

N.U.

ENGINEERING

NEWS RELEASE

ELECTRONIC COMPONENTS

Prepared by Commercial Engineering Division

N.U. 1DP1

MINIATURE CATHODE-RAY TUBE

The 1DP1 is an electrostatic focus and deflection miniature Cathode-Ray tube in a T6½ bulb with a 9 pin miniature base. The tube gives good light output, can withstand the standard shock and vibration tests, and has no exposed exhaust tip. Its low heater power consumption (less than 1.4 watts) and low operating voltages provide a tube which could be incorporated in a wide variety of electronic equipment for built-in, visual monitoring.

MAXIMUM RATINGS

Heater voltage (ac or dc).....	6.3 v.
Cathode current.....	1000 μ a
Grid voltage (cut off).....	-40.0 v.
Deflection potential •	400 v.
Anode 1.....	300 v.
Anode 2.....	600 v.
Grid resistor.....	2 meg.
Deflection resistor.....	2 meg.

- Measured between the two deflection plates of D1-D2 or D3-D4.

INTERELECTRODE CAPACITIES

G1 to all other elements.....	4.0 μ f
K to all other elements.....	2.0 μ f
D1 to D2.....	1.0 μ f
D3 to D4.....	1.0 μ f
D1 to all other elements.....	3.0 μ f
D3 to all other elements.....	3.0 μ f
D1 to all elements except D2.....	2.0 μ f
D2 to all elements except D1.....	2.0 μ f
D3 to all elements except D4.....	2.0 μ f
D4 to all elements except D3.....	2.0 μ f

TYPICAL OPERATING CONDITIONS

Heater voltage (ac or dc).....	6.3 v.
Heater current.....	215 ma
Cathode current.....	500 μ a
Line width.....	0.25 mm
Light output ▲	5.0 ft. lamberts
Grid cutoff voltage.....	-40 v.
A2 voltage.....	600 v.
A1 voltage.....	150 v.
Deflection factor ■ D1-D2.....	280 v/in.
Deflection factor ■ D3-D4.....	280 v/in.

- ▲ measured with $I_k = 500 \mu$ a, raster $\frac{1}{2}$ " X $\frac{1}{2}$ ", scanning frequencies 60 X 2100 to 6300.

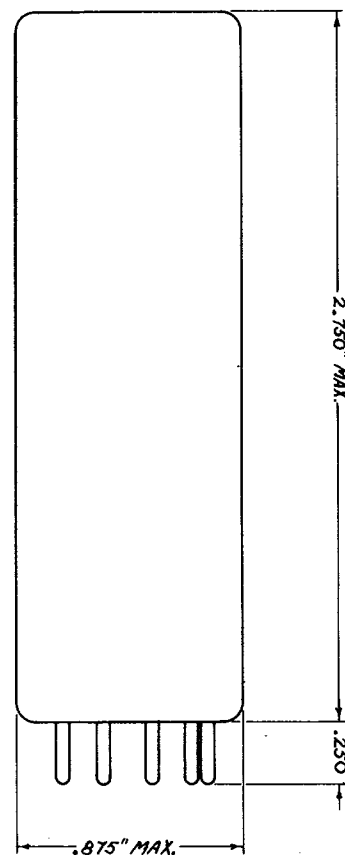
- Deflection factor is defined as the potential difference between a pair of deflection plates necessary to deflect the beam one inch from the undeflected position. This tube requires a deflection signal of about ± 110 v. to sweep the useful screen diameter.

PHYSICAL SPECIFICATIONS

Style.....	Miniature
Bulb.....	T6½
Basing.....	9 CU
Mounting Position.....	any

BASE PIN CONNECTIONS

Pin 1	G1
Pin 2	D1
Pin 3	D3
Pin 4	H
Pin 5	HK
Pin 6	D2
Pin 7	A2
Pin 8	A1
Pin 9	D4



NATIONAL UNION RADIO CORPORATION

MAIN OFFICE: HATBORO, PENNSYLVANIA

N.U. 1DP1 N.U. 1DP4 N.U. 1DP11

MINIATURE CATHODE-RAY TUBES

The 1DP1, 1DP4, 1DP7 and 1DP11 are electrostatically focused and deflected miniature Cathode-Ray tubes in T6½ bulbs with 9-pin miniature bases. These tubes give good light output, can withstand the standard shock and vibration tests, and have no exposed exhaust tip. Their low heater power consumption (less than 1.4 watts) and low operating voltages provide tubes which could be incorporated in a wide variety of electronic equipment for built-in visual monitoring.

MAXIMUM RATINGS

Heater voltage (ac or dc).....	6.3 v.
Cathode current.....	1000 μ a
Grid voltage.....	-100 v.
Deflection potential •.....	400 v.
Anode 1.....	300 v.
Anode 2.....	1000 v.
Grid resistor.....	2 meg.
Deflection resistor.....	2 meg.

- Measured between the two deflection plates of D1-D2 or D3-D4.

INTERELECTRODE CAPACITIES

G1 to all other elements.....	4.0 μ mf
K to all other elements.....	2.0 μ mf
D1 to D2.....	1.0 μ mf
D3 to D4.....	1.0 μ mf
D1 to all other elements.....	3.0 μ mf
D3 to all other elements.....	3.0 μ mf
D1 to all elements except D2.....	2.0 μ mf
D2 to all elements except D1.....	2.0 μ mf
D3 to all elements except D4.....	2.0 μ mf
D4 to all elements except D3.....	2.0 μ mf

TYPICAL OPERATING CONDITIONS

Heater voltage (ac or dc).....	6.3 v.
Heater current.....	215 ma
Cathode current.....	500 μ a
Line width.....	0.25 mm
Grid cutoff voltage.....	-40 v.
A2 voltage.....	600 v.
A1 voltage.....	150 v.
Deflection factor ■ D1-D2.....	350 v/in.
Deflection factor ■ D3-D4.....	300 v/in.

- Deflection factor is defined as the potential difference between a pair of deflection plates necessary to deflect the beam one inch from the undeflected position. This tube requires a deflection signal of about ± 110 v. to sweep the useful screen diameter.

PHOSPHOR

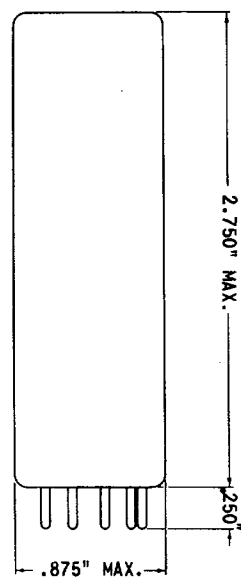
	FLUORESCENCE	PHOSPHORESCENCE	PERSISTENCE
1DP1.....	Green.....	--	Medium
1DP4.....	White.....	--	Medium
1DP7.....	Blue.....	Yellow.....	Long
1DP11.....	Blue.....	--	Short

PHYSICAL SPECIFICATIONS

Style.....	Miniature
Bulb.....	T6½
Basing.....	9 CU
Mounting Position.....	Any
Base Alignment.....	1D2 between Pins 2 and 3
Socket.....	9-pin Noval

BASE PIN CONNECTIONS

Pin 1:	G1	Pin 6:	D2
Pin 2:	D1	Pin 7:	A2
Pin 3:	D3	Pin 8:	A1
Pin 4:	H	Pin 9:	D4
Pin 5:	HK		



March 1962

PHILIPS

1E3

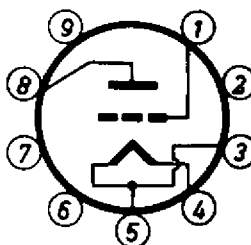
U.H.F. TRIODE FOR TRANSMITTING AND RECEIVING PURPOSES

Physical Specifications

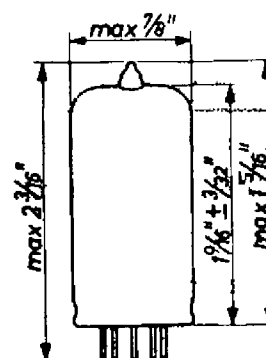
Filament	Coated
Base	Small button noval 9-pin
Bulb	T6 $\frac{1}{2}$
Maximum overall length	2 $\frac{3}{16}$ "
Maximum seated height	1 $\frac{15}{16}$ "
Bulb length excluding tip	1 $\frac{9}{16}$ " $\pm$ $\frac{3}{32}$ "
Maximum diameter	$\frac{7}{8}$ "
Mounting position	any
Basing connections - JETEC	
basing designation	9BG

- Pin 1 - grid
- Pin 2 - not connected
- Pin 3 - filament (-)
- Pin 4 - filament (+)
- Pin 5 - filament (-)
- Pin 6 - not connected
- Pin 7 - not connected
- Pin 8 - plate
- Pin 9 - not connected

Bottom view
of base



Tube outline



General Electrical Data

Filament data

Filament voltage	1.25 volts
Filament current	0.22 amp.

Direct Interelectrode Capacitances

Grid to all other elements except plate	1.25 $\mu\mu\text{F}$
Plate to all other elements except grid	0.75 $\mu\mu\text{F}$
Plate to grid	1.5 $\mu\mu\text{F}$

1E3**PHILIPS**Ratings (Design center values)

Plate voltage	max. 150 volts
Plate dissipation	max. 3 watts
Cathode current	max. 20 ma ¹⁾
Grid current	max. 5 ma
Grid current starting point.	
Grid voltage when grid current = +0.3 μ amp	max. -0.2 volt
Grid circuit resistance	1 megohm
Filament voltage	max. 1.55 volts min. 0.9 volt ²⁾

Typical Characteristics

Plate voltage	150 volts
Grid voltage	-3.5 volts
Plate current	20 ma ¹⁾
Transconductance	3500 micromhos
Amplification factor	14

Operating characteristics for use as oscillator

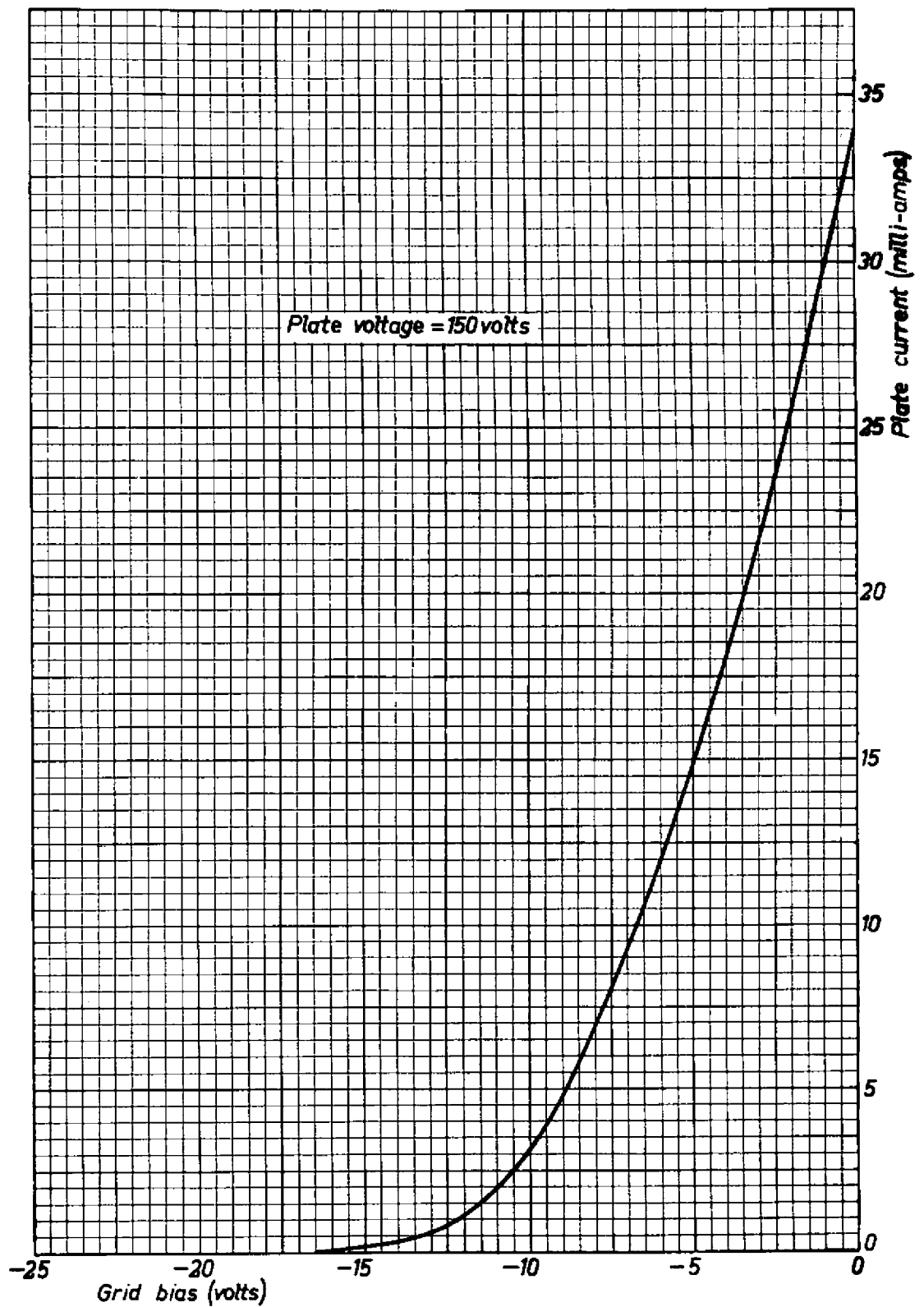
Plate voltage	150 volts
Cathode current	20 ma ¹⁾
Grid current	1.5 ma
Frequency	470 megacycles per second
Output	0.45 watt

¹⁾ Absolute maximum which must never be exceeded.
When operating the tube at this cathode current
the filament voltage must be at least 1.1 volts.

²⁾ See footnote ¹⁾

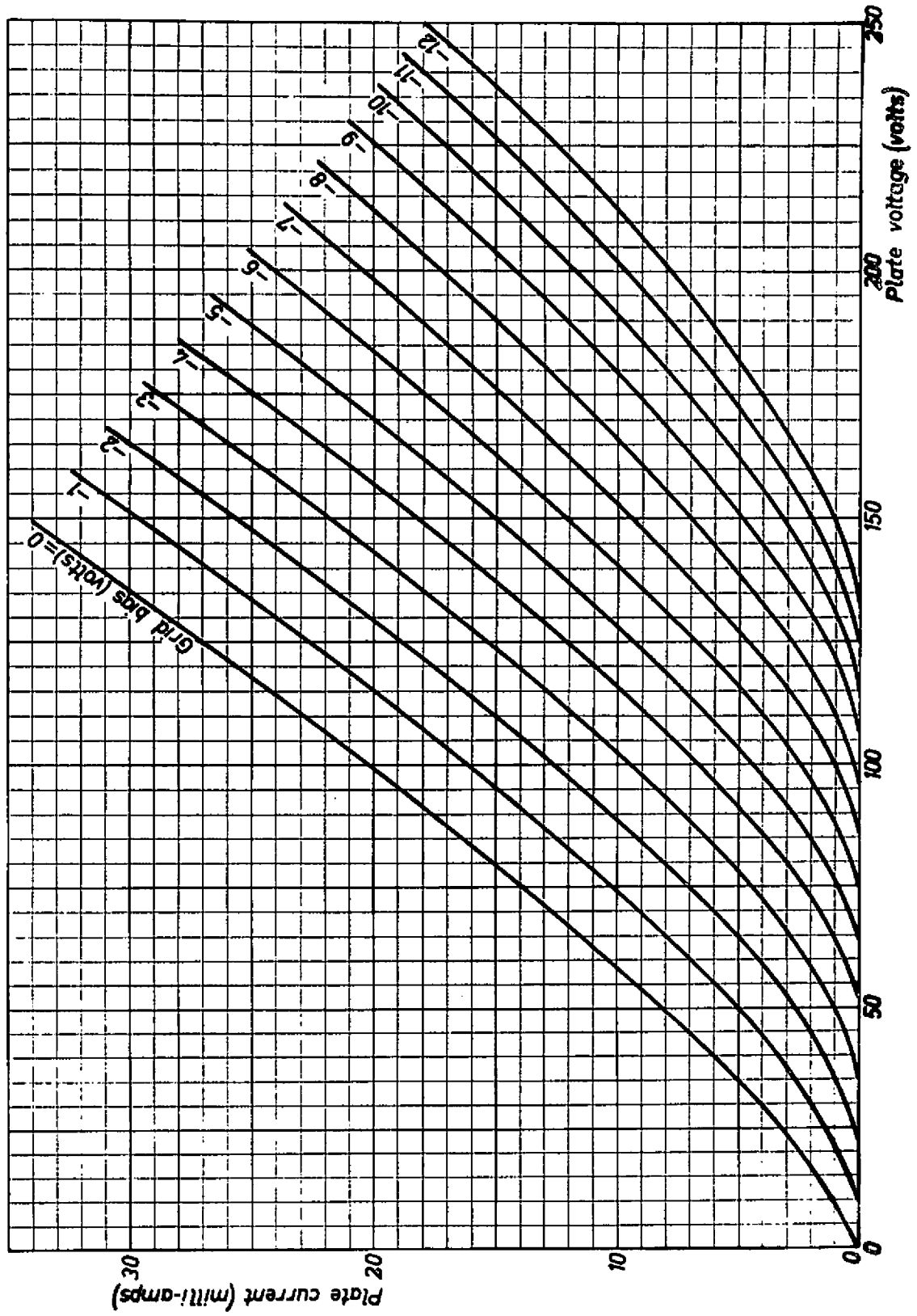
PHILIPS

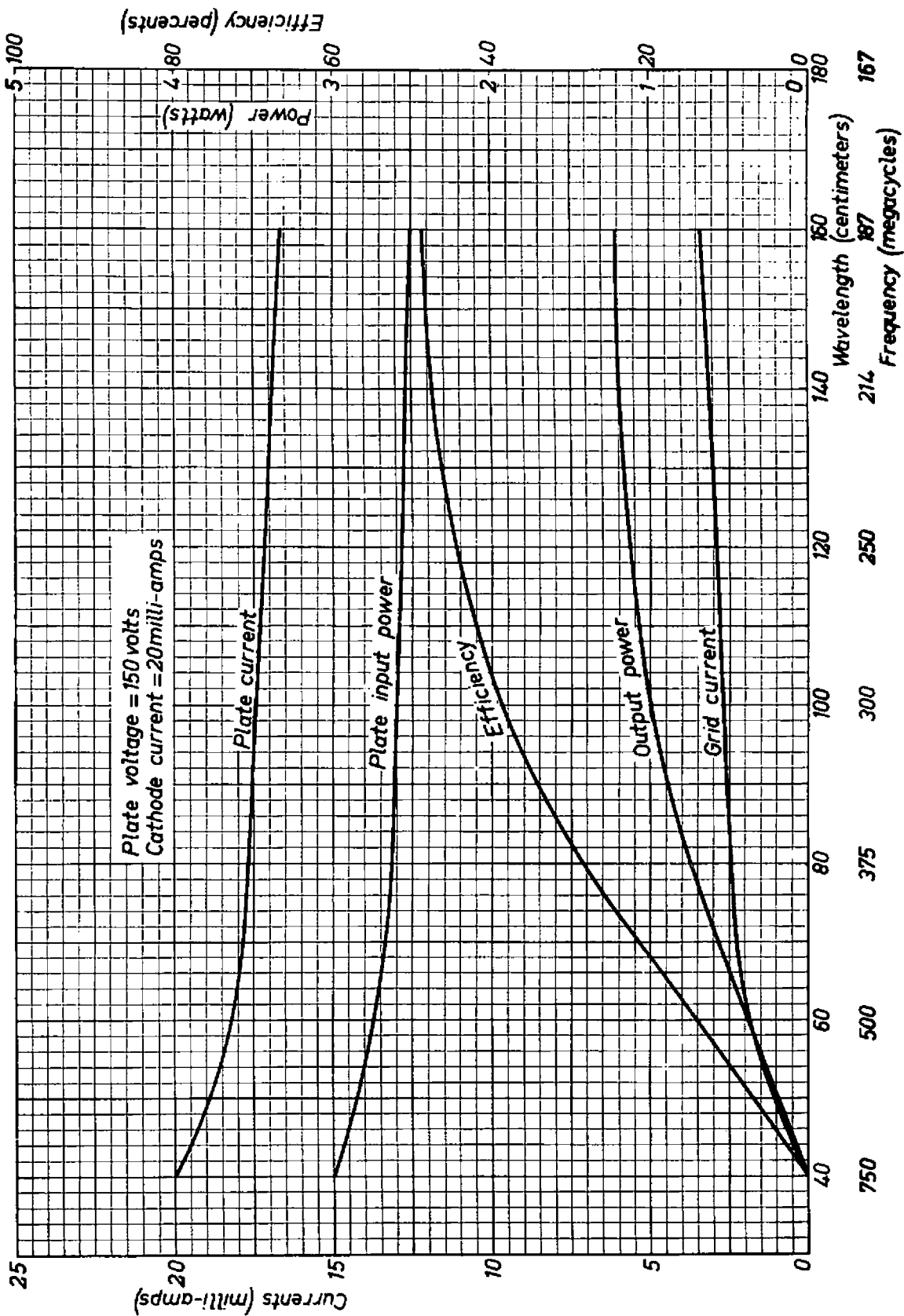
1E3



1E3

PHILIPS





TENTATIVE DATA ON
NATIONAL UNION TYPE 1F1

The National Union type 1F1 is a current-regulating device designed for use in battery-operated radio receivers using the 2.0-volt filament line of tubes. It will hold the filament current constant over the range of voltage (3.2 to 2.2 volts) presented during useful life by two dry-cells in series. The 1F1 is rated at 0.720 amperes with 0.7 volts drop across the tube. The 1F1 is for use with any combination of tubes having filament currents adding up to 0.720 amperes.

DATA

Maximum Overall Height	4-1/4"
Maximum Diameter	1-9/16"
Bulb	ST-12
Base	Small 4-prong
Basing:	Filament between large prongs
Current	0.720 amperes

**TENTATIVE DATA ON
NATIONAL UNION TYPE 1G1**

The National Union type 1G1 is a current-regulating device designed for use in battery-operated radio receivers using the 2.0-volt filament line of tubes. It will hold the filament current constant over the range of voltage (3.2 to 2.2 volts) presented during useful life by two dry-cells in series. The 1G1 is rated at .420 amperes with 0.7 volts drop across the tube. The 1G1 is for use with any combination of tubes having filament currents adding up to .420 amperes.

DATA

Maximum Overall Height_____4-1/4"
Maximum Diameter_____1-9/16"
Bulb_____ST-12
Base_____Small 4-prong
Basing: _____Filament between large prongs
Current_____0.420 amperes

RADIO MANUFACTURERS ASSOCIATION



SUITE 701-4 AMERICAN BUILDING
1317 F STREET, N. W.
WASHINGTON, D. C.

SUB-COMMITTEE ON TUBE NUMBERING

E. W. WILBY, CHAIRMAN
711 FIFTH AVENUE
NEW YORK, N. Y.

November 13th, 1936

To Tube Engineer:

RMA Tube Standardiza-
tion Release #97.

The data listed below will provide you with in-
formation on a 1 volt drop 740 ma ballast tube
type designated as 1U1. This tube is of the MG
type of shell and is based in an octal 6 pin base:

Pin #1	Blank
#2	Heater
#3	Blank
#5	Blank
#7	Heater
#8	Blank

Maximum Overall Length	4 3/16"
Maximum Diameter	1 5/16"

This information is furnished you through the
courtesy of the National Union Radio Corporation.

Very truly yours,

Chairman
Tube Numbering

eww:lg

RADIO MANUFACTURERS ASSOCIATION

#98

November 27th, 1936

To Tube Engineer:

RMA Tube Standardization Release #98 re 1V1.

The 1V1 is a ballast tube having a 1 volt drop and a current rating of 500 ma. The tube is enclosed in an ST-12 bulb and is based with a small 4-pin base. The connections and dimensions are as follows:

Pin #1	Filament
Pin #2	Blank
Pin #3	Blank
Pin #4	Filament

Maximum Overall Length	4-1/4"
Maximum Diameter	1-9/16"

RMA basing number 4A

As this tube is well known to the industry it is not necessary that this committee distribute samples to the manufacturers.

This information is furnished you through the courtesy of the National Union Radio Corporation.

Very truly yours,

Edmund W. Kelly
Chairman
Tube Numbering

NEW NATIONAL UNION ELECTRON TUBE DATA

N.U. 2C53

HIGH MU TRIODE AMPLIFIER

The 2C53 is a Very High Mu Triode designed for use in regulated power supplies or voltage amplifiers operating at plate potentials between 1 and 8 kv. This tube is particularly useful as a shunt regulator in equipment requiring stabilized output voltage essentially independent of line voltage variations and variations in load current.

Low capacities, high gain, and high voltage ratings make this tube well suited for television and oscilloscope sweep circuits employing electrostatic deflection.

MAXIMUM RATINGS:-

Heater Voltage	6.3	Volts	± 10%
Anode Voltage	8000	Volts	max.
Plate Current (Average)	5.0	ma.	max.
Plate Current (Peak)	100	ma.	max.
Grid Voltage	-200	Volts	max.
Plate Dissipation	12.0	Watts	max.
Heater cathode voltage	±300	Volts	max.

ELECTRICAL RATINGS:-

Heater Voltage	Unipotential Cathode
Current	-6.3 Volts ± 10%
Amplification Factor	.30 Amps.
Plate Resistance @ $E_b = 4$ kv	500
Transconductance @ $E_c = -5$ V	.525 megs.
	950 umhos

DIRECT INTERELECTRODE CAPACITANCES:-

Grid to Plate	.62 uuf.
Grid to Cathode	5.20 uuf.
Cathode to Plate	2.30 uuf.

MECHANICAL RATINGS:-

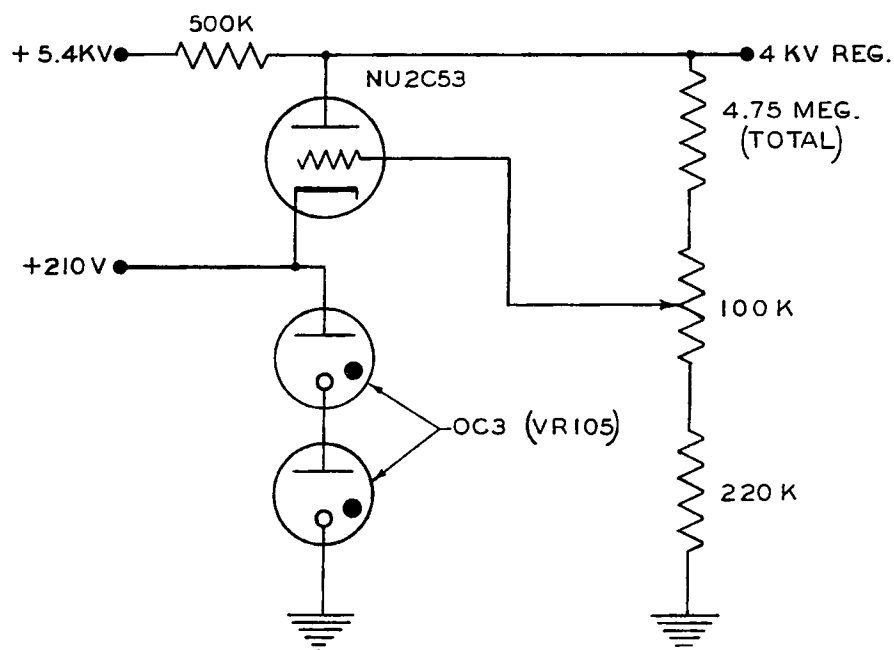
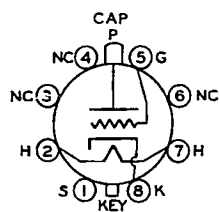
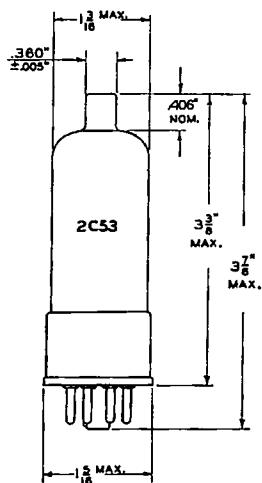
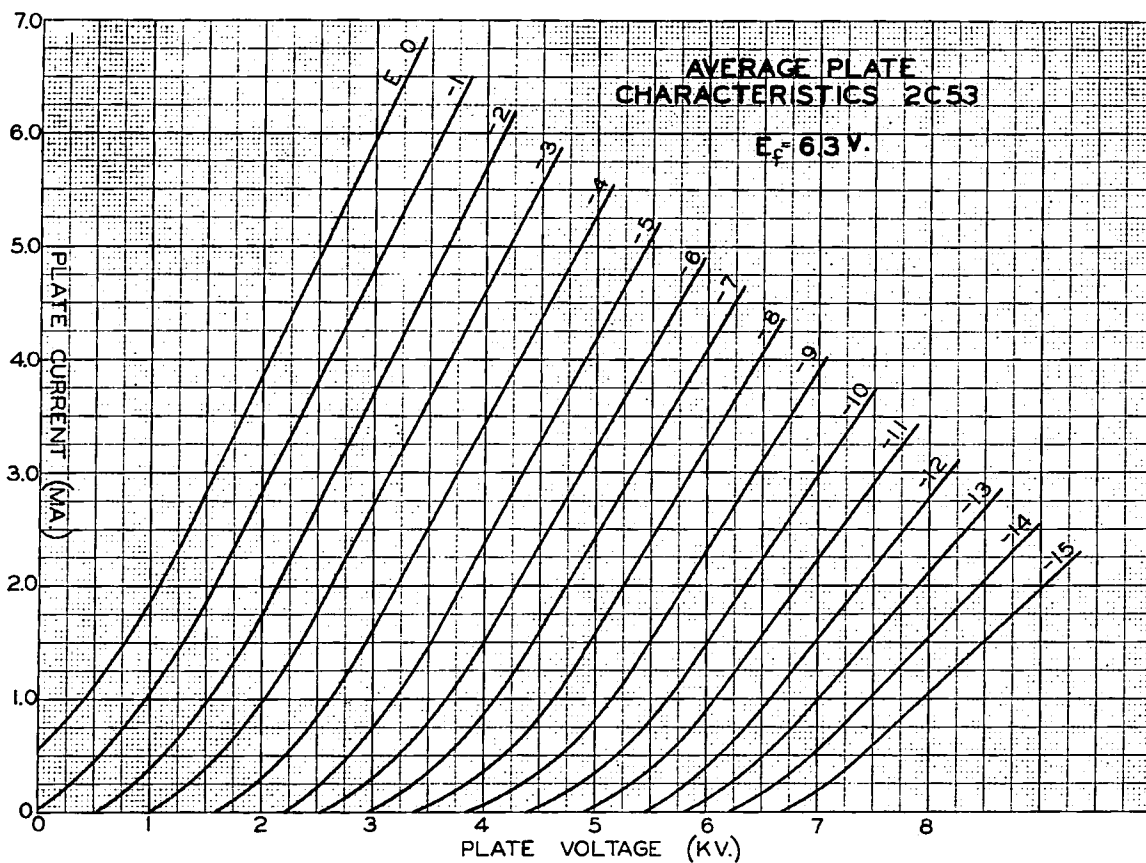
Maximum Overall Length	3 7/8 inches
Maximum Seated Length	3 3/8 inches
Maximum Diameter	1 5/16
Bulb	T - 9
Base	8 pin Octal
Cap	Small
Mounting Position	Any

BASING:-

Pin 1 - Shield	Pin 5 - Grid
Pin 2 - Heater	Pin 6 - NC
Pin 3 - NC	Pin 7 - Heater
Pin 4 - NC	Pin 8 - Cathode
Top Cap - Plate	

TYPICAL OPERATION - SHUNT REGULATORS

Series Resistance	0.5	meg.
Unregulated Input Voltage	5.4	kv.
Regulated Output Voltage	4.0	kv.
Cathode Voltage	210	Volts
Plate Current	0.9	ma.
Load Current	0.6	ma.



TYPICAL REGULATOR CIRCUIT

SERVICE ENGINEERING BULLETIN File No.

