1	Design-Cente	r Values:			
1	1.0 .				
trace is 90° ±					
trace is 90° ±	ngle betweer	$1 DJ_1 - DJ_2 $	race and	DJ3 -	DJ4
pin 5), 10°. A	ngle betweer	minal (on sa 1 DJ ₁ - DJ ₂ 1	me side d race and	DJ3 -	DJ ₄
the following a axis): Pin 5, 1 pin 5), 10 ⁰ . A trace is 90 ⁰ ±	ngle betweer	rances (measu rminal (on sa n DJ ₁ - DJ ₂ 1	me side of arred about the side of the sid	the t f tube DJ3 -	ube as DJ ₄

TUBE DEPARTMENT





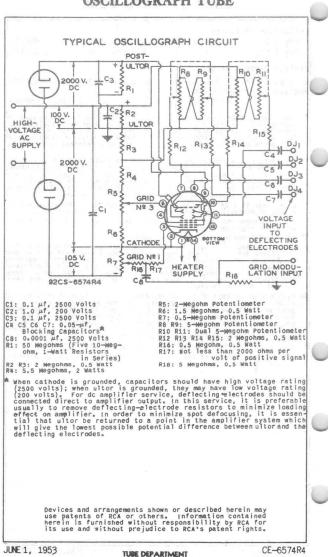
OSCILLOGRAPH TUBE

Deflection Factors:#		
DJ1 & DJ2 43 to 58 40 to 54 DJ3 & DJ4 29 to 39 27 to 36	53 to 7 36 to 4	2 v dc/in. B v dc/in.
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	1.5 m	ax. megohms
Resistance in Any Deflecting- Electrode Circuit [®]	5.0 m	ax. megohms
 The "post-ultor" in a cathode-ray tube is the applied a dc voltage higher than the ultor volt the electrons in the beam after its deflection. post-deflection acceleration function and the c both performed by grid No.5 which is conveniently ultor". 	referre	to as -post-
The "ultor" in a cathode-ray tube is the electrow the highest dc voltage for accelerating the prior to its deflection. In the SAB-types, the formed by grid No.4. Since grid No.4 and grid H gether within the SAB-types, they are collective as "ultor" for convenience in presenting data and	de to wh electro ultor fu to.2 are bly refe d curves	ich is applied ns in the beam inction is per- connected to- rred to simply
At or near this rating, the effective resistanc should be adequate to limit the ultor input powe	e of th r to 6 w	e ultor supply watts.
It is recommended that the post-ultor voltage volts for high-speed scanning.	be not	iess than 3000
** Recommended minimum value of ultor voltage. * The deflecting electrodes DJ2 and DJ2 are design	ned to h	ave extra-hig
The deflecting electrodes DJ3 and DJ4 are design deflection sensitivity and consequently produce deflection. with post-deflection acceleration, tion may be limited to a inches; without post-de deflection to full screen diameter will ordinari electrodes are, therefore, more suitable for th for the time-base voltage.		
With heater voltage of 6.3 volts, post-ultor v ultor voltage of 2000 volts, grid-wo.3 voltage a grid-wo.1 voltage adjusted to give spot that deflecting electrode connected through a 1-megg and tube shielded from all extraneous fields, deflected, focused spot will fall within a cli radius concentric with the center of the tube fa	rcle ha	of 4000 volts to give focus visible, each stor to ultor ter of the un- ving a 12.5-mm
For visual cutoff of undeflected focused spot.		
It is recommended that the deflecting-electrod be approximately equal.	e-circu	it resistances
and a set and the set of the set		ATIVE DATA 2

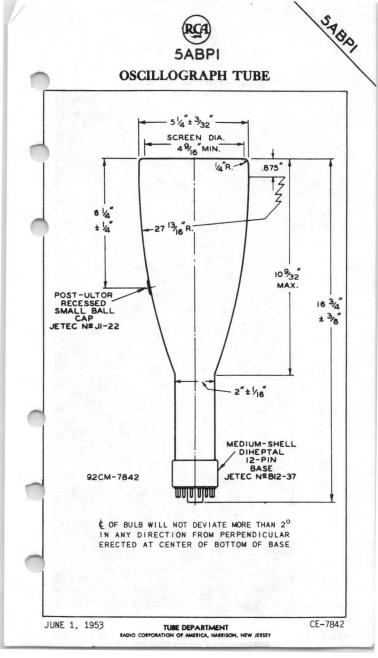
5ABPI

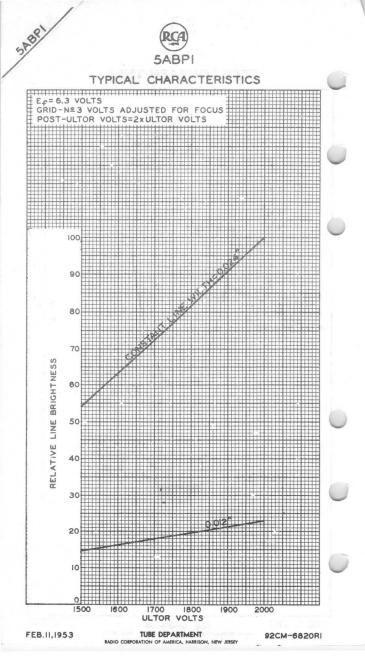
SABPI

OSCILLOGRAPH TUBE



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

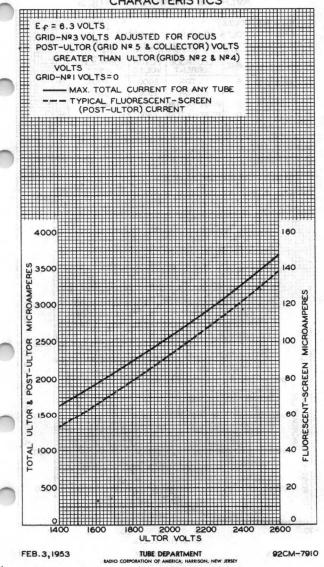


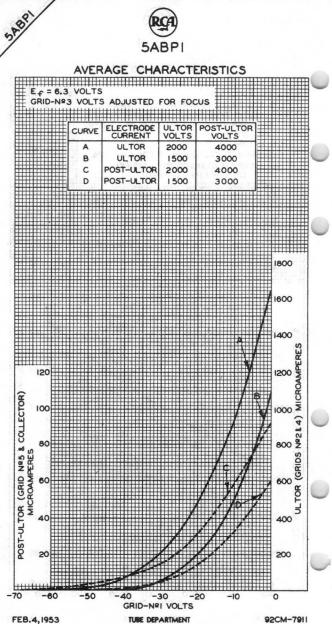




STAD

CHARACTERISTICS





RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





OSCILLOGRAPH TUBE

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The 5ABP4 is the same as the 5ABP1 except for the following items: General: Phosphor (For Curves, see front of this section). .P4—Sulfide Type

rivorescence																٠	white
Phosphorescence																	White
Persistence .		•	•		•	•	•	•	•	•		•	•	•	•	•	Short

THE PERSISTENCE CHARACTERISTICS

of the P4-sulfide phosphor are the same as those shown for the P11 phosphor at the front of this Section

5ABP7 OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The 5ABP7 is the same as the 5ABP1 except for the following items:

General:

Phosphor (Fo	or C	ur	ves	s,	S	ee	f	roi	nt	0	f	th	is	Se	ect	tio	on					. P7
Fluorescer	nce.																					.Blue
Persiste	ence						•				•					•					•	Short
Phosphores	scen	nce									•			•	•	•	G	re	en	is	h-'	rellow
Persiste	ence	•		•	•	٠	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	. Long

5ABPII OSCILLOGRAPH TUBE

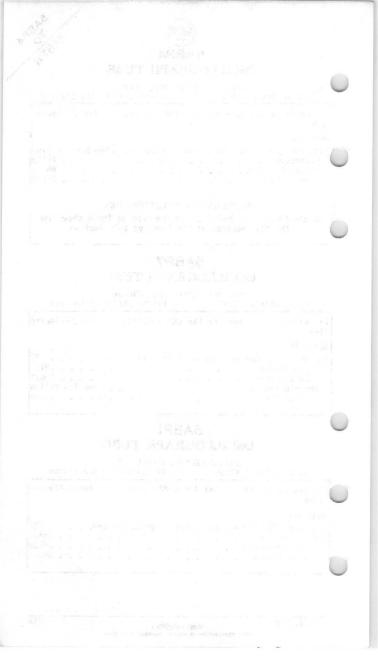
POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

The $5ABP_{11}$ is the same as the $5ABP_1$ except for the following items:

General:

Phosphor (For Curves	,	Se	ee	f	roi	nt	0	f	th	is	Se	ect	ti	on).			. P11
Fluorescence																		.Blue
Phosphorescence .																		.Blue
Persistence	•	•				•				•				•		•	•	Short





STOP

OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

			DA	TA							
Genera	1:										
Heater	, for Unipo	tential	Catho	de:							
	age							ac	or	dc	volt
	ent			6 ±							.am
	Interelect							-	-		
	No.1 to al ode to all				•••		4.2				μμ
	ecting elec						3.1	to	5.8		μμ
	flecting elec						1.7	+0	2 1		100
	ecting elec			•••			1.1	tu	2.1		μμ
	flecting el				81.19		0.7	to	1.3		μμ
	to all othe						4.4	to	9.2		μμ
DJa	to all othe	r electr	odes.	÷ .			4.4	to	9.7		1111
DJz	to all othe to all othe ate, Flat.	r electr	odes.				2.8	to	5.3		ш
DJ	to all othe	r electr	odes.				2.8	to	6.3		μμ
acepl	ate, Flat.								Cle	ar	Glas
hosph	or (For Cur	ves, see	fron	t of	this	Sec	ction	n) .			. P
	rescence .										Gree
	phorescence						• •		э		Gree
	rsistence.			• •	• •	• •	• •	• • •	•		ediu
	ng Method.		• • •	• •	• •	• •	• •				tati
	tion Method		•••	• •	• •	• •	• •	•EI	ect	ros	tati
	ecting-elec				C				,	~	
	rangement. 1 Length .										3/16
	st Diameter										3/32
	m Useful Sc					• •		5-1	./4		-1/2
	(Approx.)		• • •				11	10	2		2 1b
	na Position					11	11				. An
Cap			Reces	sed S	mall	Bal	11 (.	JETE	CN	0.J	1-22
Bulb.											J4
Base .		dium-She					n (J	ETEC	No	.B1	
Basi	ng Designat	ion for	BOTTO	M VIE	w.	• •	• •		•	• •	14
	1-Heater					Pir	n 9		tor		
	2 – Cathode								irid		
	3-Grid No.								irid		
	4 - No Conne tion-Do		G	0			10				
	Not Use		2	26)				J ₂	tro	ae
Pin	5-Grid No.		5/15	Alt	(10)	Di	11			.+:	20
	7 - Deflecti		$\overline{\Lambda}$	14	5	E II	1 11		lec		
C10	Electro		1		R				JI	LIU	ue
	DJz	ue (327	$\overline{\langle}$		Pir	1 12			nno	~
Pin	8 - Deflecti	na	en	(14)		111	1 12		ion		U-
1.1.1.1	Electro		~	-		Pir	14				
	DJ4					5	Cap				or
	+								irid		
								C	011	ect	or)

TUBE DIVISION



SADPI

OSCILLOGRAPH TUBE

laximum Ratings, Desi	gn-Ce	nter	- 1	ali	ue.	s:						
POST-ULTOR VOLTAGE .			14						6000	max.	vol	
LTOR VOLTAGE ATIO OF POST-ULTOR \					•	•	•	•	2600	max.	vol	ts
ULTOR VOLTAGE	IULIAU		1						2.3:1	max.		
RID-No.3 VOLTAGE.					÷.	÷		•		max.	vol	ts
RID-No.1 VOLTAGE:		• •	•	1	1	1	•	•	1000	inco/ve		
Negative bias value	e					7			200	max.	vol	ts
Positive bias value									0	max.	vol	ts
Positive peak value	e			÷					2	max.	vol	ts
EAK VOLTAGE BETWEEN	ULTOR	AND) A	NY								
DEFLECTING ELECTRON	DE	• •			÷				500	max.	vol	ts
EAK HEATER-CATHODE \		E:										
Heater negative wit									10'0			
respect to cathoo		• •	•	•	•	÷	•	•	180	max.	vol	ts
Heater positive wit									100	max.	vol	te
respect to cathoo		• •		1	1	•	•	•	190	max.	VUI	i LS
quipment Design Rang	es:											
With any post-ultor and any ultor vo. rid-No.3 Voltage	ltage (E _{c 4})	Be	twe	en	15	100	** (and 2600	volts		
for Focus	20	0% to	034	4.5	5%	of	FE	-c ₄			vol	ts
rid-No.1 Voltage for Visual Ex-												
tinction of Unde-												
flected Focused												
Spot	-2.1	25%	to-	-3.	.75	5%	0	fΕ	C		vol	Its
rid-No.3 Current									[~] 4			
for Any Operating												
Condition		-	-15	to	- C	+10)				μά	amp
eflection Factors:#												
When $E_{c_{5}} = 2 \times E_{c_{4}}$: $D_{1} & ^{5}D_{2} \dots $		2	6.7	+.	~ 2	2	2		v dc/i	n /ku	off	1.17
$\mathbb{D}_3 \& \mathbb{D}_4 \dots$			20.						v dc/i	n./kv	of	-C4
		3.5%	20.	/		20						1.7
When $E_c = E_{c_4}$: $D_1 \& D_2$.		21	.5	to) i	26.	.5		v dc/i	n./kv	of E	
$DJ_3 \& DJ_4 \dots$				i to	o 2				v dc/i	n./kv	of E	-C.
pot Position				#1	#							4
			+ :						o of the	ulto		1
At or near this ratin should be adequate to	limit	the	ult	or	in	put	s p	owe	r to 6	watts.	Subt	JIY
It is recommended the volts for high-speed	at the	post	-u1	to	r	vol	ta	ge	be not	lesst	nan 30	000
* Recommended minimum va # with beater voltage of	f 6.3	uit.	5.	NOI	it-	ye.	tor	- vr	ltage o	f 4000	volt	s.
<pre>## with heater voltage c ultor voltage of 2000 ' grid-No.1 voltage ad deflecting electrode and the tube shielded undeflected, focused radius concentric wit</pre>	volts, justed connect from spot w h the c	grid to g ed t all vill ente	-No live hro ext fal r o	•3 e s oug rar 11 f t	vo po h a wi he	lta t t a 1 ous thi ti	nge ha f in ube	ad ego ielo a c fa	ljusted is just hm resis ds, the circle f uce.	to give visib stor to cente naving	e focu le, ea o ulto r of f an 8-	ach or, the
:See next page.												

TUBE DIVISION



SADDI

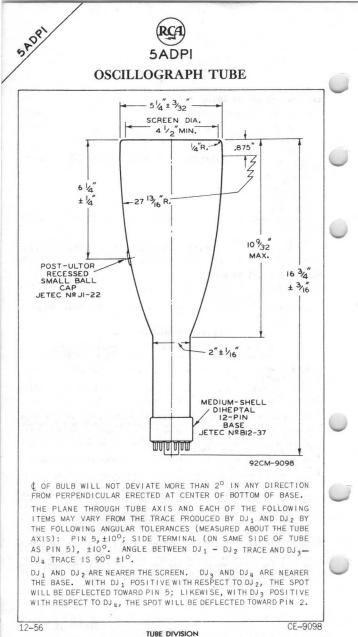
OSCILLOGRAPH TUBE

and ultor voltage of 2000 1500 2000 volt Grid-No.3 Voltage for Focus 400 to 690 300 to 515 400 to 690 volt: Grid-No.1 Voltage for Visual Ex- tinction of Undeflected Focused Spot45 to -75 -34 to -56 -45 to -75 volt: Deflection Factors:# DJ & DJ 2	Examples of Use of Design Ranges:		
Grid-No.3 Voltage for Focus 400 to 690 300 to 515 400 to 690 volts Grid-No.1 Voltage for Visual Ex- tinction of Undeflected Focused Spot45 to -75 -34 to -56 -45 to -75 volts Deflection Factors:# DJ & DJ 43 to 53 40 to 50 53.4 to 66.6 v dc/in. DJ & DJ 32 to 40 30.5 to 37.5 40.6 to 50 v dc/in. Maximum Circuit Values: Grid-No.1-Circuit Resistance 1.5 max. megohms Resistance in Any Deflecting- Electrode Circuit [®]	With post-ultor voltage of 2000 3000	4000	volts
<pre>Voltage for Focus 400 to 690 300 to 515 400 to 690 volts Grid-No.1 Voltage for Visual Ex- tinction of Undeflected Focused Spot45 to -75 -34 to -56 -45 to -75 volts Deflection Factors:# DJ1 & DJ2 43 to 53 40 to 50 53.4 to 66.6 v dc/in. DJ3 & DJ4 32 to 40 30.5 to 37.5 40.6 to 50 v dc/in. Maximum Circuit Values: Grid-No.1-Circuit Resistance 1.5 max. megohms Resistance in Any Deflecting- Electrode Circuit</pre>	and ultor voltage of 2000 1500	2000	volts
Focus	Grid-No.3		
<pre>Grid-No.1 Voltage for Visual Ex- tinction of Undeflected Focused Spot45 to -75 -34 to -56 -45 to -75 volts Deflection Factors:# DJ & DJ 2 43 to 53 40 to 50 53.4 to 66.6 v dc/in. DJ & DJ 4</pre>			
<pre>Visual Ex- tinction of Undeflected Focused Spot45 to -75 -34 to -56 -45 to -75 volts Deflection Factors:# DJ & DJ 2 43 to 53 40 to 50 53.4 to 66.6 v dc/in. DJ & DJ 2 32 to 40 30.5 to 37.5 40.6 to 50 v dc/in. Maximum Circuit Values: Grid-No.1-Circuit Resistance 1.5 max. megohms Resistance in Any Deflecting- Electrode Circuit 5.0 max. megohms Net post-ultor voltage of gooo volts and ultor voltage of gooo volts and ultor voltage of gooo volts tand ultor voltage of gooo volts and ultor voltage of gooo volts be approximately effection acceleration, the length of deflection in either horizonal or vertical direction my be limited to a-1/4 inches; without post-deflection acceleration, deflection to full screen diameter will ordinarily be obtained. It is recommended that the deflecting-electrode-circuit resistances be approximately equal. Under the following conditions: heater voltage of 6.3 volts, bright- ness of 15 foot-lamberts measured on a 2" x "0-lime raster with high-frequency scanning applied to deflecting electrodes of and of for lime-width measurement. the high-frequency scanning is adjusted to give a raster width of 12 cm with the grid-No.3 voltage adjusted to give a tarster focus at center of the tube face divided by the number of scanning limes (49). Under the following conditions: heater voltage of 6.3 volts, grid-No.3 voltage adjusted for focus, and grid-No.1 voltage adjusted to give visible raster. With 49-line raster just fouch the sides of a square 3.075</pre>	Grid-No.1	400 to 690	volts
Undeflected Focused Spot45 to -75 -34 to -56 -45 to -75 volts Deflection Factors:# DJ & DJ 43 to 53 40 to 50 53.4 to 66.6 v dc/in. DJ & DJ	Visual Ex-		
<pre>Deflection Factors:# DJ & DJ 2 43 to 53 40 to 50 53.4 to 66.6 v dc/in, DJ & DJ 4</pre>			
DJ & DJ	Deflection	-45 to -75	volts
Grid-No.1-Circuit Resistance 1.5 max. megohm: Resistance in Any Deflecting- Electrode Circuit	DJ ₁ & DJ ₂ 43 to 53 40 to 50		
<pre>Resistance in Any Deflecting- Electrode Circuit</pre>	Maximum Circuit Values:		
 Electrode Circuit. SPECIAL PERFORMANCE DATA With post-ultor voltage of gooo volts and ultor voltage of gooo volts and ultor voltage of gooo volts Line Width 		1.5 max.	megohms
With post-ultor voltage of and ultor voltage of 3000 volts Line Width 0.030 max. incl Peak Grid-No.1 Drive from 5 5 Spot Cutoff 45 max. volts Raster Shape. § * The deflecting electrodes in the 5ADP1 are designed to have extra-high deflection. with post-deflection acceleration, the length of deflection in elther horizontal or vertical direction may be limited to 4-1/4 inches; without post-deflection acceleration, deflection to full screen diameter will ordinarily be obtained. It is recommended that the deflecting-electrode-circuit resistances be approximately equal. Under the following conditions: heater voltage of 6.3 volts, bright- ness of 15 foot-lamberts measured on a 2" x 40-line raster with high-frequency scanning applied to deflecting scanning is adjusted to give a raster width of 12 cm with the grid-No.3 voltage adjusted to give a starpest focus at center of the tube face. Raster height is con- tracted until individual scanning lines are just barely distinguishable. Line width is expressed as the quotient of the contracted raster height is voltage adjusted for focus, and grid-No.1 voltage adjusted to give voltage adjusted for focus, and grid-No.1 voltage adjusted to give so that the widest points on the raster yits touch the sides of a square 3.075" on a side, no point on the raster sides will lie within an inscribed square 2.925" on a side having its sides will lie within an inscribed square 2.925" on a side having its sides parallel to the sides of the 3.075" square and its center at the center of the 3.075" square.		5.0 max.	megohms
and ultor voltage of 1500 volts Line Widthe	SPECIAL PERFORMANCE DA	ТА	
 Peak Grid-No.1 Drive from Spot Cutoff			
 Spot Cutoff		0.030 max.	inch
* The deflecting electrodes in the 5ADP1 are designed to have extra-high deflection. With post-deflection acceleration, the length of deflection in either horizontal or vertical direction may be limited to 4-1/4 inches; without post-deflection acceleration, deflection to full screen diameter will ordinarily be obtained. It is recommended that the deflecting-electrode-circuit resistances be approximately equal. Under the following conditions: heater voltage of 6.3 volts, bright- ness of 15 foot-lamberts measured on a 2* x 2* 40-line raster with high-frequency scanning applied to deflecting electrodes DJ, and DJ, for line-width measurement, the high-frequency scanning is adjusted to give a raster width of 12 cm with the grid-No.3 voltage adjusted to give a the center of the tube face divided by the number of scanning lines (49).	Spot Cutoff	45 max. 6	volts
be approximately equal. Under the following conditions: heater voltage of 6.3 volts, bright- ness of 15 foot-lamberts measured on a 2" x 2". Uo-line raster with high-frequency scanning applied to deflecting electrodes OJ, and OJ. For itme-width measurement. the high-frequency scanning is adjusted to give a raster width of 12 cm with the grid-No.3 voltage adjusted to give sharpest focus at center of tube face. Raster height is con- tracted until individual scanning lines are just barely distinguishable. Line width is expressed as the quotient of the contracted raster height measured at the center line of the tube face divided by the number of scanning lines (49). Under the following conditions: heater voltage of 6.3 volts, grid-No.3 voltage adjusted for focus, and grid-No.1 voltage adjusted to give visible raster. With 49-line raster, the size of which is adjusted so that the widest points on the raster sides will lie within an inscribed square 2.925° on a side having its sides parallel the 3.075° square.	deflection sensitivity and consequently produ deflection. With post-deflection acceleration in either horizontal or vertical direction	ce less than fu , the length of may be limited	deflection
 Under the following conditions: heater voltage of 6.3 volts, brinthess of 15 foot-lamberts measured on a 2" x 2", No-line raster with high-frequency scanning applied to deflecting electrodes DJ, and DJ, for line-width measurement, the high-frequency scanning is adjusted to give a raster width of 12 cm with the grid-No.3 voltage adjusted to give sharpest focus at center of tube face. Raster height is contracted until individual scanning lines are just barely distinguishable. Line width is expressed as the quotient of the contracted raster height measured at the center line of the tube face divided by the number of scanning lines (49). Under the following conditions: heater voltage of 6.3 volts, grid-No.3 voltage adjusted for focus, and grid-No.1 voltage adjusted to give visible raster. With 49-line raster, the size of which is adjusted so so that the widest points on the raster sides will lie within an inscribed square 2.925" on a side having its sides parallel to the sides of the 3.075" square and its center at the center of the 3.075" square. 	be approximately equal.		
9 Under the following conditions: heater voltage of 6.3 volts, grid-No.3 voltage adjusted for focus, and grid-No.1 voltage adjusted to give visible raster. With 49-line raster, the size of which is adjusted to give so that the widest points on the raster just touch the sides of a square 3.075" on a side, no point on the raster sides will lie within an inscribed square 2.925" on a side having its sides parallel to the sides of the 3.075" square and its center at the center of the 3.075" square.	Under the following conditions: heater volta ness of 15 foot-lamberts measured on a 2* x high-frequency scanning applied to deflecting for give a rate meaning applied to deflecting to give a rate meaning applied to deflect to give a sharpest focus at center of the face tracted until individual scanning lines are juy is width is expressed as the quotient of the measured at the center line of the tube face	a arriada by t	ne number
	9 Under the following conditions: heater voltage voltage adjusted for focus, and grid-No.1 v visible raster. With 49-line raster, the si so that the widest points on the raster ju square 3.075" on a side, no point on the rast an inscribed square 2.925" on a side havin the sides of the 3.075" square and its cent 3.075" square.	e of 6.3 volts, oltage adjuste ize of which is st touch the s er sides will g its sides pa er at the cent	grid-No.3 d to give adjusted ides of a lie within rallel to er of the

12-56

TENTATIVE DATA 2

TUBE DIVISION

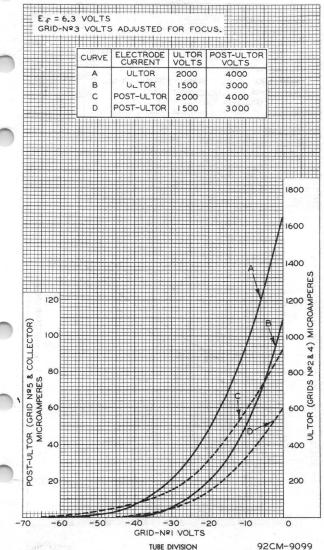


RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



1904c

AVERAGE CHARACTERISTICS



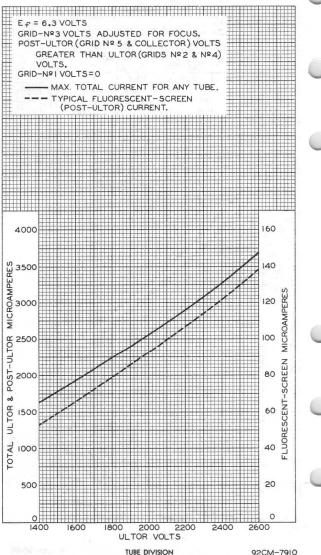
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-9099



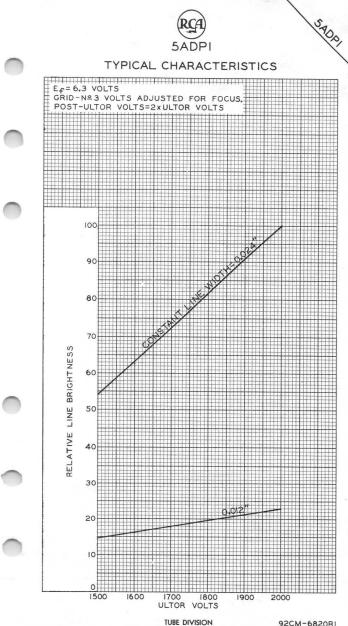
SADP

CHARACTERISTICS

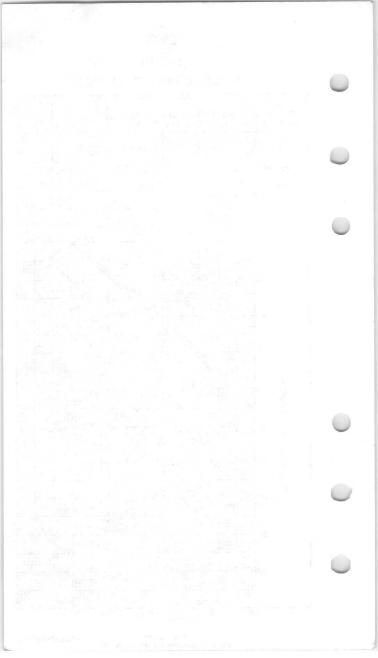


RADIO CORPORATION OF AMERICA. HARRISON, NEW JERSEY

92CM-7910



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





SAUDUAC COLOR FLYING-SPOT CATHODE-RAY TUBE

HIGH-RESOLUTION CAPABILITY ELECTROSTATIC FOCUS

ALUMINIZED SCREEN MAGNETIC DEFLECTION

For use as flying-spot scanner in color video-signal generators

DATA

General:

			I FCT		1 1110		10/10						DA	TA 1
										- 1r	dic	ates a		
Positiv	ve-peak v	value.					•				2	max.	V	olts
Positiv	e-bias	value.									0	max.	V	olts
										1	.50	max.	V	olts
GRID-No.	VOLTAG	1	• •	•	• •	•	·			1	000	max.	V	olts
GRID-No.	3 VOLTAG													
ULTOR VOL	TAGE													
eater, for Unipotential Cathode: Voltage 6.3														
Pin 10	-Grid No	5.2	(0		2	9							
				X		>	10						ur)	
Pin 7	111601110			V	_	1	L							
Pin 6	- Grid No	0.3		Y.	7	F		1.1		p – U	llto	or		
		n 1		- (6) (7								
5	5	ion t	ort	501	IUM	VII	EW.						•	. 120
Base	Small-Sh	nell D	uode	cal	7-	Pi	n (.	JET	EC	Grou	p 4	, No	.B7-	-51)
Socket .						Se	ee (Dpe	rat	ing	Con	siden	rat	ions
Weight (A	pprox.)												1.4	lbs
Greatest	Diameter											5"	±	1/8"
Deflectio Overall L	enath.	(Appr	ox.)	:	: :	÷	•	• •	:	· ·		-1/2"	÷ ±	40 ⁹ 3/8"
Deflectio	n Method	1										. Ma	agne	etic
Persi	stence. Method		• •	÷	• •	•	• •	•	•	•••	.E1	ectro	.Sh	atic
Phospho	rescence												.G	reen
Fluores	cence .											Alur	.G	reen
														P24
										1 +	00	10111111	G	ass
coati	ng to ul	tor .								. {5	00	max.		
Entorno	1 conduc	+ ino	nock											μμτ
Grid No	.1 to al	1 oth	er e	lec	tro	des	5							
Direct In	 terelect	rode (Capa	cit	U.6	± es:	10%	•	•	• •	• •	• •	• •	amp
							1 () 9	<u>.</u>						amn



5AUP24 COLOR FLYING-SPOT CATHODE-RAY TUBE

OPERATING CONSIDE	RATIONS	
Brilliance and definition decrease with general, the ultor voltage should not be	h decreasing ultor v e less than 20,000 vo	oltage. In olts.
rid-No.1-Circuit Resistance	1.5 max	. megohms
utilizes grid-No.2 voltage of 200 volts	-40 to -100	volts
No.1 voltage of -70 volts for visual extinction of undeflec- ted focused spot rid-No.1 Voltage for visual extinction of undeflected fo- cused spot when circuit design	140 to 350	volts
with ultor current of 200 μ a . with ultor current of 200 μ a . with-No.2 Voltage when circuit design utilizes fixed grid-	4600 to 5800	volts
For ultor voltage of	27000	volts
xamples of Use of Design Ranges:	-13 (0 +15	μα
aximum Grid-No.3 Current for ultor current of 200 μa rid-No.2 Current.	170 -15 to +15	μa μa
rid-No.1 Voltage for visual extinction of undeflected fo- cused spot when circuit design utilizes grid-No.2 voltage (E _{C2}) at fixed value	20% to 50% of Ec.	, volts
rid-No.2 Voltage when circuit design utilizes fixed grid- No.1 voltage (E _{C1}) for visual extinction of undeflected fo- cused spot	2 to 5 times Ec	4
Grid-No.3 Voltage for focus with ultor current of 200 μ a.	17% to 21.5% of E	
haracteristics Range Values for Ed For any ultor voltage (E _{cu}) betwee		a malta
During equipment warm-up period not exceeding 15 seconds After equipment warm-up period Heater positive with respect to d	410 ma 150 ma cathode. 150 ma	ax. volts
Heater negative with respect to a	cathode:	

-Indicates a change.

DATA 1

9-58

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



COLOR FLYING-SPOT CATHODE-RAY TUBE

adequately shielded for X-ray radiation. Although relatively simple shielding should prove adequate, make sure that it provides the required protection against personal injury.

The base pins of the 5AUP24 fit the Duodecal 12-contact socket. The socket contacts corresponding to the vacant pin positions should be omitted in order to provide the maximum insulation for the high-voltage pins 6 and 7. The socket should be made of high-grade, arc-resistant, insulating material and should preferably be designed with baffles.

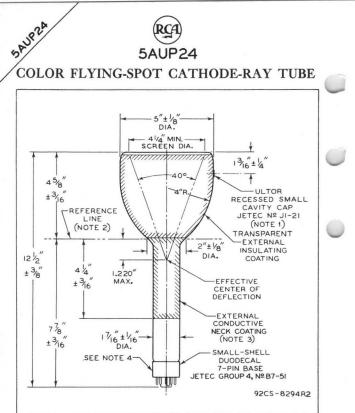
Heater Protection. Although maximum values of peak heatercathode voltage are specified in the tabulated data, it is recommended that the mid-tap or one side of the heater transformer winding be connected directly to the cathode to minimize the possibility of heater burnout. This connection will also minimize the possibility of damage due to heater-cathode shorts produced by arcing between heater and cathode when a possible momentary arc causes the voltage between heater and cathode to exceed the maximum heater-cathode ratings.

When in some circuit designs, the heater is not connected directly to the cathode, precautions must be taken to hold the peak heater-cathode voltage to the maximum values shown in the tabulated data. It is also recommended that a series limiting resistance of 50,000 ohms be placed in both the ultor and grid-No.3 leads between the tube and any filter capacitors.

Resolution of better than 800 lines at the center of the reproduced picture can be produced by the 5AUP24 when it is operated with 27,000 volts on the ultor. At lower ultor voltages, the resolution capability decreases. To obtain high resolution in the horizontal direction, it is necessary to use a video amplifier having a bandwidth of about 20 megacycles.

DATA 2

SAUPRA



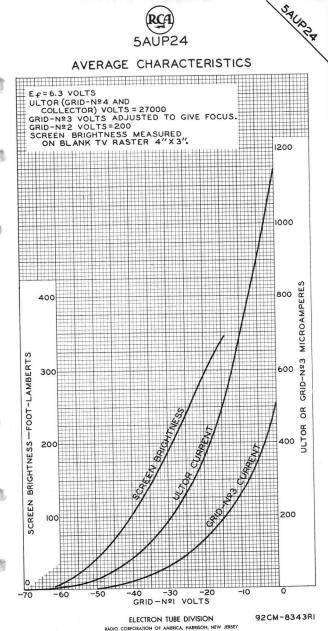
NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION 3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 10°. ULTOR TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION 3.

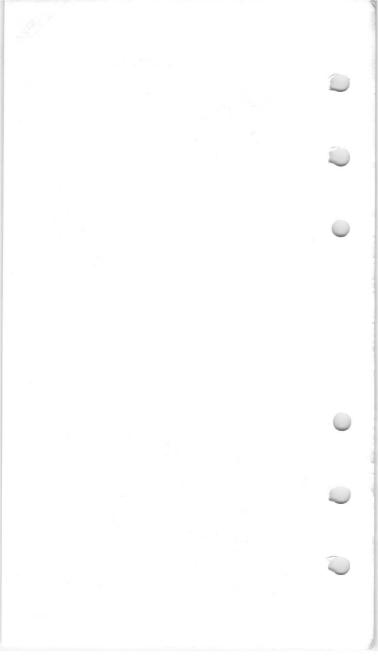
NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC NO.G-IIO (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY INTERSECTION OF PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 3: EXTERNAL CONDUCTIVE NECK COATING MUST BE GROUNDED.

NOTE 4: (0,0) BULB WILL NOT DEVIATE MORE THAN 2^0 in any direction from the perpendicular erected at the center of the bottom of the base.

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





Projection Kinescope

P4 – Aluminized Silicate Phosphor Screen Electrostatic Focus Magnetic Defle Forced-Air Cooled	ection
For Use with Reflective Optical Systems	
ELECTRICAL Heater Current at 6.3 volts Focusing Method Deflection Method Deflection Angle (Approx.)	ostatic
Direct Interelectrode Capacitances (Approx.): Grid No.1 to all other electrodes Cathode to all other electrodes OPTICAL	
Faceplate, Spherical Clear, Browning-Resistant Minimum Useful Screen Diameter	4.50"
Refractive Index of Faceplate	е Туре
y-coordinate Luminance Persistence	0.347 White
MECHANICAL Tube Dimensions : Overall Length	" -0 38"
Greatest Diameter of Bulb	± 0,12"
Anode Lead Molded-on, Insulated Cable, 48 Bulb Operating Position	J4OH1
Weight (Approx.) Image: Constraint of the second secon	volues nax. ^o C

RBA Electronic Components

Average Anode Power:

Without forced-air cooling of faceplate	9 max.	W	
With forced-air cooling of faceplate	12 max.	W	1

Air Flow to Face, when Average Anode Power Exceeds 9 Watts:

An air-cooling system is required to cool the face of these tubes when they are operated with an average anode input in excess of 9 watts. The system consists of a suitable blower and an air duct, having an outlet diameter of about 2 inches, directed perpendicularly onto the face of the tube. The air flow must be adequate to limit the faceplate temperature to 100° C. The cooling air must not contain water, dust, or other foreign matter. The air-cooling system should be electrically interconnected with the anode power supply to prevent operation of the tube without cooling.

Cooling of the face by a tangential flow of air across the face is not recommended because the temperature gradient produced across the face may result in immediate or delayed cracking of the face.

Grid-No.3 (Focusing Electrode)

Voltage
Grid-No.2 Voltage 400 max. V
Grid-No.1 Voltage:
Negative bias value 150 max. V
Positive bias value 0 max. V
Positive peak value 2 max. V
Peak Heater-Cathode Voltage:
Heater negative with respect to cathode
Heater positive with respect to cathode 10 max. V
Heater Voltage (ac or dc): Under operating conditions ^b { 6.9 max. V 5.7 min. V
RECOMMENDED OPERATING VALUES Unless otherwise specified, values are positive with respect to
cathode.
Anode Voltage 40,000 V ^C
Average Anode Current

Components

DATA 1

Grid-No.2 and Grid-No.1 Voltages for Visual Ex-		
tinction of Focused Spot	 . See	accompanying Cutoff
		Design Chart

TYPICAL PERFORMANCE DATA

At recommended operating values
Grid-No.3 Current (Total) See accompanying Typical
Grid-No.3 Current Characteristic
Grid-No.2 Current $\pm 15 \mu A$
Equivalent Passband (N _e) 270
(For sine-wave response, see accompanying
Typical Sine-Wave Response)
Center Resolution ^d
Drive Characteristics See accompanying Typical
Drive Characteristics
Luminance at 300 µA 1650 fL
Luminance Characteristics See accompanying Typical
Luminance Characteristic

LIMITING CIRCUIT VALUES

(See accompanying Schematic Diagram of Circuit Showing Protective Elements Employed to Prevent Tube Damage)

HIGH-VOLTAGE CIRCUITS

In order to minimize the possibility of damage to the tubes caused by a momentary internal arc, it is recommended that the high-voltage power supply and the grid-No.3 power supply be of the limited-energy type.

Anode-Circuit Resistance

(unbypassed)	$0.5 \text{ min. } M\Omega$	
Grid-No.3 Circuit Resistance (unbypassed)	0.1 MΩ	
LOW-VOLTAGE CIRCUITS		
Grid-No.2 Circuit Resistance (bypassed)	10 kΩ	
Grid-No.1 Circuit Resistance (unbypassed)	1 kΩ	
Effective Grid-No.1-to-Cathode Circuit Resistance	1.5 max. MΩ	
Cathode Circuit Resistance (unbypassed)	. 1 kΩ	
Heater Circuit Resistance (bypassed) to one side of heater	10 kΩ	

b For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts.

Electronic Components

- ^c Brilliance and definition may change with decreasing anode voltage. In general, the anode voltage should not be less than 30,000 volts.
- ^d Determined for a 3-inch high TV resolution test pattern with tube operating at an average screen current of 300 microamperes.

HIGH-VOLTAGE PRECAUTIONS

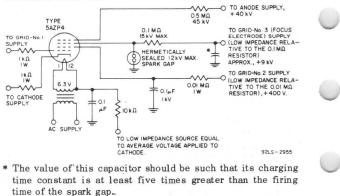
The high voltages at which this type is operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the enclosing of high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

X-RADIATION WARNING

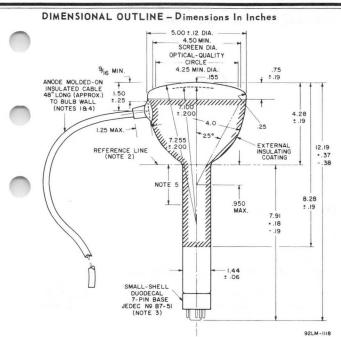
X-radiation is produced at the face of this tube when it is operated at normal anode voltage.

These rays can constitute a health hazard unless the tube is adequately shielded. Make sure that the shielding provides the required protection against personal injury.

SCHEMATIC DIAGRAM OF CIRCUIT SHOWING PROTECTIVE ELEMENTS EMPLOYED TO PREVENT TUBE DAMAGE



DATA 2



Note 1: The plane through the tube axis and vacant pin position No.3 may vary from the plane through the tube axis and anode-cable connection at bulb wall by angular tolerance (measured about the tube axis) of $\pm 20^{\circ}$. Anode-cable connection is on same side as vacant pin position No.3

Note 2: Reference line is determined by position where gauge $1.500^{\prime\prime} + 0.003^{\prime\prime} - 0.000^{\prime\prime}$ I.D. and 2^{''} long will rest on bulb cone.

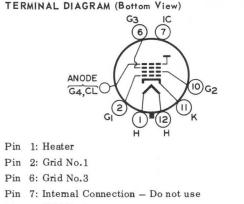
Note 3: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Socket contacts corresponding to vacant pin positions No.3, 4, 5, 8 and 9 should be removed in order to provide maximum insulation for pins No.6 and 7.

Note 4: Anode cable should not be sharply bent within 3" of bulb wall.

Note 5: The windings of the deflecting yoke should not extend more than 2" from the reference line toward the base. They should be insulated to withstand 20 kV and be spaced at least 1/10" from the tube neck.

Electronic

Components



Pin 10: Grid No.2

Pin 11: Cathode

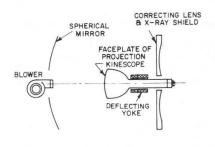
Pin 12: Heater

Flexible Cable: Anode (Grid No.4, Collector)

Note: Socket contacts for vacant pin positions No.3, 4, 5, 8, and 9 should be removed so that maximum insulation is provided for pins No.6 and 7.

REFLECTIVE OPTICAL SYSTEM

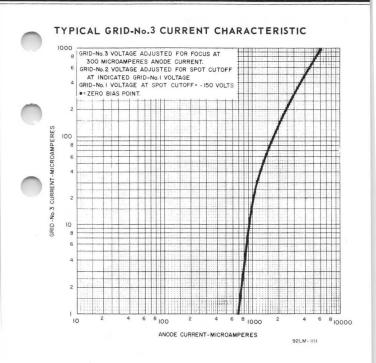
Arrangement of Typical Optical System and Air-Cooling System for Television Projector Using Reflective Optical Principles.



92LS - 2952

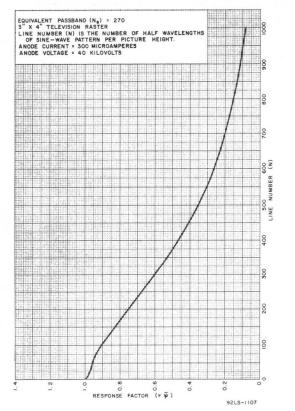
Electronic Components

DATA 3

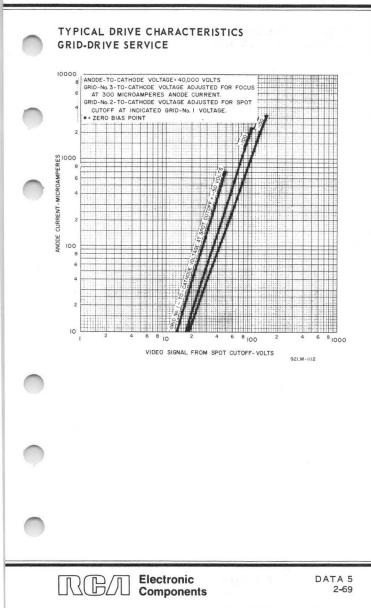


5AZP4

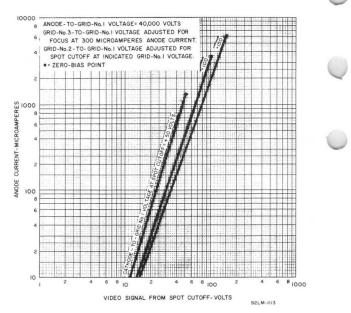
TYPICAL SINE-WAVE RESPONSE



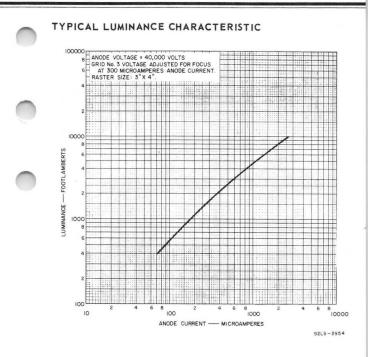
RB/ Electronic Components



TYPICAL DRIVE CHARACTERISTICS CATHODE-DRIVE SERVICE



DATA 5

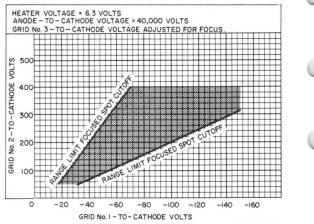


Electronic Components

RBЛ

DATA 6 2**-**69

CUTOFF DESIGN CHART



92LS-2953

B/Л



HIGH-VACUUM CATHODE-RAY TUBE

Supersedes Type 5BP1

General:

Heater, for Unipotential Cathode:
Voltage
Direct Interelectrode Capacitances (Approx.):
Grid No.1 to All Other Electrodes 8.0 µµf
DJ_1 to DJ_2
DJ_2 to DJ_4 1.2
D.I to A11 Other Electrodes 9.5 wife
DJa to All Other Electrodes. 12.0 unfl
DJ1 to All Other Electrodes except DJ2 . 8.0 uuf
DJ to All Other Electrodes except DJ2 . 8.0
DJ3 to All Other Electrodes except DJ4 . 10.0 µµf
DJ4 to All Other Electrodes except DJ3 . 7.5 µµf
Phosphor (For Curves, see front of this Section) No.1
Fluorescence
Persistence
Focusing Method Electrostatic
Deflection Method Electrostatic
Overall Length
Greatest Diameter of Bulb
Minimum Useful Screen Diameter
Mounting Position Medium Shell Magnal 11-Pin
Basing Designation for BOTTOM VIEW 11N
Basing Designation for BOTTOM VIEW
Pin 1-Heater Pin 2-No Connection 567 Pin 7-Anode No.2, Grid No.2
Pin 3-Deflecting
Electrode DJ1 Electr.DJ2
Pin 4-Anode No.1 Pin 9-Deflecting
Pin 5-Internal Con.
Do not use Unit Pin 10 - Grid No.1
Pin 6-Deflecting Pin 11-Heater,
Electrode DJ4 Cathode

 DJ_1 and DJ_2 are nearer the screen DJ_3 and DJ_4 are nearer the base

With DJ1 positive with respect to DJ2, the spot is deflected toward pin 4. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1.

The angle between the trace produced by DJ_3 and DJ_4 and its intersection with the plane through the tube axis and pin I does not exceed 10° .

The angle between the trace produced by DJ₃ and DJ₄ and the trace produced by DJ₁ and DJ₂ is $.90^{\circ} \pm 3^{\circ}$.

JULY 1, 1945

DATA 1

SBRIA



HIGH-VACUUM CATHODE-RAY TUBE

(continued from pre	anding angel			
(continued from pre	eceding page;	1		计 注意推断
Maximum Ratings, Absolute Values:				
ANODE-No.2 & GRID-No.2 VOLTAGE		2200	max.	volts
ANODE-No.1 VOLTAGE GRID-No.1 (CONTROL ELECTRODE) VOL		1100	max.	volts
Negative Value		125	max.	volts
Positive Value		0	max.	volts
PEAK VOLTAGE BETWEEN ANODE No.2 A ANY DEFLECTING E		EE0	1.1	
ANT DEFLECTING E	LECTRODE	550	max.	VOILS
Typical Operation:				11,2414
Anode-No.2 & Grid-No.2 Voltage [*] . Anode-No.1 Volt. for Focus at 75%	5			
of Grid-No.1 Volt. for Cutoff	. 337	450		volts
Grid-No.1 Volt. for Visual Cutoff	#30	-40		volts
Max. Anode-No.1 Current Range▲. Deflection Sensitivity:				
Dult and Dula	. 0.404	0.303		mm/v dc
DJ3 and DJ4	. 0.446	0.334	• •	mm/v dc
DJ1 and DJ2	. 63	84	V	/ dc/in.
DJ3 and DJ4	. 57	76	v	dc/in.
* Brilliance and definition decrease will in general, anode-No.2 voltage should	ith decreas d not be lea	ing anod ss than	e-No. 2 1500 vo	voltage. plts.
 Individual tubes may require between with grid-No.1 voltages between zero 	and cutoff.	•		
<pre># visual extinction of stationary focus able to ± 50% of these values.</pre>	sed spot. Si	upply sh	iould be	adjust-
See curve for average values.				
Individual tubes may vary from these	values by -	+ 17%		

Individual tubes may vary from these values by ± 17%.

Spot Position:

SBPIA

The undeflected focused spot will fall within a 15-mm square centered at the geometric center of the tube face and having one side parallel to the trace produced by DJ1 and DJ2. Suitable test conditions are: anode-No.2 voltage, 1500 volts; anode-No.1 voltage, adjusted for focus; deflecting-electrode resistors, I megohm each, connected to anode-No.2; the tube shielded from all extraneous fields. To avoid damage to the tube, grid-No.1 voltage should be near cutoff before application of anode voltages.

Maximum Circuit Values:

Grid-No.1-Circuit Resistance 1.5 max. megohms Impedance of Any Deflecting-Electrode

Circuit at Heater-Supply Frequency 1.0 max. megohm Resistance in Any Deflecting-

Electrode Circuit¹ 5.0 max. megohms.

It is recommended that all deflecting-electrode-circuit resistances be approximately equal.

JULY 1, 1945

DATA 1



OSCILLOGRAPH TUBE

POST-DEFLECTION ACCELERATOR ELECTROSTATIC DEFLECTION

ELECTROSTATIC FOCUS

	DATA
	General:
	Heater, for Unipotential Cathode:
	Voltage 6.3 ac or dc volts
	Current 0.6
3	Direct Interelectrode Capacitances (Approx.):
9	Grid No.1 to All Other Electrodes
	Cathode to All Other Electrodes 9 µµf
	$D_{I_{a}}$ to $D_{I_{a}}$
	Die to All Other Electrodes 9
	Die to All Other Electrodes 9
	DJ ₃ to All Other Electrodes 7 µµf
7	DJ_4 to All Other Electrodes 8 $\mu\mu f$
	Phosphor (For Curves, see front of this Section) P1
	Elupropagance and Phosphorescence
	Phosphor (For Curves, see front of this Section) P1 Fluorescence and Phosphorescence Green Persistence of Phosphorescence Medium
	Focusing Method
	Focusing Method.
	Overall Length
	Greatest Diameter of Bulb
	Minimum Useful Screen Diameter
	Mounting Position
	Mounting Position
	Base Medium-Shell Dineptal 12-Pin (JEIEC NO. 012-5/)
	Basing Designation for BOTTOM VIEW
	Pin 1-Heater Pin 9-Anode No.2,
	Pin 2 - Cathode Grid No.2
	Pin 3-Grid No.1 (7.8) Pin 10-Deflecting
	Pin 4 - Internal Con. Do not use
Ń	Do not use OF Pin 11 - Deflecting
D	Pin 5-Anode No.1 Electr.DJ Pin 7-Deflecting Pin 12-No Con-
	Fill 8 - Deffecting
	Electrode DJ ₄ Cap - Anode No.3
	DJ_1 and DJ_2 are nearer the screen DJ_3 and DJ_4 are nearer the base
D	DJ_3 and DJ_4 are nearer the base
2	With DJ ₁ positive with respect to DJ ₂ , the spot is de-
	flected toward pin 5. With DJ_3 positive with respect to
	DJ_A , the spot is deflected toward pin 2.
	The plane through the tube axis and each of the following
	items may vary from the trace produced by DJ_1 and DJ_2 by
D	the following angular tolerances measured about the tube
1	axis: Pin 5, 10 ⁰ ; Cap (on same side of tube as pin 5),
	10°.
	The angle between the trace produced by D_1 and D_2 and
	the trace produced by DJ3 and DJ4 is $90^{\circ} \pm 3^{\circ}$.

OCTOBER 1, 1951 TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

DATA 1

SCRIT



SCPITA

5CPI-A OSCILLOGRAPH TUBE

	um Rat				nter	Value	s:						
ANODE-	-No.3	VOLTA	GE .			•••					max		lts
ANODE-	-No. 2*	VOLT	AGE.							2000	max	. vo	lts
RATIO	OF AN												
NODE			ANODE-		VOLT	AGE .		•		3:1			
ANODE-				• • •	• •	· · ·		• •		1000	max	. vo	lts
GRID-N													
	ative						•	• •			max		lts
	tive						•	• •			max		lts
Posi PEAK V	I TACI	C DET	WEEN /	NODE	No. 2	AND		• •		2	max	. vo	lts
ILAN V	ULTAG	DLI			ECTIN			ODE		500	may		1+0
PEAK H	EATER.	CATH					.cm	UDL		500	max		115
	er neg					to ca	tho	de		125	may	NO	1+0
	er pos												-
near	ci po.	51 1 1 1	C WILL	103	peer	10 00	tho	ue.		120	max		113
Equipm	ent De	esign	Range	s:									
For an	ny anoo	le-No.	3 vol:	tage	(Eba)	betwe	en.	2000	**	and	4000	vol	ts
and an	ny anoa	le-No.	2 vol	tage	(Eb)	betu	veen	1 150	•00	and	2000	vol	ts
	No.1 \												
Grid-N	0.1 V	ltan			1.54	k to	4	5%	of F	b2		vo	lte
Anode-	No. 1 (urre	nt of	anv	1.01	0				02		0	
	rating					-15	to	+10)	34			amp
Deflec				1		10				10 T I	101	μ.	
156-51	No.B.	137.4		1	FL =		E.						
				inen	Eb3 =	2 %	602				1.10	1 1 2	
W1 (& DJ2	• •		• •		39	to	53	v d	c/ir	1. / kv	of	b2
W3 (& DJ4	• •	• • •	• •		33	to	45	v d	C/IF	1./kv	of	-b2
				When	Eba=	Eba							_
DI1	& DIo				3	31	to	42	v d	c/in	1/4	of	ha
DIA	& DJ2 & DJ4	1.5.161	1.0.1	100	12.	27	to	37	v d	c/in	/ky	of	DZ
Spot Pa	ositio	n				-	**	1		c/ 11		01.	-02
por it	551110		100	•••			IF IF						1
xample	es of	Use o	f Des	ign F	langes	:							
Ford	anode-	No. 3											
	oltage			2000		30	000			40	00	vol	ts
	node-					-							
vo	oltage	of.		2000		1 1	500			20	00	vol	ts
Anode-I	No.1 V	olt.	375 t	0 690	native in	280 t	o 51	15		375	to 69	ov Ol	ts
Anode-1 Grid-No	5.1 Vo	1t.4	-30 t	0 -90	-2	2.5 t	0 -6	57.5		-30	to -9	o vol	ts
Deflect	tion F	actor	s:										
N1 d	& DJ2		. 62	to 8	34	59	to 8	30	1 1	78 to	o 106	00-0	
DJ3 8	& DJ4		. 54	to 7	74	50	to 6	68	811	66 t	o 90	6	
			a de	. 150									
laximun													
Grid-No	o. 1-Ci	rcuit	Resi	stand	:e		• •	• •	1.	5 ma	x.	megor	ms
Resista	ance i	n Any										5	
Defl	lectin	g-Ele	ctrod	e Cir	cuit				5.	0 ma	x.	megot	ms
161													
**	- A 🌢	**	П. (xt pag	0						a chan	a 0

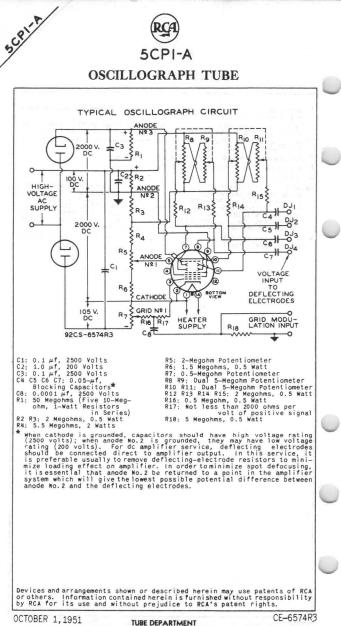
TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



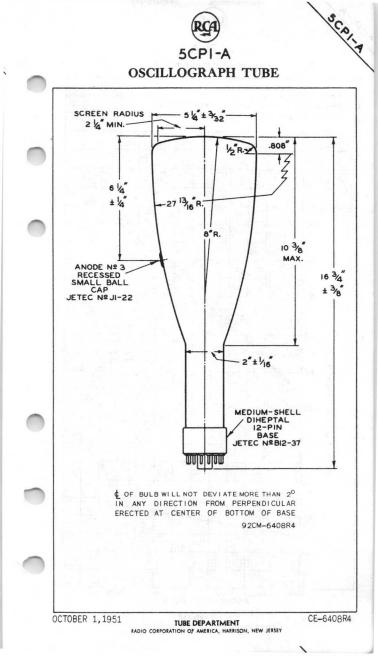
OSCILLOGRAPH TUBE

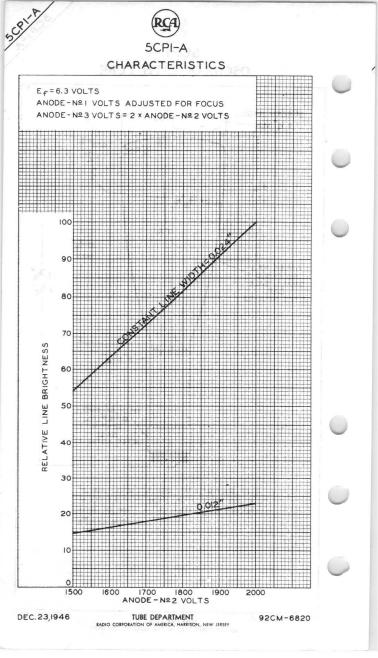
- * Anode No.2 and grid No.2, which are connected together within tube, are referred to herein as anode No.2.
- At or near this rating, the effective resistance of the anode supply should be adequate to limit the anode-No.2 input power to 6 watts.
- ** It is recommended that anode-No.3 voltage be not less than 3000 volts for high-speed scanning.
- Recommended minimum value of anode-No.2 voltage.
- For visual cutoff of undeflected focused spot.
- volts dc/in.
- # with heater voltage of 6.3 volts, anode-No.3 voltage of #000 volts, anode-No.2 voltage of 2000 volts, anode-No.1 voltage adjusted to focus, grid-No.1 voltage adjusted to give spot that is just visible, each deflecting electrode connected through 1-megohm resistor to anode No.2, and tube shielded from all extraneous fields, the center of the undeflected, focused spot will fall within a circle having a 12.5-mm radius concentric with the center of the tube face.
- It is recommended that the deflecting-electrode-circuit resistances be approximately equal.

SCOLLA



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

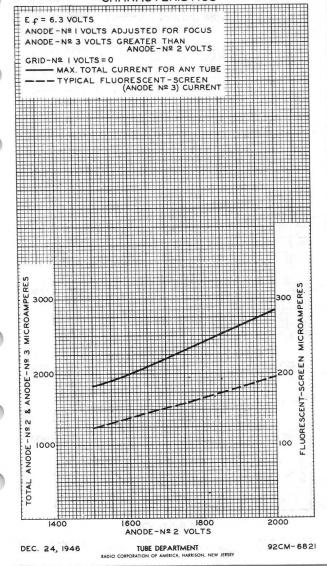






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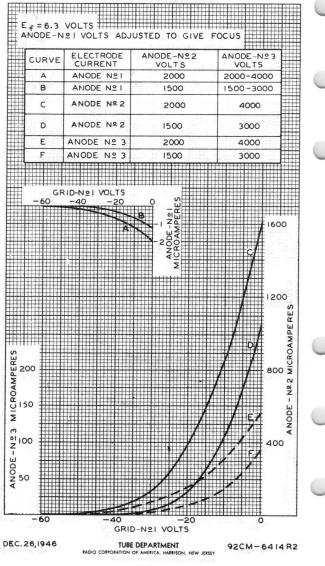
CHARACTERISTICS





SCRITE

AVERAGE CHARACTERISTICS

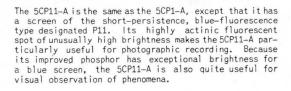




5CPII-A OSCILLOGRAPH TUBE

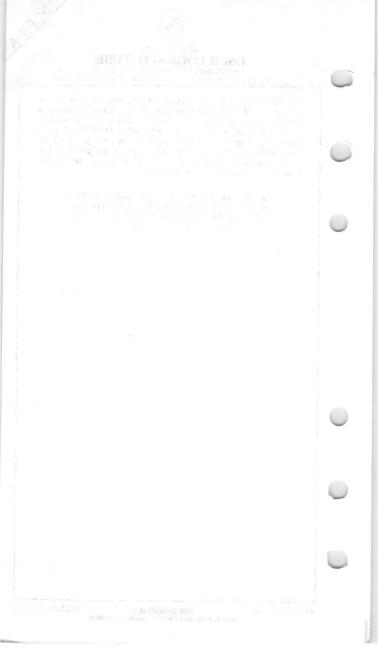
POST-DEFLECTION ACCELERATOR

ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION



The SPECTRAL-ENERGY EMISSION CHARACTERISTIC, as well as the PERSISTENCE CHARACTERISTIC for the P11 PHOSPHOR are shown at the beginning of this Section.

PCOLLIN



5FP4A

View-Finder Kinescope

MAGNETIC DEFLECTION

GENERAL DATA

Electrical:

MAGNETIC FOCUS

	Electrical:	
)	Grid No.1 to all other electrodes 5 p	of na
	Optical:	
)	Phosphor (For curves, see front of this section) P4—Sulfide Typ Fluorescence Whit Phosphorescence Shor Focusing Method Magneti Deflection Method Magneti Deflection Angle (Approx.) 53	te te tic
	Mechanical:	
	Overall Length	2" 1"
	NC ANODE G	
)	Pin 1-No Internal Connection Pin 2 - Heater Pin 3 - Grid No.2 Pin 4 - Same as Pin 1 Heater Pin 5 - Grid No.1 Pin 5 - Grid No.1	
	Maximum Ratings, Design-Center Values:	
)	ANODE VOLTAGE	
	Negative bias value	ts ts
)	Heater negative with respect to cathode 150 max. vol Heater positive with respect to cathode 150 max. vol	



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA I 8-63

5FP4A

Typical Operation:

Maximum Circuit Values:

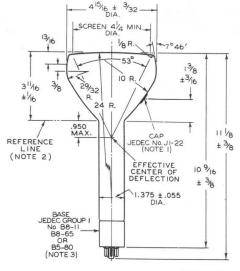
Grid-No.1-Circuit Resistance. 1.5 max. megohms

- a The product of anode voltage and average anode current should be limited to 6 watts.
- Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 4000 volts.
- General, the and eventage interview of the second s





5FP4A



92CM-6362R5

DIMENSIONS IN INCHES

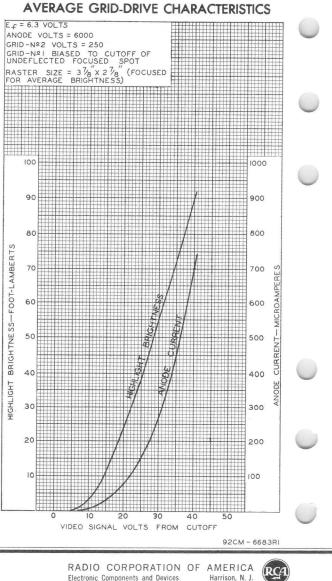
NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 5 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ANODE TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF 10°. ANODE TERMINAL IS ON SAME SIDE OF TUBE AS PIN 5.

NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE GAUGE 1.430" +.003" -000" INSIDE DIAMETER AND 2" LONG WILL REST ON BULB CONE.

NOTE 3: CENTER LINE OF BULB WILL NOT DEVIATE MORE THAN $2^{\rm O}$ in any direction from the perpendicular erected at the center of the bottom of the base.



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 2 8-63





OSCILLOGRAPH TUBE

MAGNETIC FOCUS MAGNETIC DEFLECTION DATA General: Heater, for Unipotential Cathode: Voltage. 6.3 . ac or dc volts Current. 0.6 amn Direct Interelectrode Capacitances: Grid No.1 to All Other Electrodes. . μμf 8 Cathode to All Other Electrodes. . . 5 μµf Phosphor (For Curves, see front of this Section) ... P7 Fluorescence Blue Phosphorescence. Greenish-Yellow Persistence of Phosphorescence . . . Long . Focusing Method. Magnetic Magnetic 53° Deflection Angle (Approx.) 11-1/8" ± 3/8" 4-15/16" ± 3/32" Minimum Useful Screen Diameter 4-1/4" Mounting Position. Anv . . . Recessed Small Ball (JETEC No.J1-22) Cap. Long Medium-Shell Octal 8-Pin (JETEC No.88-65) Base . BOTTOM VIEW (4) n(5) Pin 1 - No Pin 5-Grid No.1 Pin 6 - No Connection 6) (3) Connection Pin 2-Heater Pin 3-Grid No.2 Pin 7 - Cathode Pin 4-No Pin 8 - Heater Connection Cap – Anode Maximum Ratings, Design-Center Values: ANODE VOLTAGE. 8000 max. volts GRID-No.2 VOLTAGE. . . . 700 max. volts GRID-No.1 VOLTAGE: Negative bias value. . 180 max. volts -Positive bias value* 0 max. volts Positive peak value. 2 max. volts PEAK GRID-No.1 DRIVE FROM CUTOFF . . 65 max. volts PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode. 125 max. volts Heater positive with respect to cathode. 125 max. volts Typical Operation: Anode Voltage**. . . . 4000 7000 volts Grid-No.2 Voltage. 250 250 volts At or near this rating, the effective resistance of the anode supply should be adequate to limit the anode input power to 6 watts. Brilliance and definition decrease with decreasing anode voltage. In general, the anode voltage should not be less than 4000 volts. -- Indicates a change.

411946



OSCILLOGRAPH TUBE

	(DC, approx.)# Spot Position					± 15% ##	128	± 15%	ma
	Focusing-Coil Cu				00	1.50	100	150	. edaget
>	Grid-No.2 Curren	t.		÷	-15	to +15	-15	to +15	μamp
	Grid-No.1 Voltage	eo			-25	to -70	-25	to -70	volts

Maximum Circuit Values:

SEPTA

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

- O For visual extinction of undeflected focused spot.
- # For specimen focusing coil similar to JETEC Focusing Coil No.106 positioned with air gap toward face plate, and center line of airgap 2-3/4 inches from Reference Line (see Outline Drawing), and total anode current of 200 microamperes.
- ## The center of the undeflected, unfocused spot will fall within a circle having 9-mm radius concentric with center of tube face.

OPERATING NOTES

The 5FP7-A utilizes a long-persistence, cascade (two-layer) screen which exhibits biuish fluorescence of short persistence and greenish-yellow phosphorescence.

Because of its long persistence, the 5FP7-A is particularly useful where either low-speed non-recurring phenomena or high-speed recurring phenomena are to be observed. Furthermore, two or more phenomena can be observed simultaneously on the screen by means of a suitable switching arrangement.

The persistence is such that the 5FP7-A without filter can be operated with scanning frequencies as low as 30 cycles per second without excessive flicker. When used with yellow filter, such as Wratten No.15 (G), the 5FP7-A can be operated with much lower scanning frequencies.

In general, operation of the 5FP7-A at an anode voltage below 4000 volts will not give persistence of useable brightness.

OUTLINE DIMENSIONS for Type 5FP7-A are the same as those for Type 5FP4-A

AVERAGE CHARACTERISTIC CURVE for Type 5FP7-A is the same as that shown for Type 7BP7-A

->Indicates a change.

AUG. 1, 1951

TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY DATA



SUR

OSCILLOGRAPH TUBE

ELECTROSTATI	CF	OCUS	EL	ECTROSTATIC	DEFLECTION

	General:
	Heater, for Unipotential Cathode:
	Voltage 6.3 ± 10% ac or dc volts
	Current 0.6
Ν	Direct Interelectrode Capacitances (Approx.):
1	Grid No.1 to All Other Electrodes 8.0 µµf
	DJ1 to DJ2 2.5 μμf
	_DJ3 to DJ4 2.5 μμf
	D_{J_1} to All Other Electrodes 11.0 $\mu\mu f$
	DJ_2 to All Other Electrodes 8.0 $\mu\mu f$
	DJ3 to All Other Electrodes 7.0 µµf
N	DJ4 to All Other Electrodes 8.0 µµf
2	Phosphor (For Curves, see front of this Section) No.1
	Fluorescence
	Persistence
	Focusing Method Electrostatic
	Deflection Method Electrostatic
	Overall Length
	Greatest Diameter of Bulb
	Mounting Position
	Base
	Pin 1 – Heater Pin 8 – Anode No.2,
	Pin 2-Grid No.1 © O Grid No.2
	Pin 3-Cathode 9 Pin 9-Deflecting
	Pin 4 – Anode No.1
	Pin 5 - Internal Con. Pin 10- Deflecting
	Do Not Use Dir Do Electrode DJ1
	Pin 6 - Deflecting Pin 11- Internal Con.
	Electrode DJ3 KEY Do Not Use
N	Pin 7 - Deflecting Pin 12- Heater
2	Electrode DJ ₄
	DJ_1 and DJ_2 are nearer the screen
	DJ_2 and DJ_4 are nearer the base
	With DJ positive with respect to DJ2, the spot is de-
	flected toward pin 4. With DJz positive with respect to
1	DJ ₄ , the spot is deflected toward pin 1.
2	The angle between the trace produced by DJ1 and DJ2 and
	its intersection with the plane through the tube axis and
	pin I does not exceed 10°.
	The angle between the trace produced by DJ_3 and DJ_4 and
	the trace produced by DJ_1 and DJ_2 is $90^{\circ} \pm 3^{\circ}$.
)	
7	

TENTATIVE DATA

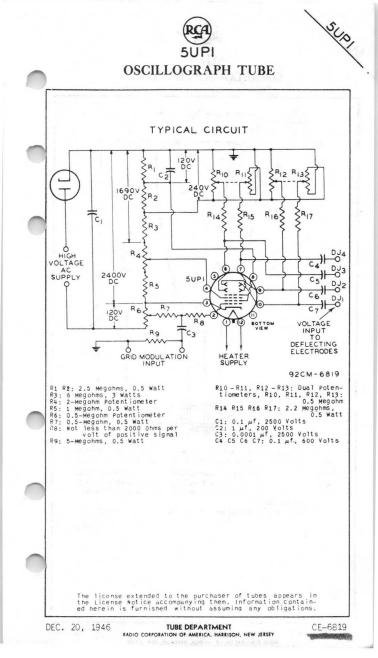


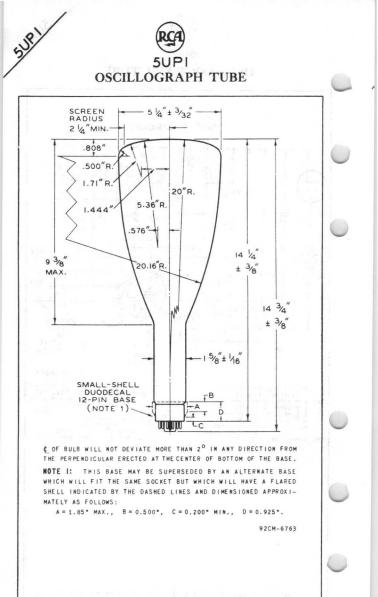
OSCILLOGRAPH TUBE

Maximum Ratings, Design-Center Values:	通道 (通行)(管
ANODE-No. 2 VOLTAGE	volts
ANODE-No.1 VOLTAGE	volts
GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:	. 10. 1
Negative bias value	volts
Positive bias value 0 max.	
Peak positive value 2 max.	volts
PEAK VOLTAGE BETWEEN ANODE No.2	
AND ANY DEFLECTING ELECTRODE 500 max. PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode. 125 max.	
Heater positive with respect to cathode. 125 max.	volts
Equipment Design Ranges:	
For any anode-No.2 voltage (Eb ₂) between 1000* and 250	o volts
	volts
Anode-No.1 Voltage 17% to 32% of E _{b2} Max. Grid-No.1 Voltage	vorts
for Visual Cutoff 4.5% of E _{b2}	volts
Anode-No.1 Current for	ion ca
Any Operating Condition -15 to +10	nicroamp
Deflection Factors: DJ1 & DJ2 28 to 38.5 v dc/in./k	voffha
$D_{13} \& D_{14} \\ \dots \\ 23 \text{ to } 31 \\ \text{ v dc/in./k}$	v of Eb2
Examples of Use of Design Ranges:	
For anode-No.2 voltages of 1000 2000	volts
Anode-No.1 Voltage 170 - 320 340 - 640 Max. Grid-No.1 Voltage	volts
	volts
DJ1 & DJ2 28 - 38.5 56 - 77 volts	dc/in.
DJ3 & DJ4 23-31 46-62 volts	s dc/in.
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max.	megohms
Resistance in Any Deflecting	
Electrode Circuit ^o 5.0 max.	meyohms
* Recommended minimum value.	1
It is recommended that the deflecting-electrode-circuit res be approximately equal.	
Anode No.2 and grid No.2, which are connected together with are referred to herein as anode No.2.	in tube,
	5 N 12
	16

SUPI

TENTATIVE DATA

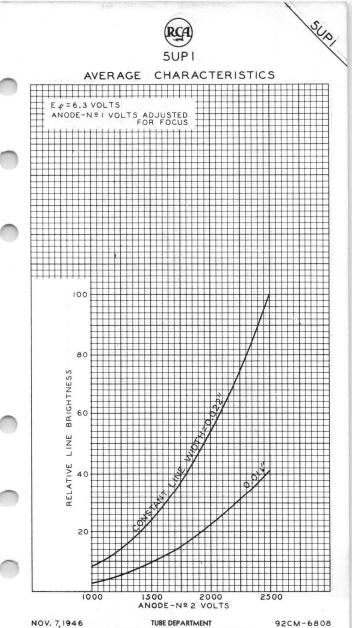




DEC. 20, 1946

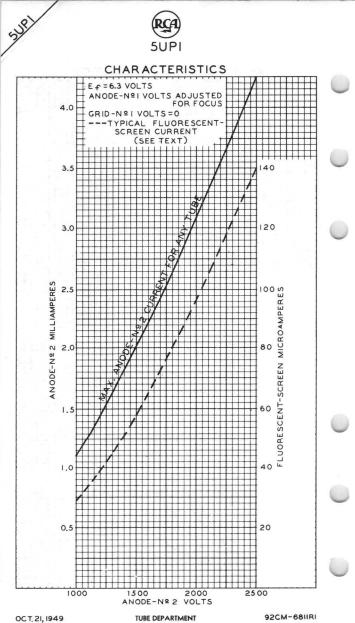
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RADIO CORPORATION OF AMERICA. HARRISON, NEW JERSEY

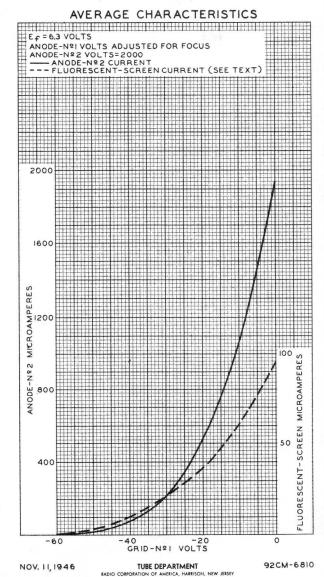
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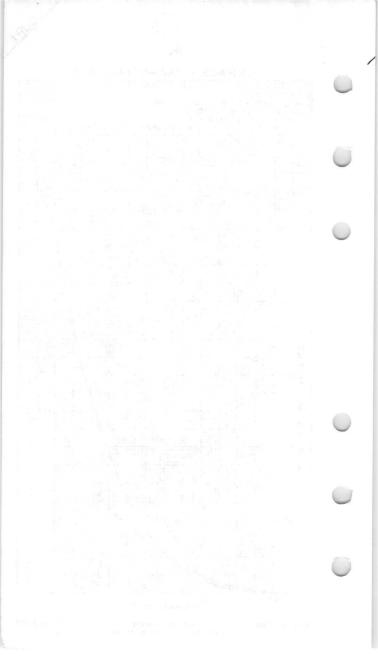


RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



- Stor





Oscillograph Tube

ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

For Extremely Low-Speed Recurrent, or Medium-Speed Non-Recurrent Image Displays

The 5UP7 is the same as the 5UP1 except for the following items:

GENERAL

Phosphor (For curve	s,	se	e	fr	on	to	of	th	is	se	ect	ic	on)		e.			×			P7
Fluorescence														÷						Whi	te
Phosphorescence,														.)	(e)	110	WC	s	n-	Gre	en
Persistence a,b			ž.	ž.													. 1	lei	ry	-Lo	png

5UP11

Oscillograph Tube

ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

For Photographic Recording and Visual Observations The 5UP11 is the same as the 5UP1 except for the following items:

GENERAL

Phosphor (For curve	es,	se	e f	ro	nt	of	tł	nis	sec	ct	ior	1)	x.	PII
Fluorescence													x	Actinic-Blue
Phosphorescence,														
Persistence ^{a, b}							2							Medium-Short

5UP31

Oscillograph Tube

ELECTROSTATIC FOCUS

ELECTROSTATIC DEFLECTION

For Low- or Medium-Speed Non-Recurring Image Displays The 5UP31is the same as the 5UP1 except for the following items:

GENERAL

Phosphor (For curve	es	S	ee	t	уре		7 V F	31	1)			X.							. P31
Fluorescence																			
Phosphorescence.																			
Persistence ^b .					7	.1	Med	liι	ım-	-SI	nor	rt'	C	(A	рр	ro	κ.	38	3 µsec)

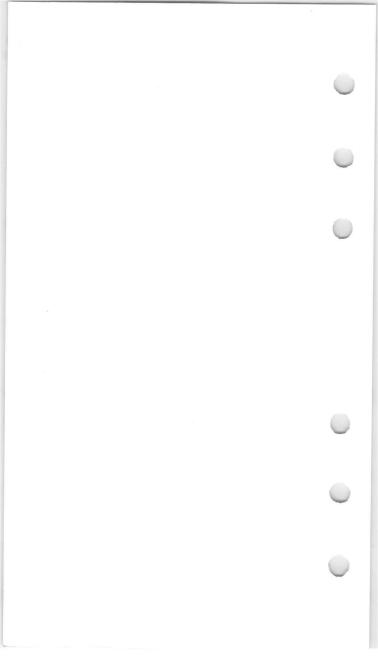
a Persistence of useable brightness can be obtained with an anode-No.2 voltage of as low as 1500 volts.

b Time for initial brightness to decay to 10% point.

C Phosphorescence may have a useful brightness for over a minute under conditions of adequate excitation and low-ambient illumination.



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 9-65





TRANSCRIBER KINESCOPE ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

SARI

DATA

General	: · · ·											
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Direct	Intere	lectro	de C	anac	itan	ces:						
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	nal Co									(500	max.	. <i>щ</i>
										1100	min.	. μμ
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Persi	stence											Shor
ocusin												
Deflect												
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linimum	Usefu	1 Scre	een D	iame	ter							4-1/4
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Raster Mountin Cap Base .								F	ece	essed S	Small	Cavit
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Basin	g Desi	gnatic	on to	IF BU	6							No. 2
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RCA 5 W PII

TRANSCRIBER KINESCOPE

Anode-No.1 Voltage Range for Anode-No.2 Current of 20 µamp 4200 to 5400 volts Grid-No.2 Voltage*		
Grid-No.1-Circuit Resistance 1.5 max. megohms Minimum Circuit Values: When the output capacitor of the power supply is capable of storing more than 250 microcoulombs, and when the inherent regu- lation of the power supply permits the instantaneous short- circuit current to exceed 1 ampere, the effective resistance in circuit between indicated electrode and the output capacitor should be as follows: Grid-No.1-Circuit Resistance	Anode-No.2 Current of 20 µamp 4200 to 5400 volts Grid-No.2 Voltage* 200 volts Grid-No.1 Voltage for Visual Cutoff42 to -98 volts Anode-No.2 Current 20° µamp Max. Anode-No.1 Current	
<pre>Winimum Circuit Values: When the output capacitor of the power supply is capable of storing more than 250 microcoulombs, and when the inherent regu- lation of the power supply permits the instantaneous short- circuit current to exceed 1 ampere, the effective resistance in circuit between indicated electrode and the output capacitor should be as follows: Grid-No.1-Circuit Resistance</pre>	Maximum Circuit Values:	
<pre>When the output capacitor of the power supply is capable of storing more than 250 microcoulombs, and when the inherent regu- lation of the power supply permits the instantaneous short- circuit current to exceed 1 ampere, the effective resistance in circuit between indicated electrode and the output capacitor should be as follows: Grid-No.1-Circuit Resistance 180 min. ohms Grid-No.2-Circuit Resistance</pre>	Grid-No.1-Circuit Resistance 1.5 max. megohms	
<pre>storing more than 250 microcoulombs, and when the inherent regu- lation of the power supply permits the instantaneous short- circuit current to exceed 1 ampere, the effective resistance in circuit between indicated electrode and the output capacitor should be as follows: Grid-No.1-Circuit Resistance</pre>	Minimum Circuit Values:	
<pre>Grid-No.2-Circuit Resistance</pre>	storing more than 250 microcoulombs, and when the inherent regu- lation of the power supply permits the instantaneous short- circuit current to exceed 1 ampere, the effective resistance in circuit between indicated electrode and the output capacitor	(
<pre>ages involved. Components: Deflecting Yoke</pre>	Grid-No.2-Circuit Resistance	
Deflecting Yoke		
and separate nigh-voltage supply RCA Type No. 20471 For use with single high-voltage tripler supply employing 3 189-67/8016's RCA Type No. 21172 Ver. Deflection Output Transformer RCA Type No. 20472 Brilliance and definition decrease with decreasing anode voltages. In general, anode-No.2 voltage should not be less than 15000 volts. Subject variation of ± wos when grid-No.1 voltage cutoff is desired at -70 volts. <u>OPERATING NOTES</u> Soft x-rays are produced when the 5WP11 is operated with an anode-No.2 voltage above approximately 20000 volts. These rays can constitute a health hazard unless the tube is adequately shielded. Relatively simple shielding should prove adequate, but the need for this precaution should be considered in equip- ment design. Resolution of better then 700 lines at the center of the re- produced picture can be produced by the 5WP11. To utilize such resolution capability in the horizontal direction with the standard scanning rate of 525 lines, it is necessary to use a	Deflecting Yoke RCA Type No. 201D11 Hor. Deflection Output Transformer:	
<pre>supply employing 3 183-GT/8016's RCA Type No. 211T2 Ver. Deflection Output Transformer RCA Type No. 204T2 * Brilliance and definition decrease with decreasing anode voltages. In subject variation of ± 40% when grid-No.1 voltage cutoff is desired at -70 volts.</pre>	and separate nigh-voltage supply RCA Type No. 204T1	
** Subject variation of ± wos when grid-wo.1 voltage cutoff is desired at -70 volts. <u>OPERATING NOTES</u> Soft x-rays are produced when the 5WPII is operated with an anode-No.2 voltage above approximately 20000 volts. These rays can constitute a health hazard unless the tube is adequately shielded. Relatively simple shielding should prove adequate, but the need for this precaution should be considered in equip- ment design. Resolution of better then 700 lines at the center of the re- produced picture can be produced by the 5WPII. To utilize such resolution capability in the horizontal direction with the standard scanning rate of 525 lines, it is necessary to use a	supply employing 3 183-GT/8016's RCA Type No. 211T2	
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	produced picture can be produced by the 5WPII. To utilize such resolution capability in the horizontal direction with the standard scanning rate of 525 lines, it is necessary to use a	

FEB. 1, 1949

SWPIL

TUBE DEPARTMENT TENTATIVE DATA 1 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



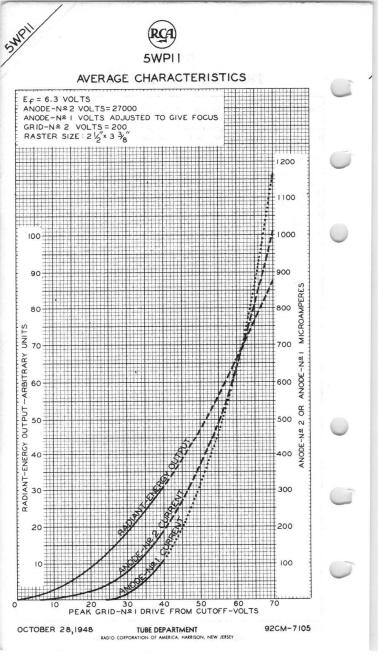
SAPII

TRANSCRIBER KINESCOPE

The screen of the 5WPII has highly actinic blue radiation, and is particularly effective for photography. The presistence of the radiation is sufficiently short to prevent "carry over" from one frame to the next. The persistence is dependent to some extent on the current density in the focused spot, and decreases with current density.

Operation of the 5WPII results in gradual browning of the face. The rate of browning increases markedly with increase in anode-No.2 voltage, is proportional to beam current, and is inversely proportional to the scanned area. The browning is most noticeable during initial operation; thereafter, a gradual increase in the amount of browning will be observed during the life of the tube.

> OUTLINE DIMENSIONS for the 5WP11 are the same as those for the 5WP15





FLYING-SPOT CATHODE-RAY TUBE

HIGH RESOLUTION CAPABILITY ALUMINIZED SCREEN ELECTROSTATIC FOCUS MAGNETIC DEFLECTION For use as scanner in high-quality flying-spot video-signal generators

DATA

General: Heater, for Unipotential Cathode: Voltage. 6.3 . . ac or dc volts $0.6 \pm 10\%$ Current.amp Direct Interelectrode Capacitances: Grid No.1 to all other electrodes. . . uuf 5 Cathode to all other electrodes. . . . μµf 500 max. External conductive neck coating to ultor. μµf 100 min. μµf . .Clear Glass Faceplate. Flat. Phosphor (For curves, see front of this Section) . P16 Aluminized Fluorescence-Visible radiation. Violet Invisible radiation. . . Near Ultraviolet Phosphorescence-Persistence of visible radiation Very Short Persistence of invisible radiation Very Short . Deflection Method. Magnetic Deflection Angle (Approx.) . . . 400 Tube Dimensions: Overall length . . . Greatest diameter of bulb. 5" ± 1/8" . 4-1/4" Minimum Useful Screen Diameter Weight (Approx.) . . . 1 - 1/2]bs Operating Position Any Cap. Recessed Small Cavity (JETEC No.J1-21) Socket See Operating Considerations Pin 1-Heater Pin 12-Heater Pin 2-Grid No.1 Cap-Ultor Pin 6-Grid No.3 (Grid No.4, Pin 7-Internal Collector) Connection-C-External Do Not Use Conductive Pin 10-Grid No.2 Neck Coat-Pin 11 - Cathode ing Maximum Ratings, Design-Center Values: 27000 max. ULTOR VOLTAGE. volts 7000 max. GRID-No.3 VOLTAGE. . . . volts GRID-No.2 VOLTAGE. . . 350 max. volts -Indicates a change. 7-58

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY DATA 1

STRIC

RCA 5ZPI6

FLYING-SPOT CATHODE-RAY TUBE

		٦.
	GRID-No.1 VOLTAGE: 150 max. volts Negative bias value. 0 max. volts Positive peak value. 2 max. volts Positive peak value. 2 max. volts PEAK HEATER-CATHODE VOLTAGE: 10 max. volts Heater negative with respect to cathode: 0 max. volts During equipment warm-up period not 410 max. volts After equipment warm-up period 150 max. volts Heater positive with respect to cathode. 150 max. volts	
	Equipment Design Ranges:	
	For any ultor voltage $(E_{C,u})$ between 20000* and 27000 volts	
	Grid-No.3 Voltage for focus with ultor current of 25 μ a or less 20.5% to 26.5% of E _{C4} volts Grid-No.2 Voltage for visual extinction of undeflected focused spot when circuit design utilizes fixed	
	grid-No.1 voltage 2 to 5 times Ec, volts Grid-No.1 Voltage for visual extinction of undeflected focused spot when circuit design utilizes fixed grid-No.2 voltage -20% to -50% of Ec2 volts Grid-No.2 Current -15 to +15 μa	5
-	Examples of Use of Design Ranges:	
	For ultor voltage of 20000 27000 volts	5
	Grid-No.3 Voltage for focus with ultor current as indicated	5
	Maximum Circuit Values:	
	Grid-No.1-Circuit Resistance 1.5 max. megohms * Brilliance and definition decrease with decreasing ultor voltage. In	
	general, the ultor voltage should not be less than 20,000 volts.	1
	- Indicates a change.	_
	7-58 ELECTRON TURE DIVISION DATA 1	1

7-58

52P10

ELECTRON TUBE DIVISION



FLYING-SPOT CATHODE-RAY TUBE

OPERATING CONSIDERATIONS

X-Ray Warning. X-ray radiation is produced at the face of the 5ZPl6 when it is operated at its normal ultor voltage. These rays can constitute a health hazard unless the tube is adequately shielded for X-ray radiation. Although relatively simple shielding should prove adequate, make sure that it provides the required protection against personal injury.

The base pins of the 5ZP16 fit the Duodecal 12-contact socket. The socket contacts corresponding to the vacant pin positions (pin positions 3,4,5,8, and 9) should be removed in order to provide the maximum insulation for the high-voltage pins 6 and 7. The socket should be made of high-grade, arcresistant, insulating material and should preferably be designed with baffles.

Resolution of better than 1000 lines at the center of the reproduced picture can be produced by the 52Pl6 when it is operated with 27,000 volts on the ultor. At lower ultor voltages, the resolution capability decreases. To obtain high resolution in the horizontal direction, it is necessary to use a video amplifier having a bandwidth of about 20 megacycles.

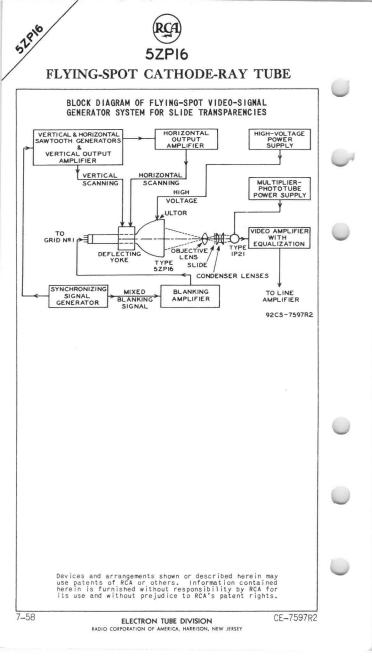
The ultraviolet output of the 5ZP16 is a linear function of the ultor current. For any particular value of ultor current, the ultraviolet output is approximately 50 per cent higher when the 5ZP16 is operated with 27,000 volts on the ultor than when operated with 20,000 volts.

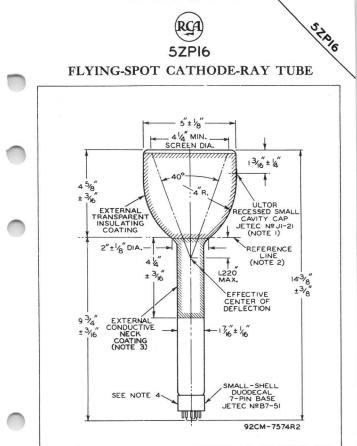
Underscanning over a protracted period should be avoided because an underscanned area of the screen will be burned and thus give diminished radiation when the raster is again scanned to full size and be slightly noticeable in the reproduced picture. Furthermore, it is inadvisable to permit a modulated stationary pattern to remain more than a few minutes on the face of the tube. If it remains for a longer time, the phosphor will be burned unevenly over the pattern area.

Neverallow the beam to remain stationary, even momentarily, because the high peak energy in the beam will seriously damage the screen. Provision should be made to prevent such a possibility. Provision should also be made in equipment design to insure that the ultor voltage will drop as fast as the scanning current when the equipment is turned off; or to bias grid No.1 to beam-current cutoff when the equipment is turned off.

-Indicates a change.

ELECTRON TUBE DIVISION



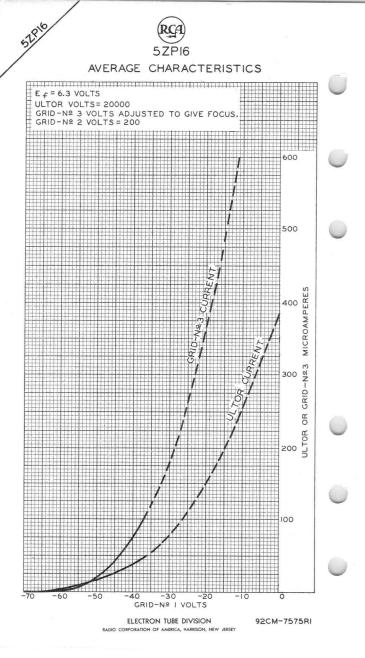


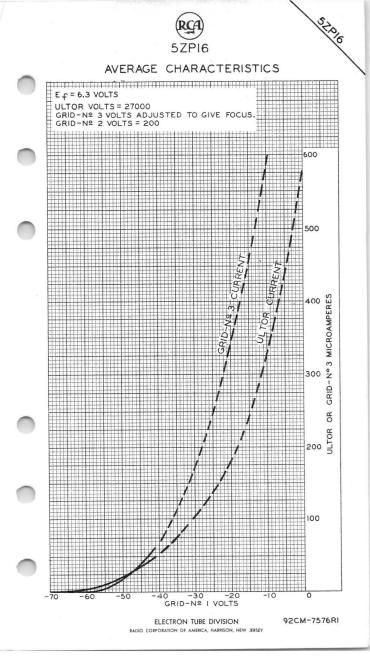
NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND VACANT PIN POSITION 3 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 10°. THE ULTOR TERMINAL IS ON SAME SIDE AS VACANT PIN POSITION 3.

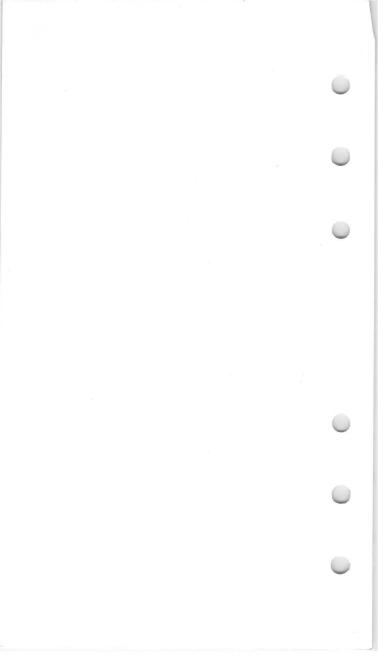
NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC NO.110 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY INTERSECTION ON PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 3: EXTERNALCONDUCTIVE NECK COATING MUST BE GROUNDED.

NOTE 4: \bigcirc OF BULB WILL NOT DEVIATE MORE THAN 2° in any direction from the perpendicular erected at the center of the bottom of the base.









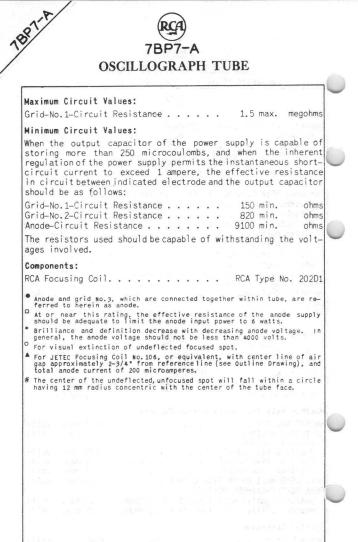
OSCILLOGRAPH TUBE

MAGNETIC FOCUS MAGNETIC DEFLECTION PD.

DATA

General:							
Heater, for Unipotent	ial Cat	hode:					
Heater, for Unipotent Voltage		6.3		241.5	ac of	r dc v	olta
Current.	Sec. 1	0.6	36.3	÷			amr
Direct Interelectrode						• • •	cant
Crid No 1 to All Ot	hor Elo	ctrada	TAPPI	0		0 5	
Grid No.1 to All Ot Grid No.2 to All Ot Cathode to All Othe	her Ele	ctrodes		• •	• • • •	. 0.0	μμ
Grid No. 2 to All Othe	ner Lie	ctrodes	·· · ·		• • • •	•• /	μμ
Phosphor (For Curves,	relect	rodes.	1.1.1				μμ
Fluorescence Phosphorescence			• • •	· · ·		- V-	
Persistence of Phos							
Focusing Method Deflection Method			0.61.1			Magn	etic
Deflection Method				• •		Magn	etic
Deflection Angle (App	rox.) .		· · ·				530
Overall Length	· · · ·		• • •	• •	13-11	4" ±	3/8
Greatest Diameter of	Bulb.		• • •	• • •		/" ±	1/8
Maximum Useful Screen						• •	6'
Mounting Position							Any
Cap				Rec	essed S	Small	Ball
Mounting Position Cap		. Lor	ng Med	ium-Sl	hell Od	ctal 8	-Pir
	BOT	TOM VIE	W				
Pin 1-No	0	4) n(5)		Pin 6	5 - No		
Connection	9	-			Cor	necti	on
Pin 2-Heater	3		6	Pin '	6 – No Cor 7 – Cath 8 – Heat	node	
Pin 3-Grid No.2	7		- · · ·	Pin	B - Heat	ter	
Pin 4 - No	2	57	7				
Connection		X	<u> </u>	Cap	- Anoc	de.	
Pin 5-Grid No.1	C	1)*(8)			Grid	No.3	
Maximum Ratings, Desi	gn-Cent	er Valı	ies:				
ANODE VOLTAGE				. 8	3000 ma	ax. v	olts
GRID-NO.2 VOLTAGE.					700 ma		olts
GRID-No.1 VOLTAGE:					700 110		012.
Negative bias value					125 ma		olts
Positive bias value			• • •		0 ma		olts
Positive peak value				•	2 ma		olts
PEAK GRID-No.1 DRIVE	FDOM CU	TOFF	• • •	•	65 ma		olts
PEAK HEATER-CATHODE V		IUFF .		•	60 116	1X. V	orts
Heater negative wit	h respe	ct to c	athod	P	125 ma		olts
Heater positive wit	h respe	ct to c	athod	e.	125 ma	ax. V	olts
			Jachou		120 110		
Typical Operation:							
Anode Voltage*		400	00		7000	V	olt
Grid-No.2 Voltage		25	50		250	V	olts
Grid-No.1 Voltage Rar	ge ^o	-25 to	o −7,0	-25	to -70) v	olts
Anode Voltage* Grid-No.2 Voltage. Grid-No.1 Voltage Ran Focusing-Coil Current	A	75 to	102	99	to 135	5	ma
Spot Position		#			-		
●□,*,0,▲,∦: See next pa	30e						
, , , , , , , , , , , , , , , , , , ,	-						

PADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



TENTATIVE DATA





OSCILLOGRAPH TUBE MAGNETIC FOCUS

MAGNETIC DEFLECTION

General:		
Heater, for Unipote	ential Cathode:	and the fact the
Voltage	6.3	ac or dc volts
Current	0.6	amp
	ode Capacitances (App	
	Other Electrodes	6 μμιf
	ther Electrodes	
	es, see front of this	Section) P7 Blue
Fluorescence		0
		Greenisn-feilow
Focusing Method.		Magnetic
		Magnetic
	Approx.)	
Greatest Diameter	of Bulb	7-3/16" ± 1/8"
	een Diameter	
Cap	. Recessed Small C	avity (JETEC No.J1-21)
	Small-Shell Duodecal	5-Pin (JETEC No. B5-57)
	BOTTOM VIEW	
Pin 2-Grid No. Pin 10-Grid No.	2	Cap - Grid No.3,
		Collector
Maximum Ratings, D	esign-Center Values:	
Maximum Ratings, D Ultor® VOLTAGE	esign-Center Values:	Collector
Maximum Ratings, D Ultor® VOLTAGE GRID-No.2 VOLTAGE:	esign-Center Values:	
Maximum Ratings, D Ultor® VOLTAGE	esign-Center Values:	8000 max. volts
Maximum Ratings, D Ultor® VOLTAGE . GRID-No.2 VOLTAGE: Positive Value (Negative Value (GRID-No.1 VOLTAGE:	esign-Center Values: DC or Peak AC) DC or Peak AC)	8000 max. volts 700 max. volts 180 max. volts
Maximum Ratings, D Ultor® VOLTAGE . GRID-No.2 VOLTAGE: Positive Value (Negative Value (GRID-No.1 VOLTAGE: Negative bias va	@1 @1 @1 @1 @1 @1 @1 @1 @1 @1 @1 @1 @1 @1 @1 @1 @1 @1 @1	8000 max. volts 700 max. volts 180 max. volts 180 max. volts
Maximum Ratings, D Ultor® VOLTAGE . GRID-No.2 VOLTAGE: Positive Value (Negative Value (GRID-No.1 VOLTAGE: Negative bias va Positive bias va	esign-Center Values: 	8000 max. volts 700 max. volts 180 max. volts 180 max. volts 0 max. volts
Maximum Ratings, D Ultor® VOLTAGE GRID-No.2 VOLTAGE. Positive Value (Negative Value (GRID-No.1 VOLTAGE: Negative bias va Positive bias va Positive peak va	@ 1 @	8000 max. volts 700 max. volts 180 max. volts 180 max. volts 0 max. volts 2 max. volts
Maximum Ratings, D Ultor® VOLTAGE . GRID-No.2 VOLTAGE: Positive Value (GRID-No.1 VOLTAGE: Negative bias va Positive bias va Positive peak va PEAK GRID-No.1 DRI	C or Peak AC) DC or Peak AC) DC or Peak AC) lue lue Ve FROM CUTOFF	8000 max. volts 700 max. volts 180 max. volts 180 max. volts 0 max. volts
Maximum Ratings, D Ultor® VOLTAGE . GRID-No.2 VOLTAGE: Positive Value (Negative Value (GRID-No.1 VOLTAGE: Negative bias va Positive bias va Positive bias va PEAK GRID-No.1 DRI PEAK HEATER-CATHOD	@0 esign-Center Values: DC or Peak AC) DC or Peak AC) DC or Peak AC) Iue. Iue#	8000 max. volts 700 max. volts 180 max. volts 180 max. volts 0 max. volts 2 max. volts 65 max. volts
Maximum Ratings, D Ultor® VOLTAGE. GRID-No.2 VOLTAGE: Positive Value (Regative Value (GRID-No.1 VOLTAGE: Negative bias va Positive bias va Positive bias va Positive peak va PEAK GRID-No.1 DRI PEAK HEATER-CATHOD Heater negative		8000 max. volts 700 max. volts 180 max. volts 180 max. volts 0 max. volts 2 max. volts 65 max. volts 125 max. volts
Maximum Ratings, D Ultor® VOLTAGE. GRID-No.2 VOLTAGE: Positive Value (Regative Value (GRID-No.1 VOLTAGE: Negative bias va Positive bias va Positive beak va PEAK GRID-No.1 DRI PEAK HEATER-CATHOD Heater negative	@0 esign-Center Values: DC or Peak AC) DC or Peak AC) DC or Peak AC) Iue. Iue#	8000 max. volts 700 max. volts 180 max. volts 180 max. volts 0 max. volts 2 max. volts 65 max. volts 125 max. volts
Maximum Ratings, D Ultor® VOLTAGE . GRID-No.2 VOLTAGE: Positive Value (Negative Value (GRID-No.1 VOLTAGE: Negative bias va Positive bias va Positive bias va Positive bias va Positive peak va PEAK GRID-No.1 DRI PEAK HEATER-CATHOC Heater negative Heater positive	C or Peak AC) DC or Peak AC) DC or Peak AC) Iue Iue# VE FROM CUTOFF E VOLTAGE: with respect to cathor with respect to cathor	8000 max. volts 700 max. volts 180 max. volts 180 max. volts 0 max. volts 2 max. volts 65 max. volts 125 max. volts 125 max. volts
Maximum Ratings, D Ultor® VOLTAGE . GRID-No.2 VOLTAGE: Positive Value (Negative Value (GRID-No.1 VOLTAGE: Negative bias va Positive bias va Positive bias va Positive peak va PEAK GRID-No.1 DRI PEAK HEATER-CATHOC Heater negative Heater positive	C or Peak AC) DC or Peak AC) DC or Peak AC) Iue Iue# VE FROM CUTOFF E VOLTAGE: with respect to cathor with respect to cathor	8000 max. volts 700 max. volts 180 max. volts 180 max. volts 0 max. volts 2 max. volts 65 max. volts 125 max. volts 125 max. volts
Maximum Ratings, D Ultor® VOLTAGE. GRID-No.2 VOLTAGE: Positive Value (Negative Value (GRID-No.1 VOLTAGE: Negative bias va Positive bias va Positive bias va Positive peak va PEAK GRID-No.1 DRI PEAK HEATER-CATHOC Heater negative Heater positive	C or Peak AC) DC or Peak AC) DC or Peak AC) Iue Iue# VE FROM CUTOFF E VOLTAGE: with respect to cathor with respect to cathor	8000 max. volts 700 max. volts 180 max. volts 180 max. volts 0 max. volts 2 max. volts 65 max. volts 125 max. volts 125 max. volts
Maximum Ratings, D Ultor® VOLTAGE . GRID-No.2 VOLTAGE: Positive Value (Negative Value (GRID-No.1 VOLTAGE: Negative bias va Positive bias va Positive bias va Positive peak va PEAK GRID-No.1 DRI PEAK HEATER-CATHOC Heater negative Heater positive	C or Peak AC) DC or Peak AC) DC or Peak AC) Iue Iue# VE FROM CUTOFF E VOLTAGE: with respect to cathor with respect to cathor	8000 max. volts 700 max. volts 180 max. volts 180 max. volts 0 max. volts 2 max. volts 65 max. volts 125 max. volts 125 max. volts
Maximum Ratings, D Ultor® VOLTAGE. GRID-No.2 VOLTAGE: Positive Value (Negative Value (GRID-No.1 VOLTAGE: Negative bias va Positive bias va Positive bias va Positive peak va PEAK GRID-No.1 DRI PEAK HEATER-CATHOC Heater negative Heater positive	C or Peak AC) DC or Peak AC) DC or Peak AC) Iue Iue# VE FROM CUTOFF E VOLTAGE: with respect to cathor with respect to cathor	8000 max. volts 700 max. volts 180 max. volts 180 max. volts 0 max. volts 2 max. volts 65 max. volts 125 max. volts
Maximum Ratings, D Ultor VOLTAGE . GRID-No.2 VOLTAGE: Positive Value (Negative Value (GRID-No.1 VOLTAGE: Negative bias va Positive bias va Positive bias va Positive peak va Positive peak va PEAK GRID-No.1 DRI PEAK HEATER-CATHOC Heater negative Heater positive • In the 7M-types, g are connected toge to collectively as electrodes connect highest dc voltage its deflection.	C or Peak AC) DC or Peak AC) DC or Peak AC) DC or Peak AC) lue lue# lue# VE FROM CUTOFF E VOLTAGE: with respect to cathor with respect to cathor with respect to cathor in the rube and "utor". The "ultor" in electrode in combination ed within the tube to i for accelerating the ele	8000 max. volts 700 max. volts 180 max. volts 180 max. volts 0 max. volts 2 max. volts 65 max. volts 125 max. volts 125 max. volts

RCA 7MP7

OSCILLOGRAPH TUBE

Typical Operation:

TMPT

	Ultor Voltage*			4000	7000	volts
	Grid-No.2 Voltage			250	250	volts
	Grid-No.1 Voltage ° .	÷		-27 to -63	-27 to -63	volts
>	Grid-No.2 Current			-15 to +15	-15 to +15	µamp
>	Focusing-Coil Current					10 S K 10
	(DC Approx.)**			64 ± 15%	85 ± 15%	ma
*	Spot Position			là e i <u>L</u> e	##	1183 B
						1 G

Maximum Circuit Values:

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

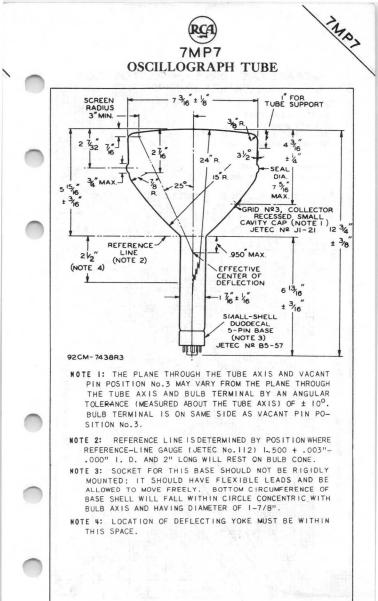
Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 4000 volts.

o For visual extinction of undeflected, focused spot.
**

** For specimen focusing coil similar to JETEC focusing Coil No.109 positioned with airgap toward faceplate and center line of air gap 2-3/4* from Reference Line (see Outline Drawing) and ultor current of 200 microamperes.

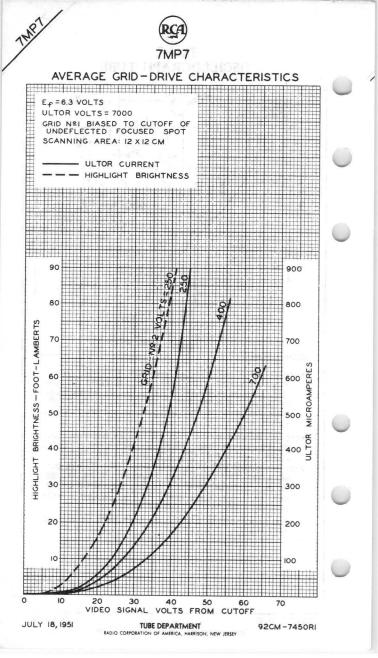
The center of the undeflected, unfocused spot will fall within a circle having 12-mm radius concentric with the center of the tube face.

Indicates a change



OCTOBER 1,1951

CE-7438R3



Projection Kinescopes

FORCED-AIR COOLED ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION 20 FT. × 15 FT. PROJECTED PICTURES

For Black-and-White Projection Systems in Theater and Closed-Circuit Television Applications

ELECTRICAL

Heater, for Unipo	oten	tia	1	Cat	ho	de											
Voltage (AC or	DC)							X		÷.		6	6.6	±	5%	6	۷
Current	$\mathbf{x} = \mathbf{x}$							ž.			×.	0	. 62				Α
Focusing Method.								÷			÷	1	Ele	ct	ros	sta	tic
Deflection Method	d									,					Mag	gn e	tic
Deflection Angle	(Ap)	pro	x.).													35 ⁰
Direct Interelect																	
Grid No.1 to a	11 0	the	er	ele	ct	ro	de	s.			×.		12				pF
Cathode to all	othe	er	el	ect	ro	de:	s.						6				pF

OPTICAL

Faceplate	
Quality Rectangle of Faceplate	
(See Dimensional Outline)	•••••5 x 3-3/4 in
Refractive Index of Faceplate.	1.469
Projection-Throw Distance for	
20 ft x 15 ft Picture	
Phosphor	inized P4-Silicate-Sulfide Type
	White
Persistence	Medium

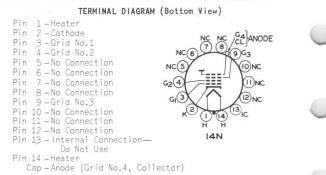
MECHANICAL

Cooling of the tube by a tangential flow of air across its face is not recommended because the temperature gradient produced across the face may result in immediate ordelayed cracking of the face.

Operati				on	2				3	1				÷								÷.		A	ny
Tube Di																									
Overa	11	Ler	ngth		2	1			3					÷.			2		19	-1	12	±	5/	8	in
Great																									
(Exc	luc	ding	a si	de	C	ap	0	r	ca	bl	e)										7	±	3/1	6	in
Cap					2				2	×.				2	М	ed	iu	m	(J	ED	EC	N	0.0	-	5)
Base				Ρ	la	st	ic	F	i1	le	d,	SI	ma	11	-S	he	11	D	ih	ep	ta	1	14-	Pi	n,
																		(J	ED	EC	N	ο.	B14	-1	5)



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA I 12-66



Note: Socket contacts for Pins No.5, 6, 7, 8, 10, 11, 12, and 13 should be removed so that maximum insulation is provided for Pin No.9.

CATHODE-DRIVE^a SERVICE

Absolute-Maximum Ratings

Anode-to-Grid-No.1 Voltage ^b .										80000	۷	
Grid-No.3-to-Grid-No.1 Volta	age .									20000	۷	
Grid-No.2-to-Grid-No.1 Volta	age .									1300	٧	
Cathode-to-Grid-No. Voltage												
Positive bias value										250	٧	
Negative bias value										0	۷	
Peak negative value										2	۷	
Average Anode Current ^b										2	mA	
Peak Heater-Cathode Voltage												
Heater negative with respe	ect t	0 0	atl	hoc	de:							
During equipment warm-up	per	ioc	in t	ot								
exceeding 15 seconds.										410	V	
After equipment warm-up										150	٧	
Heater positive with respe										150	V	
standing of the second second second second second										100		
► Equipment		-		-								-
With any anode-to-grid- 70000° and 80000 volts and	No.1	vo	lt	age	()	Ec4	g	1)	be	tween		
70000° and 80000 volts and	l gri	d-A	10.	2 - t	0-1	gri	d-	-No	. 1	voltag	e	
(E_{c2g1}) betwee	en 40	0 0	ind	85	50 1	vol	ts	S				
Grid-No.3-to-Grid-No.1												
Voltage for Focus		2	20%	to	22	2.6	5%	01	FE.	c4al	٧	
Grid-No.2-to-Grid-No.1 Volta	age									5491		
for Visual Extinction of Focu												
Raster when Circuit Design												-
Utilizes Fixed Cathode-to-Gr	-bi											
No. Voltage (E _{kgl})		2.	58	to	1 3	.87	7 4	t i n	IAS	F	V	
go (-kgi) i i i		~ .	00	r	111	s F	-, '		VO	E _{kgl} Itage		
Cathode-to-Grid-No. Video Dr	ive			P	- i u i		-Kg] [10	rugo		
from Raster Cutoff (Black Le												
to White-Level Value	ver)				1				1	dootho	da	6
to mille-sevel value	1									d catho		
	10-									cept vi		
		0	Iri	ve	IS			-		ve volt	-	
						+	In	dic	ate	s a chan	ge.	
		-				-				and a second		



_		-
	Grid-No.3 Current	
	Examples of Use of Design Ranges	
	For anode-to-grid-No.1 voltage of 75000 V	
	Grid-No.3-to-Grid-No.1	
	Voltage for Focus	
	when Circuit Design Utilizes Fixed Cathode-to-Grid-No.I Voltage (E _{kgl}) of 125 V	
	Maximum Circuit Value	
	GRID-DRIVE ^e SERVICE	
	Absolute-Maximum Ratings	
	Anode-to-Cathode Voltage ^b	
	Negative bias value	
	Average Anode Current ^b	
	Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	
	Heater positive with respect to cathode 150 V	
	Equipment Design Ranges	
)	With any anode voltage (E_{c2k}) between 70000° and 80000 volts and grid-No. 2 voltage (E_{c2k}) between 400 and 600 volts	
	Grid-No.3 Voltage for Focus 20% to 22.6% of E_{C4k} V Grid-No.2 Voltage for Visual Extinction of Focused Raster when Circuit Design Utilizes	
	Fixed Grid-No. Voltage (E _{clk}). , 2.58 to 3.87 times E _{clk} V Grid-No. Video Drive from	
;	Raster Cutoff (Black Level) to White-Level ValueSame value as fixed grid-No.I voltage except video drive is a positive voltage	
	Grid-No.3 Current	
	Grid-No.2 Current15 to+15 μA	



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

- Indicates a change.

DATA 2 12-66

Examples of Use of Design Ranges		
For anode voltage 75000	V	
Grid-No.3 Voltage for Focus 15000 to 17000 Grid-No.2 Voltage for Visual Extinction of Focused Raster when Circuit Design Utilizes Fixed	۷	
Grid-No. Voltage (E _{clk}) of -I55 V 400 to 600 Cathode-to-Grid-No. Video Drive from Raster Cutoff (Black Level) to White-	۷	
Level Value	۷	-
Grid-No.I Circuit Resistance 1.5	megohms	

a Cathode drive is the operating condition in which the video signal varies the cathode potential.

b The product of anode-to-grid-No.l voltage, or anode-to-cathode voltage, and average anode current should be limited to 160 watts.

C Brilliance and definition decrease with decreasing anode-to-grid-No.1 voltage or anode-to-cathode voltage. In general, the anode-to-grid-No.1 voltage or the anode-to-cathode voltage should not be less than 70000 volts.

d Grid-No.3 current will be approximately 10% to 5%, or less, of anode current. However, a grid-No.3 leakage current of up to 15 μA may be present.

^e Grid drive is the operating condition in which the video signal varies the grid-No.1 potential.

GENERAL CONSIDERATIONS

The high voltages at which this type is operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the enclosing of high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

In theuse of this tube, it should always be remembered that high voltages may appear at normally low-potential points in the circuit because of capacitor breakdown or incorrect circuit connections, and that the tube surface maintains a static charge for some time after the power has been turned off. Therefore, before any part of the circuit or the tube is touched, the power-supply switch should be turned off, both terminals of high-voltage capacitors should be grounded, and the terminals of the high-voltage power supply should be grounded. After these steps have been taken and before touching the tube, discharge the anode terminal, the surface of the faceplate, and the coated surface of the cone by use of a suitable wand which is connected to ground. It is to be noted that the entire surface of the cone and of the faceplate will not be discharged by touching the wand to a single point on either surface, because the surfaces have high resistance. Therefore, to discharge each surface, it will be necessary to sweep over the entire surface with the wand.

The *fluorescent screen*, utilizing phosphor No.4 of the silicate-sulfide type, is aluminized. The white fluorescence of the screen has a color temperature of approximately 6300° K.



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. The spectral energy emission characteristic is shown in Spectral-Energy Emission Characteristic of Phosphor No.4. The persistence of the phosphorescence is such that its brightness does not exceed 7 per cent of the peak value in 33 milliseconds after excitation is removed.

Darkening of face occurs during normal operation of the tubes with resulting decrease in the light transmitted by the face. The rate of darkening increases rapidly with increase in anode voltage, is proportional to the beam current, and is inversely proportional to the scanned area. The darkening develops rapidly during initial operation; thereafter, a gradual increase in the amount of darkening will be observed during the life of the tube.

The anode connection is made to the medium cap on the side of the bulb. The anode connector should have a ball-type corona shield with a diameter of about 1-1/2 inches in order to prevent corona.

OPERATING HINTS

1. Never apply power input to the screen suddenly because immediate or delayed cracking of the face may result. Always increase or decrease the anode current gradually.

2. Never exceed the rated maximum anode current of 2 milli-amperes.

3. Never overscan the screen because the beam will strike the neck and liberate occluded gas which may cause internal arcing.

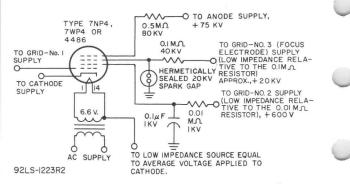
4. Never fail to operate this tube in its equipment at intervals of about 2 months to keep the tube in condition.

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section

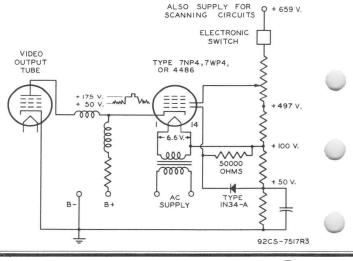


RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 3 9-67

SCHEMATIC DIAGRAM OF CIRCUIT SHOWING PROTECTIVE ELEMENTS EMPLOYED TO PREVENT TUBE DAMAGE

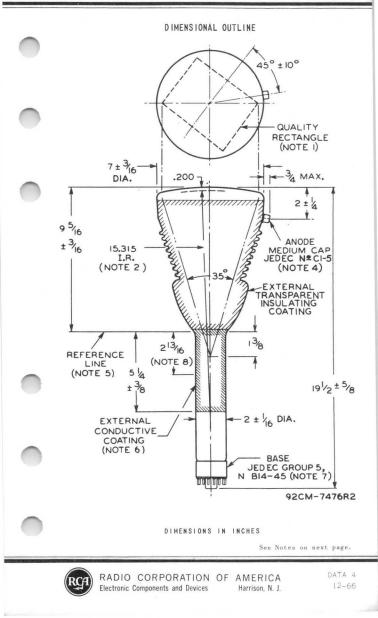


SCHEMATIC DIAGRAM SHOWING PRINCIPLES OF CATHODE DRIVE AS WELL AS METHOD FOR AUTOMATICALLY PROTECTING THE TUBE AGAINST OVERDRIVE AND SCANNING FAILURE





RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



Note 1: When viewed from the face of the tube, the minor axis of the 5 x $3 \cdot 3/4$ inch quality rectangle is located $45^{\circ} \pm 10^{\circ}$ in a counter-clockwise direction from a plane through the anode terminal and the tube axis.

Note 2: Inside surface of faceplate within the quality rectangle may vary \pm 0.006" from the spherical surface having a 15.315 inch radius.

Note 3: Inside surface of faceplate within the quality rectangle may vary \pm 0.006 inch from the spherical surface having a 20.3 inch radius (Type 7WP4 only).

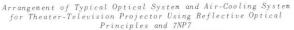
Note 4: The plane through Base Pin No.9 and the tube axis may vary from the plane through the anode terminal and the tube axis by an angular tolerance (measured about the tube axis) of $\pm 10^{\circ}$. The anode terminal is on same side as Pin No.9.

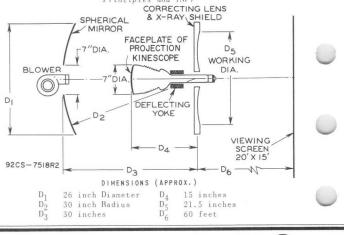
Note 5: Reference line is determined by position where gauge 2.100 \pm 0.001 inch I.D. and 3 inches long will rest on bulb cone.

Note 6: External conductive coating must be grounded.

Note 7: Socket for this base should not be rigidly mounted, it should have flexible leads and be allowed to move freely. Socket contacts for Pins 5, 6, 7, 8, 10, 11, 12, and 13 should be removed in order to provide maximum insulation for Pin No.9. Note 8: Effective deflecting field must be within this space.

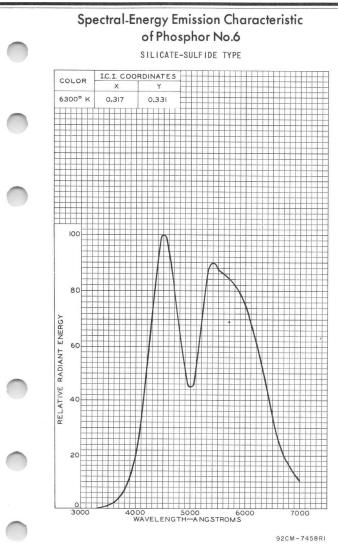
REFLECTIVE OPTICAL SYSTEM





DATA 4

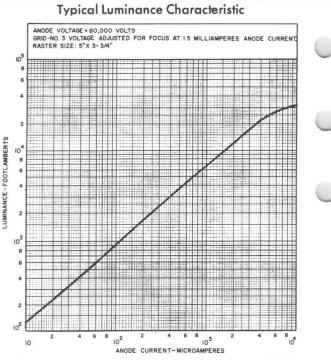
RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.





RADIO CORPORATION OF AMERICA Electronic Components and Devices

Harrison, N. J.

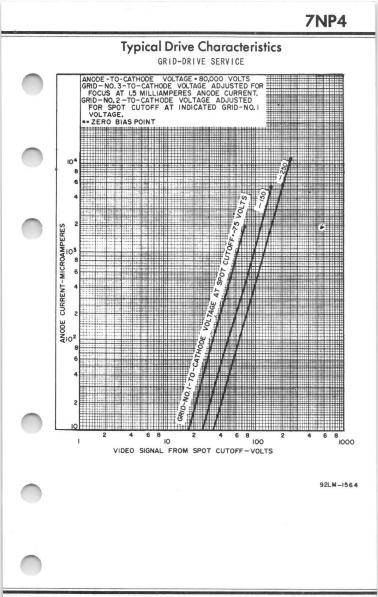


92LM-1562



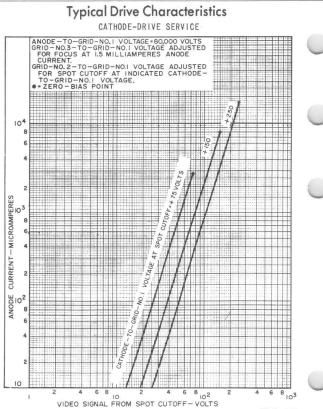
Harrison, N. J.

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RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 6 12-66



92LM-1563



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



MONITOR KINESCOPE

METAL-BACKED SCREEN

ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

DATA

Cathode:		
anthe day		
Lainode:		
6.3	ac or dc	volte
	•••• ac or ac	
		amp
	ox.):	101 I S
	6	μµf
		μμf
	P4—Sulfid	
		White
	· · · · · · · · ·	Short
	ма	gnetic
		500
ameter		6"
um-usetul-screen ar	eal . 5-3/8	" × 4"
cessed Small Cav	ity (JETEC No.	J1-21)
hell Duodecal 6-	Pin (JETEC No.	B6-63)
BOTTOM VIEW		
	D: 10 II I	
-	Pin 12 - Heater	
T	Cap - Grid M	10.4,
	Colle	
4/51 10	(U)	ltor.)
a la		
Conter Values:		
center futues.	12000 may	volts
		volts
	410 max.	volts
	100	1.
		volts
		volts
	2 max.	volts
this Section.		
ch has the ultor fu	nction, and collec	tor are
the tube and are	conveniently refer	red to
e in combination wi	th one or more add	itional
in the tube to it,	to which is appli	ed the
celerating the ele	ctrons in the beam	prior
	Electrodes . lectrodes . horescence. rescence.	center Values: Center Values: Center Values: Clear P4—Sulfid borescence. P4—Sulfid borescence. P4—Sulfid borescence. Clear P4—Sulfid borescence. Clear P4—Sulfid borescence. Clear P4—Sulfid borescence. Clear P4—Sulfid borescence. Clear P4—Sulfid borescence. Clear P4—Sulfid borescence. Clear P4—Sulfid borescence. Clear P4—Sulfid Ma -3/18" D13–1/8" borescence. Clear P4—Sulfid Clear P4—Sulfid Clear P4—Sulfid Clear P10 Cap – Grid M Colle (U) Center Values: Clear Comax.

FEB. 1, 1952

TENTATIVE DATA

1.PA

7TP4

MONITOR KINESCOPE

PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to	cathode:	
During equipment warm-up peri		
not exceeding 15		ts
After equipment warm-up perio		
Heater positive with respect to		
neater positive with respect to	cathoac. 200 max. (0)	
Equipment Design Ranges:		
For any ultor voltage (E_{ij}) betw	sear 10000* and 10000 malte	
and grid-No.2 voltage (E_{c2}) b	etween 150 and 110 volts	
Grid-No.3 Voltage for Focus with	the contract of E walt	
Ultor Current of 100 µamp	11.6% to 15.8% of Eu Voit	.5
Grid-No.1 Voltage for Visual		
Extinction of Undeflected		1
Focused Spot	11% to 25.7% of E _{C2} volt	. 5
Grid-No.3 Current**	See Curves 2	
Grid-No.2 Current	-15 to +15 μam	np
Field Strength of Adjustable		
Centering Magnet	0 to 8 gausse	35
xamples of Use of Design Ranges:		
For ultor voltage of	10000 volt	ts
and grid-No.2 voltage of	200 volt	ts
Grid-No.3 Voltage for Focus with		
Ultor Current of 100 µamp	1160 to 1580 volt	ts
Grid-No.1 Voltage for Visual	1100 10 1000 0010	
Extinction of Undeflected		
Focused Spot	-22 to -52 volt	s
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	1.5 max. megohr	ne
	1.0 max. megorm	1.5
Brilliance and definition decrease wi	th decreasing ultor voltage.	In
Brilliance and definition decrease wi general, the ultor voltage should not	be less than 10000 volts.	
Grid-No.3 Current increases as the ult	or voltage is decreased.	

FEB. 1, 1952

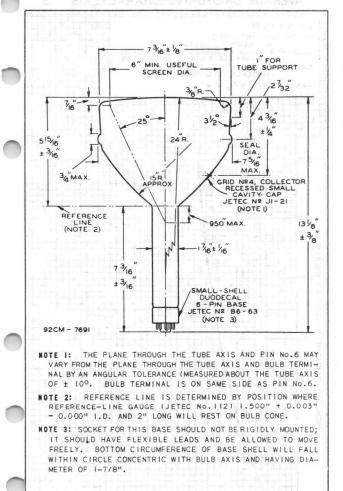
TTPA

TENTATIVE DATA

TUBE DEPARTMENT RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

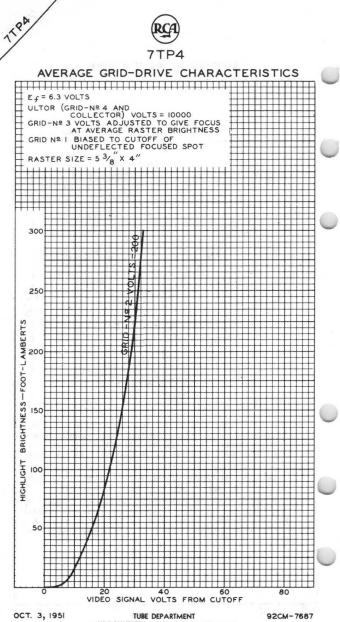


MONITOR KINESCOPE



CE-7691

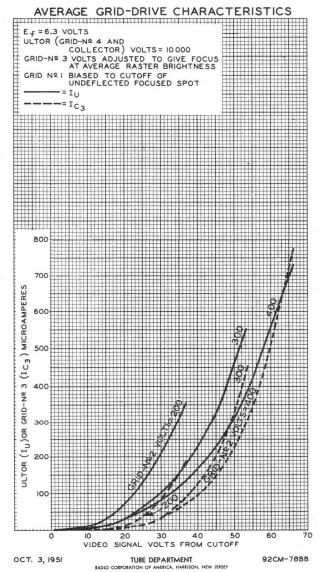
TRA

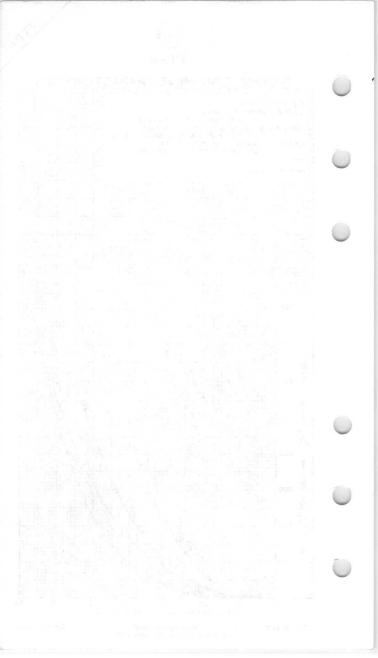


RADIC CORPORATION OF AMERICA, HARRISON, NEW JERSEY



TRA







1201

OSCILLOGRAPH TUBE

ELECTROSTATIC DEFLECTION ELECTROSTATIC FOCUS

DATA

1																				
Gener	al:																			
Heate	r, fo	r Ur	nipot	ent	ial	Ca	tho	de:												
Vol	tage						6	.3							ac	0	r	dc	vo	lts
Cur	rent						0													amp
Direc	t Int	erel	lectr	ode	Ca	pac	ita	nce	S	Ap	ppr	ox	.)	:						
Gri	d No.	1 to	o A11	l Ot	her	E1	ect	rod	es						6				1	μµf
DJ1	to D	J2													3					μµf
DJ3	to D	JA													2					14th
DJ1	to A	11 (Other	r El	ect	rod	es								9					μµt
DJ2	to A	11 (Other	r El	ect	rod	es							•	97	1				mut
DJ3	to A	11 (Other	r El	ect	rod	es								7					μµt
DJ4	to A	11 (Other	r El	ect	rod	es								7					144
Facep Phosp	late															C	le	ar	G1	ass
Phosp	hor (For	Curv	ves,	se	e f	ron	t c	f 1	thi	is	Se	ct	io	n)					P1
Flu	oresc	ence	e and	d Ph	osp	hor	esc	enc	e										Gr	eer
Per	siste	nce	of	Phos	pho	res	cen	се	•	•	•	•	•	•		. •	•	1	Med	liun
Focus	ing M	eth	. bc	• •	•	• •		• •	•	•	•	•	•	•	E	le	ct	ros	sta	itic
Defle	ction	Me	thod	• •	•	• •	•	• •		•	•	•		•	E	le	ct	ros	sta	tic
Overa Great	III Le	ngt	n .	• .•	· ' 1	: •	•	• •		•	٠	•	•	•	1	.4-	1/	2"	±3	18
Great	est U	ame	eter	OT	BUI	D .		• •	•	•	٠	•	•	•	• •	•		1.	± 1	./8
MINIM	num Us	etu	1 20	reer		ame	ter		•	٠	•	•	•	•	• •	•	•	•		6'
Mount	ing F	'0S I	tion	• •	•	• •		• •	•	•	•	•	•	•	• •	•	•	•		Any
		• •	Med	.: .		: ;;	· ·			•			•	:				•		1561
Base	• •	• •	Me	diun	-Sn	ell	UI	ner	ta	1	12-	-11	n	()	EIE	C	NO	• B	12-	-311
						BC	TTC	MV	IFI	N				~						
	1-H											H	11	9						
	2-0						(7	(8)	0										0.2	
	3-G		No.	1			1	7	R	2									0.4	
PIN	4 - N		ecti			A	L	3	2	9		0		10	r				tor	
Die	15-0					4	1	III	1	\square		PI	n	10					DJ2	
	7-0					3	1	~		2)		D		11						
FIG			trod			C	2	-(4)	-			F		11					DJ1	
		Ja	LI UU	C			Ŭ	Ŭ				Pi	in	12						5.5
Pin	8-0		ecti	na										12					ion	-
			trod																Use	
		JA	ci ou	0								Pi	n	14						
Witl	h DJ1	nos	-	3 an	d D	J_4	are	ne	are	r	th	e	ba	se		ot		is	de	
flea DJ4	cted , the	towa spc	ard p ot is	oin de	5. fle	Wi	th I d to)J3 bwa	pc rd	pi	ti n	ve 2.	W	it	h	res	spe	ect	t	0
the (mea	plan trace asure - DJ2	e pr d ab	oduc	ed the	by t	DJ1 ube	ana	d D is)	J2	by	tat	00	an.	gul A	ar	to	510	era	Inc	e
	next																			

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



TVP

OSCILLOGRAPH TUBE

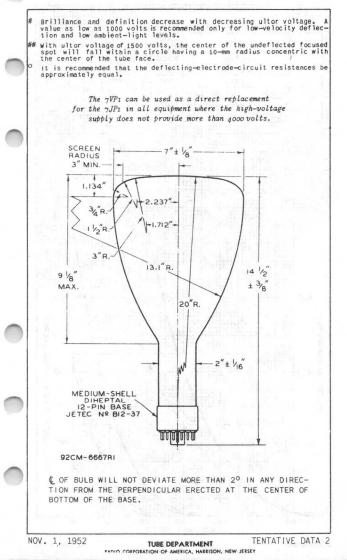
Maximum Ratings, Design-Cen	nter Values	::		
ULTOR [®] VOLTAGE		40)00 max.	volts
GRID-No.3 VOLTAGE GRID-No.1 VOLTAGE:		20)00 max.	volts
Negative bias value			200 max.	volts
Positive bias value*			0 max.	volts
Positive peak value			2 max.	
PEAK VOLTAGE BETWEEN ULTOR			750 max.	
ANY DEFLECTING ELECT PEAK HEATER-CATHODE VOLTAG	E:	194.1		
Heater negative with res			125 max.	volts
Heater positive with res	pect to cat	hode .	125 max.	volts
Equipment Design Ranges:				in and
For any ultor voltage (
Grid-No.3 Voltage for Focu Maximum Grid-No.1 Voltage for Visual Extinction of		40% of Lu		volts
Undeflected Focused Spot		of Eu		volts
Grid-No.3 Current		to +10		µamp
Deflection Factors:	-10	10 .10		particip
$DJ_1 \& DJ_2 \dots \dots$	31	to 41 v	dc/in./kv	of E.
$D_1 \& D_2 \dots \dots \dots$ $D_3 \& D_4 \dots \dots \dots \dots$		to 34 v		
Spot Position		**		J, LU
Examples of Use of Design	Ranges:			
For ultor voltage of	1500	3000		volts
Grid-No.3 Voltage				
	400 to 600	800 to 1	200	volts
Maximum Grid-No.1 Volt-				
age for Visual Extinc-				·
tion of Undeflected				
Focused Spot	-42	-84		volts
Deflection Factors:			1.	
$DJ_1 \& DJ_2 \ldots \ldots$	47 to 62		23 volts	
DJ3 & DJ4	38 to 51	75 to 1	02 volts	dc/in.
Maximum Circuit Values:				1
Grid No.1-Circuit Resistan	Ce	1.	5 max. m	egohms
Resistance in Any Deflecti				
	Circuito	5.	0 max. m	egohms
In the 7VP1, grid No.4 which the lector are connected together ferred to collectively as "ul is the electrode, or the elu additional electrodes connec applied the highest dc volta heam prior to its deflection.	has the ultor within the ltor." The ' ectrode in c cted within ge for accel	function, tube and are "ultor" in a combination the tube to erating the	convenien cathode-r with one it, to wi electrons	and col- atly re- ay tube or more hich is in the
heam prior to its deflection				
beam priver to reo der reotron.	ellective le		6 watts.	
applied the highest dc volla beam prior to its deflection. At or near this rating, the should be adequate to limit th	he ultor inpu	ut power to		
At or near this rating, the should be adequate to limit the	he ultor inp	ut power to	, acros	
beam priver to tto dellectron.	he ultor inp		ENTATIVE	892 6

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



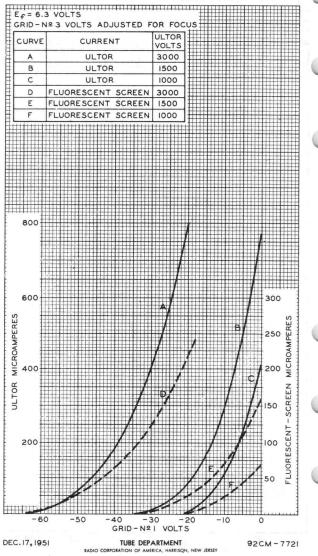
140

OSCILLOGRAPH TUBE





AVERAGE CHARACTERISTICS



7VP31



ELECTROSTATIC FOCUS ELECTROSTATIC DEFLECTION

MEDIUM-SHORT-PERSISTENCE SCREEN HIGH DEFLECTION SENSITIVITY

The 7VP31 is the same as the 7VP1 except for the following items:

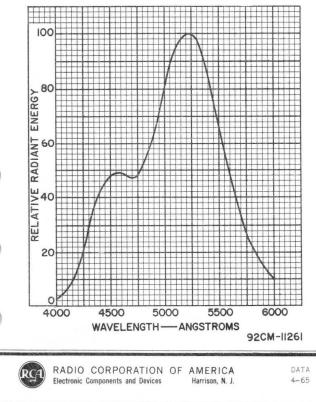
General:

Phosphor (See accor	np	an	yi	ng	CI	ur	ve	s)											P31
Fluorescence																			
Phosphorescence.																			
Persistence ^a .							Me	di	um	S	ho	rt	D	(A	pp	ro	Χ.	38	µsec)

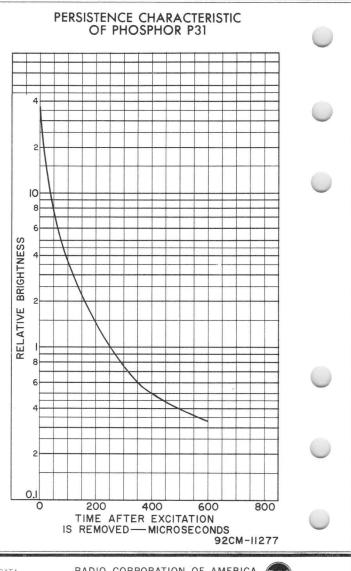
a Time for initial brightness to decay to 10% point.

Phosphorescence may have a useful brightness for over a minute under conditions of adequate excitation and low-ambient illumination.

SPECTRAL-ENERGY EMISSION CHARACTERISTIC OF PHOSPHOR P31



7VP31



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

Projection Kinescope

FORCED-AIR COOLED ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION 20 FT. x 15 FT. PROJECTED PICTURES

For Black-and-White Projection Systems in Theater and Closed-Circuit Television Applications

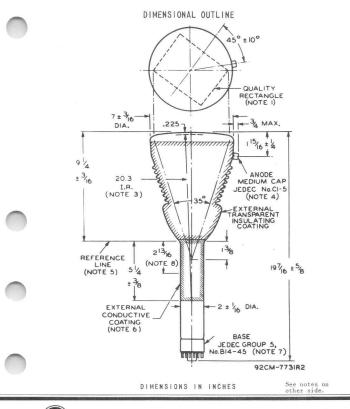
The 7WP4 is the same as the 7NP4 except for the following items:

OPTICAL

Projection-Throw Distance for 20 ft x 15 ft Picture. . .80 ft

MECHANICAL

Overall Length . $19-7/16 \pm 5/8$ in



Electronic Components and Devices

RADIO CORPORATION OF AMERICA Harrison, N. J.

DATA 12-66

7WP4

Note 1: When viewed from the face of the tube, the minor axis of the 5 inch x 3-3/4 inch quality rectangle is located 45° \pm 10° in a counter-clockwise direction from a plane through the anode terminal and the tube axis.

Note 2: Inside surface of faceplate within the quality rectangle may vary ±0.006 inch from the spherical surface having a 15.315 inch radius (Type 7NP4 only).

Note 3: Inside surface of faceplate within the quality rectangle may vary \pm 0.006 inch from the spherical surface having a 20.3 inch radius.

Note 4: The plane through base Pin No.9 and the tube axis may vary from the plane through the anode terminal and the tube axis by an angular tolerance (measured about the tube axis) of \pm 70°. The anode terminal is on same side as Pin No.9.

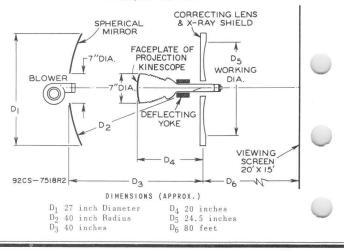
Note 5: Reference line is determined by position where gauge 2.100 inch \pm 0.001 inch I.D. and 3 inch long will rest on bulb cone.

Note 6: External conductive coating must be grounded.

Note 7: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Socket contacts for Pins 5, 6, 7, 8, 10, 11, 12, and13 should be removed inorder to provide maximum insulation for Pin No.9. Note 8: Effective deflecting field must be within this space.

REFLECTIVE OPTICAL SYSTEM

Arrangement of Typical Optical System and Air-Cooling System for Theater-Television Projector Using Reflective Optical Principles and 7WP4



DATA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.





SOP A

PICTURE TUBE

SMALL, COMPACT, RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

	DATA	
eneral:		
leater, for Unipotential	Cathode:	
Voltage	. 6.3	ac or dc volts
Voltage Current	. 0.6 ± 10%	amp
Capacitance between Exter	nal Conduc-	
tive Coating and Ultor		
aceplate, Spherical		Filterglass
Phosphor (For Curves, see fi	ront of this Section)	. P4—Sulfide Type
Deflection Angles (Appro>		
Diagonal		
Vertical	Ion-Tran Type	Requiring External
	ion hap type	Single-Field Magnet
Tube Dimensions:		en grottera magnot
Overall length		. 10-7/16" ± 5/16"
Greatest width		/8" + 1/16" - 1/32"
Greatest height.		16" + 1/16" - 1/32"
Greatest height Diagonal		16" + 1/16" - 1/32"
Neck length		6-1/2" ± 3/16"
Radius of curvature of	faceplate	
(External surface) .		•••• 27'
Screen Dimensions (Minim	um):	
Greatest width		7-3/16'
Greatest height		5-3/8'
Diagonal		7-13/16'
Projected area		35.5 sq. in.
Operating Position		
Cap	ecessed Small Cavi	ty (JETEC No.J1-21)
BaseDwart-Shell Duod	ecal 6-Pin (JETEC	Group 4, No.86-158)
Basing Designation for	ROLLOW ALEM	•••••••12At
Pin 1-Heater	A	Cap-Ultor
Pin 2-Grid No.1	(-)	(Grid No.3.
Pin 3-Grid No.4	1 - Lipc	Grid No.5.
Pin 10-Grid No.2		Collector) C-External
Pin 11 - Cathode	XAX	
Pin 12-Heater		Conductive
		Coating
Maximum Ratings, Design-	Center Values:	The second se
ULTOR VOLTAGE		8000 max. volts
GRID-No.4 (FOCUSING) VOL	TAGE:	
Positive value		500 max. volts
Negative value		500 max. volts
GRID-No.2 VOLTAGE		300 max. volt:
		Indicates a change



PICTURE TUBE

1	
	GRID-No.1 VOLTAGE:
	Negative-peak value 130 max. volts
	Negative-bias value
	Positive-bias value 0 max. volts
1	Positive-peak value 2 max. volts
1	PEAK HEATER-CATHODE VOLTAGE:
1	Heater negative with respect to cathode. 180 max. volts
	Heater positive with respect to cathode. 180 max. volts
1	Maximum Circuit Values:
	Grid-No.1-Circuit Resistance 1.5 max. megohms

80PA

DATA

Monitor Kinescope

NO ION-TRAP MAGNET REQUIRED RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 90° MAGNETIC DEFLECTION
Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes 9 pf Grid No.1 to all other electrodes 9 pf External conductive coating to anode {350 max. pf 250 min. pf
Heater Current at 6.3 volts
Optical: Phosphor (For Curves, see front of this Section)P4—Sulfide Type, Aluminized Faceplate
Mechanical: Weight (Approx.) 2.5 lbs Overall Length 9.94" ± .31" Neck Length 6.00" ± .19" Projected Area of Screen
Basing Designation for BOITTOM VIEW



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 4-64

8HP4

Maximum and Minimum Ratings, Absolute-Maximum Values: Unless otherwise specified, voltage values are positive with respect to cathode volts Positive value 1100 max. volts 550 max. volts Negative value Grid-No.2 Voltage. 550 max. volts Grid-No.1 Voltage: volts Negative peak value. . . . 220 max. Negative bias value. 155 max. volts . . . Positive bias value. 0 max. volts Positive peak value. 2 max. volts ∫6.9 max. volts Heater Voltage 15.7 min. volts Peak Heater-Cathode Voltage: Heater negative with respect to cathode . 180 max. volts Heater positive with 180 max. respect to cathode . volts Typical Operating Conditions for Grid-Drive Service: Unless otherwise specified, voltage values are positive with respect to cathode volts Grid-No.4 Voltage. 0 to 300 volts Grid-No.2 Voltage. 300 volts Grid-No.1 Voltage for visual extinction of focused raster -28 to -72 volts Maximum Circuit Value: Grid-No.1-Circuit Resistance 1.5 max. megohms

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



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

8NP4

Monitor Kinescope

NO ION-TRAP MAGNET REQUIRED

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN 90° MAGNETIC DEFLECTION LOW-VOLTAGE ELECTROSTATIC FOCUS

Electrical:

Direct Interelectrode Capacitances:

Cathode to all other electrodes.			5	pf
Grid No.1 to all other electrodes			6	pf
Heater Current at 6.3 volts			600 ±	30 ma
Heater Warm-up Time (Average)			11	seconds
Electron Gun				

Optical:

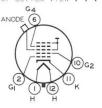
Phosphor	(For	Curves	, see	front	of	this	Sect	ion)	 P4			
												ized
Faceplate Light t												

Mechanical:

Weight (Approx.) 2-1/2 lbs 9.75" ± .19" Overall Length 5.81" ± .12" Neck Length. Projected Area of Screen 36 sq.in. External Conductive Coating. None For Additional Information on Dimensions:

See Bulb J67-1/2A sheets at front of this Section. Cap. Recessed Small Cavity (JEDEC No.J1-21) Base . . .Small-Shell Duodecal 6-Pin (JEDEC Group 4, No.B6-63)

Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10 - Grid No.2 Pin 11 - Cathode Pin 12 - Heater



Cap - Anode (Grid No.3, Grid No.5. Screen.

Maximum and Minimum Ra	ati	ng	s,	l)es	sig	n-	Ma	1x1	imı	m	Values:	
Unless other													
ues are posi Anode Voltage													olts
Grid-No.4 Voltage: Positive value												1100 max. vo	olts
Negative value												550 max. vo	
Grid-No.2 Voltage	·	•		•		•	•	·	•	·	•	200 max. vo	
Grid-No.1 Voltage:												000	1.
Negative peak value Negative bias value	•	•	•	•	•	•	•	•	•	•	•	220 max. vo 155 max. vo	

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DATA 3-64

8NP4

Positivo bias value	volto											
Positive bias value 0 max.												
Positive peak value	VOITS											
Heater Voltage	volts											
(5./ min.	volts											
Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period												
not exceeding 15 seconds 450 max.	volts											
After equipment warm-up period 200 max.	volts											
Heater positive with respect to cathode: Combined AC and DC Voltage 200 max. DC Component												
Typical Operating Conditions for Grid-Drive Service:	10100											
Unless otherwise specified, voltage val- ues are positive with respect to cathode												
Anode Voltage	volts											
Grid-No.4 Voltage ^a	volts											
Grid-No.2 Voltage	volts											
Grid-No.1 Voltage for visual												
extinction of focused raster28 to-72	volts											

Maximum Circuit Value:

Grid-No.1 Circuit Resistance 1.5 max. megohms

a The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between 0 to +400 volts.

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



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Test Picture Tube

NO ION-TRAP MAGNET REQUIRED RECTANGULAR GLASS TYPE ALUMINIZED SCREEN ELECTROSTATIC SELF FOCUS 90° MAGNETIC DEFLECTION
Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf Heater Current at 6.3 volts 600 ma Electron Gun
Optical:
Phosphor (For Curves, see front of this Section)P4—Sulfide Type, Aluminized
Faceplate
Mechanical: Weight (Approx.) Overall Length
Collector) Maximum Ratings, Design-Maximum Values:
Unless otherwise specified, voltage val-
ues are positive with respect to cathode
Anode Voltage



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8XP4

Peak Heater-Cathode Voltage: Heater negative with	
respect to cathode:	
During equipment warm-up period	
not exceeding 15 seconds 450	
After equipment-warm-up period 200	max. volts
Heater positive with respect to cathode	max. volts

Typical Operating Conditions for Cathode-Drive Service:

Unless	otherwise	specifi	ed, vol	tage	val-
ues are	positive	with res	pect to	Grid	No. 1

Anode Voltage						16000	volts
Grid-No.2 and Grid-No.4	Vo	Ita	le			400	volts
Cathode Voltage for							
visual extinction of							
focused raster						36 to 78	volts

Maximum Circuit Value:

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

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



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

Test Picture Tube

	0 10 0
NO ION-TRAP MAGNET REQUIRED RECTANGULAR GLASS TYPE ALUMINIZED S ELECTROSTATIC SELF FOCUS IIO ^O MAGNETIC DEFLE	
Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes 4 Grid No.1 to all other electrodes 6 Heater Current at 6.3 volts 600 Electron Gun Type Requiring No Ion-Trap N	pf pf ma lagnet
E 1.1.	nized
Light transmission (Approx.)	80%
Overall Length 8.69": Neck Length 5.19": Projected Area of Screen 39 sc	. 19" . in. None . 1/2 B
Maximum Ratings, Design-Maximum Values:	
Unless otherwise specified, voltage values are positive with respect to cathode	
Anode Voltage. 22000 Grid-No.2 and Grid-No.4 Voltage. 550 Crid No.1 Voltage. 550	volts volts
Grid-No.1 Voltage: Negative peak value	volts volts volts volts
RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.	DATA 4-65

8YP4

Peak Heater-Catl						
Heater negativ						
respect	t to cathode:					- 1
During equip	pment warm-up period					
	ding 15 seconds			450	volts	
	ment-warm-up period .				volts	
Heater positiv	ve with respect to ca	thode		200	volts	

Typical Operating Conditions for Cathode-Drive Service:

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

Anode Voltage	16000	volts
Grid-No.2 and Grid-No.4 Voltage	400	volts
Cathode Voltage for visual extinction		
	42 to 78	volts

Maximum Circuit Value:

Grid-No.1-Circuit Resistance . . .

1.5 megohms

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



Picture Tube

LOW-GRID-No.2 VOLTAGE

PAN-0-	PLY	TYPE
--------	-----	------

90° MAGN

ELECTRICAL

Direct Interelectrode Capacitances	
Cathode to all other electrodes 5	pF
Grid No.1 to all other electrodes 6	pF
External conductive coating to anode 300 min-750 max	pF
Heater Current at 12V	mA
Heater Warm-Up Time (Average) II	S
Electron Gun	net

OPTICAL

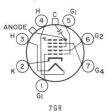
racepta																					
Light	tr	ans	mi	ssi	оп	at	C	cer	nte	er	(App	ord	x.)	X	٠	•	X	ξ.	49.5%

MECHANICAL

Weight (Approx.	.)	÷	1			υ.			2		 		2			3.1	1b
Overall Length																	
Neck Length																	
Projected Area																	
External Conduc	cti	V	e (Co	at	in	qa										
Typo (see cot	011	т1	L M	r e	4.4		fro	 of	+ 5	1.0	 -+ 1	~ ~	1		Pequi	ar-R	and

TERMINAL DIAGRAM (Bottom View)

Pin 1-Grid No.1 Pin 2-Cathode Pin 3-Heater Pin 5-Grid No.1 Pin 6-Grid No.2 Pin 7-Grid No.3, Grid No.5, Screen, Collector C-External Conductive Coating



MAXIMUM AND MINIMUM RATINGS. DESIGN-MAXIMUM VALUES

Voltages are positive with respect to cathode

Anode Voltage Grid-No.4 Voltage	×	•	÷	•	•	•	·	•	8000 min-12000 max	۷
Positive value .									1100 max	۷
Negative value .	ŝ		ÿ,	÷			÷.	÷,	550 max	٧
Grid-No.2 Voltage.										۷

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9WP4

Grid-No.1 Voltage	
Negative peak value	V
Negative bias value	V
Positive bias value 0 max	V
Positive peak value	٧
Heater Voltage 10.8 min-13.2 max	V
Peak Heater-Cathode Voltage	
Heater negative with respect to cathode:	
During equipment warm-up period≤ 15 s 450 max	V
After equipment warm-up period 200 max	V
Heater positive with respect to cathode:	
Combined AC & DC voltage 200 max	V
DC component 100 max	V
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
Voltages are positive with respect to grid No.1	
Anode Voltage	V
Grid-No.4 Voltage 0 to 300	V
Grid-No.2 Voltage	V
Cathode Voltage	V
For visual extinction of focused raster	
Field Strength 0 to 8	G
Of required adjustable centering magnet	
MAXIMUM CIRCUIT VALUE	

Grid-No.I Circuit Resistance . 1.5 max MQ

a Includes implosion protection hardware.

DIMENSIONAL OUTLINE (BULB J71-1/2 BI) Scheen Dasconal 8.28 MAX.-4.57 ±0.16 2.92 ±0.12 -.5I MAX. SCREEN HEIGHT 5.500 MIN. BASE 6.26 ±0.12 -CAVITY CAP JEDEC No. JI-21 1.84 ±0.20 SCREEN WIDTH _ 7.188 MIN. 7.95 TENSION ±0.12 20 27 R. 00 82 REFERENCE LINE. DETERMINED BY GAUGE JEDEC No. G-156 0.787 +.035 -.024 DIA.

DIMENSIONS IN INCHES





92CL-14672

DATA



MONITOR KINESCOPE

ALUMINIZED SCREEN

ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION

1050 A

DATA

Genera	1	
uciici a		

							Thu roc	u	DATA
	sitive with						180	max.	volts change.
During not e	gative with equipment w xceeding 15 quipment wa	arm-up p seconds	erioc					max. max.	volts volts
PEAK HEATER		LTAGE:					2	max.	volts
Positive	bias value.						0	max.	volts
GRID-No.1 V Negative	OLTAGE: bias value.						125	max.	volts
ULTOR VOLTA GRID-No.3 V GRID-No.2 V	DLTAGE					3	0000 3000 410	max.	volts volts volts
Maximum Rat							0000		1.
Pin 1-He Pin 2-G Pin 6-G Pin 10-G Pin 11-C	rid No.1 rid No.3 rid No.2 athode					Cap			
Base Basing De	signation fo	I-Shell pr BOTTO	M VIE	cal W .	• •	• •		• • •	36-63) 120
Cap Bulb Base		Recesse	d Sma	•;	Cavi	ty (JETE	C No	.J84
Weight (App Operating Po Cap	ox.)		•••	· ·	::	:;	• •		. Any
Picture Size	e (Within m	inimum u	seful	SCI	reen	are	a) .	. 8'	' x 6"
Overall Leng Greatest Dia Minimum Use	ameter of Bu	ulb	::	: :	::		16-3	/2" ±	1/16"
Deflection /	Angle (Appro	ox.)							. 50°
Focusing Met Deflection M	hod						.E1	ectros	static
	scence								
Light trar hosphor (For	Curves, see f	ront of th	is Sect	ion)		. P	4—Si		
Taceplate, S	Spherical .	nnrox.)	•••	• •	• •	• •	• • •	Filter	glass 76%
Cathode to	to all othe all other	electro	des.					6 5	μµ.f µµ.f
Direct Inter	electrode C	apacitar	nces:						
Guilent.									
Current									volts .amp

8-57

ELECTRON TUBE DIVISION

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



MONITOR KINESCOPE

Equipment Design Ranges:

105PA

	- 1
For any ultor voltage $(E_{C_{4}})$ between 10000* and 20000 volts and grid-No.2 voltage $(E_{C_{2}})$ between 150 and 410 volts	
Grid-No.3 Voltage for	
focus with ultor current of 100 μa 11.7% to 15.9% of E _c volt Grid-No.1 Voltage for visual extinction of	S
8" x 6" raster	S
Current**	
Grid-No.2 Current	a
Centering Magnet 0 to 8 gausse	S
Examples of Use of Design Ranges:	
For ultor voltage of 12000 14000 volt	S
and grid-No.2 voltage of 200 200 volt	
Grid-No.3 Voltage for focus with ultor	
current of 100 $\mu {\rm a.}$ 1400 to 1900 1640 to 2225 volt Grid-No.1 Voltage for visual extinction of	
8" x 6" raster18 to -48 -18 to -48 volt	S
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max. megohm	S
 Brilliance and definition decrease with decreasing ultor voltage In general, the ultor voltage should not be less than 10,000 volts ** Grid-No.3 current increases as the ultor voltage is decreased. 	:
For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section	

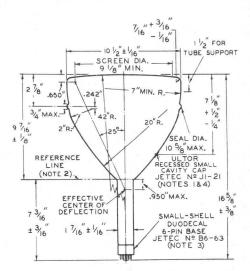
DATA

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

8-57



MONITOR KINESCOPE



92CM - 7729RI

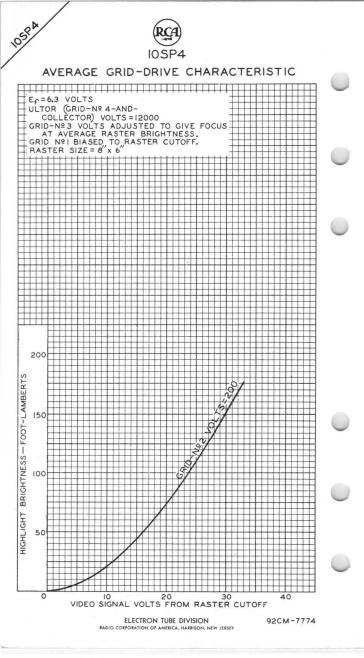
1050

NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY AN ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 10°. ULTOR TERMINAL IS ON SAME SIDE AS PIN 6.

NOTE 2: REFERENCE LINE IS DETERMINED BY POSITION WHERE REFERENCE-LINE GAUGE (JETEC No.112) 1.500" + 0.003" - 0.000" I.D. AND 2" LONG WILL REST ON BULB CONE.

NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING DIAMETER OF 1-7/8".

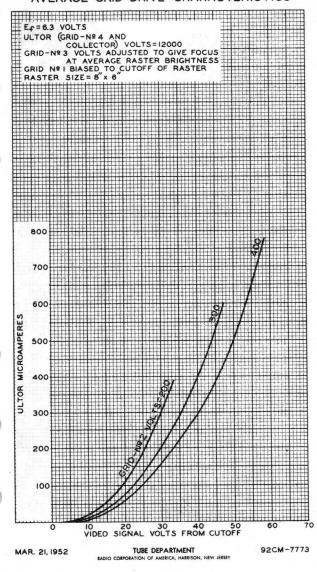
NOTE 4: TUBE SUPPORT MUST BE KEPT AT LEAST 2" AWAY FROM BULB TERMINAL.

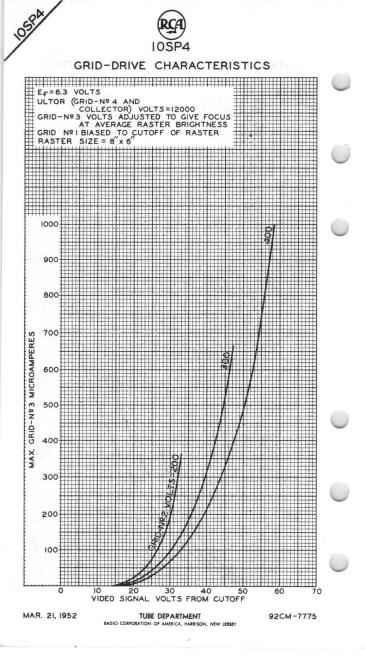




10504

AVERAGE GRID-DRIVE CHARACTERISTICS





11CP4

Picture Tube

	FICIDIE TODE
	PAN-O-PLY TYPE
	IIO ^O MAGNETIC DEFLECTION LOW-VOLTAGE ELECTROSTATIC FOCUS
	Direct Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode 500 min—750 max pF
	Heater Current at 6.3 V
	Heater Warm-Up Time (Average) II s Electron Gun Type Requiring No Ion-Trap Magnet
	OPTICAL
	Phosphor
	Faceplate
	Light transmission at center (approx.)
	MECHANICAL
	Weight (Approx.) 4 1b Overall Length 8.785 ± .250 in 8.785 ± .250 in Neck Length 4.125 ± .125 in 1.125 ± .125 in Projected Area of Screen 60 sq in 60 sq in External Conductive Coating ^a 1.125 ± .125 in 1.125 ± .125 in
	Type (See CRT OUTLINES 1 at front of this section) Regular-Band Contact area for grounding Near Reference Line
	Cap Recessed Small Cavity (JEDEC No.JI-21) Base Small-Button Neoeightar 7-Pin, Arrangement I, (JEDEC No.B7-208)
	TERMINAL DIAGRAM (Bottom View)
	Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating
	MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES
	Voltages are positive with respect to cathode
	Anode Voltage 8000 min—15000 max V Grid-No.4 Voltage
	Positive value
	Negative value 550 max V Grid-No.2 Voltage 200 min-550 max V
	Grid-No.2 Voltage 200 min—550 max V Grid-No.1 Voltage
	Negative peak value 220 max V
	Negative bias value
	Positive bias value
	Heater Voltage 5.7 min-6.9 max V
in organization	

11CP4

Peak Heater-Cathode Voltage Heater negative with respect to cathode: 450 max V During equipment warm-up period≤15 s. . . . After equipment warm-up period 300 max V Heater positive with respect to cathode: Combined AC & DC voltage . . . 200 max V DC component . . . 100 max V TYPICAL OPERATING CONDITIONS FOR GRID-DRIVE SERVICE Voltages are positive with respect to cathode Anode Voltage. . . . 12000 ۷ Grid-No.4 Voltage. . 0 to 400 ۷ Grid-No.2 Voltage. . 400 V Grid-No.1 Voltage. . -39 to -94 V For visual extinction of focused raster MAXIMUM CIRCUIT VALUE Grid-No.I Circuit Resistance . . . 1.5 max MO Includes implosion protection hardware. For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section DIMENSIONAL OUTLINE (BULB J87A) 8.785 SCREEN DIASC 4.125 4.660 ±.125 1.500 ±.125 SCREEN 8.000 HEIGHT ±.125 7.125 MIN CAVITY CAP JEDEC No. JI-21

SCREEN WIDTH SC

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Electronic Components and Devices

11GP4

Picture Tube

FILLED-RIM TYPE INTERMEDIATE-GRID-No.2 VOLTAGE Direct Interelectrode Capacitances Cathode to all other electrodes
Direct Interelectrode Capacitances Cathode to all other electrodes 6 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode ^a . 500 min—750 max pF Heater Current at 6.3 V
Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode ^a .500 min—750 max pF Heater Current at 6.3 V
For curves, see front of this section Faceplate
Faceplate.
MECHANICAL Weight (Approx.)
Weight (Approx.)
Overall Length
Contact area for groundingNear Reference Line Cap
Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 4-Grid No.1 Pin 6-Grid No.1 Pin 7-Cathode
Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.1 Pin 7 - Cathode
No.5, Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES
Voltages are positive with respect to cathode
Anode Voltage. 8000 min—15000 max V Grid-No.4 Voltage 1100 max V Positive value 550 max V Grid-No.2 Voltage. 100 min—250 max V Cathode Voltage 100 min—250 max V Negative peak value. 220 max V Negative bias value. 155 max V Positive bias value. 0 max V Positive peak value. 2 max V
Heater Voltage 5.7 min—6.9 max V

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11GP4

Peak Heater-Cathode Voltage

Heater negative with respect to cathode: During equipment warm-up period ≤ 15 s.				450	max	۷	
After equipment warm-up period	•	•	•	300	max	۷	
Heater positive with respect to cathode: Combined AC & DC voltage DC component							

TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE

Voltages are positive with respect to grid No.1

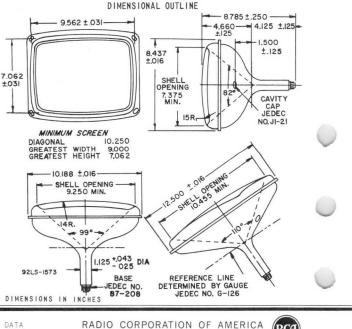
Anode Voltage									· 1	1000	۷
Grid-No.4 Voltage											٧
Grid-No.2 Voltage											٧
Cathode Voltage .									.31	to 49	٧
For visual extir											

MAXIMUM CIRCUIT VALUE

Grid-No.1 Circuit Resistance. 1.5 max MQ

a Includes implosion protection hardware.

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



Harrison, N. J.

Electronic Components and Devices

11HP4A

Picture Tube

1100 14	ANETIA DEE		AN-0-	PLY T		EL FATO	007471	0 5001
110° MA	GNETIC DEF	LECTION		LOW-V	OLIAGE	ELECTR	OSTATI	C FOCI
Catho Grid Exter Heater	Interelect de to all No.1 to all nal conduct Current at Warm-Up Ti	other el other el tive coat 6.3 V.	ectro ectro ing t	odes. odes. o anod	e		5 6 750 0 ± 20	
	marm-up ii on Gun					No lo		Magn
LIGOLIG				TICAL	quinn	ig no ro	in in up	hugin
For	or curves, see	front o	of thi	. P4	tion	fide Typ		
Facepla	te transmiss						.Filt	ergla
Light	transmiss	sion at ce						. 52
	/· ·		MECH	IANICAI	_			
Overall Neck Le Project	(Approx.) Length . ength ed Area of al Conducti	Screen	:::				785 ± 125 ± • 6	
Conta Cap	(See CRT OUTL act area fo	or groun	ding ecess	 ed Sma	 11 Cav	.Near F vity (JE	Referen	ce Li JI-2
Dase .								
				arrand	ement	1. (JEL		87-20
		ERMINAL				I, (JED View)	JEC NO.	B7-20
Pin Pin Pin Pin Pin Caj	 Heater Grid No. Grid No. Grid No. Grid No. Cathode Heater Anode (G No.5, S External Coating 	1 2 4 1 creen, Co Conduc	, Grid ollect tive	RAM (B	ottom G2 G	View) G4 4 23 T 1 H	ANODE	
Pin Pin Pin Pin Pin Caj	L - Heater 2 - Grid No. 3 - Grid No. 5 - Grid No. 6 - Grid No. 7 - Cathode 8 - Heater No.5, S C - External Coating	1 2 4 1 creen, Co Conduc 3 MINIMU	, Grid ollect tive M RAT	RAM (B tor) INGS,	ottom G2 DESIG	View) G4 4 2 	ANODE B B B HR M VALU	
Pin Pin Pin Pin Pin Ca	L - Heater 2 - Grid No. 4 - Grid No. 5 - Grid No. 7 - Cathode 8 - Heater 9 - Anode (G No.5, S 2 - External Coating MAXIMUM ANE Voltages	1 2 4 1 creen, Ci Conduct 3 MINIMU are pos	, Grid ollect tive M RAT	RAM (B tor) INGS,	ottom G2 DESIGN <i>respe</i>	View) G4 4 2 3 1 1 H H H H H H H	ANODE B 8HR M VALU athode	
Pin : Pin : Pin : Pin : Car (Anode Grid-N	L - Heater 2 - Grid No. 3 - Grid No. 4 - Grid No. 5 - Grid No. 5 - Grid No. 6 - Cathode 8 - Heater - Anode (G No.5, S C - External Coating MAXIMUM ANE Voltage. 0.4 Voltag.	1 2 4 1 rid No. 3 ccreen, C Conduct 3 MINIMUI are pos e	, Grid ollect tive M RAT	RAM (B tor) INGS,	ottom G2 DESIGN <i>respe</i>	View) G4 4 2 	ANODE B 8HR M VALU athode	
Pin . Pin ? Pin ? Pin ? Pin ? Cal Cal Cal Grid-N Posi	L - Heater 2 - Grid No. 3 - Grid No. 5 - Grid No. 5 - Grid No. 5 - Cathode 9 - Anode (G No.5, S C - External Coating MAXIMUM ANE Voltages 0.4 Voltag	1 2 4 1 ccreen, Ci Conduc 3 MINIMUI are pos	, Grid ollect tive M RAT <i>itive</i>	RAM (B tor) INGS,	ottom G2 DESIGN <i>respe</i>	View) G4 4 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4	ANODE BHR BHR M VALU athode n 1500	
Pin . Pin ? Pin ? Pin ? Pin ? Cal Cal Cal Cal Cal Cal Cal Cal Cal Cal	L - Heater 2 - Grid No. 3 - Grid No. 4 - Grid No. 5 - Grid No. 5 - Grid No. 5 - Heater 9 - Anode (G No.5, S C - External Coating MAXIMUM ANE Voltages Voltage. 0.4 Voltage tive value	1 2 4 1 1 Creen, Ci Conduc 3 MINIMUI are pos e	, Grid ollect tive M RAT	RAM (B tor) INGS,	ottom G2 DESIGN <i>respe</i>	View) G4 4 2 3 1 1 H H H H H H H H H H H H H	ANODE B B B HR M VALU athode n 1500 00 max	IES
Pin	 I – Heater Grid No. Grid No. Grid No. Grid No. Grid No. Grid No. Cathode Heater Anode (G No.5, S) External Coating KAXIMUM ANC Voltages. Voltage Voltag Voltage Voltage 	1 2 4 1 creen, Ci Conductor MINIMUI are pos e e	, Grid ollect tive M RAT <i>itive</i>	RAM (B tor) INGS,	ottom G2 DESIGN <i>respe</i>	View) G4 4 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4	ANODE B B B HR M VALU athode n 1500 00 max	IES
Pin Pin Pin Pin Pin Cal Grid-N Grid-N Grid-N Grid-N Nega	L - Heater 2 - Grid No. 3 - Grid No. 5 - Grid No. 5 - Grid No. 5 - Grid No. 6 - Anode (G No.5, S C - External Coating MAXIMUM ANE Voltages voltage. 0.4 Voltague tive value tive value tive value tive value 0.1 Voltage	1 2 4 1 creen, Ci Conduc 3 MINIMUI <i>are pos</i> • • • • • • • • • • • • • • • • • • •	, Grid ollect tive M RAT <i>itive</i>	RAM (B tor) INGS,	ottom G2 DESIGN <i>respe</i>	View) G4 4 G4 4 C C C C C C C C C C C C C	ANODE BHR 8HR M VALU athode n 1500 00 max 50 max n 250 20 max	IES
Pin Pin Pin Pin Pin Caj Caj Caj Caj Caj Caj Caj Caj Caj Caj	L - Heater 2 - Grid No. 3 - Grid No. 5 - Grid No. 5 - Grid No. 5 - Cathode 9 - Heater 0 - Anode (G No.5, S 2 - External Coating MAXIMUM ANI Voltages Voltages. 0.4 Voltag tive value 0.2 Voltag 0.1 Voltag 0	1 2 4 1 rid No.3 creen, Cr Conductor 9 MINIMUM are pos • • • • • • • • • • • • •	, Grid ollect tive M RAT <i>itive</i>	RAM (B tor) INGS,	ottom G2 DESIGN <i>respe</i>	View) G4 4 G4 4 C C C C C C C C C C C C C	ANODE B B B B HR M VALU a thode n 1500 00 max n 250 20 max 55 max	IES
Pin Pin Pin Pin Pin Grid-N Grid-N Grid-N Grid-N Nega Rogai Nega Posi	 I - Heater Grid No. Grid No. Grid No. Grid No. Grid No. Cathode Heater Anode (G No.5, S) External Coating Koltages Voltage. Volta	1 2 4 1 Creen, Ci Conductor MINIMUI are pos e e e value. value. value.	, Grid ollect tive M RAT <i>itive</i>	RAM (B tor) INGS,	ottom G2 DESIGN <i>respe</i>	View) G4 4 G4 4 C C C C C C C C C C C C C	ANODE BHR BHR M VALU athode n 1500 00 max 50 max 55 max 0 max	IES
Pin Pin Pin Pin Pin Car Car Car Car Grid–N Grid–N Grid–N Grid–N Nega Nega Nega Posi Posi	L - Heater 2 - Grid No. 3 - Grid No. 5 - Grid No. 5 - Grid No. 5 - Cathode 9 - Heater 0 - Anode (G No.5, S 2 - External Coating MAXIMUM ANI Voltages Voltages. 0.4 Voltag tive value 0.2 Voltag 0.1 Voltag 0	1 2 4 1 creen, C Conduc: 3 MINIMUI are pos e e value value value	, Grid ollect tive M RAT <i>itive</i>	RAM (B tor) INGS,	ottom G2 DESIGN <i>respe</i>	View) G4 4 G4 4 C C C C C C C C C C C C C	ANODE B B B HR M VALU a tho de m 1500 00 max 50 max 20 max 20 max 2 max	E C G G G G G G G G T K M M A X M A M

Electronic Components and Devices Harrison, N. J.

11HP4A

Peak Heater-Cathode Voltage Heater negative with respect to cathode: During equipment warm-up period≤ 15 s . 450 max V After equipment warm-up period . . . 300 max V Heater positive with respect to cathode: Combined AC & DC voltage . . 200 max V DC component . . . 100 max V TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE Voltages are positive with respect to grid No.1 Anode Voltage. . . 11000 ۷ Grid-No.4 Voltage. ۷ Grid-No.2 Voltage. 150 ۷ Cathode Voltage. . 31 to 49 V ×. For visual extinction of focused raster MAXIMUM CIRCUIT VALUE Grid-No.I Circuit Resistance . . . 1.5 max MQ a Includes implosion protection hardware. For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section DIMENSIONAL OUTLINE (BULB J87B) SCREEN OLSONAL 8.785±.250-4.125 +4.660±.125 + ±.125 1.500 ±125 SCREEN 8.052 HEIGHT 7.062 MIN, ±.125 82 4 CAVITY CAP SCREEN WIDTH 9.000 MIN. 9.825±.125 15R 0.950 999 1100

RADIO CORPORATION OF AMERICA Harrison, N. J.

REFERENCE LINE DETERMINED BY GAUGE

JEDEC No. G-126

92CS - 14044

Electronic Components and Devices

DIMENSIONS IN INCHES

1.125 +.043 DIA.

BASE JEDEC No. 87-208

Picture Tube

	PAN-O-PLY TYPE LOW-VOLTAGE ELECT NO ION-TRAP MAGNET REQUIRED IIO ^O MAGNE	ROSTATIC FOCU TIC DEFLECTIO	
	Direct Interelectrode Capacitances Cathode to all other electrodes Grid No.1 to all other electrodes External conductive coating to anode ^a 550 mi Heater Current at 6.3 V	50 ± 20 m II	FAS
	OPTICAL		
	Phosphor	Filterglas	S
	MECHANICAL		
	Overall Length	9.348 ± .250 i 4.375 ± .125 i 74 sq i	n n
	Type (see crt outLINES 1 at front of this section) Contact area for grounding Near Cap	Reference Lin JEDEC No.JI-21 eoeightar7-Pir))
		8H	
	Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.1	- Anode (Grid No.3, Grid No.5, Screen, Collector) - External Conductive Coating	
	MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIM	UM VALUES	
	Grid-No.4 Voltage	in - 15000 max	
	Negative value	100 max 550 max nin - 550 max	A A A
	Negative peak value	220 max 155 max 0 max 2 max	V V V V
n search an than th			/ Berline

RCA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 9-65

12**BNP4A**

Heater Voltage 5.7 Peak Heater-Cathode Voltage	' min - 6.9 max	۷
Heater negative with respect to cathode:		
During equipment warm-up period≤15 sec.	450 max	٧
After equipment warm-up period	300 max	٧
Heater positive with respect to cathode:		
Combined AC & DC voltage	200 max	٧
DC component	100 max	۷

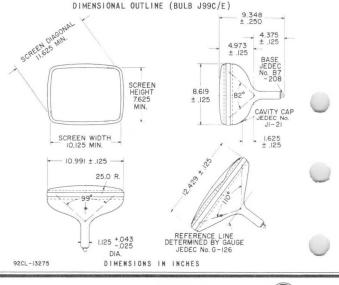
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE

Voltages are positive with respect to grid No.1	
Anode Voltage	٧
Grid-No.4 Voltage ^b	٧
Grid-No.2 Voltage	٧
Cathode Voltage	٧
For visual extinction of focused raster	
Field Strength 0 to 12	G
Of required adjustable centering magnet	

MAXIMUM CIRCUIT VALUE

a Includes implosion protection hardware.

^b The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between 100 and +300 volts with the combined cathode voltage and video-signal voltage adjusted to give an anode current of 75 microamperes on a 6-3/4-inch by 9-inch pattern from an RCA-2F21 monoscope, or equivalent.



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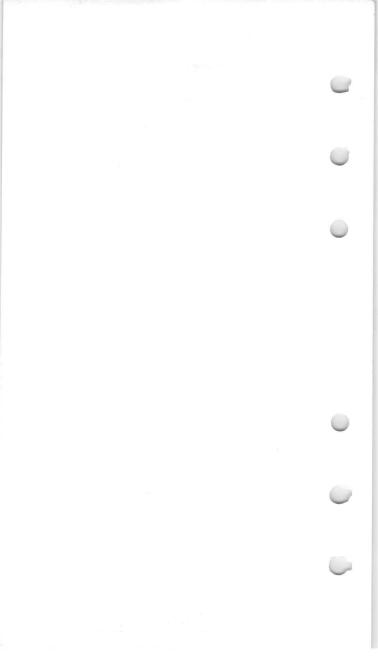
PICTURE TUBE

SHORT RECTANGULAR GLASS TYPE

LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

The 14RP4 is the same as the 14RP4-A except that it utilizes a non-aluminized phosphor.

IN P.P. R



Picture Tube

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN 90° MAGNETIC DEFLECTION LOW-VOLTAGE ELECTROSTATIC FOCUS With Heater Having Controlled Warm-Up Time GENERAL DATA Flectrical: Direct Interelectrode Capacitances: Cathode to all other electrodes . . . of Grid No.1 to all other electrodes . . 6 pf ∫1200 max. pf External conductive coating to anode. . 800 min. pf 600 ± 30 Heater Current at 6.3 volts . ma Heater Warm-Up Time (Average) . . . 11 seconds Electron Gun. Type Requiring No Ion-Trap Magnet Optical: Phosphor (For curves, see front of this section). P4-Sulfide Type, Aluminized Faceplate, Spherical. Filterglass Light transmission (Approx.). . . . 78% Mechanical: Weight (Approx.). 8.5 lbs Overall Length. 13-3/16" ± 5/16" Projected Area of Screen. 104 sa. in. . External Conductive Coating: Type.....Regular-Band Contact area for grounding. Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J112 A/B sheets at front of this section Bases (Alternates): Small-Shell Duodecal 6-Pin (JEDEC Group 4, No.B6-63) Short Small-Shell Duodecal 6-Pin (JEDEC No.B6-203) Basing Designation for BOTTOM VIEW. 121 Pin 1-Heater 6 Cap - Anode ANODE Pin 2 - Grid No.1 (Grid No.3, Pin 6 - Grid No.4 Grid No.5. Pin 10 - Grid No.2 Screen. Collector) Pin 11 - Cathode 10)₆₂ CE Pin 12 - Heater C-External Conductive Coating 1

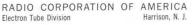


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 4-63

14WP4

Maximum and Minimum Ratings, Design-Maximum Values:								
Unless otherwise specified, voltage val-								
ues are positive with respect to cathode								
ANODE VOLTAGE								
GRID-No. 4 (FOCUSING) VOLTAGE:								
Positive value								
Negative value								
GRID-No. 1 VOLTAGE:								
Negative peak value								
Negative bias value 200 max. volts								
Positive bias value								
HEATER VOLTAGE								
PEAK HEATER-CATHODE VOLTAGE:								
Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. volts After equipment warm-up period 200 max. volts Heater positive with respect to cathode: Combined AC and DC voltage 200 max. volts DC component 100 max. volts								
Typical Operating Conditions for Grid-Drive Service:								
Unless otherwise specified, voltage val- ues are positive with respect to cathode								
Anode Voltage								
Grid-No.4 Voltage								
Grid-No.2 Voltage								
focused raster								
Maximum Circuit Value:								
Grid-No.1-Circuit Resistance 1.5 max. megohms								
a la nori officire destocanes i i i i i i i i i i i i i i i i i i i								
For X-radiation shielding considerations, see sheet								

X-RADIATION SHEEGING CONSIDERATIONS, SEE SHEET X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section





15AEP22

Color Picture Tube

This data sheet is to be used in conjunction with data for RCA-15NP22

For general data, maximum and minimum ratings, equipment design ranges, limiting circuit values, and terminal diagram of the 15AEP22, refer to 15NP22 except as noted below.

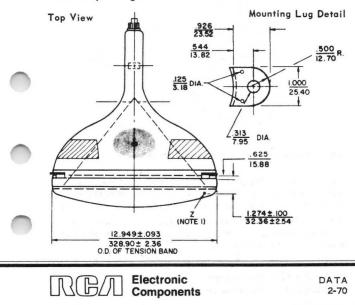
MECHANICAL

Tube Dimensions (excluding mounting lugs):

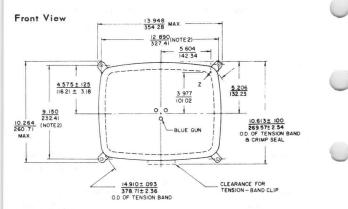
Diagonal	14.910 \pm .093 in (378.21 \pm 2.36 mm)
Greatest width	12.949 ± .093 in (328.90 ± 2.36 mm)
Greatest height (including band clip)	tension- 10.613 ± .100 in (269.57 ± 2.54 mm)
Weight (Approx.)	11.3 lb (5.1 kg)

DIMENSIONAL OUTLINE

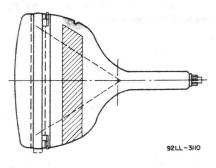
Dimensions shown are only those which are different from the corresponding dimensions for the 15NP22.



DIMENSIONAL OUTLINE (Cont'd)



Front Side View



Dimensions in _____ unless otherwise noted.

Electronic

Components

旧//

Note 1: "Z" is located on the outside surface of the faceplate, on the screen diagonal at a point .094 in (2.39 mm) beyond the minimum screen. This point is used as a reference for the mounting lugs.

Note 2: The tolerance of the mounting lug holes will accommodate mounting screws up to 0.250 in (6.35 mm) in diameter when positioned on the true hole centers.

Picture Tube

PAN-O-PLY - INTEGRAL IMPLOSION PROTECTION

(Provided by Formed Rim and Welded Tension Bands around Periphery of Tube Panel--- No Separate Safety-Glass or Integral Protective Window Required) RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4° MAGNETIC DEFLECTION NO ION-TRAP MAGNET REDUIRED

Electrical:

Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6	pf
Cathode to all other electrodes 5	pf
External conductive coating to anode ^a . 800 min.	pf
2 800 min.	pf
Heater Current at 6.3 volts	ma
Heater Warm-Up Time (Average) 11	seconds

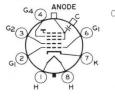
Electron Gun. Type Requiring No Ion-Trap Magnet

Optical:

Mechanical:

Basing Designation for BOTTOM VIEW. 8HR

Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater



Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 4-65

16**BG**P4

Maximum and Minimum Ratings. Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to cathode ∫20000 max. volts Anode Voltage . . . 12000 min. volts Grid-No.4 Voltage: Positive value. . 1100 max. volts . . Negative value. . . 550 max. volts (550 max. volts Grid-No.2 Voltage . . 200 min. volts Grid-No.1 Voltage: 220 max. Negative peak value . . volts Negative bias value . 155 max. volts . . volts Positive bias value . 0 max. 2 max. volts Positive peak value . (6.9 max. volts Heater Voltage. . . . 5.7 min. volts Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period volts not exceeding 15 seconds. . . 450 max. After equipment warm-up period. . . . 300 max. volts Heater positive with respect to cathode: Peak value. . . volts 200 max. DC component. 100 max. volts Typical Operating Conditions for Cathode-Drive Service:

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

Anode Voltage												•	16000	volts	
Grid-No.4 Voltage ^b .						•								volts	
Grid-No.2 Voltage .													300	volts	
Cathode Voltage for of focused raster Field Strength of re													28 to 60	volts	
centering magnet.	•••	•	•	•	•	•	•	•	•	•	•		0 to 8	gauss	

Maximum Circuit Values:

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

a Includes implosion protection hardware.

b The grid-No.4 voltage required for optimum focus of any individual tube will have avalue anywhere between -100 and +300 volts with the combined cathode voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 9-inch by 12-inch pattern from an RCA-2F21 monoscope, or equivalent.

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



Picture Tube

-	
	PAN-O-PLY TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGNETIC DEFLECTION LOW GRID-No.2 VOLTAGE
)	Direct Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode ^a .1000 min—1500 max pF Heater Current at 6.3 V
	OPTICAL
5	Phosphor
	Light transmission at center (Approx.)54%
	MECHANICAL
	Weight (Approx.). 9.5 lb Overall Length. 10.569 ± .242 in Neck Length 4.375 ± .125 in Projected Area of Screen. 1.25 sq in External Conductive Coating 1.25 sq in
	Type (see CRT OUTLINES 1 at front of this section)Regular-Band Contact area for grounding Near Reference Line Cap
	TERMINAL DIAGRAM (Bottom View)
	Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES
9	Voltages are positive with respect to grid No.1
	Anode Voltage
	Positive value I250 max V Negative value 400 max V Cathode Voltage
	Negative peak value2 maxVNegative bias value0 maxVPositive bias value100 maxVPositive peak value150 maxV

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 7-67

16CHP4A

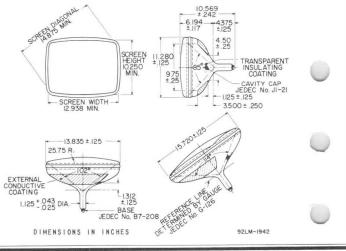
Grid-No.2 Voltage	V V	
Peak Heater-Cathode Voltage		6
Heater negative with respect to cathode:		6
During equipment warm-up period≤15 s 450 max	V	-
After equipment warm-up period 300 max	٧	
Heater positive with respect to cathode:		
Combined AC & DC voltage	V	
DC component	v	
	,	
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE		1
Voltages are positive with respect to grid No.1		
Anode Voltage	V	-
Grid-No.4 Voltage ^b 100	v	
	V	
Grid-No.2 Voltage	V	
Cathode Voltage	V	
For visual extinction of focused raster		
Field Strength 0 to 8	G	
Of required adjustable centering magnet		6
MAXIMUM CIRCUIT VALUE		-
	110	
Grid-No. Circuit Resistance	MΩ	

a Includes implosion protection hardware.

b The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between -100 and +300 volts with the combined cathode voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 9-inch by 12-inch pattern from an RCA-2F21 monoscope, or equivalent.

See X-RADIATION PRECAUTIONS at front of this section

DIMENSIONAL OUTLINE (BULB J125 B2A)



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



Dicture Tube

Picture Tube
PAN-O-PLY TYPE II4° MAGNETIC DEFLECTION
ELECTRICAL
Direct Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode. 1000 min—1500 max pF Heater Current at 6.3 V
Phosphor
Faceplate
MECHANICAL
<pre>Weight (Approx.)</pre>
TERMINAL DIAGRAM (Bottom View)
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater H 8HR H Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES

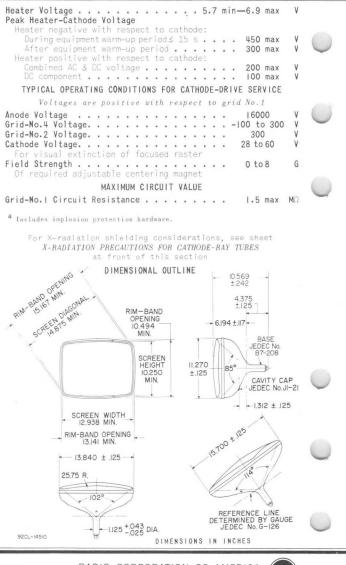
Voltages are positive with respect to cathode

Anode Voltage							10000	min-	-18000 max	١
Grid-No.4 Voltage										
Positive value.								1100	max	
Negative value.			 					550	max	
Grid-No.2 Voltage								min-	-550 max	
Grid-No. Voltage										
Negative peak va	al u	е.			2			220	max	
Negative bias va	lu	е.						155	max	
Positive bias va								0	max	
Positive peak va	al m	0						2	max	

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

DATA 12-66

16CMP4A



DATA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

10-65

Harrison, N. J.

Picture Tube

N	AGNETIC FOCUS	NO ION-TRAP M		RED MAGNETIC DE	FLECTION
		ELEC	TRICAL		
Г	irect Interelect				
U	Cathode to all Grid No.1 to al External conduc	other electro 1 other elect	des rodes	5 6 ∫2000	
	eater Current at lectron Gun	6.3 V	* * * * *		30 mA
		OPT	ICAL		
P	hosphor For curves, see	front of thi	. P4—Sulf s section	ide Type, Al	uminized
F	aceplate Light Transmiss	ion (Approx.)		Fil	terglass 66%
			ANICAL		
а.					10.11
C N F	eight (Approx.) verall Length . eck Length rojected Area of xternal Conducti		· · · · ·	. 7.500 \pm	0.375 in
	Type Contact area fo or Additional In	r grounding . formation on	 Coatings an	Near Refere d Dimensions	nce-Line
	See Picture-Tube at front of thi	s section			
E	ap Small- Basing Designatio	Shell Duodeca	15-Pin (JED	EC Group 4, N	o.B5-57)
	Pin 1-Heater Pin 2-Grid No Pin 10-Grid No Pin 11-Cathode Pin 12-Heater Cap-Anode (Screen Collec C-Externa Conduc	.2 Grid No.3, , tor)			G2
		MINIMUM RATI			IES
	Unless	otherwise spe positive with	, cified, vol	tage values	125
)	Anode Voltage Grid-No.2 Voltage Grid-No.1 Voltage			17500	max V max V
	Negative bias Positive bias Positive bias	alue		0	max V max V max V
				a company and the second	
(ORPORATION			DATA

Electronic Components and Devices

16RP4B

Heater Voltage	V V	0
exceeding 15 seconds	٧	
After equipment warm-up period	۷	
Combined AC and DC voltage	٧	
DC component	۷	1
TYPICAL OPERATING CONDITIONS FOR GRID-DRIVE SERVICE Unless otherwise specified, voltage values are positive with respect to cathode		
Anode Voltage	٧	
Grid-No.2 Voltage	٧	
Grid-No. Voltage	٧	
For visual extinction of focused raster		
MAXIMUM CIRCUIT VALUE		$\mathbf{\mathbf{\nabla}}$
Grid-No.1-Circuit Resistance	MΩ	

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



Picture Tube

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 90° MAGNETIC DEFLECTION
GENERAL DATA
Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf External conductive coating to anode {1500 max. pf {1000 min. pf Heater Current at 6.3 volts 600 ± 30 ma Electron Gun Type Requiring No Ion-Trap Magnet
Optical:
Phosphor (For Curves, see front of this Section)P4—Sulfide Type, Aluminized Faceplate, Spherical
Mechanical:
Weight (Approx.)
Basing Designation for BOTTOM VIEW
Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.2 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater G(Grid No.3, Grid No.5, Screen, Collector) C-External Conductive Conductive Conductive



- Indicates a change.

DATA 4-63

17BJP4

	Maximum and Minimum Dational Dation (17. 17. 17. 17. 17. 17. 17. 17. 17. 17.	
+	Maximum and Minimum Ratings, Design-Maximum Values:	
	Unless otherwise specified, voltage values are positive with respect to cathode	
	(17500 max wolts	
	ANODE VOLTAGE	
	GRID-No.4 (FOCUSING) VOLTAGE:	
	Positive value	
	Negative value	
	GRID-No.2 VOLTAGE	
	GRID-No.1 VOLTAGE: Negative peak value	
	Negative peak value	
	Positive bias value 0 max. volts	
	Positive peak value	
	HEATER VOLTAGE	
	(J.7 mm. Vorca	
	PEAK HEATER-CATHODE VOLTAGE:	
	Heater negative with respect to cathode:	$\mathbf{}$
	During equipment warm-up period	
	not exceeding 15 seconds 450 max. volts	
	After equipment warm-up period 200 max. volts	
	Heater positive with	
	respect to cathode:	
	Combined AC and DC voltage 200 max. volts	
	DC component 100 max. volts	
	Typical Operating Conditions for Grid-Drive Service:	
	Unless otherwise specified, voltage values	
	are positive with respect to cathode	
	Anode Voltage	
	Grid-No.4 Voltage	
	Grid-No.2 Voltage	
	visual extinction of	
	focused raster	
	N	
	Maximum Circuit Value:	<u> </u>
	Grid-No.1-Circuit Resistance 1.5 max. megohms	
	For X-radiation shielding considerations, see sheet	
	X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section	
	at front of this section	





Picture Tube

NO ION-TRAP MAGNET REQUIRED ALUMINIZED SCREEN RECTANGULAR GLASS TYPE 70° MAGNETIC DEFLECTION MAGNETIC FOCUS

Electrical:

Direct Interelectrode Capacitances: Cathode to all other electrodes 5 Grid No.1 to all other electrodes 6	pf pf
External conductive coating to anode {1500 max. 750 min.	pf pf
Heater Current at 6.3 volts	ma
No Ion-Trap Mag	gnet

Optical:

Phosphor	(For	Curves,	see	fr	ont	of	t٢	is	Se	ect	io	n)	P4	1—	-SI	J)	fi	de Ty	/pe,
																1	Α1	umin	ized
Faceplate	, Sp	herica														F	i 1	terg	ass
Light t	rans	mission	n (A	nn	ro	(.)													74%

Mechanical:

Weight (Approx.).												18 lbs
Overall Length												19-3/16" ± 3/8"
Neck Length					•					•	•	7-1/2" ± 3/16"
Projected Area of								·				149 sq. in.
External Conducti	ve	C	bat	tir	٦g	:						

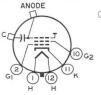
. . .Regular-Band Type.....Regular-Band Contact area for grounding.....Near Reference Line For Additional Information on Coatings and Dimensions:

See Picture-Tube Dimensional-Outlines and Bulb J133B/D sheets at front of this section

No. B5-57)

Basing Designation for BOTTOM VIEW.

Pin 1-Heater Pin 2-Grid No.1 Pin 10-Grid No.2 Pin 11 - Cathode Pin 12 - Heater



Cap - Anode (Grid No.3, Screen. Collector) C-External Conductive Coating



RADIO CORPORATION OF AMERICA Electronic Components and Devices

Harrison, N. J.

DATA 3-64

17BP4D

Maximum and Minimum Ratings, Design-Maximum Va.	lues:
Unless otherwise specified, voltage	val-
ues are positive with respect to ca	thode
	0 max. volts 0 max. volts
Negative peak value 220 Negative bias value 155 Positive bias value 200 Positive peak value 200	0 max. volts 5 max. volts 0 max. volts 2 max. volts
	9 max. volts 7 min. volts
	0 max. volts
Heater positive with respect to cathode: Combined AC and DC voltage 165	5 max. volts 5 max. volts 0 max. volts
Typical Operating Conditions for Grid-Drive Ser	rvice:
Unless otherwise specified, voltage ues are positive with respect to cat	
Anode Voltage	
Grid-No.1 Voltage for visual extinction of focused raster28 to	-72 volts
Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5	ō max. megohms
For X-radiation shielding considerations,	see sheet

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



RCA 17CF P4

PICTURE TUBE

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION DATA General: Heater. for Unipotential Cathode: volts Voltage (AC or DC) 6.3 Current. 0.6 ± 10% amp Direct Interelectrode Capacitances: Grid No.1 to all other electrodes. . 6 μµf 5 Cathode to all other electrodes. . . μµf 1500 max. μµf External conductive coating to ultor 1200 min. μµf .Filterglass Faceplate. Spherical . 79% Light transmission (Approx.) Phosphor (For curves, see front of this Section) . P4--Sulfide Type Aluminized FluorescenceWhite . .White Phosphorescence. . Medium-Short Persistence. . .Electrostatic Focusing Method. . Magnetic Deflection Method. . Deflection Angles (Approx.): 900 Diagonal . . 850 Horizontal 680 Vertical . . .Type Requiring No Ion-Trap Magnet Electron Gun . . . Tube Dimensions: Overall length 15" ± 3/8" 15-5/8" ± 1/8" Greatest width . . 12-3/4" ± 1/8" Greatest height. . 16-9/16" ± 1/8" Diagonal . . . Neck length. . . 5-1/2" ± 3/16" Radius of curvature of faceplate (External surface) 20-3/4" Screen Dimensions (Minimum): Greatest width . . . 14-3/4" Greatest height. 11-11/16" 15-3/4" Diagonal . . . 155 sq. in. Projected area . . . 10 lbs Weight (Approx.) Operating Position .Any .Recessed Small Cavity (JEDEC No. J1-21) Cap. J132-1/2 C1/D1 Bulb Short Small-Shell Duodecal 6-Pin Base . (JEDEC Group 4, No. B6-203) Pin 1-Heater Cap-Ultor (Grid No.3. Pin 2-Grid No.1 Grid No.5. Pin 6-Grid No.4 Pin 10-Grid No.2 Collector) Pin 11-Cathode C-External Pin 12-Heater Conductive Coating

10-59

ELECTRON TUBE DIVISION

DATA 1

11CAP B



PICTURE TUBE

GRID-DRIVE SERVICE

GRID-DRIVE SERVICE	
Unless otherwise specified, voltage valu	
are positive with respect to cathod	1 e
Maximum and Minimum Ratings, Design-Center Values:	
	max. volts min. volts
GRID-No.4 (FOCUSING) VOLTAGE:	
Positive value 1000	max. volts
	max. volts
GRID-No.2 VOLTAGE	max. volts
	max. volts
	max. volts
	max. volts
Positive-peak value	max. volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode:	
During equipment warm-up period not	
	max. volts
	max. volts max. volts
Heater positive with respect to cathode. 180	max. volts
Equipment Design Ranges:	
With any ultor voltage $(E_{C_2}k)$ between 12000^{\oplus} and and $grid_N_0 = 0$ voltage $(E_{C_2}k)$ between 2000^{\oplus} and	16000 volts
and grid-No.2 voltage ($\tilde{E}c_2k$) between 200 and Grid-No.4 Voltage for	500 volts
and grid-No.2 voltage $(\tilde{E}c_2k)$ between 200 and Grid-No.4 Voltage for focus§50 to +350 Grid-No.1 Voltage for visual extinction of	500 volts volts
and grid-No.2 voltage $(\tilde{E}c_2k)$ between 200 and Grid-No.4 Voltage for focus§50 to +350 Grid-No.1 Voltage for visual extinction of focused raster See Raster-Cutoff-	500 volts volts Range Chart
and grid-No.2 voltage $(\tilde{B}c_2k)$ between 200 and Grid-No.4 Voltage for focus§50 to +350 Grid-No.1 Voltage for visual extinction of focused raster	500 volts volts Range Chart
and grid-No.2 voltage $(\tilde{E}c_2k)$ between 200 and Grid-No.4 Voltage for focus§50 to +350 Grid-No.1 Voltage for visual extinction of focused raster See Raster-Cutoff- for Grid-Dr Grid-No.1 Video Drive	500 volts volts Range Chart
and grid-No.2 voltage $(\tilde{E}c_2k)$ between 200 and Grid-No.4 Voltage for focus§	500 volts volts Range Chart
and grid-No.2 voltage $(\tilde{E}c_2k)$ between 200 and Grid-No.4 Voltage for focus§50 to +350 Grid-No.1 Voltage for visual extinction of focused raster See Raster-Cutoff- for Grid-Dr Grid-No.1 Video Drive From Raster Cutoff (Black level).	500 volts volts Range Chart
and grid-No.2 voltage $(\tilde{E}c_2k)$ between 200 and Grid-No.4 Voltage for focus§50 to +350 Grid-No.1 Voltage for visual extinction of focused raster	500 volts volts Range Chart ive Service ermined for
and grid-No.2 voltage $(\tilde{E}c_2k)$ between 200 and Grid-No.4 Voltage for focus§50 to +350 Grid-No.1 Voltage for visual extinction of focused raster	500 volts volts Range Chart ive Service ermined for drive is a
and grid-No.2 voltage $(\tilde{E}c_2k)$ between 200 and Grid-No.4 Voltage for focus§50 to +350 Grid-No.1 Voltage for visual extinction of focused rasterSee Raster-Cutoff- for Grid-Dr Grid-No.1 Video Drive From Raster Cutoff (Black level): White-level value (Peak positive)Same value as det Ec_{1k} except video posit	500 volts volts Range Chart ive Service ermined for drive is a ive voltage
and grid-No.2 voltage $(\tilde{E}c_2k)$ between 200 and Grid-No.4 Voltage for focus§50 to +350 Grid-No.1 Voltage for visual extinction of focused raster	500 volts volts Range Chart ive Service ermined for drive is a ive voltage μa
and grid-No.2 voltage $(\tilde{E}c_2k)$ between 200 and Grid-No.4 Voltage for focus§50 to +350 Grid-No.1 Voltage for visual extinction of focused raster	500 volts volts Range Chart ive Service ermined for drive is a ive voltage
and grid-No.2 voltage $(\tilde{E}c_2k)$ between 200 and Grid-No.4 Voltage for focus§50 to +350 Grid-No.1 Voltage for visual extinction of focused raster	500 volts volts Range Chart ive Service ermined for drive is a ive voltage μa
and grid-No.2 voltage $(\tilde{E}c_2k)$ between 200 and Grid-No.4 Voltage for focus§50 to +350 Grid-No.1 Voltage for visual extinction of focused raster	500 volts volts Range Chart ive Service drive is a ive voltage µa µa
and grid-No.2 voltage $(\tilde{E}c_2k)$ between 200 and Grid-No.4 Voltage for focus§50 to +350 Grid-No.1 Voltage for visual extinction of focused raster	500 volts volts Range Chart ive Service ermined for drive is a ive voltage μa gausses
and grid-No.2 voltage $(\tilde{E}c_2k)$ between 200 and Grid-No.4 Voltage for focus§50 to +350 Grid-No.1 Voltage for visual extinction of focused raster	500 volts volts Range Chart ive Service drive is a ive voltage μα gausses volts
and grid-No.2 voltage $(\tilde{E}c_2k)$ between 200 and Grid-No.4 Voltage for focus§50 to +350 Grid-No.1 Voltage for visual extinction of focused raster See Raster-Cutoff- for Grid-Dr Grid-No.1 Video Drive From Raster Cutoff (Black level): White-level value (Peak positive) Same value as det Ec_1k except video posit Grid-No.4 Current25 to +25 Grid-No.2 Current15 to +15 Field Strength of Adjust- able Centering Magnet* 0 to 8 Examples of Use of Design Ranges:	500 volts volts Range Chart ive Service ermined for drive is a ive voltage μa gausses
and grid-No.2 voltage $(\tilde{E}_{2}k)$ between 200 and Grid-No.4 Voltage for focus§	500 volts volts Range Chart ive Service drive is a ive voltage μα gausses volts
and grid-No.2 voltage (\tilde{E}_{2k}) between 200 and Grid-No.4 Voltage for focus§	500 volts volts Range Chart ive Service ermined for drive is a ive voltage μa gausses volts volts

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ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY DATA 1



PICTURE TUBE

	1 Video I f (Black	level)				2		70		
	-level va			•••	•••	• 20	s to	72		volt
	Circuit									1.4.1
Grid-No	1-Circui	t Resi:	stance		• •	• •	. 1	•5 m	ax. n	negohr
					-					
			THODE-							
	Unless o are pos									
Maximum	and Mini						1000			
					gn-	cent				1.
ULIOR-I	D-GRID-No	.1 VOL	TAGE .	• •	• •	• •		6000 2000 [⊕]	max.	volt volt
CDID No	4-TO-GRII	D No 1	VOLTA	CE.			(1	2000*	min.	VOL
	ive value							1000	max.	vol
	ive value				• •	• •	•	500	max.	vol
	2-T0-GR1					• •	•	640	max.	vol
	2-TO-CAT							500	max.	vol
	-TO-GRID-I							000	marre	
	ive-peak							200	max.	volt
Posit	ive-bias	value.						140	max.	volt
Negat	ive-bias	value.						0	max.	volt
	ive-peak						. I.	2	max.	volt
	ATER-CATH									
Heate	r negativ	e with	respe	ct to	o ca	thod	e:			
	ing equip									
r	ot exceed	ing 15	secon	ds .		~ 10		410	max.	vol
	er equipm						•	180	max.	volt
Heate	r positiv	e with	respe	ct to	o ca	thod	e.	180	max.	vol
1270 7251	nt Design	-								
h	ith any u	ltor-to	o-grid	-No.	1 00	ltag	e (E	c . g .)	betwe	een
1	2000° an	d 1600	00 00	lts	and	gr1	d - N d	0.2-t	0-911	d -
٨	0.1 volt	age (E	(c 281)	bet	wee	n 22	o a	nd 64	o vol	ts
Grid-No	4-to-Gri	d-No.1								
Volta	ge for fo	cus§ .				. 0	to	400		vol
	-to-Grid-									
Volta	ge (Ekg ₁) L extinct	for								
					_				1.000	
of fo	cused ras	ter	• • •	• •				utoff		
						for	Cath	ode-D	rive :	ie rvi o
	-to-Grid-									
Video	(BIACK	luc	•							
Video Cutof					Sam	0 1/2	1.00	as de	tormin	and fo
Video Cutof White					Jaill	c va	ant	us de	o deix	ieu it
Video Cutof White	negative)			Fí.	ex				le is
Video Cutof White)			Ekg	1 ex	cept	nega	tive v	/e is /oltad
Video Cutof White (Peak					Ekg	-		nega +25	tive	/e is /oltag

10-59

DATA 2

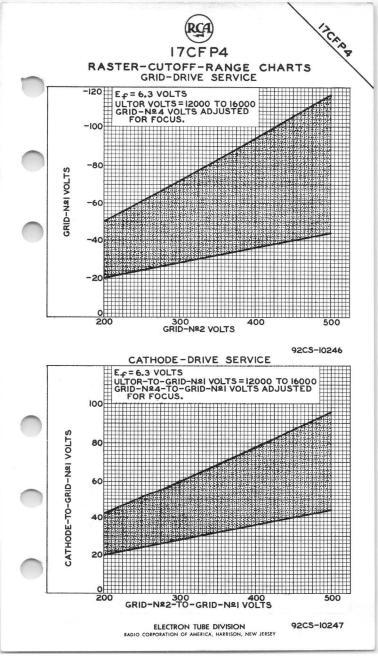
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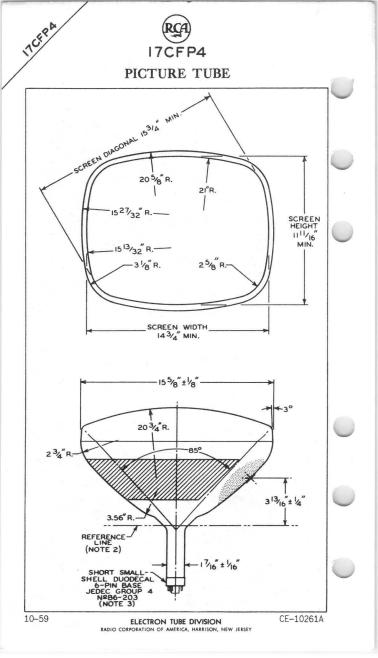
17CFP4

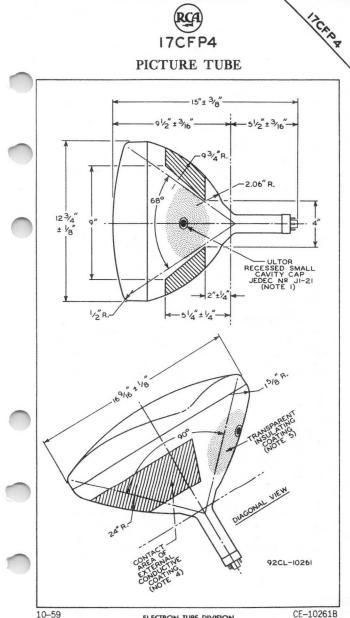
PICTURE TUBE

Grid-No.2 Current		
ield Strength of Adjust-	-15 to +15	μa
able Centering Magnet*	0 to 8	gausses
xamples of Use of Design Ranges:		
With ultor-to-grid-		
No.1 voltage of	16000	volts
No.1 voltage of	300	volts
Voltage for focus	0 to 400	volts
Cathode-to-Grid No.1 Voltage for visual extinction of focused		
raster	28 to 60	volts
Cathode-to-Grid-No.1 Video Drive from Raster		
Cutoff (Black level): White-level value	-28 to -60	volts
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	•••• 1.5 ma	x. megohms
Grid drive is the operating condition in the grid-No.1 potential with respect to	which the video s cathode.	signal varies
¹ This value is a working design-center mi minimum ultor- or ultor-to-grid-No.1 vi which the serviceability of the 17CFP4 w designer has the responsibility of detei such that under the worst probable op supply-voltage variation and equipment v ultor- or ultor-to-grid-No.1 voltage is	nimum. The equival oltage is 10,800 ill be impaired. 1 mining a minimum erating condition variation the abso	lent absolute volts, below the equipment design value is involving tute minimum
	nevel less than	10,800 volts.
The grid-No.1 voltage or grid-No.4-to-g focus of any individual tube is indepen remain essentially constant for values of grid-No.1 voltage) or grid-No.2 voltag voltage) within design ranges shown for	rid-No.1 voltage dent of ultor curr of ultor voltage (e (or grid-No.2-1 these items.	10,800 volts. required for ent and will or ultor-to- to-grid-No.1
⁷ The grid-No.4 voltage or grid-No.4-to-g focus of any individual tube is indepent remain essentially constant for values of grid-No.1 voltage) or grid-No.2 voltag voltage) within design ranges shown for Distance from Reference Line for suitab not exceed 2-1/2". Excluding extraneou undeflected focused spot will fall with radius concentric with the center of the that the earth's magnetic field can caus tion of the spot from the center of the	rid-No.1 voltage jent of ultor curr of ultor voltage (e (or grid-No.2-1 these items. le PM centering m us fields, the ce in a circle having tube face. It is se as much as 1/2- tube face.	required for ent and will or ultor-to- to-grid-No.1 agnet should inter of the a 5/16-inch s to be noted inch deflec-
⁷ The grid-No.4 voltage or grid-No.4-to-g focus of any individual tube is indepent remain essentially constant for values o grid-No.1 voltage) or grid-No.2 voltag voltage) within design ranges shown for Distance from <i>Reference Line</i> for suitab not exceed 2-1/2". Excluding extraneou undeflected focused spot will fall with radius concentric with the center of the	rid-No.1 voltage jent of ultor curr of ultor voltage (e (or grid-No.2-1 these items. le PM centering m us fields, the ce in a circle having tube face. It is se as much as 1/2- tube face.	required for ent and will or ultor-to- to-grid-No.1 agnet should inter of the a 5/16-inch s to be noted inch deflec-
<pre>/ The grid-No.4 voltage or grid-No.4-to-g focus of any individual tube is indepent remain essentially constant for values of grid-No.1 voltage) or grid-No.2 voltag voltage) within design ranges shown for Distance from Reference Line for suitab not exceed 2-1/2*. Excluding extraneou undeflected focused spot will fall with radius concentric with the center of the that the earth's magnetic field can caus tion of the spot from the center of the Cathode drive is the operating conditi varies the cathode potential with respe electrodes.</pre>	rid-No.1 voltage jent of ultor curry of ultor voltage (e (or grid-No.2-) these items. le PM centering m ys fields, the ce in a circle having tube face. It is e as much as 1/2- tube face. on in which the v ct to grid No.1 a	required for ent and will or ultor-to- to-grid-No.1 agnet Should enter of the a 5/16-inch to be noted inch deflec- video signal nd the other
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f the grid-No.4 voltage or grid-No.4-tog focus of any individual tube is indepent remain essentially constant for values of grid-No.1 voltage) or grid-No.2 voltag voltage) within design ranges shown for Distance from Reference Line for suitab not exceed 2-1/2*. Excluding extraneo- undeflected focused spot will fall with radius concentric with the center of the that the earth's magnetic field can caus tion of the spot from the center of the Cathode drive is the operating conditi varies the cathode potential with respe electrodes. For X-ray shielding consider X-RAY PRECAUTIONS FOR CAN	rid-No.1 voltage jent of ultor curry of ultor voltage (e (or grid-No.2-1 these items. le PM centering m us fields, the ce in a circle having tube face. It is se as much as 1/2- tube face. on in which the v ct to grid No.1 a pations, see she PHODE-RAY TUBES	required for ent and will or ultor-to- to-grid-No.1 agnet Should enter of the a 5/16-inch to be noted inch deflec- video signal nd the other
f the grid-No.4 voltage or grid-No.4-tog focus of any individual tube is indepent remain essentially constant for values of grid-No.1 voltage) or grid-No.2 voltag voltage) within design ranges shown for Distance from Reference Line for suitab not exceed 2-1/2*. Excluding extraneo- undeflected focused spot will fall with radius concentric with the center of the that the earth's magnetic field can caus tion of the spot from the center of the Cathode drive is the operating conditi varies the cathode potential with respe electrodes. For X-ray shielding consider X-RAY PRECAUTIONS FOR CAN	rid-No.1 voltage jent of ultor curry of ultor voltage (e (or grid-No.2-1 these items. le PM centering m us fields, the ce in a circle having tube face. It is se as much as 1/2- tube face. on in which the v ct to grid No.1 a pations, see she PHODE-RAY TUBES	required for ent and will or ultor-to- to-grid-No.1 agnet Should enter of the a 5/16-inch to be noted inch deflec- video signal nd the other
f the grid-No.4 voltage or grid-No.4-tog focus of any individual tube is indepent remain essentially constant for values of grid-No.1 voltage) or grid-No.2 voltag voltage) within design ranges shown for Distance from Reference Line for suitab not exceed 2-1/2*. Excluding extraneo- undeflected focused spot will fall with radius concentric with the center of the that the earth's magnetic field can caus tion of the spot from the center of the Cathode drive is the operating conditi varies the cathode potential with respe electrodes. For X-ray shielding consider X-RAY PRECAUTIONS FOR CAN	rid-No.1 voltage jent of ultor curry of ultor voltage (e (or grid-No.2-1 these items. le PM centering m us fields, the ce in a circle having tube face. It is se as much as 1/2- tube face. on in which the v ct to grid No.1 a pations, see she PHODE-RAY TUBES	required for ent and will or ultor-to- to-grid-No.1 agnet Should enter of the a 5/16-inch to be noted inch deflec- video signal nd the other

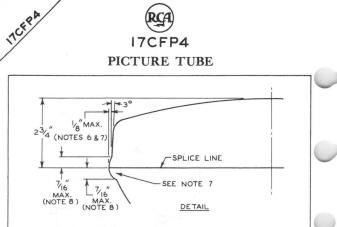
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ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm~30^{\circ}$. ULTOR TERMINAL IS ON SAME SIDE AS PIN 6.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC NO.G-II6 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNT-ED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. THE DESIGN OF THE SOCKET SHOULD BE SUCH THAT THE CIRCUITRY CANNOT IMPRESS LATERAL STRAINS THROUGH THE SOCKET CONTACTS ON THE BASE PINS. BOTTOM CIRCUMFERENCE OF BASE WAFER WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

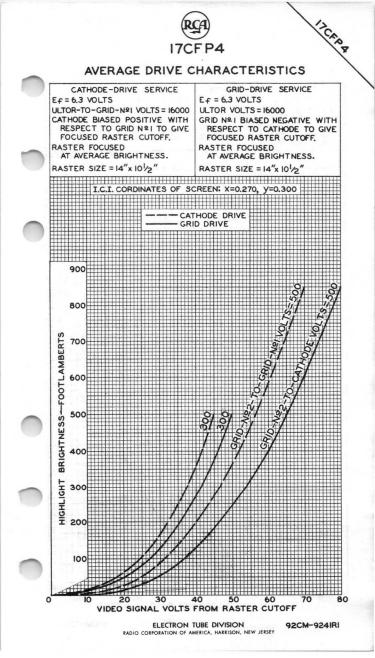
NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

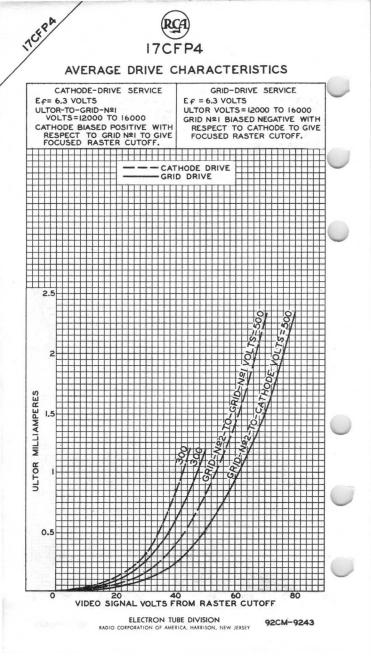
NOTE 5: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.

NOTE 6: MEASURED $2-9/32" \pm 1/32"$ FROM THE PLANE TANGENT TO THE SURFACE OF THE FACEPLATE AT THE TUBE AXIS.

NOTE 7: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE IN-DICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/4", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/8" BE-YOND THE ENVELOPE SURFACE AT THE LOCATION SPECIFIED FOR DIMENSIONING THE ENVELOPE WIDTH, DIAGONAL, AND HEIGHT.

NOTE 8: THE TUBE SHOULD BE SUPPORTED ON BOTH SIDES OF THE BULGE. THE MECHANISM USED SHOULD PROVIDE CLEARANCE FOR THE MAXIMUM DIMENSIONS OF THE BULGE.





17DQP4

Picture Tube

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 110° MAGNETIC DEFLECTION CATHODE-DRIVE TYPE LOW GRID-No.2 VOLTAGE

With Heater Having Controlled Warm-Up Time

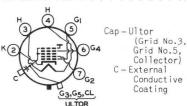
GENERAL DATA

Electrical:

Heater Current at 6.3 volts	450 ± 5% ma
Heater Warm-Up Time (Average)	11 seconds
Direct Interelectrode Capacitances:	
Grid No.1 to all other electrodes	6 <i>μμ</i> f
Cathode to all other electrodes	5 μμf
External conductive coating to ultor . $\Big\{$	1700 max. μμf
Electron Gun	No Ion-Trap Magnet
Optical:	
Faceplate	Filterglass
Phosphor (For Curves, see front of this Section)	Aluminized
	ATUIITITZEG
Mechanical:	
Operating Position	
Weight (Åpprox.)	10 lbs
Overall Length	12-1/8" + 1/4"
Neck Length	
Projected Area of Screen	
External Conductive Coating:	
Туре	Regular Band
Contact area for grounding	Near Reference Line
For Additional Information on Coatings and	Dimensions:

See Picture-Tube Dimensional-Outlines and Bulb J132-1/2 A/B sheets at the front of this section







RADIO CORPORATION OF AMERICA **Electron Tube Division** Harrison, N. J.

DATA 3-62

17DQP4

Maximum Ratings, Design-Maximum Values:		
ULTOR-TO-GRID-No.1 VOLTAGE 17600 max. GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:	volts	
Positive value	volts	
Negative value. 550 max. GRID_No.2-TO_GRID_No.1 VOLTAGE. 70 max.	volts volts	
GRID-No.2-TO-GRID-No.1 VOLTAGE 70 max. CATHODE-TO-GRID-No.1 VOLTAGE:	VOILS	
Positive bias value	volts	
Negative peak value	volts	
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with		
respect to cathode: During equipment warm-up period		
not exceeding 15 seconds 450 max.	volts	
After equipment warm-up period 200 max.	volts	
Heater positive with		
respect to cathode 200 max.	volts	
Typical Operating Conditions:		-
With ultor-to-grid-No.1 voltage of 14500	volts	
and grid-No.2-to-grid-No.1 voltage of 50	volts	
Grid-No.4-to-Grid-No.1 Voltage		
for focus	volts	
Cathode-to-Grid-No.1 Voltage for	volts	
visual extinction of focused raster . 31 to 49	VUILS	
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance 1.5 max.	megohms	

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

Picture Tube

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IIO^O MAGNETIC DEFLECTION INTERNAL MAGNETIC SHIELD

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Direct Interelectrode Capacitances: Cathode to all other electrodes 3.65 pf Grid No.1 to all other electrodes 4.15 pf External conductive coating to anode . Heater Current at 2.68 volts Heater Warm-Up Time (Average) Electron Gun
Optical: Phosphor (For curves, see front of this Section)P4—Sulfide Type,
Aluminized Faceplate, Spherical
Mechanical:
Weight (Approx.) 10 lbs Overall Length 10-13/16" ± 3/16" Neck Length 3-11/16" ± 1/16" Projected Area of Screen 3-11/16" ± 1/16" External Conductive Coating: 155 sq. in. Type 155 sq. in. For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J132-1/2 A/B sheets at front of this section Cap. Recessed Small Cavity (JEDEC No.11-21) Base Small-Button Neoeightar 7-Pin, Arrangement 1, (JEDEC No.87-208) Basing Designation for BOTTOM VIEW 8JK
Pin 1 - Heater Pin 2 - Grid No.2 Pin 3 - Grid No.4 Pin 4 - Grid No.2 Pin 7 - Cathode Pin 8 - Heater Pin 8 - Heater Pin 8 - Heater Grid No.2 Pin 9 - Grid No.