Prepared by Commercial Engineering Division

NATIONAL UNION RADIO CORPORATION

RMA RELEASE No. 392

TYPE 306

Nov. 30, 1944

TWIN TRIODE AMPLIFIER

PHYSICAL SPECIFICATIONS

CATHODE	COATED FILAMENT
BASE	LOKAL 8-PIN
BULB	T-9
MAXIMUM DIAMETER	1-3/16"
MAXIMUM OVERALL LENGTH	2-25/32"
MAXIMUM SEATED HEIGHT	2-1/4"
RMA BASING No.	7BW-L-0
PIN CONNECTIONS:	
PIN 1 - POSITIVE FILAMENT	PIN 5 - GRID #1
2 - NO CONNECTION	6 - PLATE #1 & GETTER FLAG
3 - PLATE #2	7 - NEGATIVE FILAMENT (PARALLEL),
4 - GRID #2	FILAMENT C.T.
	8 - NEGATIVE FILAMENT (SERIES)

MOUNTING POSITION

ANY

DIRECT INTERELECTRODE CAPACITANCES (WITHOUT SHIELD)

GRID-TO-PLATE (EACH SECTION)	1.7	UUF
INPUT (GRID-TO-FILAMENT-BASE) (EACH SECTION)	1.7	UUF
OUTPUT (PLATE-TO-FILAMENT-BASE) SECTION 1	2.3	UUF
SECTION 2	1.8	UUF
PLATE #1 TO PLATE #2	1.0	MAX. UUF
GRID #1 TO GRID #2	.20	MAX. UUF
GRID #1 TO PLATE #2	.06	MAX. UUF
GRID #2 TO PLATE #1	.10	MAX. UUF

RATINGS	SERIES FILAMENT		PARALLEL FILAMENT	
MAXIMUM FILAMENT VOLTAGE				
DRY BATTERY OPERATION-VOLTAGE				
MUST NEVER EXCEED	3.2		1.6	VOLTS
AC/DC POWER LINE OPERATION-DESIGN CENTER	2.6		1.3	VOLTS
MAXIMUM PLATE VOLTAGE	110		110	VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

	SERIES FILAMENT*		PARALLEL FILAMENT	
FILAMENT VOLTAGE	2.8 DC	1.4DC	1.4DC	VOLTS
FILAMENT CURRENT	0.050	0.100	0.100	AMP.
PLATE VOLTAGE (EACH SECTION)	90	90	90	VOLTS
GRID VOLTAGE (EACH SECTION)	0	0	-3	VOLTS
PLATE CURRENT (SECTION #1)	4.5	4.5	1.4	MA
PLATE RESISTANCE (SECTION #1)	11,200	11,200	19,000	OHMS
TRANSCONDUCTANCE (SECTION #1)	1300	1300	760	UMHOS
AMPLIFICATION FACTOR (SECTION #1)	14.5	14.5	14.5	
PLATE CURRENT (SECTION #2)	3.2	4.5	1.4	MA
PLATE RESISTANCE (SECTION #2)	12,800	11,200	19,000	OHMS
TRANSCONDUCTANCE (SECTION #2)	1100	1300	760	UMHOS
AMPLIFICATION FACTOR (SECTION #2)	14.1	14.5	14.5	

SERVICE ENGINEERING BULLETIN **File No.**

Prepared by Commercial Engineering Division

NATIONAL UNION RADIO CORPORATION

TYPE 306

*BOTH GRIDS RETURNED TO F-PIN #8

SECTION #2 IS RECOMMENDED FOR THE OSCILLATOR WITH GRID LEAK RETUNED PROPERLY TO AVOID OSCILLATOR STARTING DIFFICULTIES.

FOR INTERPRETATION OF RATINGS REFER TO RECEIVING TUBE RATING SHEETS.

NOVEMBER 10, 1944

NEW **NATIONAL UNION ELECTRON TUBE** DATA

N.U. 3C27B

MICRO-WAVE COAXIAL TRIODE

from RMA release # 605, Sept. 12, 1947

The National Union 3C27B is a coaxial triode designed especially for micro-wave pulsed oscillator service. Conservatively rated, one tube employed in suitable resonant cavity circuits will deliver 10 kw. peak radio frequency power at 1150 megacycles.

MAXIMUM RATINGS:-

Heater Voltage	6.3 $\pm$ 5%	Volts max.
Grid Voltage	-1000	Volts max.
Anode Voltage (Instantaneous)	5000	Volts max.
Anode Dissipation	150	Watts max.
Grid Dissipation		
Operating Temperature		
Anode and Grid Seals	140°	C max.
Cathode Seal	180°	C max.

ELECTRICAL RATINGS:-

Cathode: Oxide Coated Unipotential		
Voltage	6.3	Volts
Current	2.5	Amps.
Amplification Factor	23	
Transconductance (Eb = 700v, Ip = 70 ma)	7500	umhos

DIRECT INTERELECTRODE CAPACITANCES:-

Grid to Plate	3.5	uuf
Grid to Cathode	4.0	uuf
Cathode to Plate	1.45	uuf

MECHANICAL RATINGS:- (See Reverse)

MAXIMUM OVERALL DIMENSIONS

Length	3 17/64 inches
Diameter	1 1/2 inches
Mounting Position	Any
Radiators - Integral - See outline drawing	
Type of Cooling	Air Blast

TYPICAL OPERATING CONDITIONS:-

Class C Oscillator, Plate Pulsed

Frequency	1140 megacycles
Anode Voltage (Instantaneous)	5000 Volts
Duty Cycle	.005 %
Peak Power Output	8 Kw.

Cooling by Air Blast (Volumes)

Plate Radiator	4 cu. ft/min.
Grid Radiator	1 cu. ft/min.

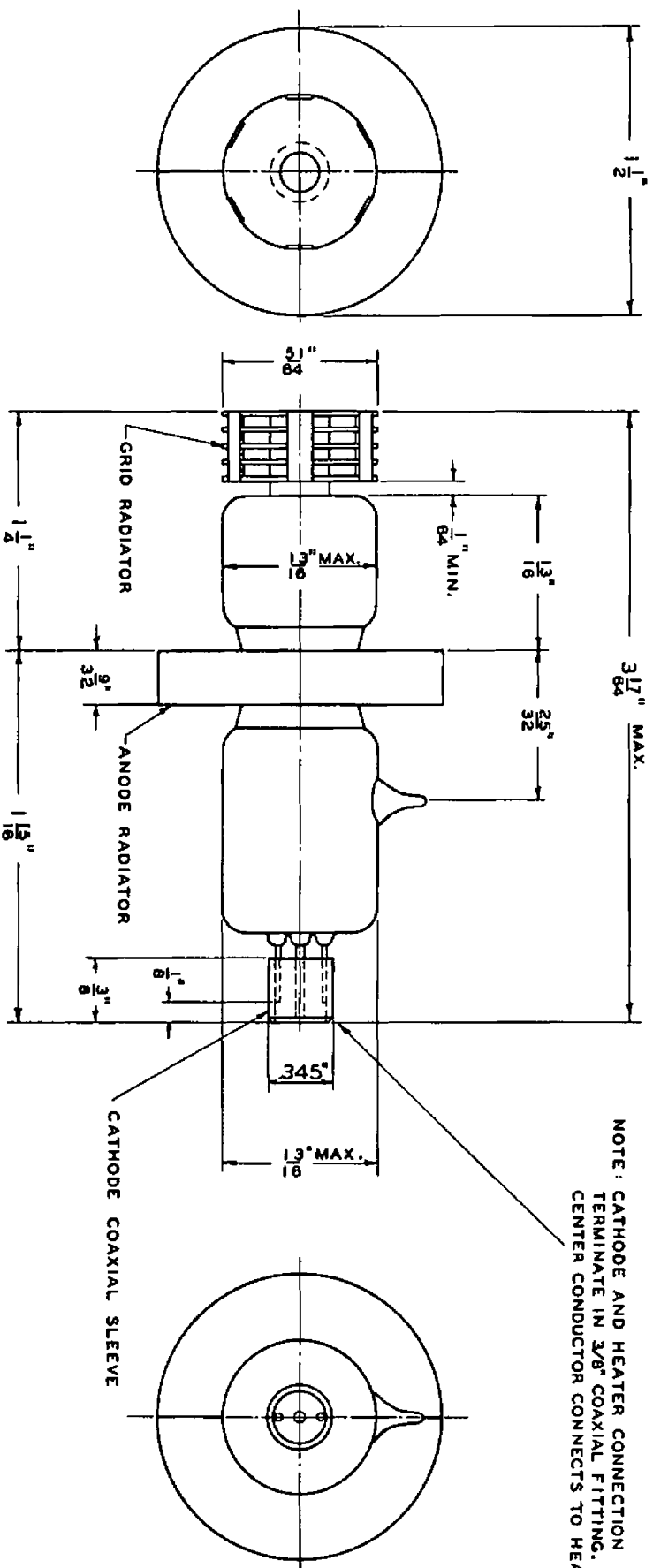
OCTOBER 1, 1946

See Over

Prepared by

Commercial Engineering Division

NEWARK **NATIONAL UNION RADIO CORPORATION** NEW JERSEY



NOTE : CATHODE AND HEATER CONNECTION
TERMINATE IN 3/8" COAXIAL FITTING.
CENTER CONDUCTOR CONNECTS TO HEATER.

N.U. 3C27B

NEW NATIONAL UNION ELECTRON TUBE DATA

N. U. - 3 C 3 6

U.H.F. POWER TRIODE

Page 1

The National Union 3C36 is a water or air cooled ultra-high frequency power triode especially designed for operation in the medium micro-wave range between 500 and 1500 megacycles. It is particularly useful in grounded grid type circuits giving stable triode performance in Class C oscillator service throughout this range. As an example it is possible to obtain better than 100 watts useful R.F. Power Output from a single tube at 1000 megacycles when operating at the rated maximum anode dissipation of 500 watts. At 750 megacycles and lower, the efficiency is greater than 50%, allowing a maximum power output of 250 watts to be obtained under similar conditions.

ELECTRICAL CHARACTERISTICS:-

Cathode: Oxide Coated Unipotential	
Heater Voltage	6.3 Volts AC or DC
Heater Current	2.8 Amps.
Amplification Factor	30
Transconductance	
(I _b = 50 ma, E _b = 500 volts)	8000 umhos
Maximum Frequency of Operation	1500 megacycles

MAXIMUM RATINGS:-

Heater Voltage	6.3 ± 5% volts max.
Average Grid Current	60 ma.
Anode Voltage	2000 volts max.
Average Anode Current	250 ma.
Peak anode current	50.0 Amps
RMS current not to exceed	0.8 Amps
Anode Dissipation:	
Water Cooled (1 liter per minute)	500 Watts max.
Air Blast Cooled	200 Watts max.

DIRECT INTERELECTRODE CAPACITANCES:-

Plate to Cathode	0.017 uuf.
Grid to Cathode	7.2 uuf.
Grid to Plate	5.3 uuf.

MECHANICAL CHARACTERISTICS:-

Maximum Overall Dimensions	
Length	3 1/4 inches
Diameter	1 3/8 inches
Mounting Position	Any
Terminal Connections	See Fig. 4
Type of Cooling -	Water
At reduced ratings	Air Blast

TYPICAL OPERATING CONDITIONS:-

Grounded Grid Class C Oscillator Service (See Fig. 5)

Frequency	1000 Megacycles
Anode Voltage	1500 Volts
Cathode Resistor	150 Ohms
Grid Resistor	2500 Ohms
Anode Current	250 Ma
Grid Current	30 Ma
Power Output	60 Watts

* * * * *

from RMA release # 473, Feb. 15, 1946

JANUARY 1, 1946

SEE PAGE 2

Prepared by

Commercial Engineering Division

NEWARK NATIONAL UNION RADIO CORPORATION NEW JERSEY

NEW **NATIONAL UNION ELECTRON TUBE** DATA

N. U. - 3 C 3 6 U.H.F. POWER TRIODE

Page 2

The following additional features make the National Union 3C36 particularly desirable where moderate power C. W. output is required between 500 and 1500 megacycles.

1. The overall dimensions of the 3C36 (3 1/4" long, 1 3/8" dia.) are such as to allow the use of highly efficient resonant cavity and concentric line circuits at maximum frequencies in this range.
2. To facilitate the highest degree of performance in grounded grid circuits, the grid connection is located between cathode and anode connections, and the cathode-anode capacitance is kept to a minimum.
3. The heater for the unipotential cathode is completely shielded from the R.F. portions of the tube and large low-loss, low impedance connections are employed to the other electrodes. (Fig.4)
4. Construction of the tube along the cylindrical principle reduces to a minimum interelement dimensional changes due to temperature variation under operation.
5. The surfaces (internally and externally) over which the radio frequency currents flow are silver plated giving low loss operation.
6. Glass-to-metal seals are employed extensively in the construction of the NU-3C36 and represent the practical application of the most recent advances in this technique.
7. Air blast cooling may be employed with this tube if the plate dissipation is not allowed to exceed 200 watts. Recommended forms of cooling units are shown in Figs. 1 & 3.

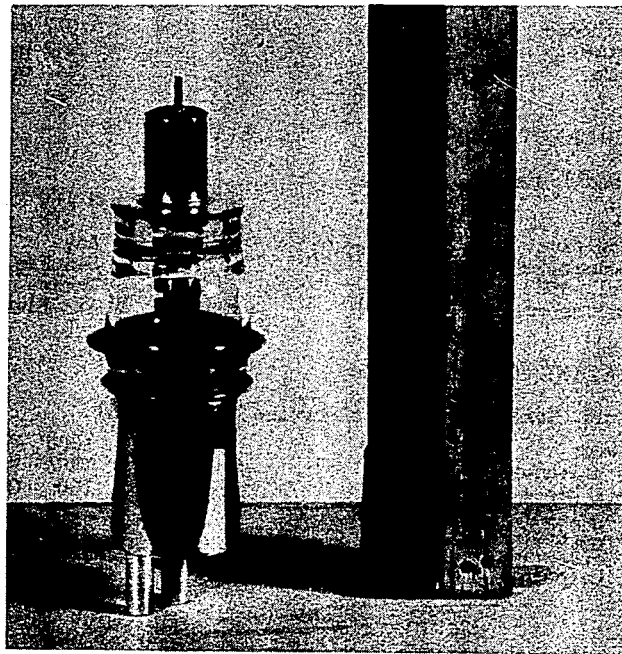


FIG. 2

JANUARY 1, 1946

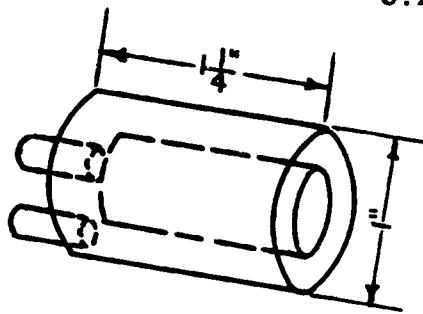
SEE PAGE 3

NEW NATIONAL UNION ELECTRON TUBE DATA

N. U. - 3 C 3 6

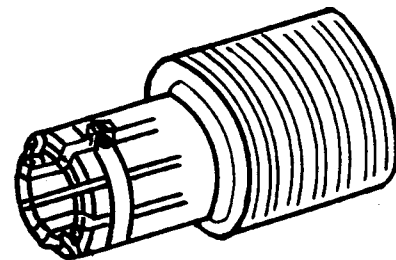
U.H.F. POWER TRIODE

Page 3



WATER COOLER
ATTACHES TO ANODE END OF
TUBE AS SHOWN IN PHOTOGRAPH
THIS COOLING UNIT MAY ALSO
EMPLOY FORCED AIR BLAST

FIG. 1



ALTERNATE TYPE
OF HEATER FOR AIR
BLAST COOLING

FIG. 3

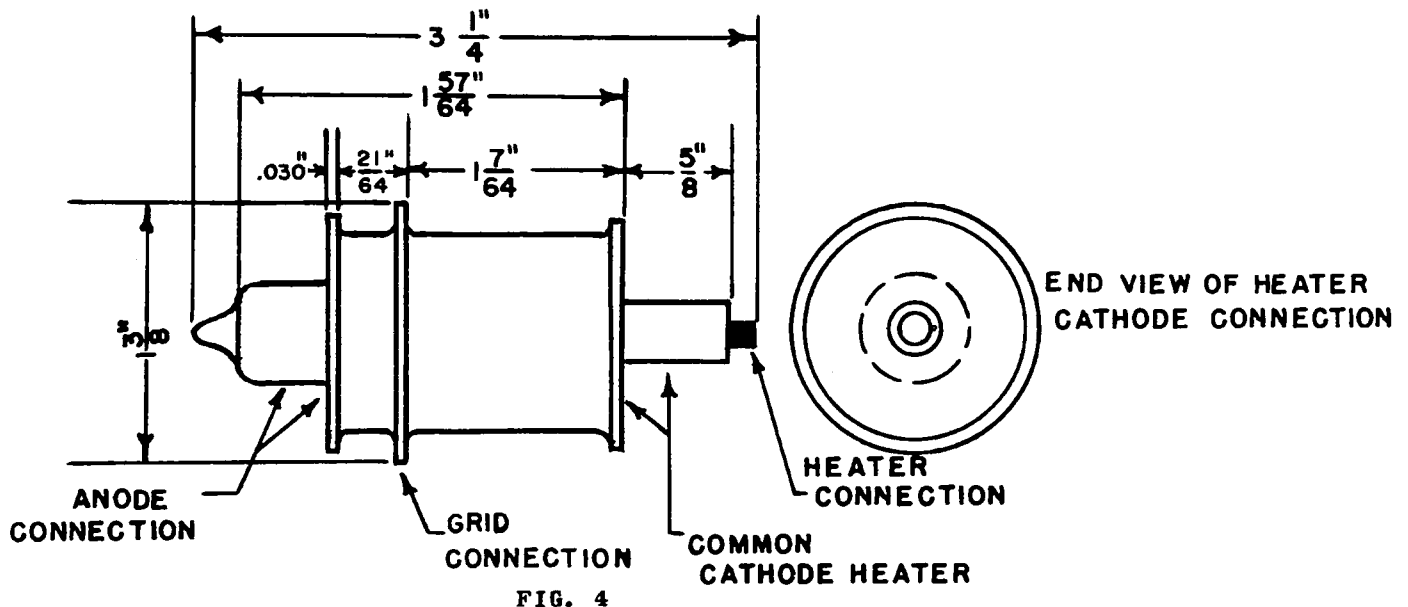


FIG. 4

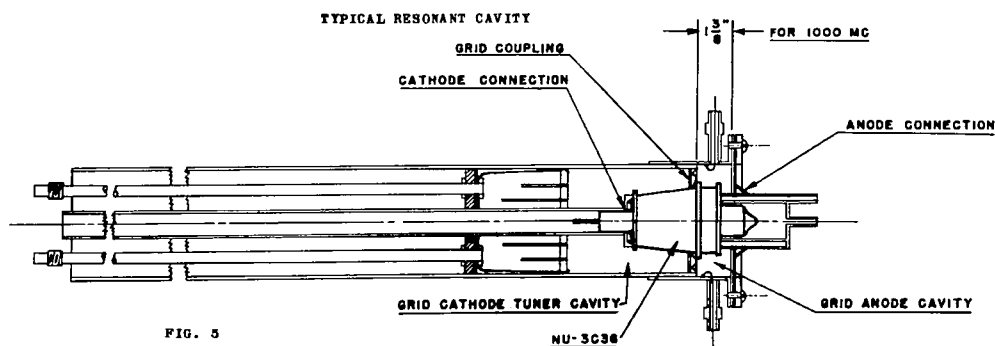


FIG. 5

RE-ENTRANT CAVITY—FIXED FREQ.

JANUARY 1, 1946

Prepared by

Commercial Engineering Division

NEWARK NATIONAL UNION RADIO CORPORATION NEW JERSEY

NEW NATIONAL UNION ELECTRON TUBE DATA

N. U. 3 C 3 7

MICRO-WAVE COAXIAL TRIODE

Page 1

The National Union 3C37 is a Coaxial Triode, designed especially for micro-wave pulse oscillator service. Conservatively rated, one tube employed in suitable resonant cavity circuits will deliver 10 kw. peak RF power output at frequencies as high as 1150 megacycles.

MAXIMUM RATINGS:-

Heater Voltage	6.3 $\pm$ 5% max. volts
Grid Voltage	1000 max. volts
Anode Voltage (Instantaneous)	5000 max. volts
Anode Dissipation	150 max. watts
Grid Dissipation (Approx.)	25 max. watts
Operating Temperature	
Anode and Grid Seals	140°C. max.
Cathode Seal	180°C. max.

ELECTRICAL RATINGS:-

Cathode: Oxide Coated Unipotential	
Voltage	6.3 volts
Current	2.5 amperes
Amplification Factor	23

DIRECT INTERELECTRODE CAPACITANCES:-

Grid to Plate	3.5 uuf.
Grid to Cathode	4.25 uuf.
Plate to Cathode	0.60 uuf.
Transconductance	
I _b = 70 ma., E _b = 700 volts	8000 umhos
Anode Dissipation	150 watts

MECHANICAL RATINGS:-

Maximum Overall Dimensions:-	
Length	3 3/32 inches
Diameter	1 1/2 inches
Mounting Position	Any
Radiators - Integral - See outline drawing	
Type of Cooling	Air Blast

TYPICAL OPERATING CONDITIONS:-

Class C Oscillator, Plate Pulsed	
Frequency	1150 megacycles
Anode Voltage (Instantaneous)	4500 volts
Duty Cycle	0.1 %
Power Output	10 KW
Grid Resistance	100 ohms
Pulse Duration	2 micro-seconds
Cooling by Air Blast (volumes)	
Plate Radiator	4 cu. ft/min.
Grid Radiator	1 cu. ft/min.

from RMA release # 473, Feb. 15, 1946

DECEMBER 17, 1945

SEE PAGE 2

Prepared by

Commercial Engineering Division

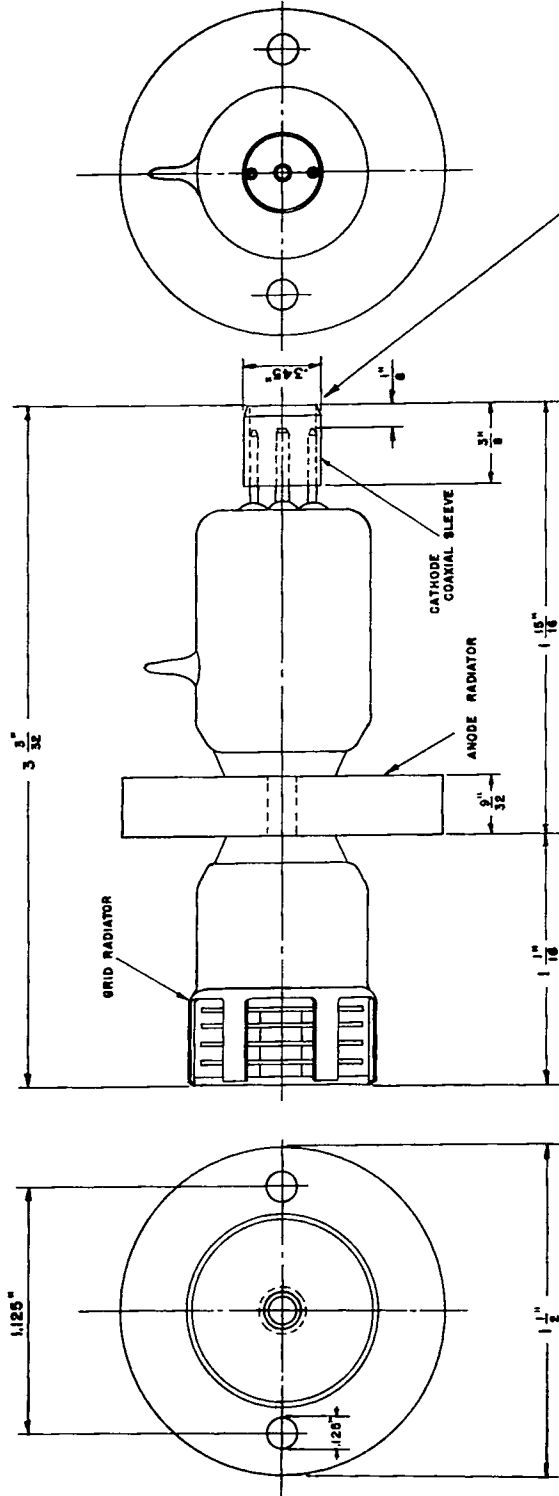
NEWARK NATIONAL UNION RADIO CORPORATION NEW JERSEY

NEW NATIONAL UNION ELECTRON TUBE DATA

N. U. 3 C 3 7

MICRO-WAVE COAXIAL TRIODE

Page 2



NOTE: CATHODE AND HEATER CONNECTION TERMINATE IN 3/8" COAXIAL FITTING, CENTER CONDUCTOR CONNECTS TO HEATER.

OUTLINE DRAWING OF 3C37

DECEMBER 17, 1945

SEE PAGE 3

Prepared by

Commercial Engineering Division

NEWARK NATIONAL UNION RADIO CORPORATION NEW JERSEY

NEW **NATIONAL UNION ELECTRON TUBE** DATA

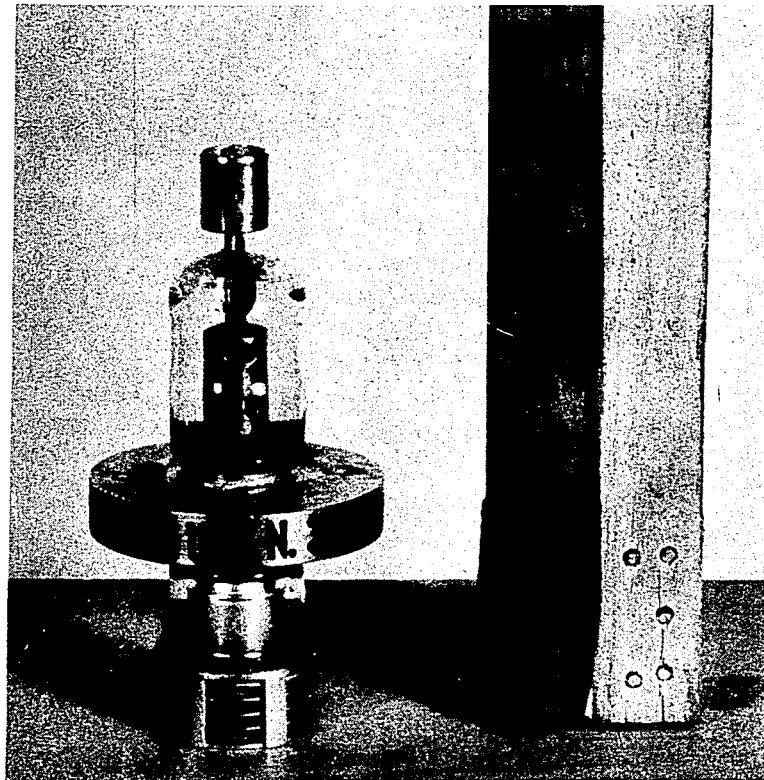
N. U. 3 C 3 7

MICRO-WAVE COAXIAL TRIODE

Page 3

The following advanced constructional techniques make the NU-3C37 especially well suited to applications in the intermediate micro-wave range:-

1. Anode and grid dissipation capabilities are adequate to enable the tube to withstand large momentary overloads without damage or distortion of electrical characteristics.
2. Internal and external surfaces are suitably silver plated to reduce skin resistance and RF losses to a minimum.
3. The grid employs a specially constructed radiator which greatly reduces RF losses while permitting operation at duty cycles of 1% with air-blast cooling.
4. The anode radiator is made integral with the tube and is of large mass. It is made entirely of silver plated copper and will efficiently transfer heat to any resonator of which it becomes a part.
5. Construction of tube elements on the cylindrical principle results in negligible frequency drift. Mechanical tolerances are closely controlled from tube to tube causing a minimum of frequency change between tubes where fixed resonators are employed.
6. A maximum of mechanical strength is obtained from the rugged construction of the tube, and breakage in use is negligible.



DECEMBER 17, 1945

Prepared by

Commercial Engineering Division

NEWARK

NATIONAL UNION RADIO CORPORATION

NEW JERSEY

NEW NATIONAL UNION ELECTRON TUBE DATA

N.U. 4C27

V.H.F. COAXIAL TRIODE

The National Union 4C27 is a coaxial triode designed particularly for use as a pulsed V.H.F. oscillator in the 200 mc. to 600 mc. range. Conservatively rated, one tube will deliver 50 kw peak power as a pulsed r.f. oscillator.

MAXIMUM RATINGS:-

Heater Voltage	6.0 $\pm$ 5%	Volts
Grid Voltage	-1000	Volts
Anode Voltage (Instantaneous)	8000	Volts
Anode Dissipation	150	Watts

ELECTRICAL RATINGS:

Cathode: Oxide coated unipotential		
Voltage	6.0 $\pm$ 5%	
Current	6.5	Amperes
Amplification Factor	23	

DIRECT INTERELECTRODE CAPACITANCES:

Grid to Plate	8	uuf.
Grid to Cathode	11	uuf.
Plate to Cathode	2.25	uuf.

MECHANICAL DATA:- (See Reverse)

MAXIMUM OVERALL DIMENSIONS

Length (less heater leads)	3	29/32 inches max.
Length (including heater leads)	5	7/8 inches max.
Width	2	1/4 inches
Radiator Diameter		
Radiator - Integral - See outline drawing		
Type of Cooling	Air Blast	
	Anode cooling fins	6 cfm
	Grid seal and lead	1 cfm

TYPICAL OPERATING CONDITIONS:

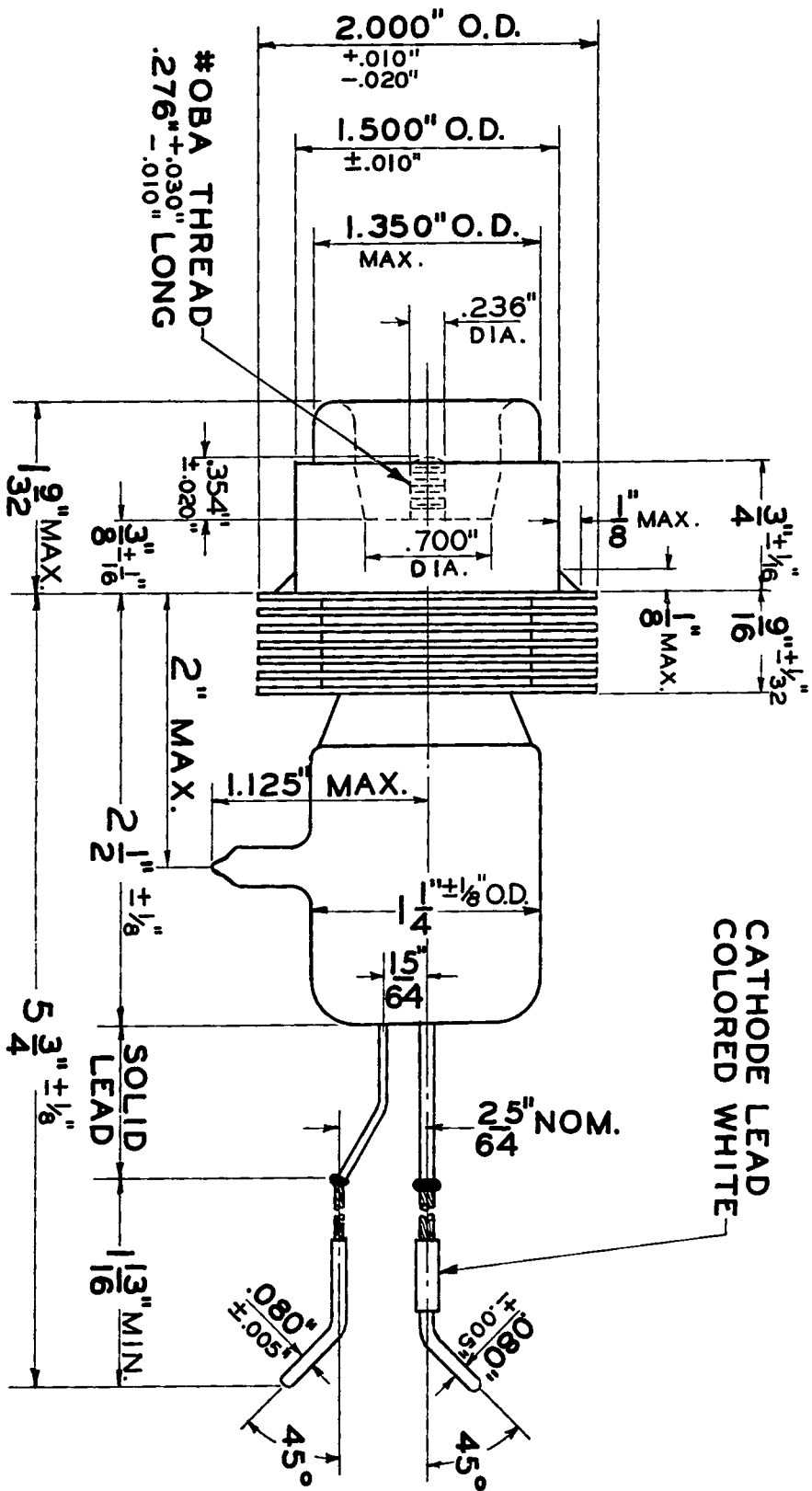
CLASS C OSCILLATOR, PLATE PULSED

Frequency	215 megacycles
Anode Voltage (Instantaneous)	8000 Volts
Repetition Rate	400 pulses per second
Pulse Width	2 microseconds
Power Output	50 kw

OCTOBER 1, 1946

from RMA release #530, Oct. 21, 1946

See Over



N.U. 4C27



ENGINEERING

NEWS RELEASE

ELECTRONIC COMPONENTS

Prepared by Commercial Engineering Division

N.U. 5ALP1 N.U. 5ALP4 N.U. 5ALP7 N.U. 5ALP11

DAYLIGHT VIEWING CATHODE RAY TUBES

The National Union Daylight Viewing tubes were developed to provide a five inch cathode-ray tube of minimum length and maximum beam current. These tubes have a standard 9 pin miniature base, use magnetic focus and deflection, and produce beam currents of 0.5 to 1.0 ma. under normal operation. These features together with low heater power consumption (1.26 watts) and maximum overall length of 7.5 inches provide a rugged as well as reliable cathode-ray tube that can be designed into airborne or small compact equipments or can be used where high ambient light levels are encountered.

MAXIMUM RATINGS

Heater voltage (ac or dc).....	6.3 v.
Anode voltage.....	10 Kv.
Grid voltage (negative).....	250 v.
Grid voltage (positive).....	0 v.
Grid resistor.....	1.5 meg.

TYPICAL OPERATING CONDITIONS

Heater voltage.....	6.3 v.
Heater current.....	200 ma.
Cathode current.....	500 μ a
Grid cutoff voltage.....	-50 v.
Anode voltage.....	8 Kv.

INTERELECTRODE CAPACITANCES

G1 to all other elements.....	4.0 μ pf (max.)
K to all other elements.....	5.5 μ pf (max.)

PHYSICAL SPECIFICATIONS

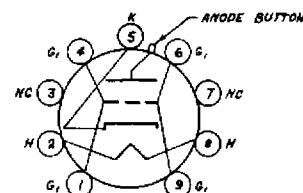
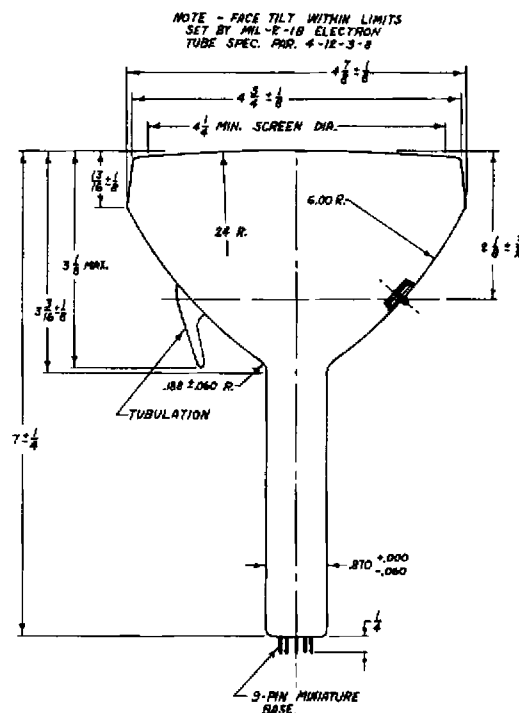
Overall length.....	7.5 in.
Useful screen diameter.....	4.25 in.
Maximum bulb diameter.....	5.0 in.
Tube neck diameter.....	0.87 in.
Cap (anode).....	snap on terminal
Base.....	9-pin miniature
Alignment, anode button and base.....	between pins 1 and 9

BASE PIN CONNECTIONS

Pin 1.....	Grid 1	Pin 6.....	Grid 1
Pin 2.....	Heater	Pin 7.....	N.C.
Pin 3.....	N.C.	Pin 8.....	Heater
Pin 4.....	Grid 1	Pin 9.....	Grid 1
Pin 5.....	Cathode		

PHOSPHOR

	FLUORESCENCE	PHOSPHORESCENCE	PERSISTENCE
5ALP1.....	Green	--	Medium
5ALP4.....	White	--	Medium
5ALP7.....	Blue	Yellow	Long
5ALP11.....	Blue	--	Short



from JETEC release
#1328, June 18, 1954

MAY 1954

NATIONAL UNION RADIO CORPORATION
MAIN OFFICE: HATBORO, PENNSYLVANIA

4/13/40

TYPE 5Z4GT/G
FULL-WAVE HIGH-VACUUM RECTIFIER

PHYSICAL SPECIFICATIONS:

Coated Unipotential Cathode	
Pin Connections	5L-0-0
Base	Intermediate Shell Octal 5-Pin
Bulb	T9-D
Maximum Diameter	1-5/16"
Maximum Overall Length	3-5/16"
Maximum Seated Height	2-3/4"
<u>Mounting Position</u>	Any

RATINGS:

Heater Voltage	5.0 A.C. Volts
Heater Current	2.0 amps.
Maximum Peak Inverse Voltage	1400 Volts
Maximum Steady State Peak Plate Current*	750 ma.
<u>Tube Voltage Drop</u> Measured with applied	20 volts
D.C. at 125 ma. Plate Current	

*When filter condensers larger than 4 uf are used it may be necessary to add additional plate supply impedance.

FULL-WAVE RECTIFIER

CONDENSER INPUT TO FILTER:

Heater Voltage	5.0 A.C. Volts
A.C. Plate Voltage per Plate (RMS)	350 max. Volts
D.C. Output Current	125 max. ma.
Total Effective Plate Supply Impedance per Plate	30 min. ohms

CHOKE INPUT TO FILTER:

Heater Voltage	5.0 A.C. Volts
A.C. Plate Voltage per Plate (RMS)	500 max. Volts
D.C. Output Current	125 max. ma.
Minimum Value of Input Choke	5 henrys

NATIONAL UNION
TYPE 6AD6G
TUNING INDICATOR

Indirectly-heated Cathode

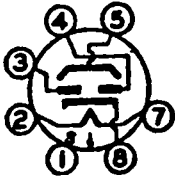
Heater Voltage		6.3 volts
Heater Current		0.15 amp.
Target Voltage	100	150 max. volts
Control Electrode—shadow closed	45 approx.	75 volts
Control Electrode—90° shadow	0 approx.	8 volts
Control Electrode—135° shadow	—23 approx.	—50 volts
Target Current—shadow closed	1.5 approx.	3.0 ma.
Target Current—90° shadow	1.0 approx.	2.0 ma.
Target Current—135° shadow	0.8 approx.	1.2 ma.

Mechanical Data:

Max. Overall Length		2-7/8"
Max. Bulb Diameter		1-3/16"
Max. Base Diameter		1-5/16"
Bulb		T-9
Base—Metal Shell		Small Octal 7-Pin

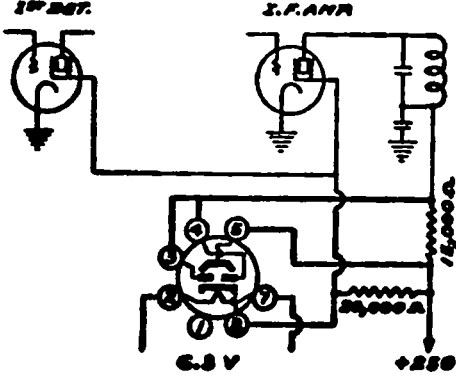
Basing:

- Pin No. 1—No Connection
- Pin No. 2—Heater
- Pin No. 3—Control Electrode 1
- Pin No. 4—Control Electrode 2
- Pin No. 5—Target
- Pin No. 7—Heater
- Pin No. 8—Cathode



BASE—Bottom View

National Union Type 6AD6G is a small cathode-ray tuning indicator tube. It is comprised of an indirectly-heated cathode, two ray control electrodes and a target. The two control electrodes are alike and thus two symmetrical patterns are produced on the target when the control electrodes are actuated directly from the same control voltage. One simple and inexpensive arrangement for utilizing the 6AD6G is indicated in the circuit below. Here the voltage on the control electrodes varies in accordance with the plate current of the I.F. amplifier tube, which current is directly governed by the A.V.C. voltage.



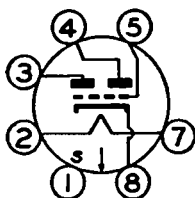
Indirectly-heated Cathode

Heater Voltage	_____				6.3 volts
Heater Current	_____				0.3 amp.
Plate No. 1 (Remote Cutoff)					
Plate Voltage	_____ 250	_____ 250	_____ 250	_____ 250	volts
Grid Voltage	_____ -35	_____ -15	_____ -6	_____ -1.5	volts
Plate Current	_____ 0.01	_____ 0.8	_____ 2.8	_____ 6.5	ma.
Mutual Conductance	_____				1000 μ mos
Amplification Factor	_____				25

Plate No. 2 (Sharp Cutoff)		
Plate Voltage	250	250 volts
Grid Voltage	-9.5	-1.5 volts
Plate Current	0.01	4.5 ma.
Mutual Conductance		950 μ mhos
Amplification Factor		33

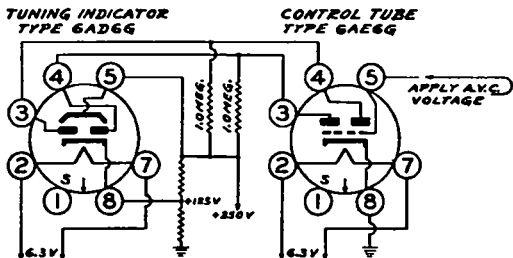
Max. Overall Length _____ 4-1/4"
 Max. Diameter _____ 1-9/16"
 Bulb _____ ST-12
 Base _____ Small Octal 7-Pin

- Pin No. 1—No Connection
Pin No. 2—Heater
Pin No. 3—Plate No. 1—Remote Cutoff
Pin No. 4—Plate No. 2—Sharp Cutoff
Pin No. 5—Grid
Pin No. 7—Heater
Pin No. 8—Cathode



7AH

BASE—Bottom View



National Union Type 6AE6G is a special-purpose tube primarily intended for use as a control tube in conjunction with cathode-ray tuning indicator tube Type 6AD6G. One arrangement for its use is indicated in the circuit above. This arrangement results in a tuning indicator system which is very sensitive to weak signals and yet gives good indication on the strongest of local signals.

NEW **NATIONAL UNION ELECTRON TUBE** DATA

N.U. 6AW7GT

DOUBLE DIODE TRIODE

MECHANICAL DATA:

Outline Drawing..... 9-16
Bulb..... T-9
Base..... B8-26 (Small wafer with metal sleeve)
Maximum Diameter..... 1-5/16"
Maximum Overall Length..... 3-7/16"
Maximum Seated Height..... 2-7/8"

PIN CONNECTIONS: RMA BASING DESIGNATION 8CQ

Pin #1 - Shell and cathode for triode and No. 2 Diode Plate
Pin #2 - Triode Grid
Pin #3 - No. 1 Diode Plate
Pin #4 - No. 2 Diode Plate
Pin #5 - Cathode for Diode Plate No. 1
Pin #6 - Triode Plate
Pin #7 - Heater
Pin #8 - Heater

Mounting Position..... Any

ELECTRICAL DATA:

Direct interelectrode capacitances (without shield)

Grid to Diode Plate No. 1	.300	μ f. maximum
Grid to Diode Plate No. 2	.100	μ f. maximum
Diode No. 1 to Diode No. 2.....	.250	μ f. maximum

Ratings

Heater Voltage (ac or dc).....	6.3	Volts
Maximum Triode Plate Voltage.....	300	Volts
Maximum Heater Cathode Voltage.....	90	Volts
Maximum Diode Plate Dissipation.....	0.5	Watt
Maximum continuous Diode Current (each diode)...	1.0	Ma.

Typical Operating Conditions and Characteristics

Heater Voltage.....	6.3	Volts
Heater Current.....	0.300	Ma.
Plate Voltage.....	100	Volts
Grid Voltage.....	0	
Plate Current.....	1.4	Ma.
Transconductance.....	1200	μ mos.
Amplification Factor.....	80	
Average Diode Current with 3 volts applied (each diode)...	5.0	Ma.

from RMA release #709. Nov. 15, 1948

JUNE 1, 1948

Research Division

ORANGE **NATIONAL UNION RADIO CORPORATION** NEW JERSEY

NEW NATIONAL UNION ELECTRON TUBE DATA

N.U. - 6AZ6

NU-6AZ6

RUGGEDIZED SUBMINIATURE UHF TWIN DIODE

APPLICATION:

The **NU-6AZ6** is a T-3 subminiature twin diode designed for rugged applications such as encountered in military service. It is a high perveance tube suitable for rectifier, clipper, detector and pulse service. An internal shield resulting in very low capacities between sections. The resonant frequency is approximately 1125 megacycles. It has an oxide coated unipotential cathode. The heater power consumption is less than 1/2 watt per section. The tube leads may either be soldered into a circuit or cut for socketing.

RATINGS:

Heater Voltage (AD or DC) $\pm 10\%$	6.3	volts
Maximum Heater Cathode Voltage	300	volts
Maximum Peak Inverse Voltage	450	volts
Maximum RMS Plate Voltage	200	volts
Maximum Peak Plate Current	50	ma
Maximum DC Output Current (F.W.)	20	ma
DC voltage drop at 8 Ma: per plate	3.5	volts

INTERELECTRODE CAPACITANCES:

Plate to Cathode, Heater, both Shields	2.5	μmf *
Cathode to Plate, Heater, both Shields	3.0	μmf *
Plate 1 to Plate 2 (with Ext. Shield)	0.01	μmf *
Plate 1 to Plate 2 (without Ext. Shield)	0.1	μmf *

* With close fitting shield

TYPICAL OPERATING CONDITIONS:

Heater Voltage	6.3	6.3	volts
Heater Current	150	150	ma
RMS Plate Voltage	150	115	volts
Plate Current (Full Wave) θ	16	12	ma
DC Output Voltage θ	180	136	volts

θ $R_L = 11,000$ ohms, $C_L = 8\mu\text{f}$, $L = 15$ mh

NOTE: LEADS MAY BE CUT TO .200" FOR USE IN CINCH SOCKET
54A-13686

from RTMA release #970, May 4, 1951

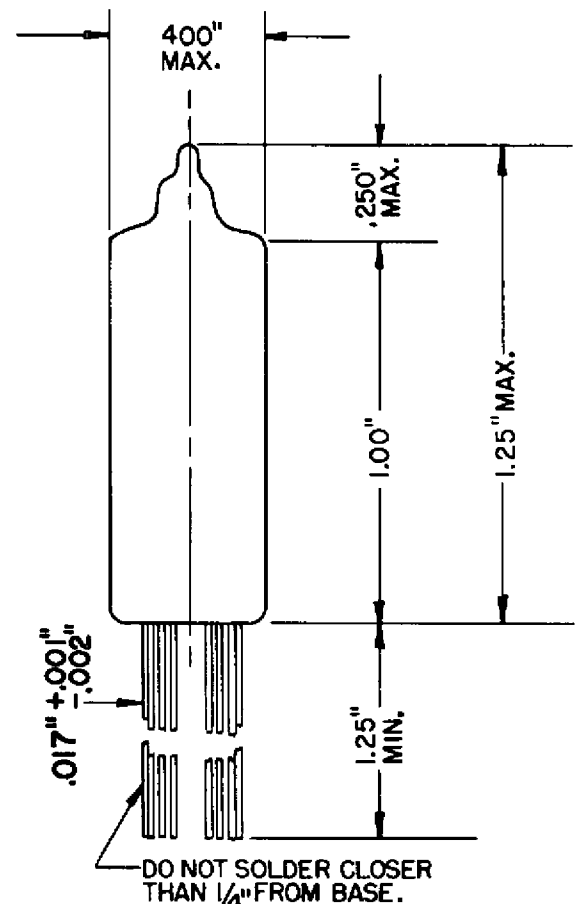
PHYSICAL SPECIFICATIONS

Style.....	Sub Miniature
Bulb.....	T-3
Base.....	Submin. Button 8-Pin
Mounting Position.....	Any

BASE PIN CONNECTIONS

Pin 1 -	N.C.
Pin 2 -	P ₁
Pin 3 -	H
Pin 4 -	K ₁
Pin 5 -	K ₂
Pin 6 -	H
Pin 7 -	P ₂
Pin 8 -	Shield

RMS Basing - 8 EH



(OVER)

APRIL 1951

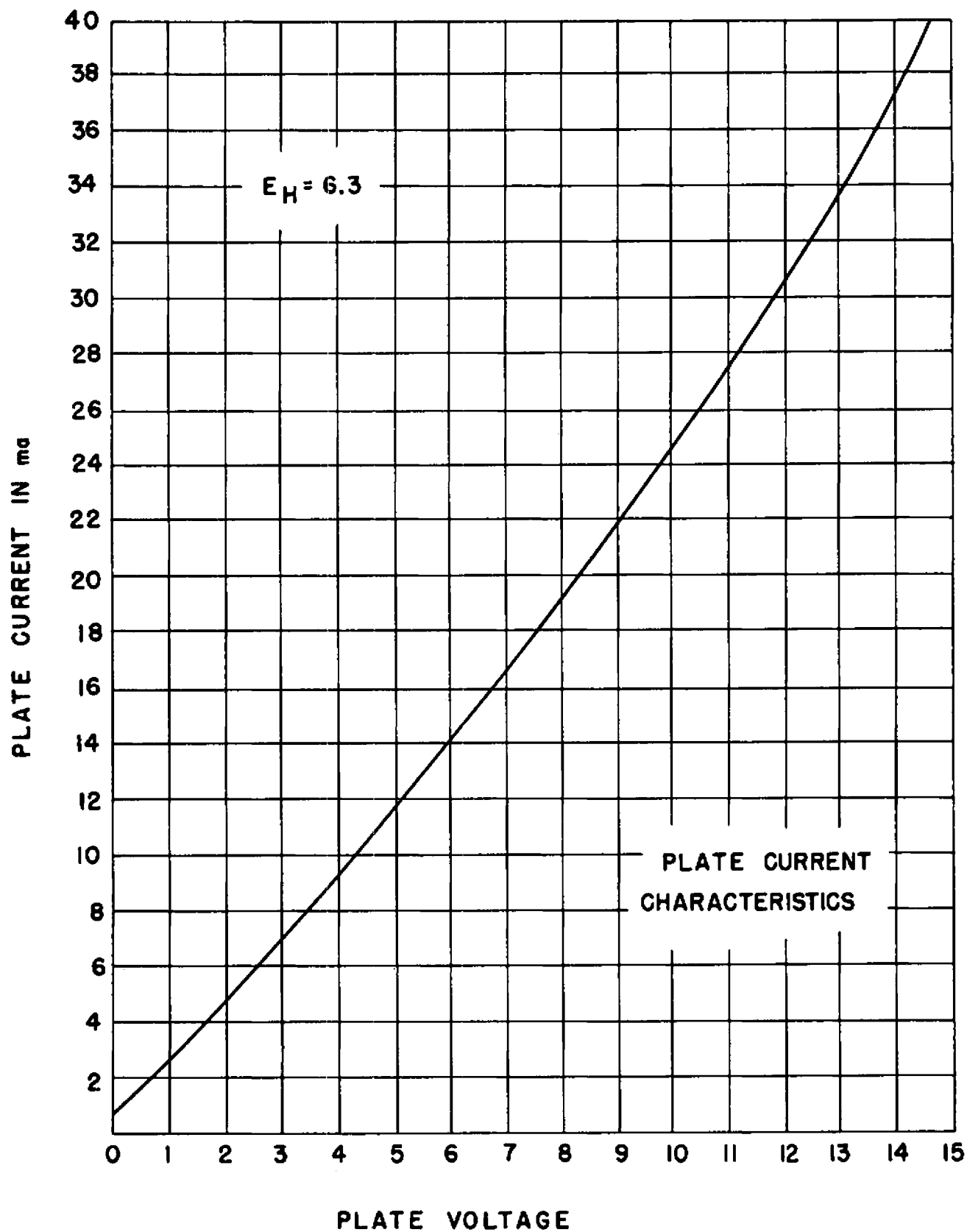
Research Division

ORANGE
NATIONAL UNION RADIO CORPORATION
NEW JERSEY

NATIONAL UNION RADIO CORPORATION

RESEARCH DIVISION

NU-6AZ6



NATIONAL UNION TYPE 6E6
DUPLEX TRIODE POWER AMPLIFIER

The 6E6 is a heater-cathode type of tube combining two low-mu output triodes in one bulb. It is intended for use in the output stage of automobile radio receivers or a-c operated radio receivers. The triode units have separate external terminals for all electrodes except the cathodes and heaters, thus permitting the triode units to be operated either in parallel, or push-pull.

CHARACTERISTICS

Heater Voltage (A.C. or D.C.)	6.3 Volts
Heater Current	0.6 Amperes
Bulb	ST-14
Base	Medium 7-pin
Maximum Overall Height	4-11/16"
Maximum Diameter	1-13/16"

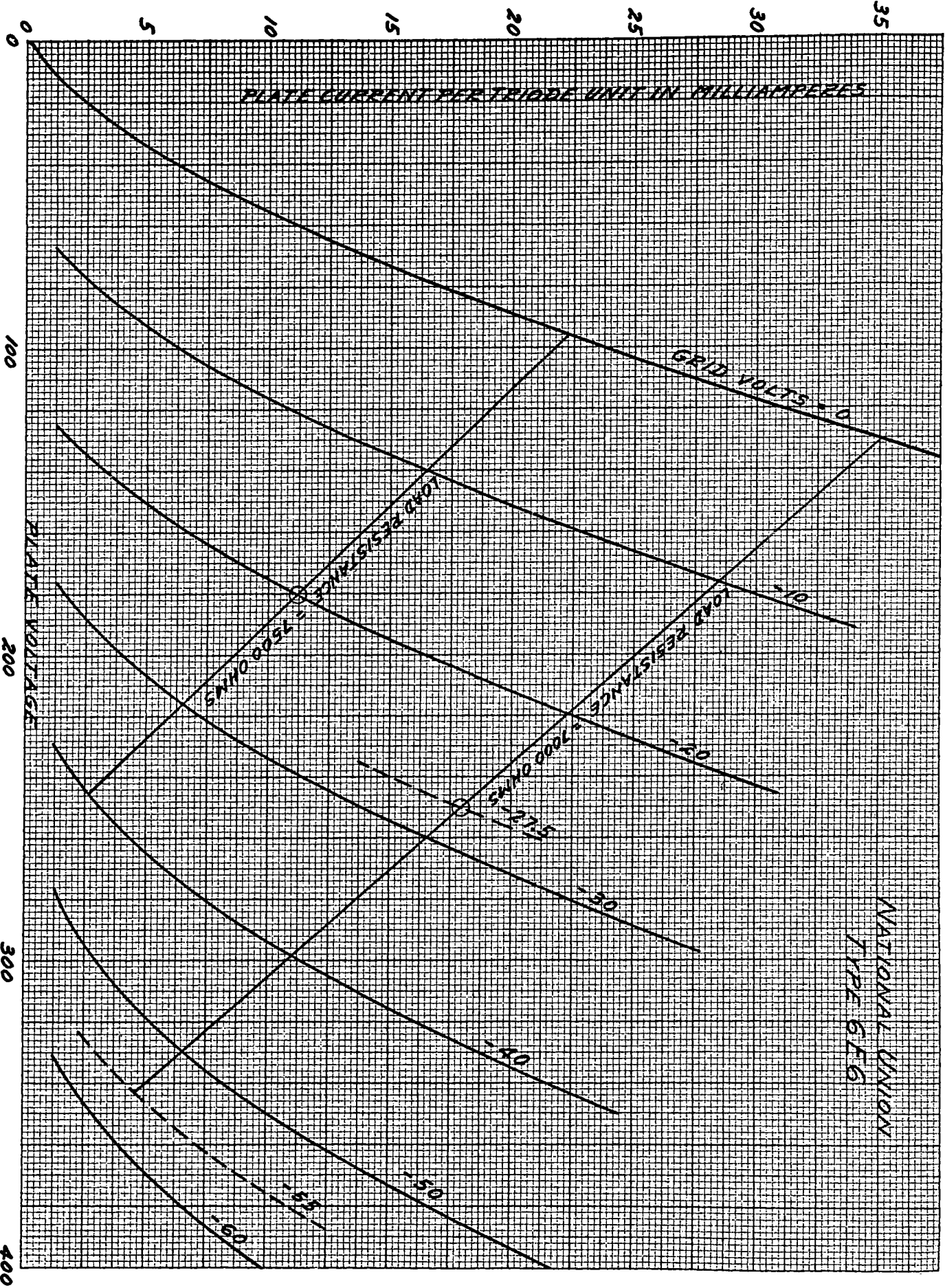
TYPICAL OPERATION:

Plate Voltage	180	250 Max. Volts
Grid Voltage	-20	-27.5 Volts
Plate Current	11.5	18 M.A. per Plate
Mutual Conductance	1400	1700 Micromhos per Triode
Amplification Factor	6.0	6.0
Plate Resistance	4300	3500 Ohms per Plate
Load Resistance	15000	14000 Ohms plate to Plate
Undistorted Power Output	0.75	1.6 Watts per Pair of Triodes

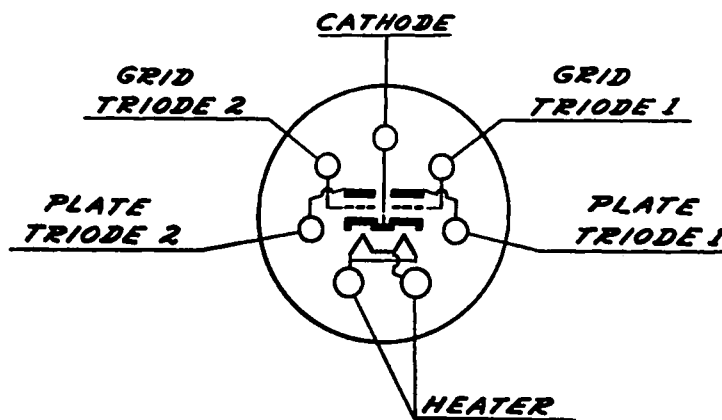
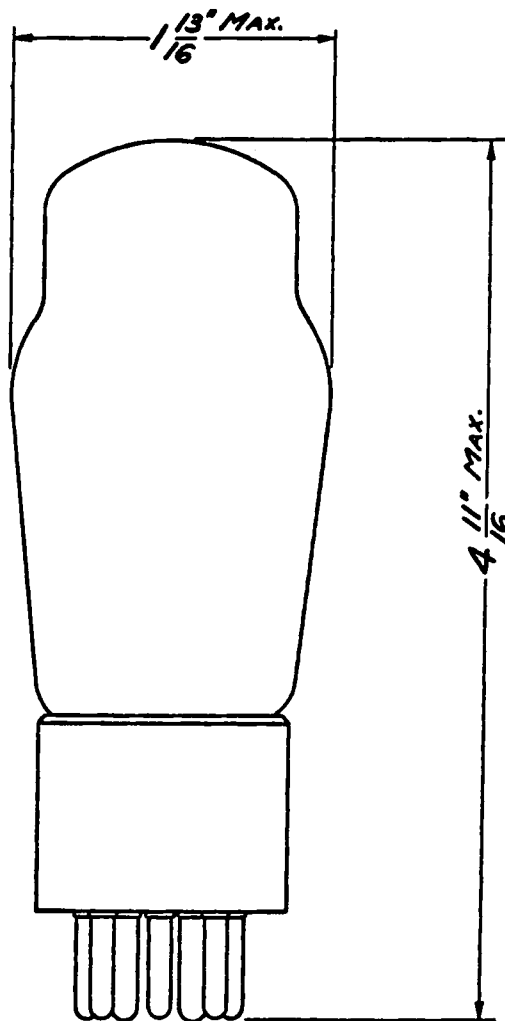
The 6E6, although primarily designed for push-pull service, may be used in single tube service without the second harmonic distortion exceeding five per cent. In the case of parallel operation of the triode, the proper load resistance is one-fourth of the plate-to-plate value given under "Characteristics."

It is preferable that grid voltage be obtained from a self-biasing resistor in the cathode circuit. For 250 volt operation, this resistor should be 770 ohms, while for 180 volt operation, it should be 870 ohms. For parallel tube operation, the resistor should either be heavily by-passed, or a suitable filter network be installed to prevent excessive degeneration at the lower frequencies. Transformer or impedance coupling to the grid circuit is recommended. Where a grid resistor is used with any type of input coupling, the resistance should not exceed one-half megohm per grid where self-bias is used. With fixed bias, the resistance should not exceed 100,000 ohms.

The base pins of the 6E6 fit the medium seven contact socket (0.855 inch pin-circle diameter) which may be installed to operate the tube in any position. Sufficient ventilation should be provided to permit of free air circulation around the tube to prevent overheating.



NATIONAL UNION TYPE 6E6



BOTTOM VIEW

NATIONAL UNION

TYPE 6H4GT

DIODE

Indirectly-heated Cathode

Type 6H4GT is a single diode having a heater rating of 6.3 volts and 0.150 ampere. This new type is recommended for use in series heater circuits where an additional 12.5 volt, 0.150 ampere heater tube would make it impossible to include a surge limiting resistor, or in six-tube low-drain receivers where for circuit or commercial reasons entirely separate diodes are used for Detection and Automatic Volume Control.

Type 6H4GT will more economically fill circuit requirements in larger AC model receivers where it is at present common practice to use triodes connected as diodes.

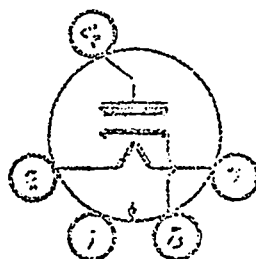
Heater Voltage.....	6.3 volts
Heater Current.....	0.150 amp.
DC Plate Voltage (RMS).....	100 volts max.
DC Output Current.....	4 ma. max.
Peak Plate Current.....	18 ma. max.
Approx. Plate Resistance (at 0.25 ma.)	1000 ohms

Mechanical Data:

Max. Overall Length.....	3-5/16"
Max. Diameter.....	1-5/16"
Bulb.....	T9
Base.....	Intermediate Octal 5-Pin

Basings:

Pin No. 1 -	No Connection
Pin No. 2 -	Heater
Pin No. 4 -	Plate
Pin No. 7 -	Heater
Pin No. 8 -	Cathode



5AF
BASE-Bottom View

TENTATIVE DATA ON THE TUBE TYPE 6N5

HEATER VOLTAGE	6.3 volts
Heater Current	0.150 amp.

Plate Supply Voltage	135	volts
Target Voltage	135	volts
Series Triode Plate Resistor	0.25	meg.
Triode Plate Current for Grid		
Voltage = 0	0.5	ma
Triode Grid Voltage to give		
zero degree Shadow	-12	approx volts
Triode Grid Voltage to give		
ninety degree Shadow	0	approx volts.

Bulb	St 12	Basing	6R
Base	Small 6 pin		Same as is used in 6E5 and 6G5

from RMA release #76, June 12, 1936
 sponsor: National Union Radio Corp.

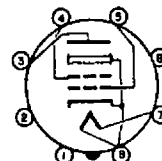
NEW NATIONAL UNION ELECTRON TUBE DATA

N.U. 6V5GT

BEAM PENTODE

MECHANICAL DATA:

Outline Drawing..... 9-11
 Bulb..... T-9
 Base..... B-8 Intermediate Shell Octal
 Maximum Diameter..... 1-5/16"
 Maximum Overall Length..... 3-5/16"
 Maximum Seated Height..... 2-3/4"

**PIN CONNECTIONS: RMA BASING DESIGNATION 6AO**

Pin #1 - No connection Pin #5 - Grid #1
 Pin #2 - No connection Pin #6 - No connection
 Pin #3 - Plate Pin #7 - Heater
 Pin #4 - Grid #2 Pin #8 - Heater, Cathode and Beam Plate
 Mounting Position..... Any

ELECTRICAL DATA:**Direct interelectrode capacitances***

Grid #1 to Plate (g_1 to p)..... 0.6 μ mf.
 Input (g_1 to k)..... 9.0 μ mf.
 Output (p to k)..... 10.0 μ mf.

*External shield #308 connected to Pin #8

Ratings

Heater Voltage (ac or dc)..... 6.3 Volts
 Heater Current..... 0.450 Ampere
 Maximum Plate Voltage..... 315 Volts
 Maximum Screen Voltage..... 285 Volts
 Maximum Plate Dissipation..... 12 Watts
 Maximum Screen Dissipation..... 2 Watts

Typical Operating Conditions and Characteristics Single Tube Amplifier Class A₁

Heater Voltage.....	6.3	6.3	6.3	Volts
Plate Voltage.....	180	250	315	Volts
Screen Voltage.....	180	250	225	Volts
Grid Voltage ϕ	-8.5	-12.5	-13	Volts
Plate Resistance (approximate).....	58,000	52,000	77,000	Ohms
Transconductance.....	3700	4100	3750	μ mhos
Peak A-F Signal Voltage.....	8.5	12.5	13	Volts
Zero-Signal Plate Current.....	29	45	34	Ma.
Zero-Signal Screen Current (nominal).....	3	4.5	2.2	Ma.
Maximum-Signal Plate Current.....	30	47	35	Ma.
Maximum-Signal Screen Current (nominal).....	4	7	6	Ma.
Load Resistance.....	5500	5000	8500	Ohms
Total Harmonic Distortion.....	8	8	12	%
Power Output.....	2.0	4.5	5.5	Watts

ϕ The dc resistance in the grid circuit, under rated maximum conditions, for the type 6V5GT, should not exceed 0.5 megohm for self-bias operation and 0.1 megohm for fixed bias operation

Push-Pull Amplifier Class AB₁

(VALUES FOR TWO TUBES UNLESS OTHERWISE SPECIFIED)

Heater Voltage.....	6.3	6.3	Volts
Plate Voltage.....	250	285	Volts
Screen Voltage.....	250	285	Volts
Grid Voltage.....	-15	-19	Volts
Plate Resistance (approximate).....	60,000	65,000	Ohms
Transconductance.....	3750	3600	μ mhos
Peak A-F Grid to Grid Voltage.....	30	38	Volts
Zero-Signal Plate Current.....	70	70	Ma.
Zero-Signal Screen Current (nominal).....	5.0	4.0	Ma.
Maximum-Signal Plate Current.....	79	92	Ma.
Maximum-Signal Screen Current (nominal).....	13	13.5	Ma.
Effective Load Resistance (Plate to Plate).....	10,000	8,000	Ohms
Total Harmonic Distortion.....	5	3.5	%
Power Output.....	10	14	Watts

JUNE 1, 1948

Research Division

ORANGE NATIONAL UNION RADIO CORPORATION NEW JERSEY

NATIONAL UNION RADIO CORPORATION

Type 7X7

Twin Diode - High Mu Triode

Physical Specifications

Cathodes	Coated Unipotential
Base	Loktal 8-Pin
Bulb	T-9
Maximum Diameter	1-3/16"
Maximum Overall Length	3-5/32"
Maximum Seated Height	2-5/8"
Pin Connections:	
Pin 1 - Heater	Pin 5 - Diode Plate #1
2 - Triode Plate	6 - Diode Plate #2
3 - Triode Grid	7 - Cathode #2 (Diode #2)
4 - Cathode #1	8 - Heater
	(Triode & Diode #1) and Diode Shields

RMA Basing No.	8BZ-L-4
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<u>Mounting Position</u>	any
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Direct Interelectrode Capacitances (without shield)

Diode #1 to All	2.9 uuf
Diode #2 to All	2.9 uuf
Diode #1 to Grid	.15 uuf max.
Diode #2 to Grid	.10 uuf max.
Diode #1 to Diode #2	.50 uuf max.