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Maximum and Minimum Ratings, Design-Maximum Values:	
Unless otherwise specified, voltage values are positive with respect to cathode	
ANODE VOLTAGE	volts
Positive value	volts
	volts
GRID-No.2 VOLTAGE	volts
Negative peak value 400 max. Negative bias value 155 max. Positive bias value 0 max.	volts volts
HEATER VOLTAGE (2.9 max.)	volts volts volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period	
not exceeding 15 seconds 450 max. v	volts volts
Combined AC and DC voltage 200 max. v	volts volts
Typical Operating Conditions for Grid-Drive Service:	

												ge values cathode	
Anode Vol	tage							•			÷	14000	volts
												100 to 500	volts
Grid-No.2	Vol	tage										300	volts
Grid-No.1	Vol	tage	fo	rv	isu	al							
extinct	ion	off	ocu	sed	ra	ste	r.	•	•	÷		-35 to -72	volts
Maximum C				-									

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

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





RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

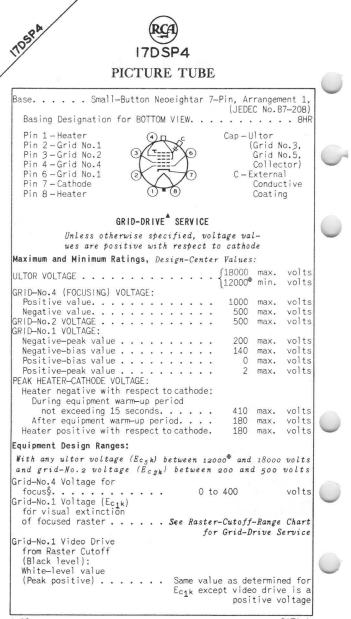
With heater having controlled warm-up time

DATA

General:

Heater, for Unipotential Cathode	
Voltage (AC or DC)	
Current	0.6 amp
Warm-up time (Average)	11 sec
Direct Interelectrode Capacitance	es:
Grid No.1 to all other electro Cathode to all other electrode	odes 6 μμf
Cathode to all other electrode	es5 μμf
External conductive coating to	ultor. $\int 1500 \text{ max}. \mu\mu f$
	1000 min. μμf
Faceplate, Spherical	Filterglass
Light transmission (Approx.).	
Phosphor (For curves, see front of t	
	Aluminized
Fluorescence	White
Phosphorescence	
Focusing Method	
Deflection Method	
Deflection Angles (Approx.):	
Diagonal	
Horizontal	
Vertical	
	e Requiring No Ion-Irap Magnet
Tube Dimensions:	11 1 / / 1 1 2 / 1 6 1
	$15-578 \pm 178$
	$ 4-1/8" \pm 1/8"$
	····· 4-1/8 ± 1/8
Radius of curvature of)
faceplate (External surface Screen Dimensions (Minimum):)
Greatest width	
Greatest Width	
Projected area	
Weight (Approx.).	10 lbs
Operating Position.	
Operating Position	Small Cavity (JEDEC No. J1-21)
Bulb	J132-1/2 A1/B1
Socket Ucinite	Part No.115446, or equivalent
	· · · · · · · · · · · · · · · · · · ·

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ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

DATA 1



PICTURE TUBE

۱.		
	Grid-No.4 Current	μa
	Grid-No.2 Current15 to +15 Field Strength of Adjust- able Centering Magnet* 0 to 8	µa gausses
		yausses
1	Examples of Use of Design Ranges:	
	With ultor voltage of 16000 16000	volts
	With ultor voltage of 16000 16000 and grid-No.2 voltage of 300 400 Grid-No.4 Voltage for	volts
	focus0 to 400 0 to 400 Grid-No.1 Voltage for visual extinction of	
	focused raster38 to -72 -45 to -90 Grid-No.1 Video Drive from Raster Cutoff (Black level):	volts
	White-level value 38 to 72 45 to 90	volts
	Maximum Circuit Values:	
	Grid-No.1-Circuit Resistance 1.5 max.	megohms
	CATHODE-DRIVE SERVICE	
	Unless otherwise specified, voltage values	
	are positive with respect to grid No. 1	
	Maximum and Minimum Ratings, Design-Center Values:	
	11 TOP_TO_CPID_No 1 VOLTACE (18000 max.	
	GRID-No.4-TO-GRID-No.1 (FOCUSING) {12000 [#] min.	. volts
	VOLTAGE:	
	Positive value 1000 max	
	Negative value 500 max GRID-No.2-TO-GRID-No.1 VOLTAGE 640 max	
	GRID-No.2-TO-CATHODE VOLTAGE	
	CATHODE-TO-GRID-No.1 VOLTAGE:	
	Positive-peak value	. volts
	Positive-bias value	
	Negative-bias value 0 max	
-	Negative-peak value 2 max PEAK HEATER-CATHODE VOLTAGE:	. volts
	Heater negative with respect to cathode:	
	During equipment warm-up period not exceeding 15 seconds 410 max	. volts
	After equipment warm-up period	
	Heater positive with respect to cathode. 180 max	

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17DSP4

PICTURE TUBE

Equipment Design Ranges:

TOSPA

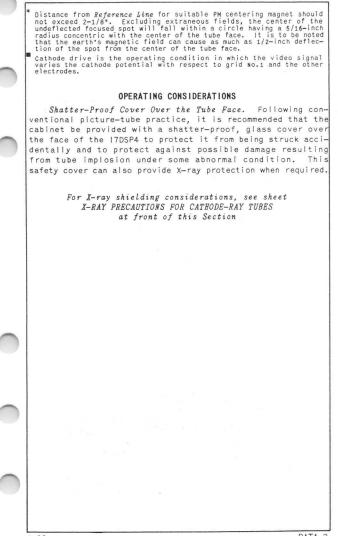
With any ultor-to-grid-No.1 voltage (Ec5g1) between 12000 and 18000 volts and grid-No. 2-to-grid-No. 1 voltage (Ecog) between 225 and 640 volts Grid-No.4-to-Grid-No.1 Voltage for focus§. 0 to 400 volts Cathode-to-Grid-No.1 Voltage (Ekg1) for visual extinction of focused raster See Raster-Cutoff-Range Chart for Cathode-Drive Service Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative) . . Same value as determined for Ekg1 except video drive is a negative value Grid-No.4 Current . -25 to +25 μa Grid-No.2 Current . . -15 to +15 μa Field Strenath of Adjustable Centering Magnet*. . . 0 to 8 qausses Examples of Use of Design Ranges: With ultor-to-grid-No. 1 voltage of 16000 16000 volts and grid-No. 2-to-grid-No. 1 voltage of volts 300 400 Grid-No.4-to-Grid-No.1 0 to 400 volts Voltage for focus . . 0 to 400 Cathode-to-Grid-No.1 Voltage for visual extincvolts tion of focused raster. . . 35 to 63 43 to 78 Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value -35 to -63 -43 to -78 volts Maximum Circuit Values: Grid-No.1-Circuit Resistance. 1.5 max. megohms Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode. This value is a working design-center minimum. The equivalent absolute minimum, ultor (or ultor-to-grid-Mo.1) voltage is 11,000 volts, below which the serviceability of the 1705P4 will be impaired. The equipment designer has the responsibility of determining a minimum design value such that under the worst probable operation the absolute minimum supply-voltage variation and equipment variation the absolute minimum ultor (or ultor-to-grid-Mo.1) voltage is never less than 11,000 volts. ultor (or ultor-to-grid-No.1) voltage is never reserved. The grid-No.4 (or grid-No.4-to-grid-No.1) voltage required for optimum focus of any individual tube will have a value between 0 and 400 volts independent of ultor current and will remain essentially constant for values of ultor (or ultor-to-grid-No.1) voltage or grid-No.2 (or grid-No.2-to-grid-No.1) voltage within design ranges shown for these items.

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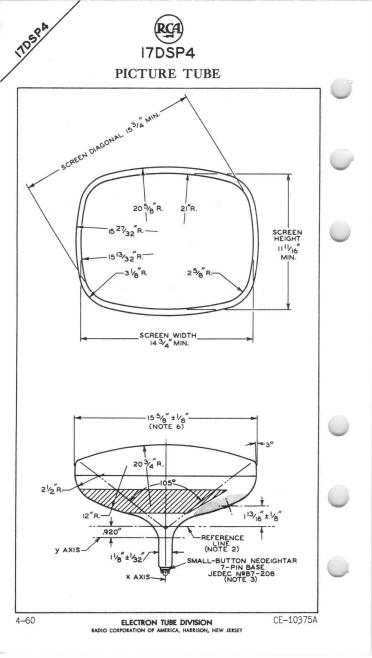
ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY DATA 2

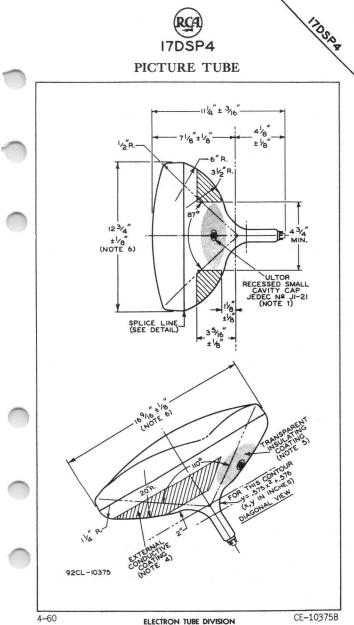


PICTURE TUBE



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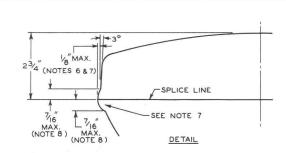




RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



PICTURE TUBE



NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 30°. ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC NO.G-126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

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

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

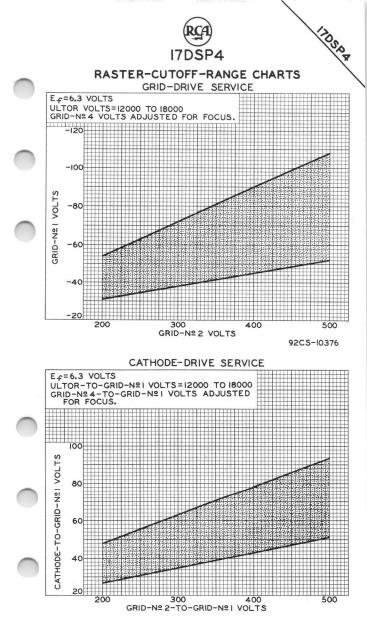
NOTE 6: MEASURED 2-9/32" \pm 1/32" from the plane tangent to the surface of the faceplate at the tube axis.

NOTE 7: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE IN-DICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/4", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/8" BEYOND THE ENVELOPE SURFACE AT THE LOCATION SPECIFIED FOR DIMEN-SIONING THE ENVELOPE WIDTH, DIAGONAL, AND HEIGHT.

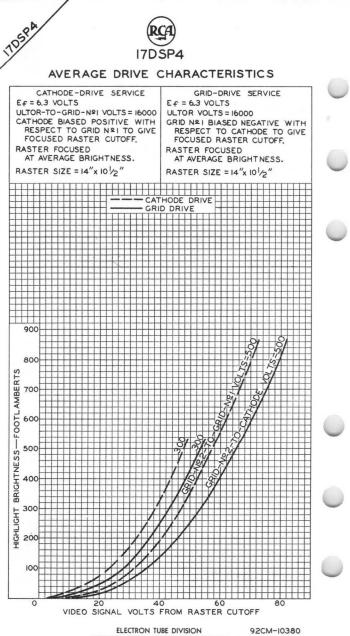
NOTE 8: THE TUBE SHOULD BE SUPPORTED ON BOTH SIDES OF THE BULGE. THE MECHANISM USED SHOULD PROVIDE CLEARANCE FOR THE MAXIMUM DIMENSIONS OF THE BULGE. SUPPORTS MUST BE SPACED FROM THE TUBE BY THE USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

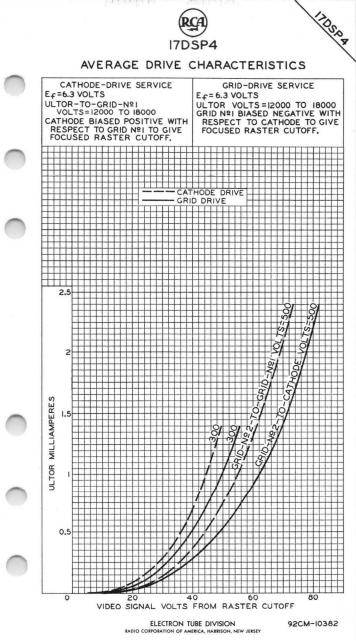
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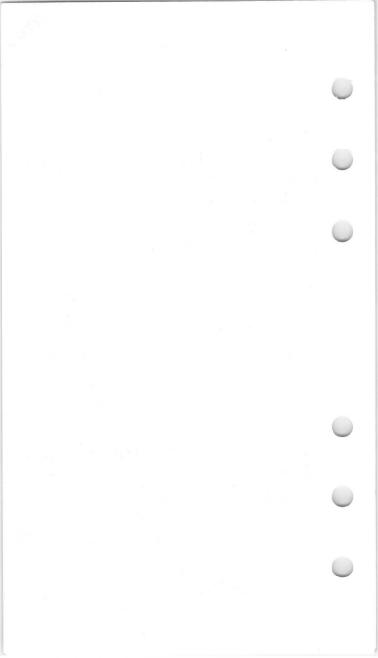


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17**DWP4**

Picture Tube

RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION

GENERAL DATA

Electrical:

Heater Current at 6.3 volts	a
Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6.5 μμ Cathode to all other electrodes 5 μμ	f
External conductive coating to ultor ${1500 \text{ max}, \mu\mu}$ 750 min. $\mu\mu$	f
Electron Gun Type Requiring No Ion-Trap Magne	t
Optical: Faceplate	S

Faceplate		
Light transmission (Approx.)		74%
Phosphor (For curves, see front of this section).	P4-S	ulfide Type,
		Aluminized

Mechanical:

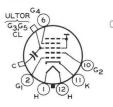
Operating Position.								Any
Weight (Approx.)							÷	18 lbs
Overall Length								
Neck Length	4							7-1/2" ± 3/16"
Projected Area of So								
External Conductive								The second secon

Туре. Regular-Band Contact area for grounding. Near Reference Line For Additional Information on Coatings and Dimensions:

See Picture-Tube Dimensional-Outlines and Bulb J133 B/D sheets at the front of this section

.....Recessed Small Cavity (JEDEC No.J1-21) Cap Base. Arrangement 1, (JEDEC Group 4, No.B6-63)

Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10 - Grid No.2 Pin 11 - Cathode Pin 12 - Heater



Cap-Ultor (Grid No.3, Grid No.5. Collector) C-External Conductive Coating



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

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Maximum Ratings, Design-Maximum Values:

ULTOR VOLTAGE		•						22000 max.	volts
Positive value								800 max. 700 max.	volts volts
GRID-No.1 VOLTAGE: Negative bias value								180 max.	volts
Positive bias value Positive peak value								0 max. 2 max.	volts
Typical Operating Conditions:	•			•	•			2 max.	VUILS
.With ultor voltage of and grid-No.2 voltage of								18000 300	volts volts
Grid-No.4 Voltage for focus . Grid-No.1 Voltage for visual	ŝ	•	•	•		ž	•	0 to 400	volts
extinction of focused raster	r.							-28 to -72	volts

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

Picture Tube

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

DATA

General:	
	~

Heater, for Unipotential Cathode:
Voltage (AC or DC)
Current at 6.3 volts 0.45 amp
Warm-up time (Average)
Direct Interelectrode Capacitances:
Grid No.1 to all other electrodes 6 $\mu\mu f$
Cathode to all other electrodes \dots 5 $\mu\mu$ f
(1500 maxf
External conductive coating to ultor. $\begin{cases} 1000 \text{ max. } \mu\mu 1\\ 1000 \text{ min. } \mu\mu f \end{cases}$
E late e la interestada Eilterestada
Faceplate, Spherical
Light transmission (Approx.)
Phosphor (For curves, see front of this section)P4-Sulfide Type
Aluminized
Fluorescence
Phosphorescence
Persistence
Focusing Method Electrostatic
Deflection Method
Deflection Angles (Approx.):
Diagonal
Horizontal
Vertical
Electron Gun Type Requiring No lon-Trap Magnet
Tube Dimensions:
Overall length 10-11/16" ± 1/4"
Greatest width
Greatest height
Diagonal
Neck length
Radius of curvature of faceplate
(External surface)
Screen Dimensions (Minimum):
Greatest width
Greatest height
Diagonal
Projected area
Weight (Approx.)
Operating Position
Cap Recessed Small Cavity (JEDEC No.J1-21)
Bulb [132-1/2 A/R
Bulb
Base Small-Button Neoeightar 7-Pin, Arrangement 1,
(JEDEC No.B7-208)
(JEDEC 10.07-200)

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA I 8-60

Basing Designation for BOTTOM VIEW. 8JR Pin 8-Heater Pin 1-Heater Pin 2-Grid No.1 Cap - Ultor Pin 3-Grid No.2 (Grid No.4, Pin 4-Grid No.3 Collector) Pin 6-Internal

Connection. Do Not Use Pin 7-Cathode



C-External Conductive Coating

GRID-DRIVE SERVICE

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

Maximum and Minimum Ratings, Design-Center Values:

3, 8			
ULTOR VOLTAGE			volts volts
GRID-No.3 (FOCUSING) VOLTAGE			volts
GRID-No.2 VOLTAGE			volts volts
GRID-No.1 VOLTAGE:			1.
Negative-peak value	200		volts
Negative-bias value	140	max.	volts
Positive-bias value	0	max.	volts
Positive-peak value	2	max.	volts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode:			
During equipment warm-up period			
not exceeding 15 seconds	410	max.	volts
After equipment warm-up period	180	max.	volts
Heater positive with respect to cathode.			volts
	-00		

Equipment Design Ranges:

With any ultor voltage (Ecuk) between 12000 and 16000 volts and grid-No.2 voltage $(\vec{E_{c}}_{k})$ between 400 and 550 volts Grid-No.3 Voltage for focus§ 0 to 400 volts Grid-No.1 Voltage (Ec.k) for visual extinction of focused raster. See Raster-Cutoff-Range Chart for Grid-Drive Service Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level. value (Peak positive). Same value as determined for Ecik except video drive is a positive voltage Grid-No.3 Current. -25 to +25 μa Grid-No.2 Current. -15 to +15 μa

> RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



Field Strength of Adjust- able Centering Magnet	0 t	o 12	gausses
Examples of Use of Design Ran	ges:		
With ultor voltage of and grid-No.2 voltage of	16000 400	16000 500	volts volts
Grid-No.3 Voltage for focus Grid-No.1 Voltage for	0 to 400	0 to 400	volts
visual extinction of focused raster Grid-No.1 Video Drive from Raster Cutoff	-34 to -63	-43 to -78	volts
(Black level): White-level value	34 to 63	43 to 78	volts
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance.		1.5 max.	megohms

CATHODE-DRIVE" SERVICE

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

Maximum and Minimum Ratings, Design-Center Values:

ULTOR-TO-GRID-No.1 VOLTAGE.						{16000 12000 [⊕]	max.	volts volts
GRID-No.3-TO-GRID-No.1 (FOCU	SING)				(12000		VUILS
VOLTAGE						650	max.	volts
GRID-No.2-TO-GRID-No.1 VOLTAG	GE.					690	max.	volts
GRID-No.2-TO-CATHODE VOLTAGE						(550	max.	volts
GRID-NO.2-IO-CATHODE VOLTAGE	• •	• •	•	•	•	1300	min.	volts
CATHODE-TO-GRID-No.1 VOLTAGE:						0		
Positive-peak value						200	max.	volts
Positive-bias value						140	max.	volts
Negative-bias value						0	max.	volts
Negative-peak value						2	max.	volts
PEAK HEATER-CATHODE VOLTAGE:					1	2		
Heater negative with respec		n ca	th/	ode	2.			
During equipment warm-up				Jui				
not exceeding 15 second						410	max.	volts
After equipment warm-up						180	max.	volts
Heater positive with respe	ct to	o ca	th	ode	е.	180	max.	volts
Equipment Design Ranges:								
With any ultor-to-grid-	Vo T	110	1+	101	2	(F))	hetwee	22
12000 and 16000 volt	c	nd	a +	10	_	Vo a-to	- arid	
No.1 voltage (E)								

No.1 voltage $(E_{c_{2}g_{1}})$ between 400 and 6 Grid-No.3-to-Grid-No.1 Voltage for focus§....0 to 400



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 2 8-60

volts

Cathode-to-Grid-No.1 Voltage (Ekg]) for visual extinction of focused raster. . See Raster-Cutoff-Range Chart for Cathode-Drive Service Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative) . Same value as determined for Ekq, except video drive is a negative voltage -25 to +25 μa Grid-No.3 Current -15 to +15 Grid-No.2 Current . μa Field Strength of Adjustable Centering Magnet. . 0 to 12 gausses Examples of Use of Design Ranges: With ultor-to-grid-No.1 voltage of 16000 volts 16000 and grid-No.2 to-grid-500 volts No. 1 voltage of 400 Grid-No.3 to-Grid-No.1 Voltage 0 to 400 0 to 400 volts for focus . . . Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster. . 34 to 56 41 to 69 volts . . . Cathode-to-Grid-No. 1 Video Drive from Raster Cutoff (Black level): White-level value . . . -34 to -56 -41 to -69 volts

Maximum Circuit Values:

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

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

This value is a working design-center minimum. The equivalent absolute minimum ultor- or ultor-to-grid-No.1 voltage is 11,000 volts, below which the serviceability of the 170kPW will be impaired. The equipment designer has the responsibility of determining a minimum design value such that under the worst probable operating conditions involving supply-voltage variation and equipment variation the absolute minimum ultor- or ultor-to-grid-No.1 voltage is never less than 11,000 volts.

ultor or ultor-to-grid-No.1 voltage is never less than 11,000 volts. The grid-No.3 voltage required for optimum focus of any individual tube may have a value anywhere between 0 and u00 volts and is a function of the value of the ultor voltage, ultor current, and grid-No.2 voltage. It changes directly with the ultor voltage at the rate of approximately uf volts for each 1000-volt change in ultor voltage; inversely with grid-No.2 voltage at the rate of about 60 volts for each 100-volt rate of about 60 volts for each 100-microampere change in ultor current. Because the 170PH has a narrow depth of focus, it is necessary to provide means such as a potentiometer or a u-tap switch for adjusting the focusing voltage. In general, commercially acceptable focus so btained if the focusing voltage is within 75 volts of the value required for optimum focus and if the focusing voltage fluctuations.

> RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



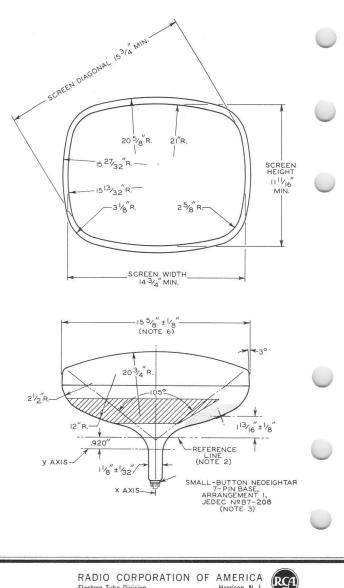
- Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/4". Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a 5/16-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as 1/2-inch deflection of the spot from the center of the tube face.
- Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.

OPERATING CONSIDERATIONS

Shatter-Proof Cover Over the Tube Face. Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the I7DXP4 to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion under some abnormal condition. This safety cover can also provide X-ray protection when required.

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

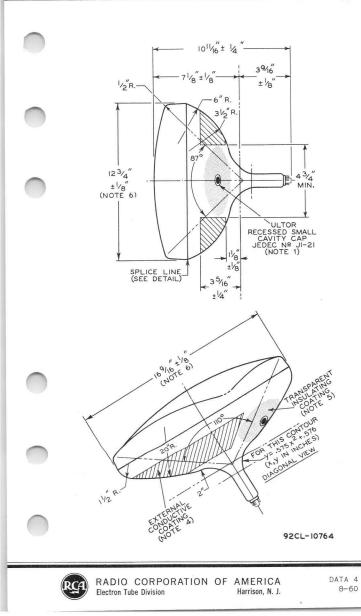


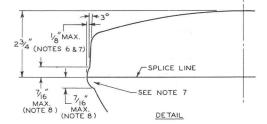


Electron Tube Division

Harrison, N. J.







NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TER-MINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 30°. ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC No.G-126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

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

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

NOTE 6: MEASURED $2-9/32" \pm 1/32"$ FROM THE PLANE TANGENT TO THE SURFACE OF THE FACEPLATE AT THE TUBE AXIS.

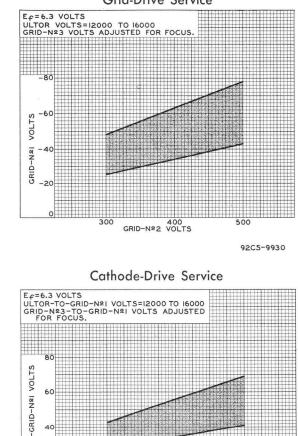
NOTE 7: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE IN-DICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/4", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/8" BEYOND THE ENVELOPE SURFACE AT THE LOCATION SPECIFIED FOR DIMEN-SIONING THE ENVELOPE WIDTH, DIAGONAL, AND HEIGHT.

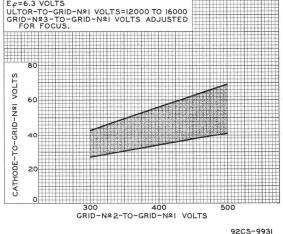
NOTE 8: THE TUBE SHOULD BE SUPPORTED ON BOTH SIDES OF THE BULGE. THE MECHANISM USED SHOULD PROVIDE CLEARANCE FOR THE MAXIMUM DIMENSIONS OF THE BULGE. SUPPORTS MUST BE SPACED FROM THE TUBE BY THE USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.

NOTE 9: NECK DIAMETER IS MAINTAINED TO AT LEAST 2-7/16" FROM REFERENCE LINE.





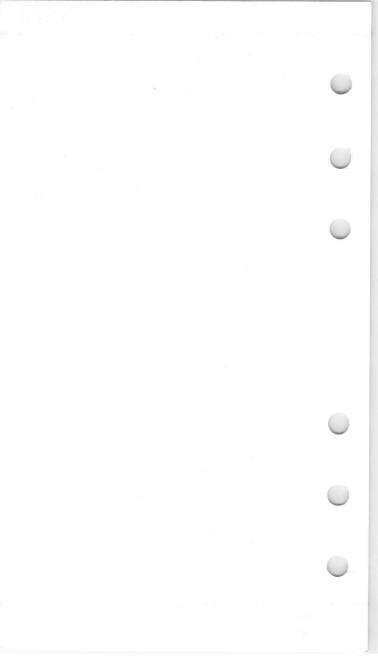






RADIO CORPORATION OF AMERICA **Electron Tube Division** Harrison, N. J.

DATA 5 8-60



17EZP22

Color Picture Tube

Germa-Chrome Banded-Type Implosion Protection 90° Rectangular Hi-Lite Screen Blue-Gun-Down Operation Unity Current Ratios
ELECTRICAL
Electron Guns, Three with Axes Tilted Toward Tube Axis
Current at 6.3 V 900 mA
Focusing Method Electrostatic
Focus Lens Unipotential
Convergence Method Magnetic
Deflection Method Magnetic
Deflection Angles (Approx.):
Diagonal 90 deg.
Horizontal
Vertical 63 deg.
Direct Interelectrode Capacitances (Approx.):
Grid No.1 of any gun to all other electrodes 7.5 pF
Grid No.4 to all other electrodes 6 pF
All cathodes to all other electrodes 15 pF
External conductive coating to anode f 1500 max. pF 1000 min. pF
OPTICAL
Faceplate Filterglass
Light transmission at center (Approx.)
Surface Polished
Screen Aluminized
Matrix Black opaque material
Phosphor, rare-earth (red), sulfide (blue & green)
Persistence Medium-Short
Array Dot trios
Spacing between centers of adjacent dot trios (approx.) 0.029 in (0.74 mm)

Electronic Components

RB/1

MECHANICAL

Operating Position: For blue gun down Anode Bulb For blue gun up Anode Bulb Co	EC No.J 13 No.FP 13 Diheptar 12 EDEC No.1 Aligns App de Bulb Con Contact on ntact on Bo	9 A ' 9B1 pin 4BH orox. ttact Top
Weight (Approx.)	17.5 lb (8.0	kg)
MAXIMUM AND MINIMUM RATINGS, Design-Max	imum Valua	-
		5
Unless otherwise specified, values are for ea voltage values are positive with respect to ca		100
12	2,500 max.	v
Anode voltage {1	7,000 min.	v
Total Anode Current, Long-Term Average Grid-No.4 (Focusing Electrode) Voltage:	750 max.	μA
Positive value	1100 max.	V
Negative value	550 max.	v
Peak Grid-No.2 Voltage, Including Video Signal Voltage Grid-No.1 Voltage:	1000 max.	v
Negative bias value	400 max.	V
Negative operating cutoff value	140 max.	V
Positive bias value	0 max.	V
Positive peak value	2 max.	v
0	§ 6.9 max.	V
Under operating conditions	15.7 min.	V
Under standby conditions ^d Peak Heater-Cathode Voltage;	5.5 max.	v
Heater negative with respect to cathode:		-
During equipment warm-up period	100 att 100	
not exceeding 15 seconds After equipment warm-up period:	450 max.	V
Combined AC and DC value	200 max.	V
DC component value	200 max.	V
Heater positive with respect to cathode:		
AC component value	200 max.	V
DC component value	0 max.	V
EQUIPMENT DESIGN RANGES		
Unless otherwise specified, values are for ea voltage values are positive with respect to ca		-
For anode voltages between 17,000 and	22,500 V	

Grid-No.4 (Focusing Electrode) Voltage .. -75 to 400

Electronic Components

RGЛ

V

17EZP22

Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused Spot SEE CUTOFF DESIGN CHART Maximum Ratio of Grid-No.2 Voltages, Highest Gun to Lowest Gun in Any Tube (At grid-No.1 spot cutoff voltage of -100 V)
Heater Voltage: ^c Under operating conditions:
When standby operation is not utilized 6.3 V
When 5.0-V standby operation is utilized ^d 6.0 V
Under standby conditions ^d
Grid-No.2 Current
Ratio of cathode currents: Min. Typ. Max. Red/blue 0.75 1.10 1.50 Red/green 0.65 1.00 1.50 Blue/green 0.60 0.91 1.30 Displacements, Measured at Center of Screen: 1.30
Raster centering displacement:
Horizontal $\dots \dots \dots$
Vertical ± 0.45 in (± 11.4 mm) Lateral distance between the blue beam and the converged red and green beams ± 0.25 in (± 6.4 mm) Radial convergence displacement excluding effects of dynamic convergence (each beam) ± 0.37 in (± 9.4 mm) Maximum Required Correction for Register [©] (Including Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the center of the Screen in any Direction 0.005 in (0.13 mm) max.
LIMITING CIRCUIT VALUES Effective grid-No.1-to-cathode- circuit resistance (each gun) 0.75 max. MΩ The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is con- be analyzed by assuming the color picture tube heater is con-

nected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous

Electronic

Components

R(B/Л

DATA 2

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17EZP22

short circuit current of more than 750 mA total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

- ^a The mating socket, including its associated, physicallyattached hardware and circuitry, must not weigh more that one pound.
- ^c For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.
- d For "instant on" applications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- ^e Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

X-RADIATION WARNING

Because the 17EZP22 is designed to be operated at anode voltages as high as 22.5 kilovolts (design-maximum value), shielding of the 17EZP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

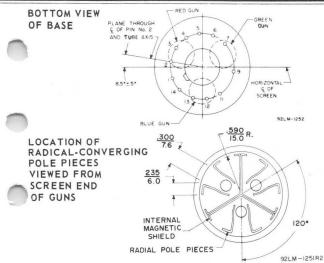
BASE SPECIFICATION - JEDEC No. 14BH

- Pin 1: Heater
- Pin 2: Cathode of Red Gun
- Pin 3: Grid No.1 of Red Gun
- Pin 4: Grid No.2 of Red Gun
- Pin 5: Grid No.2 of Green Gun
- Pin 6: Cathode of Green Gun
- Pin 7: Grid No.1 of Green Gun
- Pin 9: Grid No.4
- Pin11: Cathode of Blue Gun

Pin 12: Grid No.1 of Blue Gun Pin 13: Grid No.2 of Blue Gun Pin 14: Heater

- Cap: Anode (Grid No.3, Grid No.5, Screen, Collector)
 - C: External Conductive Coating





NOTES FOR DIMENSIONAL OUTLINE

Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge (JEDEC No.G162) and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel.

Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.

Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

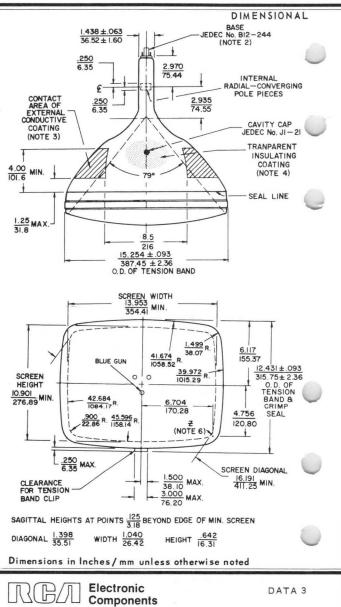
Note 4: To clean this area, wipe only with soft, dry, lintless cloth.

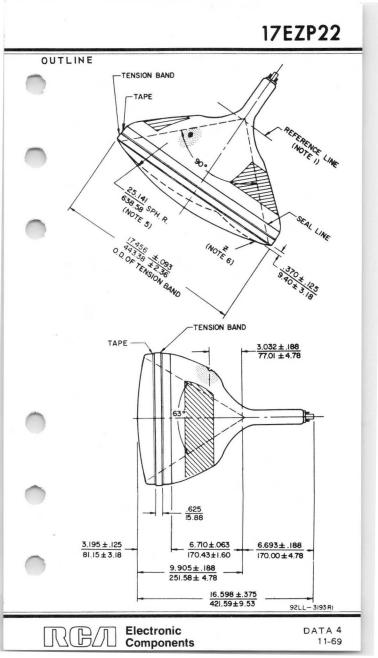
Note 5: All peripheral points of the faceplate lie on a spherical surface having a radius of 25.141 inches (638.58 mm). The center of the faceplate is located .016 inch (.41 mm) above this spherical surface.

Note 6: "Z" is located on the outside surface of the faceplate, on the screen diagonal at a point .125 in (3.18 mm) beyond the minimum screen. This point is used as a reference for the tension band.

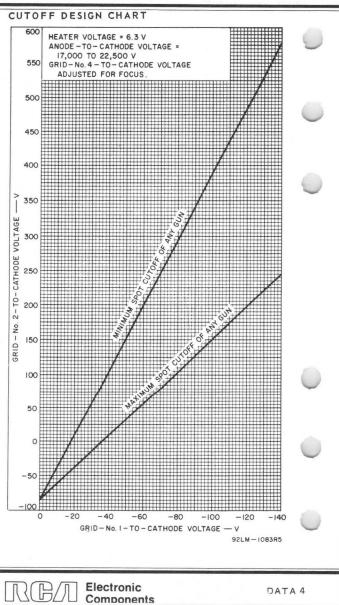


17EZP22





17EZP22



17HP4C

Picture Tube

RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS 70° MAGNETIC DEFLECTION

ALUMINIZED SCREEN

Electrical:

Direct Interelectrode Capacitances: Cathode to all other electrodes 5 Grid No.1 to all other electrodes 6	pf pf
External conductive coating to anode {1500 max. 750 min.	pf pf
the set of	ma
Electron Gun	

Optical:

Phosphor (For Curves, se	e front o	fthis	Section).	.P4—Sulfide Type, Aluminized
Faceplate, Spherical				Filterglass
Light transmission	(Approx.)		74%

Mechanical:

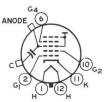
.... 18 lbs 19-3/16" ± 3/8" Overall Length 7-1/2" ± 3/16" Neck Length. Projected Area of Screen 149 sq. in. External Conductive Coating:

. Regular-Band Туре......... Contact area for grounding Near Reference Line For Additional Information on Coatings and Dimensions:

See Picture-Tube Dimensional-Outlines and Bulb J133 B/D sheets at front of this section

Cap. Recessed Small Cavity (JEDEC No.J1-21) Base . . Small-Shell Duodecal 6-Pin (JEDEC Group 4, No.B6-63) . . . 12L Basing Designation for BOTTOM VIEW

Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10 - Grid No.2 Pin 11 - Cathode Pin 12 - Heater



Cap - Anode (Grid No.3. Grid No.5. Screen. Collector) C - External Conductive Coating

Maximum and Minimum Ratings, Design-Maximum Values:

	Unle	SS	oth	er	wis	se	sp	ec	if	ie	d,	υ	ol	ta	ge valu	es	
	are	po	sit	11	ve	wi	it	h	re	st	be	c t	t	0	catho	de	
ANODE VOL GRID-No.4	TAGE	 CUS	ING	j	 voi	TA.	GE		•	•	•	8	8	•	17500	max.	volts
Positiv Negativ	/e va	lue		•													volts volts



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17HP4C

Negative bias value	volts volts volts volts volts volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. V After equipment warm-up period 200 max. V Heater positive with respect to cathode: Combined AC and DC voltage 200 max. V	volts volts
DC component 100 max. V Typical Operating Conditions for Grid-Drive Service:	
Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage	volts volts volts

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



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

17LP4B

Picture Tube

ALUMINIZED SCREEN 70° MÁGNETIC DEFLECTION

Electrical:

RECTANGULAR GLASS TYPE

LOW-VOLTAGE ELECTROSTATIC FOCUS

Direct Interelectrode Capacitances: Cathode to all other electrodes 5	pf
	pf
External conductive coating to anode {1500 max. 750 min.	pf pf
Heater Current at 6.3 volts	ma
Electron Gun	

Optical:

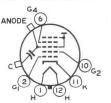
Phosphor (For Curves, see front of	this Section). P4-Sulfide Type,
	Aluminized
Faceplate, Cylindrical	
Light transmission (Approx.)	

Mechanical:

Weight (Approx.)								. 19 11	DS
Overall Length						19-	3/16'	' ± 3/8	3"
Neck Length						7-	1/2"	± 3/16	5"
Projected Area of Scr	een .						149	sq. in	n.
External Conductive Co	pati	ng:							

See Picture-Tube Dimensional-Outlines and Bulb J133 C/E sheets at front of this section

Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater



Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating

Maximum and Minimum Ratings, Design-Maximum Values:

Unless otherwise specified, voltage values

	are po	51	t 1	ve	w	1 t	п	16	2 5	pе	CI	το	catho	ae		
	ANODE VOLTAGE GRID-No.4 (FOCUS	SING)	VO	LTA	GE	:						17500	max.	volts	
	Positive value												1100	max.	volts	
	Negative value						•						550	max.	volts	
-						_			_							



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17LP4B

GRID-No.2 VOLTAGE GRID-No.1 VOLTAGE:	÷	•	•	•	•	÷	×	•	•	•	550 max.	volts	
Negative peak value											220 max.		
Negative bias value			•								155 max.	volts	
Positive bias value									1.0		0 max.	volts	
Positive peak value											2 max.	volts	
											[6.9 max.	volts	
HEATER VOLTAGE		•	•								15.7 min.		
PEAK HEATER-CATHODE V Heater negative wit respect to cathod During equipment	h e:				Der	ric	bd				(0.7 mm.	VOTES	0
not exceeding 1	5 5	sec	cor	nds	5.						450 max.	volts	
After equipment w Heater positive wit respect to cathod	h	n—ı	qr	pe	er	iod	1.		•		200 max.	volts	
Combined AC and D		101	ta	qe	2.						200 max.	volts	
DC component											100 max.		0
The second se													

Typical Operating Conditions for Grid-Drive Service:

Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage 14000 volts Grid-No.4 Voltage . . . -56 to +310 volts 3 . . . 300 volts extinction of focused raster. . . -28 to -72 volts

Maximum Circuit Value:

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

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



17QP4B

Picture Tube

ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION

RECTANGULAR GLASS TYPE MAGNETIC FOCUS

Electrical:

Direct Interelectrode Capacitances:	
Cathode to all other electrodes 5	f
Grid No.1 to all other electrodes 6 p	f
External conductive coating to anode . {1500 max. p 750 min. p	
Heater Current at 6.3 volts 600 ± 60 ma	
Heater Warm-Up Time (Average) 11 second	
Electron Gun	t
Optical:	

Phosphor (For curves	s, see front	t of this	Section).	P4-Sulfide Type,
Faceplate				Aluminized
raceprace		• • • •		· · · · · · · · · · · · · · · · · · ·
Light transmissi	on (Appro:	×.)	10 103 26 1.	74%

Mechanical:

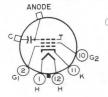
Weight (Approx.)		 			 1	9 lbs
Overall Length			1.0	1.1	 . 19-3/16":	± 3/8"
Neck Length						
Projected Area of Screen External Conductive Coati					 149 sc	. in.
External Conductive Coati	ng:				al sensities un	

See Picture-Tube Dimensional-Outlines and Bulb J133 C/E sheets at front of this section

No.B5-57)

Basing Designation for BOTTOM VIEW . .

Pin 1-Heater Pin 2-Grid No.1 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater



Cap - Anode (Grid No.3, Screen, Collector) C - External Conductive Coating

Maximum and Minimum Ratings, Design-Maximum Values:

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

Anode Voltage						20000	max.	volts
Grid-No.2 Voltage.						550	max.	volts



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17QP4B

Grid-No.1 Voltage:	
Negative peak value	
Negative bias value 155 max. volts	1
Positive bias value 0 max. volts	- 1
Positive peak value	
Heater Voltage	
(5.7 min. volts	
Peak Heater-Cathode Voltage:	
Heater negative with respect to cathode:	
to cathode: During equipment warm-up period	1
not exceeding 15 seconds 450 max. volts	
After equipment warm-up period 200 max. volts	
Heater positive with respect to cathode:	
Combined AC and DC voltage 200 max. volts	
DC component 100 max. volts	
	1

Typical Operating Conditions for Grid-Drive Service:

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

Anode Voltage									. 14000	volts
Grid-No.2 Voltage										volts
Grid-No.1 Voltage										
extinction of f	ocuse	be	ras	te	r.	·	ŝ		-28 to -72	volts
a the second	1.0									

Maximum Circuit Value:

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

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



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

19ABP4

Picture Tube

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGNETIC DEFLECTION INTERNAL MAGNETIC SHIELD

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Direct Interelectrode Capacitances: Cathode to all other electrodes 3.4 pf Grid No.1 to all other electrodes 3.4 pf External conductive coating to anode 1400 max. pf 850 min. pf
Heater Current at 2.68 volts. 450 ± 45 ma Heater Warm-Up Time (Average) 11 seconds Electron Gun. Type Requiring No Ion-Trap Magnet
Optical: Phosphor (For Curves, see front of this Section). P4—Sulfide Type, Aluminized Faceplate
Mechanical: Weight (Approx.). 14 lbs Overall Length. 10-15/16" ± 3/16" Neck Length 3-11/16" ± 1/16" Projected Area of Screen. 3-11/16" ± 1/16" External Conductive Coating: 172 sq.in. Type.
Pin 1-Heater Pin 2-Grid No.2 Pin 3-Grid No.4 Pin 6-Grid No.4 Pin 8-Heater Pin 8-Heater Pin 1-Heater Pin 2-Grid No.2 Pin 3-Grid No.4 Pin 4-Grid No.4 Pin 3-Grid No.4 Pin 4-Grid No.4 Pin 8-Heater



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

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DATA 4-63

Coating

19ABP4

Maximum and Minimum Ratings, Design-Maximum Values:						
Unless otherwise specified, voltage values						
are positive with respect to cathode						
ANODE VOLTAGE 20000 max. vo GRID-No.4 (FOCUSING) VOLTAGE:	lts 💛					
	lts					
	lts					
	lts					
	lts					
Negative bias value 155 max. vo	lts 🔍					
	lts					
	lts					
	lts					
L2.4 min. vo	lts					
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode:	0					
During equipment warm-up period	1.6					
Hot brocking to boothat i i i i i i i i i i i i i i i i i i i	lts					
After equipment warm-up period 200 max. vo Heater positive with respect to cathode:	lts					
Combined AC and DC voltage 200 max. vol	lts					
DC component 100 max. vol	lts					
Typical Operating Conditions for Grid-Drive Service:						
Unless otherwise specified, voltage values are positive with respect to cathode						
	lts					
	lts					
Grid-No.1 Voltage for visual	lts					
extinction of focused raster35 to -72 vol	lts					
Maximum Circuit Value:						
Grid-No.1-Circuit Resistance 1.5 max. megol	nms					
For X-radiation shielding considerations, see sheet						

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



19AFP4

Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4° MAGNETIC DEFLECTION

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical: Heater Current at 6.3 volts. 600 ± 5% ma Heater Warm-Up Time (Average). 11 seconds Direct Interelectrode Capacitances: Grid No.1 to all other electrodes. . 6 uuf Cathode to all other electrodes. . 5 μµf 1500 max. μµf External conductive coating to ultor . 1000 min. μµf Electron Gun Type Requiring No Ion-Trap Magnet Optical: Phosphor (For Curves, see front of this Section) . P4-Sulfide Type, Aluminized Mechanical: Operating Position Anv . . . 18-1/2 lbs Overall Length 11-5/8" ± 5/16" Neck Length. 4-1/8" ± 1/8" Projected Area of Screen 172 sq. in. External Conductive Coating: For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J140 C sheets at the front of this section Base. . . . Arrangement 1 (JEDEC No.B7-208) Pin 1 - Heater Cap-Ultor Pin 2-Grid No.1 (Grid No.3. 6)GI Pin 3-Grid No.2 Grid No.5, 3 Pin 4 - Grid No.4 Collector) Pin 6 - Grid No.1 C - External Pin 7 - Cathode Conductive Pin 8-Heater Coating

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19AFP4

Maximum Ratings, Design-Maximum Values:			
ULTOR VOLTAGE	20000 max.	volts	
Positive value	1100 max.	volts	
Negative value	550 max.	volts	
GRID-No.2 VOLTAGE	550 max.	volts	
GRID-No.1 VOLTAGE:			
Negative peak value	220 max.	volts	
Negative bias value	155 max.	volts	
Positive bias value	0 max.	volts	1
Positive peak value	2 max.	volts	
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with			
respect to cathode:			
During equipment warm-up period			
not exceeding 15 seconds	450 max.		
After equipment warm-up period	200 max.	volts	
Heater positive with			
respect to cathode	200 max.	volts	
Typical Operating Conditions:			
With ultor voltage of	16000	volts	
and grid-No.2 voltage of	300	volts	
Grid-No.4 Voltage for focus	9	volts	
Grid-No.1 Voltage for visual extinction	0 10 400	VUILS	
of focused raster	-35 to -72	volts	
	/		
Maximum Circuit Values:			
Grid-No.1-Circuit Resistance	1.5 max.	megohms	
		0	

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section





Picture Tube

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGNETIC DEFLECTION LOW GRID-No.2 VOLTAGE CATHODE-DRIVE TYPE

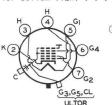
With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

LIGGETIGAT
Heater Current at 6.3 volts 450 ± 10% ma Heater Warm-Up Time (Average) 11 seconds Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 μμf
Cathodo to all other electrodes 5
External conductive coating to ultor
Electron Gun Type Requiring No Ion-Trap Magnet
Optical:
Faceplate
Mechanical:
Operating Position. Any Weight (Approx.). 14 lbs Overall Length. 11-3/8" ± 1/4" Neck Length 4-1/8" ± 1/8" Projected Area of Screen. 172 sq. in. External Conductive Coating: 172 sq. in.
Type
See <i>Picture-Tube Dimensional-Outlines</i> and <i>Bulb J149 A</i> sheets at the front of this section
Cap
Pin 2 - Cathode Pin 3 - Heater H GI Gap - Ultor (Grid No.3)

Pin 3-Heater Pin 4-Heater Pin 5-Grid No.1 Pin 6-Grid No.4 Pin 7-Grid No.2



ap - Ultor (Grid No.3, Grid No.5, Collector) C - External Conductive Coating



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 5-62

19AJP4

Maximum and Minimum Ratings, Design-Maximum Values:	
ULTOR-TO-GRID-No.1 VOLTAGE	6
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:	
Positive value	
(to min. tores	
CATHODE-TO-GRID-No.1 VOLTAGE 100 max. volts HEATER VOLTAGE	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 410 max. volts After equipment warm-up period 180 max. volts Heater positive with respect to cathode	
Typical Operating Conditions:	
With ultor-to-grid-No.1 voltage of 14500 volts and grid-No.2-to-grid-No.1 voltage of 50 volts	
Grid-No.4-to-Grid-No.1 Voltage for focus . 0 to 500 volts Cathode-to-Grid-No.1 Voltage for	
visual extinction of focused raster 31 to 49 volts	
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max. megohms	

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



Picture Tube

ALUMINIZED SCREEN RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time GENERAL DATA Electrical: Heater Current at 6.3 volts. 600 ± 30 ma Heater Warm-Up Time (Average). 11 seconds Deflection Method. Magnetic Deflection Angles (Approx.): 114⁰ Diagonal 102° 850 Direct Interelectrode Capacitances: Grid No.1 to all other electrodes. . . . 6 μμf Cathode to all other electrodes. . . 5 μµf (1500 max. μµf External conductive coating to ultor. 1000 min. μµf Optical: Phosphor (For curves, see front of this section) . P4-Sulfide Type AluminizedWhite Fluorescence Medium Short Persistence. . . Mechanical: Tube Dimensions: Overall length 11-3/8" ± 1/4" 18-5/8" ± 1/8" Diagonal 4-1/8" ± 1/8" 48" Center 21" Edge Screen Dimensions (Minimum): Greatest width 15-1/8" Greatest height. 12" Recessed Small Cavity (JEDEC No.J1-21) Cap. Bulb J149A1



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA I 10-60

Base Small-Button Neoeightar 7-Pin, Arrangement 1, (JEDEC No.B7-208)	
Basing Designation for BOTTOM VIEW	
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater Pin 8 - Heater Pin 4 - Grid No.4 Pin 4 - Grid No.4 Pin 5 - Grid No.4 Pin 6 - Grid No.4 Pin 7 - Cathode Pin 8 - Heater Pin 8 - Heater Pin 8 - Heater Cap - Ultor (Grid No.3, Collector) C - External Conductive Coating	
	-
GRID-DRIVE ^A SERVICE	
Unless otherwise specified, voltage values	
are positive with respect to cathode	
Maximum and Minimum Ratings, Design-Maximum Values:	
ULTOR VOLTAGE	
(15000 min. volts	
GRID-No.4 (FOCUSING) VOLTAGE: Positive value	
Negative value	
GRID-No.2 VOLTAGE	
200 min. volts	
GRID-No.1 VOLTAGE:	
Negative-peak value	
Negative-bias value	
Positive-bias value O max. volts	
Positive-peak value	
HEATER VOLTAGE	
15.7 min. volts	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period	
not exceeding 15 seconds 450 max. volts	
After equipment warm-up period 200 max. volts	
Heater positive with respect to cathode. 200 max. volts	
Typical Operating Conditions:	0
With ultor voltage (E _{C5k}) of 20000 volts	
and grid-No.2 voltage (E _{C2k}) of 400 volts	
Grid−No.4 Voltage for focus [●] 0 to 400 volts Grid−No.1 Voltage for visual	
extinction of focused raster*36 to -94 volts Field Strength of Adjustable	0
Centering Magnet♦ 0 to 9 gausses	
Maximum Circuit Values:	

Maximum Circuit Values: Grid-No.1-Circuit Resistance. . .

1.5 max. megohms





RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

CATHODE-DRIVE SERVICE

	CATHODE-DRIVE SERVICE		
5	Unless otherwise specified, volt are positive with respect to		
7	Maximum and Minimum Ratings, Design-Maximum		
		23000 max. 15000 min.	volts volts
	GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:	10000 11111.	VOTES
5	Positive value	1250 max. 400 max.	volts
	GRID-No.2-TO-GRID-No.1 VOLTAGE	{700 max. 350 min.	volts
	GRID-No.2-TO-CATHODE VOLTAGE CATHODE-TO-GRID-No.1 VOLTAGE:	550 max.	volts
	Positive-peak value	220 max.	volts
N	Positive-bias value	154 max.	volts
9.	Negative-bias value	0 max.	volts
	Negative-peak value	2 max.	volts
	HEATER VOLTAGE	{6.9 max.	volts
		(5.7 min.	volts
	PEAK HEATER-CATHODE VOLTAGE:		
	Heater negative with respect to cathode:		
	During equipment warm-up period	150	1.
	not exceeding 15 seconds	450 max.	volts
	After equipment warm-up period Heater positive with respect to cathode.	200 max. 200 max.	volts
	heater positive with respect to cathode.	200 max.	VULLS
	Typical Operating Conditions:		
	With ultor-to-grid-No.1		
		20000	volts
	voltage (E _{C 5g1}) of and grid-No.2-to-grid-No.1		
	voltage (E _{c2g1}) of	400	volts
	Grid-No.4-to-Grid-No.1 Voltage for focus•	0 to 400	volts
)	Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster	36 to 78	volts
	Field Strength of Adjustable Centering Magnet	0 to 9	qausses
	5 5		gaaoooo
	Maximum Circuit Values: Grid-No.1-Circuit Resistance	1.5 max.	megohms
)	▲ Grid drive is the operating condition in which the grid-No.1 potential with respect to cathode.	the video sign	al varies
	The grid-No.4 (or grid-No.4-to-grid-No.1) voltage focus of any individual tube will have a value 400 volts, is independent of ultor current and constant for values of ultor (or ultor-to-grid- No.2 (or grid-No.2-to-grid-No.1) voltage within shown for these items.	ge required fo anywhere betw will remain es No.1) voltage design-maximu	or optimum meen 0 and ssentially or grid- m ratings
	See Raster-Cutoff-Range Chart for Grid-Drive Se		N
	Distance from Reference Line for suitable PM c not exceed 2-1/4". The specified centering m for the effect which mechanical tube tolers location of the undeflected focused spot with r the tube face. Maximum field strength of adjus equals:	entering magn agnet compens inces may hav espect to the itable centeri	et should ates only ve on the center of ng magnet
(action)			



RADIO CORPORATION OF AMERICA Electron Tube Division

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Ecsk or Ec591 (volts) - x 8 gausses 16000 (volts)

The equipment manufacturer must determine and supply additional compensation for the effects of the earth's magnetic field and extraneous fields due to choice of circuitry and components. The additional compensation should preferably be applied as part of the magnetic field of the deflecting yoke.

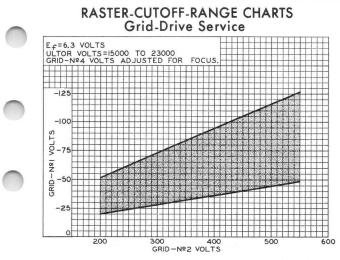
- Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.
- See Raster-Cutoff-Range Chart for Cathode-Drive Service.

OPERATING CONSIDERATIONS

X-Ray Warning. When operated at ultor voltages up to 16 kilovolts, this picture tube does not produce any harmful X-ray radiation. However, because the rating of this type permits operation atvoltages as high as 23 kilovolts (Designmaximum value), shielding of this picture tube for X-ray radiation may be needed to protect against possible injury from prolonged exposure at close range whenever the operating conditions involve voltages in excess of 16 kilovolts.

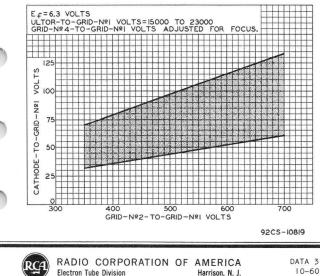
Shatter-Proof Cover Over the Tube Face. Following conventional picture tube practice, it is recommended that the cabinet be provided with\a shatterproof, glass cover over the face of this picture tube to protect it from being struck accidentally and to protect against possible damage resulting from tube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



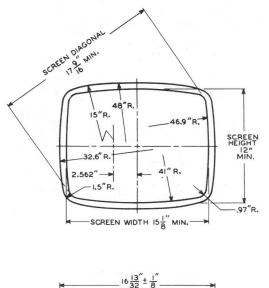


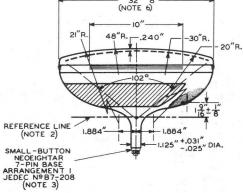
92CS-10790





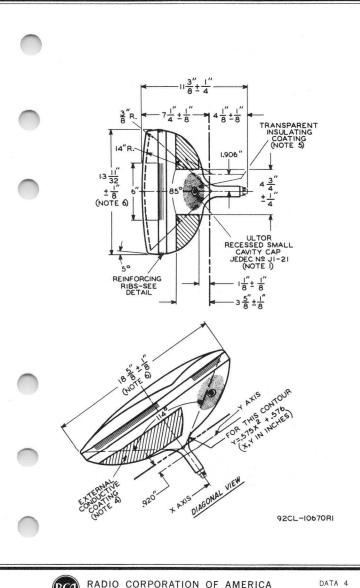
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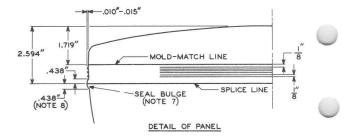




Electron Tube Division

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NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm 30^{\circ}$. ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC NO.G-126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

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

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

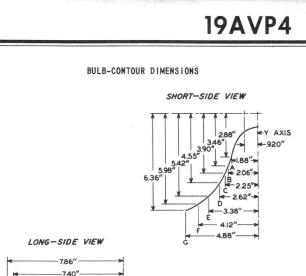
NOTE 5: TO CLEAN THIS AREA, WIPEONLY WITH SOFT DRY LINT-LESS CLOTH.

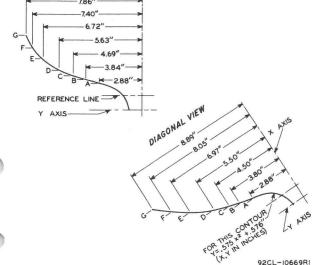
NOTE 6: MEASURED AT THE MOLD-MATCH LINE.

NOTE 7: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

NOTE 8: UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 3/8" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF THE TUBE SUPPORT BAND. TUBE MOUNTING AND YOKE SUPPORT CLAMPS MUST BE SPECED FROM THE TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.



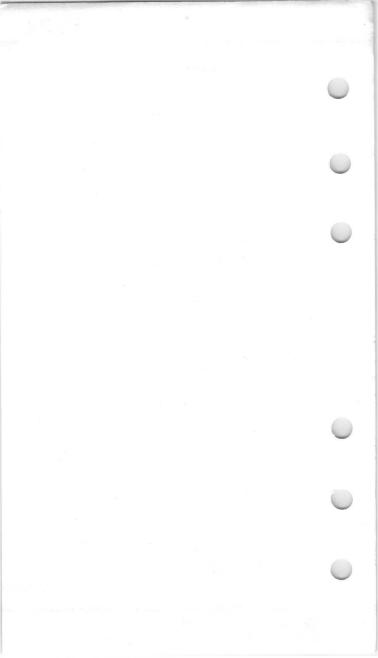




NOTE: PLANES A THROUGH G ARE NORMAL TO THE TUBE AXIS AND AT FIXED LOCATIONS FROM THE Y AXIS. THESE COORDINATES DESCRIBE THE BOGIE-BULB EXTERNAL CONTOUR IN PLANES THROUGH THE TUBE AXIS AND THE RESPECTIVE FACEPLATE AXES.



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SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGMETIC DEFLECTION With Heater Having Controlled Warm-Up Time

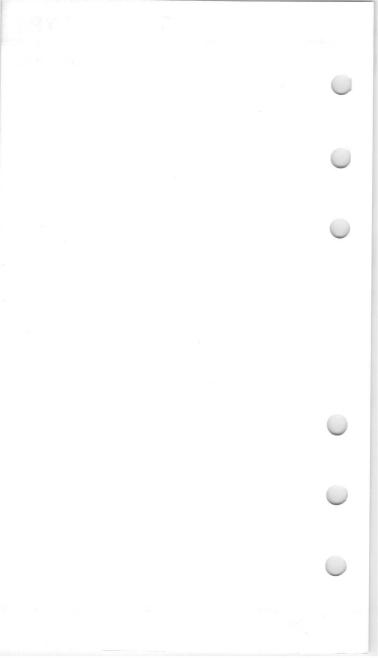
The 19AYP4 is the same as the 19AVP4 except for the following item:

Electrical:



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RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS LOW-GRID-No.2 VOLTAGE ALUMINIZED SCREEN 92° MAGNETIC DEFLECTION CATHODE-DRIVE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:
Heater Current at 6.3 volts 600 ± 10% ma Heater Warm-Up Time (Average) 11 seconds Direct Interelectrode Capacitances:
Grid No.1 to all other electrodes 6 μμf Cathode to all other electrodes 5 μμf
External conductive coating to ultor {2000 max. μμf 1500 min. μμf
Electron Gun Type Requiring No Ion-Trap Magnet
Optical:
Faceplate
Mechanical:
Operating Position. Any Weight (Approx.). 15 lbs Overall Length. 15–1/4" ± 3/8" Neck Length. 5–1/2" ± 3/16" Projected Area of Screen. 172 sq. in. External Conductive Coating: 172 sq. in.
TypeRegular Band Contact area for groundingNear Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb Jigo B sheets
at the front of this section Cap
<pre>Bases (Alternates): Short Small-Shell Duodecal 6-Pin (JEDEC Group 4, No.B6-203) Small-Shell Duodecal 6-Pin, Arrangement 1 (JEDEC Group 4, No.B6-63)</pre>
Basing Designation for BOTTOM VIEW
Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.2 Pin 10-Grid No.2
Pin 12 - Heater Pin 12 - Heater Pin 12 - Heater Pin 12 - Heater



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19BDP4

Maximum and Minimum Ratings, Design-Maximum Values:		
ULTOR-TO-GRID-No.1 VOLTAGE	volts volts	
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE: Positive value	volts	
Negative value	volts	
GRID-No.2-TO-GRID-No.1 VOLTAGE {70 max. 40 min.	volts volts	
CATHODE-TO-GRID-No.1 VOLTAGE 100 max.	volts	
HEATER VOLTAGE	volts	
(5.8 mm.	volts	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	volts	
Typical Operating Conditions:		
With ultor-to-grid-No.1 voltage of 14500	volts	
and grid-No.2-to-grid-No.1 voltage of 50	volts	
Grid-No.4-to-Grid-No.1 Voltage for focus . 0 to 500 Cathode-to-Grid-No.1 Voltage for	volts	
visual extinction of focused raster 31 to 49	volts	
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance 1.5 max.	megohms	

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section





19CHP4

Picture Tube

SHORT RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS LOW GRID-No.2 VOLTAGE ALUMINIZED SCREEN 114° MAGNETIC DEFLECTION CATHODE-DRIVE TYPE

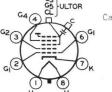
With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Electrical.	
Heater Current at 6.3 volts 600 ± 30 ma Heater Warm-Up Time (Average) 11 seconds Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 µµf Cathode to all other electrodes 5 µµf	
Eutomol accounting to ulter $\int 1500 \text{ max}, \mu\mu f$	
Electron Gun Type Requiring No Ion-Trap Magnet	
Optical:	
Faceplate	
Mechanical:	
Operating Position. Any Weight (Approx.). 14 lbs Overall Length. 11-5/8" ± 1/4" Neck Length 4-3/8" ± 1/8" Projected Area of Screen. 172 sq. in.	
External Conductive Coating: Type	
Cap	
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 4 - Grid No.4 Pin 5 - Grid No.4 Pin 5 - Grid No.4 Pin 4 - Grid No.4	

Pin 4-Grid No.4 Pin 6-Grid No.1 Pin 7-Cathode Pin 8-Heater



up - Ultor (Grid No.3, Grid No.5, Collector) C - External Conductive Coating



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 3-62

19CHP4

Maximum and Minimum Ratings, Design-Maximum Values:		
ULTOR-TO-GRID-No.1 VOLTAGE	volts	
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:	volts	C
Positive value	volts	
Negative value	volts	
GRID-No.2-TO-GRID-No.1 VOLTAGE	volts	
CATHODE-TO-GRID-No.1 VOLTAGE: 150 max. Positive peak value 100 max. Negative bias value 0 max. Negative peak value 2 max. HEATER VOLTAGE. 6.9 max. PEAK HEATER-CATHODE VOLTAGE: 5.7 min.	volts volts volts volts	0
Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	volts	0
Typical Operating Conditions:		
With ultor-to-grid-No.1 voltage of 16000	volts	
and grid-No.2-to-grid-No.1 voltage of 50	volts	
Grid-No.4-to-Grid-No.1 Voltage for focus50 to +250 Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster 32 to 50	volts volts	
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance 1.5 max.	megohms	

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



19CMP4

Picture Tube

LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGNETIC DEFLECTION

Low-Grid-No.2 Voltage - for Cathode-Drive Operation

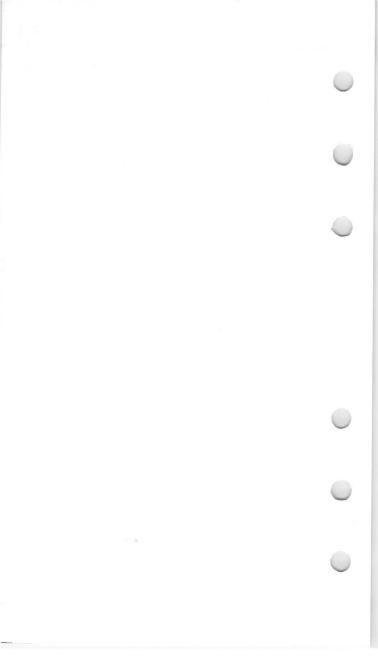
The $19\mbox{CMP4}$ is the same as the $19\mbox{CHP4}$ except for the following items:

ELECTRICAL

Heate	r Curren	t at	6.3	VC	lts	·		•		·		•			·	450	±	20	mA
	MAXIMUM	AND	MINI	MUM	RAT	FIN	GS	,	DE	S	G	-	MA)	(1)	٩UN	A VA	LUE	ES	
Anode	Voltage															1200	00	min	٧



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 7-65



NO ION-TRAP MAGNET REQUIRED

LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGNETIC DEFLECTION

Low-Grid-No.2 Voltage - for Cathode-Drive Operation

ELECTRICAL

Direct Interelectrode Capacitances Cathode to all other electrodes		5	pF
Grid No.1 to all other electrodes			pF
External conductive coating to anode	• • {	1900 max 1400 min	pF pF
Heater Current at 6.3 V		600 ±60	mA
Heater Warm-Up Time (Average)		11	S
Electron Gun Type Requiring No	lon	n-Trap Mag	net

OPTICAL

Phosphor	
For curves, see front of this	section
Faceplate	Filterglass
Light transmission (Approx.).	

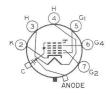
MECHANICAL

Weight (Approx.)	4 1b
Overall Length	0 in
Neck Length	5 in
Projected Area of Screen	
External Conductive Coating	

Type, ..., Regular-Band Contact area for grounding, Near Reference Line For Addition Information on Coatings and Dimensions

See Picture-Tube Dimensional-Outlines and Bulb J149A sheets at front of this section

Pin 2-Cathode Pin 3-Heater Pin 4-Heater Pin 5-Grid No.1 Pin 6-Grid No.2 Cap-Anode (Grid No.3, Grid No.5, Screen, Collector) C-External Conductive Coating





RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 10-65

19CXP4

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Unless otherwise specified, voltage values	
are positive with respect to grid No.1	
Anode Voltage	
Grid-No.4 (Focusing) Voltage Positive value	V V
Cathode Voltage 2 max Negative peak value 0 max Positive bias value 0 max Positive peak value 100 max Positive peak value 6.9 max Heater Voltage 5.7 min	V V V V
Peak Heater-Cathode Voltage Heater negative with respect to cathode: During equipment warm-up period	120
not exceeding 15 seconds	
Combined AC and DC voltage	· · · · · · · · · · · · · · · · · · ·
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	2
Unless otherwise specified, voltage values are positive with respect to grid No.1	
Anode Voltage	٧
MAXIMUM CIRCUIT VALUE	
Grid-No. Circuit Resistance 1.5 max	MΩ
For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section	



PAN-0-PLY-INTEGRAL	IMPLOSION PRO	TECTION	
(Provided by Formed Rim and Welded Ten Panel—No Separate Safety-Glass or In	sion Bands Arou tegral Protecti	nd Periphery of T ve Window Require	ube d)
LOW-VOLTAGE ELECTROSTATIC FOCUS	II4° MA	GNETIC DEFLECT	ION
ELECTR	RICAL		
	es	5 6 min—1750 max 450 ± 20 11 No Ion-Trap Mag	pF pF pF ← mA s net
OPTI			
Phosphor	on	Type, Alumini	
Light Transmission (Approx.)		····	48%
Weight (Approx.)	TOAL	15	lb
Verall Length	· · · · · · · · ·	11.375 ± .250 4.125 ± .125 172 sq	in in
Type . Contact area for grounding. For Additional Information on C See Picture-Tube Dimensional- at front of this section	oatings and D	imensions	ine
Cap Recessed			
Base	Small-Button	Neoeightar 7-P (JEDEC No.B7-2	in,
TERMINAL DIAGRA			08)
TERMINAL DIAGRA	M (BOLLON VIE	w)	
Pin 1 -Heater Pin 2 -Grid No.1 Pin 3 -Grid No.2 Pin 4 -Grid No.4 Pin 6 -Grid No.1 Pin 7 -Cathode Pin 8 -Heater Cap -Anode (Grid No.3, Grid No.5, Screen, Collector) C -External Conductive	G4 G2 G1 C		
Coating		8 H R	



RADIO CORPORATION OF AMERICA Electronic Components and Devices

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🖛 Indicates a change.

DATA I 12-66

MAXIMUM AND MINIMUM RATINGS, DE	SIGN-MAXIMUM VALUES	
Unless otherwise specified,		
are positive with respec		
Anode Voltage.	11000 min-23000 max \	
Grid-No.4 (Focusing) Voltage Positive value	1100 max	,
Negative value	550 max	
Grid-No.2 Voltage	200 min-550 max	
Grid-No.I Voltage		
Negative peak value	220 max \	
Negative bias value	155 max	
Positive bias value	0 max	
Positive peak value	2 max \ 5.7 min-6.9 max \	
Peak Heater-Cathode Voltage	5.7 min-6.9 max	'
Heater negative with respect to cath	ode:	
During equipment warm-up period		
not exceeding 15 seconds	450 max \	
After equipment warm-up period Heater positive with respect to cat	300 max \	
Combined AC and DC voltage	200 max	,
DC component	100 max	
TYPICAL OPERATING CONDITIONS FOR (
Unless otherwise specified,		
are positive with respect	0	
Anode Voltage	16000	
Grid-No.4 Voltage ^b		
Cathode Voltage		
For visual extinction of focused ra	ster	
Field Strength of required adjustable		
centering magnet ^c	0 to 8 0	à
MAXIMUM CIRCUIT V	ALUE	
Grid-No.I Circuit Resistance	1.5 max MG	2
a		
^a External conductive coating and implosion grounded.		
b The grid-No.4 voltage required for optimum will have a value anywhere between 0 and grid-No.1 voltage and video-signal volt current of 100 microamperes on a 10-1/2-inc RCA-2721 monoscope or equivalent	focus of any individual tube	
grid-No.1 voltage and video-signal volt	age adjusted to give an anode	
RCA-2F21 monoscope, or equivalent.	n by 14-inch pattern from an	
For X-radiation shielding consid		
X-RADIATION PRECAUTIONS FOR C	ATHODE-RAY TUBES	

at front of this section



19DQP4

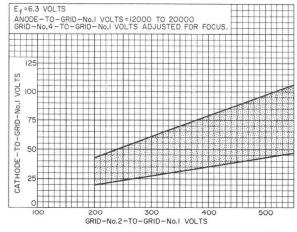
Distance from Reference Line for suitable PM centering magnet should Unstance from weierence the for solidate we centering magnet should not exceed 2-1/4 inches. The specified centering magnet compensates only for the effect which mechanical tube tolerances may have on the location of the undeflected, focused spot with respect to the center of the tube face. Maximum field strength of adjustable centering magnet equals

Anode volts 16000 volts × 8 gauss

The equipment manufacturer must determine and supply additional compen-sation for the effects of the earth's magnetic field and extraneous fields due to choice of circuitry and components. The additional compensation should preferably be applied as part of the magnetic field of the deflecting yoke.

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

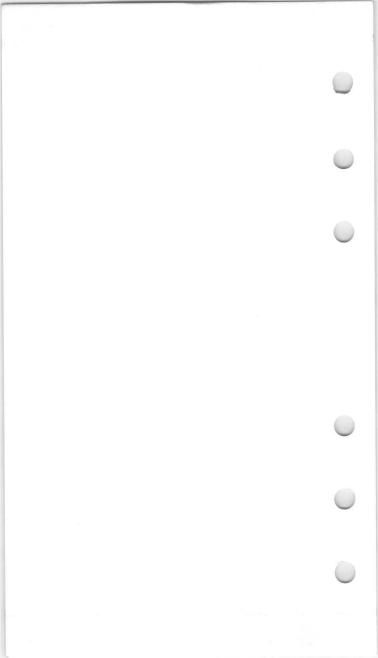




92CS-12008



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19**DRP**4

Picture Tube

PAN-O-PLY -- INTEGRAL IMPLOSION PROTECTION

(Provided by Formed Rim and Welded Tension Bands Around Periphery of Tube Panel - No Separate Safety-Glass or Integral Protective Window Required) RECTANGULAR GLASS TYPE NO ION-TRAP MAGNET REQUIRED LOW-VOLTAGE ELECTROSTATIC FOCUS 114º MAGNETIC DEFLECTION HEATER CONTROLLED WARM-UP TIME ALUMINIZED SCREEN

The 19DRP4 is the same as the 19DQP4 except for the following item:

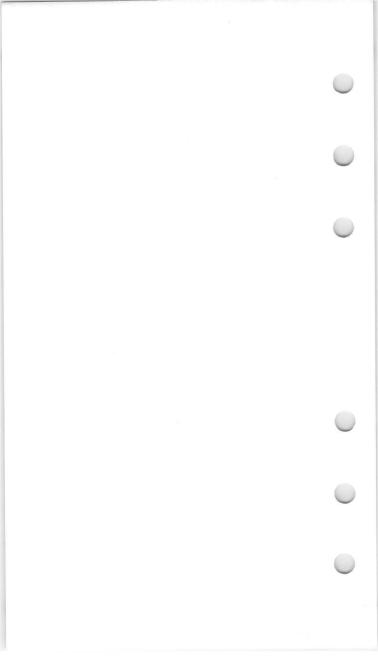
Electrical:

Heater current at 6.3 volts . . . 600 ± 30 ma



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DATA 4-65



19DSP4

Picture Tube

PAN-O-PLY -- INTEGRAL IMPLOSION PROTECTION

(Provided by Formed Rim and Welded Tension Bands Around Periphery of Tube Panel - No Separate Safety-Glass or Integral Protective Window Required) LOW-VOLTAGE ELECTROSTATIC FOCUS 114° MAGNETIC DEFLECTION

NO ION-TRAP MAGNET REQUIRED

Low-Grid-No. 2-Voltage - for Cathode-Drive Operation

ELECTRICAL

Direct Interelectrode Capacitances

Cathode to all other electrodes 5	pF
Grid No.1 to all other electrodes 6	pF
External conductive coating to anode ^a {1750 max 1250 min	pF 🖛
	pF 🖛
Heater Current at 6.3 volts \ldots	mA
Heater Warm-Up Time (Average)	S
Electron Gun Type Requiring No Ion-Trap	Magnet

OPTICAL

Phosphor	.P4-Sulfide	Type,	Aluminized
(For Curves, see front of this	section)		
Faceplate			Filterglass
Light Transmission (Approx.).			48% -

MECHANICAL

Weight (Approx.)
Overall Length
Neck Length 4.375 ± 0.125 in
Projected Area of Screen
External Conductive Coating ^a
Type
Contact area for grounding Near Reference Line
For Additional Information on Coatings and Dimensions
See Picture-Tube Dimensional-Outlines and Bulb J149 F sheets
at front of this section
Cap
Base
Arrangement I, (JEDEC No.B7-208)
Basing Designation for BOTTOM VIEW
Pin 1-Heater
Pin 2 - Grid No.1 G4 ANODE
Pin 3-Grid No.2 Pin 4-Grid No.4
Pin 6-Grid No.4 G^2 $(T_{})^{(G)}$
Pin 7 - Cathode
This / - Cathode

- Pin 8-Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector)
 - C-External Conductive Coating



- Indicates a change.



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Harrison, N. J.

DATA 7-65

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
Unless otherwise specified, voltage values	
are positive with respect to grid No.1	
Anode Voltage	
Grid-No.4 (Focusing) Voltage Positive value	
Negative value	
Grid-No.2 Voltage	
Cathode Voltage Negative peak value 2 max V Negative bias value 0 max V Positive bias value	
Positive peak value	
Heater Voltage	
Peak Heater-Cathode Voltage Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	
Heater positive with respect to cathode: Combined AC and DC voltage	
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
Unless otherwise specified, voltage values are positive with respect to grid No.1	
Anode Voltage	
Grid-No.4 Voltage ^b	
Cathode Voltage for visual extinction of focused raster	
Field Strength of required adjustable	6
contering magnet i i i i i i i i i i i i i i i i i i i	
MAXIMUM CIRCUIT VALUE Grid-No.I Circuit Resistance	
^a External conductive coating and implosion protection hardware must be grounded.	
b The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between -100 and +300 volts with the com- bined grid-No.1 voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 10-1/2-inch by 14-inch pattern from an RCA-2F21 monoscope, or equivalent.	
For X-radiation shielding considerations, see sheet X-BADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section	0



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

DEFLECTION pF 50 max pF mA s
pF 50 max pF mA s
rap Magnet
Aluminized ilterglass
+0 /0
16 1b ± .250 in ± .125 in 172 sq in
gular-Band rence Line No.JI-21) tar 7-Pin, No.B7-208)
de de
00 max V V V max V
V V V Max V

RCA

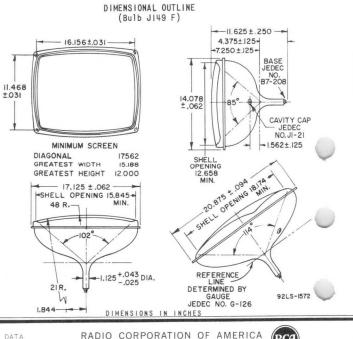
RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 2-67

19EBP4

Peak Heater-Cathode Voltage Heater negative with respect to cathode:	
	٧
After equipment warm-up period 300 max	V
Heater positive with respect to cathode:	V
	V V
DC component	¥
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
Voltages are positive with respect to grid No.1	
Anode Voltage	V
Grid-No.4 Voltage 0 to 400	V
arra nota fortagor i i i i i i i i i i i i i i i i i i i	٧
Cathode Voltage	V
For visual extinction of focused raster Field Strength	G
Field Strength 0 to 8 Of required adjustable centering magnet	G
MAXIMUM CIRCUIT VALUE	1

Grid-No.1 Circuit Resistance . 1.5 max MΩ

a Includes implosion protection hardware.



Harrison, N. J.

Electronic Components and Devices

DATA

	FILLED-RIM TYPE	
	114° MAGNETIC DEFLECTION	LOW GRID-No.2 VOLTAGE
	Direct Interelectrode Capacitances Cathode to all other electrodes Grid No.1 to all other electrodes External conductive coating to anode ^a Heater Current at 6.3 V Heater Warm-Up Time (Average) Electron Gun Type Requir OPTICAL	450 ± 20 mA
	Phosphor	lfide Type, Aluminized
	For curves, see front of this section Faceplate	Filterglass
1	MECHANICAL	
	Weight (Approx.)	11.625 \pm .250 in 4.375 \pm .125 in
	Type(see CRT OUTLINES 1 at front of this see Contact area for grounding	. Near Reference Line
	Cap	
	TERMINAL DIAGRAM (Botton	
	ANODE	
	Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.4 Pin 6 - Grid No.4 Pin 7 - Cathode Pin 8 - Heater H BHR	Cap - Anode (Grid No.3, Screen, Collector) C - External Conductive Coating
	MAXIMUM AND MINIMUM RATINGS, DESIG	N-MAXIMUM VALUES
	Voltages are positive with respe	ct to grid No.1
		12000 min-21000 max V
	Positive value	1250 max V 400 max V
	Grid-No.2 Voltage	25 min-60 max V
0	Cathode Voltage Negative peak value Negative bias value Positive bias value Positive peak value	2 max V 0 max V 100 max V 150 max V

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19EGP4

5.7 min-6.9 max V Heater negative with respect to cathode: During equipment warm-up period < 15 s. . 450 max ۷ After equipment warm-up period. . . . 300 max ۷ Heater positive with respect to cathode: Combined AC & DC voltage. . . . 200 max V DC component. . . . 100 max V TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE Voltages are positive with respect to grid No.1 16000 Anode Voltage 0 to 400 V Grid-No.4 Voltage . . . 50 V Grid-No.2 Voltage . . . 32 to 50 V Cathode Voltage . . . For visual extinction of focused raster 0 to 8 G Field Strength. . . Of required adjustable centering magnet MAXIMUM CIRCUIT VALUE 1.5 max MQ Grid-No.I Circuit Resistance. ^a Includes implosion protection hardware. DIMENSIONAL OUTLINE (Bulb J149 F) DIMENSIONS IN INCHES -11.625±.250 -- 16.156±.031-4.375±125+ -7.250 ±.125-BASE JEDEC NO. 87-208 11.468 ±.031 14.078 85 ±.062 CAVITY CAP JEDEC MINIMUM SCREEN NO. JI-21 DIAGONAL 17562 1.562±.125 GREATEST WIDTH 15,188 GREATEST HEIGHT 12.000 SHELL SHELL OPENING BURN OPENING - 17.125 ±.062 SHELL OPENING 15.845+ 48 R.-MIN 02 25 +.043 DIA. 21 R. REFERENCE I INF DETERMINED BY GAUGE 1.844 JEDEC NO. G-126 92LS-1572

DATA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



DATA

2-66

	PAN-O-PLY—INTEGRAL IMPLOSION PROTECTION LOW-VOLTAGE ELECTROSTATIC FOCUS II4° MAGNETIC DEFLECTION LOW-GRID-NO.2 VOLTAGE CATHODE-DRIVE TYPE
	ELECTRICAL
	Direct Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode ^a
	Heater Current at 6.3 V
-	OPTICAL
	Phosphor P4—Sulfide Type, Aluminized For curves, see front of this section Faceplate Faceplate Light transmission at center (approx.) 48%
	MECHANICAL
	Weight (Approx.)
	Contact area for grounding Near Reference Line For Additional Information on Coatings and Dimensions See Picture-Tube Dimensional-Outlines and Bulb J149 F sheets at front of this section Cap Recessed Small Cavity (JEDEC No.JI-21)
	Base Small-Button Neoeightar 7-Pin,
	Arrangement I, (JEDEC No.B7-208) TERMINAL DIAGRAM (Bottom View)
	Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.1 G_{2}
	Pin 7 - Cathode Pin 8 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating 8HR

RADIO CORPORATION OF AMERICA

Harrison, N. J.

Electronic Components and Devices

DCA

19ENP4A

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES			
Unless otherwise specified, voltage values are positive with respect to Grid No.1		6	
1		-	y
Anode Voltage		V V	
Grid-No.4 (Focusing) Voltage			
Positive value		٧	
Negative value		V	
Grid-No.2 Voltage	nax nin	V	b
Cathode Voltage			r
and the point th	nax	٧	
Negative bias value 0 m		V	
Positive bias value	nax	V	
Positive peak value	nax	V	
Heater Voltage	nax	٧	
(5./ n	nin	V	
Peak Heater-Cathode Voltage		~	r
Heater negative with respect to cathode:			
During equipment warm-up period not exceeding		14	
15 seconds		V	
After equipment warm-up period 300 m	nax	V	
Heater positive with respect to cathode:			
Combined AC and DC voltage 200 m		V	
DC component	lax	V	
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVI	CE		
Unless otherwise specified, voltage values			
are positive with respect to grid No.1			
	000	V	
	250	V	
Grid-No.2 Voltage	50	V	
Cathode Voltage	50	V	
For visual extinction of focused raster	50	,	
MAXIMUM CIRCUIT VALUE			
		0	
Grid-No.I-Circuit Resistance 1.5 max	X	10	Į
a	-		
^a External conductive coating and implosion protection hardware must be g	grounde	ed.	
^b The grid-No.4 voltage required for optimum focus of any individua will have a value anywhere between 0 to + 400 volts with the combin No.1 voltage and video-signal voltage adjusted to give an anode c of 100 microamperes on a 10–1/2 inch by 14-inch pattern from an RC	ed gri	d-	
No.1 voltage and video-signal voltage adjusted to give an anode of	urrer	nt	
of 100 microamperes on a 10-1/2 inch by 14-inch pattern from an RC monoscope, or equivalent.	CA-2F3	21	
		100	
			ļ
		-	-
For X-radiation shielding considerations, see shee	+		
X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES	L		
at front of this section			
at front of this section			
		6	
		and the second se	g.



PAN-O-PLY TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS LOW-GRID-No.2 VOLTAGE

ELECTRICAL

Direct Interelectrode Capacitances	
Cathode to all other electrodes 5	pF
Grid No.1 to all other electrodes 6	pF
External conductive coating to anode1250 min-1750 max	pF
Heater Current at 6.3 volts	mΑ
Heater Warm-Up Time (Average) II	s
Electron Gun	iet
Focus Lens Unipotenti	

OPTICAL

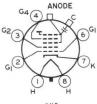


MECHANICAL

Weight (Approx.)
Overall Length
Neck Length
Projected Area of Screen
External Conductive Coating ^a
Type
Contact area for grounding Near Reference Line
For Additional Information on Coatings and Dimensions
See Picture-Tube Dimensional-Outlines and Bulb J149F sheets
at front of this section
Cap Recessed Small Cavity (JEDEC No.JI-21)
Base Small-Button Neoeightar 7-Pin, Arrangement I, (JEDEC No.B7-208)

TERMINAL DIAGRAM (Bottom View)

Pin 1 - Heater
Pin 2 - Grid No.1
Pin 3-Grid No.2
Pin 4 - Grid No.4
Pin 6 - Grid No.1
Pin 7 - Cathode
Pin 8 - Heater
Cap - Anode (Grid No.3,
Grid No.5, Screen,
Collector)
C – External Conductive
Coating



8 H R

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 12-66

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
Unless otherwise specified, voltage values	-
are positive with respect togrid No.1	
Anode Voltage	V
Positive value	٧
Negative value	٧
Grid-No.2 Voltage 20 min-60 max	٧
Cathode Voltage Negative peak value	V
Negative peak value	v V
Positive bias value	V
Positive peak value	v
Heater Voltage 5.7 min-6.9 max	v
Peak Heater-Cathode Voltage	
Heater negative with respect to cathode:	
During equipment warm-up period not	N C
exceeding 15 seconds 450 max After equipment warm-up period 300 max	v v
Heater positive with respect to cathode:	Y
Combined AC and DC voltage	V
DC component	V
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
Unless otherwise specified, voltage values are positive with respect to grid No.1	
Anode Voltage	V
Grid-No.4 Voltage ^b	v
Grid-No.2 Voltage	V
Cathode Voltage	٧
For visual extinction of focused raster	
Field Strength of required adjustable	0
centering magnet 0 to 8	G
MAXIMUM CIRCUIT VALUE	
Grid-No.I-Circuit Resistance I.5 max N	MΩ
a	-
 ^a Includes implosion protection hardware. ^b The grid-No.4 voltage required for optimum focus of any individual tu 	be
^D The grid-No.4 voltage required for optimum focus of any individual tu will have a value anywhere between -100 and +300 volts with the combine the combined of the second s	ed
will have a value anywhere between -loo and -sou volts with the combin grid-No.l voltage and video-signal voltage adjusted to give an ano- current of 100 microamperes on a 10.5-inch by 14-inch pattern from RCA-2F21 monoscope, or equivalent.	an
RCA-2F21 monoscope, or equivalent.	
For X-radiation shielding considerations, see sheet	

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



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Picture Tube

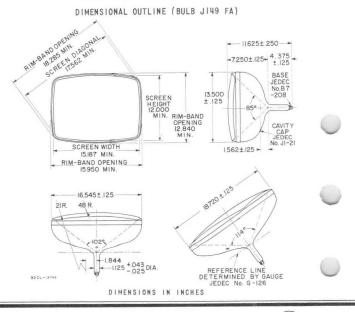
)	PAN-O-PLY—INTEGRAL IMPLOSION PROTECTION LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGNETIC DEFLECTION	
	ELECTRICAL Direct Interelectrode Capacitances	
	Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode ^a . 1250 min—1750 max pF Heater Current at 6.3 V	
	Phosphor	
	MECHANICAL	
	Weight (Approx.) 15 lb Overall Length 11.625 ± 0.250 in Neck Length 4.375 ± 0.125 in Projected Area of Screen 172 sq in External Conductive Coating Type (see GRT OUTLINES 14t front of this section)	
	Contact area for grounding Near Reference Line Cap	2
	Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 4-Grid No.4 Pin 6-Grid No.1 Pin 7-Cathode Pin 8-Heater BHR Pin 8-Heater Pin 8-Heater	
	MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
	Voltages are positive with respect to cathode Anode Voltage	V
	Grid-No.2 Voltage	V V V
	Positive bias value	V V

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19FLP4

Heater Voltage 5.7 min—6.9 max Peak Heater-Cathode Voltage Heater negative with respect to cathode:	V
During equipment warm-up period ≤ 15 seconds 450 max	v
After equipment warm-up period 300 max	V
Heater positive with respect to cathode:	
Combined AC & DC voltage 200 max	٧
DC component	V
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
Voltages are positive with respect to grid No.1	(
Anode Voltage	V
Grid-No.4 Voltage ^b	V
Grid-No.2 Voltage	٧
Cathode Voltage	V
MAXIMUM CIRCUIT VALUE	
Grid-No.l Circuit Resistance 1.5 max	ΜΩ
a External conductive coating and implosion protection hardware mus grounded.	t be

^b The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between 0 and +400 volts with the combined grid-No.1 voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 10.5-inch by 14-inch pattern from an RCA-2P21 monoscope, or equivalent.



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Picture Tube

PAN-O-PLY TYPE WITH MOUNTING LUGS II4^O MAGNETIC DEFLECTION

ELECTRICAL

Direct Interelectrode Capacitances

Cathode to all other electrodes	. 5 pF
Grid No.1 to all other electrodes .	. 6 pF
External conductive coating to anode.	.1250 min-1750 max pF
Heater Current at 6.3 V	. 450 mA
Heater Warm-Up Time (Average)	. s
Electron Gun Type Requ	

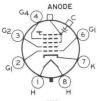
OPTICAL

MECHANICAL

Weight (Approx.).													15	1b
Overall Length										11.	625	±	.250	in
Neck Length		4								4.	375	±	.125	in
Projected Area of	So	cre	eer	۱.								17	72 sq	in
External Conduction	/e	C	oat	tir	ng	a								

TERMINAL DIAGRAM (Bottom View)

Pin	1 – Heater	
Pin	2 - Grid No.1	
Pin	3-Grid No.2	
Pin	4 - Grid No.4	
Pin	6 - Grid No.1	
Pin	7 – Cathode	
Pin	8 - Heater	
Ca	ap - Anode (Grid No.3,	
	Grid No.5, Screen,	
	Collector)	
	C-External Conductive	9
	Coating	



8 H R

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES

Voltages are positive with respect to cathode

Anode Voltage Grid-No.4 Voltage			•		•	•	11000 min-23000 max	۷
Positive value .		i.					1100 max	٧
Negative value .							550 max	٧
Grid-No.2 Voltage.							200 min-550 max	۷



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7-67

19GEP4A

Grid-No.I Voltage Negative peak value	0
Heater negative with respect to cathode: During equipment warm-up period ≤ 15 s 450 max V After equipment warm-up period 300 max V Heater positive with respect to cathode:	
Combined AC & DC voltage 200 max V DC component	\cup
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
Voltages are positive with respect to grid No.1	
Anode Voltage. 16000 V Grid-No.4 Voltage. 0 to 400 V Grid-No.2 Voltage. 300 V Cathode Voltage. 28 to 62 V For visual extinction of focused raster 28 to 62 V	0
Field Strength 0 to 8 G Of required adjustable centering magnet	
MAXIMUM CIRCUIT VALUE	
Grid-No.1 Circuit Resistance 1.5 max $M\Omega$	
^a Includes implosion protection hardware.	
See X-RADIATION PRECAUTIONS at front of this section	
±,250	
1.132 1.132 1.125 1.125 1.125	
RIM- BARD 1:469 1:88 1:500 12.510 12.510	
MINIMUM SCREEN DIAGONAL GREATEST HEIGHT 12.000	•
16.545 ±.125 TRANSPARENT INSULATING COATING RIM-BAND OPENING 15.950 MIN. 10.500 MIN. 21 R. 48 R. 21 R. 48 R. 002° 3625	0
EXTERNAL	0
DATA RADIO CORPORATION OF AMERICA	

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



19GJP4A

Picture Tube

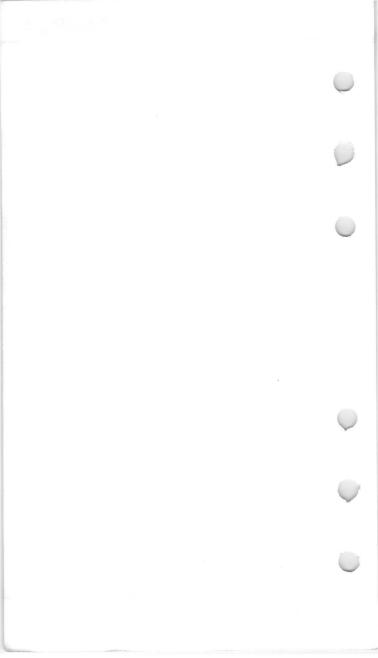
PAN-0-PLY TYPE

114° MAGNETIC DEFLECTION

The 19GJP4A is the same as the 19DQP4 except for the following item:



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19GVP22

Color Picture Tube

"PERMA-CHROME" ASSEMBLY FOR OPTIMUM FIELD PURITY AND UNIFORMITY DURING WARM-UP

RECTANGULAR TUBE MAGNETIC CONVERGENCE 90° MAGNETIC DEFLECTION 3 ELECTROSTATIC-FOCUS GUNS

ALUMINIZED TRICOLOR PHOSPHOR-DOT "*Hi-Lite*" SCREEN (Utilizing a New, Improved Rare-Earth Red-Emitting Phosphor)

For Use in Color-TV Receivers

The 19GVP22 is the same as the 19GWP22 except for the following items:

OPTICAL

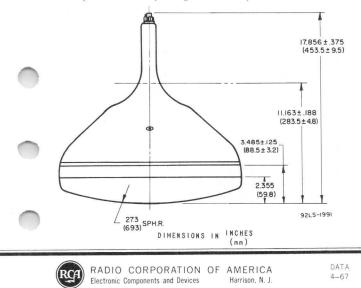
MECHANICAL



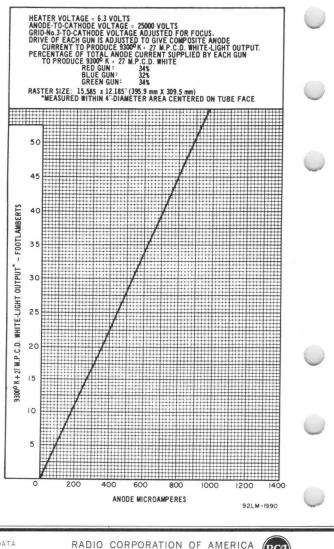
a It is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 19GVP22 to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion under some abnormal condition. This safety cover can also provide x-radiation protection when required.

DIMENSIONAL OUTLINE

Dimensions shown are only those which are different from the corresponding dimensions for the 19GWP 22



Typical Light-Output Characteristic



Electronic Components and Devices

Harrison, N. J.

Color Picture Tube

ULTRA-RECTANGULAR HI-LITE SCREEN 4 X 3 Aspect Ratio **Blue-Gun-Down Operation** Electrical Electron Guns, Three with Axes Tilted Toward Tube Axis Red, Blue, Green Heater, of Each Gun Series Connected within Tube with Each of the Other Two Heaters: Current at 6.3 V 900 mA Focusing Method Electrostatic Focus Lens Unipotential Convergence Method Magnetic Deflection Method Magnetic Deflection Angles (Approx.): Diagonal 90 deg 78 deg Horizontal 60 deg Vertical Direct Interelectrode Capacitance (Approx.): 7.5 pF Grid No.1 of any gun to all other electrodes 6 pF All cathodes to all other electrodes 15 pF Capacitance Between Anode and External (2300 max. pF Conductive Coating 1800 min. pF Resistance Between Metal Hardware and Optical Faceplate Filterglass Light transmission at center (Approx.) 53% Surface Polished Screen Phosphor, rare-earth (red) sulfide (blue & green) P22 Persistence Medium-Short Spacing between centers of adjacent dot trios (Approx.) 0.024 in (0.61 mm) Mechanical Minimum Screen Area (Projected) 185 sq in (1194 sq cm) Bulb Funnel Designation JEDEC No.J160-3/4 B1/C1 Bulb Panel Designation JEDEC No.FP161-3/4 V1 (JEDEC No.B12-244) Basing Designation JEDEC No.14BH Pin Position Alignment Pin No.5 Aligns Approx. with Anode Bulb Contact

BA Electronic Components

Operating Position, preferred Anode Bulb Contact	on Ton
Gun Configuration	
Weight (Approx.) 25 lb (11.4 kg)
Implosion Protection	-
Туре	Banded
Maximum and Minimum Ratings, Design-Maximum Values	
Unless otherwise specified, values are for each gun and	voltage
values are positive with respect to cathode.	
Anode Voltage 22.5 ma	
17 mil	n. kV
Anode Current, Long-Term Average ^b 1000 ma	ix. μΑ
Grid-No.4 (Focusing Electrode) Voltage:	
Positive value 1100 ma	
Negative value 550 ma	ix. V
Peak-Grid-No.2 Voltage, Including Video Signal Voltage 1000 ma	x V
	IX. V
Grid-No.1 Voltage: Negative bias value	x V
Negative operating cutoff value	
Positive bias value	x. V
Positive peak value 2 ma	x. V
Heater Voltage (ac or dc): ^C 6.9 ma	x. V
Under operating conditions 5.7 min	
Under standby conditions ^d 5.5 ma	x. V
Heater-Cathode Voltage:	
Heater negative with respect to cathode:	
During equipment warm-up period not exceeding 15 seconds	x. V
After equipment warm-up period:	· ·
DC component value	x. V
Peak value 200 ma	x. V 🔍
Heater positive with respect to cathode: DC component value	× V
DC component value 0 ma Peak value 200 ma	
Equipment Design Ranges	
Unless otherwise specified, values are for each gun and values are positive with respect to cathode.	voltage
For anode voltages between 17 and 22.5 kV	
Grid-No.4 (Focusing Electrode) Voltage75 to	400 V
Grid-No.2 Voltage for Visual Extinction	400 V
of Undeflected Focused Spot See CUTOFF DESIGN	CHART
in	Figure 3
At Grid No.1 voltage of -75 V 90 to	270 V
	No. No. 2010/00/00/00/00/00/00/00/00/00/00/00/00/

RCA Electronic Components

STATISTICS.	and the second	COMPANY AND A COMPANY AND A COMPANY AND A COMPANY	CONTRACT DATE OF A DESCRIPTION OF A DESC	CONTRACTOR OF CASE
	At Grid No.1 voltage of -125 V At Grid No.1 voltage of -140 V		210 to 505	v v
	Maximum Ratio of Grid-No.2 Voltag Lowest Gun in Any Tube (At grid-N voltage of -100 V)	o.1 spot cuto	off	.86
	Heater Voltage: ^C			
	Under operating conditions: When standby operation is no			
	When 5.0-V standby operation Under standby conditions ^d			
	Grid-No.4 Current (Total)		±60	μA
	Grid-No.2 Current			
	Grid-No.1 Current		±5	μA
		Illum. D	Color	
	To Produce White Light of	6550 ⁰ K +	9300° K +	
	CIE Coordinates:	7 M.P.C.D.	27 M.P.C.D.	
	Χ	0.313	0.281	
	Υ	0.329	0.311	
	Percentage of total anode curren	it		
	supplied by each gun (average): Red	41	30	%
	Blue	24	31	%
	Green	35	39	%
	Ratio of cathode currents:			
	Red/blue:			
	Minimum	1.35	0.75 0.95	
	Typical	1.70 2.20	1.25	
	Red/green:	2.20	1.20	
	Minimum	0.95	0.60	
	Typical	1.15	0.75	
	Maximum	1.70	1.10	
	Blue/green:	0.50	0.60	
	Minimum	0.50 0.70	0.80	
	Maximum	0.95	1.10	
	Displacements, Measured at Center o	f Screen:		
	Raster centering displacement:	+ 0.45	5 in (± 11,4 m	()
	Horizontal		5 in (± 11.4 m 5 in (± 11.4 m	
	Lateral distance between the blue		2 11 (= 11.4 11	
	the converged red and green bean		5 in (± 6.4 m	nm)
	Radial convergence displacement			
	effects of dynamic convergence	1 0 07		
	(each beam)	± 0.37	'in (± 9.4 n	nm)
		Construction description		
	RBA Electronic Components		DA	2-72

DATA 2 2-72

Maximum Required Correction for Register ^e (Including Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the Center of the Screen in any Direction	
Typical Operation	
Heater Voltage 6.3 V Anode Voltage 20 kV Grid-No.4 Voltage Adjusted for focus Color Temperature 9300° K + 27 M.P.C.D. Raster Size 15.922 x 11.941 in (404.42 x 303.30 mm)	
Typical White-Light Output Measured within 4 in (102 mm) diameter area centered on tube face:	
At anode current of 1000 μ A	
Limiting Circuit Values	
Low-Voltage Circuits: Effective grid-No.1-to-cathode- circuit resistance (each gun)	
X-Radiation Characteristic :	
Maximum Anode Voltage at which the X-radiation emitted will not exceed 0.5 mR/h at an anode current of 300 μ A	
linearly with anode current. ^a The mating socket, including its associated, physically-attached	

- ^a The mating socket, including its associated, physically-attached hardware and circuitry, must not weigh more than one pound (one-half kilogram).
- b The short-term average anode current should be limited by circuitry to 1500 microamperes.
- c For maximum cathode life, it is recommended that the heater supply be regulated. The series impedance to any chassis con-

nection in the dc biasing circuit for the heater should be between 100 kilohms and 1 megohm. The surge voltage across the heater must be limited to 9.5 volts rms.

- d The use of a 5-volt standby condition in conjunction with 6-volt operating conditions is recommended to improve the reliability of the color picture tube by extending the emission wear-out life and reducing other gun-related defects. A maximum heater voltage of 5.5 volts (Design-Maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- e Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

IMPORTANT: Refer to sheet Safety Precautions For Color Picture Tubes at front of this section.

Notes For Dimensional Outline

- Note 1 With tube neck inserted through flared end of referenceline and neck-funnel-contour gauge (JEDEC No.G162) and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C² of the gauge with the glass funnel.
- Note 2 Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.
- Note 3 The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

Note 4 - To clean this area, wipe only with soft, dry, lintless cloth.

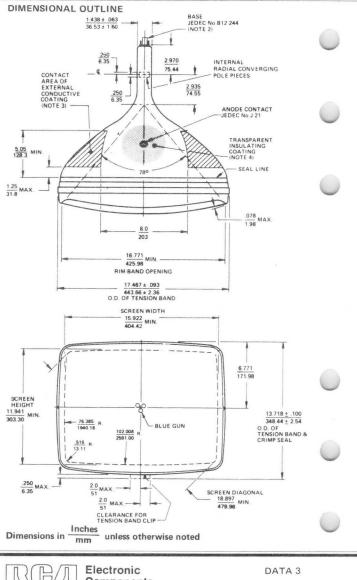
SAGITTAL HEIGHTS AT POINTS $\frac{.125}{3.18}$ BEYOND EDGE OF MIN. SCREEN

DIAGONAL 1.485

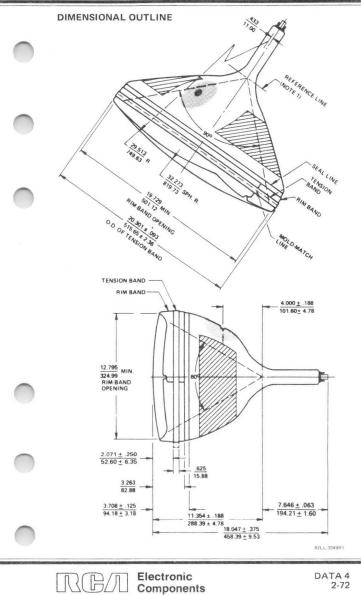
52

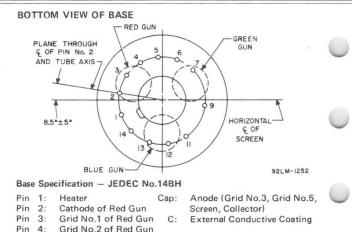
RBA Electronic Components

WIDTH 1.044 26.52 HEIGHT .582 14.78



Components





Grid No.1 of Blue Gun Pin 13: Grid No.2 of Blue Gun Pin 14: Heater

Grid No.2 of Green Gun

Grid No.1 of Green Gun

Cathode of Green Gun

Cathode of Blue Gun

Grid No.4

Pin 5: Pin 6:

Pin 7:

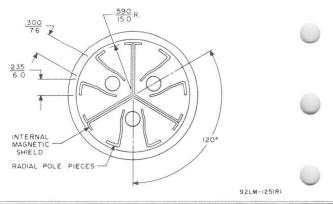
Pin 9

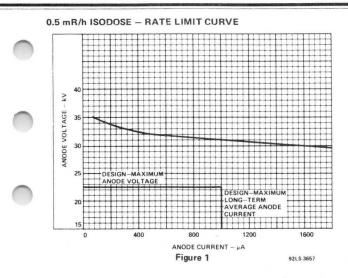
Pin 11:

Pin 12:

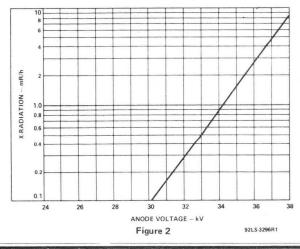
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LOCATION OF RADIAL-COVERGING POLE PIECES VIEWED FROM SCREEN END OF GUNS





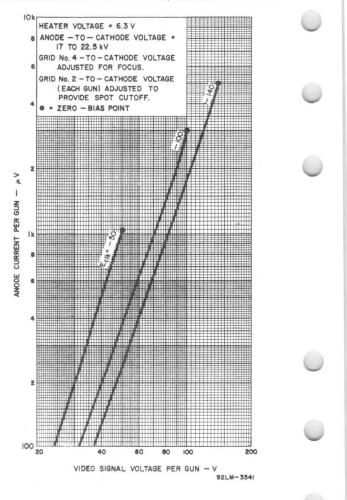




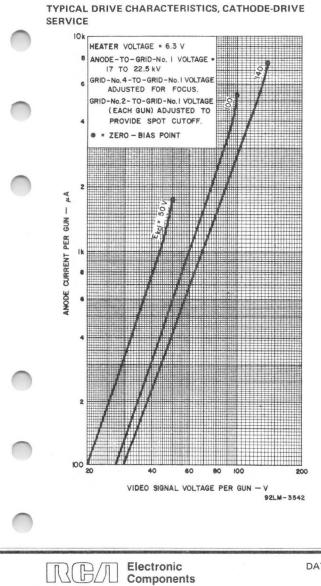
Electronic Components

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TYPICAL DRIVE CHARACTERISTICS, GRID-DRIVE SERVICE

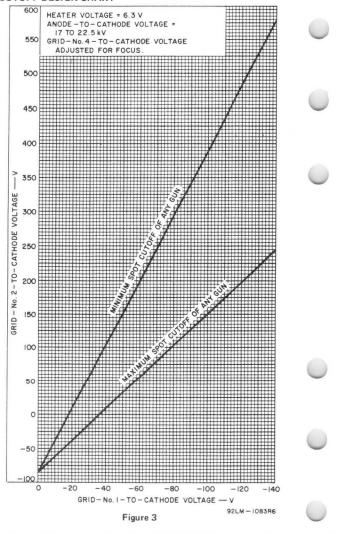


RBA Electronic Components



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CUTOFF DESIGN CHART



Electronic Components

日/Л

2

Color Picture Tube

	Ultra-Rectangular Hi-Lite	Matrix Screen
2	4 x 3 Aspect Ratio Light Neutral Scre	en Appearance
	Electrical:	
	Electron Guns, Three with Axes Tilted Toward Tube Axis R Heater:	led, Blue, Green
	Voltage Current	
	Focusing Method	Electrostatic
	Focus Lens	. Bipotential
	Convergence Method	Magnetic
	Deflection Method	Magnetic
	Deflection Angles (Approx.): Diagonal Horizontal Vertical Direct Interelectrode Capacitance (Approx.): Grid No.1 of any gun to all other electrodes Grid No.3 to all other electrodes All cathodes to all other electrodes	78 deg 60 deg 6 pF 6.5 pF
	Resistance Between Metal Hardware and External Conductive Coating	
	Optical:	
	Faceplate	70%
	Screen Matrix Black Phosphor, rare-earth (red) sulfide (blue & green Persistence Array 3 Spacing between centers of adjacent dot trios (Approx.) 0.0) P22 Medium-Short 32,000 Dot trios
	Mechanical: Minimum Screen Area (Projected) 185 sq Bulb Funnel Designation JED Bulb Panel Designation JEDEC N	EC No.J510A06
	B ase Designation ^a Small-Button (JED	Diheptar 12-Pin EC No.B12-244)
	Basing Designation	JEDEC No. 14BE
	Pin Position Alignment Pin No.12 Alig And	ns Approx. with de Bulb Contact
		And the second se

Electronic Components

RBA

Operating Position, preferred Anode Bulb Contact on Gun Configuration	Delta
Implosion Protection: TypeRim Bands and Tension	Band
Maximum and Minimum Ratings, Design-Maximum Values:	
Unless otherwise specified, values are for each gun and vo values are positive with respect to cathode.	Itage
Anode Voltage	kV kV
Anode Current, Long-Term Average ^b 1000 max.	μA
Grid-No.3 (Focusing Electrode) Voltage 6000 max.	V V
Peak-Grid-No.2 Voltage,	v
Including Video Signal Voltage	V
Grid-No.1 Voltage: 400 max. Negative bias value 200 max. Positive bias value 0 max. Positive bias value 0 max. Positive peak value 2 max.	V V V
Heater Voltage (ac or dc):C	
Under operating conditions	V
(V
Under standby conditions ^d	V
Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	v v
Heater positive with respect to cathode:	v
DC component value 0 max. Peak value 200 max.	V V
Equipment Design Ranges:	
Unless otherwise specified, values are for each gun and volvalues are positive with respect to cathode	Itage
For anode voltages between 20 and 27.5 kV	
Grid-No.3 (Focusing Electrode) Voltage	

RBA Electronic Components

100000000000000000000000000000000000000				
	Grid-No.2 Voltage for Visual Extinct of Undeflected Focused Spot So		DESIGN CH	
	At Grid No.1 voltage of -75 V At Grid No.1 voltage of -125 V At Grid No.1 voltage of -175 V		80 to 21	30 V 50 V
	Maximum Ratio of Grid-No.2 Voltag Lowest Gun in Any Tube (At grid-N voltage of -100 V)	o.1 spot cuto	ff	1.86
	Heater Voltage: ^C Under operating conditions: When standby operation in no When 5.0-V standby operation Under standby conditions ^d	is utilizedd	6.0	v
	Grid-No.3 Current (Total)		<u>+</u> 15	5 μA
	Grid-No.2 Current		<u>+</u> ŧ	5 μA
	Grid-No.1 Current		<u>+</u> ŧ	5 μΑ
	To Produce White Light of	Illum. D 6550 ⁰ K +	Color 9300 ⁰ K +	
		7 M.P.C.D.	27 M.P.C.D	
	CIE Coordinates:	0.313	0.281	
	Ŷ	0.329	0.311	
	Percentage of total anode curren		0.011	
	supplied by each gun (average):			
	Red	41	30	%
	Blue	24	31	%
	Green	35	39	%
	Ratio of cathode currents:			
	Red/blue:			
	Minimum	1.35	0.75	
	Typical	1.70	0.95	
	Maximum	2.20	1.25	
	Red/green: Minimum	0.95	0.60	
2	Typical	1.15	0.75	
	Maximum	1.70	1.10	
	Blue/green:			
	Minimum	0.50	0.60	
	Typical	0.70	0.80	
	Maximum	0.95	1.10	
	Displacements, Measured at Center	of Screen:		
	Raster centering displacement:			
	Horizontal	± 0.4	45 in (± 11.4	mm)
-	Vertical		45 in (± 11.4	mm)
	Lateral distance between the blu the converged red and green bea		25 in (+ 64	(mm)
	the converged red and green bea	inis ± 0.4	10 III (± 0.4	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
	Electronic			ATA 2

RBA Electronic Components

Radial convergence displacement excluding effects of dynamic convergence (each beam)	
Maximum Required Correction for Register ^e (Including Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the Center of the Screen in any Direction	(
Light-Output Characteristic:	
Typical White-Light Output	(
Measured within a 4 in (102 mm) diameter area centered on the tube face with the following operating conditions: Anode Voltage 25 kV Anode Current 1000 µA Grid No.3 Voltage Adjusted for focus Color Temperature	1
Limiting Circuit Values:	
High-Voltage Circuits: Grid-No.3 circuit resistance	2
Low-Voltage Circuits: Effective grid-No.1-to-cathode-	

circuit resistance (each gun) X-Radiation Characteristic:

Maximum Anode Voltage at which the X-radiation emitted	
will not exceed 0.5 mR/h at an anode current of	
300 μΑ	33 kV

The X-radiation emitted from this picture tube, as measured in accordance with the procedure of JEDEC Publication No.64A will not exceed 0.5 mR/h throughout the useful life of the tube when operated within the Design-Maximum ratings: 27.5 kV anode voltage and 1000 µA anode current. The tube should not be operated beyond its Design-Maximum ratings stated above (such operation may shorten tube life or have other permanent adverse affects on its performance), but its X-radiation will not exceed 0.5 mR/h for anode voltage and current combinations given by the isodose-rate limit characteristics as shown in Figure 1. Operation above the values shown by the curve may result in failure of the television receiver to comply with the Federal Performance Standard for Television Receivers, Sub-Part C of Part 78 of Title 42, Code of Federal Regulations (PL90-602) as published in the Federal Register Vol.34, No. 247, Thursday, December 25, 1969. Maximum X-radiation as a function of anode voltage at 300 µA anode current is shown by the curve in Figure 2. X-radiation at a constant anode voltage varies linearly with anode current.