Ratings: Triode Unit

Heater Voltage (AC or DC) (Nominal)	7.0 Volts
Heater Current (Nominal)	.320 amp.
Maximum Plate Voltage	300 Volts

Diode Units (Two)

Diode Current per Plate with 5 volts DC applied 10.0 MA Min.

Average Characteristics - Triode Unit

Heater Voltage	6.3	6.3 Volts
Heater Current	.300	.300 amp.
Plate Current Voltage	100	250 Volts
Grid Voltage	0	-1.0 Volts
Amplification Factor	85	100
Transconductance	1000	1500 umhos
Plate Resistance	85,000	67,000 ohms
Plate Current	1.2	1.0 MA

NATIONAL UNION RADIO CORPORATION

Type 7X7

Twin Diode - High Mu Triode

Average Characteristics - Diode Unit

Diode Voltage	2.5 Volts
Perveance	6.0 MA

Typical Operating Conditions & Characteristics
Zero-Bias Resistance Coupled Amplifier Class A:

Heater Voltage	6.3	6.3 Volts
Plate Supply Voltage	100	300 Volts
Grid Leak Following Stage	10	10 megohm
Load Resistance	.25	.25 megohm
Coupling Capacitance	.01 to .005	.01 to .005 uuf
Grid Resistor of Following Tube	1.0	1.0 megohm
External Grid Circuit Impedance	0	0 megohm
Voltage Gain	30	40
Voltage Output (RMS) at 5% Dist.	6	30 volts

For interpretation of ratings refer to Receiving Tube Rating Sheets.

DEVELOPMENT ENGINEERING
NATIONAL UNION RADIO CORP.
LANSDALE, PENNSYLVANIA

NATIONAL UNION
RMA Release # 25 2 Aug. 28, 1940
9CP4

SHORT NINE INCH VIDEOTRON

INDIRECTLY HEATED CATHODE

HEATER VOLTAGE **2.5 VOLTS**

HEATER CURRENT **2.1 AMP.**

ELECTROMAGNETIC DEFLECTION AND FOCUS.

CHARACTERISTICS.

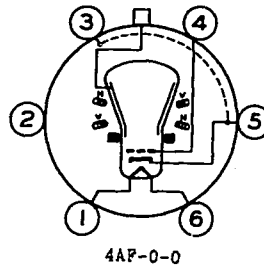
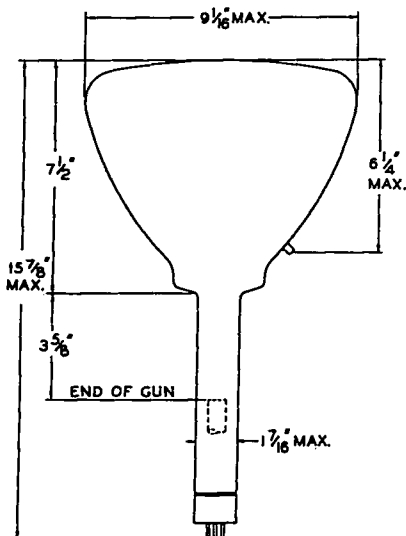
HIGH-VOLTAGE ANODE	7000 ^{MAX}	VOLTS
CONTROL GRID VOLTAGE	NEVER POSITIVE	
FLUORESCENT SCREEN INPUT POWER per Sq. Cm.	10 ^{MAX}	MILLIWATTS
FLUORESCENT COLOR	WHITE	

TYPICAL OPERATION

ANODE VOLTAGE	6000	7000	VOLTS
CONTROL GRID VOLTAGE	ADJUST FOR SUITABLE LUMINOUS SPOT		
CONTROL GRID VOLTAGE FOR CUT-OFF	-90	-110	VOLTS
CONTROL GRID, PEAK-to-PEAK VOLTAGE	25	25	VOLTS

CAPACITANCE

GRID to CATHODE	12	μf
-----------------	----	----



PIN #1 - HEATER
 PIN #2 - NO CONNECTION
 PIN #3 - INTERNAL CONNECTION
 PIN #4 - CONTROL GRID
 PIN #5 - CATHODE
 PIN #6 - HEATER
 CAP - ANODE

NATIONAL UNION
TYPE 12A8G
FREQUENCY CONVERTER
Indirectly-Heated Cathode

Heater Voltage.....	12.5 volts
Heater Current.....	0.150 amp.
Plate Voltage.....	250 max. volts
Screen Voltage G3 and G5).....	100 max. volts
Control-Grid Voltage (G4).....	-5 volts
Anode-Grid Supply Voltage (G2).....	250 max. volts
Anode-Grid Series Resistor.....	20,000 ohms
Oscillator Grid Resistor.....	50,000 ohms
Plate Current.....	3.5 ma.
Screen Current.....	2.7 ma.
Anode-Grid Current.....	4 ma.
Oscillator-grid Current (min. recommended).....	0.3 ma.
Conversion Conductance.....	500 umhos
Plate Resistance.....	0.36 meg.
Grid Voltage for Conversion Conductance = 6 umhos.....	-35 volts

CAPACITANCES:

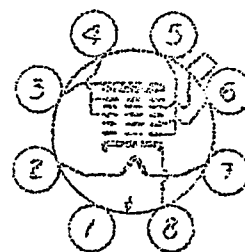
Grid 4 to Plate.....	.25 uuf.
Grid 4 to Grid 3.....	.19 uuf.
Grid 4 to Grid 1.....	.16 uuf.
Grid 1 to Grid 2.....	1.1 nuf.
RF Input.....	9.5 uuf.
Oscillator Output (Except G1).....	4.6 uuf.
Oscillator Input (Except G2).....	6.0 uuf.
Converter Output.....	12.0 uuf.

MECHANICAL DATA:

Max. Overall Length.....	4-15/32"
Max. Seated Height.....	3-29/32"
Max. Diameter.....	1-9/16"
Bulb.....	ST-12
Base.....	Small Octal 8-Pin
Cap.....	Miniature

BASING:

- Pin No. 1 - No Connection
- Pin No. 2 - Heater
- Pin No. 3 - Plate
- Pin No. 4 - Screen
- Pin No. 5 - Oscillator Grid
- Pin No. 6 - Anode-Grid
- Pin No. 7 - Heater
- Pin No. 8 - Cathode
- Cap - Grid



*Form-fitting Shield

8A
BASE-Bottom View

SHORT TWELVE INCH VIDEOTRON

INDIRECTLY HEATED CATHODE

HEATER VOLTAGE **2.5 VOLTS**

HEATER CURRENT **2.1 AMP.**

ELECTROMAGNETIC DEFLECTION AND FOCUS

CHARACTERISTICS:

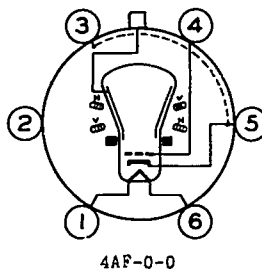
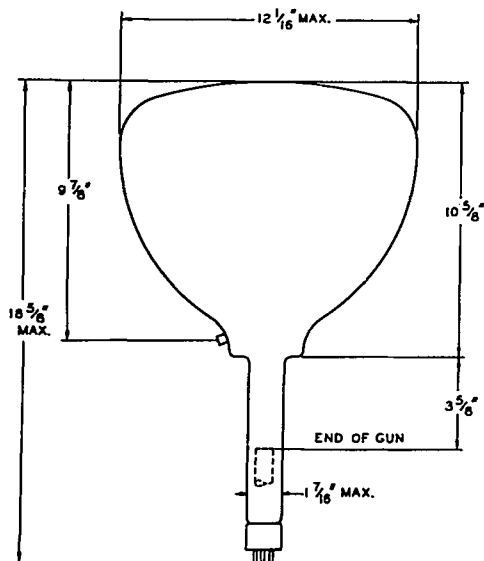
HIGH-VOLTAGE ANODE	7000 _{MAX}	VOLTS
CONTROL GRID VOLTAGE	NEVER POSITIVE	
FLUORESCENT SCREEN INPUT POWER per Sq. Cm.	10 _{MAX}	MILLIWATTS
FLUORESCENT COLOR	WHITE	

TYPICAL OPERATION

ANODE VOLTAGE	6000	7000	VOLTS
CONTROL GRID VOLTAGE	ADJUST FOR SUITABLE LUMINOUS SPOT		
CONTROL GRID VOLTAGE FOR CUT-OFF	-90	-110	VOLTS
CONTROL GRID, PEAK-to-PEAK VOLTAGE	25	25	VOLTS

CAPACITANCE

GRID to CATHODE	12	μuf
-----------------	----	-----



- PIN #1 - HEATER
- PIN #2 - NO CONNECTION
- PIN #3 - INTERNAL CONNECTION
- PIN #4 - CONTROL GRID
- PIN #5 - CATHODE
- PIN #6 - HEATER
- CAP - ANODE

NATIONAL UNION
TYPE 12K7G
PENTODE VOLTAGE AMPLIFIER
REMOTE CUT-OFF
Indirectly-heated Cathode
CLASS A AMPLIFIER

Operating Conditions and Characteristics:

Heater Voltage.....	12.5 volts
Heater Current.....	0.150 amp.
Plate Voltage.....	250 250 max. volts
Screen Voltage.....	100 125 max. volts
Suppressor Voltage.....	0 0 volts
Grid Voltage.....	-3 -3 volts
Plate Current.....	7 10.5 ma.
Screen Current.....	1.7 2.6 ma.
Mutual Conductance.....	1450 1650 umhos
Amplification Factor.....	1160 990
Plate Resistance.....	0.8 0.6 megohm
Grid Bias for Mutual Con- ductance = 2 umhos.....	-42.5 -52.5 volts

CAPACITANCES:*

Grid-to-Plate.....	0.007 uuf. max.
Input	5.0 uuf.
Output	12.0 uuf.

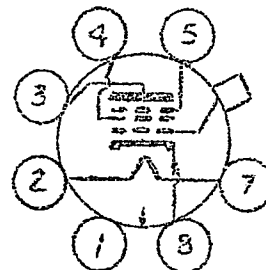
*Form-fitting shield

MECHANICAL DATA:

Max. Overall Length	4-15/32"
Max. Seated Height	3-29/32"
Max. Diameter	1-9/16"
Bulb	ST-12
Base	Small Octal 7-Pin
Cap	Miniature

BASING:

Pin No. 1 - No Connection
Pin No. 2 - Heater
Pin No. 3 - Plate
Pin No. 4 - Screen
Pin No. 5 - Suppressor
Pin No. 7 - Heater
Pin No. 8 - Cathode & Internal Shield
Cap - Grid



7R
BASE-Bottom View

186(5)

NATIONAL UNION
TYPE 12Q7G
TWIN DIODE-TRICDE AMPLIFIER
Indirectly-heated Cathode

Heater Voltage.....	12.5 volts
Heater Current.....	0.150 amp.
Plate Voltage.....	250 max. volts
Grid Voltage.....	-3 volts
Plate Current.....	1.1 ma.
Mutual Conductance.....	1200 umhos
Amplification Factor.....	70
Plate Resistance.....	58,000 ohms

Diode Units:

Peak Plate Current.....	8 max. ma.
approx. Plate Resistance (at 0.25 ma.)	6500 ohms

Resistance Coupled Amplifier:

Plate Supply.....	250 max. volts
Plate Load.....	0.25 megohm
Grid Resistor of Following Stage.....	0.5 megohm
Grid Bias).....	-2 volts
Cathode Biasing Resistor).....	4500 ohms
Approximate Gain.....	45

CAPACITANCES:

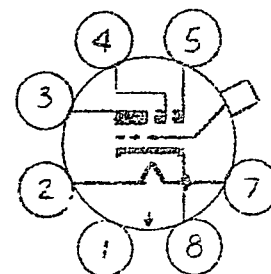
Grid-to-Cathode,.....	1.6 uuf.
Grid-to-plate.....	2.0 uuf.
Plate-to-Cathode.....	4 uuf.

MECHANICAL DATA:

Max. Overall Length.....	4-15/32"
Max. Seated Height.....	3-29/32"
Max. Diameter.....	1-9/16"
Bulb.....	ST-12
Base.....	Small Octal 7-Pin
Cap.....	Miniature

BASING:

Pin No. 1 - No Connection
Pin No. 2 - Heater
Pin No. 3 - Plate
Pin No. 4 - Diode Plate
Pin No. 5 - Diode Plate
Pin No. 7 - Heater
Pin No. 8 - Cathode
Cap - Grid



7V
BASE-Bottom View

Date: 3-18-47

NATIONAL UNION RADIO CORPORATION

Type 14X7

Twin Diode - High Mu Triode

Physical Specifications

Cathodes	Coated Unipotential
Base	Loktal 8-Pin
Bulb	T-9
Maximum Diameter	1-3/16"
Maximum Overall Length	3-5/32"
Maximum Seated Height	2-5/8"
Pin Connections:	
Pin 1 - Heater	Pin 5 - Diode Plate #1
2 - Triode Plate	6 - Diode Plate #2
3 - Triode Grid	7 - Cathode #2 (Diode #2)
4 - Cathode #1	8 - Heater
(Triode & Diode #1) and Diode Shields	

RMA Basing No. 8B7-L-4

Mounting Position Any

Direct Interelectrode Capacitances (without shield)

Diode #1 to All	2.9 uuf
Diode #2 to All	2.9 uuf
Diode #1 to Grid	.15 uuf max.
Diode #2 to Grid	.10 uuf max.
Diode #1 to Diode #2	.50 uuf max.

Ratings: Triode Unit

Heater Voltage (AC or DC) (Nominal)	14.0 volts
Heater Current (Nominal)	.12 amp.
Maximum Plate Voltage	300 volts

Diode Units (Two)

Diode Current per Plate with 5 volts DC applied 10.0 MA Min.

Average Characteristics - Triode Unit

Heater Voltage	12.6	12.6 volts
Heater Current	.150	.150 amp.
Plate Current Volts	100	250 volts
Grid Voltage	0	-1.0 volts
Amplification Factor	85	100
Transconductance	1000	1500 umho.
Plate Resistance	85,000	67,000 ohms
Plate Current	1.2	1.0 MA

NATIONAL UNION RADIO CORPORATION

Type 14X7

Twin Diode - High μ Triode

Average Characteristics - Diode Unit

Diode Voltage	2.5 Volts
Perveance	6.0 MA

Typical Operating Conditions & Characteristics
Zero-Bias Resistance Coupled Amplifier Class A:

Heater Voltage	6.3	6.3 volts
Plate Supply Voltage	100	300 volts
Grid Leak Following Stage	10	10 megohm
Load Resistance	.25	.25 megohm
Coupling Capacitance	.01 to .005	.01 to .005 uuf
Grid Resistor of Following Tube	1.0	1.0 megohm
External Grid Circuit Impedance	0	0 megohm
Voltage Gain	30	40
Voltage Output (RMS) at 5% Dist.	6	30 volts

For interpretation of ratings refer to Receiving Tube Rating Sheets.

DEVELOPMENT ENGINEERING
NATIONAL UNION RADIO CORP.
LANSDALE, PENNSYLVANIA

NATIONAL UNION

21~~EL~~PL

"VIDEOTRON"

Cylindrical Face Plate

Magnetic Focus
Magnetic Deflection
Ion-Trap Gun

Rectangular All Glass
Filterglass Face Plate

The NU-21 PL is a RECTANGULAR FACE, cylindrical front, direct-view, magnetically focused, magnetically-deflected Television Picture Tube, providing a 19-1/8" x 13-7/8" picture.

The rectangular face of the NU-21 PL uses a special "Filter" glass plate which effectively reduces ambient-light reflection, thus increasing picture contrast. Further: Advantage is taken of the well known optical properties of a cylindrical front surface to eliminate reflection and preserve sharp definition of the picture.

The tube has an electron gun designed to be used with a single-magnet external ion-trap magnet.

DATA

General:

Heater, for unipotential Cathode

Voltage (AC or DC)

6.3 Volts

Current

0.6 ($\pm$ 10%) Amp.

Direct interelectrode capacitance

Grid No. 1 to all other electrodes

6 uuf

Cathode to all other electrodes

5 uuf

Face plate (with about 66% light transmission)

Filter Glass

Phosphor

No. 4-Sulfide Type

Fluorescence

White

Phosphorescence

White

Persistence

Short

Focusing Method

Magnetic

Deflection Method

Magnetic

Deflection Angles (Approx.)

Diagonal

70°

Horizontal

65°

Vertical

50°

Ion-Trap gun

Requires external, single-field magnet

Overall Length

23-1/4" $\pm$ 3/8"

Greatest Diagonal of Tube at Face

21-7/32" $\pm$ 3/16"

Greatest Width of Tube at Face

20-1/4" $\pm$ 3/16"

Greatest Height of Tube at Face

15-9/16" $\pm$ 3/16"

Screen Size

19-1/8" x 13-7/8"

Cap
Base
Mounting Position

Recessed Small Cavity (JETEC No. J1-21)
Small-Shell Duodecal 5-Pin (JETEC No. B5-57)
Any

MAXIMUM RATINGS, Design-Center Values:

Collector VOLTAGE	18,000 Max. Volts
GRID-No. 2 VOLTAGE	500 Max. Volts
GRID-No. 1 VOLTAGE	
Negative Bias Value	125 Max. Volts
Positive Bias Value	0 Max. Volts
Positive Peak Value	2 Max. Volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode;	
During equipment warm-up period not exceeding	
15 seconds	410 Max. Volts
After equipment warm-up period	180 Max. Volts
Heater positive with respect to cathode	180 Max. Volts

TYPICAL OPERATION:

Collector Voltage	12,000 Max. Volts
Grid-No. 2 Voltage	300 Volts
Grid-No. 1 Voltage for visual extinction of undeflected focused spot	-33 to -77 Volts
Grid-No. 2 Current	-15 to +15 uamp
Focusing-coil current (Approx.) ¹	95 ua ma
Ion-Trap-Magnet Current (DC, Approx.) ²	75 ma

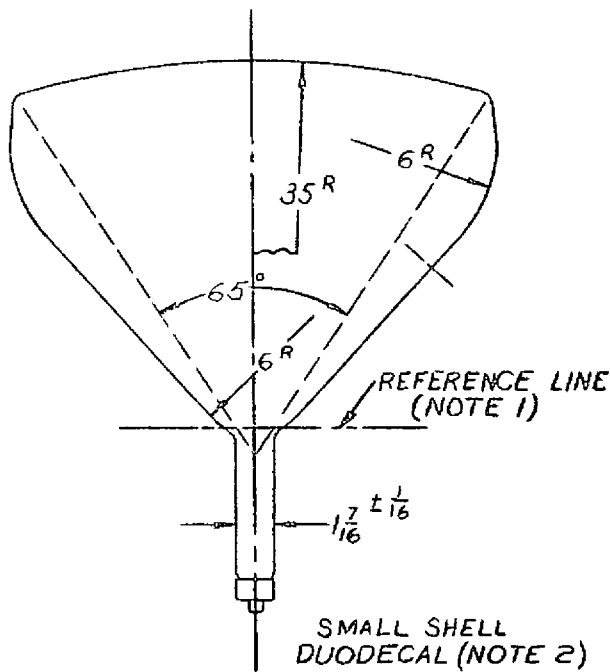
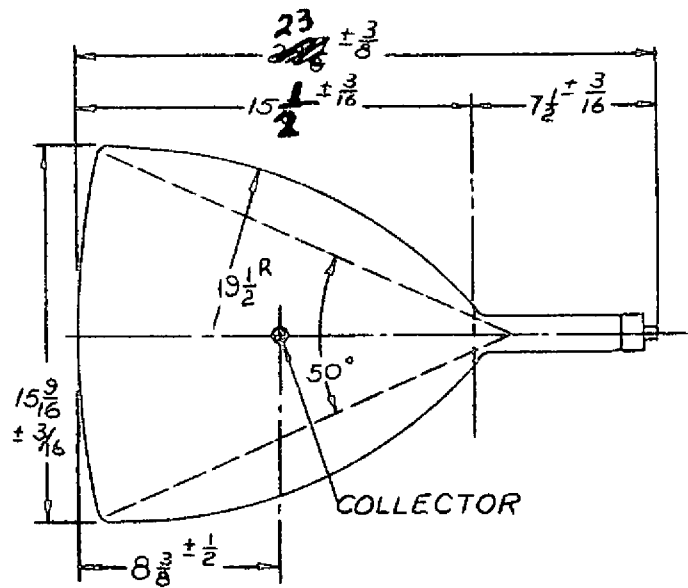
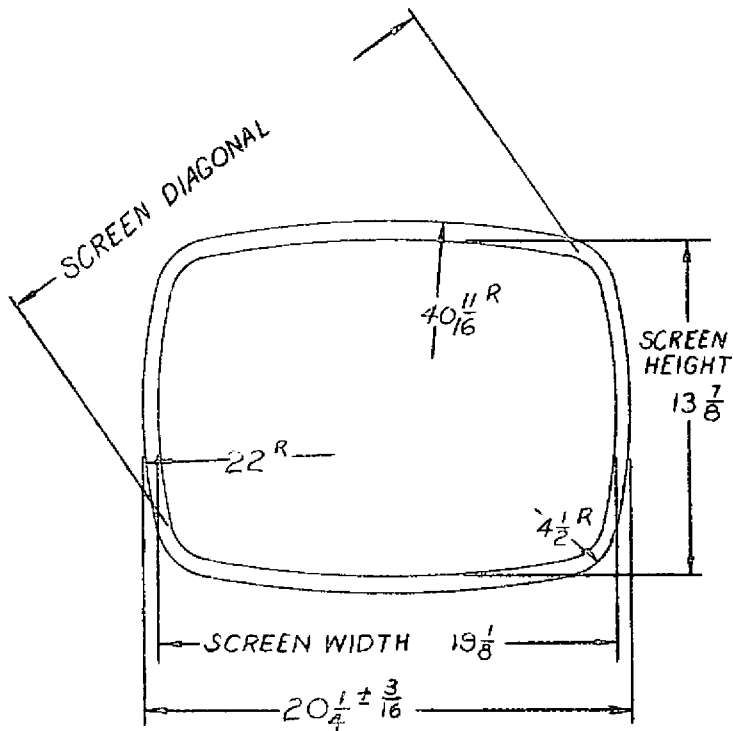
MAXIMUM CIRCUIT VALUES:

Grid-No. 1-circuit resistance	1.5 megohms
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-
1. For JETEC standard focus coil #109 with the combined grid No. 1 bias voltage and video-signal voltage adjusted to produce a highlight brightness of 30 foot lamberts on a picture area of 17" x 12-3/4". Distance from reference line of bulb to center of focus coil air gap shall be 3".
 2. JETEC ion-trap magnet No. 111 located in optimum position and rotated to give maximum brightness.

X-Ray Warning - Because the rating of the tube permits operation at voltages as high as 19.8 KILOVOLTS (absolute value), shielding of the tube for X-ray radiation may be needed whenever the operating conditions involve voltages in excess of 16 kilovolts.

Socket Connections - Pin 1: Heater; Pin 2: Grid No. 1; Pin 10: Grid No 2;
Pin 11: Cathode; Pin 12: Heater; CAP: Collector.



NOTE 1: With tube neck inserted through flared end of reference-line gauge (JETEC No. 110) and with tube seated in gauge, the reference line is determined by the inter-section 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".

NATIONAL UNION

21F4

"VIDEOTRON"

Low Voltage Electrostatic Focus
Cylindrical Face Plate

Magnetic Deflection
Ion-Trap Gun

Rectangular All Glass
Filterglass Face Plate

The NU-21 F4 is a Rectangular Face, cylindrical front, direct-view, electrostatically focused, magnetically-deflected Television Picture Tube, providing a 19-1/8" x 13-7/8" picture.

The rectangular face of the NU-21 F4 uses a special "Filter" glass plate which effectively reduces ambient-light reflection, thus increasing picture contrast. Further, Advantage is taken of the well known optical properties of a cylindrical front surface to eliminate reflection and preserve sharp definition of the picture.

The tube has an electron gun designed to be used with a single-magnet external ion-trap magnet.

DATA

General:

Heater, for unipotential Cathode

Voltage (AC or DC)

6.3 Volts

Current

0.6 ($\pm$ 10%) Amp.

Direct interelectrode capacitance

Grid No. 1 to all other electrodes

6 uuf

Cathode to all other Electrodes

5 uuf

Face plate (with about 66% light transmission)

Filter Glass

Phosphor

No. 4-Sulfide Type

Fluorescence

White

Phosphorescence

White

Persistence

Short

Focusing Method

Electrostatic

Deflection Method

Magnetic

Deflection Angles (Approx.)

Diagonal

70°

Horizontal

65°

Vertical

50°

Ion-Trap gun

Requires external, single-field magnet

Overall Length

~~22-4/16~~ $\pm$ 3/8"

Greatest Diagonal of Tube at Face

21-7/32 $\pm$ 3/16"

Greatest Width of Tube at Face

20-1/4" $\pm$ 3/16"

Greatest Height of Tube at Face

15-9/16 $\pm$ 3/16"

Screen Size

19-1/8 x 13-7/8

Cap	Recessed Small Cavity (JETEC No. J1-21)
Base	Small-Shell Duodecal 6-Pin (JETEC No. 86-63)
Mounting Position	Any

MAXIMUM RATINGS. Design-Center Values:

Collector ¹ VOLTAGE	18,000 Max. Volts
GRID-No. 4 VOLTAGE (Focus)	500 Max. Volts
GRID-No. 2 VOLTAGE	500 Max. Volts
GRID-No. 1 VOLTAGE	
Negative Bias Value	125 Max. Volts
Positive Bias Value	0 Max. Volts
Positive Peak Value	2 Max. Volts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode:	
During equipment warm-up period not exceeding 15 seconds	410 Max. Volts
After equipment warm-up period	180 Max. Volts
Heater positive with respect to cathode	180 Max. Volts

TYPICAL OPERATION:

Collector ¹ Voltage ²	14,000 Max.	Volts
Grid-No. 4 Voltage (Focus)	200 ~~4~~ 200	Volts
Grid-No. 2 Voltage	300	Volts
Grid-No. 1 Voltage for visual extinction of undeflected focused spot	-33 to -77	Volts
Grid-No. 4 Current	-15 to ~~4~~ 25	uamp
Grid-No. 2 current	-15 to ~~4~~ 25	uamp
Field strength of adjustable centering magnet	40	gausses
Ion-Trap-Magnet Current (DC, approx.) ⁴	75	ma
Field strength of adjustable centering magnet	0 to 8	gausses

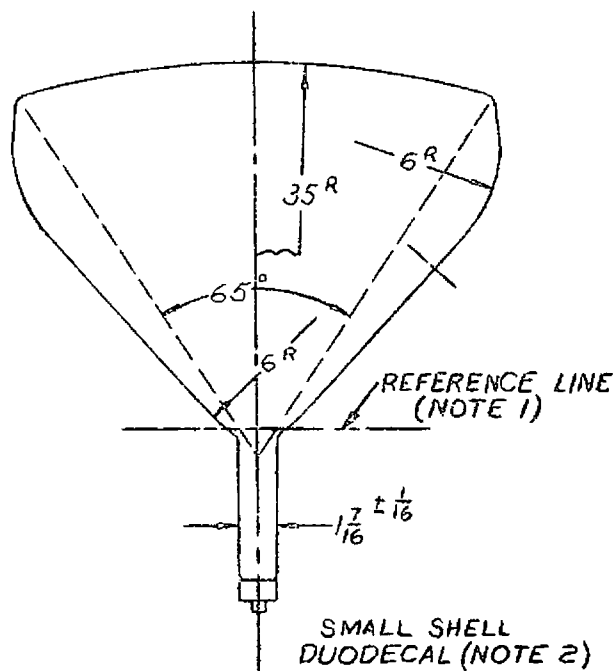
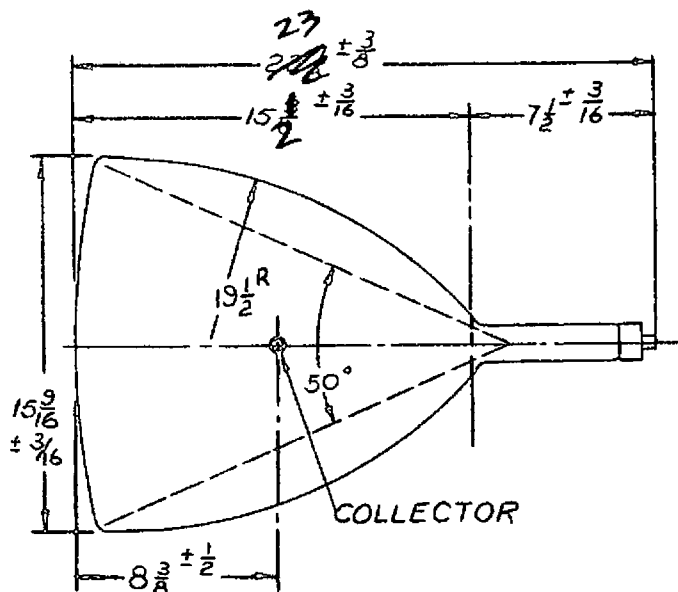
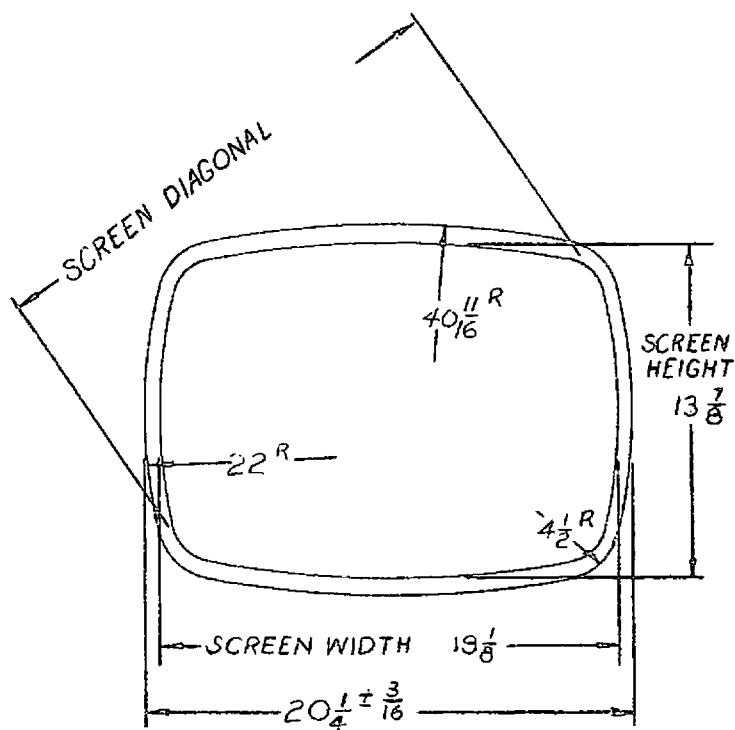
MAXIMUM CIRCUIT VALUES:

Grid-No. 1-circuit resistance	1.5	megohms
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1. Collector, Grid #3 and Grid #5 are connected internally and referred to herein as collector.
2. Brilliance and definition decrease with decreasing collector voltage. In general, the collector voltage should not be less than 14,000 volts.
3. Measured at center of field.
4. JETEC ion-trap magnet No. 111 located in optimum position and rotated to give maximum brightness.

X-Ray Warning - Because the rating of the tube permits operation at voltages as high as 19.8 KILOVOLTS (absolute value), shielding of the tube for X-ray radiation may be needed whenever the operating conditions involve voltages in excess of 16 kilovolts.

Socket Connections - 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: Grid No. 3, Grid
No. 5, Collector; ~~Pin 3: Grid No. 1; Pin 4: Grid No. 2; Pin 5: Grid No. 3; Pin 6: Grid No. 4; Pin 7: Grid No. 5; Pin 8: Grid No. 6; Pin 9: Grid No. 7; Pin 10: Grid No. 8; Pin 11: Grid No. 9; Pin 12: Grid No. 10~~



NOTE 1: With tube neck inserted through flared end of reference-line gauge (JETEC No. 110) and with tube seated in gauge, the reference line is determined by the inter-section 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".

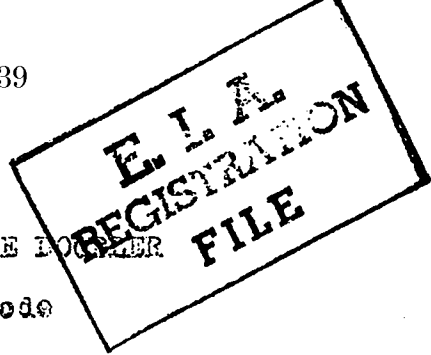
June 2, 1939

NATIONAL UNION

TYPE 50Z7G

HALF-WAVE RECTIFIER/VOLTAGE DOUBLER

Indirectly-heated Cathode



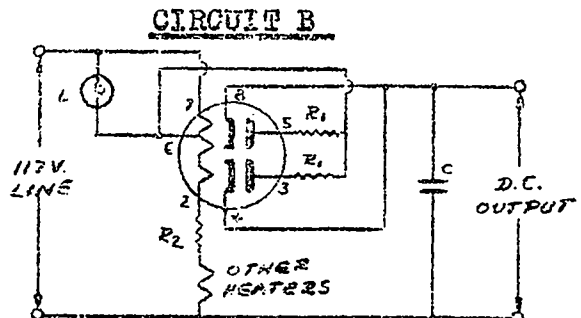
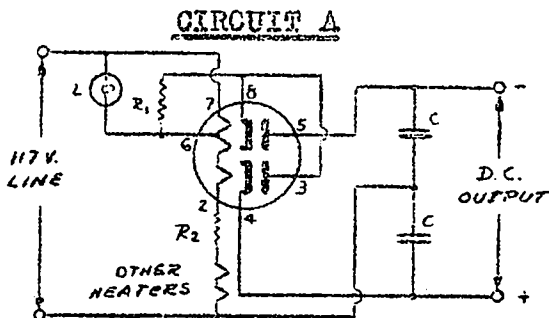
Heater Voltage (Entire Heater - pins 2 and 7)	50.0 volts
Pilot Lamp Section (Pins 6 and 7)	2.0 volts
Heater Current (Entire Heater)	0.150 amp.
DC Output Current per Plate	65 max. ma.
(With rectified plate current through pilot lamp section of heater shunted by 2.9 volt 0.170 amp pilot)	
Pilot Lamp Voltage (RMS) (See Circuits A and B)	2.5 max. volts.
Tube Voltage Drop (at 150 ma. DC per Plate	21 volts
without pilot lamp connections)	

VOLTAGE DOUBLER:

AC Plate Voltage (RMS) per Plate	117 max. volts
DC Output Current (See Circuit A)	65 max. ma.
Peak Plate Current	400 max. ma.
Resistor per Plate or Cathode (R_1)	25 min. ohms

HALF-WAVE RECTIFIER:Condenser Input

AC Plate Voltage (RMS)	117 max. volts
DC Output Current per Plate (See Circuit B)	65 max. ma.
Peak Plate Current per Plate	400 max. ma.
*Resistor per Plate (R_1)	25 min. ohms



L = Pilot Lamp #292 or #292A (2.9v .170A)

 R_1 = Peak Limiting Resistor R_2 = Surge Limiting Resistor

C = Filter Condensers

Heater Current through string should
be adjusted to .150 amp at 117 V.
line in both circuits.

*In half-wave circuit an alternative is to
use 25 ohms common to both plates, resulting
in slightly less output voltage.

NATIONAL UNION

TYPE 50Z7G

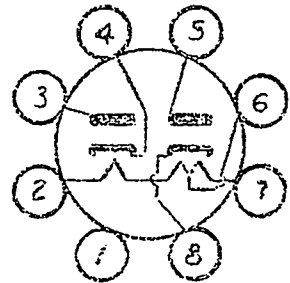
-2-

MECHANICAL DATA:

Max. Overall Length	4-1/8"
Max. Seated Height	3-9/16"
Max. Diameter	1-9/16"
Bulb	ST12
Base	Small Octal 7-Pin

BASING:

Pin No. 1 - No Connection
 Pin No. 2 - Heater
 Pin No. 3 - Plate No. 2
 Pin No. 4 - Cathode No. 2
 Pin No. 5 - Plate No. 1
 Pin No. 6 - Heater Tap (Pilot Lamp
 across Pins 6 and 7)
 Pin No. 7 - Heater
 Pin No. 8 - Cathode No. 1



8 A11
 BASE- Bottom View

In half-wave rectifier service, a load current of 100 ma. will give 2.5 volts RMS across the #292 or #292A pilot lamp as shown in Circuit B.

NEW **NATIONAL UNION ELECTRON TUBE** DATA

N.U. - 5729

30 CHANNEL RADIAL BEAM TUBE COLLECTOR TYPE

APPLICATION:

The Type NU-5729 is a collector type electrostatically focused and deflected radial beam tube intended for high speed electronic switching or commutation. It is capable of handling 30 different channels for transmission over a single carrier in multiplexing or telemetering applications.

The NU-5729 has thirty grid leads which are brought out separately, a common lead for 29 of the anodes, and a single lead for the thirtieth anode. This separate anode is useful for synchronization in telemetering or multiplexing operations. This is the input tube of such a system. It has a coated unipotential cathode.

RATINGS:

Heater Voltage (AC or DC) $\pm 10\%$	6.3	volts
Maximum Plate Voltage	500	volts
Maximum Screen Voltage (G_2)	300	volts
	rms ac	6ϕ

TYPICAL OPERATING CONDITIONS:

Heater Voltage	6.3	volts
Heater Current	0.450	amperes
Plate Voltage	375	volts*
Screen Voltage (<i>applied through dc focusing bias</i>)	300	volts
	rms ac	6ϕ
Focusing Bias (<i>positive end connected to cathode</i>)	-75 ± 10	volts dc
Grid Voltage	0	volts dc
Single Channel Peak Plate Current	90	μ a dc
Single Channel Transconductance	20	μ mhos
Single Channel Amplification Factor	62	
Single Channel Plate Resistance	3	megohms
Single Channel Grid Bias for Plate Current Cut-off	-5	volts

* 450 volts applied through the focusing bias

PHYSICAL SPECIFICATIONS

Style-----	Special
Bulb -----	T-18
Base -----	Flying Leads
Mounting Position-	Any

BASE PIN CONNECTIONS

PIN 1: G_1-1	PIN 22: G_1-16
PIN 2: G_1-2	PIN 23: G_1-17
PIN 3: G_2-1	PIN 24: G_2-4
PIN 4: G_1-3	PIN 25: G_1-18
PIN 5: G_1-4	PIN 26: G_1-19
PIN 6: H	PIN 27: H
PIN 7: G_1-5	PIN 28: G_1-20
PIN 8: G_1-6	PIN 29: G_1-21
PIN 9: G_1-7	PIN 30: G_1-22
PIN 10: G_2-2	PIN 31: G_2-5
PIN 11: G_1-8	PIN 32: G_1-23
PIN 12: G_1-9	PIN 33: G_1-24
PIN 13: K	PIN 34: Mica Rings
PIN 14: G_1-10	PIN 35: G_1-25
PIN 15: G_1-11	PIN 36: G_1-26
PIN 16: G_1-12	PIN 37: G_1-27
PIN 17: G_2-3	PIN 38: G_2-6
PIN 18: G_1-13	PIN 39: G_1-28
PIN 19: G_1-14	PIN 40: G_1-29
PIN 20: P_1 to P_{29}	PIN 41: G_1-30
PIN 21: G_1-15	PIN 42: P-30

NOTES: Due to the finite number of screen elements, the I_p/E_g characteristics are not identical for all channels. The following curves show these variations:

Curve A shows the characteristics of those channels adjacent to the center of the screen segments: Channels 2, 3, 7, 8, 12, 13, 17, 18, 22, 23, 27, and 28.

Curve B corresponds to the channels adjacent to the edge of the screen segments: Channels 1, 4, 6, 9, 11, 14, 16, 19, 21, 24, 26, 29.

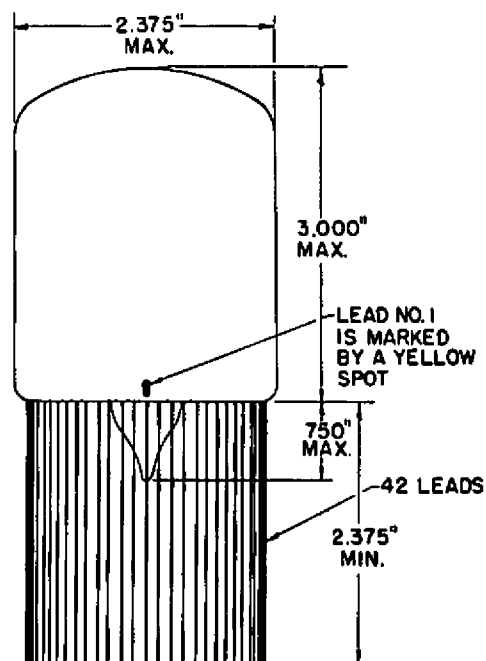
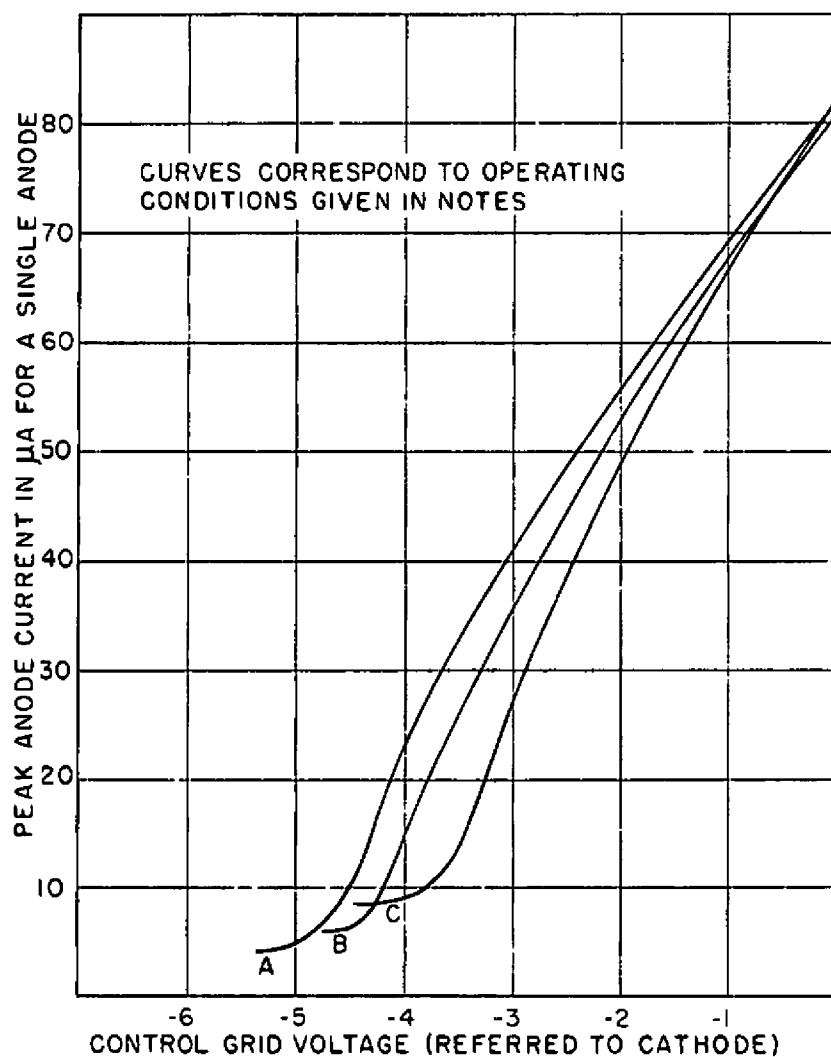
Curve C depicts the channels corresponding to gaps between screen segments: Channels 5, 10, 15, 20, 25, and 30.

from RTMA release #961, April 9, 1951

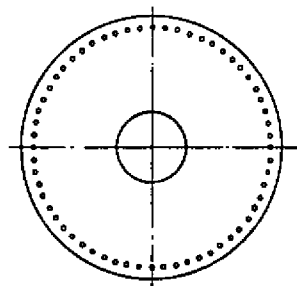
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Research Division

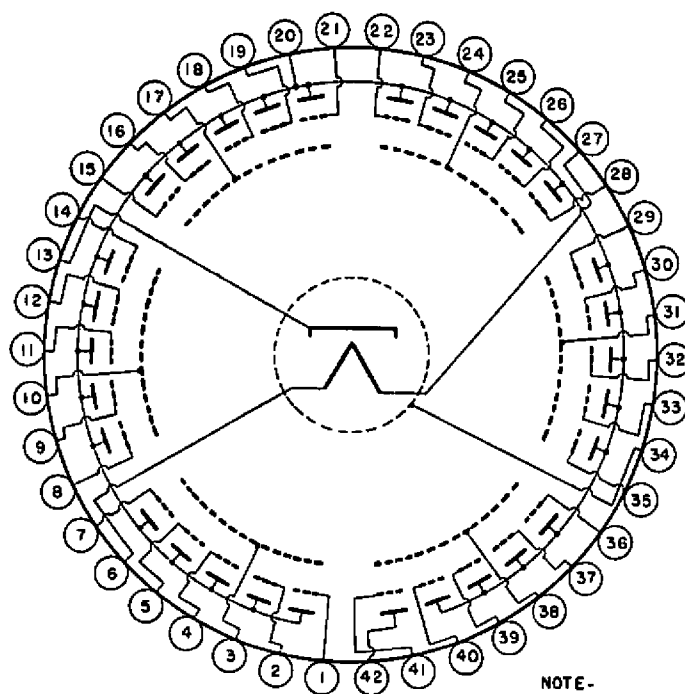
ORANGE **NATIONAL UNION RADIO CORPORATION** NEW JERSEY



OUTLINE DRAWING



BOTTOM VIEW



NU-5729
BASING DIAGRAM

NOTE -
LEAD NO. 1 IS
MARKED BY A
YELLOW DOT

NEW **NATIONAL UNION ELECTRON TUBE** DATA

RADIAL BEAM TUBES

Page 1 of 2

ELECTROSTATICALLY FOCUSED

GENERAL INFORMATION

The National Union electrostatically focused radial beam tubes offer the advantage of high speed switching and commutation without mechanical moving parts. In these tubes an electrostatic field serves both to focus and to direct an electron beam, and if the field is made to rotate the beam whirls with it. As the direction of the beam varies it reaches different channels in turn, through which signals can be injected or extracted.

The electrostatic field is established by applying suitable voltages to a number of screen segments surrounding a central cathode. For instance, in a tube with six screen segments a six-phase a.c. voltage applied to the segments results in a rotating electrostatic field much in the manner of the rotating magnetic field in the stator of a six-pole electric motor.

To hold the beam in any particular direction it is only necessary to apply d.c. potentials to the screen segments respectively equal to the instantaneous values of the various phase voltages when the beam is oriented in the wanted direction. For example, in a six segment design the beam will hit the middle of a screen segment when that segment is at maximum screen voltage, the two adjacent segments at half that voltage, and the other three segments at minus the voltage of their respective opposites; to hit the gap between two adjacent segments their potential should be .866 times the maximum, that of the opposite segments should be the negative of that value, and the other two should be at zero potential.

The spacing between the screen segments as well as windows in the segments themselves constitute a series of slots all around the cathode, each acting as the entrance to a particular channel. Beyond that entrance slot each channel consists of whatever system of elements, grid, anodes, etc. is required for the function to be performed.

In order to make the best use of the beam most applications require it to be of about the same width as the slots when it reaches the screen. This is obtained by applying to the cathode a positive focusing bias which has the effect of distorting the electrostatic field and causing the beam to converge as wanted. Proper focusing is important in most applications, for too wide a beam leads to crosstalk between channels, too narrow a beam leads to reduced channel current and loss in efficiency. It is recommended that specifications be closely followed. The cathode bias can be obtained conveniently by the use of a self-biasing resistor.

The characteristics of individual channels depend upon the design of the particular type of tube. They are given in the data sheets for each type. These include basing arrangement and circuit data as well.

For many applications this tube is used in the equivalent of a time division multiplex signaling system. Two types of tubes are required for such a system; one, at the input, in which the signal grids are brought out individually, but the anodes are all internally tied to a common lead, and the other, at the output of the system, in which the grids are tied together and the anodes brought out individually. These two types are respectively designated as "multiple grid" and "multiple anode" types, symbolized by the letters G or A following the developmental type numbers or the class designation. By class designation is meant a code by which radial beam tubes (RB) are classified as magnetically (M) or electrostatically (E) focused, and as having a given number of channels (10, 12, 30). Such are, for instance, classes RBM10G, REE12G, RBE12A, RBE30G, RBE30A. Tubes made with both grids and anodes brought out individually are identified by the two letters "GA" used simultaneously.

Multiple grid, or G, types have also been occasionally designated as input, transmitting, or collector types symbolized by letters T or C; multiple anode, or A, types have been termed output, receiving, or separator types, symbolized by letters R or S. These designations, however, are abandoned in favor of the more explicit and generally applicable ones first mentioned.

As an example, the figure on page 2 illustrates in a cut-away view the general design of a 12-channel electrostatically focused radial beam tube.

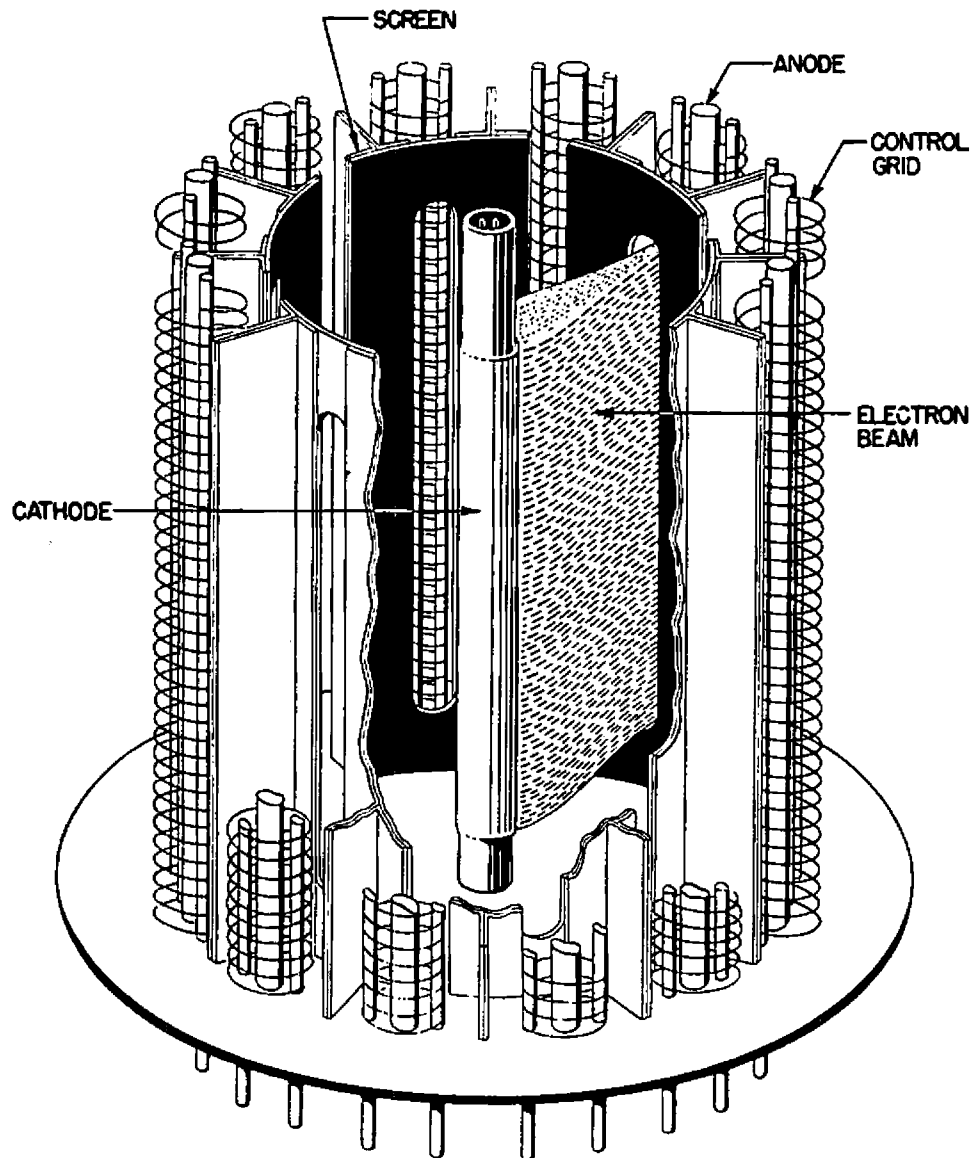
For details on operating conditions, characteristics, physical data and applications please refer to the technical data sheets available for each type of radial beam tube.

RBE-480416

NEW NATIONAL UNION ELECTRON TUBE DATA

RADIAL BEAM TUBES ELECTROSTATICALLY FOCUSED

Page 2 of 2



CUT-AWAY VIEW

12-CHANNEL ELECTROSTATICALLY FOCUSED RADIAL BEAM TUBE

RBE-480416

NEW NATIONAL UNION ELECTRON TUBE DATA

N.U. - 5730

30 CHANNEL RADIAL BEAM TUBE SEPARATOR TYPE

APPLICATION:

The Type NU-5730 is a separator type electrostatically focused and deflected radial beam tube intended for high speed electronic switching or cummutation. It is capable of handling 30 different channels for transmission over a single carrier in multiplexing or telemetering applications.

The NU-5730 has thirty anode leads which are brought out separately, a common lead for 29 of the control grids, and a single lead for the thirtieth control grid. This separate grid is useful for synchronization in telemetering or multiplexing operations. This is the output tube of such a system. It has a coated unipotential cathode.

RATINGS:

Heater Voltage (AC or DC) $\pm 10\%$	6.3	volts
Maximum Plate Voltage	500	volts
Maximum Screen voltage (G_2)	300	volts
	rms ac	6ϕ

TYPICAL OPERATING CONDITIONS:

Heater Voltage	6.3	volts
Heater Current	0.450	amperes
Plate Voltage	375	volts*
Screen Voltage (<i>applied through dc focusing bias</i>)	300	volts
	rms ac	6ϕ
Focusing Bias (<i>positive end connected to cathode</i>)	-75 ± 10	volts dc
Grid Voltage	0	volts dc
Single Channel Peak Plate Current	90	μa dc
Single Channel Transconductance	20	$\mu mhos$
Single Channel Amplification Factor	62	
Single Channel Plate Resistance	3	megohms
Single Channel Grid Bias for Plate Current Cut-off	-5	volts

* 450 volts applied through the focusing bias

PHYSICAL SPECIFICATIONS

Style _____	Special
Bulb _____	T-18
Base _____	Flying Leads
Mounting Position	Any

BASE PIN CONNECTIONS

PIN 1: P-1	PIN 22: P-16
PIN 2: P-2	PIN 23: P-17
PIN 3: G_2-1	PIN 23: G_2-4
PIN 4: P-3	PIN 25: P-18
PIN 5: P-4	PIN 26: P-19
PIN 6: H	PIN 27: H
PIN 7: P-5	PIN 28: P-20
PIN 8: P-6	PIN 29: P-21
PIN 9: P-7	PIN 30: P-22
PIN 10: G_2-2	PIN 31: G_2-5
PIN 11: P-8	PIN 32: P-23
PIN 12: P-9	PIN 33: P-24
PIN 13: K	PIN 34: Mica Rings
PIN 14: P-10	PIN 35: P-25
PIN 15: P-11	PIN 36: P-26
PIN 16: P-12	PIN 37: P-27
PIN 17: G_2-3	PIN 38: G_2-6
PIN 18: P-13	PIN 39: P-28
PIN 19: P-14	PIN 40: P-29
PIN 20: G_1-1 to G_1-29	PIN 41: P-30
PIN 21: P-15	PIN 42: G_1-30

NOTES: Due to the finite number of screen elements, the I_p/E_g characteristics are not identical for all channels. The following curves show these variations:

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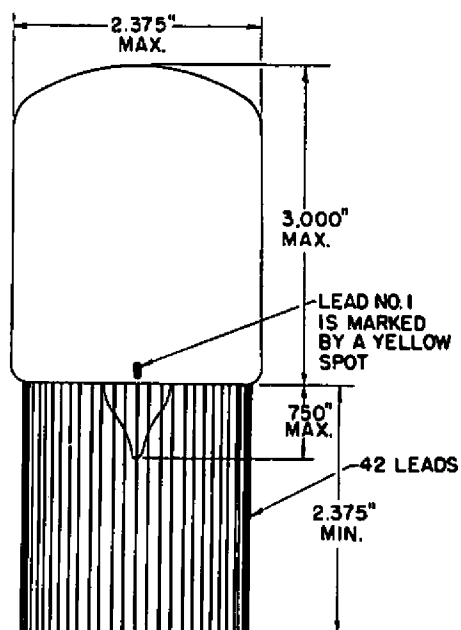
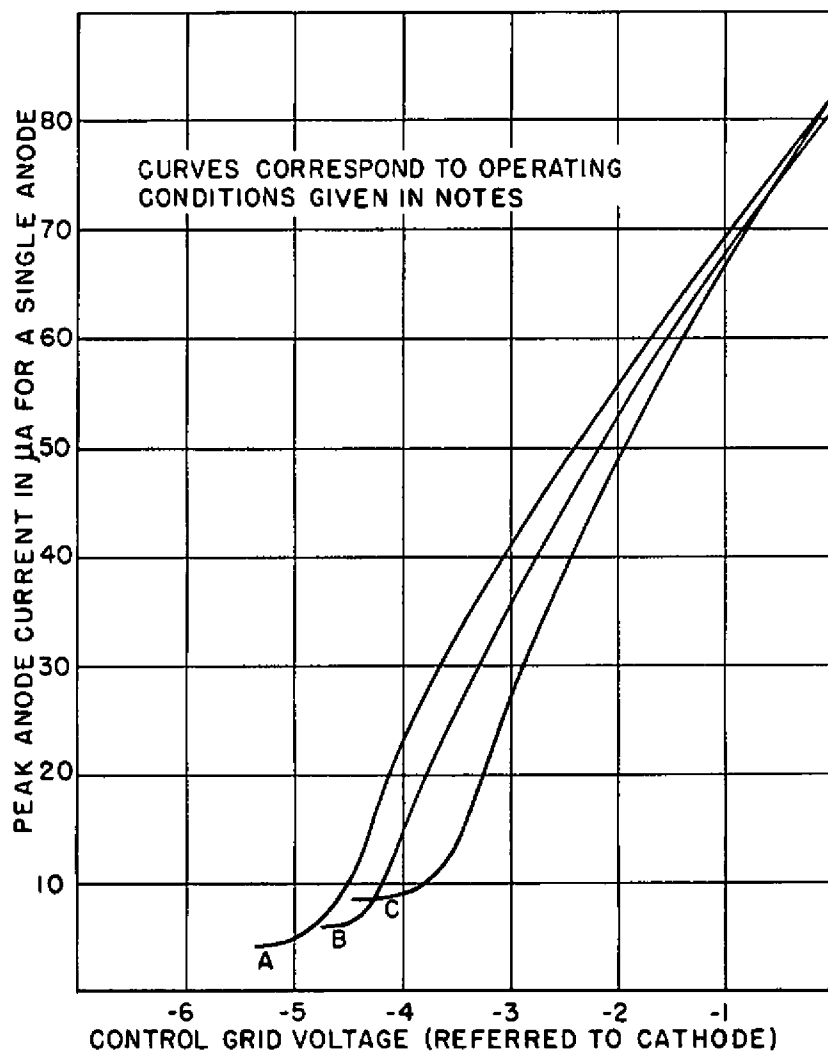
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from RTMA release #961,
April 9, 1950

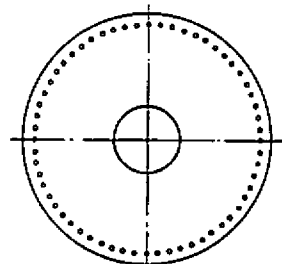
MARCH 1951

Research Division

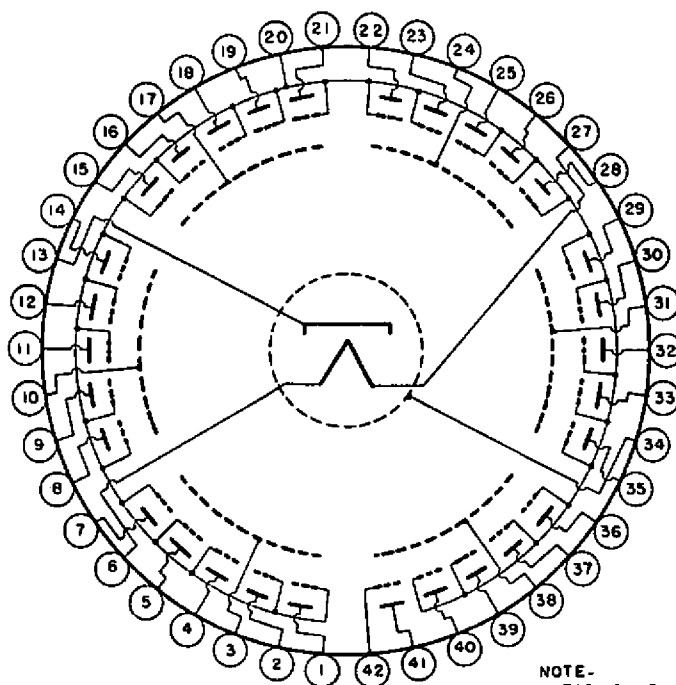
ORANGE NATIONAL UNION RADIO CORPORATION NEW JERSEY



OUTLINE DRAWING



BOTTOM VIEW



NU-5730
BASING DIAGRAM

NOTE-
LEAD NO. 1 IS
MARKED BY A
YELLOW DOT

NEW **NATIONAL UNION ELECTRON TUBE** DATA

RADIAL BEAM TUBES

Page 1 of 2

ELECTROSTATICALLY FOCUSED

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The characteristics of individual channels depend upon the design of the particular type of tube. They are given in the data sheets for each type. These include basing arrangement and circuit data as well.

For many applications this tube is used in the equivalent of a time division multiplex signaling system. Two types of tubes are required for such a system; one, at the input, in which the signal grids are brought out individually, but the anodes are all internally tied to a common lead, and the other, at the output of the system, in which the grids are tied together and the anodes brought out individually. These two types are respectively designated as "multiple grid" and "multiple anode" types, symbolized by the letters G or A following the developmental type numbers or the class designation. By class designation is meant a code by which radial beam tubes (RB) are classified as magnetically (M) or electrostatically (E) focused, and as having a given number of channels (10, 12, 30). Such are, for instance, classes RBM10G, REE12G, RBE12A, RBE30G, RBE30A. Tubes made with both grids and anodes brought out individually are identified by the two letters "GA" used simultaneously.

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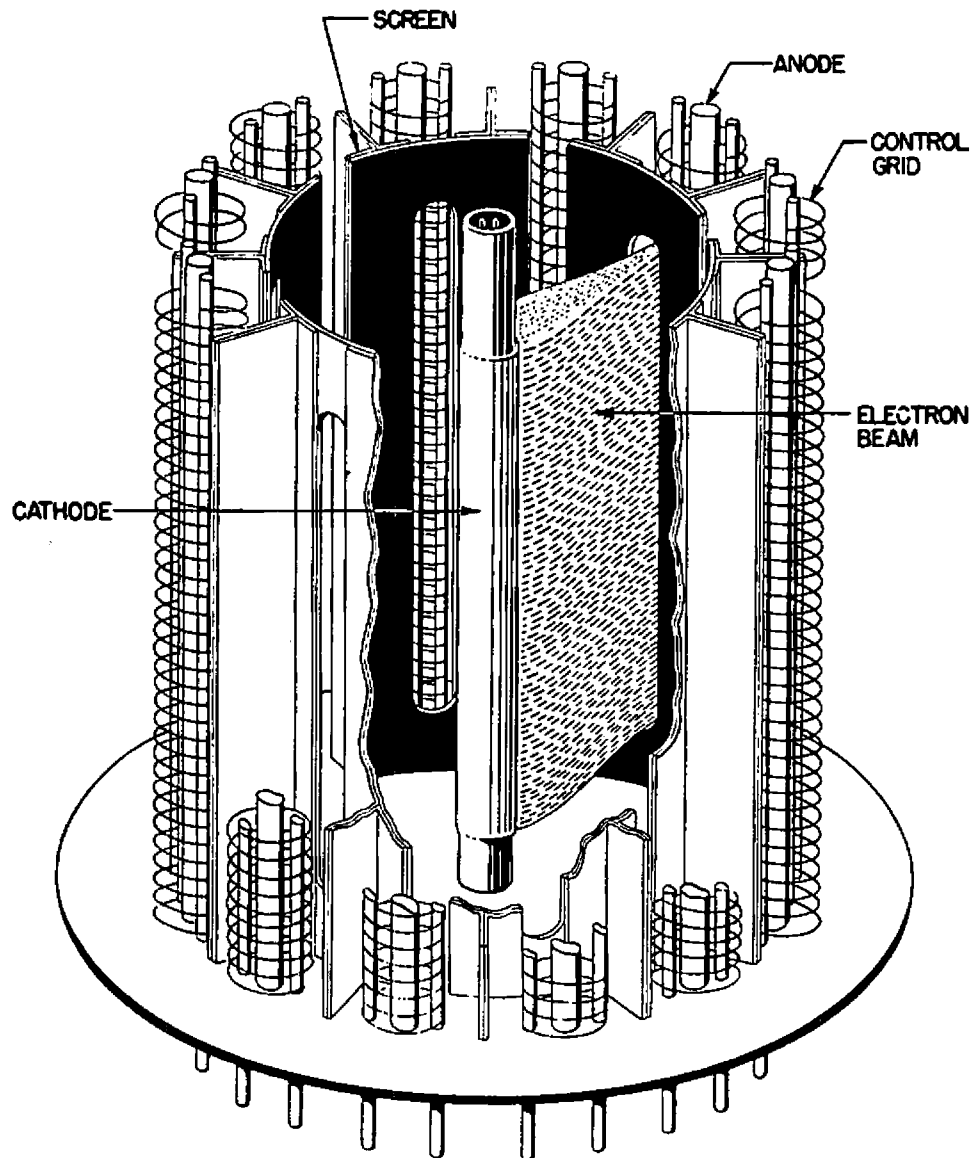
For details on operating conditions, characteristics, physical data and applications please refer to the technical data sheets available for each type of radial beam tube.