RBA Electronic Components ... 0.75 max. MΩ

- a The mating socket, including its associated, physically-attached hardware and circuitry, must not weigh more than one pound (one-half kilogram).
- b The short-term average anode current should be limited by circuitry to 1500 microamperes.
- ^c For maximum cathode life, it is recommended that the heater supply be regulated. The series impedance to any chassis connection in the dc biasing circuit for the heater should be between 100 kilohms and 1 megohm. The surge voltage across the heater must be limited to 9.5 volts rms.
- d The use of a 5-volt standby condition in conjunction with 6-volt operating conditions is recommended to improve the reliability of the color picture tube by extending the emission wear-out life and reducing other gun-related defects. A maximum heater voltage of 5.5 volts (Design-Maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- e Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

Notes for Dimensional Outline

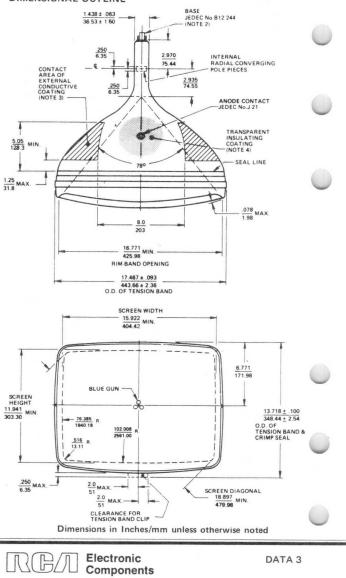
- Note 1 With tube neck inserted through flared end of referenceline and neck-funnel-contour gauge (JEDEC No.G162) and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel.
- Note 2 Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.
- Note 3 The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

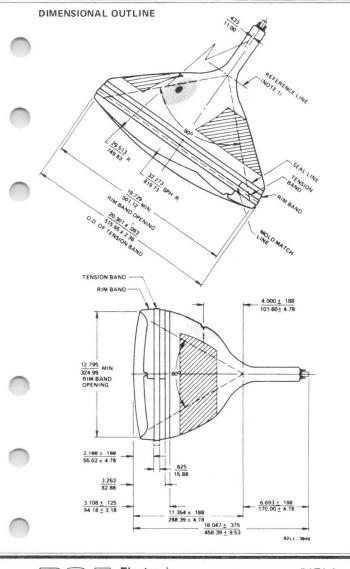
Note 4 - To clean this area, wipe only with soft, dry, lintless cloth.

SAGITTAL HEIGHTS AT POINTS $\frac{.125}{3.18}$ BEYOND EDGE OF MIN. SCREEN					
DIAGONAL	1.485 37.72	WIDTH	1.044	HEIGHT	.582 14.78

RBA Electronic Components

DIMENSIONAL OUTLINE

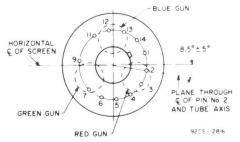




RBA Electronic Components

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BOTTOM VIEW OF BASE



Base Specification - JEDEC No.14BE

 Pin
 1 Heater

 Pin
 2 Cathode of Red Gun

 Pin
 3 Grid No.1 of Red Gun

 Pin
 4 Grid No.2 of Red Gun

 Pin
 5 Grid No.2 of Green Gun

 Pin
 6 Cathode of Green Gun

 Pin
 7 Grid No.1 of Green Gun

 Pin
 9 Grid No.3

 Pin
 1 Cathode of Blue Gun

 Pin
 12 Grid No.1 of Blue Gun

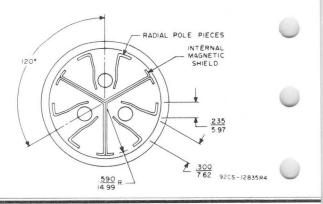
 Pin
 3 Grid No.2 of Blue Gun

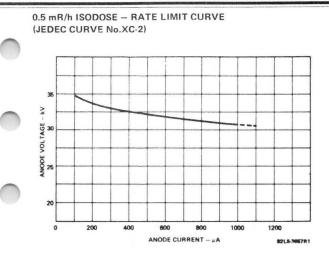
 Pin
 13 Grid No.2 of Blue Gun

 Pin
 14 Heater

Bulb Contact – Anode (Grid No:4, Screen, Collector) C- External Conductive Coating

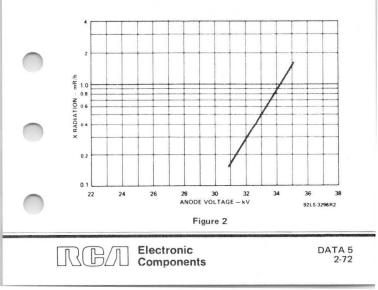
LOCATION OF RADIAL-CONVERGING POLE PIECES VIEWED FROM SCREEN END OF GUNS



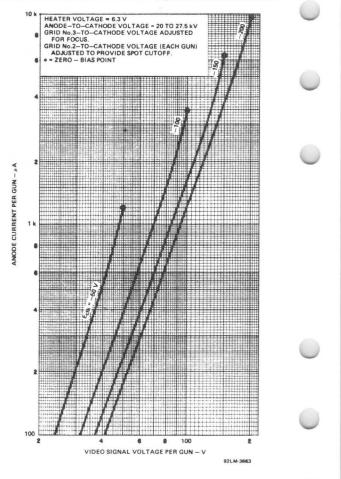




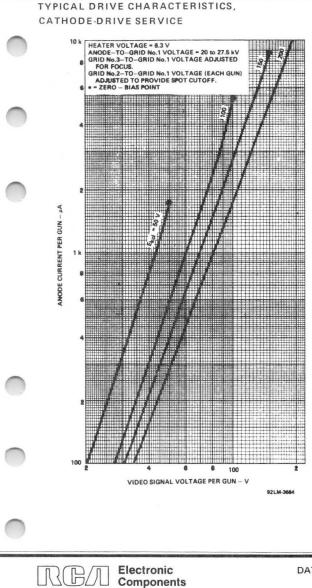
X-RADIATION LIMIT CURVE AT A CONSTANT ANODE CURRENT OF 300 μ A (X-RADIATION AT A CONSTANT ANODE VOLTAGE VARIES LINEARLY WITH ANODE CURRENT) (JEDEC CURVE No.XC-1)



TYPICAL DRIVE CHARACTERISTICS, GRID-DRIVE SERVICE

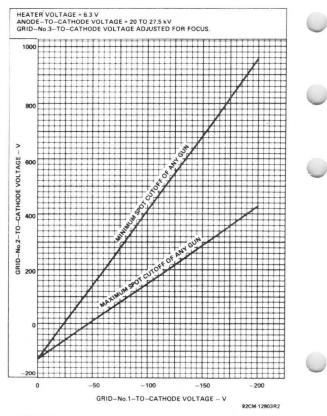


RBA Electronic Components



DATA 6 2-72

CUTOFF DESIGN CHART



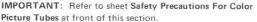


FIGURE 3

RBA Electronic Components

Picture Tube

	SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN Low-yoltage electrostatic focus magnetic deflection
	With Heater Having Controlled Warm-Up Time
	GENERAL DATA
	Electrical:
)	Heater Current at 6.3 volts
)	Diagonal
	External conductive coating to ultor {1500 max. µµf
	Electron Gun
	Optical:
	Faceplate. .
	Mechanical:
	Tube Dimensions: Overall length Greatest width Greatest height Id=13/32" ± 1/8" Greatest height Id=13/32" ± 1/8" Diagonal Neck length Id=13/2" ± 1/8" Verall length Id=13/32" ± 1/8" Diagonal Neck length Id=12/32" ± 1/8" Verall length
	Center
	Edge
	Greatest wight



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 1 10-60

19YP4

Base Small-Button Neoeightar 7-Pin,	Arrangement 1, EDEC No.B7–208)
Basing Designation for BOTTOM VIEW	
Pin 1 - Heater Pin 8	-Heater
	-Ultor
Pin 3-Grid No.2 Pin 4-Grid No.3	(Grid No.4, Collector)
Pin 6-Internal C	-External
Connection-	Conductive
Do Not Use	Coating
rin / - Cathoue	

GRID-DRIVE SERVICE

GRID-DRIVE SERVICE				
Unless otherwise specified, voltage val-				
ues are positive with respect to cathode				
Maximum and Minimum Ratings, Design-Maximum Values:				
ULTOR VOLTAGE	volts 🤍			
	volts			
GRID-No.3 (FOCUSING) VOLTAGE:	1.			
Positive value	volts volts			
600	volts			
GRID-No.2 VOLTAGE	volts			
GRID-No.1 VOLTAGE:	10100			
Negative-peak value	volts			
Negative-bias value	volts			
Positive-bias value 0 max.	volts			
Positive-peak value 2 max.	volts			
HEATER VOLTAGE $\{6.9 \text{ max}.$	volts			
(5./ min.	volts			
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period				
not exceeding 15 seconds 450 max.	volts			
After equipment warm-up period 200 max. Heater positive with	volts 🔵			
respect to cathode	volts			
Typical Operating Conditions:				
With ultor voltage (E _{cuk}) of 16000	volts			
and grid-No.2 voltage (Ec2k) of 500	volts			
Grid-No.3 Voltage for focus 0 to 400 Grid-No.1 Voltage for visual	volts 🔵			
extinction of focused raster*43 to -78 Field Strength of Adjustable	volts			
Centering Magnet♥0 to 10	gausses			
Maximum Circuit Values:				
Grid-No.1-Circuit Resistance 1.5 max.	megohms			



19YP4

CATHODE-DRIVE SERVICE

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

2	Maximum and Minimum Ratings, Design-Maximum Values:				
	ULTOR-TO-GRID-No.1 VOLTAGE	volts volts			
1	GRID-No.3-TO-GRID-No.1 (FOCUSING) VOLTAGE: Positive value	volts volts			
	CRID No 2-TO_CRID-No 1 VOLTAGE	volts			
	GRID-NO.2-TO-CATHODE VOLTAGE	volts volts			
	Positive-peak value	volts			
	Positive-bias value 154 max.	volts			
) –	Negative-bias value 0 max.	volts			
	Negative-peak value 2 max.	volts			
	HEATER VOLTAGE	volts volts			
	Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode 200 max.	volts volts volts			
	Typical Operating Conditions:				
	With ultor-to-grid-No.1 voltage (E_{cug_1}) of 16000 and grid-No.2-to-grid-No.1	volts			
	voltage (Ec2g1) of 500	volts			
)	Grid-No.3-to-Grid-No.1 Voltage for focus•0 to 400 Cathode-to-Grid-No.1 Voltage for visual	volts			
	extinction of focused raster 41 to 69 Field Strength of Adjustable	volts			
	Centering Magnet 0 to 10	gausses			
	Maximum Circuit Values:				
1	Grid-No.1-Circuit Resistance 1.5 max.	megohms			

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

The grid-No.3 voltage required for optimum focus of any individual tube may have avalue anywhere between 0 and 400 volts and is afunction of the value of the ultor voltage, ultor current, and grid-No.2 voltage. It changes directly with the ultor voltage at the rate of approximately 46 volts for each 1000-volt change in ultor voltage; inversely with grid-No.2 voltage at the rate of about 60 volts for each 100-volt change in grid No.2 voltage; and inversely with ultor current at the rate of about 60 volts for each 100-microampere change in ultor current. Because this tube has an arrow depth of focus, it is necessary to provide means such as apotentiometer or a lap witch for adjusting the focusing voltage. In general, commercially acceptable focus is obtained if the focus is



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 2 10-60 required for optimum focus and if the focusing voltage is maintained to within 75 volts of the optimum value during line-voltage fluctuations.

See Raster-Cutoff-Range Chart for Grid-Drive Service.

Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/4". The specified centering magnet compensates only for the effect which mechanical lube tolerances may have on the location of the undeflected focused spot with respect to the center of the tube face. Maximum field strength of adjustable centering magnet equals:

$$\sqrt{\frac{E_{C4k} \text{ or } E_{C491} (\text{volts})}{16000 (\text{volts})}} \times 10 \text{ gausse}$$

The equipment manufacturer must determine and supply additional compensation for the effects of the earth's magnetic field and extraneous fields due to choice of circuitry and components. The additional compensation should preferably be applied as part of the magnetic field of the deflecting yoke.

- Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.
- See Raster-Cutoff-Range Chart for Cathode-Drive Service.

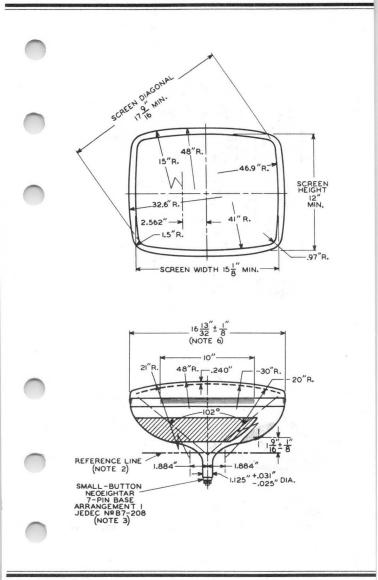
OPERATING CONSIDERATIONS

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

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

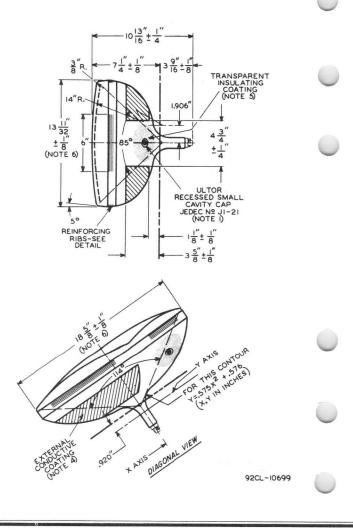


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



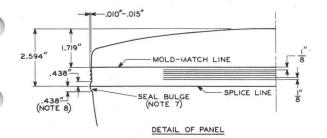


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 3 10-60



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.





NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm~30^{\circ}$. ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC NO.G-126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

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

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

NOTE 6: MEASURED AT THE MOLD-MATCH LINE.

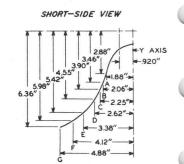
NOTE 7: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN I/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN I/16" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

NOTE 8: UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS 3/8" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF THE TUBE SUPPORT BAND. TUBE MOUNTING AND YOKE SUPPORT CLAMPS MUST BE SPACED FROM THE TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREG-NATED FELT, OR EQUIVALENT.

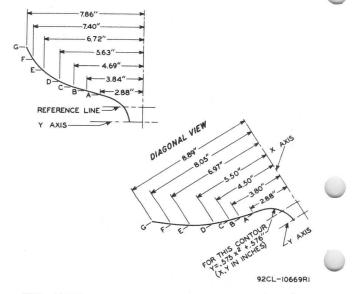


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 4 10-60

BULB-CONTOUR DIMENSIONS



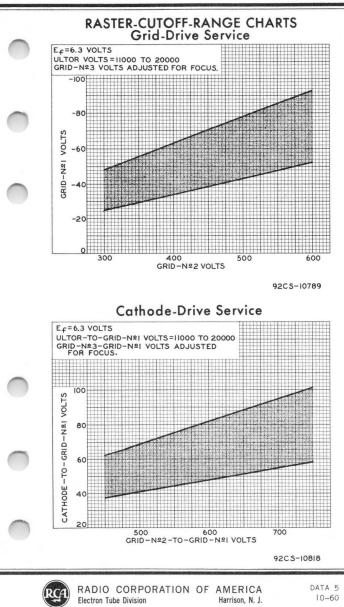
LONG-SIDE VIEW

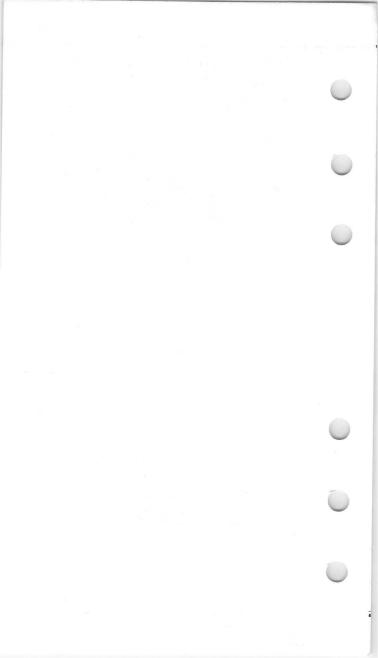


NOTE: PLANES A THROUGH G ARE NORMAL TO THE TUBE AXIS AND AT FIXED LOCATIONS FROM THE YAXIS. THESE COORDINATES DE-SCRIBE THE BOGIE-BULB EXTERNAL CONTOUR IN PLANES THROUGH THE TUBE AXIS AND THE RESPECTIVE FACEPLATE AXES.

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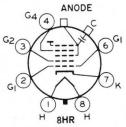


20SP4

Picture Tube

Pan-o-Ply Type Low-Voltage Electrostatic Focus
114° Magnetic Deflection Low Grid-No.2 Voltage
Direct Interelectrode Capacitances:
Cathode to all other electrodes . 5 pF
Grid No.1 to all other electrodes 6 pF
External conductive coating (2000 max. pF
to anode ^{a}
Electron Gun Type Requiring No Ion-Trap Magnet
Focus Lens Unipotential
Phosphor P4-Sulfide Type, Aluminized
Faceplate
Light Transmission at Center (Approx.) 44%
Weight (Approx.)
Overall length
Neck length 4.375" ± .125"
Projected Area of Screen 184 sq. in.
Cap Designation Recessed Small Cavity
(JEDEC No.J1-21)
Base Designation Small-Button Neoeightar 7-Pin,
Arrangement 1, (JEDEC No.B7-208)
TERMINAL DIAGRAM (Bottom View)

V)



MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES

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

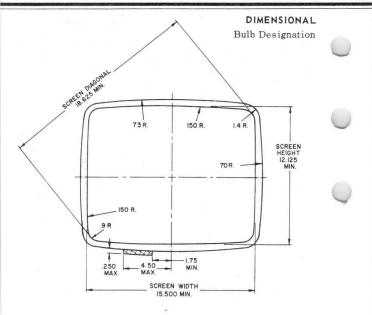
Anode Voltage	00 max. V 00 min. V
	0 max. V
Negative value	00 max. V

Electronic Components

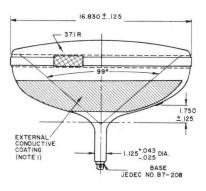
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1

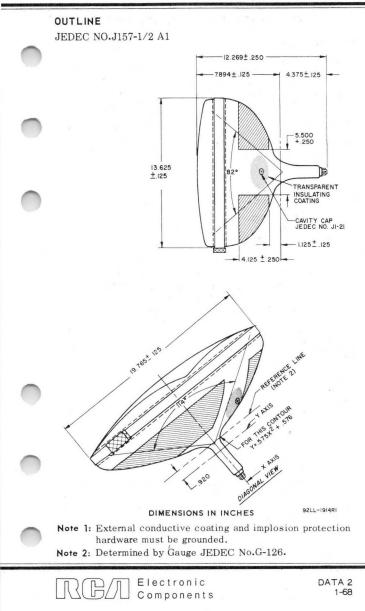
Π



M KEEP THIS SPACE CLEAR OF ANY MEHANICAL OBSTRUCTION



DATA 1



20SP4

MAXIMUM AND MINIMUM RAT	INGS (C	ONT'D		and the second secon
	(60	max.	V	
Grid-No.2 Voltage	120	min.	v	
Cathode Voltage:				
Negative peak value	2	max.	V	
Negative bias value	0	max.	V	
Positive bias value	100	max.	v	
Positive peak value	150	max.	v	
	(6.9	max.	V	
Heater Voltage	15.7	min.	v	\bigcirc
Peak Heater-Cathode Voltage:				
Heater negative with				
respect to cathode:				
During equipment warm-up				
period not exceeding				
15 seconds	450	max.	v	
After equipment warm-up				-
period	300	max.	V	
Heater positive with				
respect to cathode:				
Combined AC & DC voltage.	200	max.	V	
DC Component	100	max.	v	
TYPICAL OPERATING CON CATHODE-DRIVE SE		S FOR		
Unless otherwise specified,	voltage	values		
are positive with respect to p	grid No.	1		
Anode Voltage	16,000		V	
Grid-No.4 Voltage ^b	100		V	
Grid-No.2 Voltage	30		V	
Cathode Voltage for visual				
extinction of focused				
raster	22 to 40		v	
Field Strength of required				<u> </u>
adjustable Centering Magnet	0 to 8		G	
MAXIMUM CIRCUIT V	ALUE			
Grid-No.1 Circuit Resistance	1.5	max.	MΩ	
^o Includes implosion protection hardwa	re.			0

^bThe grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between -100 and +300 volts with the combined grid-No.1 voltage and video-signal voltage adjusted to give an anode current of 100 microamperes on a 11.25-inch by 15-inch pattern from an RCA-2F21 monoscope, or equivalent.

See X-RADIATION PRECAUTIONS at front of this section

Picture Tube

Pan-o-Ply Type Low-Voltage Electrostatic Focus 114° Magnetic Deflection

TERMINAL DIAGRAM (Bottom View)

Negative value

H/

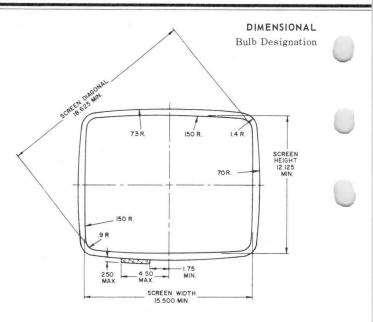
Electronic Components

Pin 1 - Heater	ANODE
Pin 2 - Grid No.1	G4(4) D C
Pin 3 - Grid No.2	GI
Pin 4 - Grid No.4	$3\sqrt{(1-1)}$
Pin 6 - Grid No.1	
Pin 7 - Cathode	
Pin 8 - Heater	(2) $(7)_{\mu}$
Cap - Anode (Grid No.3, Grid G	
No.5, Screen, Collector)	
C - External Conductive Coating	
	H 8HR H
MAXIMUM AND MINIMUM RATINGS, DESI	GN-MAXIMUM VALUES
Unless otherwise specified, volta	ge values are posi-
tive with respect to cat	hode
	(23,000 max. V
Anode Voltage) 11,000 min. V
Grid-No.4 Voltage:	(
Positive value	1100 max. V

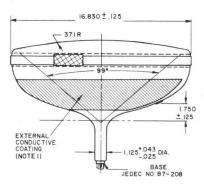
DATA 1 12-68

550 max.

V

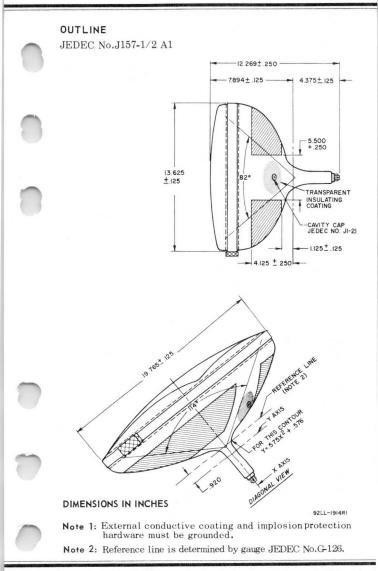


KEEP THIS SPACE CLEAR OF ANY MEHANICAL OBSTRUCTION



RBA Electronic Components

DATA 1



RBA Electronic Components

DATA 2 12-68

MAXIMUM AND MINIMUM RATINGS (CONT'D)		
Grid-No.2 Voltage		
Grid-No.1 Voltage: 200 min.	V	1
Negative peak value 220 max.	V	
Negative bias value 155 max.	-	
Positive bias value 0 max.		
Positive peak value 2 max.		
Heater Voltage	V	
Peak Heater-Cathode Voltage: ^{5.7} min.	V	1
Heater negative with		0
respect to cathode:		
During equipment warm-up		
period not exceeding		
15 seconds 450 max.	V	- 60
After equipment warm-up		
period 300 max.	V	\sim
Heater positive with		
respect to cathode:	17	
Combined AC & DC Voltage 200 max.	V V	
DC Component 100 max.	v	
TYPICAL OPERATING CONDITIONS		
FOR CATHODE-DRIVE SERVICE:		
Unless otherwise specified, voltage values are pos	<i>i</i> -	
tive with respect to grid No.1		
Anode Voltage 16,000	V	
Grid-No.4 Voltage b 200	V	
Grid-No.2 Voltage	V	
Cathode Voltage for visual extinction of focused		
raster · · · · · · · · · · · · · · · · · · ·	V	
Field Strength of required	v	
adjustable Centering Magnet 0 to 8	G	
aujuotable contenning integret in the test of	5	
MAXIMUM CIRCUIT VALUE		
Grid-No.1 Circuit Resistance 1.5 max.	MΩ	
Quelude implexion protection handware		

^aInclude implosion protection hardware.

^bThe grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between 0 and +400 volts with the combined grid-No.1 voltage and videosignal voltage adjusted to give an anode current of 100 microamperes on a 11.25-inch by 15-inch pattern from an RCA-2F21 monoscope, or equivalent.

See X-RADIATION PRECAUTIONS at front of this section.

21AMP4B

Picture Tube

RECTANGULAR GLASS TYPE MAGNETIC FOCUS ALUMINIZED SCREEN 90° MAGNETIC DEFLECTION

Electrical:

Heater Current at 6.3 volts			600	ma
Direct Interelectrode Capacitances: Grid No.1 to all other electrodes			6	of
difu no.1 to all other electrodes.			0	pi
Cathode to all other electrodes		8 8	5	pf pf
External conductive coating to anode	з.		{2500 max. 2000 min.	pf pf
Electron Gun		.Ty	pè Requirin Ion-Trap Ma	g No

Optical:

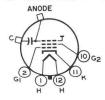
Faceplate, Spherical				
Light transmission	(Approx.)	$\sim - x$		74%
Phosphor (For Curves,	see front of	this	Section)	P4-Sulfide Type, Aluminized

Mechanical:

Operating Position			÷.			5	÷	÷.				÷	8				.Any
Weight (Approx.) .			×.						•	•		÷				. 24	lbs
Overall Length																	
Neck Length																	
Projected Area of S							\sim		\mathbf{x}		202			2	62	sq.	in.
External Conductive	e C	oat	in	q:													

See Picture-Tube Dimensional-Outlines and Bulb J171 D/E sheets at the front of this section

Pin 1-Heater Pin 2-Grid No.1 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater



Cap-Anode (Grid No.3, Collector) C-External Conductive Coating

Maximum Ratings, Design-Maximum Values:



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA I-64

21AMP4B

Grid-No.1 Voltage: Negative peak value	volts volts volts volts	D
During equipment warm-up period not exceeding 15 seconds 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode 200 max.	volts volts volts	D
Typical Operating Conditions: With anode voltage of and grid-No.2 voltage of 16000 300 Grid-No.1 Voltage for visual extinction of focused raster28 to -72	volts volts volts	
Maximum Circuit Values: Grid-No.1-Circuit Resistance 1.5 max.	megohms	

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

21AVP4C

Picture Tube

RECTANGULAR GLASS TYPE ALUMINIZED SCREE LOW-VOLTAGE ELECTROSTATIC FOCUS 72° MAGNETIC DEFLECTION	
Electrical: Heater Current at 6.3 volts	f f f
Optical: Faceplate, Spherical	S Z . d
Mechanical: Operating Position. Weight (Approx.). 24 lb Overall Length. 23-1/32" ± 3/8 Neck Length. Projected Area of Screen. External Conductive Coating: Type. Contact area for grounding. Near Reference Lin For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J171 B/F sheet at the front of this section Cap Small-Shell Duodecal 6-Pin Arrangement 1,(JEDEC Group 4, No.B6-65) Basing Designation for BOTTOM VIEW. 12	s s l l e s) , s)
Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater Pin 2-Heater Pin 2-Grid No.4 Pin 10-Grid No.4 Pin 10-Gri	



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

DATA 2-64

21AVP4C

Maximum Ratings, Design-Maximum Values:	
Anode Voltage	volts
Positive value	volts
Negative value	volts
Grid-No.2 Voltage	volts
Grid-No.1 Voltage:	
Negative peak value	volts
Negative bias value 155 max.	volts
Positive bias value 0 max.	volts
Positive peak value	volts 💛
Peak Heater-Cathode Voltage:	
Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	volts volts
Typical Operating Conditions:	
With anode voltage of 18000	volts
and grid-No.2 voltage of 300	volts
Grid-No.4 Voltage for focus72 to +396	volts
Grid-No.1 Voltage for visual extinction of focused raster28 to -72	volts
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max. m	eachms
	901110

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section

> RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



Picture Tube NO ION-TRAP MAGNET REQUIRED ALUMINIZED SCREEN RECTANGULAR GLASS TYPE 720 MAGNETIC DEFLECTION MAGNETIC FOCUS Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes. . pf Grid No.1 to all other electrodes. 2500 max. External conductive coating to anode. 2000 min. Heater Current at 6.3 volts. . . . Heater Warm-up time (Average). . . 600 ± 30 ma 11 seconds Optical: Phosphor (For curves, see front of this Section). . . P4-Sulfide Type, Aluminized . .Filterglass specular reflection Mechanical: . 24 lbs 23.031" ± .375" . 7.500" ± .188" Neck Length. Projected Area of Screen 262 sa.in. External Conductive Coating: Regular-Band Contact area for grounding. Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J171 B/F sheets at front of this section ANODE Pin 1-Heater Pin 2-Grid-No.1 Pin 10-Grid No.2 Pin 11-Cathode -)| Pin 12-Heater (10)G2 Cap - Anode (Grid No.3, Screen. Collector) G C-External Conductive Coating Maximum and Minimum Ratings, Design-Maximum Values:

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

Anode Voltage	2						20000	max.	volts
Grid-No.2 Voltage.	÷						550	max.	volts



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 4-65

21AWP4A

Grid-No.1	Volta	ae:													
Negative			e										220	max.	volts
Negative	bias	valu	e										155	max.	volts
Positive	bias	valu	e										0	max.	volts
Positive	peak	valu	e										2	max.	volts
Heater Vol													∫6.9	max.	volts
nearer for	cuge .		• •	•	•	•	•	•		•	•	•	15.7	min.	volts
Peak Heate Heater ne During	gativ equip	re wit ment	h re warn	spe r-u	p p	er	io	d	not	ť					
excee	ding :	15 se	cond	ds.									450	max.	volts
After Heater po												•	200	max.	volts
Combin	ed AC	and	DC \	101	ta	ge							200	max.	volts
DC com	oonen.	t		•		•	•				•		100	max.	volts

Typical Operating Conditions for Cathode-Drive Service:

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

Anode Voltage	volts
Grid-No.2 Voltage 400	volts
	a met in it in
focused raster	volts

Maximum Circuit Values:

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

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





11×+0221×

THREE-GUN SHADOW-MASK TYPE ELECTROSTATIC FOCUS MAGNETIC CONVERGENCE MAGNETIC DEFLECTION ALUMINIZED TRICOLOR PHOSPHOR-DOT SCREEN Supersedes Type 21AXP22

DATA

General:
Electron Guns. Three with Axes Tilted
Toward Tube Axis Blue, Green, Rec
Heater, for Unipotential Cathode of
Each Gun, Paralleled with Each of
the Other Two Heaters within Tube:
Voltage 6.3 ac or dc volts
Voltage
Direct Interelectrode Capacitances (Approx.):
Grid No.1 of any gun to all other
electrodes except the No 1 grids
of the other two guns. \dots \dots \dots \dots \dots \dots \dots \dots \dots
Cathode of blue gun + cathode of green
gun + cathode of red gun to all
other electrodes
Grid No 3 (Of each oun tied within
tube to No.3 grids of other two
guns) to all other electrodes 9 μμ
tube to No.3 grids of other two guns) to all other electrodes 9 μμ Faceplate, Spherical
Light transmission (Approx.)
Screen, on Inner Surface of Faceplate:
Type Aluminized, Tricolor, Phosphor-Do
Phosphor (Three separate phosphors, collectively)
Fluorescence and phosphorescence of
separate phosphors, respectively Blue, Green, Re
Persistence of group phosphorescence Medium
Dot arrangement
blue dot, green dot, and red do
Spacing between centers of adjacent dot trios (Approx.) 0.029
Size (Minimum):
Greatest width
Height
Projected area
Focusing Method
Convergence Method
Deflection Method
Deflection Angles (Approx.):
Horizontal
Vertical
Tube Dimensions:
Maximum overall length
Diameter:
At lip
At flange
Weight (Approx.)
Mounting Position lube axis horizonta
(base pin 12 on top

8-56

TENTATIVE DATA 1

TUBE DIVISION

RC

214792224

COLOR KINESCOPE

Ultor Terminal	
214NMINC (Axial leads), or equivalent Basing Designation for BOTTOM VIEW	
Pin 1-Heater Pin 9-Grids No.3 Pin 2-Grid No.1 Pin 11-Grid No.2 of Red Gun of Blue Gun	(
Pin 3 - Grid No.2 of Red Gun Pin 4 - Cathode	
of Red Gun Of Blue Gun Pin 5-Cathode Pin 14-Heater	0
of Green Gun Pin 6-Grid No.1 of Green Gun (Grid No.4,	
Pin 7-Grid No.2 Grid No.5, of Green Gun Collector)	
Maximum Ratings, Design-Center Values:	
JLTOR-TO-CATHODE (Of each gun) VOLTAGE 25000 max. volts JLTOR CURRENT, (Average, each gun) 500° max. wamp GRID-No.3-TO-CATHODE (Of each gun) VOLTAGE . 6000 max. volts SRID-No.2-TO-CATHODE VOLTAGE (Each gun) 800 max. volts GRID-No.1-TO-CATHODE VOLTAGE (Each gun):	
Negative bias value 400 max. volts Positive bias value 0 max. volts Positive peak value 2 max. volts PEAK HEATER-CATHODE VOLTAGE (Each gun): Heater negative with respect to cathode:	
During equipment warm-up period not exceeding 15 seconds 410 max. volts After equipment warm-up period 180 max. volts Heater positive with respect to cathode. 180 max. volts	(
Equipment Design Ranges:	
With any ultor voltage $(E_{C_4keach\ gun})$ between 20000# and 25000 volts	
Brid-No.3 (Focusing electrode)-to-Cathode (Of each gun) Voltage . 15.2% to 21.2% of E _{C4} k _{each gun} volts	C
Grid-No.2-to-Cathode Voltage (Each gun) when circuit design	
utilizes grid-No.1- to-cathode voltage	7
(E _{cik}) at fixed value for raster cutoff	0
cutori	
,∦: See next page.	

218+82218

COLOR KINESCOPE

Grid-No.	1-to-Cath	node Vol	t–							
	ach gun)		ual							
	tion of F									
	when cir									
	tilizes g		2-							
	hode volt					1.2				
	at fixed			• •	• Se	ee Cu	toff	Desi	gn (Char
	n in Rast Between									
in Any	Tube				1% of a					
				and	lowes	st cu	itoff	valu	les	
	3 Current									
curren	t of 800	$\mu \text{amp.}$.		• •	-4	5 to	+75			µam
Grid-No.	2 Current	(Each	gun) .			5 to	+5			µam
Percenta	ge of Tot	al Ulto	r Curr	ent						
Suppli	ed by Eac	h Gun:								
Ton	roduce []	luminan	t-C Wh	ite						
	. I. Coord									
	.310, y =									
	d gun				. 4	7 to	67		per	cen
81	ue gun .				1	1 to	24		per	cen
Gr	een gun.				2	0 to	33		per	cen
To p	roduce Wh	ite of I	8500°K	+						
27 M	.P.C.D. (1.C.I.	Coordi	n-						
	× = 0.287		316):							
	d gun					2 to				cen
	ue gun .			• •		2 to				cen
Gr	een gun.			• •	2	3 to	28		per	cen:
Maximum	Raster Sh	ift in a	Any	-		a				
Direct	ion from	Screen	Center	•••		1				inch
	nt to be following									
-	ing magne				Raste	er sh	ift	of 1"	ma	x. ii
iurrij	ing nagit							on fr		
a 1. 20									С	ente
Magnet	ic-field	equaliz	er		Bear	n dis	plac	ement	wit	h re-
magnor	i o i i o i o	oquaritz	mar y ba					spho		
1 2 24								ax. d		
AN DASPE	P (11) (33 4)				ment	: (i.	e., e	dge o	fsc	reen
5	ential .			• •				5" to 5" to		
Radi	al			• •		±U	.000	5 to	±U	.005
* A value	of averag crease pict	e ultor c	urrent	per	gun hig	her t	han 5	00 mic	roam	peres
will ind cathode	rease pict	ure brigh	ntness t	out m	ay impa	ir re	solut	ion ar	nd sh	orter
Centeri	ng of the ra	ster on t	the scre	en i	s accom	plish	ed by	passi	ing d	irect
current	ng of the ra of the rec ate for rast e and color	uired val er shift purity.	lue thro resulti	ough ing f	each pa rom adj	ir of ustme	defl ents f	ecting or opt	imun	is to a con-
# Brillia	nce and de , the ultor	finition voltage	decreas	e wi	th decr	easin than	g ult 2000	or vol	tage	. II
	, the uitor	torrage	Shourd							
general										
8-56						01199	1894	TATIV	1	1

COLOR KINESCOPE

21AXP22-A

_ateral-Converging Magnet:®	
After adjustment has been	
made for color purity and	
dynamic convergence	
Max. shift of blue beam	
Max. shift of red and green beams	
Average of max. shift of red	
and green beams	±7/32" to ±9/32"
Radial-Converging Magnet	••• 1///2 (0 10//2
Assembly:●	
For static convergence	
After adjustment has been made	
for optimum color purity	
and dynamic convergence	
(Each beam)	Shift of ±5/8"
For dynamic convergence†	
Effected by magnetomotive force	
of parabolic and/or saw-	
tooth waveshape synchron-	
ized with scanning.	
Horizontal:	
Blue pattern-	
Parabola amplitude to	
provide ^A	Shift of 1/4" to 9/16"
Sawtooth amplitude to	
provide ⁰⁰	Shift of ±50% of the
provide	
	shift caused by pa-
	rabola amplitude
Red pattern & green pattern	
Parabola:	
Amplitude to provide [*]	Shift of 1/8" to 3/8"
Ratio of red-pattern	
shift to green-pattern	
shift	1/2 to 2
Sawtooth:	
Amplitude for red pattern	
to provide ⁰⁰	Shift of -35% to +85%
	of the shift caused by
	parabola amplitude
Amplitude for green pattern	
Amplitude for green pattern to provide ⁰⁰	Shift of -85% to +35%
	of the shift caused by
	parabola amplitude
Difference between red-	parabora ampritude
pattern shift and green-	
	here the stand of the later
pattern shift	0 +1000
(Shift _R - Shift _G)	0 to +100%
Vertical:	
Blue pattern	C. Brancher H.
Parabola amplitude to	Completion of the second
provide ⁴	Shift of 0 to 1/8"
1.4	The second s
. , † , ▲ , ⁰⁰ : See next page.	
	TENTATIVE DATA 2



NIA+AULA

COLOR KINESCOPE

For dynamic convergence [†] (Cont'd): <i>Vertical:</i>
Sawtooth amplitude
to provide ^{oo} Shift of 0 to 1/4" Red pattern & green pattern—
Parabola:
Amplitude to provide ⁴ Shift of 1/8" to 3/8" Ratio of red-pattern
shift to green-
pattern shift
Sawtooth:
Amplitude to provide ⁰⁰ Shift of -1/8" to +3/16"
Difference between red-
pattern shift and
green-pattern shift
(Shift _R - Shift _G) 0 to +100%
Examples of Use of Design Ranges:
For ultor voltage of 20000 25000 volts
Grid-No.3 (Focusing Electrode)- to-Cathode (Of Each Gun) Voltage
Grid-No.2-to-Cathode Voltage (Each Gun) when circuit de- sign utilizes grid-No.1-to-
cathode voltage of -70 volts for raster cutoff 130 to 370 130 to 370 volts
Grid-No.1-to-Cathode Voltage (Each Gun) for Visual Extinction of Focused Raster when circuit design
utilizes grid-No.2-to- cathode voltage of 200 volts -45 to -100 -45 to -100 volts
Limiting Circuit Values:
High-Voltage Circuits:

In order to minimize the possibility of damage to the tube caused by amomentary internal arc, it is recommended that the *ultor power supply* and the *grid-No.g power supply* be of the limited-energy type with inherent regulation to limit the continuous short-circuit current to 50 milliamperes. In addition, to prevent cathode damage with resultant decrease in tube life, the effective resistance between grid-No.3 power supply output capacitor and the grid-No.3 electrode should be not less than 50000 ohms. This resistance should be capable of withstanding the maximum instantaneous current and voltage in the grid-No.3 circuit.

In equipment utilizing a well-regulated ultor power supply, the grid-No.3-circuit resistance should be limited to 7.5 megohms.

⊕, , †, ▲, ^{OO}: See next page.

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TENTATIVE DATA 3

COLOR KINESCOPE

Low-Voltage Circuits: Grid-No.1-Circuit Resistance (Each Gun) . . . 1.5 max. meaohms

When the cathode of each gun is not connected directly to the heater, the grid-No.2-to-heater circuit, the grid-No.1-to-heater circuit, and the cathode-to-heater circuit should each have an impedance such that their respective power sources in combination will not supply an instantaneous or continuous short-circuit current of more than 300 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the tube.

When the cathode is connected directly to the heater, the grid-No.2-to-heater circuit, and the grid-No.1-to-heater circuit should each have an impedance such that their respective power sources in combination will not supply an instantaneous or continuous short-circuit current of more than 300 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the tube.

- Shift is the movement of the regions of bar-or-dot-generator pattern indicated in notes (A) and (00).
- The direction of movement of the red and green beam isopposite to that of the blue beam.
- Indicated values apply when RCA test yoke is used with the 21AXP22-A. The parabola amplitude is determined by the average value of the shifts at the extremities of the respective horizontal and vertical axes of the screen with convergence of the three beams maintained at the center of the screen. An increase in amplitude should move the blue beam toward the top of the screen; the red beam toward the lower left of the screen; and the green beam toward the lower right of the screen.
- O The sawtooth amplitude is determined by the difference between the shifts at the extremities of the respective horizontal and vertical axes of the screen. Positive amplitude indicates that the shift at the right or bottom of the screen is greater than the shift at the left or top of the screen.

X-RAY WARNING

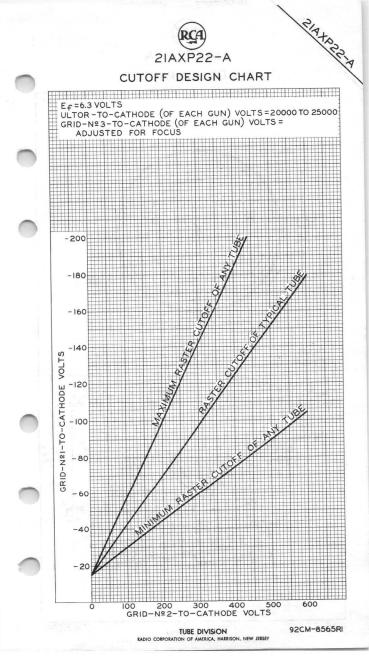
X-ray radiation is produced by the 21AXP22-A when it is operated at its normal ultor voltage. The radiation is through the faceplate, and is sufficient to require the adoption of safety measures in TV receivers. Shielding such as that provided by a 1/4-inch thickness of safety glass (lime) in front of the faceplate, should prove adequate to provide protection against personal injury from prolonged exposure at close range when the tube is operated at its maximum ultor voltage rating.

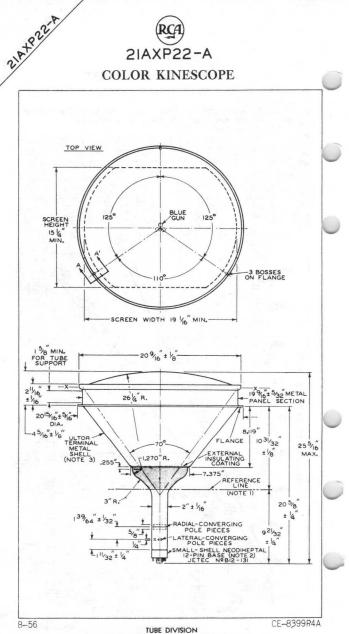
When this tube is being serviced outside of the TV receiver cabinet, it should never be operated without providing adequate X-ray shielding in front of faceplate. Because the ultor voltage may rise above its maximum rated value for short periods during adjustment with increase in the amount of X-ray radiation, provision should be made for placing a 3/8-inch thickness of safety glass in front of the faceplate to avoid the hazard of X-ray radiation.

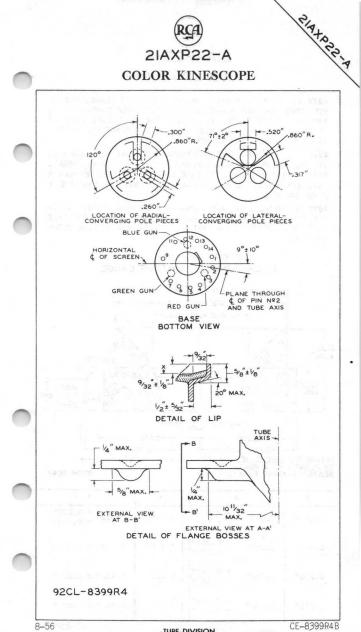
TUBE DIVISION

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214782214







TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

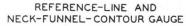
COLOR KINESCOPE

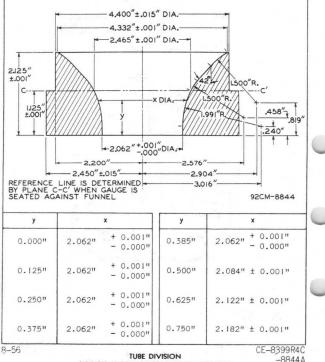
214782214

NOTE 1: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE (SHOWN BELOW) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 2: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH METAL-SHELL AXIS AND HAVING A DIAMETER OF 3".

NOTE 3: METAL SHELL AND GLASS FACE OPERATE AT HIGH VOLT-AGE. ANY MATERIAL IN CONTACT WITH THE SHELL OR THE FACE MUST BE INSULATED TO WITHSTAND THE MAXIMUM APPLIED ULTOR VOLTAGE.





RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



COLOR KINESCOPE

y	x	y y	0
0.875"	2.258" ± 0.001"	1.625"	
1.000"	2.352" ± 0.001"	1.750"	
1.125"	2.465" ± 0.001"	1.875"	Ľ
1.250"	2.604" ± 0.001"	2.000"	ľ
1.375"	2.778" ± 0.001"	2.125"	
1.500"	2.990" ± 0.001"		

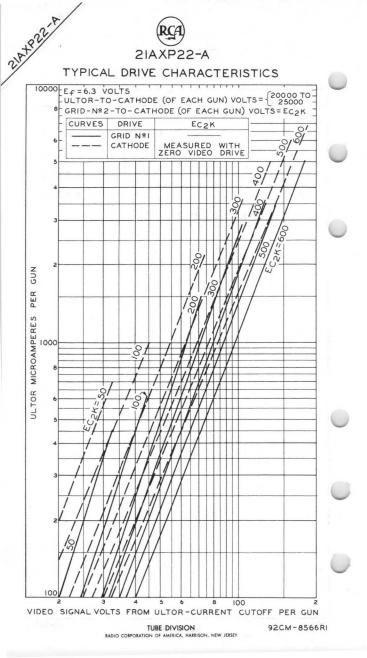
TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

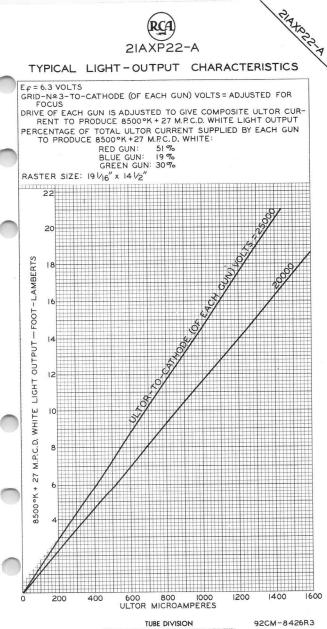
8-56

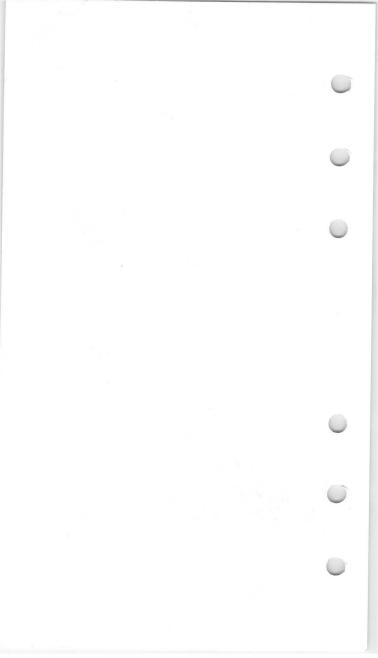
CE-8844B

218+8222 F

x 3.216" ± 0.001" 3.440" ± 0.001" 3.678" ± 0.001" 3.958" ± 0.001" 4.332" ± 0.001"







2IAXP22-A/2IAXP22 COLOR PICTURE TUBE

118+40221F

THREE-GUN SHADOW-MASK TYPE ELECTROSTATIC FOCUS MAGNETIC CONVERGENCE MAGNETIC DEFLECTION ALUMINIZED TRICOLOR PHOSPHOR-DOT SCREEN Replacement for Types 21AXP22 & 21AXP22-A

DATA

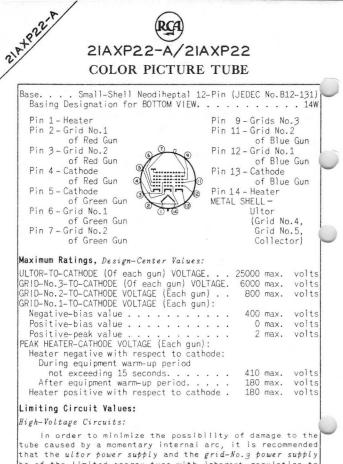
_	General:	
0	Electron Guns, Three with Axes Tilted Toward Tube Axis	
	Each Gun, Paralleled with Each of the Other Two Heaters within Tube: Voltage 6.3	
	Current 1.8 ± 10%	
	Screen, On Inner Surface of Faceplate: Type	
	Fluorescence and phosphorescence of separate phosphors, respectivelyRed, Blue, Green Persistence of group phosphorescence	
	Dot arrangement	
	Size (Minimum): Greatest width	
	Projected area	
_	Deflection Method Magnetic Deflection Angles (Approx.): Horizontal	
	Tube Dimensions: Maximum overall length	
	Diameter: At lip	
	Weight (Approx.)	
	Socket	

For Curves, see front of this Section.

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ELECTRON TUBE DIVISION

TENTATIVE DATA 1



that the ultor power supply and the grid-No.3 power supply be of the limited-energy type with inherent regulation to limit the continuous short-circuit current to 50 milliamperes. In addition, to prevent cathode damage with resultant decrease in tube life, the effective resistance between grid-No.3 powersupply output capacitor and the grid-No.3 electrode should be not less than 50,000 ohms. This resistance should be capable of withstanding the maximum instantaneous current and voltage in the grid-No.3 circuit.

In equipment utilizing a well-regulated ultor power supply, the grid-No.3-circuit resistance should be limited to 7.5 megohms.

Low-Voltage Circuits:

Grid-No.1-Circuit Resistance (Each gun) . . 1.5 max. megohms

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ELECTRON TUBE DIVISION TENTATIVE DATA 1

2IAXP22-A/2IAXP22 COLOR PICTURE TUBE

als to 22

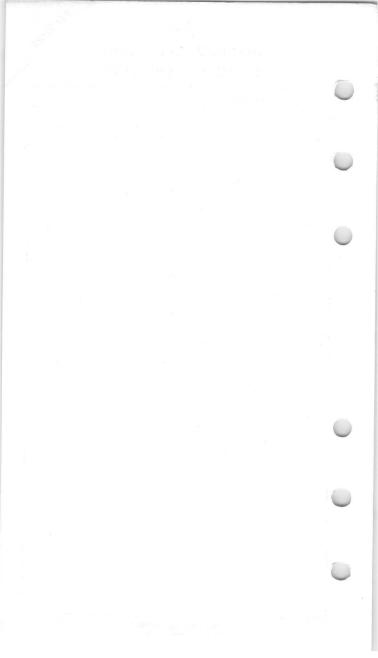
When the cathode of each gun is not connected directly to the heater, the grid-No.2-to-heater circuit, the grid-No.1-to-heater circuit, and the cathode-to-heater circuit should each have an impedance such that their respective power sources in combination will not supply an instantaneous or continuous short-circuit current of more than 300 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the tube.

When the cathode is connected directly to the heater, the grid-No.2-to-heater circuit, and the grid-No.1-to-heater circuit should each have an impedance such that their respective power sources in combination will not supply an instantaneous or continuous short-circuit current of more than 300 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the tube.

X-RAY WARNING

X-ray radiation is produced by the 2IAXP22-A/2IAXP22 when it is operated at its normal ultor voltage. The radiation is through the faceplate, and is sufficient to require the adoption of safety measures in television receivers. Shielding such as that provided by a 1/4-inch thickness of safety glass (lime) in front of the faceplate, should prove adequate to provide protection against personal injury from prolonged exposure at close range when the tube is operated at its maximum ultor-voltage rating.

When this tube is being serviced outside of the television receiver cabinet, it should never be operated without providing adequate X-ray shielding in front of faceplate. Because the ultor voltage may rise above its maximum rated value for short periods during adjustment with increase in the amount of X-ray radiation, provision should be made for placing a 3/8-inch thickness of safety glass in front of the faceplate to avoid the hazard of X-ray radiation.



Picture Tube

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 90° MAGNETIC DEFLECTION

GENERAL DATA

Electrical:

	Heater Current at 6.3 volts 600 ± 10% ma
)	Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 µµf Cathode to all other electrodes 5 µµf
	External conductive coating to ultor {2500 max. μμf 2000 min. μμf
	Electron Gun Type Requiring No Ion-Trap Magnet
	Optical:
	Faceplate, Spherical
	Mechanical:
	Operating Position
	at the front of this section Cap
)	Cap
	Pin 1 - Heater Pin 2 - Grid No.1 Pin 6 - Grid No.2 Pin 11 - Cathode Pin 12 - Heater Pin 12 - Heater Pin 12 - Heater Pin 12 - Heater Pin 2 - Grid No.2 Pin 12 - Heater Pin 2 - Grid No.2 Pin 12 - Heater Pin 2 - Grid No.2 Cap - Ultor (Grid No.3, Collector) C - External Conductive Coductive Coductive
	n n



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 1-63

21CBP4A

Maximum and Minimum Ratings, Design-Maximum Values:		
ULTOR VOLTAGE	volts	
Positive value	volts	10.00
Negative value	volts	
GRID-No.2 VOLTAGE	volts	
GRID-No.1 VOLTAGE:		
Negative peak value	volts	
Negative bias value		
Positive bias value 0 max.		
Positive peak value		1
(6 9 may		
HEATER VOLTAGE	volts	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode 200 max.	volts volts	D
Typical Operating Conditions:		
With ultor voltage of 16000	volts	
and grid-No.2 voltage of 300	volts	
Grid-No.4 Voltage for focus 0 to 450	volts	
Grid-No.1 Voltage for visual	10103	
extinction of focused raster28 to -72	volts	
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance 1.5 max.	megohms	
	-	

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section





PICTURE TUBE

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

With heater having controlled warm-up time

DATA

General:

uomor															
Vol Cur War Capac Coa Facep	r, for tage (rent . m-up t itance ting a late,	AC or ime (A betwe nd Ult Spheri	DC). vera en E or . cal.	ge). xter	nal	Cor	nduc	ctiv	ve •	· ·	{250 {200	.6 : 11 00 r 00 r	nax. nin. Filt	ergl	amp sec μμf μμf ass
Phosp	hor (F	or Curv	es, s	iee fi	ront	or	this	s Se	Cti	on).	• P4·			ae i mini	
Dia Hor Ver Elect Tube Ove Gre Gre	ction gonal. izonta tical. ron Gu Dimens rall l eatest atest	n ions: ength. width. height			•	Гуре	e Re	equ	iri	ng	No 1 • 1	on- 4-7 20-1	Trap /16" 1/4" 3/8"	 Mag ± 3 ± 1 ± 1	8/0 net /8" /8" /8"
Nec Rad (Scree Gre	igonal. k leng lius of Extern n Dime atest	th curva al sur nsions width.	ture face (Mi	of) nimu	fac m):	epla	ate	· ·		· ·	. 5	-3/:	16" • • • 1	± 3/ 28-1 9-1/	16" /2" 16"
Dia Pro Opera Cap Base.	atest gonal. jected ting P	area. ositio	n	.Re	ces	sed	Sma	all Si	Ca		у (J (JE	EDEC	262 C No No.	20-1 sq. .J1- B6-1	/4" in. Any 21) 85)
Pin Pin Pin Pin Pin	2 – Ca 3 – He 4 – He 5 – Gr 6 – Gr	ater ater id No. id No. id No.	1 4 2	(2	3 AM		d Cart)			(G G C Ex C	rid rid olle tern	ctiv	j
	um Rat			0											
ULTOR	VOLTA No.4 (GE	NG)	voi T	AGE	. • •	• •	·	• •	1	.8000	ma	×.	VC	lts
Pos	sitive	value									1000				lts
	ative No.2 V										500 500				lts

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DATA

21COP&

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



PICTURE TUBE

GRID-No.1 VOLTAGE:												
Negative-peak value.										200	max.	volts
Negative-bias value.										140	max.	volts
Positive-bias value.										0	max.	
Positive-peak value.										2	max.	volts
PEAK HEATER-CATHODE VOL	TA	GE	:									1
Heater negative with												
respect to cathode:												
During equipment wa	arn	-ι	ıр	pe	er	iod	ı b	10	t			1
exceeding 15 seco	ond	Is								410	max.	volts
After equipment war												
Heater positive with			e 9							101100101		
respect to cathode			•			•				180	max.	volts
Maximum Circuit Values:												-
Grid-No.1-Circuit Resis	sta	inc	ce							1.5	max.	megohms

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

DATA

21COPA

Color Picture Tube

THREE-GUN, GRADED-HOLE, SHADOW-MASK TYPE ALUMINIZED TRICOLOR PHOSPHOR-DOT SCREEN

ALL-GLASS ENVELOPE MAGNETIC CONVERGENCE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

Supersedes Type 21CYP22

DATA

General:

Electron Guns, Three with Axes Tilted Toward Tube Axis Blue, Green, Red Heater, for Unipotential Cathode of Each Gun, Paralleled with Each of
the Other Two Heaters within Tube: Voltage (AC or DC) ^A 6.3 volts Current at 6.3 volts 1.6 amp Direct Interelectrode Capacitances (Approx.):
Grid No.1 of any gun to all other electrodes except the No.1 grids of the other two guns
gun + cathode of red gun to all other electrodes
guns) to all other electrodes 9 μμf External conductive coating to grid No.6 {2500 max. μμf 2000 min. μμf
Faceplate, Spherical
Screen, on Inner Surface of Faceplate: Type Aluminized, Tricolor, Phosphor-Dot Phosphor (Three separate phosphors, collectively) [•] P22 Fluorescence and phosphorescence of
separate phosphors, respectively Blue, Green, Red Persistence of group phosphorescence Medium Dot arrangement
Spacing between centers of adjacent dot trios (Approx.) 0.029" Size (Minimum):
Greatest width
Focusing Method Electrostatic Convergence Method
Deflection Angles (Approx.): Horizontal
Tube Dimensions: 0verall length 25-1/32" ± 3/8" Diameter 20-13/16" ± 1/8" Weight (Approx.) 36-1/2 lbs

RADIO CORPORATION OF AMERICA Electron Tube Division

Harrison, N. J.

DATA 1 10-60

Operating Position Tube Axis Horizontal (Base pin 12 and V-grooved panel pad on top) Caps (Two) Recessed Small Cavity (JEDEC No.J1-21) . .Alden Nos.214NMINSC (Radial leads), Socket . . 214NMINC (Axial leads), or equivalent Base Small-Shell Neodiheptal 12-Pin (JEDEC No. B12-131) Basing Designation for BOTTOM VIEW 14AL Pin 1 - Heater 2-Grid No.1 of Red Gun Pin Pin 3-Grid No.2 of Red Gun Pin 4 - Cathode of Red Gun Pin 5-Cathode of Green Gun 6-Grid No.1 Pin of Green Gun Pin 7-Grid No.2 of Green Gun Pin 9-Grid No.3 Pin 11-Grid No.2 of Blue Gun Cap* Over Pin 12-Grid No.1 of Blue Gun Pin 2-Grid No.6. Pin 13-Cathode of Blue Gun Collector, High-Pin 14 - Heater Voltage-Supply Terminal Cap C-External Over Pin 1-Ultor (Grid No.4, Conductive Grid No.5) Coating

Maximum Ratings, Design-Center Values:

ULTOR-TO-CATHODE (Of each gun) VOLTAGE . . 25000 max. volts

Between the Ultor Terminal and the High-Voltage-Supply Terminal (See *Dimensional Outline*), it is necessary to connect a resistor of 50,000 ohms as described under *Limiting Circuit Values*. The high voltage must be connected to the High-Voltage-Supply Terminal-never directly to the Ultor Terminal.

GRID-No.3-TO-CATHODE (Of each gun)

VOLTAGE GRID-No.2-TO-CATHODE VOLTAGE (Each gun). GRID-No.1-TO-CATHODE VOLTAGE (Each gun):	6000 max. 600 max.		
Negative-bias value	400 max.	volts	
Positive-bias value	0 max.	volts	
Positive-peak value	2 max.	volts	
PEAK HEATER-CATHODE VOLTAGE (Each gun): Heater negative with respect to cathode:			
During equipment warm-up period not exceeding 15 seconds	410 max.	volts	
After equipment warm-up period	180 max.		
Heater positive with respect to cathode.	180 max.	volts	



	Fauinment Design Desages				
	Equipment Design Ranges:	(D			
	With ultor vol between 20000	tage (Bcy ↑ and 250	^k each gun 000 volt	s	
	Grid-No.3 (Focusing Electrode)-to-Cathode (Of each gun) Voltage Grid-No.2-to-Cathode Voltage (Each gun) when circuit design				volts
	utilizes grid-No.1- to-cathode voltage (E _{clk}) at fixed value for raster cutoff		.See Cutof	f Design	Chart
	Grid-Nc.1-to-Cathode Voltage (Each gun) for Visual Extinction of Focused Raster				
	when circuit design utilizes grid-No.2- to-cathode voltage (E _{ç2k}) at fixed		See Outed	f Design	Obaut
	value Variation in Raster Cutoff Between Guns		.See Cutof	J Design	Chart
	in Any Tube	± 21% of a	average of st cutoff		
	Grid-No.3 Current		45 to +45	141400	μa
	Grid-No.2 Current (Each gun) Percentage of Total Ultor		-5 to +5		μa
	Current Supplied by Each Gun: To Produce White of 8500° K + 27 M.P.C.D.				
	(CIE Coordinates $x = 0.287, y = 0.316$):				
0	Red gun Blue gun Green gun		49 18 33		% % %
	Ratios of Cathode Currents: To Produce White of 8500° K + 27 M.P.C.D. (CIE Coordinates				
0	x = 0.287, y = 0.316	Min.	Typical	Max.	
	Red cathode to green cathode Red cathode to	1.2	1.5	1.8	
	blue cathode Maximum Raster Shift in	2.1	2.7	3.3	
	Any Direction from Screen Center		7/8		inch



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 2 10-60

Maximum Required Displacements of Beam Trios with Respect to Associated Phosphor-Dot Trios: Uniform in any direction over .0.005" entire screen area Adjustment to be Provided by the Following Components: Lateral-Converging Magnet:*,* Maximum lateral shift of blue beam ±1/4" Maximum lateral shift of red beam and green beam ±1/8" to ±3/8" Average of maximum lateral shift of red beam and green beam ±7/32" to ±9/32" Radial-Converging Magnet Assembly: For static convergence including compensation for dc component of dynamic convergence (Each beam). Shift of ±5/8" For dynamic convergence#-Effected by magnetomotive force of parabolic and/or sawtooth waveshape synchronized with scanning. Horizontal: Blue pattern-Parabola amplitude to provide* Shift of 3/16" to 1/2" Sawtooth amplitude to provide[®] Shift of ±50% of the shift caused by parabola amplitude Red pattern & green pattern-Parabola: Amplitude to provide*. . . .Shift of 1/16" to 5/16" Ratio of red-pattern shift Sawtooth: Amplitude to provide[₽]....Shift of -60% to +60% of the shift caused by parabola amplitude Difference between redpattern shift and greenpattern shift (Shift_R -Shift_c). Vertical: Blue pattern-Parabola amplitude to provide* Shift of -1/8" to +1/16" Sawtooth amplitude to



Limiting Circuit Values:

High-Voltage Circuits:

In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the high-voltage power supply and the grid-No.3 power supply be of the limited-energy type with inherent regulation to limit the continous short-circuit current to 50 milliamperes. In addition, to prevent cathode damage with resultant decrease in tube life, an external resistor having a value of 50,000 ohms must be connected between the two bulb terminals and the effective resistance between the grid-No.3 power-supply output capacitor and the grid-No.3 electrode should not be less than 50,000 ohms. These resistances should be capable of withstanding the maximum instantaneous currents and voltages in their respective circuits. It is to be noted that the high voltage must be connected only to the High-Voltage-Supply Terminal-never directly to the Ultor Terminal. A resistor of 50,000 ohms must be connected between the Ultor Terminal and the High-Voltage-Supply Terminal.

In equipment utilizing a well-regulated high-voltage power supply, the grid-No.3-circuit resistance should be limited to 7.5 megohms.



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 3 10-60

The maximum dc current capability of the high-voltage power supply should be limited to a value of 1100 µa as measured by a dc ammeter in the lead from the high-voltage power supply to the high-voltage terminal of the tube. The product of the maximum current capability and the maximum dc voltage between the high-voltage terminal and any cathode of the tube, as measured by an electrostatic voltmeter, should not exceed 25 watts.

Low-Voltage Circuits:

Effective Grid-No.1-to-Cathode-

Circuit Resistance (Each gun). . . . 0.75 max. megohm

When the cathode of each gun is not connected directly to the heater, the grid-No.2-to-heater circuit, the grid-No.1-to-heater circuit, and the cathode-to-heater circuit should each have an impedance such that their respective power sources in combination will not supply an instantaneous or continuous short-circuit current of more than 300 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the tube.

When the cathode is connected directly to the heater, the grid-No.2-to-heater circuit, and the grid-No.1-to-heater circuit should each have an impedance such that their respective power sources in combination will not supply an instantaneous or continuous short-circuit current of more than 300 milliamperes total. Such current limitation will prevent heater burnout in case of a momentary internal arc within the tube.

- ▲ For maximum cathode life, it is recommended that the heater supply be regulated. When current regulation is employed, the regulator should be designed to provide a heater current of 1.5 amperes with variations not exceeding ± 3% under normal line-voltage variations. When voltage regulation is employed, the regulator should be designed to provide a heater voltage of 5.5 volts with variations not exceeding ± 6% under normal line-voltage variations.
- For Curves, see front of this Section.
- ★ Connect high-voltage supply to this cap and also connect 50,000-ohm resistor between this cap and cap over pin 1 (ultor cap).
- Brilliance and definition decrease with decreasing ultor voltage. In general, the ultor voltage should not be less than 20,000 volts.
- Centering of the raster on the screen may be accomplished by passing direct current of the required value through each pair of deflecting coils to compensate for raster shift resulting from adjustments for optimum convergence and color purity.
- If this displacement is accomplished by means of a purifying magnet located on the neck of the tube, the equivalent raster movement is about 3/4*.
- Shift is the movement of the regions of dot/crosshatch-generator pattern indicated in notes (*) and (母).
- $\ensuremath{\mathfrak{P}}$ The direction of movement of the red and green beam is opposite to that of the blue beam.
- # Indicated values apply when RCA test yoke is, used with this color picture tube.
- * The parabola amplitude is determined by the average value of the shifts at the extremities of the respective horizontal and vertical axes of the screen with convergence of the three beams maintained at the center of the screen. An increase in amplitude should move the blue beam toward the top of the screen; the red beam toward the lower left of the screen; and the green beam toward the lower right of the screen.
- The sawtooth amplitude is determined by the difference between the shifts at the extremities of the respective horizontal and vertical axes of the screen. Positive amplitude indicates that the shift at the right or bottom of the screen is greater than the shift at the left or top of the screen.

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.









DEFINITIONS

Beam Trio. The red beam, green beam, and blue beam passing through a common hole in the shadow mask.

Register. Exact correspondence in position of the centers of beam trios with respect to the centers of the associated phosphor-dot trios.

Misregister. Lack of correspondence in position of the centers of the beam trios with respect to the centers of the center of the associated phosphor-dot trios.

Displacement. Shift of the position of the beams with respect to the phosphor dots.

GENERAL CONSIDERATIONS

X-Ray-Warning. Because this color picture tube is designed to be operated at ultor voltages as high as 25 kilovolts (Design-center maximum value), shielding of this color picture tube for X-ray radiation may be needed to protect against possible injury from prolonged exposure at close range.

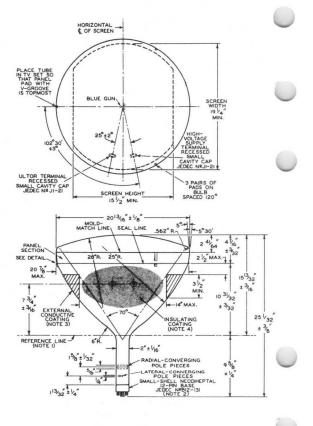
Shatter-Proof Cover Over the Tube Face. Following conventional picture-tube practice, it is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of this color picture tube to protect it from being struck accidentally and to protect against possible damage resulting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

High Voltages. The high voltages at which cathode-ray tubes are operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the inclosing of high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

> REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE for Type 21CYP22-A is the same as that shown for Type 21AXP22-A

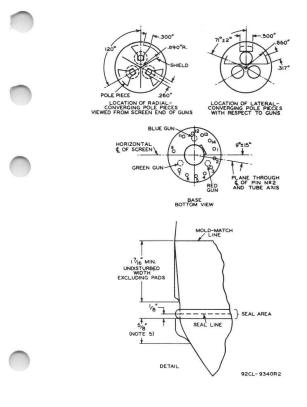


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 4



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.







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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 5 10-60

NOTE I: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFER-ENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

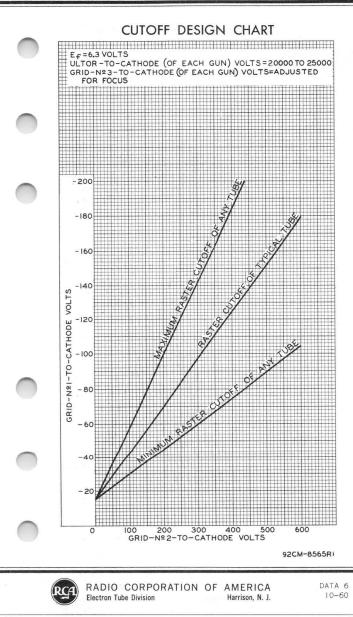
NOTE 2: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 3".

NOTE 3: THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT BAND OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THAT OF THE CONTACT BAND SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

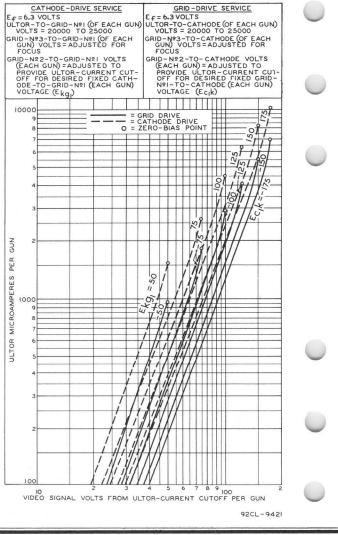
NOTE 4: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.

NOTE 5: THE MAXIMUM EFFECTIVE WIDTH OF A FUNNEL PAD IS 5/8".



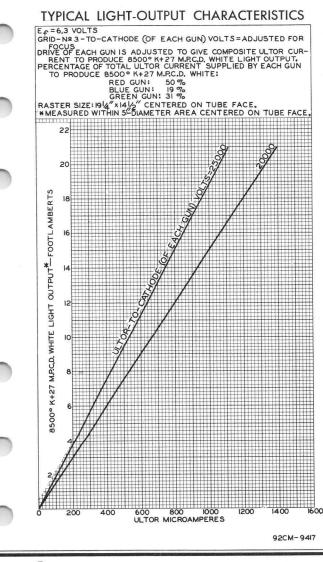


TYPICAL DRIVE CHARACTERISTICS



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

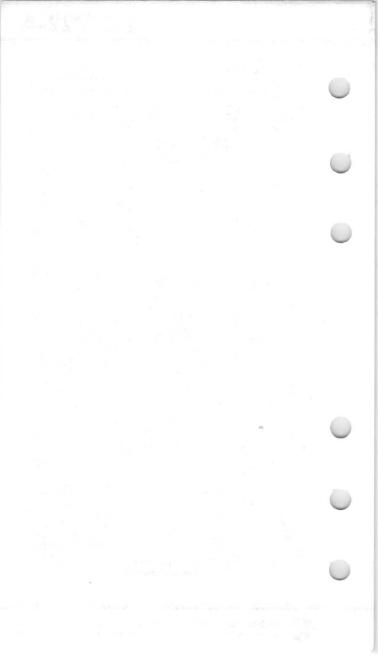






RADIO CORPORATION OF AMERICA **Electron Tube Division** Harrison, N. J.

DATA 7 10-60



Picture Tube RECTANGULAR GLASS TYPE ALUMINIZED SCREEN 110° MAGNETIC DEFLECTION LOW-VOLTAGE ELECTROSTATIC FOCUS With Heater Having Controlled Warm-Up Time GENERAL DATA Electrical: Heater Current at 6.3 volts. 450 ± 5% ma Heater Warm-Up Time (Average). 11 seconds Direct Interelectrode Capacitances: Grid No.1 to all other electrodes. . . 6 μµf 5 Cathode to all other electrodes. . . . μµf 2500 max. μµf External conductive coating to ultor . 1700 min. μµf Optical: Light transmission (Approx.) 76% Phosphor (For curves, see front of this Section) . P4-Sulfide Type, Aluminized Mechanical: Operating Position Any 20 lbs Weight (Approx.) Overall Length 14-11/16" +5/16" - 5/8"Projected Area of Screen 262 sa. in. External Conductive Coating: Regular Band Туре.... Contact area for grounding Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J171 G/K sheets at the front of this section Cap. Recessed Small Cavity (JEDEC No.J1-21) Bases (Alternates): Small-Button Eightar 7-Pin, Arrangement 2, (JEDEC No. B7-183) Small-Button Neoeightar 7-Pin, Arrangement 1, (JEDEC No. B7-208) Basing Designation for BOTTOM VIEW 8HR ULTOR G4(4 Pin 1-Heater Cap-Ultor Pin 2-Grid No.1 (Grid No.3, 6)^{GI} G2 3 Grid No.5. Pin 3-Grid No.2 τ Pin 4-Grid No.4 Collector)

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

G1(2

Pin 6 - Grid No.1

Pin 7 - Cathode

Pin 8-Heater

DATA 3-62

C-External

Conductive

Coating

21DHP4

H I BII B I I B I I B I I B I B I B I B	
Maximum Ratings, Design-Maximum Values:	
ULTOR VOLTAGE	volts
GRID-No.4 (FOCUSING) VOLTAGE:	
Positive value	volts
Negative value	volts
GRID-No.2 VOLTAGE	volts
GRID-No.1 VOLTAGE:	
Negative peak value	volts
Negative bias value 154 max.	volts
Positive bias value 0 max.	
Positive peak value 2 max.	volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with	
respect to cathode:	
During equipment warm-up period	
not exceeding 15 seconds 450 max.	volts
After equipment warm-up period 200 max.	volts
Heater positive with	
respect to cathode	volts
Typical Operating Conditions:	
With ultor voltage of 16000	volts
and grid-No.2 voltage of 300	volts
Grid-No.4 Voltage for focus 0 to 400	volts
Grid-No.1 Voltage for visual extinction	VULLS
of focused raster	volts
	VOICS
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max.	megohms

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section





2101 PA

PICTURE TUBE

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN MAGNETIC DEFLECTION LOW-VOLTAGE ELECTROSTATIC FOCUS

DATA

	DATA	
General:		
Heater, for Unipotent	ial Cathode:	
Voltage	6.3 0.6 ± 10% .	ac or dc volts
Direct Interelectrode	Capacitances:	
	her electrodes r electrodes	
External conductive	e coating to ultor	· {2500 max. μμf 2000 min. μμf
Faceplate, Spherical.		Filterglass
Light transmission Phosphor (For Curves,	(Approx.)	74%
a hukaran bulunarana. Anandrin musuk anangerak i		Aluminized
Persistence		Short
Oeflection Method		Magnetic
Deflection Angles (An	oprox.):	
Diagonal		
Vertical		680
Electron Gun Tube Dimensions:	Type Requirin	ig no ion-irap magnet
Greatest height .		16-3/8" ± 1/8"
Diagonal		21-3/8" ± 1/8"
Screen Dimensions (M	inimum):	
Greatest width Greatest height .		· · · · · · 19–1/16" · · · · · 15–1/16"
Diagonal		
Projected area Weight (Approx.).		262 sq. in.
Operating Position.	Recessed Small Cav	Any
Bulb		J171D2/E1
Base Short S	mall-Shell Duodecal 6 No.B6-203), or Small-	5-Pin (JETEC Group 4,
	(JETE	EC Group 4, No.B6-63)
Basing Designation	for BOTTOM VIEW, .	
Pin 1-Heater Pin 2-Grid No.1	6	Cap - Ultor (Grid No.3,
Pin 6-Grid No.4		Grid No.5,
Pin 10-Grid No.2 Pin 11-Cathode	at in to	Collector) C-External
Pin 12 - Heater	2 10	Conductive
		Coating TENTATIVE DATA
9–58	ELECTRON TUBE DIVISION	IENTATIVE DATA

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



GRID-DRIVE* SERVICE

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

Maximum and Minimum Ratings, Design-Center Values:

2101.84

Ma	ximum and	Minimum	Rati	ngs,	De	51	gn	-Ce	nte	er Values	1		
UL	TOR VOLTA	AGE								{20000	max.	volts	
	ID No 1	(FOCUSING	1 VOL	TAGE						\12000 ₽	min.	volts	
		value .								1000	max.	volts	
		value .							·	500	max.	volts	
		OLTAGE.								500	max.	volts	
	1D-No.1 \			• •	·			• •	Ċ.	000	max.	VOLU	1
		-peak val	le.							200	max.	volts	
		-bias val								140	max.	volts	
		bias val								0	max.	volts	
		peak val								2	max.	volts	
		-CATHODE											
		eqative wi			t t	ос	at	hod	le:				
		equipmen											
		exceeding								410	max.	volts	5
		quipment								180	max.	volts	
11		sitivewi								180	max.	volts	
Eq	uipment [esign Ra	iges:										
W	ith any u	ltor voli	age	ECS	k)	be	tw	een	12	2000 and :	20000	volts	
	and gri	d-No.2 00	oltage	e (Ĕ,	c2k)	be	twe	en	200 and 50	00 001	lts	
Gr	id-No.4	oltage f	or		~								
		• • • •						-50	to	+400		volts	
Gr	id-No.1 \	oltage (I	Ecik)										
		l extinc											
	of focuse	d raster				S	ee	Ra	ste	r-Cutoff-	Range	chart	
										r Grid-Di			
Gr	id-No.1 V	ideo Driv	/e										
		er Cutof	F										
	(Black Le												
		el value											
	(Peak pos	sitive).								ue as de			
							Ec	ık	exc	ept vide			
									-		tive	voltage	
		Current.								o +25		μa	1 1
		Current.						-1	5 t	o +15		μa	
		igth of Ad							0.1	0			1
	able Cent	ering Mag	gnet	• •					0 t	08	Ç	gausses	
Exa	amples of	Use of I)esigr	Ra	nge	s:							
		r voltage							1	6000		volts	
0	and grid-	No.2 volt	age o	f						300		volts	11
Gr	id-No.4 V	oltage fo	or										
1									o .	100		1.	1

▲,⊕,§,*: See next page.

focus. . . .

9-58

0 to 400

volts

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



NOLAR

PICTURE TUBE

-					
0	Grid-No.1 Voltage for				
	visual extinction of				1.
	focused raster	-2	8 to -72		volts
0	Grid-No.1 Video Drive				
	from Raster Cutoff (Black Level):				
	White-level value	2	28 to 72		volt
		2	0 10 72		VOIC
Ľ.	Maximum Circuit Values:		1 5		
C	Grid-No.1-Circuit Resistance		. 1.5 m	ax. n	negohm
	CATHODE-DRIVE	SERVI	CE		
	Unless otherwise specified, volta	age v	alues are	posit	ive
	with respect to g				
M	Maximum and Minimum Ratings, Design-	-Cent	er Values	:	
h	ULTOR-TO-GRID-No.1 VOLTAGE		\$20000		
			\12000 [∰]	min.	volt
0	GRID-No.4-TO-GRID-No.1 VOLTAGE:		1000		1.
L	Positive value		1000 500	max.	volt
1	Negative value		640		volt
	GRID-NO.2-TO-CATHODE VOLTAGE		500	max.	1000 g (2
	CATHODE-TO-GRID-No.1 VOLTAGE:		500	max.	VOIL
	Positive-peak value		200	max.	volt
	Positive-bias value		. 140		
l	Negative-bias value		. 0		
L	Negative-peak value		. 2	max.	volt
	PEAK HEATER-CATHODE VOLTAGE:	hadaa			
1	Heater negative with respect to cat During equipment warm-up period				
	not exceeding 15 seconds		410	max.	volt
	After equipment warm-up period			max.	
	Heater positive with respect to cat				
	Equipment Design Ranges:				
1	With any ultor-to-grid-No.1 volta	ge (E	Ecsed) bet	ween :	12000
	and 20000 volts and grid-No.2-to-g	rid-M	Vo.1 volta	ge (Ec	281)
	between 225 and 6	40 VC	olts		
1	Grid-No.4-to-Grid-No.1				1.
	Voltage for focus§ Cathode-to-Grid-No.1	() to 450		volt
ľ	Voltage (Ekg.) for				
	visual extinction				
		Rast	ter-Cutoff	-Range	e Char
			Cathode-D		
1	▲,⊕,§,*,■: See next page.				
÷	, , , ,				



PICTURE TUBE

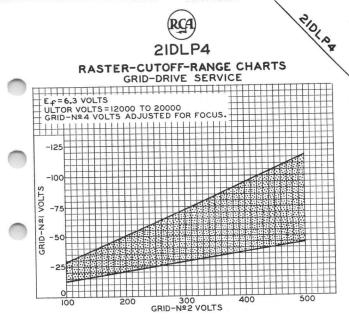
Cathode-to-Grid-No.1 Video Drive from Raster		
Cutoff (Black Level):		
White-level value (Peak negative)	Same value as dete	armined for
(reak negative)	Eka, except video	
		ve voltage
Grid-No.4 Current	-25 to +25	μa
Grid-No.2 Current	-15 to +15	μa
Field Strength of Adjust- able Centering Magnet*	0 to 8	22110000
0		gausses
Examples of Use of Design Range	s:	
With ultor-to-grid-		· · · · ·
No.1 voltage of	16000	volts
and grid-No.2-to-grid-		
No. 1 voltage of	300	volts
Grid-No.4-to-Grid-No.1 Voltage for focus	0 to 400	volts
Cathode-to-Grid-No.1	0 10 400	VOILS
Voltage for visual		
extinction of focused		
raster	28 to 60	volts
Cathode-to-Grid-No.1 Video Drive from		
Raster Cutoff		
(Black Level):		
White-level value	-28 to -60	volts
Aximum Circuit Values:		
Frid-No.1-Circuit Resistance	1.5 may	. meaohms
Grid drive is the operating condit the grid-No.1 potential with respec	ion in which the video s ct to cathode.	signal varies
This value is a working design-cer	nter minimum. The equi	valent abso-
lute minimum ultor- or ultor-to-gr low which the serviceability of	the 21DLP4 will be imp	paired. The
design value such that under the	e worst probable opera	iting condi-
This value is a working design-eer late africtum altor or ultor-to-cr late africtum altor or ultor-to-cr equipment designer has the respond design value such that under the tions involving supply-voltage val absolute minimum ultor- or ultor- besolute minimum ultor- or ultor-	riation and equipment v to-grid-No.1 voltage i	ariation the s never less
than 11,000 volts.		
The grid-No.4 voltage or grid-No.4 focus of any individual tube is in remain essentially constant for va grid-No.1 voltage) or grid-No.2 v voltage) within design ranges snow	dependent of ultor curr	ent and will
remain essentially constant for va grid-No.1 voltage) or grid-No.2 v	lues of ultor voltage (voltage (or grid-No.2-1	or ultor-to-
voltage) within design ranges shown	n for these items.	
Distance from Reference Line for not exceed 2-1/4". Excluding ext	suitable PM centering m traneous fields, the co	agnet should enter of the
undeflected focused spot will fall radius concentric with the center	within a circle having er of the tube face.	a 7/16-inch It is to be
Distance from Reference Line for not exceed 2-1/4". Excluding ext undeflected focused spot will fall radius concentric with the cent noted that the earth's magnetic f deflection of the spot from the cen	ield can cause as much	as 1/2-inch
Cathode drive is the operating co varies the cathode potential with	ondition in which the	video signal
varies the cathode potential with electrodes.	respect to grid No.1 a	nd the other
For X-ray shielding con	siderations, see she	et
X-RAY PRECAUTIONS FO.	R CATHODE-RAY TUBES	
		1

at front of this Section

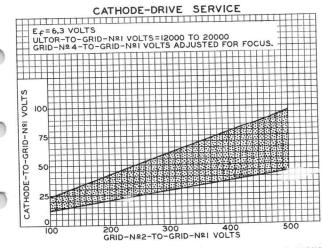
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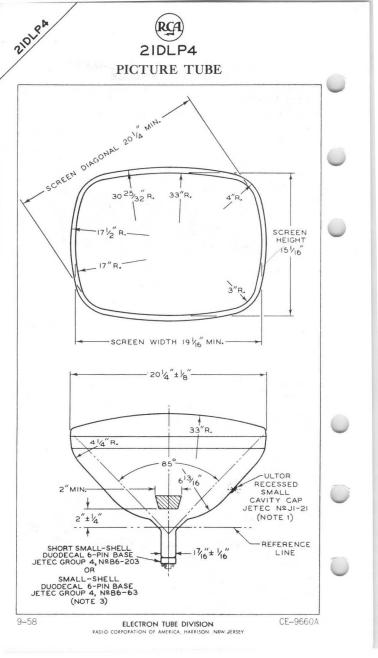
ELECTRON TUBE DIVISION TENTATIVE DATA 2 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

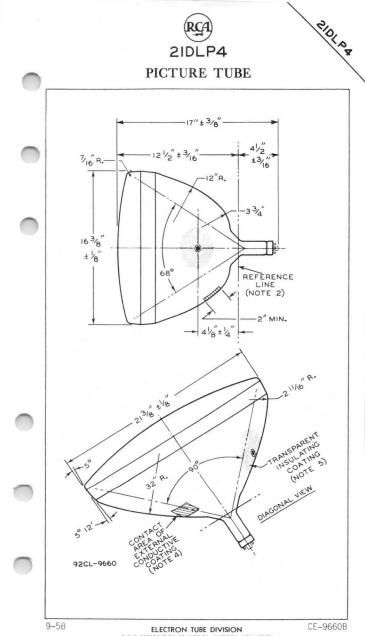


92CS-9349V



ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY 92CS-9350V





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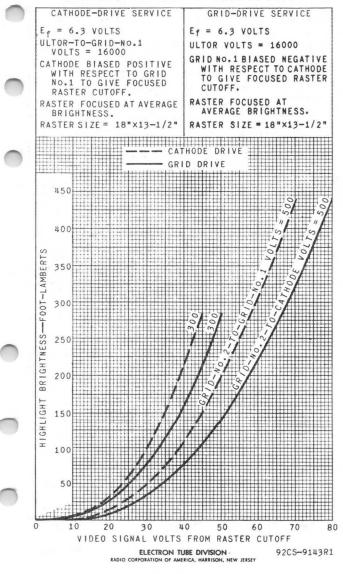
2101.84 21DI P4 PICTURE TUBE -5° 2716 MAX MOLD-MATCH LINE 3/" MIN.* SPLICE LINE *MAXIMUM WIDTH OF TUBE SEE NOTE 6-SUPPORT BAND. 5° 12'-DETAIL OF PANEL NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TER-MINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF ± 30°. ULTOR TERMINAL IS ON SAME SIDE AS PIN 6. NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC No. G-116 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL. NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BERIGIDLY MOUNT-ED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4". THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION NOTE 4: OF THE CONTACT AREA OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THE CONTACT AREA SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED. NOTE 5: TO CLEAN THIS AREA. WIPE ONLY WITH SOFT DRY LINTLESS CLOTH. NOTE 6: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICA-TED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE

ENVELOPE SURFACE AT THE MOLD-MATCH LINE.



21DLP4



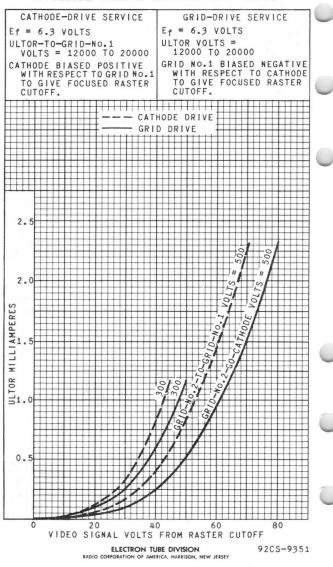




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2IDLP4

AVERAGE DRIVE CHARACTERISTICS





21058A

PICTURE TUBE

RECTANGULAR GLASS TYPE	ALUMINIZED SCREEN
LOW-VOLTAGE ELECTROSTATIC FOCUS	MAGNETIC DEFLECTION
LOW GRID-No.2 VOLTAGE	CATHODE-DRIVE TYPE
DATA	

General:	
Heater, for Unipotential Cathode: Voltage (AC or DC)	f
External conductive coating to ultor. 12000 min.	f
Faceplate, Spherical	% e 1
Fluorescence	e
Phosphorescence	e t c
Deflection Angles (Approx.):	0
Diagonal	0
Electron Gun Type Requiring No lon-Trap Magne Tube Dimensions:	
Overall length.	"
Greatest width	"
Greatest height 15-1/16 Diagonal 20-1/4 Projected area 262 sq. in	
Weight (Approx.). 24 lb Operating Position. Ar Cap)
Base Small-Shell Duodecal 6-Pin, Arrangement (JEDEC Group 4, No.B6-63), c Short Small-Shell Duodecal 6-Pi	1 r n
(JEDEC Group 4, No.B6-203	0

PICTURE TUBE Basing Designation for BOTTOM VIEW	North RCA 2IDSP4						
Pin 1 - Heater Pin 2 - Grid No.1 Pin 6 - Grid No.2 Pin 11 - Cathode Pin 12 - Heater CATHODE-DRIVE [®] SERVICE Unless otherwise specified, voltage values are positive with respect to grid No.1 Conductive Coating CATHODE-DRIVE [®] SERVICE Unless otherwise specified, voltage values are positive with respect to grid No.1 Caximum and Minimum Ratings, Design-Center Values: LTOR-TO-GRID-No.1 VOLTAGE. RID-No.4-TO-GRID-No.1 VOLTAGE: Positive value. RID-No.2-TO-GRID-No.1 VOLTAGE. RID-No.2-TO-GRID-No.1 VOLTAGE. Positive-peak value. Negative-peak value. Negative-peak value. Negative-bias value. Negative-bias value. Cathode: During equipment warm-up period not exceeding 15 seconds. After equipment warm-up period Not voltage (E_{cgg1}) be- tween 1200 and 20000 volts and grid-No.2-to-grid- No.1 voltage (E_{cgg1}) between 40 and 64 volts rid-No.4-to-Grid-No. Voltage for focus§. Voltage for focus§. Cathode-to-Grid-No.1 Voltage (E_{kg1}) for visual extinction of focused raster. See Raster-Cutoff-Range Chart	PIO	CTUR	e tu	BE	2		
Pin 2-Grid No.1 Pin 6-Grid No.2 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater CATHODE-DRIVE [®] SERVICE Unless otherwise specified, voltage values are positive with respect to grid No.1 aximum and Minimum Ratings, Design-Center Values: LTOR-TO-GRID-No.1 VOLTAGE. RID-No.4-TO-GRID-No.1 VOLTAGE: Positive value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-peak value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-peak value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-peak value. Negative-bias value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-peak value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-peak value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-peak value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-peak value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-peak value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-peak value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-bias value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-bias value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-bias value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-bias value. REGALIVE-DIS VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds. RID-No.2-TO-grid-No.1 voltage (E_{CSGI}) be- tween 1200 and 20000 volts and grid-No.2-to-grid- No.1 voltage (E_{CSGI}) between 40 and 64 volts rid-No.4-to-Grid-No. Voltage for focus§. Voltage for focus§. Voltage for visual extinction of focused raster. See Raster-Cutoff-Range Chart	Basing Designation fo	r BOTTOM	VIEW.				12L
Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater CATHODE-DRIVE [®] SERVICE Unless otherwise specified, voltage values are positive with respect to grid No.1 aximum and Minimum Ratings, Design-Center Values: ILTOR-TO-GRID-No.1 VOLTAGE. Negative value. RID-No.4-TO-GRID-No.1 VOLTAGE: Positive value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-peak value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-bias value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-bias value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-bias value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive-bias value. RID-NO.2-TO-GRID-NO.1 VOLTAGE: Positive-bias value. RID-NO.2-TO-GRID-NO.1 VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds. After equipment warm-up period not exceeding 15 seconds. After equipment warm-up period No.1 voltage (E_{cgg1}) be- tween 1200 and 2000 volts and grid-No.2-to-grid- No.1 voltage (E_{cgg1}) between 40 and 64 volts rid-No.4-to-Grid-No. Voltage for focus§. Voltage for focus§. Voltage for focus§. Voltage (E_{cgg1}) for visual extinction of focused raster. See Raster-Cutoff-Range Chart		0	-		Cap - I	Jltor	N- 2
Pin 10 - Grid No.2 Pin 11 - Cathode Pin 12 - Heater CATHODE-DRIVE [®] SERVICE Unless otherwise specified, voltage values are positive with respect to grid No.1 Maximum and Minimum Ratings, Design-Center Values: ILTOR-TO-GRID-No.1 VOLTAGE $\{20000 \text{ max}$ volts ILTOR-TO-GRID-No.1 VOLTAGE: $\{20000 \text{ max}$ volts RID-No.4-TO-GRID-No.1 VOLTAGE:		XL	T				
Pin 11 - Cathode Pin 12 - Heater CATHODE-DRIVE [®] SERVICE Unless otherwise specified, voltage values are positive with respect to grid No.1 aximum and Minimum Ratings, Design-Center Values: ULTOR-TO-GRID-No.1 VOLTAGE. Negative value. RID-No.4-TO-GRID-No.1 VOLTAGE: Positive value. RID-No.2-TO-GRID-No.1 VOLTAGE: Positive value. RID-No.2-TO-GRID-No.1 VOLTAGE. RID-No.2-TO-GRID-No.1 VOLTAGE. RID-No.2-TO-GRID-No.1 VOLTAGE. Positive-peak value. RID-No.2-TO-GRID-No.1 VOLTAGE. Positive-peak value. Negative-bias value. No to exceeding 15 seconds. Heater negative with respect to cathode: During equipment warm-up period. Not exceeding 15 seconds. Heater positive with respect to cathode. Not exceeding 15 seconds. Not exceeding 15 s		(*	5L				
$\label{eq:constraint} \begin{tabular}{ c c c c c c c } \hline Coating \\ \hline CATHODE-DRIVE® SERVICE \\ \hline Unless otherwise specified, voltage values are positive with respect to grid No.1 \\ \hline aximum and Minimum Ratings, Design-Center Values: \\ \hline Values: Values$		9/7	20		C - I	Extern	al
CATHODE-DRIVE" SERVICEUnless otherwise specified, voltage values are positive with respect to grid No.1Animum and Minimum Ratings, Design-Center Values:LITOR-TO-GRID-No.1 VOLTAGE.(20000 max. volts (12000* min. volts)RID-No.4-TO-GRID-No.1 VOLTAGE: Positive value.Nogative value.1000 max. voltsRID-No.2-TO-GRID-No.1 VOLTAGE: Positive value.Positive value.1000 max. voltsRID-No.2-TO-GRID-No.1 VOLTAGE.Add max. voltsRID-No.2-TO-GRID-No.1 VOLTAGE: Positive-peak valuePositive-bias valueOmax. voltsPositive-bias valuePositive-bias valuePositive-bias value <td>Pin 12-Heater</td> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Pin 12-Heater	2					
		00	9			Coati	ng
are positive with respect to grid No.1 aximum and Minimum Ratings, Design-Center Values: ILTOR-TO-GRID-No.1 VOLTAGE	CATH	ODE-DRIV	E" SER	VIC	E		
Aximum and Minimum Ratings, Design-Center Values:LTOR-TO-GRID-No.1 VOLTAGE. 20000 max. volts RID-No.4-TO-GRID-No.1 VOLTAGE: $12000^{\#} \text{ min. volts}$ Positive value. \dots 1000 max. volts Negative value. \dots 1000 max. volts Negative value. \dots 1000 max. volts RID-No.2-TO-GRID-No.1 VOLTAGE. 64 max. volts RID-No.2-TO-GRID-No.1 VOLTAGE. 64 max. volts RID-No.2-TO-GRID-No.1 VOLTAGE. 64 max. volts ATHODE-TO-GRID-No.1 VOLTAGE: 64 max. volts Positive-peak value 0 max. volts Negative-bias value 0 max. volts Negative-peak value 0 max. volts Heater negative with respect to cathode: 0 max. volts During equipment warm-up period not exceeding 15 seconds. 180 max. volts Heater positive with respect to cathode. 180 max. volts quipment Design Ranges: With any ultor-to-grid-No.1 voltage (E_{cgg1}) be- tween 1200 and 20000 volts and grid-No.2-to-grid- No.1 voltage (E_{cgg1}) between 40 and 64 voltsvoltage for focuss. 0 to 400 volts voltage for focuss. 0 to 400 volts athode-to-G							
$ \begin{array}{llllllllllllllllllllllllllllllllllll$							
$\begin{array}{c} 12000^{*} \text{ min.} \text{volts}\\ \text{RID-No.4-TO-GRID-No.1 VOLTAGE:}\\ \text{Positive value.} & 1000 \text{ max.} \text{volts}\\ \text{Negative value.} & 500 \text{ max.} \text{volts}\\ \text{Negative value.} & 500 \text{ max.} \text{volts}\\ \text{RID-No.2-TO-GRID-No.1 VOLTAGE.} & 64 \text{ max.} \text{volts}\\ \text{RID-No.2-TO-CATHODE VOLTAGE.} & 64 \text{ max.} \text{volts}\\ \text{RID-No.2-TO-CATHODE VOLTAGE:}\\ \text{Positive-peak value} & & & & & & & & & & & & & & & & & & &$		-	0		∫20000	max.	volts
Positive value					12000#	min.	volts
Negative value					1000	may	volto
RID-No.2-TO-GRID-No.1 VOLTAGE	Negative value		• • •	1			
ATHODE-TO-GRID-No.1 VOLTAGE: Positive-peak value 200 max. volts Positive-bias value	RID-No.2-TO-GRID-No.1	VOLTAGE.					volts
Positive-peak value					64	max.	volts
Positive-bias value					000		1.
Negative-bias value 0 max. volts Negative-peak value 2 max. volts EAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 410 max. volts After equipment warm-up period 180 max. volts Heater positive with respect to cathode							
Negative-peak value 2 max. volts EAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 410 max. volts After equipment warm-up period 180 max. volts Heater positive with respect to cathode							
EAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 410 max. volts After equipment warm-up period 180 max. volts Heater positive with respect to cathode				:			volts
<pre>respect to cathode: During equipment warm-up period not exceeding 15 seconds 410 max. volts After equipment warm-up period 180 max. volts Heater positive with respect to cathode</pre>	EAK HEATER-CATHODE VOL						
During equipment warm-up period not exceeding 15 seconds 410 max. volts After equipment warm-up period 180 max. volts Heater positive with respect to cathode							-
 not exceeding 15 seconds 410 max. volts After equipment warm-up period 180 max. volts Heater positive with respect to cathode		rm-un nei	rind				
Heater positive with respect to cathode					410	max.	volts
<pre>respect to cathode</pre>		m-up per	iod	τ.	180	max.	volts
<pre>quipment Design Ranges: With any ultor-to-grid-No.1 voltage (E_{C5g1}) be- tween 12000 and 20000 volts and grid-No.2-to-grid- No.1 voltage (E_{C2g1}) between 40 and 64 volts rid-No.4-to-Grid-No. Voltage for focus§0 to 400 volts athode-to-Grid-No.1 Voltage (Ekg1) for visual extinction of focused raster See Raster-Cutoff-Range Chart</pre>					100		1
With any ultor-to-grid-No.1 voltage (E_{CSGI}) be- tween 12000 and 20000 volts and grid-No.2-to-grid- No.1 voltage (E_{C2GI}) between 40 and 64 volts rid-No.4-to-Grid-No. Voltage for focus§0 to 400 volts athode-to-Grid-No.1 Voltage (E_{KGI}) for visual extinction of focused raster See Raster-Cutoff-Range Chart			• • •	•	180	max.	voits
tween 12000 and 20000 volts and grid-No.2-to-grid- No.1 voltage (E_{c2g1}) between 40 and 64 volts rid-No.4-to-Grid-No. Voltage for focus§0 to 400 volts athode-to-Grid-No.1 Voltage (E_{kg1}) for visual extinction of focused raster See Raster-Cutoff-Range Chart							1.1
No.1 voltage (E_{c2g1}) between 40 and 64 volts rid-No.4-to-Grid-No. Voltage for focus§0 to 400 volts athode-to-Grid-No.1 Voltage (E_{kg1}) for visual extinction of focused raster See Raster-Cutoff-Range Chart	With any ultor-to	-grid-No	0.1 VO	lta	ge (Ecse	1) be-	
rid-No.4-to-Grid-No. Voltage for focus§0 to 400 volts athode-to-Grid-No.1 Voltage (Ekg1) for visual extinction of focused raster See Raster-Cutoff-Range Chart							
Voltage for focus§ 0 to 400 volts athode-to-Grid-No.1 Voltage (Ekg1) for visual extinction of focused raster See Raster-Cutoff-Range Chart		- 251					
(Ekg1) for visual extinction of focused raster See Raster-Cutoff-Range Chart	Voltage for focus§				0 to 4	400	volts
of focused raster See Raster-Cutoff-Range Chart	athode-to-Grid-No.1 Vo	ltage					
athode-to-Grid-No.1 Video	(tkg1) for visual ext	Inction	See D	acto	r Cutof.	F_Rana	Chart
	athode-to-Grid-No.1 Vie	deo	Jee Ki	4568	7-cul05)	-nunge	e churt
Drive from Raster Cutoff	Drive from Raster Cut						
(Black level):							
White-level value (Peak negative)			Same	v21	up an de	torm	ned for
(reak negative)	(reak negative)		Eka.	exc	ept vide	eo driv	veisa

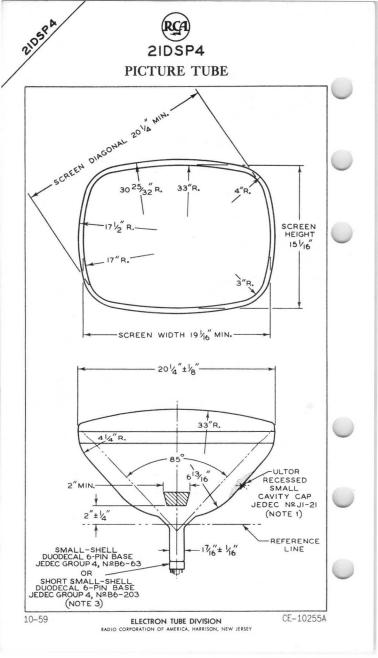
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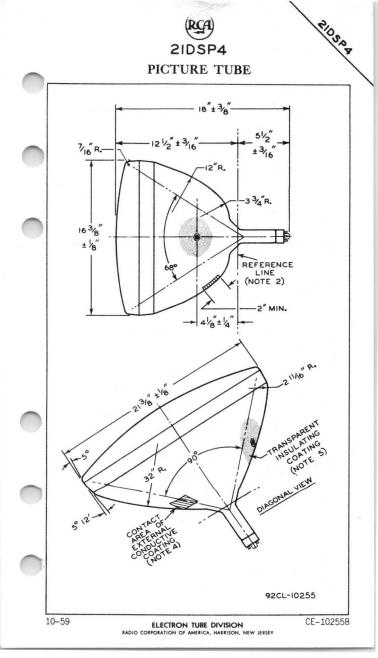


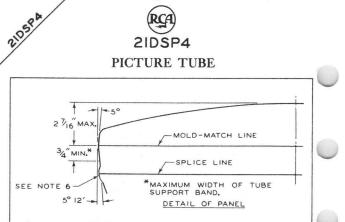
PICTURE TUBE

Grid-No.4 Current	-25 to +25	μa
Grid-No.2 Current	-15 to +15	μа
Field Strength of Adjustable Centering Magnet [*]	0 to 8	qausses
	0 10 0	gausses
Examples of Use of Design Ranges:		
With ultor-to-grid- No.1 voltage of	18000	volts
and grid-No. 2-to-grid-	18000	00115
No.1 voltage of	50	volts
Grid-No.4-to-Grid-No.1 Voltage		
for focus	0 to 350	volts
for visual extinction		
of focused raster	32 to 47	volts
Cathode-to-Grid-No.1 Video Drive		
from Raster Cutoff (Black level): White-level value	-32 to -47	volto
wille-level value	-92 10 -47	volts
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance	1.5 max.	megohms
Cathode drive is the operating condition in varies the cathode potential with respect to "electrodes.	which the vid grid No.1 and	eo signal the other
$\frac{*}{8}$ Operation below this value is not recommended		
Operation below this value is not recommended The grid-No.4, voltage or grid-No.4, who have not prid-No.4 focus of any individual tube is independent or remain essentially constant for values of ul or grid-No.2-to-grid-No.1 voltage within of these items.	o,1 voltage rec of ultor curren tor-to-grid-No. design ranges	quired for t and will 1 voltage shown for
Distance from Reference Line for suitable PM not exceed $2-1/a^*$. Excluding extraneous fi undeflected focused spot will fall within a c radius concentric with the center of the finder of the that the earth's magnetic field can c noted that the earth's magnetic field can c deflection of the spot from the center of the	centering magn elds, the cent circle having a tube face. It ause as much as tube face.	net should er of the 7/16-inch is to be 5 1/2-inch
The cathode-to-grid-No.1 voltage (Ekg1) for focused raster will increase by approximate 1000-volt increase in ultor-to-grid-No.1 volt approximately 2 per cent for every 1000-vol grid-No.1 voltage.	or visual exti ely 2 per cent age and will d t decrease in	nction of for every ecrease by ultor-to-
For x-ray shielding consideration X-RAY PRECAUTIONS FOR CATHODE	-RAY TUBES	
at front of this Secti	on	

A SECUR







NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 30°. ULTOR TERMINAL IS ON SAME SIDE AS PIN 6.

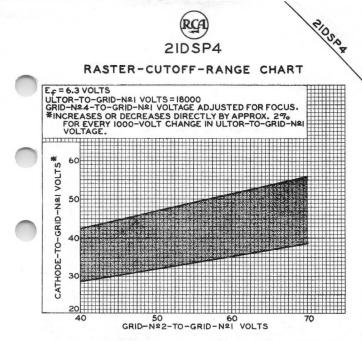
NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC NO.G-II6 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE SHELL WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

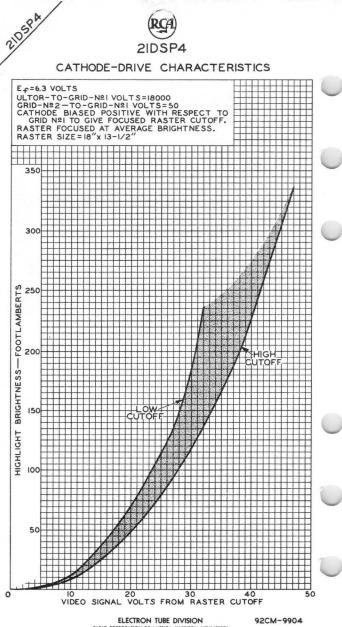
NOTE 4: THE DRAWING SHOWS THE MINIMUM SIZE AND LOCATION OF THE CONTACT AREA OF THE EXTERNAL CONDUCTIVE COATING. THE ACTUAL AREA OF THIS COATING WILL BE GREATER THAN THE CONTACT AREA SO AS TO PROVIDE THE REQUIRED CAPACITANCE. EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

NOTE 5: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINTLESS CLOTH.

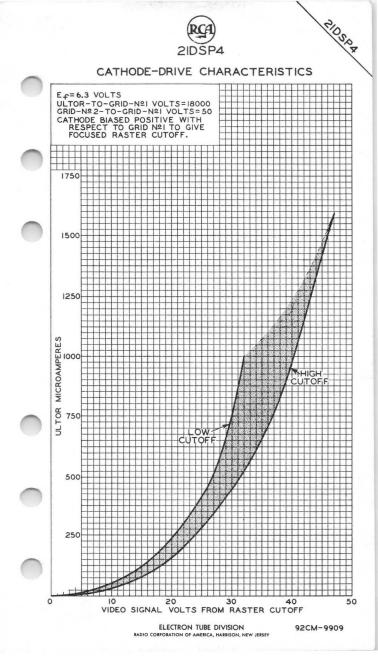
NOTE 6: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDI-CATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

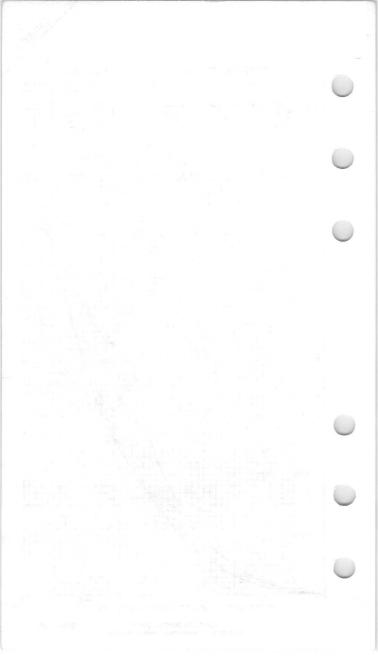


92CS-9911



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Picture Tube

RECTANGULAR GLASS TYPE MAGNETIC FOCUS ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION

Electrical:

Direct Interelectrode Capacitances: Cathode to all other electrodes 5 Grid-No.1 to all other electrodes 6	pf pf
External conductive coating to anode $\begin{cases} 750 \text{ max.} \\ 500 \text{ min.} \end{cases}$	pf pf
Heater Current at 6.3 volts 600 ± 60 Electron Gun	ma
No Ion Trap Mag	

Optical:

Phosphor (For curves,	see front	of this	Section) .	P4-SI	ulfide Type,
					Aluminized
Faceplate, Cylindri					
Light transmissio	n (Approx	<.)			74%

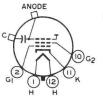
Mechanical:

Weight (Approx.).			2	÷	÷			×	÷		29 lbs
Overall Length					÷						23-1/32" ± 3/8"
Neck Length	20		•	\times							7-1/2" ± 3/16"
Projected Area of	S	cr	eer	٦.							248 sq. in.
External Conducti	/e	C	oa	tir	ng	:					
T											Denulas Dend

See Picture-Tube Dimensional-Outlines and Bulb J170 A/C sheets at front of this section

Basing Designation for BOTTOM VIEW. .

Pin 1-Heater Pin 2-Grid No.1 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater



Cap - Anode (Grid No.3, Screen, Collector) C - External Conductive Coating

. 12N



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 1-64

21EP4C

Maximum and Minimum Ratings, Design-Maximum Values:	
Unless otherwise specified, voltage val- ues are positive with respect to cathode	0
ANODE VOLTAGE 20000 max. volts GRID-No.2 VOLTAGE	0
Negative peak value220 max.voltsNegative bias value155 max.voltsPositive bias value0 max.voltsPositive peak value2 max.volts	
HEATER VOLTAGE	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. volts After equipment warm-up period 200 max. volts Heater positive with respect to cathode: Combined AC and DC voltage 200 max. volts DC component 100 max. volts	0
Typical Operating Conditions for Grid-Drive Service:	
Unless otherwise specified, voltage val- ues are positive with respect to cathode	
Anode Voltage	
extinction of focused raster28 to -72 volts Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5 max. megohms	
For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TURES	

X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

Monitor Kinescope

	NO ION-TRAP MAGNET REQUIRED
	RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 72 ⁰ MAGNETIC DEFLECTION
	Electrical:
	Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6.5 pf External conductive coating to anode {1500 max. pf 1200 min. pf
	Heater Current at 6.3 volts 6.00 ±60 ma Electron Gun
	Optical:
	Phosphor (For curves, see front of this Section) .P4-Sulfide Type,
	Aluminized Faceplate, Spherical
	Mechanical:
	Weight (Approx.)
	See Picture-Tube Dimensional-Outlines and Bulb J171 B/F sheets at front of this Section Cap
	(JEDEC Ňo.B6-63) Basing Designation for BOTTOM VIEW
)	Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4
	Pin 10 - Grid No.2 Pin 11 - Cathode
	Pin 12 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating
	Maximum and Minimum Ratings, Design-Maximum Values:
	Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage
aveat.	Anote vortage



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 6-64

21EYP4

Grid-No.4 (Focusing) Voltage: Positive value	volts volts
Grid-No.2 Voltage	volts
Grid-No.1 Voltage:	
Negative peak value	volts
Negative bias value	volts
Positive bias value 0 max.	volts
Positive peak value	volts
Heater Voltage	volts
(J. / 1811).	volts
Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period	
	volts
After equipment warm-up period 200 max.	volts
Heater positive with respect to cathode:	
Combined AC and DC voltage 200 max.	volts
DC component 100 max.	volts

Typical Operating Conditions for Grid-Drive Service:

Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage..... 18000 volts Grid-No.4 Voltage 0 to +400 volts . . . 300 volts focused raster. . . . -28 to -72 volts

Maximum Circuit Value:

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

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



21FDP4

Picture Tube

SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 110° MAGNETIC DEFLECTION
With Heater Having Controlled Warm-Up Time
GENERAL DATA
Heater Current at 6.3 volts
External conductive coating to ultor . $\begin{cases} 2000 \text{ max.} & \mu\mu\text{f} \\ 1500 \text{ min.} & \mu\mu\text{f} \end{cases}$
Electron Gun
Optical: Faceplate
Mechanical:
Operating Position Any Weight (Approx.) 20 lbs Overall Length 13-1/8" ± 1/4" Neck Length 3-7/8" ± 1/16" Projected Area of Screen 262 sq. in. External Conductive Coating: 262 sq. in.
Type
Cap
Basing Designation for BOTTOM VIEW
Pin 1 - Heater Pin 3 - Grid No.1 Pin 4 - Grid No.2 Pin 7 - Cathode Pin 8 - Heater Cap - Ultor (Grid No.3, Grid No.5, Collector) C - External Conductive Coating



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

DATA 5-62

21FDP4

ULTOR VOLTAGE 20000 max. volts GRID-No.4 (FOCUSING) VOLTAGE: Positive value
Negative value
GRID-No.2 VOLTAGE
GRID-No.1 VOLTAGE: Negative peak value
Negative bias value
Positive bias value O max. volts
Positive peak value
PEAK HEATER-CATHODE VOLTAGE:
Heater negative with
respect to cathode:
During equipment warm-up period
not exceeding 15 seconds 450 max. volts
After equipment warm-up period 200 max. volts
Heater positive with respect to cathode 200 max. volts
Typical Operating Conditions:
With ultor voltage of 16000 volts
and grid-No.2 voltage of 300 volts
Grid-No.4 Voltage for
focus +100 to +500 volts
Grid-No.1 Voltage for visual
extinction of focused raster35 to -72 volts
Maximum Circuit Values:
Grid-No.1-Circuit Resistance 1.5 max. megohms

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



21FP4D

Picture Tube

RECTANGULAR GLASS TYPE IOW-VOLTAGE FLECTROSTATIC FOCUS

ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION

Electrical:

Direct Interelectrode Capacitances: Cathode to all other electrodes			5 pf
Grid No.1 to all other electrodes			6 pf
External conductive coating to anode.			{750 max. pf 500 min. pf
Heater Current at 6.3 volts	•	• •	600 ± 60 ma
	·		Ion-Trap Magnet

Optical:

Phosphor	(For	Curves,	see	fre	ont	of	tł	his	Se	cti	on)	P	4-	-SI	11	Fi	de	Ty	/pe,
															1	11	um	in	ized
Faceplate	, C)	lindri	cal												F	1	te	rgl	ass
Light t	rans	smissic	n ()	App	ro>	(.)													74%

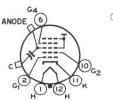
Mechanical:

29 lbs Weight (Approx.). 23-1/32" ± 3/8" Overall Length. 7-1/2" ± 3/16" . 248 sq. in. External Conductive Coating:

Type..... Regular-Band Contact area for grounding. Near Reference Line For Additional Information on Coatings and Dimensions:

See Picture-Tube Dimensional-Outlines and Bulb J170 A/C sheets at front of this section

Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater



Cap - Anode (Grid No.3. Grid No.5, Screen, Collector) C - External Conductive Coating

Maximum and Minimum Ratings, Design-Maximum Values:

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

ANODE VOLTAGE GRID-No.4 (FOCUSI				•	•	•	·	20000	max.	volts
Positive value.		 								volts
Negative value.					•			550	max.	volts



RADIO CORPORATION OF AMERICA Electronic Components and Devices

Harrison, N. J.

DATA 1-64

21FP4D

GRID-No.2 V GRID-No.1 V	/OLTA	GE . GE:		• •									550	max.	volts	
Negative	peak	valu	le										220	max.	volts	
Negative	bias	valu	Je									÷		max.	volts	-
Positive.	bias	valu	le											max.	volts	
Positive	peak	valu	le										2	max.	volts	
HEATER VOLT													16.9	max.	volts	
HEATEN YOU	AUL .	• •	•	• •	•	•	•		•	•			15.7	min.	volts	
	egativ t to c equip exceed	ve wi catho oment ding	ith de wa 15	: arm- sei	-ur	o p nds	5.							max.	volts	0
After e Heater po respect	sitiv to d	ve wi catho	ith ode	:									200	max.	volts	
Combine	d AC	and	DC	VO	lta	age	е.						200	max.		
DC comp	onent	t			·		•		•				100	max.	volts	
Typical Ope	ratir	ng Co	ond	iti	ons	5 1	for	- (àri	id-	Dr	·iv	e Serv	/ice:		\cup
													age vo o catho			
Anode Volta	ae.												140	00	volts	
Grid-No.4 V														+310	volts	
Grid-No.2 V														00	volts	
Grid-No.1 V extinctio	/oltag	ge fo	or v	visi	Ja	1							-28 to	-72	volts	
Maximum Cir	cuit	Valu	ie:													
Grid-No.1-C	lircu	it Re	esi	sta	nce	е.						÷	1.5	max.	megohms	

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



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Picture Tube

-	
	PAN-O-PLY-INTEGRAL IMPLOSION PROTECTION II4º MAGNETIC DEFLECTION NO ION-TRAP MAGNET REQUIRED LOW-VOLTAGE ELECTROSTATIC FOCUS
	Direct Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode 1500 min—2300 max pF Heater Current at 6.3 V
	OPTICAL
	Phosphor
	Light transmission at center (approx.) 46%
	MECHANICAL
	Weight (Approx.)
	Type (see CRT OUTLINES 1 at front of this section) Regular-Band Contact area for grounding Near Reference Line Cap Recessed Small Cavity (JEDEC No.JI-21) Base
	TERMINAL DIAGRAM (Bottom View)
0	Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 4-Grid No.1 Pin 6-Grid No.1 Pin 8-Heater Pin
	MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES
	Voltages are positive with respect to cathode Anode Voltage
0	Grid-No.l Voltage Negative peak value

1

1

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

DC

DATA 10-65

21FVP4

Peak Heater-Cathode Voltage

Heater negative with respect to cathode:	
During equipment warm-up period ≤ 15 seconds 450 max	٧
	٧
Heater positive with respect to cathode:	
Combined AC & DC voltage	٧
DC component	٧
TVDIALL ADDALTING ADUDITIONS FOR ALTUARE ADVIS ADVIS	

TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE

Voltages are positive with respect to grid No.1

Anode Voltage															20000	٧
Grid-No.4 Voltageb															100	٧
Grid-No.2 Voltage.															400	٧
Cathode Voltage															36 to 78	۷
For visual extinc																
Field Strength Of required adjus	ta	b]	e d	cei	nte	er	i ng	g r	naç	gne	et.	•	•	•	0 to 10	G

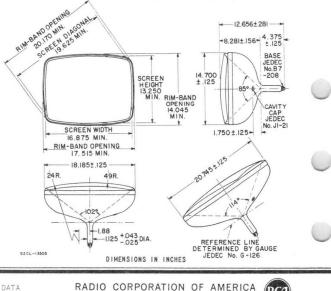
MAXIMUM CIRCUIT VALUE

Grid-No. | Circuit Resistance . 1.5 max MΩ

Includes implosion protection hardware. b

The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between -100 and +300 volts with the combined grid-No.1 voltage and video-signal voltage adjusted to give an anode cur-rent of 100 microamperes on a 11.750-inch by 15.500-inch pattern from an RCA-2F21 monoscope, or equivalent.

DIMENSIONAL OUTLINE (BULB J165-1/4 A)



Harrison, N. J.

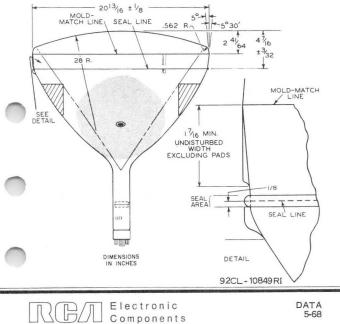
Electronic Components and Devices

21GUP22

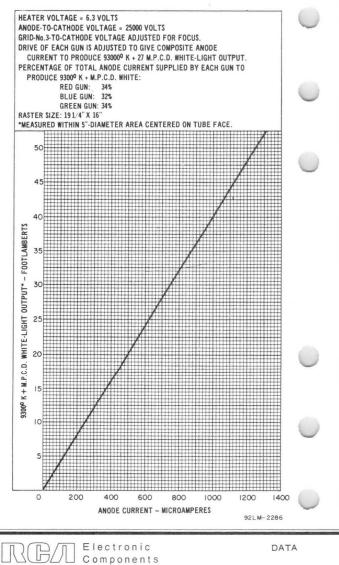
Color Picture Tube

1

New Kare-Earth	(Ked) Phosphor
70° Round Unity Current Ratios	HI-LITE Screen 70° Magnetic Deflection
The 21GUP22 is the same as following:	s the 21GVP22 except for the
Light transmission (Approx	
TUBE DIMENSIONS	
Diameter	
^a It is recommended that shatter-proof glass cover to protect it from being tect against possible	the cabinet be provided with a er over the face of the 21GUP22 struck accidentally and to pro- damage resulting from tube im-
	normal condition. This safety x-radiation protection when re-
DIMENSIONAL OUTLINE Dimensions shown are only the corresponding dimen	those which are different from sions for the 21GVP22
2013/2 + 1/2	



TYPICAL LIGHT-OUTPUT CHARACTERISTIC



Color	Picture	Tube

Ń	70° Round New	Rare-Earth (Red) Phosphor	
9	Antiglare Integral Protective	Window HI-LITE Screen	
	Unity Current Ratios	70° Magnetic Deflection	

ELECTRICAL

R.P.A.ElectronicDATA 1Components5-68
Spacing between centers of adjacent dot trios (Approx.) 0.029 in
of separate phosphors, respectively Red, Blue, Green Persistence of group phosphorescence Medium Short Dot Arrangement
Screen, on Inner Surface of Faceplate: Type Aluminized, Tricolor, Phosphor-Dot Phosphor (three separate phosphors, collectively) P22-New Rare-Earth (Red), Sulfide (Blue & Green) Type Fluorescence and phosphorescence
Faceplate and Protective Window Filterglass Light transmission at center (Approx.) 39% Surface of Protective Window Treated to minimize specular reflection
OPTICAL (2000 min. pr
Grid No.1 of any gun to all other electrodes 10 pF Grid No.3 to all other electrodes 12 pF All cathodes to all other electrodes 16 pF External conductive coating to anode (Approx.) 22000 mix. pF
Deflection Angles (Approx.): Horizontal
Current at 6.3 volts ^a 1.9 ^A Focusing Method Electrostatic Focus Lens Bipotential Convergence Method Magnetic Deflection Method
Electron Guns, Three with Axes Tilted Toward Tube Axis Red, Blue, Green Heater, of Each Gun Parallel Connected within Tube with Each of the Other Two Heaters:

MECHANICAL	
Minimum Screen Area (Projected)	q. in
Bulb Funnel Designation JEDEC No.J164-1/	/4A1
Bulb Panel Designation JEDEC No.FP166-1/	
Protective Window Designation JEDEC No.FP166-1/	
Base Small-Shell Neodiheptal 12	2-pin
Operating Position Tube Axis Horizo	
V-grooved panel pad on top (Base pin 12 near	top)
Socket Alden Nos.214NMINSC (Radial lea	
214NMINC (Axial leads), or equiva	
	1 lb
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUE	ES
Unless otherwise specified, values are for each gur	2
and voltage values are positive with respect to cathode	2
(07 500 more -	alta -
Anode Voltage	/onts
Total Anode Current, (20,000 min. V	70its
Long-Term Average 1000 max.	μΑ
Grid-No.3 (Focusing Electrode) Voltage . 6000 max.	volts
Peak Grid-No.2 Voltage, Including	
Video Signal Voltage 1000 max. v	volts
Grid-No.1 Voltage:	
Negative bias value 400 max. v	volts
Negative operating cutoff value 200 max. v	volts
Positive bias value	volts
Positive peak value 2 max. v	volts
Heater Voltage (ac or dc):	
Under operating conditions ^a (6.9 max. v	volts
Under operating conditions [5.7 min. v	
Under standby conditions ^c 5.5 max. v	
Peak Heater-Cathode Voltage:	0103
Heater negative with respect to cathode:	
During equipment warm-up period not	
exceeding 15 seconds 450 max. v	volts
After equipment warm-up period:	
Combined AC and DC value 200 max. v	olts
DC component value 200 max. v	olts
Heater positive with respect to cathode:	
AC component value 200 max. v	olts
DC component value 0 max. v	

EQUIPMENT DESIGN RANGES

Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode

For anode voltages between 20,000 and 27,500 volts Grid-No.3 (Focusing Electrode) Voltage 16.8% to 20% of Anode volts

-	
	Grid-No.2 and Grid-No.1 Voltages
	for Visual Extinction of Focused
	Spot See CUTOFF DESIGN CHART
	Maximum Ratio of Grid-No.2 Voltages, Highest
	Gun to Lowest Gun in Any Tube (At grid-No.1
	spot cutoff voltage of -100 volts) 1.86
	Grid-No.3 Current (Total)
	Grid-No.2 Current
	To Produce White of 9300 °K + 27 M.P.C.D.
	(CIE Coordinates $x = 0.281$, $y = 0.311$):
	Red Blue Green
	Percentage of total anode current
	supply by each gun (average) 34 32 34 %
	Ratio of cathode currents:
	Min. Typ. Max.
	Red/blue 0.75 1.10 1.50
	Red/green
	Blue/green 0.60 0.91 1.30
	Displacements, Measured at Center of Screen:
	Raster centering displacement:
	Horizontal ±0.60 in
	Vertical
	Lateral distance between the blue beam and
	the converged red and green beams +0.40 in
	Radial convergence displacement excluding
	effects of dynamic convergence (each beam). ± 0.50 in
	Maximum Required Correction for Register ^d (In-
	cluding Effect of Earth's Magnetic Field when
	Using Recommended Components) as Measured
	at the Center of the Screen
2	in any Direction 0.005 in max.
	LIMITING CIRCUIT VALUES
	High-Voltage Circuits:
	Grid-No.3 circuit resistance 7.5 max. megohms
	In order to minimize the possibility of damage to the
	tube caused by a momentary internal arc, it is recommended
Į.,	that the high-voltage power supply and the grid-No.3 power
	supply be of the limited-energy type, in which the short-
	circuit current does not exceed 20 mA.
	Low-Voltage Circuits:
	Effective grid-No 1-to-cathode-

Effective grid-No.1-to-cathode-

吕/

circuit resistance (each gun) 0.75 max. megohm The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under

> Electronic Components

these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short-circuit current of more than 750 mA total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

- ^a For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.
- ^b For curve, see Group Phosphor P22-New Rare-Earth (Red), Sulfide (Blue & Green) at front of this section.
- ^c For "instant on" applications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- ^d Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

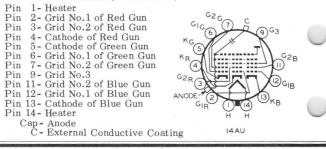
X-RADIATION WARNING

Because the 21GVP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 21GVP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

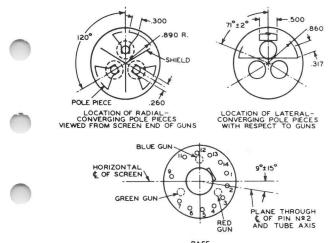
TERMINAL DIAGRAM (Bottom View)

Electronic

Components

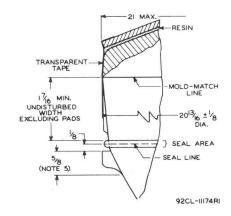


DATA 2



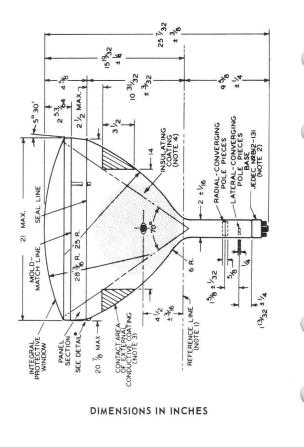
BASE BOTTOM VIEW

DIMENSIONAL OUTLINE DETAIL

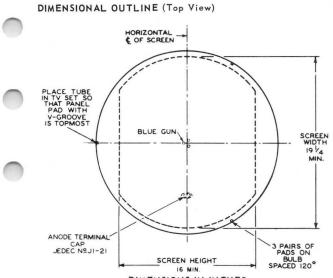


Components

DATA 3 5-68 DIMENSIONAL OUTLINE



RBA Electronic Components DATA 3



DIMENSIONS IN INCHES

NOTES FOR DIMENSIONAL OUTLINE

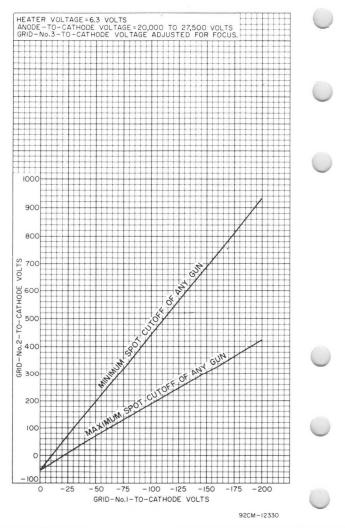
- Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge JEDEC No. G-150 and with tube seated in gauge, the reference line is determined by the intersection of the plane CC' of the gauge with the glass funnel.
- Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base shell will fall within a circle concentric with bulb axis and having a diameter of 3".
- Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

Note 4: To clean this area, wipe only with soft dry lintless cloth.

Note 5: The maximum effective width of a funnel pad is 5/8".

RBA Electronic Components

CUTOFF DESIGN CHART



RBA Electronic Components

DATA 4



RECTANGULAR METAL-SHELL TYPE

LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION

DATA

General:

uenei	ar.														
Heate	er, for U	nipoten	tial	C	atho	ode	:								
Vo	tage				E	5.3						ac or	dc \	volt	S
Cur	ltage rrent				().6	±	10	%					.an	np -
Facer	plate. Sp	herical								F	roste	ed Fi	lter	alas	SS
Phos	ohor (For	Curves,	see	fro	nt o	f ti	nis	Se	cti	on)	. P4-	-Sul	fide	Typ	e
	ection An														
	agonal.													70	0
	rizontal													66	0
Vei	rtical .													50	0
Elect	tron Gun								. 10	on-1	Trap	Type	Requ	irir	na
							E	te	rna	als	Single	-Fie	ld Ma	ane	t
Tube	Dimensio	ns.						110			singi		10 110	igne	
	kimum ove		nath										22-	-5/8	2"
Gre	eatest wi	dth at	lin	•••	• •		•			• •	19	-23/3	2".+		
Gre	eatest he	ight at	110		• •	•	•	•	•	• •	. 10	5-5/1	6" +	1/5	2"
Di	agonal at	lin	1.11	•	•	• •	•	•	•	• •	·	20-31	A" +	1//	
Nor	longth	rip	• •		• •		•	•	•	• •	• • •	7 1/2	4 <u>1</u>	2/16	
Red	ck length dius of c	· · · · ·		f f		1.	·	iF	· + .	· ·		r=1/2	1	27	211
Sara	en Dimens	ione (M			acer	JIa	Le	11	XL	erna	al Su	race	/	22	
	eatest wi												10	1/0	211
	eatest wi														
Gre	eatest ne	ignt	• •	•	•	• •	•	•	•	• •	• •	• •	12-1.	1/10	
DIA	agonal.	1.1.1.1	• •		•	•	·	•	•	• •			19-	-1/6	5
Upera	ating Pos	ition .	•	•	• •	•	•			• •	· · .	• • • •		. Ar	1y
Ulto	r Termina Smal							۰,		• •	. Me	etal-	Shel	L	P
Bas	sing Desi	gnation	for	- B	OTTO	MC	VIE	EW						.12	2M -
1.					G)									
Pi	n 1–Hea	ter			X	-	>			Me	etal-	Shell	Lip	-	
Pi	n 2-Gri	d No.1			11		T	1				Ulto	r		
Pi	n 6-Gri	d No.4			L							(Gri	d No	.3.	
Pi	n 10 - Gri	d No.2		4	1	-	-	tio	0				d No		
	n 11 - Cat			-	V	$ \land $	>	200	9				lecte		
	n 12 - Hea			(5	U				10.00		- C A	
					C		9								
Maxin	num Ratin	gs, Des	ign-	-Ce	ntei	r V	alı	ues	:						
ULTO	R VOLTAGE										16000	max.	1	volt	ts
GRID-	-No.4 (FO	CUSING)	VOI	LTA	GE:										
Po	sitive va	lue : .									1000	max.	,	volt	ts
Net	gative va	lue									500	max.		volt	
GRID	-No.2 VOL	TAGE .										max.		volt	
GRID	-No.1 VOL	TAGE :					•		1		000				
	gative-bi		е.								125	max.	,	volt	IS
Po	sitive-bi	as valu	P	• •		• •	•	•	•			max.		volt	
	sitive-pe											max.		volt	
10	sicive-pe	an varu				• •	•	•			2	max.		.011	
											🔶 i no	dicate	sac	hang	е.
9-58														DA	TA

9-58

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY DATA

21AD X



21MPA

PICTURE TUBE

11

	AY PREC.	AUTION	S FOR C	ATHODE-	RAY TUB.		
							5
			P		1.5	max.	megohms
r positi	ivewith	respe	ct to ca	thode.	180	max.	volts
ot excee er equip	eding 1 oment w	5 seco arm-up	nds period		180	max.	volts volts
1	r negat ing equ ot excee er equip r posit Circuit .1-Circu	r negative with ing equipment v ot exceeding 12 er equipment w r positive with Circuit Value .1-Circuit Res For X-ray shi X-RAY PREC.	ing equipment warm-u ot exceeding 15 seco er equipment warm-up r positive with respe Circuit Values: .1-Circuit Resistanc For X-ray shielding X-RAY PRECAUTION	r negative with respect to ca ing equipment warm-up period of exceeding 15 seconds er equipment warm-up period r positive with respect to ca Circuit Values: .1-Circuit Resistance For X-ray shielding consid X-RAY PRECAUTIONS FOR C	<pre>r negative with respect to cathode: ing equipment warm-up period ot exceeding 15 seconds er equipment warm-up period r positive with respect to cathode. Circuit Values: .1-Circuit Resistance For X-ray shielding consideration X-RAY PRECAUTIONS FOR CATHODE-</pre>	r negative with respect to cathode: ing equipment warm-up period ot exceeding 15 seconds 410 r r equipment warm-up period 180 r r positive with respect to cathode. 180 r Circuit Values: .1-Circuit Resistance 1.5 r <i>For X-ray shielding considerations, see</i>	r negative with respect to cathode: ing equipment warm-up period ot exceeding 15 seconds 410 max. er equipment warm-up period 180 max. r positive with respect to cathode. 180 max. Circuit Values: .1-Circuit Resistance 1.5 max. For X-ray shielding considerations, see sheet X-RAY PRECAUTIONS FOR CATHODE-RAY TUBES

Color Picture Tube

Ultra-Rectangular 4 X 3 Aspect Ratio Electrical Hi=Lite Matrix Screen Light Neutral Screen Appearance

Electrical	
Electron Guns, Three with Axes Tilted Toward Tube Axis	Red, Blue, Green
Heater, of Each Gun Series Connected w Tube with Each of the Other Two Heater Current at 6.3 V	ers:
Focusing Method	
Focus Lens	
Convergence Method	
Deflection Method	Magnetic
Deflection Angles (Approx.): Diagonal Horizontal Vertical	
Direct Interelectrode Capacitance (Appro Grid No.1 of any gun to all other ele Grid No.3 to all other electrodes All cathodes to all other electrodes .	ectrodes 7.5 pF 6.5 pF 15 pF
Capacitance Between Anode and Extern Conductive Coating	al 2250 max. pF 1750 min. pF
Optical	
Faceplate and Safety Panel Light transmission at center (Approx	Filterglass .)
Surface of Safety Panel	Treated to minimize specular reflection
Screen Matrix Phosphor, rare-earth (red) sulfide (blu Persistence Array Spacing between centers of adjacent	Black opaque material ue & green) P22 Medium-Short 377,000 Dot trios
dot trios (Approx.)	0.026 in (0.66 mm)
Mechanical	
Minimum Screen Area (Projected)	
Bulb Funnel Designation	
Bulb Panel Designation	
Base Designation ^a	
	(JEDEC No.B12-244)
Basing Designation	
Pin Position Alignment Pin	No.12 Aligns Approx. with Anode Bulb Contact

RBA Electronic Components

Operating Position, preferred Anode Bu Gun Configuration		Delta		
Implosion Protection			\cup	
Integral Safety Panel JEDEC No.SP177-1/4A1				
Maximum and Minimum Ratings, Design-Maximu	um Values			
Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode.				
Anode Voltage	27.5 max. 20 min.	kV kV		
Anode Current, Long-Term Average ^b	1000 max.	μΑ		
Grid-No.3 (Focusing Electrode) Voltage	6000 max.	V		
Peak-Grid-No.2 Voltage, Including Video Signal Voltage	1000 max.	V	0	
Grid-No.1 Voltage: Negative bias value Negative operating cutoff value Positive bias value Positive peak value	400 max. 200 max. 0 max. 2 max.	> > >		
Heater Voltage (ac or dc):C				
Under operating conditions	6.9 max. 5.7 min.	V V		
Under standby conditions ^d	5.5 max.	V		
Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period				
not exceeding 15 seconds	450 max.	V		
DC component value	200 max.	V		
Peak value	200 max.	V		
Heater positive with respect to cathode: DC component value Peak value	0 max. 200 max.	$\stackrel{\scriptstyle \vee}{\scriptstyle_{\scriptstyle \vee}}$		
Equipment Design Ranges			0	

Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode

For anode voltages between 20 and 27.5 kV

Grid-No.3 (Focusing Electrode) Voltage 16.8% to 20% of Anode voltage

RBA Electronic Components

DATA 1

Grid-No.2 Voltage for Visual Extino of Undeflected Focused Spot		
At Grid No.1 voltage of75 V At Grid No.1 voltage of125 V At Grid No.1 voltage of175 V	/	in Figure 3 80 to 280 V 215 to 550 V 355 to 820 V
Maximum Ratio of Grid-No.2 Volt Lowest Gun in Any Tube (At grid- voltage of -100 V)	ages, Highest	Gun to
Heater Voltage: ^C Under operating conditions: When standby operation in r When 5.0-V standby operatio Under standby conditions ^d	on is utilized ^C	6.0 V
Grid-No.3 Current (Total)		<u>+</u> 15 μΑ
Grid-No.2 Current		<u>+</u> 5 μA
Grid-No.1 Current		+5 μA
	Illum, D	Color
To Produce White Light of	6550 ⁰ K + 7 M.P.C.D.	9300 ⁰ K + 27 M.P.C.D.
CIE Coordinates:		
×	0.313	0.281 0.311
YPercentage of total anode currer		0.311
supplied by each gun (average):		
Red	41	30 %
Blue	24	31 %
Green	35	39 %
Red/blue:		
Minimum	1.35	0.75
Typical	1.70	0.95
Maximum	2.20	1.25
Red/green: Minimum	0.95	0.60
Typical	1.15	0.75
Maximum	1.70	1.10
Blue/green:		
Minimum	0.50 0.70	0.60 0.80
Typical	0.95	1.10
	0.00	
Displacements, Measured at Center	of Screen:	
Raster centering displacement:	+ 0	ar : (+ aa a)
Horizontal		45 in (± 11.4 mm) 45 in (± 11.4 mm)
Lateral distance between the bl		45 m (± 11.4 mm)
the converged red and green bea		25 in (± 6.4 mm)
		NALONSH 670 OKTO ISMO SAVETINA RODISION
R P Electronic		DATA 2 2-72
Components		2-12.

Radial convergence displacement excluding effects of dynamic convergence (each beam)	
Maximum Required Correction for Register ^e (Including Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the Center of the Screen in any Direction	0
Typical Operation	
Heater Voltage	C
Anode Voltage	
Grid No.3 Voltage Adjusted for focus	
Color Temperature	
Raster Size	
Typical White-Light Output Measured within 5 in (127 mm) diameter area centered on tube face:	0
At anode current of 1000 μ A	
Limiting Circuit Values High-Voltage Circuits:	
$\begin{array}{llllllllllllllllllllllllllllllllllll$	
X-Radiation Characteristic	
Maximum Anode Voltage at which the X-radiation emitted will not exceed 0.5 mR/h at an anode current of	

The X-radiation emitted from this picture tube, as measured in accordance with the procedure of JEDEC Publication No.64A will not exceed 0.5 mR/h throughout the useful life of the tube when operated within the Design-Maximum ratings: 27.5 kV anode voltage and 1000 µA anode current. The tube should not be operated beyond its Design-Maximum ratings stated above (such operation may shorten tube life or have other permanent adverse affects on its performance), but its X-radiation will not exceed 0.5 mR/h for anode voltage and current combinations given by the isodose-rate limit characteristics as shown in Figure 1. Operation above the values shown by the curve may result in failure of the television receiver to comply with the Federal Performance Standard for Television Re-ceivers, Sub-Part C of Part 78 of Title 42, Code of Federal Regulations (PL90-602) as published in the Federal Register Vol.34, No. 247, Thursday, December 25, 1969. Maximum X-radiation as a function of anode voltage at 300 µA anode current is shown by the curve in Figure 2. X-radiation at a constant anode voltage varies linearly with anode current.

- ^a The mating socket, including its associated, physically-attached hardware and circuitry, must not weigh more than one pound (one-half kilogram).
- b The short-term average anode current should be limited by circuitry to 1500 microamperes.
- ^c For maximum cathode life, it is recommended that the heater supply be regulated. The series impedance to any chassis connection in the dc biasing circuit for the heater should be between 100 kilohms and 1 megohm. The surge voltage across the heater must be limited to 9.5 volts rms.
- d The use of a 5-volt standby condition in conjunction with 6-volt operating conditions is recommended to improve the reliability of the color picture tube by extending the emission wear-out life and reducing other gun-related defects. A maximum heater voltage of 5.5 volts (Design-Maximum velue) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- e Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

Notes For Dimensional Outline

- Note 1— With tube neck inserted through flared end of referenceline and neck-funnel-contour gauge (JEDEC No.G162) and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C ' of the gauge with the glass funnel.
- Note 2- Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with blub axis.
- Note 3— The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

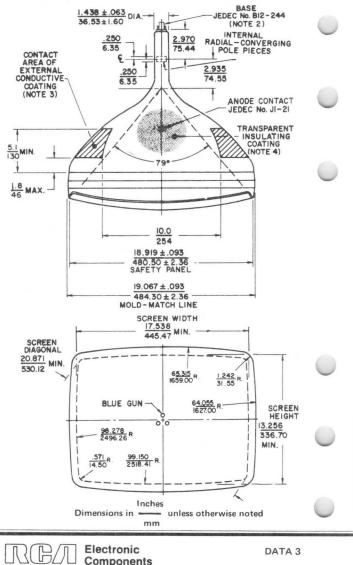
Note 4- To clean this area, wipe only with soft, dry, lintless cloth.

SAGITTAL HEIGHTS AT POINTS 125 BEYOND EDGE OF MIN. SCREEN

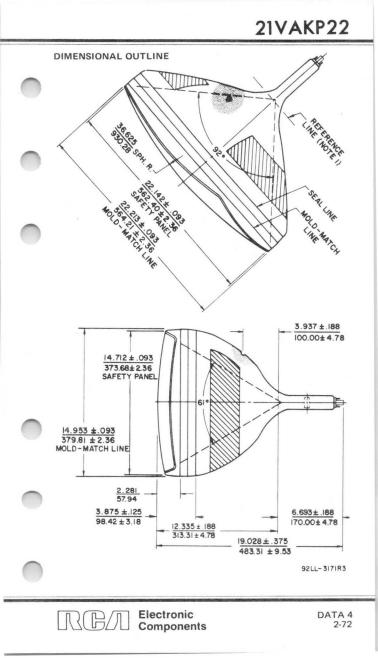
DIAGONAL 1.561 39.65 HORIZONTAL 27.94 / VERTICAL 0.630

RBA Electronic Components

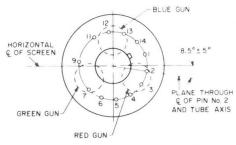
DIMENSIONAL OUTLINE



Electronic Components DATA 3



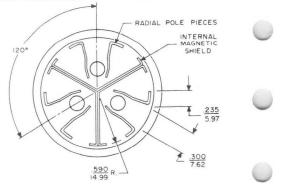
BOTTOM VIEW OF BASE



Base Specification - JEDEC No.14BE

- Pin 1-Heater Pin 2- Cathode of Red Gun Pin 3-Grid No.1 of Red Gun Pin 4-Grid No.2 of Red Gun Pin 5-Grid No.2 of Green Gun Pin 6-Cathode of Green Gun 7-Pin Grid No.1 of Green Gun Pin 9-Grid No.3 Pin 11-Cathode of Blue Gun Pin 12- Grid No.1 of Blue Gun Pin 13- Grid No.2 of Blue Gun Pin 14- Heater Cap- Anode (Grid No.4, Screen, Collector)
 - C- External Conductive Coating

LOCATION OF RADIAL-CONVERGING POLE PIECES VIEWED FROM SCREEN END OF GUNS

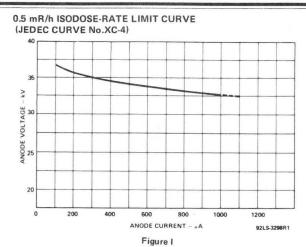


92CS-12835R4

9205-12816

RBA Electronic Components

DATA 4



X-RADIATION LIMIT CURVE AT A CONSTANT ANODE CURRENT OF 300 μ A (X-RADIATION AT A CONSTANT ANODE VOLTAGE VARIES LINEARLY WITH ANODE CURRENT) (JEDEC CURVE No.XC-3)

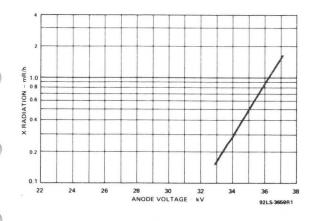


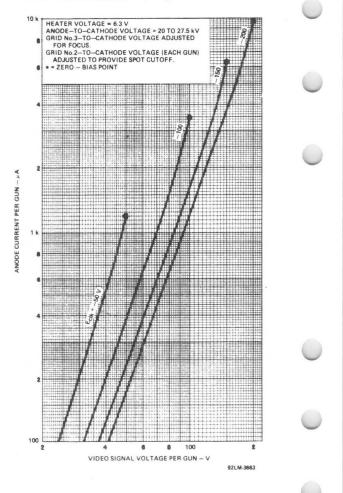
Figure 2

Electronic Components

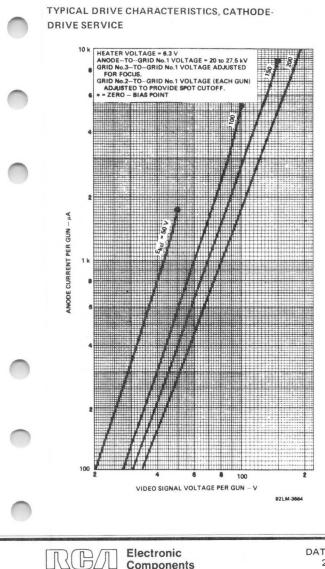
RB/1

21VAKP22

TYPICAL DRIVE CHARACTERISTICS, GRID-DRIVE SERVICE



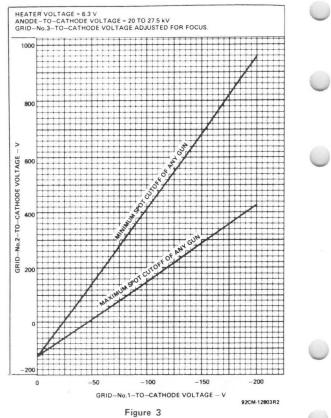
RBA Electronic Components DATA 5



Components

DATA 6 2-72

CUTOFF DESIGN CHART



IMPORTANT: Refer to sheet Safety Precautions For Color Picture Tubes at front of this section.

RBA Electronic Components

Picture Tube

	NO ION-TRAP MAGNET REQUIRED MAGNETIC FOCUS 70° MAGNETIC DEFLECTION
	ELECTRICAL
	Direct Interelectrode Capacitances
-	Cathode to all other electrodes
	External conductive coating to anode
	Later null conductive counting to under 1 1 1 1 500 min pF Heater Current at 6.3 V
	Electron Gun
	OPTICAL
	Phosphor
	Faceplate
	MECHANICAL
	Weight (Approx.)
	Overall Length
	Neck Length 7.500 ± 0.188 in
	Projected Area of Screen
	Type
	Contact area for grounding Near Reference Line
	For Additional Information on Coatings and Dimensions
	See $Picture$ -Tube Dimensional-Outlines and Bulb J165Z sheets at front of this section
	Cap Recessed Small Cavity (JEDEC No.JI-21)
	Base Small-Shell Duodecal 5-Pin (JEDEC Group 4, No. B5-57)
	Basing Designation for BOTTOM VIEW
	Pin 1-Heater ANODE
	Pin 2-Grid No.1
	Pin 10 - Grid No.2
	Pin 11 – Cathode
	Cap - Anode (Grid No.3. $\sqrt{20}$ G2
	Screen 2
	Collector) GI (1) (12) K
-	C-External H H
	Conductive Coating
	MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Unless otherwise specified, voltage values
	are positive with respect to cathode
	Anode Voltage
-	Grid-No.1 Voltage
\bigcirc	Negative peak value
	Negative bias value
	Positive bias value
	Positive peak value 2 max V
	RCA RADIO CORPORATION OF AMERICA DATA
	Electronic Components and Devices Harrison, N. J.

21WP4B

Heater Voltage	V V	
Peak Heater-Cathode Voltage		\cup
Heater negative with respect to cathode: During equipment warm-up period not		
exceeding 15 seconds	٧	
After equipment warm-up period 200 max	٧	
Heater positive with respect to cathode:	V	
Combined AC and DC voltage 200 max DC Component	v	
TYPICAL OPERATING CONDITIONS FOR GRID-DRIVE SERVICE	÷	
Unless otherwise specified, voltage values are positive with respect to cathode		
Anode Voltage	V	
Grid-No.2 Voltage	v	
Grid-No.1 Voltage	٧	
For visual extinction of focused raster		-
MAXIMUM CIRCUIT VALUE		

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



Picture Tube

LOW-VOLTAGE ELECTROSTATIC FOCUS 70° MAGNETIC DEFLECTION NO ION-TRAP MAGNET REQUIRED

ne ren neterner
ELECTRICAL
Direct Interelectrode Capacitances Cathode to all other electrodes
OPTICAL
Phosphor P4—Sulfide Type, Aluminized
For curves, see front of this section Faceplate
MECHANICAL
Weight (Approx.)
Cap Recessed Small Cavity (JEDEC No.JI-21) Base Small-Shell Duodecal 6-Pin (JEDEC Group 4, No.B6-63) Basing Designation for BOTTOM VIEW
Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 12-Heater Cap-Anode (Grid No.3,
Grid No.5, Screen, Collector) C – External Conductive Coating
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES
Unless otherwise specified, voltage values are positive with respect to cathode
Anode Voltage

Anode Voltage. Grid-No.4 (Focu				 	 20000	max	V
Positive valu Negative valu	е				1100 550	max max	
RADIO		PORAT				DA	ТA

Harrison, N. J.

Electronic Components and Devices

10-65



21XP4B

Grid-No.2 Voltage Grid-No.1 Voltage	•				•		•		•	•				550	max	۷	
Negative peak value														220	max	V	
Negative bias value																v	
Positive bias value															max	V	
Desitive east value														0	-	V	
Heater Valtage												÷.		6.9	max	V	
Heater Voltage	•		•	•		•	•		•	•	•	•	•	5.7	min	v	
Peak Heater-Cathode V																	
Heater negative wit								h	ode	е:							
During equipment																	
not exceeding 15	S	eco	ond	S.										450	max	V	
After equipment w	an	n-i	D	pe	ric	bd								200	max	V	
Heater positive wit	h	res	spe	ct	to	0 0	at	h	ode	e :							
Combined AC and D														200	max	V	
DC Component															max	v	
TYPICAL OPERATIN	G	COL	DI	ΤI	ON	SF	-01	RI	GR	I D.	-DI	RI	VE	SERV	ICE		
Unless othe	r w	ise	51	neo	· i t	ie	d	,	01	to	100	. ,	al	IPS			
are posi														103			
A LAND CONTRACTOR OF A LAND																	
Anode Voltage																۷	
Grid-No.4 Voltage																۷	
Grid-No.2 Voltage	•		• •			•								300		۷	
Grid-No.1 Voltage	•	٠			•	•							-28	to -	-72	۷	
For visual extinct	ior	0	f 1	00	US	ed	r	as	te	r							
,	MAX	IM	UM	CI	RC	01	T	٧Å	LU	E							
Grid-No.I-Circuit Res	sis	ta	nce		X	•								1.5	max	ΜΩ	
For X-radiation	sh	ie	ldi	na	C	on	si	de	ra	ti	on	s.	Se	e sh	eet		

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



21YP4B

Picture Tube

ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 70° MAGNETIC DEFLECTION

RECTANGULAR GLASS TYPE

Direct Interelectrode Capacitances:	
Cathode to all other electrodes 5	pf
Grid No.1 to all other electrodes 6	pf
External conductive coating to anode 500 min.	pf pf
Heater Current at 6.3 volts	
Electron Gun	
No Ion-Trap Ma	agnet

Optical:

Electrical:

Phosphor (Fo	or Curves,	see	fro	nt	of	thi	S	Sec	cti	on		Ρ	4-	-S					ype, ized
Faceplate, S	Spherical										ŝ,				Fi	11	te	rq	lass
Light tran	nsmission	(A	ppr	OX,).		•		٠	8		٠	•	•	•	8		•	75%

Mechanical:

24 lbs 23-1/32" ± 3/8" Overall Length. 7-1/2" ± 3/16" . . 248 sg. in. External Conductive Coating:

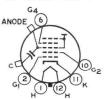
Type..... Regular-Band Contact area for grounding.... Near Reference Line For Additional Information on Coatings and Dimensions:

See Picture-Tube Dimensional-Outlines and Bulb J170 B/D sheets at front of this section

Cap Recessed Small Cavity (JEDEC No.J1-21) Base. Small-Shell Duodecal 6-Pin (JEDEC Group 4, No. B6-63)

Basing Designation for BOTTOM VIEW. . .

Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10 - Grid No.2 Pin 11 - Cathode Pin 12 - Heater



Cap - Anode (Grid No.3, Grid No.5. Screen, Collector) C-External Conductive Coating

. . 12L

Maximum and Minimum Ratings, Design-Maximum Values:

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

ANODE VOLTAGE 20000 max. volts



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 1-64

21YP4B

GRID-No.4 (FOCUSING) VOLTAGE: Positive value. 1100 max. Negative value. 550 max. GRID-No.2 VOLTAGE 550 max. GRID-No.1 VOLTAGE: 220 max. Negative beak value. 155 max. Positive bias value. 0 max. Positive bias value. 0 max. Positive peak value. 6.9 max. HEATER VOLTAGE. {6.9 max.	volts volts volts volts volts volts volts volts
HEATER VOLTAGE	volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode: Combined AC and DC voltage 200 max. DC component 100 max.	volts volts volts
Typical Operating Conditions for Grid-Drive Service:	
Unless otherwise specified, voltage val-	
ues are positive with respect to cathode	
Anode Voltage	volts volts volts volts
Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5 max. r	megohms
personalities Andersonee Section Representation Comparent Statements (1999) 2 K (2 10 10 10 10 10 10 10 10 10 10 10 10 10	

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



21ZP4C

Picture Tube

RECTANGUI	AR	GLASS	TYPE
MAGNETIC	F0(CUS	

ALUMINIZED SCREEN 70° MAGNETIC DEFLECTION

Electrical:

Direct Interelectrode Capacitances: Cathode to all other electrodes 5	pf pf
Grid No.1 to all other electrodes 6	pt
External conductive coating to anode {750 ma 500 mi	x. pf n. pf
Heater Current at 6.3 volts 600 ±	60 ma
	equiring Magnet

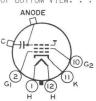
Mechanical:

Optical:

Type..... Regular-Band Contact area for grounding..... Near Reference Line For Additional Information on Coatings and Dimensions:

See Picture-Tube Dimensional-Outlines and Bulb J170 B/D sheets at front of this section

Pin 1-Heater Pin 2-Grid No.1 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater



Cap - Anode (Grid No.3, Screen, Collector) C - External Conductive Coating

Maximum and Minimum Ratings, Design-Maximum Values:

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

	- 6				 	 - D		r -	 		
ANODE VOLTAGE		×.								20000 max.	volts
GRID-No.2 VOLTAGE	•		÷.	ł.		÷	÷			550 max.	volts



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA I-64

21ZP4C

GRID-No.1 VOLTAGE: Negative peak value	-
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. volts After equipment warm-up period 200 max. volts Heater positive with respect to cathode:	
Combined AC and DC voltage 200 max. volts DC component 100 max. volts Typical Operating Conditions for Grid-Drive Service:	
Unless otherwise specified, voltage val- ues are positive with respect to cathode	
Anode Voltage	
focused raster	
Grid-No.1-Circuit Resistance 1.5 max. megohms For X-radiation shielding considerations, see sheet	

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



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

22JP22

Color Picture Tube

"PERMA-CHROME" ASSEMBLY FOR OPTIMUM FIELD PURITY AND UNIFORMITY DURING WARM-UP

RECTANGULAR TUBE

90° MAGNETIC DEFLECTION

ALUMINIZED TRICOLOR PHOSPHOR-DOT *Hi-Lite* SCREEN (Utilizing a New Improved Rare-Earth Red-Emitting Phosphor) INTEGRAL FILTERGLASS PROTECTIVE WINDOW

MAGNETIC CONVERGENCE

3 ELECTROSTATIC-FOCUS GUNS

For Use in Color-TV Receivers

ELECTRICAL

Electron Guns, Three.											. 1	Rec	1,	BI	ue	, G	reen
Axes tilted toward	tuł	be	a>	cis	5												
Heater, of Each Gun																	
Series connected wi	thi	in	tu	be	e v	vit	:h										
each of the other t	WO	he	eat	er	S												
Current at 6.3 vo	olts	sa														900	mA
Focusing Method													El	ec	tr	osta	atic
Focus Lens														Bi	po	ten	tial
Convergence Method									÷						. M	agne	etic
Deflection Method											y.				. M	agn	etic
Deflection Angles (Ap	pro	ox.	.)														
Diagonal																	900
Horizontal																	790
Vertical										•							63 ⁰
Direct Interelectrode																	
Grid No.1 of any gu																	
Grid No.3 to all of																	
All cathodes to all	0	th€	er	e	e	cti	00	des	5.	•			•			15	pF
External conductive	- 00	oat	tir	na	t	0	and	ode	à.,				.1	25	500	ma	x pF
Excernar conductive		ou	5.13	.9				Jur	••		•		1	20	000	mi	n pF

OPTICAL

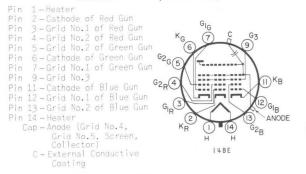
Surface of Protective Window. Treated to minimize specular reflection Screen, on Inner Surface of Faceplate Type. Aluminized, Tricolor, Phosphor-Dot Phosphor (Three separate phosphors, collectively)^b . . . P22-New Rare-Earth (Red), Sulfide (Blue & Green) Type Fluorescence and phosphorescence of separate phosphors, respectively Red, Blue, Green Persistence of group phosphorescence. Medium Short Dot arrangement Each triangular group consists of a red, green, and blue dot Spacing between centers of adjacent dot trios (Approx.) 0.025 in (0.64 mm)



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 1 4-67 MECHANICAL

Tube Dimensions

TERMINAL DIAGRAM (Bottom View)



MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES

Unless otherwise specified, values are for voltage values are positive with respect	each gun and to cathode
Anode Voltage	$\{ \begin{array}{ccc} 27,500 \text{ max } V \\ 20,000 \text{ min } V \end{array} \}$
Typical Anode Current, Long-Term Average Grid-No.3 (Focusing Electrode) Voltage	. 1000 max μA . 6000 max V
Peak Grid-No.2 Voltage, Including Video Signal Voltage	. 1000 max V

22JP22

Grid-No.| Voltage

Negative bias value				. 400	max V
Negative operating cutoff value	8 R -		2	. 200	max V
Positive bias value				. 0	max V
Positive peak value				. 2	max V
Heater Voltage (AC or DC)					
Under operating conditions ^a				6.9	max V
Under operating conditions ^a	• •	• •		15.7	min V
Under standby conditions ^b				. 5.5	max V
Peak Heater-Cathode Voltage					
Heater negative with respect to cath	ode:				
During equipment warm-up period					
not exceeding 15 seconds				. 450	max V
After equipment warm-up period:			2		
Combined AC and DC value				200	max V
DC component value					max V
Heater positive with respect to cath			•	. 200	IIICA V
AC component value	ouc.			. 200	max V
DC component value		• •	•	. 200	max V
De component value		• •		. 0	max V

EQUIPMENT DESIGN RANGES Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode For anode voltages between 20,000 and 27,500 V of anode volts Grid-No.2 and Grid-No.1 Voltages. See accompanying For visual extinction of Cutoff Design Chart focused spot Maximum Ratio of Grid-No.2 Voltages . . . 1.86 Highest gun to lowest gun in any tube (At grid-No.1 spot cutoff voltage of -100 volts) Grid-No.3 Current (Total) -45 to +15 µA -5 to +5 µA (CIE Coordinates x = 0.281, y = 0.311) Percentage of total anode current supplied by each Red Blue Green qun (Average).... 34 32 34 % Ratio of cathode currents: Min Max Typ 0.75 1.10 1.50 Red/blue. Red/green 0.65 1.00 1.50 Blue/green. 0.60 0.91 1.30 Displacements, Measured at Center of Screen Raster centering displacement: Horizontal. ±0.47 in (±11.9 mm) Vertical. ±0.45 in (±11.4 mm) Lateral distance between the blue beam and the converged red and green beams. ± 0.25 in (± 6.4 mm) Radial convergence displacement excluding effects of dynamic convergence (Each beam). ±0.37 in (±9.4 mm)

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

22JP22

Maximum Required Correction for Register^c (Including Effect of Earth's Magnet Field when Using Recommended Components) Measured at the center of the screen in any direction. . . . 0.005 in (0.13 mm) max

EXAMPLES OF USE OF DESIGN RANGES

Unless otherwise specified, voltage values are for each gun and are positive with respect to cathode	
Anode Voltage	٧
Grid-No.3 (Focusing Electrode) Voltage 4200 to 5000 Grid-No.2 Voltage when circuit design utilizes grid-No.1 voltage of -I50 volts for visual extinction	۷
of focused spot	۷
voltage of 400 volta	۷
Heater Voltage 6.3 Under operating conditions ^a 5.0	V V

LIMITING CIRCUIT VALUES

High-Voltage Circuits

Grid-No.3 circuit resistance. 7.5 max MΩ

In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the *high-voltage power supply* and the grid-No.3 power supply be of the limited-energy type, in which the short-circuit current does not exceed 20 mA.

Low-Voltage Circuits

Effective grid-No.1-to-cathodecircuit resistance (Each gun). 0.75 max MO

The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short circuit current of more than 750 mA total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.



DATA 2

- For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.
- ^b For curve, see Group rnosphor P22-New Rare-Barth (Red), Sulfide (Blue & Green) at front of this section.
- C For "instant on" applications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- d Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

GENERAL CONSIDERATIONS

X-Radiation Warning. Because the 22JP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 22JP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

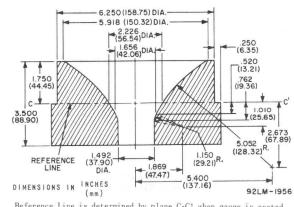
Orientation. The 22JP22 must be operated with tube axis in a horizontal position and with the blue gun uppermost (i.e., the anode contact button on top).

The Deflecting Yoke and tube axes must coincide and the yoke must be free to move along the neck for a distance of approximately 0.5 inch (13 mm) from its most forward position for adjustment purposes. The yoke mount should also provide for a small amount of rotational adjustment.

Contact to the external conductive coating should be made by multiple fingers to prevent possible damage to the tube from localized overheating due to poor contact.

Misregister Compensation. Proper operation of the 22JP22 requires compensation for the effects of extraneous magnetic fields, the earth's magnetic field, and other causes which may produce misregister. Compensation for these effects may be accomplished by the use of a purifying magnet.

REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE JEDEC No.GI62

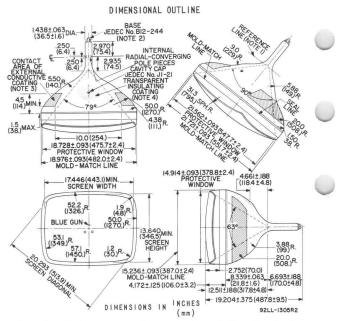


Reference Line is determined by plane C-C' when gauge is seated.



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22JP22



Note I: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge and with tube seated in gauge, the reference line is determined by the intersection on the plane C-C' of the gauge with the glass funnel.

Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.

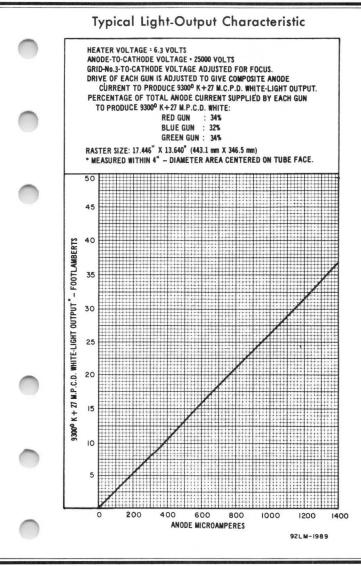
Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

Note 4: To clean this area, wipe only with soft, dry, lintless cloth.

LOCATION OF RADIAL-CONVERGING POLE PIECES VIEWED FROM SCREEN END OF GUNS

for type 22JP22 is the same as that shown for type 25XP22





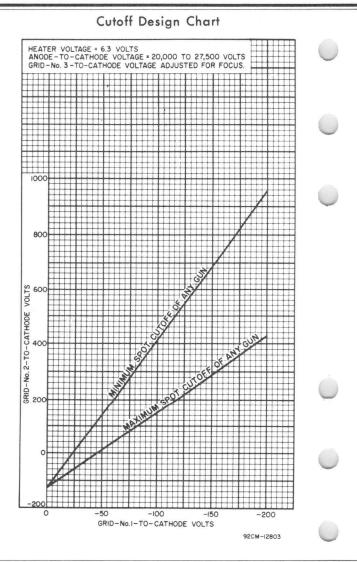


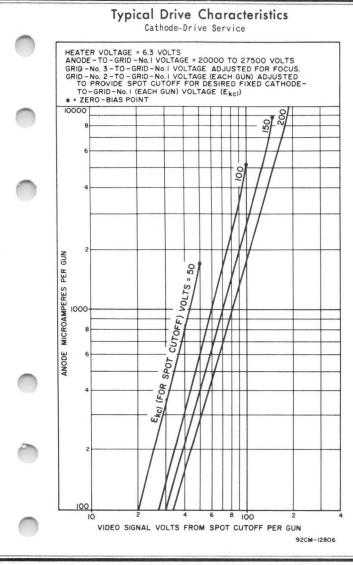
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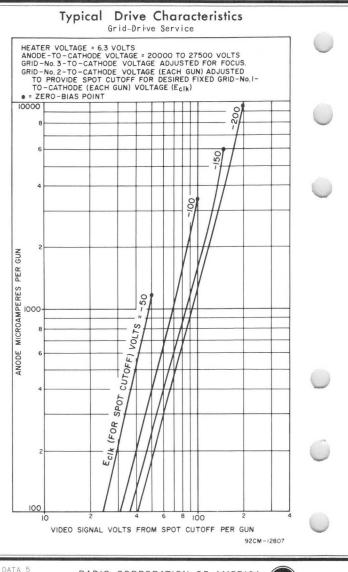
22JP22







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RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

Color Picture Tube

"PERMA-CHROME" ASSEMBLY FOR OPTIMUM FIELD PURITY AND UNIFORMITY DURING WARM-UP

RECTANGULAR TUBE 90° MAGNETIC DEFLECTION

ALUMINIZED TRICOLOR PHOSPHOR-DOT "Hi-Lite" SCREEN (Utilizing an Improved Rare-Earth Red-Emitting Phosphor) MAGNETIC CONVERGENCE 3 ELECTROSTATIC-FOCUS GUNS

For Use in Color-TV Receivers

The 22KP22 is the same as the 22JP22 except for the following items:

OPTICAL

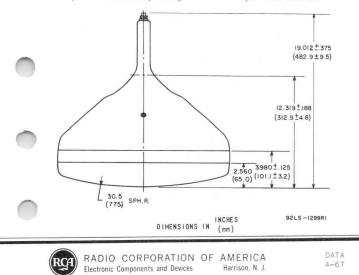
MECHANICAL

Tube Dimensions

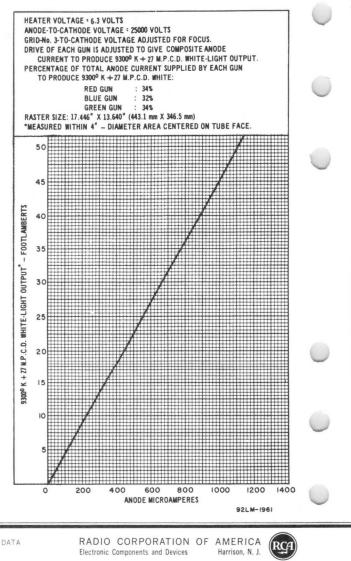
^a It is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 22KP22 to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion under some abnormal condition. This safety cover can also provide x-radiation protection when required.

DIMENSIONAL OUTLINE

Dimensions shown are only those which are different from the corresponding dimensions for the 22JP22







Color Picture Tube

Perma-Chrome 90° Rectangular New Rare-Earth (R	Banded-Type ed) Phosphor	HI-L	n Protec LITE Sci Surrent Ro	reen
ELECTRICAL Electron Guns, Three Tilted Toward Tub	e with Axes e Axis	Red.	Blue, G	reen
Heater, of Each Gun Connected within Each of the Other	Tube with			
Current at 6.3 V ^a .			900	mA
Focusing Method			Electrost	tatic
Focus Lens			Bipoter	
Convergence Method			Magn	
Deflection Method Deflection Angles (A			Magn	
Diagonal			90	deg.
Horizontal				deg.
Vertical Direct Interelectrode			63	deg.
Grid No.1 of any gu	un trodes		6	pF
Grid No.3 to all oth	her electrodes		6.5	pF
All cathodes to all	other electrodes		15	pF
External conductiv to anode (Approx	e coating	{2	500 max. 000 min.	pF pF
OPTICAL		(
Faceplate	*********		Filterg	lass
Light transmission	at center (Appro:	x.)		42%
Surface			. Polis	shed
Screen, on Inner Surfa	ace of Faceplate:	:		
Туре	. Aluminized,	Tricolor, I	Phosphor	-Dot
Phosphor (three sepa phosphors, collect	ively) b P22- Sulfic	-New Rare de (Blue &		
Fluorescence and p of separate phos respectively		Red.	Blue, G	reen
Persistence of grou				
Dot Arrangement	Triang		consistin	ng of
Spacing between cent dot trios (Approx.)	ters of adjacent			
	atropio			TA 1

RBA Electronic Components

MECHANICAL		
Minimum Screen Area (Projected): 227 se	q. in (1465 sq.	cm)
Bulb Funnel Designation JEDEC Bulb Panel Designation JEI Base Small-Butt Pin Position Alignment Pin No	C No.J173-1/2 DEC No.FP173 ton Diheptar 12	A1A -3/4 2-pin
Operating Position Anode Bu		Top
Weight (Approx.)	29 lb (13.3	kg)
MAXIMUM AND MINIMUM RATINGS, Design-	Maximum Valu	es
Unless otherwise specified, values are for voltage values are positive with respect to	each gun and cathode	
Anode Voltage	27,500 max. 20,000 min.	V V
Total Anode Current, Long-Term Average	1000 max.	μA
Grid-No.3 (Focusing Electrode) Voltage	6000 max.	V
Peak Grid-No.2 Voltage, Including Video Signal Voltage	1000 max.	V
Grid-No.1 Voltage: Negative bias value Negative operating cutoff value Positive bias value Positive peak value Heater Voltage (ac or dc):	400 max. 200 max. 0 max. 2 max.	V V V V
Under operating conditions ^a	$\begin{cases} 6.9 \text{ max.} \\ 5.7 \text{ min.} \end{cases}$	V V
Under standby conditions ^c	5.5 max.	V
Peak Heater-Cathode Voltage:		
Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	450 max.	v
After equipment warm-up period:		
Combined AC and DC value DC component value	200 max. 200 max.	V V
Heater positive with respect to cathode:		
AC component value DC component value	200 max. 0 max.	V V
EQUIPMENT DESIGN RANGES Unless otherwise specified, values are for voltage values are positive with respect to	cathode	
For grade voltages between 20 000 and 27	E00 17	

For anode voltages between 20,000 and 27,500 V

Grid-No.3 (Focusing Electrode) Voltage.... 16.8% to 20% of Anode Voltage

.

Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused Spot
Heater Voltage: Under operating conditions ^a 6.3 V
Under standby conditions ^c 5.0 V
Grid-No.3 Current (Total)
Grid-No.2 Current
To Produce White 9300 ^o K + 27 M.P.C.D. (CIE Coordinates x = 0.281, y = 0.311):
Percentage of total anode current supplied by Red Blue Green each gun (average) 34 32 34 %
Ratio of cathode currents: Min. Typ. Max. Red/blue 0.75 1.10 1.50 Red/green 0.65 1.00 1.50 Blue/green 0.60 0.91 1.30
Displacements, Measured at Center of Screen:
Raster centering displacement:
Horizontal ± 0.47 in (± 11.9 mm)
Vertical \pm 0.45 in (± 11.4 mm)
Lateral distance between the blue beam and the converged red and green beams ± 0.25 in (± 6.4 mm)
Radial convergence displacement excluding effects of dynamic convergence (each beam) ± 0.37 in (± 9.4 mm)
Maximum Required Correction for Register ^d (Including Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the center of the Screen in any Direction 0.005 in (0.13 mm) max.
LIMITING CIRCUIT VALUES:

High-Voltage Circuits:

RBA Electronic Components Low-Voltage Circuits:

Effective grid-No.1-to-cathodecircuit resistance (each gun)

The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short circuit current of more than 750 mA total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

..... 0.75 max. MΩ

^a For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.

b For curve, see Group Phosphor-P22-New Rare Earth (Red), Sulfide (Blue & Green) at front of this section.

^c For "instant on" applications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.

^d Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

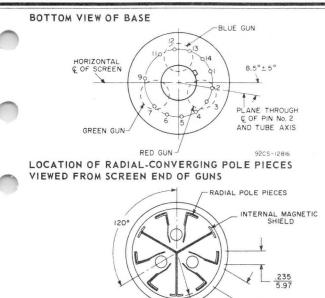
X-RADIATION WARNING

Because the 22UP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 22UP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

BASE SPECIFICATION - JEDEC No. 14BE

Pin	1: Heater	Pin 11: Cathode of Blue Gun	
Pin	2: Cathode of Red Gun	Pin 12: Grid No.1 of Blue Gun	
Pin	3: Grid No.1 of Red Gun	Pin 13: Grid No.2 of Blue Gun	
Pin	4: Grid No.2 of Red Gun	Pin 14: Heater	
Pin	5: Grid No.2 of Green Gur	Cap: Anode (Grid No.4,	
Pin	6: Cathode of Green Gun	Screen, Collector)	
Pin	7: Grid No.1 of Green Gur	C: External Conductive	
Pin	9: Grid No.3	Coating	

DATA 2



NOTES FOR DIMENSIONAL OUTLINE

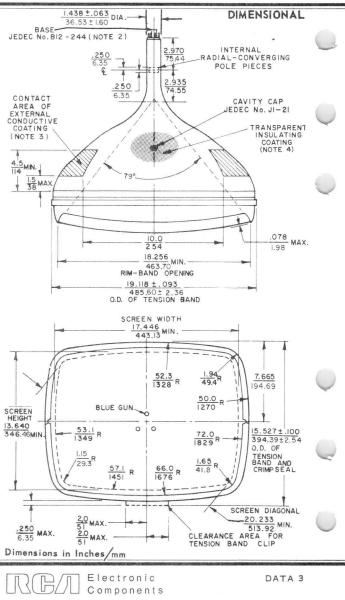
Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge JEDEC No.G162 and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel.

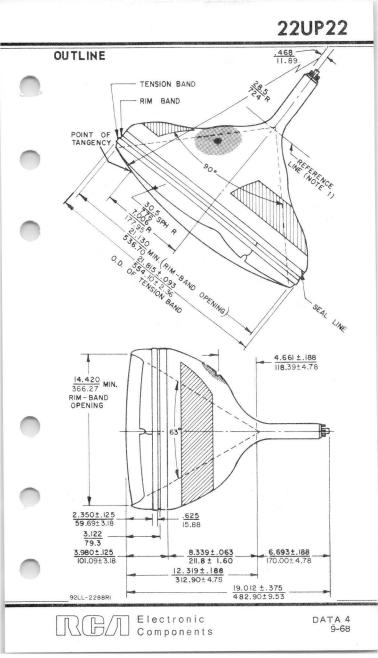
.590 R.

300

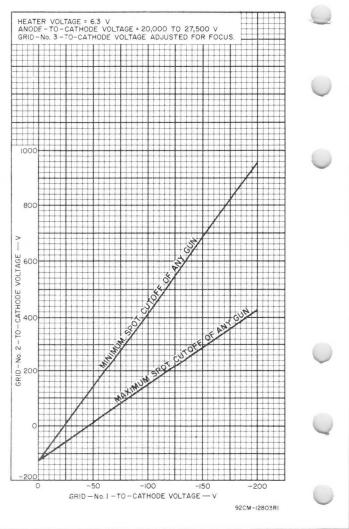
92CS-12835R3

- Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.
- Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.
- Note 4: To clean this area, wipe only with soft, dry, lintless cloth.





CUTOFF DESIGN CHART



RGA Electronic Components

DATA 4

22WP22

Color Picture Tube

Perma-Chrome Banded-Type Implosion Protection 90° Rectangular HI-LITE Screen New Rare-Earth (Red) Phosphor Unity Current Ratios This data sheet is to be used in conjunction with data for RCA-22UP22.

For general data, maximum and minimum ratings, equipment design ranges, limiting circuit values, xradiation warning, and base specification of the 22WP22, refer to the 22UP22 except as noted below.

MECHANICAL

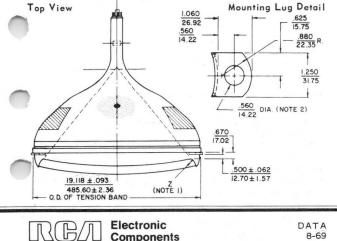
Tube Dimensions (excluding mounting lugs):

Diagonal 21.971 ±.093 in (558.06 ± 2.36 mm) Greatest

Width 19.118 ± .093 in (485.60 ± 2.36 mm) Greatest Height (including tensionband clip) 15.527 ± .100 in (394.39 ± 2.54 mm)

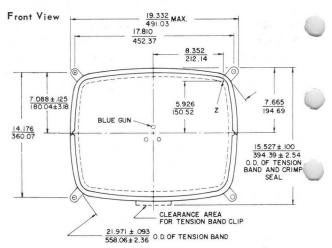
DIMENSIONAL OUTLINE

Dimensions shown are only those which are different from the corresponding dimensions for the 22UP22.

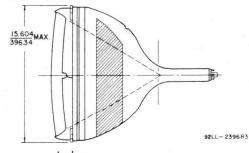


22WP22

DIMENSIONAL OUTLINE (Cont'd)







Dimensions in Inches unless otherwise noted

Electronic

Components

Note 1: "Z" is located on the outside surface of the faceplate, on the screen diagonal at a point .125" beyond the minimum screen. This point is used as a reference for the mounting lugs.

Note 2: The tolerance of the mounting lug holes will accommodate mounting screws up to 0.375 in (9.5 mm) in diameter when positioned on the true hole centers.

23AHP4

Picture Tube

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

GENERAL DATA

Heater Current at 6.3 volts 600 ± 30 ma Heater Warm-Up Time (Average) 11 seconds Focusina Method Electrostatic Deflection Method Magnetic Deflection Anales (Approx.): 920 . 800 . 650 Direct Interelectrode Capacitances: Grid No.1 to all other electrodes . 6 μµf 5 Cathode to all other electrodes . . μµf (2500 max. μµf External conductive coating to ultor. 1700 min. μµf Electron Gun. Type Requiring No Ion-Trap Magnet Optical: Faceplate . . . Light transmission at center (Approx.). 78% Phosphor (For curves, see front of this Section). . P4-Sulfide Type Aluminized . . White Mechanical: Tube Dimensions: Overall length. 18" ± 3/8" Curvature of faceplate (Radii): 50" 36-3/4" Edge. Screen Dimensions (Minimum): Projected area. 282 sq. in. Weight (Approx.)..... 25 lbs . . Any Bulb. .

Electrical:

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Basing Designation for BOTTOM VIEW.	DEC Group 4, B6-203)
Pin 1 -Heater Pin 2 -Grid No.1 Pin 6 -Grid No.4 Pin 10 -Grid No.2 Pin 11 -Cathode Pin 12 -Heater	Cap-Ultor (Grid No.3, Grid No.5, Collector) C-External Conductive Coating

GRID-DRIVE* SERVICE

GRID-DRIVE SERVICE	
Unless otherwise specified, voltage values	
are positive with respect to cathode	
Maximum and Minimum Ratings, Design-Maximum Values:	
ULTOR VOLTAGE	0
GRID-No.4 (FOCUSING) VOLTAGE: Positive value	Ŭ
GRID-No.2 VOLTAGE	
GRID-No.1 VOLTAGE: Negative-peak value	
HEATER VOLTAGE	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. volts After equipment warm-up period 200 max. volts Heater positive with respect to cathode 200 max. volts	0
Typical Operating Conditions:	
With ultor voltage (E_{Cgk}) of18000voltsand grid-No.2 voltage (E_{Cgk}) of400voltsGrid-No.4 Voltage for focus 0 to 400voltsGrid-No.1 Voltage for visual	0
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max. megohms	

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RADIO CORPORATION OF AMERICA Electron Tube Division

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CATHODE-DRIVE SERVICE

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

Maximum and Minimum Ratings, Design-Maximum Values:

Haxing and Hitting Harrige, see 8					
ULTOR-TO-GRID-No.1 VOLTAGE				22000 max. 11000 min.	
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLT	٢٨	CE.		(11000 min.	VOILS
Positive value.				1250 max.	volts
Negative value			Ċ	400 max.	
GRID-No.2-TO-GRID-No.1 VOLTAGE				∫700 max.	
GRID-NO.2-IU-GRID-NO.1 VOLIAGE		• •	•	350 min.	
GRID-No.2-TO-CATHODE VOLTAGE CATHODE-TO-GRID-No.1 VOLTAGE:			•	550 max.	
Positive-peak value				220 max.	
Positive-bias value			•	154 max.	
Negative-bias value				0 max.	
Negative-peak value			٠	2 max.	
HEATER VOLTAGE				{6.9 max.	
DEAL HEATED ANTHONE WALTAGE				(5.7 min.	volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds				450 max.	volts
After equipment warm-up period.				200 max.	
Heater positive with	•	• •	•	200 max.	VOTES
respect to cathode				200 max.	volts
Typical Operating Conditions:					
With ultor-to-grid-No.1					
voltage (E_{c5g_1}) of and grid-No.2-to-grid-No.1				18000	volts
voltage (Ec2g1) of				400	volts
Grid-No.4-to-Grid-No.1 Voltage for focus• Cathode-to-Grid-No.1 Voltage				0 to 400	volts
for visual extinction of focused raster				36 to 78	volts
Field Strength of Adjustable	•	• •	•	10 10 10	VOILS
Centering Magnet				0 to 11	gausses
Maximum Circuit Values:					
Grid-No.1-Circuit Resistance	•			1.5 max.	megohms

- Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.
- The grid-Mo.4 (or grid-No.4-to-grid-No.1) voltage required for optimum focus of any individual tube will have a value anywhere between 0 and 400 volts, is independent of ultor current and will remain essentially constant for values of ultor (or ultor-to-grid-No.1) voltage or grid-No.2 (or grid-Mo.2-to-grid-No.1) voltage within design-maximum ratings shown for these items.

See Raster-Cutoff-Range Chart for Grid-Drive Service.

Distance from Reference Line for suitable PM centering magnetshould not exceed 2-1/4". The specified centering magnet compensates only for the effect which mechanical tube tolerances may have on the location of the undeflected focused spot with respect to the center of the tube



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face. Maximum field strength of adjustable centering magnet equals:

$$\sqrt{\frac{E_{c_5k \text{ or } E_{c_5}g_1 \text{ (volts)}}{16000 \text{ (volts)}}} \times 10 \text{ gausses}}$$

The equipment manufacturer must determine and supply additional compensation for the effects of the earth's magnetic field and extraneous fields due to choice of circuitry and components. The additional compensation should preferably be applied as part of the magnetic field of the deflecting yoke.

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

See Raster-Cutoff-Range Chart for Cathode-Drive Service.

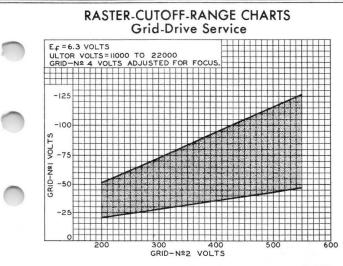
OPERATING CONSIDERATIONS

X-Ray Warning. When operated at ultor voltages up to 16 kilovolts, this picture tube does not produce any harmful X-ray radiation. However, because the rating of this type permits operation atvoltages as high as 22 kilovolts (Designmaximum value), shielding of this picture tube for X-ray radiation may be needed to protect against possible injury from prolonged exposure at close range whenever the operating conditions involve voltages in excess of 16 kilovolts.

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

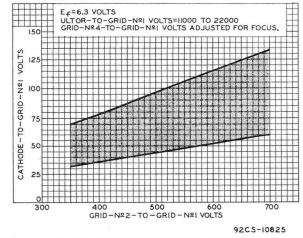






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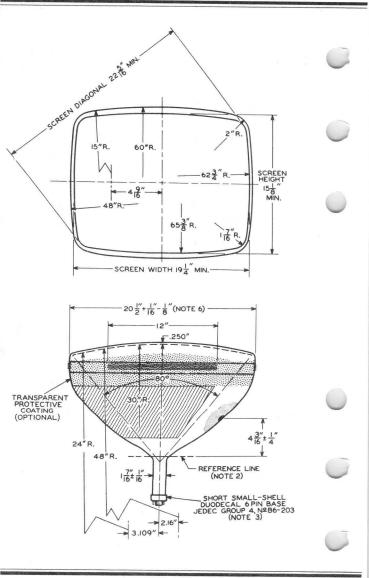






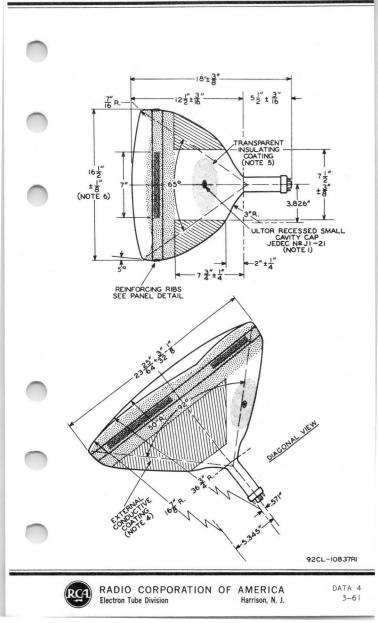
RADIO CORPORATION OF AMERICA Electron Tube Division Somerville, N. J. DATA 3 3-61

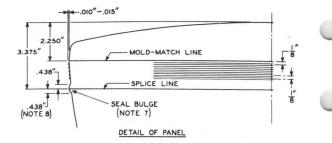
23AHP4





23AHP4





NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm 30^{\circ}$. ULTOR TERMINAL IS ON SAME SIDE AS PIN 6.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC NO.G-II6 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BERIGIDLY MOUNT-ED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREELY. BOTTOM CIRCUMFERENCE OF BASE WAFER WILL FALL WITHIN A CIRCLE CONCENTRIC WITH BULB AXIS AND HAVING A DIAMETER OF 2-3/4".

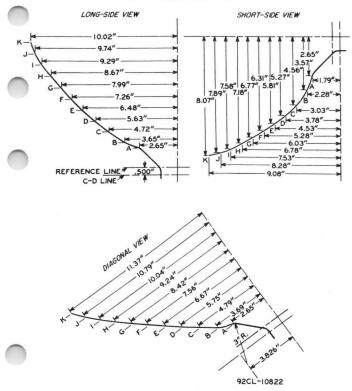
NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED. NOTE 5: TO CLEAN THIS AREA, WIPEONLY WITH SOFT DRY LINT-LESS CLOTH.

NOTE 6: MEASURED AT THE MOLD-MATCH LINE.

NOTE 7: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE IN-DICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE LOCATION SPECIFIED FOR DIMEN-SIONING THE ENVELOPE WIDTH, DIAGONAL, AND HEIGHT.

NOTE 8: AREA BETWEEN MOLD-MATCH LINE AND SEAL BULGE IS 1/2" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND. SUPPORTS MUST BE SPACED FROM THE TUBE BY THE USE OF CUSHIONING PADS MADE OF ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.

23AHP4

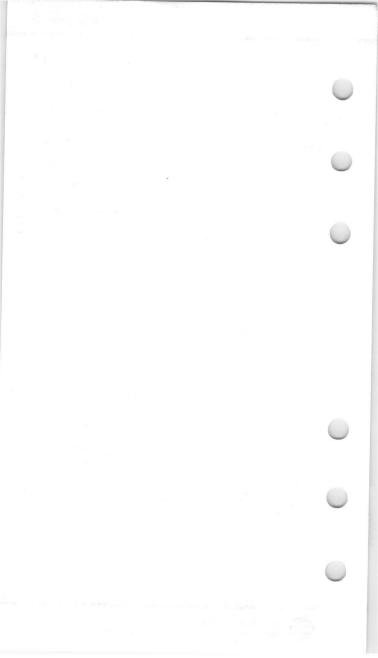


BULB-CONTOUR DIMENSIONS

NOTE: PLANES A THRU K ARE NORMAL TO THE TUBE AXIS AND AT FIXED LOCATIONS FROM THE C-D LINE. THESE COORDINATES DESCRIBE THE BULB EXTERNAL CONTOUR IN PLANES THROUGH THE TUBE AXIS AND THE RESPECTIVE FACEPLATE AXES.



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23ARP4

Picture Tube

NO ION-TRAP MAGNET REQUIRED LOW-VOLTAGE ELECTROSTATIC FOCUS IO° MAGNETIC DEFLECTION
ELECTRICAL
Direct Interelectrode Capacitances Cathode to all other electrodes
Heater Warm-up Time (Average)
OPTICAL
Phosphor
Faceplate
MECHANICAL
Weight (Approx.)
Type
Cap Recessed Small Cavity (JEDEC No.JI-21) Base Small-Button Neoeightar 7-Pin, Arrangement I (JEDEC No.B7-208)
TERMINAL DIAGRAM (Bottom View)
Pin 1-Heater Pin 2-Grid No.1 ANODE
Pin 3-Grid No.2 Pin 4-Grid No.4 Pin 6-Grid No.1 Pin 7-Cathode
Pin 8 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating BHR

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MAXIMUM AND MININ Unless other					× .								LUES		
are positi				~						~					
Anode Voltage												121	0 max 0 min	V V	0
Grid-No.4 (Focusing) Ve Positive value	olt	age	e .						×	ĩ		1100	max	۷	
Positive value Negative value								2					max	٧	
Grid-No.2 Voltage										÷	x.	∫550		۷	
Grid-No.1 Voltage												(200	min	۷	
Negative peak value.			(- X					3	ž.	ž,	8		max	۷	4
Negative bias value.													max	۷	
Positive bias value.													max	۷	
Positive peak value.												2	max	۷	
Heater Voltage		8 - X	1					÷.	÷.			{6.9 5.7	max	V V	
Peak Heater-Cathode Vo Heater negative with During equipment wa	re	spe							9:			(0.7	min	v	0
exceeding 15 secon After equipment wa	nds												max max	V V	
Heater positive with													in arc		
Combined AC and DC	VC	lta	age					÷		e.		200	max	٧	
DC component			- 14				×.		÷			100	max	٧	
TYPICAL OPERATING (ERVICE		
Unless otheru are positiu															
Anode Voltage				÷	÷			,		÷	,	16000		۷	
Grid-No.4 Voltage		8.1	1.1	5		٠				5	0	to 40	-	۷	
Grid-No.2 Voltage												400		V	
Cathode Voltage For visual extinction										•	4	3 to 7	0	V	

MAXIMUM CIRCUIT VALUE

Grid-No.l Circuit Resistance Ι.5 max ΜΩ	Grid-No.l	Circuit	Resistance	÷.						÷.	x	x	1.5	max	MΩ	1
---	-----------	---------	------------	----	--	--	--	--	--	----	---	---	-----	-----	----	---



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23ASP4

Picture Tube

0

RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS

ALUMINIZED SCREEN MAGNETIC DEFLECTION

With Heater Having Controlled Warm-Up Time

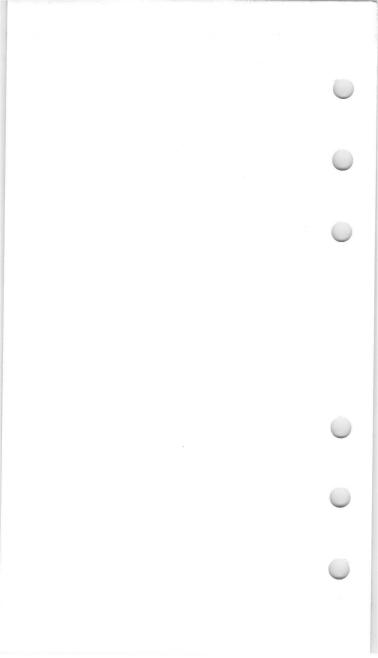
The $23ABP_4$ is the same as the $23ABP_4$ except for the following items:

Mechanical:

Tube Dimen											
											17" ± 3/8"
Neck len	gth				×.		÷	÷	÷		4-1/2" ± 3/16"



DATA 3-61



Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS With Heater Having Controlled Warm-Up Time

The 23BDP4 is the same as the 23YP4 except for the following item:

Optical:





Picture Tube

2500 max.

of

LOW-VOLTAGE ELECTROSTATIC FOCUS LOW-GRID-No.2 VOLTAGE BI-PANEL TYPE CATHODE-DRIVE TYPE 110° MAGNETIC DEFLECTION NO ION-TRAP MAGNET REQUIRED Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes . Grid No.1 to all other electrodes. External conductive coating to anode . 1700 min. 600 ± 30 Heater Current at 6.3 volts. Heater Warm-up Time (Average). . . . Optical: Phosphor P4—Sulfide Type, Aluminized (For Curves, see front of this Section) Faceplate and Protective Panel Filterglass Light transmission (Approx.) . Mechanical:

Weight (Approx.) 15.188" ± .375" 5.125" ± .125" . External Conductive Coating:

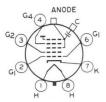
Contact area for grounding Near Reference Line For Additional Information on Coatings and Dimensions:

See Picture-Tube Dimensional-Outlines and Bulb J187 A sheets at front of this section

Cap. Recessed Small Cavity (JEDEC No.J1-21) Base Small-Button Neoeightar 7-Pin Arrangement 1, (JEDEC No. B7-208)

Basing Designation for BOTTOM VIEW

Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 4-Grid No.4 Pin 6-Grid No.1 Pin 7 - Cathode Pin 8-Heater Cap-Anode (Grid No.3. Grid No.5. Screen, Collector) Conductive Coating





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Harrison, N. J.

DATA

23BGP4

Maximum and Minimum Ratings, Design-Maximum Values:		
Unless otherwise specified, voltage values are positive with respect to grid No.1		0
Anode Voltage	volts volts	
Grid-No.4 (Focusing) Voltage: Positive value	volts volts volts volts volts	
Cathode Voltage: Negative peak value	volts volts volts volts volts volts	
Peak Heater-Cathode Voltage: (0.7 mm. Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds. 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode: 200 max. Combined AC and DC voltage 200 max. DC component 100 max.	volts volts volts volts	
Typical Operating Conditions for Cathode-Drive Service	:	
Unless otherwise specified, voltage values are positive with respect to grid No.1		
Anode Voltage	volts volts volts volts	
Maximum Circuit Value:		

Maximum circuit value:

Grid-No.1-Circuit Resistance . . .

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section

.



1.5 max. megohms

Picture Tube

RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS LOW GRID-No.2 VOLTAGE

Electron Tube Division

ALUMINIZED SCREEN 92° MAGNETIC DEFLECTION CATHODE-DRIVE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

)	Heater Current at 6.3 volts 600 ± 30 ma Heater Warm-Up Time (Average) 11 seconds Direct Interelectrode Capacitances:
	Grid No.1 to all other electrodes 6 $\mu\mu f$ Cathode to all other electrodes 5 $\mu\mu f$
	External conductive coating to ultor . 1700 min. uuf
	Electron Gun
	Optical:
	Faceplate
	Mechanical:
	Operating Position
	Cap
	Basing Designation for BOTTOM VIEW
)	Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 12-Heater Pin 12-Heater Pin 12-Heater Pin 2-Grid No.4 Pin 10-Grid No.4 Pin 12-Heater Pin 2-Grid No.4 Pin 12-Heater Pin 2-Grid No.4 Pin 2-Grid No.4
).	
	RADIO CORPORATION OF AMERICA DATA

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Harrison, N. J.

23BJP4

Maximum and Minimum Ratings, Design-Maximum Values:		
ULTOR-TO-GRID-No.1 VOLTAGE	volts	
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:	volts	6
Positive value	volts	
Negative value	volts	
- (225 may	volts	
GRID-No.2 TO-GRID-No.1 VOLTAGE { 220 max. 40 min.	volts	
GRID-No.2-TO-CATHODE VOLTAGE 70 max. CATHODE-TO-GRID-No.1 VOLTAGE:	volts	
Positive peak value	volts	6
Positive bias value	volts	-
Negative bias value 0 max.	volts	
Negative peak value	volts	
f 6 9 max	volts	
HEATER VOLTAGE	volts	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	volts volts	0
After equipment warm-up period 200 max. Heater positive with	VUILS	
respect to cathode 200 max.	volts	
Typical Operating Conditions:		
With ultor-to-grid No.1 voltage of 20000	volts	
and grid-No.2-to-grid-No.1 voltage of 50	volts	
Grid-No.4-to-Grid-No.1 Voltage for focus. 0 to 400	volts	
Cathode-to-Grid-No.1 Voltage for visual extinction of focused raster	volts	
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance 1.5 max.	megohms	

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE ALUM LOW-VOLTAGE ELECTROSTATIC FOCUS 92° MAGNET LOW GRID-No.2 VOLTAGE CATHO

ALUMINIZED SCREEN 92° MAGNETIC DEFLECTION CATHODE-DRIVE TYPE

With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

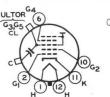
Heater Current at 6.3 volts 600 ± 30 ma	
Heater Warm-Up Time (Average) 11 seconds	
Direct Interelectrode Capacitances:	
Grid No.1 to all other electrodes 6 $\mu\mu f$	
Cathode to all other electrodes 5 $\mu\mu$ f	
External conductive coating to ultor. $\begin{cases} 2500 \text{ max.} & \mu\mu f \\ 1700 \text{ min.} & \mu\mu f \end{cases}$	
External conductive coaring to untor. $1700 \text{ min.} \mu\mu f$	
Electron Gun Type Requiring No Ion-Trap Magnet	
Optical:	
Faceplate and Protective Panel	
Light transmission (Approx.)	
Phosphor (For Curves, see front of this section) • P4Sulfide Type, Aluminized	
Mechanical:	
Operating Position	
Weight (Approx.)	

Weight (Approx.).										35	bs
Overall Length										18-7/16" ± 7	7/16"
Neck Length										. 5-5/8" ± 3	3/16"
Projected Area of											
External Conducti	ve	C	oat	ti	ng	:					

Type......Regular Band Contact area for grounding.....Near Reference Line For Additional Information on Coatings and Dimensions:

See Picture-Tube Dimensional-Outlines and Bulb J187 D/G sheets at the front of this section

Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater



Cap - Ultor (Grid No.3 Grid No.5 Collector) C-External Conductive Coating



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 5-62

23**BK**P4

Maximum and Minimum Ratings, Design-Maximum Values:		
ULTOP_TO_CPID_No 1 VOLTAGE ∫25000 max.	volts	
(13000 1111).	volts	
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE: Positive value	volts	\smile
Negative value	volts	
(225 max	volts	
GRID-No.2-TO-GRID-No.1 VOLTAGE	volts	
GRID-No.2-TO-CATHODE VOLTAGE	volts	
CATHODE-TO-GRID-No.1 VOLTAGE:		
Positive peak value	volts	
Positive bias value	volts	
Negative bias value 0 max.		
Negative peak value		
HEATER VOLTAGE		
(5./ min.	volts	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period		0
not exceeding 15 seconds 450 max.	volts	
After equipment warm-up period 200 max.	volts	
Heater positive with		
respect to cathode 200 max.	volts	
Typical Operating Conditions:		
With ultor-to-grid-No.1 voltage of 20000	volts	
and grid-No.2-to-grid-No.1 voltage of 50	volts	
Grid-No.4-to-Grid-No.1 Voltage for focus. 0 to 400 Cathode-to-Grid-No.1 Voltage for	volts	
visual extinction of focused raster 36 to 54	volts	
Maximum Circuit Values:		
Grid-No.1-Circuit Resistance 1.5 max. m	negohms	

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



23BQP4

Picture Tube

	BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IIO ^O MAGNETIC DEFLECTION
	With Heater Having Controlled Warm-Up Time
	GENERAL DATA
	Electrical:
	Heater Current at 6.3 volts
	Electron Gun
	Operating Position
	See Picture-Tube Dimensional-Outlines and Bulb J187 A sheets
0	at the front of this section Cap
	G3 G5 JUI TOB
0	Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater Pin 8 - Heater Pin 4 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater Pin 8 - Heater



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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 3-62

23BQP4

Maximum and Minimum Ratings,	Desig	n-Ma	ıxim	uum Values:		
ULTOR VOLTAGE				∫23000 max.	volts volts	
GRID-No.4 (FOCUSING) VOLTAGE:				(12000 mm.	VUILS	\bigcirc
Positive value				1100 max.		
Negative value				550 max.		
GRID-No.2 VOLTAGE	· · ·		• •	550 max.	volts	
Negative peak value				220 max.	volts	
Negative bias value				154 max.	volts	
Positive bias value				0 max.		
Positive peak value				2 max.		$\overline{}$
PEAK HEATER-CATHODE VOLTAGE:						
Heater negative with						
respect to cathode:						
During equipment warm-up	perio	d				
not exceeding 15 second				450 max.	volts	
After equipment warm-up p				200 max.		
Heater positive with						
respect to cathode				200 max.	volts	
Typical Operating Conditions:						
With ultor voltage of				16000	volts	
and grid-No.2 voltage of				300	volts	
Grid-No.4 Voltage for focus. Grid-No.1 Voltage for visual				0	volts	
extinction of focused raste	er			-35 to -72	volts	
Maximum Circuit Values:						
0				4 5		

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

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

23BTP4

Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS ALUMINIZED SCREEN 92° MAGNETIC DEFLECTION

23CBP4

Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS The 23CBP4 is the same as the 23BQP4 except for the following item: Optical: Surface of Protective Panel.....Treated to reduce

23CGP4

specular reflection

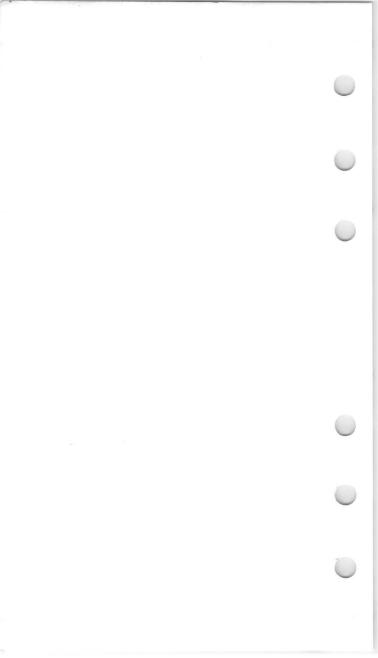
Picture Tube

CONTROLLED HEATER WARM-UP TIME

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 92° MAGNETIC DEFLECTION The 23CGP4 is the same as the 23AHP4 except for the following item: Electrical:



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Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

DATA

General:

	Heater, for Unipotential Cathode:
1	Voltage (AC or DC)
	Current at 6.3 volts 0.6 ± 5% amp
	Warm-up time (Average) 11 sec
	Direct Interelectrode Capacitances:
	Grid No.1 to all other electrodes 6 $\mu\mu$ f
	Cathode to all other electrodes 5 $\mu\mu$ f
	(2E00 may f
Ν.	External conductive coating to ultor 2000 min
7	Faceplate and Protective Panel
	Total light transmission (Approx.)
	Phosphor (For curves, see front of this Section) P4-Sulfide Type Aluminized
	Fluorescence
	Phosphorescence
	Persistence
	Focusing Method Electrostatic
	Deflection Method
	Deflection Angles (Approx.):
	Diagonal
	Horizontal
	Vertical
	Electron Gun Type Requiring No Ion-Trap Magnet
	Tube Dimensions:
	Overall length
	Greatest width
	Greatest height 17-5/16" + 1/8" - 1/16"
	Diagonal
7	Neck length
	Radius of curvature of protective panel (External surface):
	Radius at center Radius at edge
	In plane of diago-
	nal deflection
	sional Outline
۴.	In plane of hori-
9	zontal deflection 50-1/4" 35-1/4"
	In plane of verti-
	cal deflection 45-1/2" 35"
	Radius of curvature of faceplate (Internal surface):
	Radius at center Radius at edge
	In plane of diago-
)	nal deflection
1	In plane of hori-
	zontal deflection 39-3/4" 26-1/2"



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA I 8-60

focus*. .

Radius at center Radius at edge In plane of vertical deflection. . . . 36-3/4" 18-1/2" Screen Dimensions (Minimum): Greatest width.19-5/16" Greatest height . . 15-1/4" Diagonal. . . . 22-5/16" Projected area. . 282 sq. in. . . 33 lbs Weight (Approx.). Operating Position. Any Bulb. J187 Fitted with Protective Panel FP198 Base. Small-Button Neoeightar 7-Pin, Arrangement 1, (JEDEC No. B7-208) Basing Designation for BOTTOM VIEW. . ••••••••••••••••••••• Pin 1-Heater Cap - Ultor 1 Pin 2-Grid No.1 (Grid No.3. Pin 3-Grid No.2 6 Grid No.5. Pin 4-Grid No.4 Collector) Pin 6-Grid No.1 C-External (2 Pin 7-Cathode Conductive Pin 8-Heater Coating GRID-DRIVE* SERVICE Unless otherwise specified, voltage values are positive with respect to cathode

Maximum and Minimum Ratings, Design-Center Values:



0 to 400 volts

19			1.5. 1.4. 4.
	Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak positive)Same	uster-Cutoff-Rang for Grid-Drive value as determ	Service
	Grid-No.4 Current	except video dr positive -25 to +25 -15 to +15 0 to 8	
	Examples of Use of Design Ranges:		
	With ultor voltage of and grid-No.2 voltage of Grid-No.4 Voltage for	18000 400	volts volts
	Grid-No.1 Voltage for visual extinction of	0 to 400	volts
	focused raster	-44 to -94 44 to 94	volts volts
	Maximum Circuit Values:		
	Grid-No.1-Circuit Resistance	1.5 max.	megohms
	CATHODE-DRIVE SERV	ICE	
	Unless otherwise specified,		
	are positive with respect	0	
	Maximum and Minimum Katings, Design-Ce	a test tester	
	ULTOR-TO-GRID-No.1 VOLTAGE		
	GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE: Positive value	1000 max	volts volts
	GRID-No.2-TO-GRID-No.1 VOLTAGE	640 max	. volts
	Maximum and Minimum Ratings, Design-Ce ULTOR-TO-GRID-No.1 VOLTAGE GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE: Positive value	enter Values: 20000 max 12000 min 1000 max 500 max 640 max	 volts volts volts volts

Positive value										1000	max.	VOITS
Negative value										500	max.	volts
GRID-No.2-TO-GRID-No.:	LV	OL	TAC	GE						640	max.	volts
GRID-No.2-TO-CATHODE	OL	TA	GE					•		500	max.	volts
CATHODE-TO-GRID-No.1	/0L	TA	GE									
Positive-peak value							i.			200	max.	volts
Positive-bias value		×				2			•	140	max.	volts
Negative-bias value										0	max.	volts
Negative-peak value										2	max.	volts
PEAK HEATER-CATHODE VO	DLT	AG	E:									
Heater negative with	re	sp	ec	t t	0 0	ca	the	ode	e:			
During equipment w	ar	m-u	I qu	be	ric	bc	n	ot				
exceeding 15 sec	cor	Ids								410	max.	volts



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DATA 2 8-60

23CP4

After equipment warm-up period Heater positive with respect to cath			
Equipment Design Ranges:			\bigcirc
With any ultor-to-grid-No.1 voltage and 20000 volts and grid-No.2-to-gri between 225 and 640	d-No.1 voltage		•
Grid-No.4-to-Grid-No.1			
Voltage for focus* Cathode-to-Grid-No.1 Volt- age (Ekg ₁) for visual ex- tinction of focused	0 to 400	volts	0
	Raster-Cutoff-R for Cathode-Driv	0	
Cathode-to-Grid-No.1 Video	or carnoue-pric	JE DETVICE	
Drive from Raster Cutoff (Black level):			-
White-level value (Peak negative)	value as deter	rmined for	
	except video d		
	negativ	ve voltage	
Grid-No.4 Current	-25 to +25 -15 to +15	μa	
Grid-No.2 Current	-15 10 +15	μa	
Centering Magnet	0 to 8	gausses	
Examples of Use of Design Ranges:			
With ultor-to-grid-			
No.1 voltage of and grid-No.2-to-grid-	18000	volts	
No.1 voltage of	400	volts	
Grid-No.4-to-Grid-No.1 Voltage for focus*. Cathode-to-Grid-No.1 Voltage	0 to 400	volts	
for visual extinction of focused raster	42 to 78	volts	
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level):			0
White-level value	-42 to -78	volts	
Maximum Circuit Values:	1.00		
Crid No 1 Circuit Paciatanaa	1 E may	monohmo	

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

- Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.
- This value is a working design-center minimum. The equivalent absolute minimum of the equivalent absolute minimum autor (or ultor-to-grid-No.1) voltage is 11000 volts below which the serviceability of the 230Pu will be impaired. The equipment designer has the responsibility of determining a minimum design value such that under the worst probable operating on the toos to minimum such voltage is never less than 11,000 voltage.
- The grid-No.4 (or grid-No.4-to-grid-No.1) voltage required for optimum focus of any individual tube may have a value anywhere between 0 and 400 volts; is independent of ultor current; and will remain essentially constant for values of ultor (or ultor-to-grid-No.1) voltage, or grid-No.2 (or grid-No.2-to-grid-No.1) voltage, within design ranges shown for these items.





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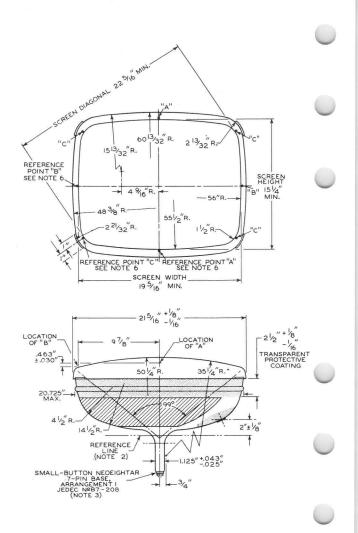
- Distance from Reference Line for suitable PM centering magnet should not exceed 2-1/4*. Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a 3/8-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause asmuch as 1/2-inch deflection of the spot from the center of the tube face.
- Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.

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



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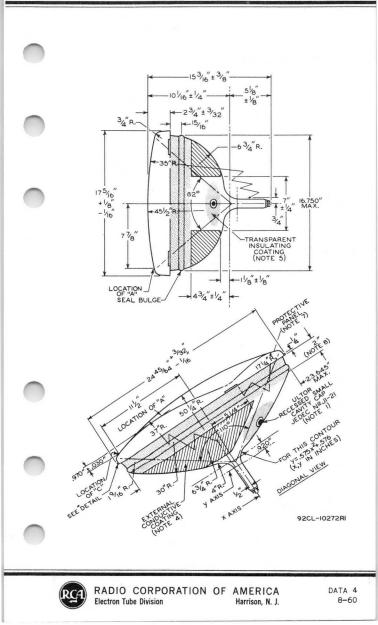
DATA 3 8-60 23CP4

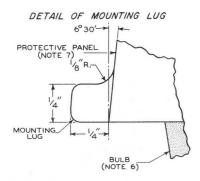


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23CP4





NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 30°. ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC NO.G-126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINEDBY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

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

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

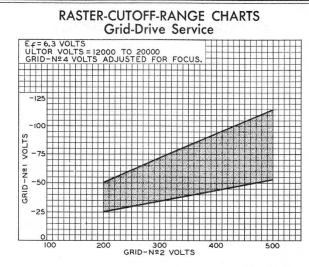
NOTE 6: REFERENCE POINTS A, B, AND C ARE PROVIDED FOR USE IN DESIGN OF A MASK CONTOURED FOR CLOSE FIT TO THE PROTECTIVE PANEL.

NOTE 7: THE CENTER OF THE PROTECTIVE PANEL MAY BE ECCENTRIC WITH RESPECT TO THE AXIS OF THE TUBE ENVELOPE. ASSOCIATED SHIFT OF THE PROTECTIVE PANEL ALONG ITS MINOR AND/OR MAJOR AXIS WILL NOT EXCEED I//6".

NOTE 8: KEEP THIS CIRCUMFERENTIAL AREA FREE OF MOUNTING HARDWARE.

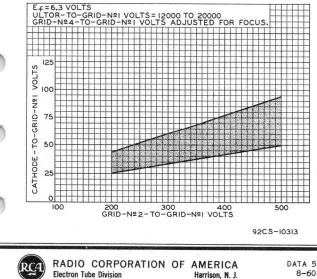
NOTE 9: ADEQUATE TUBE SUPPORT IS OBTAINED BY CLAMPING TO THE MOUNTING LUGS PROVIDED AT EACH CORNER OF THE PROTECTIVE PANEL. TUBE MOUNTING AND YOKE SUPPORT CLAMPS MUST BE SPACED FROM THE TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS.ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.



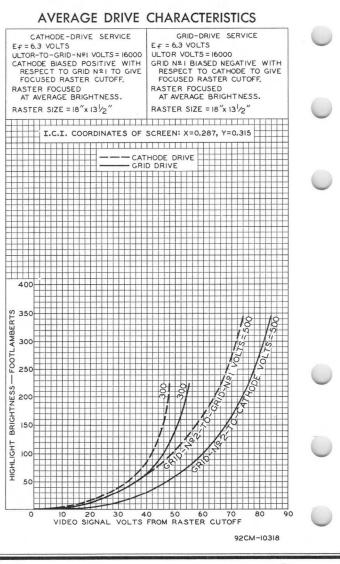


92CS-10312



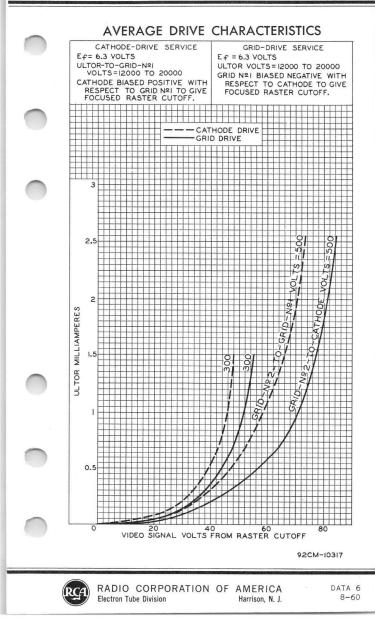


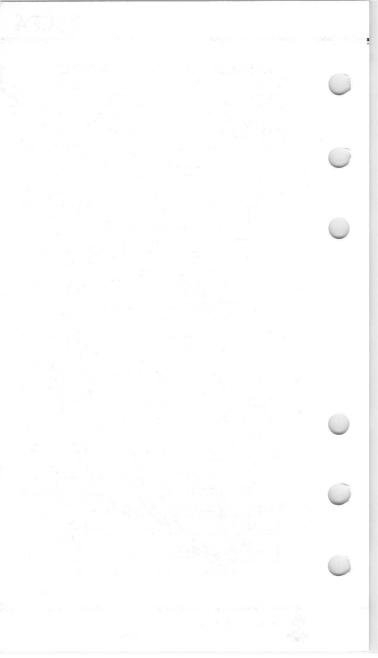
8-60



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.







Picture Tube

LOW-VOLTAGE ELECTROSTATIC FOCUS NO ION-TRAP MAGNET REQUIRED II4° MAGNETIC DEFLECTION Electrical:

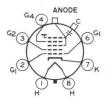
Direct Interelectrode Capacitances:	- F
Cathode to all other electrodes 5 Grid No.1 to all other electrodes 6	pr
Grid No.1 to all other electrodes 6	pi
External conductive coating to anode{2500 max. 1700 min.	pf pf
Heater Current at 6.3 volts	ma
lieater current at 0.9 vorts	
Heater Warm-Up Time (Average)	seconds
Electron Gun Type Requiring No lon-Trap	Magnet
Optical:	
Phosphor	
	1

Mechanical:

See Picture-Tube Dimensional-Outlines and Bulb J187B sheets at front of this section.

Basing Designation for BOTTOM VIEW. 8HR

Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 4 - Grid No.4 Pin 6-Grid No.1 Pin 7 - Cathode Pin 8 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating





DATA 5-65

23CQP4

Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to cathode ∫23500 max. Anode Voltage 11000 min. Grid-No.4 (Focusing) Voltage: Positive value. 1100 max. . Negative value. Grid-No.2 Voltage 1200 min. volts Negative peak value Negative bias value 155 max. volts Positive bias value 0 max. . Positive peak value volts Heater Voltage. 15.7 min. Heater negative with respect to cathode: During equipment warm-up period 450 max. 200 max. Heater positive with respect to cathode: 200 max. Combined AC and DC voltage. DC component. 100 max. Typical Operating Conditions for Cathode-Drive Service: Unless otherwise specified, voltage values are positive with respect to grid No.1 Grid-No.4 Voltage 0 to 400 Maximum Circuit Value: Grid-No.1-Circuit Resistance. 1.5 max. megohms

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



23DAP4

Picture Tube

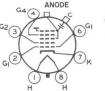
RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 94° MAGNETIC DEFLECTION

> Low-Grid-No.2-Voltage Type for Cathode-Drive Operation

GENERAL DATA

Electrical:
Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf
External conductive coating to anode{2500 max. pf 1700 min. pf
Heater Current at 6.3 volts
Optical:
Phosphor (For curves, see front of this section) P4Sulfide Type, Aluminized
Faceplate
Mechanical:
Weight (Approx.). 27 lbs Overall Length. 17-5/64"+5/16" Neck Length. 5"+1/8" Projected Area of Screen. 282 sq. in. External Conductive Coatina: 282 sq. in.
Type
See Picture-Tube Dimensional-Outlines and Bulb J187 H1
sheets at the front of this section. Cap
G4 (A) D
Pin 1 - Heater Pin 2 - Grid No.1 Gerid No.2 Gerid No.3, Cap - Anode (Grid No.3, Circle No.5

Pin 3-Grid No.2 Pin 4 - Grid No.4 Pin 6-Grid No.1 Pin 7-Cathode Pin 8-Heater



Grid No.5, Screen. Collector) C-External Conductive Coating



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

DATA 8-63

23DAP4

Maximum and Minimum Ratings, Design-Maximum Values:		
Unless otherwise specified, voltage values		
are positive with respect to grid No. 1		()
ANODE VOLTAGE	volts volts	-
GRID-No.4 VOLTAGE: 1100 max. Positive value. 550 max. Negative value. 550 max. GRID-No.2 VOLTAGE. 70 max. 140 min. 140 min.	volts volts volts volts	
CATHODE VOLTAGE: Negative peak value 2 max. Negative bias value 0 max. Positive bias value 100 max. Positive peak value	volts volts volts volts volts volts	
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. After equipment warm-up period 200 max. Heater positive with respect to cathode: Combined AC & DC voltage DC Component 100 max.	volts volts volts volts	
Typical Operating Conditions for Cathode-Drive Service Unless otherwise specified, voltage values are positive with respect to grid No.1	e:	
Anode Voltage	volts volts volts volts gausses	
Maximum Circuit Value:	5	
Grid-No.1 Circuit Resistance 1.5 max. For X-radiation shielding considerations, see she X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section ^a The grid-No.4 voltage required for optimum focus of any indiv will have a value anywhere between -100 and +300 volts.		0





23**DBP**4

Picture Tube

LOW-VOLTAGE ELECTROSTATIC FOCUS NO ION-TRAP MAGNET REQUIRED ALUMINIZED SCREEN 110° MAGNETIC DEFLECTION RECTANGULAR GLASS TYPE Low-Grid-No.2-Voltage-for Cathode-Drive Operation Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes. . . . Grid No.1 to all other electrodes. . 6 [2500 max. External conductive coating to anode. 2000 min. Heater Current at 6.3 volts. . . 600 ± 30 ma Heater Warm-Up Time (Average). . . . seconds Optical: Phosphor (For curves, see front of this section) .P4-Sulfide Type, Aluminized . . . Filterglass Faceplate. Light transmission (Approx.) . . Mechanical: Weight (Approx.) 25 lbs Overall length 14.875" ± .281" . 5.125" + .125" . . Projected Area of Screen 282 sq.in. External Conductive Coating: Contact area for grounding Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J187 E at front on this section Cap. Recessed Small Cavity (JEDEC No.J1-21) Basing Designation for BOTTOM VIEW 8HR Pin 1 - Heater Pin 2-Grid No.1 ANODE Pin 3-Grid No.2 Pin 4-Grid No.4 G2/3 6)GI Pin 6-Grid No.1 Pin 7 - Cathode Pin 8-Heater Cap-Anode (Grid No.3, G (2 7 Grid No.5, Screen, Collector) C - External Conductive Coating RADIO CORPORATION OF AMERICA DATA 8-64 Electronic Components and Devices Harrison, N. J.