RBE-480416

NEW **NATIONAL UNION ELECTRON TUBE** DATA

RADIAL BEAM TUBES ELECTROSTATICALLY FOCUSED

Page 2 of 2



CUT-AWAY VIEW

12-CHANNEL ELECTROSTATICALLY FOCUSED RADIAL BEAM TUBE

RBE-480416

NEW DATA

N.U. - 5851

N.U. 5851

RUGGEDIZED R. F. POWER OUTPUT BEAM PENTODE.

APPLICATION:

The NU-5851 is a T-3 subminiature beam pentode designed for rugged applications such as encountered in the military service. It is designed for use in Class A, Class C and is tested as a frequency doubler at an output frequency of 400 mc. It has an oxide coated filamentary cathode which is center-tapped permitting operation at either 1.25 volts at 110 ma or 2.5 volts at 55 ma. The tube leads may either be soldered into a circuit or cut for use in a Cinch socket #8329.

RATINGS:

Filament Voltage $\pm 10\%$	1.25/2.5 volts d.c.
Maximum Plate Voltage	180 volts
Maximum Screen Voltage	135 volts
Maximum Grid Voltage	-80 volts
Maximum Plate Dissipation	1.5 watts
Maximum Screen Dissipation	0.3 watts
Maximum Cathode Current	12 ma
Maximum Altitude	60,000 feet
Maximum Impact	500 g
Maximum Ambient Temperature	200° C

INTERELECTRODE CAPACITIES:

	UNSHIELDED	SHIELDED
Grid to Plate	0.06 μf	0.055 μf
Input	2.5 μf	2.5 μf
Output	2.15 μf	3.0 μf

TYPICAL OPERATING CONDITIONS: (Class A Amplifier)

Filament Voltage	1.25/2.5 volts
Filament Current	110/55 ma
Plate Voltage	125 volts
Screen Voltage	125 volts
Grid Voltage	-7.5 volts
Plate Current	5.5 ma
Screen Current	0.9 ma
Transconductance	1600 μmhos
Plate Resistance	175,000 ohms

650 milliwatts output at 10% total harmonic distortion is obtained when $E_b = 180$ V, $E_{c2} = 135$ V and $E_{c1} = -7$ V.

DOUBLER OPERATION AT 400 MC OUTPUT FREQUENCY:

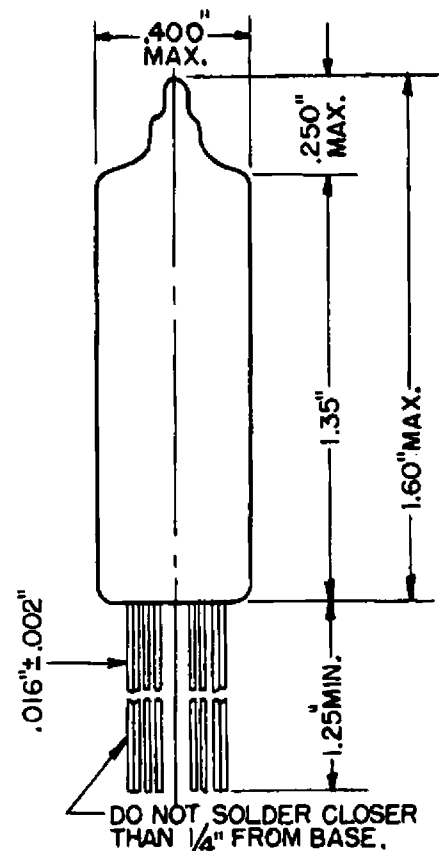
Filament Voltage	1.25/2.5 volts
Filament Current	110/55 ma
Plate Voltage	125 volts
Screen Voltage	125 volts
Grid Resistance	350,000 ohms
Plate Current	8.0 ma
Screen Current	2.0 ma
Power Output	120 mw

PHYSICAL SPECIFICATIONS

Style..... Sub Miniature
Bulb..... T-3
Base..... Submin. Button 8-Pin
Mounting Position..... Any

BASE PIN CONNECTIONS

Pin 1 - Fil -
Pin 2 - NC
Pin 3 - P
Pin 4 - NC
Pin 5 - Fil CT and G₃
Pin 6 - G₂
Pin 7 - Fil +
Pin 8 - G₁
RMA Basing - 6CL-0-0



LEADS MAY BE CUT TO .200" FOR
USE IN CINCH SOCKET #8329

JULY 1950

Research Division

ORANGE NATIONAL UNION RADIO CORPORATION NEW JERSEY

from RMA release #904A, July 10, 1953
sponsor: National Union Radio Corp.

5857

WIDE BAND SECONDARY EMISSION
V.H.F. AMPLIFIER

Release #904

September 11, 1950

RATINGS

Heater Voltage AC or DC	6.3 volts
Maximum Plate Voltage	350 volts
Maximum Inner Shield Voltage	275 volts
Maximum Dynode Voltage	250 volts
Maximum Screen Voltage	75 volts
Maximum Plate Dissipation *	1.5 watts
Maximum Dynode Dissipation *	0.65 watts
Maximum Heater to Cathode Voltage	100 volts

* $P_{dy} = E_{dy} (I_b - I_{dy})$ * $W_b = I_b (E_b - E_{dy})$

INTERELECTRODE CAPACITIES

Grid to Plate	0.004 μ mf(max)
Input	9.300 μ mf
Output	2.200 μ mf

♦ With no external shield

CONDITIONS OF OPERATION

Heater Voltage	6.3 volts
Heater Current	450 ma
Plate Voltage	300 volts
Inner Shield Voltage	250 volts
Dynode Voltage	210 volts
Screen Resistor for 300 V. Supply	680,000 ohms.
Cathode Resistor	200 ohms
Plate Current	8.0 ma
Inner Shield Current	0.2 ma
Dynode Current	-6.0 ma
Screen Current	0.40 ma
Cathode Current	2.60 ma
Transconductance	25,000 μ mhos
Grid Voltage for a Plate Current of 10 μ a (Approx.)	-3.0 volts
Plate Resistance (Approx.)	70,000 ohms

Life Tested for 1000 Hours

PHYSICAL SPECIFICATIONS

Style - - - - -	Miniature
Bulb - - - - -	T6 $\frac{1}{2}$
Diameter - - - - -	7/8"
Seated Height - - - -	1-15/16" max
Overall Length - - -	2-3/16" max
Base - - - - -	9 pin Noval
Mounting Position - -	Any

BASE PIN CONNECTIONS

Pin 1 -	G3
Pin 2 -	K + G4
Pin 3 -	H
Pin 4 -	G1
Pin 5 -	K
Pin 6 -	H
Pin 7 -	G2
Pin 8 -	Dy
Pin 9 -	P

RMA Basing - 9 AB

July 1950



ENGINEERING BULLETIN

ELECTRONIC COMPONENTS

from JETEC release #1590, Feb. 20, 1956

N. U. - 6090

18 CHANNEL RADIAL BEAM TUBE MULTIPLE ANODE TYPE

The Type N.U.-6090 is a multiple anode electrostatically focused and deflected radial beam tube intended for high speed electronic switching or commutation. It is capable of handling 18 different channels for transmission over a single carrier in multiplexing or telemetering applications. This is the output tube of such a system. It has a coated unipotential cathode. The N.U.-6090 has eighteen anode leads which are brought out separately, a common lead for the six gap grids and another lead for the remaining twelve window grids. The gap grids are physically positioned between adjacent screen segments.

ELECTRICAL RATINGS

Heater Voltage (ac or dc)..... 6.3 volts $\pm 10\%$
Maximum Plate Voltage..... 300 volts dc
Maximum Screen Voltage (G_2)..... 300 volts rms ac 6ϕ

TYPICAL OPERATING CONDITIONS

Heater Voltage..... 6.3 volts
Heater Current..... 0.670 amperes
Plate Voltage..... 300 volts Δ
Screen Voltage (Applied through dc focusing bias) .. 150 volts rms ac 6ϕ
Focusing Bias (Positive end connected to cathode)... 60 volts dc
Shield Voltage..... 60 volts dc
Grid Voltage EG-1 (Gap grids)..... 0 volts dc
Grid Voltage EG-2 (Window grids)..... -10 volts dc Δ
Single Channel Peak Current..... 60 μ a dc
Single Channel Transconductance..... 2.0 μ hos max.
Plate Load Resistance..... 500K ohms

• All voltages except EG-1 and EG-2 are measured with respect to the six phase power supply neutral. EG-1 and EG-2 are measured with respect to the cathode.

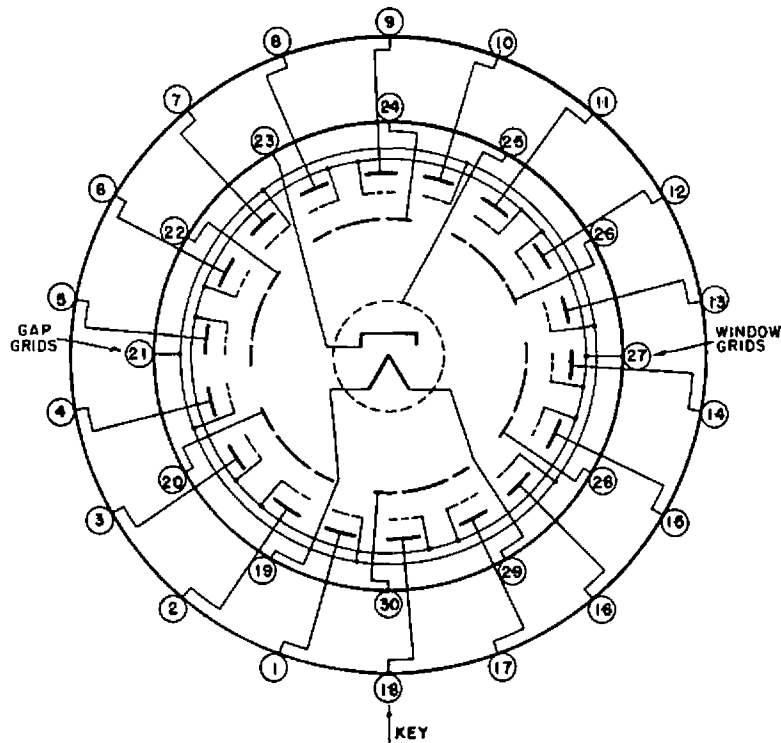
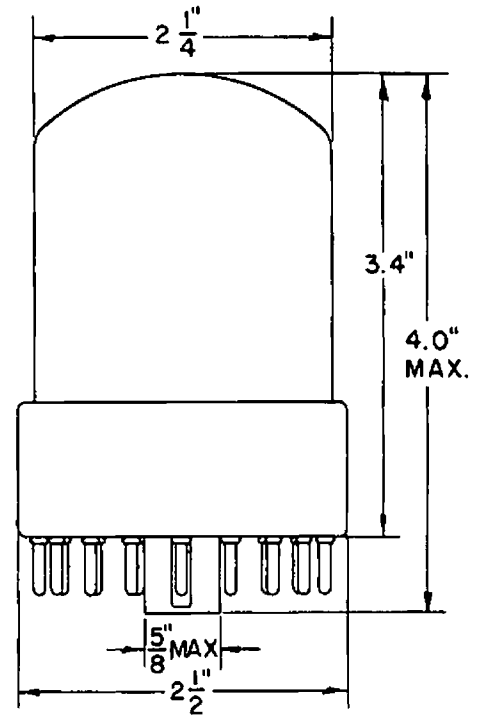
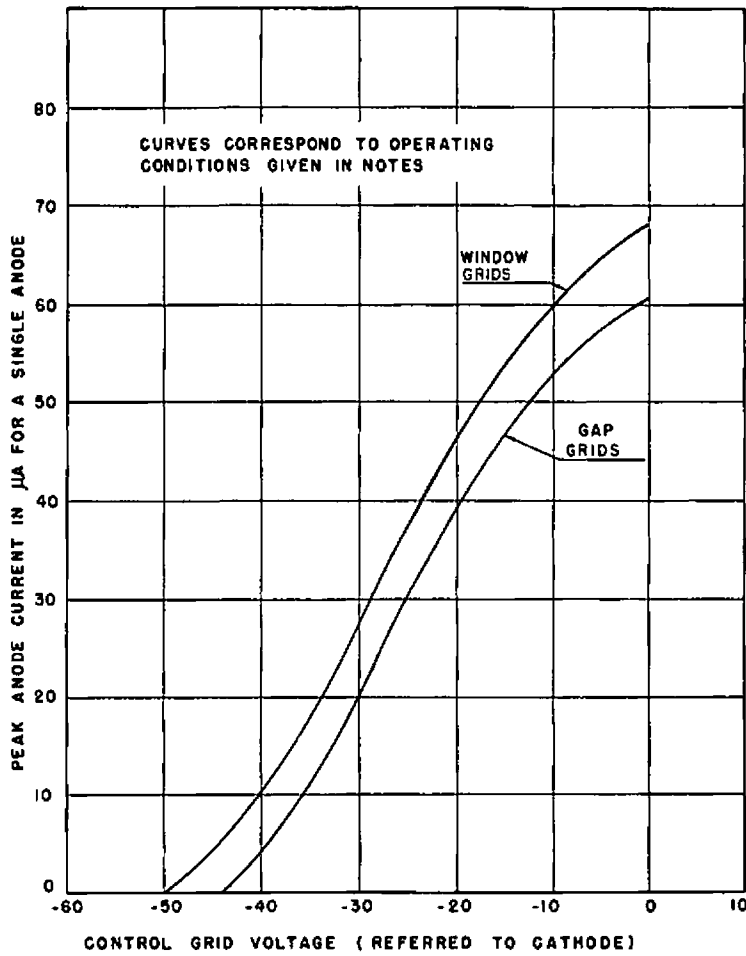
Δ The bias on the window grids may be adjusted to equalize the uniformity of output current between the gap grid and window grid channels. This will limit the maximum deviation in output uniformity to $\pm 15\%$.

MECHANICAL RATINGS

STYLE..... Special
BULB..... T-18
BASE..... Special 30-pin
OVERALL HEIGHT..... 4.0"
MAX. DIA..... 2.5" (BASED)
MOUNTING POSITION.. Any

BASE PIN CONNECTIONS

PIN 1: P-1
PIN 2: P-2
PIN 3: P-3
PIN 4: P-4
PIN 5: P-5
PIN 6: P-6
PIN 7: P-7
PIN 8: P-8
PIN 9: P-9
PIN 10: P-10
PIN 11: P-11
PIN 12: P-12
PIN 13: P-13
PIN 14: P-14
PIN 15: P-15
PIN 16: P-16
PIN 17: P-17
PIN 18: P-18
PIN 19: H
PIN 20: SC-1
PIN 21: G_1 (GAP GRIDS)
PIN 22: SC-2
PIN 23: K
PIN 24: SC-3
PIN 25: Mica Charge Ring
PIN 26: SC-4
PIN 27: G_2 (WINDOW GRIDS)
PIN 28: SC-5
PIN 29: H
PIN 30: SC-6



BOTTOM VIEW

18 CHANNEL RADIAL BEAM TUBE
NU- 6090



ENGINEERING BULLETIN

ELECTRONIC COMPONENTS

from JETEC release
#1614, March 26, 1956

N. U. - 6091

18 CHANNEL RADIAL BEAM TUBE MULTIPLE GRID TYPE

The type N.U. - 6091 is a multiple grid electrostatically focused and deflected radial beam tube intended for high speed electronic switching or commutation. It is capable of handling 18 different channels for transmission over a single carrier in multiplexing or telemetering applications. This is the input tube of such a system. The N.U.-6091 has eighteen grid leads which are brought out separately, a common lead for the six gap anodes and another lead for the remaining twelve window anodes. It has a coated unipotential cathode. The gap anodes are physically positioned between adjacent screen segments.

ELECTRICAL RATINGS

Heater Voltage (ac or dc)..... 6.3 volts $\pm 10\%$
Maximum Plate Voltage..... 300 volts dc
Maximum Screen Voltages (ac) 300 volts rms ac 6 ϕ

TYPICAL OPERATING CONDITIONS

Heater Voltage..... 6.3 volts
Heater Current..... 0.670 amperes
Plate Voltage..... 300 volts $\bullet$
Screen Voltage (*Applied through dc focusing bias*) .. 150 volts rms ac 6 ϕ
Focusing Bias (*Positive end connected to cathode*)... 60 volts dc
Grid Voltage E_{g1} (*Gap grids*) 0 volts dc
Grid Voltage E_{g2} (*Window grids*)..... -10 volts dc Δ
Single Channel Peak Current..... 60 μ a dc
Single Channel Transconductance..... 2.0 μ mhos max.
Plate Load Resistance..... 500K ohms
Mica Charge Ring..... Normally connected to cathode

$\bullet$ All voltages except E_{g1} and E_{g2} are measured with respect to the six phase power supply neutral. E_{g1} and E_{g2} are measured with respect to the cathode.

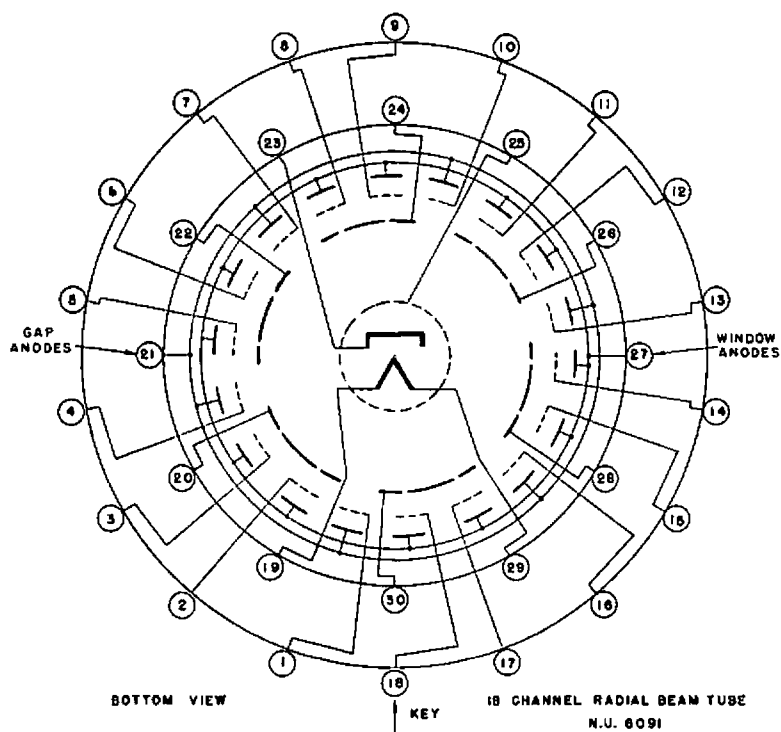
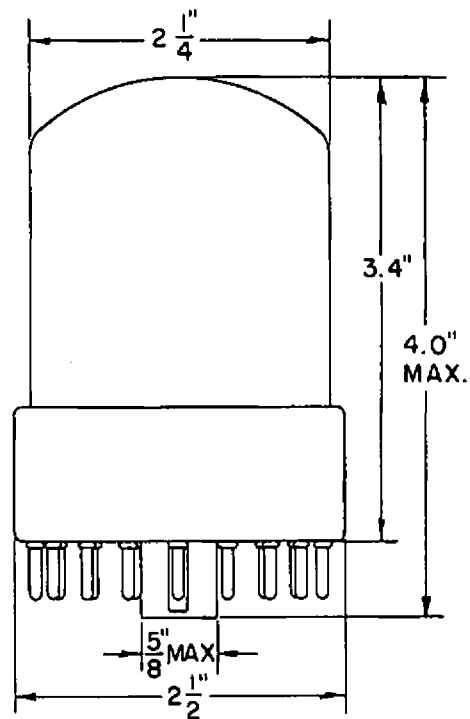
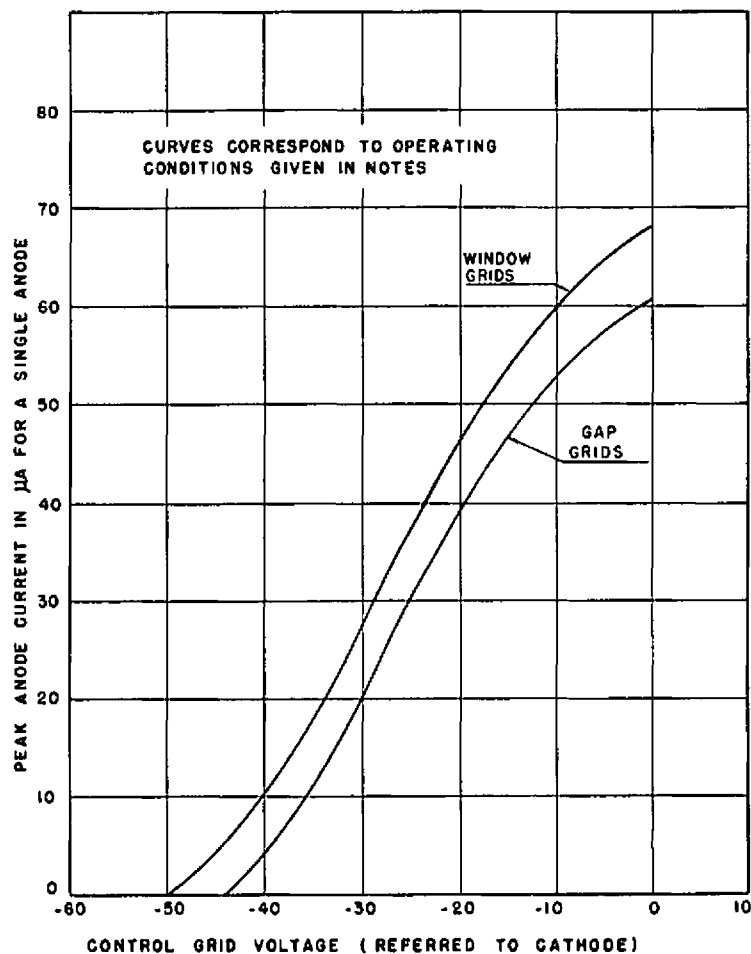
Δ The bias on the window grids may be adjusted to equalize the uniformity of output current between the gap grid and window grid channels. This will limit the maximum deviation in output uniformity to $\pm 1\%$.

MECHANICAL RATINGS

STYLE..... Special
BULB..... T-18
BASE..... Special 30-pin
OVERALL HEIGHT..... 4.0"
MAX. DIA..... 2.5" (BASED)
MOUNTING POSITION.. Any

BASE PIN CONNECTIONS

PIN 1: G-1
PIN 2: G-2
PIN 3: G-3
PIN 4: G-4
PIN 5: G-5
PIN 6: G-6
PIN 7: G-7
PIN 8: G-8
PIN 9: G-9
PIN 10: G-10
PIN 11: G-11
PIN 12: G-12
PIN 13: G-13
PIN 14: G-14
PIN 15: G-15
PIN 16: G-16
PIN 17: G-17
PIN 18: G-18
PIN 19: H
PIN 20: SC-1
PIN 21: P (GAP ANODES)
PIN 22: SC-2
PIN 23: K
PIN 24: SC-3
PIN 25: Mica Charge Ring
PIN 26: SC-4
PIN 27: P (WINDOW ANODES)
PIN 28: SC-5
PIN 29: H
PIN 30: SC-6



TENTATIVE CHARACTERISTICS

6113

LOW MICROPHONIC TWIN TRIODE AMPLIFIER

MECHANICAL DATA

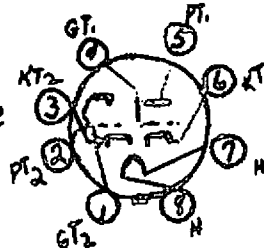
Coated Unipotential cathode
Outline drawing

Bulb

T-9

Base B8-6 Intermediate Shell octal 8-pin
Maximum diameter.....1-5/16"
Maximum overall length.....3-5/16"
Maximum seated height.....2-3/4"
Pin connections.....8BD

Pin 1 - Grid T-2
Pin 2 - Plate T-2
Pin 3 - Cathode T-2
Pin 4 - Grid T-1



Pin 5 - Plate T-1
Pin 6 - Cathode T-1
Pin 7 - Heater
Pin 8 - Heater

Mounting Position

any

ELECTRICAL DATARatingsPer Triode

Heater voltage (A.C. or D.C.).....6.3 volts
Heater current.....0.3 amperes
Maximum plate voltage.....250 volts
Minimum grid voltage.....0 volts
Maximum plate dissipation.....1 watt
Maximum microphonism **.....50 milliwatts*

* Where power amplifier gain has been adjusted for 50 milliwatts output at an input sensitivity of 70 millivolts.

** Rp= 0.2 Megohm and triodes are connected in parallel.

Typical Operating Conditions and Characteristics.

Class A1 Amplifier Per Unit

Plate voltage.....250 volts
Grid voltage.....-2 volts
Plate current.....2.3 MA.
Transconductance.....1600 μ mhos
Plate resistance.....44000 ohms
Amplification factor.....70

Direct Interelectrode Capacitances.

Cap. Grid to Plate	2.8 μ ufds
Cap. In.....	3.0 μ ufds
Cap. Out.....	3.8 μ ufds
Plate to Plate.....	0.4 μ ufds
Grid to Grid.....	0.65 μ ufds
Grid T2 to Plate T1.....	0.13 μ ufds.

NEW DATA

6169

6169

RUGGEDIZED SUB-MINIATURE U.H.F. TRIODE

APPLICATION:

The 6169 is a T-3 subminiature triode designed for rugged applications as encountered in the military service. It is primarily intended for use in U.H.F. mixer, amplifier or pulse service. The frequency limit as an oscillator is above 800 megacycles. Elements carrying R.F. have double leads to reduce lead inductance and resistance. This is the equivalent to a single section of a 7F8 loctal.

RATINGS:

Heater Voltage (AC or DC) $\pm 10\%$	6.3	volts
Maximum Plate Voltage	250	volts
Maximum Heater to Cathode Voltage	100	volts
Maximum Plate Dissipation	3.0	watts
Maximum Cathode Current	15	ma
Maximum impact	500	g
Maximum vibration output *	50	mv
Maximum bulb temperature	200°	c

INTERELECTRODE CAPACITANCES:

	UNSHIELDED	* SHIELDED
Grid to Plate	1.7	1.6 μf
Input	2.1	2.5 μf
Output	.75	2.6 μf

*With close fitting shield connected to cathode

TYPICAL CONDITION OF OPERATION:

Heater Voltage	6.3		volts
Heater Current	150		ma
Plate Voltage	180	120	90 volts
Grid Voltage	-1	-.75	-.50 volts
Plate Current	11.5	6.0	4.5 ma
Grid Voltage for 10 μamp , Plate Current (approx.)	-7	—	— volts
Plate Resistance	8500	8300	9000 ohms
Transconductance	6500	6000	5800 μmhos
Amplification Factor	55	50	50

NOTE: LEADS MAY BE CUT TO .200" FOR USE IN CINCH SOCKET
54A-13686

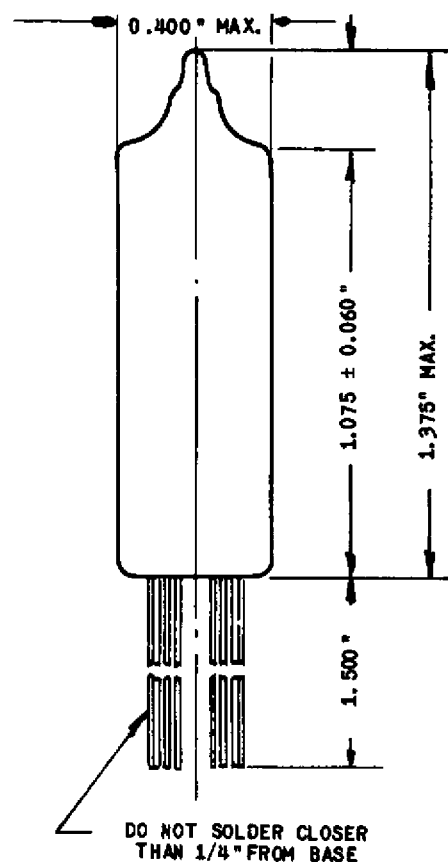
* Measured across a 10,000 ohms load. Resistor when vibrated at 25 cps at .080" excursion.

PHYSICAL SPECIFICATIONS

Style.....	Sub Miniature
Bulb.....	T-3-1
Mounting Position.....	Any
Leads.....	Flexible
Basing Diagram.....	8EE
Base.....	KB-1

BASE PIN CONNECTIONS

PIN 1	Grid
PIN 2	Plate
PIN 3	Heater
PIN 4	Cathode
PIN 5	Cathode
PIN 6	Heater
PIN 7	Plate
PIN 8	Grid



(over)

NOVEMBER 1951

Prepared by

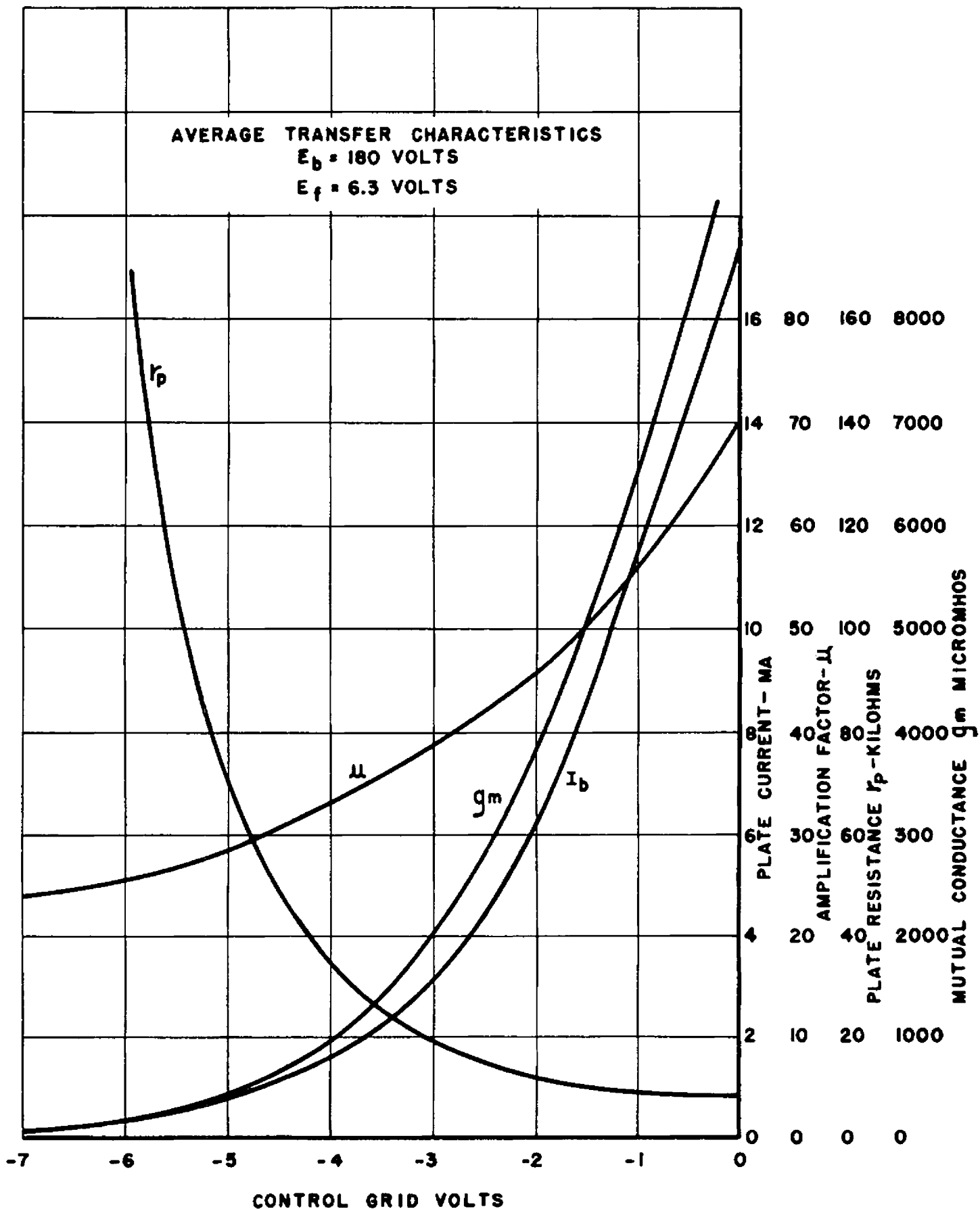
Commercial Engineering Division

ORANGE NATIONAL UNION RADIO CORPORATION NEW JERSEY

NATIONAL UNION RADIO CORPORATION

RESEARCH DIVISION

6169 TRIODE



NEW **NATIONAL UNION ELECTRON TUBE** DATA

6170

25 CHANNEL RADIAL BEAM TUBE COLLECTOR TYPE

APPLICATION

The type 6170 is a collector type magnetically focused and deflected radial beam tube intended for high speed commutation or switching. It is capable of handling twenty-five (25) different channels for transmission over a single carrier in multiplexing or telemetering applications. This is the input tube of such a system.

The 6170 has twenty-five (25) grid leads which are brought out separately and common anode lead for all 25 anodes. A polyphase wound stator is necessary to focus and rotate the beam. The field from the stator produces two (2) rotating electron beams spaced 180° from each other. Double-beam scanning is normally employed, but one beam may be suppressed relatively simply if necessary. The value of the field required is determined by the degree of focusing desired and the voltages on the elements. It has a coated unipotential cathode.