23DBP4

Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to Grid No. 1 ∫22000 max. volts Anode Voltage. 15000 min. volts Grid-No.4 (Focusing) Voltage: 1250 max. volts 400 max. volts Negative value 250 max. volts volts (100 max. Grid-No.2 to Cathode Voltage) 40 min. volts Cathode Voltage: 220 max. volts Positive bias value. 155 max. volts 0 max. volts Negative bias value. 2 max. volts Negative peak value. 6.9 max. volts Heater Voltage 15.7 min. volts Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period not 450 max. volts exceeding 15 seconds After equipment warm-up period 300 max. volts 200 max. volts Heater positive with respect to cathode . Typical Operating Conditions for Cathode-Drive Service: Unless otherwise specified, voltage values are positive with respect to grid No. 1 18000 volts 250 volts Grid-No.4 Voltage. Grid-No.2 Voltage. 50 volts Cathode Voltage for visual extinction of 34 to 52 volts focused raster . . . Maximum Circuit Value: Grid-No.1 Circuit Resistance 1.5 max. megohms For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front on this Section



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

23EKP4

Picture Tube

PAN-O-PLY - INTEGRAL IMPLOSION PROTECTION
(Provided by Formed Rim and Welded Tension Bands around Periphery of Tube PanelNo Separate Safety-Glass or Integral Protective Window Required) RECTANGULAR GLASS TYPE ALUMINIZED SCREEN
LOW-VOLTAGE ELECTROSTATIC FOCUS 92° MAGNETIC DEFLECTION NO ION-TRAP MAGNET REQUIRED
Electrical:
Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf External conductive coating to anode ^a . {2500 max. pf {1700 min. pf
Heater Current at 6.3 volts
Optical:
Phosphor (For curves, see front of this Section) .P4Sulfide Type, Aluminized
Faceplate
Mechanical:
Weight (Approx.)
Type
See Picture-Tube Dimensional-Outlines and Bulb J187 J sheets at the front of this section.
Cap Recessed Small Cavity (JEDEC No.J1-21) Base
Basing Designation for BOTTOM VIEW
Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater Pin 12-Heater ANODE Cap-Anode, (Grid No.3, Grid No.3, Screen, Collector) C-External Conductive Coductive Coductive Coductive



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

23EKP4

	Maximum and Minimum Ratings, Design-Maximum Values:												
	Unless otherwise specified, voltage values												
	are positive with respect to cathode												
		volts volts											
	Grid-No.4 Voltage: Positive value	volts volts volts volts											
	Grid-No.1 Voltage: Negative peak value	volts											
	Negative bias value	volts volts volts											
	Heater Voltage	volts											
Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period not													
	Heater positive with respect to cathode:	volts											
	Combined AC & DC voltage 200 max. DC Component	volts volts											
	Typical Operating Conditions for Cathode-Drive Service:												
	Unless otherwise specified, voltage values are positive with respect to grid No.1												
	Anode Voltage 20000	olte											

Anode Voltage		2	2				2	ž.		20000	volts	
Grid-No.4 Voltage		2		1						200	volts	
Grid-No.2 Voltage.										400	volts	
Cathode Voltage for	N	is	sua	a]								
extinction of foc	us	sec	d i	ra	ste	er				36 to 78	volts	
Field Strength of r												
adjustable Center	ir	ng	Ma	agi	ne:	t.	×.			0 to 12	gauss	

Maximum Circuit Value:

Grid-No.1 Circuit Resistance 1.5 max. megohms

a Includes implosion protection hardware.

b The grid-No.# voltage required for optimum focus of any individual tube will have a value anywhere between 0 and +#00 volts with the combined grid-No.1 voltage and video-signal voltage adjusted to give an anode current of 200 microamperes on a 13-1/2-inch by 18-inch pattern from an RCA-2F21 monoscope, or equivalent.

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front on this Section



Picture Tube

PAN-O-PLY - INTEGRAL IMPLOSION PROTECTION

(Provided by Formed Rim and Welded Tension Bands around Periphery of Tube Panel——No Separate Safety-Glass or Integral Protective Window Required) RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 92° MAGNETIC DEFLECTION NO ION-TRAP MAGNET REOUIRED

Low-Grid-No.2-Voltage-for Cathode-Drive Operation

Electrical:

Direct Interelectrode Capacitances: Cathode to all other electrodes Grid No.1 to all other electrodes		5	pf pf
External conductive coating to anode ^a	· .	{2500 max. {1700 min.	pf pf
Heater Current at 6.3 volts Heater Warm-up Time (Average) Electron Gun Type Requi		600 ± 30 11 g No Ion-Tra	ma seconds p Magnet

Optical:

Phosphor (For	Curves,	see	front	of	this	Section)	.P4	-S	u] f	id	e T	ype,
									A	110	imir	nized
Faceplate .												
Light tran	smissio	n at	t cen	ter	(Ap	prox.).						42%

Mechanical:

 Weight (Approx.).
 29 lbs

 Overall Length.
 18.125" ± .375"

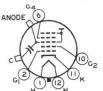
 Neck Length
 5.625" ± .125"

 Projected Area of Screen.
 282 sq. in.

 External Conductive Coating:
 282 sq. in.

See Picture-Tube Dimensional-Outlines and Bulb J187 J sheets at the front of this section.

Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater



Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 8-64

23ENP4

Maximum and Minimum Ratings, Design-Maximum Value	es:
Unless otherwise specified, voltage val are positive with respect to grid N	
Anode Voltage	max. volts
Grid-No.4 Voltage: Positive value	
Cathode Voltage: Negative peak value	max. volts max. volts max. volts max. volts max. volts
Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 After equipment warm-up period 300 Heater positive with respect to cathode: Combined AC & DC voltage 200	min. volts max. volts max. volts max. volts max. volts

Typical Operating Conditions for Cathode-Drive Service:

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

Anode Voltage									×	20000	volts
Grid-No.4 Voltage ^b										200	volts
Grid-No.2 Voltage.										50	volts
Cathode Voltage for	- 1	is	sua	a1							
extinction of foo					ste	er				36 to 54	volts
Field Strength of r	rec	u	iri	ed							
adjustable Center	ir	ig	Ma	agi	net	ι.				0 to 12	gauss

Maximum Circuit Value:

Grid-No.1 Circuit Resistance 1.5 max. megohms

a Includes implosion protection hardware.

The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between 0 and +000 volts with the combined grid-No.1 voltage and video-signal voltage adjusted to give an anode current of 200 microamperes on a 13-1/2-inch by 18-inch pattern from an RCA-2721 monoscope, or equivalent.

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





Picture Tube

BI-PANEL RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS LOW GRID-No.2 VOLTAGE ALUMINIZED SCREEN MAGNETIC DEFLECTION CATHODE-DRIVE TYPE

With Heater Having Controlled Warm-Up Time

DATA

General:

deneral	
Heater, for Unipotential Cathode:	
Voltage (AC or DC)	6.3 ± 10% volts
Current at 6.3 volts	0.6 amp
Warm-up time (Average)	11 sec
Direct Interelectrode Capacitances:	
Grid No.1 to all other electrodes	6 μμf
Cathode to all other electrodes	5 μμf
External conductive coating to ultor	∫2500 max. μμf
Faceplate and Protective Panel	
Total light transmission (Approx.)	
Phosphor (For curves, see front of this Section)	P4-Sulfide Type
	Aluminized
Fluorescence	
Phosphorescence	
Persistence	
Focusing Method	
Deflection Method	Magnetic
Deflection Angles (Approx.):	
Diagonal	1100
Horizontal	· · · · · · · 99°
Vertical	•••• 82 ⁰
Electron Gun	No lon-Irap Magnet
Tube Dimensions:	
Overall length	
Greatest width	/16" + 1/8" - 1/16"
Greatest height	/16" + 1/8" - 1/16"
Diagonal	54" + 3/32" - 1/16"
Neck length	5-1/8" ± 1/8"
Radius of curvature of protective panel	
(External surface):	
Radius at center	r Radius at edge
In plane of diago-	
nal deflection 50-1/4"	See Dimen-
hai deffection 50-1/4	sional Outline
In plane of hori-	stonat Gattine
zontal deflection 50-1/4"	35-1/4"
In plane of verti-	10 111
cal deflection 45-1/2"	35"
Radius of curvature of faceplate (Interna	
	r Radius at edge
	Raaius at eage
In plane of diago-	
nal deflection 39-1/2"	31-1/2"

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA I 8-60

	Radius at cente	er Radius at edge	
In plane of hori- zontal deflection . In plane of verti- cal deflection		26-1/2" 18-1/2"	
Screen Dimensions (Minimum Greatest width. Diagonal. Projected area. Weight (Approx.). Operating Position. Cap. Bulb. Base. Small-But	n): essed Small Cavi YFitted with Pro	19-5/16" 15-1/4" 22-5/16" 282 sq. in. 33 lbs 	
Basing Designation for E Pin 2 - Internal Connection- Do Not Use Pin 3 - Cathode Pin 4 - Heater Pin 5 - Heater Pin 6 - Grid No.1 Pin 7 - Grid No.2	NOTTOM VIEW	(JEDEC No.B7-219) 	

CATHODE-DRIVE SERVICE

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

Maximum and Minimum Ratings, Design-Center Values:

	olts
Positive value	olts olts olts
Positive-bias value	olts olts olts olts
Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	olts olts olts

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Equipment Design Ranges:

	With any ultor-to-grid-No. 1 voltage (E_{c5g1}) between 12000 and 20000 volts and grid-No. 2-to-grid No. 1 voltage (E_{c2g1}) between 40 and 64 volts
	Grid-No.4-to-Grid-No.1 Voltage for focus*0 to 400 volts Cathode-to-Grid-No.1 Voltage (Ekg.) for visual extinc-
)	tion of focused raster See Raster-Cutoff-Range Chart Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value (Peak negative)Same value as determined for Ekg1
	except video drive is a negative voltaĝê Grid-No.4 Current25 to +25 μa
)	Grid-No.2 Current −15 to +15 μa Field Strength of Adjustable Centering Magnet♦ 0 to 8 gausses
	Examples of Use of Design Ranges:
	With ultor-to-grid- No.1 voltage of 16000 18000 volts and grid-No.2-to-grid- No.1 voltage of 50 50 volts
	No.1 voltage of 50 50 volts Grid-No.4-to-Grid-No.1 Voltage for focus* 0 to 400 0 to 400 volts Cathode-to-Grid-No.1
	Voltage for visual extinction of focused raster
	Video Drive from Raster Cutoff (Black level): White-level value32 to -47 -34 to -49 volts
١	Maximum Circuit Values:

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

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

This value is a working design-center minimum. The equivalent absolute minimum ultor-to-grid-No.1 voltage is 11,000 volts below which the serviceability of the 23FPW will be impaired. The equipment design has the responsibility of determining a minimum design value such that under the worst probable operating conditions involving supplyvoltage variation and equipment variation the absolute minimum ultorto-grid-No.1 voltage is never less than 11,000 volts.

* The grid-No.4-to-grid-No.1 voltage required for focus of any individual tube may have a value anywhere between 0 and 400 volts.

Distance from Reference Line for suitable PM centering magnet should not exceed $2-1/u^*$. Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a 3/8-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as 1/2-inch deflection of the spot from the center of the tube face.

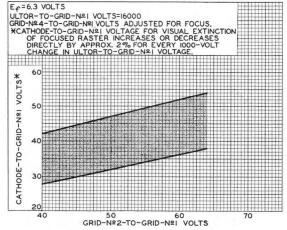


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 2 8-60

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



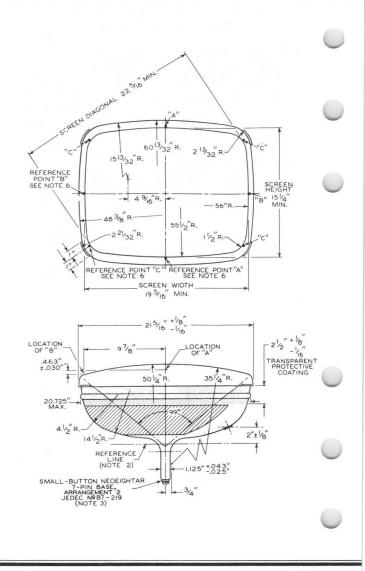




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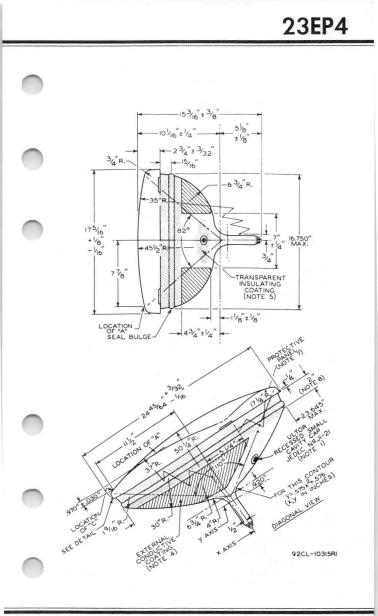


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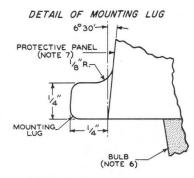
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NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 8 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm 30^{\circ}$. ULTOR TERMINAL IS ON SAME SIDE AS PIN 8.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC NO.G-126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

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

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

NOTE 6: REFERENCE POINTS A,B, AND C ARE PROVIDED FOR USE IN DESIGN OF A MASK CONTOURED FOR CLOSE FIT TO THE PROTECTIVE PANEL.

NOTE 7: THE CENTER OF THE PROTECTIVE PANEL MAY BE ECCENTRIC WITH RESPECT TO THE AXIS OF THE TUBE ENVELOPE. ASSOCIATED SHIFT OF THE PROTECTIVE PANEL ALONG ITS MINOR AND/OR MAJOR AXIS WILL NOT EXCEED I//6".

NOTE 8: KEEP THIS CIRCUMFERENTIAL AREA FREE OF MOUNTING HARDWARE.

NOTE 9: ADEQUATE TUBE SUPPORT IS OBTAINED BY CLAMPING TO THE MOUNTING LUGS PROVIDED AT EACH CORNER OF THE PROTECTIVE PANEL. TUBE MOUNTING AND YOKE SUPPORT CLAMPS MUST BE SPACED FROM THE TUBE BY USE OF CUSHIONING PADS MADE OF MATERIAL SUCH AS ASPHALT-IMPREGNATED FELT, OR EQUIVALENT.

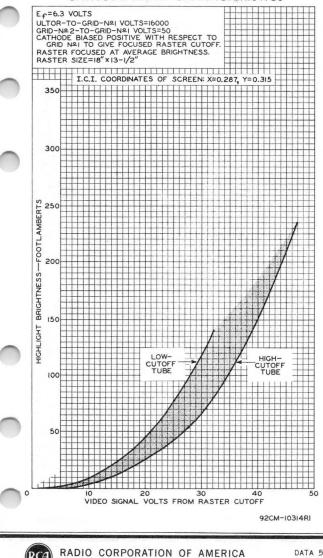


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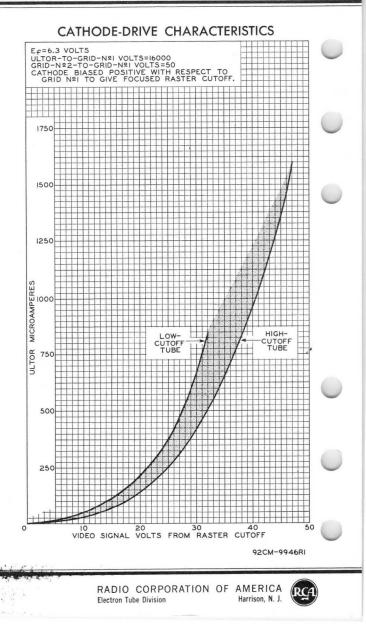
8-60

Harrison, N. J.





Electron Tube Division



23EQP4

Picture Tube

	PAN-O-PLY - INTEGRAL IMPLOSION PROTECTION
	(Provided by Formed Rim and Welded Tension Bands Around Periphery of Tube Panel—— No Separate Safety-Glass or Integral Protective Window Required)
	RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 114° MAGNETIC DEFLECTION
	NO ION-TRAP MAGNET REQUIRED
	Electrical:
	Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf
	External conductive coating to anode ^a {2500 max. pf 1700 min. pf
	Heater Current at 6.3 volts
1	Optical:
	Phosphor (For curves, see front of this section)P4—Sulfide Type, Aluminized
	Faceplate
1	Mechanical:
(Weight (Approx.)
	Type
	Cap Recessed Small Cavity (JEDEC No.J1-21) Base
	Arrangement 1, (JEDEC No.B7-208) Basing Designation for BOTTOM VIEW 8HR
	Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive
	Coating



RADIO CORPORATION OF AMERICA **Electronic Components and Devices**

Harrison, N. J.

DATA 4-65

23EQP4

Unicess Upnerwise	specified, v	altage ma	1105	
are positive				
node Voltage		· {23000		lts lts
rid-No.4 (Focusing) Volta	age:	11000		1 1 3
Positive value				lts
Negative value				lts
rid-No.2 Voltage				lts lts
-id-No.1 Voltage:		(200		100
Negative peak value		. 220	max. vo	lts
Negative bias value		. 155	max. vo	lts
Positive bias value		. 0	max. vo	lts
Positive peak value		. 2	max. vo	lts
eater Voltage		∫6.9	max. vo	lts
eak Heater-Cathode Voltag		15.7	min. vo	lts
Heater negative with resp During equipment warm- exceeding 15 seconds. After equipment warm- Heater positive with resp Combined AC and DC vol DC component	up period not up period ect to cathoo ltage	450 300 e: 200	max. vo max. vo	lts lts lts lts
vpical Operating Condition				
are positive u				
node Voltage		18000	VC	lts
rid-No.4 Voltage ^b		200		lts
rid-No.2 Voltage athode Voltage for visual		300		lts
focused raster		28 to 6	2 vc	lts
ield Strength of required centering magnet		0 to 1	2 ga	uss
aximum Circuit Values:				
rid-No.1 Circuit Resistar	nce	. 1.5	max. mego	hms
External conductive coating grounded.	and implosion	protection	hardware mus	t be
The grid-No.4 voltage requir will have a value anywhere grid-No.1 and video-signal-	red for optimum between 0 and voltage adjust	focus of an +400 volts v ed to give a	y individual with the comb a 200-microam	tube
grid-No.1 and video-signal- anode current.				pere
grid-No.1 and video-signal- anode current. For X-radiation shie X-RADIATION PRECAU	lding conside	erations,		pere



Picture Tube

	PAN-O-PLY-INTEGRAL IMPLOSION PROTECTION
	(Provided by Formed Rim and Welded Tension Bands Around Periphery of Tube Panel—No Separate Safety-Glassor Integral Protective Window Required)
	LOW-VOLTAGE ELECTROSTATIC FOCUS II40 MAGNETIC DEFLECTION
	ELECTRICAL
)	Direct Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode1700 min-2500 max pF Heater Current at 6.3 volts
	OPTICAL
	Phosphor
	Weight (Approx.)
	See Picture-Tube Dimensional-Outlines and Bulb J187L sheets
	at front of this section Cap
	TERMINAL DIAGRAM (Bottom View)
	Pin 1 -Heater Pin 2 -Grid No.1 Pin 3 -Grid No.2 Pin 4 -Grid No.1 Pin 6 -Grid No.1
	Pin 6 -Grid No.1 Pin 7 - Cathode Pin 8 -Heater Cap -Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating 8HR

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-Indicates a change.

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES	
Unless otherwise specified, voltage values	
are positive with respect to cathode	
Anode Voltage	۲ V
Positive value	٧
Negative value	٧
Grid-No.2 Voltage 200 min-550 max	V
Grid-No.1 Voltage	
Negative peak value	V
Negative bias value 155 max	V
Positive bias value	v
Positive peak value	v
Heater Voltage 5.7 min—6.9 max Peak Heater-Cathode Voltage	¥
Heater negative with respect to cathode:	
During equipment warm-up period not	
exceeding 15 seconds	V
After equipment warm-up period . 300 max	V
Heater positive with respect to cathode:	
Combined AC and DC voltage 200 max	V
DC component	V
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVIC	E
Unless otherwise specified, voltage values are positive with respect to grid No.1	
	V
Anode Voltage	v
Grid-No.2 Voltage	v
Cathode Voltage for visual extinction of	-
focused raster	V
Field Strength of required adjustable	
centering magnet 0 to 12	G
MAXIMUM CIRCUIT VALUE	
Grid-No. Circuit Resistance	MΩ
	1144
a External conductive coating and implosion protection hardware mugrounded.	st be
b The grid-No.4 voltage required for optimum focus of any individual will have a value anywhere between 0 and +400 volts with the com grid-No.1 and video-signal-voltage adjusted to give a 200-microan anode current.	bined
For X-radiation shielding considerations, see sheet	

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



23ERP4

Picture Tube

PAN-O-PLY TYPE

114° MAGNETIC DEFLECTION LOW GRID-No.2 VOLTAGE

The 23ERP4 is the same as the 23EQP4 except for the following items:

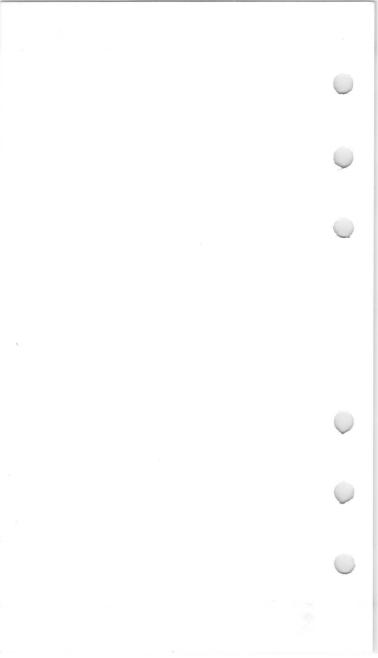
ELECTRICAL

MECHANICAL

External Conductive Coating

Type (see CRT OUTLINES 1 at front of this section). . Regular-Band Contact area for grounding Near Reference Line





Picture Tube

	PAN-O-PLY — INTEGRAL IMPLOSION PROTECTION (Provided by Formed Rim and Welded Tension Bands around Periphery of Tube Panel—No Separate Safety-Glass or Integral Protective Window Required) RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IIO ^O MAGNETIC DEFLECTION NO ION-TRAP MAGNET REQUIRED	
	Electrical: Direct Interelectrode Capacitances: Cathode to all other electrodes5 pf Grid No.1 to all other electrodes6 pf External conductive coating to anode ^a . {2500 max. pf 1700 min. pf	
	Heater Current at 6.3 volts	
	Optical:	
	Phosphor (For curves, see front of this section)P4Sulfide Type,	
	Aluminized Faceplate	
	Mechanical:	
	Weight (Approx.)	
•	Type	
	Cap	
	Basing Designation for BOTTOM VIEW 8HR	
	Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.1 Pin 7 - Cathode	
	Pin 8 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External conductive	
	Coating	
Contraction of the	RADIO CORPORATION OF AMERICA DATA	

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23ETP4

Maximum and Minimum Ratings, Design-Maximum Values:	
Unless otherwise specified, voltage val- ues are positive with respect to cathode	C
Anode Voltage	
Grid-No.4 Voltage: Positive value	6
Grid-No.1 Voltage: Negative peak value	
Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds 450 max. volts After equipment warm-up period 300 max. volts Heater positive with respect to cathode: Combined AC & DC Voltage 200 max. volts DC Component 100 max. volts	

Typical Operating Conditions for Cathode-Drive Service:

Unless otherwise specified, voltage values are positive with respect to grid No.1	
Anode Voltage	volts volts
Grid-No.2 Voltage	volts
extinction of focused raster 28 to 62 Field Strength of required	volts
adjustable Centering Magnet 0 to 12	gauss

Maximum Circuit Value:

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

a Includes implosion protection hardware.

b The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between 0 and + 000 volts with the combined grid-No.1 voltage and video-signal voltage adjusted to give an anoned current of 200 microamperes on a 13-1/2-inch by 18-inch pattern from an RCA-2F21 monoscope, or equivalent.

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





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Picture Tube

	PAN-O-PLY TYPE WITH MOUNTING LUGS 94° MAGNETIC DEFLECTION LOW-GRID-No.2 VOLTAGE LOW-VOLTAGE ELECTROSTATIC FOCUS CATHODE-DRIVE TYPE
	ELECTRICAL
	Direct Interelectrode Capacitances Cathode to all other electrodes. 5 pF Grid No.1 to all other electrodes. 6 pF External conductive coating to anode I700 min—2500 max pF Heater Current at 6.3 V 450 ± 20 mA Heater Warm-Up Time (Average) II s Electron Gun Type Requiring No Ion-Trap Magnet
	OPTICAL
	Phosphor
	MECHANICAL
	<pre>Weight (Approx.)</pre>
-	TERMINAL DIAGRAM (Bottom View)
	Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating BHR

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DATA

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES		
Voltages are positive with respect to Grid No. 1		
Anode Voltage	۷	
Grid-No.4 Voltage	M	
Positive value	Y	
Negative value	V	
Grid-No.2 Voltage	٧	
Cathode Voltage		
Negative peak value	٧	
Negative bias value 0 max	٧	-
Positive bias value	٧	
Positive peak value	V	
Heater Voltage 5.7 min-6.9 max	V	
Peak Heater-Cathode Voltage		
Heater negative with respect to cathode:		
During equipment warm-up period < 15 s . 450 max	V	
	N.	
After equipment warm-up period 300 max	V	- 1
Heater positive with respect to cathode:		
Combined AC & DC voltage 200 max	٧	
DC component	٧	

TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE

Voltages are positive with respect to grid No.1

Anode Voltage						\mathbf{x}			18000	۷
Grid-No.4 Voltageb									200	٧
Grid-No.2 Voltage.									50	۷
Cathode Voltage									34 to 52	۷
For visual extine										

MAXIMUM CIRCUIT VALUE

Grid-No.I Circuit Resistance I.5 max MO

a Includes implosion protection hardware.

b The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between 0 and +400 volts with the combined grid-No.1 voltage and video-signal voltage adjusted to give an anode current of 200 microamperes on a 13-1/2 inch by 18-inch pattern from an RCA-2F21 monoscope, or equivalent.

or X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



23FDP4

Picture Tube

DATA

8-64

	FICIDIE TODE
	PAN-O-PLY INTEGRAL IMPLOSION PROTECTION
	(Provided by Formed Rim and Welded Tension Bands around Periphery of Tube Panel——No Separate Safety-Glass or Integral Protective Window Required)
	RECTANGULAR GLASS TYPE ALUMINIZED SCREEN
	LOW-VOLTAGE ELECTROSTATIC FOCUS 1100 MAGNETIC DEFLECTION
	NO ION-TRAP MAGNET REQUIRED Low-Grid-No.2-Voltage-for Cathode-Drive Operation
	Electrical:
	Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf
	External conductive coating to anode ^a . ²⁵⁰⁰ max. pf
	Heater Current at 6.3 volts
	Optical:
	Phosphor (For curves, see front of this Section) .P4Sulfide Type, Aluminized
	Faceplate
	Mechanical:
	Weight (Approx.)
	Type
	See Picture-Tube Dimensional-Outlines and Bulb J187 K sheets at the front of this section.
	Cap
	Arrangement 1, (JEDEC No.B7-208) Basing Designation for BOTTOM VIEW.
	ANODE
	Pin 1 - Heater Pin 2 - Grid No.1 (Grid No.3)
	Pin 3 - Grid No.2 3 (
	Pin 4-Grid No.4 Pin 6-Grid No.1
	Pin 7 - Cathode Pin 8 - Heater Conductive Coating
	H H Coarrig
0	

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Electronic Components and Devices

23FDP4

Maximum and Minimum Ratings, Design-Maximum Val	ues:
Unless otherwise specified, voltage v are positive with respect to grid	No. 1
Anode Voltage	max. volts min. volts
Negative value	max. volts max. volts max. volts
Grid-No.2 Voltage	min. volts (
Negative peak value. 2 Negative bias value. 0 Positive bias value. 100 Positive peak value. 150	max. volts max. volts max. volts max. volts
Heater Voltage	max. volts min. volts
After equipment warm-up period 300 Heater positive with respect to cathode: Combined AC & DC voltage 200	max. volts max. volts max. volts max. volts

Typical Operating Conditions for Cathode-Drive Service:

Unless	otherwise	specified,	voltage values
are to	siting wi	th respect	to arid No 1

are peereres wren	~ ~	P	~ ~	~	 5100 1011	
Anode Voltage					18000	volts
Grid-No.4 Voltage ^b					200	volts
Grid-No.2 Voltage					50	volts
Cathode Voltage for visual						
extinction of focused raster				•	34 to 52	volts
Field Strength of required						
adjustable Centering Magnet.		\mathbf{x}			0 to 12	gauss

Maximum Circuit Value:

Grid-No.1 Circuit Resistance 1.5 max. megohms

a Includes implosion protection hardware.

The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between 0 and +400 volts with the combined grid-No.1 voltage and video-signal voltage adjusted to give an anode current of 200 microamperes on a 13-1/2-inch by 18-inch pattern from an RCA-2F21 monoscope, or equivalent.

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

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23FMP4

Picture Tube

PAN-O-PLY-INTEGRAL IMPLOSION PROTECTION

(Provided by Formed Rim and Welded Tension Bands around Periphery of Tube Panel-No Separate Safety-Glass or Integral Protective Window Required)

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 110° MAGNETIC DEFLECTION NO ION-TRAP MAGNET REQUIRED

The 23FMP4 is the same as the 23ETP4 except for the following item: Electrical:

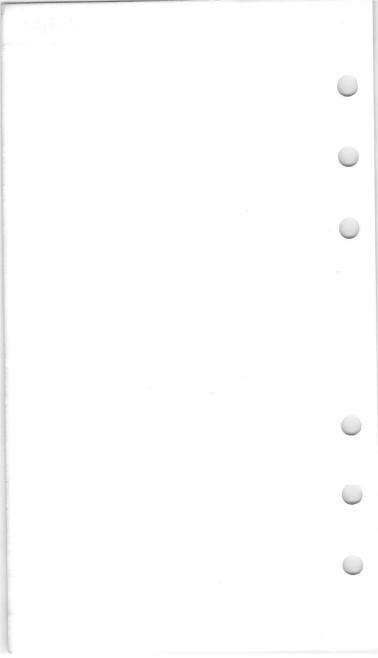
Heater Current at 6.3 volts. . 450 ± 20 ma



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DATA 8-64



23FP4A

Picture Tube

	SHORT RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS II4º MAGNETIC DEFLECTION
	With Heater Having Controlled Warm-Up Time
	GENERAL DATA
	Electrical:
	Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf
	External conductive coating to anode {2500 max. pf 1700 min. pf
	Heater Current at 6.3 volts 100 mm Heater Warm-Up Time (Average) 11 seconds Electron Gun Type Requiring No Ion-Trap Magnet
	Optical:
	Phosphor (For Curves, see front of this Section). P4—Sulfide Type, Aluminized
a.	Faceplate
	Mechanical:
	Weight (Approx.)
	Cap Recessed Small Cavity (JEDEC No.J1-21) Base
	Basing Designation for BOTTOM VIEW 8HR
	Pin 1-Heater Pin 2-Grid No.1 Pin 3-Grid No.2 Pin 4-Grid No.2 Pin 6-Grid No.1 Pin 7-Cathode. Pin 8-Heater Pin 8-Heater Pin 8-Heater Pin 4-Grid No.1 Pin 7-Cathode. Pin 8-Heater Pin 8-Heate



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 4–63

23FP4A

Maximum and Minimum Ratings, Design-Maximum Values: Unless otherwise specified, voltage values are positive with respect to cathode .∫23500 max. volts 11000 min. volts GRID-No.4 (FOCUSING) VOLTAGE: Positive value. 1100 max. . . . volts Negative value. . . . 550 max. volts (550 max. volts GRID-No.2 VOLTAGE 1200 min. volts GRID-No.1 VOLTAGE: Negative peak value 200 max. volts Negative bias value 154 max. volts Positive bias value . . . 0 max. volts . Positive peak value 2 max. volts (6.9 max. volts HEATER VOLTAGE.]5.7 min. volts PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds. 450 max. volts 200 max. volts After equipment warm-up period. . . . Heater positive with respect to cathode: Combined AC and DC voltage. 200 max. volts 100 max. volts Typical Operating Conditions for Grid-Drive Service: Unless otherwise specified, voltage values are positive with respect to cathode Anode Voltage 14000 volts 0 to 400 Grid-No.4 Voltage volts Grid-No.2 Voltage 450 volts Grid-No.1 Voltage for visual extinction volts Maximum Circuit Value: Grid-No.1-Circuit Resistance. 1.5 max. meaohms For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES

at front of this Section



Tube Dictura

Picture Tube
FILLED-RIM TYPE IIO ^O MAGNETIC DEFLECTION LOW GRID-No.2 VOLTAGE
Direct Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode ^a 1700 min—2500 max pF Heater Current at 6.3 V
Phosphor
Light transmission at center (Approx.)
MECHANICAL
Weight (Approx.)
Type (see cRT OUTLINES LAT Front of this section) Regular-Band Contact area for grounding Near Reference Line Cap
TERMINAL DIAGRAM (Bottom View)
Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES
Voltages are positive with respect to grid No.1 Anode Voltage Il000 min—23000 max V Grid-No.4 Voltage Positive value I250 max V Negative value 400 max V Grid-No.2 Voltage 25 min—60 max V
Cathode Voltage Negative peak value 2 max V Negative bias value 0 max V Positive bias value 100 max V Positive peak value 150 max V Heater Voltage 5.7 min—6.9 max V

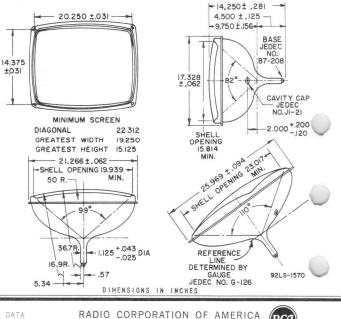
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23FRP4

Peak Heater-Cathode Voltage Heater negative with respect to cathode:		
During equipment warm-up period ≤ 15 s 450 max	٧	
After equipment warm-up period 300 max	۷	
Heater positive with respect to cathode:		
Combined AC & DC voltage 200 max	۷	
DC component	V	
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE		
Voltages are positive with respect to grid No.1		
Anode Voltage	V	
Grid-No.4 Voltage 0 to 400	V	
Grid-No.2 Voltage	V	
Cathode Voltage	V	
For visual extinction of focused raster		
Field Strength 0 to 10	G	
Of required adjustable centering magnet		
MAXIMUM CIRCUIT VALUE		
Grid-No.I Circuit Resistance 1.5 max	ΜΩ	

^a Includes implosion protection hardware.

DIMENSIONAL OUTLINE (Bulb J187 K)



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Picture Tube

FILLED-RIM TYPE	110° MAGNETIC DEFLECTION
Direct Interelectrode Capacitances Cathode to all other electrodes Grid No.1 to all other electrodes External conductive coating to anor Heater Current at 6.3 V Heater Warm-Up Time (Average) Electron Gun Type Requ	6 PF 6 a 1700 min—2500 max pF 6 600 ± 30 mA 11 s
OPTICAL	
Phosphor	ion
Faceplate	Filterglass ox.) 42%
MECHANICAL	
Weight (Approx.) Overall Length Neck Length Projected Area of Screen External Conductive Coating	14.875 ± .281 in 5.125 ± .125 in

Type (see CRT OUTLINES 1 at front of this section) . . Regular-Band Contact area for grounding. Near Reference Line Arrangement I, (JEDEC No. B7-208)

TERMINAL DIAGRAM (Bottom View)

Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater		Cap - Anode (Grid No.3) Grid No.5, Screen, Collector) C - External Conductive
	H BHR B H	Coating

MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES

Voltages are positive with respect to cathode

Anode Voltage			20						11000 min-23	000 max	٧
Grid-No.4 Voltage											
Positive value.									1100 ma	iX	٧
Negative value.	a,			×.	×.				550 ma	ìΧ	۷
Grid-No.2 Voltage									200 min-55	0 max	٧
Grid-No.1 Voltage											
Negative peak va	1	ue		÷.			2		220 ma	X	٧
Negative bias va	a]	ue							155 ma	аx	٧
Positive bias va	al	ue			÷.				O ma	ax	٧
Positive peak va									2 ma	ax	٧
Heater Voltage									5.7 min-6.	9 max	۷

23FSP4

Peak Heater-Cathode Voltage

During equip	nent	war	m-u	o pe	eri	bc	<	15	5 5	5.				450	max	۷	
After equipm	ent v	warr	n-up	per	io	d.								300	max	۷	
eater positiv	e wi	th r	respe	ect	to	Ca	ath	100	le:								
Combined AC	& DC	vol	tage	e										200	max	٧	
DC component												0		100	max	V	
	During equipm After equipme eater positive Combined AC	During equipment After equipment eater positive wi Combined AC & DC	During equipment war After equipment war eater positive with r Combined AC & DC vol	During equipment warm-up After equipment warm-up eater positive with resp Combined AC & DC voltage	During equipment warm-up per After equipment warm-up per eater positive with respect Combined AC & DC voltage.	During equipment warm-up period After equipment warm-up period eater positive with respect to Combined AC & DC voltage	During equipment warm-up period After equipment warm-up period. eater positive with respect to ca Combined AC & DC voltage	During equipment warm-up period ≤ After equipment warm-up period. eater positive with respect to cath Combined AC & DC voltage	During equipment warm-up period ≤ 15 After equipment warm-up period. eater positive with respect to cathoo Combined AC & DC voltage.	During equipment warm-up period < 15 s After equipment warm-up period eater positive with respect to cathode: Combined AC & DC voltage	After equipment warm-up period eater positive with respect to cathode: Combined AC & DC voltage	During equipment warm-up period ≤ 15 s After equipment warm-up period eater positive with respect to cathode: Combined AC & DC voltage	During equipment warm-up period ≤ 15 s After equipment warm-up period eater positive with respect to cathode: Combined AC & DC voltage	During equipment warm-up period ≤ 15 s After equipment warm-up period eater positive with respect to cathode: Combined AC & DC voltage	During equipment warm-up period ≤ 15 s 450 After equipment warm-up period 300 eater positive with respect to cathode: Combined AC & DC voltage 200	During equipment warm-up period ≤ 15 s 450 max After equipment warm-up period 300 max eater positive with respect to cathode:	$\begin{array}{llllllllllllllllllllllllllllllllllll$

TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE

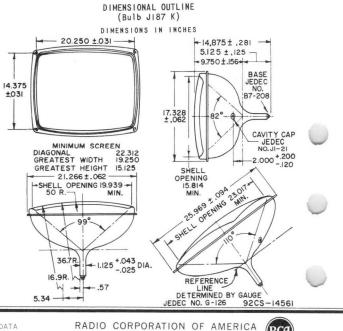
Voltages are positive with respect to grid No.1

Anode Voltage							×								1	800	0	V
Grid-No.4 Voltage																		
Grid-No.2 Voltage																		
Cathode Voltage .															28	to	62	٧
For visual extin	ct	i	nc	0	f	fo	cu	se	d	ra	ste	er						
Field Strength															0	to	12	G
Of required adju	st	al	ole	2 1	cer	nte	er	ing	g r	mag	gne	et						

MAXIMUM CIRCUIT VALUE

. 1.5 max MQ Grid-No.| Circuit Resistance. .

a Includes implosion protection hardware.



Picture Tube

0	PAN-O-PLY TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS NO ION-TRAP MAGNET REQUIRED IIO° MAGNETIC DEFLECTION
0	Direct Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode. 1700 min — 2500 max pF Heater Current at 6.3 V 600 ± 30 mA Heater Warm-Up Time (Average) 11 s Electron Gun Type Requiring No Ion-Trap Magnet OPTICAL
	Phosphor
	Faceplate
	MECHANICAL
	Weight (Approx.)
	Type (see CRT OUTLINES 1 at front of this section)Regular-Band
	Contact area for grounding Near Reference Line Cap
	Base
	Arrangement 1, (JEDEC No.B7-208)
	TERMINAL DIAGRAM (BOTTOM VIEW)
	Pin 1 Hester G4 Con Anode
•	Pin 2 – Grid No.1 Pin 3 – Grid No.1 Pin 4 – Grid No.1 Pin 6 – Grid No.1 Pin 8 – Heater Pin 8 – Heater
	MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES
	Voltages are positive with respect to cathode
0	Anode Voltage
0	Grid-No.I Voltage 220 max V Negative beas value 155 max V Positive bias value 0 max V Positive peak value 2 max V Heater Voltage 5.7 min — 6.9 max V

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DATA 10-65

23GSP4

Peak Heater-Cathode Voltage

Heater negative with respect to cathode: During equipment warm-up period ≤ 15 s 450 max	٧
After equipment warm-up period 300 max	٧
Heater positive with respect to cathode:	
Combined AC & DC voltage 200 max	٧
DC component	٧
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
Voltages are positive with respect to grid No.1	
Anode Voltage	۷

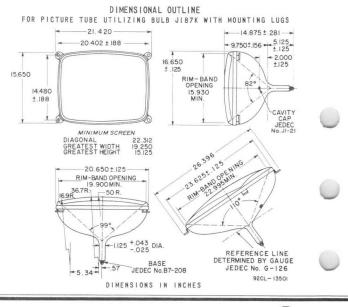
Alloue Vollage										10000	v
Grid-No.4-Voltage ^b .										200	۷
Grid-No.2 Voltage .	. ,									300	٧
Cathode Voltage										28 to 62	٧
For visual extinct	tior	0	f fo	cu	sed	r	ast	er			
Field Strength										0 to 12	G
Of required adjust	tabl	e	cent	er	ing	m	agn	et			

MAXIMUM CIRCUIT VALUE

Grid-No.I Circuit Resistance. MO

^a Includes implosion protection hardware.

^b The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between 0 and +400 volts with the combined grid-No.1 voltage and video-signal voltage adjusted to give an anode current of 200 microamperes on a 13-1/2-inch by 18-inch pattern from an RCA-2F21 monoscope, or equivalent.



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23HFP4A

Picture Tube



PAN-O-PLY-INTEGRAL IMPLOSION PROTECTION

(Provided by Formed Rim and Welded Tension Bands Around Periphery of Tube Panel—No Separate Safety-Glass or Integral Protective Window Required)

LOW-VOLTAGE ELECTROSTATIC FOCUS IIO^O MAGNETIC DEFLECTION NO ION-TRAP MAGNET REQUIRED

The 23HFP4A is the same as the 23ETP4 except for the following items:

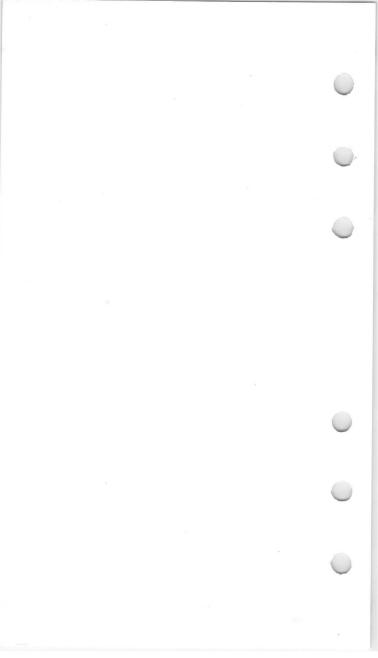
ELECTRICAL

MECHANICAL



External Conductive Coating

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Picture Tube

1	PAN-O-PLY TYPE WITH MOUNTING LUGS 110° MAGNETIC DEFLECTION LOW-VOLTAGE ELECTROSTATIC FOCUS
	Direct Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode1700 min—2500 max pF Heater Current at 6.3 V
	Heater Warm-Up Time (Average) II s Electron Gun Type Requiring No Ion-Trap Magnet
	OPTICAL
	Phosphor
	For curves, see front of this section
	Faceplate
	MECHANICAL
	Weight (Approx.).
	External Conductive Coating ^a Type (see CRT OUTLINES 1 at front of this section)Regular-Band Contact area for grounding Near Reference Line
	Cap
	TERMINAL DIAGRAM (Bottom View)
	Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4 Pin 6 - Grid No.1 Pin 7 - Cathode Pin 8 - Heater Pin 8 - Heater
	8 H R
	MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES
	Voltages are positive with respect to cathode
	Anode Voltage
	Positive value IIO0 max V Negative value 550 max V Grid-No.2 Voltage 200 min—550 max V
	Grid-No.1 Voltage
	Negative peak value 220 max V Negative bias value 155 max V Positive bias value 0 max V Positive peak value 2 max V Heater Voltage 5.7 min—6.9 max V
CAN BE READ	-
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23HGP4

Peak Heater-Cathode Voltage Heater negative with respect to cathode: During equipment warm-up period < 15 s . . 450 max After equipment warn-up period. . . . 300 max Heater positive with respect to cathode: Combined AC & DC voltage. 200 max DC component. . 100 max TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE Voltages are positive with respect to grid No.1 Anode Voltage . . Grid-No.4 Voltage^b. 18000 ×. 200 Grid-No.2 Voltage . 300 Cathode Voltage . . 28 to 62 For visual extinction of focused raster Field Strength. . . 0 to 12 2 2 2 Of required adjustable centering magnet

V

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G

MAXIMUM CIRCUIT VALUE

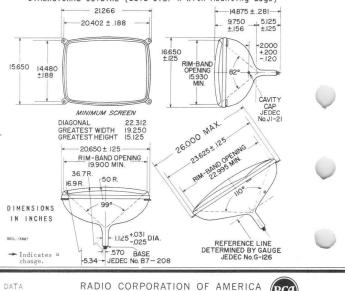
Grid-No.I Circuit Resistance. 1.5 max MO

a Includes implosion protection hardware. h

The grid-No.4 voltage required for optimum focus of any individual tube will have a value anywhere between 0 and +400 volts with the combined grid-No.1 voltage and video-signal voltage adjusted to give an anode current of 200 microamperes on a 13-1/2-inch by 18-inch pattern from an RCA-2F21 monoscope, or equivalent.

X-radiation shielding considerations, see sh X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section

DIMENSIONAL OUTLINE (Bulb J187 K With Mounting Lugs)



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Picture Tube

PAN-O-PLY TYPE LOW-GRID-No.2 VOLTAGE LOW-VOLTAGE ELECTROSTATIC FOCUS IIO ^O MAGNETIC DEFLECTION
ELECTRICAL
ELECTRICAL Direct Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode 1700 min—2500 max pF Heater Current at 6.3 volts
For curves, see front of this section
Faceplate
MECHANICAL
Weight (Approx.)
Arrangement I, (JEDEC No.B7-208)
TERMINAL DIAGRAM (Bottom View)
Pin 1 -Heater Pin 2 -Grid No.1 Pin 3 -Grid No.2 Pin 4 -Grid No.4 Pin 6 -Grid No.1 Pin 7 -Cathode Pin 8 -Heater Cap -Anode (Grid No.3, Grid No.5, Screen, Collector) C -External Conductive Coating BHR

- Indicates a change.

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MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES		
Unless otherwise specified, voltage values		
are positive with respect to grid No.1		
Anode Voltage	۷	-
Positive value	V	
Grid-No.2 Voltage 20 min-60 max	v	
Cathode Voltage Negative peak value	٧	
Negative bias value	V	-
Positive bias value	v	
Heater Voltage	v	
Peak Heater-Cathode Voltage		
Heater negative with respect to cathode:		
During equipment warm-up period not exceeding 15 seconds 450 max	v	1
After equipment warm-up period . 300 max	v	-
Heater positive with respect to cathode:		
Combined AC and DC voltage 200 max	۷	
DC component	۷	
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE		
Unless otherwise specified, voltage values		
are positive with respect to grid No.1		
Anode Voltage	٧	
Grid-No.4 Voltage ^b	V	
Grid-No.2 Voltage	V	
For visual extinction of focused raster	۷	
Field Strength of required adjustable		
centering magnet 0 to 12	G	
MAXIMUM CIRCUIT VALUE		
Grid-No.1-Circuit Resistance	MΩ	
		0
a Includes implosion protection hardware.		0
 The grid-No.4 voltage required for optimum focus of any individual will have a value anywhere between 0 and +400 volts with the comb: 	ined	
b The grid-No.4 voltage required for optimum focus of any individual will have a value anywhere between 0 and +400 volts with the combigrid-No.1 voltage and video-signal voltage adjusted to give an arcurrent of 200 microamperes on a 13.5-inch by 18-inch pattern from provide and video and vide	10de n an	
RCA-2F21 monoscope, or equivalent.		

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



23HWP4A

Picture Tube

PAN-O-PLY TYPE WITH MOUNTING LUGS IIO ^O MAGNETIC DEFLECTION LOW GRID-No.2 VOLTAGE ELECTRICAL Direct Interelectrode Capacitances Cathode to all other electrodes. 5 pF Grid No.1 to all other electrodes. 6 pF External conductive coating to anode ^a
ELECTRICAL Direct Interelectrode Capacitances Cathode to all other electrodes. SpF Grid No.1 to all other electrodes. SpF Grid No.1 to all other electrodes. SpF External conductive coating to anode ^a . Anode ^a . Letternal conductive coating to anode ^a . Heater Current at 6.3 V. Heater Warm-Up Time (Average). II s Electron Gun . OPTICAL Phosphor . Phosphor . Phosphor . PH-Sulfide Type, Aluminized For curves, see front of this section
Direct Interelectrode Capacitances Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes 6 pF External conductive coating to anode ^a
Cathode to all other electrodes 5 pF Grid No.1 to all other electrodes. 6 pF External conductive coating to anode ^a
Grid No.1 to all other electrodes. 6 pF External conductive coating to anode ^a
External conductive coating to anode ^a
anode ^a
Heater Current at 6.3 V. 450 ± 20 mA Heater Warm-Up Time (Average). 11 s Electron Gun Type Requiring No Ion-Trap Magnet OPTICAL Phosphor . For curves, see front of this section
Electron Gun
OPTICAL Phosphor
Phosphor
For curves, see front of this section
Facenlate Filterglass
Light transmission at center (Approx.) 42%
MECHANICAL
Weight (Approx.)
Overall Length
Projected Area of Screen
External Conductive Coating
Type (See CRT OUTLINES 1 at front of this section) Regular-Band
Contact area for grounding
Cap Small Cavity (JEDEC no.JI-21) Base
Arrangement I, (JEDEC No.B7-208)
TERMINAL DIAGRAM (Bottom View)
Pin 1 - Heater ANODE Cap - Anode
Pin 2 - Grid No.1 G4 (Grid No.3,
Pin 3 - Grid No.2 Pin 4 - Grid No.4 G2 - G1 Screen
Pin 4 -Grid No.4 G23 (T) 6 GI Screen Pin 6 -Grid No.1 Collector)
Pin 7 - Cathode (Contector)
Pin 8 - Heater (2) (7), Conductive
Pin 8 - Heater G
GI Coating
GI Coating H SHR H MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES
GIU U U U U U U U U U U U U U U U U U U
GI H BHR MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to grid No.1 Anode Voltage
GIU U U U U U U U U U U U U U U U U U U
Gi G
Gi G
GI GI Coating H BHR MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to grid No.1 Anode Voltage Positive value
Coating H BHR MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to grid No.1 Anode Voltage
Coating H H H MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to grid No.1 Anode Voltage Positive value
Coating MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Voltages are positive with respect to grid No.1 Anode Voltage

RCA

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Heater Voltage 5.7 min-6.9 max V Peak Heater-Cathode Voltage	
Heater negative with respect to cathode:	
During equipment warm-up period≤ 15 s 450 max V	-
After equipment warm-up period 300 max V	
Heater positive with respect to cathode:	
Combined AC & DC voltage 200 max V	
DC component	
TYPICAL OPERATING CONDITIONS FOR CATHODE-DRIVE SERVICE	
Voltages are positive with respect to grid No.1	
Anode Voltage	\sim
Grid-No.4 Voltage 0 to 400 V	
Grid-No.2 Voltage	
Cathode Voltage	
For visual extinction of focused raster	
Field Strength 0 to 10 G	
Of required adjustable centering magnet	0
MAXIMUM CIRCUIT VALUE	
Grid-No.1 Circuit Resistance	
a Includes implosion protection hardware.	
For X-radiation shielding considerations, see sheet	
X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES	
at front of this section	
DIMENSIONAL OUTLINE	
(Bulb J187K with Mounting Lugs)	
- 20.402 ± .188 - ±.156 ±.125	
2000	
16650 +125	
±125 RIM BAND	
±125 PIM PAND //120	
±J25 RIM-BAND 0PENING 82°	
15.650 14,480 ±188 ±188 ±188	
15650 14480 ±188 ±188 ±188 ±188 ±125 RIM-BAND OPENING 15930 MIN CAVITY CAP	0
15650 14480 ±188 ±188 ±188 ±125 RIM-BAND OPENING 15.930 MIN MIN CAVITY CAVIT	
15650 14480 ±188 ±188 ±188 ±125 RIM-BAND OPENING 15.930 MIN MIN CAVITY CAVIT	Ó
15.650 14.480 ±188 ±188 ±125 RIM-BAND OPENING DIAGONAL 22.312 OPENING CAVITY	Q
15650 14,480 ±188 ±125 RIM-BAND OPENING DEPENING DEPENING State MINI MINI DIAGONAL 22,312 GREATEST WIDTH 19,250 GREATEST WIDTH 19,250 COMMA CAVITY CA	Q
15650 14,480 ±188 ±125 RIM-BAND OPENING DEPENING DEPENING State MINI MINI DIAGONAL 22,312 GREATEST WIDTH 19,250 GREATEST WIDTH 19,250 COMMA CAVITY CA	0
15650 14,480 ±188 ±125 RIM-BAND OPENING DEPENING DEPENING State MINI MINI DIAGONAL 22,312 GREATEST WIDTH 19,250 GREATEST WIDTH 19,250 COMMA CAVITY CA	•
15650 14,480 ±188 ±125 RIM-BAND OPENING DEPENING DEPENING State MINI MINI DIAGONAL 22,312 GREATEST WIDTH 19,250 GREATEST WIDTH 19,250 COMMA CAVITY CA	0
15.650 14.480 ±188 ±125 RIM-BAND OPENING OPENING OPENING State DIAGONAL CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY STATE CAVITY CAVITY STATE CAVITY STATE CAVITY STATE CAVITY STATE STA	0
15.650 14.480 ±188 ±125 RIM-BAND OPENING OPENING OPENING State DIAGONAL CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY STATE CAVITY CAVITY STATE CAVITY STATE CAVITY STATE CAVITY STATE STA	Q
15.650 14.480 -120 15.650 14.480 -120 15.650 14.480 -120 15.650 14.480 0PENING 15.650 14.480 0PENING 15.650 14.480 0PENING 15.650 14.480 100 16.9 R 59.30 100 16.9 R 50 R 100 16.9 R 50 R 100 16.9 R 50 R 100	0
15.650 14.480 ±188 ±125 RIM-BAND OPENING OPENING OPENING State DIAGONAL CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY CAVITY STATE CAVITY CAVITY STATE CAVITY STATE CAVITY STATE CAVITY STATE STA	0
15650 14,480 -120 15650 14,480 -120 15650 14,480 -120 1588 -120 MINIMUM SCREEN 15,925 GREATEST WIDTH 19,250 GREATEST HEIGHT 15,125 20650 ± 125 25605 ± 125 RIM-BAND OPENING 25605 ± 100 19,900 MIN. 36,7R. 16,9R 50 R. 99° 100°	0
15.650 14.480 ±188 ±188 MINIMUM SCREEN DIAGONAL 22.312 GREATEST HEIGHT 19.250 GREATEST HEIGHT 19.250 GREATEST HEIGHT 19.250 GREATEST HEIGHT 19.250 GREATEST HEIGHT 19.250 GREATEST HEIGHT 19.250 COVMA 36.7R. 19.900 MIN. 36.7R. 19.900 MIN. 36.7R. 19.900 MIN. 36.7R. 19.900 MIN. 36.7R. 19.900 MIN. 36.7R. 19.900 MIN. 36.7R. 19.900 MIN. 19.900 MIN. 10.000 MI	0
15650 14.480 ±188 ±188 MINIMUM SCREEN DIAGONAL 22.312 GREATEST HEIGHT 19.250 GREATEST HEIGHT 19.250 HIM-BAND OPENING 19.900 MIN. 36.7R. 19.900 MIN. 36.7R. 19.900 MIN. 36.7R. 19.900 MIN. 36.7R. 19.900 MIN. 36.7R. 19.900 MIN. 36.7R. 19.900 MIN. 19.900 MIN. 36.7R. 19.900 MIN. 36.7R. 19.900 MIN. 36.7R. 19.900 MIN. 36.7R. 19.900 MIN. 36.7R. 11.25-025 DIA. BEEEDENICT LINE.	
LI25 RIM-BAND DIAGONAL 22312 GREATEST WIDTH 19205 GREATEST HEIGHT 19205 GREATEST HEIGHT 19205 GREATEST HEIGHT 19205 GREATEST HEIGHT 19205 GREATEST HEIGHT 19205 GREATEST HEIGHT 19205 GREATEST HEIGHT 19205 CAVITY	
15.650 14.480 ±188 ±125 RIM-BAND OPENING B2° (AVITY CAVITY JEDEC No.JI-21 RIM-BAND OPENING S2° (CAVITY JEDEC No.JI-21 S20605 ±125 RIM-BAND OPENING S2° (CAVITY JEDEC No.JI-21 S2000 MIN 36.7 R IS 90° NO.JI-21 S000 MIN 36.7 R IS 90° S0 R S0	0
LIZE-USBERE DI MENSIONS DI ME	0
LI25 RIM-BAND DIAGONAL 22.312 GREATEST WIDTH 19.250 GREATEST HEIGHT 19.250 GREATEST HEIGHT 19.250 GREATEST HEIGHT 19.250 GREATEST HEIGHT 19.250 GREATEST HEIGHT 19.250 GREATEST HEIGHT 19.250 DI MENSIONS IN IN CHES DI MENSIONS IN IN IN CHES DI MENSIONS IN IN	0
LIZE-USBERE DI MENSIONS DI ME	

23JP4

Picture Tube

ALUMINIZED SCREEN **BI-PANEL RECTANGULAR GLASS TYPE** 110° MAGNETIC DEFLECTION LOW-VOLTAGE ELECTROSTATIC FOCUS LOW-GRID-NO.2 VOLTAGE CATHODE-DRIVE TYPE With Heater Having Controlled Warm-Up Time GENERAL DATA Flectrical: Direct Interelectrode Capacitances: Cathode to all other electrodes . . . 5 pf Grid No.1 to all other electrodes . . . 6 pf 2500 max. pf External conductive coating to anode. 2000 min. of 450 ± 25 Heater Current at 6.3 volts . . ma Heater Warm-Up Time (Average) 11 seconds Electron Gun. Type Requiring No Ion-Trap Magnet Optical: Phosphor (For curves, see front of this section). P4-Sulfide Type, Aluminized Faceplate and Protective Panel. Filterglass Light transmission (Approx.). 40% Mechanical: Weight (Approx.). 32-1/2 lbs . . . 15-7/16" ± 7/16" Overall Length. Projected Area of Screen. 282 sq. in. External Conductive Coating: Type.....Regular-Band Contact area for grounding. Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J187 A sheets at front of this section Basing Designation for BOTTOM VIEW. 7FA Pin 2 - Cathode Cap - Anode 4 G Pin 3-Heater (Grid No.3. Pin 4 - Heater Grid No.5. Pin 5 - Grid No.1 K(2 6)G4 Screen. Pin 6-Grid No.4 Collector) Pin 7-Grid No.2 C - External Conductive Coating ANODE



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 4-63

23JP4

Maximum and Minimum Ratings, Design-Maximum Values:	
Unless otherwise specified, voltage val-	
ues are positive with respect to grid No. 1	J
ANODE VOLTAGE	
GRID-No.4 (FOCUSING) VOLTAGE:	
Positive value	
Negative value	
GRID-No.2 VOLTAGE	
CATHODE VOLTAGE:	j
Negative peak value	
Negative bias value 0 max. volts	
Positive bias value 100 max. volts	
Positive peak value 150 max. volts	
HEATER VOLTAGE	
[5.7 min. volts	
PEAK HEATER-CATHODE VOLTAGE:	Į
Heater negative with	
respect to cathode:	
During equipment warm-up period	
not exceeding 15 seconds 450 max. volts	
After equipment warm-up period 200 max. volts	
Heater positive with	
respect to cathode:	
Combined AC and DC voltage 200 max. volts	
DC component 100 max. volts	
Typical Operating Conditions for Cathode-Drive Service:	
Unless otherwise specified, voltage val-	
ues are positive with respect to grid No. 1	
Anode Voltage	
Grid-No.4 Voltage 0 to 500 volts	
Grid-No.2 Voltage	
Cathode Voltage for	
visual extinction of	
focused raster	j.
Maximum Circuit Value:	
Grid-No.1-Circuit Resistance 1.5 max. megohms	
For X-radiation shielding considerations, see sheet	
X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES	
at front of this Section	í.
	Į.



Picture Tube

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION With Heater Having Controlled Warm-Up Time

GENERAL DATA

Electrical:

Heater Current at 6.3 volts 600 ± 30 ma Heater Warm-Up Time (Average)
Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 µµf Cathode to all other electrodes 5 µµf
External conductive coating to ultor . $\begin{cases} 2500 \text{ max.} & \mu\mu\text{f} \\ 1700 \text{ min.} & \mu\mu\text{f} \end{cases}$
Focusing Method
Diagonal
Optical: Faceplate
Aluminized Fluorescence
Mechanical:
Tube Dimensions:

Overall lengt	h	 	 		14-3/8" ± 5/16"
Greatest widt	h	 	 	. 20-1/2	' + 1/16" - 1/8"
Greatest heig	ht	 	 		. 16-1/2" ± 1/8"
Diagonal		 	 	23-25/64	' + 3/32" - 1/8"
					. 5-1/8" ± 1/8"
Curvature of					

		C	en	te	r	1	nı	ter	me	ed 1	at	е	Edge
External surface	c		5	0"					-				36-3/4"
Internal surface			3	0"					48	"			24"
Screen Dimensions (Minimum):													
Greatest width	0.1											•	19-1/4"
Greatest height													
Diagonal													22-5/16"
Projected area											.2	82	sq. in.
Weight (Approx.)													. 24 lbs
Operating Position													Any
Cap Recesse	ed		Sma	a 1 1	1	Cav	/i	ty	(.	JEI	DEC	N	lo. J1-21)
Bulb		•		•					•		J	18	37 (1140)

RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA I 10-60

Basing Designation for BOTTOM VIEW Pin 1 - Heater Pin 2 - Grid No.1 Pin 3 - Grid No.2 Pin 4 - Grid No.4	, Arrangement 1, JEDEC No. 87–208)
GRID-DRIVE SERVICE	
Unless otherwise specified, voltage	
are positive with respect to ca	thode
Maximum and Minimum Ratings, Design-Maximum Vi	alues:
111 TOP VOLTACE (220)	00 max. volts
ULTOR VOLTAGE	00 max. volts 00 min. volts
GRID-No.4 (FOCUSING) VOLTAGE:	
Positive value	00 max. volts
Negative value	
	50 max. volts
GRID-No.2 VOLTAGE	00 min. volts
GRID-No.1 VOLTAGE:	
	20 max. volts
	54 max. volts
	0 max. volts
Positive-peak value	2 max. volts
(0	.9 max. volts
	.7 min. volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with	
respect to cathode:	
During equipment warm-up period	
not exceeding 15 seconds 4	50 max. volts
After equipment warm-up period 20	00 max. volts
Heater positive with	
respect to cathode	00 max. volts 💛
Equipment Design Ranges:	
With any ultor voltage (Ec5k) between 11000 a	na 22000 volts

> RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



	Grid-No.4 Current	μа μа	
)		ausses	
	Examples of Use of Design Ranges:		
	With ultor voltage of 18000 and grid-No.2 voltage of 400	volts volts	
	Grid-No.4 Voltage for focus [®] 0 to 400 Grid-No.1 Voltage for visual	volts	
)	extinction of focused raster36 to -94 Grid-No.1 Video Drive from Raster Cutoff (Black level):	volts	
	White-level value	volts	
	Maximum Circuit Values:		
ŝ.	Grid-No.1-Circuit Resistance 1.5 max. me	egohms	

CATHODE-DRIVE SERVICE

Unless otherwise specified, volt are positive with respect to	
Maximum and Minimum Ratings, Design-Maximu	
	{22000 max. volts 11000 max. volts
GRID-No.4-TO-GRID-No.1 (FOCUSING) VOLTAGE:	
Positive value	1250 max. volts
Negative value	400 max. volts
GRID-No.2-TO-GRID-No.1 VOLTAGE	∫700 max. volts
	l350 min. volts
GRID-No.2-TO-CATHODE VOLTAGE CATHODE-TO-GRID-No.1 VOLTAGE:	550 max. volts
Positive-peak value	220 max. volts
Positive-bias value	154 max. volts
Negative-bias value	0 max. volts
Negative-peak value	2 max. volts
	6.9 max. volts
HEATER VOLTAGE	5.7 min. volts
PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds	450 max. volts
After equipment warm-up period	200 max. volts
Heater positive with	200
respect to cathode	200 max. volts
Equipment Design Ranges:	
With any ultor-to-grid-No.1 voltage (Ec and 22000 volts and grid-No.2-to-grid-No between 225 and 700 vol Grid-No.4-to-Grid-No.1	.1 voltage (Ec2g1)
Voltage for focus [•]	0 to 400 volts



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Cathode-to-Grid-No.1 Voltage (Ekg]) for visual extinction of focused raster See Raster-Cutoff-Range Chart	
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black level): White-level value	
(Peak negative) Same value as determined for E _{kg1} except video drive is a negative voltage	
Grid-No.4 Current. -25 to +25 μa μa Grid-No.2 Current. -15 to +15 μa Field Strength of Adjustable	
Centering Magnet* 0 to 8 gausses	
Examples of Use of Design Ranges:	
With ultor-to-grid- No.1 voltage of 18000 volts and grid-No.2-to-	0
grid-No.1 voltage of 400 volts	
Grid-No.4-to-Grid-No.1 Voltage for focus ⁶ 0 to 400 volts Cathode-to-Grid-No.1 Voltage for visual extinction	
of focused raster	
White-level value	
Maximum Circuit Values:	

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

- Grid drive is the operating condition in which the video signal varies the grid-No.1 potential with respect to cathode.
- Individual tubes will have satisfactory focus at some value of grid-No.4 (or grid-No.4-to-grid-No.1) voltage between 0 and 400 volts under conditions with the combined bias voltage and video-signal voltage adjusted to produce an ultor current of 200 microamperes.
- Distance from Reference_Line for suitable PM centering magnet should not exceed 2-1/4". Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having a 3/8-inch radius concentric with the center of the tube face. It is to be noted that the earth's magnetic field can cause as much as 1/2-inch deflection of the spot from the the center of the tube face.
- Cathode drive is the operating condition in which the video signal varies the cathode potential with respect to grid No.1 and the other electrodes.

OPERATING CONSIDERATIONS

X-Ray Warning. When operated at ultor voltages up to 16 kilovolts, this picture tube does not produce any harmful X-ray radiation. However, because the rating of this type permits operation at voltages as high as 22 kilovolts (Design-maximum value), shielding of this picture tube for X-ray radiation may be needed to protect against possible injury from prolonged

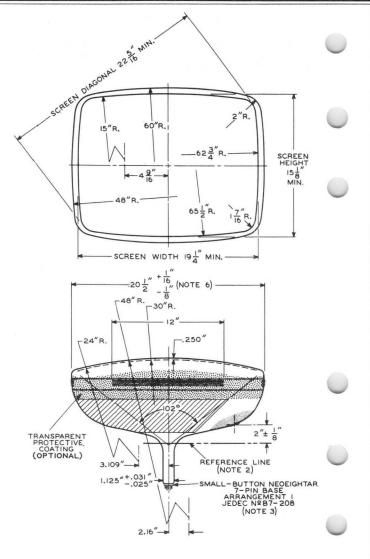


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. exposure at close range whenever the operating conditions involve voltages in excess of 16 kilovolts.

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

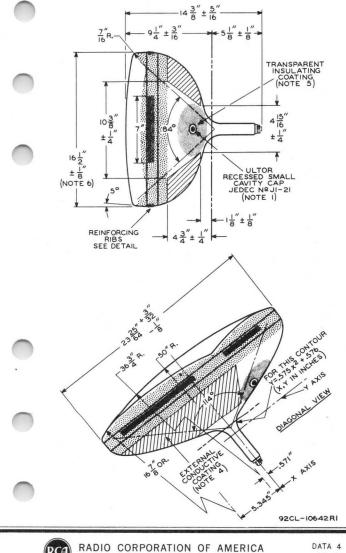


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 3 10-60



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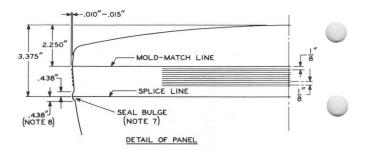




Electron Tube Division

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NOTE 1: THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm~30^\circ$. ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC NO.G-126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

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

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

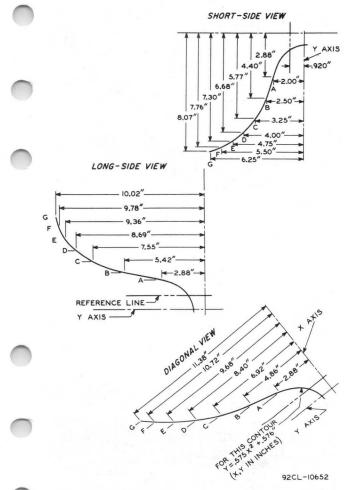
NOTE 6: MEASURED AT THE MOLD-MATCH LINE.

NOTE 7: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE IN-DICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE LOCATION SPECIFIED FOR DIMEN-SIONING THE ENVELOPE WIDTH, DIAGONAL, AND HEIGHT.

NOTE 8: AREA BETWEEN MOLD-MATCH LINE AND SEAL BULGE IS 1/2" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND. SUPPORTS MUST BE SPACED FROM THE TUBE BY THE USE OF CUSHIONING PADS MADE OF ASPHALT, IMPREGNATED FELT OR EQUIVALENT.



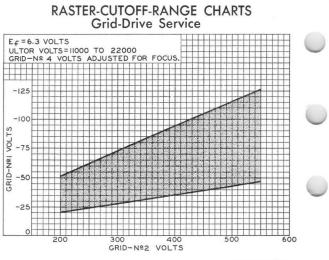
BULB-CONTOUR DIMENSIONS



NOTE: PLANES A THRU G ARE NORMAL TO THE TUBE AXIS AND AT FIXED LOCATIONS FROM THE Y AXIS. THESE COORDINATES DESCRIBE THE BOGIE-BULB EXTERNAL CONTOUR IN PLANES THOUGH THE TUBE AXIS AND THE RESPECTIVE FACEPLATE AXES.

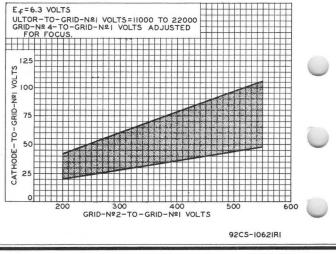


RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA 5 10-60



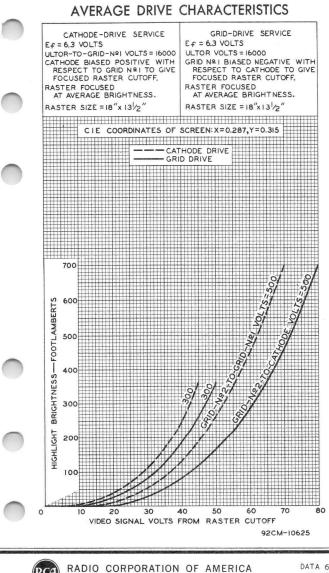
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RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

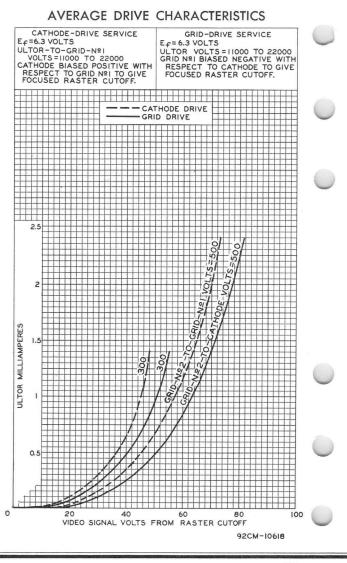




Electron Tube Division

Harrison, N. J.

¹⁰⁻⁶⁰



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



Picture Tube

NO ION-TRAP MAGNET REQUIRED RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 114° MAGNETIC DEFLECTION LOW GRID-No. 2 VOLTAGE CATHODE-DRIVE TYPE Electrical: Direct Interelectrode Capacitances: Grid No.1 to all other electrodes. pf Cathode to all other electrodes. . 5 pf [2500 max. pf External conductive coating to anode . . 1700 min. pf Heater Current at 6.3 volts. 600 ± 30 ma Heater Warm-Up Time (Average).... 11 seconds Optical: Phosphor (For curves, see front of this Section). . . P4-Sulfide Type Aluminized Faceplate..... . .Filteralass Light transmission at center (Approx.) . . Mechanical: . . 24 lbs Weight (Approx.) 14.531" ± .281" 5.125" ± .125" 282 sq. in. External Conductive Coating: Contact area for grounding Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J187 B sheets at front of this section Cap. Recessed Small Cavity (JEDEC No.J1-21) Base . . . Small-Button Neoeightar 7-Pin, Arrangement 1 (JEDEC No. B7-208) Pin 1-Heater Pin 2-Grid No.1 ANODE G4 (4 Pin 3-Grid No.2 Pin 4-Grid No.4 G2/ GI Pin 6-Grid No.1 3 6 Pin 7-Cathode Pin 8-Heater G1(2 Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C-External Conductive Coating RADIO CORPORATION OF AMERICA DATA Harrison, N. J. 4-65 Electronic Components and Devices

23NP4

Maximum and Minimum Ratings, Design-Maximum Values:	
Unless otherwise specified, voltage values are positive with respect to grid No.1	6
Anode Voltage	volts volts
Grid-No.4 (Focusing) Voltage: Positive value	volts volts volts volts
Cathode Voltage: Negative peak value	volts volts volts volts volts volts
Peak Heater-Cathode Voltage: 5.7 min. Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds. 450 max. After equipment warm-up period	volts volts volts volts volts
Typical Operating Conditions for Cathode-Drive Service	:
Unless otherwise specified, voltage values are positive with respect to grid No.1	

Anode Voltage	volts
Grid-No.4 Võltage	volts
Grid-No.2 Voltage	volts
Cathode Voltage for visual extinction	
of focused raster	volts

Maximum Circuit Value:

Grid-No.1 Circuit Resistance 1.5 max. megohms

For X-radiation shielding consideration, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this Section



Picture Tube

0	BI-PANEL RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS 92° MAGNETIC DEFLECTION
	With Heater Having Controlled Warm-Up Time
	GENERAL DATA
	Electrical:
	Heater Current at 6.3 volts 600 ± 5% ma Heater Warm-Up Time (Average) 11 seconds Direct Interelectrode Capacitances: Grid No.1 to all other electrodes 6 μμf Cathode to all other electrodes 5 μμf
	External conductive coating to ultor {2500 max. μμf 2000 min. μμf
	Electron Gun Type Requiring No Ion-Trap Magnet
	Optical:
	Faceplate and Protective Panel
	Mechanical:
	Operating Position
	For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J187 D/G sheets
	at the front of this section Cap Recessed Small Cavity (JEDEC No.J1-21) Base
•	Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 12-Heater Pin 12-Heater H H H Cap-Ultor (Grid No.3, Grid No.5, Collector) C-External Conductive Coating
•	8



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.

DATA 3-62

23YP4

Maximum and Minimum Ratings, Design-Maximum	n Values:	
ULTOR VOLTAGE	22000 max	. volts
	12000 min	. volts
GRID-No.4 (FOCUSING) VOLTAGE:		
Positive value	1100 max	
Negative value	550 max	
GRID-No.2 VOLTAGE	550 max	. volts
GRID-No.1 VOLTAGE:		
Negative peak value	220 max	. volts
Negative bias value	155 max	. volts
Positive bias value	0 max	. volts
Positive peak value	2 max	. volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with		
respect to cathode:		
During equipment warm-up period	150	1.
not exceeding 15 seconds	450 max	
After equipment warm-up period	200 max	. volts
Heater positive with	200	
respect to cathode	200 max	. volts
Typical Operating Conditions:		
With ultor voltage of	16000	volts
and grid-No.2 voltage of	300	volts
Grid-No.4 Voltage for focus	0 to 40	0 volts
Grid-No.1 Voltage for visual extinction	2 20 10	

Maximum circuit values:

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

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



24**AEP**4

Picture Tube

ALUMINIZED SCREEN RECTANGULAR GLASS TYPE LOW-VOLTAGE ELECTROSTATIC FOCUS 90° MAGNETIC DEFLECTION GENERAL DATA Electrical: Heater Current at 6.3 volts 600 ± 10% ma Direct Interelectrode Capacitances: Grid No.1 to all other electrodes . 6 μµf Cathode to all other electrodes . 5 μµf (2500 max. μµf External conductive coating to ultor. ·{2000_min. μµf Electron Gun. Type Requiring No lon-Trap Magnet Optical: Phosphor (For curves, see front of this section). . P4-Sulfide Type, Aluminized Mechanical: Operating Position. . . Any 35 lbs 19-1/8" ± 3/8" Overall Length. Neck Length 5-1/2" ± 3/16" Projected Area of Screen. 332 sg. in. External Conductive Coating: . . . Special Contact area for grounding. Near Reference Line For Additional Information on Coatings and Dimensions: See Picture-Tube Dimensional-Outlines and Bulb J102 A/B sheets at the front of this section Bases (Alternates): Short Small-Shell Duodecal 6-Pin (JEDEC Group 4, No.B6-203) Small-Shell Duodecal 6-Pin, Arrangement 1 (JEDEC Group 4, No.B6-63) Basing Designation for BOTTOM VIEW. . 12L ULTOR Pin 1-Heater G3,G5 Cap-Ultor Pin 2-Grid No.1 (Grid No.3, Pin 6-Grid No.4 Grid No.5. Pin 10 - Grid No.2 Collector) (10)_{G2} Pin 11 - Cathode CE C-External Pin 12 - Heater Conductive Coating



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J. DATA

24AEP4

Maximum Ratings, Design-Maximum	Valu	les	:				
ULTOR VOLTAGE	• •			22000	max.	volts	0
Positive value				1100	max.	volts	-
Negative value				550	max.	volts	
GRID-No.2 VOLTAGE				550	max.	volts	
GRID-No.1 VOLTAGE:							
Negative bias value				155	max.	volts	
Positive bias value				0	max.	volts	
Positive peak value				2	max.	volts	6
PEAK HEATER-CATHODE VOLTAGE:							-
Heater negative with							
respect to cathode:							
During equipment warm-up pe	riod						
not exceeding 15 seconds.				450	max.	volts	
After equipment warm-up per	iod.			200	max.	volts	
Heater positive with							
respect to cathode				200	max.	volts	
Typical Operating Conditions:							

With ultor voltage of		18000	volts
and grid-No.2 voltage of		300	volts
Grid-No.4 Voltage for focus	• •	-50 to +350	volts
Grid-No.1 Voltage for visual extinction of focused raster		-28 to -72	volts

Maximum Circuit Values:

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

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



RADIO CORPORATION OF AMERICA Electron Tube Division Harrison, N. J.



PARTIR A

PICTURE TUBE

RECTANGULAR	GLASS	TYPE	ALUMINI	ZED	SCREEN
LOW-VOLTAGE	FOCUS		MAGNETIC	DEFL	ECTION

DATA

							D	ATA										
Gener	ral:																	
Vo Cui Direa Gr	er, f ltage rrent ct ln id No	terel .1 to	ectr all	ode ot	e Ca	ipac el	6 C ita ect	.3 .6 .nce	± es:	10%	•			••• 6			μ	ιmj
	thode terna	10000	10 D 10											5 500 000			μ	ιμ` ιμ`
li	plate ght t phor	ransm	issi	on	(Ac	pro	x.)						•	• •	Fi Sul	lte fid	rgla 7	69
Ph Focu Defl	uores ospho Persi sing ectio ectio	resce stenc Metho n Met	nce e . d . hod	•		• •	:	•		:	: :	•	:	 . E	: lec	· · · · · ·	Whi Whi Sho stat	te te or
Di Ho Ve Elec	agona rizon rtica tron Dime	1 tal. 1 Gun.	 	• •				:		ł	: :	:	No	lon			11 10 8 Magn)5 37
Ov Gr Gr Di Ne	erall eates eates agona ck le en Di	leng t wid t hei l ngth	th. th. ght	• •		• •	•	•		:		•	.2	2–1 18	1/1 -1/ 2	6" 2" 4"	± 1/	8 8 8
Gr Gr Di Pr Weig	eates eates agona oject ht (A	t wid t hei l ed ar pprox	ght ea.							•			:		33	. 1 22- 2 s	13/1 q. i 28 l	8 6 10
Cap Bulb Base	ting	::	::	• •	F	Rece •	esse	ed	Sma S ang	11 mal eme	Cav 1-E	But	y (tor (J	JET Ei Ete	EC J1 ght C N	No. 92 ar	J1-2 (110 7-Pi 7-18	21 00 10 33
Pi Pi Pi Pi Pi	sing n 1- n 2- n 3- n 4- n 6- n 7- n 8-	Heate Grid Grid Grid Grid Cathc	No.1 No.2 No.2 No.1 No.1	L 2 4	for	- B(W.	• •		Cap	– U (– E	lto Gri Col xte Con	d N d N lec rna	0.3, o.5, tor) l tive	

6-57

ELECTRON TUBE DIVISION

TENTATIVE DATA 1



PICTURE TUBE

GRID-DRIVE* SERVICE

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

Maximum Ratings, Design-Center Values:

24AHPA

3 / 6 6 6 6 6 6 6	e
ULTOR VOLTAGE	
GRID-No.4 VOLTAGE: l12000⊕min. volts	
Positive value	
Negative value. 500 max. volts GRID-No.2 VOLTAGE 500 max. volts	
GRID-No.2 VOLTAGE	
Negative peak value	
Negative bias value	
Positive bias value 0 max. volts	
Positive peak value	-
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode:	
During equipment warm-up period	
not exceeding 15 seconds 410 max. volts	
After equipment warm-up period 180 max. volts	
Heater positive with respect to cathode. 180 max. volts	
Equipment Design Ranges:	
With any ultor voltage $(E_{C_5 k})$ between 12000 and 20000 volts	
and grid-No.2 voltage $(E_{C_{2k}})$ between 200 and 500 volts	
Grid-No,4 Voltage for	
Focus 9 -50 to +350 volts	
Grid-No.1 Voltage (Ec1k)	
for Visual Extinc- ¹ tion of Focused Raster See Raster-Cutoff-Range Chart	
tion of Focused Raster See Raster-Cutoff-Range Chart for Grid-Drive Service	
Grid-No.1 Video Drive	
from Raster Cutoff	1
(Black Level):	
White-level value	
(Peak positive) Same value as determined for	
Ectk except video drive is a	
E _{cik} except video drive is a positive voltage	
Ec ₁ k except video drive is a positive voltage Grid-No.4 Current25 to +25 μa	
E _{cik} except video drive is a positive voltage	0
Ec ₁ k except video drive is a positive voltage Grid-No.4 Current25 to +25 µa Grid-No.2 Current15 to +15 µa	C
Ec ₁ k except video drive is a positive voltage Grid-No.4 Current25 to +25 μa Grid-No.2 Current15 to +15 μa Field Strength of Adjust-	C
Ec1k except video drive is a positive voltage Grid-No.4 Current -25 to +25 µa Grid-No.2 Current -15 to +15 µa Field Strength of Adjust- able Centering Magnet* 0 to 8 gausses Examples of Use of Design Ranges: With ultor voltage of 14000 16000 volts	C
Ec1k except video drive is a positive voltage Grid-No.4 Current -25 to +25 μa Grid-No.2 Current -15 to +15 μa Field Strength of Adjust- able Centering Magnet* 0 to 8 gausses Examples of Use of Design Ranges:	0
Ecik except video drive is a positive voltage Grid-No.4 Current -25 to +25 µa Grid-No.2 Current -15 to +15 µa Field Strength of Adjust- able Centering Magnet* 0 to 8 gausses Examples of Use of Design Ranges: 14000 16000 volts With ultor voltage of 300 400 volts Grid-No.4 Voltage for 300 400 volts	0
Ecik except video drive is a positive voltageGrid-No.4 Current-25 to +25Grid-No.2 Current-15 to +15Field Strength of Adjust- able Centering Magnet*0 to 8gaussesExamples of Use of Design Ranges: With ultor voltage of and grid-No.2 voltage of Grid-No.4 Voltage for Focus140001600volts gooGrid-No.4 Voltage for Focus-50 to +350-50 to +350-50 to +350	0
Ecik except video drive is a positive voltage Grid-No.4 Current -25 to +25 µa Grid-No.2 Current -15 to +15 µa Field Strength of Adjust- able Centering Magnet* 0 to 8 gausses Examples of Use of Design Ranges: 14000 16000 volts With ultor voltage of 300 400 volts Grid-No.4 Voltage for 300 400 volts	0
Ecik except video drive is a positive voltageGrid-No.4 Current-25 to +25µaGrid-No.2 Current-15 to +15µaField Strength of Adjust- able Centering Magnet*0 to 8gaussesExamples of Use of Design Ranges: With ultor voltage of and grid-No.2 voltage of Grid-No.4 Voltage for Focus16000voltsGrid-No.4 Voltage for Focus-50 to +350-50 to +350volts	0



LANTIS D

PICTURE TUBE

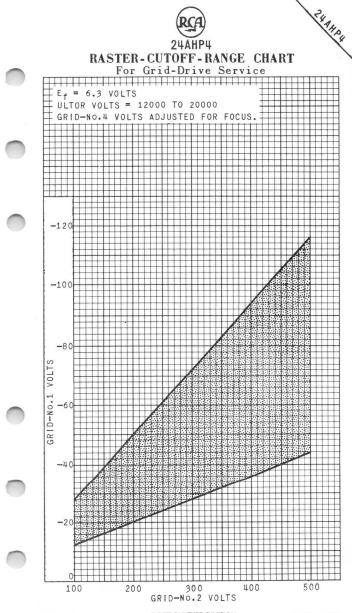
tage for							
		20	+ -	70	26 +-	04	volt
	• •	-28	to -	-12	-36 to	-94	VOIL
value	• •	28	to	72	36 to	94	volt
it Values:	:						
cuit Resis	stance	• •	•••	•••	. 1.5 m	ax. m	negohm
CAT	HODE-I	DRIVE	SE	RVICE			
eruise st.	ecifie	d no	lta	10 110	lues are	hosit	1110
						poste	100
gs, Design	n-Cent	er Va	lues	:			
-No.1 VOL	TAGE .				∫20000_	max.	volt
			•••	•••	12000 ₽	min.	volt
					4000		
		• •		• •			volt
				• •		max.	volt
GRID-No.1	VOLTA	GE .		• •		max.	volt
CATHODE VO	DLTAGE	•••	•••	•••	500	max.	volt
ak value.					200	max.	volt
					140	max.	volt
as value.					0	max.	volt
ak value.		• •	• •	• •	2	max.	volt
		+ +0	cath	ode.			
				ioue.			
					410	may	volt
				• •			volt
							volt
		1 10 0	atric	ae.	180	max.	VOIL
-to-gria-	-NO.11	voita	gel	EC 58	1) between	en	ava 1 + .
to arid 1	Vo 1 11	altar	0 15				00113
·LO-grid-A	10.1 0	orrag	e	c2 8 1'	oetween	nd fra	101+
					229 W	14 040	0011.
						~	1.
Focusy .		•••	•	-:	50 to +35	0	volt
is the op athode pot	erating	g cond with	itio	n in spect	which the to grid	video No.1 a	signal nd the
100	circiai						
105				nimum	The equ	ivalen	t abea
105				nimum. volta	The equage is 110	ivalen 00 vol	t abso- ts, be-
105				nimum. volta AHP4 w	The equipe is 110 will be in	nivalen 000 vol mpaired	t abso ts, be- l. The
105				nimum. volta AHP4 w ty of robabl	The equip age is 110 will be in determin le operati	nivalen 000 vol mpaired ing a m ing com	t abso ts, be- l. The ninimum ditions
105				nimum. volta AHP4 w ty of robabl quipme 1 volt	The equ age is 110 will be in determin le operati ent variat age is ne	nivalen mpaired ing a m ing com ing com ion the iver les	t abso ts, be- i. The ninimum ditions abso- ss than
des. a working ultor-or ul igner has such that u ply-voltage ultor-or ul ge.				nimum. volta AHP4 w ty of robabl quipme 1 volt	The equ age is 110 will be in determin le operati ent variat age is ne	vivalen 000 vol mpaired ing con ing con ing con ver les	t abso ts, be- l. The ninimur ditions e abso- ss than
	cation of ter co Drive Cutoff (): value it Values: cuit Resis cuit R	Action of ter	nction of ter28 co Drive Cutoff (): value 28 it Values: cuit Resistance CATHODE-DRIVE erwise specified, vo with respect to gs, Design-Center Va -No.1 VOLTAGE GRID-No.1 VOLTAGE: ue GRID-No.1 VOLTAGE . CATHODE VOLTAGE . CATHODE VOLTAGE . SATHODE VOLTAGE . SATHODE VOLTAGE . ive with respect to ipment warm-up perio tive with respect to c gn Ranges: -to-grid-No.1 voltage -to-grid-No.1 voltage Scid-No.1 Focus§	nction of ter	nction of ter28 to -72 ao Drive Cutoff)): value 28 to 72 it Values: cuit Resistance CATHODE-DRIVE [®] SERVICE erwise specified, voltage va with respect to grid No gs, Design-Center Values: -No.1 VOLTAGE GRID-No.1 VOLTAGE: ue GRID-No.1 VOLTAGE GRID-No.1 VOLTAGE ATHODE VOLTAGE ATHODE VOLTAGE	nction of ter	nction of -28 to -72 -36 to -94 ter



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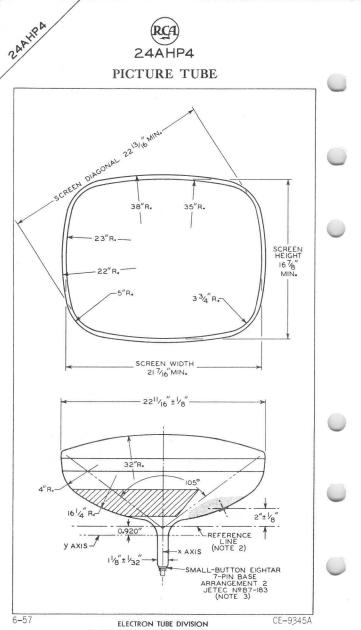
PICTURE TUBE

Cathode-to-Grid-No.1			
Voltage (Ekg1) for			
Visual Extinction			
of Focused Raster	See Raster	-Cutoff-Range	e Chart
		ithode-Drive	
Cathode-to-Grid-No.1	507 00		
Video Drive from Raster			
Cutoff (Black Level):			
White-level value			
	Carry 1		and from
(Peak negative)		ue as determin	
	Ekg1 exce	ept video driv	/e_is a
	05	negative v	
rid-No.4 Current	-25 to		μa
rid-No.2 Current.	-15 to	+10	μa
ield Strength of Adjust-	0	0	
able Centering Magnet* .	0 to	8	gausses
xamples of Use of Design Rang	es:		
With ultor-to-grid-No.1			
voltage of	14000	16000	volts
and grid-No.2-to-grid-No.1	14000	10000	00005
una gria-No. 2-10-gria-No. 1 voltage of	300	400	volts
0	300	400	00165
rid-No.4-to-Grid-			1.
No.1 Voltage for Focus	-50 to +350	-50 to +350	volts
athode-to-Grid-No.1			
Voltage for Visual			
Extinction of Focused			
	28 to 60	36 to 78	volts
athode-to-Grid-No.1			
Video Drive from			
Raster Cutoff			
(Black Level):			
White-level value	-28 to -60	-36 to -78	volts
aximum Circuit Values:			
rid-No.1-Circuit Resistance.		1.5 max. m	eachms
			9
Distance from Reference Line for	suitable PM c	entering magnet	should
undeflected focused spot will fal	1 within a cir	cle having a 7/	16-inch
radius concentric with the center	of the tube f	ace. It is to t	e noted
Distance from Reference Line for not exceed 2-1/4". Excluding ex undeflected focused spot will fal radius concentric with the center that the earth's magnetic field car of the spot from the center of the	e tube face.	as 1/2-men der	rection
The grid-No.4 voltage or grid-No.	.4-to-grid-No.	1 voltage requi	red for
focus of any individual tube is i	ndependent of	ultor current a	nd will
grid-No.1 voltage) or grid-No.2	voltage (or c	rid-No.2-to-ar	id-No.1
of the spot from the center of the The grid-No.4 voltage or grid-No. focus of any individual tube is i remain essentially constant for v grid-No.1 voltage) or grid-No.2 voltage) within design ranges show	wn for these i	tems.	
			-
For X-ray shielding cor	nsiderations	see sheet	
X-RAY PRECAUTIONS FO			
at front of			
ac 5.0nc 05	0.000 0000000		

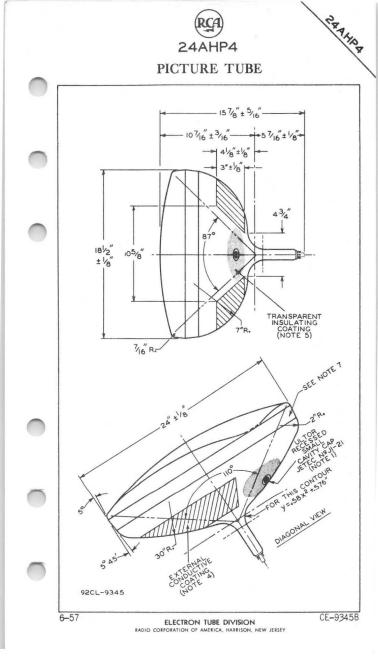


ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CS-9349



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 4 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF $\pm~30^\circ$. ULTOR TERMINAL IS ON SAME SIDE AS PIN 4.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JETEC NO.126 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

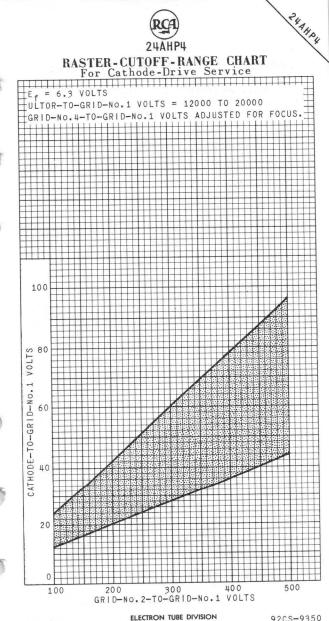
NOTE 3: SOCKET FOR THIS BASE SHOULD NOT BE RIGIDLY MOUNTED; IT SHOULD HAVE FLEXIBLE LEADS AND BE ALLOWED TO MOVE FREE-LY. THE DESIGN OF THE SOCKET SHOULD BE SUCH THAT THE CIRCUIT WIRING CANNOT IMPRESS LATERAL STRAINS THROUGH THE SOCKET CONTACTS ON THE BASE PINS. BOTTOM CIRCUMFERENCE OF BASE WAFER WILL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

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

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

NOTE 6: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE INDICAT-ED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN I/16" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.

NOTE 7: UNDISTURBED AREA BETWEEN MOLD-MATCH LINE AND SPLICE LINE IS I" MINIMUM. THIS SHOULD BE THE MAXIMUM WIDTH OF TUBE SUPPORT BAND.



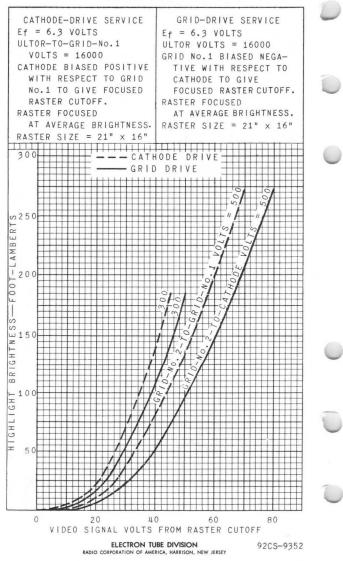
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92CS-9350



24AHP4

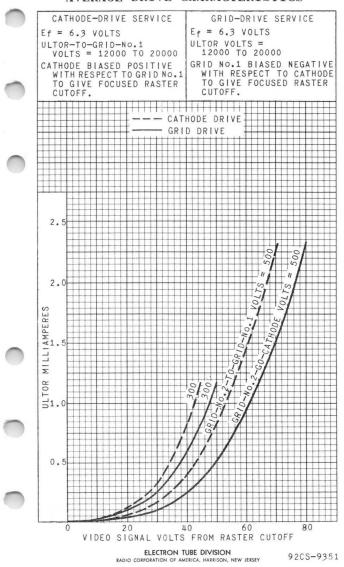
AVERAGE DRIVE CHARACTERISTICS





24AHP#

AVERAGE DRIVE CHARACTERISTICS







P.P.A.J.O.D.

PICTURE TUBE

RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS MAGNETIC DEFLECTION With heater having controlled warm-up time

DATA

	DATA
	General:
)	Heater, for Unipotential Cathode: Voltage
)	Direct Interelectrode Capacitances: Grid No.1 to all other electrodes6 μμf Cathode to all other electrodes
	Light transmission (Approx.)
	Fluorescence
	Diagonal
)	Overall length
)	Greatest width
)	Operating Position

ELECTRON TUBE DIVISION

TENTATIVE DATA 1

AAUPA	R	A			
7	24A		P		
14 1 P 14 194	PICTURE	LIUBI	±.	San gʻal	
Basing Designatio	n for BOTTOM	VIEW			12L
Pin 1-Heater Pin 2-Grid No.1 Pin 6-Grid No.4 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater			Gr Cc C – Ext Cc	id No.3 id No.5	3
	GRID-DRIVE	SERVICE			
Unless otherwise	specified, r with respect			ositive	
Maximum Ratings, De	· · · · · ·		u c		0
ULTOR VOLTAGE					olts
GRID-No.4 (FOCUSING Positive value . Negative value . GRID-No.2 VOLTAGE. GRID-No.1 VOLTAGE:			500 r	nax. vo	olts olts olts
Negative-peak val Negative-bias val Positive-bias val Positive-peak val	ue		140 r 0 r	nax. vo nax. vo	olts olts olts olts
PEAK HEATER-CATHODE Heater negative w During equipmen	ith respect to				
not exceeding After equipment Heater positive w	15 seconds . warm-up per	 iod	180 n	nax. vo	olts olts olts
Equipment Design Ra	nges:				
With any ultor vol and grid-No.2 v Grid-No.4 Voltage f	oltage (Eczk)	etween 1 between	2000 and 20 200 and 500	ooo vol volts	ts
focus§ Grid-No.1 Voltage (visual extinction focused raster .	E _{cik}) for	See Rast	-75 to +		art (
Grid-No.1 Video Dri Raster Cutoff (Bl	ve from	f	or Grid-Dri	ve Serv	ice
White-level value (Peak positive).			lue as dete cept video	drive i	s a
Grid-No.4 Current.			positi -25 to	ve volt +25	age μa
,⊕,§: See next page.					



N.B.R.J.R.B.

PICTURE TUBE

Grid-No.2 Current	-15 to			μα
Centering Magnett	0 to	8	g	ausses
Examples of Use of Design Ranges:				
With ultor voltage of	1800	0		volts
and grid-No.2 voltage of	300			volts
Grid-No.4 Voltage for focus	-75 to			volts
Grid-No.1 Voltage for visual				
extinction of focused raster Grid-No.1 Video Drive from	-35 to	-72		volts
Raster Cutoff (Black Level):	05	70		1.
White-level value	35 to	12		volt
Maximum Circuit Values:				
Grid-No.1-Circuit Resistance		1.5 m	ax. n	negohms
CATHODE-DRIVE S	FRVICE			
Unless otherwise specified, volta		5 150	tosit	1110
with respect to gr		5 470	<i>p</i> 00 <i>r</i> 0	
Maximum Ratings, Design-Center Value				
ULTOR-TO-GRID-No.1 VOLTAGE		0000	max.	volt
ULTOR-TO-GRID-NO.1 VOLTAGL	· · · {1	2000#	min.	volt
GRID-No.4-TO-GRID-No.1 VOLTAGE:				
Positive value		1000	max.	volt
Negative value	• • •	500		volt
GRID-No.2-TO-GRID-No.1 VOLTAGE GRID-No.2-TO-CATHODE VOLTAGE	• • •	640 500	max.	volt
CATHODE-TO-GRID-No.1 VOLTAGE:		500	max.	VUIL.
Positive-peak value		200	max.	volt
Positive-bias value		140	max.	volt
Negative-bias value		0	max.	volt
Negative-peak value		2	max.	volt
PEAK HEATER-CATHODE VOLTAGE:				
Heater negative with respect to cat	thode:			
During equipment warm-up period				
not exceeding 15 seconds		410	max.	volt
After equipment warm-up period.			max.	
Heater positive with respect to cat	thode.	180	max.	volt
Equipment Design Ranges:				
W	ae (Far) bet	ween	12000
With any ultor-to-grid-No.1 volta				
With any ultor-to-grid-No.1 volta and 20000 volts and grid-No.2-to-g between 225 and 6.	rid-No.1	voita		
	rid-No.1	voita		
and 20000 volts and grid-No.2-to-g between 225 and 6. Grid-No.4-to-Grid-No.1 Voltage for focus§.	rid-No.1 40 volts	to +	400	volt
and 20000 volts and grid-No.2-to-g between 225 and 6, Grid-No.4-to-Grid-No.1 Voltage for focus§, Cathode-to-Grid-No.1 Voltage	rid-No.1 40 volts		400	volt
and 20000 volts and grid-No.2-to-g between 225 and 6. Grid-No.4-to-Grid-No.1 Voltage for focus§.	rid-No.1 40 volts -75	to +/		
and 20000 volts and grid-No.2-to-g between 225 and 6, Grid-No.4-to-Grid-No.1 Voltage for focus§, Cathode-to-Grid-No.1 Voltage (E _{kg1}) for visual extinction	rid-No.1 40 volts -75	to ++ Cutoff	-Range	

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24 AUP4

PICTURE TUBE

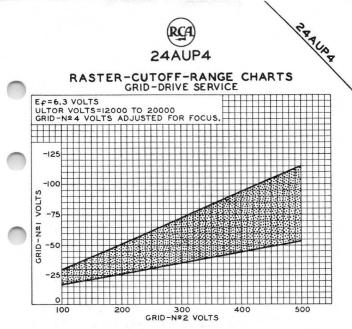
Cathode-to-Grid-No.1 Video Drive from Raster Cutoff (Black Level): White-level value		
E _{kg}		
Grid-No.4 Current Grid-No.2 Current Field Strength of Adjustable Centering Magnet [†]	-25 to +25 -15 to +15 0 to 8	µа µа gausses
Examples of Use of Design Ranges:		
With ultor-to-grid-		
No.1 voltage of and grid-No.2-to-grid-	18000	volts
No.1 voltage of	300	volts
Grid-No.4-to-Grid-No.1 Voltage for focus	-75 to +40C	volts
of focused raster	33 to 60	volts
(Black Level): White-level value	-33 to -60	volts
Maximum Circuit Values:		1
Grid-No.1-Circuit Resistance	1.5 max.	megohms
Grid drive is the operating condition in the grid-No.1 potential with respect to c	cathode.	
This value is a working design-center m lute minimum ultor-or ultor-to-grid-No.1 low which the serviceability of the 24 equipment designer has the responsion involving supply-voltage variation and lute minimum ultor-or ultor-to-grid-No. 11,000 volts.	inimum. The equiva voltage is 11,000 AUP4 will be impa ity of determining probable operating equipment variation 1 voltage is never	lent abso- volts, be- ired. The a minimum conditions the abso- less than
9 The grid-No.4 voltage or grid-No.4-to-gr focus of any individual tube is independ remain essentially constant for values o grid-No.1 voltage) or grid-No.2 voltagr voltage) within design ranges shown for t	rid-No.1 voltage re ent of ultor curren f ultor voltage (or e (or grid-No.2-to- bese items.	quired for t and will ultor-to- -grid-No.1
Distance from Reference Line for suitabl not exceed 2-1/4". Excluding extraneous deflected focused spot will fall within radius concentric with the center of the that the earth's magnetic field can caus tion of the spot from the center of the t	le PM centering mag fields, the center n a circle having a tube face. It is t e as much as 1/2-in	net should of the un- a 1/2-inch o be noted ch deflec-
Cathode drive is the operating condition varies the cathode potential with respect trodes.	on in which the vio to grid No.1 and c	deo signal ther elec-
For X-ray shielding consider X-RAY PRECAUTIONS FOR CAT.	HODE-RAY TUBES	t
at front of this S	ection	

ELECTRON TUBE DIVISION TENTATIVE DATA

2

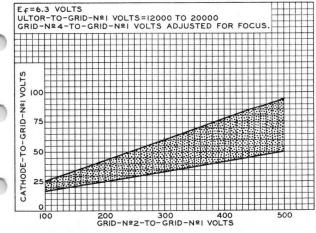
4-59

24AUPA



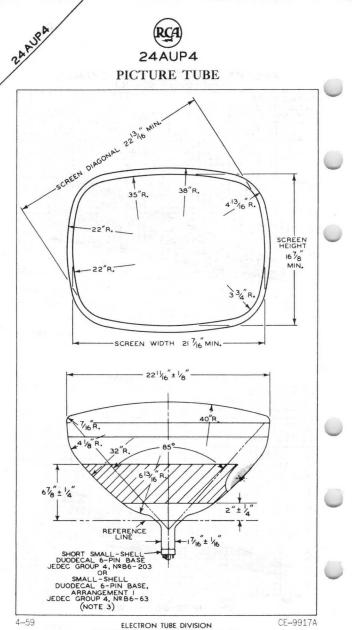
92CS-9919

CATHODE-DRIVE SERVICE

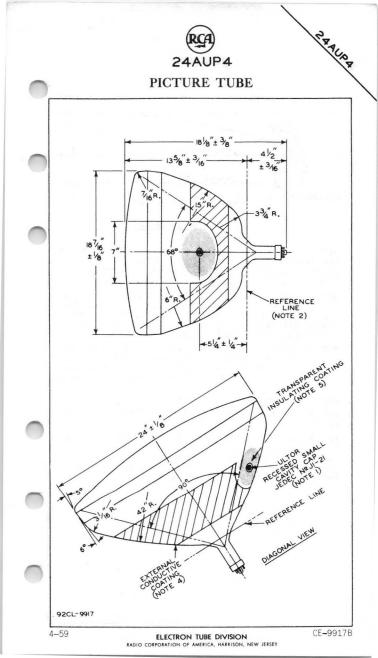


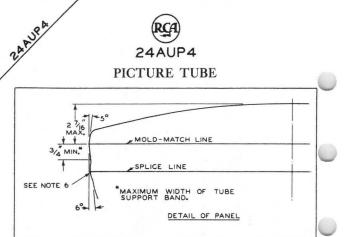
ELECTRON TUBE DIVISION

92CS-9918



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





NOTE I: THE PLANE THROUGH THE TUBE AXIS AND PIN 6 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND ULTOR TERMINAL BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 30°. ULTOR TERMINAL IS ON SAME SIDE AS PIN 6.

NOTE 2: WITH TUBE NECK INSERTED THROUGH FLARED END OF REFERENCE-LINE GAUGE JEDEC No.G-II6 (SHOWN AT FRONT OF THIS SECTION) AND WITH TUBE SEATED IN GAUGE, THE REFERENCE LINE IS DETERMINED BY THE INTERSECTION OF THE PLANE CC' OF THE GAUGE WITH THE GLASS FUNNEL.

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

NOTE 4: EXTERNAL CONDUCTIVE COATING MUST BE GROUNDED.

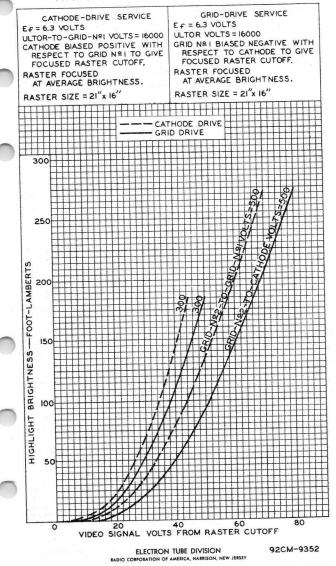
NOTE 5: TO CLEAN THIS AREA, WIPE ONLY WITH SOFT DRY LINT-LESS CLOTH.

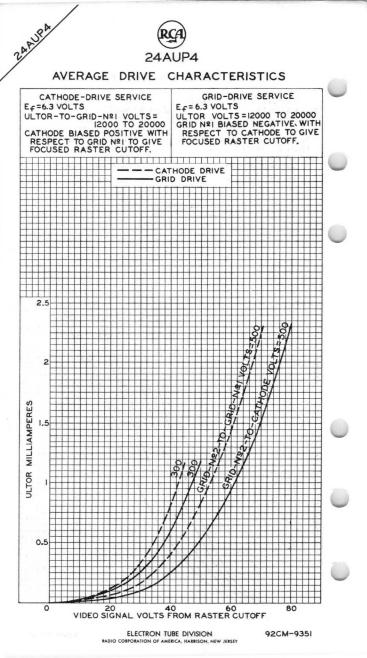
NOTE 6: BULGE AT SPLICE-LINE SEAL MAY INCREASE THE IN-DICATED MAXIMUM VALUE FOR ENVELOPE WIDTH, DIAGONAL, AND HEIGHT BY NOT MORE THAN 1/8", BUT AT ANY POINT AROUND THE SEAL, THE BULGE WILL NOT PROTRUDE MORE THAN 1/16" BEYOND THE ENVELOPE SURFACE AT THE MOLD-MATCH LINE.



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AVERAGE DRIVE CHARACTERISTICS





24BEP4

Picture Tube

	FICTORE TODE
	NO ION-TRAP MAGNET REQUIRED
)	RECTANGULAR GLASS TYPE ALUMINIZED SCREEN LOW-VOLTAGE ELECTROSTATIC FOCUS IIO ^O MAGNETIC DEFLECTION
	Electrical:
	Direct Interelectrode Capacitances: Cathode to all other electrodes 5 pf Grid No.1 to all other electrodes 6 pf External conductive coating to anode. Heater Current at 6.3 volts 60 ± 30 ma Heater Warm-up Time (Average) 11 seconds
	Electron Gun
	Optical:
	Phosphor (For curves, see front of this section) P4—Sulfide Type, Aluminized
	Faceplate
	Mechanical:
	Weight (Approx.)
	Type
	Basing Designation for BOTTOM VIEW
	Pin 1 - Heater Pin 3 - Grid No.1 Pin 4 - Grid No.4
)	Pin 6 - Grid No.2 Pin 7 - Cathode Pin 8 - Heater Cap - Anode (Grid No.3, Grid No.5, Screen, Collector) C - External Conductive Coating
	Maximum and Minimum Ratings, Design-Maximum Values:
	Unless otherwise specified, voltage values are positive with respect to cathode
	Anode Voltage 20000 max. volts Grid-No.4 (Focusing) Voltage:
	Positive value



RADIO CORPORATION OF AMERICA **Electronic Components and Devices**

Harrison, N. J.

DATA 10-64

24**BEP**4

Grid-No.2 Voltage Grid-No.1 Voltage:	• •		·	·	•							550	max.	volts	
Negative peak value												220	max.	volts	$\left(\right)$
Negative bias value												154	max.	volts	
Positive bias value												0	max.	volts	
Pocitivo poak valuo												2	max.	volts	
Heater Voltage											. 5	6.9	max.	volts	
Heater Vortage	• •	•	•	·							. J	5.7	min.	volts	
Peak Heater-Cathode V Heater negative with During equipment v not exceeding 11 After equipment wa Heater positive with	res warr 5 se arm-	pe n-u ecc	ct up onc p p	pe is per	ic	oc •	:	•	:			200		volts volts volts	0
Typical Operating Cond	dit	ior	IS	fo	r	Ca	ath	100	le-	-Dr	ive	Se	rvice:		
Unless other are positi													es		0
Anode Voltage												16	000	volts	
Grid-No.4 Voltage													200	volts	
Grid-No.2 Voltage													400	volts	
Cathode Voltage for visual extinction o	f														
focused raster										2	42	to	78	volts	

Maximum Circuit Value:

Grid-No.1 Circuit Resistance 1.5 max. megohms

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES At front of this section



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

Picture Tube

RECTANGULAR GLASS TYPE MAGNETIC FOCUS ALUMINIZED SCREEN 90° MAGNETIC DEFLECTION

Electrical:

Heater Current at 6.3 volts			. $600 \pm 10\%$ ma
Direct Interelectrode Capacitances: Grid No.1 to all other electrodes			6 of
Grid No.1 to all other electrodes			
Cathode to all other electrodes			. 5 pf
External conductive coating to anode	•	•	. {2500 max. pf \2000 min. pf
Electron Gun	•	·	.Type Requiring No Ion-Trap Magnet

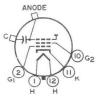
Optical:

Mechanical:

Operating Position													
Weight (Approx.) .										•		. 35	lbs
Overall Length							•		21	-1	/8	" ± .	3/8"
Neck Length									1-	1/	2"	± 3	/16"
Projected Area of S	Scr	een						•		3	32	sq.	in.
External Conductive	e C	oat	in	g:									

See Picture-Tube Dimensional-Outlines and Bulb Jig2 A/B sheets at the front of this section

Pin 1-Heater Pin 2-Grid No.1 Pin 10-Grid No.2 Pin 11-Cathode Pin 12-Heater



Cap-Anode (Grid No.3, Collector) C-External Conductive Coating

Maximum Ratings, Design-Maximum Values:

Anode Voltage							22000	max.	volts
Grid-No.2 Voltage.							550	max.	volts



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA I-64

24CP4B

Grid-No.1 Voltage: Negative peak value	0
not exceeding 15 seconds	
With anode voltage of 16000 volts and grid-No.2 voltage of 300 volts	
Grid-No.1 Voltage for visual extinction of focused raster	
Maximum Circuit Values: Grid-No.1-Circuit Resistance 1.5 max. megohms	•

For X-radiation shielding considerations, see sheet X-RADIATION PRECAUTIONS FOR CATHODE-RAY TUBES at front of this section



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

Color Picture Tube

Perma-Chrome Banded-Type Implosion Protection 90° Rectangular HI-LITE Screen New Rare-Earth (Red) Phosphor Unity Current Ratios

ELECTRICAL

Electron Guns, Three with Axes Tilted Toward Tube Axis Red, Blue, Green	
Heater, of Each Gun Series Connected within Tube with Each of the Other Two Heaters:	
Current at 6.3 V ^a 900 mA	
Focusing Method Electrostatic	2
Focus Lens Bipotential	l.
Convergence Method Magnetic	:
Deflection Method Magnetic	:
Deflection Angles (Approx.):	
Diagonal	
Horizontal	
	•
Direct Interelectrode Capacitances (Approx.): Grid No.1 of any gun	
to all other electrodes 6 pF	
Grid No.3 to all other electrodes 6.5 pF	•
All cathodes to all other electrodes 15 pF	
External conductive coating to anode (Approx.)	
OPTICAL	
Faceplate Filterglass	3
Light transmission at center (Approx.) 42%	6
Surface Polished	Ł
Screen, on Inner Surface of Faceplate:	
Type Aluminized, Tricolor, Phosphor-Do	t
Phosphor (three separate phosphors, collectively) ^b P22-New Rare-Earth (Red) Sulfide (Blue & Green) Typ	, e
Fluorescence and phosphorescence of separate phosphors, respectively Red, Blue, Gree	n
Persistence of group phosphorescence Medium Shor	t
Dot Arrangement Triangular group consisting o red dot, blue dot, and green do	
Spacing between centers of adjacent dot trios (Approx.)	n)
DATA DATA	4 1

LIGL Components

MECHANICAL Minimum Screen Area (Projected): 2	95 sq. in (1905 sq. cm)
Bulb Funnel Designation JE	DEC No.J195-1/2 A1
Bulb Panel Designation J	EDEC No.FP196-1/2
	Button Diheptar 12-pin
Basing Designation ^c	
Pin Position Alignment Pin	
wit	h Anode Bulb Contact
Operating Position Anode	Bulb Contact on Top
Weight (Approx.)	38 lb (17.4 kg) n-Maximum Values
Unless otherwise specified, values are and voltage values are positive with re-	spect to cathode
Anode Voltage	27,500 max. V 20,000 min. V
Total Anode Current.	(20,000 mm. v
Long-Term Average	. 1000 max.µA
Grid-No.3 (Focusing Electrode) Voltage	. 6000 max. V
Peak Grid-No.2 Voltage, Including Video Signal Voltage	. 1000 max. V
Grid-No.1 Voltage:	
Negative bias value	
Negative operating cutoff value	
Positive bias value	. 0 max. V . 2 max. V
Heater Voltage (ac or dc):	. 2 max. v
5	16.9 max. V
Under operating conditions ^a	· 15.7 min. V
Under standby conditions ^d	. 5.5 max. V
Peak Heater-Cathode Voltage:	1
Heater negative with respect to catho	ode:
During equipment warm-up period not exceeding 15 seconds	. 450 max. V
After equipment warm-up period:	
Combined AC and DC value	
DC component value	
Heater positive with respect to catho AC component value	
DC component value	
20 component value	· · · · · · · · · · · · · · · · · · ·

EQUIPMENT DESIGN RANGES

Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode

For anode voltages between 20,000 and 27,500 V

Grid-No.3 (Focusing Electrode) Voltage 16.8% to 20% of Anode voltage

DATA 1

Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused Spot See CUTOFF DESIGN CHART
Maximum Ratio of Grid-No.2 Voltages, Highest Gun to Lowest Gun in Any Tube (At grid-No.1 spot cutoff voltage of -100 V)1.86
Heater Voltage:
Under operating conditions ^a
Under standby conditions ^c 5.0 V
Grid-No.3 Current (Total)
Grid-No.2 Current
To Produce White of 9300 ^o K + 27 M.P.C.D. (CIE Coordinates x=0.281, y=0.311): Percentage of total anode current supplied by each gun (average) 34 32 34 %
Ratio of cathode currents; Min. Typ. Max. Red/blue 0.75 1.10 1.50 Red/green 0.65 1.00 1.50 Blue/green 0.60 0.91 1.30 Displacements, Measured at Center of Screen; 0.60 0.91 1.30
Raster centering displacement:
Horizontal
Lateral distance between the blue beam and the con- verged red and green beams ±0.25 in (±6.4 mm) Radial convergence displacement excluding effects of dynamic convergence (each beam) ±0.37 in (±9.4 mm) Maximum Required Correction for Register® (Including Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the Center of the Screen in any Direction 0.005 in (0.13 mm) max.
LIMITING CIRCUIT VALUES
High-Voltage Circuite:

High-Voltage Circuits:

Grid-No.3 circuit resistance 7.5 max. MΩ

In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the *high-voltage power supply* and the grid-No.3 power supply be of the limited-energy type, in which the shortcircuit current does not exceed 20 milliamperes.

Low-Voltage Circuits:

Effective grid-No.1-to-cathode-

circuit resistance (each gun)..... 0.75 max. MΩ

Components

DATA 2 9-68

The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short circuit current of more than 750 milliamperes total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by aminimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

- ^a Formaximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.
- ^b For curve, see *Group Phosphor-P22-New Rare-Earth (Red)*, *Sulfide (Blue & Green)* at front of this section.
- ^c The mating socket, including its associated, physicallyattached hardware and circuitry, must not weigh more than one pound.
- d For "instant on" applications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- ^e Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

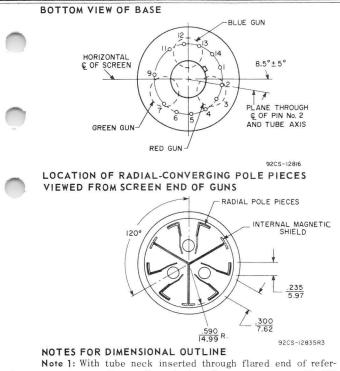
X-RADIATION WARNING

Because the 25AJP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 25AJP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

BASE SPECIFICATION - JEDEC No. 14BE

Pin 1: HeaterPin 11: Cathode of Blue GunPin 2: Cathode of Red GunPin 12: Grid No.1 of Blue GunPin 3: Grid No.1 of Red GunPin 12: Grid No.1 of Blue GunPin 4: Grid No.2 of Red GunPin 13: Grid No.2 of Blue GunPin 5: Grid No.2 of Red GunPin 14: HeaterPin 5: Grid No.2 of Green GunCare Anode (Grid No.4,Pin 7: Grid No.1 of Green GunScreen, Collector)Pin 9: Grid No.3Coating

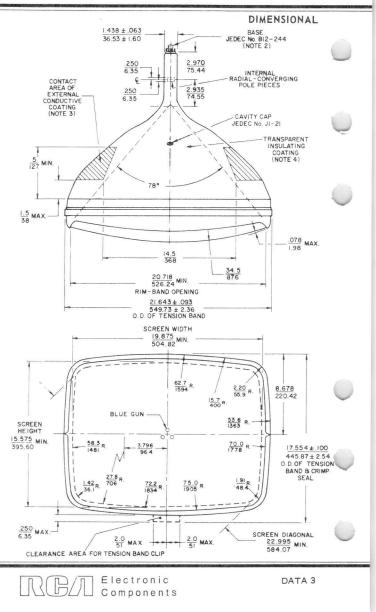
DATA 2

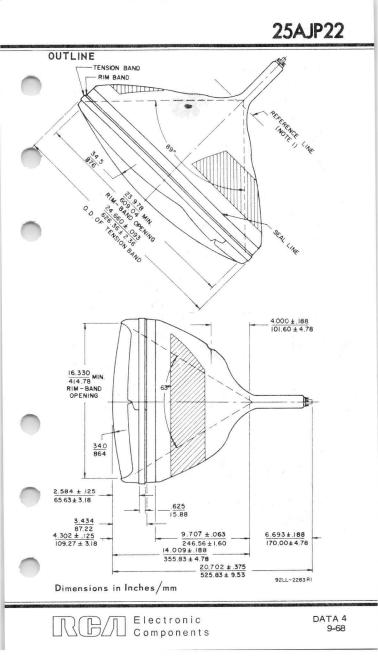


- Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge JEDEC No.G162 and with tube seated in guage, the reference line is determined by the intersection on the plane C-C' of the gauge with the glass funnel.
- Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.
- Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

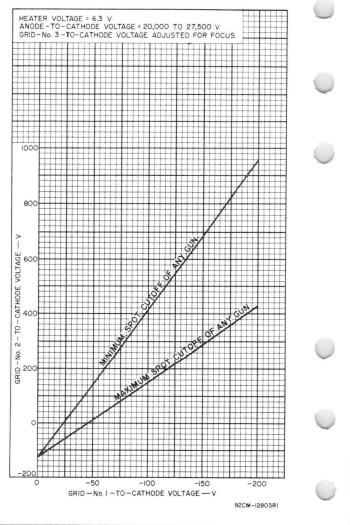
Note 4: To clean this area, wipe only with soft, dry, lintless cloth.

Components





CUTOFF DESIGN CHART



RBA Electronic Components

DATA 4

Color Picture Tube

	000	
H 🦳	i-Lite Matrix Screen	Perma-Chrome
90)° Rectangular	High-Resolution Gun
N	ew Green Phosphor	Unity Current Ratios
	Antiglare Integral Prote	
EI	ECTRICAL ectron Guns, Three with Axes lited Toward Tube Axis	Red, Blue, Green
Co	eater, of Each Gun Series onnected within Tube with ach of the Other two Heaters:	
	Current at 6.3 $V^{\mathbf{a}}$	900 mA
Fo	ocusing Method	Electrostatic
Fo	ocus Lens	Bipotential
Co	onvergence Method	Magnetic
De	eflection Method	Magnetic
De	eflection Angles:	
	Diagonal	89 deg.
	Horizontal	78 deg.
	Vertical	
Di	rect Interelectrode Capacitances (A	pprox.):
	Grid No.1 of any gun to all other electrodes	7.5 pF
	Grid No.3 to all other electrodes .	6.5 pF
	All cathodes to all other electrodes	s 15 pF
	External conductive coating to anode	2500 max. pF 2000 min. pF
	PTICAL aceplate and Protective Window	Filterglass
	Light transmission at center (Appr	
0	rface of Protective Window	specular reflection
Sc		Aluminized
	Matrix	Black opaque material
	0	P22
	Persistence	
	Array	422,550 Dot trios
	Spacing between centers of adjacent dot trios (approx.)	0.029 in (0.74 mm)
CONTRACTOR OF THE OWNER	如何的教教的名词复杂。如果我们有自己没有的教育和问题,我们就能够能够完全的考虑和教育和问题。 第二章	

Electronic Components

RBЛ

DATA 1 8-69

MECHANICAL Minimum Screen Area (Projected) 295 sq. in (1905 sq. cm)
Bulb Funnel Designation JEDEC No.J195-1/2
Bulb Panel Designation JEDEC No.FP196-1/2
Protective Window Designation JEDEC No.SP196-1/2
Base ^b Small-Button Diheptar 12-pin Pin Position Alignment Pin No.12 Aligns Approx. with Anode Bulb Contact
Operating Position Anode Bulb Contact on Top
Weight (Approx.)
MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES Unless otherwise specified, values are for each gun and volt- age values are positive with respect to cathode
Anode Voltage V
Total Anode Current,
Long-Term Average 1000 max. µA
Grid-No.3 (Focusing Electrode) Voltage
Peak-Grid-No.2 Voltage, Including Video Signal Voltage 1000 max. V
Grid-No.1 Voltage: Negative bias value
Negative operating cutoff value 200 max. V
Positive bias value 0 max. V
Positive peak value 2 max. V Heater Voltage (ac or dc):
Under operating conditions ^a 5.7 min6.9 max. V
Under standby conditions ^d 5.5 max. V
Peak Heater-Cathode Voltage: Heater negative with respect to cathode: During equipment warm-up period not exceeding 15 seconds
After equipment warm-up period:
Combined AC and DC value 200 max. V
DC component value 200 max. V
Heater positive with respect to cathode: AC component value
DC component value
EQUIPMENT DESIGN RANGES
Unless otherwise specified, values are for each gun and volt- age values are positive with respect to cathode
For anode voltages between 20,000 and 27,500 V
Grid-No.3 (Focusing Electrode) Voltage 16.8% to 20% of Anode voltage

RBA Electronic Components

	Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused Spot See CUTOFF DESIGN CHART
	Maximum Ratio of Grid-No.2 Voltages, Highest Gun to Lowest Gun in Any
	Tube (At grid-No.1 spot cutoff voltage of -100 V) 1.86 Heater Voltage: 1.86
	0
	Under operating conditions: ^a
	When standby operation is not utilized
	When 5.0-V standby operation is utilized
	Under standby conditions ^d 5.0 V
	Grid-No.3 Current (Total)
-	rid-No.2 Current
	To Produce White of 9300° K + 27 M.P.C.D. (CIE Coordinates x = 0.281, y =0.311):
	Percentage of total anode current supplied by each gun (average)
	Ratio of cathode currents: Min. Typ. Max.
	Red/blue 0.75 1.10 1.50
	Red/green 0.65 1.00 1.50
	Blue/green 0.60 0.91 1.30
	Displacements, Measured at Center of Screen:
	Raster centering displacement:
	Horizontal ± 0.45 in (± 11.4 mm)
	Vertical ± 0.45 in (± 11.4 mm)
	Lateral distance between the blue beam and the con-
	verged red and green beams $\dots \pm 0.25$ in (± 6.4 mm)
	Radial convergence displacement excluding effects of dynamic convergence (each beam) ± 0.37 in (± 9.4 mm)
	aximum Required Correction for Register ^e (Including Effect of Earth's Magnetic Field when
	Using Recommended Components) as Measured at the Center of the Screen in any Direction 0.005 in (0.13 mm) max.
1	MITING CIRCUIT VALUES
	Aigh-Voltage Circuits:
	Grid-No.3 circuit resistance 7.5 max. MΩ

RBA Electronic Components

In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the high-voltage power supply and the grid-No.3 power supply be of the limited-energy type, in which the short-circuit current does not exceed 20 milliamperes.

Low-Voltage Circuits:

Effective grid-No.1-to-cathode-

circuit resistance (each gun) 0.75 max. MΩ The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short circuit current of more than 750 milliamperes total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

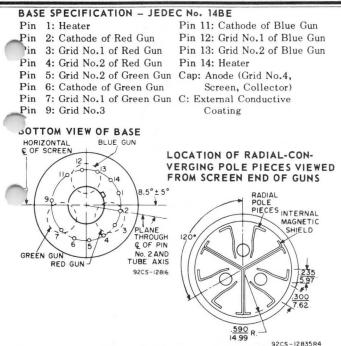
- ^a For maximum cathode life, it is recommended that the heater supply be regulated. The series impedance to any chassis connection in the dc biasing circuit for the heater should be between 100,000 ohms and 1 megohm.
- ^b The mating socket, including its associated, physicallyattached hardware and circuitry, must not weigh more than one pound.
- d The use of a 5-volt standby condition in conjunction with 6-volt operating condition is recommended to improve the reliability of the color picture tube by extending the emission wear-out life and reducing other gun-related defects. A maximum heater voltage of 5.5 volts (Design-Maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- e Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

X-RADIATION WARNING: Because the 25BCP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (Design-Maximum value), shielding of the 25BCP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

25BCP22

DATA 3

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NOTES FOR DIMENSIONAL OUTLINE

Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge (JEDEC No.G162) and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel. Note 2: Socket for this base should not be rigidly mounted;

Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis. Note 3: The drawing shows the size and location of the con-

Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

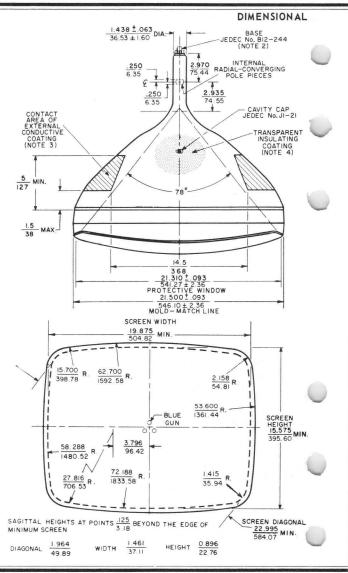
Note 4: To clean this area, wipe only with soft, dry, lint-less cloth.

Electronic

Components

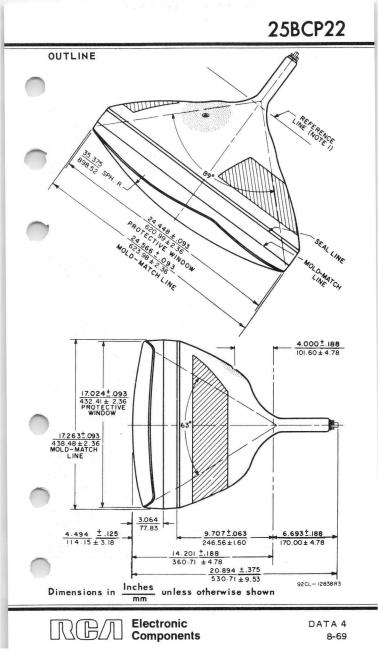
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25BCP22

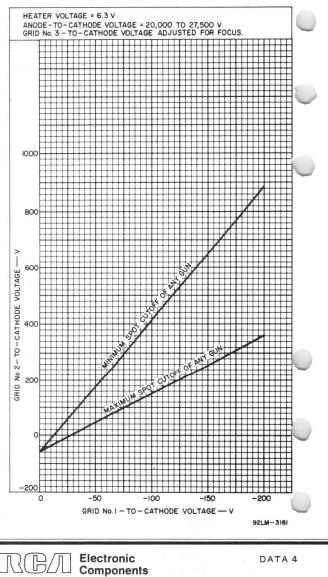


BA Electronic Components

DATA 3



CUTOFF DESIGN CHART



25BDP22

Color Picture Tube

 Hi-Lite Matrix Screen
 Perma-Chrome

 90° Rectangular
 High-Resolution Gun

 New Green Phosphor
 Unity Current Ratios

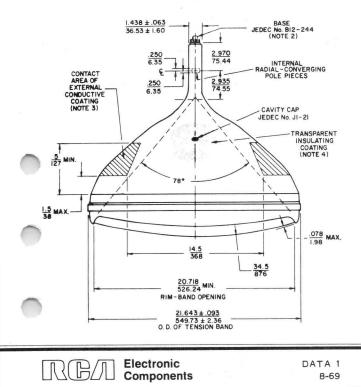
 Integral Implosion Protection – Banded Type

 The 25BDP22 is the same as the 25BCP22 except for:

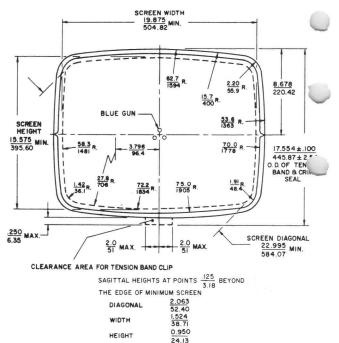
 OPTICAL

Faceplate		•	•	F	ilterglass
Light transmission at center (Approx.)	٤.,				. 69%
Surface		•	•		Polished
MECHANICAL					
Weight (Approx.)		38	3	lb	(17.4 kg)

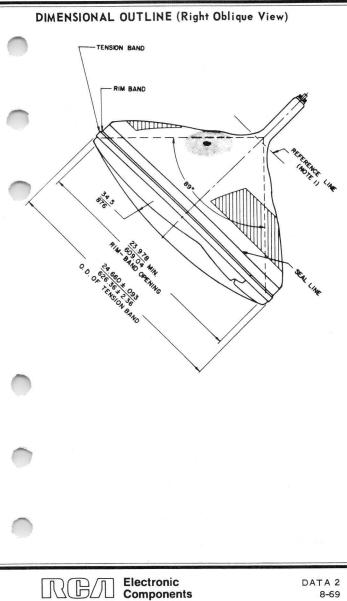
DIMENSIONAL OUTLINE (Top View)

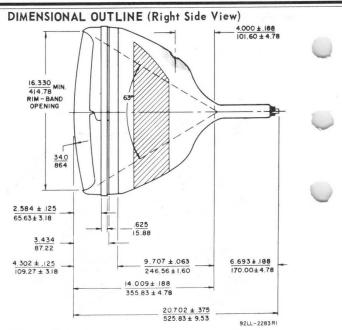


DIMENSIONAL OUTLINE (Front View)



25BDP22





Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge (JEDEC No.G162) and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel.

Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.

Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

Note 4: To clean this area, wipe only with soft, dry, lint-less cloth.

Dimensions in Inches unless otherwise shown

Electronic

Components

DATA 2

25BGP22

Color Picture Tube

PERMA-CHROME

HI-LITE Screen

Rare-Earth (Red) Phosphor Antiglare Integral Protective Window This data sheet is to be used in conjunction with data for RCA-25XP22.

For general data, terminal diagram, maximum and minimum ratings, equipment design ranges, limiting circuit values, x-radiation warning, and general considerations of the 25BGP22, refer to the 25XP22 except as noted below.

MECHANICAL

Bulb Panel Designation JEDEC No. FP196-1/2A3

OPTICAL

EQUIPMENT DESIGN RANGES

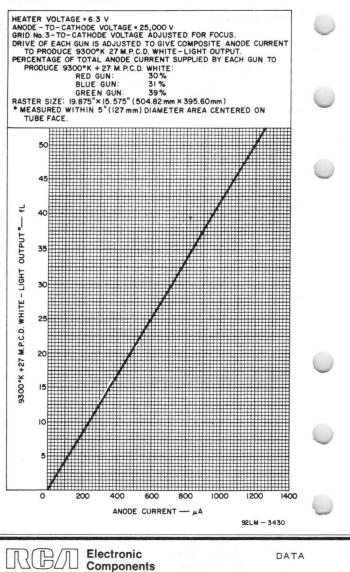
To Product White of 9300° K + 27 M.P.C.D. (CIE Coordinates x = 0.281, y = 0.311):

Percentage of total anode current supplied by	Red	Blue	Gree	n
each gun (average)	30	31	39	%
Ratio of cathode currents:		Min	Тур	Max
Red/blue		0.75	0.95	1.25
Red/green		0.60	0.75	1.10
Blue/green		0.60	0.80	1.10



Electronic Components DATA 2-70

TYPICAL LIGHT-OUTPUT CHARACTERISTIC



25BHP22

Color Picture Tube

PERMA-CHROME

HI-LITE Screen

Rare-Earth (Red) Phosphor Integral Implosion Protection – Banded Type

This data sheet is to be used in conjunction with data for RCA-25AJP22.

For general data, maximum and minimum ratings, equipment design ranges, limiting circuit values, x-radiation warning and base specification of the 25BHP22, refer to the 25AJP22 except as noted below.

MECHANICAL

Bulb Panel Designation JEDEC No.FP196-1/2HI

OPTICAL

Faceplate:

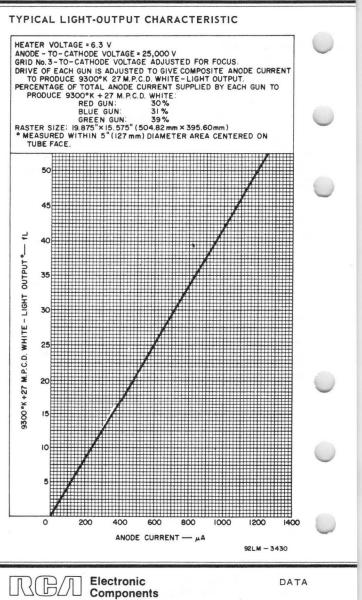
EQUIPMENT DESIGN RANGES

To Product White of 9300° K + 27 M.P.C.D. (CIE Coordinates x = 0.281, y = 0.311):

Percentage of total anode current supplied by each gun (average)	Red 30	Blue 31	Gree 39	n %
Ratio of cathode currents:		Min	Тур	Max
Red/blue		0.75	0.95	1.25
Red/green		0.60	0.75	1.10
Blue/green		0.60	0.80	1.10

DATA 2-70

25BHP22



Color Picture Tube

Ultra-Rectangular

4 x 3 Aspect Ratio

Hi-Lite Matrix Screen Light-Neutral Screen Appearance

Electrical:

Electron Guns, Three with Axes Tilted Toward Tube Axis
Heater, of Each Gun Series Connected within Tube with Each of the Other Two Heaters:
Current at 6.3 V 900 mA
Focusing Method Electrostatic
Focus Lens Bipotential
Convergence Method Magnetic
Deflection Method Magnetic
Deflection Angles (Approx.): 90 deg Diagonal 90 deg Horizontal 78 deg Vertical 60 deg Direct Interelectrode Capacitance (Approx.): 67 deg Grid No.1 of any gun to all other electrodes 7.5 pF All cathodes to all other electrodes 15 pF Capacitance Between Anode and External 2500 max. pF Optical: 2000 min. pF
Faceplate and Safety Panel Filterglass Light transmission at center (Approx.)
Screen Aluminized Matrix Black opaque material Phosphor, rare-earth (red) sulfide (blue & green) P22 Persistence Medium-Short Array 566,000 Dot trios Spacing between centers of adjacent
dot trios (approx.) 0.026 in (0.66 mm) Mechanical:
Minimum Screen Area (Projected) 315 sq. in (2032 sq. cm) Bulb Funnel Designation JEDEC No.J208-3/4 B1/D1
Bulb Panel Designation JEDEC No.FP209-3/4 W2
Base Designation ^a Small-Button Diheptar 12-Pin (JEDEC No.B12-244)
Basing Designation
Pin Position Alignment Pin No.12 Aligns Approx. with Anode Bulb Contact

Operating Position, preferred Anode Bulb Contact on Top	
Gun Configuration	
Weight (Approx.)	
Implosion Protection:	
Integral Safety PanelJEDEC No.SP209-1/4A1	
Maximum and Minimum Ratings, Design-Maximum Values:	
Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode.	0
Anode Voltage	
Anode Current, Long-Term Average ^b 1000 max. µA	
Grid-No.3 (Focusing Electrode) Voltage 6000 max. V	
Peak-Grid-No.2 Voltage, Including Video Signal Voltage	\mathbf{U}
Grid-No.1 Voltage:	
Negative bias value	
Positive bias value	
Positive peak value	
Heater Voltage (ac or dc): ^C	
Under operating conditions	
Under standby conditions ^d 5.5 max. V	
Heater-Cathode Voltage:	
Heater negative with respect to cathode:	
During equipment warm-up period	
not exceeding 15 seconds 450 max. V	
After equipment warm-up period: DC component value	
Peak value 200 max. V	
Heater positive with respect to cathode:	
DC component value 0 max. V Peak value 200 max. V	
Equipment Design Ranges:	
Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode	
For anode voltages between 20 and 27.5 kV	
Grid-No.3 (Focusing Electrode) Voltage 16.8% to 20% of Anode voltage	

Grid-No.2 Voltage for Visual Extinction of Undeflected Focused Spot See CUTOFF DESIGN CHART in Figure 3
At Grid No.1 voltage of -75 V 95 to 295 V At Grid No.1 voltage of -125 V 205 to 535 V At Grid No.1 voltage of -175 V 315 to 780 V
Maximum Ratio of Grid-No.2 Voltages, Highest Gun to Lowest Gun in Any Tube (At grid-No.1 spot cutoff voltage of -100 V)
Heater Voltage: ^C Under operating conditions: When standby operation is not utilized When 5.0-V standby operation is utilized ^d Under standby conditions ^d
Grid-No.3 Current (Total) ±15 μA
Grid-No.2 Current
Grid-No.1 Current ±5 μA
To Produce White Light of 6550°K + 9300°K + 7 M.P.C.D. 27 M.P.C.D.
CIE Coordinates:
X 0.313 0.281 Y 0.329 0.311
Percentage of total anode current
supplied by each gun (average): Red
Blue
Green
Red/blue:
Minimum 1.35 0.75
Турісаl 1.70 0.95 Maximum 2.20 1.25
Red/green:
Minimum 0.95 0.60 Typical 1.15 0.75
Typical
Blue/green:
Minimum 0.50 0.60 Typical 0.70 0.80
Typical
Displacements, Measured at Center of Screen:
Raster centering displacement: Horizontal ± 0.45 in (± 11.4 mm)
Vertical ± 0.45 in (± 11.4 mm)
Lateral distance between the blue beam and the converged red and green beams $\therefore \pm 0.25$ in $(\pm 6.4$ mm)
the converged red and green beams \pm 0.25 in (± 6.4 mm)

Radial convergence displacement excluding effects of dynamic convergence (each beam) ± 0.37 in (± 9.4 mm)	
Maximum Required Correction for Register ^e (Including Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the Center of the Screen in any Direction	1
Typical Operation:	
Heater Voltage 6.3 V	(
Anode Voltage 25 kV	
Grid No.3 Voltage Adjusted for focus	
Color Temperature	
Raster Size	1
Typical White-Light Output Measured within 5 in (127 mm) diameter area centered on tube face:	
At anode current of 1000 μ A	
Limiting Circuit Values:	
High-Voltage Circuits: Grid-No.3 circuit resistance	
Low-Voltage Circuits: Effective grid-No.1-to-cathode- circuit resistance (each gun)	
X-Radiation Characteristic:	
Maximum Anode Voltage at which the X-radiation emitted will not exceed 0.5 mR/h at an anode current of 300 µA	
The X-radiation emitted from this picture tube, as measured in ac- cordance with the procedure of JEDEC Publication No.64A will not exceed 0.5 mR/h throughout the useful life of the tube when opera- ted within the Design-Maximum ratings: 27.5 kV anode voltage and 1000 μ A anode current. The tube should not be operated beyond its Design-Maximum ratings stated above (such operation may shorten tube life or have other permanent adverse affects on its per- formance), but its X-radiation will not exceed 0.5 mR/h for anode upltone and ourset combinations (such operation with limit	(

shorten tube life or have other permanent adverse affects on its performance), but its X-radiation will not exceed 0.5 mR/h for anode voltage and current combinations given by the isodose-rate limit characteristics as shown in Figure 1. Operation above the values shown by the curve may result in failure of the television receiver to comply with the Federal Performance Standard for Television Receivers, Sub-Part C of Part 78 of Title 42, Code of Federal Regulations (PL90-602) as published in the Federal Register Vol.34, No. 247, Thursday, December 25, 1969. Maximum X-radiation as a function of anode voltage at 300 μ A anode current is shown by the curve in Figure 2. X-radiation at a constant anode voltage varies linearly with anode current.

> Electronic Components

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- ^a The mating socket, including its associated, physically-attached hardware and circuitry, must not weigh more than one pound (one-half kilogram).
- b The short-term average anode current should be limited by circuitry to 1500 microamperes.
- ^c For maximum cathode life, it is recommended that the heater supply be regulated. The series impedance to any chassis connection in the dc biasing cirucit for the heater should be between 100 kilohms and 1 megohm. The surge voltage across the heater must be limited to 9.5 volts rms.
- d The use of a 5-volt standby condition in conjunction with 6-volt operating conditions is recommended to improve the reliability of the color picture tube by extending the emission wear-out life and reducing other gun-related defects. A maximum heater voltage of 5.5 volts (Design-Maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- e Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

Notes for Dimensional Outline

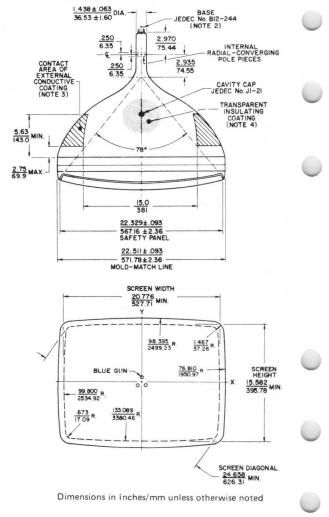
Note 1: With tube neck inserted through flared end of referenceline and neck-funnel-contour gauge (JEDEC No.G162) and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C² of the gauge with the glass funnel.

Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.

Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

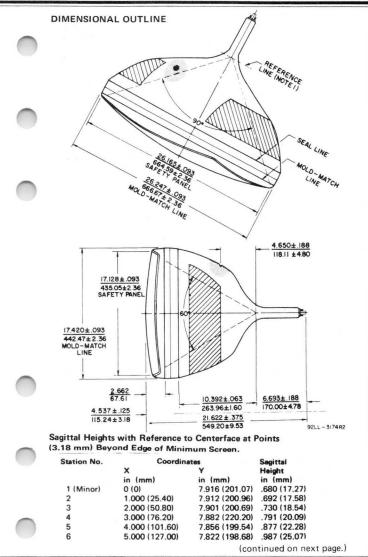
Note 4: To clean this area, wipe only with soft, dry, lintless cloth.

DIMENSIONAL OUTLINE



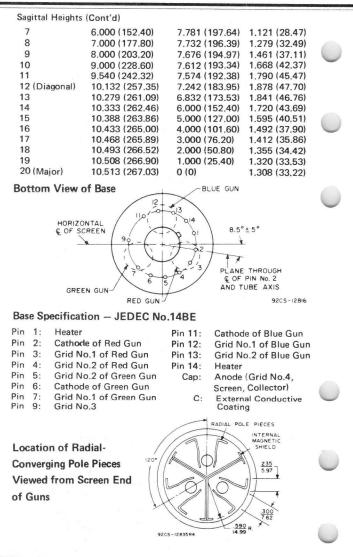
RBA Electronic Components

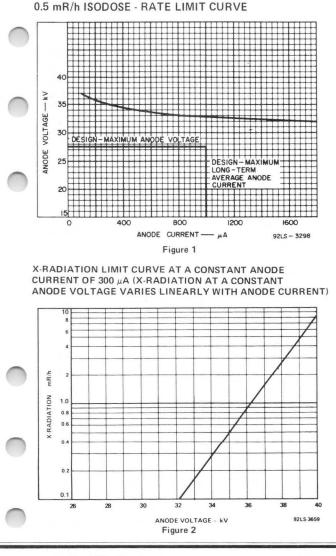
DATA 3



Electronic Components

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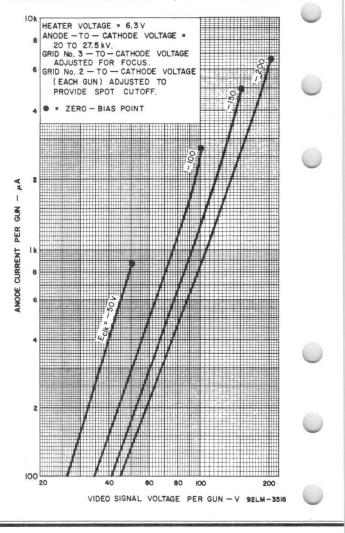


Electronic Components

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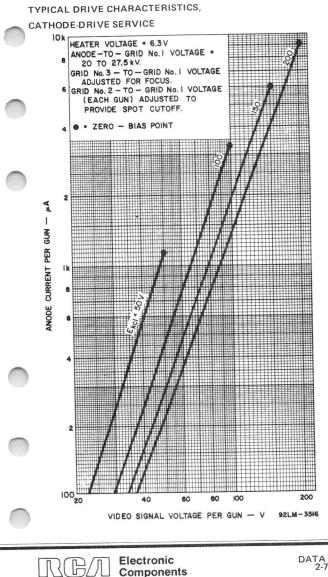
DATA 5 2-72

TYPICAL DRIVE CHARACTERISTICS, GRID-DRIVE SERVICE



RBA Electronic Components

DATA 5



Components

DATA 6 2-72

CUTOFF DESIGN CHART

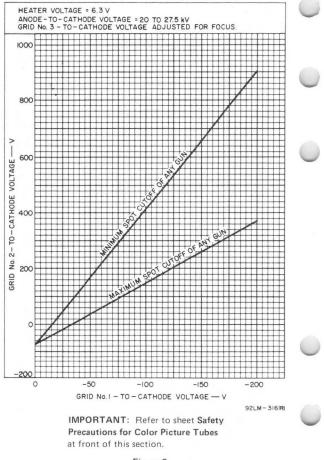


Figure 3

Color Picture Tube

"PERMA-CHROME" ASSEMBLY FOR OPTIMUM FIELD PURITY AND UNIFORMITY DURING WARM-UP

RECTANGULAR TUBE

90° MAGNETIC DEFLECTION

ALUMINIZED TRICOLOR PHOSPHOR-DOT *Hi-Lite* Screen (Utilizing a New Improved Rare-Earth Red-Emitting Phosphor)

INTEGRAL FILTERGLASS PROTECTIVE WINDOW

MAGNETIC CONVERGENCE

3 ELECTROSTATIC-FOCUS GUNS

For Use in Color-TV Receivers

ELECTRICAL

Electron Guns, Three	e, Green
Axes tilted toward tube axis	
Heater, of Each Gun	
Series connected within tube with each	
of the other two heaters	
Current at 6.3 volts ^a	
Focusing Method Electr	rostatic
Focus Lens	otential
Convergence Method	
Deflection Method	Magnetic
Deflection Angles (Approx.)	
Diagonal	89 ⁰
Horizontal	78 ⁰
Vertical	630
Direct Interelectrode Capacitances (Approx.)	
Grid No.1 of any gun to all other electrodes.	6 pF
All cathodes to all other electrodes	
Grid No.3 to all other electrodes 6.	
External conductive coating to anode {2500 2000	min pF
	200001000

OPTICAL

Faceplate and Protective Window Filterglass Light transmission at center (Approx.) H% Surface of Protective Window Treated to minimize specular reflection specular reflection
Screen, on Inner Surface of Faceplate
Type Aluminized, Tricolor, Phosphor-Dot Phosphor (Three separate
phosphors, collectively) ^b P22New Rare-Earth (Red), Sulfide (Blue & Green) Type
Fluorescence and phosphorescence of
separate phosphors, respectively
Persistence of group phosphorescence Medium Short
Dot arrangement Each triangular group consists of a red, green, and blue dot
Spacing between centers of
adjacent dot trios (Approx.)

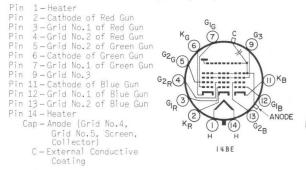
25XP22

MECHANICAL

Tube Dimensions

Overall length				$20.924 \pm$.375 in (531.5 ± 9.5 mm)
Neck length				6.693 ±	.188 in (170.0 ± 4.8 mm)
Diagonal				$24.566 \pm$.093 in (624.0 ± 2.4 mm)
Greatest width				21.500 +	.093 in (546.1 ± 2.4 mm)
					.093 in (438.5 ± 2.4 mm)
Minimum Screen Dime					
					22.995 in (584.1 mm)
Creatact width	•	• •			19.875 in (504.8 mm)
Greatest width	•	• •	•		13.075 11 (504.0 1111)
Greatest height .	•	• •	•		15.575 in (395.6 mm)
Area					.295 sq. in (1905 sq. cm)
Bulb Funnel Designa	tio	n.			JEDEC No. J195-1/2 AI
					JEDEC No. FP196-1/2 A3
					JEDEC No. FP196-1/2 CI
					Recessed Small Cavity Cap
					(JEDEC No.JI-21)
Pin Position Alianm	ont				.Pin No.12 Aligns Approx.
The restriction Arrynni	CITE	• •	•		with Anode Bulb Contact
a 11 a 111					
Operating Position.					Anode Bulb Contact on Top
Weight (Approx.)					42 lb (19.1 kg)
					12-pin (JEDEC No. B12-244)

TERMINAL DIAGRAM (Bottom View)



MAXIMUM AND MINIMUM RATINGS, DESIGN-MAXIMUM VALUES

Unless otherwise specified, values are for voltage values are positive with respect	to cathode	
Anode Voltage	. {27,500 max 20,000 min	V
Total Anode Current, Long-Term Average Grid-No.3 (Focusing Electrode) Voltage	. 1000 max ,	uА
Peak Grid-No.2 Voltage, Including Video Signal Voltage		



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

25XP22

Grid-No.| Voltage

Negative bias value	max V
Negative operating cutoff value 200	max V
	max V
Positive peak value	max V
(6.0	max V
Under operating conditions ^a	min V
Under standby conditions ^b 5.5	max V
Peak Heater-Cathode Voltage	
Heater negative with respect to cathode:	
During equipment warm-up period not exceeding 15 seconds	max V
After equipment warm-up period:	
Combined AC and DC value	max V
DC component value	max V
Heater positive with respect to cathode:	
AC component value	max V
	max V

EQUIPMENT DESIGN RANGES

Unless otherwise specified, values are for each gun and
voltage values are positive with respect to cathode
For anode voltages between 20,000 and 27,500 V
5
Grid-No.3 (Focusing Electrode Voltage
Grid-No.2 and Grid-No.1 Voltages See accompanying
For visual extinction of Cutoff Design Chart
focused spot
Maximum Ratio of Grid-No.2 Voltages
Highest gun to lowest gun in any
tube (At grid-No.1 spot cutoff
voltage of -100 volts)
Grid-No.3 Current (Total)
Grid-No.2 Current5 to +5 μA
To Produce White of 9300°K +27 M.P.C.D.
TO Produce white of 9300 K TZ7 M.F.G.D.
(CIE Coordinates $x = 0.281$, $y = 0.311$)
(CIE Coordinates x = 0.281, y = 0.311) Percentage of total anode current Red Blue Green
(CIE Coordinates x = 0.281, y = 0.311) Percentage of total anode current supplied by each gun (Average) 34 32 34 %
(CIE Coordinates x = 0.281, y = 0.311) Percentage of total anode current supplied by each gun (Average) 34 32 34 %
(CIE Coordinates x = 0.281, y = 0.311) Percentage of total anode current Red Blue Green supplied by each gun (Average) 34 32 34 % Ratio of cathode currents: Min Typ Max Red/blue
(CIE Coordinates x = 0.281, y = 0.311)Percentage of total anode currentsupplied by each gun (Average)Ratio of cathode currents:MinRed/blueRed/blueRed/green0.651.002.50
(CIE Coordinates x = 0.281, y = 0.311) Percentage of total anode current Red Blue Green supplied by each gun (Average) 34 32 34 % Ratio of cathode currents: Min Typ Max Red/blue 0.75 1.10 1.50 Red/green 0.65 1.00 2.50 Blue/green 0.60 0.91 1.30
(CIE Coordinates x = 0.281, y = 0.311)Percentage of total anode currentsupplied by each gun (Average)Ratio of cathode currents:Red/blueRed/blueRed/blueMinTypMaxRed/greenBlue/greenStatement,Blue/greenStatement,Displacement,Measured at Center of Screen
(CIE Coordinates x = 0.281, y = 0.311) Percentage of total anode current Red Blue Green supplied by each gun (Average) 34 32 34 % Ratio of cathode currents: Min Typ Max Red/blue Red/blue Red/blue Red/green Blue/green 0.65 1.00 2.50 Blue/green 0.60 0.91 1.30 Displacement, Measured at Center of Screen Raster centering displacement:
(CIE Coordinates x = 0.281, y = 0.311) Percentage of total anode current Red Blue Green supplied by each gun (Average) 34 32 34 % Ratio of cathode currents: Min Typ Max Red/blue Red/blue <td< td=""></td<>
(CIE Coordinates x = 0.281, y = 0.311) Percentage of total anode current Red Blue Green supplied by each gun (Average) 34 32 34 % Ratio of cathode currents: Min Typ Max Red/blue. 0.75 1.10 1.50 Red/green 0.65 1.00 2.50 Blue/green. 0.60 0.91 1.30 Displacement, Measured at Center of Screen Raster centering displacement: Horizontal. ±0.47 in (±11.9 mm) Vertical. ±0.45 in (±11.4 mm)
(CIE Coordinates x = 0.281, y = 0.311)Percentage of total anode currentRed Blue Greensupplied by each gun (Average) 343234Ratio of cathode currents:Min Typ MaxRed/blue 0.751.101.50Red/green 0.651.002.50Blue/green 0.651.002.50Blue/green 0.600.911.30Displacement, Measured at Center of ScreenRaster centering displacement:±0.47 in (±11.9 mm)Vertical ±0.45 in (±11.4 mm)Lateral distance between the blue beam
(CIE Coordinates x = 0.281, y = 0.311) Percentage of total anode current Red Blue Green supplied by each gun (Average) 34 32 34 % Ratio of cathode currents: Min Typ Max Red/blue Red/blue Blue/green 0.65 1.00 2.50 Blue/green Raster centering displacement: 0.60 0.91 1.30 Porizontal ±0.47 in (±11.9 mm) Vertical ±0.45 in (±11.4 mm) Lateral distance between the blue beam and the converged red and green beams. ±0.25 in (±6.4 mm)
(CIE Coordinates x = 0.281, y = 0.311) Percentage of total anode current Red Blue Green supplied by each gun (Average) 34 32 34 % Ratio of cathode currents: Min Typ Max Red/blue No Typ Max Red/blue No No No No
(CIE Coordinates x = 0.281, y = 0.311) Percentage of total anode current Red Blue Green supplied by each gun (Average) 34 32 34 % Ratio of cathode currents: Min Typ Max Red/blue Red/blue Blue/green 0.65 1.00 2.50 Blue/green Raster centering displacement: 0.60 0.91 1.30 Porizontal ±0.47 in (±11.9 mm) Vertical ±0.45 in (±11.4 mm) Lateral distance between the blue beam and the converged red and green beams. ±0.25 in (±6.4 mm)

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EXAMPLES OF USE OF DESIGN RANGES

Unless otherwise specified, voltage values are for each gun and are positive with respect to cathode	
Anode Voltage	٧
Grid-No.3 (Focusing Electrode) Voltage 4200 to 5000 Grid-No.2 Voltage when circuit design utilizes grid-No.1 voltage	۷
of -150 volts for visual extinction of focused spot	۷
utilizes grid-No.2 voltage of 400 volts95 to -190	۷
Heater Voltage G.3 Under operating conditions ^a 6.3 Under standby conditions 5.0	V V

LIMITING CIRCUIT VALUES

High-Voltage Circuits

Grid-No.3 Circuit Resistance. 7.5 max MO

In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the high-voltage power supply and the grid-No.3 power supply be of the limited-energy type, in which the short-circuit current does not exceed 20 mÅ.

Low-Voltage Circuits

Effective grid-No.1-to-cathode-

circuit resistance (Each gun). 0.75 max MD

The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short circuit current of more than 750 mA total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

- a For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.
- b For curve, see Group Phosphor P22-New Rare-Barth (Red), Sulfide (Blue & Green) at front of this section.
- C For "instant on" applications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picturetube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- d Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

GENERAL CONSIDERATIONS

X-Radiation Warning. Because the 25XP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (designmaximum value), shielding of the 25XP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

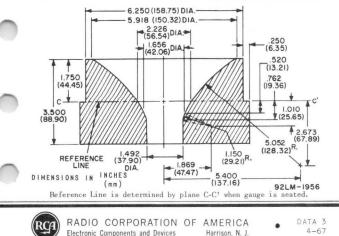
Orientation. The 25XP22 must be operated with tube axis in a horizontal position and with the blue gun uppermost (i.e., the anode contact button on top).

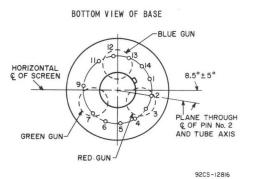
The Deflecting Yoke and tube axes must coincide and the yoke must be free to move along the neck for a distance of approximately 0.5 inch (13 mm) from its most forward position for adjustment purposes. The yoke mount should also provide for a small amount of rotational adjustment.

Contact to the external conductive coating should be made by multiple fingers to prevent possible damage to the tube from localized overheating due to poor contact.

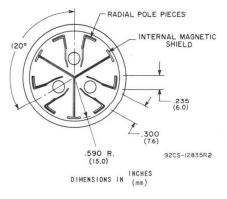
Misregister Compensation. Proper operation of the 25XP22 requires compensation for the effects of extraneous magnetic fields, the earth's magnetic field, and other causes which may produce misregister. Compensation for these effects may be accomplished by the use of a purifying magnet.

REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE JEDEC No.GI62





LOCATION OF RADIAL-CONVERGING POLE PIECES VIEWED FROM SCREEN END OF GUNS

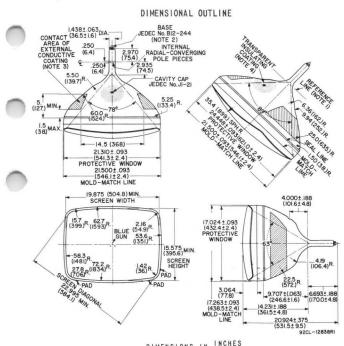




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DATA 3

25XP22



DIMENSIONS IN INCHES (mm)

Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge and with tube seated in gauge, the reference line is determined by the intersection on the plane C-C' of the gauge with the glass funnel.

Note 2: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.

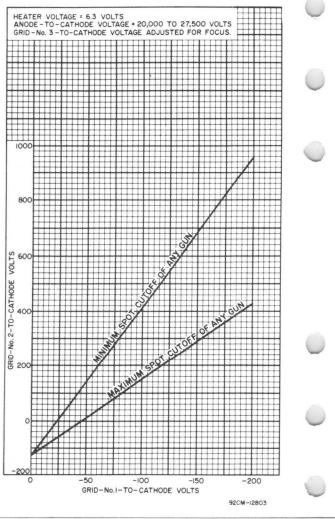
Note 3: The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

Note 4: To clean this area, wipe only with soft, dry, lintless cloth.



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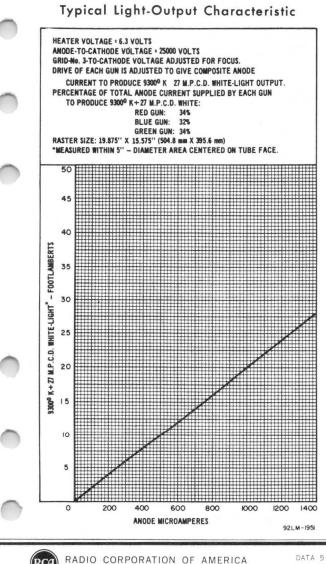




DATA 4

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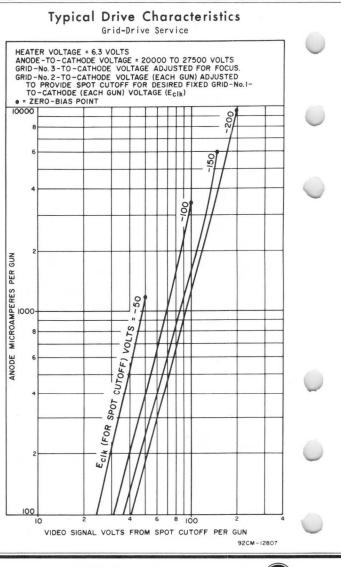




Electronic Components and Devices

4-67

Harrison, N. J.

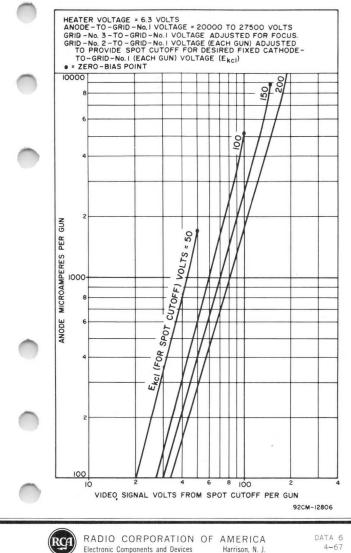


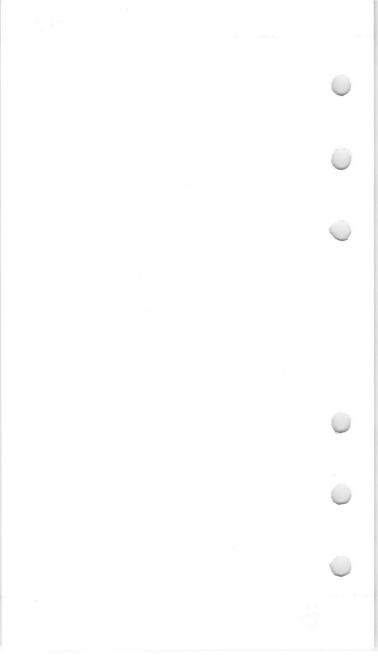
DATA 5

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Typical Drive Characteristics

Cathode-Drive Service





Color Picture Tube

"PERMA-CHROME" ASSEMBLY FOR OPTIMUM FIELD PURITY AND UNIFORMITY DURING WARM-UP

RECTANGULAR TUBE MAGNETIC CONVERGENCE 90° MAGNETIC DEFLECTION 3 ELECTROSTATIC-FOCUS GUNS

ALUMINIZED TRICOLOR PHOSPHOR-DOT *Hi-Lite* SCREEN (Utilizing a New, Improved Rare-Earth Red-Emitting Phosphor)

For Use in Color-TV Receivers

The 25YP22 is the same as the 25XP22 except for the following items:

OPTICAL

 Faceplate.
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MECHANICAL

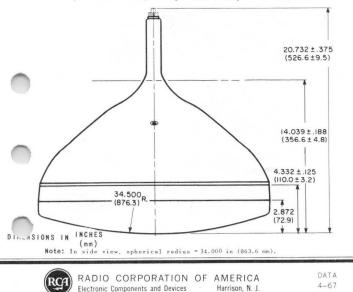


Tube Dimensions

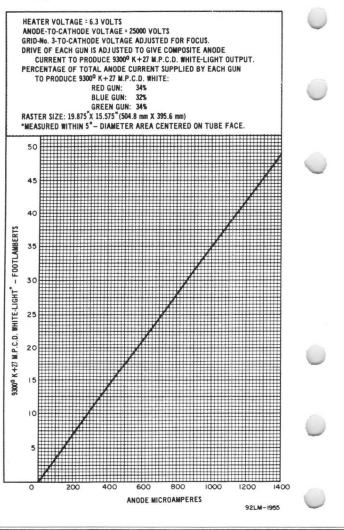
a It is recommended that the cabinet be provided with a shatter-proof, glass cover over the face of the 25YP22 to protect it from being struck accidentally and to protect against possible damage resulting from tube implosion under some abnormal condition. This safety cover can also provide x-radiation protection when required.

DIMENSIONAL OUTLINE

Dimensions shown are only those which are different from the corresponding dimensions for the 25XP22



Typical Light-Output Characteristic



DATA

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.





HIGH-VACUUM CATHODE-RAY TUBE

General:

	General:
A REAL PROPERTY AND A REAL	Heater, for Unipotential Cathode: Voltage
	With DJ ₁ positive with respect to DJ ₂ , the spot is de- flected toward pin 3. With DJ3 positive with respect to DJ4, the spot is deflected toward pin 1.
	The angle between the trace produced by DJ ₃ and DJ ₄ and its intersection with the plane through the tube axis and pin I does not exceed 10° .
	The angle between the trace produced by DJ_3 and DJ_4 and the trace produced by DJ_1 and DJ_2 is 90° \pm 4°.
	Maximum Ratings, Absolute Values:

		max.	volts
		max.	volts
	GRID-No.1 (CONTROL ELECTRODE) VOLTAGE:		
N		max.	volts
1		max.	volts
	PEAK VOLTAGE BETWEEN ANODE NO.2 AND		
		max.	volts

JULY 1, 1945

DATA 1

2000

RCA VICTOR DIVISION



HIGH-VACUUM CATHODE-RAY TUBE

Grid-No.1 Volt. for Visual Cutoff#40 -60	volts
Anode No.1 Voltage for Focus at 75% of Grid-No.1 Volt- age for Cutoff • 100 150 Grid-No.1 Volt. for Visual Cutoff #40 -60	volts
Grid-No.1 Volt. for Visual Cutoff#40 -60	2.5
Grid-No.1 Volt. for Visual Cutoff#40 -60	volts
	volts
Max. Anode-No.1 Current Range≜ Between -50 and +10	uamp.
Deflection Sensitivity:	Hamp.
DJ1 and DJ2 0.273 0.183 m	m/v dc m/v dc
Deflection Factor:**	1.1.
DJ1 and DJ2 93 139 v DJ3 and DJ4 78 117 v	
★ Brilliance and definition decrease with decreasing anode-No.2 vo In general, anode-No.2 voltage should not be less than 400 volts	
 Individual tubes may require between +20% and -35% of the values with grid-No.1 voltages between zero and cutoff. 	
# visual extinction of stationary focused spot. Supply should be a able to \pm 50% of these values. See curve for average values.	
Individual tubes may vary from these values by ± 20%.	
Spot Position:	
The undeflected focused spot will fall within a 10-mm centered at the geometric center of the tube face and one side parallel to the trace produced by DJ ₁ and DJ ₂ , able test conditions are: anode-No.2 voltage, 600 anode-No.1 voltage, adjusted for focus; deflecting-ele resistors, ² I megohm each for DJ ₁ and DJ ₄ , connected t No.2; the tube shielded from all extraneous fields. To damage to the tube, grid-No.1 voltage should be near before application of anode voltages.	having Suit- volts; ctrode o anode avoid
Maximum Circuit Values:	
Grid-No.1-Circuit Resistance 1.5 max. m Impedance of Any Deflecting-Electrode Circuit at Heater-Supply Frequency 1.0 max.	
Resistance in Any Deflecting- Electrode Circuit 5.0 max. m	
It is recommended that both deflecting-electrode-circuit resibe approximately equal.	stànces
	-3067-5
	2.5

902:4

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DATA

Projection Kinescope

FORCED-AIR COOLED ELECTROSTATIC FOCUS

MAGNETIC DEFLECTION 20 FT. x 15 FT. PROJECTED PICTURES

For Black-and-White Projection Systems in Theater and Closed-Circuit Television Applications

The 4486 is the same as the 7NP4 except that it is supplied with a fitted high-voltage anode cable. (See Accompanying Dimension Outline).

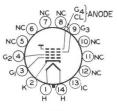
MECHANICAL

Cap shown for type 7NP4 does not apply for type 4486.

TERMINAL DIAGRAM (Bottom View)



Pin Pin 2 - Cathode Pin 3-Grid No.1 Pin 4 - Grid No.2 5 - No Connection 6 - No Connection Pin Pin 7 - No Connection Pin 8 - No Connection Pin 9-Grid No.3 Pin 10 - No Connection Pin 11-No Connection Pin 12 - No Connection Pin 13 - Internal Connection-Do Not Use Pin 14 - Heater Cable - Anode (Grid No.4,

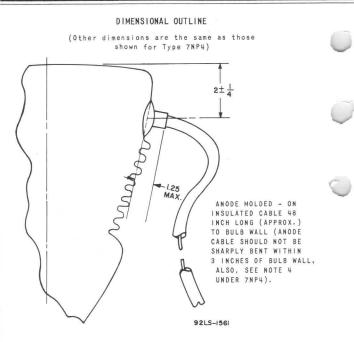


14N

Note: Socket contacts for Pins No.5, 6, 7, 8, 10, 11, 12, and 13 should be removed so that maximum insulation is provided for Pin No.9.



DATA 12-66



DIMENSIONS IN INCHES



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10-66

Harrison, N. J.

Oscillograph-Type	Cathode-Ray	Tube
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7-IN DIAMETER ELECTROSTATIC DEFLECTION POST-DEFLECTION ACCELERATOR ELECTROSTATIC FOCUS

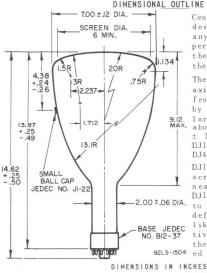
For General Oscillographic Applications in which Low-Speed or Medium Speed Recurrent-Wave Phenomena are to be Observed

ELECTRICAL

	Heater Current at 6.3 V 0.6 A Direct Interelectrode Capacitances (Approx.)	
	Grid-No.1 to all other electrodes 6 pF	
	Cathode to all other electrodes 7.5 pF	
	DJ1 to DJ2	
	DJ3 to DJ4	
	DJ1 to all other electrodes	
	DJ2 to all other electrodes	
	DJ3 to all other electrodes	
	DJ4 to all other electrodes	
	Focusing Method	
	Deflection Method	
	OPTICAL	
	Phosphor	
	Flourescence and phosphorescence	
	Persistence	
	Faceplate	
	Shape Curved, Circular	
	Minimum Useful Screen Diameter 6 in	
	MECHANICAL	
	Operating Position	
	Weight (Approx.)	
	Overall Length	
	Greatest Diameter	
	Bulb	
	Base	
	TERMINAL DIAGRAM (Bottom View)	
	Pin 1-Heater	
	Pin 2 Cathada POST G5 G G2 ANODE	
	Pip 3 Grid No. 1 ACCELERATORICE	
	Pin 4 – No Connection – Do Not Use G3 (5) (21) (0) DJ2	
	Pin 5-Grid No.3	
	Pin 5-Grid No.3 Pin 7-Deflecting Electrode DJ3 DONOT	
	Pin 8 - Deflecting Electrode DJ4 Pin 9 - Anode (Grids No.2 & No.4)	
í.	Pin 10 – Deflecting Electrode DJ2 κ^2 (1) (14)	
	Pin 11 - Deflecting Electrode DJ1 H	
	Pin 12 - Internal Connection - Do Not Use 14 J	
	Pin 14 - Heater	
	Cap - Post-Accelerator (Grid No.5 & Collector)	
	ABSOLUTE-MAXIMUM AND MINIMUM RATINGS	
6	Post-Deflection Accelerator Voltage 8000 max V	
1	Anode Voltage	
	Grid-No.3 (Focusing-Electrode) Voltage 2000 max V	
		-
		1
	RADIO CORPORATION OF AMERICA	
	(RCF) Flortenic Comments and Daviants Herrison Null 10-66	

Electronic Components and Devices

Grid-No.I Voltage Negative bias value	
Positive bias value	
Positive peak value	
Heater Voltage	
5.7 min V	
Peak Heater-Cathode Voltage Heater negative with respect to cathode 125 max V Heater positive with respect to cathode 125 max V	
TYPICAL OPERATING VALUES	
Unless otherwise specified all values	
are positive with respect to cathode	-
Post-Deflection Accelerator Voltage 6000 V	
Anode Voltage	
Grid-No.3 (Focusing-Electrode) Voltage 750 to 1200 V	
Grid-No.1 Voltage	
For visual cutoff of focused spot	
Deflection Factors	- 65
DJ1 and DJ2	
DJ3 and DJ4	
MAXIMUM CIRCUIT VALUES	
Grid-No.I-Circuit Resistance I.5 max MΩ Resistance in any Deflection Electrode Circuit ^a 5 max MΩ	
${\boldsymbol{a}}$ It is recommended that the deflecting-electrode-circuit resistances be approximately equal.	
DIMENSIONAL OUTLINE	



Center line of bulb will not deviate more than 2° in any direction from the perpendicular erected at the center of bottom of the base.

The plane through the tube axis and pin 5 may vary from the trace produced by DJ1 and DJ2 by an angular tolerance (measured about the tube axis) of \pm 10°. Angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° \pm 3°.

DJl and DJ2 are nearer the screen; DJ3 and DJ4 are nearer the base. With DJl positive with respect to DJ2, the spot will be deflected toward pin 5; likewise, with DJ3 positive with respect to DJ4, the spot will be deflected toward pin 2.

RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.



DATA I

Oscillograph-Type	Cathode-Ray	Tube
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8-INCH DIAMETER ELECTROSTATIC DEFLECTION

POST-DEFLECTION ACCELERATOR ELECTROSTATIC FOCUS

For General Oscillographic Applications in which Low-Speed or Medium-Speed Recurrent-Wave Phenomena are to be Observed

ELECTRICAL

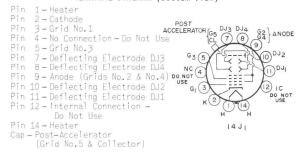
Heater Current at 6.3 V	0.6	A
Direct Interelectrode Capacitances (Approx.)		
Grid-No.1 to all other electrodes	6	pF
Cathode to all other electrodes	7.5	pF
DJ1 to DJ2	3	pF
DJ3 to DJ4	2	pF
DJ1 to all other electrodes	9	pF
DJ2 to all other electrodes	9	pF
DJ3 to all other electrodes		
DJ4 to all other electrodes	7	pF
Focusing Method		
Deflection Method Elect	rosta	tic

OPTICAL

Phosphor	$\cdots \cdots \cdots = p_{-1}$	P31
Fluorescence and ph	osphorescence.	Green
Persistence		Medium-Short
Faceplate		Clear Glass
Shape		Curved, Circular
Minimum Useful Screen	Diameter	7 in

MECHANICAL

Operating Position.																		. 1	Any
Weight (Approx.)																		3	16
Overall Length																			
Greatest Diameter .																			
Bulb																			
Base Mediu	um-	Sh	el	1 D	ihe	ept	tal		12.	-P	in	(,	JEI	DE	CN	0.	BI	2-	37)
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RADIO CORPORATION OF AMERICA Electronic Components and Devices

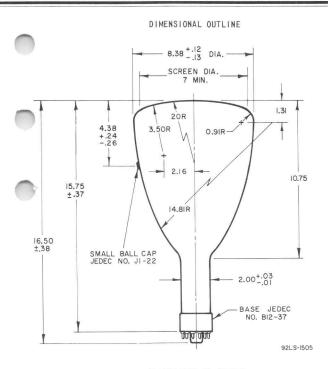
Harrison, N. J.

DATA 1

ABSOLUTE-MAXIMUM AND MINIMUM RATINGS		
Post-Deflection Accelerator Voltage 8000 max	V	
Anode Voltage	v	
Grid-No.3 (Focusing-Electrode) Voltage 2000 max	v	
Grid-No.I Voltage	*	-
Negative bias value	V	
Positive bias value 0 max	v	
Positive peak value 2 max	V	
(6 0 max	V	
Heater Voltage	٧	
Peak Heater-Cathode Voltage		
Heater negative with respect to cathode 125 max	V	-
Heater positive with respect to cathode 125 max	V	
TYPICAL OPERATING VALUES		
Unless otherwise specified all values		
are positive with respect to cathode		
Post-Deflection Accelerator Voltage 6000	V	2
Anode Voltage	V	-
Grid-No.3 (Focusing-Electrode) Voltage. 750 to 1200	۷	
Grid-No.1 Voltage	۷	
For visual cutoff of focused spot		
Deflection Factors		
DJ1 and DJ2 107 to 129 V (dc)/in	
DJ3 and DJ4 85 to 101 V (dc)/in	
MAXIMUM CIRCUIT VALUES		
Grid-No.1-Circuit Resistance 1.5 max	MΩ	

a It is recommended that the deflecting-electrode-circuit resistances be approximately equal.





DIMENSIONS IN INCHES

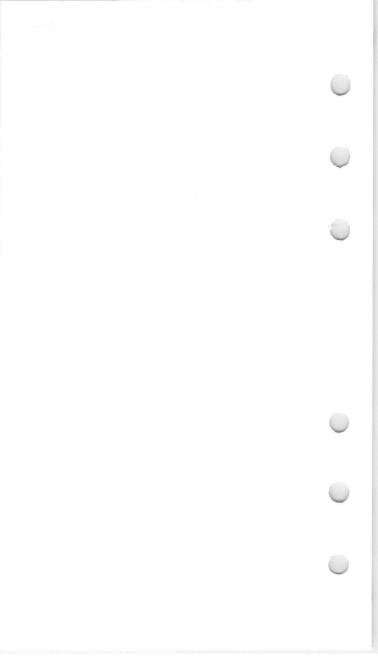
Center line of bulb will not deviate more than 2° in any direction from the perpendicular erected at the center of bottom of the base.

The plane through the tube axis and pin 5 may vary from the trace produced by DJl and DJ2 by an angular tolerance (measured about the tube axis) of $\pm 10^{\circ}$. Angle between DJl - DJ2 trace and DJ3 - DJ4 trace is $90^{\circ} \pm 3^{\circ}$.

DJ1 and DJ2 are nearer the screen; DJ3 and DJ4 are nearer the base. With DJ1 positive with respect to DJ2; the spot will be deflected toward pin 5; likewise, with DJ3 positive with respect to DJ4, the spot will be deflected toward pin 2.



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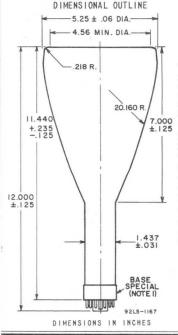




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Heater Voltage	
Peak Heater-Cathode Voltage Heater negative with respect to cathode 125 max V Heater positive with respect to cathode 125 max V	0
TYPICAL OPERATING VALUES	
Unless otherwise specified all values are positive with respect to cathode	
Anode Voltage 2200 V Grid-No.3 (Focusing-Electrode) Voltage. 750 to 1000 V Grid-No.1 Voltage	0
Deflection Factors Dul and DJ2	
MAXIMUM CIRCUIT VALUES	
Grid-No.I-Circuit Resistance	0

^a It is recommended that the deflecting-electrode-circuit resistances be approximately equal.



The plane through the tube axis and pin 4 may vary from the trace produced by DU1 and DU2 by an angular tolerance (measured about the tube axis) of 10° . Angle between DU1 -DU2 trace and DU3 - DU4 trace is $90^{\circ} \pm 3^{\circ}$.

DU1 and DU2 are nearer the screen; DU3 and DU4 are nearer the base. With DU1 positive with respect to DU2, the spot will be deflected toward pin 4; likewise, with DU3 positive with respect to DU4, the spot will be deflected toward Pin 1.

Note I: Base is identical to short small-shellduodecal JEDECNo.B12-207 except pin No.5 and pin No.11 are omitted.



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J.

Oscillograph-Type Cathode-Ray Tube

5-Inch Diameter Electrostatic Deflection

Post-Deflection Accelerator Electrostatic Focus

For General Oscillographic Applications in which Extremely Low-Speed or Medium-Speed Recurrent- or Non-Recurrent-Wave Phenomena are to be Observed

ELECTRICAL

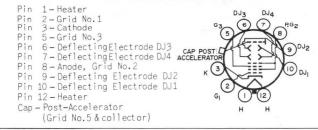
Heater Current at 6.3 V	÷.		0.6	A
Direct Interelectrode Capacitances (Approx.)				
Grid No.1 to all other electrodes			10 p	F
Cathode to all other electrodes			5.5 p	F
DJ1 to DJ2				F
DJ3 to DJ4				F
DJ1 to all other electrodes			10.5 p	F
DJ2 to all other electrodes			8.5 P	F
DJ3 to all other electrodes			8.5 F	ρF
DJ4 to all other electrodes			9.0 F	ρF
Focusing Method	E	le	ctrostati	C
Deflection Method				

OPTICAL

Phosphor												P7
Fluorescence.												 Purplish-Blue
Phosphorescenc	е.											Yellowish-Green
Persistence .			÷						•			Long
Faceplate												Clear Glass
Shape												.Flat, Circular
Minimum Useful S	cree	en	D	iar	net	te	r.					4.56 in
					MF	СН	ΔN	I C	AL			

Operating Position.																	Any
Weight (Approx.)																. 2	16
Overall Length												1	2.	.00	±	0.13	in
Greatest Diameter .																5.31	in
Bulb.															J4	2 Dev	. 67
Base	S	pe	ci	al	,	Sr	na l	1-	Sh	e1	1	Du	100	dec	al	, 10-	Pin

TERMINAL DIAGRAM (Bottom View)



Electronic

Components

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ABSOLUTE-MAXIMUM AND MINIMUM RATINGS

Post-Deflection Accelerator Voltage 6000 m. Anode Voltage	ax V
Negative bias value 200 m. Positive bias value 0 m. Positive peak value 2 m.	ax V
Heater Voltage	
Peak Heater-Cathode Voltage Heater negative with respect to cathode	

TYPICAL OPERATING VALUES

Unless otherwise specified all values are positive with respect to cathode	
Post-Deflection Accelerator Voltage 3000	٧
Anode Voltage	٧
Grid-No.3 (Focusing-Electrode) Voltage. 475 to 725	٧
Grid-No.1 Voltage	۷
For visual cutoff of focused spot	
Deflection Factors	
DJ1 and DJ2 69 to 91 V (dc)/	
DJ3 and DJ4	in

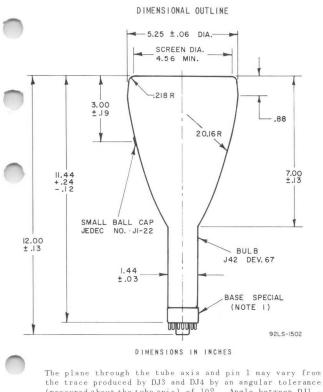
MAXIMUM CIRCUIT VALUES

	Resistance			
^a It is recommended approximately equa	that the deflecting-electrode-circuit 1.	resis	stance:	s be

X-RADIATION WARNING: Shielding of these cathode-ray tubes for x-radiation may be needed to protect against possible danger of personal injury from prolonged exposure at close range.

RBA Electronic Components

DATA 1



the trace produced by DJ3 and DJ4 by an angular tolerance (measured about the tube axis) of 10°. Angle between DJ1 - DJ2 trace and DJ3 - DJ4 trace is 90° \pm 3°.

DJ1 and DJ2 are nearer the screen; DJ3 and DJ4 are nearer the base. With DJl positive with respect to DJ2, the spot will be deflected toward pin 5; likewise, with DJ3 positive with respect to DJ4, the spot will be deflected toward pin 1.

Note I: Base is identical to short small-shell duodecal JEDEC No.B12-207 except pin No.4 and pin No.11 are omitted.

533





DATA 1

11/72

5" Radar Display CRT

- Electrostatic focus
- Magnetic deflection
- Less than ten inches overall length
- Offset neck facilitates positioning of display origin at screen edge
- For display of airborne weather radar data in airplane cockpits

Data

-		1.1.1	- 2	
E	lect	tri	cal	

Electrical:	
Heater for Unipotential Cathode:	
Voltage ^a (AC or DC)	6.3 V
Current at 6.3 V	0.3 A
Focusing Method	Electrostatic
Deflection Method	Magnetic
Direct Interelectrode Capacitances:	
Grid No.1 to all other electrodes	10 max. pF
Cathode to all other electrodes	6 max. pF
Optical:	
Faceplate:	
Material	Clear Glass
Shape	Spherical

 Minimum useful diameter
 4.5 in

 Phosphor:
 Type

 Type
 Aluminized, P7

 Fluorescence
 White

 Phosphorescence
 Yellowish Green

 Persistence
 Long (100 ms to 1 sec.)

Mechanical:

B/I

Tube Dimensions:	
Maximum overall length 9-13/16 i	in
Maximum bulb diameter	in
Neck diameter	in
Base	37
Anode Connector Button J1-2	22
Operating Attitude An	ıy
Weight 2	lb

Electronic

Components

Maximum Ratings, Absolute Maximum Valuesb

Anode Voltage	12000	max.	V
Grid No.4 Voltage	450	max.	V
Grid No.2 Voltage	450	max.	V
Grid No.1 Voltage:			
Negative bias value	100	max.	V
Positive bias value	0	max.	V
Positive peak value	2	max.	V
Peak Heater Cathode Voltage	125	max.	V

Typical Operating Values

All values are specified with respect to cathode.	
Anode Voltage	V
Grid No.4 Voltage ^c 40 to 250	V
Grid No.2 Voltage	V
Grid No.1 Voltage d	V
Anode Current	μΑ
Grid No.3 Current	μΑ
Grid No.2 Current	μΑ
Grid No.1 Drive Voltage	v
Resolution ^e 0.014	in

- ^a For optimum life the heater voltage should be regulated at 6.3 volts.
- b A description of the Absolute-Maximum Rating is given in the General Section, titled Rating Systems for Electron Tubes.
- c Adjust for best focus.
- d Adjust for visual cutoff of undeflected spot.
- e At center of tube face. Shrinking raster measurement.

X-Ray Warning

Shielding of this cathode-ray tube for X-ray radiation may be needed to protect against possible danger of personal injury from prolonged exposure at close range.

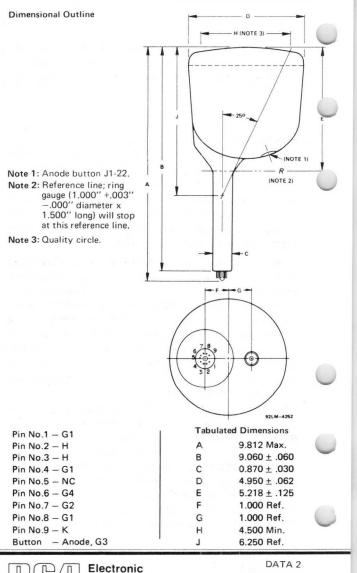
High Voltage

The high voltages at which tube type is operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the enclosing of high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

In the use of the - tube it should always be remembered that high voltages may appear at normally low-potential points in the circuit because of capacitor breakdown or incorrect circuit connections, and that the tube surface maintains a static charge for some time after the power has been turned off. Therefore, before any part of the circuit or the tube is touched, the power-supply switch should be turned off, both terminals of high-voltage capacitors should be grounded, and the terminals of the high-voltage power supply should be grounded.

After these steps have been taken and before touching the tube, discharge the anode terminals, the surface of the faceplate, and the coated surface of the cone by use of a suitable wand which is connected to ground. It is to be noted that the entire surface of the cone and of the faceplate will not be discharged by touching the wand to a single point on either surface, because the surfaces have high resistance. Therefore, to discharge each surface, it will be necessary to sweep over the entire surface with the wand.

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Components

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	Displa	y-Stor	age Tu	be
0	Single Writing Gun Single Viewing Gun High Display Uniformity		High Lumi High Resol TV Capabi	lution
	ELECTRICAL	and and the		
		Writing Section	Viewing Section	Units
	Heater: For Unipotential Cathode			
	Voltage (AC or DC)	6.3 ± 10%	6.3 ± 10%	V
	Current at 6.3 V	0.6	0.6	А
	Warmup Time ^a		60	S
	Direct Interelectrode Capacitance	s:		
	Grid No.1 to all other			
	electrodes	7.0		pF
	Cathode to all other electrodes	5.0		pF
	Backplate to all other electrodes		150	pF
	Focusing Method	Electrostatic		
	Deflection Method	Magnetic		
	Phosphor		P20 (Alum	inized)
	MECHANICAL			
	Minimum Useful Viewing Diamete	er	4.0	in
	Maximum Overall Length (Excluding Ring) ^b		11.59	in
	Maximum Seated Length (Excluding Ring) ^b		11.25	in
	Maximum Diameter (Silastic Padding Ring) ^b		5.396 ± 0.015	5 in
\frown	Bases:			
	Writing gun		JEDEC No.	E8-49
	Viewing gun		JEDEC No	.E7-1
	Bulb terminals (two)		JEDEC No.	J1-21
	Screen connector		AMP Type No.832692 or	
	Operating Position			Any
	Weight (Approx.)		20	lb

RBA Electronic Components

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MAXIMUM RATINGS

Absolute-Maximum Ratings – All voltages are shown with respect to the cathode of the viewing gun unless otherwise specified.

Screen Voltage	0			
	0			
Peak		10,000	V	
DC	0	9,000	V	
Backplate Voltage				
Peak	0	15	V	
DC	-30	10	V	
Viewing Section Voltages				
Collector (Grid No.5)	180	300	V	
Collimator (Grid No.4)	40	150	V	
Grid No.3 ^e	10	150	V	
Grid No.2		150	V	
Grid No.1	-100	0	V	
Heater	-125	125	V	
Writing Section				
Grid No.4 ^e	10	150	V	
Grid No.3 ^f	0	1200	V	
Grid No.2 ^e	10	150	V	
Grid No.1 ^f	-200	Note g	V	
Cathode	-2750	145	V	
Heaterf	-125	125	V	
Screen Resistor ^h	1.0		MΩ	
Collector Resistor ^h	5,000		Ω	

RECOMMENDED OPERATING VALUES

All voltages are shown with respect to the cathode of the viewing gun.

Screen Voltage	8500	V	
Backplate Voltage	0	V	
Viewing Section Voltages			Ļ
Collector (Grid No.5)	200	V	
Collimator ^j (Grid No.4)	60 to 110	V	
Grid No.3 ^j	10 to 60	V	
Grid No.2 ^j	110	V	
Grid No.1j	-40 to 0	V	

RBA Electronic Components

RECOMMENDED OPERATING VALUES (Cont'd)

Writing Section Voltages

Grid No.3 ^k		-2075 to 1575 V
Grid No.1		Notes g ,m
Cathode	*************	-2500 V
Screen Resistor		1.0 MΩ
Collector Resistor	1	0,000 Ω

PERFORMANCE DATA AND CHARACTERISTICS

	Min.	Typical	Max,	Units
Useful Viewing Diameter	4.0			in
Luminance (Brightness)P	700	1300		fL
Viewing Duration ^r	10			S
Undeflected Spot Position			Note s	
Screen Current ^p		300	750	μΑ
Viewing Gun Collector Current ^t .		1.0	2.4	mA
Viewing Gun Cathode Current ^u .		2.5	4.0	mA
Writing Gun Cathode Current v		2.5	5.0	mA
Resolution ^W	400			lines
Erase Time ^x	1.5	2.5	3.5	ms

- a Viewing-gun Heater Warm-up Time must be completed before any other voltages are applied.
- b The silastic-padding ring is permanently attached to the bulb and is used to facilitate shock mounting.
- C Mates with AMP No.833589 or equiv. from AMP Inc., 155 Park Street, Elizabethtown, PA 17022.
- e Grids No.4 and No.2 of Writing Gun and grid No.3 of Viewing Gun are connected within the tube.
- f Voltages are shown with respect to cathode of Writing Gun.
- 9 The writing-gun grid No.1 should never be more positive than necessary to write the display to saturated brightness for a given scanning and drive condition. In no case should the writing-gun No.1 voltage have a value greater than zero with respect to the writing-gun cathode.
- h Unbypassed, current-limiting resistor.
- j Adjust for brightest, most uniform, full-size pattern.
- k Adjust for the smallest, most circular spot.

- ^m The maximum bias-voltage value for writing-beam cutoff is -130 volts with respect to writing-gun cathode.
- P Luminance (Brightness) and screen current are measured after the entire display is written to saturated brightness, the writing gun has been turned off, and with no erasing pulse applied.
- The time required for any 1.5-inch diameter area of the useful 4inch diameter viewing area to spontaneously rise (with no writing or erasing) from zero brightness (viewing-beam cutoff) to 10% of saturated brightness.
- S The undeflected spot position must fall within a circle having a 5/16-inch radius (maximum), 1-3/4-inches from the geometric center of the tube face, on the radius passing through the center of the neck of the writing gun.
- t With writing gun turned off, with no erasing pulse applied, and display erased to cutoff.
- ^u Measured with viewing-gun grid No.1 at zero volts and with all other electrodes at voltages shown under Recommended Operating Values.
- Measured with writing-gun grid No.1 at zero volts while writing an overscanned TV-type raster.
- Adjust erase pulser to 60 pps, 0.5 milliseconds width, and sufficient amplitude to just erase any written information. Using a standard television raster, without blanking or video, adjust raster to 3.0 inch horizontal by 2-1/4 inch vertical. Adjust writing-gun grid No.1 bias to reduce the raster to just under write threshold. Adjust the video amplitude so that all half-tones, of a television pattern such as that provided by an RCA 2F21 Monoscope, are clearly discernable. Move the raster and adjust the erase-pulse amplitude to eliminate undersirable picture retention. Minor readjustment of the write-gun grid No.1 bias, the erase pulse amplitude and the video drive may be necessary to obtain the best subjective picture.
- X Measured from saturated brightness to cutoff with an erase pulse 0.5 volt more positive than that necessary for complete erasure.

ENVIRONMENTAL TESTS

The 4547 is designed to withstand the following environmental tests:

Test 1. Vibration in each of the three orthogonal axes as shown in **Figure 1**, to a double amplitude of 0.03 inch, varied at a uniform rate from 10 to 55 Hz and back to 10 Hz over a five minute interval for each axis.

Test 2. Temperature storage for 24 hours each at $100^{0}\ \text{C}$ and at $^{-65^{\circ}}\ \text{C}.$

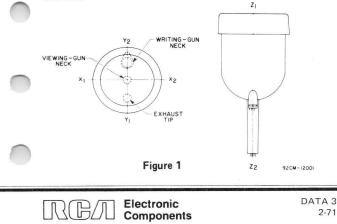
Test 3. Temperature and altitude in three phases as follows:

Phase 1. Storage for one hour at a temperature of -40° C followed by tube operation for five minutes under the conditions shown under Recommended Operating Values.

Phase 2. Temperature is increased from -40° C at a rate of 2° C per minute until a temperature of $+86^{\circ}$ C is reached. Following one hour storage at $+86^{\circ}$ C, the tube is operated for five minutes under the conditions shown under Recommended Operating Values.

Phase 3. Barometric pressure is next reduced until a pressure equivalent to an altitude of 20,000 feet is attained. The tube is then operated for five minutes under the conditions shown under Recommended Operating Values. Upon completion of the third phase of this test, pressure is increased and temperature decreased, at a rate of 2° C per minute, until ambient pressure-temperature conditions are reached.

ORTHOGONAL AXES OF 4547 USED FOR ENVIRONMENTAL TESTING



OPERATING CONSIDERATIONS

Deflection. The undeflected, focused writing beam lands nearly normal (perpendicular) to the storage-grid surface at a distance of 1-3/4 inches from its center and in the direction of the wirting gun neck.

The writing beam may be deflected by two stationary pairs of coils. One pair is used for horizontal deflection, and the other pair for vertical deflection. When these coils are used, centering the undeflected writing beam can be accomplished by passing direct current of the required value through each pair of deflecting coils.

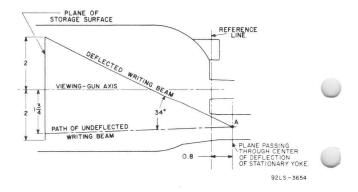
To avoid neck shadow, when the stationary coils are used, it is essential that the center of deflection should be located not more than 0.8 inch from the reference line as shown below. The writing beam must be deflected from its undeflected position, through a typical angle of 34° to sweep fully the storage surface.

LOCATION OF CENTER OF DEFLECTION

Electronic

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DATA 3

CAUTION

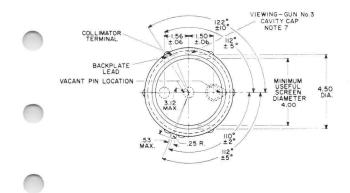
To prevent possible damage to the tube, allow the viewinggun beam current to reach normal operating value before turning on the writing-gun beam current, and keep the viewing beam on till the writing beam is turned off.

PRECAUTIONS

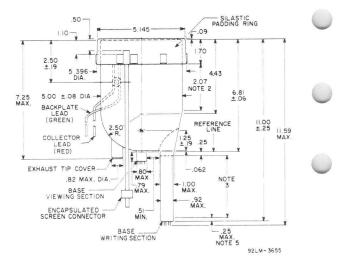
The following operating precautions must be followed to protect the 4547 from inadvertent damage -

- 1. Do not exceed maximum ratings.
- 2. Be sure to include the screen resistor.
- 3. Be sure to include the collector resistor.
- 4. Do not apply excessive writing-beam current density.
- 5. Protect against scanning failure.
- 6. Protect against loss of bias.
- 7. Apply voltages to tube in correct order.
- 8. Never write unless viewing beam is on.
- 9. Stay within recommended viewing-grid voltage ranges.

DIMENSIONAL OUTLINE (TOP VIEW)



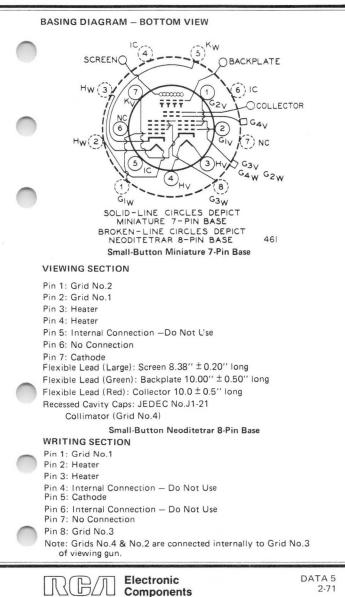
DIMENSIONAL OUTLINE (FRONT VIEW)



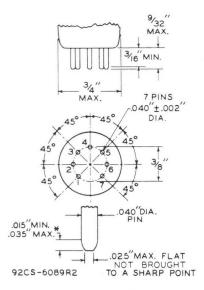
DIMENSIONAL OUTLINE NOTES

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- Note 1: The silastic-padding ring is permanently attached to the bulb and fits with a light push into a gauge having an inside diameter of 5.396" ± 0.015".
- Note 2: Within this length, bulb diameter is $5.00^{\prime\prime} \pm 0.08^{\prime\prime}$.
- Note 3: Within this length, neck diameter is 0.920" maximum.
- Note 4: Aircraft-Marine Products, Inc., type LGH Part No.832692, or equivalent. This part mates with Aircraft-Marine Products, Inc., Part No. AMP 833589, Ceramic Terminal, or Equivalent.
- Note 5: Within this length, neck diameter is 0.950" maximum.
- Note 6: Do not use these cavity caps for connection. The caps are connected internally and may be at a potential which could constitute a shock hazard. It is recommended that these caps be covered with electrical insulation.
- Note 7: Grids No.4 and No.2 of Writing Gun and grid No.3 of the Viewing Gun are connected within the tube.



SMALL BUTTON MINIATURE 7-PIN BASE



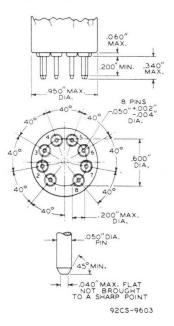
*This dimension around the periphery of any individual pin may vary within the limits shown.

Base-pin positions are held to tolerances such that entire length of pins will, without undue force, pass into and disengage from flatplate gauge (part of gauge JEDEC No.GE7-1) having thickness of 1/4" and eight holes with diameters of 0.0520" \pm 0.0005" so located on a 0.3750" \pm 0.0005" diameter circle that the distance along the chord between any two adjacent hole centers is 0.1434" \pm 0.0005".

The design of the socket should be such that circuit wiring can not impress lateral strains through the socket contacts on the base pins. The point of bearing of the contacts on the base pins should not be closer than 1/8'' from the bottom of the seated tube.

SMALL BUTTON NEODITETRAR 8-PIN BASE

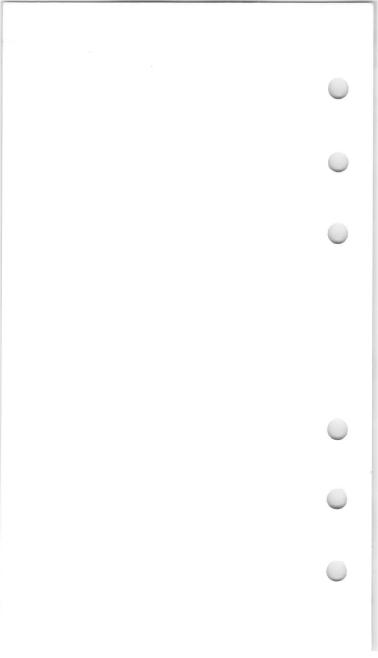
Base-pin positions are held to tolerances such that entire length of pins will, without undue force, pass into and disengage from flatplate gauge having thickness of 1/4'' and nine holes with diameter of $0.0700'' \pm 0.0005''$ so located on a $0.6000'' \pm 0.0005''$ diameter circle that the distance along the chord between any two adjacent hole centers is $0.2052'' \pm 0.0005'$.



X-RADIATION WARNING: Shielding of this cathode-ray tube for x-radiation may be needed to protect against possible danger of personal injury from prolonged exposure at close range.

For further information or application assistance on this device, contact your RCA Field Representative or write, Display Tube Marketing, RCA, Lancaster, PA. 17604





Display Cathode-Ray Tube

12"-Rectangular 70⁰-Magnetic Deflection Display Cathode-Ray Tube Having Integral Protective Window and P4 Phosphor Screen

ELECTRICAL

Heater Current at 6.3 volts 0.6 A
Focus Method Electrostatic
Deflection Method Magnetic
Direct Interelectrode Capacitances (Typical):
Grid No.1 to all other electrodes 6 pF
Cathode to all other electrodes 5 pF
External conductive coating to anode

OPTICAL

Faceplate, Spherical
Light transmission at center (Approx.) 37%
Phosphor P4-Sulfide Type, Aluminized Tube Dimensions:
Overall length 16.60 max. in
Neck length 7.56 ± 0.25 in
Greatest width 10.94 ± 0.12 in
Greatest height
Bulb See Dimensional Outline
Anode Cap Recessed Small Cavity Cap (JEDEC No.J1-21)
Base
Weight (Approx.) 9-1/2 lb
MAXIMUM AND MINIMUM RATINGS, Absolute-Maximum Values Unless otherwise specified, values are positive with respect to cathode. Anode Voltage
Grid-No.3 (Focusing-Electrode) Voltage 2700 max. V
Grid-No.2 Voltage 400 max. V
Grid-No.1 Voltage:
Negative bias value 80 max. V
Positive bias value 0 max. V

Electronic Components

RB/A

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Positive peak value	2 max. V
Peak Heater-Cathode Voltage:	
Heater negative with respect to cathode	180 max. V
Heater positive with respect to cathode	180 max. V
Heater Voltage (ac or dc):	/
Under operating conditions ^b	6.9 max. V
Under operating conditions	5.7 min. V

RECOMMENDED OPERATING VALUES

Unless otherwise specified, values are positive with respect to cathode. Raster size 6 inches by 8 inches. Standard TV Scan.

Anode Voltage			• •	•		•	•	•	•	•		•	•	•	•	•	•		12000)	V
Anode Current				•				•	•	•	•	•	•	•	•	•		•	100)	μA
Grid-No.3 (Focu Voltage for a of 100 micros	n An	ode	C	urr	en	t									14	10)0	to	1800)	v
Grid-No.2 Volta	ge						•	•	•	•	•			•					340)	V
Grid-No.1 Volta Extinction of Raster	f Foc	use	d						•								-6	8 1	to -38	3	v
		Se	e	aco	cor	np	a	ny	/i	ng	z	С	ut	to	ff	L	De	si	gn Cl	ha	art

TYPICAL PERFORMANCE DATA

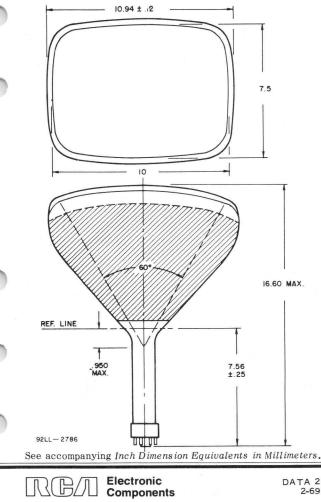
At recommended operating values, unless otherwise specified.
Anode Current
Grid-No.3 Current
Typical Trace Luminance ^c See accompanying Typical Trace Luminance Characteristic
Typical Center Line Width ^d 0.010 in
Spot Position See footnote e
MAXIMUM CIRCUIT VALUE
Grid-No.1 Circuit Resistance 1.5 may MO

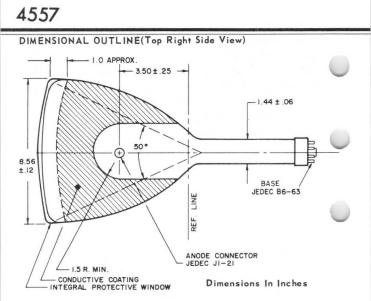
- b For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts.
- ^c Average luminance (brightness) at the center of a single trace scanned at a given sweep speed and refreshed at a given rate.
- ^d Measured by shrinking raster technique at an anode current of 100 microamperes.
- ^e The center of the undeflected, unfocused spot will fall within a circle having a 0.8 inch diameter concentric with the center of the tube face.

X-RADIATION WARNING

Because the 4557 is designed to be operated at anode voltages as high as 16,000 volts, shielding of the 4557 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.



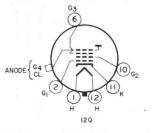




Inch	mm	Inch	mm	Inch	mm
.06	1.5	1.44	36.5	8.56	217.4
.12	3	1.5	38.1	10	254
.25	6.3	3.50	88.9	10.94	277.8
.950	24.1	7.5	190.5	16.60	421.6
1.0	25.4	7.56	192		

TERMINAL DIAGRAM (Bottom View)

Pin 1: Heater Pin 2: Grid No.1 Pin 6: Grid No.3 Pin 10: Grid No.2 Pin 11: Cathode Pin 12: Heater Cap: Anode (Grid No.4 and Collector)

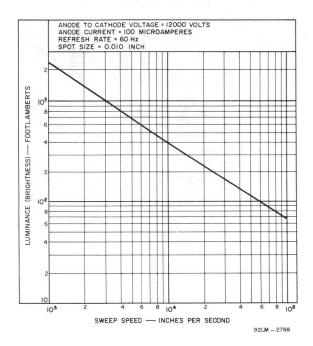


Electronic Components

DATA 2

TYPICAL TRACE LUMINANCE CHARACTERISTIC

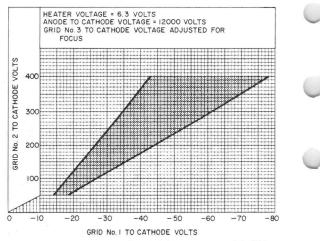
(Average brightness at center of single trace scanned at the refreshed at the indicated rate)



Electronic Components

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CUTOFF DESIGN CHART



92LS-2787

RBA Electronic Components

DATA 3

Monoscopes^a

Custom-Built 2"-Diameter, Electrostatic-Focus, Electrostatic-Deflection Monoscope Tubes For Use As Alpha-Numeric Character Generators

ELECTRICAL

Heater Current at 6.3 volts 0.6	A
Focusing Method Electrostati	ic
Deflection Method Electrostat	ic
Direct Interelectrode Capacitances (Approx.):	
Grid No.1 to all other electrodes	F
Cathode to all other electrodes	F
Output Signal Electrode to all other electrodes 8 p	F
DJ1 to all other electrodes 10 p	F
DJ2 to all other electrodes 10 p	F
DJ3 to all other electrodes 7 p	F
DJ4 to all other electrodes 7 p	F
DJ1 to DJ2 3 p	F
DJ3 to DJ4 3 p	F
Deflection Direction:	
	10.00

A positive voltage on DJ1 deflects the beam toward top of stencil.

A positive voltage on DJ3 deflects the beam toward the left side of the stencil.

MECHANICAL

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Tube Dimensions:

Maximum Overall Length 11.5 in Maximum Diameter Including
Bulb Terminals 2.285 in
Bulb (Glass) T16
Base Medium-Shell, Diheptal 12-Pin JEDEC No.B12-37
Socket Cinch ^b Part No.3M14, or equivalent
Bulb Terminals (Two) Small Ball JEDEC J1-25
Bulb Terminal Contacts Cinch b Part No.3A1, or equivalent

Electronic Components

Stencil Electrode:	
Useful area	
Typical Pattern See accompanying pattern.	
Operating Position Any	
Weight (Approx.) 13 oz	
MAXIMUM AND MINIMUM RATINGS,	
Absolute-Maximum Values	
Unless otherwise stated, values are positive with respect to cathode.	
Output Signal Electrode Voltage 2500 max. V	
Stencil-Electrode Voltage 2500 max. V	
Deflecting Electrode Voltage:	
DJ1 and DJ2 V	
DJ3 and DJ4 V	
Grid-No.4 & Grid-No.2 Voltage 2500 max. V	
Grid-No.3 Voltage 1000 max. V	
Grid-No.1 Voltage:	
Negative Bias Value 200 max. V	
Positive Bias Value 0 max. V	
Positive Peak Value 2 max. V	
Peak Heater-Cathode Voltage:	
Heater Negative with respect to Cathode 200 max. V	
Heater Positive with respect to Cathode 200 max. V	
Heater Voltage (ac or dc):	V
Under Operating Conditions ^c	
RECOMMENDED OPERATING VALUES ^d	
Unless otherwise specified, values are positive with respect to output signal electrode.	0
Output Signal Electrode Voltage Ground ^e	-
Stencil-Electrode Voltage	
Average Deflecting Electrode Voltage.	
Vertical (DJ1 and DJ2) +35 V	

> Electronic Components

RB/A

	Grid-No.3 (Focusing Electrode)		10	00.4	00.17
	Voltage				
١.	Grid-No.1 Voltage ⁹				
2	Cathode Voltage				
	Heater Voltage ^h			••• 6	3.3 V
	TYPICAL PERFORMANCE CHA			î	
		Min.	Typical	Max.	
1	Output Signal Current ⁱ	-	5	_	μΑ
	Trace Angle:				
	Vertical		2	5 deg	rees
	Horizontal		2	5 deg	rees
	Between Vertical and Horizontal				
	Traces	89	90	91 deg	rees
	Deflection Factors: ^k				
	Vertical (DJ1 and DJ2)	46	-	60 V	//in
	Horizontal (DJ3 and DJ4)	46	_	60 V	//in
	Undeflected Spot Position ^m	-	_	0.15	in
	^a A specific tube designation in signed to each type employing a				
	b Made by Cinch Manufacturing C Elk Grove Village, IL 60007.	ompany	y, 1501 M	orse Avei	nue,
)	^c For maximum cathode life, it is er supply be regulated at 6.3 vo		nmended t	hat the h	eat-

- d The tube must be shielded to prevent stray magnetic fields from affecting performance. At no time should the undeflected beam be allowed to rest on the usable 1.1" x 1.1" area of the stencil electrode pattern.
- ^e The output signal electrode is grounded through a 1000ohm load resistor.
- f Adjust for minimum astigmatism.
- 9 Adjust as required.

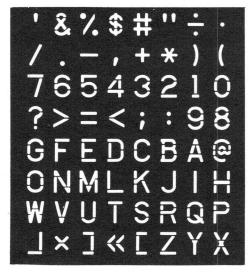
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^h One side of heater terminal (Pin No.1) is connected to -1800 V dc.

> Electronic Components

- i For cathode current not exceeding 110 microamperes.
- k Useful area of stencil electrode is 1.1"x 1.1".
- ^m The undeflected spot position must fall within a circle having a 0.15 inch diameter (maximum) centered on the stencil electrode pattern.

TYPICAL STENCIL ELECTRODE PATTERN



OPERATING CONSIDERATIONS

Tubes in the 4560 series are intended for use as character generators in conjunction with display cathoderay tubes in computer data terminal display equipment. In such equipment, the electron beam in the monoscope is first deflected to a desired character location on the stencil and at the same time the display cathode-ray tube electron beam is deflected to a desired position in the display. The monoscope electron beam is then rapidly scanned over the selected character in the stencil and the display cathode-ray tube electron beam is synchronously deflected on the phosphor screen.

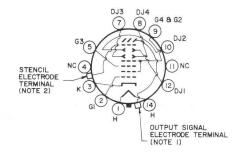
In the monoscope, electrons which pass through the stencil are collected on the output signal electrode and generate a video signal across the output load resistor. This signal is amplified and then applied to the grid of the display cathode-ray tube.

The effect of this operation is that the character stenciled into the monoscope is displayed on the phosphor screen of the display cathode-ray tube. Other characters may be chosen by positioning the monoscope electron beam at different locations on the stencil. A character may be located anywhere in the cathode-ray tube display by appropriate positioning of its electron beam.

NOTE

Stencil patterns supplied to RCA for incorporation in the 4560 family of monoscopes should be at least 10 times larger than the useful 1.1" x 1.1" area of the stencil electrode. The alpha-numeric characters of the pattern should be white on a dark background. Such patterns or requests for information on RCA fabricated stencil patterns should be directed to Storage Tube Marketing, RCA, Lancaster, PA 17604, or to the nearest Sales Office.

TERMINAL DIAGRAM (Bottom View)



Pin No.1: Heater Pin No.2: Grid No.1 Pin No.3: Cathode Pin No.4: No connection Pin No.5: Grid No.3 Pin No.7: Deflecting Electrode DJ3 Pin No.8: Deflecting Electrode DJ4 Pin No.9: Grid No.4 and Grid No.2 Pin No.10: Deflecting Electrode DJ2 Pin No.11: No connection Pin No.12: Deflection Electrode DJ1 Pin No.14: Heater Terminals — Nearest Base: Stencil Electrode

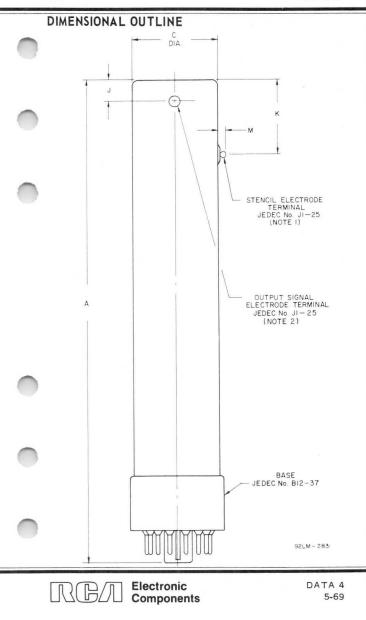
Furthest from Base: Output Signal Electrode

Electronic

Components

Note 1: The plane passing through the tube axis and the key of the base does not deviate more than $\pm 10^{\circ}$ from the plane passing through the tube axis and the output signal electrode terminal cap.

Note 2: The plane passing through the tube axis and Pin No.4 of the base does not deviate more than $\pm 10^{\circ}$ from the plane passing through the tube axis and the stencil electrode cap.



NOTES FOR DIMENSIONAL OUTLINE

Note 1: Angular orientation of the stencil electrode terminal with respect to pin No.4 of base is $\pm \ 10^{0}.$

Note 2: Angular orientation of the output signal electrode terminal with respect to key of base is $\pm 10^{\circ}$.

Dimensions	Inches	mm	
А	$11.312 \pm .188$	287.32 ± 4.77	1
С	2.050 ± .050 Dia.	52.07 ± 1.27 Dia.	
J	.500 ± .062	12.70 ± 1.57	
K	$1.750 \pm .125$	44.45 ± 3.17	
М	.185 max.	4.69 max.	

OUTLINE DIMENSIONS

Projection Kinescopes

- 7"-Diameter Electrostatic-Focus, Magnetic-Deflection Types
- Matched Trio of Tubes for Color Projection Systems
- Designed for Use with Schmidt Reflective Optical Systems
- Matched Phosphors
- High Picture Brightness
- Wide Range of Synthesized Colors
- Balanced Drive Characteristics

General Data

Electrical:

Heater Current at 6.6 Volts
Focusing Method Electrostatic
Deflection Method ^a Magnetic
Deflection Angle (Approx.)
Direct Interelectrode Capacitances (Approx.):
Grid No.1 to all other electrodes
Cathode to all other electrodes

Optical:

Faceplate, Spherical Clear, Browning-Resistant Glass
Radius of curvature (inner radius)
Minimum Optical-Quality-Rectangle
Refractive Index of Faceplate 1.469
Phosphors, Aluminized:
4583
C.I.E. coordinates (x,y) 0.155, 0.048
Luminescence
Persistence
4584 Silicate (Green) Type
C.I.E. coordinates (x,y) 0.218, 0.728
Luminescence Green
Persistence
4585 Rare-Earth (Red) Type
C.I.E. coordinates (x,y) 0.660, 0.340
Luminescence Red
Persistence Medium

Electronic Components

Mechanical:

Tube Dimensions:

Tube Dimensions.						
Overall length19-1/2 \pm 5/8Greatest diameter of bulb (excluding side cap or cable)7 \pm 3/1						
Base						
Anode Lead						
Anode Lead 48 in. long						
Operating Position	Any					
Weight (Approx.)	lbs					
Maximum and Minimum Ratings,						
Absolute-Maximum Valuesb						
Average Anode Power: ^C						
With forced-air cooling of faceplate 160 max.	W					
Air Flow to Face ^d	cfm					
Anode-to-Cathode Voltage	kV					
Grid-No.3-to-Cathode Voltage	kV					
Grid-No.2-to-Cathode Voltage 1.05 max.	kV					
Grid-No.1-to-Cathode Voltage:						
Negative bias value	V					
Positive bias value	V					
Peak positive value	V					
Anode Current, Long-Term Average (for 5'' x 3-3/4'' TV raster)	mA					
Peak Heater-Cathode Voltage:						
Heater negative with respect to cathode 150 max.	V					
Heater positive with respect to cathode 150 max.	V					
(6.93 max	V					
Heater Voltage (AC or DC) ^e	V					
Recommended Operating Values ^f						
Raster Size	/4''					
Anode Voltage	kV					
Anode Current, Long-Term Average	μΑ					
Grid-No.3 Voltage for Focus at an Anode Current of 1000 μA	kV					
Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused Raster	e 1					
Heater Voltage	V					

Electronic Components

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DATA 1

Typical Performance Data

	Blue	Green	Red	
Luminous Output of each Tube at an Anode Current of 1000 μ A for each tube	88	1400	520	lumens
Luminance of Each Tube at an Anode Current of 1000 μ A for Each Tube	680	10800	4000	fL
Luminance of Three Tubes Combine at an Anode Current of $1000 \ \mu$ A on Limiting Tube and with Anode Curre of Other Two Tubes Adjusted to Produce White of 9300° K + 27 M.P.C.D.			8500	total fL
Percentage of Total Luminance Supplied by Each Tube	8	70	22	%
Percentage of Total Anode Current Supplied by Each Tube (Approx.)	50	27	23	%
Center Resolution ⁹			600	TV Lines
Grid-No.3 Current (Total) ^h			±15	μΑ
Grid-No.2 Current			±15	μΑ

Circuit Requirements

High-Voltage Circuits

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In order to minimize the possibility of damage to the tubes and adjacent circuits caused by a momentary internal arc, it is recommended that the high-voltage power supply and the grid-No.3 power supply be of the limited-energy type. An external spark gap must be provided at the grid-No.3 terminal. The following resistor and voltage values are mandatory.

Anode-Circuit Resistance (unbypassed)	0.5	min.	MΩ
Grid-No.3 Circuit Resistance (unbypassed)	0.1		MΩ
Grid-No.3 Spark-Gap Firing Voltage	20		kV
Low-Voltage Circuits			
Grid-No.2 Circuit Resistance (bypassed)	10		kΩ
Grid-No.1 Circuit Resistance (unbypassed)	1		kΩ
Effective Grid-No.1-to- Cathode Circuit Resistance	1.5	max.	мΩ

^a Sharp corners on the yoke assembly in the vicinity of the tube neck should be avoided. Insulation between the yoke winding and/or the core and the tube neck should be capable of withstanding at least 10 kV and preferably 15 kV.

> Electronic Components

- b A description of the Absolute Maximum Rating is given in the General Section, titled Rating Systems for Electron Tubes.
- C The product of anode-to-cathode voltage and anode current (long term average) should never exceed 160 watts.
- d The specified air flow should be delivered perpendicularly from a nozzle having a diameter of about 2 inches onto the face of the tube while it is in operation. In a typical system with air filter, the total system static pressure is approximately 0.25 inch of water. The cooling air must not contain water, dust, or other foreign matter. The air-cooling system should be electrically interconnected with the anode power supply to prevent operation of the tube without cooling.

Cooling of the tube by a tangential flow of air across its face is not recommended because the temperature gradient produced across the face may result in immediate or delayed cracking of the face.

- e For maximum cathode life, it is recommended that the heater supply be regulated at 6.6 volts.
- f These tubes may be operated at reduced anode voltage and/or anode current. At reduced anode voltage, center resolution will decrease. At reduced anode voltage and/or anode current, luminance will decrease. The grid-No.3 voltage for focus will be reduced in proportion to the reduction in anode voltage. Other performance characteristics may also be affected.
- 9 Determined for a 3-3/4 inch high TV resolution test pattern with tube operating at a screen current of 1000 microamperes.
- h Grid-No.3 current is normally low, as indicated in the data, when the tube is operated under recommended conditions. Lower grid-No.3 voltages (as required for focus if anode voltage is reduced) and/or higher grid-No.2 voltages can lead to a grid-No.3 current level approaching that measured in the anode circuit. Note that the fraction of available current intercepted by the grid-No.3 electrode is not constant, but increases with increasing anode current.

The Conductive Coating

The conductive coating on the exterior of the tube neck must be grounded. Connection to the coating may be made by using a flexible metal band fastened firmly around the neck at the base end of the coating. The metal band should be fastened only tight enough to insure good contact. If

the band is clamped very tight, resultant glass strains may eventually cause the neck to break. This coating must not be scratched and must never be washed with liquids likely to soften or dissolve lacquers.

The external coating on the neck serves to prevent corona between the neck and the yoke. Corona would damage the yoke insulation and cause breakdown in the glass of the neck. It is important that the yoke insulation be adequate for operation of the yoke against the external grounded coating. The resistance of the external conductive coating is sufficiently high so that damping of the yoke deflecting energy is negligible. Because of this high resistance, a contact area of at least 1/4 square inch should be used in making connection to the external coating.

Safety Precautions

X-Radiation Warning

Although X-radiation is generated primarily at the face of the tube when it is operated, the X-rays are emitted in all directions.

These rays can constitute a health hazard unless the tube is adequately shielded. Make sure that the shielding provides the required protection against personal injury.

On the neck of the tube itself the following warning appears and should be strictly adhered to:

X-Ray Warning

This tube in operation produces X-rays which can constitute a health hazard unless the tube is adequately shielded for radiation.

High Voltage

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The high voltages at which these tubes are operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the enclosing of

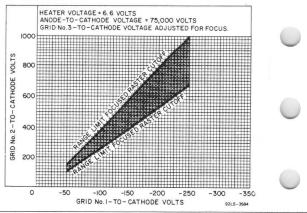
high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

In the use of these tubes it should always be remembered that high voltages may appear at normally low-potential points in the circuit because of capacitor breakdown or incorrect circuit connections, and that the tube surface maintains a static charge for some time after the power has been turned off. Therefore, before any part of the circuit or the tube is touched, the power-supply switch should be turned off, both terminals of high-voltage capacitors should be grounded, and the terminals of the high-voltage power supply should be grounded.

After these steps have been taken and before touching the tube, discharge the anode terminal, the surface of the faceplate, and the coated surface of the cone by use of a suitable wand which is connected to ground. It is to be noted that the entire surface of the cone and of the faceplate will not be discharged by touching the wand to a single point on either surface, because the surfaces have high resistance. Therefore, to discharge each surface, it will be necessary to sweep over the entire surface with the wand.