RATINGS

Heater Voltage (AC or DC) $\pm 10\%$	6.3 volts
Maximum Anode Voltage	500 volts
Maximum Cathode Current	30 mAdc

TYPICAL OPERATING CONDITIONS:

Heater Voltage	6.3 volts
Heater Current	0.300 amperes
Anode Voltage	300 volts dc
Screen Grid Voltage (G_3)	77 volts dc
Space Charge Voltage (G_1)	18 volts dc
Channel Defining Post Voltage (G_5)	50 volts dc
Single Channel Peak Plate Current	310 μ Adc
Screen Current	4.7 μ Adc
Channel Defining Post Current	28 μ Adc
Space Charge Grid Current	1.7 mAdc
Single Channel Transconductance	80 μ mhos
Single Channel Grid Bias (E_{g4}) for Anode Current Cut Off	-4 volts dc
Field	140 Gauss

Mica Rings (G_2) Normally connected to
the Cathode

PHYSICAL SPECIFICATIONS

Style	Special
Bulb	T-18
Base	34 Lead Acorn Type
Dimension	See Attached Drawing

BASE PIN CONNECTIONS

PIN 1: G_3	PIN 18: G_4-13
PIN 2: G_4-1	PIN 19: G_4-14
PIN 3: G_1	PIN 20: G_4-15
PIN 4: G_4-2	PIN 21: H
PIN 5: G_4-3	PIN 22: G_4-16
PIN 6: P	PIN 23: G_4-17
PIN 7: G_4-4	PIN 24: G_4-18
PIN 8: G_4-5	PIN 25: P
PIN 9: G_4-6	PIN 26: G_4-19
PIN 10: G_4-7	PIN 27: G_4-20
PIN 11: H	PIN 28: G_4-21
PIN 12: G_4-8	PIN 29: G_2
PIN 13: G_4-9	PIN 30: G_4-22
PIN 14: G_4-10	PIN 31: G_4-23
PIN 15: G_4-11	PIN 32: G_5
PIN 16: NC	PIN 33: G_4-24
PIN 17: G_4-12	PIN 34: G_4-25

TOP CAP: Cathode

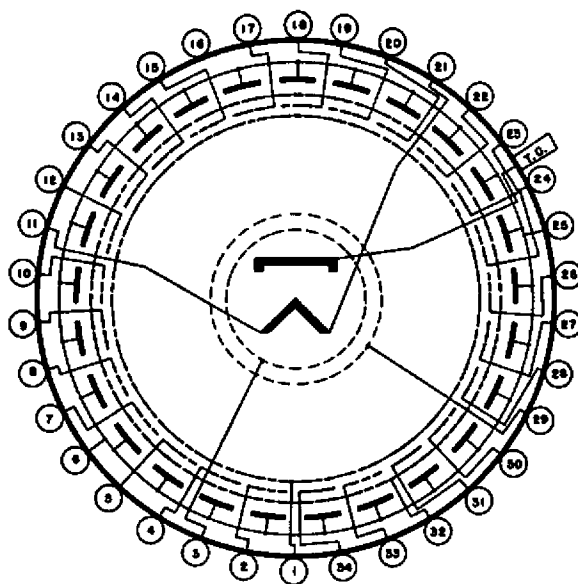
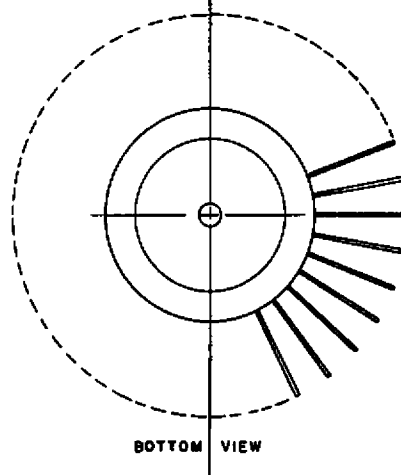
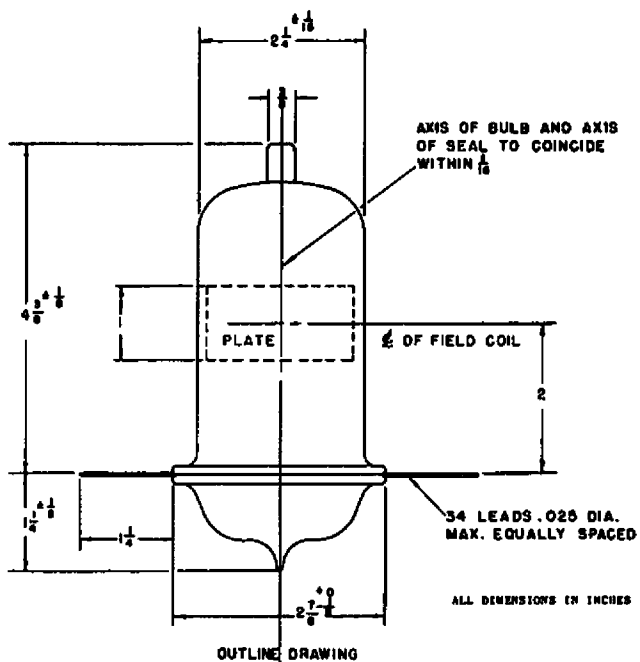
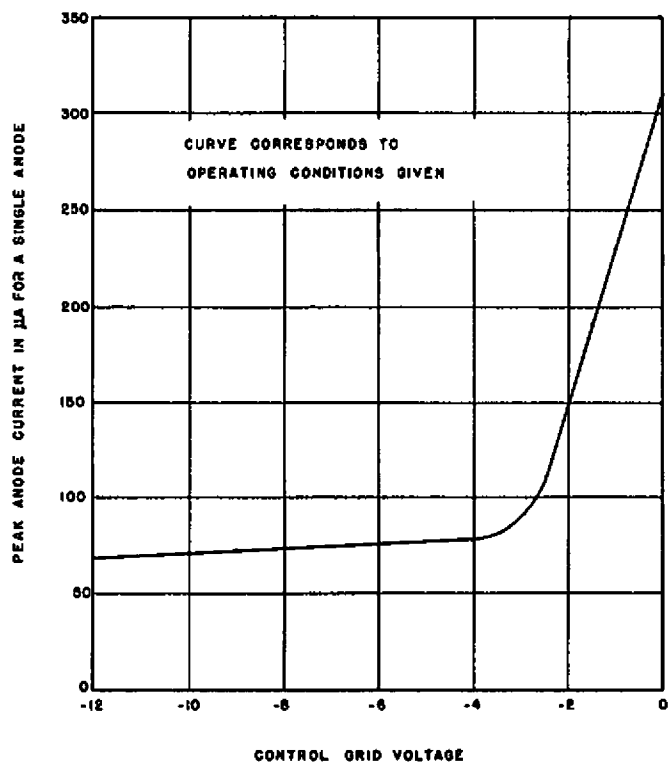
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from RTMA release #1036,
Nov. 21, 1951

NOVEMBER 1951

Prepared by
Commercial Engineering Division

ORANGE **NATIONAL UNION RADIO CORPORATION** NEW JERSEY



NOTE-
LEAD NO. 1 IS
MARKED BY A
YELLOW DOT

6170
BASING DIAGRAM

NEW NATIONAL UNION ELECTRON TUBE DATA

N.U. - 6184

NU-6184

from RTMA release #1067,
March 17, 1952

RELIABLE SUBMINIATURE UHF TWIN DIODE

APPLICATION:

The NU-6184 is a T-3 subminiature twin diode designed for reliable applications such as encountered in military service where long life and stable performance is required. It is a high pervance tube suitable for rectifier, clipper, detector and pulse service. An internal shield results in very low capacitance between sections. The resonant frequency is approximately 1125 megacycles. It has an oxide coated unipotential cathode. The heater power consumption is less than 1/2 watt per section. The tube leads may either be soldered into a circuit or cut for socketing.

RATINGS:

Heater Voltage (AC or DC) $\pm 10\%$	6.3	volts
Maximum Heater Cathode Voltage	300	volts
Maximum Peak Inverse Voltage	450	volts
Maximum RMS Plate Voltage	200	volts
Maximum Peak Plate Current	50	ma
Maximum DC Output Current (F.W.)	20	ma
DC voltage drop at 8ma: per plate	5.0	volts
Maximum Impact Acceleration	500	G
Maximum Vibrational Acceleration for Extended Periods	2.5	G
Maximum Ambient Temperature	200	C
Maximum Altitude	60,000	ft.

INTERELECTRODE CAPACITANCES:

Plate to all other elements	2.5	μmf *
Cathode to all other elements	3.0	μmf *
Plate 1 to Plate 2 (with Ext. Shield)	0.01	μmf *
Plate 1 to Plate 2 (without Ext. Shield)	0.1	μmf

* With close fitting shield

TYPICAL OPERATION CONDITIONS:

Heater Voltage	6.3	6.3	volts
Heater Current	150	150	ma
RMS Plate Voltage	150	115	volts
Plate Current (Full Wave) θ	16	12	ma
DC Output Voltage θ	180	136	volts

$\theta R_L = 11,000 \text{ ohms}$, $C_L = 8\mu\text{f}$, $L = 15 \text{ mh}$

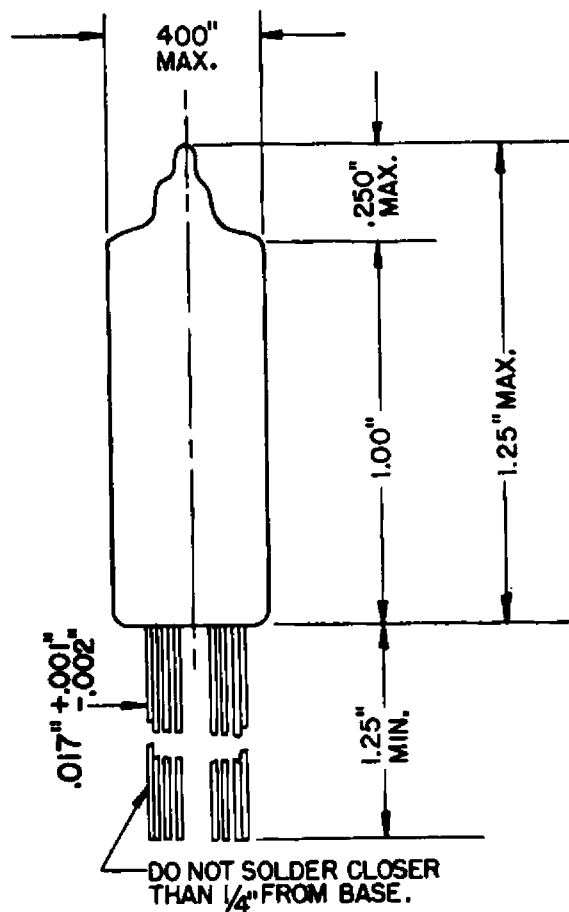
NOTE: LEADS MAY BE CUT TO .200" FOR USE IN CINCH SOCKET
54A-13686

PHYSICAL SPECIFICATIONS

Style.....	Sub Miniature
Bulb.....	T-3
Base.....	Submin. Button 8-Pin
Mounting Position.....	Any

BASE PIN CONNECTIONS

Pin 1 -	N.C.
Pin 2 -	P ₁
Pin 3 -	H
Pin 4 -	K ₁
Pin 5 -	K ₂
Pin 6 -	H
Pin 7 -	P ₂
Pin 8 -	Shield
RMS Basing -	8 EH



(Over)

JANUARY 1952

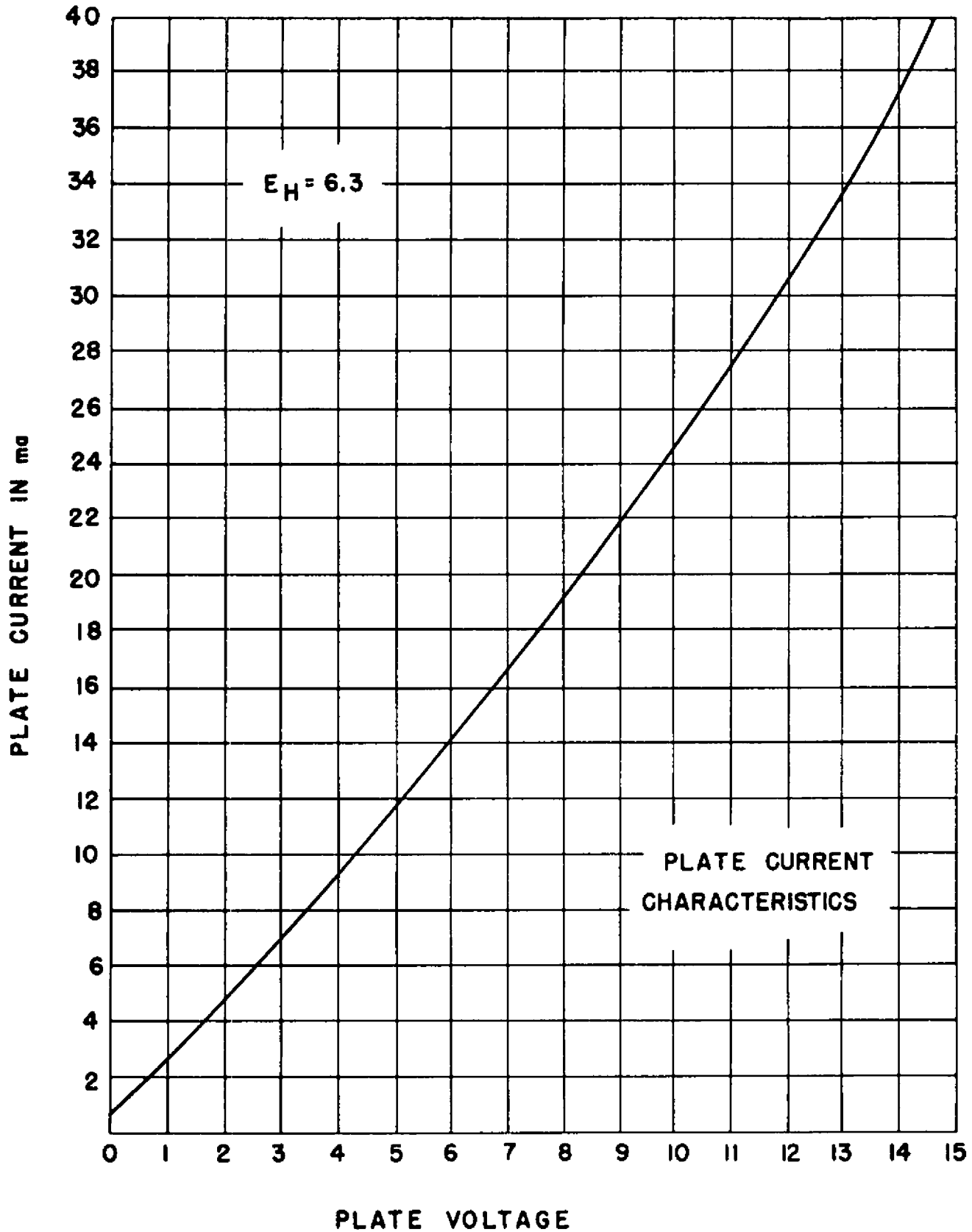
Research Division

ORANGE NATIONAL UNION RADIO CORPORATION NEW JERSEY

NATIONAL UNION RADIO CORPORATION

RESEARCH DIVISION

NU-6184



NEW NATIONAL UNION ELECTRON TUBE DATA

N.U. 6195

RUGGEDIZED R.F. POWER OUTPUT BEAM PENTODE

APPLICATION:

The NU-6195 is a T-3 subminiature beam pentode designed for rugged applications such as encountered in the military service. It is designed for use in Class A & Class C applications and is tested as a frequency doubler at an output frequency of 400 mc. It has an oxide coated filamentary cathode which is center-tapped permitting operation at either 1.25 volts and 220 ma or 2.5 volts and 110 ma. The tube leads may either be soldered into a circuit or cut for use in a Cinch socket #54A-13686.

RATINGS:

Filament Voltage $\pm 10\%$	1.25/2.5 volts d.c.
Maximum Plate Voltage	180 volts
Maximum Screen Voltage	150 volts
Maximum Grid Voltage	-80 volts
Maximum Plate Dissipation	2.5 watts
Maximum Screen Dissipation	0.6 watts
Maximum Cathode Current	20 ma
Maximum Altitude	60,000 feet
Maximum Impact	500 g
Maximum Temperature	200° C

INTERELECTRODE CAPACITIES:

	SHIELDED
Grid to Plate	0.045 μf
Input	2.4 μf
Output	1.3 μf

TYPICAL OPERATING CONDITIONS: (Class A Amplifier)

Filament Voltage	1.25/2.5 volts
Filament Current	220/110 ma
Plate Voltage	125 volts
Screen Voltage	125 volts
Grid Voltage	-7.5 volts
Plate Current	9.0 ma
Screen Current	1.5 ma
Transconductance	2100 μmhos
Plate Resistance	120,000 ohms

1.0 watt output at 10% total harmonic distortion is obtained when $E_b = 180$ V, $E_{c2} = 135$ V and $E_{c1} = -8$ V.

DOUBLER OPERATION AT 400 MC OUTPUT FREQUENCY:

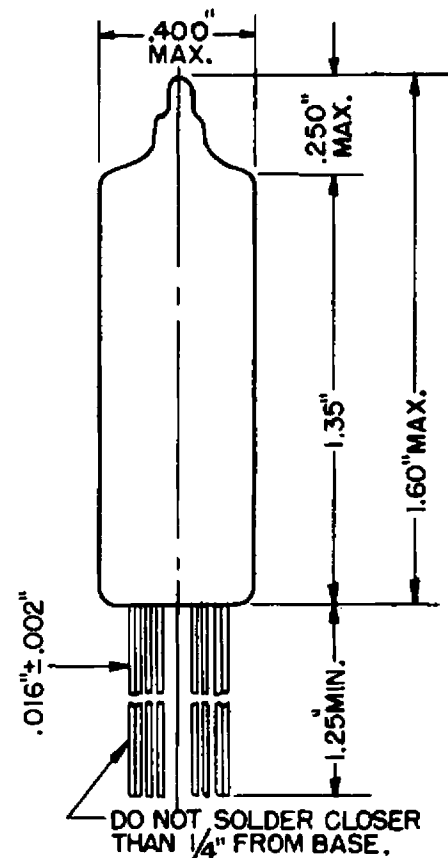
Filament Voltage	1.25/2.5 volts
Filament Current	220/110 ma
Plate Voltage	125 volts
Screen Voltage	125 volts
Grid Resistance	220,000 ohms
Plate Current	8.0 ma
Screen Current	2.0 ma
Power Output	200 mw

PHYSICAL SPECIFICATIONS

Style..... Sub Miniature
Bulb..... T-3
Base..... K8-1 Submin. Button 8- Pin
Mounting Position ... Any

BASE PIN CONNECTIONS

Pin 1 - Fil -
Pin 2 - NC
Pin 3 - P
Pin 4 - NC
Pin 5 - Fil CT and G_3
Pin 6 - G_2
Pin 7 - Fil+
Pin 8 - G_1
RMA Basing - 6CL-0-0



LEADS MAY BE CUT TO .200\" FROM
USE IN CINCH SOCKET #54A-13686

MAY 1952

Research Division

ORANGE NATIONAL UNION RADIO CORPORATION NEW JERSEY

SPLIT ELECTROMETER TUBE

Tube 6196

The 6196 is a split tetrode miniature tube for electrometer applications. It consists of a low filament power, a space-charge grid n° 1 and two grid n° 2-anode elements which are geometrically similar and are symmetrically situated on each side of the filament plane.

One of the n^o 2 grids is connected to the top of the bulb. The tube has been treated both inside and outside to provide this grid with maximum leakage resistance and absolute minimum current.

The use of this tube in a balanced Wheatstone bridge arrangement provides not only a means of compensating for fluctuations in anode voltage and filament current but also for random filament emission fluctuations. For these reasons the circuit drift is reduced to the lowest value.

CHARACTERISTICS

ELECTRICAL:

Filament, coated:

	<u>Min.</u>	<u>Nominal</u>	<u>Max.</u>	
Voltage		3		Volts
Current	45	50	55	mA

Capacitance* Grid n° 2 3.7 μF

MECHANICAL:

Maximum overall length	2-1/2"
Maximum diameter	7/8"
Base	Small button Noval 9 pin

Basic designation (bottom view) :

Pin 1 - Grid n° 1
Pin 2 - Compensating element Grid n° 2
Pin 3 - Filament (+)
Pin 4 - Filament (-)
Pin 5 - Compensating element Plate
Pin 6 - Grid n° 1
Pin 7 - No connection
Pin 8 - Measuring element Plate
Pin 9 - Measuring element Plate

MAXIMUM RATINGS (each element) :

Plate voltage 9 Volts max.
Grid n° 1 voltage 6 Volts max.
Grid n° 2 voltage -2 Volts max.

TYPICAL OPERATION (each element)

Plate voltage	9 volts
Grid n° 1 voltage	6 volts
Grid n° 2 voltage	-4 volts
Plate current	40 μ A
Grid n° 1 current	500 μ A
Transconductance	20 μ mho
Grid n° 2 Leakage resistance (measuring element) ;	$>10^{15}$ ohms
Grid n° 2 total inverse current (measuring element) :	$2 \cdot 10^{-15}$ amp. (approx)

The measuring element grid n° 2 is connected to the top of the bulb.

* Control grid of the measuring element to all other electrodes in parallel.

LAMPE MAZDA

Department TUBES ELECTRONIQUES

Service des Liaisons Techniques

Attn: Mr. A. Pignon

Compagnie des Lampes

c/o International General Electric Co.

Schenectady, N.Y.

N.U. 6320**RELIABLE SUBMINIATURE HIGH-MU TWIN TRIODE****APPLICATION**

The NU-6320 is a T-3 subminiature high-mu twin triode with a heater power consumption of approximately 1/4 of a watt per section. It was designed for reliable applications where long life and stable performance is required. The characteristics of the tube are similar to those of the 6SL7.

MAXIMUM RATINGS

Heater voltage (ac or dc) $\pm$ 5%	6.3 volts
Heater cathode voltage	100 volts
Plate voltage	150 volts
Plate dissipation (per section)	0.6 watts
Cathode current (per section)	7.0 ma
Impact	500 G
Vibration output	40 mv
Ambient temperature	200° C

INTERELECTRODE CAPACITANCES

	Shielded
Grid to plate	0.60 mmf
Input	1.00 mmf
Output	1.40 mmf

TYPICAL CONDITION OF OPERATION

Heater voltage	6.3 volts
Heater current	85 ma
Plate voltage (single section)	100 volts
Cathode resistor (single section)	680 ohms
Amplification factor	60
Transconductance	1800 μ mhos

- Measured across 2000 ohm load resistor when vibrated at 25 cps at 0.080" excursion.

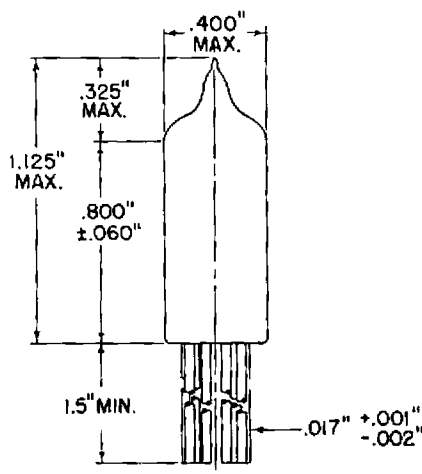
PHYSICAL SPECIFICATIONS

Style	Subminiature
Bulb	T-3
Base	Submin. Button
Mounting position	Any
Leads	Flexible

BASE PIN CONNECTIONS

Pin 1	P ₂
Pin 2	G ₂
Pin 3	H
Pin 4	K ₂
Pin 5	K ₁
Pin 6	H
Pin 7	G ₁
Pin 8	P ₁

RMA Basing 8 DG



from JETEC release #1558, Dec. 27, 1955



ENGINEERING BULLETIN

ELECTRONIC COMPONENTS

N.U. 6321

RELIABLE SUBMINIATURE LOW-MU TWIN TRIODE

APPLICATION

The NU-6321 is a T-3 subminiature low-mu twin triode with a heater power consumption of approximately 1/4 of a watt per section. It was designed for reliable applications where long life and stable performance is required. The characteristics of the tube are similar to those of the 6SN7.

MAXIMUM RATINGS

Heater voltage (ac or dc) $\pm$ 5%	6.3 volts
Heater cathode voltage	100 volts
Plate voltage	150 volts
Plate dissipation (per section)	0.6 watts
Cathode current (per section)	7.0 ma
Impact	500 G
Vibration output *	40 mv
Ambient temperature	200° C

INTERELECTRODE CAPACITANCES

	Shielded
Grid to plate	0.55 mmf
Input	1.00 mmf
Output	1.40 mmf

TYPICAL CONDITION OF OPERATION

Heater voltage	6.3 volts
Heater current	85 ma
Plate voltage	100 volts
Cathode resistor	680 ohms
Amplification factor	16
Transconductance	1700 μ ahos

* Measured across 2000 ohm load resistor when vibrated at 25 cps at 0.080" excursion.

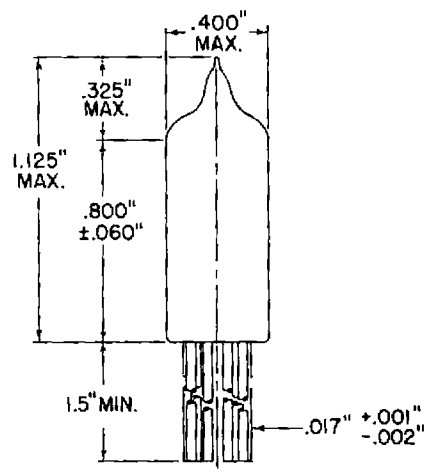
PHYSICAL SPECIFICATIONS

Style	Subminiature
Bulb	T-3
Base	Submin. Button
Mounting position	Any
Leads	Flexible

BASE PIN CONNECTIONS

Pin 1	P ₂
Pin 2	G ₂
Pin 3	H
Pin 4	K ₂
Pin 5	K ₁
Pin 6	H
Pin 7	G ₁
Pin 8	P ₁

RMA Basing 8 DG



from JETEC release #1558, Dec. 27, 1955

NATIONAL UNION ELECTRIC CORPORATION
RESEARCH DIVISION: • 350 SCOTLAND ROAD • ORANGE, N. J.



ENGINEERING BULLETIN

ELECTRONIC COMPONENTS

from JETEC release #1590, Feb. 20, 1956

6170 & 6324

25 CHANNEL RADIAL BEAM TUBES MULTIPLE GRID TYPE

6170 APPLICATION:

The type 6170 is a multiple grid type magnetically focused and deflected radial beam tube intended for high speed commutation or switching. It is capable of handling twenty-five (25) different channels for transmission over a single carrier in multiplexing or telemetering applications. This is the input tube of such a system. The 6170 has twenty-five (25) grid leads which are brought out separately and a common anode lead for all 25 anodes. A polyphase wound stator is necessary to focus and rotate the beam. The field from the stator produces two (2) rotating electron beams spaced 180° from each other. Double-beam scanning is normally employed, but one beam may be suppressed relatively simply if necessary. The value of the field required is determined by the degree of focusing desired and the voltages on the elements. It has a coated unipotential cathode.

6324 APPLICATION:

The tube application and characteristics of the 6324 are identical to those of the 6170. The only difference is that the 6324 comes furnished with a special 33-pin base.

ELECTRICAL RATINGS

Heater Voltage (AC or DC) $\pm 10\%$	6.3 volts
Maximum Anode Voltage	500 volts
Maximum Cathode Current	30 mAdc

MECHANICAL RATINGS

STYLE.....	Special
BULB.....	T-18
BASE 6170.....	34-Lead Acorn Type
BASE 6324.....	Special 33-pin
DIMENSION..	See Attached Drawings

TYPICAL OPERATING CONDITIONS

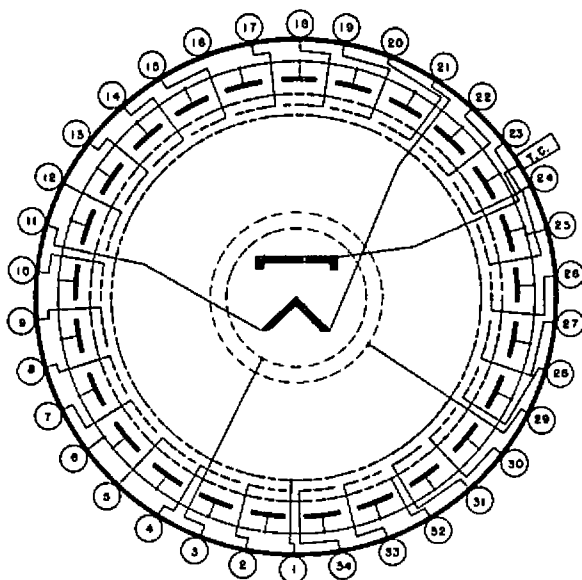
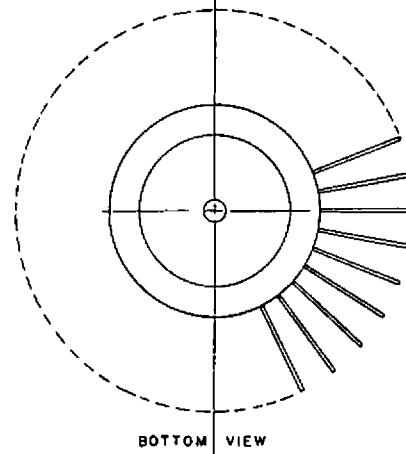
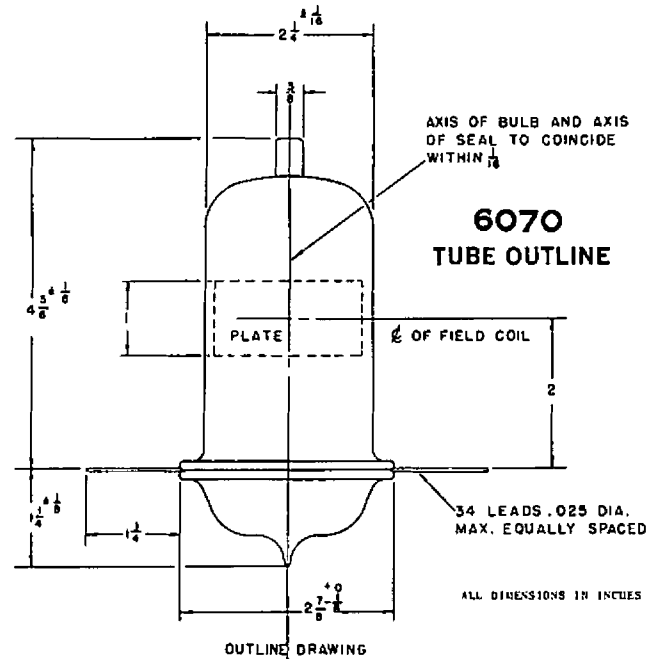
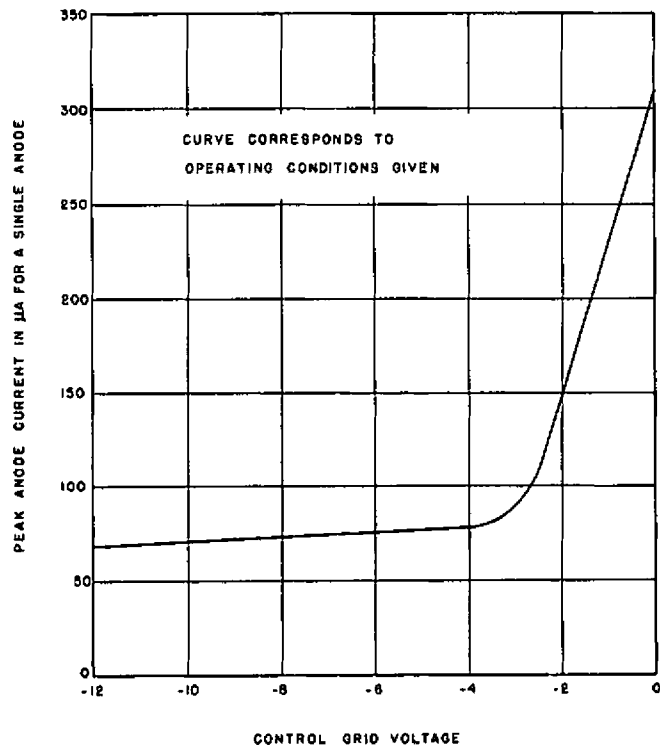
Heater Voltage	6.3 volts
Heater Current	0.300 amperes
Anode Voltage	300 volts dc
Screen Grid Voltage (G_2)	77 volts dc
Space Charge Voltage (G_1)	18 volts dc
Channel Defining Post Voltage (G_5)	50 volts dc
Single Channel Peak Plate Current	310 μ Adc
Screen Current	4.7 mAdc
Channel Defining Post Current	28 μ Adc
Space Charge Grid Current	1.7 mAdc
Single Channel Transconductance	80 μ mhos
Single Channel Grid Bias (E_{g4}) for	-4 volts dc
Anode Current Cut Off	
Field	140 Gauss

Mica Rings (G_2) Normally connected to the Cathode

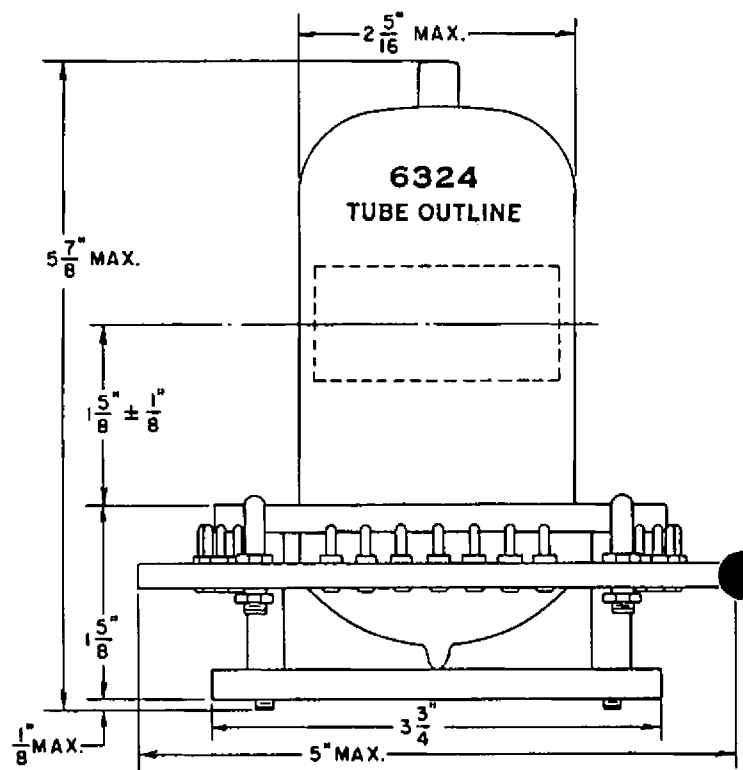
BASE PIN CONNECTIONS

PIN 1: G_3	PIN 18: G_4-13
PIN 2: G_4-1	PIN 19: G_4-14
PIN 3: G_1	PIN 20: G_4-15
PIN 4: G_4-2	PIN 21: H
PIN 5: G_4-3	PIN 22: G_4-16
PIN 6: P	PIN 23: G_4-17
PIN 7: G_4-4	PIN 24: G_4-18
PIN 8: G_4-5	PIN 25: P
PIN 9: G_4-6	PIN 26: G_4-19
PIN 10: G_4-7	PIN 27: G_4-20
PIN 11: H	PIN 28: G_4-21
PIN 12: G_4-8	PIN 29: G_2
PIN 13: G_4-9	PIN 30: G_4-22
PIN 14: G_4-10	PIN 31: G_4-23
PIN 15: G_4-11	PIN 32: G_5
PIN 16: NC	PIN 33: G_4-24
PIN 17: G_4-12	PIN 34: G_4-25

TOP CAP: Cathode



6170 - LEAD NUMBER 1 IS MARKED WITH A YELLOW DOT
6324 - ALL PINS ARE NUMBERED





ENGINEERING

NEWS RELEASE

ELECTRONIC COMPONENTS

Prepared by Commercial Engineering Division

from RETMA release #1259,
Dec. 11, 1953

N.U. 6355

TWIN INDICATOR

The NU-6355 is a Twin Indicator tube designed to provide a built-in test indicator in electronic equipment. The tube is small in size (T-5½ bulb with a 7 pin miniature base) and has no exposed exhaust tip. It is of rugged design making it ideally suited for military applications. The characteristics of the tube are similar to those of the 6AF6G.