Cutoff Design Chart

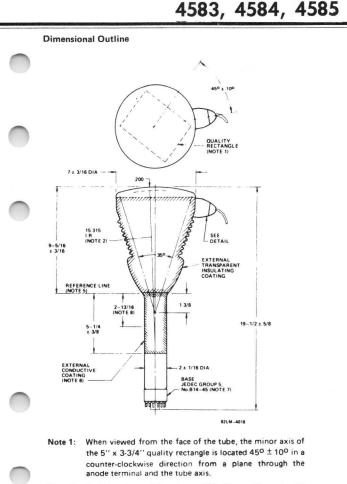
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DATA 3

Electronic

Components



Note 2: Inside surface of faceplate within the quality rectangle may vary $\pm 0.006''$ from the spherical surface having a 15.315'' radius.

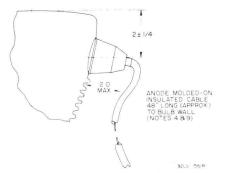
Note 4: The plane through Base Pin No.9 and the tube axis may vary from the plane through the anode terminal and the tube axis by an angular tolerance (measured about the tube axis) of ± 10°. The anode terminal is on same side as Pin No.9.

> Electronic Components

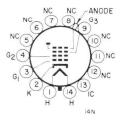
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- Note 5: Reference line is determined by position where gauge $2.100^{\prime\prime} \pm 0.001^{\prime\prime}$ I.D. and 3^{''} long will rest on bulb cone.
- Note 6: External conductive coating must be grounded.
- Note 7: Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Socket contacts for Pins 5, 6, 7, 8, 10, 11, 12, and 13 should be removed in order to provide maximum insulation for Pin No.9.
- Note 8: Effective deflecting field must be within this space.
- Note 9: Anode cable should not be sharply bent within 5" of bulb wall.

Dimensional Outline Detail



Socket Connections (Bottom View)



Electronic

Components

Note: Socket contacts for Pins No. 5, 6, 7, 8, 10, 11, 12, and 13 should be removed so that maximum insulation is provided for Pin No. 9. Pin 1: Heater Pin 2: Cathode Pin 3: Grid No.1 Pin 4: Grid No.2 Pin 5: No Connection Pin 6: No Connection Pin 7: No Connection Pin 8: No Connection Pin 99: Grid No.3 Pin 10: No Connection Pin 11: No Connection Pin 12: No Connection Pin 13: Internal Connection -Do Not use Pin 14: Heater Cable: Anode

DATA 4

Graphechon Tube

Scan-Conversion Storage-Tube Assembly Very High Resolution Capability Ruggedized Structure Designed to Meet MIL-E-5400 Specification Integral Shielding and Deflection Coils Small Size – 15" Max. Length 3.65" Diameter 0.6-Watt Heaters for Writing and Reading Guns

ELECTRICAL

Heater Current at 6.3 Volts, Each Gun
Focusing Method, Each Gun Electrostatic
Deflection Method, Each Gun Magnetic
Deflection Coils See footnote a
Total Deflection Angle, Each Gun (Approx.) 50 degrees
Deflection Coil Alignment ^b 0.5 degrees
Undeflected Spot Position, Each Gun ^c 5% of target diameter
Direct Interelectrode Capacitances:

	Typ.	wax.	
Output-signal-electrode to all other electrodes ^d	17	20	pF
Reading-gun grid No.1 to all other electrodes	-	15	pF
Reading-gun cathode to all other electrodes	-	9	pF
Writing-gun grid No.1 to all other electrodes	_	15	pF
Writing-gun cathode to all other electrodes	-	9	pF

MECHANICAL

RBA

Tube Dimensions See Dimensional Outline	
Connections See footnote e	
Operating Position Any	
Maximum Weight 5.25 lbs	

Electronic

Components

MAXIMUM AND MINIMUM RATINGS, Absolute-Maximum Values

Voltages are referred to ground unless otherwi				
Writing Gun:	Min.	Max.		
Heater voltage ^g (AC or DC)	5.7	6.9	V	
Cathode voltage	-9000	-	V	
Heater-cathode voltage	-125	10	V	
Grid-No.1 (control grid) voltage ^h	-300	0	V	
Grid-No.2 voltage ^h	_	750	V	
Grid-No.3 (beam focus) voltageh,j	—	1500	V	
Grid-No.4 (anode) voltage	Gro	bund		
Reading Gun:				
Heater voltage ^k (AC or DC)	5.7	6.9	V	
Cathode voltage	-1500		V	
Heater-cathode voltage	-125	10	V	
Grid-No.1 (control grid) voltagem	-300	0	V	
Grid-No.2 voltage ^m	-	750	V	
Grid-No.4 (beam focus) voltage ^{j,m}	-	750	V	
Grids No.3 & No.5 (anode) voltage	-30	30	V	
External conductive coating	Gro			
Target Section:				
Output signal electrode voltage	-10	10	V	
Shading electrode voltage	-30	30	V	
Backplate voltage	-20	50	V	
TYPICAL OPERATING CONDITIONS				
Voltages are referred to ground unless otherw	ise specifi	ed.		
Writing Gun:				
Heater voltage ^g (AC or DC)		6.3	V	
Cathode voltage		8000	V	
Grid-No.1 (control grid) voltage for beam		20 +- 70		
cutoff ^h	1.	20 to -70	V	

Grid-No.2 voltage ^h	300	V
Grid-No.3 (beam focus) voltageh,j 600 to	1400	V
Grid-No.4 (anode) voltage	Grou	und
Reading Gun:		
Heater voltage ^k (AC or DC)	6.3	V
Cathode voltage	-1200	V

Electronic Components

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DATA 1

TYPICAL OUTPUT CONDITIONS

Reading Gun:

Grid-No.1 (control grid) voltage for beam cutoff ^m	-120 to -70	v
Grid-No.2 voltage ^m	300	V
Grid-No.4 (beam focus) voltage ^{j,m}	200 to 440	V
Grids No.3 & No.5 (anode) voltage ⁿ	-20 to 0	V
External conductive coating	Grou	und
Target Section:		
Output-signal-electrode voltage	0	V
Shading electrode voltagen	0 to 20	V
Backplate voltage ⁿ	-15 to 0	V

PERFORMANCE CHARACTERISTICS

The Performance Characteristics shown below are obtained in one mode of tube operation which is representative of many applications. Trade-offs in these characteristics may be made to achieve optimum tube performance in other operating modes.

	Min.	Max.
Output Signal Current ^p	0.5	— μA
Storage Time ^q		See footnote r
Signal-to-Shading Ratio ^s	5:1	-
Signal-to-Background-Shading Ratio ^t .	8:1	-
Center Resolution, At 50% amplitude response	1600	 TV lines/ target diameter
Edge Resolution, At 50% amplitude response		See footnote v
Writing Speed	200	 μs/ target diameter
Shades of Gray ^w	7	-
Blemishes ^x		See footnote y

ENVIRONMENTAL CONDITIONS

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The 4598 will provide the performance specified under Performance Characteristics when the tube is exposed to the following environmental conditions:

Temperature-Altitude ^z	MIL-E-5400L, Par. 3.2.24.3, Table I Class 1A
Humidity	MIL-E-5400L, Par. 3.2.24.4
Shock	MIL-E-5400L, Par. 3.2.24.6
Vibration	. See accompanying Vibration Levels

Electronic Components DATA 2 2-71

- ^a The deflection coils are electrically similar to type Y65 manufactured by Syntronic Instruments Inc., Addison, Illinois. A variety of inductances are available, which are suitable for either push-pull or single-ended circuit configurations.
- b The orthogonality of the horizontal and vertical axes of each deflection coil is within 1/2 degree of 90 degrees. The horizontal axis of the writing deflection coil is parallel within 1/2 degree to the horizontal axis of the reading deflection coil.
- c The undeflected spots of both guns fall within a circle having a diameter that is 5 per cent of the target diameter, and is centered on the target.
- d The value shown is the capacitance of the assembly supplied with a solderable terminal as the output signal electrode connection; if a coaxial connector or cable is supplied, their capacitance must be added to this value.
- e Connection to the output signal electrode can be provided by means of a solderable terminal, coaxial connector, or coaxial cable. Connections to the deflection coils and low voltage electrodes are by flexible leads. Connections to the high voltage electrodes are made by silicone rubber leads; connectors such as type 840706 lead assemblies manufactured by AMP Inc., Capitron Division, Elizabethtown, PA, can also be supplied.
- 9 One side to be externally connected to writing-gun cathode.
- h With respect to writing-gun cathode.
- j Adjust for best focus.
- k One side to be externally connected to reading-gun cathode.
- m With respect to reading-gun cathode.
- n Adjust for optimum signal and storage performance.
- P This value is the saturated output signal current.
- 9 Storage time is proportional to the area scanned by the readinggun raster. The limits are given for a raster of aspect ratio 1:1, and inscribed within the target area.
- ^r The specified performance characteristics are obtained over a range of storage times from 1.0 second maximum to 3.0 seconds minimum. The specified performance characteristics except shades of gray are obtained over a range of storage times from 0.5 second maximum to 4.0 seconds minimum. Storage time is measured to 10 per cent of signal amplitude.

⁵ This limit applies to the central 75 per cent of the target. The measurement is taken along that single line of the output video signal which has the lowest signal-to-shading ratio.

^t This limit applies to the central 75 per cent of the target. The measurement is taken along that single line of the output video signal which has the lowest signal-to-background-shading ratio.

^u Resolution is measured using a raster written perpendicular to the horizontal scanning lines of the reading-gun raster, and with the writing-gun drive voltage adjusted to give a peak output signal 85 per cent of saturated signal amplitude.

A minimum resolution of 1200 TV lines per target diameter is obtained over 75 per cent of the target diameter. A minimum resolution of 1400 TV lines per target diameter is obtained over 75 per cent of the target diameter using dynamic focusing of the reading gun.

- A step voltage waveform with seven equally spaced levels is used as input.
- X Blemishes are measured within a circular area centered on the target and with a diameter of 90 per cent of the target diameter. Blemish size is specified as a percentage of the target diameter;

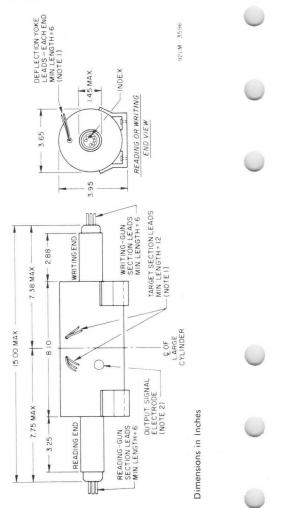
blemish amplitude, as a percentage of saturated signal amplitube. Blemishes with an amplitude of less than 10 per cent are not counted. Dark blemishes with a size of less than 1/8 per cent are not counted.

Y The maximum size of any light blemish is 1/2 per cent. The amplitude and number of light blemishes are limited as shown in the following table:

Amplitude	Maximum Number
10% to 50%	10
20% to 50%	3
Greater than 50%	0

- The maximum size of any dark blemish is 1/2 per cent. The maximum number of dark blemishes is five.
- ² The backplate voltage of the tube may be changed in a predetermined manner to compensate for the variation in storage time as a function of temperature.

DIMENSIONAL OUTLINE



Electronic Components

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DIMENSIONAL OUTLINE (cont'd)

Note 1 - All leads are labeled.

Note 2 – Connection to the output signal electrode can be provided by means of a solderable terminal, coaxial connector, or coaxial cable.

TARGET-SECTION LEADS

Lead 1: Writing-Gun Grid No.4

- Lead 2: Backplate
- Lead 3: Shading Electrode
- Lead 4: Reading Gun Grids No. 3 & 5
- Lead 5: Reading-Gun External Conductive Coating

WRITING-GUN SECTION LEADS

Lead 1: Heater Lead 2: Grid No.1 Lead 3: Grid No.3 Lead 4: Grid No.2 Lead 5: Cathode Lead 6: Heater

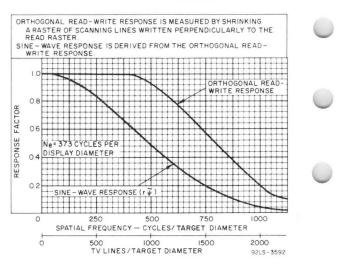
READING-GUN SECTION LEADS

Lead 1: Heater Lead 2: Grid No.1 Lead 3: Grid No.4 Lead 4: Grid No.2 Lead 5: Cathode Lead 6: Heater

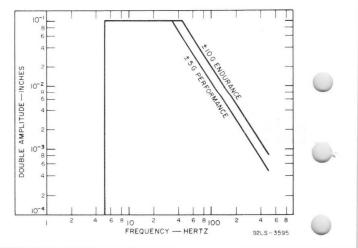
RBA Electronic Components

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FREQUENCY RESPONSE CHARACTERISTICS



VIBRATION LEVELS



RBA Electronic Components

DATA 4

Projection Kinescope

- 5"-Diameter Electrostatic-Focus, Magnetic-Deflection Type
- For Monochrome Television Projectors
- Designed for Use with Schmidt Reflective Optics
- High Picture Luminance 3000 fL at 300 µA
- High Resolution 600 TV Lines at 300 μA
- Forced-Air Cooled
- Rare Earth (White) Phosphor
- Fine Screen Texture
- Color Temperature 7800° K + 70 MPCD

General Data

Electrical:
Heater Current at 6.3 Volts 0.6 A
Focusing Method Electrostatic
Deflection Method ^a Magnetic
Deflection Angle (Approx.) 500
Direct Interelectrode Capacitances (Approx.):
Grid No.1 to all other electrodes 8 pF
Cathode to all other electrodes 5 pF
Optical:
Faceplate, Spherical Clear, Browning-Resistant Glass
Radius of curvature (inner radius) $\dots \dots \dots$
Minimum Useful Screen Diameter 4.50 in
Minimum Optical-Quality-Circle Diameter 4.25 in
Refractive Index of Faceplate 1.519
Phosphor, Aluminized P45 Rare Earth
C.I.E. coordinates (x,y) 0.290, 0.361
Luminescence White
Color temperature
Persistence Medium
Mechanical:
Tube Dimensions:
Overall length 12.19 + 0.37 - 0.38 in
Greatest diameter of bulb (Excluding cable) 5.00 \pm 0.12 in
Base

Electronic Components

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Absolute-Maximum ValuesbAverage Anode Power:9max.WWithout forced-air cooling of faceplate12max.WWith forced-air cooling of faceplate12max.WAir Flow to Face ^C when Average Anode40cfmPower Exceeds 9 Watts40cfmAnode-to-Cathode Voltage42max.kVGrid-No.3-to-Cathode Voltage9max.kVGrid-No.1-to-Cathode Voltage9max.VPositive bias value0max.VPositive bias value0max.VPositive bias value150max.VPositive bias value0max.VPeak positive value2max.VAnode Current, Long-Term Average300max. μ APeak Heater-Cathode Voltage:10max.VHeater negative with respect to cathode10max.VHeater positive with respect to cathode10max.VHeater Voltage (ac or dc) ^d {6.9max.VLeater Size4" x 3"40kVAnode Current, Long-Term Average300 μ A40Grid-No.3 Voltage for Focus at an Anode Current, Long-Term Average300 μ AGrid-No.3 Voltage for Focus at an Anode Current, Long-Term Average300 μ AGrid-No.3 voltage for Focus at an Anode Current of 300 μ A7.4 to 9kVGrid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused Spot </th <th>Anode Lead Molded-on, Insulated Cable, 48 in long Bulb J40H1 Operating Position Any Weight (Approx.) 1-1/2 lbs Maximum and Minimum Ratings,</th> <th>0</th>	Anode Lead Molded-on, Insulated Cable, 48 in long Bulb J40H1 Operating Position Any Weight (Approx.) 1-1/2 lbs Maximum and Minimum Ratings,	0
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At Recommended Operating Values: Center Resolution ^f	Heater Voltage	
Center Resolution ^f	Typical Performance Data	
Center Resolution ^f	At Recommended Operating Values:	
Luminance at 300 μ A		
	Luminance at 300 µA	

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Luminous Flux	250	lumens
Grid-No.3 Current (Total)9	±10	μΑ
Grid-No.2 Current	±15	μΑ

Circuit Requirements

High-Voltage Circuits:

In order to minimize the possibility of damage to the tubes and adjacent circuits caused by a momentary internal arc, it is recommended that the high-voltage power supply and the grid-No.3 power supply be of the limited-energy type. An external spark gap must be provided at the grid-No.3 terminal. The following resistor and voltage values are mandatory.

Anode-Circuit Resistance (unbypassed)	0.5	min. M Ω
Grid-No.3 Circuit Resistance (unbypassed)	0.1	MΩ
Grid-No.3 Spark-Gap Firing Voltage	12	kV
Low-Voltage Circuits:		
Grid-No.2 Circuit Resistance (bypassed)	10	kΩ
Grid-No.1 Circuit Resistance (unbypassed)	1	kΩ
Effective Grid-No.1-to-Cathode Circuit Resistance	1.5	max. M Ω

- ^a Sharp corners on the yoke assembly in the vicinity of the tube neck should be avoided. Insulation between the yoke winding and/or the core and the tube neck should be capable of withstanding at least 10 kV and preferably 15 kV.
- b A description of the Absolute Maximum Ratings is given in the General Section, titled Rating System for Electron Tubes.
- C The specified air flow should be delivered perpendicularly from a nozzle having a diameter of about 2 inches onto the face of the tube while it is in operation. In a typical system with air filter, the total system static pressure is approximately 0.25 inch of water. The cooling air must not contain water, dust, or other foreign matter. The air-cooling system should be electrically interconnected with the anode power supply to prevent operation of the tube without cooling.
 - Cooling of the tube by a tangential flow of air across its face is not recommended because the temperature gradient produced across the face may result in immediate or delayed cracking of the face.
- d For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts.
- ^e This tube may be operated at reduced anode voltage and/or anode current. At reduced anode voltage, center resolution will decrease. At reduced anode voltage and/or anode current, lumi-

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nance will decrease. The grid-No.3 voltage for focus will be reduced in proportion to the reduction in anode voltage. Other performance characteristics may also be affected.

- f Determined for a 3-inch high TV resolution test pattern with tube operating at a screen current of 300 microamperes.
- 9 Grid-No.3 current is normally low, as indicated in the data, when the tube is operated under recommended conditions. Lower grid-No.3 voltage (as required for focus if anode voltage is reduced) and/or higher grid-No.2 voltages can lead to a grid-No.3 current level approaching that measured in the anode circuit. Note that the fraction of available current intercepted by the grid-No.3 electrode is not constant, but increases with increasing anode current.

Safety Precautions

X-Radiation Warning

Although X-radiation is generated primarily at the face of the tube when it is operated, the X-rays are emitted in all directions.

These rays can constitute a health hazard unless the tube is adequately shielded. Make sure that the shielding provides the required protection against personal injury.

On the neck of the tube itself the following warning appears and should be strictly adhered to:

X-RAY WARNING

This tube in operation produces X-Rays which can constitute a health hazard unless the tube is adequately shielded for radiation.

In normal operation, this tube produces more x-radiation than the Tube Type 5AZP4 which it may replace. Make sure that shielding is adequate.

High Voltage

The high voltages at which this type is operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the enclosing of highpotential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

In the use of this tube it should always be remembered that high voltages may appear at normally low-potential points in the circuit because of capacitor breakdown or incorrect circuit connections, and that the tube surface maintains a static charge for some time after the power has been turned off. Therefore, before any part of the circuit or the tube is touched, the power-supply switch should be turned off, both terminals of high-voltage capacitors should be grounded, and the terminals of the high-voltage power supply should be grounded.

After these steps have been taken and before touching the tube, discharge the anode terminal, the surface of the faceplate, and the coated surface of the cone by use of a suitable wand which is connected to ground. It is to be noted that the entire surface of the cone and of the faceplate will not be discharged by touching the wand to a single point on either surface, because the surfaces have high resistance. Therefore, to discharge each surface, it will be necessary to sweep over the entire surface with the wand.

Tube Handling

Wear "Safety" Goggles with side shields, when handling tube to prevent possible injury from flying glass in case of tube breakage. Do not strike or scratch tube. Never subject it to more than moderate pressure when installing in or removing from equipment. Always Handle Tube with Extreme Care. Ground anode contact before touching after power is off.

Operating Considerations

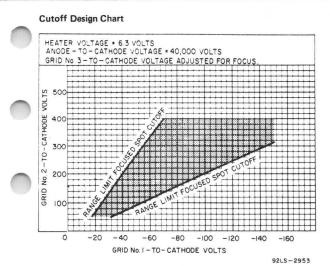
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Humidity Considerations. When humidity is high, a continuous film of moisture may form on untreated glass. If a high-voltage gradient is present, this film may permit sparking to take place over the glass surface. In order to minimize the formation of a continuous moisture film, the glass cone is treated with a transparent moisture-repellent insulating coating. This coating must not be scratched, and must be

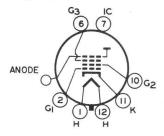
kept clean and free from contamination such as fingerprints. The coating may be washed with a solution of a mild soapless detergent and water. After the surface is washed, it should be rinsed with clean water and be dried immediately. Any damage to the coating or any contamination on the surface may result in sparking over the cone of the bulb.

Dust Considerations. The high voltage applied to the tube increases the rate at which dust is precipitated on the surface of the tube. The rate of precipitation is further accelerated in the presence of corona. Such dust not only decreases the insulation of the bulb coating but also reduces the amount of radiation transmitted through the bulb face. The dust usually consists of fibrous materials and may contain soluble salts. The fibers absorb and retain moisture; the soluble salts provide electrical leakage paths that increase in conductivity as the humidity increases. Because a film of dust can nullify the protection provided by the insulating coating on the bulb, the tube should be protected as much as possible from dust and should be cleaned, when necessary, as described under **Humidity Considerations**.

Corona Considerations. A high-voltage system may be subject to corona, especially when the humidity is high, unless suitable precautions are taken. Corona, which is an electrical discharge appearing on the surface of a conductor when the voltage gradient exceeds the breakdown value of air, causes deterioration of organic insulating materials, induces arc-over at points and sharp edges, and forms ozone, a gas which is deleterious to many insulating materials. Sharp points or other irregularities on any part of the high-voltage system may increase the possibility of corona and should be avoided. Instead, rounded contours and surfaces should be used.



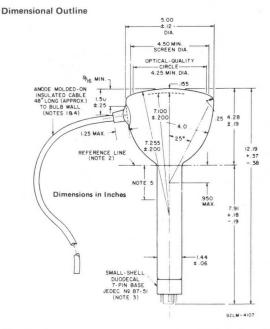
Basing Diagram, Bottom View



- Pin 1: Heater
- Pin 2: Grid No.1
- Pin 6: Grid No.3
- Pin 7: Internal Connection Do not use
- Pin 10: Grid No.2
- Pin 11: Cathode
- Pin 12: Heater
- Flexible Cable: Anode

Note: Socket contacts for vacant pin positions No.3, 4, 5, 8, and 9 should be removed so that maximum insulation is provided for pins No.6 and 7.

> Electronic Components



- Note 1 The plane through the tube axis and vacant pin position No.3 may vary from the plane through the tube axis and anode-cable connection at bulb wall by angular tolerance (measured about the tube axis) of ±20°. Anode-cable connection is on same side as vacant pin position No.3.
- Note 2 Reference line is determined by position where gauge 1.500" +0.003" -0.000" I.D. and 2" long will rest on bulb cone.
- Note 3 Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Socket contacts corresponding to vacant pin positions No.3, 4, 5, 8 and 9 should be removed in order to provide maximum insulation for pins No.6 and 7.
- Note 4 Anode cable should not be sharply bent within 3" of bulb wall.
- Note 5 To avoid excessive interaction between the deflecting and focusing fields, the windings of the deflecting yoke should not extend more than 2 inches from the reference line toward the base.

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RADECHON

CHARGE STORAGE TUBE

SINGLE-BEAM. BARRIER-GRID TYPE CAPACITANCE-DISCHARGE READING

6799

NON-EQUILIBRIUM WRITING

DATA

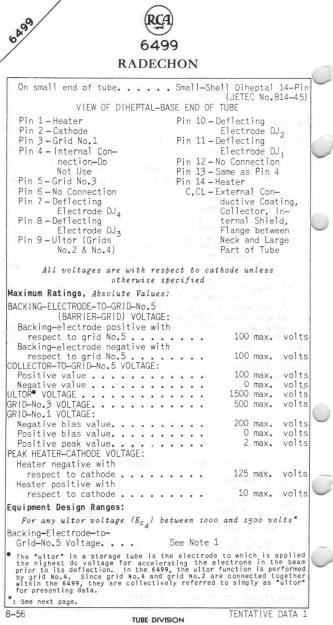
General:

	Heater, for Unipotential Cathode:
Y	Voltage 6.3 ac or dc volts
9	Current 0.6
	Direct Interelectrode Capacitances (Approx.):
	Deflecting electrode DJ ₁ to all
	other electrodes 13 μμf
	Deflecting electrode DJ ₂ to all
Ń.	other electrodes
P.	Deflecting electrode DJ ₃ to all
	other electrodes $\dots \dots \dots$
	Deflecting electrode DJ_4 to all
	DJ ₁ to DJ ₂
	DJ_3 to DJ_4
	Grid No.5 ⁺ to backing-electrode 800 µµf
	Grid No.5 and backing-electrode
	to collector 4 μμf
	Collector to all other electrodes &
	external cylindrical shield See Curve
	Focusing Method
	Deflection Method.
	Overall Length
	Greatest Diameter of Tube
	Minimum Useful Storage-Surface Diameter
	Mounting Position Any except those positions where
	the diheptal base is up and the
	tube axis is at an angle of less
	than 60 ⁰ from the vertical.
	Weight (Approx.)
	Base:
	On large end of tube Small-Button Twentyninar 8-Pin
	(JETEC No.E8-19)
	VIEW OF TWENTYNINAR-BASE END OF TUBE
	Pin 2 Multiple Connec-
	Pin 6 tions to Backing-
	Pin 10 Flectrode, Only
	Pin 14 One Need be Used
	Pin 18
	Dia 21 No Canada Marine Contra
	Pin 21 - No Connec-
	tion
	Pin 25 - No Connec-
	tion (2) (2) (3) (4)
	Pin 28-Grid No.5
	PINS 2 6 10 11 18: 01 1-7/8"
	PINS 2.6.10,14,18: ON 1-7/8"
	PINS 21, 25, 28: ON 7/8" DIA. SOLID-LINE CIRCLES DEPICT DIHEPTAL BASE
	PIN CIRCLE BROKEN-LINE CIRCLES DEPICT TWENTYNINAR BASE
	8-56 TENTATIVE DATA 1

8-56

TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA 1



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



67.99

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3-56	TENTATIV	E DATA 2
Note 3: See next page.		
Spot position is calculated 6.3 volts, ultor voltage of 1000 vo collector voltage of 1050 volts, focus, grid-No.I voltage adjusted current, each deflecting electrode to ultor, and the tube shielded fro	1s, grid-No.3 voltage of 11 grid-No.3 voltage adjuste for 15 microamperes peak connected through a 1-megohn m all extraneous fields, the	d to give collector resistor voltages
Note 2: The undeflected focused sp a diameter equal to 10% of the and having its center coincider surface.		
Note 1: The backing-electrode, gri ated at the same dc potential. Du electrode may be pulsed to ±60 vol	d No.5, and ultor are usua ring the writing cycle, the ts with respect to grid No.	lly oper- backing- 5.
It is recommended that all deflect be approximately equal.		
* In general, the recommended minimum 1000 volts. Signal output and reso voltage. Secondary emission char limit the maximum ultor voltage to	lution decrease with decreas acteristics of the dielect 1500 volts.	ric layer
Resistance in Any Deflecting- Electrode Circuit*	1.0 max.	megohn
Maximum Circuit Values: Grid-No.1-Circuit Resistance .	1.5 max.	megohms
DJ_3 and DJ_4	78 10 90	v uc/m.
DJ_1 and DJ_2		v dc/in. v dc/in.
cutoff	-25 to -47	volts
No.1 volts = 0 Grid-No.1 Voltage for collector-current	140 (0 200	VOTES
Grid-No.3 Voltage for Focus with grid-	140 to 260	volts
For ultor voltage of	1000	volts
Examples of Use Design Ranges:		
Spot Position	See Note 2 See Note 3	
DJ_3 and DJ_4	78 to 96 v dc/in./k	v of Ec4
Deflection Factors: DJ and DJ2	85 to 105 v dc/in./k	v of Ec.
for grid-No.1 volts = 0	See Curve	
grid-No.1 volts = 0 Max. Cathode Current	20 to 50	µamp
Collector Current for	-2.5% to -4.7% of E_{C_4}	volts
Grid-No.1 Voltage for collector-current	al last to provide the	
Focus with grid- No.1 volts = 0	14% to 26% of E_{C_A}	volts

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8-56

RADECHON

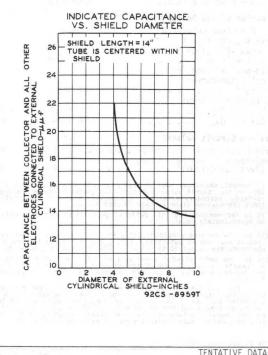
required to displace the beam from its undeflected position to the edge of the storage surface in the direction of each deflecting electrode are recorded as a for DJ $_1$, b for DJ $_2$, c for DJ $_3$, and d for DJ $_4$.

Spot Position in **\$** of Storage-Surface Diameter = $1/2\sqrt{\left(\frac{b-a}{b+a}\right)^2 + \left(\frac{d-c}{d+c}\right)^2} \times 100$

Note 3: with voltages as specified in Note 2, and with a signal written into storage by applying a series of well-formed symmetrical square waves to grid No.1 such that a series of 25 equally spaced stored elements are written across a single line scan, the ratio of the maximum to minimum signal amplitude observed as the single line scan is moved across the storage surface will not exceed 1.35.

OPERATING CONSIDERATIONS

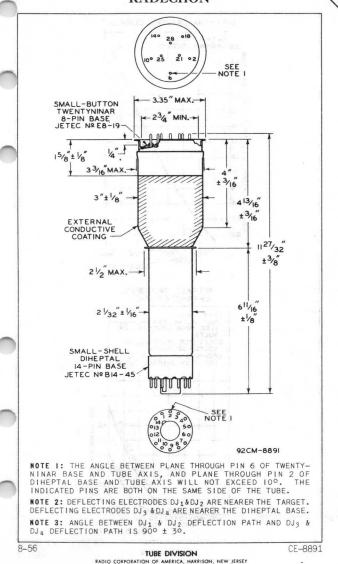
Shielding. The use of a magnetic shield of high-permeability material surrounding the tube is recommended. This shield prevents the effect of stray fields in causing unwanted deflection of the electron beam.

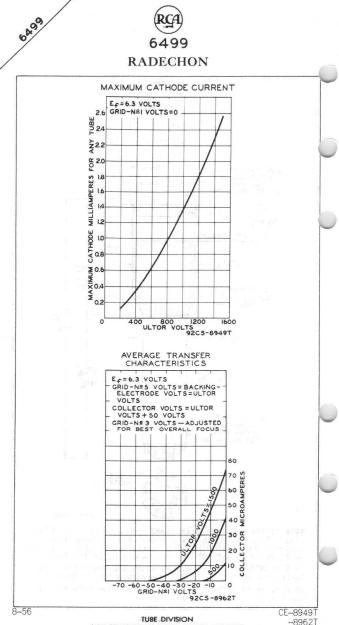




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RADECHON



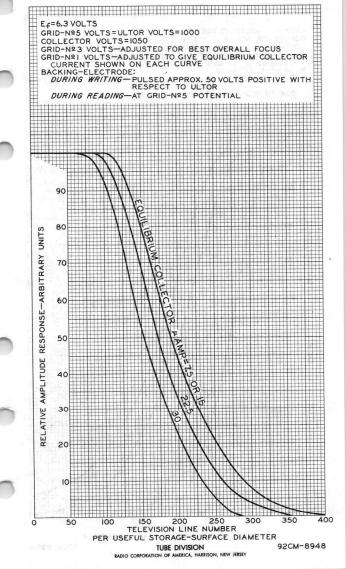


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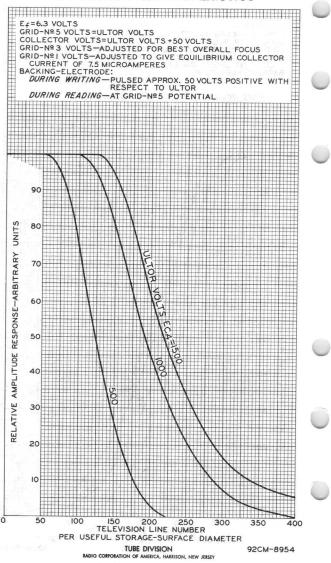


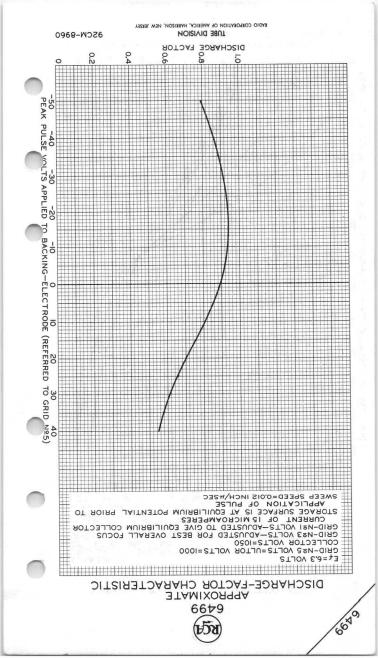


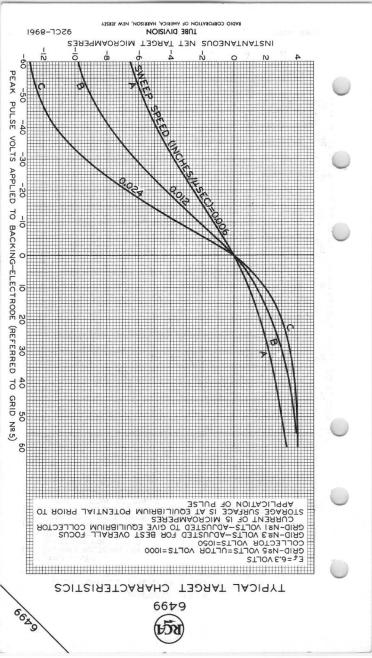




RESOLUTION CHARACTERISTICS









DISPLAY STORAGE TUBE

DIRECT-VIEW TYPE

4"-DIAMETER DISPLAY

NON-EQUILIBRIUM WRITING GRID-CONTROL READING (VIEWING)

DATA

Co	n	0	ra	1.	
ue		e	ı a	۰.	

	Writing Se	ection	Viewing Sect	ion
Heater, for Unipotential Cathoo				
Voltage (AC or DC)		*	6.3	volt
Current			0.6	am
Minimum Cathode Heating Time			0.0	
before other electrode volt-				
ages are applied			30	se
Direct Interelectrode			50	30
Capacitances (Approx.): ⁰				
Grid No. I to all other				
tube electrodes	. 6		18	μμ
Cathode to all other	. 0			14-
tube electrodes	. 4.2		6.5	μμ
Deflecting electrode DJ, to			0.5	14-
deflecting electrode DJ	. 1.8		-	μμ
Deflecting electrode DJ to				7.00
deflecting electrode DJ	. 1.8			μμ
DJ, to all other tube electrode				μμ
DJ, to all other tube electrode			the late	μμ
DJa to all other tube electrode				μμ
DJ to all other tube electrode				μμ
Focusing Method		tatic	None	11
Deflection Method			None	
Deflecting-Electrode Arrangemen			_	
	sional Ou			
Phosphor		Hi	gh-Visual-Ef	fi-
1			ciency Type,	
			Aluminized	
Fluorescence	. –		Yellow	
Phosphorescence	. –		Yellow	
Minimum Useful Screen Diameter.				4
Maximum Overall Length				. 15-1/2
Seated Length				14" ± 3/8
Maximum Tube Radius				. 3-5/32
Bulb-Flange Diameter				8" ± 1/16
Greatest Bulb Diameter				5" ± 1/16
Bulb Terminals:				
Caps (Two)				
Flange			ee Dimension	
Flexible cable			ee Dimension	
Ambient-Temperature Range			•••• -65°	
Mounting Position				An
Weight (Approx.)			175CDA	2 lb
Socket	Alden	Fart No	-435SBA, or -Pin (JETEC	No E31 34
Base Small-Bu	itton inirty	rivar Si	-PIN (JEIEC	NO. E31-30
^O Without external shield.				

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

6866 DISPLAY STORAGE TUBE

6860

BOTTOM	VIEW - ON CONFLANGE
Pin 1-No Connec-	9
tion	
Pin 2-Same as Pin 1	7
Pin 3-Deflecting	
Electrode DJ ₄	
of Writing Gun	SI CITATION DE MO
Pin 4 - Deflecting	
Electrode DJ ₃	(4) (18)
of Writing Gun Pin 5-Same as Pin 1	3 2 3 / 19
Pin 6-Grid No.3 of	2 2 2 2 2 2
Writing Gun	SHORT
Pin 7-Same as Pin 1	INDEX PIN
Pin 8-Heater of	Pin 22 - Heater of
Writing Gun	Viewing Gun
Pin 9-Heater of	Pin 25 - Same as Pin 1
Writing Gun	Pin 26 - Same as Pin 1
Pin 10-Grid No.1 of	Pin 27 - Cathode of Writing Gun
Writing Gun	Pin 28 - Same as Pin 1
Pin 11-Same as Pin 1	Pin 29 - Same as Pin 1
Pin 12-Same as Pin 1 Pin 13-Deflecting	Pin 32-Grid No.1 of
Electrode DJ	Viewing Gun
of Writing Gun	Pin 33 - Cathode of
Pin 14 - Deflecting	Viewing Gun
Electrode DJ ₂	Pin 34 - Same as Pin 1
of Writing Gun	Pin 35-Heater of
Pin 15-Grid No.2 of	Viewing Gun
Writing Gun	Flexible Cable - Con-
Pin 16 – Internal Con-	nection to
nection-Do	Screen Flange - Backing-
Not Use Pin 17-Grid No.4 of	Electrode
Writing Gun,	Recessed Cavity Cap -
Grid No.2 of	Nearer Tube
Viewing Gun	FaceGrid No.4 of
Pin 18-Same as Pin 1	Viewing Gun
Pin 19-Same as Pin 1	Nearer Electron
Pin 20 - Same as Pin 16	GunsGrid No.3 of
Pin 21-Same as Pin 1	Viewing Gun
aximum Ratings, Absolute Value	s:
Writ	ing Section Viewing Section**
CREEN VOLTAGE	- 11000 max, volts
EAK BACKING-ELECTRODE	
VOLTAGE	- 20 max volts
Pins 23 and 31 are not shown beca dimension as the short index pin an	ause they are trimmed to the same d are not to be used.
*	
*: See next page.	
0-56	TENTATIVE DATA 1

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



DISPLAY STORAGE TUBE

		Writing	Section	Viewing	Sectio	n**
	E	quivaler	nt Values			
GRID-No.4 VOLTAGE	2900	max.*	150 max.	** 300	max.	volts
GRID-No.3 VOLTAGE	1000	max.*	-	300	max.	volts
GRID-No.2 VOLTAGE	2750	max.*	- <u>-</u>	150	max.	volts
CATHODE VOLTAGE	-		-2900 max.	** -		volts
Negative bias value		200	max.*	100	max.	volts
Positive bias value		0	max.*	0	max.	volts
Positive peak value		2	max.*	0	max.	volts
PEAK VOLTAGE BETWEEN GRID No.4 AND ANY						
DEFLECTING ELECTRODE PEAK HEATER-CATHODE		500	max.	-		volts
VOLTAGE:						
Heater negative with		105	*			- Sand to
respect to cathode Heater positive with		125	max.*	125	max.	volts
respect to cathode		125	max.*	125	max.	volts
	VIEW	ING SE	CTION**			
Operating Values and T	ypic	al Per	formance C	haract	eristi	cs:
Screen Voltage DC Backing-Electrode	-	5000	10000	1	0000	volts
Voltage		5	5		5	volts
Grid-No.4 Voltage		150	210		150	volts
Grid-No.3 Voltage [#]	. 25	5 to 125	50 to 15	60 25	to 125	volts
Grid-No.2 Voltage ^{1#}	. 50) to 75	70 to 10	5 50	to 75	volts
Grid-No.I Voltage [#]	. () to -50	0 to -7	5 0	to -50	volts
Maximum Screen Current Maximum Peak Backing-	•	350	600		350	µamp
Electrode Current		1.5	2		1.5	ma
Vaximum Grid-No.4 Current		2	3		2	ma
Maximum Grid−No.3 Current.		1.5	2		1.5	ma
Waximum Cathode Current.		3	4		3	ma
Writing Speed ^{††}	• 3	00000	300000	300	0000	in./sec
Number of Half-Tone Steps	,	5	5		5	
Viewing Duration Maximum Erasing-Uniformity		40	20		40	sec
Factor ¹⁰	,	0.5	0.5		0.5	
Resolution [®]		50	50		50 I	ines/in.
Brightness	•	275	2750		1500	f
** Voltages are shown with	resp	ect to	cathode of W	iewing (Sun.	
# Adjusted for brightest,	most	unifor	m pattern.			
Grid No.2 of the Viewin the Writing Gun.						
For conditions with cor No.2 voltage, and grid- pattern.	mbine -No.3	d adjus voltag	tment of gr e to give bi	id-No.1 rightest	voltage , most	e, grid- uniforn
*, ††, ¤, ▲, ¤, *, •. See next				5 52		a change



DISPLAY STORAGE TUBE

WRITING SECTION®

Range Values for Equipment Design:*

°°°°

With any grid-No.2 voltage (E $_{\rm C_2})$ between 500 and 2750 volts

Grid-No.4 Voltage (Ec.,)	95% to 105% of Ec.	volts
Grid-No.3 Voltage for Focus	14% to 28% of Ec.	volts
Maximum Grid-No. I Voltage	2	
for Cutoff of Undeflected		
Focused Spot	-4.6% of Ec.	volts
Maximum Grid-No.3 Current	-15 to +10 ²	µamp
Maximum Cathode Current	See Curve	
Deflection Factors:		
DJ1 and DJ2	28 to 38 v dc/in.	kv of Ec.
DJ_3 and DJ_4^2	28 to 38 v dc/in.	
Focused Beam Position	##	-

Examples of Use of Design Ranges:*

With grid-No.2 voltage of	1500	2500	volts
Grid-No.4 Voltage (E _{C,1})	1425 to 1575	2375 to 2625	volts
Grid-No.3 Voltage for Focus	210 to 420	350 to 700	volts
Maximum Grid-No.1 Voltage			
for Cutoff of Undeflected			
Focused Spot	-69	-115	volts
Deflection Factors			
when $E_{C_{11}} = E_{C_{2}}$:			
DJ, and DJ2	42 to 57	70 to 95	v dc/in.
DJ_3 and DJ_{μ}	42 to 57	70 to 95	v dc/in.

Equivalent Values for Examples of Writing-Gun Voltages Referred to Cathode of Viewing Gun:

Cathode Voltage .		 -1450 to -1395	-2450 to -2395	volts
Grid-No.2 Voltage		 -25 to +180	-75 to +230	volts
Grid-No.3 Voltage	for Focus	 -1240 to -975	-2100 to -1695	volts
Grid-No.4 Voltage		 50 to 105	50 to 105	volts

VIEWING SECTION and WRITING SECTION

Circuit Values:

Grid-No.l-Circuit Resistance (Either gun) 1.0 max. megohm Resistance in Any Deflecting-Electrode Circuit 0.1 max. . . . megohm Backing-Electrode-Circuit Resistance. 0.005 max. megohm 1.0 min. Series Current-Limiting Resistance in Screen Circuit. megohm

Voltages are shown with respect to cathode of Writing Gun.

Voltages are shown with respect to cannot or mitting during the assured under conditions of writing from just zero brightness (view-ing-beam cutoff) to maximum brightness with grid No.1 of writing Gun at -10 volts with respect to cathode of Writing Gun, and grids No.2 and No.4 of Writing Gun at +2500 volts with respect to cathode of Writ-ing Gun.

Observed with an RCA-2F21 Monoscope display.

TENTATIVE DATA 2

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



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DISPLAY STORAGE TUBE

۵ Expressed in terms of the time required for the brightness of the un-written background to rise from just zero brightness (viewing-beam cutoff) to 10% of the maximum brightness.

Defined as $(t_2 - t_1)/t_2$, where

- t1 = time measured from start of erasing to instant at which any screen area is reduced to zero brightness. t2 = time measured from start of erasing to instant at which en-tire screen area is reduced to zero brightness.

Measured by shrinking-raster method at a display brightness of 50% of saturated brightness and with grids No.2 and No.4 of Writing Gun at +2500 volts with respect to cathode of Writing Gun.

- 99 Measured with entire storage grid written to produce maximum brightness and with screen at indicated voltage.
- . The cathode of the Writing Gun is operated at about -2500 volts with respect to the cathode of the Viewing Gun which is usually operated at ground potential.
- The center of the undeflected focused beam will fall within a circle having a 10-mm radius concentric with the center of the face under the following conditions: grids No.2 and No.4 of writing Gun at +2500 volts with respect to cathode of Writing Gun, grid No.3 of writing Gun at voltage to give focus, grid No.1 of writing Gun at voltage which will permit storage of a charge just sufficient to give a barely perceptible spot on screen, viewing Section operating under normal conditions, and tube shielded against extraneous fields. ## 62
 - It is recommended that the deflecting-electrode-circuit resistances be approximately equal.

OPERATING CONSIDERATIONS

Magnetic shielding must be provided to prevent external fields from interfering with the required accurate control of the low-velocity viewing beam. A cylindrical shield of properly annealed high-permeability material about 1/16-inch thick is usually satisfactory. The screen cable should be placed outside the shield.

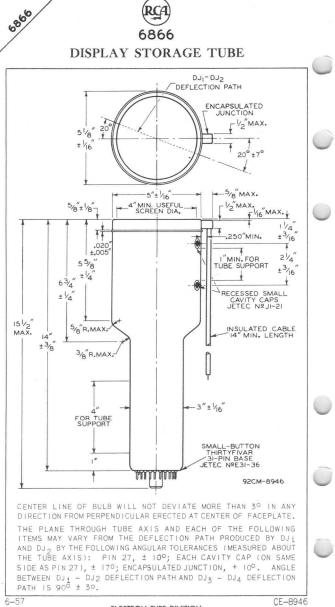
The metal flange at the face end of the tube requires the use of a spring-contact ring bearing against the edge of the flange.

To prevent possible damage to the tube, allow the viewinggun beam current to reach normal operating value before turning on the writing-gun beam current, and keep the viewing beam on until the writing beam is turned off.

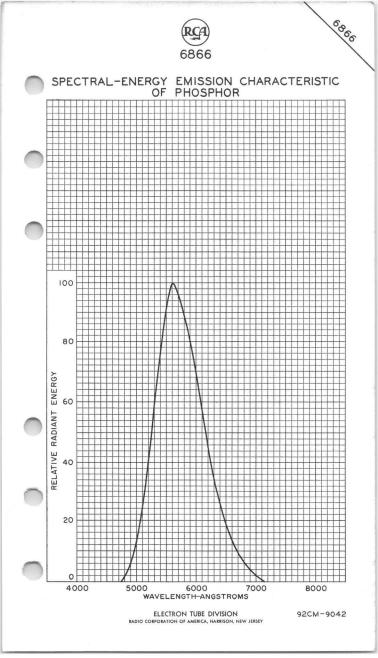
6-57

 Indicates a change. TENTATIVE DATA 3

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



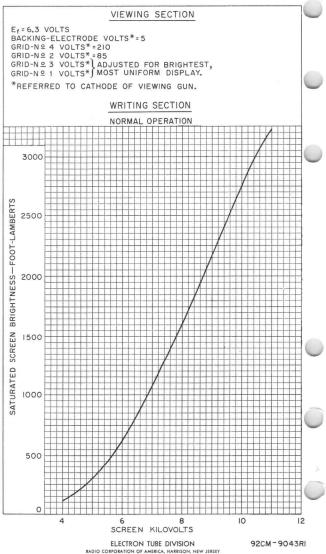
ELECTRON TUBE DIVISION





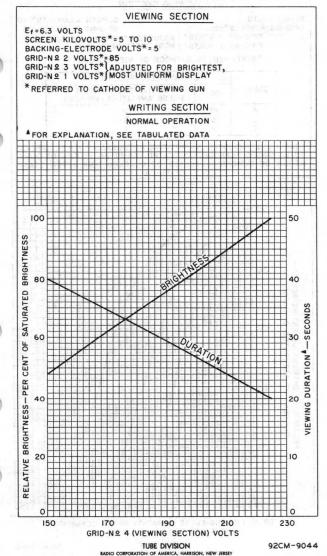
°°°°

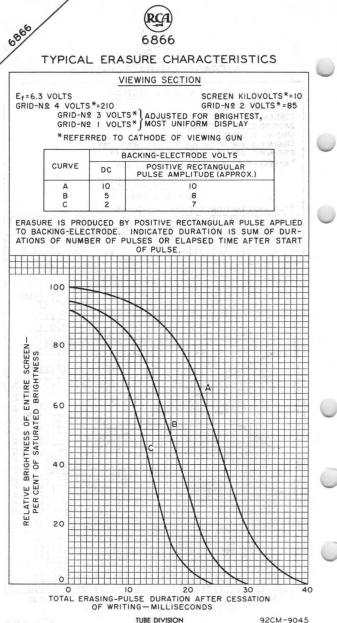
AVERAGE CHARACTERISTIC





AVERAGE CHARACTERISTICS





RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



CURRENT CHARACTERISTIC

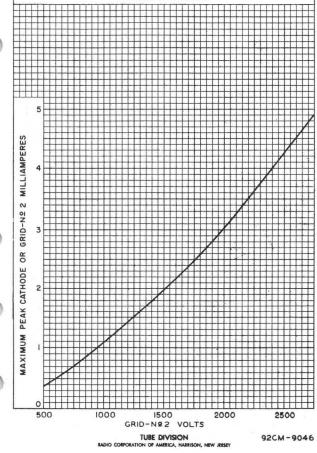
WRITING SECTION

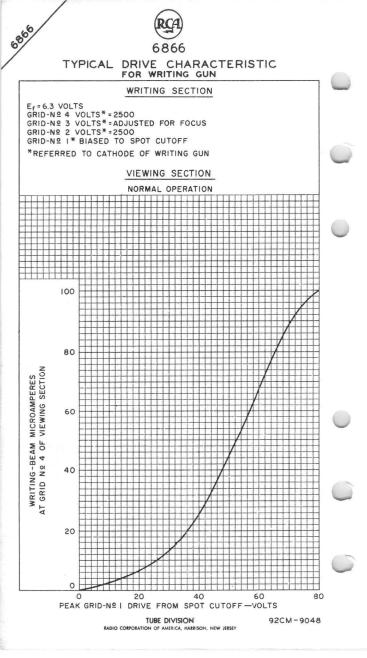
 $\begin{array}{l} {\sf E}_f{=}\,6.3 \ \mbox{VOLTS} \\ {\sf GRID}{=} {\sf N}{=} \ 4 \ \mbox{VOLTS}^{\mbox{*}}{=} {\sf GRID}{=} {\sf N}{o}. 2 \ \mbox{VOLTS} \\ {\sf GRID}{=} {\sf N}{=} \ 3 \ \mbox{VOLTS}^{\mbox{*}}{=} {\sf ADJUSTED} \ \mbox{FOR FOCUS} \\ {\sf GRID}{=} {\sf N}{=} \ \ \ \mbox{VOLTS}^{\mbox{*}}{=} {\sf O} \end{array}$

*REFERRED TO CATHODE OF WRITING GUN

VIEWING SECTION

NORMAL OPERATION





Display-Storage Tube

5-Inch Diameter

High Display Uniformity Improved Collimation System Design Typical Luminance of 1300 Footlamberts

For use in radar and other information-handling systems requiring bright non-flickering displays of stored information, including half-tones, for relatively long periods.

The 7183A is Directly Interchangeable with Type 7183.

	GENERAL			
		Writing	Viewing	
		Section	Section	
)	Heater, for Unipotential Cathode:			
	e diffe del	$6.3 \pm 10\%$	$6.3 \pm 10\%$	37
	Current at 6.3 volts	0.6	$0.3 \pm 10\%$ 0.6	· •
		0.6	0.6	A
	Cathode Heating Time			
	(Minimum)before other electro	de		
	voltages are applied	-	60	8
	Direct Interelectrode			
	Capacitances:			
	Grid No.1 to all other			
	electrodes	7	-	pF
	Cathode to all other			
	electrodes	5	-	pF
	Backplate to all other			
	electrodes	-	100	pF
	Focusing Method	Electro-	_	F-
-	r ocubing method i i i i i i i i i	static		
	Deflection Method	Magnetic	-	
	Phosphor	-	P20,	
			Aluminized	
	Minimum Useful Viewing Diame	eter		. 4"
	Maximum Overall Length		1	1.62"
-	Maximum Seated Length		1	1.25"
	Maximum Diameter (Excluding	Screen		
	Connector Assembly)			5.06"
	Bases:			
	Writing Gun	Small-Button	n Neoditetrar	8-Pin
	_		(JEDEC No.E	8-49)
-	Viewing Gun	. Small-But	ton Miniature	7-Pin
			(JEDEC No.	
	Bulb Terminals (Five)	Rec	essed Small C	
			(JEDEC No.J	
			COLDEC NO.0	1-41/
1000				

Electronic 日// Components

Screen Connector Assembly	Products	Aircraft-M , Inc., ^o Type 1 692 ^b , or equiv	LGH,
Operating Position			
ABSOLUTE MAXIMUM AND MIN	IMUM RAT	INGS	
All voltages are shown with	n respect t	to the cathode	2
of the viewing gun unless ot			
	Minimum	Maximum	
Screen Voltage:			
Peak	0	10,000	V
DC	0	9,000	V
Backplate Voltage:			
Peak	0	30	V
DC	-30	10	v
Collector (Viewing-Grid-	00		
No.5) Voltage	180	300	V
Collimator (Viewing-Grid-			
No.4) Voltage	50	150	V
Viewing-Grid-No.3 Voltage,			
Writing-Grid-No.4 and			
Writing-Grid-No.2 Voltage ^d	10	150	V
Viewing-Grid-No.2 Voltage	100	150	V
Viewing-Grid-No.1 Voltage	0	-100	V
Viewing-Gun Heater-to-			
Cathode Voltage	-125	125	V
Writing-Grid-No.3 Voltage ^e	0	1200	V
Writing-Grid-No.1 Voltage ^e	-200	(f)	V
Writing-Gun Cathode Voltage	-2750	145	V
Writing-Gun Heater-to-			
Cathode Voltage	-125	125	v
Series Current-Limiting			
Resistor (Unbypassed) in	1		MΩ
Screen Circuit	1	-	IVIS2
Resistor (Unbypassed) in			-
Collector (Viewing-Grid-			
No.5) Circuit	0.005		MΩ
RECOMMENDED OPERATING V		-	MIL
		to the outhout	
All voltages are shown wit of the viewing gun unless ot			2
Screen Voltage			17
Backplate Voltage ⁹		. 0	V
Collector Voltage			v
Collimator Voltage ^h			v
commander rorrage		. 10 10 110	T CONTRACTOR OF THE OWNER OF THE OWNER
R P Electronic		D	ATA 1

LKG/L Components

	Viewing-Grid-No.3 Voltage ^{d, h} 10 to 40	V
	Viewing-Grid-No.2 Voltage 100	V
	Viewing-Grid-No.1 Voltage ^h	V
-	Writing-Grid-No.3 Voltage ¹ 1925 to -1675	V
	Writing-Grid-No.1 Voltage (f,k)	V
	Writing-Gun Cathode Voltage2500	V
	Circuit Values:	
	Grid-No.1 circuit resistance (Either gun)	MΩ
-	Backplate-circuit resistance 0.005 max.	MΩ
	Series current-limiting	MIDE
	resistor (Unbypassed) in	
	screen circuit 1	MΩ
	Series current-limiting	
	resistor (Unbypassed) in	
-	collector (Viewing-grid-No.5)	
	circuit 0.01	MΩ
	PERFORMANCE DATA AND CHARACTERISTICS	
	Min. Typ. Max.	
	Useful Viewing Diameter 4.0	in
	Luminance (Brightness) ^m – 1300 –	fL
	Viewing Duration ⁿ 10	S
	Erase Time ^{p}	ms
	Erasing Uniformity Factor:	
	For 4 ^r diameter area ^q	
	Resolution' 50 1	lines/ in
	Undeflected Spot Position (s)	
	Screen Current ^m	μA
	Viewing-Gun Grid-No.5	
	Current [*] 1.0 2.4 Maximum Viewing-Gun	mA
	Cathode Current ^U	mA
	Maximum Writing-Gun	
	Cathode Current ^v	mA
	^a Aircraft-Marine Products, Inc., Capitron Division, 155	Park
-	St., Elizabethtown, Pa.	1 Curre
	^b This part mates with Aircraft-Marine Products, Inc.,	Part
	No.AMP833589, ceramic terminal, or equivalent.	
	d Grids No.4 and No.2 of Writing Gun and grid No.3 of Vie	ewing
	Gun are connected within the tube.	0
	^e Voltages are shown with respect to cathode of Writing	Gun.
	f The writing-gun grid No.1 should never be more pos	
	than necessary to write the display to saturated bright	
		ATA 2
	LL Components	5-68

for a given scanning and drive condition. In no case should the writing-gun grid-No.1 voltage have a value greater than zero with respect to the writing-gun cathode.

- ^g Dynamic erasure and bright-ring elimination circuitry are recommended. Dynamic erasure is accomplished by a series of rectangular pulses. The backplate should be maintained at zero volts between erase pulses. Bright-ring elimination is accomplished by connecting an 0.1 µF, 200 VDC capacitor between the backplate electrode and the collimator electrode.
- h Adjusted for brightest, most uniform, full-size pattern.
- Adjusted for the smallest, most circular spot.
- k The maximum bias-voltage value for writing-beam cutoff is -130 volts with respect to writing-gun cathode.
- ^m Luminance (Brightness) and screen current are measured after the entire display is written to saturated brightness, the writing gun has been turned off, and with no erasing pulse applied.
- ⁿ The time required for any 1.5-inch diameter area of the useful 4-inch diameter viewing area to spontaneously rise (with no writing or erasing) from zero brightness (viewing-beam cutoff) to 10% of saturated brightness.
- ^p With the display at saturated brightness, a series of rectangular pulses 5 milliseconds in width and at a repetition frequency of 2 pps is applied to the backplate. The number of pulses required to just erase completely the center of the display is noted. This number is multiplied by 5 milliseconds to obtain the erase time. The amplitude of the erase pulses is adjusted to obtain the minimum erase time.
- ^q Determined as follows: With no erasing pulse, overscan the storage surface with writing beam to obtain maximum pattern brightness. Then cut off writing beam and adjust erasing pulse to obtain complete erasure in approximately 10 seconds. Measure time (t1) from start of erasing to the instant at which any area within the 4" diameter is reduced to background-brightness level, and time (to) from start of erasing to the instant at which the entire area within the 4" diameter area is reduced to background-brightness level. The erasinguniformity factor is defined as $(t_2-t_1)/t_2$.
- " Measured by shrinking-raster method at a display brightness of 50% of saturated brightness and with grids No.2 and No.4 of Writing Gun at about +2500 volts with respect to cathode of Writing Gun.

R.B.A. Electronic Components Electronic

- ⁵ The undeflected spot position must fall within a circle having a 5/16-inch radius (maximum), 1-3/4-inches from the geometric center of the tube face, on the radius passing through the center of the neck of the writing gun.
- [†] With writing gun turned off, with no erasing pulse applied, and display erased to cutoff.
- ^U Measured with viewing-gun grid No.1 at zero volts and with all other electrodes at voltages shown under *Recommended Operating Values*.
- Y Measured with writing-gun grid No.1 at zero volts while writing an overscanned TV-type raster.

ENVIRONMENTAL TESTS

The 7183A is designed to withstand the following environmental tests:

Vibration parallel to each of the three orthogonal axes shown in Fig.1, and as specified in the schedule below:

Axis of Vibration	Double Amplitude inches	Frequency in Hz	Cycle Duration minutes
Х	0.08	30	30
Y	0.08	30	30
Z	0.08	30	30

High and Low Temperature Storage for at least 24 hours at a temperature of $\pm 100^{\circ}$ C and for at least 24 hours at a temperature of $\pm 65^{\circ}$ C.

Temperature and Low Pressure (Altitude) in three concurrent phases as specified below:

Phase 1. Storage for one hour at a temperature of -40° C followed by tube operation for five minutes under the conditions shown under *Recommended Operating Values*.

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Phase 2. Temperature is increased from -40° C at a rate of 2° C per minute until a temperature of $+86^{\circ}$ C is reached. Following one hour storage at $+86^{\circ}$ C, the tube is operated for five minutes under the conditions shown under *Recommended Operating Values*.

Phase 3. Barometric pressure is next reduced until a pressure equivalent to an altitude of 20,000 feet is attained. The tube is then operated for five minutes under the conditions shown under *Recommended Operating Values*. Upon completion of the third phase of this test, pressure is increased and temperature decreased, at a rate of 2° C per minute, until ambient pressure-temperature conditions are reached.

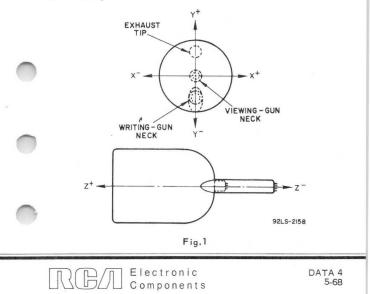
PRECAUTIONS

The following operating precautions must be followed to protect the 7183A from inadvertent damage -

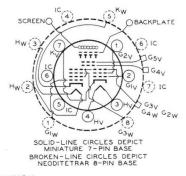
- 1. Do not exceed maximum ratings.
- 2. Be sure to include the screen resistor.
- 3. Be sure to include the collector resistor.
- 4. Do not apply excessive writing-beam current density.
- 5. Protect against scanning failure.
- 6. Protect against loss of bias.
- 7. Apply voltages to tube in correct order.
- 8. Never write unless viewing beam is on.
- 9. Stay within recommended viewing-grid voltage ranges.

SCHEMATIC DIAGRAM

Showing Orthogonal Axes of 7183A Used during Environmental Tests



TERMINAL DIAGRAM (Bottom View)



VIEWING SECTION

Small-Button Miniature 7-Pin Base

- Pin 1: Grid No.2
- Pin 2: Grid No.1
- Pin 3: Heater
- Pin 4: Heater
- Pin 5: Internal Connection Do Not Use
- Pin 6: Internal Connection -Do Not Use
- Pin 7: Cathode
- Flexible Lead (Large): Screen

Flexible Lead (Small): Backplate

WRITING SECTION

Small-Button Neoditetrar 8-Pin Base

- Pin 1: Grid No.1 Pin 2: Heater
- Pin 3: Heater Pin 4: Internal Connection -Do Not Use
- Pin 5: Cathode

Pin 6: Internal Connection – Do Not Use Pin 7: Internal Connection – Do Not Use Pin 8: Grid No.3

Recessed Cavity Caps: Collector (Grid No.5) -

Located 1.25" from tube

line through writing and

viewing gun necks away

Collimator (Grid No.4) -

line through writing and

viewing gun necks away

Located near viewing gun-

Grid No.3 and Grids No.4 & No.2 of writing gun.

from screen connector.

from screen connector.

located 3" from tube face; 15^o from center

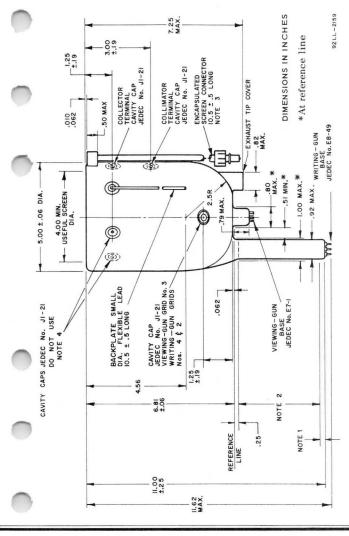
face: 15° from center

Note : Grids No.4 & No.2 are connected internally to Grid No.3 of viewing gun

> Electronic Components

DATA 4

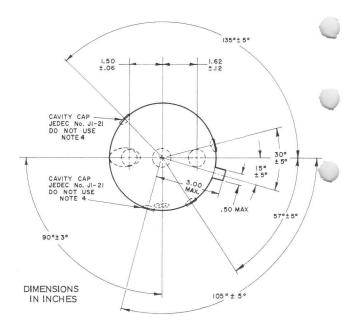
DIMENSIONAL OUTLINE (Front View)



RBA Electronic Components

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DIMENSIONAL OUTLINE (Top View)



NOTES FOR DIMENSIONAL OUTLINE

Note 1: Within this distance, neck diameter is .920" max.

Note 2: Within this distance, neck diameter is .950" max.

Note 3: Aircraft-Marine Products, Inc., type LGH Part No. 832692, or equivalent. This part mates with Aircraft-Marine Products, Inc., Part No.AMP833589, ceramic terminal, or equivalent.

Note 4: Do not use these cavity caps for connection. The caps are connected internally and may be at a potential which could constitute a shock hazard. It is recommended that these caps be covered with electrical insulation.

Display-Storage Tube

FACTORY-COLLIMATED "RUGGEDIZED" TYPE 5-INCH DIAMETER TWO WRITING GUNS 4-INCH-DIAMETER DISPLAY ONE VIEWING GUN INTEGRAL MACNETIC SHIELD

For Use in Military and Commercial Information Handling Displays Where Rough Tube Usage May BeEncountered. The 7268B is Unilaterally Interchangeable with Types 7268 and 7268A.

ELECTRICAL

Heater, for Unipotential Cathode (All guns)	
Voltage (AC or DC) 6.3 ± 10%	٧
Current at 6.3 V 0.6	Α
Cathode Heating Time (Minimum)	s
Before other electrode voltages are applied	

Writing Section-Each Gun

Focusing Method	Electrostatic
Deflection Method	Electrostatic
Deflecting-Electrode Arrangement S	ee Dimensional Outline
Direct Interelectrode Capacitances	
Grid No.1 to all other electrodes	15 max pF

0110 110.1	to all other creek	C1 V	200	 •	•			10	max	PI
	all other electro							8	max	pF
	electrode DJ1 to									
	DJ2						•	3	max	pF
	electrode DJ3 to									
electrode	DJ4							2	max	pF
DJ1 to all	other electrodes						•	10	max	pF
DJ2 to all	other electrodes							10	max	pF
	other electrodes								max	pF
DJ4 to all	other electrodes	÷	÷.					10	max	pF

Viewing Section

Direct	Inter	electr	ode Ca	pacitance				
Backp	late	to all	other	electrodes			110 max	pF

OPTICAL

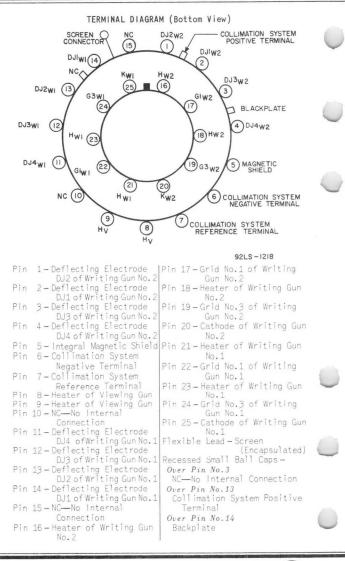
MECHANICAL

Operating Position	. Any
Minimum Useful Viewing Diameter	4 in
Maximum Overall Length	16 in
Maximum Diameter	28 in
Excluding screen lead	
Screen-Connector Assembly See Dimensional On	utline
Weight	
Bulb Terminals	
Caps (Three)	11-22)
Base	



RADIO CORPORATION OF AMERICA Electronic Components and Devices Harrison, N. J. DATA 1 4-66

7268B



DATA I

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MAXIMUM AND MINIMUM RATINGS, ABSOLUTE MA	XIMUM	ALUES	
All voltages are shown with respect to t	he refe	rence	
terminal of the collimation system unle			
specified. The reference terminal must			
	Min	Max	
Screen Voltage			
Peak	-	11500	V
DC	0	11000	v
DC Backplate Voltage	0	35	v
Collimation System ^a	0	00	
Positive-terminal voltage	0	300	V
Negative-terminal voltage	-100	-50	v
Viewing-Gun Heater	-125	125	v
Magnetic Shield Voltage	-200	200	v
Deflecting-Electrode Voltage	-600	600	v
Each gun	-000	000	¥
Writing-Grid-No.3 Voltage	0	2000	V
Each gun ^b	0	2000	V
	200	1.1	v
Writing-Grid-No.1 Voltage	-200	(c)	V
Writing-Gun Cathode Voltage	-2800	0	V
Each gun			•
Writing-Gun Heater-to-Cathode Voltage	-125	125	۷
Each gun			
Series Current-Limiting Resistor			
Unbypassed, in screen circuit	1	-	MΩ
Unbypassed, in collimation system			
positive terminal circuit	0.005	-	MΩ

RECOMMENDED OPERATING VALUES

All voltages are shown with respect to the reference terminal of the collimation system unless otherwise specified.

Screen Voltage												10000		۷	
Backplate Voltage ^d .												2		V	
Collimation System ^a															
Positive-terminal	vo	lta	ae									265		V	
Negative-terminal	VO	lta	ae					2				-55		v	
Reference termina	1.						2	÷			1		. aroun	ded	
Writing-Grid-No.3 V	olt	ane	2			<u> </u>	÷.	-	-		0	-2325 to	-1975	V	
Each gune	010	go	•	•	•		•	•	•	•	•	2020 10	10/5		
Writing-Grid-No.I V Each gun	olta	age	·			•	·		•			(c, f)	۷	
Writing-Gun Cathode	Vo	1+a	an									-2400		V	
Magnetic Shield Vol	tan		ge	•		·	·	·	•	•		0		v	
Average Deflecting	Dia			÷.		à	•	•	•	•	•	100		v	
Circuit Values	ria	Le	40	LC	ige		•	•	•	•	•	100		v	
Grid-No.1 circuit	rec	ist	an	00	(F	11	he	r	a	In		1	max	MΩ	
Impedance in any					10				9.		•		max	1.67	
electrode circui												0.01	max	MQ	
Backplate-circuit														MQ	
								•	•	•	•	0.005	max	MP 2	
Series current-li														110	
Unbypassed, in											•	1		MΩ	
Unbypassed, in															
positive termi	nal	ci	rci	li	t.			•	•		•	0.005		MΩ	

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CHARACTERISTICS

	Min Typ M	a x
Useful Viewing Diameter	4	- in
Brightness (Luminance) ^j	- 2500 -	- fL
Viewing Duration ^k	15 -	- S
Erase Time ^m	- 28 -	- ms
Resolution ⁿ	70	- lines/in
Undeflected Spot Position	()	p) mm
Deflection Factors		
DJ1 & DJ2	82 - 10	00 V/in
DJ3 & DJ4	82 - 10	00 V/in

^a The collimation system includes a passive internal network which provides the proper voltages for all viewing gun electrodes; except screen, backplate and heater; as well as grids No.2 and 4 of the writing gun.

^b Voltages are shown with respect to cathode of writing gun.

^C The writing-gun grid No.1 should never be more positive than necessary to write the display to saturated brightness for a given scanning and drive condition. In no case should the writing-gun grid No.1 voltage have a value greater than zero with respect to the writing-gun cathode.

d The backplate should be maintained at 2 volts between erasing pulses when dynamic erasure is employed.

- e Adjusted for the smallest, most circular spot.
- [†] The bias-voltage value for writing-beam cutoff is between -60 and -100 volts with respect to writing-gun cathode.
- g With respect to the reference terminal of the collimation system for each pair of deflecting electrodes.
- ⁿ Recommended value for minimum distortion because of viewing-beam collection by the deflecting plates. Where strict display accuracy and display uniformity are not required, the impedance value for any deflecting-electrode circuit may be as high as 0.1 megohm maximum. For optimum performance, it is recommended that the deflecting-electrode-circuit impedances be approximately equal.
- J Brightness (Luminance) is measured after the entire display is written to saturated brightness, the writing gun has been turned off, and with no erasing pulse applied.
- ^k The time required for any 0.5-inch-diameter area of the 4-inch-diameter viewing area to rise spontaneously (with no writing or erasing) from zero brightness (viewing-beam visual cutoff) to 10% of saturated brightness.
- With the display at saturated brightness, a series of rectangular pulses 5 milliseconds in width and at a repetition frequency of 2 p/s is applied to the backplate. The number of pulses required to just erase completely the center of the display is noted. This number is multiplied by 5 milliseconds to obtain the erase time. The amplitude of the erase pulses is adjusted to obtain the minimum erase time.
- Measured by the "shrinking" raster method under conditions of continuous writing and erasing, with erase pulses of 60 microseconds width and a repetition frequency of 300 p/s. The amplitude of the erase pulses is adjusted to provide 3.5-second erasure and grid No. 1 is adjusted to provide 1000 footlamberts brightness of the just "shrunkem" raster.
- ^p The undeflected spot position must fall within a square having a 15 millimeter side (maximum) centered on the tube face and parallel to a trace produced by one set of deflecting plates.



Performance Data

Writing Ability and Writing Uniformity Characteristics are measured singly for both guns. A 3.5" x 3.5" raster is centered on the tube face. Vertical scanning is accomplished by an interrupted linear sawtooth waveform having a scan time of 625 microseconds and a prf of 500 p/s. Horizontal scanning is provided by a triangular waveform having a scan rate of 3.5 inches per second.

Writing Ability. The writing-gun grid No.1 of the gun under test is driven above cutoff during the vertical scan time by white noise, of approximately 5 megacycle bandwidth, having a zero-to-peak amplitude of approximately 35 volts. The display brightness under these conditions shall be at least 20% of saturated brightness.

Writing Uniformity. This characteristic is determined under the same conditions as specified above except that the rms amplitude of the white noise is adjusted to produce brightness of 40% of saturated brightness at the dimmest area in the display. The measured brightness at the brightest area of the display shall be not more than 60% of the saturated brightness.

Environmental Tests

The 7268B is designed to withstand the following operational and non-operational environmental tests.

Operational Tests

Sinusoidal Vibration: This test consists of tube vibration in each of three orthogonal axes. One of these axes is in the plane passing through the major axis of the tube and the center of the tube-base key. The tube is mounted so that its major axis is parallel to the plane of the earth. A total of 6 cycles of swept sinusoidal vibration, from 10 to 500 and back to 10 cycles per second, is performed. The duration of a sweep cycle is 15 minutes. The frequencies of any resonant points are noted. The sinusoidal vibration schedule is shown below.

Double Amplitude inches	Peak Acceleration g's	Sweep Frequency c/s	Sweep Cycle Duration minutes
0.27	-	10 to 20)
-	4	20 to 46	
-	2	46 to 500	
	2	500 to 46	15
-	4	46 to 20	1
0.27	-	20 to 10)



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Vibration at Resonance. This test consists of tube vibration at the resonant point or points determined in Sinusoidal Vibration for a period of 30 minutes. If more than one resonant point is noted for a given axis, the tube is vibrated for a total of 30 minutes at that resonant point in each axis most likely to produce tube failure. If no resonant points are determined in Sinusoidal Vibration, the tube is vibrated for 60 minutes at a frequency of 55 cycles per second.

Low Pressure-High Temperature. This test consists of tube storage for a period of not less than one hour at a temperature of $\pm 100^{\circ}$ C. At the termination of this storage period, the tube is operated with the values shown under *Recommended Operating Values* applied and at a pressure equivalent to an altitude of 32,000 feet. The temperature is then reduced to $\pm 53^{\circ}$ C. The tube is stored at this temperature for 1 hour and then is operated with normal voltages applied at a pressure equivalent to an altitude of 60,000 feet.

Low Temperature. This test consists of the tube being maintained at a temperature of -65° C for 48 hours. At the end of this period and while the tube is still at -65° C, the tube is operated with recommended voltages applied for 15 minutes.

Non-Operational Tests

Temperature Cycling. This test consists of tube storage for a period of not less than 2 hours at a temperature of -65° C followed within 5 minutes by storage for a period of 2 hours at a temperature of $\pm 100^{\circ}$ C. A minimum of five consecutive cycles are performed.

High Pressure. This test consists of tube exposure to an absolute pressure of 45 pounds per square inch for a period of at least 60 seconds. This pressure shall be attained within 60 seconds.

Torque. This test consists of the application of a torque of 40 inch-pounds between the integral magnetic shield and the tube base.

Salt Spray. This test consists of tube exposure to a fine spray from a salt solution for a period of 48 hours. The ambient temperature is maintained at approximately $35^{\circ}C$.

OPERATING PROCEDURE

The following steps should be followed when the 7268B is first placed in operation. Refer to the precautions shown under Operating Considerations in the publication 1CE-277 "RCA Display-Storage Tubes". Note that all electrode voltages are referred to the reference terminal of the collimation system unless otherwise specified.

 Viewing Gun - Ground the collimation system reference terminal and magnetic shield. Apply power to the heater of the







the

viewing gun and allow 60 seconds for the cathode to reach normal operating temperature. Next apply the following voltages, in the indicated order: +2 volts to the backplate, -55 volts to the collimation system negative terminal, and +265 volts to the collimation system positive terminal (be sure a minimum resistance of 5000 ohms is in this circuit). Then increase screen voltage slowly from 0 to 10,000 volts (be sure aminimum resistance of 1 megohm is in the screen circuit). Next apply dynamic erasing pulses to the backplate.

The storage property of the tube can be observed by setting the amplitude of the dynamic erasing pulses at +8 volts for several seconds and by then reducing it to zero volts. As the erasing pulse amplitude is reduced the screen should go dark. The 7268B is now storing an overall "black picture" and stays in this condition until the screen begins to brighten as a result of the storage grid being gradually discharged by positive ions landing on it.

- 2. Writing Gun Apply power to the heater of the writing gun and allow 60 seconds for the cathode to reach normal operating temperature. Then, with reference to the typical operating values shown in the tabulated data under Recommended Operating Values, set the grid-No.1 voltage to cutoff, and apply dc voltages to the electrodes of the writing gun. With the screen made dark by the charging method described under (1), the grid-No.1 bias is reduced until the writing beam is seen as a spot on the screen. If the beam is caused to move, either by centering adjustment or by application of deflection voltage, it should leave a bright trace. After an area has been written to full brightness, the writing-beam spot may be seen as a slightly brighter spot on the bright background. Writingbeam focus can then be optimized by adjusting the grid-No.3 voltage.
- 3. Final Display Adjustments The dc bias and the videosignal amplitude applied to grid No.1 or cathode of the writing gun should be adjusted to set the black level and and the highlight level in the display. These adjustments depend on the scanning rate used. Resolution decreases with increasing writing-gun beam current. Excessive writing-gun beam current will produce screen saturation and any further beam-current increase will not produce additional highlight brightness and may also decrease halftone rendition. It is recommended that the writing-beam current always be adjusted to a minimum value to produce the best display without saturation of highlight brightness. The dynamic erasing-pulse amplitude and duty cycle should be adjusted in accordance with the information contained in ICE-277.

The following operating precautions must be followed to protect the 7268B from inadvertent damage -

- 1. Do not exceed maximum ratings.
 - 2. Be sure to include the screen resistor.



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- 3. Be sure to include the collimation system positive terminal resistor.
- 4. Do not apply excessive writing-beam current density.
- 5. Protect against scanning failure.
- 6. Protect against loss of bias.
- 7. Apply voltages to tube in correct order.
- 8. Never write unless viewing beam is on.

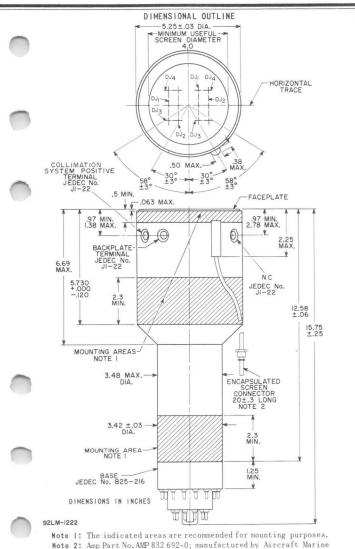


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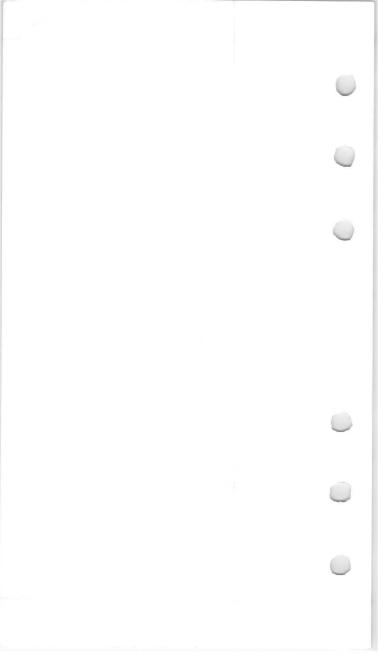
7268B



Products, Inc., Harrisburg, Pa., or equivalent.



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DISPLAY STORAGE TUBE

DIRECT-VIEW TYPE 3.8"-DIAMETER DISPLAY

WRITING GUN: ELECTROSTATIC DEFLECTION ELECTROSTATIC FOCUS

VIEWING GUN: NO DEFLECTION NO FOCUS

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DATA

General:

	Writing Section	Viewing Sectio	n
Heater, for Unipotential Cathode:			
Voltage (AC or DC)	6.3	6.3	volts
Current	0.6	0.6	amp
Minimum Cathode Heating Time			
before other electrode volt-			
ages are applied	-	30	sec
Direct Interelectrode Capaci-		3.0	
tances (Approx.):0			
Grid No. 1 to all other			
tube electrodes	6.5	11	μµf
Cathode to all other			101000
tube electrodes	5.5	8	μμf
Backplate to all other			1-1
tube electrodes	_	116	μμf
Deflecting electrode DJ ₁ to		110	paper.
deflecting electrode DJ ₂	1.9		μµf
Deflecting electrode DJ ₃ to	1.9	_	pper
deflecting electrode DJ ₃ to	2		£
	6		μµf
DJ ₁ to all other tube electrodes.		_	μµf
DJ ₂ to all other tube electrodes.		_	μµf
DJ ₃ to all other tube electrodes. DJ ₁ to all other tube electrodes.			μµf
Focusing Method		None	μµf
Deflection Method		None	
Deflecting-Electrode Arrangement.		NUTIE	
Lettecting-crectione Arrangement.	sional Outline		
Phosphor (For Curves, see front	Stonat Outtine		
of this Section)	Sector Sector	P20, Aluminize	d
Fluorescence.		Yellow-Green	
	-	Yellow-Green	
Phosphorescence	_		
Minimum Useful Viewing Diameter.			
Maximum Overall Length			
Seated Length		5.25"	
Maximum Tube Radius		•••• • • • • • • • • • • • • • • • • • •	2.69"
Bulb Terminals:			2.09
Caps (Three)	Pacassad Small	Ball LIEDEC N	11 221
	Recessed Small (
Temperature Range:	Recessed Sharr C	avity (JEDEC NC	J.JI-21)
Operating		650 to	+1000 0
Storage			
Operating Position			
Weight (Approx.)			
		· · · · · 2-	
Base Medium-Shell Dih		EC Group 5 No	RIA 301

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DISPLAY STORAGE TUBE

BOTTOM VIEW		C
Pin I-Heater of	BACKPLATE	
Writing Gun	BAGINERAL	
Pin 2-Grid No.1 of	$\overline{718}$	
Writing Gun	6 9	
Pin 3-Grid No.3 of		
Writing Gun	5 5 TIL 10	6
Pin 4-Deflecting		-
Electrode DJ3		
of Writing Gun	ANTE ALLA	
Pin 5-Deflecting	3/16/202	
Electrode DJ4	2 3 13	
of Writing Gun		
Pin 6-Grid No.2 of		6
Viewing Gun,	SCREEN	6
Grid No.2 and		
Grid No.4 of	Pin 13-Cathode of	
Writing Gun	Writing Gun	
Pin 7-Grid No.1 of	Pin 14-Heater of	
Viewing Gun	Writing Gun	
Pin 8-Grid No.3 of	Recessed Ball Cap:	
Viewing Gun	Over Pin	
Pin 9-Heater of	3 - Grid No.5 of	
Viewing Gun	Viewing Gun	
Pin 10-Heater and	Over Pin	
Cathode of	12 Grid No.4 of	
Viewing Gun	Viewing Gun On Side of Tube	
Pin II - Deflecting Electrode DJ ₁	Opposite Base	
of Writing Gun	Key — Backplate	
Pin 12-Deflecting	Recessed Cavity Cap:	
Electrode DJ ₂	Over Base	
of Writing Gun	Key — Screen	
and the second of the		
Maximum and Minimum Ratings, Absolute-Maxim For altitudes up to 10		-
Writing Section	Viewing Section	
SCREEN VOLTAGE	11000 max.** volts	
BACKPLATE VOLT-	vorus	
AGE (Peak).	20 max.** volts	
Equivalent Values	Equivalent Values	
GRID-No.5 VOLT-	squitoutont rabaes	-
AGE	- 300 max.** volts	
GRID-No.4 VOLT-	Jos mart Vorts	
AGE 2950 max.*▲ 200 max.**	- 300 max.** voits	
GRID-No.3 VOLT-		
AGE 1200 max.* -1550 max.**	- {200 max.**} volts	-
PEAK VOLTAGE	10 min.**	6
BETWEEN GRID		-
NO.3 AND		
GRIDS No.2 &		
No.4 – 2950 max.	volts	
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ELECTRON TUBE DIVISION



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DISPLAY STORAGE TUBE

	Writing Section	Viewing Section	
GRID-No.2 VOLT-			
AGE	2950 max.** 200 max.**	2950 max.** 200 max.**	volts
CATHODE VOLT-			
AGE	 – 2750 max.** 		volts
GRID-No.1 VOLT- AGE:			
Negative-bias			
value	200 max.*	200 max.**	volts
Positive-bias	200 11211	200 mart	
value	0 max.*	0 max.**	volts
Positive-peak			
value	2 max.*	0 max.**	volts
PEAK VOLTAGE			
BETWEEN GRIDS			
No.2 & No.4			
AND ANY DE-			
FLECTING			
ELECTRODE	500 max.	-	volts
PEAK HEATER-			
CATHODE			
VOLTAGE:			
Heater nega-			
tive with			
respect to			
cathode	125 max.*	-	volts
Heater posi-			
tive with			
respect to			
cathode	125 max.*	-	volts

VIEWING SECTION**

Operating Values and Typical Performance Characteristics:

To prevent possible damage to the tube, allow the viewing-gun beam current to reach normal operating value before turning on the writing-gun beam current, and keep the viewing-gun beam on till the writing beam is turned off

Screen Voltage							10000	10000	volts
Backplate Voltage (DC)	•				•		2	2	volts
Grid-No.5 Voltage		•				•	210	150	volts
Grid-No.4 Voltage [#]							50 to 150	30 to 90	volts
Grid-No.3 Voltage [#]							10 to 50	10 to 40	volts
Grid-No.2 Voltage ⁴							150	125	volts
Grid-No.1 Voltage [#]							0 to -80	0 to -60	volts
Maximum Screen Current							0.75	0.5	ma
Maximum Backplate Current	(F	Pea	ak).			2	1.5	ma
Maximum Grid-No.5 Current	•					•	3	2.5	ma
Maximum Grid-No.4 Current							3	2.5	ma
Maximum Grid-No.3 Current		•					5	4	ma
and the second sec									man and the second second

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ELECTRON TUBE DIVISION

TENTATIVE DATA 2

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



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DISPLAY STORAGE TUBE

Maximum Grid-No.2 Current.		3 2.5	ma.
Maximum Cathode Current Number of Half-Tone Steps ^D		8 6.5	ma
Number of Half-Tone Steps		5 5	
Viewing Duration ^{▲▲} Maximum Erasing-Uniformity	· · · · · · · · ·	20 40	sec
Maximum Erasing-Uniformity	Factor (0.45 0.4	
Resolution [®]		50 50	lines/in.
Brightness 🏎		2750 1500	fl
	WRITING SECTION®	C	
Range Values for Equipment	Design:*		
For any grids-N	10.2 & No.4 voltage	(Eco+u) between	
	1500 and 2750 volts	•	
Grid-No.3 Voltage for			
focus	17.5% to 37.5% of E	24.1	volts
Maximum Grid-No.1		2 7 4	
Voltage for cutoff			
of undeflected			
focused spot	-4.6% of Ec2+4		volts
Maximum Grid-No.3			
Current	-15 to +10		μα
Maximum Cathode Current.	See Curve		
Deflection Factors:	76 1 10		
$DJ_1 \& DJ_2 \dots \dots$	36 to 48 35 to 47	v dc/in.	/kv of Ec2+4
DJ ₃ & DJ ₄	25 to 47 ##	v ac/in.	/kv of Ec 2+4
Focused Beam Position Writing Speedtt	** 3000		in./sec
writing speed i	5000		111.7Sec
Examples of Use of Design	Ranges:*		
For grids-No.2 & No.4 volt	age (E _{C 2+µ})▲	2000	volts
Grid-No.3 Voltage for focu	IS	350 to 750	volts
Maximum Grid-No.1 Voltage			
of undeflected focused s		-92	volts
Deflection Factors:			
$DJ_1 \& DJ_2 \dots \dots$		72 to 96	volts
DJ3 & DJ4		70 to 94	volts
Equivalent Values of Writi to Cathode of Viewing Gu		erred	
to Cathode of Viewing Gu	in:		volts
to Cathode of Viewing Gu Cathode Voltage	in: -1875	-1850	volts 500 volts
to Cathode of Viewing Gu Cathode Voltage Grid-No.3 Voltage for focu	. −1875 . −1125 to −152	-1850	
to Cathode of Viewing Gu Cathode Voltage Grid-No.3 Voltage for focu	. −1875 . −1125 to −152	-1850 5 -1100 to -1	500 volts
to Cathode of Viewing Gu Cathode Voltage Grid-No.3 Voltage for focu Grids-No.2 & No.4 Voltage	. −1875 . −1125 to −152	-1850 5 -1100 to -1 +150	500 volts
to Cathode of Viewing Gu Cathode Voltage Grid-No.3 Voltage for focu Grids-No.2 & No.4 Voltage	in: 	-1850 5 -1100 to -1 +150	500 volts
to Cathode of Viewing Gu Cathode Voltage Grid-No.3 Voltage for focu Grids-No.2 & No.4 Voltage VIEWING SU Circuit Yalues:	n: -1875 is1125 to -1523 +125 ECTION and WRITIN	-1850 5 -1100 to -1 +150	500 volts volts
to Cathode of Viewing Gu Cathode Voltage Grid-No.3 Voltage for focu Grids-No.2 & No.4 Voltage VIEWING S Circuit Values: Grid-No.1-Circuit Resistar	n: -1875 s1125 to -1525 +125 ECTION and WRITIN rce (Either gun).	-1850 5 -1 (00 to -1 +150 IG SECTION	500 volts volts max. megohm
to Cathode of Viewing Gu Cathode Voltage Grid-No.3 Voltage for focu Grids-No.2 & No.4 Voltage VIEWING SU Circuit Yalues:	n: -1875 -1125 to -152 +125 ECTION and WRITIN the (Either gun) ng-Electrode Circui	-1850 5 -1 (00 to -1 +150 IG SECTION	500 volts volts max. megohm
to Cathode of Viewing Gu Cathode Voltage Grid-No.3 Voltage for focu Grids-No.2 & No.4 Voltage VIEWING S Circuit Values: Grid-No.1-Circuit Resistar Resistance in Any Deflecti		-1850 5 -1 (00 to -1 +150 IG SECTION	500 volts volts max. megohm max. megohm



2315

DISPLAY STORAGE TUBE

Backplate-Circuit Resistance. 0.005 max. megohm Series Current-Limiting Resistance in Screen Circuit. . . . 1 min. megohm Without external shield. Minimum useful viewing area may be eccentric with respect to the tube face. stst Voltages are shown with respect to cathode of Viewing Gun. Voltages are shown with respect to cathode of Writing Gun. . Grids No.2 and No.4 of Writing Gun are connected together and to grid No.2 of Viewing Gun within the tube. # Adjusted for brightest, most uniform pattern. Observed with an RCA-2F21 Monoscope display. Expressed in terms of the time required for the brightness of the unwritten background to rise from just zero brightness (viewing-beam cutoff) to 10 per cent of saturated brightness. Cutoff) to 10 per cent of saturated originaness. Determined as follows: With no erasing pulse, overscan the storage surface with writing beam to obtain maximum pattern brightness. Then cut off writing beam. Apply erasing pulses having an amplitude of between 8 to 10 volts and adjust duty cycle to obtain complete erasure in approximately 10 seconds. Measure time (t₁) from start of erasing to the instant at which any area within the minimum useful viewing dimenser is reduced to background-brightness level, and time (t₂) diameter is reduced to background-brightness level, and time (12) from start of erasing to the instant at which the entire area within the minimum useful viewing-diameter area is reduced to background-prightness level. The erasing-uniformity factor is defined as $(t_2 - t_1)/t_2.$ 击 Measured by shrinking-raster method at a display brightness of 50 per cent of saturated brightness and with grids No.2 & No.4 of Writing Gun at about ± 2000 volts with respect to cathode of Writing Gun. Measured with entire storage grid written to produce saturated bright-ness and with screen at indicated voltage. . The cathode of the Writing Gun is operated at about -2000 volts with respect to the cathode of the Viewing Gun which is usually operated at ground potential. W found potentar. #* The center of the undeflected focused beam will fall within a circle having a 10-mm radius and having its center on the Writing-Gun axis (See Dimensional Outline) under the following conditions: grids No.2 & See Dimensional Outline) under the following conditions: No.4 of Writing Gun at +2000 volts with respect to cathode of Writing Gun, grid No.3 of Writing Gun at voltage to give focus, grid No.1 of Writing Gun at voltage which will permit storage of a charge just sufficient to give a barely perceptible spoton screen, viewing Section operating under normal conditions, and tube shielded against extraneous fields. # Measured under conditions of writing from just zero brightness (viewingbeam cutoff) to maximum brightness with grid No.1 of Writing Gun at -10 volts with respect to cathode of Writing Gun, and grids No.2 & No.4 of Writing Gun at +2000 volts with respect to cathode of Writing Gun. 鵩 It is recommended that the deflecting-electrode-circuit resistances be approximately equal. OPERATING CONSIDERATIONS

Shielding. Magnetic shielding must be provided to prevent external fields from interfering with the required accurate control of the low-velocity viewing beam. A cylindrical shield of properly annealed high-permeability material about 1/16-inch thick is usually satisfactory.

Terminal Connections. The base pins of the 7315 fit the Diheptal 14-contact socket. The Recessed Small Ball caps and the Recessed Small Cavity cap require standard flexible-lead connectors.

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ELECTRON TUBE DIVISION TENTATIVE DATA 3 RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



DISPLAY STORAGE TUBE

The high voltages at which the 7315 is operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Safety precautions include the enclosing of high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is desired.

In the use of high-voltage tubes, it should always be remembered that high voltages may appear at normally lowpotential points in the circuit as a result of capacitor breakdown or incorrect circuit connections. Therefore, before any part of the circuit is touched, the power-supply switch should be turned off, and both terminals of any capacitors grounded.

To prevent possible damage to the tube, allow the Viewing-Gun beam current to reach normal operating value before turning on the Writing-Gun beam current, and keep the viewing beam on till the writing beam is turned off.

Failure of scanning while the writing beam is turned on may permanently damage the storage grid. Therefore, provision should be made to cut off automatically the writing-beam current in case of a scanning failure. The writing-beam current can be cut off by an electronic switch which applies -200 volts bias to grid No.1 of the Writing Gun. This switch should be actuated by a portion of the scanning voltages applied to both sets of deflecting electrodes.

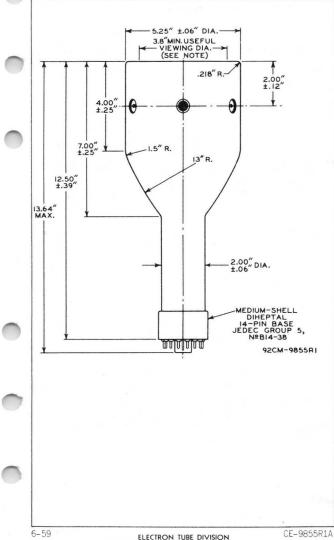
1315

TENTATIVE DATA 3



13/5

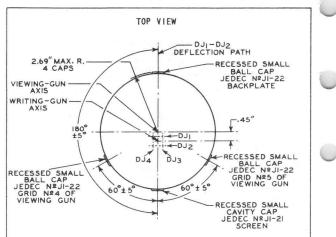
DISPLAY STORAGE TUBE



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY



DISPLAY STORAGE TUBE



NOTE: MINIMUM USEFUL VIEWING AREA MAY BE ECCENTRIC WITH RESPECT TO THE TUBE FACE. THE MINIMUM USEFUL VIEWING AREA WILL HAVE DIAMETER OF 3.8".

CENTER LINE OF BULB WILL NOT DEVIATE MORE THAN $2^{\rm O}$ IN ANY DIRECTION FROM PERPENDICULAR ERECTED AT CENTER OF BOTTOM OF BASE.

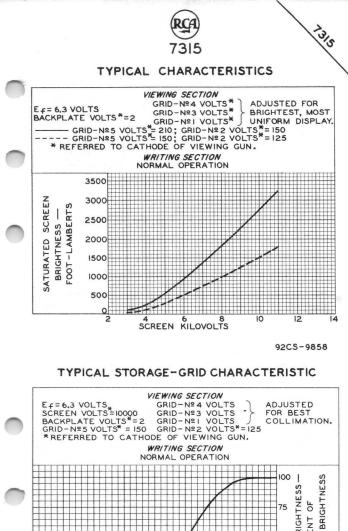
DEFLECTING ELECTRODES DJ₁ AND DJ₂ ARE NEARER THE SCREEN; DEFLECTING ELECTRODES DJ₃ AND DJ₄ ARE NEARER THE BASE. WITH DJ₁ POSITIVE WITH RESPECT TO DJ₂, THE SPOT WILL BE DEFLECTED TOWARD PIN 8; LIKEWISE, WITH DJ₃ POSITIVE WITH RESPECT TO DJ₄, THE SPOT WILL BE DEFLECTED TOWARD PIN 4. THE ANGLE BETWEEN THE DEFLECTION PATH PRODUCED BY DJ₁ AND DJ₂ MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND THE BASE KEY BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 10°. ANGLE BETWEEN DJ₁ - DJ₂ DEFLECTION PATH AND DJ₃ - DJ₄ DEFLECTION PATH IS 90° \pm 3°.

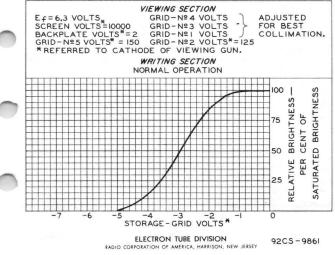
THE ANGLE BETWEEN THE DEFLECTION PATH PRODUCED BY DJ1 AND DJ2 MAY VARY FROM THE PLANE THROUGH THE TUBE AXIS AND THE SCREEN CAP BY ANGULAR TOLERANCE (MEASURED ABOUT THE TUBE AXIS) OF \pm 10°.

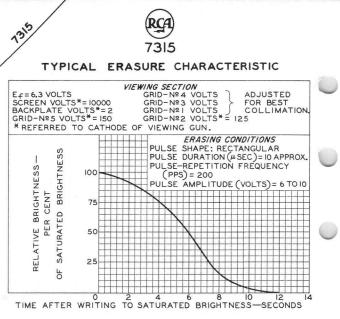
CE-9855R1B

ELECTRON TUBE DIVISION RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

1315

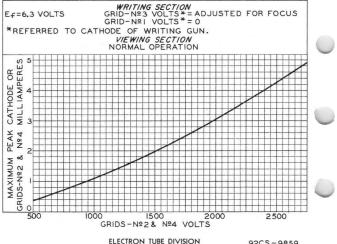






92CS-9860

WRITING-GUN-CURRENT CHARACTERISTIC



RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CS-9859

DR2000 DR2100 DR2200 Series Series Series

NUMITRON Digital Display Devices

Segmented Incandescent Types FEATURES:

- high brightness fully adjustable
- Iow voltage operation
- high contrast segmented digits viewed against a dark background
- compatible with IC Decoder/Drivers such as the RCA CD2500E family
- high-reliability rugged construction
- wide-spectrum light emission permits unlimited filter selection
- DR2200 Series have a recommended DC segment operating voltage range of 1.5 to 3V
- wide viewing angle

Maximum Segment Deflection From a Straight Line

Contrast Ratio

- void of "clutter"
- solderable base pins permits direct PC board mounting
- DR2000 Series fits popular low cost 9-pin miniature socket
- DR2100 and DR2200 Series fit popular TO-5 style, 10-pin socket
- DR2100V1 and DR2200V1 Series have formed lead to facilitate direct PC-board mounting

MECHANICAL	DR20 Series		DI	R2100 R2200 pries	DR2100\ DR2200\ Series	
Mounting Position Maximum Overall Length Maximum Seated Length Maximum Diameter Base	1.875 1.625 0.785	in. in.	1.4 0.4 9-1 0.1	Any 660 in. 450 in. 485 in. pin, 230 in. n circle	Any 1.705 in 1.540 in 0.485 in 9-pin, 0.380 in pin circle	
CHARACTERISTICS		DR20 Series	00	DR2100 Series	DR2200 Series	
ELECTRICAL Recommended DC Segment Operating Voltage Range DC Segment Voltage unless		3.5 to 5.0		3.5 to 5.0	1.5 to 3.0	V
otherwise specified Segment Current		4.5 24		4.5 24	2.5 14	/ mA
Mean Life Expectancy (at 95% confidence)		100 k		100 k	100 k	h
Viewing Angle (including angle Segment Luminance (typ.)				120 7000	120 4000	o fL
Response Times: Ascent to Visibility (typ.) Descent to 50% of Luminanc				15 <20	8 <10	ms ms

Electronic Components

0.004

30:1

0.005

30:1

DATA 1 11/72

in

0.004

20:1

DR2000	DR2100	DR2200
Series	Series	Series

Mechanical Characteristics DR2000 and DR2100 Series

TEST	CONDITIONS	DC Segment Volts
SHOCK* a) b)	100g, 1 ms, Half-Sine Wave 50g, 11 ms, Half-Sine Wave	4.5 Not Applied
VIBRA- TION a) b) c) d) e)*	Variable Frequency: 10 to 44 Hz, 0.1-inch DA Variable Frequency: 44 to 200 Hz, 10g Variable Frequency: 200 to 800 Hz, 1g Variable Frequency: 800 to 2000 Hz, 10g Fatigue: 25 Hz, 2.5q, 96 hr	4.5 4.5 4.5 4.5 4.5

DR2200 Series

RB/1

SHOCK* a) b)	200g, 1 ms, Half-Sine Wave 50g, 11 ms, Half-Sine Wave	2.5 Not Applied
VIBRA- TION a) b) c)*	Variable Frequency: 5 to 60 Hz, 0.1-inch DA Variable Frequency: 60 to 500 Hz, 20g Fatigue: 25 Hz, 2.5g, 96 hr	2.5 2.5 2.5

* Performed in Accordance with MIL-E-1F

The NUMITRON digital display devices will meet the Specifications for operational and crash safety tests; standard environmental vibration for instrument panel location in all types of aircraft, as set by the Radio Technical Commission for Aeronautics (RTCA). Document No. DO-138 Dated June 27, 1968.

> Electronic Components

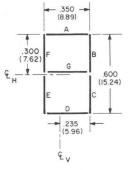
						DR2 Serie		DR2100 Series	DR2 Serie	
0										T
			6	ш	ш		A	NC	A	
			8	в	æ		U	A	NC	
			7	A	4			NC	В	
0	H-A suc	ber	9	σ	U	ſ	۵	в	NC	
	Segment Designations A-H	Base Pin Number	5	U	U		NC	NC	NC	
	egment [Base	4	۵		1	NC	NC	NC	
Chart	S		S	ш	ш	1	NC	NC	NC	tie point
esignation			2	+	N	IOWW	oo—			e used as
egment C			-	NC	т		NC	NC	NC	– may b
Base Pin Number And Segment Designation Chart			Type	DR2000 DR2100 DR2200	DR2010 DR2110 DR2115	DR2210 DR2215	DR2020 DR2120	DR 2030	DR2130 DR2230	NC = no connection – may be used as tie point.
ase Pin Nu			Display			with decimal	- -	- -	- -	IC = no co

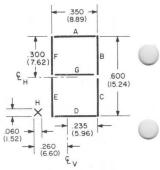
RBA Electronic Components DR2000 DR2100 DR2200 Series Series Series

Segment Dimensions and Designations



DR2010



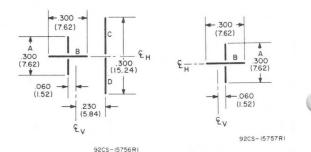


92CS-15754RI

92CS-15755RI



DR2030



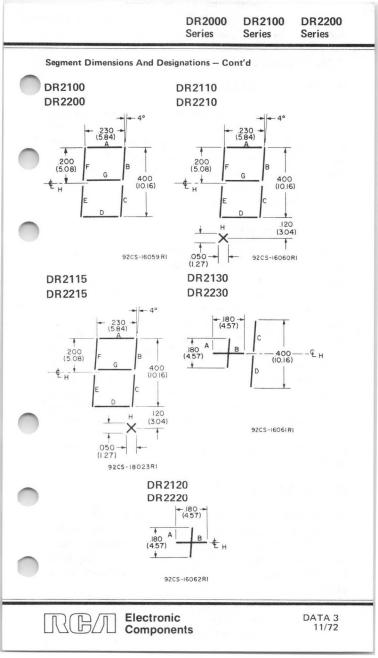
 ∉_H = Horizontal center line of display (bulb outline dimension F) with pin No. 3 toward viewer. Segment "G" is 0.030" above ∉_H.

¢_H = Vertical center line of device.

DR2100 and DR2200 series; vertical center line of display coincides with vertical center line of device.

Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated.

Electronic Components



DR2000 DR2100 DR2200 Series Series Series

OPERATING CONSIDERATIONS

Integrated Circuit Decoder/Driver

The NUMITRON series devices are compatible with the RCA Integrated Circuit Decoder/Driver types CD2500E and CD2501E. The integrated circuit decoder/driver accepts four inputs in BCD (8-4-2-1 code) and decodes them into outputs representing a decimal number from 0 to 9 on a 7-segment display. For basic interconnection of decoder/driver and the NUMITRON display devices see Fig. 4.

Mounting Arrangements

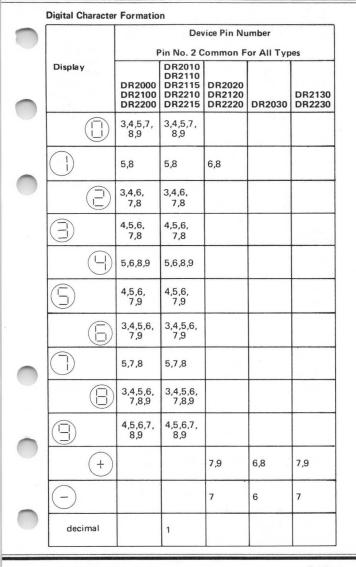
The NUMITRON devices are designed for mounting in either commercially available sockets or directly on printed circuit boards. The DR2000 series devices fit into a standard 9-pin miniature electron tube socket. A commercial PC board socket which permits 0.8-inch center-to-center mounting is available. (See Hardware and Accessories.) The DR2100 and DR2200 series devices are available in two versions: straight leads and V1 versions with formed leads: The straight lead versions may be mounted on 0.5-inch centers directly on PC boards or may be used with standard TO-5 style, 10-pin sockets. The V1 versions facilitate direct PC board mounting on 0.5-inch centers. To use the light shield, DR3000⁺, the center-to-center mounting must be increased to 0.515-inch.

Figure 5 shows the base diagram and pin-circle dimensions for the various NUMITRON devices.

Character Formation

The following chart gives the base pin connections for forming the various character displays for each device. Pin No. 2 is the common connection for all segments in each device. For example, to form a numeral one using type DR2000, connect the segment voltage between pin No. 2 (common) and pin Nos. 5 and 8.

DR2000 DR2100 Series Series DR2200 Series



Electronic Components

RG/1

DR2000	DR2100	DR2200
Series	Series	Series

Power Supply Requirements

The NUMITRON Series devices do not require critical voltage regulation over the useable operating range. As is the case with any incandescent type device, dc voltage operation above the recommended value may result in reduced life expectancy. For multiplex operation, segment voltage above the normal range may be used provided that the appropriate duty factor is observed. (See NUMITRON Display Device Booklet, NUM-421).

Display

Because these NUMITRON devices have a wide-band light spectrum emission, filters can be used to produce any desired color display. (See Hardware and Accessories.) A display having a broader stroke can be obtained with an etched glass such as "Trusite" or a diffused filter. For a larger size display, a Fresnel lens may be used.

*Trademark "Trusite" Dearborn Glass Co., Chicago, Illinois.

Hardware and Accessories

Sockets

Noval 9-pin Types

DR2000 Series

- Methode Electronics, Inc., M8610 (For 0.8-inch centers) and P460 (standard)
- Cinch Mfg. Co., 121-51-00-040 (standard)

TO-5 10-Lead Types

DR2100, DR2200 Series

- Methode Electronics, Inc., M8620
- Cinch Mfg. Co., 133-99-92-054 and 133-99-92-065
 133-99-92-065 (spread-lead socket)

Filters

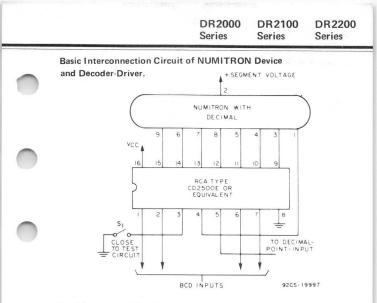
Polaroid Corp., Cambridge Mass. 02139 Circular Polarizer:

Standard and Diffused Surface for Broader Stroke Panelgraphic Corp., West Caldwell, N.J. 07006 Chromafilter CF-131: Anti-Reflection Filters

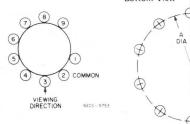
Plastic Light Shield to Reduce Side Reflections

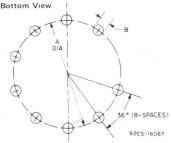
DR2100, DR2200 Series RCA DS3000

RBA Electronic Components







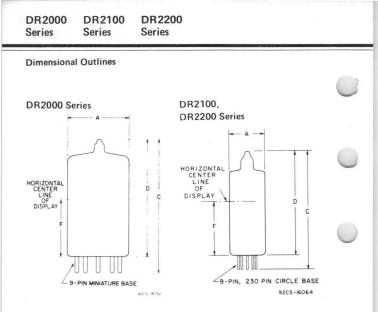


NUMITRON	DIMENSION (INCHES)			
	A	В		
	NOMINAL	MIN.	MAX.	
DR2000	0.468	0.038	0.042	
DR2100 and	0.000	0.010		
DR2200	0.230	0.018	0.022	
DR2100V1				
and	0.380	0.018	0.022	
DR2200V1				

Electronic Components

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DATA 5 11/72



DI-		DR20	000 Series				100 and 00 Series	
MEN-	INC	INCHES N		IETERS	IN	CHES	MILLIN	ETERS
SION N	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
A		0.800		20.32		0.485		12.32
С		1.875		47.62		1.660		42.16
D		1.625		41.27		1.450		36.83
F	0.700	0.730	17.78	18.54	0.625	0.655	15.87	16.64

MILLIMETER DIMENSION DERIVED FROM INCH DIMENSION

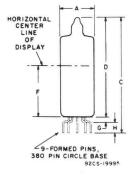
RBA Electronic Components

DATA 5

DR2000	DR2100	DR2200	
Series	Series	Series	

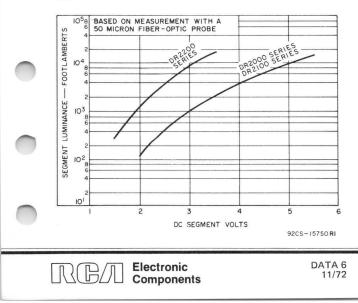
Dimensional Outlines - Cont'd

DR2100V1, DR2200V1 Series



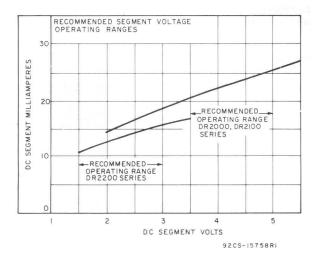
DI- MEN-	DR2100V1 and DR2200V1 Series			
SION	INCHES		MILLIMETERS	
51014	MIN.	MAX.	MIN.	MAX.
А	1	0.485		12.32
С		1.705		43.30
D		1.450		36.83
F	0.625	0.655	15.87	16.64
G	0.060	0.090	1.52	2.28
н	0.135	0.165	3.43	4.19

Segment Luminance Characteristics

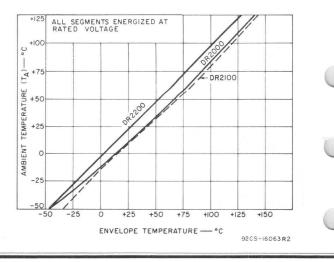


DR2000 DR2100 DR2200 Series Series Series

Segment Current Characteristics



Envelope Temperature Characteristics



Electronic Components

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DATA 6