MAXIMUM RATINGS

Filament voltage (ac or dc)...	6.3 v $\pm$ 10%
Target voltage.....	275 v
Focus electrode voltage.....	190 v
Heater-cathode voltage.....	100 v
Impact shock.....	500 G
Altitude.....	60000 ft
Ambient temperature.....	200 °C.

TYPICAL OPERATING CONDITIONS

Filament voltage.....	6.3 v
Filament current.....	140 ma
Target voltage.....	250 v
Focus electrode 1 voltage.....	120 to 190 v
Focus electrode 2 voltage.....	120 to 190 v

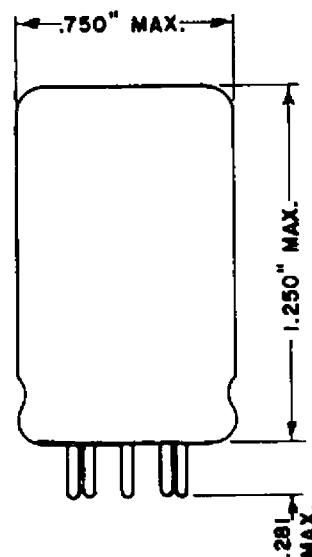
NOVEMBER 1953

PHYSICAL SPECIFICATIONS

Style.....	Miniature
Bulb.....	T-5½
Base.....	E7-1
Mounting Position....	Any

BASE PIN CONNECTIONS

Pin 1	Focus Electrode 1
Pin 2	Target
Pin 3	Heater
Pin 4	Focus Electrode 2
Pin 5	Heater
Pin 6	Target
Pin 7	Cathode



NATIONAL UNION RADIO CORPORATION

MAIN OFFICE: HATBORO, PENNSYLVANIA

from JETEC release
#1458, May 9, 1955

N.U. MAGNETIC PICK-UP TUBE

TYPE 6462

DESCRIPTION

The new National Union Pick-up Tube, formerly Type R-2211, is a miniature cathode-ray tube in a T-5½ bulb with a 7-pin miniature stem. The tube consists of a miniature electron gun, magnetic pole pieces, electrostatic deflection plates, and beam collectors. With no magnetic signal the beam is adjusted, by means of the electrostatic deflection plates, so that the beam equally divides between the two collector plates. A change in the magnetic field (input signal) between the pole pieces, results in a deflection of the electron beam, with a corresponding change in the relative division of the beam between the two plates. When the plates are connected to suitable load resistors, a push-pull output signal voltage is developed between the plate terminals. The output of the tube depends upon the flux density in the pole pieces. Magnetic field measurements down to 1 gamma have been obtained with this new device.

ELECTRICAL DATA

MAXIMUM TUBE RATINGS

Heater Voltage (ac/dc).....	6.3 volts $\pm 10\%$
Cathode Current.....	2.5 ma.
Grid Nos. 2 & 4, Pole pieces, and D1	300 volts
Plate No. 1 and Plate No. 2	400 volts
Deflection Voltage.....	± 25 volts
Load Resistance..... (per Plate)	0.5 megohm

TYPICAL TUBE OPERATING CONDITIONS

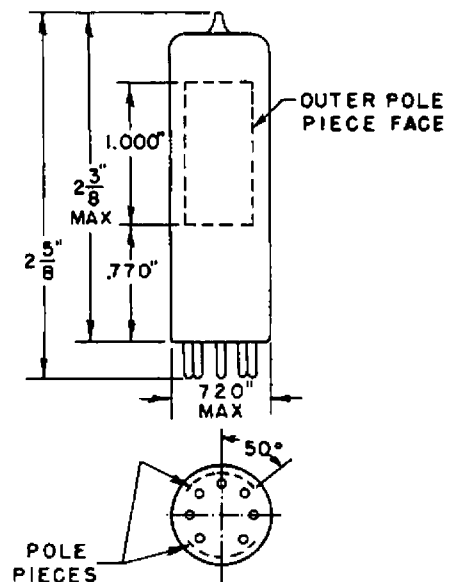
Heater Voltage.....	6.3 volts (ac/dc)
Heater Current.....	175 ma.
Cathode Current.....	1.5 ma.
Grid Nos. 2 & 4, Pole pieces, and D1	200 volts
Grid No. 3 (focusing electrode).....	14 volts
Voltage between D1 and D2.....	variable
Plate Voltages.....	280 volts
Plate Current (both elements).....	400 μ a.
Load Resistance/Plate.....	0.1 megohms
Plate Resistance (plate to Plate)...	2.6 megohms

TUBE MECHANICAL DATA

STYLE..... Miniature
BULB..... T-5½
BASE..... 7-pin button
MOUNTING POSITION..... Any

BASE PIN CONNECTIONS

PIN 1..... Plate No. 1 (P1)
PIN 2..... Grid No. 3 (G3), focusing electrode
PIN 3..... Heater (H), Grid No. 1 (G1),
Cathode (K), Repeller (R)
PIN 4..... Heater (H)
PIN 5..... Deflection Plate (D2)
PIN 6..... Grid Nos. 2 and 4 (G2, G4), Pole Pieces (PP),
Deflection Plate (D1)
PIN 7..... Plate No. 2 (P2)



APRIL 1955

N. U. - 6842

HIGH VOLTAGE REGULATOR TUBE

The N.U. 6842 is designed for use in regulated power supplies or voltage amplifiers operating at plate potentials between 300 V. and 4 Kv. This tube is particularly useful as a shunt or series regulator in equipment requiring stabilized output voltage essentially independent of line voltage variations in load current.

Low capacities, high gain, and high voltage ratings make this tube well suited for sweep circuits employing electrostatic deflection.

MAXIMUM RATINGS

Heater Voltage.....	6.3 Volts $\pm 10\%$
Anode Voltage.....	4 kv. max.
Plate Current (average).....	10 ma. max.
Plate Current (peak).....	100 ma. max.
Grid Voltage.....	-100 volts max.
Plate Dissipation.....	8.0 watts max.
Heater Cathode Voltage.....	± 300 volts max.
Screen Dissipation.....	.5 watts
Screen Voltage.....	150 volts

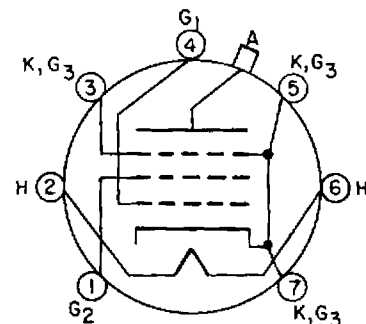
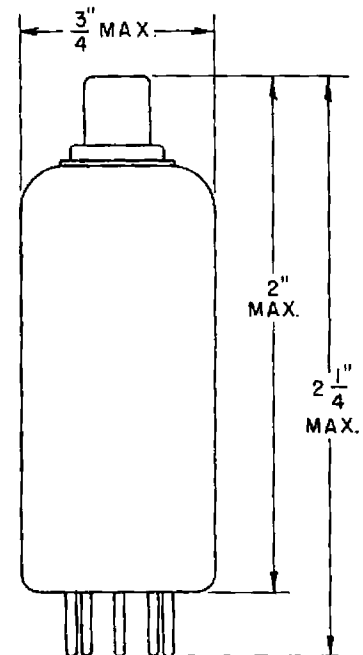
DIRECT INTERELECTRODE CAPACITIES

Cg-p (unshielded).....	.067 μf
C in.....	3.95 μf
C out.....	1.34 μf

CLASS A OPERATION

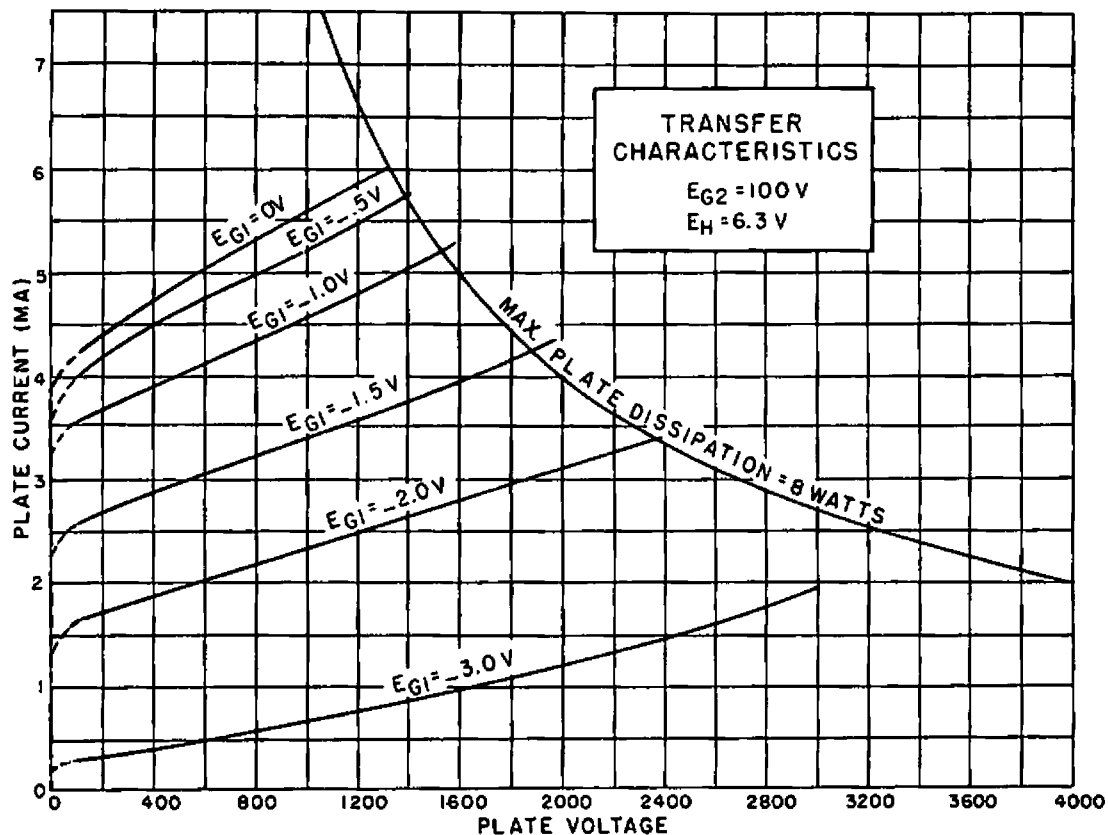
Heater Voltage.....	6.3 volts	6.3 volts	6.3 volts
Heater Current.....	.150 amps	.150 amps	.150 amps
Plate Voltage.....	500 volts	1000 volts	1500 volts
Grid Voltage.....	-1.0 volts	-1.0 volts	-1.0 volts
Screen Voltage.....	100 volts	100 volts	100 volts
Plate Current.....	3.5 ma.	4.0 ma.	4.5 ma.
Screen Current.....	0.50 ma.	0.50 ma.	0.50 ma.
Plate Res. (approx)...	.93 megohms	.93 megohms	.93 megohms
Mutual Conductance....	2250 μmhos	2400 μmhos	2500 μmhos

MECHANICAL RATINGS

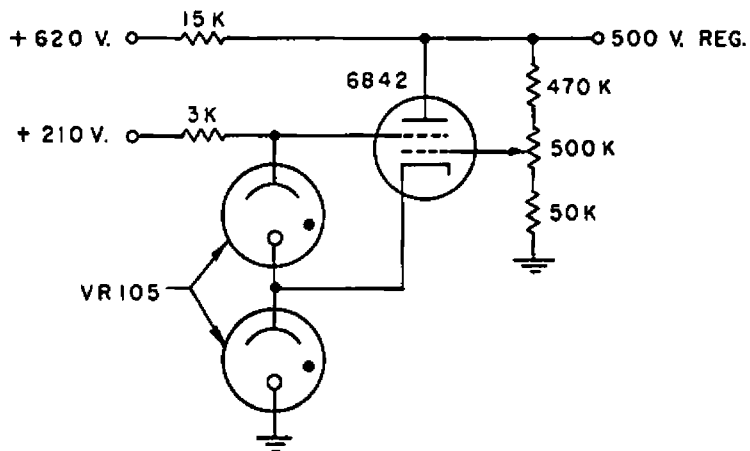


7EQ

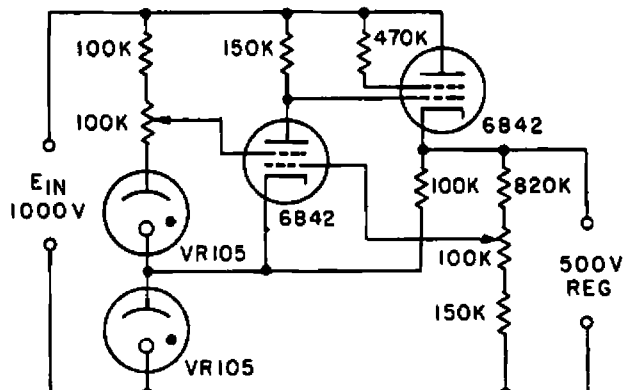
Bulb.....	T-5 1/2
Base.....	7-pin miniature
Cap.....	Skirted Miniature
Mounting Position	Any

**TYPICAL OPERATION - SHUNT REGULATOR**

Series Resistance.....	15 k ohms
Unregulated Input Voltage..	620 volts
Regulated Output Voltage..	500 volts
Cathode Voltage.....	105 volts
Plate Current.....	6 ma.
Load Current (average) ...	2 ma.
Screen Voltage.....	210 volts

**TYPICAL OPERATION - SERIES REGULATOR**

Unregulated Input Voltage..	1000 volts
Regulated Output Voltage...	500 volts
Load Current (average)	2 ma.
Cathode Voltage.....	105 volts
Screen Voltage.....	210 volts



NOTE: Should the peak instantaneous voltage exceed the maximum rated voltage in any 6842 application, a current limiting series impedance must be inserted in the plate lead. The purpose of this impedance is to limit the anode peak current so that it shall not exceed in value the maximum rated current characteristic.

ELECTRONIC COMPONENTS

from JEDEC release #3140,
Feb. 13, 1961

N. U. 7234**High Voltage Pentode**

The N.U. 7234 is designed for use in circuits employing the characteristics of a pentode with operating anode voltages between 3 and 8 KV. It is especially useful as a control or regulator tube where equipment requires stabilized output voltage in the kilovolt range. Low capacities, high gain and high voltage ratings permit this pentode to be of considerable usage in high voltage sweep circuits. This tube extends the pentode region beyond the limits of its companion tube, the N.U. 6842, which operates over the 1 to 4 KV anode volt range.

ELECTRICAL CHARACTERISTICS

Transconductance	3800
E_b 1500 E_{c2} 150 E_{c1} -1	
Plate Resistance	1 meg
E_b 1500 E_{c2} 150 E_{c1} -1	
Anode Voltage	Max 8000
Anode Dissipation Watts	Max 10
Anode Current Average	Max 5 ma
Screen Dissipation Watts	Max .5
Screen Current	Max 2 ma

Heater Characteristics:

Heater Voltage	6.3
Heater Current	.150
Heater Cathode Voltage	Max ± 300

Capacitance:

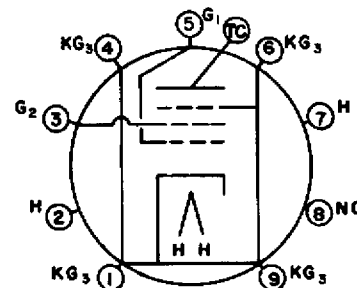
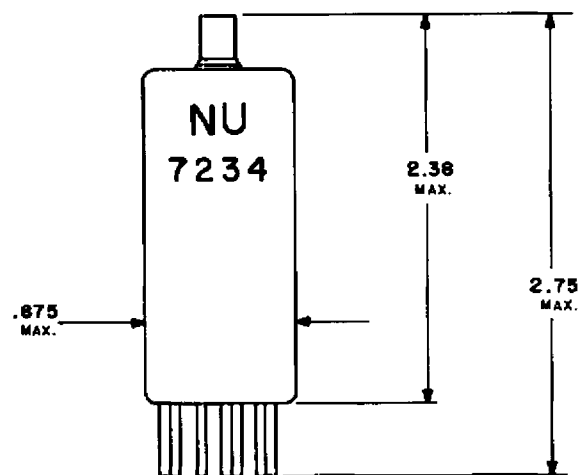
Grid to Plate	.0159 uuf
Cin	4.06 uuf
Cout	2.23 uuf

BASE CONNECTIONS:

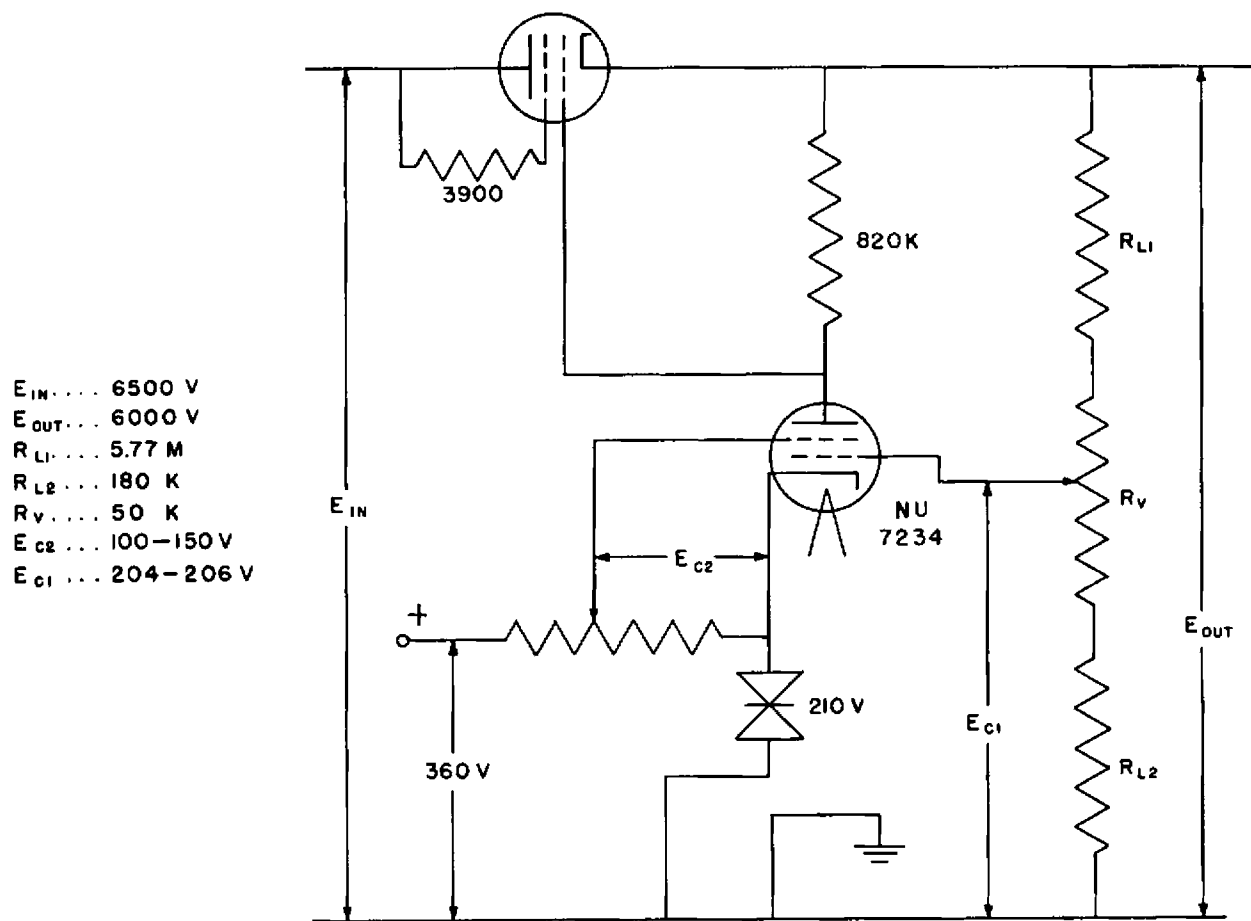
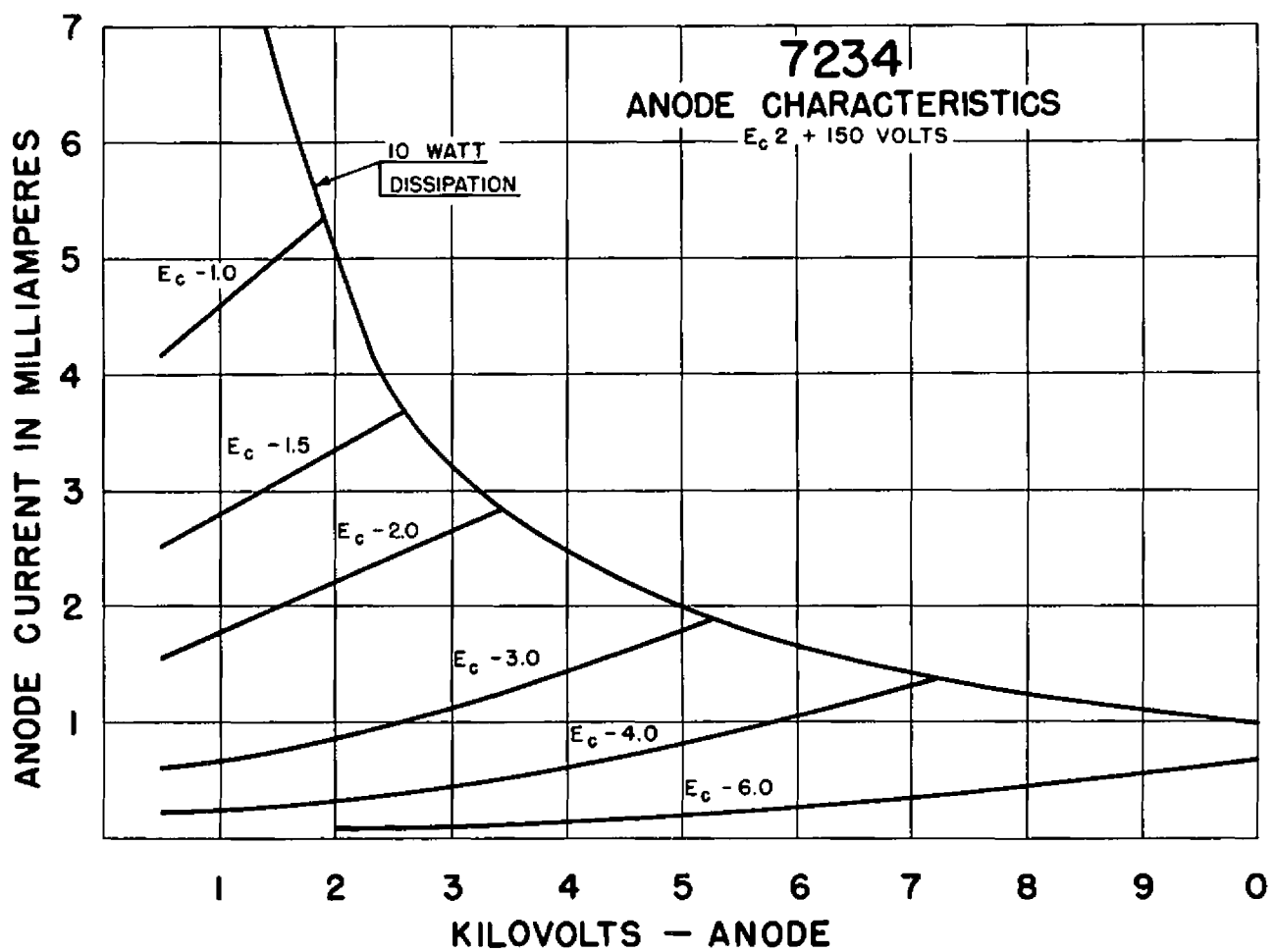
1 Cathode grid 3	6 Cathode grid 3
2 Heater	7 Heater
3 Grid 2	8 NC
4 Cathode grid 3	9 Cathode grid 3
5 Grid	Top Cap Anode

PHYSICAL CHARACTERISTICS

Bulb	T-6 $\frac{1}{2}$
Top Cap	C1-3
Basing	9KD
Mounting Position	Any



Jan. 1959



TYPICAL SIMPLIFIED VOLTAGE REGULATOR



ENGINEERING BULLETIN

ELECTRONIC COMPONENTS

from JEDEC release #3140,
Feb. 13, 1961

N. U. 7235

HIGH MU TRIODE AMPLIFIER

The 7235 is a miniature high mu triode designed for usage in regulated power supplies or voltage amplifiers operating at plate potentials between 1 KV and 10 KV. Low capacities, high gain and high voltage ratings make this tube well suited for critical television, oscilloscope, regulator or other circuits employing high voltages and low currents. The characteristics and recommended usage are similar to the National Union 2053 triode amplifier tube. The size has been decreased for more ease in adapting to the space requirements of the designer.

ELECTRICAL DATA

Transconductance at 1500 V E_c -1.0 850
Amplification at 1500 V E_c -1.0 550
Anode Voltage Max 10 KV
Plate Current Average Max 5 ma
Anode Wattage Max 10 watts

Heater Characteristics:

Heater Voltage 6.3
Heater Current 300 ma
Heater-Cathode Peak Voltage ± 300 V.

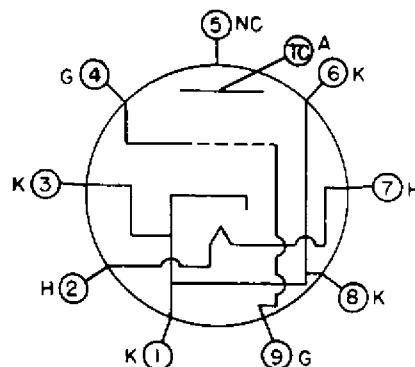
Capacitance:

Control Grid to Plate 1.03 uuf
Control Grid to Cathode 2.24 uuf
Plate to Cathode 1.03 uuf

MECHANICAL DATA

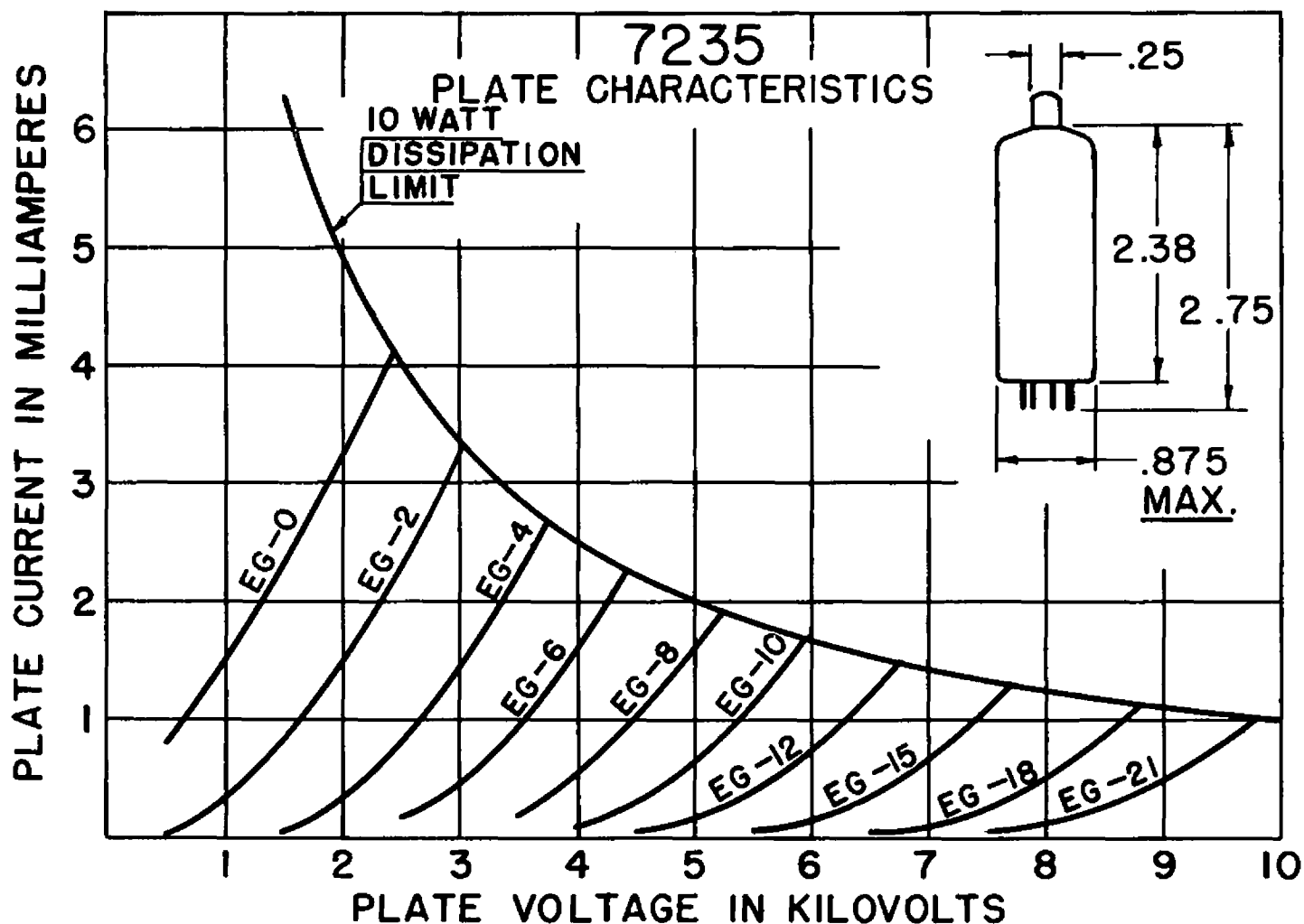
Bulb $T6\frac{1}{2}$
Base (9KE) 9 Pin
Maximum Length 2-3/4"
Seated Height 2-3/8"
Cap C1-3
Mounting Position Any

Base Connections:



Pin 1 Cathode
Pin 2 Heater
Pin 3 Cathode
Pin 4 Grid
Pin 5 NC
Pin 6 Cathode
Pin 7 Heater
Pin 8 Cathode
Pin 9 Grid
Top Cap Anode

Dec. 1958



TYPICAL OPERATION - SIMPLIFIED VOLTAGE REGULATOR

$E_{IN} \dots 5400 \text{ V}$
 $E_{OUT} \dots 4000 \text{ V}$
 $E_K \dots 210 \text{ V}$
 $E \dots 204 \text{ V}$
 $R \dots 500 \text{ K}$
 $R_1 \dots 4.7 \text{ MEG.}$
 $R_2 \dots 220 \text{ K}$
 $R_{VAR} \dots 100 \text{ K}$

